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SINUMERIK

SINUMERIK 808D Parameter Manual

Operating Instructions

Valid for:
SINUMERIK 808D Turning (software version: V4.4.2)
SINUMERIK 808D Milling (software version: V4.4.2)

Target group:
Project engineers, commissioning engineers, machine operators and service and maintenance personnel

12/2012
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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Preface

SINUMERIK 808D documentation

The SINUMERIK 808D documentation consists of the following components:

- Operating Instructions
  - Mechanical Installation Manual
  - Electrical Installation Manual
  - PLC Subroutines Manual
  - Function Manual
  - Parameter Manual
- Diagnostics Manual
- Commissioning Manual
- Programming and Operating Manual (Turning)
- Programming and Operating Manual (Milling)
- Manual Machine Plus (Turning)
- Online Help for Programming and Operating (Turning)
- Online Help for Programming and Operating (Milling)
- Online Help for Manual Machine Plus (Turning)

My Documentation Manager (MDM)

Under the following link you will find information to individually compile your documentation based on the Siemens content:

www.siemens.com/mdm

Target group

This manual is intended for use by project engineers, commissioning engineers, machine operators and service and maintenance personnel.

Benefits

This manual enables the intended target groups to find required parameter information of the SINUMERIK 808D control system.

Technical support

Hotline:	+86 400-810-4288
Service and Support	• China: www.siemens.com.cn/808D • Worldwide: http://support.automation.siemens.com

EC Declaration of Conformity

The EC Declaration of Conformity for the EMC Directive can be found on the Internet at http://support.automation.siemens.com

Here, enter the number **15257461** as the search term or contact your local Siemens office.

Licensing provisions

The SINUMERIK 808D software is protected by national and international copyright laws and agreements. Unauthorized reproduction and distribution of this software or parts thereof is liable to prosecution. It will be prosecuted both according to criminal and civil law and may result in severe penalties or claims for compensation.

In the SINUMERIK 808D, open source software is used. The licensing provisions for this software are included on the Toolbox DVD and are to be observed accordingly.

1 Explanation of machine data and setting data

1.1 Data in the list

The machine data and the setting data are listed in form of tables shown below:

MD number	Identifier			Display filter	Reference	
Units	Name			Data type	Activation	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	Class

Expanded table

The expanded table includes data from the standard table plus additional rows with system-specific values.

MD number	Identifier			Display filter	Reference	
Units	Name			Data type	Activation	
Attributes						
-	Dimension	Default value	Minimum value	Maximum value	Protection	
<System 1>	-	Default value	-	-	-/-	
<System 2>	-	-	-	-	-1/-	

A dash "-" in a field means that the same value as for <System 1> applies for the specified system.

The entry "-/-" in the "Protection" field means that the machine data is not available for the specified system.

Example:

10881	MM_EXTERN_GCODE_SYSTEM			N01, N12	FBF A	
-	ISO_3 Mode: GCodeSystem			DWORD	Power On	
-						
808d-te41	-	0	0	2	1/1	M
808d-me41	-	0	0	2	0/0	S

MD number and identifier

MD and SD are addressed via their numbers or their names (identifiers). The number and the name, as well as the activation type and the unit are displayed on the screen of the control system.

In the field "identifier", you can see the name of the data.

Cross reference

For a detailed description of the appropriate data, refer to the description of functions or manual/guide specified.

Attributes

The "Attributes" field contains additional attributes of the data:

Attribute	Meaning
NBUP	No Back UP: The data is not backed up as part of the data backup.
ODLD	Only DownLoaD: The data can only be written to via an INI file, archive, or from the part program.
NDLD	No DownLoaD: The data can only be written to via the HMI user interface.
SFCO	SaFety COnfiguration: Component of the "Safety Integrated" function
SCAL	SCaling ALarm: Scaling data; when changed, alarm 4070 is displayed
LINK	LINK description: The data describes a link cluster, component of the "NCU Link" function
CTEQ	ConTainer EQual: The data must be the same for all axes in an axis container, component of the "Axis container" function
CTDE	ConTainer DEscription: The data describes an axis container, component of the "Axis container" function

Unit/unit system

Depending on MD10240 SCALING_SYSTEM_IS_METRIC, the physical units of the machine data (MD) differ as follows:

MD10240 = 1	MD10240 = 0
mm	inch
mm/min	inch/min
m/s^2	$inch/s^2$
m/s^3	$inch/s^3$
mm/rev.	inch/rev.

If there are machine data with no physical unit assigned, a hyphen ("-") can be found in the relevant field.

Note

The default setting for MD10240 SCALING_SYSTEM_IS_MERIC is "1".

Dimension

The "Dimension" field contains the number of elements of a data field.

Activation

The control system has defined four activating conditions. Each machine has a corresponding activating condition:

- **PO**: **P**ower **O**n (activate by powering on)
- **RE**: **Re**set (activate by pressing **RESET** key)
- **CF**: **C**on**f**ig (activate by pressing vertical softkey "**Activate**")
- **IM**: **Im**mediate (activate immediately after your change)

Display filter

The "Display filter" field contains the identifier of the data filter setting that enables the data to be seen. Using the filter setting, the exact data areas required at a given time can be selected for display.

ID	Data area
EXP	Expert mode
General machine data	
N01	Configuration/scaling
N02	Memory configuration
N03	PLC machine data
N04	Drive control
N05	Status data/diagnostics
N06	Monitoring/limiting functions
N07	Auxiliary functions
N08	Corrections/compensations
N09	Technological functions
N10	I/O configuration
N11	Standard machine
A12	NC language, ISO dialect
Channel machine data	
C01	Configuration
C02	Memory configuration
C03	Initial states
C04	Auxiliary functions
C05	Velocities
C06	Monitoring/limiting functions
C07	Transformations
C08	Corrections/compensations
C09	Technological functions
C10	Standard machine
C11	NC language, ISO dialect

ID	Data area
Axis machine data	
A01	Configuration (including memory)
A02	Measuring system
A03	Machine geometry
A04	Velocities / accelerations
A05	Monitoring/limiting functions
A06	Spindle
A07	Controller data
A08	Status data
A09	Corrections/compensations
A10	Technological functions
A11	Standard machine
A12	NC language, ISO dialect

Data type

In the "Data type" field, the short designators indicate the data types. They have the following meanings:

Designator	Meaning
BOOLEAN	Boolean value • 1: TURE • 0: FALSE
BYTE	I8-bit value • As an INTEGER value: -128 to 127 • As a hexadecimal value: 00 to FF • As a character as per ASCII character set, e.g. "a"
STRING	Sequence of characters (max. 16)
WORD	16-bit value • As an INTEGER value: 0 to 65,535 • As a hexadecimal value: 0000 to FFFF
UNSIGNED WORD	I16-bit value • As an INTEGRER value: 0 to 65,535 • As a hexadecimal value: 0000 to FFFF
INTEGER	I16-bit value (here defined locally) • INTEGER value: -32,768 to 32767
DWORD	32-bit value • As an INTEGER value: -2,147,483,648 to 2,147,483,647 • As a hexadecimal value: 0000 0000 to FFFF
UNSIGNED DWORD	I32-bit value • As an INTEGER value: 0 to 4,294,967,295 • As a hexadecimal value: 0000 0000 to FFFF FFFF

Designator	Meaning
DOUBLE	64-bit value • Floating point value: ±4.19 x 10^{-307} to ±1.57 x 10^{308}
FLOAT DWORD	Real value: ±7.43 x 10^{-37} to 3.37 x 10^{38}
UBYTE	Integer value: 0 to 255
LONG	Integer value: 4,294,967,296 to 4,294,967,295

System

Specifies the control system for which the data with the entered values applies.

By default, the entered values apply for both the SINUMERIK 808D Turning and SINUEMRIK 808D Milling.

If no "default" entry exists, the data only apply for the control variants specified:

808d-te41	SINUMERIK 808D Turning
808d-me41	SINUMERIK 808D Milling

Default values

Specifies a default value fort he machine data. If the default values for the channels are different, they are separated with a comma ",".

Range of values (minimum/maximum value)

Specifies the limits for the entered values. If no range of value is specified, the data type determines the input limits, and the field is marked with a dash "-".

Protection

The SINUMERIK 808D provides a concept of access levels for enabling data areas. The access levels correspond with protection levels **0** to **7** (**0**: the highest level; **7**: the lowest level). You can view such information from the table shown as below:

Protection level	Access level	Default password	Target group
0	Siemens	-	Reserved for Siemens
1	Manufacturer	SUNRISE	OEMs
2	Reserved		
3	Customer	CUSTOMER	End users
4	-	Key-operated switch setting 3	End user
5	-	Key-operated switch setting 2	End user
6	-	Key-operated switch setting 1	End user
7	No password	-	-

For the function areas listed below, the input and modification of data depends on the protection level you have set:

- Tool offsets
- Work offsets
- Setting data
- RS232 settings
- Program creation / program correction

You can set the protection levels for these function areas via the display machine data (USER_CLASS...): "SYSTEM" operating area > "Machine data" > "Expert list" > "Display MD".

Note

For detailed information about how to set the access levels, refer to *Programming and Operating Manual*.

Protection levels: 1, 3

Both of the two access levels require a password.

You can change the password only after an activation with the protection level 1.

If you forget your password, you can carry out a start-up: "SYSTEM" operating area > "Start-up" > "NC start-up" > "Power-up with default data". This will reset all passwords to their defaults according to the software release you have acquired.

Note

Before performing a start-up with default data, you must backup your data; otherwise, you will have your data lost.

Protection level: 7

If you have deleted your password or do not set a password, you only have the access right of viewing above-mentioned function areas.

Note

The system by default has no password.

1.2 Overview of the data

Machine and setting data (SINUMERIK)

The machine and setting data are divided into the following areas:

Range	Designation
from 200 to 1200	Displaying machine data
from 10000 to 18999	General NC machine data
from 19000 to 19999	Reserved
from 20000 to 28999	Channel-specific machine data
from 29000 to 29999	Reserved
from 30000 to 38999	Axis-specific machine data
from 39000 to 39999	Reserved
from 41000 to 41999	General setting data
from 42000 to 42999	Channel-specific setting data
from 43000 to 43999	Axis-specific setting data
from 51000 to 51299	General configuration machine data
from 51300 to 51999	General cycle machine data
from 52000 to 52299	Channel-specific configuration machine data
from 52300 to 52999	Channel-specific cycle machine data
from 53000 to 53299	Axis-specific configuration machine data
from 53300 to 53999	Axis-specific cycle machine data

Data Identifiers

The identifier specified in the data description is displayed on the HMI user interface; however, if the data is addressed in the parts program, for example, the identifier of the relevant data area must precede the data identifier (designator).

Identifier	Data area
$MM_	Displaying machine data
$MN_/ $SN_ $MNS_/ $SNS_	General machine/setting data
$MC_/ $SC_ $MCS_/ $SCS_	Channel-specific machine/setting data
$MA_/ $SA_ $MAS_/ $SAS_	Axis-specific machine/setting data

Characters	Meanings
$	System variables
M	Machine data (first letter)
S	Setting data (first letter)
M, N, C, A, D	Subarea (second letter)
S	Siemens data (third letter)

Note

Axis-specific data can also be addressed with the axis name as an index. The internal axis identifier (AX1, AX2, AX3, etc.) or the identifier specified in MD10000 $MA_AX_CONF_NAME_TAB can be used as the axis name.

Example: $MA_JOG_VELO[Y1]=2000

The JOG velocity of axis Y1 is 2000 mm/min.

If the content of a machine data is a STRING (e.g., X1) or a hexadecimal value (e.g., H41), the content must be enclosed in single quotation marks (e.g., 'X1' or 'H41').

Example: $MA_FIX_POINT_POS[0,X1]=500.000

The value 500 is assigned to the first fixed point position on axis 1.

Examples:

$MN_AUXFU_GROUP_SPEC[2]='H41'

Output instant in time of the auxiliary functions of the 3rd auxiliary function group.

$MN_AXCONF_MACHAX_NAME_TAB[0]='X1'
String "X1" is assigned as name for the first machine axis.

$MA_REFP_SET_POS[0,X1]=100.00000

A value of 100 mm is assigned to the first reference point of axis X1.

Examples:

Assignment to channel-specific machine data:

```
CHANDATA(1)                              ; Selection of the first channel
$MC_CHAN_NAME='CHAN1'                    ; Name of the first channel
$MC_AXCONF_GEOAX_NAME_TAB[1]='Y'         ; Name of the 2nd geometry axis
                                         ; of the first channel 'Y'
R10=33.75                                ; R10 of the first channel
```

Machine data

2

2.1 Display machine data

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	

Description: Description

1092	MAX_SPINDEL_SPEED_MANUAL_MA			-	-	
-	Input limit spindle speed MM+			DOUBLE	Immediately	
-						
-	-	99999.00000	0	99999.00000	2/2	

Description: Input limit spindle speed MM+

1093	MAX_SPEED_G96_MANUAL_MA			-	-	
-	Input limit cutting meter MM+			DOUBLE	Immediately	
-						
-	-	99999.00000	0	99999.00000	2/2	

Description: Input limit cutting meter MM+

1094	MAX_FEEDRATE_G94_MANUAL_MA			-	-	
-	Input limit time feed MM+			DOUBLE	Immediately	
-						
-	-	99999.00000	0	99999.00000	2/2	

Description: Input limit time feed MM+

1095	MAX_FEEDRATE_G95_MANUAL_MA			-	-	
-	Input limit rotation feed MM+			DOUBLE	Immediately	
-						
-	-	99999.00000	0	99999.00000	2/2	

Description: Input limit rotation feed MM+

1096	MAX_NUM_CYCLE_MANUAL_MA			-	-	
-	Number of managed masks per cycle in manual mode of MM+			DWORD	Immediately	
-						
-	-	9	1	9	3/3	

Description: Number of managed masks per cycle in manual mode of MM+

1097	MAX_NUM_CUTT_EDGES_MANUAL_MA			-	-	
-	Number of managed cutting edges in MM+			DWORD	Immediately	
-						
-	-	9	1	9	3/3	

Description: Number of managed cutting edges in MM+

1098	INVERT_SPIN_ICON_MANUAL_MA			-	-	
-	The direction of spindle rotation is displayed inverted.			BOOLEAN	Immediately	
-						
-	-	1	0	1	3/2	

Description: The direction of spindle rotation is displayed inverted.

1099	USE_FIXPOINT_MANUAL_MA			-	-	
-	Tool change step MM+			BOOLEAN	Immediately	
-						
-	-	1	0	1	3/3	

Description: Tool change increment MM+:

The selection field for fixed-point approach is selected or deselected by default

1100	MEAS_SPIN_ACTIV_MANUAL_MA			-	-	
-	Measuring the tool offset data in the X direction with spindle rotating			BOOLEAN	Immediately	
-						
-	-	1	0	1	3/2	

Description: If the value is 1, the tool offset data can be measured in the X direction with rotating spindle.

1101	USER_TOOL_CHG_MANUAL_MA			-	-	
-	Tool change step MM+			BOOLEAN	Immediately	
-						
-	-	1	0	1	3/3	

Description: Tool change increment MM+:

If the value is 1, input of a tool or cutting edge number is permissible.

1102	CYC_TOOLNO_EDTMOD_MANUAL_MA			-	-	
-	Input mode T number in the cycle masks MM+			BOOLEAN	Immediately	
-						
-	-	1	0	1	3/3	

Description: Input mode T no. in the cycle masks MM+:

0: No T no. input by the operator. T no. is automatically created from SGUD.

>=1: T no. input by the operator

1103	TAPPINGCYCLE_MODE_MANUAL_MA			-	-	
-	Preselection cycle type for tapping MM+			BOOLEAN	Immediately	
-						
-	-	1	0	1	3/3	

Description: Preselection of cycle type on tapping MM+:

	With compensating chuck	without compensating chuck
0	CYCLE840	CYCLE840
1	CYCLE840	CYCLE84
>=2	CYCLE840	not possible

1104	TOOL_CHG_MANUALMODE_MA			-	-	
-	Release of tool change in the JOG function of MM+			BOOLEAN	Immediately	
-						
-	-	1	0	1	3/3	

Description: Tool change enable in the JOG function of the MM+

1105	STARTUP_WITH_MMP			-	-	
-	Automatic start-up of MM+ after power ON			BOOLEAN	PowerOn	
-						
-	-	1	0	1	3/3	

Description: Automatic start of MM+ after power ON

1106	SOFTKEY_CENTRE_ADJ			-	-	
-	Text on softkeys being adjusted			BOOLEAN	PowerOn	
-						
-	-	1	0	1	3/3	

Description: Text on the softkeys is justified

1110	ENABLE_LADDER_DB_ADDRESSES			-	-	
-	DB display in the PLC ladder viewer			BOOLEAN	Immediately	
-						
-	-	1	0	1	7/2	

Description: DB display in the PLC ladder viewer

0 - VB display of the PLC signals

1 - DB display of the PLC signals

1111	ENABLE_LADDER_EDITOR			-	-	
-	Switching the PLC ladder editor on/off			BOOLEAN	Immediately	
-						
-	-	1	0	1	7/2	

Description: Switching the PLC ladder editor on/off

0 - No editing functionality for PLC programs

1 - Switching on editing functionality for PLC programs

203	DISPLAY_RESOLUTION			-	-	
-	Display resolution for mm system of measurement			BYTE	Immediately	
-						
-	0	3	0	5	3/2	

Description: This MD is used to define the number of decimal places of the position display, for linear axes in metric systems, in general for rotary axes.

Spindle positions are treated like rotary axis positions.

The position display is displayed with a max. of 10 characters including signs and decimal places. A positive sign is not displayed.

By default 3 digits are displayed after the decimal point.

MD value=3: display resolution = 10-3 [mm] or [degree],

Related to:

MD 10200: INT_INCR_PER_MM bzw. MD 10210: INT_INCR_PER_DEG

204	DISPLAY_RESOLUTION_INCH			-	-
-	Display resolution for inch system of measurement			BYTE	Immediately
-					
-	0	4	0	5	3/2

Description: This MD is used to define the number of decimal places of the position display for linear axes in the inch system of measurement.

The position display is displayed with a max. of 10 characters including signs and decimal places. A positive sign is not displayed.

By default 4 digits are displayed after the decimal point.

MD value=4: display resolution = 10-4 [mm]

For rotary axes and spindle positions the display is maintained as in MD 203.

Related to:

MD 10200: INT_INCR_PER_MM, MD 203: DISPLAY_RESOLUTION

205	DISPLAY_RESOLUTION_SPINDLE			-	-
-	Display resolution for spindle values			BYTE	Immediately
-					
-	0	1	0	5	3/2

Description: This MD is used to define the number of decimal places for spindle speed display.

The values are displayed with a max. of 10 characters including sign and decimal point. A positive sign is not displayed.

By default 1 digit is displayed after the decimal point.

MD value=1: display resolution = 10-1

207	USER_CLASS_READ_TOA			-	-
-	Read tool offsets protection level, general			BYTE	Immediately
-					
-	0	7	0	7	3/3

Description: Protection level of the tool offsets, general

208	USER_CLASS_WRITE_TOA_GEO			-	-
-	Write tool geometry protection level			BYTE	Immediately
-					
-	0	7	0	7	3/3

Description: Protection level for tool offsets (geometry) for writing

209	USER_CLASS_WRITE_TOA_WEAR			-	-
-	Write tool wear data protection level			BYTE	Immediately
-					
-	0	7	0	7	3/3

Description: Protection level of tool offsets (wear) for writing

210	USER_CLASS_WRITE_ZOA			-	-
-	Write settable work offset protection level			BYTE	Immediately
-					
-	0	7	0	7	3/3

Description: Protection level Settable work offset for writing

212	USER_CLASS_WRITE_SEA			-	-	
-	Protection level write setting data			BYTE	Immediately	
-						
-	0	7	0	7	3/3	

Description: `Protection level Setting data for writing`

213	USER_CLASS_READ_PROGRAM			-	-	
-	Read protection level of part program			BYTE	Immediately	
-						
-	0	7	0	7	3/3	

Description: `Read protection level of part program`

214	USER_CLASS_WRITE_PROGRAM			-	-	
-	Enter part program protection level			BYTE	Immediately	
-						
-	0	7	0	7	3/3	

Description: `Enter part program protection level`

215	USER_CLASS_SELECT_PROGRAM			-	-	
-	Program selection protection level			BYTE	Immediately	
-						
-	0	7	0	7	3/3	

Description: `Protection level program selection`

218	USER_CLASS_WRITE_RPA			-	-	
-	Protection level write R variables			BYTE	Immediately	
-						
-	0	7	0	7	3/3	

Description: `Protection level write R variables`

219	USER_CLASS_SET_V24			-	-	
-	Set RS-232 protection level			BYTE	Immediately	
-						
-	0	7	0	7	3/3	

Description: `Protection level Change parameters for RS-232 interface`

221	USER_CLASS_DIR_ACCESS			-	-	
-	Directory access protection level			BYTE	Immediately	
-						
-	0	7	0	7	3/3	

Description: `Directory access protection level`

222	USER_CLASS_PLC_ACCESS			-	-	
-	PLC project protection level			BYTE	Immediately	
-						
-	0	7	0	7	2/2	

Description: `PLC project protection level`

223	USER_CLASS_WRITE_PWA		-	-	
-	Protected work area protection level		BYTE	Immediately	
-					
-	0	7	0	7	3/2	

Description: Protected work area protection level

247	V24_PG_PC_BAUD		-	-	
-	PG: baud rate (300, 600, 1200, 2400, 4800, 9600, 19200, 38400)		BYTE	Immediately	
-					
-	0	7	5	9	3/3	

Description: PG: baud rate (300, 600, 1200, 2400, 4800, 9600, 19200, 38400)

280	V24_PPI_ADDR_PLC		-	-	
-	PLC station address		BYTE	PowerOn	
-					
-	-	2	0	126	3/3	

Description: PLC station address

281	V24_PPI_ADDR_NCK		-	-	
-	NCK station address		BYTE	PowerOn	
-					
-	-	3	0	126	3/3	

Description: NCK station address

289	CTM_SIMULATION_TIME_NEW_POS		-	-	
-	Simulation of actual value update rate		BOOLEAN	Immediately	
-					
-	0	100	0	4000	4/3	

Description: Use this MD to define the time intervals in which the simulation graphic is updated on the current machine tool machining.

Value = 0 means no update

290	CTM_POS_COORDINATE_SYSTEM		-	-	
-	Coordinate system position		BYTE	Immediately	
-					
-	0	2	0	7	4/3	

Description: The position of the coordinate system can be changed as follows:

291	CTM_CROSS_AX_DIAMETER_ON			-	-	
-	Diameter display active for transv. axes			BYTE	Immediately	
-						
-	0	1	0	1	4/3	

Description:
```
0:   Input of absolute values as radius value
Work offsets always in radius
Tool lengths always in radius
Tool wear always in radius
1:   Position display in diameter
Distance to go in diameter
Absolute paths in diameter
```

292	CTM_G91_DIAMETER_ON			-	-	
-	Incremental infeed			BYTE	Immediately	
-						
-	0	1	0	1	7/3	

Description:
```
0:   Input in radius
1:   Input in diameter
```

305	G_GROUP1			-	-	
-	User-oriented G group for position display			BOOLEAN	Immediately	
-						
-	0	1	1	1000	7/3	

Description: `User-oriented G group for position display`

306	G_GROUP2			-	-	
-	User-oriented G group for position display			BOOLEAN	Immediately	
-						
-	0	2	1	1000	7/3	

Description: `User-oriented G group for position display`

307	G_GROUP3			-	-	
-	User-oriented G group for position display			BOOLEAN	Immediately	
-						
-	0	8	1	1000	7/3	

Description: `User-oriented G group for position display`

308	G_GROUP4			-	-	
-	User-oriented G group for position display			BOOLEAN	Immediately	
-						
-	0	9	1	1000	7/3	

Description: `User-oriented G group for position display`

309	G_GROUP5			-	-	
-	User-oriented G group for position display			BOOLEAN	Immediately	
-						
-	0	10	1	1000	7/3	

Description: `User-oriented G group for position display`

310	FG_GROUP1			-	-	
-	User-oriented G group for position display (external language)			BOOLEAN	Immediately	
-						
-	0	1	1	1000	7/3	

Description: User-oriented G group for position display (ext. language)

311	FG_GROUP2			-	-	
-	User-oriented G group for position display (external language)			BOOLEAN	Immediately	
-						
-	0	2	1	1000	7/3	

Description: User-oriented G group for position display (ext. language)

312	FG_GROUP3			-	-	
-	User-oriented G group for position display (external language)			BOOLEAN	Immediately	
-						
-	0	8	1	1000	7/3	

Description: User-oriented G group for position display (ext. language)

313	FG_GROUP4			-	-	
-	User-oriented G group for position display (external language)			BOOLEAN	Immediately	
-						
-	0	9	1	1000	7/3	

Description: User-oriented G group for position display (ext. language)

314	FG_GROUP5			-	-	
-	User-oriented G group for position display (external language)			BOOLEAN	Immediately	
-						
-	0	19	1	1000	7/3	

Description: User-oriented G group for position display (ext. language)

330	CMM_POS_COORDINATE_SYSTEM			-	-	
-	Coordinate position of the machine axis			BYTE	Immediately	
-						
-	0	0	0	7	7/3	

Description: Coordinate position of the machine

361	USER_MEAS_TOOL_CHANGE			-	-	
-	Input enable for T/D no. in tool measuring window			BYTE	Immediately	
-						
-	-	0	0	1	3/3	

Description: 0: Input of T/D no. disabled
1: Input of T/D no. enabled

369	PROBE_MODE			-	-	
-	Type of measuring system: 1: probe, 2: opt. measuring procedure			BOOLEAN	Immediately	
-						
-	-	1	0	2	3/3	

Description: Type of measuring system: 1: probe, 2: opt. measuring procedure

370	TOOL_REF_PROBE_AXIS1			-	-	
-	Absolute position probe X			DOUBLE	Immediately	
-						
-	-	0	-999999.999	999999.999	2/2	

Description: Absolute position probe X

371	TOOL_REF_PROBE_AXIS2			-	-	
-	Absolute position probe Y			DOUBLE	Immediately	
-						
-	-	0	-999999.999	999999.999	2/2	

Description: Absolute position probe Y

372	TOOL_REF_PROBE_AXIS3			-	-	
-	Absolute position probe Z			DOUBLE	Immediately	
-						
-	-	9	-999999.999	999999.999	2/2	

Description: Absolute position probe Z

374	TOOL_WEAR_LIMIT_VALUE			-	-	
-	Limit value wear control on input			DOUBLE	Immediately	
-						
-	-	9.999	0	9.999	2/2	

Description: Limit value wear control on input

376	USER_CLASS_WRITE_CUS_DIR			-	-	
-	Write user cycles protection level			BYTE	Immediately	
-						
-	0	7	0	7	3/3	

Description: Protection level User cycles for writing

377	USER_CLASS_WRITE_TO_MON_DAT			-	-	
-	Tool monitoring protection level			BYTE	Immediately	
-						
-	0	7	0	7	3/2	

Description: Tool monitoring protection level

378	USER_CLASS_LADDER_VIEW			-	-	
-	Select User Ladder View protection level			BYTE	Immediately	
-						
-	0	2	0	7	2/2	

Description: Select User Ladder View protection level

379	SPINDLE_DISP_MODE			-	-	
-	Spindle display mode			BYTE	Immediately	
-						
-	0	0	0	2	3/3	

Description: 0: Standard Mode; spindle speed display
1: Constant cutting speed display when G96 is set
2: Mixed display

383	V24_PPI_ADDR_DRV1			-	-	
-	Station address Drives			BYTE	PowerOn	
-						
-	0	5	0	126	3/3	

Description: Station address Drives

386	USER_CLASS_WRITE_CMA_DIR			-	-	
-	Defines the access level for the CMA directory in the NCK			BYTE	Immediately	
-						
-	-	7	1	7	2/2	

Description: Defines the access level for the CMA directory in the NCK

391	DISPLAY_MODE_INDEXING_AXIS			-	-	
-	Defines the display format of an indexing axis			DWORD	Immediately	
-						
-	-	0	0	1	7/2	

Description: Defines the display format of an indexing axis.
0 = indexing position;
1 = type-spec. actual value

392	USER_CLASS_WRITE_LOC_NO			-	-	
-	Access rights for writing the location number in the tool list			BYTE	Immediately	
-						
-	-	7	0	7	3/2	

Description: Defines the access authorization for writing the location number in the tool list

9000	SCREEN_SAVER_WAIT_TIME			-	-	
s	The time wait for switch to screen save.			DWORD	PowerOn	
-						
-	-	3600	0	3600	1/1	

Description: The time wait for switch to screen save.

9001	TIME_BETWEEN_SLIDES			-	-	
s	The time between slides show			DWORD	Immediately	
-						
-	-	10	5	60	1/1	

Description: The time between slides show

2.2 General machine data

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	

Description: Description

10000	AXCONF_MACHAX_NAME_TAB			N01, N11	K2,F1,G2,F2,K5,M1	
-	Machine axis name			STRING	PowerOn	
-						
-	31	X1, Y1, Z1, A1, B1, C1, U1...	-	-	7/2	

Description: List of the machine axis identifiers.

The name of the machine axis is entered in this MD.

In addition to the fixed, defined machine axis identifiers "AX1", "AX2" ..., user-defined identifiers for the machine axes can also be assigned in this data.

The identifiers defined here can be used parallel to the fixed, defined identifiers for addressing axial data (e.g. MD) and machine axis-related NC functions (reference point approach, axial measurement, travel to fixed stop).

Special cases:

- The input machine axis name must not conflict with the names and assignments of the geometry axes (MD20060 $MC_AXCONF_GEOAX_NAME_TAB, MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB) or channel axes (MD20080 $MC_AXCONF_CHANAX_NAME_TAB, MD20070 $MC_AXCONF_MACHAX_USED).
- The input machine axis name must not be the same as the names for Euler angles (MD10620 $MN_EULER_ANGLE_NAME_TAB), names for path-relevant orientation (MMD10624 $MN_ORIPATH_LIFT_VECTOR_TAB), names for normal vectors (MD10630 $MN_NORMAL_VECTOR_NAME_TAB), names for directional vectors (MD10640 $MN_DIR_VECTOR_NAME_TAB), names for rotation vectors (MD10642 $MN_ROT_VECTOR_NAME_TAB), names for intermediate vector components (MD10644 $MN_INTER_VECTOR_NAME_TAB), names for intermediate circle point coordinates with CIP (MD10660 $MN_INTERMEDIATE_POINT_NAME_TAB) or the names for interpolation parameters (MD10650 $MN_IPO_PARAM_NAME_TAB).
- The input machine axis name must not include any of the following reserved address letters:

D Tool offset	(D function)	E Reserved
F Feedrate	(F function)	G Preparatory function
H Auxiliary function	(H function)	L Subroutine call
M Miscellaneous function	(M function)	N Subblock
P Subroutine number of passes		R Arithmetic parameters
S Spindle speed	(S function)	T Tool (T function)

The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined identifiers (e.g. ASPLINE, SOFT).

The use of an axis identifier consisting of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z), followed by an optional numerical extension (1-99) gives slightly better block cycle times than a general identifier.

If no identifier is assigned to a machine axis, then the predefined name ("AXn") applies to the nth machine axis.

Related to:

MD20060 $MC_AXCONF_GEOAX_NAME_TAB (geometry axis name in the channel [GEOAxisno.]

MD20080 $MC_AXCONF_CHANAX_NAME_TAB (channel axis name in the channel [Chanelaxisno.]

10010	ASSIGN_CHAN_TO_MODE_GROUP			N01, N02, N11	K1,K5	
-	Channel valid in mode group			DWORD	PowerOn	
-						
-	10	1, 0, 0, 0, 0, 0, 0, 0...	0	10	7/2	

Description:

```
This MD assigns the channel to a mode group
Entry value 1 => Assigned to 1st mode group
Entry value 2 => Assigned to 2nd mode group
etc.
From software version 4, it is permissible not to assign a mode group number
to individual channels.
Channel gaps are allowed, in order to favor uniform configuration in similar
types of machines. In this case, the number 0 is assigned to the channel
instead of assigning a mode group number equal to or greater than 1. The
channel is not activated, however it is handled like an active channel when
counting the channels.
E.g.
ASSIGN_CHAN_TO_MODE_GROUP[0] = 1
ASSIGN_CHAN_TO_MODE_GROUP[1] = 1
ASSIGN_CHAN_TO_MODE_GROUP[2] = 0   ; gap
ASSIGN_CHAN_TO_MODE_GROUP[3] = 1
Application example:
Select desired channel via HMI and enter with MD10010
$MN_ASSIGN_CHAN_TO_MODE_GROUP = 1.
Note:
This MD must still be entered even when only one mode group is present.
```

10050	SYSCLOCK_CYCLE_TIME			N01, N05, N11, -	G3,G2,R1	
s	System clock cycle			DOUBLE	PowerOn	
SFCO						
-	-	0.004	0.000125	0.031	7/2	

Description:

Basic cycle time of the system software

The cycle times settings of cyclical tasks (position controller/IPO) are multiples of this basic cycle. Apart from special applications in which MD10060 $MN_POSCTRL_SYSCLOCK_TIME_RATIO is set greater than 1, the basic cycle corresponds to the position controller cycle.

Note:

Reducing this MD can result in an automatic correction of MD10062 $MN_POSCTRL_CYCLE_DELAY and MD10064 $MN_POSCTRL_CYCLE_DESVAL_DELAY that cannot be undone by a subsequent increase!

Details:

The basic cycle is incremented in multiples (MD10080 $MN_SYSCLOCK_SAMPL_TIME_RATIO) of units of the measured value sampling cycle. During system startup, the entered value is automatically rounded up to a multiple of this incrementation.

Note:

Discrete timer division ratios can give rise to the entered value producing a value that is not an integer after a Power OFF/ON.

For example:

Input	= 0.005s
	after Power OFF/ON =0.00499840
or	
Input	= 0.006s
	after Power OFF/ON =0.0060032

10060	POSCTRL_SYSCLOCK_TIME_RATIO			N01, N05	G3	
-	Factor for position control cycle			DWORD	PowerOn	
SFCO						
-	-	1	1	31	7/2	

Description:

The position-control cycle is stated as a multiple of the time units of the system basic cycle MD10050 $MN_SYSCLOCK_CYCLE_TIME.

The regular setting is 1. The position-control cycle then corresponds to the system basic cycle MD10050 $MN_SYSCLOCK_CYCLE_TIME.

Setting values > 1 costs computing time for the operating system to calculate the additional timer interrupts, and should therefore only be used in those cases in which there is a task in the system that is to run faster than the position-control cycle.

10061	POSCTRL_CYCLE_TIME			N01, N05	G3	
-	Position control cycle			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	ReadOnly	

Description:

Position controller cycle time:

Display of the position controller cycle time (not modifiable !).

It is compiled internally from MD10050 $MN_SYSCLOCK_CYCLE_TIME and MD10060 $MN_POSCTRL_SYSCLOCK_TIME_RATIO.

10070	IPO_SYSCLOCK_TIME_RATIO			N01, N05, N11, -	G3,R1	
-	Factor for interpolation cycle			DWORD	PowerOn	
SFCO						
-	-	4	1	100	7/2	

Description: The interpolator cycle is stated as a multiple of the time units of the system basic cycle MD10050 $MN_SYSCLOCK_CYCLE_TIME.

Only integer multiples of the position control cycle can be set (set in MD10060 $MN_POSCTRL_SYSCLOCK_TIME_RATIO). Values that are not an integer multiple of the position control cycle are automatically increased to the next integer multiple of the position control cycle before they become active (on next power up).

This is accompanied by alarm 4110 "IPO cycle changed to [ ] ms".

10071	IPO_CYCLE_TIME			N01, N05, N11, -	G3	
-	Interpolator cycle			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	ReadOnly	

Description: Interpolation time

Display of the interpolator cycle time (not modifiable !).

It is compiled internally from MD10050 $MN_SYSCLOCK_CYCLE_TIME and MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO.

10075	PLC_CYCLE_TIME			N01, N05	-	
-	PLC cycle time			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	ReadOnly	

Description: Display of the PLC cycle time (not modifiable !)

It is compiled internally from MD10071 $MN_IPO_CYCLE_TIME and MD10074 $MN_PLC_IPO_TIME_RATIO.

10088	REBOOT_DELAY_TIME			EXP	K3	
s	Reboot delay			DOUBLE	Immediately	
-						
-	-	0.2	0.0	1.0	2/2	

Description: The reboot following PI "_N_IBN_SS" is delayed by the time MD10088 $MN_REBOOT_DELAY_TIME.

The suppressable NOREADY alarm 2900 is triggered immediately by PI "_N_IBN_SS".

If MD10088 $MN_REBOOT_DELAY_TIME falls below the MD36620 $MA_SERVO_DISABLE_DELAY_TIME value of an axis, the axis is decelerated during MD10088 $MN_REBOOT_DELAY_TIME. The servo enable is then disabled. That is, the full MD36620 $MA_SERVO_DISABLE_DELAY_TIME is NOT waited.

Alarm 2900 does not become active if MD10088 $MN_REBOOT_DELAY_TIME = 0.0, and there is no reboot delay.

The NCK waits beyond the stated delay time until the PI has been able to be acknowledged to the HMI. The total delay time may be as much as 2 s.

10100	PLC_CYCLIC_TIMEOUT			EXP, N01, N06	P3	
s	Maximum PLC cycle time			DOUBLE	PowerOn	
-						
-	-	0.1	-	-	7/2	

Description: Cyclical PLC monitoring time.

This machine data specifies the maximum monitoring time after which the PLC must have incremented its sign of life. Incrementing takes place within the interpolation cycles.

10110	PLC_CYCLE_TIME_AVERAGE			N01, N07	B1	
s	Average PLC acknowledgement time			DOUBLE	PowerOn	
-						
-	-	0.05	-	-	7/2	

Description: Time information for the CNC about the OB1 cycle time. During this cycle time, it is guaranteed that the auxiliary functions will be acknowledged.

By means of the MD, the status transitions:

"channel operates/ channel in RESET/ channel failure --> channel interrupted" can be delayed for the PLC in case of a RESET. With the output "channel interrupted", the NCK waits at least the time indicated in the MD + 1 IPO cycle.

With the time indication, the path feedrate during path control operation in case of an auxiliary function output during motion is controlled in a way to ensure that the minimum travel time corresponds to the time information. This ensures a uniform velocity behavior which is not disturbed by waiting for the PLC acknowledgement. The internal incrementation is performed in the interpolation cycle.

For the auxiliary function output in the continuous-path mode, the MD is also relevant for the FM357 and 802/802s systems. With SW 5.1 and higher, the other systems are parameterized directly via the PLC.

10120	PLC_RUNNINGUP_TIMEOUT			EXP, N01, N06	H2	
s	Monitoring time for PLC power up			DOUBLE	PowerOn	
-						
-	-	50.0	-	-	7/2	

Description: Power up PLC monitoring time

This machine data specifies the maximum monitoring time within which the PLC must report its first sign of life to the NCK. During the power up routine, the monitoring function has the task of verifying that the PLC has properly assumed cyclic operation. If the PLC does not issue a message within this time, the NC issues an alarm message when it powers up; NC-READY is not set. The incrementing takes place within the interpolation cycles.

10131	SUPPRESS_SCREEN_REFRESH			EXP	A2	
-	Screen refresh response under overload			BYTE	PowerOn	
-						
-	-	0	0	2	7/2	

Description: There are part programs in which the main run (HL) has to wait until the pre-processing (VL) makes new blocks available.

The pre-processing and display update compete for NC computing time. The MD defines how the NC is to respond when the pre-processing is too slow.

0: When the VL of a channel is too slow, the updating of the display is suppressed in all channels.

1: When the VL of a channel is too slow, the updating of the display is suppressed only in the time-critical channels in order to gain time for the pre-processing.

2: The updating of the display is never suppressed.

10134	MM_NUM_MMC_UNITS			EXP, N01, N02	B3	
-	Possible number of simultaneous HMI communication partners			DWORD	PowerOn	
-						
-	-	6	1	10	2/2	

Description: Possible number of simultaneous HMI communication partners with which the NCU can exchange data.

This value affects then number of communication orders that the NCK can manage. The higher the value, the more HMIs that can be simultaneously connected to the NCK without leading to communication problems.

DRAM is made available for this function in the NCU corresponding to the input in the machine data. The inputs for changing the memory areas have to be taken into account.

The unit of MD10134 $MN_MM_NUM_MMC_UNITS is a "resource unit".

A standard HMI needs 1 resource unit, an HMI100/103 needs 2. OEM variants may need more or less resources.

- If the value is set lower than would be needed for the number of connected HMIs, this is not inevitably problematical. Actions may not function sporadically during multiple, simultaneous, communication-intensive operations (e.g. loading a program): Alarm 5000 is displayed. The operation then has to be repeated.
- If the value is et higher, more dynamic memory is occupied than necessary. The value should be reduced appropriately if the memory is required for other purposes.

References: /FB/, S7, "Memory Configuration"

10136	DISPLAY_MODE_POSITION			N01	-	
-	Display mode for actual position in the WCS			DWORD	Reset	
-						
-	-	0	0	1	7/1	

Description: Defines how the position and the distance to go are displayed in the WCS.

0: Display as in software version 5 and earlier

1: At end of block, the actual value display is in principle the same as the programmed end point, irrespective of where the machine actually is (e.g. as a result of the tool radius compensation). The distance to go is the same as the actual distance to be traversed. This means that the displayed actual postion has to be the same as the displayed end position minus the distance to go, irrespective of the actual machine position. If the block end points are changed by chamfers, radii, contour definitions, splines or SAR in comparison to the NC programm, then these changes are reflected in the display as if thay had been programmed. This does not apply to changes resulting from tool radius compensation or smoothing.

10160	PREP_COM_TASK_CYCLE_RATIO			EXP, N01	ECO	
-	Factor for communication with HMI			DWORD	PowerOn	
-						
-	-	3	1	50	7/1	

Description: This machine data specifies the division ratio used for activating the communication task in the non-cyclic time level. This allows the time share of preparation in the non-cyclic time level to be increased, which reduces block cycle times. External communication (file transfer) is slowed down in particular during program execution (block reload).

10174	TIME_LIMIT_PLCINT_TASK_DIAG			EXP, N01, N05	-	
s	Runtimes of the servosynch. task of software PLC2xx with timeout			DOUBLE	PowerOn	
-						
-	3	0.0, 0.0, 0.0	-	-	ReadOnly	

Description: Diagnostic data of the runtimes of the servosynchronous task of the SW-PLC2xx in the case of a time-out.

[0]: Current runtime that has led to a time-out

[1]: Minimum runtime so far measured

[2]: Maximum runtime so far measured

Diagnostic data are initialized with ZERO at each NCK power up

10185	NCK_PCOS_TIME_RATIO			EXP, N01	-	
-	Processing time share NCK			DWORD	PowerOn	
-						
-	-	65	10	90	7/2	

Description: This machine data defines the maximum proportion of CPU time given to the NC kernel in the entire system. The division specified by the user is implemented as well as possible.

When implementing the specification, the system takes into account limiting values for the absolute proportion of CPU time that must not be exceeded or undershot.

Adaptations are made without generating an alarm.

10192	GEAR_CHANGE_WAIT_TIME			N01	S1	
s	Gear stage change waiting time			DOUBLE	PowerOn	
-						
-	-	10.0	0.0	1.0e5	7/2	

Description: External events which trigger reorganization, wait for the end of a gear stage change. GEAR_CHANGE_WAIT_TIME now determines the waiting time for the gear stage change. Time unit in seconds.

When this time expires without the gear stage change having been terminated, the NCK reacts with an alarm.

Among others, the following events will cause reorganization:

User ASUB

Mode change

Delete distance-to-go

Axis replacement

Activate user data

10200	INT_INCR_PER_MM			N01	G2,K3	
-	Calculation resolution for linear positions			DOUBLE	PowerOn	
LINK						
-	-	1000.	1.0	1.0e9	7/2	

Description: This MD defines the number of internal increments per millimeter.

The accuracy of the input of linear positions is limited to the calculation accuracy by rounding the product of the programmed value and the calculation accuracy to an integer.

In order to keep the executed rounding easily understandable it is useful to use powers of 10 for the calculation accuracy.

10210	INT_INCR_PER_DEG			N01	G2,K3,R2	
-	Calculation resolution for angular positions			DOUBLE	PowerOn	
LINK						
-	-	1000.0	1.0	1.0e9	7/2	

Description: This MD defines the number of internal increments per degree.

The accuracy of the input of angular positions is limited to the calculation accuracy by rounding the product of the programmed value and the calculation accuracy to an integer.

In order to keep the executed rounding easily understandable it is useful to use powers of 10 for the calculation accuracy.

10220	SCALING_USER_DEF_MASK			EXP, N01	G2	
-	Activation of scaling factors			DWORD	PowerOn	
SCAL						
-	-	0x200	0	0x3FFF	7/2	

Description:

Bit mask for selecting the base values for the data (e.g. machine and setting data) that have a physical unit, they are interpreted in the default units shown below according to the basic system (metric/inch). If other input/output units are to be selected for individual physical units then these are activated with the scale factors associated with this machine data (entered in MD10230 $MN_SCALING_FACTORS_USER_DEF[n]).

This does not affect the programming of geometry and feed values.

Bit set:

Data of the assigned physical variable (see list) are scaled to the unit defined by MD10230 $MN_SCALING_FACTORS_USER_DEF[n].

Bit not set:

Data of the assigned physical variable are scaled to the default unit shown below.

Assigned physical variable	Default units for: MD10240 $MN_SCALING_SYSTEM_IS_METRIC	
Bit no.	1 = METRIC	0 = INCH
(Stated as hex value)		
0 Linear position	1 mm	1 inch
1 Angular position	1 degree	1 degree
2 Linear velocity	1 mm/min	1 inch/min
3 Angular speed	1 rpm	1 rpm
4 Linear acceleration	1 m/s^2	1 $inch/s^2$
5 Angular acceleration	1 rev/s^2	1 rev/s^2
6 Linear jerk	1 m/s^3	1 $inch/s^3$
7 Angular jerk	1 rev/s^3	1 rev/s^3
8 Time	1 s	1 s
9 Position-controller servo gain	1/s	1/s
10 Revolutional feedrate	1 mm/rev	1 mm/rev
11 Compensation value linear pos.	1 mm	1 mm
12 Compensation value angular pos.	1 degree	1 degree
13 Cutting rate	1 m/min	1 feet/min

Example:

SCALING_USER_DEF_MASK =?H3?; (Bit nos. 0 and 1 as hex values)

The scale factor defined in the associated MD10230 $MN_SCALING_FACTORS_USER_DEF[n] is activated for linear and angular positions.

If this machine data is changed, a power on is required as otherwise the associated machine data that have physical units would be incorrectly scaled.

Proceed as follows:

- MD changed manually

First start up and then enter the associated machine data with physical units.

- MD changed via machine data file

First start up and then reload the machine data file so that the new physical units are taken into account.

If the machine data are altered, alarm 4070 "Scaling machine data altered" is

output.
Application example: Input/output of linear velocities is to be in cm/min:
SCALING_USER_DEF_MASK = 0x4 (bit no. 2 as hex value)
SCALING_FACTORS_USER_DEF[2] = 0.1666666667 (10/60)
[Related to:
MD10230 $MN_SCALING_FACTORS_USER_DEF[n] (scaling factors of the physical variables)

10230	SCALING_FACTORS_USER_DEF			EXP, N01	G2	
-	Scaling factors of physical variables			DOUBLE	PowerOn	
SCAL						
-	15	1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0...	1e-9	-	7/2	

Description:

The scaling factor of a physical variable that has a unit other than the default unit setting (set bit in MD10220 $MN_SCALING_USER_DEF_MASK) is entered in this MD. The factor must refer to the unit used internally for the physical variable in question.

Index [n]	Assigned physical variable	Internal unit
0	Linear position	1 mm
1	Angular position	1 degree
2	Linear velocity	1 mm/s
3	Angular speed	1 degree/s
4	Linear acceleration	1 mm/s²
5	Angular acceleration	1 degree/s²
6	Linear jerk	1 mm/s³
7	Angular jerk	1 degree/s³
8	Time	1 s
9	Position-controller servo gain	1/s
10	Revolutional feedrate	1 mm/degree
11	Compensation value linear position	1 mm
12	Compensation value angular position	1 degree
13	Cutting rate	1 mm/s

The scaling factor is assigned to the physical variable using the index [0...12]. If this machine data is changed, a startup is required because otherwise the associated machine data that have physical units would be incorrectly scaled.

Proceed as follows:

- MD changed manually

First start up and then enter the associated machine data with physical units.

- MD changed via machine data file

First start up and then reload the machine data file so that the new physical units are taken into account.

If the machine data are altered, alarm 4070 "Scaling machine data altered" is output.

Application example(s):

Input/output of angular speeds is to be in new degree/min:
$MN_SCALING_USER_DEF_MASK = 'H8'; (bit no. 3 as hex value)
$MN_SCALING_FACTORS_USER_DEF[3] = 0.01851852; (400/360/60)

[3]: Index for angular speed.

Related to:

MD10220 $MN_SCALING_USER_DEF_MASK (activation of scaling factors).

10240	SCALING_SYSTEM_IS_METRIC			N01	G2,K3,A3,S1	
-	Basic system metric			BOOLEAN	PowerOn	
SCAL						
-	-	TRUE	-	-	7/2	

Description: The MD defines the basic system used by the control for scaling length-dependent physical variables for data input/output.

All corresponding data are stored internally in the basic units of 1 mm, 1 degree and 1 sec.

In the case of access from the interpreter (part program and download), from the operator panel (variable service) or through external communication, scaling takes place in the following units:

MD10240 $MN_SCALING_SYSTEM_IS_METRIC = 1: scaled in:

mm, mm/min, m/s2 , m/s3, mm/rev.

MD10240 $MN_SCALING_SYSTEM_IS_METRIC = 0: scaled in:

inch, inch/min, inch/s2, inch/s3, inch/rev.

The selection of the basic system also defines the interpretation of the programmed F value for linear axes:

	metric	inch
G94	mm/min	inch/min
G95	mm/rev.	inch/rev.

If this machine data is changed, a startup is required because otherwise the associated machine data that have physical units would be incorrectly scaled.

Proceed as follows:

- MD changed manually

First start up and then enter the associated machine data with physical units.

- MD changed via machine data file

First start up and then reload the machine data file so that the new physical units are taken into account.

If the machine data are altered, alarm 4070 "Scaling machine data altered" is output.

Application example(s):

Setup is in the metric system and then changed over to the inch system.

Special cases, errors:

The factor used for changing from 1 mm to 1 inch can be changed with MD10250 $MN_SCALING_VALUE_INCH.

10260	CONVERT_SCALING_SYSTEM			EXP	-	
-	Enable basic system conversion			BOOLEAN	PowerOn	
LINK						
-	-	FALSE	-	-	1/1	

Description:

Determines the handling of MD10240 $MN_SCALING_SYSTEM_IS_METRIC.

0: Inch/metric behavior conforms to SW1-SW4

1: Inch/metric behavior from SW5

Inch/metric functionality of SW5:

1. Switch over the systems of units with HMI softkey
2. New G codes G700/G710
3. Data backup with system of unit recognition INCH/METRIC
4. Automatic data conversion on change of system of units

- All zero point offsets
- Compensation data (EEC, QEC)
- Tool offsets
- etc.

The change from MD10260 $MN_CONVERT_SCALING_SYSTEM leads to alarm 4070!

This alarm is designed to indicate that data which remain active after a POWERON are not subjected to automatic conversion from SW1-SW4 and SW5 formats.

10270	POS_TAB_SCALING_SYSTEM			N01, N09	T1,N3,G2	
-	System of units of position tables			BYTE	Reset	
-						
-	-	0	0	1	7/2	

Description:

Defines the measuring system for the positional data for the following machine data

MD10910 $MN_INDEX_AX_POS_TAB_1
MD10930 $MN_INDEX_AX_POS_TAB_2
SD41500 $SN_SW_CAM_MINUS_POS_TAB_1
SD41501 $SN_SW_CAM_PLUS_POS_TAB_1
SD41502 $SN_SW_CAM_MINUS_POS_TAB_2
SD41503 $SN_SW_CAM_PLUS_POS_TAB_2
SD41504 $SN_SW_CAM_MINUS_POS_TAB_3
SD41505 $SN_SW_CAM_PLUS_POS_TAB_3
SD41506 $SN_SW_CAM_MINUS_POS_TAB_4
SD41507 $SN_SW_CAM_PLUS_POS_TAB_4

0: metric
1: inch

This machine data is only evaluated for MD10260 $MN_CONVERT_SCALING_SYSTEM = 1.

Related to:

MD10260 $MN_CONVERT_SCALING_SYSTEM
MD10910 $MN_INDEX_AX_POS_TAB_1
MD10930 $MN_INDEX_AX_POS_TAB_2
SD41500 $SN_SW_CAM_MINUS_POS_TAB_1
SD41501 $SN_SW_CAM_PLUS_POS_TAB_1
SD41502 $SN_SW_CAM_MINUS_POS_TAB_2
SD41503 $SN_SW_CAM_PLUS_POS_TAB_2
SD41504 $SN_SW_CAM_MINUS_POS_TAB_3
SD41505 $SN_SW_CAM_PLUS_POS_TAB_3
SD41506 $SN_SW_CAM_MINUS_POS_TAB_4
SD41507 $SN_SW_CAM_PLUS_POS_TAB_4

10280	PROG_FUNCTION_MASK			EXP, N01	K1	
-	Bit mask for parameterizing various subprogram commands			DWORD	PowerOn	
-						
-	-	0x0	0	0x0F	7/2	

Description: Bit mask for parameterizing various subprogram commands

Bit Hexadec.Meaning with bit set

value

0: 0x1Comparison commands ">" and "<" are processed as for SW 6.3 and earlier:

Subprogram data of the type REAL are mapped internally in the IEEE 64 bit format. This mode maps decimal numbers inaccurately if this format's 52-bit wide mantissa is inadequate to map the number in binary notation. To solve this problem, all comparison commands (==, <>, >=, <=, > and <) are checked for relative equality of 1E-12.

This procedure is switched off for greater than (>) and less than (<) comparisons by setting bit 0. (Compatibility setting for software releases earlier than SW 6.4)

1: 0x2Programming the channel names from machine data MD20000 $MC_CHAN_NAME

By setting bit 1, the channel name stored in machine data MD20000 $MC_CHAN_NAME can be programmed in the part program. The channel name can thus also be programmed instead of a numerical value for the channel number in programming coordination commands such as (START(), INIT(), WAIT() etc.

2: 0x4reserved

3: 0x8Change impermissible ASCII characters to spaces

When bit 3 is set, the previous behavior activates a subprogram block during the interpretation. This means that all invalid ASCII characters in a subprogram block are treated internally as spaces.

10284	DISPLAY_FUNCTION_MASK			EXP, N01	-	
-	BTSS-variable lastBlockNoStr active			DWORD	PowerOn	
-						
-	-	0x0	-	-	7/2	

Description: Bit mask for parameterizing various display variables:

BitNo. Hexadec. Meaning with bit set

value

Bit0: 0x1

Parameters are assigned to the OPI variable lastBlockNoStr in the SPARP and SPARPP blocks.

Bit1: 0x2

Concerns the OPI variable cmdSpeed in the SPARPP block. If the bit is set, the variable returns the programmed speed even if the spindle is at a standstill or in another mode (positioning mode, axis mode).

Bit2 0x4

Concerns the OPI variable cmdSpeed in the SPARPP block. (reserved for constant cutting speed)

Bit8: 0x100

Servotrace manages larger numerical values internally. Overruns in data format are avoided. The accuracy may be reduced with large numerical values.

10285	TASK_TIME_AVERAGE_CONFIG			EXP, N01	-	
-	Period for task runtime mean value generation			DOUBLE	PowerOn	
-						
-	-	1.0	0	86400	7/2	

Description: Period in seconds for which the respective mean value of the task runtimes is generated.
For the value 0, the current actual value is provided as mean value.
This mean value can be read via the OPI variable aveCycleTimeNet.

10290	CC_TDA_PARAM_UNIT			N09	G2	
-	Physical units of tool data for compile cycles			DWORD	PowerOn	
-						
-	10	0, 0, 0, 0, 0, 0, 0, 0...	0	9	2/2	

Description: Physical units for the user-defined tool-specific data:

```
0 ;No unit
1 ;Linear position       [ mm ; inch ]
2 ;Angular position      [ degree ; degree ]
3 ;Linear velocity       [ mm/min ; inch/min ]
4 ;Angular speed         [ rpm ; rpm ]
5 ;Linear acceleration   [ m/s²  ; inch/s² ]
6 ;Angular acceleration. [ rev/s ² ; rev/s ² ]
7 ;Linear jerk           [ m/s ³ ; inch/s ³  ]
8 ;Angular jerk          [ rev/s ³ ; rev/s ³ ]
9 ;Revolutional feedrate [ mm/rev ; inch/rev ]
```

Only available if bit 2 (0x4) is set in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

10291	CCS_TDA_PARAM_UNIT			N09	-	
-	physical units of SIEMENS-OEM tool data			DWORD	PowerOn	
-						
-	10	0, 0, 0, 0, 0, 0, 0, 0...	0	9	2/2	

Description: Physical units for application-specific tool-specific data:

```
0:   No unit
1:   Linear position             [ mm; inch ]
2:   Angular position            [ degree ; degree ]
3:   Linear velocity             [ mm/min ; inch/min ]
4:   Angular speed               [ rpm ; rpm ]
5:   Linear acceleration         [ m/s² ; inch/s² ]
6:   Angular acceleration        [ rev/s² ; rev/s² ]
7:   Linear jerk                 [ m/s³ ; inch/s³ ]
8:   Angular jerk                [ rev/s³ ; rev/s³ ]
9:   Feedrate per revolution     [ mm/rev; inch/rev]
```

Only available if Bit 2 (0x4) is set in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK.
Related to:
MD18204 $MN_MM_NUM_CCS_TDA_PARAM

10292	CC_TOA_PARAM_UNIT			N09	G2	
-	Physical units of cutting edge data for compile cycles			DWORD	PowerOn	
-						
-	10	0, 0, 0, 0, 0, 0, 0, 0...	0	9	2/2	

Description:

```
Physical units for the user-defined cutting edge data:
0  ;No unit
1  ;Linear position        [ mm ; inch ]
2  ;Angular position       [ degree ; degree ]
3  ;Linear velocity        [ mm/min ; inch/min ]
4  ;Angular speed          [ rpm ; rpm ]
5  ;Linear acceleration    [ m/s²  ; inch/s² ]
6  ;Angular acceleration.  [ rev/s ² ; rev/s ² ]
7  ;Linear jerk            [ m/s ³ ; inch/s ³  ]
8  ;Angular jerk           [ rev/s ³ ; rev/s ³ ]
9  ;Revolutional feedrate  [ mm/rev ; inch/rev ]
Only available if bit 2 (0x4) is set in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK
```

10293	CCS_TOA_PARAM_UNIT			N09	-	
-	Physical units of SIEMENS-OEM cutting edge data			DWORD	PowerOn	
-						
-	10	0, 0, 0, 0, 0, 0, 0, 0...	0	9	2/2	

Description:

```
Physical units for application-specific cutting data:
0 :  No unit
1 :  Linear position              [ mm ; inch ]
2 :  Angular position             [ degree ; degree ]
3 :  Linear velocity              [ mm/min ; inch/min ]
4 :  Angular speed                [ rpm ; rpm ]
5 :  Linear acceleration          [ m/s² ; inch/s² ]
6 :  Angular acceleration         [ rev/s² ; rev/s² ]
7 :  Linear jerk                  [ m/s³ ; inch/s³ ]
8 :  Angular jerk                 [ rev/s³ ; rev/s³ ]
9 :  Feedrate per revolution      [ mm/rev; inch/rev]
Only available if Bit 2 (0x4) is set in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK.
Related to:
 MD18206 $MN_MM_NUM_CCS_TOA_PARAM
```

10300	FASTIO_ANA_NUM_INPUTS			N10	A4,TE1	
-	Number of active analog NCK inputs			BYTE	PowerOn	
-						
-	-	0	0	8	7/2	

Description: This machine data defines the number of usable analog NCK inputs on the control.

Only these analog NCK inputs can be addressed by the NC part program or assigned by NC functions.

If more analog NCK inputs are defined with the machine data than are available in the hardware of the control, the binary analog actual value is set to zero in the control for the inputs that do not exist in the hardware. The NCK value can be altered by the PLC.

Note:

CPU computing time on the interpolation level is required for processing the digital and analog NCK I/Os. The number of active NCK I/Os should therefore be limited to the demands of the machine so that the interpolation cycle time is not unnecessarily loaded.

10310	FASTIO_ANA_NUM_OUTPUTS			N10	A4	
-	Number of active analog NCK outputs			BYTE	PowerOn	
-						
-	-	0	0	8	7/2	

Description: This machine data defines the number of usable analog NCK outputs on the control.

Only these analog NCK outputs can be addressed by the NC part program or assigned by NC functions.

If more analog NCK outputs are defined with the machine data than are available in the hardware of the control, no alarm is triggered. The analog values specified by the part program can be read by the PLC.

Note:

CPU computing time on the interpolation level is required for processing the digital and analog NCK I/Os. The number of active NCK I/Os should therefore be limited to the demands of the machine so that the interpolation cycle time is not unnecessarily loaded.

10350	FASTIO_DIG_NUM_INPUTS			N10	A4,TE1	
-	Number of active digital NCK input bytes			BYTE	PowerOn	
-						
-	-	1	0	5	7/2	

Description: The number of bytes of the digital NCK inputs that can be used on the control are defined in this machine data.

These digital NCK inputs can be read directly by the part program. Moreover, the signal state at the HW inputs can also be changed by the PLC.

If more digital NCK inputs are defined in the machine data than are available in the control hardware, a signal status of 0 is set in the control for the inputs that do not exist in the hardware. The NCK value can be altered by the PLC.

Related to:

NC/PLC interface signal DB2800 DBX0 (Disable the digital NCK inputs 1-8);

NC/PLC interface signal DB2800 DBB1000 (Disable the external digital inputs 9-40)

NC/PLC interface signal DB2800 DBX1(PLC setting for digital NCK inputs 1-9)

NC/PLC interface signal DB2800 SBB1001 (PLC values for external digital inputs 9-40)

NC/PLC interface signal DB2900 DBX0,4,1000,1004 (Actual value for digital NCK inputs)

10360	FASTIO_DIG_NUM_OUTPUTS			N10	A4,TE8	
-	Number of active digital NCK output bytes			BYTE	PowerOn	
-						
-	-	0	0	5	7/2	

Description: The number of bytes for digital NCK outputs that can be used on the control are defined in this machine data.

These digital NCK outputs can be set directly by the part program. The PLC is able to

- set the digital outputs to "0" in a defined way with NC/PLC interface signal DB2800 DBX4,1008 (Disable the digital NCK outputs).
- alter the NCK value with NC/PLC interface signal DB2800 DBX5,1009 (Overwrite mask for digital NCK outputs).
- specify a PLC value with NC/PLC interface signal DB2800 DBX7,1011 (Setting mask for digital NCK outputs).

If more digital NCK outputs are defined in the machine data than are available in the control hardware, no alarm is triggered. The signal states specified by the part program can be read by the PLC.

Special cases:

Digital NCK outputs 5 to 8 can be processed only by the PLC (no hardware outputs).

Related to:

NC/PLC interface signal DB2800 DBX4,1008 (Disable the digital NCK outputs)

NC/PLC interface signal DB2800 DBX5,1009 (Overwrite mask for digital NCK outputs)

NC/PLC interface signal DB2800 DBX6,1001 (PLC setting value for digital NCK outputs)

NC/PLC interface signal DB2800 DBX7,1011 (Setting mask for digital NCK outputs)

NC/PLC interface signal DB2900 DBX4,1004 (Setpoint for digital NCK outputs)

10361	FASTIO_DIG_SHORT_CIRCUIT			N10	A4	
-	Short circuit of digital inputs and outputs			DWORD	PowerOn	
-						
-	10	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description:

Defined short circuits between digital output and input signals of the high-speed NCK I/Os are realized by linking the signals read in from the high-speed NCK I/Os or the PLC interface to defined output signals.

The output signals always remain unchanged by the link, the inputs that have to be taken into account internally arise from the read inputs and the link. If a plurality of output bits are specified for one input bit in overwrite mode, the last defined assignment in the list determines the result.

The definition of non-existent or non-activated inputs/outputs is ignored without an alarm.

Bits 0-7:Number of the input byte to be written (1 - 5)

Bits 8-15:Bit number within the input byte (1 - 8)

Link:

The type of link is selected by adding a hexadecimal number to the input bit number:

00 Overwrite input identically to output

A0 Input is AND-gated to the read input with the status of the stated output

B0 Input is OR-gated to the read input with the status of the stated output

Bits 16-23:Number of the output byte to be used (1 - 5)

Bits 24-31:Bit number within the output byte (1 - 8)

Example:

$MN_FASTIO_DIG_SHORT_CIRCUIT[0] = 0x04010302

Input: 3rd bit of the 2nd byte

Output: 4th bit of the 1st byte (= 4th onboard NCU output)

The input status is overwritten by the specified output

$MN_FASTIO_DIG_SHORT_CIRCUIT[1] = 0x0705A201

Input: 2nd bit of the 1st byte (= 2nd onboard NCU input)

Output: 7th bit of the 5th byte

The input status is AND-gated with the specified output

$MN_FASTIO_DIG_SHORT_CIRCUIT[2] = 0x0103B502

Input: 5th bit of the 2nd byte

Output: 1st bit of the 3rd byte

The input status is OR-gated with the specified output

Related to:

MD10350 $MN_FASTIO_DIG_NUM_INPUTS,

MD10360 $MN_FASTIO_DIG_NUM_OUTPUTS.

References: /FB/, A4, "Digital and Analog NCK I/Os"

10362	HW_ASSIGN_ANA_FASTIN			N10	A4,TE1	
-	Hardware assignment of the fast analog NCK inputs			DWORD	PowerOn	
-						
-	8	0x01000000, 0x01000000, 0x01000000...	0x01000000	0x060003FF	7/2	

Description: The individual bytes are explained in MD10366 $MN_HW_ASSIGN_DIG_FASTIN.
[hw] = Index (0 to 7) for addressing the external analog inputs
Related to:
MD10366 $MN_HW_ASSIGN_DIG_FASTIN
MD10368 $MN_HW_ASSIGN_DIG_FASTOUT
MD10364 $MN_HW_ASSIGN_ANA_FASTOUT

10364	HW_ASSIGN_ANA_FASTOUT			N10	A4,TE3	
-	Hardware assignment of external analog NCK outputs			DWORD	PowerOn	
-						
-	8	0x01000000, 0x01000000, 0x01000000...	0x01000000	0x060003FF	7/2	

Description: The individual bytes are explained in MD10366 $MN_HW_ASSIGN_DIG_FASTIN.
Related to:
MD10366 $MN_HW_ASSIGN_DIG_FASTIN
MD10368 $MN_HW_ASSIGN_DIG_FASTOUT
MD10362 $MN_HW_ASSIGN_ANA_FASTIN

10366	HW_ASSIGN_DIG_FASTIN			N10	A4,TE1	
-	Hardware assignment of external digital NCK inputs			DWORD	PowerOn	
-						
-	10	0x01000000, 0x01000000, 0x01000000...	0x01000000	0x060003FF	7/2	

Description: Related to:
MD10368 $MN_HW_ASSIGN_DIG_FASTOUT
MD10362 $MN_HW_ASSIGN_ANA_FASTIN
MD10364 $MN_HW_ASSIGN_ANA_FASTOUT

10368	HW_ASSIGN_DIG_FASTOUT			N10	A4	
-	Hardware assignment of external digital NCK outputs			DWORD	PowerOn	
-						
-	4	0x01000000, 0x01000000, 0x01000000...	0x01000000	0x060003FF	7/2	

Description: The individual bytes are explained under MD10366 $MN_HW_ASSIGN_DIG_FASTIN.
[hw] = Index (0 to 3) for addressing the external digital output bytes
Related to:
MD10366 $MN_HW_ASSIGN_DIG_FASTIN
MD10362 $MN_HW_ASSIGN_ANA_FASTIN
MD10364 $MN_HW_ASSIGN_ANA_FASTOUT

10430	CC_HW_DEBUG_MASK			EXP	OEM	
-	Hardware debug mask for compile cycles			DWORD	PowerOn	
NBUP, NDLD						
-	-	0	0	0x7fffffff	7/1	

Description: Setting of special responses to peripheral HW interfaces for NCK debug

For practical debugging of NCK software, among other things, the response of peripheral units to the loss of the NCK sign of life must be suppressed when the NCK software has run to a breakpoint.

Bit 0(LSB)-3:

For practical debugging of NCK software, among other things, the response of peripheral units to the loss of the NCK sign of life must be suppressed when the NCK software has run to a breakpoint.

Meaning of set bits:

Bit 0:

Drive modules ignore the loss of the NCK sign of life

Bit 1:

Terminal blocks ignore the loss of the NCK sign of life

Bit 3:

PLC ignores the loss of the NCK sign of life

Bit 4:

Recording of internal and external control commands. Recording the control sequences and storing them in a file in the passive file system. One can trace the exact sequence between the incoming hardware signals of the PLC interface and the internal sequences with the aid of the recording file.

Bit 5:

Servotrace: Enable physical addresses without access control

Bit10:

Test for measuring function. If this bit is set, one can use the GUD Variables CHAN INT MEA_TASK and CHAN INT MEA_COUNTER to transfer the inverse transformation of the measured values into cyclical and non-cyclical tasks.

Bit11:

No EMERGENCY STOP alarm on loss of PLC sign of life. If the PLC sign of life is not obtained within the time defined in MD10100 $MN_PLC_CYCLIC_TIMEOUT, an alarm is not issued, merely the axis release withdrawn. (Application case: debugging the PLC user program)

Bit15:

Reserved for gantry setup help.

10530	COMPAR_ASSIGN_ANA_INPUT_1			N10	A4	
-	Hardware assignment of analog inputs for comparator byte 1			BYTE	PowerOn	
-						
-	8	0, 0, 0, 0, 0, 0, 0, 0	-	-	7/2	

Description:

```
This MD assigns analog inputs 1 to 8 to a bit number of comparator byte 1.
This input bit of the comparator is set to "1" if the comparison between the
applied analog value and the associated threshold value (SD41600
$SN_COMPAR_THRESHOLD_1 fulfills the condition parameterized in (MD10540
$MN_COMPAR_TYPE_1).
An analog input can be assigned to a plurality of comparator input bits.
The following generally applies to comparator byte 1:
COMPAR_ASSIGN_ANA_INPUT_1 [b] = n
with index:  b = number of comparator input bit (0 to 7)
             n = number of analog input (1 to 8)
Example:
           COMPAR_ASSIGN_ANA_INPUT_1[0] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[1] = 2
           COMPAR_ASSIGN_ANA_INPUT_1[2] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[3] = 3
           COMPAR_ASSIGN_ANA_INPUT_1[4] = 3
           COMPAR_ASSIGN_ANA_INPUT_1[5] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[6] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[7] = 1
Analog input 1 affects input bits 0, 2 , 5, 6 and 7 of comparator byte 1
Analog input 2 affects input bit 1 of comparator byte 1
Analog input 3 affects input bits 3 and 4 of comparator byte 1
Related to:
MD10540 $MN_COMPAR_TYPE_1
MD10541 $MN_COMPAR_TYPE_2
```

10531	COMPAR_ASSIGN_ANA_INPUT_2			N10	A4	
-	Hardware assignment of analog inputs for comparator byte 2			BYTE	PowerOn	
-						
-	8	0, 0, 0, 0, 0, 0, 0, 0	-	-	7/2	

Description:

This MD assigns analog inputs 1 to 8 to a bit number of comparator byte 2. This input bit of the comparator is set to "1" if the comparison between the applied analog value and the associated threshold value (SD41601 $SN_COMPAR_THRESHOLD_2 fulfills the condition parameterized in (MD10541 $MN_COMPAR_TYPE_2).

An analog input can be assigned to a plurality of comparator input bits.

The following generally applies to comparator byte 2:

```
COMPAR_ASSIGN_ANA_INPUT_2 [b] = n
with index:b = number of comparator input bit (0 to 7)
           n = number of analog input (1 to 8)
```

Example:

```
COMPAR_ASSIGN_ANA_INPUT_2[0] = 1
COMPAR_ASSIGN_ANA_INPUT_2[1] = 2
COMPAR_ASSIGN_ANA_INPUT_2[2] = 1
COMPAR_ASSIGN_ANA_INPUT_2[3] = 3
COMPAR_ASSIGN_ANA_INPUT_2[4] = 3
COMPAR_ASSIGN_ANA_INPUT_2[5] = 1
COMPAR_ASSIGN_ANA_INPUT_2[6] = 1
COMPAR_ASSIGN_ANA_INPUT_2[7] = 1
```

Analog input 1 affects input bits 0, 2 , 5, 6 and 7 of comparator byte 2

Analog input 2 affects input bit 1 of comparator byte 2

Analog input 3 affects input bits 3 and 4 of comparator byte 2

Related to:

MD10540 $MN_COMPAR_TYPE_1

MD10541 $MN_COMPAR_TYPE_2

10540	COMPAR_TYPE_1			N10	A4	
-	Parameterization for comparator byte 1			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	

Description:

```
This MD can be used to make the following settings for the individual output
bits (0 to 7) of comparator byte 1:
•   Bits 0 to 7: Comparison type mask (for comparator output bits 0 to 7)
          Bit = 1: output bit = 1 if analog value >= threshold value
          Bit = 0: output bit = 1 if analog value < threshold value
          (Threshold value defined by SD41600 $SN_COMPAR_THRESHOLD_1)
•   Bits 8 to 15:      Not used (defined to be set to 0)
•   Bits 16 to 23:     Assignment of a HW output byte for outputting
          the comparator states (statement of the byte address)
          Byte = 0:  No output via digital NCK outputs
          Byte = 1:  Output via digital onboard NCK outputs (1 to 4)
          Byte = 2:  Output via external digital NCK outputs 9 to 16
          Byte = 3:  Output via external digital NCK outputs 17 to 24
          Byte = 4:  Output via external digital NCK outputs 25 to 32
          Byte = 5:  Output via external digital NCK outputs 33 to 40
•   Bits 24 to 31:     Inversion mask for the output of the comparator states
    (bits 0 to 7)
          Bit = 0:   Output bit is not inverted
          Bit = 1:   Output bit is inverted
Related to:
MD10530 $MN_COMPAR_ASSIGN_ANA_INPUT_1
MD10531 $MN_COMPAR_ASSIGN_ANA_INPUT_2
SD41600 $SN_COMPAR_THRESHOLD_1
SD41601 $SN_COMPAR_THRESHOLD_2
MD10360 $MN_FASTIO_DIG_NUM_OUTPUTS
```

10541	COMPAR_TYPE_2			N10	A4	
-	Parameterization of comparator byte 2			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	

Description:

This MD can be used to make the following settings for the individual output bits (0 to 7) of comparator byte 2:

- Bits 0 to 7: Comparison type mask (for comparator output bits 0 to 7)
  Bit = 1: output bit = 1 if analog value >= threshold value
  Bit = 0: output bit = 1 if analog value < threshold value
  (Threshold value defined by SD41601 $SN_COMPAR_THRESHOLD_2)
- Bits 8 to 15: not used (defined to be set to 0)
- Bits 16 to 23: Assignment of a HW output byte for outputting the comparator states (statement of the byte address)
- Byte = 0: no output via digital NCK outputs
  Byte = 1: output via digital onboard NCK outputs (1 to 4)
  Byte = 2: output via external digital NCK outputs 9 to 16
  Byte = 3: output via external digital NCK outputs 17 to 24
  Byte = 4: output via external digital NCK outputs 25 to 32
  Byte = 5: output via external digital NCK outputs 33 to 40
- Bits 24 to 31: Inversion mask for the output of the comparator states (bits 0 to 7)
  Bit = 0: Output bit is not inverted
  Bit = 1: Output bit is inverted

Related to:

MD10530 $MN_COMPAR_ASSIGN_ANA_INPUT_1
MD10531 $MN_COMPAR_ASSIGN_ANA_INPUT_2
SD41600 $SN_COMPAR_THRESHOLD_1
SD41601 $SN_COMPAR_THRESHOLD_2
MD10360 $MN_FASTIO_DIG_NUM_OUTPUTS

10600	FRAME_ANGLE_INPUT_MODE			EXP, N01, N09	K2	
-	Sequence of rotation in FRAME			BYTE	PowerOn	
-						
-	-	1	1	2	7/2	

Description: FRAME_ANGLE_INPUT_MODE sets how the rotations (ROT and AROT) around the three geometry axes are defined if more than one rotationis programmed in a block. The order in which these rotations are programmed within the block is irrelevant.

The rotations can be set to be calculated according to:

- Euler angle with FRAME_ANGLE_INPUT_MODE = 2

The rotations are calculated according to the Euler angle in the following order:

1. Rotation around Z
2. Rotation around X
3. Rotation around Y

- RPY with FRAME_ANGLE_INPUT_MODE = 1

The rotations are calculated according to the Euler angle in the following order:

1. Rotation around Z
2. Rotation around Y
3. Rotation around X

10602	FRAME_GEOAX_CHANGE_MODE			EXP, N01, N09	K2	
-	Frames when changing geometry axes			BYTE	PowerOn	
-						
-	-	0	0	5	7/2	

Description: Geometry axes can be switched over in the following states:

- Selection and deselection of transformations
- Switchable geometry axes GEOAX()

The current total frame is then defined as follows:

0: The current total frame is canceled.

1: The current total frame is recalculated when geometry axes are switched over. Translations, scaling and mirroring for the new geometry axes become active. The rotations of the old geometry axes still apply.

2: The current total frame is recalculated when geometry axes are switched over. Translations, scaling and mirroring for the new geometry axes become active. If rotations were active before switching over to the current base frames, current settable frame or programmable frame, switchover is aborted with an alarm.

3: The current total frame is deleted when selecting and deselecting transformations.When the GEOAX() command is entered, the frame is recalculated and transaction, scaling and mirroring for the new geometry axes become active. The rotations of the old geometry axes still apply.

10604	WALIM_GEOAX_CHANGE_MODE			EXP, N01, N09	A3	
-	Working area limitation by changing geometry axes			BYTE	PowerOn	
-						
-	-	0	0	1	7/2	

Description:

```
This machine data specifies whether a potentially active  working area limi-
tation will remain active after geo axis replacement, or whether it will be
deactivated.
Meaning of the MD values:
= 0  Working area limitation will be deactivated when replacing geo axis.
= 1 Working area limitation will remain activated when replacing geo axis.
```

10610	MIRROR_REF_AX			EXP, N01, N09	K2	
-	Reference axis for mirroring			BYTE	PowerOn	
-						
-	-	0	0	3	7/2	

Description:

```
0: Mirroring always takes place in the stated axis, without scaling.
The mirroring of a geometry axis can always be related to a defined
reference axis.
1: x is the reference axis
Mirroring of the x axis is unique.
Mirroring of the y axis  is mapped on:
 a mirroring of the x axis and
 a rotation of the z axis through 180 degrees.
Mirroring of the z axis is mapped on:
 a mirroring of the x axis and
 a rotation of the x axis through 180 degrees and
 a rotation of the z axis through 180 degrees
2: y is the reference axis
Mirroring of the x axis is mapped on:
  a mirroring of the y axis and
  a rotation of the z axis through 180 degrees.
Mirroring of the y axis is unique.
Mirroring of the z axis  is mapped on:
  a mirroring of the y axis and
  a rotation of the x axis through 180 degrees
3: z is the reference axis
Mirroring of the x axis is mapped on:
  a mirroring of the z axis and
  a rotation of the z axis through 180 degrees and
  a rotation of the x axis through 180 degrees
Mirroring of the y axis is mapped on:
  a mirroring of the z axis and
  a rotation of the x axis through 180 degrees.
Mirroring of the z axis is unique.
```

10612	MIRROR_TOGGLE			EXP, N01, N09	K2	
-	Mirror toggle			BYTE	PowerOn	
-						
-	-	1	0	1	7/2	

Description: Mirror toggle function.

1: Programmed axis values are not evaluated. Toggle switching behavior.

0: Programmed axis values are evaluated.

The axes are mirrored in the case of values not equal to 0 if they are not already mirrored. Mirroring is disabled if the value is 0.

10613	NCBFRAME_RESET_MASK			EXP	K2	
-	Active NCU global base frames after reset			DWORD	Reset	
-						
-	-	0xFFFF	0	0xFFFF	7/2	

Description: Bit mask for the reset setting of the NCU global base frames which are included in the channel.

The following applies:

When MD20110 $MC_RESET_MODE_MASK bit0 = 1 and bit14 = 1

The entire base frame is derived on reset from the linking of the NCU global base frame field elements whose bit in the bit mask is 1.

When MD20110 $MC_RESET_MODE_MASK bit0 = 1 and bit14 = 0

The entire base frame is deselected on reset.

10615	NCBFRAME_POWERON_MASK			EXP, N12	K2	
-	Reset global base frames after power on			DWORD	PowerOn	
-						
-	-	0	0	0xFFFF	7/2	

Description: This machine data defines whether global base frames are reset in the data management on Power On.

That is

- Offsets are set to 0,
- Scalings are set to 1.
- Mirroring is disabled.

The individual base frames can be selected separately.

Bit 0 means base frame 0, bit 1 base frame 1 etc.

Value=0: Base frame is retained on Power On

Value=1: Base frame is reset in the data management on Power On.

Related to:

MD24004 $MC_CHBFRAME_POWERON_MASK

10616	MAPPED_FRAME_MASK			N01	-	
-	Enable frame mapping			DWORD	PowerOn	
-						
-	-	0x3001	0	0x00003FFF	7/2	

Description: Bit mask for channel-specific data management frames, the axial frames of which can be mapped onto other axial frames.

The mapping takes place via $MA_MAPPED_FRAME[AXn] = "AXm".

Bit 0:$P_SETFRSystem frame for actual value setting and scratching

Bit 1:$P_EXTFRSystem frame for external work offset

Bit 2:$P_PARTFRSystem frame for TCARR and PAROT

Bit 3:$P_TOOLFRSystem frame for TOROT and TOFRAME

Bit 4:$P_WPFRSystem frame for workpiece reference points

Bit 5:$P_CYCFRSystem frame for cycles

Bit 6:$P_TRAFRSystem frame for transformations

Bit 7:$P_ISO1FRSystem frame for ISO G51.1 Mirror

Bit 8:$P_ISO2FRSystem frame for ISO G68 2DROT

Bit 9:$P_ISO3FRSystem frame for ISO G68 3DROT

Bit 10:$P_ISO4FRSystem frame for ISO G51 Scale

Bit 11: $P_RELFRSystem frame for relative coordinate systems

Bit12:$P_CHBFRChannel-specific basic frames

Bit13:$P_UIFRSettable frames

10617	FRAME_SAVE_MASK			EXP	K2	
-	Behavior of frames in SAVE subroutines			DWORD	PowerOn	
-						
-	-	0	0	0x3	7/2	

Description: This machine data is used to define which frames are restored with SAVE attribute at return from a subprogram.

Bit 0: Settable frames G54 through G599

Value = 0:

If the same G code is active at subprogram return and subprogram call, the active settable frame is maintained. If not, the settable frame is reactivated when the subprogram is called.

Value = 1:

At subprogram return, the settable frame is reactivated when the subprogram is called.

Bit 1: Basic frame

Value = 0:

The active basic frame is not changed at subprogram return. This is also the case, if a basic frame change is carried out in the subprogram by an operation or by an implicit frame deselection (possibly through TRAFOOF).

Value = 1:

At subprogram return, the basic frame is reactivated when the subprogram is called.

10618	PROTAREA_GEOAX_CHANGE_MODE			EXP, N01, N09	A3	
-	Protection range on change of geometry axes			BYTE	PowerOn	
-						
-	-	0	0	3	7/2	

Description: This machine data is used to define whether any active protection zones will remain active after a transformation change or geo axis replacement, or whether they will be deactivated.

The machine data is bit-coded with the following meanings:

Bit 0 = 0

Protection zones deactivated on transformation change.

Bit 0 = 1

Active protection zones remain active after transformation change.

Bit 1 = 0

Protection zones deactivated on geo axis replacement.

Bit 1 = 1

Active protection zones remain active after geo axis replacement.

10650	IPO_PARAM_NAME_TAB			EXP, N01	K2	
-	Name of interpolation parameters			STRING	PowerOn	
-						
-	3	I, J, K	-	-	7/2	

Description: List of identifiers for the interpolation parameters

The rules for axis identifiers described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

Related to:

MD10660 $MN_INTERMEDIATE_POINT_NAME_TAB

References: /PA/, Programming Guide: Fundamentals

10660	INTERMEDIATE_POINT_NAME_TAB			EXP, N01	K2	
-	Name of interpolation point coordinates for G2/G3			STRING	PowerOn	
-						
-	3	I1, J1, K1	-	-	7/2	

Description: List of identifiers for the intermediate point coordinates

The rules for axis identifiers described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

Related to:

MD10650 $MN_IPO_PARAM_NAME_TAB

References: /PG/, Programming Guide: Fundamentals

10682	CONTOUR_SAMPLING_FACTOR			N01, EXP	-	
-	Contour sampling factor			DOUBLE	Reset	
-						
-	-	1.0	-	-	1/1	

Description: This factor defines the maximum time interval in which a curved contour is sampled in the interpolator.

The maximum sampling time results from the set interpolation cycle (see MD10071 $MN_IPO_CYCLE_TIME), the factor set with this data, and the tolerance set for the geometry axes in MD33100 $MA_COMPRESS_POS_TOL[].

The minimum sampling time cannot be shorter than the time set in MD10680 $MN_MIN_CONTOUR_SAMPLING_TIME.

10690	DRAW_POS_TRIGGER_TIME			EXP, N01	-	
s	Trigger time for IPO event 'DRAW_POS'			DOUBLE	NEW CONF	
-						
-	-	0.3	0	30	1/1	

Description: This can be used to set a time within which an IPO event for position output will always be generated. If a value smaller than the current interpolation cycle is entered here, the trigger will only be activated according to the maximum chord length in the case of complex geometries and in the last interpolation cycle in the case of non-complex geometries.

10700	PREPROCESSING_LEVEL			N01, N02	V2,K1	
-	Program preprocessing level			BYTE	PowerOn	
-						
-	-	0x01	-	-	2/2	

Description:

Bit 0= 0:

No preprocessing

Bit 0= 1:

The call description of the cycles is formed during control power on. All the programs in the directories _N_CUS_DIR, _N_CMA_DIR and _N_CST_DIR can be called in the part program without EXTERNAL declaration. If the parameter interface of a cycle is changed in the control, then this change does not become active until after Power On.

Bit 1=1:

During control power on, all cydes in the directories _N_CUS_DIR, _N_CMA_DIR and _N_CST_DIR are preprocessed to form a process-optimizing compilation. These cycles are then processed more quickly. Changes to the cycle programs do not become active until after the next Power On.

Bit 2=1:

During control power on, the Siemens cycles in the directory _N_CST_DIR are preprocessed to form a process-optimizing compilation (from SW 3.5).

Bit 3=1:

During control power on, the user cycles in the directory _N_CUS_DIR are preprocessed to form a process-optimizing compilation (from SW 3.5).

Bit 4=1:

Preprocessing the user cycles in the directory _N_CMA_DIR

Bit 5=1:

All files marked with PREPRO in the PROG statement line are preprocessed (from SW 6.4)

Bit 5=0:

During control power on, all cycles in the directoires activated by bits 1 to 4 are preprocessed. This also applies to programs that are not marked with PREPRO.

Bit 6=1:

The compilation is stored in SRAM if there is inadequate space in DRAM (from SW 7.1).

Memory space is required for preprocessing cycles. Better utilization of memory can be achieved by selective setting of the preprocessing:

The runtime-critical cycles are brought together in one directory. The remaining cycles are in the other directory.

References:

/PG/, "Programming Guide Fundamentals" (EXTERNAL declaration)

10702	IGNORE_SINGLEBLOCK_MASK			N01	K1,Z1	
-	Prevents stopping at specific blocks in single block mode			DWORD	PowerOn	
-						
-	-	0	0	0x1FFFF	7/2	

Description: This machine data prevents stopping at certain blocks with single block.

Single block stop can be prevented with the following bits of the mask:

Bit0 = 1

Means that there is no stop in any internal ASUB block. Exception: The single block stop has been explicitly activated by the SBLON command.

There are three different internal ASUBs that are triggered by different events.

- Repos: In the case of the events: change of operating mode to a manual mode (JOG, JOGREF, etc.) unless MODESWITCH_MASK is not set, switch skip block on and off, activate machine data, switch-on overstore, axis replacement, subroutine level abort, switch-on single block, switch dry run feedrate on and off, alarm with compensation block.

- Return: Delete distance-to-go, switchover after TEACH-IN, or deselection of MDI with corresponding MODESWITCH_MASK.

- _N_PROG_EVENT_SPF: Parameterizing MD 20108 $MC_PROG_EVENT_MASK parameterizes the events whereby _N_PROG_EVENT_SPF is executed.

Bit1 = 1

Means that there is no stop in any user ASUB block. Exception: The single block stop has been explicitly activated via the SBLON command.

User ASUBs are linked to an interrupt channel by the part program command SETINT or via the PI- _N_ASUP__. The interrupt channel is then activated via PLC or the high-speed inputs, and the user ASUBs are retracted.

This disables machine data MD20117 $MC_IGNORE_SINGLEBLOCK_ASUP. The NCK behavior corresponds to the machine data assignment MD20117 $MC_IGNORE_SINGLEBLOCK_ASUP= FFFFFFFF.

Bit2 = 1

Means that there is no stop in any intermediate block. Intermediate blocks are generated at, among other events, tool change, ADIS and complicated geometry.

Bit3 = 1

Means that there is no stop in the block search pickup block. The block search pickup block is the 1st block that is loaded into the main run at the start after the search target has been found in the program.

Bit4 = 1

Means that there is no stop in the INIT blocks. INIT blocks are generated from reset immediately after a part program start.

Bit5 = 1

Means that there is no stop in any subprogram block with the parameter DISPLOF.

Bit6 = 1

Means that there is no stop in any block in which the NCK cannot reorganize.

Reorganize is an internal procedure that is needed for mode change after JOG/JOGREF..., switch skip block on and off, activate machine data, axis replacement, switch on overstore, switch on single block, switch dry run feedrate on and off, subroutine level abort, user ASUBs delete distance-to-go, switchover after TEACH-IN. Reorganize is never needed in Reset state.

Example blocks in which reorganize is impossible:

- Tool change
- 1st block after the Repos procedure
- Block after an ASUB from JOG/aborted

Bit7 = 1

Means that there cannot be a stop in any block in which repositioning is impossible.

Reposition is an internal procedure that is needed for mode change after JOG/ JOGREF..., switch skip block on and off, activate machine data, axis replacement, switch on overstore, switch on single block, switch dry run feedrate on and off, subroutine level abort, and possibly user ASUBs. Reposition is never needed in Reset state.

Example blocks in which reposition is impossible:

- G33 + blocks in which reorganize is impossible.

Bit8 = 1

Means that there is no stop in a residual block that does not contain traversing information.

Bit9 = 1

Means that there is no stop in a run in/main run synchronization block (e.g.STOPRE, $Variable) that is repeated because of an interruption with Reorg (e.g. mode change).

Bit10= 1

Means that there is no stop in a "tool selection block". "Tool selection block" only occurs with tool management (magazine management or TMMG) active. This block gives the corresponding tool change command to the PLC.

This block is generally generated by T programming from the part program.

Example block "N1010 T="Drill" M6 D1"

Depending on machine data, the "tool selection block" can be held in the interpolator until the PLC has acknowledged the corresponding tool change (see MD20310 $MC_TOOL_MANAGEMENT_MASK). However the program status remains in "run".

Bit11= 1

The control has to automatically generate implicit GET blocks for the axis replacement function (axis replacement: 2 or more channels control one axis alternately) if no explicit GET(D) has been programmed and the following block wants to traverse the axis. (The other channel had previously used this axis).

An explicitly programmed GET may appear as follows "getd(x1,y1,z1) or get(x1,y1,z1)".

There is no stop at explicit or implicit GET blocks in the single block with this bit 11.

Bit12= 1

There is no stop in the single block type 2 in the SBLON block.

Bit13= 1

If an axis is pulled out in the middle of a block and possibly assigned to another channel, then there is no stop at the PREMATURE end of this block. This block follows a REPOSA in order to traverse it to the end, there is no stop until this end has been reached.

Bit14=1

In a part program line, in which a substitution subroutine is called due to NC language replacement, only one stop is performed under the condition that the subroutine includes PROC attribute SBLOF. It is irrelevant whether the subroutine is called at block start and/or end or whether it is exited with

M17 or RET.

Bit15=1

Means that there is no stop in any user ASUB block. Exception: The single block stop has been explicitly activated via the SBLON command.

There are three different internal ASUBs that are triggered by different events.

- Repos: In the case of the events: change of operating mode to a manual mode (JOG, JOGREF,...) unless MODESWITCH_MASK is not set, switch skip block on and off, activate machine data, switch-on overstore, axis replacement, subroutine level abort, switch-on single block, switch dry run feedrate on and off, alarm with compensation block.

- Return: Delete distance-to-go, switchover after TEACH-IN, or deselection of MDI with corresponding MODESWITCH_MASK.

Bit16=1

Activating SERUPRO (search run via prog test) prevents stopping at single blocks.

Related to:

MD20117 $MC_IGNORE_SINGLEBLOCK_ASUP

10704	DRYRUN_MASK			N01	V1	
-	Dry run feedrate activation			BYTE	PowerOn	
-						
-	-	0	0	2	7/2	

Description: DRYRUN_MASK == 0

Dryrun can only be switched on or off at the end of the block.

When DRYRUN_MASK = 1 is set, the dry run feedrate can also be activated during program execution (in the part program block).

NOTICE!

After activating dry run feedrate, the axes are stopped for the duration of the reorganization process.

DRYRUN_MASK == 2

Dryrun can be switched on or off in every phase and the axes are not stopped.

NOTICE:

However, the function does not become active until a "later" block in the program execution and this is with the next (implicit) StopRe block.

Related to:

SD42100 $SC_DRY_RUN_FEED

10706	SLASH_MASK			N01	PG,A2	
-	Activation of block skip			BYTE	PowerOn	
-						
-	-	0	0	2	7/2	

Description: If SLASH_MASK = 0, skip block can only be activated when stopped at the end of the block

If SLASH_MASK = 1, skip block can also be activated during program execution.

NOTICE!

After activating skip block, the axes are stopped for the duration of the reorganization process.

If SLASH_MASK = 2 ,skip block can be activated in every phase.

Notice!

However, the function does not become active until a "later" block in the program execution, and this is with the next (implicit) StopRe block.

10707	PROG_TEST_MASK			N01	K1	
-	Program test mode			DWORD	PowerOn	
-						
-	-	0x1	0	0x7	7/2	

Description: Bit-coded mask for program test

Bit 0 == 1 Program test cannot be deselected in 'Stopped' program status.

Bit 1 == 1 Enable to activate the program test using the PI command_N_NCKMOD

Bit 2 == 1 Activation of program test via VDI using accelerated feed

Bits 3..31 As yet unused.

10708	SERUPRO_MASK			N01	K1	
-	Search run modes			DWORD	PowerOn	
-						
-	-	0	0	31	7/2	

Description: Bit-coded mask for block search via program test (abbr. SERUPRO).

SERUPRO block search is activated with the PI service _N_FINDBL mode parameter == 5.

SERUPRO means SEarchRUn by PROgram test; in other words, proceed under program test from start of program to search target. Note: Program test does not move any axes.

Bit 0 == 0

There is a stop at M0 during the search phase.

Bit 0 == 1

There is no stop at M0 during the search phase.

Bit 1 == 0

Alarm 16942 aborts the search phase on part programm command START.

Bit 1 == 1

Alarm 16942 is switched off.

NOTICE:

A start program command might actually start the other channel!

Bit 2 == 0

Switches the function "Group Serupro" off

Bit 2 == 1

Switches the function "Group Serupro" on.

"Group-Serupro" enables a search routine in which the start part program command is changed into a search routine for the other channel.

Bit 3 == 0

Forces all channels that have started SERUPRO to end SERUPRO simultaneously unless they are aborted via Reset or the channel reaches M30 without finding the search taget. In other words, all channels that find the search target (including self-acting SERUPRO) terminate SERUPRO simultaneously.

Bit 3 == 1

Switches this function off

Bit 4 == 0

Take external override into account in SERUPRO.

Bit 4 == 1

An external override (sent via PLC signal or MCP) is ignored during SERUPRO.

Bit 5 .. 31

As yet unused.

10709	PROG_SD_POWERON_INIT_TAB			EXP, N01	K1	
-	Setting data to be initialized			DWORD	PowerOn	
-						
-	30	43200, 43202, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description:

```
Setting data to be initialized:
The values of the programmable SD indicated in this MD are set to their ini-
tial values on control power up.
Programmable setting data are:
                                                (GCODE)
SD42000 $SC_THREAD_START_ANGLE                  SF
SD42010 $SC_THREAD_RAMP_DISP                    DITS/DITE
SD42400 $SC_PUNCH_DWELLTIME                     PDELAYON
SD42800 $SC_SPIND_ASSIGN_TAB                    SETMS
SD43200 $SA_SPIND_S                             S wih G94,G95,G97,G971,G972
SD43202 $SA_SPIND_CONSTCUT_S                    S with G96,G961,G962
SD43210 $SA_SPIND_MIN_VELO_G25                  G25 S
SD43220 $SA_SPIND_MAX_VELO_G26                  G26 S
SD43230 $SA_SPIND_MAX_VELO_LIMS                 LIMS
SD43300 $SA_ASSIGN_FEED_PER_REV_SOURCE          FPRAON
SD43420 $SA_WORKAREA_LIMIT_PLUS                 G26
SD43430 $SA_WORKAREA_LIMIT_MINUS                G25
SD43700 $SA_OSCILL_REVERSE_POS1                 OSP1
SD43710 $SA_OSCILL_REVERSE_POS2                 OSP2
SD43720 $SA_OSCILL_DWELL_TIME1                  OST1
SD43730 $SA_OSCILL_DWELL_TIME2                  OST2
SD43740 $SA_OSCILL_VELO                         FA
SD43750 $SA_OSCILL_NUM_SPARK_CYCLES             OSNSC
SD43760 $SA_OSCILL_END_POS                      OSE
SD43770 $SA_OSCILL_CTRL_MASK                    OSCTRL
SD43780 $SA_OSCILL_IS_ACTIVE                    OS
```

10710	PROG_SD_RESET_SAVE_TAB			EXP, N01	A3, V1	
-	Setting data to be updated			DWORD	PowerOn	
-						
-	30	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description:

```
Setting data to be backed up
The values of the SDs listed in this table are stored in non-volatile memory,
i.e. they remain valid after power ON. The setting data whose HMI numbers
were entered in the backup list are written into the (buffered) active file
system after the description of the part program on reset.
Programmable setting data are:
                                                (GCODE)
SD 42000   $SC_THREAD_START_ANGLE                  SF
SD 42010:  $SC_THREAD_RAMP_DISP                    DITS/DITE
SD 42400   $SC_PUNCH_DWELLTIME                     PDELAYON
SD 42800   $SC_SPIND_ASSIGN_TAB                    SETMS
SD 43200:  $SA_SPIND_S                          S with G94,G95,G97,G971,G972
SD 43202:  $SA_SPIND_CONSTCUT_S                    S with G96,G961,G962
SD 43210   $SA_SPIND_MIN_VELO_G25                  G25S
SD 43220   $SA_SPIND_MAX_VELO_G26                  G26 S
SD 43230   $SA_SPIND_MAX_VELO_LIMS                 LIMS
SD 43300   $SA_ASSIGN_FEED_PER_REV_SOURCE          FPRAON
SD 43420   $SA_WORKAREA_LIMIT_PLUS                 G26
SD 43430   $SA_WORKAREA_LIMIT_MINUS                G25
SD 43700   $SA_OSCILL_REVERSE_POS1                 OSP1
SD 43710   $SA_OSCILL_REVERSE_POS2                 OSP2
SD 43720   $SA_OSCILL_DWELL_TIME1                  OST1
SD 43730   $SA_OSCILL_DWELL_TIME2                  OST2
SD 43740   $SA_OSCILL_VELO                         FA
SD 43750   $SA_OSCILL_NUM_SPARK_CYCLES             OSNSC
SD 43760   $SA_OSCILL_END_POS                      OSE
SD 43770   $SA_OSCILL_CTRL_MASK                    OSCTRL
SD 43780   $SA_OSCILL_IS_ACTIVE                    OS
The values of D43420 $SA_WORKAREA_LIMIT_PLUS (working area limitation plus)
and SD43430 $SA_WORKAREA_LIMIT_MINUS (working area limitation minus) are to
be stored in the buffered RAM after every RESET, M02, M30 or M17.
-->  PROG_SD_RESET_SAVE_TAB[0] = 43420
-->  PROG_SD_RESET_SAVE_TAB[1] = 43430
See also: 'REDEF: change attributes of NC language elements', setting data/
PRLOC
```

10712	NC_USER_CODE_CONF_NAME_TAB			EXP, N01, N12	TE1,B1	
-	List of reconfigured NC codes			STRING	PowerOn	
-						
-	200	...	-	-	2/2	

Description:

```
List of identifiers of the NC codes reconfigured by the user.
The list is to be structured as follows:
Even address:                Identifier to be changed
Subsequent odd address:      New identifier
The following three types of NC codes can reconfigured:
1. G codes                  e.g.: G02, G64, ASPLINE...
2. NC addresses             e.g.: RND, CHF, ...
3. Pre-defined subprograms e.g.: CONTPRON, ...
```

10713	M_NO_FCT_STOPRE			EXP, N12, N07	H2	
-	M function with preprocessing stop			DWORD	PowerOn	
-						
-	15	-1, -1, -1, -1, -1, -1, -1, -1...	-	-	7/2	

Description:

The M functions defined by MD10713 $MN_M_NO_FCT_STOPRE perform an implicit preprocessing stop.

That is, the interpretation of the next part program line will be stopped until the block with the M function defined in that way has been processed completely

(PLC acknowledgement, motion, etc.).

10714	M_NO_FCT_EOP			EXP, N07	K1,H2	
-	M function for spindle active after reset			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	

Description:

For spindles where a '2' is configured in MD35040 $MA_SPIND_ACTIVE_AFTER_RESET, no spindle reset is enabled with this M function when the part program is terminated. The spindle therefore remains active after the end of the part program.

Proposal: M32

Restrictions: see MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET

MD10714 $MN_M_NO_FCT_EOP,

MD10715 $MN_M_NO_FCT_CYCLE,

MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,

MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,

MD10804 $MN_EXTERN_M_NO_SET_INT

MD10806 $MN_EXTERN_M_NO_DISABLE_INT,

MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,

MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX

MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

10715	M_NO_FCT_CYCLE			EXP, N12, N07	H2,K1	
-	M function to be replaced by a subroutine			DWORD	PowerOn	
-						
-	30	-1, -1, -1, -1, -1, -1, -1, -1...	-	-	7/2	

Description:

M number with which a subprogram is called.

The name of the subprogram is stated in MD10716 $MN_M_NO_FCT_CYCLE_NAME[n]. If the M function defined with MD10715 $MN_M_NO_FCT_CYCLE[n] is programmed in a part program block, the subprogram defined in MD10716 $MNM_NO_FCT_CYCLE_NAME[n] is started at the end of the block. If the M function is programmed again in the subprogram, there is no longer substitution by a subprogram call. MD10715 $MN_M_NO_FCT_CYCLE[n] acts both in Siemens mode G290 and in external language mode G291.

The subprograms configured with MD10716 $MN_M_NO_FCT_CYCLE_NAME[n] and MD10717 $MN_T_NO_FCT_CYCLE_NAME must not be active simultaneously in one block (line of a part program). This means that no more than one M/T function replacement can be active in any one block. Neither an M98 nor a modal subprogram call can be programmed in a block with the M function replacement.

Subprogram return and end of part program are also not permitted. Alarm 14016 is output in the event of a conflict.

Restrictions:

M functions with a fixed meaning and configurable M functions are checked for conflicting settings. A conflict is reported with an alarm.

The following M functions are checked:

- M0 to M5,
- M17, M30,
- M19,
- M40 to M45,
- M function for spindle/axis mode switchover according to MD20094 $MC_SPIND_RIGID_TAPPING_M_NR (default: M70),
- M functions for nibbling/punching as configured in MD26008 $MC_NIBBLE_PUNCH_CODE if activated by MD26012 $MC_PUNCHNIB_ACTIVATION.
- M19, M96-M99 for applied external language (MD18800 $MN_MM_EXTERN_LANGUAGE).

Exception: The M function for the tool change defined by MD22560 $MC_TOOL_CHANGE_M_CODE.

10716	M_NO_FCT_CYCLE_NAME			EXP, N12, N07	K1	
-	Subroutine name for M function replacement			STRING	PowerOn	
-						
-	30	...	-	-	7/2	

Description:

The machine data contains the name of the cycle. This cycle is called if the M function has been programmed from MD10715 $MN_M_NO_FCT_CYCLE.

If the M function is programmed in a motion block, the cycle is executed after the motion.

MD10715 $MN_M_NO_FCT_CYCLE is active in both Siemens mode G290 and in external language mode G291.

If a T number is programmed in the call block, then the programmed T number can be polled in the cycle under the variable $P_TOOL.

M and T function replacements must not be programmed simultaneously in one block. This means that not more than one M or T function replacement may be active in any one block.

Neither an M98 nor a modal subprogram call may be programmed in a block with M function replacement.

Moreover, neither subprogram return nor part program end are allowed.

Alarm 14016 is issued if there is a conflict.

Related to:

MD10715 $MN_M_NO_FCT_CYCLE,

MD10717 $MN_T_NO_FCT_CYCLE_NAME

10717	T_NO_FCT_CYCLE_NAME			EXP, N12, N07	K1	
-	Name of tool-changing cycle for T function replacement			STRING	PowerOn	
-						
-	-		-	-	7/2	

Description:

Cycle name for tool change routine on call-up with a T function.

If a T function is programmed in a part program block, the subprogram defined in T_NO_FCT_CYCLE_NAME is called at the end of the block.

The T number programmed can be polled in the cycle via system variables $C_T / $C_T_PROG as a decimal value and via $C_TS / $C_TS_PROG as a string (only with tool management). MD10717 $MN_T_NO_FCT_CYCLE_NAME is active both in Siemens mode G290 and in external language mode G291.

MD10716 $MN_M_NO_FCT_CYCLE_NAME and MD10717 $MN_T_NO_FCT_CYCLE_NAME must not be active in one block at the same time, i.e. no more than one M/T function replacement can be active per block. Neither an M98 nor a modal subprogram call can be programmed in a block with a T function replacement. Furthermore, neither subprogram return nor part program end are allowed.

Alarm 14016 is output in the event of a conflict.

Related to:

MD10715 $MN_M_NO_FCT_CYCLE,

MD10716 $MN_M_NO_FCT_CYCLE_NAME

10718	M_NO_FCT_CYCLE_PAR			EXP, N12, N07	K1	
-	M function replacement with parameters			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	

Description: If an M function replacement was configured with MD10715 $MN_M_NO_FCT_CYCLE[n] / MD10716 $MN_M_NO_FCT_CYCLE_NAME[n], a parameter transfer via system variable can be specified for one of these M functions using MD10718 $MN_M_NO_FCT_CYCLE_PAR, in the same way as T function replacement. The parameters stored in the system variables always refer to the part program line where the M function to be replaced was programmed.

The following system variables are available:

$C_ME : Address extension of the replaced M function

$C_T_PROG : TRUE if address T was programmed

$C_T : Value of address T (Integer)

$C_TE : Address extension of address T

$C_TS_PROG : TRUE if address TS was programmed

$C_TS : Value of address TS (string, only with tool management)

$C_D_PROG : TRUE if address D was programmed

$C_D : Value of address D

$C_DL_PROG : TRUE if address DL was programmed

$C_DL : Value of address DL

10719	T_NO_FCT_CYCLE_MODE			EXP, N12, N07	K1	
-	Setting of T function substitution			DWORD	PowerOn	
-						
-	-	0	0	7	7/2	

Description: This machine data parameterizes the execution of the replacement subprogram for the tool and tool offset selection.

Bit 0 = 0:

D or DL number is transferred to the replacement subprogram (default value)

Bit 0 = 1:

The D or DL number is not transferred to the replacement subprogram if the following conditions are fulfilled: $MC_TOOL_CHANGE_MODE = 1 Programming D/DL with T or M function with which the tool change cycle is called, in a part program line.

Bit 1 = 0

Execution of the replacement subprogram at end of block (default value)

Bit 1 = 1

Execution of the replacement subprogram at block start

Bit 2 = 0:

Execution of the replacement subprogram according to the settin of bit 1

Bit 2 = 1:

Execution of the replacement subprogram at block start and at end of block.

10720	OPERATING_MODE_DEFAULT			N01	H2	
-	Setting of mode after power ON			BYTE	PowerOn	
-						
-	10	7, 7, 7, 7, 7, 7, 7, 7...	0	12	7/2	

Description: Default modes of the mode groups after power ON.

If no mode is selected by the PLC, all the channels associated with mode group n are in the mode preset by OPERATING_MODE_DEFAULT[n -1] after power ON:

0 = Automatic mode

1 = Automatic mode, submode REPOS

2 = MDI mode

3 = MDI mode, submode REPOS

4 = MDI mode, submode Teach In

5 = MDI mode, submode Reference point approach

6 = JOG mode

7 = JOG mode, submode Reference point approach

8 = AUTO mode, submode Teach In

9 = AUTO mode, submode Teach In, submode Reference point approach

10 = AUTO mode, submode Teach In, submode Repos

11 = MDI mode, submode Teach In, submode Reference point approach

12 = MDI mode, submode Teach In, submode Repos

10722	AXCHANGE_MASK			EXP, N01	K5	
-	Parameterization for axis replacement behavior			DWORD	PowerOn	
-						
-	-	0	0	0xFFFF	7/2	

Description:

The axis replacement behavior can be changed with this machine data.

Bit0 = 1

Means that there is an automatic axis replacement via channels even if the axis has been brought into a neutral state by Waitp.

Bit1 = 1

Means that an AXCTSWE fetches all the axis container axes that can be assigned to the channel by means of implicit GET or GETD, and an axis replacement is not permitted again until after the axis container rotation.

Bit2 = 1

Means that, in the case of a GET, an intermediate block without preprocessing stop is generated, and whether a reorganization is needed is not checked until main run.

Bit3 = 1 means, that the NC carries out an axis replacement request for the VDI interface only for:

- an axis exclusively controlled by the PLC ($MA_BASE_FUNCTION_MASK Bit 4 == 1)

- a permanently assigned PLC axis ($MA_BASE_FUNCTION_MASK Bit 5 == 1)

For such axes, the VDI interface signal 'Axis replacement possible' is always 1.

For all other axes, the VDI interface signal 'Axis replacement possible' is always 0.

For permanently assigned PLC axes, an axis replacement is possible only from neutral axis to PLC axis or from PLC axis to neutral axis.

Bit3 = 0 means that an axis replacement can be requested by the PLC for each axis.

For permanently assigned PLC axes, an axis replacement is only possible from neutral axis to PLC axis or from PLC axis to neutral axis.

10735	JOG_MODE_MASK			EXP, N01	K1	
-	Settings for JOG mode			DWORD	PowerOn	
-						
-	-	0	0	0xff	7/2	

Description:

Bit 0:

Enables JOG in automatic.

JOG is enabled in automatic when all channels in the mode group are in the RESET state and no channel of the DRF mode group has been selected. The mode group changes internally to JOG with the +/- key and the handwheel, and the axis moves. After the JOG motion has ended, a change back to AUTO is also made internally.

Bit 1:

Position with AxFrame.

The function 'JOG to position' considers all axial frames and, in the case of an axis configured as geometry axis, the tool length offset.

Bit 2:

Travel in opposite direction.

The functions 'JOG to position' and 'Approach machine fixed point manually' allow travel in opposite direction, i.e. away from the specified position.

Bit 3:

Tool radius offset.

MD21020 $MC_WORKAREA_WITH_TOOL_RADIUS is active with JOG motions of the geometry axes.

Bit 4:

Alarm suppression operating range limit in the basic coordinate system in JOG.

Alarms that would be output in JOG when an operating range limit is reached in the basic coordinate system, are suppressed.

Bit 5:

Alarm suppression operating range limit in the workpiece coordinate system in JOG.

Alarms that would be output in JOG when an operating range limit is reached in the workpiece coordinate system, are suppressed.

Bit 6, 7:

JOG of circles:

Bit 7 and bit 6 = 0: traversing the 2nd geometry axis of the active plane to PLUS for radius increase, traversing to MINUS for radius decrease independently of inner or outer machining being active.

Bit 7 = 1 and bit 6 = 0: traversing the 2nd geometry axis of the active plane to PLUS always travels in the direction of the limiting circle. This means that the radius is increased on inner machining and decreased on outer machining.

Bit 7 = 1 and bit 6 = 1: traversing the 2nd geometry axis of the active plane to MINUS always travels in the direction of the limiting circle. This means that the radius is increased on inner machining and decreased on outer machining.

Bits 8-31:

Currently unassigned.

10750	SPRINT_FORMAT_P_CODE			N12	PGA	
-	String coding of the SPRINT format %P			DWORD	PowerOn	
-						
-	-	0	0	2	7/2	

Description: Description:

Specification of the character or punched tape code used to code the string which the SPRINT command generates with format control character %P:

0: ASCII

1: ISO (DIN66024)

2. EIA (RS-244)

10751	SPRINT_FORMAT_P_DECIMAL			N12	PGA	
-	Parameterization of the SPRINT format %P			DWORD	PowerOn	
-						
-	-	0	0	1	7/2	

Description: Description:

Parameterization of the format description %n.mP of the SPRINT command

Value range:

0: The format specification %n.mP generates a string from a transfer parameter of type REAL or INT consisting of an integer with n + m places. The first n places represent the integer places and the following m places the decimal places of the transfer parameter. Missing decimal places are filled with 0. If there are more than m decimal places, the number is rounded. Missing integer places are filled with spaces.

1: The format specification %n.mP generates a string from a transfer parameter of type REAL or INT that consists of a decimal number with up to n integer places, the decimal point and m decimal places, which are filled with 0 or rounded as necessary.

10760	G53_TOOLCORR			N12	FBFA	
-	Method of operation of G53, G153 and SUPA			DWORD	NEW CONF	
-						
-	-	0	0	3	7/2	

Description: With this MD you define whether tool length offset and tool radius offset are also to be suppressed with language commands G53, G153 and SUPA

The machine data is bit-coded.

Bit 0 = 0: G53, G153 and SUPA cause block-by-block suppression of work offsets. The active tool length offset and tool radius offset remain active.

Bit 0 = 1: G53, G153 and SUPA cause block-by-block suppression of work offsets, active tool length offset and tool radius offset. The tool length behavior can be modified with bit 1.

Bit 1 is only evaluated, if the value of bit 0 is 1.

Bit1 = 0: with bit 0 set, the tool length is always suppressed with G53, G153 and SUPA.

Bit1 = 1: with bit 0 set the tool length is only suppressed with G53, G153 and SUPA, if a cutting edge is not selected in the same block (this can also be the cutting edge that is already active).

10800	EXTERN_CHAN_SYNC_M_NO_MIN			EXP, N12	H2	
-	1st M function for channel synchronization			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	

Description: M number of the first M function which can be used to perform a channel (program) synchronization in ISO2/3 mode.

To avoid conflicts with standard M functions the lowest permissible value is 100. If you enter a value between 0 and 99, alarm 4170 will be issued.

10802	EXTERN_CHAN_SYNC_M_NO_MAX			EXP, N12	H2	
-	Last M function for channel synchronization			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	

Description: M number of the last M function which can be used to perform a channel (program) synchronization in ISO2/3 mode.

In combination with MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN, the machine data defines an M number range reserved for channel synchronization. This range may be a maximum of 10 times the number of channels as only 10 WAIT marks may be set for each channel.

Alarm 4170 is output if a value is entered between 0 and 99 or less than MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN.

10804	EXTERN_M_NO_SET_INT			EXP, N12	H2,K1	
-	M function to activate ASUB			DWORD	PowerOn	
-						
-	-	96	-	-	7/2	

Description: M function number used to activate an interrupt program (ASUB) in ISO2/3 mode. The interrupt program is always started by the 1st high-speed input of the numerical control.

The M number defined in the machine data replaces M96 in external language mode.

Restrictions: Refer to MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,

MD10715 $MN_M_NO_FCT_CYCLE,

MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,

MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,

MD10804 $MN_EXTERN_M_NO_SET_INT

MD10806 $MN_EXTERN_M_NO_DISABLE_INT,

MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,

MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX

MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

$MC_NIBBLE_PUNCH_CODE

10806	EXTERN_M_NO_DISABLE_INT			EXP, N12	H2,K1	
-	M function to deactivate ASUB			DWORD	PowerOn	
-						
-	-	97	-	-	7/2	

Description: M function number used to deactivate an interrupt program (ASUB) in ISO2/3 mode.

The M number defined in the machine data replaces M97 in external language mode.

Restrictions: refer to MD10715 $MN_M_NO_FCT_CYCLE

MD10714 $MN_M_NO_FCT_EOP,

MD10715 $MN_M_NO_FCT_CYCLE,

MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,

MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,

MD10804 $MN_EXTERN_M_NO_SET_INT

MD10806 $MN_EXTERN_M_NO_DISABLE_INT,

MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,

MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX

MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

10808	EXTERN_INTERRUPT_BITS_M96			EXP, N12	FBFA	
-	Activate interrupt program (ASUB)			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	

Description: Setting the various bits can influence the processing of the interrupt routine activated by M96 P...

Bit 0 = 0,

No interrupt program possible, M96/M97 are normal M functions

Bit 0 = 1,

Using M96/M97 to activate an interrupt program is allowed

Bit 1 = 0,

Continue processing part program at the final position of the next block after the interrupt block

Bit 1 = 1,

Continue processing part program from interrupt position

Bit 2 = 0,

The interrupt signal immediately interrupts the current block and starts the interrupt routine

Bit 2 = 1,

The interrupt routine will not be started until the end of the block

Bit 3 = 0,

Interrupt machining cycle at an interupt signal

Bit 3 = 1,

Do not start interrupt program until the end of a machining cycle.

10810	EXTERN_MEAS_G31_P_SIGNAL			EXP, N12	FBFA	
-	Config. of measuring inputs for G31 P..			BYTE	PowerOn	
-						
-	4	1, 1, 1, 1	0	3	7/2	

Description: This machine data defines the assignment of measurement inputs 1 and 2 to the P numbers programmed with G31 P1 (- P4). Themachine data is bit-coded. Only bits 0 and 1 are evaluated. For example, if bit 0 = 1 in MD10810 $MN_EXTERN_MEAS_G31_P_SIGNAL[1], the 1st measurement input is activated with G31 P2. If MD10810 $MN_EXTERN_MEAS_G31_P_SIGNAL[3]=2, the 2nd measurement input is activated with G31 P4.

Bit 0: = 0, Do not evaluate measurement input 1 with G31 P1 (- P4)

Bit 0: = 1, Activate measurement input 1 with G31 P1 (- P4)

Bit 1: = 0, Do not evaluate measurement input 2 with G31 P1 (- P4)

Bit 1: = 1, Activate measurement input 2 with G31 P1 (- P4)

10812	EXTERN_DOUBLE_TURRET_ON			EXP, N12	FBFA	
-	Double turret with G68			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	

Description: This machine data is used to determine whether double-slide machining (channel synchronization for 1st and 2nd channel) is to be started using G68 or whether the second tool of a double turret (= two closely-linked tools at a distance defined in the MD42162 SC_EXTERN_DOUBLE_TURRET_DIST) is to be activated.

FALSE:

Channel synchronization for double-slide machining

TRUE:

Load 2nd tool of a double turret (that is, activate $SC_EXTERN_DOUBLE_TURRET_DISTANCE as additive zero offset and mirroring around Z axis)

10814	EXTERN_M_NO_MAC_CYCLE			EXP, N12	H2,K1	
-	Macro call via M function			DWORD	PowerOn	
-						
-	30	-1, -1, -1, -1, -1, -1, -1, -1...	-	-	7/2	

Description: A macro is called with this M number.

The name of the subprogram is stated in MD10815 $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n].

If the M function specified with MD10814 $MN_EXTERN_M_NO_MAC_CYCLE[n] is programmed in a part program block, the subprogram defined in MD10815 $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n] is started. All addresses programmed in the block are written into the corresponding variables.

If the M function is programmed again in the subprogram, there is no longer a replacement by a subprogram call.

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE[n] is only active in the external language mode G291.

The subprograms configured with MD10815 $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n] must not be active simultaneously in a block (part program line), i.e. only one M function replacement can become active in any one block. Neither an M98 nor a modal subprogram call may be programmed in the block with the M function replacement.

Subprogram return and the part program end are also not permitted. Alarm 14016 is issued in case of a conflict. Restrictions: see MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,

MD10715 $MN_M_NO_FCT_CYCLE,

MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,

MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,

MD10804 $MN_EXTERN_M_NO_SET_INT

MD10806 $MN_EXTERN_M_NO_DISABLE_INT,

MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,

MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX

MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

10815	EXTERN_M_NO_MAC_CYCLE_NAME			EXP, N12	H2	
-	Name of subroutine for M function macro call			STRING	PowerOn	
-						
-	30	...	-	-	7/2	

Description: Name of the subprogram started by a call via the M function defined by MD10814 $MN_EXTERN_M_NO_MAC_CYCLE[n].

10816	EXTERN_G_NO_MAC_CYCLE			EXP, N12	FBFA	
-	Macro call via G function			DOUBLE	PowerOn	
-						
-	50	-1., -1., -1., -1., -1., -1., -1., -1....	-	-	7/2	

Description: G number for calling a macro.

The name of the subprogram is stated in MD10817 $MN_EXTERN_G_NO_MAC_CYCLE_NAME[n].

If the G function specified with MD10816 $MN_EXTERN_G_NO_MAC_CYCLE[n] is programmed in a part program block, the subprogram defined in MD10817 $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n] is started. All addresses programmed in the block are written in the corresponding $C_xx variables.

No subprogram call is executed if a subprogram call is already active via an M/G macro or an M replacement. If a standard G function is programmed in this case, this code is executed. Otherwise, alarm 12470 is issued.

MD10816 $MN_EXTERN_G_NO_MAC_CYCLE[n] is only active in the external language mode G291.

Only a single subprogram call may be included in any one block. This means that only a single M/G function replacement may be programmed in a block, and no additional subprogram (M98) or cycle call may be included in the block.

Furthermore, a subprogram return and a part program end are not permitted in the same block.

Alarm 14016 is issued in case of a conflict.

10817	EXTERN_G_NO_MAC_CYCLE_NAME			EXP, N12	FBFA	
-	Name of subroutine for G function macro call			STRING	PowerOn	
-						
-	50	...	-	-	7/2	

Description: Name of the subprogram started by call via the G function defined by MD10816 $MN_EXTERN_G_NO_MAC_CYCLE[n].

10818	EXTERN_INTERRUPT_NUM_ASUP			EXP, N12	FBFA	
-	Interrupt number for ASUB start (M96)			BYTE	PowerOn	
-						
-	-	1	1	8	7/2	

Description: Number of the interrupt input starting an asynchronous subprogram activated in ISO mode. (M96 <program number>)

10820	EXTERN_INTERRUPT_NUM_RETRAC			EXP, N12	FBFA	
-	Interrupt number for rapid retraction (G10.6)			BYTE	PowerOn	
-						
-	-	2	1	8	7/2	

Description: Number of the interrupt input triggering rapid retraction to the position programmed with G10.6 in ISO mode.

10830	EXTERN_PRINT_DEVICE			EXP, N12	FBFA	
-	Output device for ISOPRINT			STRING	PowerOn	
-						
-	-		-	-	7/2	

Description: Path of output device for ISOPRINT

10831	EXTERN_PRINT_MODE			EXP, N12	FBFA	
-	Parameterize output device for ISOPRINT			DWORD	PowerOn	
-						
-	-	0	0	63	7/2	

Description:

```
Parameterize output device for ISOPRINT
Bit 0: 0= Synchronous output
       1= Asynchronous output
Bit 1: 0= Exclusive assignment
       1= Shared assignment
Bit 2: Output of DC2 (H12) on opening
Bit 3: Output of DC4 (H14) on closing
Bit 4: Output string concluded with LF
Bit 5: Output string concluded with CR + LF
```

10880	MM_EXTERN_CNC_SYSTEM			N01, N12	FBFA	
-	Definition of the control system to be adapted			DWORD	PowerOn	
-						
-	-	1	1	5	7/2	

Description:

```
Definition of the external CNC system whose part programs are to be executed
on the SINUMERIK control in addition to SINUMERIK code (ISO_1):
1: ISO_21:  System Fanuc0 milling (5.1 and higher)
2: ISO_31:  System Fanuc0 turning (P5.2 and higher)
3: External language via OEM application (P6.2 and higher)
4: ISO_22: System Fanuc0 Milling (P7 and higher)
5: ISO_32: System Fanuc0 Turning (P7 and higher)
```

10881	MM_EXTERN_GCODE_SYSTEM			N01, N12	FBFA	
-	ISO_3 Mode: GCodeSystem			DWORD	PowerOn	
-						
-	-	0	0	2	7/2	

Description:

```
Definition of the GCodeSystem to be actively executed in ISO_3 Mod (turning):
Value = 0 :   ISO_3: Code system B
Value = 1 :   ISO_3: Code system A
Value = 2 :   ISO_3: Code system C
```

10882	NC_USER_EXTERN_GCODES_TAB			N12	FBFA	
-	List of user-specific G commands of an external NC language			STRING	PowerOn	
-						
-	60	...	-	-	2/2	

Description:

```
List of G commands of external NC languages which have been reconfigured by
the user.
The implemented G commands are to be taken from the current Siemens documen-
tation for this programming language.
The list is structured as follows:
Even address:              G command to be changed
Subsequent odd address:    New G command
Only G codes can be reconfigured, e.g.: G20, G71.
```

10884	EXTERN_FLOATINGPOINT_PROG			N12	FBFA	
-	Evaluation of programmed values without decimal point			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	

Description: This MD defines how programmed values without a decimal point are evaluated:

0: Values without a decimal point are interpreted in internal units. For example, X1000 = 1 mm (for 0.001 mm input resolution) X1000.0 = 1000 mm

1: Values without decimal point are interpreted as mm, inch or degrees. For example, X1000 = 1000 mm X1000.0 = 1000 mm

Related to:

MD10886 $MN_EXTERN_INCREMENT_SYSTEM

10886	EXTERN_INCREMENT_SYSTEM			N12	FBFA	
-	Incremental system in external language mode			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	

Description: This machine data is active for external programming languages, that is if MD18800 $MN_MM_EXTERN_LANGUAGE = 1.

This machine data specifies which incremental system is active:

```
0: Incremental system  IS-B = 0.001 mm/degree
                            = 0.0001 inch
1: Incremental system  IS-C = 0.0001 mm/degree
                            = 0.00001 inch
```

Related to:

MD10884 $MN_EXTERN_FLOATINGPOINT_PROG

10888	EXTERN_DIGITS_TOOL_NO			N12	FBFA	
-	Digits for T number in ISO mode			BYTE	PowerOn	
-						
-	-	2	0	8	7/2	

Description: This machine data is only active when MD10880 $MN_MM_EXTERN_CNC_SYSTEM == 2.

Number of digits of the tool number in the programmed T word.

From the programmed T word, the number of leading digits specified in MD10888 $MN_EXTERN_DIGITS_TOOL_NO are interpreted as the tool number.

The following digits address the offset memory.

Entering a value > 0 in MD $MN_EXTERN_DIGITS_OFFSET_NO renders MD $MN_EXTERN_DIGITS_TOOL_NO ineffective.

$MN_EXTERN_DIGITS_OFFSET_NO has priority over $MN_EXTERN_DIGITS_TOOL_NO.

10889	EXTERN_DIGITS_OFFSET_NO			N12	FBFA	
-	Digits for offset number in ISO mode			BYTE	PowerOn	
-						
-	-	0	0	8	7/2	

Description: This machine data is only active when $MN_MM_EXTERN_CNC_SYSTEM == 2.

Number of digits of the offset number in the programmed T word.

From the programmed T word, the number of leading digits specified in $MN_EXTERN_DIGITS_OFFSET_NO are interpreted as the offset number.

The following digits address the tool number.

10890	EXTERN_TOOLPROG_MODE			N12	FBFA	
-	Tool change programming for external language			DWORD	PowerOn	
-						
-	-	0x0	-	-	7/2	

Description:

```
Configuration for programming the tool change in an external programming language:
Bit0=0:
Only active if MD10880 $MN_MM_EXTERN_CNC_SYSTEM =2: The tool number and offset number are programmed in the T word. $MN_DIGITS_TOOLNO defines the number of leading digits that form the tool number.
Example:
$MN_DIGITS_TOOLNO = 2
T=1234    ; Tool number 12,
          ; Offset number 34
Bit0=1:
Only active if MD10880 $MN_MM_EXTERN_CNC_SYSTEM =2: Only the tool number is programmed in the T word. Offset number = Tool number. $MN_DIGITS_TOOLNO is irrelevant.
Example:
T=12      ; Tool number 12
          ; Offset number 12
Bit1=0:
Only active if MD10880 $MN_MM_EXTERN_CNC_SYSTEM =2: A leading 0 is added if the number of digits programmed in the T word is the same as that in MD10888 $MN_EXTERN_DIGITS_TOOL_NO.
Bit1=1:
Only active if MD10880 $MN_MM_EXTERN_CNC_SYSTEM =2: If the number of digits programmed in the T word is equal to the number of digits defined in MD10888 $MN_EXTERN_DIGITS_TOOL_NO, the programmed number is both the offset number and the tool number
Bit2=0:
Only active if MD10880 $MN_MM_EXTERN_CNC_SYSTEM =2: ISO T offset selection only with D (Siemens cutting edge number)
Bit2=1:
Only active if MD10880 $MN_MM_EXTERN_CNC_SYSTEM =2: ISO T offset selection only with H ($TC_DPH[t,d])
Bit6=0:
The offset memories for the tool length and tool radius are linked so that tool length and tool radius are always selected when either H or D is programmed.
Bit6=1:
The offset memories for the tool length and tool radius are not linked, so that the number of the tool length value is selected when H is programmed, and the number of the tool radius value is selected when D is programmed.
Bit7=0:
Only active if $MN_MM_EXTERN_CNC_SYSTEM =2. If T substitution ( $MN_T_NO_FCT_CYCLE_NAME ) is active, the H number programmed in the T word is transferred to the cycle in the variable $C_D.
Bit7=1:
Only active if $MN_MM_EXTERN_CNC_SYSTEM =2. If T substitution ( $MN_T_NO_FCT_CYCLE_NAME ) is active, the Siemens cutting edge number D corre-
```

sponding to the H number programmed in the T word is transferred to the cycle in the variable $C_D.

10900	INDEX_AX_LENGTH_POS_TAB_1			N09	T1	
-	Number of positions for indexing axis table 1			DWORD	Reset	
-						
-	-	0	0	60	7/2	

Description: The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis. The number of indexing positions used in table 1 is defined by MD10900 $MN_INDEX_AX_LENGTH_POS_TAB_1.

These indexing positions must be assigned valid values in table 1. Any indexing positions in the table above the number specified in the machine data are ignored. Up to 60 indexing positions (0 to 59) can be entered in the table.

Table length = 0 means that the table is not evaluated. If the length is not equal to 0, then the table must be assigned to an axis with MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB.

If the indexing axis is defined as a rotary axis (MD30300 $MA_IS_ROT_AX = "1") with modulo 360° (MD30310 $MA_ROT_IS_MODULO = "1"), the machine data defines the last indexing position after which, with a further traversing movement in the positive direction, the indexing positions begin again at 1.

Special cases:

Alarm 17090 "Value violates upper limit" if values over 60 are entered in MD10900 $MN_INDEX_AX_LENGTH_POS_TAB_1.

Related to:

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD10910 $MN_INDEX_AX_POS_TAB_1 (indexing position table 1)

MD30300 $MA_IS_ROT_AX(rotary axis)

MD30310 $MA_ROT_IS_MODULO (modulo conversion for rotary axis)

10910	INDEX_AX_POS_TAB_1			N09	T1	
mm/inch, degrees	Indexing position table 1			DOUBLE	Reset	
-						
-	60	0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/2	

Description:

The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis.

[n] = indexing for the entry of the indexing positions in the indexing position table.

Range: 0 y n x 59, where 0 corresponds to the 1st indexing position and 59 to the 60th indexing position.

Note.

Programming with the absolute indexing position (e.g. CAC) starts with indexing position 1. This corresponds to the indexing position with indexing n = 0 in the indexing position table.

The following should be noted when entering the indexing positions:

- Up to 60 different indexing positions can be stored in the table.
- The 1st entry in the table corresponds to indexing position 1; the nth entry corresponds to indexing position n.
- The indexing positions must be entered in the table in ascending order (starting with the negative and going to the positive traversing range) with no gaps between the entries. Consecutive position values must not be identical.
- If the indexing axis is defined as a rotary axis (MD30300 $MA_IS_ROT_AX = "1") with modulo 360° (MD30310 $MA_ROT_IS_MODULO = "1"), then the position values are limited to a range of 0° x pos. < 360°.

The number of indexing positions used in the table is defined by MD10900 $MN_INDEX_AX_LENGTH_POS_TAB_1.

Entering the value 1 in axial MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB assigns indexing position table 1 to the current axis.

Special cases:

Alarm 17020 "Illegal array index" if over 60 positions are entered in the table.

Related to:

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD10900 $MN_INDEX_AX_LENGTH_POS_TAB_1 (number of indexing positions used in table 1)

MD30300 $MA_IS_ROT_AX(rotary axis)

MD30310 $MA_ROT_IS_MODULO (modulo conversion for rotary axis)

10920	INDEX_AX_LENGTH_POS_TAB_2			N09	T1	
-	Number of positions for indexing axis table 2			DWORD	Reset	
-						
-	-	0	0	60	7/2	

Description: The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis. The number of indexing positions used in table 2 is defined by MD10920 $MN_INDEX_AX_LENGTH_POS_TAB_2.

These indexing positions in table 2 must be assigned valid values. Any indexing positions in the table above the number specified in the machine data are ignored.

Up to 60 indexing positions (0 to 59) can be entered in the table.

Table length = 0 means that the table is not evaluated. If the length is not equal to 0, the table must be assigned to an axis with MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB.

If the indexing axis is defined as a rotary axis (MD30300 $MA_IS_ROT_AX = "1") with modulo 360° (MD30310 $MA_ROT_IS_MODULO = "1"), the machine data defines the last indexing position after which, with a further traversing movement in the positive direction, the indexing positions begin again at 1.

Not relevant for tool magazines (revolvers, chain magazines)

Special cases:

Alarm 17090 "Value violates upper limit" if a value over 60 is entered in MD10920 $MN_INDEX_AX_LENGTH_POS_TAB_2.

Related to:

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD10930 $MN_INDEX_AX_POS_TAB_2 (indexing position table 2)

MD30300 $MA_IS_ROT_AX(rotary axis)

MD30310 $MA_ROT_IS_MODULO (modulo conversion for rotary axis)

10930	INDEX_AX_POS_TAB_2			N09	T1	
mm/inch, degrees	Indexing position table 2			DOUBLE	Reset	
-						
-	60	0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/2	

Description: The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis.

[n] = indexing for the entry of the indexing positions in the indexing position table.

Range: 0 y n x 59, where 0 corresponds to the 1st indexing position and 59 to the 60th indexing position.

Note:

Programming with the absolute indexing position (e.g. CAC) starts with indexing position 1. This corresponds to the indexing position with indexing n = 0 in the table.

The following should be noted when entering the indexing positions:

- Up to 60 different indexing positions can be stored in the table.
- The 1st entry in the table corresponds to indexing position 1; the nth entry corresponds to indexing position n.
- The indexing positions should be entered in the table in ascending order (starting with the negative and going to the positive traversing range) with no gaps between the entries. Consecutive position values must not be identical.
- If the indexing axis is defined as a rotary axis (MD30300 $MA_IS_ROT_AX = "1") with modulo 360° (MD30310 $MA_ROT_IS_MODULO = "1"), then the position values are limited to a range of 0° x pos. < 360°.

The number of indexing positions used in the table is defined by MD10920 $MN_INDEX_AX_LENGTH_POS_TAB_2.

Entering the value 1 in axial MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB assigns indexing position table 1 to the current axis.

Special cases:

Alarm 17020 "Illegal array index" if over 60 positions are entered in the table.

Related to:

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD10920 $MN_INDEX_AX_LENGTH_POS_TAB_2 (num ber of indexing positions used in table 2)

MD30300 $MA_IS_ROT_AX(rotary axis)

MD30310 $MA_ROT_IS_MODULO (modulo conversion for rotary axis)

10940	INDEX_AX_MODE			EXP	T1	
-	Settings for indexing position			DWORD	PowerOn	
-						
-	-	0	0	1	7/2	

Description: Affects the display of indexing positions (AA_ACT_INDEX_AX_POS_NO and aaActIndexAxPosNo).

Bit 0 = 0:

Indexing position display changes on reaching/passing the indexing position (indexing range lies between the indexing positions, compatible behavior).

Bit 0 = 1:

Indexing position display changes on passing the half indexing axis position (indexing range lies quasi symmetrically round the indexing position)

11100	AUXFU_MAXNUM_GROUP_ASSIGN			N01, N07, N02	H2	
-	Number of auxiliary functions distr. amongst aux. fct. groups			DWORD	PowerOn	
-						
-	-	1	1	255	7/2	

Description: The maximum number of auxiliary functions that can be assigned to a group by

AUXFU_ASSIGN_TYPE,

AUXFU_ASSIGN_EXTENTION,

AUXFU_ASSIGN_VALUE and

AUXFU_ASSIGN_GROUP.

This number includes only the user-defined auxiliary functions, not the pre-defined auxiliary functions.

Related to:

MD22010 $MC_AUXFU_ASSIGN_TYPE[n].

11110	AUXFU_GROUP_SPEC			N07	H2	
-	Auxiliary function group specification			DWORD	PowerOn	
-						
-	168	0x81, 0x21, 0x41, 0x41, 0x41, 0x41, 0x41...	-	-	7/2	

Description:

Defines the output options for the auxiliary functions belonging to a group.

However, the output option of an auxiliary function configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex] or MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] has a higher priority.

Bit 0=1"Normal" acknowledgement after an OB1 cycle

Bit 1=1"Quick" acknowledgement with OB40

Bit 2=1No predefined auxiliary function

Bit 3=1No output to PLC

Bit 4=1Spindle response after acknowledgement by the PLC

Bit 5=1Output prior to motion

Bit 6=1Output during motion

Bit 7=1Output at end of block

Bit 8=1No output after block search types 1, 2, 4

Bit 9=1Collection during block search type 5 (SERUPRO)

Bit 10 = 1 No output during block search type 5 (SERUPRO)

Bit 11 = 1Cross-channel auxiliary function (SERUPRO)

Bit 12 = 1Output via synchronized action

Bit 13 = 1 Implicit auxiliary function

Bit 14 = 1 Active M01

Bit 15 = 1 No output during running-in test

Bit 16 = 1 Nibbling off

Bit 17 = 1 Nibbling on

Bit 18 = 1 Nibbling

The MD must be defined for each existing auxiliary function group.

The index [n] corresponds to the auxiliary function group: 0...63

The assignment of individual auxiliary functions to specific groups is defined in channel-specific machine data (AUXFU_PREDEF_TYPE, AUXFU_PREDEF_EXTENTION, AUXFU_PREDEF_VALUE, AUXFU_PREDEF_GROUP, AUXFU_ASSIGN_TYPE, AUXFU_ASSIGN_EXTENTION, AUXFU_ASSIGN_VALUE, AUXFU_ASSIGN_GROUP).

M0, M1, M2, M17 and M30 are assigned to group 1 by default.

The specification of this group (0x81: output duration 1 OB1 pass, output at end of block) must not be changed.

All spindle-specific auxiliary functions (M3, M4, M5, M19, M70) are assigned to group 2 by default.

If several auxiliary functions with different output types (before / during / at end of motion) are programmed in one motion block, then the output of the individual auxiliary functions occurs in accordance with their output types.

All auxiliary functions are output simultaneously in a block without motion.

Default setting:

AUXFU_GROUP_SPEC[0]=81H

AUXFU_GROUP_SPEC[1]=21H

AUXFU_GROUP_SPEC[2]=41H

```
...
AUXFU_GROUP_SPEC[n]=41H
```

11120	LUD_EXTENDED_SCOPE			N01	PG	
-	Function "program global user data (PUD)" is active			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	

Description: Activate function "Program-global user data (PUD)":

MD = 0: User data of the main program level are only active on this level.

MD = 1: User data of the main program level are also visible in the subprogram levels.

11140	GUD_AREA_SAVE_TAB			N01	-	
-	Additional saving for GUD modules			DWORD	Immediately	
-						
-	9	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description: This data indicates in which area the contents of the GUD module are also saved.

```
MD11140 $MN_GUD_AREA_SAVE_TAB[0] : SGUD_DEF
MD11140 $MN_GUD_AREA_SAVE_TAB[1] : MGUD_DEF
MD11140 $MN_GUD_AREA_SAVE_TAB[2] : UGUD_DEF
MD11140 $MN_GUD_AREA_SAVE_TAB[3] : GUD4_DEF
MD11140 $MN_GUD_AREA_SAVE_TAB[4] : GUD5_DEF
MD11140 $MN_GUD_AREA_SAVE_TAB[5] : GUD6_DEF
MD11140 $MN_GUD_AREA_SAVE_TAB[6] : GUD7_DEF
MD11140 $MN_GUD_AREA_SAVE_TAB[7] : GUD8_DEF
MD11140 $MN_GUD_AREA_SAVE_TAB[8] : GUD9_DEF
BitNo.   Hexadec.        Meaning when bit is set
Value
0 (LSB)  0x00000001    TOA area
```

11160	ACCESS_EXEC_CST			N01	-	
-	Execution right for /_N_CST_DIR			BYTE	PowerOn	
-						
-	-	7	-	-	7/2	

Description: Execution right assigned to the program stored in directory /_N_CST_DIR :

Value 0: Siemens password

Value 1: Machine OEM password

Value 2: Password of setup engineer, service

Value 3: End user password

Value 4: Keyswitch position 3

Value 5: Keyswitch position 2

Value 6: Keyswitch position 1

Value 7: Keyswitch position 0

Machine data can only be written with values 0 and 1, and with the corresponding password also active.

11161	ACCESS_EXEC_CMA			N01	-	
-	Execution right for /_N_CMA_DIR			BYTE	PowerOn	
-						
-	-	7	-	-	7/2	

Description: Execution right assigned to the programs stored in directory /_N_CMA_DIR :
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
Machine data can only be written with values 0 and 1, and with the corresponding password also active.

11162	ACCESS_EXEC_CUS			N01	-	
-	Execution right for /_N_CUS_DIR			BYTE	PowerOn	
-						
-	-	7	-	-	7/3	

Description: Execution right assigned to the programs stored in directory /_N_CUS_DIR :
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
Machine data can only be written with values 0, 1 and 2, and with the corresponding password also active.

11165	ACCESS_WRITE_CST			N01	-	
-	Write protection for directory /_N_CST_DIR			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	

Description: Set write protection for cycle directory /_N_CST_DIR:
Assigned to the programs:
Value -1: Keep the value currently set
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11166	ACCESS_WRITE_CMA			N01	-	
-	Write protection for directory /_N_CMA_DIR			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	

Description:

```
Set write protection for cycle directory /_N_CMA_DIR:
Assigned to the programs:
Value -1: Keep the value currently set
Value  0: Siemens password
Value  1: Machine OEM password
Value  2: Password of setup engineer, service
Value  3: End user password
Value  4: Keyswitch position 3
Value  5: Keyswitch position 2
Value  6: Keyswitch position 1
Value  7: Keyswitch position 0
```

The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11167	ACCESS_WRITE_CUS			N01	-	
-	Write protection for directory /_N_CUS_DIR			DWORD	PowerOn	
-						
-	-	-1	-	-	7/3	

Description:

```
Set write protection for cycle directory /_N_CUS_DIR:
Assigned to the programs:
Value -1: Keep the value currently set
Value  0: Siemens password
Value  1: Machine OEM password
Value  2: Password of setup engineer, service
Value  3: End user password
Value  4: Keyswitch position 3
Value  5: Keyswitch position 2
Value  6: Keyswitch position 1
Value  7: Keyswitch position 0
```

The machine data can only be written with values 0, 1 and 2, and with the corresponding password also active.

11170	ACCESS_WRITE_SACCESS			N01	-	
-	Write protection for _N_SACCESS_DEF			BYTE	PowerOn	
-						
-	-	7	-	-	7/2	

Description: Set write protection for definition file /_N_DEF_DIR/_N_SACCESS_DEF:

Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0

The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11171	ACCESS_WRITE_MACCESS			N01	-	
-	Write protection for _N_MACCESS_DEF			BYTE	PowerOn	
-						
-	-	7	-	-	7/2	

Description: Set write protection for definition file /_N_DEF_DIR/_N_SACCESS_DEF:

Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0

The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11172	ACCESS_WRITE_UACCESS			N01	-	
-	Write protection for _N_UACCESS_DEF			BYTE	PowerOn	
-						
-	-	7	-	-	7/3	

Description: Set write protection for definition file /_N_DEF_DIR/_N_UACCESS_DEF:

Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0

The machine data can only be written with values 0, 1 and 2, and with the corresponding password also active.

11200	INIT_MD			EXP, N01	IAF,IAD,IA	
-	Standard machine data loaded at next Power On			BYTE	PowerOn	
-						
-	-	0	-	-	7/2	

Description:

A power on must be triggered after setting MD11200 $MN_INIT_MD. The function is executed and the MD reset to "0" at power on.

Meaning of the input:

Bit 0 set:

All machine data (with the exception of the memory-configuring data) will be overwritten with the compiled values at the next NCK power on.

Bit 1 set:

All memory-configuring machine data will be overwritten with the compiled values at the next NCK power on.

Bit 2 set:

The OEM machine data brought in by compile cycles will be deleted from the buffered memory at the next power on.

Bit 3 set:

All setting data will be overwritten with the compiled values at the next power on.

Bit 4 set:

All option data will be overwritten with the compiled values at the next power on.

INIT_MD is automatically set to 0 at power on.

Memory configuring MDs are described in:

References: /IAD/, Installation and Setup Guide, Memory Configuration

- MD10010 $MN_ASSIGN_CHAN_TO_MODE_GROUP
- All machine data starting with "MM_"

MD 18000 - 18999 (general MD)

MD 28000 - 28999 (channel-specific MD)

MD 38000 - 38999 (axis-specific MD)

11210	UPLOAD_MD_CHANGES_ONLY			N01, N05	IAD	
-	Machine data backup of changed machine data only			BYTE	Immediately	
-						
-	-	0xFF	-	-	7/3	

Description:

Either all data or only those data which differ from the default setting can be set to be output when creating standard archives (ARC) and copying 'NC active data'.

Bit0(LSB) Effectiveness of the differential upload with INI/TEA files

0: All data are output

1: Only those MDs which have changed in comparison to the compiled values are output

Bit1 is reserved and acts like bit 0

Bit2 Change to an array element

0: Complete array is output

1: Only those elements of an array which have changed are output

Bit3 R parameters (only for INI files)

0: All R parameters are output

1: Only those R parameters not equal to '0' are output

Bit4 Frames (only for INI files)

0: All frames are output

1: Only those frames which are not zero frames are output.

Bit5 Tool data (cutting edge parameters) (only for INI files)

0: All tool data are output

1: Only those tool data not equal to '0' are output.

Bit6 Buffered system variables ($AC_MARKER[], $AC_PARAM[] only for INI files)

0: All system variables are output

1: Only those system variables not equal to '0' are output

Bit7 Synchronized actions GUD (for INI files only)

0: All Syna GUD are output

1: Only those Syna GUD not equal to '0' are output

Active: The change in the data becomes active on the start of the upload for the next range.

11220	INI_FILE_MODE			N01, N05	G2	
-	Error response to INI file errors			BYTE	Reset	
-						
-	-	1	0	2	7/2	

Description:

If, while reading machine data files (INI files) into controls, data are read in

- that are faulty or
- do not agree with the check sum

then alarms are generated and the reading in may be aborted. The following control behaviors can be selected via machine data

settings:

0: Output of an alarm, abort on detection of 1st error. (As SW versions 1 and 2).

1: Output of an alarm, continuation of execution. An alarm with the number of errors is output at the end of execution.

2: Execution continues despite possible errors. An alarm with the number of errors is output at the end of execution.

11230	MD_FILE_STYLE			N01, N05	IAD	
-	Structure of machine data backup files			BYTE	Immediately	
LINK						
-	-	0x3	-	-	7/3	

Description: Appearance of a machine data file at 'upload'

Bit 0 (LSB): Line check sum is generated

Bit 1:

MD numbers are generated

Bit 2:

Channel axis name as field index with axis-MD in the TEA file

Bit 3:

With an NCU-link, the MDs of the LINK axes are also output.

Bit 4:

All local axes are output (even when they are not activated by MD20070 $MC_AXCONF_MACHAX_USED)

Active:

The change in the data becomes active on the start of the upload for the next area.

Default setting:

The line check sums and MD numbers are generated, but not channel names as field index with axis-MD.

11280	WPD_INI_MODE			N01	IAD	
-	Handling of INI files in workpiece directory			BYTE	PowerOn	
-						
-	-	0	0	1	7/2	

Description: Processing mode of INI files in the workpiece directory:

Value = 0:

An INI file, _N_werkstück_INI, stored in the workpiece directory is executed on the first NC start after workpiece selection.

Value = 1:

INI files with the names of the selected part program and extensions are executed on the first NC start after workpiece selection

SEA,

GUD,

RPA,

UFR,

PRO,

TOA,

TMA and

CEC

.

11294	SIEM_TRACEFILES_CONFIG			EXP	-	
-	Configuration of the SIEM* trace file			DWORD	PowerOn	
-						
-	-	0	-	-	2/2	

Description: Configuration of the tracefiles SIEM*

Bit0:

Additional information about the PDUs sent is to be entered in _N_SIEMDOMAINSEQ_MPF for download

Bit1:

Additional information about the PDUs received is to be entered in _N_SIEMDOMAINSEQ_MPF for download

Bit2:

Trace of warm start and connection abort in_N_SIEMDOMAINSEQ_MPF

Bit4:

Additional information about the PDUs sent is to be entered in _N_SIEMDOMAINSEQ_MPF for upload

Bit5:

Additional information about the PDUs received is to be entered in _N_SIEMDOMAINSEQ_MPF for upload

11297	PROTOC_IPOCYCLE_CONTROL			N01	-	
-	Prevent overrun of IPO time level			BYTE	PowerOn	
-						
-	10	1, 1, 1, 1, 1, 1, 1, 1...	0	1	1/1	

Description: Setting whether an overflow of the time level is to be prevented during the recording of data in the time level of the IPO.

If applicable, data sets are discarded when the function is active, and are not entered in the log file in order to prevent an impending overflow of the IPO time level.

This may mean that data sets are also then lost if a level overflow would not yet have occurred with the function inactive.

11298	PROTOC_PREPTIME_CONTROL			N01	-	
-	Interruption time prep time level in seconds.			DOUBLE	PowerOn	
-						
-	10	1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0...	-	-	1/1	

Description: Time in seconds, for which the prep time level may be blocked. If the PREP does not manage to pass through within the set time, the cyclic events are not logged. It is thus ensured that operation cannot be completely blocked by data recording.

11300	JOG_INC_MODE_LEVELTRIGGRD			N01	H1,R1	
-	INC and REF in jog mode			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	

Description:

1: Jog mode for JOG-INC and reference point approach

JOG-INC:

When the traversing key is pressed in the required direction (e.g. +), the axis begins to traverse the set increment. If the key is released before the increment has been completely the traversed, the movement is interrupted and the axis stops. If the same key is pressed again, the axis completes the remaining distance-to-go until this is 0.

0: Continuous operation for JOG-INC and reference point approach

JOG-INC:

When the traversing key is pressed (first rising edge) the axis travels the whole set increment. If the same key is pressed again (second rising edge) before the axis has completed traversing the increment, the movement is aborted, i.e. not completed.

The differences in axis travel behavior between the jog mode and continuous operation in incremental traversing are described in detail in the relevant chapters.

For travel behavior in reference point approach see

References: /FB/, R1, "Reference Point Approach"

MD irrelevant for:

Continuous traversing (JOG continuous)

11310	HANDWH_REVERSE			N09	H1	
-	Threshold for direction change handwheel			BYTE	PowerOn	
-						
-	-	2	-	-	7/2	

Description:

Handwheel travel:

Value = 0:

No immediate travel in the opposite direction

Value > 0:

Immediate travel in the opposite direction if the handwheel is turned at least the stated number of pulses in the opposite direction.

Whether this machine data is also active for handwheel travel with DRF depends on bit10 of MD20624 $MC_HANDWH_CHAN_STOP_COND.

11320	HANDWH_IMP_PER_LATCH			N09	H1	
-	Handwheel pulses per detent position			DOUBLE	PowerOn	
-						
-	6	1., 1., 1., 1., 1., 1.	-	-	7/2	

Description: The connected handwheels are adapted to the control in MD11320 $MN_HANDWH_IMP_PER_LATCH.

The number of pulses generated by the handwheel for each handwheel detent position has to be entered. The handwheel pulse weighting must be defined separately for each connected handwheel (1 to 3). With this adaptation, each handwheel detent position has the same effect as one press of the traversing key in incremental traversal.

Entering a negative value reverses the direction of rotation of the handwheel.

Related to:

MD31090 $MA_JOG_INCR_WEIGHT (weighting of an increment of a machine axis for INC/manual).

11322	CONTOURHANDWH_IMP_PER_LATCH			N09	H1	
-	Contour handwheel pulses per detent position			DOUBLE	PowerOn	
-						
-	6	1., 1., 1., 1., 1., 1.	-	-	7/2	

Description: Adaptation factor to the hardware of the contour handwheel:

Enter the number of pulses issued per detent position by the contour handwheel.

Because of this normalization, a detent position of the contour handwheel corresponds to one press of a key with incremental jog processes.

Sign reversal reverses the direction of evaluation.

11324	HANDWH_VDI_REPRESENTATION			N01	OEM	
-	Display of handwheel number in VDI Interface			DWORD	PowerOn	
-						
-	-	0	0	1	7/2	

Description: The number of the handwheel is displayed in the channel/axis-specific signals of the

VDI interface:

Value = 0 :

Bit coded (1 of 3, only 3 handwheels can be displayed)

Value = 1 :

Binary coded (6 handwheels can be displayed)

11330	JOG_INCR_SIZE_TAB			EXP, N09	H1	
-	Increment size for INC/handwheel			DOUBLE	PowerOn	
-						
-	5	1., 10., 100., 1000., 10000.	-	-	7/2	

Description: In incremental traversal or handwheel travel, the number of increments to be traversed by the axis can be defined by the user, e.g. via the machine control panel.

In addition to the variable increment size (INCvar), 5 fixed increment sizes (INC...) can also be set.

The increment size for each of these 5 fixed increments is defined collectively for all axes by entering values in JOG_INCR_SIZE_TAB [n]. The default setting is INC1, INC10, INC100, INC1000 and INC10000.

The entered increment sizes are also active for DRF.

The size of the variable increment is defined in SD41010 $SN_JOG_VAR_INCR_SIZE.

Related to:

MD31090 $MA_JOG_INCR_WEIGHT (weighting of an increment for INC/manual)

NC/PLC interface signal DB3300 DBX1001.0-4,1005.0-4,1009.0-4 (Geometry axis 1-3 active machine function: INC1; ...; INC10000)

NC/PLC interface signal DB390x DBX5.0 - .5 (active machine function: INC1; ...; INC10000).

11346	HANDWH_TRUE_DISTANCE			N01	H1,P1,W1	
-	Handwheel default path or velocity			BYTE	PowerOn	
-						
-	-	1	0	7	7/2	

Description:

Setting the behavior for traversing with the handwheel, contour handwheel and with FDA=0:

Value = 1: (default value)

The default settings of the handwheel are path defaults. No pulses are lost. Residual axis motions occur as a result of the limitation to a maximal permissible velocity.

Value = 0:

The default settings of the handwheel are velocity defaults. The axes stop as soon as the handwheel stops. The motion is immediately braked if no pulses come from the handwheel in an interpolation cycle.

Therefore, only a short residual motion of the axes can occur as a result of the braking ramp. The handwheel pulses do not supply a path default.

Value = 2:

The default settings of the handwheel are velocity defaults. The axes are to stop as soon as the handwheel stops. The motion is immediately braked if no pulses come from the handwheel in an interpolation cycle.

However, in contrast to

value = 0 braking is not along the shortest possible path but

to the next possible point in a notional grid.

Each increment in the grid corresponds to a displacement which the selected

axis travels per handwheel detent position (see MD31090 $MA_JOG_INCR_WEIGHT and

MD11330 $MN_JOG_INCR_SIZE_TAB, MD20620 $MC_HANDWH_GEOAX_MAX_INCR_SIZE,

MD32080 $MA_HANDWH_MAX_INCR_SIZE). The start of the traversing is taken as the zero point

of the grid.

Value = 3:

The default settings of the handwheel are path defaults. If premature braking is required

on account of settings in other machine data (MD11310 $MN_HANDWH_REVERSE != 0, MD20624 $MC_HANDWH_CHAN_STOP_COND,

MD32084 $MA_HANDWH_STOP_COND), then, in

contrast to value = 1 braking is not along the shortest possible path,

but to the next possible point in a notional grid (see

value = 2).

Value = 6:

Same as value = 2, but travel does not stop at the last possible grid position in front of a limit, but at the limit.

Value = 7:

Same as value = 3, but travel does not stop at the last possible grid position in front of a limit, but at the limit.

11350	HANDWHEEL_SEGMENT			N09	H1	
-	Handwheel segment			BYTE	PowerOn	
-						
-	6	0, 0, 0, 0, 0, 0	-	-	7/2	

Description:

```
Machine data defines which
hardware segment the handwheel is connected to:
  0 = SEGMENT_EMPTY     ;no handwheel
  1 = SEGMENT_840D_HW   ;handwheel at 840D HW
  2 = SEGMENT_8xxD_HW ;handwheel at 802D sl, 828D sl, 808D -HW
  5 = SEGMENT_PROFIBUS  ;handwheel at PROFIBUS
  7 = SEGMENT_ETHERNET  ;handwheel at Ethernet
```

11351	HANDWHEEL_MODULE			N09	H1	
-	Handwheel module			BYTE	PowerOn	
-						
-	6	0, 0, 0, 0, 0, 0	0	6	7/2	

Description:

```
Machine data specifies the hardware module to which
the handwheel is connected.
(Content dependent on MD11350 $MN_HANDWHEEL_SEGMENT):
  0 = no handwheel configured
    $MN_HANDWHEEL_MODUL =
  1    ;SEGMENT_840D_HW
  1    ;SEGMENT_8xxD_HW; 802D sl, 828D sl, 808D -HW
  1..6 ;SEGMENT_PROFIBUS/PROFINET  ;index for MD11353
$MN_HANDWHEEL_LOGIC_ADDRESS[(x-1)]
  1    ;SEGMENT_ETHERNET
```

11352	HANDWHEEL_INPUT			N09	H1	
-	Handwheel connection			BYTE	PowerOn	
-						
-	6	0, 0, 0, 0, 0, 0	0	6	7/2	

Description:

```
Machine data which is intended to select
the handwheels connected to
a hardware module:
  0   = No handwheel configured
  1..6 = Handwheel connection to HW module/Ethernet interface
```

11354	HANDWHEEL_FILTER_TIME			N09	-	
s	Filter time for handwheel pulses			DOUBLE	PowerOn	
-						
-	6	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	0.0	2.0	7/2	

Description: The filter time indicates the time during which the pulses from the handwheel are output to the interpolator. The values are incremented internally in interpolation cycles.

In the case of a filter time setting = 0.0, the pulses from the handwheel are output to the interpolator within a single interpolation cycle. This can cause the controlled axis to exhibit jerk during traversing.

Machine data is valid for the following types of handwheel (see 11350 $MN_HANDWHEEL_SEGMENT):

SEGMENT_ETHERNET:

- Recommended filter time: 0.2 - 0.5 s

11398	AXIS_VAR_SERVER_SENSITIVE			EXP	B3	
-	Axis-Var server response			BYTE	PowerOn	
-						
-	-	0	-	-	7/2	

Description: The axis-variable server supplies the data for the OPI blocks SMA/SEMA, SGA/SEGA and SSP.

If no value can be supplied for an axis (e.g. because the axis is a link axis) then a default value (usually 0) is returned.

For debugging purposes, this machine data can be used to set the axis-var-server to sensitive so that an error message is returned instead of a default value.

0: default value

1: error message

11410	SUPPRESS_ALARM_MASK			EXP, N06	D1,M3,K3,S1,V1,W1	
-	Mask for support of special alarm outputs			DWORD	PowerOn	
-						
-	-	0x108000	0	0xFFFFFFFF	7/2	

Description:

Mask for suppressing special alarm outputs

Bit set: The corresponding alarm (warning) is NOT triggered.

Bit 0:

Alarm 15110 "Channel %1 block %2 REORG not possible"

Bit 1:

Alarm 10763 "Channel %1 block %2. The path component of the block in the contour plane is zero"

Bit 2:

Alarm 16924 "Channel %1 Caution: Program testing can modify tool/magazine data"

--> Note: The alarm is only a message alarm

Bit 3:

Alarm 22010 "Channel %1 spindle %2 block %3. Actual gear stage does not correspond to set gear stage"

Bit 4:

Alarm 17188 "Channel %1 D number %2 with tool T nos. %3 and %4 defined"

Alarm 17189 "Channel %1 D number %2 of the tools in magazines/magazine locations %3 and %4 defined". The two alarms are of equal status and are only message alarms.

Bit 5:

Alarm 22071 "TO unit %1 tool %2 duplo no. %3 is active but not in the active wear grouping." The alarm is only a message alarm.

Bit 6:

Alarm 4027 "NOTICE! MD %1 was also changed for the other axes in the axis container %2 "

Alarm 4028 "NOTICE! The axial MDs in the axis container will be aligned on the next runup "

Bit 7:

Alarm 22070 "TO unit %1 please change tool T= %2 to magazine. Repeat data backup". The alarm is only a message alarm.

Bit 8:

Alarm 6411 "Channel %1 tool %2 with duplo no. %3 has reached tool prewarning limit"

Alarm 6413 "Channel %1 tool %2 with duplo no. %3 has reached tool monitoring limit."

The two alarms are only message alarms. They occur during program execution.

Bit 9:

Alarm 6410 "TO unit %1 tool %2 with duplo no. %3 has reached tool prewarning limit ."

Alarm 6412 "TO unit %1 tool %2 with duplo no. %3 has reached tool monitoring limit ".

The two alarms are only message alarms. They occur as a result of an operator action.

Bit10:

Alarm 10604 "channel %1 block %2 "Thread lead increase too high"

Alarm 10605 "channel %1 block %2 "Thread lead decrease too high"

Bit 11:

Alarm 14088 "Channel 51 block %2 axis %3 doubtful position".

Bit 12:

obsolete (Alarm 10607)"

Bit13:

Alarm 10704 " channel %1 block %2 Protection area monitoring is not guaranteed."

Bit14:

Alarm 21701 "Measuring reactivated too soon (<2 IPO cycles)"

Bit15:

Alarm 5000 "Communication order cannot be executed"

Bit16:

Alarm 21600 "Monitoring active for ESR"

Bit17:

Alarm 16945 "Channel %1 action %2<ALNX> is delayed until block end"

Note: The alarm is only a message alarm.

Bit18:

Alarm 10750 "Channel %1 block %2 Activation of the tool radius compensation without tool number"

Bit19: Alarm 17193 "Channel %1 block %2 The active tool ist no longer at tool holder no./spindle no. %3, program %4"

Bit20:

Alarm 2900 "Reboot is delayed"

Bit21:

Alarm 22012 "Channel %1 block %2. Leading axis %3 is in simulation mode"

Alarm 22013 "Channel %1 block %2. Following axis %3 is in simulation mode"

Alarm 22014 "Channel %1 block %2. The dynamics of leading axis %3 and following axis %4 are very different"

Alarm 22040 "Channel%1 Block %3 Spindle %2 not referenced with zero mark" is no longer checked (cyclically) with Bit21 set after power ON of the closed loop position control.

Bit22:

Alarm 26080 "Channel %1 retraction position of axis %2 not programmed or invalid"

Alarm 26081 "Channel %1 single axis trigger axis %2 is triggered, but axis is not PLC controlled"

Bit23:

Alarm 16949 "Correspondence between marks of channel %1 and channel %2 is invalid"

Bit24:

Alarm 16950 "Channel %1 search run with holding block"

Bit25:

Alarm 22016 "Channel %1 block %2 following spindle %3 in range of reduced acceleration capacity"

Bit26:

Alarm 22015 "Channel %1 block %2 following spindle %3 no dynamic response for additional motion"

Bit27:

Alarms 16112 and 22030 "Channel %1 block %2 following spindle %3 impermissible programming"

Bit28:
Alarm 26083 "Channel %1 ESR for PLC controlled axis %2 was triggered"
Bit29:
Alarm 16772 "Channel %1 block %2 axis %3 is following axis, coupling is opened"
Bit30:
Alarm 16600 "Channel %1 block %2 spindle %3 gear stage change not possible"
Bit31:
Alarm 16774 "Channel %1 axis %2 synchronization aborted"

11411	ENABLE_ALARM_MASK			EXP	D1,K1	
-	Activation of warnings			DWORD	Reset	
-						
-	-	0x0	0	0xFFFFFFFF	7/2	

Description: Mask for generating alarms that are normally suppressed.
Bit set:Alarms of this alarm group are output.
Bit not set:Alarms of this alarm group are not output.
Bit Hex.Meaning
value
==
0: 0x1Alarms that have SHOWALARMAUTO as the alarm response are output.
1: 0x2Alarms that have SHOWWARNING as the alarm response are output.
2: 0x4Alarm 22280 "Thread power up path too short" is output.
3: 0x8Alarms that are triggered by the NCU LINK MODULE are switched on.
4: 0x10Alarm 10883 "Chamfer or rounding must be shortened" allowed.
5: 0x20Alarm 20096 "Brake test aborted" is output.
6: 0x40Alarm 16956 "Program cannot be started because of global start disable" is output.
Alarm14005 "Program cannot be started because of program-specific start disable" is output. Alarm can only be switched on in channel status RESET, in all other channel states it is output without conditions.
7: 0x80Alarm 16957 "Stop delay range is suppressed" is output.
8: 0x100Alarm 1011 fine coding150019 or 150020 "Incorrect axis number in the LINK".
9: 0x200Alarm 22033 Diagnostics 1 to 6 for "Track synchronism" (linkages).
10: 0x400Alarm 15122 "PowerOn after Powerfail: %1 data were restored, thereof %2 machine data, %3 errors" is output.
11: 0x800Alarms 10722, 10723, 10732 or 10733 are output instead of alarms 10720, 10721, 10730 or 10731.
12: 0x1000Alarm 22033 diagnostics greater than or equal to 7 for "Track synchronism" (linkages)

11412	ALARM_REACTION_CHAN_NOREADY			EXP, N01	D1	
-	Alarm response CHAN_NOREADY permitted			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	

Description: This MD is used for compatibility with the PLC systems older than SW4.1.

If this MD is not set, the behavior implemented before SW4.1 (configured alarm reaction) is set

With SW 4.1 and higher, it is possible to set signal CHANNEL_NOREADY on the PLC in response to alarms.

If this MD is not set, then the alarm handler internally re-configures BAG_NOREADY into CHAN_NOREADY.

11414	ALARM_CLR_NCSTART_W_CANCEL			EXP, N01	D1	
-	Clear NCSTART alarms with CANCEL			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	

Description: If this MD is set, then alarms that have ClearInfo=NCSTART are cleared by the Alarm Cancel button as well as by NC-Start.

If this MD is not set, then NCSTART alarms are not cleared by Cancel.

The purpose of this MD is to provide compatibility with system behavior.

11415	SUPPRESS_ALARM_MASK_2			EXP, N06	-	
-	Masking of alarm outputs			DWORD	PowerOn	
-						
-	-	0x8	-	-	7/2	

Description:

```
Mask for suppressing special alarm outputs
Bit set:Corresponding alarm (warning) is NOT triggered.
Bit  Hex. Meaning
value
============================================================================
0:   0x116773 "Channel %1 axis %3 is following axis. The axis/spindle dis-
ables for the leading axes differ."
1:   0x22100  "NCK battery warning level reached"
     2101  "NCK battery alarm"
     2102  "NCK battery alarm"
2:   0x42120 "NCK fan alarm" (ineffective on modules which do not require a
fan by design)
3:   0x815120 "PowerFail: Show buffer overflow"
4:   0x1015187 "Error during execution of PROGEVENT file"
5:   0x2015188 "Error during execution of ASUB file"
6:   0x4026120 "$AA_ESR_ENABLE = 1 and axis is to become neutral"
     26121 "Axis is neutral and $AA_ESR_ENABLE =1 is to be set"
     26123 "$AA_ESR_ENABLE = 1 is to be set, but $MA_ESR_REACTION is not set"
     26124 "$AC_TRIGGER triggered, but axis is neutral, ESR ignores this
axis"
7:   0x80:10724 "Software limit violated at start of block"
     10734 "Operating range limit violated at start of block"
     10737 "Work (WCS) operating range limit violated at start of block"
8:   0x100:14008 "WRITE command in /_N_EXT_DIR"
     10734 "Operating range limit violated at start of block"
     10737 "Work (WCS) operating range limit violated at start of block"
9:   0x20014006 "Invalid program name"
10:  0x400:4006 "Maximum number of axes that can be activated exceeded"
11:  0x80016017 "LIFTFAST ignores this axis, as it cannot be used for the
current axis type"
12:  0x100022025 "Channel %1 Block %2 Following axis/spindle %3 Synchronism
(2): Fine tolerance exceeded"
- Exception: Alarm is generated if CPMALARM[FAx] bit 8 = 0 is programmed for
the corresponding following axis/spindle.
22026 "Channel %1 Block %2 Following axis/spindle %3 Synchronism (2): Coarse
tolerance exceeded"
- Exception: Alarm is generated if CPMALARM[FAx] bit 9 = 0 is programmed for
the corresponding following axis/spindle.
13:  0x200022001 "Braking ramp longer than Stop D time."
22002 "Braking ramp longer than Stop D time with gear stage %3 reason %4"
14:  0x400016963 "ASUB start refused."
15:  0x800021751,"Limit velocity %2 deg/min on modulo axis %1 exceeded
(defective cam output)"
21752,"Axis %1 minimum cam width cam %3 undershot at curr. velocity %2 "
16:  0x1000017212 "Channel %1 Tool management: Load manual tool %3, Duplo no.
```

```
%2 to spindle/toolholder"
17214 "Channel %1 Tool management: Unload manual tool %3 from spindle/tool-
holder %2"
17215 "Channel %1 Tool management: Unload manual tool %3 from buffer location
%2"
17216 "Channel %1 Unload manual tool from toolholder %4 and load manual tool
%3 %2"
17: 0x2000016771 "Channel %1 Block %3 Following axis %2 Overlaid movement not
enabled"
18: 0x400004039  "Channel %1 Axis container %2 Advance not allowed: Channel
has no container axes"
```

11450	SEARCH_RUN_MODE			EXP, N01	K1,TE3,N4,H2,Z1	
-	Parameterization for search run			DWORD	PowerOn	
-						
-	-	0	0	0x3F	7/2	

Description: The behavior during the action blocks after search run can be affected by the following bits:

Bit 0 = 0:

Machining is stopped after loading of the last action block after search run, the NC/PLC interface signal DB3300 DBX0.6 (last action block active) and alarm 10208 is output.

Bit 0 = 1:

Machining is stopped with the loading of the last action block after search run, and the NC/PLC interface signal DB3300 DBX0.6 (last action block active) is set. Alarm 10208 is not output until the PLC requests it by setting the NC/PLC interface signal DB3200 DBX1.6 (PLC action finished).

Usage:

Starting an ASUB from the PLC after search run.

The message to the operator that another NC start is required in order to continue with the program is not to be displayed until after the end of the ASUB.

Bit1 = 1

Automatic ASUB start after output of the action blocks (see also MD11620 $MN_PROG_EVENT_NAME). Alarm 10208 is not output until the ASUB has finished.

Bit2 = 0:

Spindle: The auxiliary functions are output in the action blocks

Bit2 = 1:

The output of the auxiliary functions in the action blocks is suppressed. The spindle programming collected by search run can be output at a later point in time (e.g. in an ASUB).

The program data for this are stored in the following system variables:

- $P_SEARCH_S,
- $P_SEARCH_SDIR,
- $P_SEARCH_SGEAR,
- $P_SEARCH_SPOS,
- $P_SEARCH_SPOSMODE.

Bit 3 = 1:

The cascaded search run is disabled (default setting: release).

Cascaded search run means that the search run is restarted immediately after finding a search target.

Bit 4:Reserved

Bit 5 = 0:

During block search on a nibbling block the 1st nibbling stroke is not executed.

Bit 5 = 1:

During block search on a nibbling block a punching stroke is triggered at block start (1st nibbling stroke).

11460	OSCILL_MODE_MASK			N09	P5	
-	Mode mask for asynchronous oscillation			DWORD	PowerOn	
-						
-	-	0x0	0	0xFFFF	7/2	

Description:

```
Bit 0
Value 1
In the case of block search, the oscillation movement is started immediately
after NC start, i.e. during approach to approach position, provided it has
been activated in the program section being processed.
Value 0
(default value)
The oscillation movement is not started until the approach position is
reached.
```

11470	REPOS_MODE_MASK			EXP, N01	K1	
-	Repositioning properties			DWORD	PowerOn	
-						
-	-	0x8	0	0xFFFF	7/2	

Description:

```
This bit mask can be used to set the behavior of the control during reposi-
tioning.
Bit no.      Meaning when bit set
-----------------------------------------------------------------------------
-
0 (LSB)
The dwell time is continued in the residual block from where it was inter-
rupted. (If the bit is not set, the dwell time is repeated completely).
1    Reserved
2    When the bit is set, the repositioning of individual axes can be pre-
vented or delayed via the VDI interface.
3    When the bit is set, positioning axes are repositioned in the approach
block during search run via program test.
4    As 3, but after every Repos, not only during search run.
5    When the bit is set, changed feeds and spindle speeds already become
valid in the residual block, otherwise not until the following block.
6    When the bit is set, neutral axes and positioning spindles are reposi-
tioned after SERUPRO as command axes in the approach block.
7    The bit changes the behavior of the VDI-AXIN interface signal "Repos
Delay". The level of "Repos Delay" is read if REPOSA is interpreted. Axes
that are neither geo nor orientation axes are then excluded from the REPOS,
that is REPOS does NOT move these axes.
```

11480	PLC_OB1_TRACE_DEPTH			EXP, N03, N09	-	
-	Buffer depth of PLC trace data at OB1			DWORD	PowerOn	
-						
-	-	2	2	8	2/2	

Description: Buffer depth of PLC trace data at OB1.

Multiple values of PLC data are buffered, between the time of collection in the PLC and the time of inspection in NCK. Variables traced at "OB1" are collected once per complete PLC scan, but can only be inspected once per IPO cycle.

The buffer size must accomodate at least one more value than the total number of buffered values to be inspected. This is to prevent NCK from inspecting a value that the PLC is in the process of collecting.

A good value to start with is one more than MD10074 $MN_PLC_IPO_TIME_RATIO.

The larger the buffer depth, the fewer PLC variables that can be traced, because there is a single, small, fixed pool of data slots for sending data samples from the PLC to NCK (64 data slots). Every PLC variable being traced is allocated as many data slots from the pool as the value of the buffer depth.

This single pool of data slots is shared by data collected at OB1, OB35, and OB40 (even though the buffer depths of OB1, OB35, and OB40 can be configured to be different from one another). It is also shared by all concurrent users of trace, even though the users might have no knowledge of one another.

11481	PLC_OB35_TRACE_DEPTH			EXP, N03, N09	-	
-	Buffer depth of PLC trace data at OB35			DWORD	PowerOn	
-						
-	-	2	2	8	2/2	

Description: Buffer depth of PLC trace data at OB35.

Multiple values of PLC data are buffered, between the time of collection in the PLC and the time of inspection in NCK. Variables traced at "OB35" are collected every time the PLC timer interrupts, but can only be inspected once per IPO cycle.

The buffer size must accomodate at least one more value than the number of buffered values to be inspected. This is to prevent NCK from inspecting a value that the PLC is in the process of collecting.

A good value to start with is one more than the number of PLC timer interrupts expected to occur every IPO cycle.

The larger the buffer depth, the fewer PLC variables that can be traced, because there is a single, small, fixed pool of data slots for sending data samples from the PLC to NCK (64 data slots). Every PLC variable being traced is allocated as many data slots from the pool as the value of the buffer depth.

The single pool of data slots is shared by data collected at OB1, OB35, and OB40 (even though the buffer depths of OB1, OB35, and OB40 can be configured to be different from each other). It is also shared by all concurrent users of trace, even though the users might have no knowledge of one another.

11482	PLC_OB40_TRACE_DEPTH			EXP, N03, N09	-	
-	Buffer depth of PLC trace data at OB40			DWORD	PowerOn	
-						
-	-	2	2	8	2/2	

Description: Buffer depth of PLC trace data at OB40.

Multiple values of PLC data are buffered, between the time of collection in the PLC and the time of inspection in NCK. Variables traced at "OB40" are collected just when the PLC receives the special, programmably initiated OB40 interrupt from NCK, but can only be inspected once per IPO cycle.

The buffer size must accomodate at least one more value than the number of buffered values to be inspected. This is to prevent NCK from inspecting a value that the PLC is in the process of collecting.

If the OB40 interrupt is issued less frequently than once per IPO cycle, then the OB40 buffer depth should be 2. Otherwise it should be one more than the largest number of interrupts expected during any one IPO cycle.

The larger the buffer depth, the fewer PLC variables that can be traced, because there is a single, small, fixed pool of data slots for sending data samples from the PLC to NCK (64 data slots). Every PLC variable being traced is allocated as many data slots from the pool as the value of the buffer depth.

The single pool of data slots is shared by data collected at OB1, OB35, and OB40 (even though the buffer depths of OB1, OB35, and OB40 can be configured to be different from each other). It is also shared by all concurrent users of trace, even though the users might have no knowledge of one another.

11500	PREVENT_SYNACT_LOCK			N01, N09, -	S5,FBSY	
-	Protected synchronized actions			DWORD	PowerOn	
-						
-	2	0, 0	0	255	7/2	

Description: First and last IDs of a protected synchronized action area.

Synchronized actions with ID numbers in the protected area can no longer be

- overwritten
- disabled (CANCEL)
- locked (LOCK)

once they have been defined. Furthermore, protected synchronized actions cannot be locked by the PLC (LOCK). They are shown at the interface to the PLC as non-lockable.

Note:

The protection should be suspended while creating the synchronized actions to be protected, as otherwise a Power On will be necessary after every change in order to be able to redefine the logic. There is no area of protected synchronized actions with 0.0. The function is disabled. The values are read as absolute values, and over and under values can be given in any order.

11510	IPO_MAX_LOAD			N01, N05	-	
%	Max. permitted IPO load			DOUBLE	PowerOn	
-						
-	-	0.00	0.0	100.0	7/2	

Description: Enable utilization analysis via synchronized actions.

This MD11510 $MN_IPO_MAX_LOAD sets the IPO computing time (in % of the IPO cycle) after which the variable $AN_IPO_LOAD_LIMIT is to be set to TRUE. The variable is reset to FALSE if the value falls below this after having once exceeded it.

This diagnostics function is disabled if the machine data is 0.

11550	STOP_MODE_MASK			N01	V1	
-	Defines the stop behavior.			DWORD	PowerOn	
-						
-	-	0	0	0x1	7/2	

Description: This MD describes the stop behavior of the NCK under certain conditions:

Bit no. Meaning

Bit 0 == 0 :=

No stop if G codes G331/G332 are active and a path motion or G4 has also been programmed.

Bit 0 == 1 :=

Same behavior as until SW version 6.4, i.e. a stop is possible during G331/ G332.

Bits 1.....15

Not assigned

11600	BAG_MASK			N01	K1,Z1	
-	Defines the mode group behavior			DWORD	PowerOn	
-						
-	-	0	0	0x3	7/2	

Description: This MD describes the effect of the VDI signals on the channels of a mode group in respect of ASUBs and interrupt routines.

Bit no. Hexadec. value Meaning when bit set

Bit0: 0x0 Normal response to mode group signals in all channels of the mode group (as SW 3)

All channels switch into a program operating mode on interrupt.

Bit0: 0x1 No response to other mode group VDI signals in the channel in which an interrupt handling (ASUB) is running. (BAG-RESET, BAG-STOP. individual types A and B, mode selection). In addition, an internal operating mode switchover takes place only in those channels that have received an interrupt request.

Bit1: 0x1 There is an operating mode changeover only in those channels which have received an interrupt request. This is similar to bit0, operating mode signal VDI only take effect on the interrupt

11602	ASUP_START_MASK			N01, -	K1,M3,TE3,TE7	
-	Ignore stop conditions for ASUB			DWORD	PowerOn	
-						
-	-	0	0	0xf	7/2	

Description: This machine data defines which stop reasons are to be ignored on an ASUB start. The ASUB is started or the following stop reasons are ignored:

Bit 0 :

STOP reason: STOP key, M0 or M01

An ASUB is started immediately if NCK is in RESET status (or JOG mode) (no ASUB can be started in RESET/JOG without this bit).

Bit 1 :

Start allowed even if not all axes have been referenced yet.

Bit 2:

Start allowed even if a read-in disable is active;in other words, the blocks of the ASUB program are loaded and executed immediately. This disables machine data IGNORE_INHIBIT_ASUP. The NCK behavior corresponds to the machine data content of IGNORE_INHIBIT_ASUP== FFFFFFFF.

If the bit is not set:

The ASUB is selected internally but is not processed until the read-in disable is canceled.

The assignment of the machine data IGNORE_INHIBIT_ASUP is evaluated.

If IGNORE_INHIBIT_ASUP = 0 also applies, then an ASUB is triggered internally immediately but the blocks of the ASUB program are not loaded until the read-in disable is canceled.

The path is decelerated immediately when the ASUB is triggered (except with option BLSYNC).

The read-in disable is set once more in the ASUB program.

Bit 3:

Notice:

The following function can always be activated in single-channel systems. Multi-channel systems require bit1 in MD11600 $MN_BAG_MASK in addition. The function is active o_n_l_y for those ASUBs that were activated from the Abort program status (Reset channel status). The function is not active in multi-channel systems without MD11600 $MN_BAG_MASK bit1.

If an ASUB is started automatically from JOG, the user may stop in the middle of the ASUB program. JOG mode is displayed continuously for the user. With bit 3 set, the user may jog in this situation. This is not possible without bit 3. In this case mode change is locked with alarm 16927. By pressing the Start key, the user can continue the ASUB program. As long as the ASUB program is running, the user is naturally not able to jog. After ASUB program end the user may jog again.

Bits 4 to 15:Reserved

Related to:

MD11604 $MN_ASUP_START_PRIO_LEVEL

11604	ASUP_START_PRIO_LEVEL			N01, -	K1,TE3,TE7	
-	Priorities from which 'ASUP_START_MASK' is effective			DWORD	PowerOn	
-						
-	-	0	0	128	7/2	

Description: This machine data defines the ASUB priority from which MD11602 $MN_ASUP_START_MASK is to be applied. MD11602 $MN_ASUP_START_MASK is applied from the level specified here up to the highest ASUB priority level 1.

Related to:

MD11602 $MN_ASUP_START_MASK

11610	ASUP_EDITABLE			N01	K1	
-	Activation of a user-specific ASUB program			DWORD	PowerOn	
-						
-	-	0	0	0x7	7/2	

Description: This MD determines whether user-specific routine: _N_ASUP_SPF stored in directory _N_CUS_DIR/ _N_CMA_DIR is to be used to process RET and REPOS. The user ASUB is searched for first in _N_CUS_DIR.

Value: Meaning:

0 Routine _N_ASUP_SPF is not activated for either RET or REPOS.

Bit0 = 1User-specific routine _N_ASUP_SPF is executed for RET, the routine supplied by the system is executed for REPOS.

Bit1 = 1User-specific routine _N_ASUP_SPF is executed for REPOS, the routine supplied by the system is executed for RET

Bit0= + bit1 = 3User-specific routine _N_ASUP_SPF is executed for both RET and REPOS

Bit2 = 1User ASUB _N_ASUP_SPF is searched for first in _N_CMA_DIR

Related to:

MD11612 $MN_ASUP_EDIT_PROTECTION_LEVEL

References:

/IAD/ "Installation and Setup Guide"

11612	ASUP_EDIT_PROTECTION_LEVEL			N01	K1	
-	Protection level of the user-specific ASUB program			DWORD	PowerOn	
-						
-	-	2	0	7	7/2	

Description: Protection level of the user-specific ASUB program for RET and/or REPOS

The data is active only if MD11610 $MN_ASUP_EDITABLE is set to a value other than 0.

This machine data defines the protection level of the program _N_ASU_CUS.

MD irrelevant for:

MD11610 $MN_ASUP_EDITABLE set to 0

Related to:

MD11610 $MN_ASUP_EDITABLE

11620	PROG_EVENT_NAME			EXP, N12	K1	
-	Program name for PROG_EVENT			STRING	PowerOn	
-						
-	-		-	-	7/2	

Description: Name of the user program called by the "event-driven program calls" and "automatic ASUB start after block search" functions (MD11450 $MN_SEARCH_RUN_MODE, bit 1). _N_PROG_EVENT_SPF is the default setting.

The default setting is activated if MD11620 $MN_PROG_EVENT_NAME includes a blank string.

If the machine data does not contain a blank string, then the syntax of the string is checked as in the case of a subprogram identifier. This means that the first two characters must be letters (not numbers) or underscores. If this is not the case, alarm 4010 is output during ramp-up.

The program must be located in a cycle directory. When it is called, the search runs through the cycle directories in accordance with the setting of $MN_PROG_EVENT_PATH.

The prefix (_N_) and the suffix (_SPF) of the program name are added automatically if they have not been specified.

11622	PROG_EVENT_PATH			N01	-	
-	Call path for PROG_EVENT			BYTE	PowerOn	
-						
-	-	3	0	3	7/2	

Description: Path on which the user program set with $MN_PROG_EVENT_NAME is called in response to an event-driven program call configured with $MC_PROG_EVENT_MASK:

0: /_N_CMA_DIR

1: /_N_CUS_DIR

2: /_N_CST_DIR

3: Search path in the sequence /_N_CUS_DIR, /_N_CMA_DIR, and /_N_CST_DIR

11640	ENABLE_CHAN_AX_GAP			N01, N11	K2	
-	Allow channel axis gaps in AXCONF_MACHAX_USED			DWORD	PowerOn	
-						
-	-	0x0	0	0x1	2/2	

Description:

```
Bit0 = 1
Machine data allows configuration of channel axis gaps in the MD20070
$MC_AXCONF_MACHAX_USED.
Permits following MD assignment:
$AXCONF_MACHAX_USED[0] = 1     ; 1st  MA is 1st axis in channel
$AXCONF_MACHAX_USED[1] = 2     ; 2nd MA is 2nd axis in channel
$AXCONF_MACHAX_USED[2] = 0     ; Channel axis gap
$AXCONF_MACHAX_USED[3] = 3     ; 3rd MA is 3rd axis in channel
$AXCONF_MACHAX_USED[4] = 0
C A U T I O N:
(BIT0 set with MD20070 $MC_AXCONF_MACHAX_USED):
If a geo axis is placed in a channel axis gap with MD20050
$MC_AXCONF_GEOAX_ASSIGN_TAB[1]= 3, the control responds as with MD20050
$MC_AXCONF_GEOAX_ASSIGN_TAB[1]= 0. This eliminates the geo axis!
Transformation machine data must not be assigned a channel axis number spec-
ified as a gap.
BIT1 - BIT31:  not used.
Related to:
MD20080 $MC_AXCONF_CHANAX_NAME_TAB,
MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB,
MD20060 $MC_AXCONF_GEOAX_NAME_TAB
MD20070 $MC_AXCONF_MACHAX_USED
MD24... $MC_TRAFO_AXES_IN_...
MD24... $MC_TRAFO_GEOAX_ASSIGN_TAB_...
```

11700	PERMISSIVE_FLASH_TAB			EXP, N01	IAD	
-	Codes for NC card			DWORD	PowerOn	
-						
-	6	0, 0, 0, 0, 0, 0, 0, 0	-	-	1/1	

Description:

```
Normally, the NCK knows the program algorithms for writing on the flash of
the PCMCIA card, however, if "new" cards with another ManufactorCode and/or
DeviceCode are used, then these values can be entered here. Whereby, the Man-
ufactorCode must be entered in the first line, and the DeviceCode in the fol-
lowing line.
```

11717	D_NO_FCT_CYCLE_NAME			EXP, N12, N07	K1	
-	Subroutine name for D function replacement			STRING	PowerOn	
-						
-	-		-	-	7/2	

Description:

Cycle name for replacement routine of the D function.

If a D function is programmed in a part program block, then, depending on machine data MD10717 $MN_T_NO_FCT_CYCLE_NAME, MD10719 $MN_T_NO_FCT_CYCLE_MODE and MD10718 $MN_M_NO_FCT_CYCLE_PAR, the MD subprogram defined in MD11717 $MN_D_NO_FCT_CYCLE_NAME is called.

The programmed D number can be polled in the cycle via system variable $C_D / $C_D_PROG.

MD11717 $MN_D_NO_FCT_CYCLE_NAME is only active in Siemens mode (G290).

No more than one M/T/D function replacement can be active per part program line.

A modal subprogram call must not be programmed in the block with the D function replacement. Furthermore, neither subprogram return nor part program end are allowed.

In the event of a conflict alarm 14016 is output.

11750	NCK_LEAD_FUNCTION_MASK			N09	-	
-	Functions for master value coupling			DWORD	NEW CONF	
-						
-	-	0x00	0	0x10	1/1	

Description:

Special functions of the master value coupling are set with this MD.

The MD is bit-coded, the following bits are assigned:

Bits 0-3:

reserved

Bit 4 == 0:

the following axis of a master value coupling decelerates independently on NC or mode group stop or channel-specific feed disable

Bit 4 == 1:

the following axis of a master value coupling does not decelerate independently on NC or mode group stop or channel-specific feed disable

Bits 5-31:

reserved

11754	COUPLE_CYCLE_MASK			EXP, N09	-	
-	Replacement of coupling language commands by machining cycles			DWORD	PowerOn	
-						
-	-	0x0	0	0x7F	1/1	

Description:

This machine data defines which predefined procedures for axis-spindle coupling are replaced by machining cycles.

This MD is bit-coded; the following bits are assigned:

Bit 0 == 0:

The predefined procedures EGDEL, EGOFC, EGOFS, EGON, EGONSYN, and EGONSYNE are executed

Bit 0 == 1:

The predefined procedures EGDEL, EGOFC, EGOFS, EGON, EGONSYN, and EGONSYNE are replaced by calling machining cycles

Bit 1 == 0:

The predefined procedures LEADON and LEADOF are executed

Bit 1 == 1:

The predefined procedures LEADON and LEADOF are replaced by calling machining cycles

Bit 2 == 0:

The predefined procedures TRAILON and TRAILOF are executed

Bit 2 == 1:

The predefined procedures TRAILON and TRAILOF are replaced by calling machining cycles

Bit 3 == 0:

The predefined procedures COUPDEF, COUPDEL, COUPOF, COUPOFS, COUPON, COUPONC, and COUPRES are executed

Bit 3 ==1:

The predefined procedures COUPDEF, COUPDEL, COUPOF, COUPOFS, COUPON, COUPONC, and COUPRES are replaced by calling machining cycles

Bit 4 == 0:

The predefined procedures LEADON and LEADOF are executed in synchronized actions

Bit 4 == 1:

The predefined procedures LEADON and LEADOF are replaced in synchronized actions by calling machining cycles as technology cycles

Bit 5 == 0:

The predefined procedures TRAILON and TRAILOF are executed in synchronized actions

Bit 5 == 1:

The predefined procedures TRAILON and TRAILOF are replaced in synchronized actions by calling machining cycles as technology cycles

Bit 6 == 0:

NCU link: Synchronism signals for classic couplings

Bit 6 == 1:

NCU link: Synchronism signals for generic coupling

11756	NCK_EG_FUNCTION_MASK			N09	-	
-	Functions for Electronic Gear			DWORD	NEW CONF	
-						
-	-	0x0	0	0x2F	1/1	

Description: This MD is used to set special functions of Electronic Gear (EG).

The MD is bit-coded, the following bits are occupied:

Bit 0 - 4:

reserved

Bit 5 = 0:

Positions indicated in EGONSYN and EGONSYNE are evaluated according to setting G700 or G710 inch or metric that is valid in the currently machined part program block.

Bit 5 = 1

Positions indicated in EGONSYN and EGONSYNE are evaluated in the basic system involved.

Bit 6 - 31:

reserved

12000	OVR_AX_IS_GRAY_CODE			EXP, N10	V1,Z1	
-	Axis feedrate override switch Gray-coded			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	

Description: 1This machine data is used to adapt the axis feed override switch to the interface coding of the PLC interface.

1: The 5 low-order bits of the PLC interface signal DB380x DBX0 (Feed override A-H) are interpreted as a Gray code. The value which is read corresponds to a switch setting. It is used as an index for selecting the correct override factor from the table of MD12010 $MN_OVR_FACTOR_AX_SPEED [n].

0: The feed override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent).

Related to:

NC/PLC interface signal DB380x DBX0 (Feed override A-H), (axis-specific)

MD12010 $MN_OVR_FACTOR_AX_SPEED [n]

(Evaluation of the axis feed override switch)

12010	OVR_FACTOR_AX_SPEED			EXP, N10	V1,Z1	
-	Evaluation of axis feedrate override switch			DOUBLE	PowerOn	
-						
-	31	0.00, 0.01, 0.02, 0.04, 0.06, 0.08, 0.10...	0.00	2.00	7/2	

Description: Evaluation of the axis velocity override switch with gray-coded interface.

Not relevant with:

MD12000 $MN_OVR_AX_IS_GRAY_CODE = 0

Related to:

NC/PLC interface signal DB380x DBX0 (Feed override A-H), (axis-specific)

12020	OVR_FEED_IS_GRAY_CODE			EXP, N10	V1,Z1	
-	Path feedrate override switch Gray-coded			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	

Description:

This machine data is used to adapt the path feed override switch to the interface coding of the PLC interface.

1: The 5 low-order bits of the NC/PLC interface signal DB380x DBX0 (Feed override A-H) are interpreted as a Gray code. The value which is read corresponds to a switch setting. It is used as an index for selecting the correct override factor from the table of MD12030 $MN_OVR_FACTOR_FEEDRATE [n].

0: The feed override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent).

Related to:

NC/PLC interface signal DB380x DBX0 (Feed override A-H)

MD12030 $MN_OVR_FACTOR_FEEDRATE [n]

(Evaluation of the path feed override switch)

12030	OVR_FACTOR_FEEDRATE			EXP, N10	V1,B1,Z1	
-	Evaluation of path feedrate override switch			DOUBLE	PowerOn	
-						
-	31	0.00, 0.01, 0.02, 0.04, 0.06, 0.08, 0.10...	0.00	2.00	7/2	

Description:

Evaluation of the feedrate override switch with gray-coded interface.

Special function of the 31st value for the velocity control:

The setting of the 31st override value defines the dynamic reserves which take the velocity control to be an excessive increase in the path feed. The setting should correspond to the highest override factor actually used.

The function of the 31st value is thus identical to the effect of MD12100 $MN_OVR_FACTOR_LIMIT_BIN when using the binary-coded interface.

Not relevant with:

MD12020 $MN_OVR_FEED_IS_GRAY_CODE = 0

Related to:

NC/PLC interface signal DB380x DBX0 (Feed override A-H)

12040	OVR_RAPID_IS_GRAY_CODE			EXP, N10	V1,Z1	
-	Rapid traverse override switch Gray-coded			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	

Description: This machine data is used to adapt the rapid traverse override switch to the interface coding of the PLC interface.

1: The 5 low-order bits of the PLC interface signal DB3200 DBX5 (Rapid traverse override A-H) are interpreted as a Gray code. The value which is read corresponds to a switch setting.

It is used as an index for selecting the correct override factor from the table of MD12050 $MN_OVR_FACTOR_RAPID_TRA[n].

0: The rapid traverse override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent).

Related to:

NC/PLC interface signal DB3200 DBX5 (Rapid traverse override A-H)

MD12050 $MN_OVR_FACTOR_RAPID_TRA[n]

(Evaluation of the rapid traverse override switch)

12050	OVR_FACTOR_RAPID_TRA			EXP, N10	V1,Z1	
-	Evaluation of rapid traverse override switch			DOUBLE	PowerOn	
-						
-	31	0.00, 0.01, 0.02, 0.04, 0.06, 0.08, 0.10...	0.00	1.00	7/2	

Description: Evaluation of the rapid traverse override switch with gray-coded interface.

Not relevant with:

MD12040 $MN_OVR_RAPID_IS_GRAY_CODE = 0

Related to:

NC/PLC interface signal DB3200 DBX5 (Rapid traverse override A-H)

12060	OVR_SPIND_IS_GRAY_CODE			EXP, N10	V1,Z1	
-	Spindle override switch Gray-coded			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	

Description: This machine data is used to adapt the spindle speed override switch to the interface coding of the PLC interface.

1: The 5 low-order bits of the "spindle speed override" PLC interface signal are interpreted as a Gray code. The value which is read corresponds to a switch setting. It is used as an index for selecting the correct override factor from the table of MD12070 $MN_OVR_FACTOR_SPIND_ SPEED [n].

0: The spindle speed override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent).

Related to:

NC/PLC interface signal DB380x DBX2003 (Spindle speed override)

MD12070 $MN_OVR_FACTOR_SPIND_SPEED[n]

(Evaluation of the spindle speed override switch)

12070	OVR_FACTOR_SPIND_SPEED			EXP, N10	V1,Z1	
-	Evaluation of spindle override switch			DOUBLE	PowerOn	
-						
-	31	0.5, 0.55, 0.60, 0.65, 0.70, 0.75, 0.80...	0.00	2.00	7/2	

Description: Evaluation of the spindle-specific override switch with Gray-coded interface.

Special function of the 31st value for the velocity control:

The setting of the 31st override value defines the dynamic reserves which take the velocity control to be an excessive increase in the spindle feed. The setting should correspond to the highest override factor actually used.

The function of the 31st value is thus identical to the effect of MD12100 $MN_OVR_FACTOR_LIMIT_BIN when using the binary-coded interface.

Not relevant for:

MD12060 $MN_OVR_SPIND_IS_GRAY_CODE = 0

Related to:

NC/PLC interface signal DB380x DBX2003 (Spindle speed override)

12080	OVR_REFERENCE_IS_PROG_FEED			N10, N09	V1	
-	Override reference speed			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	

Description: The entry in this MD specifies whether the spindle override given by the IS refers to the speed limited by MD/SD or to the programmed speed.

1: Spindle override acts with reference to the programmed speed

(programmed speed _ spindle override 100%)

0: Spindle override acts on the speed limited by MD or SD

(speed limited by MD/SD _ spindle override 100%)

Related machine data:

A speed limitation is effected by the following MDs or SDs:

MD35100 $MA_SPIND_VELO_LIMIT Maximum spindle speed

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT Maximum speed of gear stage

MD35160 $MA_SPIND_EXTERN_VELO_LIMIT Spindle speed limitation by PLC

SD43220 $SA_SPIND_MAX_VELO_G26 Maximum spindle speed

SD43230 $SA_SPIND_MAX_VELO_LIMS Spindle speed limitation with G96

12082	OVR_REFERENCE_IS_MIN_FEED			N10, N09	V1	
-	Specification of the reference of the path override			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	

Description: The reference speed for the path feed override specified via the machine control panel can be set differently from the standard.

0: Standard:

The override is relative to the programmed feed.

1: Special case:

The override is relative to the programmed feed or to the path feed limit, depending on which resulting value is lower. In this way, even for a great feed reduction (due to the permissible axis dynamics), the effect of the override value (in the range 0 to 100%) is always visible.

12090	OVR_FUNCTION_MASK			N01, N10, N09	-	
-	Selection of override specifications			DWORD	Reset	
-						
-	-	0	0	0x01	7/2	

Description: The functionality of the override switches can be affected by the bits.

Bit 0: = 0,

Standard: Spindle override active with G331/G332

= 1,

Path override is active instead of spindle override with G331/G332

(Tapping without compensating chuck)

12100	OVR_FACTOR_LIMIT_BIN			EXP, N10	V1,B1,Z1	
-	Limitation for binary-coded override switch			DOUBLE	PowerOn	
-						
-	-	1.2	0.0	2.0	7/2	

Description: This machine data can be used as an additional limit for the override factor when using the binary-coded interface for path, axis and spindle feeds.

In this case, the maximum values

- 200% for channel-specific feed override
- 100% for channel-specific rapid traverse override
- 200% for axis-specific feed override
- 200% for spindle override

are replaced with the limit value entered in MD: OVR_FACTOR_LIMIT_BIN when this value is lower.

Example: OVR_FACTOR_LIMIT_BIN = 1.20

--> maximum override factor for

- channel-specific feed override =120%
- channel-specific rapid traverse override =100%
- axis-specific feed override =120%
- spindle override =120%

This value also defines the dynamic reserves maintained by the speed control for increasing the path and spindle feedrates.

References:

/FB/, B1, "Continuous Path Mode, Exact Stop and Look Ahead"

12200	RUN_OVERRIDE_0			N01, N09	FBMA,V1,Z1	
-	Traversing response with override 0			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	

Description: = 0

Override 0 is active and means deceleration (JOG mode, safety function).

Bits 0 and 1 in MD32084 $MA_HANDWH_STOP_COND for hand wheels and in MD20624 $MC_HANDWH_CHAN_STOP_COND for machine axes define whether the pulses are collected for geometry axes and contour handwheel.

= 1

Traversing with handwheels and in JOG mode with fixed feedrates is also possible with a 0 % override.

Related to:

MD32084 $MA_HANDWH_STOP_COND

MD20624 $MC_HANDWH_CHAN_STOP_COND

12202	PERMANENT_FEED			N01, N09	Z1,V1	
mm/min	Fixed feedrates for linear axes			DOUBLE	Reset	
-						
-	4	0., 0., 0., 0.	-	-	7/2	

Description:

In AUTOMATIC mode:

After activating a fixed feedrate via an interface signal, traversing is done with a fixed feedrate instead of the programmed feedrate.

Note:

The fixed feedrate is also evaluated in continuous-path mode in order to optimize the overhead for the Look Ahead calculation. Unnecessarily high values should therefore be avoided. Enter zero if a fixed feedrate is not wanted

In JOG mode:

After activating a fixed feedrate via an interface signal, and traversing the linear axis with a traversing key, traversing proceeds in the selected direction with the fixed feedrate.

n = 0, 1, 2, 3 mean fixed feedrates 1, 2, 3, 4. The values must be entered in ascending order.

Special cases, errors, ...

The maximum velocity defined by MD32000 $MA_MAX_AX_VELO is active. An override setting of 100 % is assumed. MD12200 $MN_RUN_OVERRIDE_0 is active if the override is 0.

Related to:

MD12200 $MN_RUN_OVERRIDE_0

12204	PERMANENT_ROT_AX_FEED			N01, N09	V1	
rev/min	Fixed feedrates for rotary axes			DOUBLE	Reset	
-						
-	4	0., 0., 0., 0.	-	-	7/2	

Description:

Fixed feedrate values:

In AUTOMATIC mode:

After activating a fixed feedrate via an interface signal, traversing is done with a fixed feedrate instead of the programmed feedrate.

Note: PERMANENT_ROT_AX_FEED is used instead of PERMANENT_FEED for the path motion if all synchronously traversed axes in the current block are rotary axes. PERMANENT_FEED applies if linear and rotary axes are to be synchronously traversed together.

The fixed feedrate is also evaluated in continuous-path mode in order to optimize the overhead for the Look Ahead calculation. Unnecessarily high values should therefore be avoided. Enter zero if a fixed feedrate is not wanted

In JOG mode:

After activating a fixed feedrate via an interface signal, and traversing the rotary axis with a traversing key, traversing proceeds in the selected direction with the fixed feedrate.

n = 0, 1, 2, 3 mean fixed feedrates 1, 2, 3, 4.

Special cases, errors, ...

The maximum velocity defined by MD32000 $MA_MAX_AX_VELO is active. An override setting of 100 % is assumed. MD12200 $MN_RUN_OVERRIDE_0 is active if the override is 0.

Related to:

MD12200 $MN_RUN_OVERRIDE_0

12205	PERMANENT_SPINDLE_FEED			N01, N09	FBMA	
rev/min	Fixed feedrates for spindles			DOUBLE	Reset	
-						
-	4	0., 0., 0., 0.	-	-	7/2	

Description: Fixed feedrate values:

JOG: A spindle is traversed with a fixed feedrate by activating the traversing keys and activating the appropriate signals in the PLC interface.

The override is not active.

Depending upon MD12200 $MN_RUN_OVERRIDE_0, traversing also takes place with override 0.

The value defined by MD32000 $MA_MAX_AX_VELO is taken as the upper limit. If the fixed feedrate has a larger value, the aforementioned limiting value applies.

12300	CENTRAL_LUBRICATION			N01, N09	-	
-	Central lubrication active			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	

Description: When a settable axial path has been exceeded, the axial VDI signals request a lubrication pulse from the PLC (compare MD33050 $MA_LUBRICATION_DIST). These axial pulses act (by default) independently of each other.

If the machine construction requires a central lubrication, i.e. the lubrication pulse of any axis is acting on all axes, the corresponding path monitoring of all axes must be restarted after lubrication pulse output. This start synchronization of the monitoring is executed via MD12300 $MN_CENTRAL_LUBRICATION=TRUE.

13200	MEAS_PROBE_LOW_ACTIVE			N10, N09	M5	
-	Polarity reversal of sensor			BOOLEAN	PowerOn	
-						
-	2	FALSE, FALSE	-	-	7/2	

Description: This MD defines the electrical polarity of each connected sensor.

Value 0:

(Default setting)

Non-deflected state 0 V

Deflected state 24 V

Value 1:

Non-deflected state 24 V

Deflected state 0 V

The programmed edges of the sensor are independent of the electrical polarity, and are to be regarded as purely mechanical. The programming of a positive edge always means the transition from the non-deflected into the deflected state. The programming of a negative edge always means the transition from the deflected into the non-deflected state.

13220	MEAS_PROBE_DELAY_TIME			N10, N09	FBA/IAD	
s	Delay time between probe deflection and recognition			DOUBLE	PowerOn	
-						
-	2	0.0, 0.0	0	0.1	7/2	

Description: For probes with e.g. radio transmission, the probe deflection can be detected in the NC only with delay.

With this MD, the transmission link delay between the probe deflection and its detection is set in the control.

The measured value is corrected internally by the control by the distance that corresponds to the traversing motion during this time before measuring (modeling).

It is practicable to set values only up to a maximum of 15 position controller cycles.

Anyhow, the modeling could not work with the expected accuracy with values greater than that. In this case, the input value is therefore limited internally by the software to 15 position controller cycles (without any further feedback).

13230	MEAS_PROBE_SOURCE			N10, N09	-	
-	Probe simulation			BYTE	PowerOn	
-						
-	-	0	0	9	7/2	

Description: Simulation of the probe only works when all axes are simulated.

Value = 0: the probe is triggered on the programmed end position.

Value = 1-8: the probe is triggered via digital output with the number=value.

Value = 9: reserved

13231	MEAS_PROBE_OFFSET			N10, N09	-	
mm/inch, degrees	Probe offset			DOUBLE	Immediately	
-						
-	-	0.1	-	-	7/7	

Description: The switching position of the probe is offset by the value.

The offset is only active with the simulated probes and MD 13230=0.

14000	ENC_SSI_BAUD_RATE			N01, N10, EXP, N09	-	
-	Baud rate for SSI absolute value encoder			BYTE	PowerOn	
-						
-	-	0	0	4	7/7	

Description: Baud rate for SSI_Absolute_value_encoder

Value 0: 250 kHz

Value 1: 250 kHz

Value 2: 400 kHz

Value 3: 500 kHz

Value 4:   1 MHz

14504	MAXNUM_USER_DATA_INT			N03	P3	
-	Number of user data (INT)			DWORD	PowerOn	
-						
-	-	0	0	256	7/2	

Description: Number of NC/PLC user data of type INT

14506	MAXNUM_USER_DATA_HEX			N03	P3	
-	Number of user data (HEX)			DWORD	PowerOn	
-						
-	-	0	0	256	7/2	

Description: Number of NC/PLC user data (HEX)

14508	MAXNUM_USER_DATA_FLOAT			N03	P3	
-	Number of user data (FLOAT)			DWORD	PowerOn	
-						
-	-	0	0	32	7/2	

Description: Number of NC/PLC user data of type FLOAT

14510	USER_DATA_INT			N03	P3	
-	User data (INT)			DWORD	PowerOn	
-						
-	256	0, 0, 0, 0, 0, 0, 0, 0...	-32768	32767	7/2	

Description: User data is stored in the NCK-PLC interface, and can be read by the PLC user from the DB20 during the runup.

14512	USER_DATA_HEX			N03	P3	
-	User data (HEX)			DWORD	PowerOn	
-						
-	256	0, 0, 0, 0, 0, 0, 0, 0...	0	0x0FF	7/2	

Description: User data is stored in the NCK-PLC interface and can be read by the PLC user from the DB20 during the PLC runup.

14514	USER_DATA_FLOAT			N03	P3	
-	User data (FLOAT)			DOUBLE	PowerOn	
-						
-	32	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0...	-3.40e38	3.40e38	7/2	

Description: User data is stored in the NCK-PLC interface, and can be read by the PLC user from the DB20 during the runup.

15700	LANG_SUB_NAME			N01	K1	
-	Name for substitution subroutine			STRING	PowerOn	
-						
-	-		-	-	7/2	

Description: Name of the user program called on the basis of a substitution configured by MD30465 $MA_AXIS_LANG_SUB_MASK.

The user program is called with the path configured by MD15702 $MN_LANG_SUB_PATH.

15702	LANG_SUB_PATH			N01	K1	
-	Call path for substitution subroutine			BYTE	PowerOn	
-						
-	-	0	0	2	7/2	

Description: Path with which the user program set by MD15700 $MN_LANG_SUB_NAME is called on the basis of a substitution configured by MD30465 $MA_AXIS_LANG_SUB_MASK:

0: /_N_CMA_DIR (default)

1: /_N_CUS_DIR

2: /_N_CST_DIR

17400	OEM_GLOBAL_INFO			A01, A11	-	
-	OEM version information			STRING	PowerOn	
-						
-	5		-	-	7/2	

Description: A version information freely available to the user

(is indicated in the version screen)

Note: MD17400 $MN_OEM_GLOBAL_INFO[0] is used with functions such as logbook, licensing, etc. to store the machine identity.

17500	MAXNUM_REPLACEMENT_TOOLS			N09	FBW	
-	Maximal number of replacement tools.			DWORD	PowerOn	
-						
-	-	0	0	32	7/2	

Description: Only relevant if the tool management function is active.

Only relevant if the tool management (TMMA) function or the tool monitoring function (TMMO) is active.

0: The number of replacement tools is not monitored.

1: Exactly one replacement tool may be assigned to an identifier.

The data does not influence the memory requirement. It is solely for monitoring purposes.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK,

MD20310 $MC_TOOL_MANAGEMENT_MASK

17520	TOOL_DEFAULT_DATA_MASK			N09	FBW	
-	Create new tool: default settings			DWORD	PowerOn	
-						
-	-	0	0	0x1F	7/2	

Description:

When defining a tool for the first time (bits 0, 1, 2) or the magazine locations (bit 3) for the first time, certain data of the tool can be set to fixed default values. Bit 4 can couple the magazine location status 'Overlapping allowed' ('H2000') to the value of the magazine location status 'disabled' ('H1'). This can prevent simple applications from dealing with data which do not necessarily have to be assigned individual values.

Bit no.: 0 Bit value: 0 Hex value: -

Meaning: Default value of tool status ($TC_TP8), bit1=0 ='not released'

Bit no.: 0 Bit value: 1 Hex value: 'H1'

Meaning: Default value of tool status ($TC_TP8), bit1=1 ='released'

Bit no.: 1 Bit value: 0 Hex value: -

Meaning: Default value of tool status ($TC_TP8), bit6=0 ='not fixed-location-coded'

Bit no.: 1 Bit value: 1 Hex value: 'H2'

Meaning: Default value of tool status ($TC_TP8), bit6=1 ='fixed-location-coded'

Bit no.: 2 Bit value: 0 Hex value: -

Meaning: The tool is only accepted in the tool group when the explicit write command is used for the tool name. Only then can it be loaded via programming.

Bit no.: 2 Bit value: 1 Hex value: 'H4'

Meaning: The tool is automatically accepted in the tool group corresponding to the tool name when it is defined for the first time. The tool can then be changed using the default name ("t" = t-No.).

The term 'tool name' ($TC_TP2) can be hidden from the user. (This only makes sense if you do not use replacement tools or if the tool name is not written explicitly, as this may give rise to data consistency problems.)

Bit no.: 3 Bit value: 0 Only with TMMG: Default value of location type ($TC_TP7)=9999=not defined

Bit no.: 3 Bit value: 1 Hex value: 'H8'

Meaning: Only with TMMG: Default value of location type ($TC_TP7) = 1 and consequently the default value of magazine location type ($TC_MPP2)=1. This means that all magazine locations can accept all tools.

Bit no.: 4 Bit value: 0 Hex value: -

Meaning: Only with TMMG + active consider adjacent location: With SET/RESET of the magazine location status 'disabled', the magazine location status 'Overlapping allowed' remains unchanged.

Bit no.: 4 Bit value: 1 Hex value: 'H10'

Meaning: Only with TMMG + active consider adjacent location: With SET/RESET of the magazine location status 'disabled', the magazine location status 'Overlapping allowed' is automatically SET/RESET.

17530	TOOL_DATA_CHANGE_COUNTER			EXP, N01	FBW	
-	Mark tool data change for HMI			DWORD	PowerOn	
-						
-	-	0	0	0x1F	7/2	

Description: HMI display support. This data enables individual data to be explicitly taken into account or not taken into account in the OPI variables (block C/S) toolCounter, toolCounterC, toolCounterM.

Bit no.: 0 Bit value: 0 Hex value: -

Meaning: Changes to the values of the tool status ($TC_TP8) are not taken into account in toolCounterC

Bit no.: 0 Bit value: 1 Hex value: 'H1'

Meaning: Changes to the values of the tool status ($TC_TP8) are taken into account in toolCounterC

Bit no.: 1 Bit value: 0 Hex value: -

Meaning: Changes to the values of the remaining number of tools ($TC_MOP4) are not taken into account in toolCounterC

Bit no.: 1 Bit value: 1 Hex value: 'H2'

Meaning: Changes to the values of the remaining number of tools ($TC_MOP4) are taken into account in toolCounterC

Bit no.: 2 Bit value: 0 Hex value: -

Meaning: Changes to the values of the tool data are not taken into account in the tool data update service

Bit no.: 2 Bit value: 1 Hex value: 'H4'

Meaning: Changes to the values of the tool data are taken into account in the tool data update service

Bit no.: 3 Bit value: 0 Hex value: -

Meaning: Changes to the values of the magazine data are not taken into account in the tool data update service

Bit no.: 3 Bit value: 1 Hex value: 'H8'

Meaning: Changes to the values of the magazine data are taken into account in the tool data update service.

Bit no.: 4 Bit value: 0 Hex value: -

Meaning: Changes to the values of the ISO tool offset data are not taken into account in the tool data update service

Bit no.: 4 Bit value: 1 Hex value: 'H10' Meaning: Changes to the values of the ISO tool offset data are taken into account in the tool data update service

The statements "Changes to the values of the tool status" and "Changes to the values of the remaining number of tools" refer not only to value changes effected by internal processes in the NC but also to value changes produced by writing the corresponding system variables.

17540	TOOLTYPES_ALLOWED			N09	-	
-	Permitted tool types			DWORD	PowerOn	
-						
-	-	0x3FF	0	0x3FF	7/2	

Description:

```
Definition of the tool types permitted in NCK (see $TC_DP1) with the tool
offset selection. That is, tools of any type may be loaded in the NCK; but
only the tools types defined here may be defined in the offset defining tool.
A bit value = 1 means that the named tool type range is permitted for the
offset selection. A bit value = 0 means that the named tool type range is
rejected with an offset-capable alarm in the case of an attempted offset
selection of a cutting edge of this type. The special value = 0, 9999 for the
tool type means "undefined". Tool offsets with this tool type value generally
cannot be selected.
Bit no.: 0 value 0x1 means: Tool types 1 to  99 permitted
Bit no.: 1 value 0x2 means: Tool types 100 to 199 permitted (milling tools)
Bit no.: 2 value 0x4 means: Tool types 200 to 299 permitted (drilling tools)
Bit no.: 3 value 0x8 means: Tool types 300 to 399 permitted
Bit no.: 4 value 0x10 means: Tool types 400 to 499 permitted (grinding tools)
Bit no.: 5 value 0x20 means: Tool types 500 to 599 permitted (turning tools)
Bit no.: 6 value 0x40 means: Tool types 600 to 699 permitted
Bit no.: 7 value 0x80 means: Tool types 700 to 799 permitte
Bit no.: 8 value 0x100 means: Tool types 800 to 899 permitted
Bit no.: 9 value 0x200 means: Tool types 900 to 999 permitted
Related to:
MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA
```

17600	DEPTH_OF_LOGFILE_OPT			EXP, N01	-	
-	Depth of log memory optimization in REORG			DWORD	Reset	
-						
-	-	5	0	300	3/3	

Description:

```
The depth of memory optimization in the REORG log file
(=search depth to determine if a parameter to be written is already included
in the REORG log file).
The value of the machine data can be increased if alarm 15110 occurs during
program execution and if this alarm is to be avoided.
(Alternatively, the size of the REORG log file can be increased with MD28000
$MC_MM_REORG_LOG_FILE_MEM, provided that the operator has the access rights
required. This procedure should generally be preferred.)
Value
0       = No optimization,
That is each write operation creates an input into the REORG log file. Writ-
ing a variable value is therefore very time-efficient, but requires more mem-
ory.
0< n <= Maximum value
When a new variable value is written, the n previously entered write opera-
tions (but maximally up to the previous indicatable block) are checked to
determine if the parameter now to be written has already been written in the
past. If this is the case, a new entry is not made in the REORG log file.
If this is not the case, an entry is made. A variable value can therefore be
written in a very memory-efficient way, but requires more time.
Example:
MD17600 $MN_DEPTH_OF_LOGFILE_OPT is assumed to be 5 and the following would
be a typical program sequence:
x10     ; Executable NC block
r1=1    ; The first write command since x10
        ; -> Save old value in log file. 1st entry
r2=1    ; Determine that r2 is not yet included
        ; -> Save old value in log file. 2nd entry
r3=1    ; Determine that r3 is not yet included
        ; -> Save old value in log file. 3rd entry
r4=1    ; Determine that r4 is not yet included
        ; -> Save old value in log file. 4th entry
r5=1    ; Determine that r5 is not yet included
        ; -> Save old value in log file. 5th entry
r6=1    ; Determine that r6 is not yet included
        ; -> Save old value in log file. 6th entry
r2=1    ; Determine that r2 is already included
        ; (5th oldest entry) -> no renewed saving
r3=1    ; Determine that r3 is already included
        ; (4th oldest entry) -> no renewed saving
r1=2    ; As MD17600 $MN_DEPTH_OF_LOGFILE_OPT = 5 it is not detected that
        ; r1 is already included
        ; (6th oldest entry) -> save old value in log file.
        ; 7th entry
x20     ; Executable NC block
r1=3    ; The first write command since x20
```

```
        ; -> Save old value in log file. 1st entry
r1=4    ; Determine that r1 is already included
        ; (Only one entry) -> no renewed saving
```

The setting of the MD is particularly useful if a small number of verious parameters
are written frequently (e.g. in a loop) and if alarm 15110 occurs for this reason.

17610	DEPTH_OF_LOGFILE_OPT_PF			EXP, N01	-	
-	Depth of the PowerFail log memory optimization			DWORD	Reset	
-						
-	3	10, 0, 0	0	300	1/1	

Description: Depth of the memory optimization in the PowerFail log file (=search depth, to find out
whether a parameter to be written is already included in the PowerFail log file).
It is possible to increase the value of the machine data if
alarm 15120 occurs during program processing and if you wish to avoid it.
(Alternatively, you can increase the size of the PowerFail log file itself
by means of MD18232 $MN_MM_ACTFILESYS_LOG_FILE_MEM, if you have the necessary access right
and if the required memory is available.
Value
0 = same effect as value 1.
Writing of a variable value is therefore very time-efficient at the cost of the required memory.
0< n <= Maximum value
= Writing of a new variable value leads, prior to saving of the new variable value in the PowerFail log file, to the last n write operations which have been being checked to see whether
the new parameter to be written has already been written once.
If yes, the new value is not entered again in the PowerFail log file, but the old value is overwritten with the new one.
If no, the new value is entered.
At the cost of the required time, writing of a variable value
can therefore be designed very memory-efficiently.
Changing of the data can shorten/increase the time requirement of the present application.
Changing of the data can fill the available log buffers faster/more slowly.
Frequent occuring of alarm 15120 -> Increase values for index=0,1,2.
The value indicating the index to be changed can be deducted from the parameter of alarm 15120:
if it is the value for MD18232 $MN_MM_ACTFILESYS_LOG_FILE_MEM[0], then increase the value for index 0;
or increase MD18232 $MN_MM_ACTFILESYS_LOG_FILE_MEM[0] itself.
Index Meaning
0 Search depth in preprocessing buffer
1 Search depth in buffer for data changes within the range of tool change
2 Search depth in buffer for data changes of main processing (especially synchronized actions)

17900	VDI_FUNCTION_MASK			EXP, N09	H1	
-	Setting to VDI signals			DWORD	PowerOn	
-						
-	-	0x0	0	0x1	7/2	

Description: Settings for VDI signals:

Bit 0 == 0:

The VDI signals motion command + / motion command - are already issued if there is a travel request (default).

Bit 0 == 1:

The VDI signals motion command + / motion command - are issued only if the axis actually moves.

18030	HW_SERIAL_NUMBER			N05	-	
-	Hardware series number			STRING	PowerOn	
-						
-	1		-	-	ReadOnly	

Description: During power on of the control, a unique hardware serial number is stored in this MD:

- For Powerline series modules this is the serial number of the NCU module
- For Solutionline series modules this is the serial number of the CF card, or the unique number of the MCI module in the case of PC-based systems

This data cannot be written.

18040	VERSION_INFO			N05	IAD	
-	Version			STRING	PowerOn	
-						
-	4		-	-	ReadOnly	

Description: Version identifiers of the system software

18050	INFO_FREE_MEM_DYNAMIC			N01, N02, N05	S7	
-	Display data of free dynamic memory			DWORD	PowerOn	
-						
-	-	430080	-	-	ReadOnly	

Description:

The data is used for

a) the manufacturer's presetting of the memory size [bytes] available to the user for each channel after cold restart.

b) Displaying the available dynamic memory [bytes]

The data cannot be written.

The contents of the data state how much unbuffered memory is available per channel for increasing the unbuffered user data storage area via MD.

One should check whether the available memory is sufficient before increasing, for example, the number of LUDs, number of functional parameters, or the size of the IPO buffer.

If necessary, proceed step by step:

- increase by 1, note (old) value
- NCK startup (= 'warm start' or NCK reset), read off new value
- memory requirement = new value - old value

On the first NCK startup or cold restart of the control (=deletion of user data), MD18210 $MN_MM_USER_MEM_DYNAMIC is set by the NCK software so that at least the preset value results for MD18050 $MN_INFO_FREE_MEM_DYNAMIC.

That is, the value is automatically increased if the initial value of MD18210 $MN_MM_USER_MEM_DYNAMIC is too low.

The following also applies to multichannel systems:

- The preset value applies to each possible channel. That is, if there are ten possible channels, MD18210 $MN_MM_USER_MEM_DYNAMIC is set by the NCK SW so that at least the 'preset value* ten' results for MD18050 $MN_INFO_FREE_MEM_DYNAMIC.
- On activation of a channel, MD18210 $MN_MM_USER_MEM_DYNAMIC is increased if necessary so that the memory free at the time of activation continues to be free (provided that the memory structure permits this) after the channel has become active.
- The activation of the maximum possible number of axes is ensured by increasing the data MD18210 $MN_MM_USER_MEM_DYNAMIC if necessary so that memory free at the time of activation continues to be free (provided that the memory structure permits this) after the axis has become active.

'If necessary' in the previous sentences means that the adjustment is automatic if the channel/axis could not be activated with the current values of MD18210 $MN_MM_USER_MEM_DYNAMIC/$MN_INFO_FREE_MEM_DYNAMIC.

18060	INFO_FREE_MEM_STATIC			N01, N02, N05	S7	
-	Display data of free static memory			DWORD	PowerOn	
-						
-	-	2097152	-	-	ReadOnly	

Description: The following applies to powerline control models:

Output of the buffered memory available in the passive file system [bytes].

The data cannot be written.

The preset value states the minimum number of bytes available to the user when the NCK starts up with a cold restart.

The contents of the data state how much battery-backed memory is available for the passive file system at the time of startup.

After a non-buffered startup, the maximum memory available in the file system can be read.

If MDs that affect the requirement for buffered memory (e.g. MM_NUM_GUD_VALUES_MEM, MD38000 $MA_MM_ENC_COMP_MAX_POINTS) are changed then this changes the amount of memory available for the passive file system, as the amount of memory allocated to the passive file system consists of MD18230 $MN_MM_USER_MEM_BUFFERED minus all other buffered user data.

(See also the document on MD18350 $MN_MM_USER_FILE_MEM_MINIMUM)

At the first NCK startup or cold restart of the control (=deletion of user data) MD18230 $MN_MM_USER_MEM_BUFFERED is set by the NCK software so that at least the default value results for MD18060 $MN_INFO_FREE_MEM_STATIC.

That is MD18230 $MN_MM_USER_MEM_BUFFERED is automatically increased if its initial value is too low.

The following applies to solution line control models:

The data reserves the available memory for the data that are not the passive file system.

(MD18350 $MN_MM_USER_FILE_MEM_MINIMUM[0] dimensions the passive file system.)

Machine data for setting the active file system (tools, GUDs, ...) can be increased until this memory has all been allocated.

18070	INFO_FREE_MEM_DPR			EXP, N01, N02, N05	S7	
-	Display data of free memory in DUAL PORT RAM			DWORD	PowerOn	
-						
-	-	0	-	-	ReadOnly	

Description: Output of the available memory in the Dual Port RAM (Bytes).

The data cannot be written.

18075	MM_NUM_TOOLHOLDERS			N02, N09	/FBW/, "Description of Functions, Tool Management"	
-	Max. number of tool holders per TOA			DWORD	PowerOn	
-						
-	-	16	1	128	7/2	

Description:

Max. number of definable tool holders per TO range.

The address extension e of commands Te=t, Me=6 (*) is the number of the tool holder.

t=T number/tool name - depending on the function activated in the NCK.

(*) if: MD22550 $MC_TOOL_CHANGE_MODE=1 and MD22560 $MC_TOOL_CHANGE_M_CODE=6 applies

Normally the tool holder of milling machines is a spindle.

Also see MD20090 $MC_SPIND_DEF_MASTER_SPIND.

For turning machines the tool holder normally is not a spindle axis.

Also see MD20124 $MC_TOOL_MANAGEMENT_TOOLHOLDER.

In this case it should reasonably apply that MD18075 $MN_MM_NUM_TOOLHOLDERS is larger or equal to MD20090 $MC_SPIND_DEF_MASTER_SPIND/MD20124 $MC_TOOL_MANAGEMENT_TOOLHOLDER.

If bit 0 = 1 in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK and MD20310 $MC_TOOL_MANAGEMENT_MASK is set (=magazine management (TOOLMAN))

it will apply for reasonable values that MD18075 $MN_MM_NUM_TOOLHOLDERS is smaller or equal to MD18076 $MN_MM_NUM_LOCS_WITH_DISTANCE.

A maximum of MD18075 $MN_MM_NUM_TOOLHOLDERS intermediate memory locations of the type spindle

($TC_MPP1[9998,x]=2) can then be defined.

Example: TOOLMAN inactive

MD20090 $MC_SPIND_DEF_MASTER_SPIND shall be =3, MD18075 $MN_MM_NUM_TOOLHOLDERS shall be =3.

Then T1=t, T2=t, T3=t, T=t can be programmed.

Example: TOOLMAN active, milling machine with Me=6 as tool change command

MD18075 $MN_MM_NUM_TOOLHOLDERS shall be = 14, MD18076 $MN_MM_NUM_LOCS_WITH_DISTANCE=20,

10 channels shall be active, all channels have TOOLMAN active and have the same tool and magazine data

(=one TO range for all channels). MD20090 $MC_SPIND_DEF_MASTER_SPIND=1,.....10 for the channels.

Then up to 14 locations of the kind 'tool holder'/'spindle' can be defined in the intermediate magazine memory.

Additional 6 grippers or others can be defined.

These 20 locations max. can be linked to magazines.

In the channels T1=t, ... T14=t and Tt, or M1=6,....M14=6 and M6 can be programmed.

The PLC version used can limit the maximum number of tool holders.

18082	MM_NUM_TOOL			N02, N09	FBW,S7	
-	Number of tools the NCK can manage (SRAM)			DWORD	PowerOn	
-						
-	-	30	0	1500	7/2	

Description: The NC cannot manage more tools than the number entered in the MD. A tool has at least one cutting edge.

Buffered user memory is used.

The maximum possible number of tools is equal to the number of cutting edges. The MD must also be set when TOOLMAN is not used.

The buffered data are lost when the machine data is changed.

Related to:

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

18088	MM_NUM_TOOL_CARRIER			N02, N09	W1	
-	Maximum number of definable tool holders			DWORD	PowerOn	
-						
-	-	0	0	600	7/2	

Description: Maximum number of definable toolholders for orientable tools in the TO area. The value is divided by the number of active TO units. The integer result states how many toolholders can be defined for each TO unit. The data for defining a toolholder are set with the system variables $TC_CARR1, ... $TC_CARR14.

The data are stored in battery-backed memory.

Application example(s):

-

18094	MM_NUM_CC_TDA_PARAM			N02, N09	H2	
-	Number of OEM tool data (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	

Description: Number of tool-specific data (of type Integer) which can be created per tool, and which are available to the user or the compile cycle.

This machine data increases the buffered memory requirement by sizeof(double)*max. number of tools.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD18082 $MN_MM_NUM_TOOL

18095	MM_TYPE_CC_TDA_PARAM			N02, N09	-	
-	Type of OEM tool data (SRAM)			DWORD	PowerOn	
-						
-	10	4, 4, 4, 4, 4, 4, 4, 4...	1	6	2/2	

Description: Work may only be done with the default setting.

Individual types can be assigned to the parameters in this way. The array index n can accept values from 0 to the value of MD18094 $MN_MM_NUM_CC_TDA_PARAM.

The possible values of the MD = 1, 2, 3, 4, 5 and 6 represent the NC language types

1 BOOL,

2 CHAR,

3 INT,

4 REAL,

5 STRING and

6 AXIS.

The type FRAME cannot be defined here. The type STRING can be up to 31 characters long.

Example:

MD18094 $MN_MM_NUM_CC_TDA_PARAM=1

MD18095 $MN_MM_TYPE_CC_TDA_PARAM=5

"UserCuttingEdge" can then be programmed for parameter $TC_TPC1.

Buffered working memory is used. A value change can - but need not - lead to reconfiguration of the buffered memory.

Related to:

MD18094 $MN_MM_NUM_CC_TDA_PARAM

MD18082 $MN_MM_NUM_TOOL

18096	MM_NUM_CC_TOA_PARAM			N02, N09	G2	
-	Number of data per tool edge for compile cycles (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	

Description: Number of TOA data (of type Real) which can be created per tool, and which are available to the user or the compile cycle.

This MD increases the buffered memory requirement by sizeof(double)*max. number of cutting edges.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

18097	MM_TYPE_CC_TOA_PARAM			N02, N09	-	
-	Type of OEM data per cutting edge (SRAM)			DWORD	PowerOn	
-						
-	10	4, 4, 4, 4, 4, 4, 4, 4...	1	6	2/2	

Description: Work may only be done with the default setting.

Individual types can be assigned to the parameters in this way. The array index n can accept values from 0 to the value of MD18096 $MN_MM_NUM_CC_TOA_PARAM.

The possible values of the MD = 1, 2, 3, 4 and 6 represent the NC language types

1 BOOL,

2 CHAR,

3 INT,

4 REAL and

6 AXIS.

The type STRING is explicitly not possible here. The value 5 is treated like value 2).

The type FRAME cannot be defined here.

Example:

MD18096 $MN_MM_NUM_CC_TOA_PARAM=1

MD18097 $MN_MM_TYPE_CC_TOA_PARAM=2

"A" can then be programmed for parameter $TC_DPC1.

Buffered working memory is used. A value change can - but need not - lead to reconfiguration of the buffered memory.

Related to:

MD18096 $MN_MM_NUM_CC_TOA_PARAM

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

18098	MM_NUM_CC_MON_PARAM			N02, N09	FBW	
-	Number of monitoring data per tool for compile cycles			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	

Description: Number of monitoring data (of type Integer) which can be created per tool, and which are available to the user or the compile cycle.

This MD increases the buffered memory requirement by sizeof(int)*max. number of cutting edges.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

18099	MM_TYPE_CC_MON_PARAM			N02, N09	FBW	
-	Type of OEM monitor data (SRAM)			DWORD	PowerOn	
-						
-	10	3, 3, 3, 3, 3, 3, 3, 3...	1	6	2/2	

Description: Work may only be done with the default setting.

Individual types can be assigned to the parameters in this way. The array index n can accept values from 0 to the value of MD18098 $MN_MM_NUM_CC_MON_PARAM.

Possible values of the MD = 1, 2, 3, 4 and 6 represent the NC language types

1 BOOL,

2 CHAR,

3 INT,

4 REAL and

6 AXIS.

The FRAME type cannot be defined here.

(The type STRING is explicitly not possible here. The value 5 is treated like value 2.)

Example:

MD18098 $MN_MM_NUM_CC_MON_PARAM=1

MD18099 $MN_MM_TYPE_CC_MON_PARAM=2

"UserCuttingEdge" can then be programmed for the parameter $TC_MOPC1.

Buffered working memory is used. A value change can - but need not - lead to reconfiguration of the buffered memory.

Related to:

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

MD18098 $MN_MM_NUM_CC_MON_PARAM

18100	MM_NUM_CUTTING_EDGES_IN_TOA			N02, N09	W1	
-	Tool offsets in the TO range (SRAM)			DWORD	PowerOn	
-						
-	-	30	0	1500	7/2	

Description: Defines the number of tool cutting edges in a TO area. This machine data reserves approximately 250 bytes of battery-backed memory per TOA block for each tool cutting edge, irrespective of the tool type.

Tools with cutting edges of type 400-499 (= grinding tools) also occupy the location of a cutting edge.

Example:

Defining 10 grinding tools each of which has one cutting edge. Then at least:

MD18082 $MN_MM_NUM_TOOL = 10

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA = 20 must apply.

See also MD18082 $MN_MM_NUM_TOOL

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

18102	MM_TYPE_OF_CUTTING_EDGE			N02, N09	W1	
-	Type of D No. programming (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	1	7/2	

Description:

This MD activates the 'flat D number management'.

The type of D programming can be determined by individual values:

- direct or
- indirect programming.

The default value is zero. This means that the NCK manages the T and D numbers.

The NCK only accepts a value > 0 if bit 0 is not set in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK. That means the tool managment function cannot be active at the same time.

Value: Meaning

0: No 'flat D number management' active

1: D numbers are programmed directly and absolutely

Values 2, 3 have not yet been released

18105	MM_MAX_CUTTING_EDGE_NO			N02, N09	W1	
-	maximum value of D number			DWORD	PowerOn	
-						
-	-	9	1	32000	7/2	

Description:

Maximum value of the D number.

This does not affect the maximum number of D numbers per cutting edge.

The monitoring of the D number assignment associated with this value is only active when the D numbers are redefined. This means that existing data blocks are not subsequently checked if the MD is changed.

The following settings are advantageus:

MD18105 $MN_MM_MAX_CUTTING_EDGE_NO is equal to

MD18106 $MN_MM_MAX_CUTTING_EDGE_PER_TOOL.

If MD18105 $MN_MM_MAX_CUTTING_EDGE_NO is selected > MD18106 $MN_MM_MAX_CUTTING_EDGE_PER_TOOL, then the difference between offset number D and cutting-edge number CE should be known.

See also language commands CHKDNO, CHKDM, GETDNO, SETDNO, DZERO.

The machine data is not evaluated with the function "flat D number", and therefore has no significance there.

The MD can affect the memory requirement:

If the relation between the two, above-mentioned MDs changes from "less than or equal to" to "greater than" or vice versa, then this affects the non-buffered memory requirement.

Related to:

MD18106 $MN_MM_MAX_CUTTING_EDGE_PER_TOOL

18106	MM_MAX_CUTTING_EDGE_PERTOOL			N02, N09	W1	
-	maximum number of D numbers per tool			DWORD	PowerOn	
-						
-	-	9	1	12	7/2	

Description: Maximum number of cutting edges (D offsets) per tool (per T number).

This enables more safety to be achieved in the data definition. The value can be set to 1 if only tools with one cutting edge are used. This prevents more than one cutting edge being assigned to a tool in the data definition.

The following settings are advantageus: MD18105 $MN_MM_MAX_CUTTING_EDGE_NO is equal to MD18106 $MN_MM_MAX_CUTTING_EDGE_PER_TOOL. If MD18105 $MN_MM_MAX_CUTTING_EDGE_NO is selected > MD18106 $MN_MM_MAX_CUTTING_EDGE_PER_TOOL, then the difference between offset number D and cutting-edge number CE should be known.

See also language commands CHKDNO, CHKDM, GETDNO, SETDNO, DZERO.

The machine data is not evaluated with the function "flat D number", and therefore has no significance there.

The data can affect the memory requirement.

The MD can affect the memory requirement.

If the relation between the two, above-mentioned MDs changes from "less than or equal to" to "greater than" or vice versa, then this affects the non-buffered memory requirement.

Related to:

MD19105 $MN_MM_MAX_CUTTING_EDGE_NO

18108	MM_NUM_SUMCORR			N02, N09	W1	
-	Resulting offsets in TO area (SRAM)			DWORD	PowerOn	
-						
-	-	-1	-1	9000	7/2	

Description: Total number of resulting offsets in the NCK.

The value = -1 means that the number of resulting offsets is equal to the number of cutting edges multiplied by the number of resulting offsets per cutting edge.

A value > 0 and < "number of cutting edges multiplied by the number of resulting offsets per cutting edge" means that a maximum "number of resulting offsets per cutting edge" can be defined per cutting edge but do not have to be. This means that buffered memory can be used economically. Only those cutting edges for which expliicit data have been defined have a resulting offset data block.

Buffered memory is reserved. The memory requirement for a resulting offset doubles if "setup offset active" has also been configured, see MD18112 $MN_MM_KIND_OF_SUMCORR.

See also:

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA,

MD18110 $MN_MM_MAX_SUMCORR_PER_CUTTEDGE

18110	MM_MAX_SUMCORR_PER_CUTTEDGE			N02, N09	S7	
-	Max. number of additive offsets per edge (SRAM)			DWORD	PowerOn	
-						
-	-	1	1	6	7/2	

Description: Maximum number of resulting offsets per cutting edge.

If MD18108 $MN_MM_NUM_SUMCORR > 0 then:

The data is not memory defining, but is only used for monitoring.

If MD18108 $MN_MM_NUM_SUMCORR = -1 then:

The data is memory defining.

See also

MD18108 $MN_MM_NUM_SUMCORR,

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA.

18112	MM_KIND_OF_SUMCORR			N02, N09	W1	
-	Properties of resulting offsets in TO area (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	0x1F	7/2	

Description: Properties of the resulting offsets in NCK.

Bit 0=0 "Resulting offsets fine" are backed up when the tool data are backed up.

Bit 0=1 "Resulting offsets fine" are backed up when the tool data are backed up.

Bit 1=0 Set-up offsets are backed up when the tool data are backed up.

Bit 1=1 Set-up offsets are not backed up when the tool data are backed up.

Bit 2=0 If work is done with the function tool management (TOOLMAN) and/or tool monitoring (TMMO), existing "resulting offsets fine/setup offsets" are not affected when the tool status is set to "active".

Bit 2 =1 Existing resulting offsets are set to zero when the tool status is set to "active".

Bit 3=0 If work is done with the function "TOOLMAN" +"adapter", the "resulting offsets fine"/setup offsets are transformed.

Bit 3=1 No transformation of the "resulting offsets fine"/setup offsets

Bit 4=0 No set-up offset data blocks

Bit 4=1 Set-up offset data blocks are additionally created. Whereby the resulting offset is composed of the sum of the set-up offset + "resulting offset fine"

Changing the status of bits 0, 1, 2, 3 does not change the memory structure.

Changing the status of bit 4 triggers restructuring of the buffered memory after the next PowerOn.

See also

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

MD18108 $MN_MM_NUM_SUMCORR

MD18110 $MN_MM_MAX_SUMCORR_PER_CUTTEDGE

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK,

MD20310 $MC_TOOL_MANAGEMENT_MASK,

MD18086 $MN_MM_NUM_MAGAZINE_LOCATION,

MD18104 $MN_MM_NUM_TOOL_ADAPTER

18114	MM_ENABLE_TOOL_ORIENT			N02, N09	W1, F2	
-	Assign tool cutting edge orientation			DWORD	PowerOn	
-						
-	-	0	0	3	7/2	

Description: The function allows an orientation deviating from the default value to be assigned to each tool cutting edge.

Value = 0:

The tool orientation function is inactive.

Value = 1:

The system parameter $TC_DPV[n, m] is assigned to each tool cutting edge D=m of the tool T=n, with the aid of which one of 6 possible tool orientations in positive or negative coordinate direction can be defined.

Value = 2:

Not only the system parameter $TC_DPV[n, m] but also the additional three system parameters $TC_DPV3[n, m], $TC_DPV4[n, m] and $TC_DPV5[n, m] are assigned to each tool cutting edge D=m of the tool T=n, with the aid of which any spatial tool orientation can be defined

T, D are the NC addresses T and D with which the tool change or the tool selection and the offset selection are programmed.

Value = 3:

Not only the system parameters $TC_DPV[n, m] and $TC_DPV3 - $TC_DPV5 but also the additional three system parameters $TC_DPVN3[n, m], $TC_DPVN4[n, m] and $TC_DPVN5[n, m] are assigned to each tool cutting edge D=m of the tool T=n, with the aid of which a vector (normal vector) can be defined that is preferably perpendicular to the tool orientation. The normal vector may be modified so that it lies in the plane formed by the orientation and the programmed normal vector but perpendicular to the orientation

The orientation and the possibly modified normal vector together define a complete orientation coordinate system. The machine data affects the requirement for battery-backed memory.

18116	MM_NUM_TOOL_ENV			N02, N09	W1	
-	Number of tool environments in the TO area (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	600	7/2	

Description: Total number of tool environments in the NCK.

Battery-backed memory is reserved.

18118	MM_NUM_GUD_MODULES			N02	S7	
-	Number of GUD files in active file system (SRAM)			DWORD	PowerOn	
-						
-	-	7	1	9	7/2	

Description:

A GUD block corresponds to a file in which user-defined data can be stored. 9 GUD blocks are available of which 3 are already assigned to specific users/ applications.

UGUD_DEF_USER (block for user)

SGUD_DEF_USER (block for SIEMENS)

MGUD_DEF_USER (block for machine manufacturer)

Special cases:

The number of GUD modules is determined by the GUD module with the highest number entered.

Example:

If the following GUD modules are defined,

UGUD
MGUD
GUD5
GUD8

then the machine data must be set to a value of 8, signifying a memory requirement of 8 x 120 bytes = 960 bytes.

It is therefore advisable to selected the "lowest" possible GUD module. If GUD modules UGUD and MGUD have not been assigned elsewhere, then they may be used for this purpose.

Related to:

MD18150 $MN_MM_GUD_VALUES_MEM

(Memory space for user variables)

18120	MM_NUM_GUD_NAMES_NCK			N02	S7	
-	Number of global user variable names (SRAM)			DWORD	PowerOn	
-						
-	-	60	60	32000	7/2	

Description:

Defines the number of user variables for NCK global user data (GUD). Approximately 80 bytes of memory per variable are reserved in the SRAM for the names of the variables. The additional memory required for the value of the variable depends on the data type of the variable. The number of available NCK global user data is exhausted on reaching the limit value set in MD18120 $MN_MM_NUM_GUD_NAMES_NCK or MD18150 $MN_MM_GUD_VALUES_MEM (memory space for user variables).

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD18150 $MN_MM_GUD_VALUES_MEM

(Memory space for user variables)

18130	MM_NUM_GUD_NAMES_CHAN			N02	S7	
-	Number of channel-specific user variable names (SRAM)			DWORD	PowerOn	
-						
-	-	450	450	32000	7/2	

Description: Defines the number of user variable names for channel-specific global user data (GUD). Approximately 80 bytes of memory are reserved in the SRAM for each variable name. The additional memory required for the value of the variable is equal to the size of the data type of the variable multiplied by the number of channels. This means that each channel has its own memory available for the variable values. The number of available channel-specific global user data is exhausted on reaching the limit value set in MD18130 $MN_MM_NUM_GUD_NAMES_CHAN or MD18150 $MN_MM_GUD_VALUES_MEM (memory space for user variables).

The name created with the DEF statement is valid for all channels.

The memory requirement for the variable value is equal to the size of the data type multiplied by the number of channels.

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD18150 $MN_MM_GUD_VALUES_MEM

(Memory space for user variables)

18150	MM_GUD_VALUES_MEM			N02	A2	
-	Memory location for global user variable values (SRAM)			DWORD	PowerOn	
-						
-	-	196	136	32000	7/2	

Description: The specified value reserves memory space for the variable values of the global user data (GUD). The dimensioning of the memory depends to a large extent on the data types used for the variables.

Overview of the memory requirements of the data types:

Data type	Memory requirement
REAL	8 bytes
INT	4 bytes
BOOL	1 byte
CHAR	1 byte
STRING	1 byte per character, 100 characters permitted per string
AXIS	4 bytes
FRAME	up to 1KB depending on control model

The total memory required by a channel or axis-specific global user variable is the memory requirement of the variables multiplied by the number of channels or axes. The number of global user variables available is given when the limit defined in MD18120 $MN_MM_NUM_GUD_NAMES_NCK, MD18130 $MN_MM_NUM_GUD_NAMES_CHAN, MD18140 $MN_MM_NUM_GUD_NAMES_AXIS or MD18150 $MN_MM_GUD_VALUES_MEM is reached.

Buffered user memory is used.

Special cases:

The buffered data are lost if this machine data is altered!

Related to:

MD18118 $MN_MM_NUM_GUD_MODULES

(Number of GUD blocks)

MD18120 $MN_MM_NUM_GUD_NAMES_NCK

(Number of global user variables)

MD18130 $MN_MM_NUM_GUD_NAMES_CHAN

(Number of channel-specific user variables)

18170	MM_NUM_MAX_FUNC_NAMES			N02	V2,A2	
-	Number of miscellaneous functions (cycles, DRAM)			DWORD	PowerOn	
-						
-	-	410	410	32000	7/2	

Description: The data limits the maximum number of special functions over and above the predefined functions (such as sine, cosine, etc.) which can be used in

- cycle programs
- compile cycle software.

The function names are entered in the global NCK dictionary and must not conflict with the names that already exist.

The SIEMENS cycle package contains special functions that are taken into account by the default setting of the MD.

The data are stored in unbuffered memory. Approximately 150 bytes are required for each special function for management purposes.

Related to:

MD18180 $MN_MM_NUM_MAX_FUNC_PARAM

(Number. of additional parameters)

18180	MM_NUM_MAX_FUNC_PARAM			N02	V2	
-	Number of additional parameters for cycles according to MD 18170			DWORD	PowerOn	
-						
-	-	6750	6750	32000	7/2	

Description: Defines the maximum number of parameters required for the special functions in

- cycle programs
- compile cycle software.

50 parameters are required for the special functions of the SIEMENS cycle package, software version 1.

The data are stored in unbuffered memory. 72 bytes of memory are reserved for each parameter.

Related to:

MD18170 $MN_MM_NUM_MAX_FUNC_NAMES

(Number of special functions)

18190	MM_NUM_PROTECT_AREA_NCK			N12, N02, N06, N09	A3	
-	Number of files for machine-related protection zones (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	7/2	

Description: This machine data defines how many blocks are created for the protection zones available in the NCK.

Buffered memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

References:

/FB/, A3, "Axis Monitoring, Protection Zones"

18204	MM_NUM_CCS_TDA_PARAM			N02, N09	FBW	
-	Number of Siemens OEM tool data (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	

Description: Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:

User or OEM data of the tools.

Number of Siemens OEM TDA (=tool-specific) data (standard format Int).

See also: MD18094 $MN_MM_NUM_CC_TDA_PARAM, MD18082 $MN_MM_NUM_TOOL

Buffered user memory is used

18205	MM_TYPE_CCS_TDA_PARAM			N02, N09	FBW	
-	Type of Siemens OEM tool data (SRAM)			DWORD	PowerOn	
-						
-	10	4, 4, 4, 4, 4, 4, 4, 4...	1	6	2/2	

Description:

```
Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:
User or OEM data in the tool management.
Type of tool-specific Siemens user data configured by MD18204
$MN_MM_NUM_CCS_TDA_PARAM.
Each parameter can be assigned its own type. The permissible types are
Type                              Value of the machine data
(See types of the NC language)
----------------------------------------------------------------
BOOL                                   1
CHAR                                   2
INT                                    3
REAL                                   4
STRING                                 5 (permits identifiers up to 31 char-
acters long)
AXIS                                   6
FRAME                                  not defined
See also: MD18204 $MN_MM_NUM_CCS_TDA_PARAM, MD18082 $MN_MM_NUM_TOOL
Buffered user memory is used
```

18206	MM_NUM_CCS_TOA_PARAM			N02, N09	FBW	
-	No. of Siemens OEM data per cutting edge (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	

Description:

```
Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:
User or OEM data of the tools.
Number of Siemens OEM TOA data (standard format IN_Real).
See also: MD18096 $MN_MM_NUM_CC_TOA_PARAM, MD18100
$MN_MM_NUM_CUTTING_EDGES_IN_TOA
Buffered user memory is used
```

18207	MM_TYPE_CCS_TOA_PARAM			N02, N09	FBW	
-	Type of Siemens OEM data per cutting edge (SRAM)			DWORD	PowerOn	
-						
-	10	4, 4, 4, 4, 4, 4, 4, 4...	1	6	2/2	

Description: Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:

User or OEM data in the tool management.

Type of cutting-edge-specific Siemens user data configured by MD18206 $MN_MM_NUM_CCS_TOA_PARAM.

Each parameter can be assigned its own type. The permissible types are

```
Type                                Value of the machine data
(See types of the NC language)
----------------------------------------------------------------
BOOL                                 1
CHAR                                 2
INT                                  3
REAL                                 4
```

- (STRING is explicitly impossible here; value 5 is treated like value 2)

```
AXIS                                 6
FRAME                                not defined
```

See also: MD18206 $MN_MM_NUM_CCS_TOA_PARAM, MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

Buffered user memory is used

18208	MM_NUM_CCS_MON_PARAM			N02, N09	FBW	
-	No. of Siemens OEM monitor data (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	

Description: Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 0 = 1 or bit 1 = 1 and bit 2=1 ('H4'), is set:

User or OEM data in the tool management.

Number of Siemens OEM monitoring data; standard format IN_Int).

See also: MD18098 $MN_MM_NUM_CC_MON_PARAM, MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

Buffered user memory is used

18209	MM_TYPE_CCS_MON_PARAM			N02, N09	FBW	
-	Type of Siemens OEM monitor data (SRAM)			DWORD	PowerOn	
-						
-	10	3, 3, 3, 3, 3, 3, 3, 3...	1	6	2/2	

Description:

```
Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 0 = 1 or bit 1 = 1 and bit
2=1 ('H4'), is set:
User or OEM data in the tool management.
Type of monitoring-specific Siemens user data configured by MD18208
$MN_MM_NUM_CCS_MON_PARAM.
Each parameter can be assigned its own type. The permissible types are
Type                                Value of the machine data
(See types of the NC language)
----------------------------------------------------------------
BOOL                                 1
CHAR                                 2
INT                                  3
REAL                                 4
•   (STRING is explicitly impossible here; value 5 is treated like value 2)
AXIS                                 6
FRAME                                not defined
See also: MD18208 $MN_MM_NUM_CCS_MON_PARAM, MD18100
$MN_MM_NUM_CUTTING_EDGES_IN_TOA
Buffered user memory is used
```

18210	MM_USER_MEM_DYNAMIC			EXP, N02	S7	
-	User memory in DRAM [KB]			DWORD	PowerOn	
-						
-	-	9000	0	4000000	7/2	

Description:

The DRAM in the NC is used jointly by the system and the user.

MD18210 $MN_MM_USER_MEM_DYNAMIC defines the size of the DRAM available to the user. The input limits depend upon the hardware and software configurations of the CNC.

There are various types of user data in this memory area, for example.

- Local user data
- IPO block buffers
- User macros
- Diagnostics functions such as trace recording of times,.....
- Tool management trace
- Communication with 1-n HMIs; Value of n: See MD10134 $MN_MM_NUM_MMC_UNITS.
- Reorg Log file (required for internal purposes of the NC program sequence)
- ...

Each additionally active channel occupies a substantial amount of memory here.

Each activated axis requires part of this memory.

Exactly how much that is depends largely on the control model and the software version.

The settable values depend on the hardware and software configurations.

The value of NCK is automatically set after unbuffered startup of the NCK or deletion of the memory. The value is then such that the free memory defined in MD18050 $MN_INFO_FREE_MEM_DYNAMIC is available to the user.

(See the description of MD18050 $MN_INFO_FREE_MEM_DYNAMIC).

If the value is set too high (in the sense that the memory required is more than that available on the memory module), the NCK responds at the next NCK reset/power on by automatically reducing the machine data value to the maximum possible value that the hardware permits.

Message alarm 6030 advises of this process. This corresponds to a legal response of the NCK and is not an incorrect response.

The essential significance of the machine data is not to release the entire memory to the user because the memory is shared between the system and the user. A part of the physically existing memory is reserved for future develo- ments of the NCK.

The maximum amount of memory available on the hardware can be found by selecting a value for the data that is so large that, after the subsequent restart, message alarm 6030 indicates the maximum available memory. Applications that use the maximum available memory will in all probability have memory problems with a software conversion to a newer NCK version.

Upper and lower limits are not necessary. The software rejects values outside the permissible range and then automatically sets suitable values.

(See also message alarm 6030.)

The data in the dynamic memory are not battery-backed.

Note:

During power on, the system software compares the sum of all requests for dynamic memory with the value in MD18210 $MN_MM_USER_MEM_DYNAMIC. Alarm 6000 "Memory allocated with standard machine data" is output if the memory required exceeds the memory capacity set with the MD. Alarm 6030 "User memory limit has been adapted" is output if the control detects during the power on that the memory capacity required by MD18210 $MN_MM_USER_MEM_DYNAMIC is larger than the physical memory.

Related to:

The available dynamic memory can be taken from MD18050 $MN_INFO_FREE_MEM_DYNAMIC (display data of the free dynamic memory).

18230	MM_USER_MEM_BUFFERED			N02	S7	
-	User memory in SRAM			DWORD	PowerOn	
-						
-	-	0	0	4000000	7/1	

Description: Battery-backed user memory (in kbyte).

Various types of user data are stored in this memory area.

For example:

- NC part programs
- R parameters
- Global user data (GUD)
- Definitions of the protection zones
- Correction tables EEC, CEC, QEC
- Tool / magazine data

...

This data is retained after control power off.

(Provided the data backup (battery,...) is in good working order and the Init switch is correctly set on the control).

This means that they are available unchanged after restart.

In the case of control models without a backup battery (e.g. 802S,...) there is, as a rule, an option of , specifically backing up the data by operation, so that they are available again after the next power on process.

The settable values depend on the hardware and software configurations.

The set values are designed for the minimum memory configuration of the particular control model.

256, 512 and 2000, 4000KB of battery-backed memory are available on the hardware.

Approximately 30KB of this physically present memory is used for internal purposes. This means that approximately 226, 482, 1970, 3970KB ofuser memory can be set.

After all the NCK functions have taken 'their' memory corresponding to the relevant machine data values, the rest of the memory is added to the part program memory. As a rule, the user will thus have more part program memory available than that guaranteed in the sales brochure. This 'more' may however vary from version to version.

If there are various memory configuration options for a control model then the data may have to be increased correspondingly when using the larger memory variants.

In this respect, see the meaning of MD18060 $MN_INFO_FREE_MEM_STATIC

Special cases:

The battery-backed data are lost if this machine data is altered.

18232	MM_ACTFILESYS_LOG_FILE_MEM			N02	-	
-	System: logfile size in SRAM [KB]			DWORD	PowerOn	
-						
-	3	200, 50, 30	0	32000	2/2	

Description: Buffered log file for buffered data of the active file system (in kbytes)

Systems with slow data buffer media store changed buffered data in the internal system SRAM. When the buffer is full, all data of the active file system are made persistent. The buffer backs up the data persistence of the last persistence operation until the next power fail. After a power fail (power failure or power OFF), data that had not yet been made persistent at the time of the power fail can be restored from this buffer.

The log file serves to minimize or totally avoid data loss in the event of power fail.

1000 entries require approximately 70 kB.

A value greater than 0 is only practicable if MD18231 $MN_MM_USER_MEM_BUFFERED_TYPEOF[1] = 1.

A value equal to 0 means that the buffered data are not voltage loss safe

if MD18231 $MN_MM_USER_MEM_BUFFERED_TYPEOF[1] = 1 (typical for SINUMERIK solution line)

Example:

With MD18232 $MN_MM_ACTFILESYS_LOG_FILE_MEM[2] = 0, data changes from synchronized actions can be excluded from the power fail data backup.

An improved time response of the synchronized actions would be advantageous. This should only be set if the buffered data that are changed by the synchronized action are not safety-relevant.

Index Meaning

0 Preprocessing buffer

1 Buffer for data changes within the range of the tool change

2 Buffer for data changes of the main processing (especially synchronized actions)

See also MD17610 $MN_DEPTH_OF_LOGFILE_OPT_PF, which can be used to optimize the behavior.

18233	IS_CONTINOUS_DATA_SAVE_ON			EXP, N02	-	
-	System: Automatic saving of persistent data			BOOLEAN	PowerOn	
-						
-	3	TRUE, TRUE, TRUE	-	-	7/2	

Description: The machine data is relevant only if MD18231 $MN_MM_USER_MEM_BUFFERED_TYPEOF = 1.

The default value should be changed only if the system is operated in an environment,

Value = 0 : Continuous saving of persistent data on disk/flash/etc. is deactivated.

The dynamic response of the software on systems of the SolutionLine range can thus be improved.

Value = 1 : Continuous automatic saving of persistent data on disk/flash/etc. is active.

Index 0 = Reserved

Index 1 = Definition for the buffered data of the active file system (incl. machine data).

Index 2 = Definition for the buffered data of the passive file system (part programs, cycles, ...).

The default value should be changed only for diagnostic purposes or for optimizing the dynamic response.

The default value should be changed only if the system is operated in an environment,

where no spontaneous shutdown of the system / spontaneous power failure occurs.

Otherwise, persistent data can be lost.

18235	MM_INCOA_MEM_SIZE			EXP	-	
-	Size of the DRAM memory for INCOA applications [Kbyte]			DWORD	PowerOn	
-						
-	-	20480	0	25600	7/2	

Description: On cold restart of the control system, the default value of MD18235 $MN_MM_INCOA_MEM_SIZE specifies

the DRAM memory range that is available for INCOA applications in total.

This MD can only be read. With the diagnostics function "Read current actual value" the

memory space actually occupied by the INCOA applications can be determined.

18237	MM_CYC_DATA_MEM_SIZE			EXP, N02	-	
-	Cycle/display setting data in SRAM [kB]			DWORD	PowerOn	
-						
-	-	0	0	96	ReadOnly	

Description: Size of the buffered memory for 'Setting data for cycles and display' [kB]

18270	MM_NUM_SUBDIR_PER_DIR			N02	S7	
-	Number of subdirectories (DRAM)			DWORD	PowerOn	
-						
-	-	256	-	-	ReadOnly	

Description: Defines the maximum number of subdirectories that can be created in a directory or subdirectory of the passive file system.

This value is for information only, and cannot be changed.

See also MD18280 $MN_MM_NUM_FILES_PER_DIR (number of files per directory).

18280	MM_NUM_FILES_PER_DIR			N02	S7	
-	Number of files per directory (DRAM)			DWORD	PowerOn	
-						
-	-	512	-	-	ReadOnly	

Description: Defines the maximum number of files that can be created in a directory or subdirectory of the passive file system.

This value is for information only, and cannot be changed.

See also MMD18270 $MN_MM_NUM_SUBDIR_PER_DIR (number of subdirectories per directory).

18310	MM_NUM_DIR_IN_FILESYSTEM			N02	S7	
-	Number of directories in passive file system (SRAM)			DWORD	PowerOn	
-						
-	-	30	30	256	7/2	

Description: This machine data limits the number of directories in the passive file system.

It can be used to reserve memory in the SRAM for the management of the directories. The directories and subdirectories of the passive file system set up by the system are included in this machine data. The memory required for the management of the directories can be calculated as follows:

Memory required = a (440+28 (b+c)) bytes

a = Input value of MD18310 $MN_MM_NUM_DIR_IN_FILESYSTEM

(no. of directories in passive file system)

b = Input value of MD19300 $MN_MM_DIR_HASH_TABLE_SIZE

(HASH table size for subdirectories)

c = Input value of MD18290 $MN_MM_FILE_HASH_TABLE_SIZE

(hash table size for the files of a directory)

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD18270 $MN_MM_NUM_SUBDIR_PER_DIR

(Number of subdirectories)

18320	MM_NUM_FILES_IN_FILESYSTEM			N02	S7	
-	Number of files in passive file system (SRAM)			DWORD	PowerOn	
-						
-	-	750	64	1000	7/2	

Description: Defines the number of files available in the part program memory. This machine data is used to reserve memory in SRAM - approximately 320 bytes per file - for managing the file memory. Each file created requires a minimum of one kbyte of memory for the file code. If the one kbyte limit for the file code is exceeded another kbyte is reserved for the file.

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD18280 $MN_MM_NUM_FILES_PER_DIR

(Number of files in directories)

18321	MM_NUM_SYSTEM_FILES_IN_FS			N02	-	
-	Number of system files			DWORD	PowerOn	
-						
-	-	400	400	1000	1/1	

Description: Number of temporary system files in the passive file system (see also MD18355 $MN_MM_T_FILE_MEM_SIZE);

For example: Compilations of cycles (preprocessing), system traces

18332	MM_FLASH_FILE_SYSTEM_SIZE			N01, N02	IAD	
-	Size of FFS			DWORD	PowerOn	
-						
-	-	0	0	4096	7/1	

Description: Size of the flash file system on the PCNC (in kbyte)

Entries have to be made in steps of 128KB. Apart from 0, the smallest possible value is 512KB.

If the flash file system is used as a backup memory for the DRAM file system, then MD18332 $MN_MM_FLASH_FILE_SYSTEM_SIZE must be at least 3 times the size of the largest file in the DRAM file system larger than MD18351 $MN_MM_DRAM_FILE_MEM_SIZE.

Additional memory space is needed in the DRAM file system for log files if this has been configured by MD11295 $PROTOC_FILE_MEM.

18352	MM_U_FILE_MEM_SIZE			EXP, N02	S7	
-	End user memory for part programs/cycles/files			DWORD	PowerOn	
-						
-	3	0, 0, 0	0	0	2/2	

Description: The machine data is not available or not defined for PowerLine control models.

End user memory for files in the passive file system (in kbyte).

There are various types of user data in this memory area.

E.g.: NC part programs, cycle programs of the end user, diagnostic files, ...

The settable values depend on the hardware and software configurations.

The settable size of the part program memory is, apart from the upper limit value,

determined by the MD18230 $MN_MM_USER_MEM_BUFFERED and can also

be determined by a software option.

Index 0 = Size of the battery-backed part program / cycle program memory

Index 1 = Reserved

Index 2 = Reserved

18353	MM_M_FILE_MEM_SIZE			EXP, N02	S7	
-	Memory capacity for machine manufacturer's cycles/files			DWORD	PowerOn	
-						
-	3	0, 0, 0	0	0	1/1	

Description: The machine data is not available or not defined for PowerLine control models.

Memory for machine manufacturer files in the passive file system (in kbyte).

The machine manufacturer's files are in this memory area of the passive file system.

E.g.: cycle programs

The settable values depend on the hardware and software configurations.

The settable size of the memory is, apart from the upper limit value,

determined by the MD18230 $MN_MM_USER_MEM_BUFFERED.

Index 0 = Minimum size of the battery-backed (persistent) part program / cycle program memory

Index 1 = Reserved

Index 2 = Reserved

18354	MM_S_FILE_MEM_SIZE			EXP, N02	-	
-	Memory capacity for NC manufacturer's cycles/files			DWORD	PowerOn	
-						
-	3	0, 0, 0	0	0	7/2	

Description: The machine data is not available or not defined for PowerLine control models.

Memory for the control manufacturer's files in the passive file system (in kbyte).

The control manufacturer's files are in this memory area of the passive file system.

E.g.: cycle programs, system files

The settable values depend on the hardware and software configurations.

The settable size of the memory is, apart from the upper limit value,

for index = 0 determined by MD18230 $MN_MM_USER_MEM_BUFFERED.

For index 1 = Reserved.

For index 2 = limited by the size of the internally availble battery-backed memory (SRAM).

Index 0 = Size of the battery-backed cycle program memory

Index 1 = Reserved

Index 2 = Size of the battery-backed memory for system files

18355	MM_T_FILE_MEM_SIZE			EXP, N02	-	
-	Memory size for temporary files			DWORD	PowerOn	
-						
-	-	4608	4608	-	7/2	

Description: Memory for temporary files in the passive file system (in kbyte) e.g. compilations of cycles (preprocessing), cycles on CF, system traces

18370	MM_PROTOC_NUM_FILES			N02	D1,OEM	
-	Max.no. of log files in passive file system			DWORD	PowerOn	
-						
-	10	2, 0, 0, 0, 0, 2, 2, 2...	0	10	1/1	

Description: Maximum number of log files in the passive file system.

18371	MM_PROTOC_NUM_ETPD_STD_LIST			N02	D1,OEM	
-	Number of standard data lists ETPD.			DWORD	PowerOn	
-						
-	10	25, 0, 0, 0, 0, 25, 25, 25...	0	25	1/1	

Description: Number of standard data lists in the OPI module ETPD (user-specific)

18373	MM_PROTOC_NUM_SERVO_DATA			N02	D1	
-	Number of servo data for log			DWORD	PowerOn	
-						
-	10	0, 0, 0, 0, 0, 10, 10, 10...	0	20	1/1	

Description: Number of servo data which must be recordable at the same time (user-specific).

18374	MM_PROTOC_FILE_BUFFER_SIZE			N02	-	
-	Size of log file buffer			DWORD	PowerOn	
-						
-	10	8000, 8000, 8000, 8000, 8000, 8000, 8000...	5000	-	1/1	

Description: Size of the data buffer between the IPO and preprocessing time levels of a log file [Bytes].

18375	MM_PROTOC_SESS_ENAB_USER			N02	-	
-	Users enabled for sessions			BYTE	PowerOn	
-						
-	10	0, 0, 0, 0, 0, 1, 1, 1...	0	1	1/1	

Description: Users that are available for session management.

18390	MM_COM_COMPRESS_METHOD			EXP, N01, N02	-	
-	Supported compression methods.			DWORD	PowerOn	
-						
-	-	0x01	-	-	2/2	

Description: Setting for the compression methods to be supported.

18391	TRACE_PATHNAME			EXP	-	
-	Path for trace generation			STRING	PowerOn	
NBUP						
-	-		-	-	1/1	

Description: Path on which traces are saved.

The trace files are used for problem analysis by NCK development.

18392	TRACE_SAVE_OLD_FILE			EXP	-	
-	Old trace files are retained			BOOLEAN	PowerOn	
NBUP						
-	-	FALSE	-	-	1/1	

Description: The old traces are no longer overwritten when new traces are created; instead, a version extension is added to the trace file name.

At the current time this function is executed only if files are saved on the host file system (see TRACE_PATHNAME).

The trace files are used for problem analysis by NCK development.

18400	MM_NUM_CURVE_TABS			N02, N09	M3	
-	Number of curve tables (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	

Description: Defines the maximum number of curve tables that can be stored in the SRAM of the entire system. A curve table consists of a number of curve segments.

Related to:

MD18402 $MN_MM_NUM_CURVE_SEGMENTS

18402	MM_NUM_CURVE_SEGMENTS			N02, N09	M3,B3	
-	Number of curve segments (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	

Description: Defines the maximum number of curve segments that can be stored in the SRAM of the entire system. The curve segments are a component of a curve table.

Related to

MD18400 $MN_MM_NUM_CURVE_TABS

18403	MM_NUM_CURVE_SEG_LIN			N02, N09	M3	
-	Number of linear curve segments (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	

Description: Number of linear curve segments in the SRAM available throughout the NCK.

A curve table may consist of"normal" curve segments and linear segments. The number of "normal" curve segments in the SRAM is defined by MD18402 $MN_MM_NUM_CURVE_SEGMENTS, these curve segments can accommodate polynomials.

Linear curve segments can only accommodate straight lines.

These linear curve segments are stored in battery-backed memory.

18404	MM_NUM_CURVE_POLYNOMS			N02, N09	M3,B3	
-	Number of curve table polynomials (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	

Description: Defines the maximum total number of polynomials for curve tables that can be stored in the SRAM of the entire system. The polynomials are a component of a curve segment. A maximum of 3 polynomials are required for a curve segment. As a rule, only 2 polynomials are used for each curve segment.

Related to

MD18400 $MN_MM_NUM_CURVE_TABS

MD18402 $MN_MM_NUM_CURVE_SEGMENTS

18406	MM_NUM_CURVE_TABS_DRAM			N02, N09	M3	
-	Number of curve tables (DRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	

Description: Number of curve tables in the DRAM available throughout the NCK.

The curve tables are stored either in the buffer memory or in the dynamic memory.

This MD is used to set the number of curve tables in the dynamic memory (DRAM).

18408	MM_NUM_CURVE_SEGMENTS_DRAM			N02, N09	M3	
-	Number of curve segments (DRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	

Description: Number of polynomial curve segments in the DRAM available throughout the NCK.

The curve segments are stored either in the buffer memory or in the dynamic memory.

This MD is used to set the number of segments in the dynamic memory (DRAM).

18409	MM_NUM_CURVE_SEG_LIN_DRAM			N02, N09	M3	
-	Number of linear curve segments (DRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	

Description: Number of linear curve segments in the DRAM available throughout the NCK.

A curve table may consist of "normal" curve segments and linear segments. The number of "normal" curve segments in the DRAM is defined by MD18408 $MN_MM_NUM_CURVE_SEGMENTS_DRAM, these curve segments can accommodate polynomials. Linear curve segments can only accommodate straight lines.

The curve segments are stored either in the buffer memory or in the dynamic memory. This MD defines the number of curve segments in the dynamic memory (DRAM).

18410	MM_NUM_CURVE_POLYNOMS_DRAM			N02, N09	M3	
-	Number of curve table polynomials (DRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	

Description: Number of polynomials for curve tables in the DRAM available throughout the NCK.

The polynomials for curve tables are stored in the buffer memory or in the dynamic memory.

This MD is used to set the number of polynomials for curve tables in the dynamic memory (DRAM).

18450	MM_NUM_CP_MODULES			N02, N09	-	
-	Max. number of CP modules			DWORD	PowerOn	
-						
-	-	4	0	48	1/1	

Description: Number of CP coupling modules available within the NCK

The MD defines the max. permissible number of CP couplings and reserves the required dynamic memory (DRAM).

18452	MM_NUM_CP_MODUL_LEAD			N02, N09	-	
-	Maximum number of CP master values			DWORD	PowerOn	
-						
-	-	4	0	99	1/1	

Description: Number of NCK-wide available CP master values.

This MD defines the max. permissible number of CP master values and reserves the required dynamic memory (DRAM).

18600	MM_FRAME_FINE_TRANS			N02	K2,M5	
-	Fine offset with FRAME (SRAM)			DWORD	PowerOn	
-						
-	-	1	0	1	7/2	

Description: 0: The fine offset cannot be entered or programmed.

Disabling fine offset saves a maximum of 10KB SRAM, (depending on MD28080 $MC_MM_NUM_USER_FRAMES).

1: The fine offset is possible for settable frames, the basic frame and the programmable frame by operator input or via program.

18601	MM_NUM_GLOBAL_USER_FRAMES			N02	K2,M5	
-	Number of global predefined user frames (SRAM).			DWORD	PowerOn	
-						
-	-	0	0	100	7/2	

Description: Number of global predefined user frames.

The value corresponds to the number of field elements for the predefined field $P_UIFR[].

If the value of the data is greater than 0, then all settable fields are only global. The MD28080 $MC_MM_NUM_USER_FRAMES is then ignored.

18602	MM_NUM_GLOBAL_BASE_FRAMES			N02	K2,M5	
-	Number of global base frames (SRAM).			DWORD	PowerOn	
-						
-	-	0	0	16	7/2	

Description: Number of NCU basic frames.

The value corresponds to the number for the predefined field $P_NCBFR[].

18660	MM_NUM_SYNACT_GUD_REAL			N02	-	
-	Number of configurable GUD variables of type REAL			DWORD	PowerOn	
-						
-	9	0, 0, 0, 0, 0, 0, 0, 0...	0	32767	7/2	

Description: The MD18660 $MN_MM_NUM_SYNACT_GUD_REAL[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type REAL. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_REAL[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_REAL[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_REAL[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_REAL[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_REAL[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type REAL

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_RS[ ] -> Synact parameter of type REAL in the SGUD block

SYG_RM[ ] -> Synact parameter of type REAL in the MGUD block

SYG_RU[ ] -> Synact parameter of type REAL in the UGUD block

SYG_R4[ ] -> Synact parameter of type REAL in the GUD4 block

....

SYG_R9[ ] -> Synact parameter of type REAL in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18661	MM_NUM_SYNACT_GUD_INT			N02	-	
-	Number of configurable GUD variables of type integer			DWORD	PowerOn	
-						
-	9	0, 0, 0, 0, 0, 0, 0, 0...	0	32767	7/2	

Description: The MD18661 $MN_MM_NUM_SYNACT_GUD_INT[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type INTEGER. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_INT[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_INT[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_INT[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_INT[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_INT[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type BOOL

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_IS[ ] -> Synact parameter of type INT in the SGUD block

SYG_IM[ ] -> Synact parameter of type INT in the MGUD block

SYG_IU[ ] -> Synact parameter of type INT in the UGUD block

SYG_I4[ ] -> Synact parameter of type INT in the GUD4 block

....

SYG_I9[ ] -> Synact parameter of type INT in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18662	MM_NUM_SYNACT_GUD_BOOL			N02	-	
-	Number of configurable GUD variables of type Boolean			DWORD	PowerOn	
-						
-	9	0, 0, 0, 0, 0, 0, 0, 0...	0	32767	7/2	

Description: The MD18662 $MN_MM_NUM_SYNACT_GUD_BOOL[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type Boolean. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_BOOL[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_BOOL[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_BOOL[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_BOOL[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_BOOL[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type BOOL

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_BS[ ] -> Synact parameter of type Boolean in the SGUD block

SYG_BM[ ] -> Synact parameter of type Boolean in the MGUD block

SYG_BU[ ] -> Synact parameter of type Boolean in the UGUD block

SYG_B4[ ] -> Synact parameter of type Boolean in the GUD4 block

....

SYG_B9[ ] -> Synact parameter of type Boolean in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18663	MM_NUM_SYNACT_GUD_AXIS			N02	-	
-	Number of configurable GUD variables of type Axis			DWORD	PowerOn	
-						
-	9	0, 0, 0, 0, 0, 0, 0, 0...	0	32767	7/2	

Description:

The MD18663 $MN_MM_NUM_SYNACT_GUD_AXIS[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type AXIS. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_AXIS[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_AXIS[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_AXIS[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_AXIS[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_AXIS[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type AXIS

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_AS[ ] -> Synact parameter of type AXIS in the SGUD block

SYG_AM[ ] -> Synact parameter of type AXIS in the MGUD block

SYG_AU[ ] -> Synact parameter of type AXIS in the UGUD block

SYG_A4[ ] -> Synact parameter of type AXIS in the GUD4 block

....

SYG_A9[ ] -> Synact parameter of type AXIS in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18664	MM_NUM_SYNACT_GUD_CHAR			N02	-	
-	Configurable GUD variable of type Char			DWORD	PowerOn	
-						
-	9	0, 0, 0, 0, 0, 0, 0, 0...	0	32767	7/2	

Description:

```
The MD18664 $MN_MM_NUM_SYNACT_GUD_CHAR[ ]
can be used to extend individual GUD blocks by additional
channel-specific parameter areas of type CHAR.
The GUD blocks are differentiated by the field index:
$MN_MM_NUM_SYNACT_GUD_CHAR[0] =  <value> -> extension of the SGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[1] =  <value> -> extension of the MGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[2] =  <value> -> extension of the UGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[3] =  <value> -> extension of the GUD4 block
$MN_MM_NUM_SYNACT_GUD_CHAR[8] =  <value> -> extension of the GUD9 block
In each case, fields with the following properties are created:
Data type CHAR
Field size corresponding to <value> of the relevant machine data
Predefined names:
   SYG_CS[ ] -> Synact parameter of type CHAR in the SGUD block
   SYG_CM[ ] -> Synact parameter of type CHAR in the MGUD block
   SYG_CU[ ] -> Synact parameter of type CHAR in the UGUD block
   SYG_C4[ ] -> Synact parameter of type CHAR in the GUD4 block
   ....
   SYG_C9[ ] -> Synact parameter of type CHAR in the GUD9 block
The parameters can be read and written both by the part program
and also via synchronous actions.
```

18665	MM_NUM_SYNACT_GUD_STRING			N02	-	
-	Configurable GUD variable of type STRING			DWORD	PowerOn	
-						
-	9	0, 0, 0, 0, 0, 0, 0, 0...	0	25	7/2	

Description:

```
The MD18665 $MN_MM_NUM_SYNACT_GUD_STRING[ ] can be
used to extend individual GUD blocks by additional channel-specific
parameter areas of type STRING.
The GUD blocks are differentiated by the field index:
$MN_MM_NUM_SYNACT_GUD_STRING[0] =  <value> -> extension of the SGUD block
$MN_MM_NUM_SYNACT_GUD_STRING[1] =  <value> -> extension of the MGUD block
$MN_MM_NUM_SYNACT_GUD_STRING[2] =  <value> -> extension of the UGUD block
$MN_MM_NUM_SYNACT_GUD_STRING[3] =  <value> -> extension of the GUD4 block
$MN_MM_NUM_SYNACT_GUD_STRING[8] =  <value> -> extension of the GUD9 block
In each case, fields with the following properties are created:
Data type STRING
Field size corresponding to <value> of the relevant machine data
The maximum length of a string is 31 characters.
Predefined names:
   SYG_SS[ ] -> Synact parameter of type STRING in the SGUD block
   SYG_SM[ ] -> Synact parameter of type STRING in the MGUD block
   SYG_SU[ ] -> Synact parameter of type STRING in the UGUD block
   SYG_S4[ ] -> Synact parameter of type STRING in the GUD4 block
   ....
   SYG_S9[ ] -> Synact parameter of type STRING in the GUD9 block
The parameters can be read and written both by the part program
and also via synchronous actions.
```

18710	MM_NUM_AN_TIMER			N02	-	
-	Number of global time variable for synchronized actions			DWORD	PowerOn	
-						
-	-	0	0	10000	7/2	

Description: Number of global time variables for motion-synchronous actions (DRAM)

18720	MM_SERVO_FIFO_SIZE			EXP, N01	B3	
-	Setpoint value for buffer size between IPO and position control			DWORD	PowerOn	
-						
-	-	2	2	35	3/2	

Description: The machine data determines the size of the setpoint value buffer between interpolator and position control, and has a direct effect on the dynamic user memory requirement.

That is normally 2. If several NCUs are connected via NCU link for e.g. rotary indexing machines, the value should be set to 3 on all NCUs. This will balance the transmission rates of the setpoint values via the link.

In a master value application (e.g. line shaft), the value should be set to 4, but only on the NCU that generates the master value. For all the other NCUs, the preset value should be maintained at 2.

Note:

In control loops that are connected via interpolator, every increase of the value generates a further dead-time.

When the IPO cycles of the NCUs within an NCU group are set to different values, the link communication will only run in the slowest IPO cycle. The MD must be increased in the ratio of the NCU IPO cycle to the slowest IPO cycle in the NCU group, in order to achieve a synchronized output of the setpoint values on the drive interface. The formula for this is as follows:

MM_SERVO_FIFO_SIZE = 2 * IPO cycle ratio + 1

Example:

In an IPO cycle ratio of 4:1, the value on the fast NCU should be set to 9 instead of 3. On the slow NCU, the value must be set to 3.

18730	MM_MAXNUM_ALARM_ACTIONS			N02	-	
-	Length of the alarm action list			DWORD	PowerOn	
-						
-	-	500	100	2000	1/1	

Description: Maximum number of alarm actions that are retained. This is the length of the alarm action list.

18794	MM_TRACE_VDI_SIGNAL			EXP, N02, N06	-	
-	Trace specification of VDI signals			DWORD	PowerOn	
NBUP						
-	-	0	0	0x7FFFFFFF	2/2	

Description: The NCK sends and receives PLC VDI signals. The Trace function stores the signals which have changed in each interpolation cycle in an FIFO memory (first in-first out) having a size of MM_MAX_TRACE_POINTS.

The FIFO is written to a file (for the 1st channel: ncsctr01.mpf) when a "trigger event" occurs (e.g. Cancel Alarm key, see MD22704 $MC_TRACE_STOPTRACE_EVENT and MD22700 $MC_TRACE_STARTTRACE_EVENT).

The machine data should be interpreted as bit mask. The corresponding VDI signals are recorded depending on which bit is set.

Bits 1.. 6 describe which axial VDI input signals are recorded in the trace (see .. TRACE_DATA_FUNCTION).

18800	MM_EXTERN_LANGUAGE			N01, N12	K1	
-	Activation of external NC languages			DWORD	PowerOn	
-						
-	-	0x0000	0x0000	0x0001	7/2	

Description: The corresponding NC language must be activated to execute part programs of other control manufacturers. Only one external NC language can be selected. The range of instructions which is made available in each case is to be taken from the current documentation.

Bit 0 (LSB):

Execution of part programs ISO_2 or ISO_3.

See MD10880 $MN_MM_EXTERN_CNC_SYSTEM for coding.

18860	MM_MAINTENANCE_MON			EXP, N01	W6	
-	Activation of maintenance data recording			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	

Description: Maintenance data is recorded when this MD has the value TRUE.

The axial MD33060 $MA_MAINTENANCE_DATA sets which data are to be recorded.

Details are to be found in the service documentation.

18864	MM_NUM_TRAFO_DATA_SETS			N02, N09	W1	
-	Maximum number of definable transformation data blocks.			DWORD	PowerOn	
-						
-	-	0	0	100	7/2	

Description: Maximum number of definable transformation data blocks. The data for defining a transformation data block are set by the system variables $NT_XXX.

The data are stored in the buffered memory.

18866	MM_NUM_KIN_TRAFOS			N02, N09	W1	
-	Maximum number of transformation objects in NCK			DWORD	PowerOn	
-						
-	-	0	0	200	7/2	

Description: Maximum number of transformation objects in NCK.

This machine data indicates the maximum number of transformation objects in the NCK.

If this machine data is 0, the maximum number of kinematic transformations per channel which can be created using machine data ($MC_TRAFO_TYPE_N) remains at 20 (conventional parameter setting for kinematic transformations).

If the machine data is not equal to zero, it indicates the possible total number of all transformations in the NCK. This can be transfomations parameterized conventionally as well as (alternatively or in addition) transformations paramterized using kinematic chains.

18930	COREFILE_NAME			EXP	-	
-	Path for core file creation			STRING	PowerOn	
-						
-	-		-	-	7/1	

Description: File name with path name under which a core file is created in the case of a control crash.

The core file is used for problem analysis by NCK development.

A core file will be created, if a valid file name is entered in this MD.

18960	POS_DYN_MODE			N01	K1	
-	Type of positioning axis dynamic response			BYTE	Reset	
-						
-	-	0	0	1	7/2	

Description: The machine data deterrmines the accelerations and jerks which are applied in the case of positioning axis motion.

Value 0:

The acceleration is taken from the first field entry in $MA_MAX_AX_ACCEL (value for DYNNORM).

With G75 and active jerk limitation (SOFT), the jerk is taken from the first field entry in $MA_MAX_AX_JERK (value for DYNNORM); without jerk limitation (BRISK) it is infinite.

The following applies for all other positioning axis movements:

If $MA_JOG_AND_POS_JERK_ENABLE is true, the jerk is taken from $MA_JOG_AND_POS_MAX_JERK; otherwise it is infinite (BRISK behavior).

Value 1:

The acceleration is taken from the second field entry in $MA_MAX_AX_ACCEL (value for DYNPOS).

The jerk is taken from the second field entry in $MA_MAX_AX_JERK (value for DYNPOS).

For BRISK behavior, enter very high values here.

2.3 Channel-specific machine data

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	

Description: Description

20000	CHAN_NAME			C01, C10	B3,K1	
-	Channel name			STRING	PowerOn	
-						
-	-	CHAN1, CHAN2, CHAN3, CHAN4...	-	-	7/2	

Description: The channel name can be defined in this MD. The channel name is only used for the display on the HMI.

20050	AXCONF_GEOAX_ASSIGN_TAB			C01, C10	TE7,TE8,M1,R2,K1,K2	
-	Assignment of geometry axis to channel axis			BYTE	PowerOn	
-						
-	3	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/2	

Description: This MD is used to specify which channel axis the geometry axis is assiged to. Each geometry axis must be assigned to a specific channel. If a geometry axis is not assigned to a channel axis, then this geometry axis is not available, and cannot be programmed (with the name defined under MD20060 $MC_AXCONF_GEOAX_NAME_TAB).

For example: Turning machine without transformation:

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[0] = 1 ; 1st geometry axis = 1st channel axis

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[1] = 0 ; 2nd geometry axis not defined

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[2] = 2 ; 3rd geometry axis = 2nd channel axis

The assignment made here is valid if no transformation is active. With active transformation n, the transformation-specific assignment table MD24... $MC_TRAFO_GEOAX_ASSIGN_TAB_... becomes active.

20060	AXCONF_GEOAX_NAME_TAB			C01, C11, C10	F2,V2,M1,K2	
-	Geometry axis name in channel			STRING	PowerOn	
-						
-	3	X, Y, Z, X, Y, Z...	-	-	7/2	

Description: This MD is used to enter the names of the geometry axes separately for each channel. Geometry axes can be programmed in the part program using the names specified here.

Special cases:

- The geometry axis name entered must not conflict with the designations and assignments of the machine and channel axis names.
- The machine axis names entered must not be the same as the names entered for Euler angles (MD10620 $MN_EULER_ANGLE_NAME_TAB), names specified for directional vectors (MD10640 $MN_DIR_VECTOR_NAME_TAB), names given to intermediate point coordinates in the case of CIP (MD10660 $MN_INTERMEDIATE_POINT_NAME_TAB) or the names of interpolation parameters (MD10650 $MN_IPO_PARAM_NAME_TAB).
- The geometry axis name entered must not include any of the following reserved address letters:

- D Tool offset (D function)
- E Reserved
- F Feedrate (F function)
- G Preparatory function
- H Auxiliary function (H function)
- L Subroutine call
- M Miscellaneous function (M function)
- N Subblock
- P Subroutine number of passes
- R Arithmetic parameters
- S Spindle speed (S function)
- T Tool (T function)

- The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined identifiers (e.g. ASPLINE, SOFT).
- The use of an axis identifier consisting of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z) followed by an optional numerical extension (1-99) gives slightly better block cycle times than a general identifier.
- Identical names may be given to geometry axes assigned to different channels.

Related to:

MD10000 $MN_AXCONF_MACHAX_NAME_TAB

(machine axis name [axis no.])

MD20080 $MC_AXCONF_CHANAX_NAME_TAB

(channel axis name in the channel [channel axis no.])

20070	AXCONF_MACHAX_USED			C01, C10	TE3,B3,K5,M1,K1,K2,P3pl,P3sl,S1	
-	Machine axis number valid in channel			BYTE	PowerOn	
-						
-	20	1, 2, 3, 4, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2	

Description: This MD is used to specify the machine axis which the channel axis/special axis is assigned to. Each channel axis has to be assigned to a specific channel. A machine axis that has not been assigned to a channel is inactive, i.e. the axis control is not computed, the axis is not shown on the screen, and it cannot be programmed in any channel.

From software version 5, a machine axis need not be assigned to a channel axis for reasons of uniform configuration. The MD for the machine axis is set to 0 in this case. At the same time, MD11640 $MN_ENABLE_CHAN_AX_GAP must be set to 1 (channel axis gaps are permitted).

From software version 5, the machine data MD20070 $MC_AXCONF_MACHAX_USED does not directly refer to the machine axes created with MD10000 $MN_AXCONF_MACHAX_NAME_TAB, but to the logical machine axis map which is defined with MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.

MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB refers:

- directly to a local machine axis on the NCU,
- to a machine axis of another NCU in the NCU grouping or
- indirectly to an axis container with local or remote machine axes.

If the default values AX1, AX2, ..., AX31 are entered with MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB, then the NCK behaves in the same way as up to software version 4, this means that machine data MD20070 $MC_AXCONF_MACHAX_USED refers to the corresponding local machine axis.

Special cases:

- Each geometry axis must be assigned to a channel axis and a machine axis so that it can be programmed.
- If a machine axis is assigned to several channels by means of MD20070 $MC_AXCONF_MACHAX_USED, then the number of the channel from which the axis is to be programmed must be entered in MD30550 $MA_AXCONF_ASSIGN_MASTER_CHAN.
- Up to software version 4, the list of entries must not contain any gaps (as from software version 5 - see above). In contrast, the assignment of the machine axes used may contain gaps.

For example:

Permissible:

AXCONF_MACHAX_USED [0] = 3; 3rd MA is the 1st axis in the channel

AXCONF_MACHAX_USED [1] = 1; 1st MA is the 2nd axis in the channel

AXCONF_MACHAX_USED [2] = 5; 5th MA is the 3rd axis in the channel

AXCONF_MACHAX_USED [3] = 0

Error for software version 4, permissible for version 5:

AXCONF_MACHAX_USED [0] = 1; 1st MA is the 1st axis in the channel

AXCONF_MACHAX_USED [1] = 2; 2nd MA is the 2nd axis in the channel

AXCONF_MACHAX_USED [2] = 0; gap in the list ...

AXCONF_MACHAX_USED [3] = 3; ... of the channel axes

Axis identifiers must be defined in the corresponding list places of AXCONF_CHANAX_NAME_TAB for the axes activated in the channel.

Related to:

MD30550 $MA_AXCONF_ASSIGN_MASTER_CHAN
(Initial setting of the channel for axis change)
MD20080 $MC_AXCONF_CHANAX_NAME_TAB
(Channel axis name in the channel [channel axis number])
MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB
MD11640 $MN_ENABLE_CHAN_AX_GAP
Reference:
Description of Functions B3.

20080	AXCONF_CHANAX_NAME_TAB			C01, C11, C10	F2,V2,M1,K2,V1	
-	Channel axis name in channel			STRING	PowerOn	
-						
-	20	"X", "Y", "Z", "A", "B", "C", "U", "V", "X11", "Y11"...	-	-	7/2	

Description: This MD is used to set the name of the channel axis/special axis. The first three channel axes are normally occupied by the three assigned geometry axes (see also MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB). The remaining channel axes are also designated as special axes. The channel axis/special axis is always displayed on the screen in the WCS (workpiece coordinate system) with the name set in this MD.

Special cases:

- The specified channel axis name/special axis name must not conflict with the designation and assignment of the machine and geometry axis names.
- The specified channel axis name must not be the same as the names entered for Euler angles (Eulerwinkel(MD10620 $MN_EULER_ANGLE_NAME_TAB), names specified for directional vectors (MD10640 $MN_DIR_VECTOR_NAME_TAB), names given to intermediate point coordinates in the case of CIP (MD10660 $MN_INTERMEDIATE_POINT_NAME_TAB) or the names of interpolation parameters (MD10650 $MN_IPO_PARAM_NAME_TAB).
- The channel axis name entered must not include any of the following reserved address letters:

- D Tool offset (D function)	- E Reserved
- F Feedrate (F function)	- G Preparatory function
- H Auxiliary function (H function)	- L Subroutine call
- M Miscellaneous function (M function)	- N Subblock
- P Subroutine number of passes	- R Arithmetic parameters
- S Spindle speed (S function)	- T Tool (T function)

- The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined identifiers (e.g. ASPLINE, SOFT).
- The use of an axis identifier consisting of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z) followed by an optional numerical extension (1-99) gives slightly better block cycle times than a general identifier.
- No special names need be entered in this MD for channel axes to which geometry axes are assigned (normally the first three channel axes).

Axis identifiers that are not allowed are rejected with an alarm during runup.

20082	AXCONF_CHANAX_DEFAULT_NAME			C01, C11, C10	-	
-	Default axis name for axis variables in the channel			STRING	PowerOn	
-						
-	-	...	-	-	7/2	

Description:

Variables or parameters of type Axis which have not been initialized are initialized with a default axis identifier. The identifier can be configured via the machine data MD20082 $MC_AXCONF_CHANAX_DEFAULT_NAME. If this machine data is set with an empty string, the 1st geometry axis is used, as previously.

MD20082 $MC_AXCONF_CHANAX_DEFAULT_NAME can be set by default with all available, valid axis identifiers. The value of this machine data should generally always correspond to a value of $MD20060 $MC_AXCONF_GEOAX_NAME_TAB, MD20080 $MC_AXCONF_CHANAX_NAME_TAB or MD10000 $MN_AXCONF_MACHAX_NAME_TAB.

If an invalid axis name is entered as a value or if this name has been changed, for example, in MD20080 $MC_AXCONF_CHANAX_NAME_TAB but not in MD20082 $MC_AXCONF_CHANAX_DEFAULT_NAME, then this is indicated with alarm 4041 channel %1 block %2 axis identifier %3 is invalid".

Only valid axis identifiers, empty string and "NO_AXIS" may be entered in MD20082 $MC_AXCONF_CHANAX_DEFAULT_NAME. "NO_AXIS" is used to indicate a non-initialized axis variable, empty string means previous behavior, i.e. each variable is initialized with the 1st geometry axis.

20090	SPIND_DEF_MASTER_SPIND			C01, C03	H2,K1,K2,P3 pl,P3 sl,S1,W1	
-	Initial setting of master spindle in channel			BYTE	PowerOn	
-						
-	-	1, 1, 1, 1, 1, 1, 1, 1...	1	20	7/2	

Description:

Definition of the default setting for the master spindle (in the channel).

The number of the spindle is entered.

A number of functions are linked to the master spindle, which are not possible with any other spindle.

Note:

The language command SETMS(n) can declare the spindle number as the master spindle.

The spindle defined in this MD is declared once again as the master spindle with SETMS.

The spindle defined in this MD is also declared as the master spindle at program end and program abort.

20094	SPIND_RIGID_TAPPING_M_NR			C01, C03, C10	H2,K1,S1		
-	M function for switching into controlled axis mode			DWORD	PowerOn		
-							
-	-	70, 70, 70, 70, 70, 70, 70, 70...	-	-	7/2		

Description: This machine data defines the M auxiliary function number with which the spindle is switched into axis mode.

The M number defined in the machine data replaces M70 in Siemens language mode.

Note:

On the VDI interface, M70 is always output with the corresponding address extension to indicate the switch to axis mode.

Restrictions: Refer to machine data MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,

MD10715 $MN_M_NO_FCT_CYCLE,

MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,

MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,

MD10804 $MN_EXTERN_M_NO_SET_INT

MD10806 $MN_EXTERN_M_NO_DISABLE_INT,

MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,

MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX

MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

$MD26008 $MC_NIBBLE_PUNCH_CODE

20095	EXTERN_RIGID_TAPPING_M_NR			C01, C11, C03, C10	H2,K1		
-	M function for switching to controlled axis mode(external mode)			DWORD	PowerOn		
-							
-	-	29, 29, 29, 29, 29, 29, 29, 29...	-	-	7/2		

Description: This machine data defines the M function number with which the switchover to controlled spindle/axis mode is to be carried out.

The M number defined in the machine data replaces M29 in external language mode.

Pre-defined M numbers, such as M00,M1,M2,M3, etc., are not allowed as M numbers.

Restrictions: See machine data MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,

MD10715 $MN_M_NO_FCT_CYCLE,

MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,

MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,

MD10804 $MN_EXTERN_M_NO_SET_INT

MD10806 $MN_EXTERN_M_NO_DISABLE_INT,

MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,

MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX

MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

20096	T_M_ADDRESS_EXT_IS_SPINO			C01, C04, C09	H2,W1	
-	Meaning of address extension at T, M tool change			BOOLEAN	PowerOn	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: This MD is only significant if the functions 'Tool management'/'flat D numbers' are inactive.

FALSE

The contents of the address extensions of the NC addresses T and M 'tool change command number' are not evaluated by the NCK. The PLC decides on the significance of the programmed extension.

TRUE

The address extensions of the NC addresses T and M 'tool change command number' - 'tool change command number'=TOOL_CHANGE_M_CODE with 6 as the default value - are interpreted as spindle numbers.

NCK treats the extension in the same way as the active functions 'tool management' and 'flat D number management'.

That is, the programmed D number always refers to the T number of the programmed main spindle number.

See also:

MD20090 $MC_SPIND_DEF_MASTER_SPIND,

MD22550 $MC_TOOL_CHANGE_MODE,

MD22560 $MC_TOOL_CHANGE_M_CODE

20098	DISPLAY_AXIS			EXP, C01	-	
-	Display axis on HMI			DWORD	Immediately	
-						
-	20	0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF...	-	-	7/2	

Description:

```
Identifies whether the axis is to be displayed by the HMI as a machine, geom-
etry or auxiliary axis.
This data is only evaluated by the HMI.
Bits 0 to 15: Machine
Bit 0= 1 Display machine axis in the actual value windows
       0 Hide machine axis in the actual value windows
Bit 1= 1 Display machine axis in the reference point windows
       0 Hide machine axis in the reference point windows
Bit 2=1  Display machine axis in preset/scratch/parameter work offset
       0 Hide machine axis in preset/scratch/parameter work offset
Bit 3= 1 Display machine axis in the handwheel selection window
       0 Hide machine axis in the handwheel selection window
Bit 16 to 31: WCS
Bit 16= 1 Display geometry axis in the actual value windows
        0 Hide geometry axis in the actual value windows
(Bit 17)  Not assigned
Bit 18= 1 Display geometry axis in parameter work offset
        0 Hide geometry axis in parameter work offset
Bit 19= 1 Display geometry axis in the handwheel selection window
        0 Hide geometry axis in the handwheel selection window
Bit 20= 1 Display position axes in the JOG/manual windows
        0 Hide position axes in the JOG/manual windows
```

20100	DIAMETER_AX_DEF			C01, C10	H1,M5,P1,V1,W1	
-	Geometry axis with transverse axis function			STRING	PowerOn	
-						
-	-	...	-	-	7/2	

Description: This MD is used to define a geometry axis as a transverse axis. Only one transverse axis can be defined here for each channel.

Further transverse axes for axis-specific diameter programming can be activated via MD30460 $MA_BASE_FUNCTION_MASK, bit 2.

The axis identifier of an active geometry axis that has been defined in the channel-specific MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[n] or MD24120 $MC_TRAFO_AX_GEOAX_ASSIGN_TAB_1[n] (from SW 4) and MD20060 $MC_AXCONF_GEOAX_NAME_TAB[n] must be specified.

If space characters are entered or if an axis identifier is specified for an axis which is not defined as a geometry axis, this leads to the following alarms:

- during runup, to alarm 4032 "Channel %1 wrong identifier for transverse axis in %2", if the "Diameter programming" function (DIAMON) or constant cutting velocity G96/G961/G962 is the switch-on setting.
- when the "Diameter programming (DIAMON)" function is activated, to alarm 16510 "Channel %1 block %2 No transverse axis available for diameter programming", if no axis has been permitted via DIAMCHANA[AX] for channel-specific diameter programming.
- when G96/G961/G962 has been programmed, to alarm 10870 "Channel %1 block %2 No transverse axis defined as reference axis for G96/G961/G962", if no geometry axis has been defined as the reference axis for G96/G961/G962 by the instruction SCC[ax].

Related to:

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[n]

(assignment of geometry axis to channel axis)

MD20060 $MC_AXCONF_GEOAX_NAME_TAB[n]

(geometry axis name in the channel)

MD24120 $MC_TRAFO_AX_GEOAX_ASSIGN_TAB_1[n]

(assignment of GEO axis to channel axis for transformation 1)

MD30460 $MA_BASE_FUNCTION_MASK

(Bit2 == 1: Axis-specific diameter programming)

20106	PROG_EVENT_IGN_SINGLEBLOCK			N01	K1,Z1		
-	Prog-Events ignore single block			DWORD	PowerOn		
-							
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x3F	7/2		

Description: Event-driven program calls (Prog-Events) can be set regarding their single-block response.

Bit 0 = 1 :

Prog-Event after start-of-part-program causes block change without restart

Bit 1 = 1 :

Prog-Event after end-of-part-program causes block change without restart

Bit 2 = 1 :

Prog-Event after OP reset causes block change without restart

Bit 3 = 1 :

Prog-Event after ramp-up causes block change without restart

Bit 4 = 1 :

Prog-Event after 1st start after search causes block change without restart

Bit 5 = 1 :

Safety Prog-Event during ramp-up causes block change without restart

20107	PROG_EVENT_IGN_INHIBIT			N01	K1,Z1		
-	Prog-Events ignore read-in disable			DWORD	PowerOn		
-							
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x3F	7/2		

Description: Event-driven programm calls (Prog-Events) can be set regarding their read-in disable response.

Bit 0 = 1 :

Prog-Event after start-of-part-program causes block change despite read-in disable

Bit 1 = 1 :

Prog-Event after end-of-part-program causes block change despite read-in disable

Bit 2 = 1 :

Prog-Event after OP reset causes block change despite read-in disable

Bit 3 = 1 :

Prog-Event after ramp-up causes block change despite read-in disable

Bit 4 = 1 :

Prog-Event after 1st start after search run causes block change despite read-in disable

Bit 5 = 1 :

Safety-Prog-Event during ramp-up causes block change despite read-in disable

20108	PROG_EVENT_MASK			N01, -	TE3,K1		
-	Setting of event-driven programm calls			DWORD	PowerOn		
-							
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x3F	7/2		

Description: Parameterization of the events causing the user program set with MD11620 $MN_PROG_EVENT_NAME (default: _N_PROG_EVENT_SPF) or the safety program _N_SAFE_SPF to be called implicitly:

Bit 0 = 1 : Start-of-part-program

Bit 1 = 1 : End-of-part-program

Bit 2 = 1 : Operator panel reset

Bit 3 = 1 : Ramp-up

Bit 4 = 1 : Reserved

Bit 5 = 1 : Safety program booting

The user program is called via the following search path:

1. /_N_CUS_DIR/_N_PROG_EVENT_SPF
2. /_N_CMA_DIR/_N_PROG_EVENT_SPF
3. /_N_CST_DIR/_N_PROG_EVENT_SPF

The safety program has to be available in the following location:

1. /_N_CST_DIR/_N_SAFE_SPF

Furthermore, MD11450 $MN_SEARCH_RUN_MODE bit 1 also causes the user program set with MD11620 $MN_PROG_EVENT_NAME to be started up automatically after the action blocks, regardless of the settings in the machine data.

20109	PROG_EVENT_MASK_PROPERTIES			N01	K1		
-	Properties of Prog-Events			DWORD	PowerOn		
-							
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x1	7/2		

Description: Parameterization of additional properties of the event-controlled program calls (in short, Prog-Event), that is, the MD20108 $MC_PROG_EVENT_MASK is further parameterized.

Bit 0 = 1 :

An ASUB started from channel status RESET does not result in a Prog-Event.

20110	RESET_MODE_MASK			C11, C03	F2,K6,M3,TE4,W5,B3,K5,M1, G2,K1,K2,P1,S1,W1,2.4,2.7		
-	Definition of basic control settings after reset/PP end			DWORD	Reset		
-							
-	-	0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1...	0	0x7FFFF	7/2		

Description: Definition of the initial setting of the control after ramp-up and at reset/end-of-part-program with regard to the G codes (in particular the active plane and the settable work offset), tool length offset and transformation by setting the following bits:

Bit 0: Reset mode

Bit 1: Suppress aux. funct. output on tool selection

Bit 2: Select reset response after power-on (e.g. tool offset)

Bit 3: Select reset response after end of test mode with regard to active tool offsets

Bit 4: Reserved

Bit 5: Reserved

Bit 6: Reset response "Active tool length offset"

Bit 7: Reset response "Active kinematic transformation"

Bit 8: Reset response "Coupled-motion axes"

Bit 9: Reset response "Tangential correction"

Bit 10: Reset response "Synchronous spindle"

Bit 11: Reset response "Revolutional feedrate"

Bit 12: Reset response "Geo axis replacement"

Bit 13: Reset response "Master value coupling"

Bit 14: Reset response "Basic frame"

Bit 15: Reset response "Electronic gearbox"

Bit 16: Reset response "Master spindle"

Bit 17: Reset response "Master toolholder"

Bit 18: Reset response "Reference axis for G96/G961/G962"

Bit 19: Reserved "Adjustable software limit switch ineffective"

Bits 4 to 11, 16, and 17 are only evaluated when bit 0 = 1.

Meaning of each bit:

Bit 0 (LSB) = 0: Corresponds with response of software version 1

Initial setting after ramp-up:

- G codes acc. to $MC_GCODE_RESET_VALUES
- Tool length offset not active
- Transformation not active
- No coupled-motion axis groupings active
- No tangential correction active
- No axial revolutional feedrate active
- Path revolutional feedrate with master spindle (default)

Initial setting after reset or end-of-part-program:

The current settings are retained.

When next part program is started, the following initial setting is in effect:

- G codes acc. to $MC_GCODE_RESET_VALUES
- Tool length offset not active
- Transformation not active

- No coupled-motion axis groupings active
- No tangential correction active
- No master value coupling active
- No axial revolutional feedrate active
- Path revolutional feedrate with master spindle (default)

Bit 0(LSB) = 1:

Initial setting after ramp-up:

- G codes acc. to $MC_GCODE_RESET_VALUES
- Tool length offset active acc. to $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE and $MC_SUMCORR_RESET_VALUE
- Transformation active acc. to $MC_TRAFO_RESET_VALUE
- Geometry axis replacement acc. to $MC_GEOAX_CHANGE_RESET
- No coupled-motion axis groupings active
- No tangential correction active

Initial setting after reset or end-of-part-program:

Depending on $MC_GCODE_RESET_MODE the current settings are retained for the G groups or the initial settings stored in $MC_GCODE_RESET_VALUES are set.

Initial setting after reset or end-of-part-program:

Depending on $MC_RESET_MODE_MASK bits 6 to 7,

the current settings are retained or the initial settings stored in the MDs are set for:

- Tool length offset
- Transformation

Depending on bits 8 and 9, the current settings of coupled-motion axes or tangentially corrected axes are either deactivated or retained.

- Synchronous spindle coupling configured:

The coupling is deselected depending on the setting in $MC_COUPLE_RESET_MODE_1.

- Synchronous spindle coupling not configured:

Depending on bit 10, the coupling is either deactivated or retained.

Depending on bit 14, the basic frame is either retained or deselected.

Bit 1 = 0:

Aux. funct. output (D, T, M) to PLC on tool selection according to MDs $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_TOOL_PRESEL_RESET_VALUE, and $MC_TOOL_CHANGE_MODE. If magazine management is active, T, M are generally not output as auxiliary functions.

The function uses its own communication to output T, M to the PLC, for example.

Bit 1 = 1:

Suppress aux. funct. output to PLC on tool selection.

If tool management or magazine management is active, T, M are generally not output as auxiliary functions.

Bit 2 = 0:

If tool or magazine management is not active:

- No tool offset active after power-on. Active and programmed T depend on the subsequent settings of the machine data (bits 0, 6).

If tool or magazine management is active:

- Not relevant

Bit 2 = 1:

If tool or magazine management is not active:

- If bits 0 and 6 both = 1 (0x41), the tool offset of the last tool active in the NCK is active after the first reset after power-on.

(The value of the programmed tool depends on the value of machine data $MC_TOOL_PRESEL_RESET_VALUE.)

Notice: The NCK does not know the conditions at the machine.

If tool or magazine management is active:

- Not relevant

Bit 3 = 0:

With and without active tool management:

End of test mode: "Retain current setting for active tool length offset" (bits 0 and 6 set) refers to the program which was active before activation of test mode.

Bit 3 = 1:

Relevant only if tool management is not active:

End of test mode: "Retain current setting for active tool length offset" (bits 0 and 6 set) refers to the program which was active at the end of test mode. (If tool management is active, the tool on the spindle is generally the active tool. Exception only for $MC_CUTTING_EDGE_DEFAULT = -2.)

Bit 4 = 0:Reserved

Bit 4 = 1:Reserved

Bit 5 = 0:Reserved

Bit 5 = 1:Reserved

Bit 6 = 0:

Initial setting for active tool length offset after reset/end-of-part-program acc. to $MC_TOOL_RESET_VALUE,$MC_CUTTING_EDGE_RESET_VALUE, $MC_USEKT_RESET_VALUE, and $MC_SUMCORR_RESET_VALUE.

If $MC_TOOL_CHANGE_MODE = 1, the tool specified in $MC_TOOL_PRESEL_RESET_VALUE is also preselected.

If tool or magazine management is active, $MC_TOOL_RESET_NAME is used instead of $MC_TOOL_RESET_VALUE.

Bit 6 = 1:

Current setting for active tool length offset is retained after reset/end-of-part-program.

If tool or magazine management is active, the tool that is currentlly on the master spindle (generally = master toolholder) is selected.

If the tool on the master spindle is disabled, the 'disabled' status is ignored.

Please note that after a program ends or is aborted either the most recent value for master spindle or master toolholder programmed in the program or the value specified with $MC_SPIND_DEF_MASTER_SPIND or $MC_TOOL_MANAGEMENT_TOOLHOLDER defines the master spindle or master tool-holder.

(The selection is made using bit 16 or bit 17.)

For $MC_CUTTING_EDGE_DEFAULT = -2 the following applies specifically:

If a tool has been switched to the spindle but a new offset D has not yet been programmed, the previous tool is still active in the NCK.

If machining is aborted in this status (e.g. with the Reset key), the offset is defined with the smallest D number associated with the master spindle tool.

Bit 7 = 0:

Initial setting for active transformation after reset/end-of-part-program according to $MC_TRAFO_RESET_VALUE.

Bit 7 = 1:

The current setting for active transformation is retained after reset/end-of-part-program.

Bit 8 = 0:

Coupled-motion axis groupings are ungrouped at reset/end-of-part-program.

Bit 8 = 1:

Coupled-motion axis groupings remain active after reset/end-of-part-program.

Bit 9 = 0:

Tangential correction is switched off at reset/end-of-part-program.

Bit 9 = 1:

Tangential correction remains active after reset/end-of-part-program.

Bit 10 = 0:

Non-configured synchronous spindle coupling is switched off at reset/end-of-part-program.

Bit 10 = 1:

Non-configured synchronous spindle coupling remains active after reset/end-of-part-program.

Bit 11 = 0:

At reset/end-of-part-program the setting data $SA_ASSIGN_FEED_PER_REV_SOURCE is reset to 0 for all non-active axes/spindles, i.e. traversing at revolutional feedrate is canceled and the setting for path and synchronous axes is reset to the master spindle (default).

Bit 11 = 1:

The current setting for revolutional feedrate is retained after reset/end-of-part-program. At the start of the part program, the setting data $SA_ASSIGN_FEED_PER_REV_SOURCE is reset to 0 for all non-active axes/spindles, i.e. traversing at revolutional feedrate is canceled and the setting for path and synchronous axes is reset to the master spindle (default).

Bit 12 = 0:

If machine data $MC_GEOAX_CHANGE_RESET is set, a changed geometry axis assignment is canceled at reset/end-of-part-program. The initial setting for the geometry axis assignment defined in the machine data becomes active.

Bit 12 = 1:

A changed geometry axis assignment remains active after reset/end-of-part-program.

Bit 13 = 0:

Master value couplings are canceled at reset/end-of-part-program.

Bit 13 = 1:

Master value couplings remain active after reset/end-of-part-program.

Bit 14 = 0:

The basic frame is deselected.

Bit 14 = 1:

The current setting of the basic frame is retained.

Bit 15 = 0:

Active electronic gearboxes remain active at reset/end-of-part-program.

Bit 15 = 1:

Active electronic gearboxes are canceled at reset/end-of-part-program.

Bit 16 = 0:

Initial setting for the master spindle according to $MC_SPIND_DEF_MASTER_SPIND.

Bit 16 = 1:

The current setting of the master spindle (SETMS) is retained.

If $MC_TOOL_MANAGEMENT_TOOLHOLDER = 0, this bit has also an effect on the response of bit 6.

Bit 17 = 0:

Initial setting for the master toolholder according to $MC_TOOL_MANAGEMENT_TOOLHOLDER

Bit 17 = 1:

The current setting of the master toolholder (SETMTH) is retained

(Bit 17 is only relevant if tool or magazine management is active and if $MC_TOOL_MANAGEMENT_TOOLHOLDER> 0. Otherwise, the setting for master spindle bit 16 applies if tool or magazine management is active. This bit has also an effect on the response of bit 6.)

Bit 18 = 0:

Reference axis for G96/G961/G962 according to MD 20100: $MC_DIAMETER_AX_DEF.

When using SCC with its own spindle reset, setting bit 18 = 1 is recommended (see also MD 20112: $MC_START_MODE_MASK, bit 18).

Bit 18 = 1:

Reference axis for G96/G961/G962 is retained.

Bit 19: Reserved!

Bit 19 = 0:

The two adjustable software limit switches are deleted after reset and are no longer effective.

Bit 19 = 1:

The two adjustable software limit switches remain active after reset.

Corresponds with:

MD20120 $MC_TOOL_RESET_VALUE

MD20130 $MC_CUTTING_EDGE_RESET_VALUE

MD20150 $MC_GCODE_RESET_VALUES

MD20152 $MC_GCODE_RESET_MODE

MD20140 $MC_TRAFO_RESET_VALUE

MD20112 $MC_START_MODE_MASK

MD20121 $MC_TOOL_PRESEL_RESET_VALUE

MD20118 $MC_GEOAX_CHANGE_RESET

20112	START_MODE_MASK			C03	K6,M3,K5,M1,K1,K2,P1,S1,W1	
-	Definition of basic setting of control after part program start			DWORD	Reset	
-						
-	-	0x400, 0x400, 0x400, 0x400, 0x400, 0x400...	0	0x7FFFF	7/2	

Description:

Definition of the initial setting of the control at the start of the part program with respect to G codes (in particular, active plane and active settable work offset), tool length offset, transformation, and axis couplings by setting the following bits:

Bit 0: Not assigned: MD20112 $MC_START_MODE_MASK is evaluated every time a part program starts up

Bit 1: Suppress aux. funct. output on tool selection

Bit 2: Not assigned, but reserved (see corresponding bit in RESET_MODE_MASK)

Bit 3: Not assigned, but reserved (see corresponding bit in RESET_MODE_MASK)

Bit 4: Start response for G code "Current plane"

Bit 5: Start response for G code "Settable work offset"

Bit 6: Start response for "Active tool length offset"

Bit 7: Start response for "Active kinematic transformation"

Bit 8: Start response for "Coupled-motion axes"

Bit 9:Start response for "Tangential correction"

Bit 10: Start response for "Synchronous spindle"

Bit 11: Not assigned, but reserved (see corresponding bit in RESET_MODE_MASK)

Bit 12: Start response for "Geo axis replacement"

Bit 13: Start response for "Master value coupling"

Bit 14: Not assigned, but reserved (see corresponding bit in RESET_MODE_MASK)

Bit 15: Not assigned, but reserved (see corresponding bit in RESET_MODE_MASK)

Bit 16: Start response for "Master spindle"

Bit 17: Start response for "Master toolholder"

Bit 18: Start response for "Reference axis for G96/G961/G962"

Bit 19: Reserved "Adjustable software limit switch ineffective"

Meaning of individual bits:

Bit 1 = 0:

Auxiliary function output (D, T, M, DL) to PLC on tool selection according to the following MDs:$MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_TOOL_PRESEL_RESET_VALUE, and $MC_TOOL_CHANGE_MODE.

Note:

If tool or magazine management is active, only auxiliary functions D and DL are output.

Bit 1 = 1:

Suppress auxiliary function output to PLC on tool selection.

Bit 1 is not relevant if tool or magazine management is active.

Bit 2 : Reserved (reset response after power-on)

Bit 3 : Reserved (end of test mode)

Bit 4 = 0:

The current setting for G code "current plane" is retained.

Bit 4 = 1:

Initial setting for G code "current plane" according to $MC_GCODE_RESET_VALUES

Bit 5 = 0:

The current setting for G code "settable work offset" is retained.

Bit 5 = 1:

Initial setting for G code "settable work offset" according to $MC_GCODE_RESET_VALUES

Bit 6 = 0:

The current setting for active tool length offset is retained.

If tool or magazine management is active, the tool currently on the active toolholder (spindle) is always selected.

If the tool that is currently on the spindle is disabled, it is automatically replaced by a suitable spare tool.

If such a spare tool does not exist, an alarm is output.

Bit 6 = 1:

Initial setting for active tool length offset according to $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_USEKT_RESET_VALUE, and $MC_SUMCORR_RESET_VALUE.

If $MC_TOOL_CHANGE_MODE == 1, the tool selected via $MC_TOOL_PRESEL_RESET_VALUE is preselected in addition.

If tool or magazine management is active, MD $MC_TOOL_RESET_NAME is used instead of $MC_TOOL_RESET_VALUE.

Bit 7 = 0:

The current setting for active transformation is retained.

Bit 7 = 1:

Initial setting for active transformation after reset/end-of-part-program according to $MC_TRAFO_RESET_VALUE

Bit 8 = 0:

Coupled-motion axis groupings remain active.

Bit 8 = 1:

Coupled-motion axis groupings are ungrouped.

Bit 9 = 0:

Tangential correction remains active.

Bit 9 = 1:

Tangential correction is switched off.

Bit 10 = 0:

Non-configured synchronous spindle coupling remains active.

Bit 10 = 1:

Non-configured synchronous spindle coupling is switched off.

Bit 11 :   Reserved (revolutional feedrate)

Bit 12 = 0:

A changed geometry axis assignment remains active when the part program starts up.

Bit 12 = 1:

If machine data $MC_GEOAX_CHANGE_RESET is set, a changed geometry axis assignment is deleted when the part program starts up.

Bit 13 = 0:

Master value couplings remain active.

Bit 13 = 1:

Master value couplings are canceled.

Bit 14 :   Reserved (basic frame)

Bit 15 = 0:

Active electronic gearboxes remain active.

Bit 15 = 1:

Active electronic gearboxes are canceled.

Bit 16 = 0:

The current setting of the master spindle (SETMS) is retained.

Bit 16 = 1:

Initial setting for the master spindle according to $MC_SPIND_DEF_MASTER_SPIND

Bit 17 = 0:

The current setting of the master toolholder (SETMTH) is retained (relevant only if tool or magazine management is active)

Bit 17 = 1:

Only if $MC_TOOL_MANAGEMENT_TOOLHOLDER> 0: Inital setting for the master toolholder according to $MC_TOOL_MANAGEMENT_TOOLHOLDER.

Otherwise, the setting for the master spindle applies.

Bit 18 = 0:

Reference axis for G96/G961/G962 according to MD20100 $MC_DIAMETER_AX_DEF.

When using SCC with its own spindle reset, setting bit 18 = 1 is recommended (see also MD 20110: $MC_RESET_MODE_MASK, bit 18).

Bit 18 = 1:

Reference axis for G96/G961/G962 is retained.

Corresponds with:

MD20120 $MC_TOOL_RESET_VALUE

MD20130 $MC_CUTTING_EDGE_RESET_VALUE

MD20150 $MC_GCODE_RESET_VALUES

MD20152 $MC_GCODE_RESET_MODE

MD20140 $MC_TRAFO_RESET_VALUE

MD20110 $MC_RESET_MODE_MASK

MD20121 $MC_TOOL_PRESEL_RESET_VALUE

MD20118 $MC_GEOAX_CHANGE_RESET

20114	MODESWITCH_MASK			C03	K1	
-	Interruption MDA by mode change			DWORD	Reset	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0xFFFF	7/2	

Description: After program interruption in MDI mode (e.g. in order to carry out a measurement on the workpiece and to correct the tool wear values or after tool breakage) the tool can be manually withdrawn from the contour by changing into JOG mode.

In this case, the control stores the coordinates of the position of the interruption and indicates the path differences traversed by the axes in JOG mode as "Repos offset". When MDI mode is selected again, the axis is repositioned on the contour. This response can be canceled by means of this machine data.

Bit 0 (LSB)= 0:

When MDI (JOG, JOGREF, JOGREPOS, MDIREF and MDIREPOS) are deselected in stopped status, the system ASUB Repos is selected.

Bit 0 (LSB) = 1:

When MDI (JOG, JOGREF, JOGREPOS, MDIREF and MDIREPOS) are deselected in stopped status, the system ASUB Repos is not selected.

Bit 1 (LSB) = 0:

If the NCK stops at a part program block in the program execution in which repositioning is not possible, alarm 16916 is generated if an attempt is made to switch to manual mode.

Bit 1 (LSB) = 1:

If the NCK stops at a part program block in the program execution in which repositioning is not possible, no alarm is generated if an attempt is made to switch to manual mode.

20116	IGNORE_INHIBIT_ASUP			C01	K1,Z1	
-	Execute interrupt program despite read-in disable			DWORD	NEW CONF	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description: In spite of the set read-in disable, an assigned user ASUB is completely executed for the interrupt channel with the set bit.

Bit 0 is assigned to interrupt channel 1.

Bit 1 is assigned to interrupt channel 2, etc.

Related to:

MD20117 $MC_IGNORE_SINGLEBLOCK_ASUP

20117	IGNORE_SINGLEBLOCK_ASUP			C01	K1,Z1	
-	Execute interrupt program completely despite single block			DWORD	NEW CONF	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description: In spite of the set single-block processing mode, an assigned user ASUB is completely executed for the relevant channel with the set bit.

Bit 0 is assigned to interrupt channel 1.

Bit 1 is assigned to interrupt channel 2, etc.

The MD is only active with single block type 1.

Related to:

MD20116 $MC_IGNORE_INHIBIT_ASUP

20118	GEOAX_CHANGE_RESET			C03	M1,K1,Z1	
-	Enable automatic geometry axis change			BOOLEAN	Reset	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description:

0: The current configuration of the geometry axes remains unchanged on reset and part program start. With this setting, the response is identical to that with older software versions without geometry axis replacement.

1: The configuration of the geometry axes remains unchanged on reset or part program end, depending on MD20110 $MC_RESET_MODE_MASK and, on part program start, depending on MD20112 $MC_START_MODE_MASK, or is switched to the initial state defined by MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB.

Related to:

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20120	TOOL_RESET_VALUE			C03	K1,W1	
-	Tool with length compens. during runup (reset/part program end).			DWORD	Reset	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	32000	7/2	

Description:

Definition of the tool for which tool length compensation is selected during runup or on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK, and on part program start as a function of MD20112 $MC_START_MODE_MASK

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20121	TOOL_PRESEL_RESET_VALUE			C03	K1,W1	
-	Preselected tool on RESET			DWORD	Reset	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	32000	7/2	

Description:

Definition of the preselected tool in MD20310 $MC_TOOL_MANAGEMENT_MASK=1. A tool is selected after runup, or on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK, and on part program start as a function of MD20112 $MC_START_MODE_MASK.

This MD is valid only without tool management.

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20123	USEKT_RESET_VALUE			C03	-	
-	Preselected value of $P_USEKT on RESET			DWORD	Reset	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	0xF	7/2	

Description: The system variable $P_USEKT is set with the value of this MD:

- after run-up:

As a function of MD20112 $MC_START_MODE_MASK

- after RESET or part program end:

As a function of MD20110 $MC_RESET_MODE_MASK

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20126	TOOL_CARRIER_RESET_VALUE			C03	W1	
-	Active tool holder on RESET			DWORD	Reset	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7	

Description: Definition of the tool holder for which tool length compensation is selected during runup or on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK and as a function of MD20112 $MC_START_MODE_MASK on part program start.

This data is valid without tool management.

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20127	CUTMOD_INIT			C08	K1,W1	
-	Initialize CUTMOD after power ON			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-2	999999999	7/2	

Description: The value programmable with NC command CUTMOD is initialized automatically on power ON with the value stored in this machine data. If the value of the machine data equals -2, CUTMOD will be set to the value included in MD20126 $MC_TOOL_CARRIER_VALUE.

20129	CUTMODK_INIT			C08	K1,W1	
-	Initialize CUTMODK at POWERON			STRING	PowerOn	
-						
-	-	...	-	-	7/2	

Description: On POWER ON, the name (which can be programmed using the NC command CUTMODK) of a transformation defined by means of kinematic chains is automatically initialized with the value stored in this machine data.

20130	CUTTING_EDGE_RESET_VALUE			C03	-	
-	Tool edge with length compens. during runup (reset/end of pp)			DWORD	Reset	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	32000	7/2	

Description: Definition of the cutting edge for which tool length compensation is selected during runup or on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK, and as a function of MD20112 $MC_START_MODE_MASK on part program start.

With active tool management and with bit 0 and bit 6 set in MD20110 $MC_RESET_MODE_MASK at selection, the last offset of the tool active at power OFF - as a rule the tool on the spindle - is effective after runup.

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20132	SUMCORR_RESET_VALUE			C03	-	
-	Effective resulting offset on RESET			DWORD	Reset	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	6	7/2	

Description: Definition of the total offset with which the tool length compensation is selected in the runup and on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK and as a function of MD20112 $MC_START_MODE_MASK on part program start.

MD18110 $MN_MM_MAX_SUMCORR_PER_CUTTEDGE determines the maximum useful value which can be entered.

20144	TRAFO_MODE_MASK			C07	M1	
-	Function selection of kinematic transformation			BYTE	Reset	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x03	7/2	

Description: The specific functionality of the kinematic transformation is selected by setting the following bits:

Bit 0 = 0:

Default behavior.

Bit 0 = 1:

The transformation as defined in MD20140 $MC_TRAFO_RESET_VALUE is persistent. That is, it is also selected with TRAFOOF and not shown in the display. This requires that the transformation defined in MD20140 $MC_TRAFO_RESET_VALUE is selected automatically after RESET and START via MD20110 $MC_RESET_MODE_MASK and MD20112 $MC_START_MODE_MASK. This means that:

MD20110 $MC_RESET_MODE_MASK bit 0 = 1 and bit 7 = 0,

MD20112 $MC_START_MODE_MASK bit 7 = 1

MD20118 $MC_GEOAX_CHANGE_RESET = TRUE

Bit 1 = 0:

Default behavior.

Bit 1 = 1:

The last active transformation is selected again after control power on. MD20110 $MC_RESET_MODE_MASK Bit 0 = 1 and Bit 7 = 1 also have to be set.

20150	GCODE_RESET_VALUES			C11, C03	F2,TE4,K3,M1,M5,K1,K2,P1, V1	
-	Initial setting of G groups			BYTE	Reset	
-						
-	70	2, 0, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1, 2, 1, 2, 1, 1, 1, 1, 1, 1...	-	-	7/2	

Description: Definition of the G codes which become active on runup and reset or at part program end depending on MD20110 $MC_RESET_MODE_MASK (up to software version 4) and MD20152 $MC_GCODE_RESET_MODE (from software version 5) and at part program start depending on MD20112 $MC_START_MODE_MASK.

The index of the G codes in the respective groups must be programmed as the default value.

For a list of the G groups and their G functions, please refer to References:

Programming Manual, Fundamentals

TitleGroupDefault setting on 840D

```
GCODE_RESET_VALUES[0]     12 (G1)
GCODE_RESET_VALUES[1]     20 (inactive)
GCODE_RESET_VALUES[2]     30 (inactive)
GCODE_RESET_VALUES[3]     42 (STARTFIFO)
GCODE_RESET_VALUES[4]     50 (inactive)
GCODE_RESET_VALUES[5]     61 (G17)
GCODE_RESET_VALUES[6]     71 (G40)
GCODE_RESET_VALUES[7]     81 (G500)
GCODE_RESET_VALUES[8]     90 (inactive)
GCODE_RESET_VALUES[9]    101 (G60)
GCODE_RESET_VALUES[10]   110 (inactive)
GCODE_RESET_VALUES[11]   121 (G601)
GCODE_RESET_VALUES[12]   132 (G71)
GCODE_RESET_VALUES[13]   141 (G90)
GCODE_RESET_VALUES[14]   151 (G94)
GCODE_RESET_VALUES[15]   161 (CFC)
GCODE_RESET_VALUES[16]   171 (NORM)
GCODE_RESET_VALUES[17]   181 (G450)
GCODE_RESET_VALUES[18]   191 (BNAT)
GCODE_RESET_VALUES[19]   201 (ENAT)
GCODE_RESET_VALUES[20]   211 (BRISK)
GCODE_RESET_VALUES[21]   221 (CUT2D)
GCODE_RESET_VALUES[22]   231 (CDOF)
GCODE_RESET_VALUES[23]   241 (FFWOF)
GCODE_RESET_VALUES[24]   251 (ORIWKS)
GCODE_RESET_VALUES[25]   262 (RMI)
GCODE_RESET_VALUES[26]   271 (ORIC)
GCODE_RESET_VALUES[27]   281 (WALIMON)
GCODE_RESET_VALUES[28]   291 (DIAMOF)
GCODE_RESET_VALUES[29]   301 (COMPOF)
GCODE_RESET_VALUES[30]   311 (inactive)
GCODE_RESET_VALUES[31]   321 (inactive)
GCODE_RESET_VALUES[32]   331 (FTOCOF)
```

```
GCODE_RESET_VALUES[33]    341 (OSOF)
GCODE_RESET_VALUES[34]    351 (SPOF)
GCODE_RESET_VALUES[35]    361 (PDELAYON)
GCODE_RESET_VALUES[36]    371 (FNORM)
)GCODE_RESET_VALUES[37]    381 (SPIF1)
GCODE_RESET_VALUES[38]    391 (CPRECOF)
GCODE_RESET_VALUES[39]    401 (CUTCONOF)
GCODE_RESET_VALUES[40]    411 (LFOF)
GCODE_RESET_VALUES[41]    421 (TCOABS)
GCODE_RESET_VALUES[42]    431 (G140)
GCODE_RESET_VALUES[43]    441 (G340)
GCODE_RESET_VALUES[44]    451 (SPATH)
GCODE_RESET_VALUES[45]    461 (LFTXT)
GCODE_RESET_VALUES[46]    471 (G290  SINUMERIK mode)
GCODE_RESET_VALUES[47]    483 (G462)
GCODE_RESET_VALUES[48]    491 (CP)
GCODE_RESET_VALUES[49]    501 (ORIEULER)
GCODE_RESET_VALUES[50]    511 (ORIVECT)
GCODE_RESET_VALUES[51]    521 (PAROTOF)
GCODE_RESET_VALUES[52]    531 (TOROTOF)
GCODE_RESET_VALUES[53]    541 (ORIROTA)
GCODE_RESET_VALUES[54]    551 (RTLION)
GCODE_RESET_VALUES[55]    561 (TOWSTD)
GCODE_RESET_VALUES[56]    571 (FENDNORM)
GCODE_RESET_VALUES[57]    581 (RELIEVEON)
GCODE_RESET_VALUES[58]    591 (DYNNORM)
GCODE_RESET_VALUES[59]    601 (WALCS0)
GCODE_RESET_VALUES[60]    611 (ORISOF)
GCODE_RESET_VALUES[61]    621 (inactive)
:       ::
GCODE_RESET_VALUES[69]    701 (not defined)
```

20152	GCODE_RESET_MODE			C03	M1,K1,K2,P1	
-	Reset response of G groups			BYTE	Reset	
-						
-	70	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	

Description:

```
This MD is only evaluated if bit 0 is set in MD20110 $MC_RESET_MODE_MASK.
For each entry in MD20150 $MC_GCODE_RESET_VALUES (that is for each G group),
this MD is used to determine whether, on reset/part program end, the setting
in MD20150 $MC_GCODE_RESET_VALUES is used again (MD = 0) or the current set-
ting is retained (MD = 1).
Example:
Here, the basic setting for the 6th G group (current plane) is read from
MD20150 $MC_GCODE_RESET_VALUES at each reset / part program end:
$MC_GCODE_RESET_VALUES[5]=1 ; reset value of the 6th G group is G17
$MC_GCODE_RESET_MODE[5]=0 ; basic setting for 6th G group corresponds, after
;reset / part program end
;to MD20150 $MC_GCODE_RESET_VALUES[5]
However, if the current setting for the 6th G group (current plane) is to be
retained after reset / part program end, then the following setting results:
$MC_GCODE_RESET_VALUES[5]=1 ; reset value of the 6th G group is G17
$MC_GCODE_RESET_MODE[5]=1 ; current setting for 6th G group
;is retained even after reset / part program end.
Related to:
MD20110 $MC_RESET_MODE_MASK
MD20112 $MC_START_MODE_MASK
```

20154	EXTERN_GCODE_RESET_VALUES			C11, C03	-	
-	Initial setting of G groups in ISO mode			BYTE	Reset	
-						
-	31	1, 1, 1, 2, 1, 1, 1, 3, 4, 1, 1, 2, 2, 1, 3, 2, 1, 0, 1, 1, 1...	-	-	2/2	

Description: When an external NC programming language is used, the G codes which become active on runup and reset or at part program end are defined as a function of MD20110 $MC_RESET_MODE_MASK and at part program start as a function of MD20112 $MC_START_MODE_MASK.

The following external programming languages are possible:

ISO2 dialect Milling

ISO3 dialect Turning

The G group division that is to be used is stated in the current SINUMERIK documentation.

The following groups within MD20154 $MC_EXTERN_GCODE_RESET_VALUES can be written:

ISO2 dialect M:

G group 2: G17/G18/G19

G group 3: G90/G91

G group 5: G94/G95

G group 6: G20/G21

G group 13: G96/G97

G group 14: G54-G59

ISO3 dialect T:

G group 2: G96/G97

G group 3: G90/G91

G group 5: G94/G95

G group 6: G20/G21

G group 16: G17/G18/G19

20156	EXTERN_GCODE_RESET_MODE			C03	-	
-	Reset response of external G groups			BYTE	Reset	
-						
-	31	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	

Description:

This MD is evaluated only if bit0 is set in MD20110 $MC_RESET_MODE_MASK (see there).

For each entry in MD20154 $MC_EXTERN_GCODE_RESET_VALUES (that is for each G group), this MD is used to determine whether, on reset/part program end, the setting in MD20154 $MC_EXTERN_GCODE_RESET_VALUES is used again (MD = 0) or the current setting is retained (MD = 1).

Example for ISO dialect M:

Here, the basic setting for the 14th G group (settable zero offset) is read from MD20154 $MC_EXTERN_GCODE_RESET_VALUES at each reset / part program end:

MD20154 $MC_EXTERN_GCODE_RESET_VALUES[13]=1 ; the reset value for the 14th G group is G54

MD20156 $MC_EXTERN_GCODE_RESET_MODE[13]=0 ; the basic setting for the 14th G group after reset / part program end is defined by MD20154 $MC_EXTERN_GCODE_RESET_VALUES[13]

However, if the current setting for the 14th G group is to be retained beyond reset / part program end, this results in the following setting:

MD20154 $MC_EXTERN_GCODE_RESET_VALUES[13]=1 ;reset value for the 14th G group is G54

MD20156 $MC_EXTERN_GCODE_RESET_MODE[13]=1 ;current setting for the 14th G group is retained even after reset / part program end

20180	TOCARR_ROT_ANGLE_INCR			C08	W1	
-	Rotary axis increment of orientable tool holder			DOUBLE	NEW CONF	
-						
-	2	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0...	-	-	7/3	

Description:

For orientable tool carriers, this machine data defines the size of the minimum increment (in degrees) by which the first or second orientation axis can be changed (e.g. for Hirth tooth systems).

A programmed or calculated angle is rounded to the nearest value resulting from

phi = s + n * d

with integer n.

In which:

s = MD20180 $MC_TOCARR_ROT_ANGLE_INCR[i]

d = MD20182 $MC_TOCARR_ROT_ANGLE_OFFSET[i]

and i is 0 for the 1st and 1 for the 2nd axis.

There is no rounding if this machine data is equal to zero.

20182	TOCARR_ROT_ANGLE_OFFSET			C08	-	
-	Rotary axis offset of orientable tool holder			DOUBLE	NEW CONF	
-						
-	2	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0...	-	-	7/3	

Description: This machine data defines the offset of the rotary axis for an orientable tool holder if its position cannot be continuously changed.

It is only evaluated if MD20180 $MC_TOCARR_ROT_ANGLE_INCR is not equal to zero.

For the precise meaning of this machine data, see the description of MD20180 $MC_TOCARR_ROT_ANGLE_INCR.

20184	TOCARR_BASE_FRAME_NUMBER			C08	K2,W1	
-	Base frame number for holding machine table offset			DWORD	NEW CONF	
-						
-	-	-1, -1, -1, -1, -1, -1, -1, -1...	-1	15	7/3	

Description: This machine data indicates into which channel-specific base frame the table offset of an orientable tool holder with a rotary table is written.

This machine data must refer to a valid base frame.

If its content is less than 0 or greater than or equal to the maximum number of base frames set in MD28081 $MC_MM_NUM_BASE_FRAMES, selection of a corresponding tool holder causes an alarm.

20188	TOCARR_FINE_LIM_LIN			C07	W1	
mm	Limit of linear fine offset TCARR			DOUBLE	Immediately	
-						
-	-	1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0...	-	-	7/3	

Description: Indicates for each channel the input limit for the linear fine offset values of an orientable tool holder.

20190	TOCARR_FINE_LIM_ROT			C07	W1	
degrees	Limit of rotary fine offset TCARR			DOUBLE	Immediately	
-						
-	-	1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0...	-	-	7/3	

Description: Indicates for each channel the input limit for the rotary fine offset values of an orientable tool holder.

20191	IGN_PROG_STATE_ASUP			EXP	K1	
-	Do not display interrupt program execution on OPI			DWORD	NEW CONF	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description: If the ASUB is started, OPI variables

progStatus and chanStatus do not change, i.e. the HMI does not see this normally short program execution.

Bit 0 is assigned to interrupt channel 1.

Bit 1 is assigned to interrupt channel 2, etc.

Korrespondiert mit:

MD20192 $MC_PROG_EVENT_IGN_PROG_STATE

20192	PROG_EVENT_IGN_PROG_STATE			EXP	-	
-	Do not display the Prog-Event on OPI			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x3F	7/2	

Description: Event-driven program calls (Prog-Events) can be set regarding their response on the OPI.

The progStatus and chanStatus variables remain unaffected despite Prog-Event processing being active and retain the old value. This provides a means of concealing Prog-Event processing from the HMI.

Bit 0 = 1 :

Reserved bit, ineffective

Bit 1 = 1 :

Prog-Event after end-of-part-program does not change progStatus and chanStatus

Bit 2 = 1 :

Prog-Event after OP reset does not change progStatus and chanStatus

Bit 3 = 1 :

Prog-Event after ramp-up does not change progStatus and chanStatus

Bit 4 = 1 :

Reserved

Bit 5 = 1 :

Safety-Prog-Event during ramp-up does not change progStatus and chanStatus

20193	PROG_EVENT_IGN_STOP			EXP	-	
-	Prog-Events ignore the stop key			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0xF	7/2	

Description: Event-controlled program calls (Prog-Events) can be influenced with regard to their behavior after pressing of the stop key.

The Stop, StopAll and StopAtEnd key of the PLC is ignored, if required.

Bit 0 = 1 :

Prog-Event after part program start delays the stop until the part program starts, i.e. the stop only becomes active in the part program, not before its start. If the part program starts with a traversing block, it is possible that it starts briefly, i.e. a short motion occurs, although Stop has already been pressed in the Start-Prog-Event.

Bit 1 = 1 :

Prog-Event after part program end ignores the stop

Bit 2 = 1 :

Prog-Event after operator panel reset ignores the stop

Bit 3 = 1 :

Prog-Event after power up ignores the stop

20196	TOCARR_ROTAX_MODE			C07	W1	
-	ToolCarrier: rotary axis setting with axis positions not defined			DWORD	Immediately	
-						
-	-	2, 2, 2, 2, 2, 2, 2, 2...	0	3	7/3	

Description: The MD is bit-coded. Bit 0 applies to orientable tool holders with one axis, bit 1 for those with 2 axes.

When the axis positions of an orientable tool holder are determined from a specified frame, it might happen that the required orientation is achieved at any position of a rotary axis.

This MD specifies how the rotary axis position is defined in these cases:

If the relevant bit is 0, the position of the rotary axis will be 0; a possibly necessary rotation is performed through the specified frame.

If the relevant bit is 1, the rotation is performed by means of the rotary axis of the orientable tool holder. The resulting frame will no longer include a rotation.

Example:

A tool in its basic position points into the Z direction, and an axis of the orientable tool holder rotates the workpiece around Z (C_Axis). If the tool shall be oriented in parallel with the Z axis of a rotating frame, and if the frame only rotates around the Z axis, the tool orientation will not be changed, if the C axis is rotated. The condition saying that the tool is to point in the direction of the Z axis defined by the frame is therefore fulfilled for any position of the Z axis.

20200	CHFRND_MAXNUM_DUMMY_BLOCKS			EXP, C02, C06, C09	V1	
-	Empty blocks with chamfer/radii			BYTE	PowerOn	
-						
-	-	3, 3, 3, 3, 3, 3, 3, 3...	0	15	7/2	

Description: Indicates the maximum number of blocks without traversing information in the compensation plane (dummy blocks) that can be programmed between two blocks with traversing information when chamfer/rounding are active.

20201	CHFRND_MODE_MASK			C09	V1	
-	Chamfer/rounding behavior			DWORD	Reset	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0xFFFF	7/2	

Description: Determination of the chamfer/rounding behavior

Bit 0: (LSB) Assignment of the chamfer/rounding to the preceding or following block.

This influences:

- The technology of the chamfer/rounding (feed, type of feed, M commands ...)
- The execution of the blocks without movement in the active plane (e.g. M commands, movement in the applicate) before or after a modal rounding (RNDM)

Bit 1: free

Meaning of the individual bits:

Bit 0 = 0

Chamfer/rounding is derived from the following block (default value).

The technology of the chamfer/rounding is determined by the following block. Blocks without movement (M commands) or movement only in the applicate between two movement blocks in the plane are executed before the modal rounding.

Bit 0 = 1:

Chamfer/rounding is derived from the preceding block.

The technology of the chamfer/rounding is determined by the preceding block. Blocks without movement (M commands) or movement only in the applicate between two movement blocks in the plane are executed after the modal rounding.

20202	WAB_MAXNUM_DUMMY_BLOCKS			C02, C06	W1	
-	maximum number of blocks w/o traversing movement with SAR			BYTE	Reset	
-						
-	-	5, 5, 5, 5, 5, 5, 5, 5...	0	10	7/2	

Description: Maximum number of blocks which can appear between the SAR (soft approach and retraction) block and the traversing block which determines the direction of the approach or retraction tangent.

20204	WAB_CLEARANCE_TOLERANCE			C06	W1	
mm	Change of direction with SAR			DOUBLE	PowerOn	
-						
-	-	0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01...	-	-	7/2	

Description: In the case of smooth approach and retraction, the point defined with DISCL, from which, in the case of infeed from the initial plane, traversing is carried out at lower speed (G341) or the point in which the actual approach movement begins (G 340), must lie between the initial plane and the approach plane.

If this point lies outside this interval and the deviation is less than or equal to this machine data, it is assumed that the point lies in the approach or retraction plane.

If the deviation is greater, then alarm 10741 is output.

Example:

An approach is made from position Z = 20. The SAR plane is at Z = 0. The point defined by DISCL must therefore lie between these two values. If it lies between 20.000 and 20.010 or between 0 and -0.010, it is assumed that the value 20.0 or 0.0 was programmed (under the condition that the MD has the value 0.010). The alarm is output if the position is greater than 20.010 or less than -0.010.

20210	CUTCOM_CORNER_LIMIT			C08, C06	W1	
degrees	Maximum angle f. compensation blocks in tool radius compensation			DOUBLE	Reset	
-						
-	-	100., 100., 100., 100., 100., 100., 100....	0.0	150.	7/2	

Description: Where outer corners are very pointed, G451 can result in long idle paths. The system therefore switches automatically from G451 (intersection) to G450 (transition circle, with DISC where appropriate) when the outer corners are very pointed. The contour angle which can be traversed following this automatic switchover (intersection ---> transition circle) can be defined in CUTCOM_CORNER_LIMIT.

20220	CUTCOM_MAX_DISC			C08, C06	W1	
-	Maximum value for DISC			DOUBLE	Reset	
-						
-	-	50.0, 50.0, 50.0, 50.0, 50.0, 50.0, 50.0...	0.0	75.0	7/2	

Description:

The G450 transition circle cannot produce sharp outer contour corners, because the path of the tool center point through the transition circle is controlled so that the cutting edge stops at the outer corner (programmed position).

Where sharp outer corners are to be machined with G450, the DISC instruction can be used in the program to program an overshoot. This transforms the transition circle into a conic section and the cutting edge lifts off from the outer corner.

The value range of the DISC instruction extends from 0 to theoretically 100 in steps of 1.

DISC = 0 ...Overshoot disabled, transition circle active

DISC = 100 ...Overshoot large enough to theoretically produce a response similar to intersection (G451).

Programmed values of DISC which are higher than those stored in CUTCOM_MAX_DISC are limited to this maximum value without output of a message. A severely non-linear alteration in the path speed can thus be avoided.

Special cases:

It is not generally meaningful to enter values higher than 50 in DISC.

It is therefore not possible to enter values > 75.

20230	CUTCOM_CURVE_INSERT_LIMIT			C08, C06	W1	
-	Maximum angle for calculation of intersection with TRC			DOUBLE	Reset	
-						
-	-	10., 10., 10., 10., 10., 10., 10., 10....	0.0	150.	7/2	

Description:

Where outer corners are very flat, G450 (transition circle) and G451 (intersection) approximate each other more and more. In such a case, it is no longer useful to insert a transition circle. Especially with 5-axis machining, it is not allowed to insert a transition circle at these outer corners, as this might lead to losses in velocity during continuous-path mode (G64).

That is why the system switches automatically from G450 (transition circle, possibly with DISC) to G451 (intersection) in the case of very flat outer corners. The contour angle (in degrees), as of which the automatic switchover (transition circle ---> intersection) is to be carried out, can be specified in CUTCOM_CURVE_INSERT_LIMIT.

20240	CUTCOM_MAXNUM_CHECK_BLOCKS			C08, C02	W1	
-	Blocks for look-ahead contour calculation with TRC			DWORD	PowerOn	
-						
-	-	4, 4, 4, 4, 4, 4, 4, 4...	2	10000	7/2	

Description:

Indicates the maximum number of blocks with traversing information at the offset plane that are considered simultaneously for collision detection with active radius compensation.

20250	CUTCOM_MAXNUM_DUMMY_BLOCKS			C08, C02	W1	
-	maximum number of blocks without traversing motion in TRC			DWORD	PowerOn	
-						
-	-	3, 3, 3, 3, 3, 3, 3, 3...	0	1000	7/2	

Description: During active TRC only program blocks with movements of geometry axes perpendicular to the current tool orientation are normally programmed. Nevertheless, individual intermediate blocks that do not contain such path information may also be programmed during active TRC. For example:

- Movements in the direction of tool orientation
- Movements in axes that are not geometry axes
- Auxiliary functions
- In general: Blocks that are taken over into the main run and executed there

The maximum number of intermediate blocks is defined with this MD. If the value is exceeded, alarm 10762 "Too many empty blocks between 2 traversing blocks during active tool radius compensation" is output.

Note:

Comment blocks, arithmetic blocks and empty blocks are not intermediate blocks in the sense of this MD and can therefore be programmed in any number (without an alarm being triggered).

20252	CUTCOM_MAXNUM_SUPPR_BLOCKS			EXP, C01, C08, C02	W1	
-	Maximum number of blocks with compensation suppression			DWORD	PowerOn	
-						
-	-	5, 5, 5, 5, 5, 5, 5, 5...	0	1000	7/2	

Description: Indicates the maximum number of blocks for active tool radius compensation, in which the function "Keep radius offset constant" (CUTCONON or reprogramming of G41 / G42 during active TRC) may be active.

Note:

The restriction of the number of blocks with active CUTONON is necessary in order to carry out repositioning in this situation too. Increasing this value for the machine data can lead to an increased memory requirement for NC blocks.

20262	SPLINE_FEED_PRECISION			EXP, C09, C05	-	
-	Permissible rel. error of path velocity for spline			DOUBLE	PowerOn	
-						
-	-	0.001, 0.001, 0.001, 0.001, 0.001, 0.001...	0.000001	1.0	7/2	

Description: This machine data is evaluated only if MD28540 $MC_MM_ARCLENGTH_SEGMENTS is greater than 0.

The factor indicates how large the relative error of the path velocity may be for splines, compressor and polynomial interpolation. The smaller the factor the more computing time is required for preprocessing.

Furthermore, more memory is required to display the arc length function (see 28540 $MC_MM_ARCLENGTH_SEGMENTS).

Example:

SPLINE_FEED_PRECISION=0.1, programmed path velocity=1000 mm/min.

The actual path velocity for polynomial and spline interpolations may then vary within the range between 900 and 1100 mm/min.

20270	CUTTING_EDGE_DEFAULT			C11, C03	H2,W1	
-	Initial position of tool cutting edge without programming			DWORD	PowerOn	
-						
-	-	1, 1, 1, 1, 1, 1, 1, 1...	-2	32000	7/2	

Description: Default cutting edge after tool change

If no cutting edge has been programmed after a tool change, the default cutting edge number set in MD20270 $MC_CUTTING_EDGE_DEFAULT is used.

Value

:= 0

Initially, no cutting edge is active after a tool change.

The cutting edge is not selected until D programming.

:= 1

MD_SLMAXCUTTINGEDGENUMBER

No. of cutting edge (MD_SLMAXCUTTINGEDGENUMBER=9 is valid up to P4)

:= -1

Cutting edge number of old tool also applies to new tool.

:= -2

Cutting edge (correction) of old tool remains active until D is programmed. This means that the old tool remains the active tool until D is programmed. In other words, the tool on the spindle remains the programmed tool until D is programmed.

Example:

MD20270 $MC_CUTTING_EDGE_DEFAULT = 1;

After a tool change, the first cutting edge is active if no other cutting edge has been programmed.

20272	SUMCORR_DEFAULT			C03	H2,W1	
-	Initial position resulting offset without program			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-1	6	7/2	

Description: The number of the total offset of the cutting edge which becomes active when a new cutting edge compensation is activated without a programmed DL value being available.

MD18110 $MN_MM_MAX_SUMCORR_PER_CUTTEDGE

defines the maximum useful value which can be entered.

Value	Meaning
> 0	Number of the total offset
= 0	No total offset active with D programming
= 1	The total offset number for the previously programmed D is used.

Related to:

MD20270 $MC_CUTTING_EDGE_DEFAULT.

20280	LIMIT_CHECK_MODE			EXP	-	
-	Type of limit position check			DWORD	Reset	
-						
-	-	1, 1, 1, 1, 1, 1, 1, 1...	0	1	1/1	

Description: This MD can be used to set the mode of operation for the software limit position check.

The following options are available:

0: The limit positions are checked in real time on active transformation

1: The limit positions are checked in a preparative manner on active transformation

20310	TOOL_MANAGEMENT_MASK			C09	P3 pl,P3 sl	
-	Activation of tool management functions			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0xFFFFFFF	7/2	

Description:

```
MD = 0: Tool management inactive
Bit 0 to bit4
Bit 0=1: Tool management active
Tool management functions are enabled for the current channel.
Bit 1=1: Tool monitoring function active
The functions for monitoring the tools (tool life and guantity) are enabled.
Bit 2=1: OEM functions active
The memory for user data can be used (see also MD18090
$MN_MM_NUM_CC_MAGAZINE_PARAM to MD18098 $MN_MM_NUM_CC_MON_PARAM)
Bit 3=1: Consider adjacent location active
Bit 0 to bit 3 must be set as in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK.
Bit 4=1: The PLC has the option of requesting a T preparation again with
changed parameters.
The acknowledgment states  "2", "7" und "103" are enabled with this bit. The
tool selection is then recalculated in the NCK.
Bit 5 to bit 8
Bit 5 and bit 7 refer to the main spindle
Bit 6 und bit 8 refer to secondary spindles
Bit 5 = 1: The command is regarded as output when the internal transport
acknowledgment + the transport acknowledgment are present, that is, when the
command has been accepted by the basic PLC program.
(Bit 19=1 also allows the block change to be prevented (main run) until the
required acknowledgments have been received.)
Bit 7 = 1: The output of the command is not regarded as being completed until
the end acknowledgment has been received from the PLC. That is, the command
has beren acknowledged by the PLC user program with status "1".
(Bit 19=1 also allows the block change to be prevented (main run) until the
required acknowledgments have been received.)
Bit 5 and bit 7 (alternatively bit 6 and bit 8) are mutually exclusive.
Only the following combinations are permissible:
Bit 5: ...0...1...0
Bit 7: ...0...0...1
With the default setting, that is bits 5 to 8 = 0, synchronisation takes
place in the block in which a cutting edge is selected for the first time.
Setting these bits delays the block processing.
Bit 9 to bit 11
Bit 9: Reserved for test purposes
It can also be used by machine manufacturers during the test phase, provided
that the PLC program does not yet control the tool change.
Bit 10=1: M06 is delayed until the preparation has been accepted by the PLC
user program.
The change command is not output until the preparation acknowledgment has
been received. That can be, for example, status "1" or "105".
Bit 10=0: The change command is output without delay, directly after the
preparation command.
```

Bit 11=1: The tool preparation command (PLC command numbers=2, 4, 5) is also executed if the same tool preparation command has already been executed. (Commands 4, 5 contain the tool preparation)

Example: (Tool changed with M6 (PLC command no.= 3):

T="Tool1"; tool preparation

M6; tool change

T="Tool2" ; 1st tool preparation after M6 (for same tool holder)

; is always output to PLC.

T="Tool2"; 2nd tool preparation is only output as a command to the PLC if bit 11 = 1.

; This tool preparation counts as the first if the state of the tool has changed since the previous tool preparation such that it would no longer be serviceable.

That might be, for example, an asynchronous unloading of the tool. This tool preparation then attempts to select a replacement tool.

Bit 11=0: The preparation command can only be output once for any one tool.

Bit 12 to bit 14

Bit 12=1: The preparation command (PLC command numbers = 2, 4, 5) is also executed when the tool is already in the spindle/tool holder.

T="Tool1" ; tool preparation

M6; tool change

T="Tool1"; tool is already in the tool holder

; 1st tool preparation after M6 (for the same tool holder)

; is only output to the PLC if bit 12 = 1.

; An unserviceable tool (e.g. disabled because of tool monitoring.) on the tool holder does not count as being on the tool holder. This tool preparation then attempts to select a replacement tool.

T="Tool2" ; 2nd tool preparation - the rules of bit 11 apply to the output.

Bit 12=0: The preparation command is not executed if the tool is already in the spindle.

Bit 13=1: On reset, the commands are retrieved from the diagnostics buffer and stored in the passive file system (TCTRAxx.MPF under part program) This file is required by the Hotline.

The tool sequences are only recorded in the the diagnostics buffers of systems that have adequate memory (NCU572, NCU573)).

Bit 14=1: Reset mode

Tool and offset selection correspond to the settings in MD20110 $MC_RESET_MODE_MASK and MD20112 $MC_START_MODE_MASK.

Bit 14=0: No reset mode

Bit 15 to bit 19

Bit 15=1: No return transport of the tool if there are multiple preparation commands (Tx->Tx).

Bit 15=0: Return transport of the tool from any defined buffers.

Bit 16=1: T = location number is active

Bit 16=0: T="Tool name"

Bit 17=1: Tool life decrementation can be started and stopped via the PLC in channel DB 2.1...DBx 1.3.

Bit 18=1: Activation of monitoring of "Last tool in the tool group"

Bit 18 Lengthens the search for a suitable tool, above all, when there are a large number of disabled replacement tools.

Bit 18=0: No monitoring of "Last tool in the tool group"

Bit 19=1: The synchronizations determined by bits 5...8 refer to the main run block. This means that the block change is delayed until the required acknowledgments have been received.

Bit 19, in conjunction with set bits 5, 6, 7, 8, delays block processng.

Bit 19=0: The synchronizations determined by bits 5...8 refer to the tool command output. This means that the block change is not delayed.

Bit 20 to bit 24

Bit 20=0: If the PLC signal "Program test active" is present, then the commands generated are not output to the PLC. The NCK acknowledges the commands itself. The magazine and tool data are not changed.

Bit 20=1: If the PLC signal "Program test active" is present, then the commands generated are output to the PLC. Depending upon the type of acknowledgment, tool/magazine data can be changed in the NCK. If the acknowledgment parameters for the "target magazine" are given the values of the "source magazine", then there is no tool transport, and thus also no data change in the NCK.

Bit 21=0: Default setting: Ignore the tool state "W" during tool selection.

Bit 21=1: Tools in the state "W" cannot be selected by another tool change/ tool preparation command.

Bit 22=1: Function "Tool subgroups"

$TC_TP11[x] is the grouping or selection parameter

Bit 23=0: Default setting

The tool management selects the tool optimally and safely in the main run. This means that the interpreter may have to wait until the end of the tool selection for the offset selection.

Bit 23=1: For simple applications

The interpreter selects the tool itself. This means synchronization with the main run is not required for the offset selection. (However, an uncorrectable alarm may be issued if a tool becomes unserviceable after selection but before loading.)

Bit 24=0: Default setting

If the PLC commands 8 and 9 (asynchronous transfer) want to move a tool to a location reserved for another tool, then this is rejected with an alarm.

Bit 24=1: If the PLC commands 8 and 9 want to move a tool to a location reserved for another tool with "Reserved for tool from buffer" (bit value= "H4"), then this is possible. This location reservation is removed before execution of the motion ("Reserved for new tool to be loaded" (bit value= "H8") remains effective).

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD20320 $MC_TOOL_TIME_MONITOR_MASK

MD20122 $MC_TOOL_RESET_NAME

MD20110 $MC_RESET_MODE_MASK

MD20124 $MC_TOOL_MANAGEMENT_TOOLHOLDER

MD22560 $MC_TOOL_CHANGE_M_CODE

20320	TOOL_TIME_MONITOR_MASK			C06, C09	-	
-	Time monitoring for tool in tool holder			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	-	-	7/2	

Description: Activation of the tool time monitoring for the tool holders and spindles 1..x.

As soon as the path axes have been traversed (not with G00, always with G63), the tool time monitoring data of the active D compensation are updated for the tool in the selected tool holder, which is also the master tool holder.

Bit 0...x-1: Monitoring of the tool in tool holder 1...x

20360	TOOL_PARAMETER_DEF_MASK			C09	M5,P1,W1		
-	Definition of tool parameters			DWORD	PowerOn		
-							
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x1FFFFF	7/2		

Description: Definition of the effects of tool parameters.

Bit no. Meaning when bit is set

Bit 0: (LSB):

For turning and grinding tools, the wear parameter of the transverse axis is included in the calculation as a diameter value.

Bit 1:

For turning and grinding tools, the tool length component of the transverse axis is included in the calculation as a diameter value.

Bit 2:

If a wear component or a length component is included in the calculation as a diameter value, the tool may only be used in the plane that was active when the tool was selected. If this bit is set, a plane change leads to an alarm.

Bit 3:

Work offsets in frames in the transverse axis are included in the calculation as a diameter value.

Bit 4:

PRESET value is included in the calculation as a diameter value

Bit 5:

Include the external work offset in the transverse axis in the calculation as a diameter value

Bit 6:

Read actual values of the transverse axis as diameter values (AA_IW, AA_IEN, AA_IBN, AA_IB. Notice! Not AA_IM.)

Bit 7:

Display all actual values of the transverse axis as diameter values, irrespective of the G code of group 29 (DIAMON / DIAMOF)

Bit 8:

Always display the distance-to-go as a radius in the work (WCS)

Bit 9:

During DRF handwheel travel of a transverse axis, only half the distance of the specified increment is traveled (on condition that MD11346 $MN_HANDWH_TRUE_DISTANCE = 1).

Bit10:

Activate the tool component of an active, orientable tool carrier even if no tool is active.

Bit11:

The tool parameter $TC_DP6 is not interpreted as a tool radius but as a tool diameter.

Bit12:

The tool parameter $TC_DP15 is not interpreted as wear of the tool radius but as wear of the tool diameter.

Bit13:

During JOG of circles, the circle center coordinate is always a radius value, see D42690 $SC_JOG_CIRCLE_CENTRE.

Bit14:

Absolute values of the transverse axis with cycle masks in the radius

Bit15:

Incremental values of the transverse axis with cycle masks as diameter

Bit16:

For GWPS (GWPSON/TMON), the tool parameters tool length, wear and base dimension are interpreted as diameter values

Bit17:

With cutting edge position compensation (CUTMOD) for turning and grinding tools, the cutting plane for calculating the compensation values is rotated into the machining plane. If this bit is not set, the cutting edge is projected into the machining plane instead.

Bit18:

With cutting edge position compensation (CUTMOD) for turning and grinding tools, always use the active plane (G17 - G19). If this bit is not set, the plane specified by setting data $SC_TOOL_LENGTH_CONST has priority over the plane specified by the G code group 6 (plane selection, G17 - G19).

Bit19:

The change of orientation of a tool caused by the orientable toolcarrier can become effective even if no tool is active. This bit is effective only if bit 10 is also set.

Bit20:

If this bit is zero and if the tool parameters $TC_DP10 (holder angle) and/or $TC_DP24 (clearance angle) contain the value 0, then the function CUTMOD uses the following default values to calculate the modified cutting edge position and the modified cutting direction:

Holder angle 112.5 degrees for cutting edge positions 1 - 4

Holder angle 67.5 degrees for cutting edge positions 5 - 8

Clearance angle 22.5 degrees for cutting edge positions 1 - 4

Clearance angle 67.5 degrees for cutting edge positions 5 - 8

If this bit is set, then an alarm is output in the stated cases. This bit is used to create compatibility with older software versions.

20370	SHAPED_TOOL_TYPE_NO			C01, C08	-	
-	Tool type number for contour tools			DWORD	Immediately	
-						
-	4	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description: Indicates for each channel max. two number ranges for tool types that are treated as forming tools. Therefore individual ranges are possible both for grinding and for turning tools.

The first range is specified by the first and the second number, the second range by the third and fourth number.

If the first number is not smaller than the second one (the same applies for the third and fourth number), no range will be defined, but two individual numbers will be specified instead.

The numbers 400 through 599 are permissible (tool type numbers for turning and grinding tools), and also value 0 (no tool type number defined).

Examples:

400 405 590 596 : Tool types 400-405 and 590-596 are contour tools

410 400 590 596 : tool types 400, 410 and 590-596 are contour tools

450   0 420 430 : Tool types 450 and 420-430 are contour tools

20372	SHAPED_TOOL_CHECKSUM			C01, C08	-	
-	Checksum test for contour tools			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/5	

Description: Indicates for each channel whether for completion of the contour tool definition an edge must be available that includes the negative sums of tool length components and tool radius of the previous edges.

20380	TOOL_CORR_MODE_G43G44			C01, C08, C11	-	
-	Treatment of tool length compensation with G43 / G44			BYTE	Reset	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	2	7/2	

Description: This machine data determines in ISO dialect M (G43 / G44) the way in which length compensations programmed with H are processed.

0: Mode A

Tool length H always acts on the third geometry axis (usually Z)

1: Mode B

Tool length H acts, depending on the active plane, on one of the three geometry axes. This means with

G17 on the 3rd geometry axis (usually Z)

G18 on the 2nd geometry axis (usually Y)

G19 on the 1st geometry axis (usually X)

In this mode, compensations in all three geometry axes can be configured through multiple programming, i.e. through the activation of one component, the length compensation possibly active in another axis is not deleted.

2: Mode C

The tool length acts, independent of the active plane, on the axis that has simultaneously been programmed with H. Otherwise, the response is the same as with mode B.

20382	TOOL_CORR_MOVE_MODE			C01, C08	-	
-	Traversing of tool length compensation			BOOLEAN	Reset	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: This machine data determines how the tool length compensations are traversed.

0: A tool length compensation is only traversed if the associated axis has been programmed (behavior as in previous software versions)

1: Tool lengths are always traversed independently of whether the associated axes are programmed or not.

20384	TOOL_CORR_MULTIPLE_AXES			C01, C08, C11	-	
-	Tool length compensation in several axes simultaneously			BOOLEAN	Reset	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/2	

Description: This machine data determines for tool length compensation in ISO dialect M (ISO2) (G43 / G44), whether the compensation shall be allowed in mode C (selection of the axis on which the compensation is acting by specifying the corresponding axis letter) to act on several axes simultaneously.

If this machine data is 1, this type of programming is allowed; otherwise it is rejected with an alarm.

20390	TOOL_TEMP_COMP_ON			C01, C08	K3,W1	
-	Activation of temperature compensation for tool length			BOOLEAN	Reset	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: This machine data activates the temperature compensation in tool direction (see also SD42960 $SC_TOOL_TEMP_COMP)

20392	TOOL_TEMP_COMP_LIMIT			C01, C08	W1	
mm	Max. temperature compensation for tool length			DOUBLE	Reset	
-						
-	3	1.0, 1.0 , 1.0, 1.0, 1.0 , 1.0...	-	-	7/7	

Description: With temperature compensation, this machine data indicates the maximum permissible value for the tool length for each geometry axis.

If a temperature compensation value larger than this limit value is entered, it will be limited without an alarm.

20396	TOOL_OFFSET_DRF_ON			C01, C08	-	
-	Handwheel override in tool direction			BOOLEAN	Reset	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: This machine data activates the handwheel override in tool direction.

When this machine data is set, a handwheel override is active in the axis that is assigned to length L1 of the active tool, in the direction defined by tool orientation.

Example:

G17 is active; the tool is a milling tool; tool length L1 is therefore assigned to the Z axis (the 3rd geometry axis).

When the tool (e.g. with active 5-axistransformation) is turned around the Y axis by 90 degrees, so that it shows in X direction, a handwheel override becomes active in the 3rd axis in the X axis.

20400	LOOKAH_USE_VELO_NEXT_BLOCK			EXP, C05	B1	
-	LookAhead following block velocity			BOOLEAN	PowerOn	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/2	

Description: For SW-internal function optimization.

20430	LOOKAH_NUM_OVR_POINTS			EXP, C02, C05	B1	
-	Number of override characteristics for LookAhead			DWORD	PowerOn	
-						
-	-	1, 1, 1, 1, 1, 1, 1, 1...	0	2	7/2	

Description: For SW-internal function optimization.

20440	LOOKAH_OVR_POINTS			EXP, C05	B1	
-	Override switch points for Look Ahead			DOUBLE	PowerOn	
-						
-	2	1.0, 0.2, 1.0, 0.2, 1.0, 0.2, 1.0, 0.2...	0.2	2.0	7/2	

Description: For SW-internal function optimization.

20443	LOOKAH_FFORM			EXP, C05	-	
-	Activate extended LookAhead			BYTE	NEW CONF	
-						
-	5	0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	2	7/2	

Description: The MD specifies for which technology groups the extended LookAhead is active.

Value 0: Default LookAhead

Value 1: Extended LookAhead

Value 2: Extended LookAhead

E.g. MD20443 $MC_LOOKAH_FFORM[4]=1; i.e. activation for DYNFINISH.

Entry for all dynamic G code groups.

When changing between default LookAhead and extended LookAhead or vice versa, the continuous-path mode is interrupted by an interpolatory stop.

20450	LOOKAH_RELIEVE_BLOCK_CYCLE			EXP, C05	B1	
-	Relief factor for block cycle time			DOUBLE	PowerOn	
-						
-	-	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0...	-	-	7/2	

Description: Block cycle problems occur for the following reason:

The traversing length of the NC blocks to be processed is so short that the Look Ahead function must reduce the machine velocity to provide enough time for block preparation. In this situation, constant deceleration and acceleration of the path motion can occur.

This machine data defines the extent to which such velocity fluctuations are to be smoothed.

Special cases:

Values up to approx. 1.0 are appropriate.

The value 0.0 means that the function is deactivated.

20455	LOOKAH_FUNCTION_MASK			EXP, C05	-	
-	Look Ahead special functions			BYTE	NEW CONF	
-						
-	-	1, 1, 1, 1, 1, 1, 1, 1...	0	1	7/2	

Description: Look Ahead special functions:

Bit 0 = 1:

The Safety Integrated setpoint limitation is already taken into account in Look Ahead.

20460	LOOKAH_SMOOTH_FACTOR			EXP, C05	B1	
%	Smoothing factor for Look Ahead			DOUBLE	NEW CONF	
-						
-	-	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0...	0.	500.0	7/2	

Description: A smoothing factor can be defined to give a more stable path velocity control.

It defines the maximum permitted productivity loss.

Acceleration procedures which contribute less than this factor to a shorter program run time are then not executed.

In this case, only those acceleration procedures whose frequency lies above the frequency parameterized in MD32440 $MA_LOOKAH_FREQUENCY are taken into account.

The entry of 0.0 deactivates the function.

20462	LOOKAH_SMOOTH_WITH_FEED			EXP, C05	B1	
-	Path velocity smoothing with programmed feed			BOOLEAN	NEW CONF	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/2	

Description: The MD defines whether the programmed feed is also taken into account for smoothing the path velocity. In these cases, the factor defined in MD20460 $MC_LOOKAH_SMOOTH_FACTOR can be better maintained when the override is set to 100%.

Related to:

MD32440 $MA_LOOKAH_FREQUENCY,

MD20460 $MC_LOOKAH_SMOOTH_FACTOR

20463	FIFOCTRL_ADAPTION			EXP, C05	-	
-	Adaptation of the IPO buffer control			DOUBLE	NEW CONF	
-						
-	-	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0...	0.0	1.0	1/1	

Description: The MD specifies how strongly the IPO buffer control (FIFOCTRL) influences the path feed when the buffer is full.

0.0 means that the IPO buffer control ceases to limit the path feed when the IPO buffer is full. This shortens the machining time but can increase the risk of the IPO buffer running empty.

1.0 means that the IPO buffer control continues to limit the path feed when the IPO buffer is full, and thus prevents the IPO buffer from running empty too quickly. This leads to less pronounced fluctuations of the fill level of the IPO buffer. However, a longer machining time has to be expected.

Values between 0.0 and 1.0 enable a smooth transition from the old to the new behavior.

Related to:

FIFOCTRL

20464	PATH_MODE_MASK			EXP, C05	-	
-	Path behavior			DWORD	Reset	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	0xffff	7/2	

Description: This machine data is used to influence the path action

Bit0:

If only rotary axes are traversed in the block as path axes with active G700, the programmed rotary axis velocity corresponds to

0: [degrees/min]

1: [25.4*degrees/min]

20465	ADAPT_PATH_DYNAMIC			EXP, C05	B1	
-	Adaptation of path dynamic response			DOUBLE	NEW CONF	
-						
-	2	1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0...	1.0	100.0	7/2	

Description: This adaptation factor can be used to reduce the dynamics of changes in tool path velocity.

ADAPT_PATH_DYNAMIC[0] is effective with Brisk, reducing the permissible acceleration

ADAPT_PATH_DYNAMIC[1] is effective with Soft, reducing the permissible jerk

Considering only acceleration processes using a frequency above the frequency parameterized in MD32440 $MA_LOOKAH_FREQUENCY.

To disable this function, enter 1.0.

20470	CPREC_WITH_FFW			EXP, C06, C05	K6	
-	Programmable contour accuracy			BYTE	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	3	7/2	

Description: This machine data defines the behavior of the programmable function CPRECON.

0: The CPRECON function is inactive when feedforward control is activated simultaneously.

1: CPRECON is also active with feedforward control.

2: As 1, but the function is parameterized with $MA_EQUIV_CPREC_TIME.

3: As 2, but any contour accuracy programmed with CTOL has priority over $SC_CONTPREC.

The values 0 and 1 are no longer recommended. They only provide compatibility with older software versions.

Related to:

$SC_CONTPREC, $SC_MINFEED, $MA_EQUIV_CPREC_TIME

20485	COMPRESS_SMOOTH_FACTOR			EXP, C05	B1	
-	Smoothing by compressor			DOUBLE	NEW CONF	
-						
-	5	0., 0., 0., 0., 0., 0., 0., 0., 0., 0....	0.	1.	7/2	

Description: Smoothing of the programmed block end points with compressor type COMPCAD. Value 0: no smoothing. Value 1: maximum smoothing.

Entry for all dynamic G code groups.

20486	COMPRESS_SPLINE_DEGREE			EXP, C05	B1	
-	Compressor spline degree			BYTE	NEW CONF	
-						
-	5	3, 3, 3, 3, 3,3, 3, 3, 3, 3...	3	5	7/2	

Description: Spline degree for compressor type COMPCAD. Value 3 is recommended; value 5 may be possible for roughing, if soft and rapid movements are more important than accuracy

Entry for all dynamic G code groups.

20487	COMPRESS_SMOOTH_FACTOR_2			EXP, C05	B1	
-	Smoothing by compressor			DOUBLE	NEW CONF	
-						
-	5	0., 0., 0., 0., 0., 0., 0., 0., 0., 0....	0.	1.	7/2	

Description: Extent to which the programmed block end points are smoothed in the case of compressor type COMPCAD for non-geometry axes. Value 0: No smoothing. Value 1: Maximum smoothing.

Entry for each dynamic G code group.

20490	IGNORE_OVL_FACTOR_FOR_ADIS			EXP	B1	
-	G641/G642 independent of overload factor			BOOLEAN	NEW CONF	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description: A block transition is normally only smoothed with G641 and G642 when thepath velocity at block transition is reduced by the overload factor set in MD32310 $MA_MAX_ACCEL_OVL_FACTOR. When SOFT is active, the maximum jerk occurring at block transitions is also limited by MD32432 $MA_PATH_TRANS_JERK_LIM. This means that the effect of smoothing with G641 and G642 depends on the values set for the overload factor and possibly for the maximum jerk.

By setting MD20490 $MC_IGNORE_OVL_FACTOR_FOR_ADIS = TRUE a block transition can be smoothed with G641 and G642, irrespectively of the values set for the overload factor.

20500	CONST_VELO_MIN_TIME			EXP, C05	B2	
s	Minimum time with constant velocity			DOUBLE	PowerOn	
-						
-	-	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0...	0.0	0.1	7/2	

Description: Defines the minimum time for constant velocity during transition from acceleration to deceleration in short blocks in which the set velocity cannot be reached. Entering a time of at least several IPO cycles prevents a direct transition from the acceleration to the deceleration phase and thus reduces the acceleration jump to half. This acceleration limitation is only active with the acceleration profile BRISK.

MD irrelevant for:

Look Ahead does not take account of this function.

20550	EXACT_POS_MODE			EXP	B1	
-	Exact stop conditions on G00/G01.			BYTE	NEW CONF	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	33	7/2	

Description: Configuration of the exact stop conditions for G00 and other G codes of the 1st G code group.

The MD is decimal-coded. The units digits define the behavior at G00 (infeed motion) and the tens digits the behavior of all the other G codes of the 1st group ("machining G codes").

x0: At G00, the relevant programmed exact stop conditions become active.

x1: At G00, G601 (fine positioning window) becomes active independent of the programmed exact stop condition.

x2: At G00, G602 (coarse positioning window) becomes active independent of the programmed exact stop condition.

x3: At G00, G603 (setpoint value reached) becomes active independent of the programmed exact stop condition.

0x: At the machining G codes, the relevant programmed exact stop conditions become active.

1x: At the machining G codes, G601 (fine positioning window) becomes active independent of the programmed exact stop condition.

2x: At the machining G codes, G602 (coarse positioning window) becomes active independent of the programmed exact stop condition.

3x: At the machining G codes, G603 (setpoint value reached) becomes active independent of the programmed exact stop condition.

The values of the units digits and tens digits are added.

For example, the value of EXACT_POS_MODE = 2 means that the exact stop condition G602 is always activated automatically at G00, independently of which exact stop condition was programmed. At all other G codes of group 1, the programmed exact stop condition becomes active.

20552	EXACT_POS_MODE_G0_TO_G1			EXP	B1	
-	Exact stop condition at G00-G01 transition			BYTE	NEW CONF	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	5	7/2	

Description: Configuration of a stop at transition from G00 to a different G code of the 1st G code group, and also vice versa, at transition from non-G00 to G00 in continuous-path mode.

In exact-stop mode, the positioning window programmed or set in MD20550 $MC_EXACT_POS_MODE is used.

The following applies:

0: No additional stop, no control of exact stop

1: Behavior active as with G601 (positioning window, fine).

2: Behavior active as with G602 (positioning window, coarse).

3: Behavior active as with G603 (setpoint reached).

4: As 0,

in addition, the override of the subsequent non-G00 block is taken into account in the G00 block via LookAhead in the case of a change from G00 to non-G00.

5: As 0,

in addition, the override of the subsequent block is taken into account via LookAhead in the case of a change from G00 to non-G00 and non-G00 to G00.

20560	G0_TOLERANCE_FACTOR			EXP	B1	
-	Tolerance factor for G00			DOUBLE	NEW CONF	
-						
-	-	1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0...	1.e-9	-	1/1	

Description: Tolerance factor for G00.

This factor is used to make different settings for the tolerances for processing when G00 is active (rapid traverse, infeed motion).

This tolerance factor is relevant for the following control functions:

1. Compressor (COMPCAD, COMPCURV, and COMPON)
2. Smoothing with G64x
3. Smoothing of orientation with OST
4. Smoothing of orientation response with ORISON

This factor can be both greater than 1 and less than 1. However, higher tolerance settings are usual for infeed motion.

If the factor is equal to 1, the tolerances applied for G00 motion are the same as those for non-G00 motion.

20600	MAX_PATH_JERK			C05	B1,B2	
m/s³	Path-related maximum jerk			DOUBLE	NEW CONF	
-						
-	5	100., 100., 100., 100., 100....	1.e-9	-	7/2	

Description: The jerk limitation restricts the path acceleration change in SOFT mode. The path acceleration divided by the jerk limitation value produces a time in which the acceleration change takes place.

The jerk limitation is activated on the path by the NC command SOFT, and deactivated by BRISK.

MD irrelevant for:

Error states that lead to a rapid stop. In addition, the limitation is also inactive for positioning axes.

There is an entry for each dynamic G code group.

20602	CURV_EFFECT_ON_PATH_ACCEL			EXP, C05	B1,B2	
-	Effect of path curvature on path dynamic			DOUBLE	NEW CONF	
-						
-	5	0., 0., 0., 0., 0., 0., 0., 0., 0., 0....	0.	0.95	7/2	

Description: This MD is used to determine whether the reaction of path curvature on path acceleration and path velocity is taken into account.

0:

Not taken into account

> 0:

If required, the path velocity and path acceleration are reduced in order to keep a sufficient reserve on the machine axes for centripetal acceleration.

0.75: Recommended setting.

MD20602 $MC_CURV_EFFECT_ON_PATH_ACCEL defines the proportion of the axis accelerations (see MD32300 $MA_MAX_AX_ACCEL[..]) that can be used for centripetal acceleration. The remainder is used for changing the path velocity.

Centripetal acceleration is not required for linear blocks; the full axis acceleration is therefore available for the path acceleration. On slightly curved contours or with a sufficiently low maximum path feedrate $MC_CURV_EFFECT_ON_PATH_ACCEL has only a partial or no effect. Accordingly, the path acceleration is higher than that specified by (1. - MD20602 $MC_CURV_EFFECT_ON_PATH_ACCEL) * MD32300 $MA_MAX_AX_ACCEL[..].

There is an entry for each dynamic G code group.

20603	CURV_EFFECT_ON_PATH_JERK			EXP, C05	B1	
-	Effect of path curvature on path jerk			DOUBLE	NEW CONF	
-						
-	5	0., 0., 0., 0., 0., 0., 0., 0., 0., 0....	0.	1000.	7/2	

Description: Allows the reaction of the path curvature on the path jerk to be taken into account on especially jerk-sensitive machines.

Entry for each dynamic G code group.

20605	PREPDYN_SMOOTHING_FACTOR			EXP, C05	B1	
-	Factor for curve smoothing			DOUBLE	NEW CONF	
-						
-	5	1., 1., 1., 1., 1., 1., 1., 1., 1., 1....	-	-	1/1	

Description: Factor to determine the degree of smoothing and torsion.

A larger value of this MD causes a stronger smoothing and thus a more homogenous curvature/torsion and resulting path velocity.

With this factor being zero no smoothing is performed.

There is an entry for all dynamic G code groups.

20606	PREPDYN_SMOOTHING_ON			EXP, C05	B1	
-	Activation of curve smoothing			BOOLEAN	NEW CONF	
-						
-	5	0, 0, 0, 0, 0,0, 0, 0, 0, 0...	-	-	7/2	

Description: Switch on of curve and torsion smoothing.

Smoothing of the curve or torsion causes a homogenous path velocity.

Smoothing is only performed, when the relevant factor is MD 20605 $MC_PREPDYN_SMOOTHING_FACTOR > 0.

There is an entry for all dynamic G code groups.

20610	ADD_MOVE_ACCEL_RESERVE			C05	F2,B2,K1	
-	Acceleration margin for overlaid movements			DOUBLE	PowerOn	
-						
-	-	.2, .2, .2, .2, .2, .2, .2, .2...	0.	0.9	7/2	

Description: This machine data contains the factor which defines the acceleration margin which is not used by a path movement in order to provide sufficient acceleration reserves for an overlaid movement for the velocity control.

A factor of 0.2 means that the path axes utilize 80% of the path acceleration in normal operation. Only when a request for overlaid movement is made, can 100% of the path acceleration be utilized.

MD irrelevant for:

Error states that lead to a rapid stop. In addition, the limitation is also ineffective for positioning axes.

Special cases:

At the moment the machine data is only taken into account if the function "Fast retraction" is first activated.

Related to:

MD32300 $MA_MAX_AX_ACCEL (axis acceleration)

20620	HANDWH_GEOAX_MAX_INCR_SIZE			C08, C06	H1	
mm	Limitation handwheel increment for geometry axes			DOUBLE	PowerOn	
-						
-	-	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0...	-	-	7/2	

Description: > 0: Limitation of the size of the selected increment for geometry axes

$MN_JOG_INCR_SIZE0[<increment/VDI signal>] or

SD41010 $SN_JOG_VAR_INCR_SIZE for geometry axes

0: No limitation on geometry axes

20622	HANDWH_GEOAX_MAX_INCR_VSIZE			C08, C06, C05	-		
mm/min	Path velocity override			DOUBLE	PowerOn		
-							
-	-	500., 500., 500., 500., 500., 500., 500....	-	-	7/2		

Description:

```
The following applies to the velocity override of the path:
> 0: Limitation of the size of the selected increment
($MN_JOG_INCR_SIZE_[<increment/VDI signal>] or
SD41010 $SN_JOG_VAR_INCR_SIZE) / 1000*IPO sampling time
= 0: No limitation
```

20624	HANDWH_CHAN_STOP_COND			EXP, C09	H1,P1	
-	Definition of response of handwheel travel, channel-specific			DWORD	PowerOn	
-						
-	-	0x13FF, 0x13FF, 0x13FF, 0x13FF, 0x13FF...	0	0xFFFF	7/2	

Description: Definition of the behavior for handwheel travel to channel-specific VDI interface signals (bit 0 to bit 7) or the context-sensitive interpolator stop (bit 7):

Bit = 0:

Interruption or collection of the displacements entered via the handwheel.

Bit = 1:

Traversing aborted and no collecting

Bit assignment:

Bit 0: Mode group stop

Bit 1: Mode group stop, axes plus spindle

Bit 2: NC stop

Bit 3: NC stop, axes plus spindles

Bit 4: Feed disable (exceptions with MD30460 $MA_BASE_FUNCTION_MASK bit 6)

For bit 4 feed disable, it must be taken into account that a PLC-controlled axis, for which MD30460 $MA_BASE_FUNCTION_MASK bit 6 = 1, is not stopped by the feed disable, and that no interruption and no abort are triggered here.

Bit 5: Feedrate override

Bit 6: Rapid traverse override

Bit 7: Feed stop, geometry axis or context-sensitive interpolator stop

Bit 8 = 0:

The maximum feedrate for handwheel travel of geometry axes is that specified in machine data JOG_AX_VELO for the corresponding machine axis/axes.

Bit 8 == 1:

The maximum feedrate for handwheel travel of geometry axes is that specified in machine data MAX_AX_VELO for the corresponding machine axis/axes.

Bit 9 = 0:

The override is active during handwheel travel of geometry axes

Bit 9 = 1:

During handwheel travel of geometry axes, the override is assumed to be 100% irrespective of the position of the override switch.

Exception: override 0, which is always active.

Bit 10 = 0:

MD11310 $MN_HANDWH_REVERSE is not active for DRF, i.e. handwheel travel with DRF is carried out as if MD11310 $MN_HANDWH_REVERSE = 0.

Bit 10 = 1:

MD11310 $MN_HANDWH_REVERSE is active for DRF.

Bit 11 = 0:

When the contour handwheel is deselected, program processing is continued automatically.

Bit 11 = 1:

When the contour handwheel is deselected, an NCSTOP is triggered automatically. Program processing is not continued until NCSTART is entered.

Bit 12 = 0

NC start has no effect on handwheel travel.

Bit 12 = 1:

The previously collected paths are rejected at NC start.

Bit 13 = 0:

For DRF, bits 0 - 3 and bit 12: bit = 0 / bit = 1 are active (see above).

Bit 13 = 1:

For DRF, bits 0 - 3 and bit 12 are NOT active: the DRF motion is not interrupted by a stop, and a DRF motion can take place even in "Automatic interrupted" state (achieved by NC Stop).

Note:

If an alarm leads to an axis stop and if such an alarm is pending, no DRF motion can take place.

Bit 14 = 0:

The maximum feedrate for handwheel travel of geometry axes is that specified in SD41120 $SN_JOG_REV_SET_VELO or in MD32050 $MA_JOG_REV_VELO (for revolutional feedrate) or in MD32040 $MA_JOG_REV_VELO_RAPID (for rapid traverse) for the corresponding machine axis, the spindle or rotary axis feedrate is included in the calculation.

Bit 14 = 1:

The maximum rotational feedrate for handwheel travel of geometry axes is the feedrate specified in MD32000 $MA_MAX_AX_VELO for the corresponding machine axis (see also bit 6).

Bit 15 = 0:

If an axis with active diameter programming is traversed in the channel, only half the distance of the specified increment is traveled during handwheel travel ($MN_HANDWH_TRUE_DISTANCE = 1 or 3).

Bit 15 = 1:

If an axis with active diameter programming is traversed in the channel, the specified increment is fully traveled during handwheel travel ($MN_HANDWH_TRUE_DISTANCE = 1 or 3).

20700	REFP_NC_START_LOCK			C01, C03	D1,R1,Z1	
-	NC start disable without reference point			BYTE	Reset	
-						
-	-	1, 1, 1, 1, 1, 1, 1, 1...	0	2	7/2	

Description: 0: The NC/PLC interface signal DB3200 DBX7.1 (NC start) for starting part programs or part program blocks (MDI and overstore) is active even if one or all axes of the channel have not yet been referenced.

To ensure that the axes nevertheless reach the correct position after NC startup, the work (workpiece coordinate system = WCS) must be set to the correct value by means of other methods (scratch method, automatic work offset determination etc.).

1: Axes for which the axial MD34110 $MA_REFP_CYCLE_NR specifies that a reference point is mandatory (value > -1), must be referenced for NC startup to be enabled.

2: Advanced form of setting 1 in that the axis state "Position restored" (instead of "referenced") is sufficient for NC startup in MDI or overstore.

20730	G0_LINEAR_MODE			C09	P2	
-	G0 interpolation mode			BOOLEAN	PowerOn	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/2	

Description: This machine data defines the interpolation behavior of G0:

0: Non-linear interpolation (RTLIOF): Each path axis interpolates as an individual axis (positioning axis), independently of the other axes, at the rapid traverse velocity of the axis (MD32000 $MA_MAX_AX_VELO).

1: Linear interpolation (RTLION): The path axes are interpolated jointly.

Related to:

MD20732 $MC_EXTERN_G0_LINEAR_MODE

20732	EXTERN_G0_LINEAR_MODE			N12	P2	
-	G00 interpolation mode			BOOLEAN	PowerOn	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/2	

Description: This machine data defines the interpolation behavior of G00:

0: Axes are traversed as positioning axes

1: Axes interpolate with each other

Related to:

MD10886 $MN_EXTERN_INCREMENT_SYSTEM

20734	EXTERN_FUNCTION_MASK			N12	-	
-	Function mask for external language			DWORD	Reset	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	0xFFFF	7/2	

Description: This machine data is used to influence functions in ISO mode.

Bit0: 0:

ISO mode T: "A" and "C" are interpreted as axes. If contour definition has been programmed, "A" or "C" must be preceded by a comma.

1:

"A" and "C" in the part program are always interpreted as a contour definition. An axis "A" or "C" is not allowed.

Bit1: 0:

ISO mode T: G10 P < 100 tool geometry
P > 100 tool wear

1:

G10 P < 10000 tool geometry
P > 10000 tool wear

Bit2: 0:

G04 dwell time: always [s] or [ms]

1:

If G95 is active, in spindle revolutions

Bit3: 0:

Errors in ISO scanner lead to an alarm

1:

Errors in ISO scannner are not output, the block is transferred to the Siemens translator.

Bit4: 0:

G00 is traversed with the current exact stop - continuous-path mode G code

1:

G00 is always traversed with G09

Bit5: 0:

Modulo rotary axis is positioned at the shortest possible distance

1:

Direction of rotation of modulo rotary axis depends on sign

Bit6: 0:

Only 4-digit program number allowed.

1:

8-digit program number allowed. If the program number has less than 4 digits, it is expanded to 4 digits with 0.

Bit7: 0:

Axis programming for geometry axis exchange/parallel axes is compatible with ISO mode.

1:

Axis programming for geometry axis exchange/parallel axes in ISO mode is compatible with Siemens mode.

Bit8: 0:

With cycles, the F value transferred is always interpreted as a feedrate.

1:

With threading cycles, the F value transferred is interpreted as a pitch.

Bit9: 0:
Multiplication with 0.01mm / 0.0001inch is carried out in ISO mode T for G84, G88 and in standard mode F for G95.
1:
Multiplication with 0.001mm / 0.00001inch is carried out in ISO mode T for G84, G88 and in standard mode F for G95.
Bit10: 0:
With M96 Pxx, the program programmed with Pxx is always called in the case of an interrupt
1:
With M96 Pxx, CYCLE396.spf is always called in the case of an interrupt
Bit11: 0:
With G54 Pxx, only G54.1 is displayed
1:
With G54 Pxx, the programmed program is displayed after the point, e.g. G54.48
Bit12: 0:
When the subroutine defined with M96 Pxx is called, $P_ISO_STACK is not modified
1:
When the subroutine defined with M96 Pxx is called, $P_ISO_STACK is incremented
Bit13: 0:
G10 is executed without internal STOPRE
1:
G10 is executed with internal STOPRE
Bit14: 0:
ISO_mode T: No alarm if a cutting edge has been programmed in the T command.
1:
ISO mode T: Alarm 14185 if a cutting edge has not been programmed in the T command.

20750	ALLOW_G0_IN_G96			C09, C05	P2,V1	
-	G0 logic with G96, G961			BOOLEAN	PowerOn	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/2	

Description: This machine data defines the speed regulation characteristic of the spindle in G0 blocks with constant cutting rate (G96, G961) selected .

1: In a G0 block, the spindle speed is kept constant at the last value of the previous block that was unequal G0.

Prior to a subsequent block that does not contain G0, the spindle speed is increased to a value that belongs to the transverse axis position of the subsequent block.

0: In a G0 block, the spindle speed changes against the transverse axis position.

20800	SPF_END_TO_VDI			C04, C03	H2,K1	
-	End of subroutine to PLC			BYTE	PowerOn	
-						
-	-	1, 1, 1, 1, 1, 1, 1, 1...	-	-	7/2	

Description:

Bit 0 = 1:

The M functions for subroutine end (M17 and/or M2/M30) are transferred to the PLC interface.

Bit 0 = 0:

The M functions for subroutine end (M17 and/or M2/M30) are not transferred to the PLC interface.

Note:

To prevent stopping in continuous-path mode, M17 must not be programmed alone in a block.

Example of a subroutine: G64 F2000 G91 Y10 X10
X10 Z10 M17

Bit 1 = 0:

M01:

conditional program stop is always output to PLC, irrespective of whether the M01 signal is active or not.

Fast auxiliary function output M=QU(1) is inactive because M01 is assigned to the 1st M function group and thus is always output at block end.

Bit 1 = 1:

M01:

conditional program stop is only output to PLC, if M01 is also active.

This thus enables optimal run-time processing of the part program.

With fast auxiliary function output M=QU(1), M1 is output during the movement; thus it is possible to traverse blocks in continuous-path mode with programmed M01 as long as M01 is not active.

The request of the M01 signal with M=QU(1) no longer occurs at block end but during the movement.

20850	SPOS_TO_VDI			C04, C03	S1	
-	Output of M19 to PLC on SPOS/SPOSA			BYTE	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description:

Bit 0 = 0:

When bit 19 is also set to '0' in MD35035 $MA_SPIND_FUNCTION_MASK, auxiliary function M19 is not generated with SPOS and SPOSA. This also eliminates the acknowledgement time for the auxiliary function, which can cause faults with very short blocks.

Bit 0 = 1:

When SPOS and SPOSA are programmed in the part program, auxiliary function M19 is generated and output to the PLC. The address extension corresponds to the spindle number.

Related to:

SPIND_FUNCTION_MASK

20900	CTAB_ENABLE_NO_LEADMOTION			EXP	M3		
-	Curve tables with jump of slave axis			BYTE	Reset		
-							
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	2	7/2		

Description: This MD is used to configure the way jumps of the slave axis are processed in curve tables. A jump of the slave axis results from the presence of a movement of the slave axis in a segment of the curve table with no corresponding movement of the master axis.

The jumps of the slave axis may be programmed directly, or they are created internally in the control.

These segments may be created especially if a curve table with active tool radius compensation is generated.

The following configurations are possible:

0: No curve tables are created that contain a jump of the slave axis. If a jump of the slave axis occurs, alarm 10949(CTAB_NO_LEADMOTION) is issued and program processing is terminated. This setting is compatible with previous software versions.

1: Curve tables containing a jump of the slave axis may be implemented. If a jump of the slave axis occurs, alarm 10955 (CTAB_NO_LEADMOTIONWARNING) is issued without terminating program processing.

2: Curve tables with jumps of the slave axis are implemented without issuing an alarm or a note.

20905	CTAB_DEFAULT_MEMORY_TYPE			EXP	M3		
-	Default memory type for curve tables			BYTE	Reset		
-							
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2		

Description: This machine data defines the memory (SRAM or DRAM) in which the curve tables are created by default.

This MD is only relevant if no memory type was specified when defining a curve table using CTABDEF().

The following settings can be selected:

0: By default, curve tables are created in the SRAM.

1: By default, curve tables are created in the DRAM.

21000	CIRCLE_ERROR_CONST		C06	-		
mm	Circle end point monitoring constant		DOUBLE	PowerOn		
-						
-	-	0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01...	-	-	7/2	

Description: This machine data is used to specify the permissible absolute circle error [mm].

When a circle is programmed, both conditions (that the distances from the programmed center point to the start and end points (circle radius) must be the same and that the center point of the circle must be located on the perpendicular bisector of the straight line connecting the start and end points (perpendicular bisector of the circular plane)) apply.

The fact that the circular parameters can be freely programmed means that these conditions are not usually met exactly in the case of circular-path programming with I, J, and K (the circle is "overdefined").

The maximum permissible difference between the two radii that is accepted without an alarm, as well as the distance between the programmied center point of the circle and the perpendicular bisector described above, is defined by the larger value in the following data:

- MD21000 $MC_CIRCLE_ERROR_CONST
- Start radius multiplied by MD21010 $MC_CIRCLE_ERROR_FACTOR

This means that for small circles the tolerance is a fixed value (MD21000 $MC_CIRCLE_ERROR_CONST), and for large circles it is proportional to the start radius.

Related to:

MD21010 $MC_CIRCLE_ERROR_FACTOR

(circle end point monitoring factor)

In the context of the predefined tolerances, conflicting circle data is compensated essentially by moving the center point of the circle. Please note that the deviation between the programmed center point and the actual center point can reach the order of magnitude set with machine data $MC_CIRCLE_ERROR_CONST and/or $MC_CIRCLE_ERROR_FACTOR. In the case of circles which are almost full circles in particular, this can also lead to contour deviations of the same order of magnitude.

21010	CIRCLE_ERROR_FACTOR			C06	-	
-	Circle end point monitoring factor			DOUBLE	PowerOn	
-						
-	-	0.001, 0.001, 0.001, 0.001, 0.001, 0.001...	-	-	7/2	

Description: Factor for permissible radius difference.

Defines the factor for large circles by which the starting radius and end radius may deviate from each other

(see also MD21000 $MC_CIRCLE_ERROR_CONST (circle end point monitoring constant).

When a circle is programmed, both conditions (that the distances from the programmed center point to the start and end points (circle radius) must be the same and that the center point of the circle must be located on the perpendicular bisector of the straight line connecting the start and end points (perpendicular bisector of the circular plane)) apply.

The fact that the circular parameters can be freely programmed means that these conditions are not usually met exactly in the case of circular-path programming with I, J, and K (the circle is "overdefined").

The maximum permissible difference between the two radii that is accepted without an alarm, as well as the distance between the programmied center point of the circle and the perpendicular bisector described above, is defined by the larger value in the following data:

- MD21000 $MC_CIRCLE_ERROR_CONST
- Start radius multiplied by MD21010 $MC_CIRCLE_ERROR_FACTOR

This means that for small circles the tolerance is a fixed value (MD21000 $MC_CIRCLE_ERROR_CONST), and for large circles it is proportional to the start radius.

Related to:

MD21000 $MC_CIRCLE_ERROR_CO'NST

(circle end point monitoring factor)

In the context of the predefined tolerances, conflicting circle data is compensated essentially by moving the center point of the circle. Please note that the deviation between the programmed center point and the actual center point can reach the order of magnitude set with machine data $MC_CIRCLE_ERROR_CONST and/or $MC_CIRCLE_ERROR_FACTOR. In the case of circles which are almost full circles in particular, this can also lead to contour deviations of the same order of magnitude.

21015	INVOLUTE_RADIUS_DELTA			C06	A2	
mm	Involute end point monitoring			DOUBLE	PowerOn	
-						
-	-	0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01...	-	-	7/2	

Description: Permissible absolute difference of radius at involute interpolation [mm].

At involute interpolation, the radius of the basic circle determined by the end point may differ from the programmed radius.

This data is used to limit the permissible maximum difference between start radius and end radius.

21016	INVOLUTE_AUTO_ANGLE_LIMIT			C06	A2	
-	Automatic angle limitation during involute interpolation			BOOLEAN	PowerOn	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: If the angle of rotation is programmed for an involute (AR=angle), the maximum angle of rotation is limited in case the involute is travelling towards the basic circle (AR < 0). The maximum angle of rotation is reached when the involute touches the basic circle.

Normally, if an angle larger than the maximum angle is programmed, an alarm is issued and the NC program aborted.

If this MD is set to TRUE any angle is accepted without an alarm for programming. If required, this angle is limited automatically.

21020	WORKAREA_WITH_TOOL_RADIUS			C03, C06	A3	
-	Consideration of tool radius for working area limitation			BOOLEAN	Reset	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: This machine data indicates whether the tool radius is taken into account in the working area limitation.

0: It is checked whether the tool center lies within the working area limits.

1: The tool radius is taken into account when the working area limitation is checked. This means that the working area is reduced by the tool radius.

21090	MAX_LEAD_ANGLE			C08, C09	M1	
degrees	Maximum value of permitted lead angle for orientation progr.			DOUBLE	NEW CONF	
-						
-	-	80., 80., 80., 80., 80., 80., 80., 80....	0.	80.	7/7	

Description: Maximum permissible value of the lead angle in degrees.

21092	MAX_TILT_ANGLE			C08, C09	M1	
degrees	Maximum value of permitted side angle for orientation progr.			DOUBLE	NEW CONF	
-						
-	-	180., 180., 180., 180., 180., 180., 180....	-180.	180.	7/7	

Description: Maximum permissible value of the tilt angle in degrees.

21110	X_AXIS_IN_OLD_X_Z_PLANE			EXP, C01, C09	M1,K2	
-	Coordinate system for automatic frame definition			BOOLEAN	PowerOn	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/7	

Description: 1 = With automatic definition of a frame (TOFRAME), the Z direction of which equals the current tool orientation, the new coordinate system is additionally rotated around the new Z axis so that the new X axis is in the old Z-X plane.

0 = With automatic definition of a frame (TOFRAME), the Z direction of which equals the current tool orientation, the new coordinate system is maintained as it results from the kinematics of the machine, i.e. it is assumed that the coordinate system is fixed to the tool and rotates with the tool (orientation).

From SW 5.3:

This machine data is only effective when the three lowest value decimal positions (units, tens, hundreds) of SD42980 $SC_TOFRAME_MODE) equal zero. Otherwise the frame definition is specified by SD42980 $SC_TOFRAME_MODE.

MD irrelevant for:

No orientation programming

Related to:

MD21100 $MC_ORIENTATION_IS_EULER

Further references:

/PG/, Programming Guide, Fundamentals

21160	JOG_VELO_RAPID_GEO			C07	F2	
mm/min	JOG rapid traverse for geometry axes			DOUBLE	Reset	
-						
-	3	10000., 10000.0, 10000., 10000., 10000.0, 10000....	-	-	7/2	

Description: Velocity in JOG mode with rapid traverse override for geometry axes in the channel (mm/min)

21165	JOG_VELO_GEO			C07	F2	
mm/min	Jog feedrate for geometry axes			DOUBLE	Reset	
-						
-	3	1000., 1000., 1000., 1000., 1000., 1000....	-	-	7/2	

Description: JOG velocity for geometry axes in the channel (mm/min)

21186	TOCARR_ROT_OFFSET_FROM_FR			C01, C07	F2	
-	Offset of TOCARR rotary axes from WO			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: Rotary axes offset for the orientable tool holder is automatically accepted from the work offset activated on activation of the orientable tool holder for the rotary axes.

21190	TOFF_MODE			C08	F2,2.4	
-	Mode of correction in tool direction			BYTE	Reset	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description: This machine data specifies the online correction mode in tool direction via $AA_TOFF[ ].

Bit 0: Behavior of $AA_TOFF in case of a RESET

0: $AA_TOFF is deseclected in case of a RESET

1: $AA_TOFF is maintained also after RESET

Bit 1: Effect of the value assignment on the 1st component of $AA_TOFF[ ]

0: absolute value

1: incremental value (integrator)

Bit 2: Effect of the value assignment on the 2nd component of $AA_TOFF[ ]

0: absolute value

1: incremental value (integrator)

Bit 3: Effect of the value assignment on the 3rd component of $AA_TOFF[ ]

0: absolute value

1: incremental value (integrator)

21194	TOFF_VELO			C08	F2,2.4	
mm/min	Feedrate for online correction in tool direction			DOUBLE	NEW CONF	
-						
-	3	0., 0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/2	

Description: Feedrate for online correction in tool direction [mm/min] via $AA_TOFF[ ]

21196	TOFF_ACCEL			C08	2.4	
m/s²	Acceleration for online correction in tool direction			DOUBLE	NEW CONF	
-						
-	3	100., 100., 100., 100., 100., 100....	1.0e-3	-	7/2	

Description: Acceleration for online correction in tool direction [m/s**2] via $AA_TOFF[ ]

21200	LIFTFAST_DIST			C09	K1,V1,2.6,6.1	
mm	Traversing distance on rapid lift from contour			DOUBLE	PowerOn	
-						
-	-	0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1...	-	-	7/2	

Description: The machine data determines the absolute value of the traverse movement for rapid lift. The direction of the traverse movement is defined in the part program by the command ALF.

References:

/PA/, Programming Guide: Fundamentals

21202	LIFTFAST_WITH_MIRROR			C09	K1	
-	Rapid retract with mirrorring			BOOLEAN	PowerOn	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: 1: When determining the retraction direction, if mirroring of the contour is active then the retraction direction is also mirrored. Mirroring of the retraction direction only refers to the directional components vertical to the tool direction.

0: Mirroring of the contour is NOT taken into account when determining the retraction direction.

21204	LIFTFAST_STOP_COND			C09	M3	
-	Stop behavior with fast retraction			DWORD	NEW CONF	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description: Specifies the stop behavior of the liftfast motion under different stop conditions

Bit0: Axial NC/PLC interface signal DB380x DBX4.3 (Axial feed stop /Spindle stop) or context-sensitive interpolator stop

=0 Stop of the retraction motion in case of an axial feed stop or context-sensitive interpolator stop

=1 No stop of the retraction motion in case of an axial feed stop or context-sensitive interpolator stop

Bit1: Feed disable in channel NC/PLC interface signal DB3200 DBX6.0 (Feed stop)

=0 Stop of the retraction motion in case of the feed stop in the channel

=1 No stop of the retraction motion in case of the feed stop in the channel

21210	SETINT_ASSIGN_FASTIN			C01, C09	-	
-	HW assignment of ext. NCK input byte for NC progr. interrupts			DWORD	PowerOn	
-						
-	-	1, 1, 1, 1, 1, 1, 1, 1...	-	-	7/2	

Description: HW assignment of the fast input byte for NC program interrupts

Bit 0 to 7:

Number of input used

Bit 16 to 23:

Mask of signals that the channel is not to evaluate

Bit 24 to 31:

Mask of signals that are to be evaluated in inverted form

Bit set: Interrupt initiated by falling edge.

Possible inputs:

1:

On board-inputs of the 840D (4 fast + 4 bits via VDI default)

2 - 5:

External digital inputs (fast NCK I/Os or VDI default)

128 - 129:

Comparator byte (results from fast analog inputs or VDI default)

21240	PREVENT_SYNACT_LOCK_CHAN			C01, C09	-	
-	Protected synchronized actions			DWORD	PowerOn	
-						
-	2	-1, -1, -1, -1, -1, -1, -1, -1, -1, -1...	-1	255	7/2	

Description: The machine data specifies a range of synchronized action IDs.

Synchronized actions with IDs in this range cannot be overwritten, cancelled or locked via synchronized actions.

With 0.0, there is no range of protected synchronized actions. The values are read as absolute values; the upper value and the lower value can be indicated in any order.

If a value is configured with -1, the configuration of the general machine data becomes active.

Note:

During the creation of protected static synchronized actions, the protection should be cancelled; otherwise, a power ON would be necessary for each change in order to be able to redefine the logic.

21380	ESR_DELAY_TIME1			EXP, N09	M3	
s	Delay time ESR axes			DOUBLE	NEW CONF	
-						
-	-	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0...	-	-	7/2	

Description: When, for example, an alarm occurs, this MD can be used to delay deceleration in order, for example, to enable a retraction from the tooth gap (ESR) in gear wheel machining.

21381	ESR_DELAY_TIME2			EXP, N09	M3	
s	ESR time for IPO controlled braking			DOUBLE	NEW CONF	
-						
-	-	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0...	-	-	7/2	

Description: When time MD21380 $MC_ESR_DELAY_TIME1 has expired, the time (MD21381 $MC_ESR_DELAY_TIME2) specified for interpolatory braking is still available.

When time MD21381 $MC_ESR_DELAY_TIME2 has expired, rapid deceleration with following tracking is initiated.

22000	AUXFU_ASSIGN_GROUP			C04	H2,S1	
-	Auxiliary function group			DWORD	PowerOn	
-						
-	255	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1...	1	168	7/2	

Description: See MD22010 $MC_AUXFU_ASSIGN_TYPE [n] (auxiliary function type)

22010	AUXFU_ASSIGN_TYPE			C04	H2,S1	
-	Auxiliary function type			STRING	PowerOn	
-						
-	255	"", "", "", "", "", "", "", "", "", "", "", "", "", "", "", ""...	-	-	7/2	

Description:

Machine data

AUXFU_ASSIGN_TYPE[n] (auxiliary function type),

AUXFU_ASSIGN_EXTENSION[n] (auxiliary function extension),

AUXFU_ASSIGN_VALUE[n] (auxiliary function value) and

AUXFU_ASSIGN_GROUP[n] (auxiliary function group)

assign an auxiliary function type (M,S,H,T,F,D,DL), the associated extension and the auxiliary function value to an auxiliary function group.

Example:

M0 = 100 => Group 5 (corr. M100)

Auxiliary function typeM

Auxiliary function extension 0

Auxiliary function value 100

Auxiliary function group 5

MD22010 $MC_AUXFU_ASSIGN_TYPE[0] = "M"

MD22020 $MC_AUXFU_ASSIGN_EXTENSION[0] = 0

MD22030 $MC_AUXFU_ASSIGN_VALUE[0] = 100

MD22040 $MC_AUXFU_ASSIGN_GROUP[0] = 5 ; (5th group)

M00, M01, M02, M17 and M30 are assigned to group 1 as default.

M3, M4, M5 and M70 of the master spindle are assigned to group 2 as default.

The S functions of the master spindle are assigned to group 3 as default.

The four machine data for assigning an auxiliary function to an auxiliary function group must always be given the same index [n].

Special cases:

If the value of an auxiliary function is less than 0, all auxiliary functions of this type and extension are assigned to one group.

Example:

S2 = -1 => group 9(all S values of the 2nd spindle are assigned to group 9)

Note:

Only one auxiliary function from a group may be programmed in each block, otherwise alarm 14760 is output.

Related to:

MD11100 $MN_AUXFU_MAXNUM_GROUP_ASSIGN

22020	AUXFU_ASSIGN_EXTENSION			C04	H2,S1	
-	Auxiliary function extension			DWORD	PowerOn	
-						
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-1	99	7/2	

Description:

See MD22010 $MC_AUXFU_ASSIGN_TYPE[n] (auxiliary function type)

Special cases:

With the spindle functions M3, M4, M5, M19, M70, M40, M41, M42, M43, M44, M45 and S,

the spindle number is output to the PLC in the auxiliary function extension.

22030	AUXFU_ASSIGN_VALUE			C04	H2,S1	
-	Auxiliary function value			DWORD	PowerOn	
-						
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description: See MD22010 $MC_AUXFU_ASSIGN_TYPE[n] (auxiliary function type)

22035	AUXFU_ASSIGN_SPEC			C04	H2	
-	Output specification			DWORD	PowerOn	
-						
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description: Specification of the output behavior of the user-defined auxiliary functions.

Bit 0 = 1Acknowledgment "normal" after an OB1 cycle
Bit 1 = 1Acknowledgment "quick" with OB40
Bit 2 = 1No predefined auxiliary function
Bit 3 = 1No output to the PLC
Bit 4 = 1Spindle reaction after acknowledgment by the PLC
Bit 5 = 1Output before the motion
Bit 6 = 1Output during the motion
Bit 7 = 1Output at block end
Bit 8 = 1No output after block search types 1, 2, 4
Bit 9 = 1Collection during block search type 5 (SERUPRO)
Bit 10 = 1 No output during block search type 5 (SERUPRO)
Bit 11 = 1Cross-channel auxiliary function (SERUPRO)
Bit 12 = 1Output via synchronized action
Bit 13 = 1 Implicit auxiliary function
Bit 14 = 1 Active M01
Bit 15 = 1 No output during running-in test
Bit 16 = 1 Nibbling off
Bit 17 = 1 Nibbling on
Bit 18 = 1 Nibbling

22037	AUXFU_ASSIGN_SIM_TIME			C04	H2,S1	
-	Acknowledgment time			DWORD	PowerOn	
-						
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	0x7FFFFFF	7/2	

Description: Acknowledgment time for auxiliary functions in ms.
See MD22010 $MC_AUXFU_ASSIGN_TYPE[n] (auxiliary function type)

22040	AUXFU_PREDEF_GROUP			C04	H2	
-	Predefined auxiliary function groups			DWORD	PowerOn	
-						
-	301	1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 4, 4, 4, 4, 4, 4, 3, 1, 1, 1...	0	168	7/2	

Description: Group assignment of predefined auxiliary functions.

The predefined groups cannot be changed for indices 0, 1, 2, 3, 4, 22, 23, 24.

22050	AUXFU_PREDEF_TYPE			C04	H2	
-	Predefined auxiliary function type			STRING	PowerOn	
-						
-	301	"M", "M", "M", "M", "M", "M", "M", "M", "M", "M", "M", "M", "M"...	-	-	7/2	

Description: The address codes of the predefined auxiliary functions are fix.

This setting cannot be changed!

22060	AUXFU_PREDEF_EXTENSION			C04	H2	
-	Predefined auxiliary function extension			DWORD	PowerOn	
-						
-	301	0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 0...	-1	99	7/2	

Description: Address extension for predefined auxiliary functions:

This setting can be changed only for indices 5 to 17 and 21!

22070	AUXFU_PREDEF_VALUE			C04	H2	
-	Predefined auxiliary function value			DWORD	PowerOn	
-						
-	301	0, 1, 2, 17, 30, 6, 3, 4, 5, 19, 70, 40, 41, 42, 43, 44, 45, -1...	-	-	7/2	

Description: Value of predefined auxiliary functions.

This setting cannot be changed!

22080	AUXFU_PREDEF_SPEC			C04	H2,K1	
-	Output specification			DWORD	PowerOn	
-						
-	301	0x81, 0x81, 0x81, 0x81, 0x81, 0x21, 0x21, 0x21, 0x21, 0x21...	-	-	7/2	

Description: Specification of the output behavior of the predefined auxiliary functions.

Bit 0 = 1 Acknowledgment "normal" after an OB1 cycle
Bit 1 = 1 Acknowledgment "quick" with OB40
Bit 2 = 1 No predefined auxiliary function
Bit 3 = 1 No output to the PLC
Bit 4 = 1 Spindle reaction after acknowledgment by the PLC
Bit 5 = 1 Output before the motion
Bit 6 = 1 Output during the motion
Bit 7 = 1 Output at block end
Bit 8 = 1 No output after block search types 1, 2, 4
Bit 9 = 1 Collection during block search type 5 (SERUPRO)
Bit 10 = 1 No output during block search type 5 (SERUPRO)
Bit 11 = 1 Cross-channel auxiliary function (SERUPRO)
Bit 12 = 1 Output via synchronized action
Bit 13 = 1 Implicit auxiliary function
Bit 14 = 1 Active M01
Bit 15 = 1 No output during running-in test
Bit 16 = 1 Nibbling off
Bit 17 = 1 Nibbling on
Bit 18 = 1 Nibbling

22090	AUXFU_PREDEF_SIM_TIME			C04	H2,S1	
-	Acknowledgment time			DWORD	PowerOn	
-						
-	301	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	0x7FFFFFF	7/2	

Description: Acknowledgment time for auxiliary functions in ms.

See MD22010 $MC_AUXFU_PREDEF_TYPE[n] (auxiliary function type)

22100	AUXFU_QUICK_BLOCKCHANGE			C04	H2	
-	Block change delay with quick auxiliary functions.			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	

Description: Block change is not delayed with quick auxiliary functions.

0: With the quick auxiliary function output the block change is delayed until acknowledgement by the PLC (OB40).

1: With the quick auxiliary function output to the PLC the block change is not delayed.

MD irrelevant for:

Auxiliary functions with normal acknowledgement

References:

/FBSY/, Synchronized Actions

22110	AUXFU_H_TYPE_INT			C11, C04	H2,K1	
-	Data format of H auxiliary functions (integer/real)			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	

Description:

```
0:   The values of H auxiliary functions are present in floating point for-
mat.
The maximum value range is +/-3.4028 ex 38.
1:   The value of H auxiliary functions is rounded and changed to an integer.
The basic program in the PLC must interpret the value as an integer.
The maximum value range is -2147483648 to 2147483647.
```

22200	AUXFU_M_SYNC_TYPE			C04	H2,K1,2.4	
-	Output time of M functions			BYTE	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	3	7/2	

Description:

```
Synchronization of the M auxiliary functions with regard to a simultaneously
programmed axis motion.
0 = Output before motion
1 = Output during motion
2 = Output at block end
3 = No output to the PLC (therefore no block change delay)
Notice:
An auxiliary function output specification configured by MD22080
$MC_AUXFU_PREDEF_SPEC[ preIndex ], MD22035 $MC_AUXFU_ASSIGN_SPEC[ auxIndex ]
or
A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[
groupIndex ], which has a higher priority.
```

22210	AUXFU_S_SYNC_TYPE			C04	H2,2.4	
-	Output time of S functions (see MD22200 for values)			BYTE	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	4	7/2	

Description:

```
Synchronization of the S auxiliary functions with regard to a simultaneously
programmed axis motion.
0 = Output before motion
1 = Output during motion
2 = Output at block end
3 = No output to the PLC (therefore no block change delay)
4 = Output in accordance with the predefined output specification
Notice:
An auxiliary function output specification configured by MD22080
$MC_AUXFU_PREDEF_SPEC[ preIndex ], MD22035 $MC_AUXFU_ASSIGN_SPEC[ auxIndex ]
or
A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[
groupIndex ], which has a higher priority.
```

22220	AUXFU_T_SYNC_TYPE			C11, C04	H2,2.4	
-	Output time for T functions (see MD22200 for values)			BYTE	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	4	7/2	

Description: Synchronization of the T auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

An auxiliary function output specification configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex], MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] or

A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[groupIndex], which has a higher priority.

22250	AUXFU_D_SYNC_TYPE			C04	H2	
-	Output time for D functions (see MD22200 for values)			BYTE	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	4	7/2	

Description: Synchronization of the D auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

An auxiliary function output specification configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex], MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] or

A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[groupIndex], which has a higher priority.

22252	AUXFU_DL_SYNC_TYPE			C04	H2	
-	Output time of DL functions			BYTE	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	4	7/2	

Description: Synchronization of the auxiliary function with regard to a simultaneously programmed motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

An auxiliary function output specification configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex], MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] or

A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[groupIndex], which has a higher priority.

22254	AUXFU_ASSOC_M0_VALUE			C01, C03, C10	H2,K1	
-	Additional M function to stop a program			DWORD	PowerOn	
-						
-	-	-1, -1, -1, -1, -1, -1, -1, -1...	-	-	7/2	

Description: This machine data defines an additional, predefined M function, which behaves in the same way as M0. The value of the machine data corresponds to the number of the auxiliary M function.

Predefined M numbers, such as M0, M1, M2, M3, etc., are not allowed.

Restriction:

See MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,

MD10715 $MN_M_NO_FCT_CYCLE,

MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,

MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,

MD10804 $MN_EXTERN_M_NO_SET_INT

MD10806 $MN_EXTERN_M_NO_DISABLE_INT,

MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,

MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX

MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

22256	AUXFU_ASSOC_M1_VALUE			C01, C03, C10	H2	
-	Additional M function for conditional stop			DWORD	PowerOn	
-						
-	-	-1, -1, -1, -1, -1, -1, -1, -1...	-	-	7/2	

Description: This machine data defines an additional, predefined M function, which behaves in the same way as M1. The value of the machine data corresponds to the number of the auxiliary M function.

Predefined M numbers, such as M0, M1, M2, M3, etc., are not allowed.

Restriction:

See MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,

MD10715 $MN_M_NO_FCT_CYCLE,

MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,

MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,

MD10804 $MN_EXTERN_M_NO_SET_INT

MD10806 $MN_EXTERN_M_NO_DISABLE_INT,

MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,

MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX

MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

22400	S_VALUES_ACTIVE_AFTER_RESET			C04, C03, C05	-	
-	S function active beyond RESET			BOOLEAN	PowerOn	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: 1: The last S values set in the main run are still active after a RESET.

This also applies to the dynamic correction values ACC, VELOLIM in spindle mode.

0: The various S values are equal to 0 after a RESET, and must therefore be reprogrammed.

The dynamic correction values ACC and VELOLIM are reset to 100% for spindle mode if the axis-specific MD35040 $MA_SPIND_ACTIVE_AFTER_RESET and MD32320 $MA_DYN_LIMIT_RESET_MASK do not specify anything else.

Note:

The values for ACC and VELOLIM are also retained for spindle mode if MD35040 $MA_SPIND_ACTIVE_AFTER_RESET is not equal to zero or the axis-specific MD35040 $MA_SPIND_ACTIVE_AFTER_RESET is not equal to zero.

22410	F_VALUES_ACTIVE_AFTER_RESET			C04, C03, C05	M3,V1	
-	F function active beyond RESET			BOOLEAN	PowerOn	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description:

1: The last programmed F, FA, OVR and OVRA values are still active after RESET.

This also applies to the dynamic correction values (ACC, VELOLIM, JERKLIM, ACCLIMA, VELOLIMA, JERKLIMA).

0: The various values are set to their default values after reset.

This does not apply to the dynamic correction values if the axis-specific MD32320 $MA_DYN_LIMIT_RESET_MASK specifies anything else.

Note:

The dynamic correction values are also retained if the axis-specific MD32320 $MA_DYN_LIMIT_RESET_MASK is not equal to zero.

Related to:

MD22240 $MC_AUXFU_F_SYNC_TYPE Output time of the F functions

22420	FGROUP_DEFAULT_AXES			C11	-	
-	Default setting for FGROUP command			BYTE	PowerOn	
-						
-	8	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7	

Description:

Default setting for FGROUP command. You can specify up to 8 channel axes whose resulting velocity is equivalent to the programmed path feed.

If all eight values are zero (default), the geo axis entered in MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB are active as the default setting for the FGROUP command as previously.

22510	GCODE_GROUPS_TO_PLC			C04	K1,P3 pl,P3 sl	
-	G codes output at NCK-PLC interface on block change/RESET			BYTE	PowerOn	
-						
-	8	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description:

Specification of the G code group, the G codes of which are output to the NCK/PLC interface in case of block change/ reset.

The interface is updated after each block change and reset.

Notice:

It is not guaranteed that a PLC user program has at all times a block-synchronous relation between the active NC block and the G codes present.

Example: Path mode with very short blocks

22512	EXTERN_GCODE_GROUPS_TO_PLC			C11, C04	-	
-	Send G codes of an external NC language to PLC			BYTE	PowerOn	
-						
-	8	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description: Specification of the G code group of external languages, the G codes of which are output at the NCK interface on block change/reset.

The interface is updated at each block change and after RESET.

Notice:

It is not guaranteed that a PLC user program has at all times a block-synchronous relation between the active NC block and the G codes present. (Example: Path mode with very short blocks).

22515	GCODE_GROUPS_TO_PLC_MODE			C04	-	
-	Behavior of G group transfer to PLC			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	

Description: For setting the behavior, i.e. how the G groups are to be interpreted in the PLC with regard to data.

With the current behavior (bit 0 = 0), the G group is the array index of a 64-byte field (DBB 208 - DBB 271).

Maximally the 64th G group can be reached in this way.

With the new behavior (bit 0 = 1), the data storage in the PLC consists of max. 8 bytes (DBB 208 - DBB 215).

With this procedure, the array index of this byte array is identical with the index of the MD22510 $MC_GCODE_GROUPS_TO_PLC[Index] and MD22512 $MC_EXTERN_GCODE_GROUPS_TO_PLC[Index].

Each index (0 - 7) may only be set for one of the two machine data; the value 0 must be entered for the other MD.

Bit 0(LSB) = 0:

Behavior as before, the 64-byte field is used for displaying the G codes

Bit 0(LSB) = 1:

The user specifies for which G groups the first 8 bytes are to be used

22530	TOCARR_CHANGE_M_CODE			C04	H2,W1	
-	M code at change of tool holder			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-99999999	99999999	7/2	

Description: The absolute value of this machine data indicates the number of the M code, which is output at the VDI interface when a tool holder is activated.

- If the MD is positive, the unchanged M code is always output.
- If the MD is negative, the number of the tool holder is added to the absolute value of the machine data and the number is output.

Special cases:

N M code is output, if the number of the M code to be output or the absolute value of this MD is set to one of the values 0 to 6, 17 or 30. It is not monitored whether an M code created in this way will conflict with other functions.

References:

/FB/, H2, Auxiliary Function Output to PLC

22532	GEOAX_CHANGE_M_CODE			C04	H2,K2	
-	M code at change of geo axes			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	99999999	7/2	

Description: Number of the M code, which is output at the VDI interface in the case of a switchover of the geometry axes.

No M code is output if this MD is set to one of the values 0 to 6, 17 or 30.

It is not monitored whether an M code created in this way will conflict with other functions.

22550	TOOL_CHANGE_MODE			C01, C11, C04, C09	W3,K1,W1	
-	New tool compensation for M function			BYTE	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	

Description: The T function is used to select a tool in the program. The setting in this machine data determines whether the new tool is loaded immediately on execution of the T function:

MD22550 $MC_TOOL_CHANGE_MODE = 0

The new tool is loaded directly with the programming of T or D. This setting is mainly used on lathes. If a D is not programmed in the block by T, then the tool offset defined in MD20270 $MC_CUTTING_EDGE_DEFAULT is active.

In this case, the function "Manual tools" is not enabled.

MD22550 $MC_TOOL_CHANGE_MODE = 1

The new tool is prepared for loading on execution of the T function. This setting is used mainly on milling machines with a tool magazine in order to bring the new tool into the tool change position without interrupting the machining process. The M function entered in MD22560 $MC_ TOOL_CHANGE_M_CODE is used to remove the old tool from the spindle and load the new tool onto the spindle. According to DIN 66025, this tool change has to be programmed with M function M06.

Related to:

MD22560 $MC_TOOL_CHANGE_M_CODE

22560	TOOL_CHANGE_M_CODE			C01, C04, C09	H2,K1,W1	
-	M function for tool change			DWORD	PowerOn	
-						
-	-	6, 6, 6, 6, 6, 6, 6, 6...	6	99999999	7/2	

Description: If the T function is only used to prepare a new tool for a tool change (this setting is used mainly on milling machines with a tool magazine, in order to bring the new tool into the tool change position without interrupting the machining process), another M function must be used to trigger the tool change.

The M function entered in TOOL_CHANGE_M_CODE triggers the tool change (remove old tool from the spindle and load new tool into the spindle). This tool change is required to be programmed with M function M06, in accordance with DIN 66025.

Related to:

MD22550 $MC_TOOL_CHANGE_MODE

22562	TOOL_CHANGE_ERROR_MODE			C09	W1	
-	Response to tool change errors			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x1FF	7/2	

Description: Behavior if faults/problems occur during programmed tool change.

Bit 0=0: Standard behavior: Stop on the faulty NC block

Bit 0=1: If a fault is detected in the block with the tool change preparation, the alarm relevant to the preparation command T is delayed until the corresponding tool change command (M06) has been interpreted in the program sequence. Until then, the alarm triggered by the preparation command is not output. The operator can take corrective actions in this block. When the program continues, the faulty NC block is re-interpreted, and the preparation command is automatically executed again internally.

The value = 1 is relevant only if the setting MD22550 $MC_TOOL_CHANGE_MODE = 1 is used.

Bit 1 Only relevant with active tool management:

Bit 1=0: Standard behavior: Only tools with data assigned to a magazine are detected during tool change preparation.

Bit 1=1: Manual tools can be loaded.

A tool will also be loaded if its data are known in the NCK but have not been assigned to a magazine. In this case, the tool data is automatically assigned to the programmed tool holder.

The user is prompted to insert tools into or remove tools from the tool holder).

Bit 2 modifies the offset programming

Bit 2=0: active D no. > 0 and active T no.=0 gives offset 0

Active D no. > 0 and active D no.=0 gives total offset 0

Bit 2=1: active D no. > 0 and active T no.=0 lead to an alarm message

Active D no. > 0 and active D no.=0 lead to an alarm message

Bits 3 and 4 are only relevant with active tool management.

Function:

Control of the behavior of the init. block generation on program start if a disabled tool is on the spindle and this tool is to be activated.

See MD20112 $MC_START_MODE_MASK, MD20110 $MC_RESET_MODE_MASK

On RESET, this does not affect the behavior "Keep disabled tool on the spindle active".

Bit 3=0: Standard: If the tool on the spindle is disabled, generate a tool change command requesting a replacement tool. An alarm will be generated if there is no such replacement tool.

Bit 3=1: The disabled status of the spindle tool is ignored. The tool becomes active. The subsequent part program should be formulated so that no parts are machined with the disabled tool.

Bit 4=0: Standard: The system tries to activate the spindle tool or its replacement tool.

Bit 4=1: If the tool on the spindle is disabled, T0 is programmed in the start init block.

The combination of bits 3 and 4 produces the following statements:

0 / 0: Behavior as before, automatic change on NC start if a disabled tool is in the spindle

1 / 0: No automatic change

0 / 1: A T0 is automatically generated if a disabled tool is in the spindle at NC start

1 / 1: No statement

Bit 5: Reserved

Bit 6=0: Standard: If T0 or D0, only T0 or D0 is exactly programmed. This means that MD20270 $MC_CUTTING_EDGE_DEFAULT and MD20272 $MC_SUMCORR_DEFAULT determine the value of D and DL for the programming of T0.

Example: MD20270 $MC_CUTTING_EDGE_DEFAULT=1, MD20272 $MC_SUMCORR_DEFAULT=2, MD22550 $MC_TOOL_CHANGE_MODE=0 (tool change with T programming)

N10 T0 ; T no. 0 has active numbers D1 and DL=2, which results in offset zero. If bit 2 is also set:

Programming of

a) T0; for tool deselection

b) D0; for offset deselection

generates an alarm, if

a) at least one of MD20270 $MC_CUTTING_EDGE_DEFAULT and MD20272 $MC_SUMCORR_DEFAULT is unequal to zero (The correct programming is T0 D0 DL=0).

b) MD20272 $MC_SUMCORR_DEFAULT is unequal to zero (The correct programming is D0 DL=0).

Bit 6=1: Controls the NCK behavior when x, y, z are all programmed greater than zero, if at least one of MD20270 $MC_CUTTING_EDGE_DEFAULT and MD20272 $MC_SUMCORR_DEFAULT is unequal to zero.

a) Tx Dy --> T0:

With T0, D0 or D0 DL=0 is automatically programmed in the NCK; i.e. values in MD20270 $MC_CUTTING_EDGE_DEFAULT and $MC_SUMCORR_DEFAULT unequal to zero are treated as values equal to zero.

b) Tx Dy --> T0 Dy, or T0 DL=z, or T0 Dy DL=z, or T0 D0 DL=z, explicitly programmed values of D, DL are not influenced.

c) Dy DL=z --> D0

With D0, DL=0 is automatically programmed in the NCK; i.e. values in MD20272 $MC_SUMCORR_DEFAULT unequal to zero are treated as values equal to zero.

d) Dy DL=z --> D0 DL=z

Explicitly programmed values of DL are not influenced.

If bit 2 is also set:

Only T0 / D0 have to be programmed for tool/offset deselection, and this does not generate an alarm.

The statements relating to MD20272 $MC_SUMCORR_DEFAULT or DL are valid only if the total offset function is active (see MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 8).

Bit 7=0: When Tx is programmed, a check is made to see whether a tool with T number x is known in the TO unit of the channel. If not, the program is stopped in this block with alarm 17190

Bit 7=1: Only if tool basic functionality is active (MD20310 $MC_TOOL_MANAGEMENT_MASK, bit 0,1=0) and (MD18102 $MN_MM_TYPE_OF_CUTTING_EDGE=0):

When Tx is programmed, an unknown Tx is initially ignored, and the alarm relating to the preparation command (Tx) is also ignored until the D selection is interpreted in the program sequence. Only then is alarm 17191, which has been triggered by the preparation command, output. This means that the operator can take corrective actions with the D selection in this block. When the program is continued, the incorrect NC block is re-interpreted, and the preparation command is automatically executed again internally.

(This is of interest for Cutting-Edge-Default=0 or =-2 and D0 programming, otherwise the D of Cutting-Edge-Default is deselected on tool change.)

This variant is justified for programming "Tool number=Location" (revolver as tool holder) without tool management. The revolver can now be positioned on a location for which a tool has not (yet) been defined.

This bit has no meaning if bit 0=1 is set.

Bit 8=0: A tool mounted on adisabled magazine location is not considered for tool selection. (Default setting)

Bit 8=1: A tool mounted on a disabled magazine location is considered for tool selection. (Corresponds to the previous behavior.)

22600	SERUPRO_SPEED_MODE			EXP	K1	
-	Speed for block search run type 5			DWORD	Immediately	
-						
-	-	1, 1, 1, 1, 1, 1, 1, 1...	0	3	2/2	

Description:

This machine data specifies the search run mode: SERUPRO in more detail.

SERUPRO search run is activated with PI service _N_FINDBL mode parameter = 5.

SERUPRO means Search Run by Program test, i.e. traversing under program test from beginning of program to search target.

Note:

Program test does not move any axes/spindles.

$MC_SERUPRO_SPEED_MODE= 0

Program test with the search run/dry run speed

Under program test, the axes/spindles are traversed at the following velocity/speed:

Axes: $MC_SERUPRO_SPEED_FACTOR*dry run feed

Spindles: $MC_SERUPRO_SPEED_FACTOR*programmed speed

Dynamic axis / spindle limitations are not taken into account.

$MC_SERUPRO_SPEED_MODE= 1

Program test at programmed speed

Under program test, the axes/spindles are traversed at the following velocity/speed:

Axes: at the same velocity as dry run feed.

Spindles: at the programmed speed.

Dynamic axis / spindle limitations are taken into account.

$MC_SERUPRO_SPEED_MODE= 2

Program test at dry run speed

Under program test, the axes/spindles are traversed at the programmed velocity/speed.

Dynamic axis /spindle limitations are taken into account.

$MC_SERUPRO_SPEED_MODE= 3

Program test at search run speed

Under program test, the axes/spindles are traversed at the following velocity/speed:

Axes: $MC_SERUPRO_SPEED_FACTOR*programmed feed

Spindles: $MC_SERUPRO_SPEED_FACTOR*programmed speed.

Dynamic axis / spindle limitations are not taken into account.

Note:

With active revolutional feedrate (e.g. G95), the programmed F value is not multiplied by the factor $MC_SERUPRO_SPEED_FACTOR but only by the programmed spindle speed. Here again, this increases the effective path speed by the $MC_SERUPRO_SPEED_FACTOR.

Related to:

SD42100 $SC_DRY_RUN_FEED, MD22601 $MC_SERUPRO_SPEED_FACTOR

22601	SERUPRO_SPEED_FACTOR			EXP	K1	
-	Speed factor for search run type 5			DOUBLE	Immediately	
-						
-	-	10.0, 10.0, 10.0, 10.0, 10.0, 10.0, 10.0...	1.0	-	2/2	

Description: SERUPRO means Search Run by Program test, i.e. traversing under program test from beginning of program to search target.

Note:

Program test does not move any axes / spindles.

The machine data is relevant only if the first two bits of MD22600 $MC_SERUPRO_SPEED_MODE are 0. The machine data has the following meaning:

Axes: MD specifies the factor by which the test run feedrate is multiplied.

Spindles: MD specifies the factor by which the programmed speed is multi-plied.

Dynamic limitations of axes / spindles are always ignored.

Related to:

SD42100 $SC_DRY_RUN_FEED, MD22600 $MC_SERUPRO_SPEED_MODE

22620	START_MODE_MASK_PRT			EXP, C03	M3,K1	
-	Initial setting on special starts			DWORD	Reset	
-						
-	-	0x400, 0x400, 0x400, 0x400, 0x400, 0x400...	0	0xFFFF	7/2	

Description: This machine data is activated via MD22621 $MC_ENABLE_START_MODE_MASK_PRT.

If MD22621 $MC_ENABLE_START_MODE_MASK_PRT is in its initial setting, MD22620 $MC_START_MODE_MASK_PRT is inactive.

If MD22620 $MC_START_MODE_MASK_PRT is activated for "search via program test" (abbr. SERUPRO), then MD22620 $MC_START_MODE_MASK_PRT replaces MD20112 $MC_START_MODE_MASK when "search via program test" is started.

This enables a behavior deviating from PLC start to be set at the start of the search. The meaning of the bit-by-bit assignment of MD22620 $MC_START_MODE_MASK_PRT is the same as that in MD20112 $MC_START_MODE_MASK.

22621	ENABLE_START_MODE_MASK_PRT			EXP, C03	M3,K1	
-	Enables MD22620 $MC_START_MODE_MASK_PRT			DWORD	Reset	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x1	7/2	

Description: MD22620 $MC_START_MODE_MASK_PRT is activated via MD22621 $MC_ENABLE_START_MODE_MASK_PRT.

If MD22621 $MC_ENABLE_START_MODE_MASK_PRT is in its initial setting, MD22620 $MC_START_MODE_MASK_PRT is inactive.

Bit0 = 1:

If a "search via program test" (English abbr. SERUPRO) is started from RESET (PI service _N_FINDBL mode paramter == 5), MD22620 $MC_START_MODE_MASK_PRT replaces MD20112 $MC_START_MODE_MASK.

This method can be used to set a start behavior differing from PLC start when the search
is started.

22622	DISABLE_PLC_START			EXP	-	
-	Enable part program start via PLC			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	-	-	2/2	

Description: Allow part program start via PLC.

This machine data will ONLY be evaluated, if "Group-Serupro" mode is switched on.

"Group-Serupro" is switched on by means of "$MC_SERUPRO_MODE BIT2".

BIT0 = 0

A part program can be started in this channel only via the PLC. Starting via the part program command "START" is interlocked.

BIT0 = 1

A part program can be started in this channel only by means of the part program command "START" from another channel. Starting via the PLC is interlocked.

22680	AUTO_IPTR_LOCK			EXP, C03	K1	
-	Disable interrupt pointer			DWORD	Reset	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x3	7/2	

Description: With MD22680 $MC_AUTO_IPTR_LOCK program areas are defined in which the individually indicated coupling types are active. If a program abort is executed in a program range that is defined as such, it will not be the currently executed part program block that is stored in the interrupt pointer (OPI module InterruptionSearch),but the last block prior to activation of the coupling.

22700	TRACE_STARTTRACE_EVENT			EXP, C06	-	
-	Diagnostic data rec. starts with event TRACE_STARTTRACE_EVENT.			STRING	PowerOn	
NBUP						
-	-	...	-	-	2/2	

Description: The machine data is used for diagnostics.

The recording of the diagnostic data does not start until the event (TRACE_STARTTRACE_EVENT) has occurred at the trace point (TRACE_STARTTRACE_TRACEPOINT) and in the correct step (TRACE_STARTTRACE_STEP).

22702	TRACE_STARTTRACE_STEP			EXP, C06	-	
-	Conditions for start of trace recording			STRING	PowerOn	
NBUP						
-	2	, , , , , , , , , ...	-	-	2/2	

Description: The machine data is only intended for diagnostic use.

See TRACE_STARTTRACE_EVENT

In the case of TRACE_STARTTRACE_EVENT BLOCK_CHANGE the string TRACE_STARTTRACE_STEP is interpreted as a file name and block number.

In the case of BSEVENTTYPE_SETALARM the string is interpreted as an alarm number.

22704	TRACE_STOPTRACE_EVENT			EXP, C06	-	
-	Conditions for stop of trace recording			STRING	PowerOn	
NBUP						
-	-	CLEARCANCELALARM_M, CLEARCANCELALARM_M...	-	-	2/2	

Description: The machine data is only used for diagnostics.

The recording of the diagnostic data ends when the event (TRACE_STOP_ART_EVENT) has occurred at the trace point (TRACE_STOPTRACE_TRACEPOINT) and in the correct step (TRACE_STOPTRACE_STEP).

(After reaching the stop condition, the previously recorded diagnostic data is stored in a file "NCSCTRyy.MPF" or for NCU-LINK in "NCxxTRyy.MPF" in the MPF directory.

22706	TRACE_STOPTRACE_STEP			EXP, C06	-	
-	CommandSequenzStep with which the recording ends			STRING	PowerOn	
NBUP						
-	2	, , , , , , , , , ...	-	-	2/2	

Description: The machine data is only intended for diagnostic use.

22708	TRACE_SCOPE_MASK			EXP, C06	-	
-	Selects the contents of the trace file			STRING	PowerOn	
NBUP						
-	-	...	-	-	2/2	

Description: The machine data is only intended for diagnostic purposes.

Specific trace contents are selected with the MD datum.

The entry SETALARM records the alarm environment and the block change in the main run is also logged by means of BLOCK_CHANGE.

22710	TRACE_VARIABLE_NAME			-	-	
-	Definition of trace data			STRING	PowerOn	
NBUP						
-	10	"BL_NR", "TR_POINT", "EV_TYPE", "EV_SRC", "CS_ASTEP"...	-	-	2/2	

Description: The machine data is only intended for diagnostic purposes.

The MD datum defines which data are recorded in the trace file.

22712	TRACE_VARIABLE_INDEX			EXP, C06	-	
-	Index for trace recording data			DWORD	PowerOn	
NBUP						
-	10	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0xFFFF	2/2	

Description: The machine data is only intended for diagnostic use.

The MD data, together with TRACE_VARIABLE_NAME, determines which data are recorded in the trace file.

It enables access to an array element.

E.g. use as an axis index when accessing axis data.

22714	MM_TRACE_DATA_FUNCTION			EXP, C02, C06	-	
-	Activating diagnostics			DWORD	PowerOn	
NBUP						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0xFFFFF	2/2	

Description:

```
The machine data is only intended for diagnostic purposes.
Activating diagnostics
An internal ring buffer records important events.
After a trigger event, with the 'Cancel alarm' key set as default,
the ring buffer is briefly freezed, read, and converted into an ASCII file
in the part program directory. The file name for the 1st channel
is ncsctr01.mpf and for the 7th channel it is ncsctr07.mpf.
The data in the ring buffer is referred to as dynamic data in the following.
In addition to the trigger event, other up-to-date data is read from the
NCK and transferred to the ASCII file. These recordings do
NOT have a history and are referred to as static data in the following.
Bit no.   Significance when bit is set
-----------------------------------------------------------------
0 (LSB) Recording of dynamic data (see TRACE_VARIABLE_NAME)
1       Recording of block control static data
2       Recording of alarm data static data
3       Recording of process data static data
4       Recording of command sequence static data
5       Recording of tool management static data
6       Recording of the NCK version file. Static data
7       Recording of the statuses of the current block
        Various statuses of the axes and the SPARPI.  Static data
8       Recording of various statuses of the channel.  Static data
9       Error statuses in the NCK memory management are scanned during trace
generation.
        An error renames the trace file. Static data
        Possible names and their meaning:
        NCFIER.MPF   Error in the file system
        NCSLER.MPF   Error during string creation
        NCFIER.MPF   Error on New/Delete
10      All block changes in the interpreter are recorded. Dynamic data.
11      Axial VDI signals are recorded. Dynamic data.
        Only in conjunction with MD18794 $MN_MM_TRACE_VDI_SIGNAL
12      OEM traces are activated. Dynamic data.
13      Synchronized actions are recorded. Dynamic data.
        NOTICE:  Filled in applications with intensive use of
        these trace points, other events are ignored!
        That is why this bit should remain at 0 in these cases.
14      Not assigned.
15      Recording of station commands.    Dynamic data.
        Note: Most important output of the NCK module NCSC!
16     Recording of gantry commands
17     Recording of changes in the drive's status
```

18 Recording of the processing of the Event-Queue and generation of command sequences

19 Recording of event destructor call

22900	STROKE_CHECK_INSIDE			EXP, C01, C11	-	
-	Direction (inside/outside) in which prot. zone 3 is effective			BOOLEAN	PowerOn	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: This MD defines whether protection zone 3 is a protection zone inside or outside.

Meaning:

0: Protection zone 3 is a protection zone inside, i.e. the protection zone must not entered inwardly.

1: Protection zone 3 is a protection zone outside

22910	WEIGHTING_FACTOR_FOR_SCALE			EXP, C01, C11	-	
-	Input resolution for scaling factor			BOOLEAN	PowerOn	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: Definition of the unit for the scaling factor P and for the axial scaling factors I, J, K.

Meaning:

0 Scale factor in 0.001

1 Scale factor in 0.00001

Related to:

SD43120 $SA_DEFAULT_SCALE_FACTOR_AXIS,

SD42140 $SC_DEFAULT_SCALE_FACTOR_P

22914	AXES_SCALE_ENABLE			EXP, C01, C11	-	
-	Activation for axial scaling factor (G51)			BOOLEAN	PowerOn	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: This MD enables axial scaling.

Meaning:

0: Axial scaling not possible

1: Axial scaling possible -> MD DEFAULT_SCALE_FACTOR_AXIS is active

Related to:

SD43120 $SA_DEFAULT_SCALE_FACTOR_AXIS

22920	EXTERN_FIXED_FEEDRATE_F1_ON			EXP, C01, C11	-	
-	Activation of fixed feedrates F1 - F9			BOOLEAN	PowerOn	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: This MD is used to activate the fixed feedrates set in SD42160 $SC_EXTERN_FIXED_FEEDRATE_F1_F9[].

Meaning:

0: no fixed feedrates with F1 - F9

1: the feedrates set in SD42160 $SC_EXTERN_FIXED_FEEDRATE_F1_F9[] become active when F1 - F9 are programmed.

22930	EXTERN_PARALLEL_GEOAX			EXP, C01, C11	-	
-	Assignment of a parallel channel axis to the geometry axis			BYTE	PowerOn	
-						
-	3	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/2	

Description: Assignment table of the axes positioned parallel to the geometry axes.

This table can be used to assign channel axes positioned parallel to the geometry axes. The parallel axes can then be activated as geometry axes in ISO mode using the G functions of plane selection (G17 - G19) and the axis name of the parallel axis. The axis is then replaced by the axis defined via MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[].

Prerequisite:

The channel axes used must be active. (list position assigned in AXCONF_MACHAX_USED). Entering zero deactivates the corresponding parallel geometry axis:

24000	FRAME_ADD_COMPONENTS			C03	K2	
-	Frame components for G58 and G59			BOOLEAN	PowerOn	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description: Additive programmable frame components can be separately programmed and modified.

0: Additive translations which have been programmed with ATRANS are stored in the frame together with the absolute translation (prog. with TRANS).

G58 and G59 are not possible.

1: The sum of the additive translations are stored in the fine offset of the programmable frame. The absolute and the additive translations can be changed independently of one another.

G58 and G59 are possible.

24002	CHBFRAME_RESET_MASK			C03	K2	
-	Active channel-specific base frames after reset			DWORD	Reset	
-						
-	-	0xFFFF, 0xFFFF, 0xFFFF, 0xFFFF, 0xFFFF...	0	0xFFFF	7/2	

Description: Bit mask for the reset setting of the channel-specific base frames which are included in the channel.

The following apply:

If MD20110 $MC_RESET_MODE_MASK bit0 = 1 and BIT14 = 1

the entire base frame is determined on reset by chaining the base frame field elements, whose bit is 1 in the bit mask.

If MD20110 $MC_RESET_MODE_MASK bit0 = 1 and BIT14 = 0

the entire base frame is deselected on reset.

24004	CHBFRAME_POWERON_MASK			C03	K2	
-	Reset channel-specific base frames after power on			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0xFFFF	7/2	

Description: This machine data defines whether channel-specific base frames are reset in the data management on Power On.

That is

- Offsets and rotations are set to 0,
- Scalings are set to 1.
- Mirror image machining is disabled.

The selection can be made separately for individual base frames.

Bit 0 means base frame 0, bit 1 base frame 1 etc.

Value=0: Base frame is retained on Power On

Value=1: Base frame is reset in the data management on Power On.

Related to:

MD10615 $MN_NCBFRAME_POWERON_MASK

24006	CHSFRAME_RESET_MASK			C03	K2	
-	Active system frames after reset			DWORD	Reset	
-						
-	-	0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1...	0	0x00000FFF	7/2	

Description: Bit mask used for the reset setting of the channel-specific system frames included in the channel.

Bit 0: System frame for actual value setting and scratching is active after reset.

Bit 1: System frame for external work offset is active after reset.

Bit 2: Reserved, for TCARR and PAROT see MD20150 $MC_GCODE_RESET_VALUES[].

Bit 3: Reserved, for TOROT and TOFRAME see MD20150 $MC_GCODE_RESET_VALUES[].

Bit 4: System frame for workpiece reference points is active after reset.

Bit 5: System frame for cycles is active after reset.

Bit 6: Reserved; reset behavior dependent on MD20110 $MC_RESET_MODE_MASK.

Bit 7:System frame $P_ISO1FR (ISO G51.1 Mirror) is active after reset.

Bit 8:System frame $P_ISO2FR (ISO G68 2DROT) is active after reset.

Bit 9:System frame $P_ISO3FR (ISO G68 3DROT) is active after reset.

Bit 10:System frame $P_ISO4FR (ISO G51 Scale) is active after reset.

Bit 11: System frame $P_RELFR is active after reset.

Related to:

MD28082 $MC_MM_SYSTEM_FRAME_MASK

24007	CHSFRAME_RESET_CLEAR_MASK			C03	K2	
-	Deletion of system frames after reset			DWORD	Reset	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x00000FFF	7/2	

Description: Bit mask used to delete channel-specific system frames from the data management on reset.

Bit 0: System frame for actual value setting and scratching is deleted on reset.

Bit 1: System frame for exernal work offset is deleted on reset.

Bit 2: Reserved, for TCARR and PAROT, see MD20150 $MC_GCODE_RESET_VALUES[].

Bit 3: Reserved, for TOROT and TOFRAME, see MD20150 $MC_GCODE_RESET_VALUES[].

Bit 4: System frame for workpiece reference points is deleted on reset.

Bit 5: System frame for cycles is deleted on reset.

Bit 6: Reserved; reset behavior depends on MD20110 $MC_RESET_MODE_MASK.

Bit 7:System frame $P_ISO1FR (ISO G51.1 Mirror) is deleted on reset.

Bit 8:System frame $P_ISO2FR (ISO G68 2DROT) is deleted on reset.

Bit 9:System frame $P_ISO3FR (ISO G68 3DROT) is deleted on reset.

Bit 10:System frame $P_ISO4FR (ISO G51 Scale) is deleted on reset.

Bit 11: System frame $P_RELFR is deleted on reset.

24008	CHSFRAME_POWERON_MASK			C03	K2	
-	Reset channel system frames after power on			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x00000FFF	7/2	

Description: This machine data defines whether channel-specific system frames are reset in the data management on Power On. That is offsets and rotations are set to 0, scalings to 1. Mirroring is disabled.

The selection can be made separately for individual system frames.

Bit 0:System frame for set actual value and scratching is deleted after Power On.

Bit 1:System frame for external work offset is deleted after Power On.

Bit 2:System frame for TCARR and PAROT is deleted after Power On.

Bit 3:System frame for TOROT and TOFRAME is deleted after Power On.

Bit 4:System frame for work piece reference points deleted after Power On.

Bit 5:System frame for cycles retained after Power On.

Bit 6:System frame for transformations deleted after Power On.

Bit 7:System frame $P_ISO1FR (ISO G51.1 Mirror) is deleted after power ON.

Bit 8:System frame $P_ISO2FR (ISO G68 2DROT) is deleted after power ON.

Bit 9:System frame $P_ISO3FR (ISO G68 3DROT) is deleted after power ON.

Bit 10:System frame $P_ISO4FR (ISO G51 Scale) is deleted after power ON.

Bit 11:System frame $P_RELFR is deleted after power ON.

Related to:

MD28082 $MC_MM_SYSTEM_FRAME_MASK

24010	PFRAME_RESET_MODE			C03	K2	
-	Reset mode for programmable frame			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	

Description: 0: Programmable frame is deleted at reset.

1: Programmable frame remains active at reset.

24020	FRAME_SUPPRESS_MODE			C03	K2	
-	Positions for frame suppression			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x0000003	7/2	

Description: Bit mask for configuring the positions for frame suppressions (SUPA, G153, G53).

The following rule applies:

Bit 0: Positions for display (OPI) without frame suppression

Bit 1: Position variables without frame suppression

24030	FRAME_ACS_SET			C03	K2	
-	Adjustment of SZS coordinate system			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	

Description: 0: SZS results from the WCS transformed with $P_CYCFRAME and $P_PFRAME.

1: SZS results from the WCS transformed with the $P_CYCFRAME.

24040	FRAME_ADAPT_MODE			C03	K2	
-	Adaptation of active frames			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x0000007	7/2	

Description: Bit mask for adapting the active frames or axis configuration

The following applies:

Bit 0:

Rotations in active frames that rotate coordinate axes for which there are no geometry axes are deleted from the active frames.

Bit 1:

Shear angles in active frames are orthogonalized.

Bit 2:

Scalings of all geometry axes in the active frames are set to value 1.

24050	FRAME_SAA_MODE			C03	-	
-	Saving and activating of data management frames			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x0000003	7/2	

Description: Bit mask for saving and activating data handling frames.

The following applies:

Bit 0:

Data handling frames are only activated by programming the bit masks $P_CHBFRMASK, $P_NCBFRMASK and $P_CHSFRMASK. G500..G599 only activate the relevant settable frame. The reset behavior is independent of this.

Bit 1:

Data handling frames are not written implicitly by system functions such as TOROT, PAROT, ext. work offset, transformations.

24080	USER_FRAME_POWERON_MASK			N01	-	
-	Parameterize properties for settable frame			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x1	7/2	

Description: Setting the following bits activates certain properties of the settable frame:

Bit 0 = 0: default behavior.

Bit 0 = 1: if MD20152 $MC_GCODE_RESET_MODE[7] = 1, the last active settable frame is selected again according to G code group 8 after power up of the control.

24470	TRAFO_TYPE_9			C07	M1	
-	Type of transformation 9 in the channel			DWORD	NEW CONF	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7	

Description: Type of transformation available as the ninth in the channel. See MD24100 $MC_TRAFO_TYPE_1 for explanation.

24472	TRAFO_AXES_IN_9			C07	-	
-	Axis assignment for transformation 9			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	

Description: Axis assignment at the input point of the 9th transformation. See TRAFO_AXES_IN_1 for explanation.

24474	TRAFO_GEOAX_ASSIGN_TAB_9			C07	-	
-	Assignment of geometry axes to channel axes for transformation 9			BYTE	NEW CONF	
-						
-	3	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 9.

24476	TRAFO_INCLUDES_TOOL_9			C07	-	
-	Treatment of tool with active 9th transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/7	

Description: Same as TRAFO_INCLUDES_TOOL_1, but for the 9th transformation.

24480	TRAFO_TYPE_10			C07	F2,M1	
-	Transformation 10 in channel			DWORD	NEW CONF	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7	

Description: Same as TRAFO_TYPE_1, but for the tenth available transformation in the channel.

24482	TRAFO_AXES_IN_10			C07	F2,M1	
-	Axis assignment for transformation 10			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	

Description: Axis assignment at the input of the 10th transformation. See TRAFO_AXES_IN_1 for explanation.

24484	TRAFO_GEOAX_ASSIGN_TAB_10			C07	M1	
-	Assignment of geometry axes to channel axes f. transformation 10			BYTE	NEW CONF	
-						
-	3	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	

Description: Assignment table of geometry axes with transformation 10

Same as AXCONF_GEOAX_ASSIGN_TAB, but only effective when transformation 10 is active.

24486	TRAFO_INCLUDES_TOOL_10			C07	-	
-	Treatment of tool with active 10th transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/7	

Description: Same as TRAFO_INCLUDES_TOOL_1, but for the 10th transformation.

24561	TRAFO6_JOINT_OFFSET_2_3_1			C07	F2	
mm	Vector of kinematic offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0, 0.0, 0.0 , 0.0...	-	-	7/7	

Description: In the case of 6-axis transformations, defines the offset between the 2nd and third rotary axes for the 1st transformation of each channel.

24573	TRAFO5_AXIS3_1			C07	F2	
-	Direction of the 3rd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0, 0.0, 0.0 , 0.0...	-	-	7/7	

Description: Indicates the vector which defines the direction of the third rotary axis in the case of the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

The vector may have any value except zero.

Example:

The same axis is defined with both (0, 1, 0) and (0, 7.21, 0) (in the direction of the 2nd geometry axis, that is as a rule Y).

Valid for the first orientation transformation of a channel.

24576	TRAFO6_BASE_ORIENT_NORMAL_1			C07	F2	
-	Normal tool vector in 6-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 1.0 , 0.0, 0.0, 1.0 , 0.0...	-	-	7/7	

Description: Indicates a vector that is perpendicular to the tool orientation (TRAFO5_BASE_ORIENTATION_1) in the case of the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

If TRAFO6_BASE_ORIENT_NORMAL_1 and TRAFO5_BASE_ORIENTATION_1 are neither orthogonal nor parallel, then the two vectors are orthogonalized by modifying the normal vector.The two vectors must not be parallel.

The vector may have any value other than zero.

Valid for the first orientation transformation of a channel.

24661	TRAFO6_JOINT_OFFSET_2_3_2			C07	-	
mm	Vector of kinematic offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0, 0.0, 0.0 , 0.0...	-	-	7/7	

Description: As TRAFO6_JOINT_OFFSET_2_3_1 but for the second transformation.

24673	TRAFO5_AXIS3_2			C07	-	
-	Direction of the 3rd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0, 0.0, 0.0 , 0.0...	-	-	7/7	

Description: As TRAFO5_AXIS3_1 but for the second orientation transformation of a channel.

24676	TRAFO6_BASE_ORIENT_NORMAL_2			C07	-	
-	Normal tool vector			DOUBLE	NEW CONF	
-						
-	3	0.0, 1.0 , 0.0, 0.0, 1.0 , 0.0...	-	-	7/7	

Description: As TRAFO6_BASE_ORIENT_NORMAL_1 but for the second orientation transformation

24808	TRACYL_DEFAULT_MODE_1			C07	M1	
-	TRACYL mode selection			BYTE	NEW CONF	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/7	

Description: Default setting of TRACYL type 514:

0: without groove side offset (i.e. TRACYL type 514 - equals 512)

1: with groove side offset (i.e. TRACYL type 514 - equals 513)

MD2.... $MC_TRAFO_TYPE_... = 514 can be used to decide, via the selection parameters, whether calculation is made with or without groove side offset. The parameter defines the variable to be selected if no selection is made in the call parameters.

If MD24808 $MC_TRACYL_DEFAULT_MODE_1 = 1, it is sufficient to program TRA-CYL(30) in the part program instead of TRACYL(30,1,1).

24858	TRACYL_DEFAULT_MODE_2			C07	M1	
-	TRACYL mode selection			BYTE	NEW CONF	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/7	

Description: Default setting of TRACYL type 514 for the 2nd TRACYL:

0: without groove side offset (i.e. TRACYL type 514 - equals 512)

1: with groove side offset (i.e. TRACYL type 514 - equals 513)

MD2.... $MC_TRAFO_TYPE_... = 514 can be used to decide, via the selection parameters, whether calculation is made with or without groove side offset. The parameter defines the variable to be selected if no selection is made in the call parameters.

If MD24858 $MC_TRACYL_DEFAULT_MODE_2 = 1, it is sufficient to program TRA-CYL(30,2) in the part program instead of TRACYL(30,2,1).

24997	TRACON_CHAIN_3			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 , 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	

Description: Transformation chain of the third concatenated transformation.

See TRACON_CHAIN_1 for documentation.

24998	TRACON_CHAIN_4			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 , 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	

Description: Transformation chain of the fourth concatenated transformation.
See TRACON_CHAIN_1 for documentation.

25261	TRAFO6_JOINT_OFFSET_2_3_3			C07	-	
mm	Vector of kinematic offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0, 0.0, 0.0 , 0.0...	-	-	7/7	

Description: In the case of 6-axis transformations, defines the offset between the 2nd and third rotary axes for the 3rd transformation of each channel.

25273	TRAFO5_AXIS3_3			C07	-	
-	Direction of the 3rd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0, 0.0, 0.0 , 0.0...	-	-	7/7	

Description: The MD designates the vector that describes the direction of the third rotary axis with the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).
Other than that it has the same meaning as TRAFO5_AXIS3_1.

25276	TRAFO6_BASE_ORIENT_NORMAL_3			C07	-	
-	Normal tool vector in 6-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 1.0 , 0.0, 0.0, 1.0 , 0.0...	-	-	7/7	

Description: Indicates the vector that stands vertically on the tool orientation (TRAFO5_BASE_ORIENTATION_1) in general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).
Other than that it has the same meaning as TRAFO6_BASE_ORIENT_NORMAL_1.

25361	TRAFO6_JOINT_OFFSET_2_3_4			C07	-	
mm	Vector of kinematic offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0, 0.0, 0.0 , 0.0...	-	-	7/7	

Description: In the case of 6-axis transformations, defines the offset between the 2nd and third rotary axes for the 4th transformation of each channel.

25373	TRAFO5_AXIS3_4			C07	-	
-	Direction of the 3rd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0, 0.0, 0.0 , 0.0...	-	-	7/7	

Description: The MD designates the vector that describes the direction of the third rotary axis with the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).
Other than that it has the same meaning as TRAFO5_AXIS3_1.

25376	TRAFO6_BASE_ORIENT_NORMAL_4			C07	-	
-	Normal tool vector in 6-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 1.0 , 0.0, 0.0, 1.0 , 0.0...	-	-	7/7	

Description: Indicates the vector that stands vertically on the tool orientation (TRAFO5_BASE_ORIENTATION_1) in general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

Other than that it has the same meaning as TRAFO6_BASE_ORIENT_NORMAL_1.

25495	TRACON_CHAIN_5			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 , 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	

Description: Transformation chain of the 5th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

25496	TRACON_CHAIN_6			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 , 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	

Description: Transformation chain of the 6th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

25497	TRACON_CHAIN_7			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 , 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	

Description: Transformation chain of the 7th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

25498	TRACON_CHAIN_8			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 , 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	

Description: Transformation chain of the 8th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

27100	ABSBLOCK_FUNCTION_MASK			N01	K1,P1	
-	Parameterize basic blocks with absolute values			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x1	7/2	

Description: Parameterization of the "basic blocks with absolute values" function

Bit 0 = 1 :

The position values of the transverse axis are always displayed as diameter values.

Transverse axes can be applied using MD20100 $MC_DIAMETER_AX_DEF or MD30460 $MA_BASE_FUNCTION_MASK, bit 2.

27400	OEM_CHAN_INFO			A01, A11	-	
-	OEM version information			STRING	PowerOn	
-						
-	3	, , , , , , , , ...	-	-	7/2	

Description: A version information freely available to the user

(is indicated in the version screen)

27800	TECHNOLOGY_MODE			C09	A2,K1	
-	Mode of technology in channel			BYTE	NEW CONF	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	

Description: This machine data can be used for stating the technology independently of the channel.

This information is used, among other things, for evaluating HMI, PLC and standard cycles.

Meaning:

MD = 0:Milling

MD = 1:Turning

MD = 2:Grinding

21:Cylindrical grinding

22:Surface grinding

MD = 3:Nibbling

MD = 4:...

(Enter additional technologies as and when required.)

27850	PROG_NET_TIMER_MODE			C09	-	
-	Impact of the program runtime net counter			DWORD	Reset	
-						
-	-	0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00...	0x00	0x03	7/2	

Description: The program run time is measured using system variables and can be read out. It provides a means of outputting the current progress of the processing of a part program. This MD can be used to make the following settings on a channel-specific basis:

Bit 0 = 0

$AC_ACT_PROG_NET_TIME is not deleted on a jump to the start of the program with GOTOS

Bit 0 = 1

$AC_ACT_PROG_NET_TIME is deleted on a jump to the start of the program with GOTOS, the value is saved in $AC_OLD_PROG_NET_TIMES, and the program counter $AC_OLD_PROG_NET_TIME_COUNT is incremented.

Bit 1 = 0

$AC_ACT_PROG_NET_TIME ceases to be increased if override = 0 is set; in other words, the program run time is measured without the time for which the override was set to 0.

Bit 1 = 1

$AC_ACT_PROG_NET_TIME is increased if override = 0; in other words, the program run time is measured with the time for which the override was set to 0.

Bits 2 to 31

Reserved

27860	PROCESSTIMER_MODE			C09	K1	
-	Activation and impact of program runtime measurement			DWORD	Reset	
-						
-	-	0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00...	0	0x7FF	7/2	

Description: Timers are provided as system variables under the function program runtime. While the NCK-specific timers are always activated (for time measurements since the last control power on), the channel-specific timers have to be started via this machine data.

Meaning:

Bit 0 = 0

No measurement of total operating time for any part program

Bit 0 = 1

Measurement of total operating time is active for all part programs ($AC_OPERATING_TIME)

Bit 1 = 0

No measurement of current program runtime

Bit 1 = 1

Measurement of current program runtime is active ($AC_CYCLE_TIME)

Bit 2 = 0

No measurement of tool operating time

Bit 2 = 1

Measurement of tool operating time is active ($AC_CUTTING_TIME)

Bit 3

Reserved

Bits 4,5 only when bit 0, 1, 2 = 1:

Bit 4 = 0   No measurement with active dry run feed

Bit 4 = 1   Measurement also with active dry run feed

Bit 5 = 0   No measurement with program test

Bit 5 = 1   Measurement also with program test

Bit 6 only when Bit 1 = 1:

Bit 6 = 0

Delete $AC_CYCLE_TIME also with start by ASUB and PROG_EVENTs

Bit 6 = 1

$AC_CYCLE_TIME is not deleted on start by ASUB and PROG_EVENTs.

Bit 7 only when bit 2 = 1:

Bit 7 = 0 $AC_CUTTING_TIME counts only with active tool

Bit 7 = 1 $AC_CUTTING_TIME counts irrespective of tool

Bits 8 only when bit 1 = 1

Bit 8 = 0

$AC_CYCLE_TIME is not deleted on jumping to program start with GOTOS

Bit 8 = 1

$AC_CYCLE_TIME is deleted on jumping to program start with GOTOS.

Bit 9 only when bits 0, 1 = 1:

Bit 9 = 0

$AC_OPERATING_TIME, $AC_CYCLE_TIME: No measurement with override = 0.

Bit 9 = 1

$AC_OPERATING_TIME, $AC_CYCLE_TIME: Measurement also with override = 0.

Bits 10 to 31
Reserved

27880	PART_COUNTER			C09	K1	
-	Activation of workpiece counter			DWORD	Reset	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x0FFFF	7/2	

Description:

```
The part counters can be configured with this machine data.
Note: with bit 0 = 1 and $AC_REQUIRED_PARTS smaller than 0 all workpiece
counts
activated in this MD are frozen at the status reached.
Meaning of the individual bits:
Bits 0 - 3:Activating $AC_REQUIRED_PARTS
-------------------------------------------------------------------------
Bit 0 = 1:Counter $AC_REQUIRED_PARTS is activated
Further significance of bits 1-3 only when bit 0 =1 and $AC_REQUIRED_PARTS >
0:
Bit 1 = 0:Alarm/VDI output if $AC_ACTUAL_PARTS corresponds to
$AC_REQUIRED_PARTS
Bit 1 = 1:Alarm/VDI output if $AC_SPECIAL_PARTS corresponds to
$AC_REQUIRED_PARTS
Bit 2Reserved!
Bit 3Reserved!
Bits 4 - 7:Activating $AC_TOTAL_PARTS
-------------------------------------------------------------------------
Bit 4 = 1:Counter $AC_TOTAL_PARTS is active
Further meaning of bits 5-7 only when bit 4 =1 and $AC_REQUIRED_PARTS > 0:
Bit 5 = 0:Counter $AC_TOTAL_PARTS is incremented by 1 with a VDI output of
M02/M30
Bit 5 = 1:Counter $AC_TOTAL_PARTS  is incremented by 1 with output of the M
command from MD PART_COUNTER_MCODE[0]
Bit 6 = 0:$AC_TOTAL_PARTS also active with program test/block search
Bit 7 = 1:counter $AC_TOTAL_PARTS is incremented by 1 when jumping back with
GOTOS
Bits 8 - 11:Activating $AC_ACTUAL_PARTS
-------------------------------------------------------------------------
Bit 8 = 1:Counter $AC_ACTUAL_PARTS is active
Further significance of bits 9-11 only when bit 8 =1 and $AC_REQUIRED_PARTS >
0:
Bit 9 = 0:Counter $AC_ACTUAL_PARTS is incremented by 1 with a VDI output of
M02/M30
Bit 9 = 1:Counter $AC_ACTUAL_PARTS  is incremented by 1 with output of the M
command from MD PART_COUNTER_MCODE[1]
Bit 10 = 0:$AC_ACTUAL_PARTS also active with program test/block search
Bit 10 = 1:No machining $AC_ACTUAL_PARTS with program test/block search
Bit 11 = 1:counter $AC_ACTUAL_PARTS is incremented by 1 when jumping bakc
with GOTOS
Bit 12 - 15:Activating $AC_SPECIAL_PARTS
-------------------------------------------------------------------------
Bit 12 = 1:Counter $AC_SPECIAL_PARTS is active
Further significance of bits 13-15 only when bit 12 =1 and $AC_REQUIRED_PARTS
> 0:
```

Bit 13 = 0:Counter $AC_SPECIAL_PARTS is incremented by 1 with a VDI output of M02/M30

Bit 13 = 1:Counter $AC_SPECIAL_PARTS is incremented by 1 with output of the M command from MD PART_COUNTER_MCODE[2]

Bit 14 = 0:$AC_SPECIAL_PARTS also active with program test/block search

Bit 14 = 1:No machining $AC_SPECIAL_PARTS with program test/block search

Bit 15 = 1:counter $AC_SPECIAL_PARTS is incremented by 1 when jumping back with GOTOS

Related to:

MD27882 $MC_PART_COUNTER_MCODE

27882	PART_COUNTER_MCODE			C09	K1	
-	Workpiece counting with user-defined M command			BYTE	PowerOn	
-						
-	3	2, 2, 2,2, 2, 2,2, 2, 2, 2, 2, 2...	0	99	7/2	

Description: If part counting is activated via MD27880 $MC_PART_COUNTER, the count pulse can be triggered by a special M command.

Only then are the values defined here taken into account:

Meaning:

The part counters are incremented by 1 in the NST signal output of the M command described, where:

MD27882 $MC_PART_COUNTER_MCODE[0] for $AC_TOTAL_PARTS

MD27882 $MC_PART_COUNTER_MCODE[1] for $AC_ACTUAL_PARTS

MD27882 $MC_PART_COUNTER_MCODE[2] for $AC_SPECIAL_PARTS

27920	TIME_LIMIT_NETTO_INT_TASK			EXP, C01	-	
s	Runtime limit of interpreter subtask			DOUBLE	PowerOn	
-						
-	-	0.005, 0.005, 0.005, 0.005, 0.005, 0.005...	0.001	0.100	7/0	

Description: With MD27920 $MC_TIME_LIMIT_NETTO_INT_TASK, the maximum runtime of the interpreter subtask is set. The interpreter subtask is started from the preprocessing task. If the interpreter task does not end on its ownwithin the time set with MD27920 $MC_TIME_LIMIT_NETTO_INT_TASK, it will be stopped and continued after a preprocessing cycle.

28000	MM_REORG_LOG_FILE_MEM			EXP, C02	V2,K1	
-	Memory space for REORG (DRAM)			DWORD	PowerOn	
-						
-	-	50, 50, 50, 50, 50, 50, 50, 50...	1	500	7/2	

Description: Definition of the size (in kbyte) of the dynamic memory for the REORG-LOG data. The size of the memory determines the quantity of the data available for the function REORG.

References:

/FB/, K1, "Mode Groups, Channel, Program Operation"

28010	MM_NUM_REORG_LUD_MODULES			EXP, C02	V2,K1	
-	Number of blocks for local user variables in REORG (DRAM)			DWORD	PowerOn	
-						
-	-	8, 8, 8, 8, 8, 8, 8, 8...	0	SLMAXNUMBEROF_USERMODULES	7/2	

Description: Defines the number of additional LUD data blocks available for the function REORG (see Description of Functions, Channels, Mode Groups, Program Operation (K1)).

This value can be 0 if the function REORG is not used. The CNC always opens 12 LUD data blocks, of which 8 are used for NC programs and 4 for the ASUBs.

An LUD data block is needed for each NC program and ASUB in which a local user variable is defined. This value may have to be increased for the function REORG if a large IPO buffer is present and a large number of short NC programs in which LUD variables are defined are active (prepared NC blocks of the programs are located in the IPO buffer).

An LUD data block is needed for each of these programs. The size of the reserved memory is affected by the number of LUDs per NC program and their individual memory requirements. The LUD data blocks are stored inthe dynamic memory.

The memory requirement for managing the blocks for local user variables with REORG can be determined as follows:

The size of the LUD blocks depends on the number of active LUDs and their data type. The memory for the LUD blocks is limited by the MD28000 $MC_MM_REORG_LOG_FILE_MEM (memory size for REORG).

28020	MM_NUM_LUD_NAMES_TOTAL			C02	V2,K1	
-	Number of local user variables (DRAM)			DWORD	PowerOn	
-						
-	-	2000, 2000, 2000, 2000, 2000, 2000, 2000...	2000	32000	7/2	

Description: Defines the number of variables for the local user data (LUD) which are permitted to exist in the active sections of the program. Approximately 150 bytes of memory per variable are reserved for the names of the variables and the variable values. The memory required for the variable value is equal to the size of the data type. If the total of the local user variables from the active main program and the related subprograms is larger than the defined limit, the variables which are over the limit are not accepted during execution of the program. Dynamic memory is used for the variable names and variable values.

Overview of the memory used by the data types:

Data type	Memory used
REAL	8 bytes
INT	4 bytes
BOOL	1 byte
CHAR	1 byte
STRING	1 byte per character, 200 characters per string are possible
AXIS	4 bytes
FRAME	400 bytes

28040	MM_LUD_VALUES_MEM			C02	V2,K1		
-	Memory space for local user variables (DRAM)			DWORD	PowerOn		
-							
-	-	250, 250, 250, 250, 250, 250, 250, 250...	250	32000	7/2		

Description: This MD defines the amount of memory space available for LUD variables.

The maximum number of available LUDs is given by one of the limit values of MD28020 $MC_MM_NUM_LUD_NAMES_TOTAL or MD28040 $MC_MM_LUD_VALUES_MEM.

The memory defined here is subdivided into (MD28040 $MC_MM_LUD_VALUES_MEM * 1024) / MD18242 $MN_MM_MAX_SIZE_OF_LUD_VALUE blocks, and allocated to part programs which request memory. Each part program that contains at least one definition of an LUD variable or call parameters uses at least one such block.

It should be remembered that several part programs requiring memory can be open simultaneously in the NCK. The number depends on the type of programming, the program length, and the size of the internal NCK block memory upwards of (MD28060 $MC_MM_IPO_BUFFER_SIZE, MD28070 $MC_MM_NUM_BLOCKS_IN_PREP).

Related to:

MD28020 $MC_MM_NUM_LUD_NAMES_TOTAL

(number of local user variables (DRAM))

28050	MM_NUM_R_PARAM			C02	K1		
-	Number of channel-specific R parameters (SRAM)			DWORD	PowerOn		
-							
-	-	100, 100, 100, 100, 100, 100, 100, 100...	0	32535	7/2		

Description: Defines the number of R parameters available in the channel. A maximum of 32535 R parameters are available per channel. This machine data reserves 8 bytes of buffered user memory per R parameter.

R parameters have a considerably lower management overhead in comparison to LUD and GUD variables.

Attention:

The buffered data are lost when this machine data is changed!

28060	MM_IPO_BUFFER_SIZE			C02	B1,K1		
-	Number of NC blocks in IPO buffer (DRAM)			DWORD	PowerOn		
-							
-	-	10, 10, 10, 10, 10, 10, 10, 10...	2	1000	7/2		

Description: Defines the number of blocks for the interpolation buffer. This buffer contains prepared NC blocks available for the interpolation. A number of kbytes of the dynamic user memory are reserved for each NC block. The data also limits the number of blocks for look ahead consideration of speed limitation for the LookAhead function.

MD28060 $MC_MM_IPO_BUFFER_SIZE is set by the system.

Related to:

MD28070 $MC_MM_NUM_BLOCKS_IN_PREP

(number of blocks for block preparation)

28070	MM_NUM_BLOCKS_IN_PREP			EXP, C02	B1,K1	
-	Number of blocks for block preparation (DRAM)			DWORD	PowerOn	
-						
-	-	50, 50, 50, 50, 50, 50, 50, 50...	20	500	7/2	

Description: Defines the number of NC blocks available for NC block preparation. This figure is determined mainly by the system software and is used largely for optimization. Approximately 10 Kbytes of dynamic memory is reserved per NC block.

Related to:

MD28060 $MC_MM_IPO_BUFFER_SIZE

(number of NC blocks with IPO buffer)

28080	MM_NUM_USER_FRAMES			C11, C02	K1,K2	
-	Number of settable frames (SRAM)			DWORD	PowerOn	
-						
-	-	5, 5, 5, 5, 5, 5, 5, 5...	5	100	7/2	

Description: Defines the number of predefined user frames. Approximately 400 bytes of backup memory are reserved per frame.

The standard system configuration provides four frames for G54 to G57 and one frame for G500.

Special cases:

The backup data are lost if this machine data is altered!

28081	MM_NUM_BASE_FRAMES			C02	M5,K2	
-	Number of base frames (SRAM)			DWORD	PowerOn	
-						
-	-	1, 1, 1, 1, 1, 1, 1, 1...	0	16	7/2	

Description: Number of channel-specific base frames per channel.

The value corresponds to the number of field elements for the predefined field $P_CHBFR[].

Buffered memory is reserved for this.

28082	MM_SYSTEM_FRAME_MASK			C02	M5,K2,W1	
-	System frames (SRAM)			DWORD	PowerOn	
-						
-	-	0x21, 0x21, 0x21, 0x21, 0x21, 0x21, 0x21...	0	0x00000FFF	7/2	

Description: Bit mask for configuring channel-specific system frames included in the channel.

Bit 0: System frame for setting actual value and scratching
Bit 1: System frame for external work offset
Bit 2: System frame for TCARR aund PAROT
Bit 3: System frame for TOROT and TOFRAME
Bit 4: System frame for workpiece reference points
Bit 5: System frame for cycles
Bit 6: System frame for transformations
Bit 7: System frame $P_ISO1FR for ISO G51.1 Mirror
Bit 8: System frame $P_ISO2FR for ISO G68 2DROT
Bit 9: System frame $P_ISO3FR for ISO G68 3DROT
Bit 10:System frame $P_ISO4FR for ISO G51 Scale
Bit 11:System frame $P_RELFR for relative coordinate systems

28083	MM_SYSTEM_DATAFRAME_MASK			C02	-	
-	System frames (SRAM)			DWORD	PowerOn	
-						
-	-	0xF9F, 0xF9F, 0xF9F, 0xF9F, 0xF9F, 0xF9F...	0	0x00000FFF	7/2	

Description: Bit mask for configuring channel-specific system frames in the data storage (SRAM).

Bit 0: System frame for setting actual value and scratching
Bit 1: System frame for external work offset
Bit 2: System frame for TCARR aund PAROT
Bit 3: System frame for TOROT and TOFRAME
Bit 4: System frame for workpiece reference points
Bit 5: System frame for cycles
Bit 6: System frame for transformations
Bit 7: System frame $P_ISO1FR for ISO G51.1 Mirror
Bit 8: System frame $P_ISO2FR for ISO G68 2DROT
Bit 9: System frame $P_ISO3FR for ISO G68 3DROT
Bit 10:System frame $P_ISO4FR for ISO G51 Scale
Bit 11:System frame $P_RELFR for relative coordinate systems

28150	MM_NUM_VDIVAR_ELEMENTS			C02	A2,P3 pl,P3 sl	
-	Number of elements for writing PLC variables			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	32000	7/2	

Description: The MD defines the number of elements which the user has available for writing PLC variables ($A_DBx=...). This number also applies to block search, but not to synchronized actions.

The memory requirement is ca. 24 bytes per element.

One element is needed for each write action when writing PLC variables in quick succession.

If more writing actions are to be performed than elements are available, block transport must be guaranteed (trigger preprocessing stop, if required)

However, the number of elements can be reduced if the accessing actions are made separately (block transport has already been accomplished). Writing accesses (var=$A_DBx) are unlimited.

28180	MM_MAX_TRACE_DATAPOINTS			EXP, C02, C06	-	
-	Length of the trace data buffer			DWORD	PowerOn	
NBUP						
-	-	100, 100, 100, 100, 100, 100, 100, 100...	0	20000	2/2	

Description: MM_MAX_TRACE_DATAPOINTS defines the size of an internal data buffer which contains the trace recordings.

28200	MM_NUM_PROTECT_AREA_CHAN			C02, C06, C09	A3	
-	Number of files for channel-specific protection zones (SRAM)			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	10	7/2	

Description: This machine data defines how many blocks are set up for channel-specific protection zones.

Related to:

MD28210 $MC_MM_NUM_PROTECT_AREA_ACTIVE

(number of simultaneously active protection zones)

MD18190 $MN_MM_NUM_PROTECT_AREA_NCK

(number of files for machine-related protection zones (SRAM))

References:

/FB/, A3, "Axis/Contour Tunnel Monitoring, Protection Zones"

28210	MM_NUM_PROTECT_AREA_ACTIVE			C11, C02, C06, C09	A3	
-	Number of simultaneously active protection zones in one channel			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	10	7/2	

Description: This machine data defines the number of protection zones that may be activated simultaneously for each channel.

It is not practical to enter a numerical value higher than MD18190 $MN_MM_NUM_PROTECT_AREA_NCK + MD28200 $MC_MM_NUM_PROTECT_AREA_CHAN.

Related to:

MD28200 $MC_MM_NUM_PROTECT_AREA_CHAN

(Number of blocks for channel-specific protection zones)

MD18190 $MN_MM_NUM_PROTECT_AREA_NCK

(Number of files for machine-related protection zones (SRAM))

References:

/FB1/ Function Manual Basic Functions; Axis Monitoring, Protection Zones (A3)

28212	MM_NUM_PROTECT_AREA_CONTOUR			C11, C02, C06, C09	A3	
-	Elements for active protection zones (DRAM)			DWORD	PowerOn	
-						
-	-	30, 30, 30, 30, 30, 30, 30, 30...	0	50	7/2	

Description: This machine data defines for each channel how many internal contour elements in total are held available for active protection zones.

Dynamic memory is used.

The MD affects the memory requirements for the activated protection zones.

This machine data is active only if MD28210 $MC_MM_NUM_PROTECT_AREA_ACTIVE is not equal to 0.

28240	MM_NUM_SYNC_DIAG_ELEMENTS			N05, C02	-	
-	Number of diagnostic elements for expressions in synchronized actions			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	32000	7/2	

Description: The values of the variables and machine data during diagnostics of the motion-synchronous actions are saved to memory elements for storage in the control. A motion-synchronous action uses up to the number of elements for as many variables as are set with $MC_MAXNUM_SYNC_DIAG_VAR.

The following are assigned:

- 1 element for each variable
- 1 element for each index

Example:

WHEN $R1 == 1 DO $R2 = $R[AC_MARKER[1]]

R1 = 2 elements, variable with written value 1 element, index "1" an element

R2 = 2 elements, variable with written value 1 Element, index "2" an element

AC_MARKER = 2 elements, variable with read value 1 element, index "1" an element

R = 2 elements, variable with written value 1 element, index "1" an element

Total 8 elements.

28241	MAXNUM_SYNC_DIAG_VAR			N05	-	
-	Maximum number of diagnostics variables per synchronized action			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	10000	7/2	

Description: Maximum number of diagnostics variables per synchronized action.

28250	MM_NUM_SYNC_ELEMENTS			C02, -	2.8,6.1	
-	Number of elements for expressions in synchronized actions			DWORD	PowerOn	
-						
-	-	159, 159, 159, 159, 159, 159, 159, 159...	0	32000	7/2	

Description: The expressions of the motion-synchronous actions are stored in memory elements in the control. A motion-synchronous action occupies at least 4 elements.

It occupies:

- 1 element for each operand in the condition
- >= 1 element for each action
- 2 elements for each assignment
- 1 element for each further operand in complex expressions.

One element is ca 64 bytes.

The option "Synchronous actions stage 2" is required if the MD is to be changed beyond its default value.

References:

Programming Guide, Advanced

28251	MM_NUM_SAFE_SYNC_ELEMENTS			C02, -	-	
-	Number of elements for expressions in Safety synchr. actions			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	32000	7/2	

Description: The expressions of motion-synchronous actions are stored in memory elements of the control. A motion-synchronous action assigns at least 4 elements.

Assignments:

Each operand in the condition:1 element

Each action:>= 1 element

Each assignment:2 elements

Each additional operand in complex expressions:1 element

Also see:

MD28250 $MC_MM_NUM_SYNC_ELEMENTS

28252	MM_NUM_FCTDEF_ELEMENTS			C02	2.4,2.8,6.1	
-	Number of FCTDEF elements			DWORD	PowerOn	
-						
-	-	3, 3, 3, 3, 3, 3, 3, 3...	0	100	7/2	

Description: Defines the number of FCTDEF elements.

28253	MM_NUM_SYNC_STRINGS			C02, -	-	
-	Number of strings for expressions in synchronized actions			DWORD	PowerOn	
-						
-	-	200, 200, 200, 200, 200, 200, 200, 200...	0	32000	7/2	

Description: The expressions of motion-synchronous actions are saved in memory elements for storage in the control. Elements have to be reserved specifically for strings within expressions.

28254	MM_NUM_AC_PARAM			C02	-	
-	Dimension of $AC_PARAM.			DWORD	PowerOn	
-						
-	-	50, 50, 50, 50, 50, 50, 50, 50...	0	20000	7/2	

Description: Panel size of $AC_PARAM.

28255	MM_BUFFERED_AC_PARAM			C02	2.3,6.1	
-	$AC_PARAM[] is stored in SRAM.			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	

Description: $AC_PARAM[] is stored in SRAM.

28256	MM_NUM_AC_MARKER			C02	2.3,6.1	
-	Dimension of $AC_MARKER			DWORD	PowerOn	
-						
-	-	8, 8, 8, 8, 8, 8, 8, 8...	0	20000	7/2	

Description: Number of channel-specific markers $AC_MARKER for motion-synchronous actions.

DRAM or SRAM is required depending on MD28257 $MC_MM_BUFFERED_AC_MARKER.

28257	MM_BUFFERED_AC_MARKER			C02	2.3,6.1	
-	$AC_MARKER[] is stored in SRAM.			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	

Description: $AC_MARKER[] is stored in SRAM.

28258	MM_NUM_AC_TIMER			C02	2.3,2.4,6.1	
-	Number of time variables $AC_TIMER (DRAM)			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	10000	7/2	

Description: Number of channel-specific time variables $AC_TIMER for motion-synchronous actions (DRAM)

28260	NUM_AC_FIFO			C01	2.3,2.4,6.1	
-	Number of FIFO variable for synchronized actions			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	10	7/2	

Description: Number of FIFO variables $AC_FIFO1 - $AC_FIFO10 for motion-synchronous actions.

FIFO variables are used for product tracking. A piece of information (e.g. the product length) for each part on a conveyor belt can be temporarily stored in each FIFO variable.

FIFO variables are stored in R parameters.

MD28262 $MC_START_AC_FIFO defines the number of the R parameter as from which the FIFO variables can be stored. All R parameters with lower numbers can be used freely in the part program.

R parameters above the FIFO range cannot be written from the part program.

The number of R parameters must set via MD28050 $MC_MM_NUM_R_PARAM so that all FIFI variables can be accommodated from the start of the R parameters:

MD28050 $MC_MM_NUM_R_PARAM = MD28262 $MC_START_AC_FIFO + MD28260 $MC_NUM_AC_FIFO * (MD28264 $MC_LEN_AC_FIFO + 6)

The FIFO variables bear the names $AC_FIFO1 to $AC_FIFOn.

They are stored as arrays.

The indices 0 - 5 have special meanings:

n= 0:

A new value is stored in the FIFO when writing with index 0.

The oldest element is read and removed from the FIFO when writing with index 0.

n=1: Access to the first element read in

n=2: Access to the last element 1 read in

n=3: Sum of all FIFO elements

n=4: Number of elements available in the FIFO

n=5: Current write index relative to FIFO start

n=6: 1st element read in

28262	START_AC_FIFO			C01	2.3,2.4,6.1	
-	FIFO variables store from R parameter			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	32535	7/2	

Description:

Number of the R parameter as from which FIFO variables are stored. All R parameters with lower numbers can be used freely in the part program. R parameters above the FIFO range cannot be written from the part program.

The number of R parameters must set via MD28050 $MC_MM_NUM_R_PARAM so that all FIFI variables can be accommodated from the start of the R parameters:

MD28050 $MC_MM_NUM_R_PARAM = MD28262 $MC_START_AC_FIFO + MD28260 $MC_NUM_AC_FIFO *(MD28264 $MC_LEN_AC_FIFO + 6)

The FIFO variables bear the names $AC_FIFO1 to $AC_FIFOn. They are stored as arrays.

The indices 0 - 5 have special meanings:

n= 0:

A new value is stored in the FIFO when writing with index 0.

The oldest element is read and removed from the FIFO when reading with index 0.

n=1: Access to the first element read in

n=2: Access to the last element read in

n=3: Sum of all FIFO elements

n=4: Number of elements available in the FIFO

n=5: Current write index relative to FIFO start

Related to:

MD28260 $MC_NUM_AC_FIFO

28264	LEN_AC_FIFO			C01	2.3,2.4,6.1,M5	
-	Length of FIFO variables AC_FIFO1-AC_FIFO10			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	32535	7/2	

Description:

Length of the FIFO variables $AC_FIFO1 to $AC_FIFO10.

All FIFO variables are the same length.

28266	MODE_AC_FIFO			C01	2.3,2.4,6.1	
-	Mode of FIFO processing			BYTE	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	-	7/2	

Description:

Mode of FIFO processing:

Bit 0 = 1:

The sum of all FIFO contents is updated at each write access.

Bit 0 = 0:

No summation

Related to:

MD28260 $MC_NUM_AC_FIFO

28274	MM_NUM_AC_SYSTEM_PARAM			EXP, C02	-	
-	Number of $AC_SYSTEM_ PARAM for motion-synchronous actions			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	20000	7/2	

Description: Number of $AC_SYSTEM_ PARAM parameters for motion-synchronous actions.
Depending on MD28255 $MC_MM_BUFFERED_AC_PARAM, DRAM or SRAM is required.
Reserved for SIEMENS applications.

28276	MM_NUM_AC_SYSTEM_MARKER			EXP, C02	-	
-	Number of $AC_SYSTEM_MARKER for motion-synchronous actions			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	20000	7/2	

Description: Number of $AC_SYSTEM_MARKER markers for motion-synchronous actions.
Depending on MD28257 $MC_MM_BUFFERED_AC_MARKER, DRAM or SRAM is required.
Reserved for SIEMENS applications.

28290	MM_SHAPED_TOOLS_ENABLE			C01, C08, C02	-	
-	Enable tool radius compensation for contour tools			BOOLEAN	PowerOn	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description: The function "Tool radius compensation for contour tools" is enabled with this tool.

28300	MM_PROTOC_USER_ACTIVE			C02	-	
-	Activation of logging for a user			BOOLEAN	PowerOn	
-						
-	10	TRUE, FALSE, FALSE, FALSE, FALSE, TRUE, TRUE, TRUE, FALSE...	-	-	1/1	

Description: Activation of recording for a user.
The users 0 and 1, and 5 - 9 are reserved for system functions.
The users 2, 3 and 4 can be used by OEM.

28301	MM_PROTOC_NUM_ETP_OEM_TYP			C02	-	
-	Anzahl von OEM-Event-Typen ETP.			DWORD	PowerOn	
-						
-	10	0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	1/1	

Description: Anzahl von OEM-Event-Typen im BTSS-Baustein ETP.

28302	MM_PROTOC_NUM_ETP_STD_TYP			C02	-	
-	Number of standard event types ETP			DWORD	PowerOn	
-						
-	10	28, 0, 0, 0, 0, 20, 20, 20, 0, 3...	0	59	1/1	

Description: Number of standard event types required in the ETP OPI block.

28400	MM_ABSBLOCK			EXP, C02	K1	
-	Activate basic blocks with absolute values			DWORD	PowerOn	
-						
-	-	1, 1, 1, 1, 1, 1, 1...	0	512	7/2	

Description: Value:

0: Basic blocks with absolute values deactivated.

1: Basic blocks with absolute values activated;

A display buffer of the following size is created:

(MD28257 $MC_MM_BUFFERED_AC_MARKER + MD28070 $MC_MM_NUM_BLOCKS_IN_PREP) * 256 bytes

>= 128:Basic blocks with absolute values activated.

A display buffer of the following size is created:

(MD28060 $MC_MM_IPO_BUFFER_SIZE + MD28070 $MC_MM_NUM_BLOCKS_IN_PREP) * <value>

28402	MM_ABSBLOCK_BUFFER_CONF			EXP, C02	K1	
-	Setting of upload buffer size			DWORD	PowerOn	
-						
-	2	2, 4, 2, 4, 2, 4, 2, 4, 2, 4, 2, 4, 2, 4...	0	32000	7/2	

Description: Dimensioning the size of the upload buffer:

MD28402 $MC_MM_ABSBLOCK_BUFFER_CONF[0] : Number of blocks before the current block

MD28402 $MC_MM_ABSBLOCK_BUFFER_CONF[1] : Number of blocks after the current block

The machine data is tested for the following upper / lower limits during startup:

0 <= MD28402 $MC_MM_ABSBLOCK_BUFFER_CONF[0] <= 8

0 <= MD28402 $MC_MM_ABSBLOCK_BUFFER_CONF[1] <= (MD28060 $MC_MM_IPO_BUFFER_SIZE + MD28070 $MC_MM_NUM_BLOCKS_IN_PREP)

Alarm 4152 is issued when the limits are violated.

28520	MM_MAX_AXISPOLY_PER_BLOCK			C02	B1	
-	maximal number of axial polynomials per block			DWORD	PowerOn	
-						
-	-	3, 3, 3, 3, 3, 3, 3...	1	5	7/2	

Description: Maximum number of axis polynomials which can be contained in a block.

In the standard case, each block only contains one polynomial per axis, i.e. this data can immediately be set to one.

Currently, more polynomials are only needed for the new ADIS function with G643.

In this case, this data must have a minimum value of three.

28530	MM_PATH_VELO_SEGMENTS			C02	A2,B1		
-	Number of memory elements for path velocity limitation			DWORD	PowerOn		
-							
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	100	7/2		

Description: Number of memory elements available for limiting the path velocity and changing it in the block.

```
0   : Each block is limited by a maximum path velocity.
> 0 : If required, a profile of the permissible path velocity
    ; and its modification options is generated and monitored
    ; in the block.
    ; This results in a smoother axis velocity progression and
    ; a shorter travel time.
    ; MD28530 $MC_MM_PATH_VELO_SEGMENTS defines the average
    ; number of segments available in the block.
    ; The necessary setting essentially depends
    ; on the requirements.
```

The following values are recommended:

3: for G643 and G644, if only geometry axes are traversed

5: for G643 and G644, if geometry and rotary axes are traversed

5: for COMPCAD

5: for dyn. transformation

A value that is too low this may lead to additional velocity limitations if a sufficient number of blocks cannot be made available for interpolation.

MD28530 $MC_MM_PATH_VELO_SEGMENTS additionally increases the memory requirement of dyn. Look Ahead. Values higher than 5 are only practical in exceptional cases.

3 ... 5 :

Recommended setting.

28533	MM_LOOKAH_FFORM_UNITS			C02	-		
-	Memory for extended LookAhead			DWORD	PowerOn		
-							
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	100000	7/2		

Description: The machine data is used to configure the work memory for extended LookAhead.

The MD scales the value defined internally through MD28060 $MC_MM_IPO_BUFFER_SIZE, MD28520 $MC_MM_MAX_AXISPOLY_PER_BLOCK, MD28530 $MC_MM_PATH_VELO_SEGMENTS, MD28535 $MC_MM_FEED_PROFILE_SEGMENTS, MD28540 $MC_MM_ARCLENGTH_SEGMENTS).

Its practical size depends on the part program, the block lengths, the axis dynamics, and an active kinematic transformation.

The MD should only be set for those channels in which free-form surfaces are also machined.

0 : default LookAhead is active.

> 0 : extended LookAhead is active if switched on by MD20443 $MC_LOOKAH_FFORM.

The guide value for free-form surface applications is: 18..20

28540	MM_ARCLENGTH_SEGMENTS			C02	B1	
-	Number of memory elements for arc length function representation			DWORD	PowerOn	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	100	7/2	

Description: Number of memory elements available for the arc length function for parameterizing polynomials.

If this machine data is equal to zero, a fixed interval division is used to represent the arc length function. In this case, the calculated function is only tangent-continuous. This can lead to discontinuities in the axis accelerations.

If the function G643 or G644 is used for smoothing and/or COMPCAD, this MD should be assigned a value of at least 10. In this case, the calculated function also has a constant curvature which results in a smoother progression of the path velocity, as well as the axis velocities and accelerations.

Values substantially larger than 10 are only practical in exceptional cases.

Not only the value of MD28540 $MC_MM_ARCLENGTH_SEGMENTS but also that of MD20262 $MC_SPLINE_FEED_PRECISION are crucial for the accuracy.

28560	MM_SEARCH_RUN_RESTORE_MODE			C02	K2	
-	Data restore after simulation			DWORD	PowerOn	
-						
-	-	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0x00000001	7/2	

Description: Bit mask to restore data after abort of a simulated program execution. The following applies:

Bit 0: All frames in the data storage are restored.

2.4 Axis-specific machine data

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	

Description: Description

30100	CTRLOUT_SEGMENT_NR			EXP, A01	G2,S9	
-	Setpoint assignment: bus segment number			BYTE	PowerOn	
-						
-	1	1	1	5	7/2	

Description: In this MD, enter the number of the bus segment through which the output is addressed.

0: Local bus (for 802D MCPA, 808d, 828d analog spindle)

1: SIMODRIVE611D drive bus for SINUMERIK 840D/810D (1st DCM)

2: reserved (previously local P bus)

3: reserved (previously 611D bus, 2nd DCM)

4: reserved (virtual buses)

5: PROFIBUS/PROFINET (e.g. SINUMERIK 840Di)

6: reserved (same effect as 5)

30110	CTRLOUT_MODULE_NR			A01, A11, -	G2,S9	
-	Setpoint assignment: module number			BYTE	PowerOn	
-						
-	1	1, 2, 3, 4, 5, 6, 7, 8...	1	31	7/2	

Description: Enter in this MD the number of the module within a bus segment through which the output is addressed.

30120	CTRLOUT_NR			EXP, A01, -	G2	
-	Setpoint assignment: Setpoint output on drive submodule/ module			BYTE	PowerOn	
-						
-	1	1, 1, 1, 1, 1, 1, 1, 1...	1	3	2/2	

Description: Number of the output on a module which is used to address the setpoint output.

The value is always 1 for modular drives.

30130	CTRLOUT_TYPE			A01, A11	G2,M3,S9	
-	Output type of setpoint			BYTE	PowerOn	
-						
-	1	0	0	3	7/2	

Description: The type of speed setpoint output is entered in this MD:

0: Simulation (no hardware required)

1: Setpoint output active (differentiated by hardware configuration)

2: Semi servo - only with onboard hardware present

3: Reserved

4: Reserved

For SW 4 and higher, MD30132 $MA_IS_VIRTUAL_AX must now be used instead of the value 4.

30132	IS_VIRTUAL_AX			A01	M3,TE1,TE3	
-	Axis is a virtual axis			BOOLEAN	PowerOn	
CTEQ						
-	1	FALSE	-	-	7/2	

Description: Virtual axis. An axis that is also interpolated in follow-up mode. (Electronic transfer technology; virtual and real master values.)

This MD is the successor to MD30130 $MA_CTRLOUT_TYPE=4. MD30130 $MA_CTRLOUT_TYPE=0 and MD30132 $MA_IS_VIRTUAL_AX=1 must now be used instead of MD30130 $MA_CTRLOUT_TYPE=4.

Related to:

MD30130 $MA_CTRLOUT_TYPE

30134	IS_UNIPOLAR_OUTPUT			A01	G2	
-	Setpoint output is unipolar			BYTE	PowerOn	
-						
-	1	0	0	2	7/2	

Description: Only for PROFIdrive, special application of analog additional drives:

Unipolar output driver (for unipolar analog drive actuator):

Only positive set speeds are supplied to the drive, the sign of the set speed is separately output in its own digital control signal.

Input value "0":

Bipolar output with pos./neg. set speed (this is the normal case)

Input value "1":

0. Digital bit = servo enable

1. Digital bit = neg. direction of travel

Input value "2": (linking of enable and direction of travel signals):

0. Digital bit = servo enable pos. direction of travel

1. Digital bit = servo enable neg. direction of travel

30200	NUM_ENCS			A01, A02, -	G2,R1,Z1	
-	Number of encoders			BYTE	PowerOn	
-						
-	-	1	0	2	7/2	

Description: The number of encoders of the axis or spindle is to be entered in the MD for actual position value sensing (the differentiation between direct and indirect measuring systems, i.e. the locations at which these encoders are installed, is then specified, for example, in MD31040 $MA_ENC_IS_DIRECT).

For simulation axes/spindles, MD30200 $MA_NUM_ENCS > 0 must be specified for referencing.

30210	ENC_SEGMENT_NR			EXP, A01, A02	G2	
-	Actual value assignment: bus segment number.			BYTE	PowerOn	
-						
-	2	1, 1	1	5	7/2	

Description: Number of the bus segment, through which the encoder is addressed.

The bus segments must be firmly assigned to the control systems.

0: local bus (FM357-3)

1: SIMODRIVE611D drive bus for SINUMERIK 840D/810D (1st DCM)

2: reserved (previously local P bus)

3: reserved (previously 611D bus, 2nd DCM)

4: reserved (virtual buses)

5: PROFIBUS/PROFINET (e.g. SINUMERIK 840Di)

6: reserved (same effect as 5)

Index [n] has the following coding [Encodernr.]: 0 or 1

30220	ENC_MODULE_NR			A01, A02, A11	G2	
-	Actual value assignment: Drive number/measuring circuit number			BYTE	PowerOn	
-						
-	2	1, 1, 2, 2, 3, 3, 4, 4, 5, 5, 6, 6, 7, 7...	1	31	7/2	

Description: The number of the module within a bus segment (MD30210 $MA_ENC_SEGMENT_NR[n]) through which the encoder is addressed must be entered in the MD.

The index[n] of the machine data has the following coding:

[Encoder no.]: 0 or 1

Related to:

MD30110 $MA_CTRLOUT_MODULE_NR[n]

(setpoint assignment: drive number/module number)

30230	ENC_INPUT_NR			A01, A02, A11, -	G2,S9	
-	Actual value assignm.: Input on drive module/meas. circuit board			BYTE	PowerOn	
-						
-	2	1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2...	1	2	7/2	

Description: The index[n] of the machine data has the following coding:

[Encodernr.]: 0 or 1

If an input is selected, to which no encoder is connected, alarm 300008 "Measuring circuit not available on drive" is output.

30240	ENC_TYPE			A01, A02, A11, -	A3,,G2,R1	
-	Encoder type of actual value sensing (actual position value).			BYTE	PowerOn	
-						
-	2	0, 0	0	5	7/2	

Description:

```
Encoder type:
0:   Simulation
1:   Raw signal generator (high resolution)
2:   Rectangular signal encoder  - only with onboard hardware present
3:   Encoder for semi servo - only with onboard hardware present
4:   Absolute encoder gen. (e.g. with EnDat interface)
5:   Reserved
Related to:
```

30242	ENC_IS_INDEPENDENT			A02, A11, -	G2,R1	
-	Encoder is independent			BYTE	NEW CONF	
-						
-	2	0, 0	0	3	7/2	

Description:

If actual value corrections performed by the NC on the encoder selected for position control are not to influence the actual value of any other encoder defined in the same axis, then the position control encoder must be declared to be "independent".

Actual value corrections include the following:

- Modulo treatment,
- Reference point approach,
- Measuring system calibration,
- PRESET

Example:

MD30200 $MA_NUM_ENCS[AX1] = 2

MD30242 $MA_ENC_IS_INDEPENDENT[0, AX1] = 0

MD30242 $MA_ENC_IS_INDEPENDENT[1, AX1] = 1

When the VDI interface has selected the first encoder for position control, the above mentioned actual value corrections will be executed on this encoder only.

When the VDI interface has selected the second encoder for position control, the above mentioned actual value corrections will be executed on both encoders.

The machine data is therefore only valid for encoders that have not been selected by the VDI interface for positon control (passive encoders).

As from SW5, the scope of functions has been extended:

MD30242 $MA_ENC_IS_INDEPENDENT = 2

The passive encoder is dependent. The active encoder changes the actual encoder value. In combination with MD35102 $MA_REFP_SYNC_ENCS = 1, the passive encoder is adjusted to the active encoder during reference point approach, but is NOT referenced.

In reference mode MD34200 $MA_ENC_REFP_MODE = 3 (distance-coded reference marks), the passive encoder is automatically referenced with the next traversing movement after zero mark distance overtravel. This is done independently of the current mode setting.

MD30242 $MA_ENC_IS_INDEPENDENT = 3

In contrast to MD30242 $MA_ENC_IS_INDEPENDENT = 1, modulo actual value corrections are executed in the passive encoder of modulo rotary axes.

30250	ACT_POS_ABS			EXP, A02, A08	R1	
-	Internal encoder position			DOUBLE	PowerOn	
ODLD, -, -						
-	2	0.0, 0.0	-	-	7/2	

Description: The actual position (hardware counter status only without machine reference) is stored (in internal format display) in this MD.

At power ON (or encoder activation), it acts with:

- Absolute encoders:

To restore the current position (in combination with the position, possibly with several meanings, buffered in the encoder).

- Incremental encoders:

To buffer the actual value beyond power OFF when the functionality is activated MD34210 $MA_ENC_REFP_STATE = 1 or. 2 (i.e. as a reference point replacement).

To buffer the actual value beyond power OFF when the functionality is activated MD34210 $MA_ENC_REFP_STATE = 3 (i.e. as a restored position value).

Note:

This MD is changed internally by the control during traversing movements. Loading a previously saved MD data block can therefore destroy the encoder calibration (machine position reference) of absolute encoders.

For software conversions, we recommend removing the MD data block from the old software release prior to conversion and reloading it into the new software release without moving any axis in the meantime. Protection level 1 should be set for SW 3.6; protection level 2 suffices for SW 4 and higher. The encoder calibration must be explicitly verified (controlled, calibrated) after the software conversion.

30260	ABS_INC_RATIO			EXP, A01, A02	-	
-	Absolute encoder: Ratio of absolute to incremental resolution			DWORD	PowerOn	
-						
-	2	4, 4	-	-	7/2	

Description: Absolute track resolution in relation to the incremental signal resolution.

This MD only applies for absolute encoders:

Implausible drive parameters (e.g. multiplication of absolute track higher than that of the incremental signal) are rejected and replaced by the value entered in the current MD.

Implausible input values in the current MD (e.g. value=0) are reset to the default value. In addition, alarm 26025 or 26002 is output to inform the user accordingly.

30270	ENC_ABS_BUFFERING			EXP, A01, A02	R1	
-	Absolute encoder: Traversing range extension			BYTE	PowerOn	
-						
-	2	0, 0	0	1	7/2	

Description:

This MD defines the way in which the absolute encoder position is buffered, and whether a traversing range extension is active on software side (exceeding the limits of the absolute value encoder range that can be displayed on the hardware).

"0" = standard = traversing range extension (compare ACT_POS_ABS) is active.

"1" = traversing range extension on software side is inactive.

When using an absolute linear scale, there will not be a traversing range overflow for mechanical reasons. This MD is therefore only valid for rotary absolute value encoders.

For rotary absolute value encoders, the traversing range that can be clearly displayed on the encoder side, is stored in MD34220 $MA_ENC_ABS_TURNS_MODULO. You can do without a traversing range extension without any problems (a hardware counter overflow that might be within the traversing range is concealed in the software via shortest-path decision):

a. in linear axes or limited rotary axes, if the actual traversing range on the load side is smaller than the traversing range on the load side that corresponds to MD34220 $MA_ENC_ABS_TURNS_MODULO.

b. in endlessly turning rotary axes (ROT_IS_MODULO = TRUE), if the absolute encoder is connected on the load side (no gear to be considered) or if "without remainder" can be calculated:

Number of rotations on the load side = ENC_ABS_TURNS_MODULO * gear ratio

(Example: ENC_ABS_TURNS_MODULO = 4096 encoder rotations, gear 25:32, i.e. number of rotations on load side = 4096*(25/32)=3200).

Notice:

If you do not meet the conditions under a. or b., you run the risk of getting a wrong absolute encoder position at next Power ON or encoder activation after parking without prewarning if the traversing range extension is not working. Therefore, the traversing range extension remains active in the standard version.

Related to:

MD30240 $MA_ENC_TYPE

MD30300 $MA_IS_ROT_AX

MD30310 $MA_ROT_IS_MODULO

MD30250 $MA_ACT_POS_ABS

MD34220 $MA_ENC_ABS_TURNS_MODULO

MD34090 $MA_REFP_MOVE_DIST_CORR

30300	IS_ROT_AX			A01, A06, A11, -	G1,K3,R2,T1,G2,K2,R1,S1,V1	
-	Rotary axis / spindle			BOOLEAN	PowerOn	
SCAL, CTEQ						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description:

1: Axis: The axis is defined as a "rotary axis".

- The special functions of the rotary axis are active or can be activated by means of additional machine data according to the type of machine required (see below).
- The unit of measurement is degrees.
- The units of the axis-specific machine and setting data are interpreted as follows with the standard control setting:

- Positions in "degrees"
- Speedsin "rev/minute"
- Accelerationin "rev/second²"
- Jerk limitationin "rev/second³"

Spindle:

The machine data should always be set to "1" for a spindle, otherwise alarm 4210 "Rotary axis declaration missing" is output.

0: The axis is defined as a "linear axis".

Special cases:

- For an axis: Alarm 4200 if the axis is already defined as a geometry axis.
- For a spindle: Alarm 4210

Related to:

The following machine data are active only after activation of MD30300 $MA_IS_ROT_AX = "1":

- MD30310 $MA_ROT_IS_MODULO "Modulo conversion for rotary axis"
- MD30320 $MA_DISPLAY_IS_MODULO "Position display is modulo"
- MD10210 $MN_INT_INCR_PER_DEG "Calculation precision for angular positions"

30310	ROT_IS_MODULO			A01, A06, A11, -	TE3,K3,R2,T1,A3,R1,R2,S1	
-	Modulo conversion for rotary axis / spindle			BOOLEAN	PowerOn	
CTEQ						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description:

```
1: A modulo conversion is performed on the setpoints for the rotary axis. The
software limit switches and the working area limitations are inactive; the
traversing range is therefore unlimited in both directions. MD30300
$MA_IS_ROT_AX must be set to "1"
0: No modulo conversion
MD irrelevant for:
MD30300 $MA_IS_ROT_AX = "0" (linear axes)
Related to:
MD30320 $MA_DISPLAY_IS_MODULO        "Position display is modulo 360°"
MD30300 $MA_IS_ROT_AX  = 1                     "Rotary axis"
MD36100 $MA_POS_LIMIT_MINUS              "Software limit switch minus"
MD36110 $MA_POS_LIMIT_PLUS                "Software limit switch plus"
SD43430 $SA_WORKAREA_LIMIT_MINUS  "Working area limitation minus"
SD43420 $SA_WORKAREA_LIMIT_PLUS    "Working area limitation plus"
```

30320	DISPLAY_IS_MODULO			A01, A06, A11	R2,T1,K2	
-	Modulo 360 degrees displayed for rotary axis or spindle.			BOOLEAN	PowerOn	
CTEQ						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/2	

Description:

```
1: "Modulo 360 degrees" position display is active:
The position display of the rotary axis or spindle (for basic or machine
coordinate system) is defined as "Modulo 360 degrees". In the case of a pos-
itive direction of rotation, the control resets the position display inter-
nally to 0.000 degrees following each cycle of 359.999 degrees. The display
range is always positive and lies between 0 and 359.999 degrees.
0: Absolute position display is active:
In contrast to the modulo 360 degrees position display, absolute positions
are indicated by the absolute position display, e.g. +360 degrees after 1
rotation, and +720 degrees after 2 rotations, etc in the positive direction.
In this case, the display range is limited by the control in accordance with
the linear axes.
MD irrelevant for:
Linear axes MD30300 $MA_IS_ROT_AX = "0"
Related to:
MD30300 $MA_IS_ROT_AX  = 1 "Axis is rotary axis"
```

30330	MODULO_RANGE			EXP, A01, -	R2,T1,R1	
degrees	Size of modulo range.			DOUBLE	Reset	
CTEQ						
-	-	360.0	1.0	360000000.0	7/2	

Description: Defines the size of the modulo range. Default positions are accepted and displayed within this range. Useful modulo ranges are n * 360 degrees with integer n. Other settings are equally possible in principle. Attention should be paid to having a useful relationship between the positions in the NC and the mechanics (ambiguity). Velocity definitions are not affected by settings in this MD.

30340	MODULO_RANGE_START			EXP, A01	R1,R2	
degrees	Modulo range start position			DOUBLE	Reset	
CTEQ						
-	-	0.0	-	-	7/2	

Description: Defines the start position for the modulo range.

Example:

```
Start =    0 degree -> modulo range          0 <->360 degrees
Start =  180 degrees -> modulo range   180 <->540 degrees
Start = -180 degrees -> modulo range  -180 <->180 degrees
```

30350	SIMU_AX_VDI_OUTPUT			A01, A06	A2,G2,Z1	
-	Axis signals output for simulation axes			BOOLEAN	PowerOn	
CTEQ						
-	-	FALSE	-	-	7/2	

Description: The machine data defines whether axis-specific interface signals are output to the PLC while an axis is being simulated.

1: The axis-specific NC/PLC interface signals for a simulated axis are output to the PLC.

This means that the user PLC program can be tested without the drives having to be available.

0: The axis-specific NC/PLC interface signals for a simulated axis are not output to the PLC.

All axis-specific NC/PLC interface signals are set to "0".

Not relevant for:

MD30130 $MA_CTRLOUT_TYPE (setpoint output type) = 1

30450	IS_CONCURRENT_POS_AX			EXP, A01	G1	
-	Default for reset: neutral/channel axis			BOOLEAN	Reset	
CTEQ						
-	-	FALSE	-	-	7/2	

Description: For SW4.3:

If FALSE: On RESET, a neutral axis is reassigned to the NC program.

If TRUE: On RESET, a neutral axis remains in the neutral axis state and an axis assigned to the NC program becomes a neutral axis

30455	MISC_FUNCTION_MASK			A06, A10	R2,S3,R1	
-	Axis functions			DWORD	Reset	
CTEQ						
-	-	0x00	0	0x17FF	7/2	

Description:

Bit 0 =0:

Modulo rotary axis/spindle: Programmed positions must be within the modulo range. Otherwise, an alarm is output.

Bit 0 =1:

If positions outside the modulo range are programmed, no alarm is output. The position is modulo-converted internally.

Example: B-5 is equivalent to B355, POS[A]=730 is identical to POS[A]=10, and SPOS=-360 behaves like SPOS=0 (modulo range 360 degrees)

Bit 1 =0:

Determination of reference point position of rotary, distance-coded encoders analog (1:1) in relation to the mechanical absolute position.

Bit 1 =1:

Determination of reference point position of rotary, distance-coded encoders within the configured modulo range.

For rotary axes with MD30310 $MA_ROT_IS_MODULO=0 using rotary, distance-coded encoders MD34200 $MA_ENC_REFP_MODE=3, the reference point position is determined as a function of MD30330 $MA_MODULO_RANGE and MD30340 $MA_MODULO_RANGE_START. This is automatically adapted to the motion limits of the modulo range. This bit is irrelevant for rotary axes with MD30310 $MA_ROT_IS_MODULO=1, since the reference point position is always determined within the modulo range.

Bit 2 =0:

Modulo rotary axis positioned at G90 with AC by default

Bit 2 =1:

Modulo rotary axis positioned at G90 with DC by default (shortest path)

Bit 3 =0:

With spindle/axis disable, $VA_IM, $VA_IM1, $VA_IM2 supply the setpoint value

Bit 3 =1:

With spindle/axis disable, $VA_IM, $VA_IM1, $VA_IM2 supply the actual value

Bit 4 =0:

Synchronous spindle coupling, following spindle: Cancellation of feedrate enable will decelerate the coupled group.

Bit 4 =1:

Following spindle: Feedrate enable only refers to the interpolation share of the overlaid motion (SPOS, etc.) and has no impact on the coupling.

Bit 5 = 0:

Synchronous spindle coupling, following spindle: Position control, feedforward control, and parameter block are set corresponding to the leading spindle.

Bit 5 =1:

Synchronous spindle coupling: The parameters of the following spindle are set as in the uncoupled case.

Bit 6 =0:

Programming of FA, OVRA, ACC, and VELOLIM is applied separately for spindle and axis modes. The assignment is made by the programmed axis or spindle identifier.

Bit 6 =1:

Programming of FA, OVRA, ACC, and VELOLIM is applied in concert for spindle and axis modes, irrespective of the programmed identifier.

Bit 7 = 0:

Synchronous spindle, correct synchronism error: Correction value $AA_COUP_CORR[Sn] is continuously calculated as long as the NC/PLC interface signal DB380x DBX5007.6 (Correct synchronism) is set and setpoint-related synchronism is present.

Bit 7 = 1:

Synchronous spindle, correct synchronism error: Correction value $AA_COUP_CORR[Sn] is calculated only at the moment the NC/PLC interface signal DB380x DBX5007.6 (Correct synchronism) is set from 0 to 1.

Bit 8 = 0:

Absolute encoders can only be readjusted in the enabled state MD34210=1.

Bit 8 = 1:

Absolute encoders can also be readjusted in the adjusted state MD34210=2.

Bit 9 = 0:

Coupled axes (e.g. gantry) jointly delete their pulse enable if an error occurs.

Bit 9 = 1:

Coupled axes (e.g. gantry) only delete their pulse enable for their own errors.

Bit 10 = 0:

The maximum dynamic of a TRAIL or TANGON axis limits the maximum dynamic path response.

Bit 10 = 1:

The maximum dynamic of a TRAIL or TANGON axis has no effects on the dynamic path response. This can lead to a longer overtravel of the dependent axis.

Bit 12 = 0:

Unconditional switch to actual value coupling when the servo enable of the stationary axis/spindle is reset (in relation to this leading axis/spindle), as with rapid stop after resetting the servo enable during the motion (alarm 21612). This applies to generic couplings (with replacement cycles or CP programming).

Bit 12 = 1:

The switch to actual value coupling is suppressed when the servo enable of the stationary axis/spindle is reset (in relation to this leading axis/spindle). This applies to generic couplings (with replacement cycles or CP programming)

30460	BASE_FUNCTION_MASK			A01	K5,P2,P1	
-	Axis functions			DWORD	PowerOn	
CTEQ						
-	-	0x00	0	0x1FF	7/2	

Description: Axis-specific functions can be set by means of this MD.

The MD is bit-coded; the following bits are assigned:

Bit 0 = 0:

"Axis control" is not permissible.

Bit 0 = 1:

"Axis control" is permissible (the axis moves in the speed mode, if the NC/PLC interface signal DB380x DBX5000.1 (Axis control) is set).

Bit 1:

Reserved for "Axis control".

Bit 2 = 0:

Axis-specific diameter programming not permitted.

Bit 2 = 1:

Axis-specific diameter programming permitted.

Bit 3:

Reserved for "Axis control"

Bit 4 = 0:

For control purposes, the axis can be used by NC and PLC.

Bit 4 = 1:

The axis is exclusively controlled by the PLC.

Bit 5 = 0:

The axis can be used by the NC and PLC.

Bit 5 = 1:

The axis is a permanently assigned PLC axis. However, the axis can be jogged and referenced.

Axis exchange between channels is not possible. The axis cannot be assigned to the NC program.

Bit 6 = 0:

The channel-specific interface signal DB3200 DBX6.0 (feedforward disable) has an effect on the axis, even though it is a PLC-controlled axis.

Bit 6 = 1:

The channel-specific interface signal DB3200 DBX6.0 (feedforward disable) will have no effect on the axis, if it is a PLC-controlled axis.

Bit 7 = 0:

The channel-specific interface signal DB3300 DBX4.3 (all axes stationary) is set dependently of the axis, even though it is PLC-controlled.

Bit 7 = 1:

The channel-specific interface signal DB3300 DBX4.3 (all axes stationary) will be set independently of the axis, if this axis is PLC-controlled.

Bit 8 = 0:

The axis is an 'interpolating (full) axis' (path/GEO/additional path axis/GEOAX()/spindle for thread cutting/tapping)

Bit 8 = 1:

The axis is a positioning axis / auxiliary spindle

30465	AXIS_LANG_SUB_MASK			N01	K1	
-	Substitution of NC language commands			DWORD	PowerOn	
-						
-	-	0x0	0x0	0x3	7/2	

Description: MD30465 $MA_AXIS_LANG_SUB_MASK defines for the leading spindle(s) of a coupling (synchronous spindle coupling, ELG, tangential tracking, coupled motion, master value coupling, master/slave) which language constructs/functions are to be substituted by the user program set by MD15700 $MN_LANG_SUB_NAME / MD15702 $MN_LANG_SUB_PATH (default: /_N_CMA_DIR/_N_LANG_SUB_SPF).

The substitution is executed only if a coupling is active for the relevant spindle and, in the case of a gear stage change, only if a gear stage change is actually pending.

Bit 0 = 1:

Automatic (M40) and direct (M41-M45) gear stage change

Bit 1 = 1:

Spindle positioning with SPOS/SPOSA/M19

30500	INDEX_AX_ASSIGN_POS_TAB			A01, A10	T1,H1	
-	Axis is an indexing axis			BYTE	Reset	
-						
-	-	0	0	3	7/2	

Description: The axis is declared as an indexing axis by assignment of indexing position table 1 or 2.

0: The axis is not declared as an indexing axis

1: The axis is an indexing axis. The associated indexing positions are stored in table 1 (MD10910 $MN_INDEX_AX_POS_TAB_1).

2: The axis is an indexing axis. The associated indexing positions are stored in table 2 (MD10930 $MN_INDEX_AX_POS_TAB_2).

3: Equidistant indexing with SW 4.3 and higher (840D) and SW 2.3 and higher (810D)

>3: Alarm 17090 "Value violates upper limit"

Special cases:

Several axes can be assigned to an indexing position table on the condition that all these indexing axes are of the same type (linear axis, rotary axis, modulo 360° function). If they are not, alarm 4000 is output during power-up.

Alarm 17500 "Axis is not an indexing axis"

Alarm 17090 "Value violates upper limit"

Related to:

MD10910 $MN_INDEX_AX_POS_TAB_1 (indexing position table 1)

MD10900 $MN_INDEX_AX_LENGTH_POS_TAB_1

(no. of indexing positions used in table 1)

MD10930 $MN_INDEX_AX_POS_TAB_2 (indexing position table 2)

MD10920 $MN_INDEX_AX_LENGTH_POS_TAB_2

(no. of indexing positions used in table 2)

For equidistant indexings with value 3:

MD30501 $MA_INDEX_AX_NUMERATOR Numerator

MD30502 $MA_INDEX_AX_DENOMINATOR Denominator

MD30503 $MA_INDEX_AX_OFFSET First indexing position

MD30505 $MA_HIRTH_IS_ACTIVE Hirth tooth system

30501	INDEX_AX_NUMERATOR			A01, A10	T1	
mm, degrees	Indexing axis equidistant positions numerator			DOUBLE	Reset	
-						
-	-	0.0	-	-	7/2	

Description: Defines the value of the numerator for calculating the distances between two indexing positions when the positions are equidistant. Modulo axes ignore this value and use MD30330 $MA_MODULO_RANGE instead.

MD irrelevant for non-equidistant indexes in accordance with tables.

Related to:

MD30502 $MA_INDEX_AX_DENOMINATOR,

MD30503 $MA_INDEX_AX_OFFSET;

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB

30502	INDEX_AX_DENOMINATOR			A01, A10	T1	
-	Indexing axis equidistant positions denominator			DWORD	Reset	
-						
-	-	1	1	-	7/2	

Description: Defines the value of the denominator for calculating the distances between two indexing positions when the positions are equidistant. For modulo axes it therefore specifies the number of indexing positions.

MD irrelevant for non-equidistant indexes in accordance with tables.

Related to:

MD30501 $MA_INDEX_AX_NUMERATOR,

MD30503 $MA_INDEX_AX_OFFSET,

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB

30503	INDEX_AX_OFFSET			A01, A10	T1,R2	
mm, degrees	Indexing axis with equidistant positions first index position			DOUBLE	Reset	
-						
-	-	0.0	-	-	7/2	

Description: Defines the position of the first indexing position from zero for an indexing axis with equidistant positions.

MD irrelevant for non-equidistant indexes in accordance with tables.

Related to:

MD30501 $MA_INDEX_AX_NUMERATOR, MD30502 $MA_INDEX_AX_DENOMINATOR, MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB

30505	HIRTH_IS_ACTIVE			A01, A10	T1	
-	Axis is an indexing axis with Hirth tooth system			BOOLEAN	Reset	
CTEQ						
-	-	FALSE	-	-	7/2	

Description: Hirth tooth system is active when value 1 is set.

MD irrelevant if axis is not an indexing axis.

Related to:

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB, MD30501 $MA_INDEX_AX_NUMERATOR, MD30502 $MA_INDEX_AX_DENOMINATOR, MD30503 $MA_INDEX_AX_OFFSET

30550	AXCONF_ASSIGN_MASTER_CHAN			A01, A06, A10	K5,TE3,B3,S3,K1,R1	
-	Initial setting of channel for change of axis			BYTE	PowerOn	
-						
-	-	0	0	10	7/2	

Description: Definition of the channel to which the axis is assigned after Power ON.

Related to:

MD20070 $MC_AXCONF_MACHAX_USED

30552	AUTO_GET_TYPE			EXP, A06, A10	K5,M3,TE6,P2,P5,2.4	
-	Automatic GET for get axis			BYTE	PowerOn	
-						
-	-	1	0	2	7/2	

Description: 0 = No automatically created GET -> Alarm in response to incorrect programming.

1 = GET is output when GET is generated automatically.

2 = GETD is output when GET is generated automatically.

30600	FIX_POINT_POS			A03, A10	K1,W3	
mm, degrees	Fixed-value positions of axis with G75			DOUBLE	PowerOn	
-						
-	4	0.0, 0.0, 0.0, 0.0	-	-	7/2	

Description: The fixed-point positions (4 max.) for each axis which can be approached when G75 is programmed or via JOG are entered in these machine data.

References:

/PA/, "Programming Guide: Fundamentals"

30610	NUM_FIX_POINT_POS			A03, A10	K1	
-	Number of fixed-value positions of an axis			DWORD	PowerOn	
-						
-	-	0	0	4	7/2	

Description: Number of fixed point positions set, i.e. the number of valid entries in MD30600 $MA_FIX_POINT_POS.

For G75, two (2) fixed point positions are assumed in MD30600 $MA_FIX_POINT_POS for reasons of compatibility, even if '0' has been entered in this machine data.

30800	WORKAREA_CHECK_TYPE			-	A3	
-	Type of check of working area limitations.			BOOLEAN	NEW CONF	
CTEQ						
-	-	FALSE	-	-	7/2	

Description: With this machine data you can specify whether only the working area limitations of traversing axes are to be checked (0)

or

whether the stationary axes in a traversing block are also to be checked (1).

The value 0 corresponds to the behavior up to SW5.

31000	ENC_IS_LINEAR			A02, A11, -	G2	
-	Linear scale			BOOLEAN	PowerOn	
-						
-	2	FALSE, FALSE	-	-	7/2	

Description:

```
MD = 1: Encoder for position actual-value acquisition is linear (linear scale).
MD = 0: Encoder for position actual-value acquisition is rotary.
The index [n] of the machine data has the following coding:
[encoder no.]: 0 or 1
```

31010	ENC_GRID_POINT_DIST			A02, A11, -	G2	
mm	Division period for linear scales			DOUBLE	PowerOn	
-						
-	2	0.01, 0.01	-	-	7/2	

Description:

```
For linear measuring system only:
The distance between the reference marks on the linear scale must be entered in this MD.
Index [n] of the machine data has the following coding:
[encoder no.]: 0 or 1
```

31020	ENC_RESOL			A02, A11, -	G2,R1	
-	Encoder lines per revolution			DWORD	PowerOn	
-						
-	2	2048, 2048, 2048, 2048, 2048, 2048...	1	-	7/2	

Description:

```
For rotary measuring system only:
The number of encoder lines per encoder revolution must be entered in this MD.
Index [n] of the machine data has the following coding:
[encoder no.]: 0 or 1
```

31030	LEADSCREW_PITCH			A02, A11, -	G2,A3	
mm	Pitch of leadscrew			DOUBLE	PowerOn	
-						
-	-	10.0	-	-	7/2	

Description:

```
The ball screw lead must be entered in the MD (see data sheet: mm/rev or inch/rev).
Special meaning for hydraulic linear drives:
If a hydraulic linear drive (HLA) is configured as rotary axis, it must be specified in this MD, which drive feedrate in mm corresponds to a programmed revolution (360 degrees).
```

31040	ENC_IS_DIRECT			A02, A11, -	G2,S1	
-	Direct measuring system (no compilation to load position)			BOOLEAN	PowerOn	
-						
-	2	FALSE, FALSE	-	-	7/2	

Description: MD = 1:

Encoder for actual position value sensing is attached directly to the machine (without an intermediate gear unit).

MD = 0:

Encoder for actual position value sensing is attached to the motor (MD31060 $MA_DRIVE_AX_RATIO_NUMERA and MD31050 $MA_DRIVE_AX_RATIO_DENOM are included in the encoder valuation).

The index[n] of the machine data has the following coding:

[encoder no.]: 0 or 1

Special cases:

An incorrect entry may result in an incorrect encoder resolution, as, for example, the gear ratios would be calculated incorrectly.

31044	ENC_IS_DIRECT2			A02, -	G2,S1	
-	Encoder mounted on the additional gearbox			BOOLEAN	NEW CONF	
-						
-	2	FALSE, FALSE	-	-	7/2	

Description: When using a load intermediate gearbox (for example for rotating tools, compare MD31066 $MA_DRIVE_AX_RATIO2_NUMERA and MD31064 $MA_DRIVE_AX_RATIO2_DENOM), the encoder installation location can be defined as "on the output" of this load intermediate gearbox:

Encoder installation "on the output of the load intermediate gearbox" is configured by MD31040 $MA_ENC_IS_DIRECT=1 and MD31044 $MA_ENC_IS_DIRECT2=1 at the same time.

Encoder installation "on the input of the load intermediate gearbox" is configured by MD31040 $MA_ENC_IS_DIRECT=1 together with MD31044 $MA_ENC_IS_DIRECT2=0.

A parameterization alarm will be output if MD31044 $MA_ENC_IS_DIRECT2=1 is set without MD31040 $MA_ENC_IS_DIRECT=1 (this combination has not been defined).

31050	DRIVE_AX_RATIO_DENOM			A02, A11, -	A2,A3,G2,S1,V1	
-	Denominator load gearbox			DWORD	PowerOn	
-						
-	6	1, 1, 1, 1, 1, 1	1	2147000000	7/2	

Description: The load gearbox denominator is entered in this MD.

The index [n] of the machine data has the following coding:

[control parameter set no.]: 0-5

31060	DRIVE_AX_RATIO_NUMERA			A02, A11, -	A2,A3,G2,S1,V1	
-	Numerator load gearbox			DWORD	PowerOn	
-						
-	6	1, 1, 1, 1, 1, 1	-2147000000	2147000000	7/2	

Description: The load gearbox numerator is entered in this MD.

The index [n] of the machine data has the following coding:

[control parameter set no.]: 0-5

31064	DRIVE_AX_RATIO2_DENOM			A02, -	G2,S1	
-	Denominator additional gearbox			DWORD	NEW CONF	
-						
-	-	1	1	2147000000	7/2	

Description: Intermediate gearbox denominator

This MD together with MD31066 $MA_DRIVE_AX_RATIO2_NUMERA defines an intermediate gearbox that acts as a multiplier to the motor/load gearbox (described by MD31060 $MA_DRIVE_AX_RATIO_NUMERA and MD31050 $MA_DRIVE_AX_RATIO_DENOM).

The load intermediate gearbox is inactive with the default values 1:1.

Please consider MD31044 $MA_ENC_IS_DIRECT2 for encoder installation.

When the Safety Integrated functionality (see MD36901 $MA_SAFE_FUNCTION_ENABLE) is active, the intermediate gearbox can be used, if

- the effectively active gear ratio from the motor to the tool is considered in the safety-relevant machine data and if
- the safety-relevant supplementary conditions for gear ratios are considered.

For more detailed information see the Safety Integrated Description of Functions.

31066	DRIVE_AX_RATIO2_NUMERA			A02, -	G2,S1	
-	Numerator additional gearbox			DWORD	NEW CONF	
-						
-	-	1	-2147000000	2147000000	7/2	

Description: Intermediate gearbox numerator

Related to:

MD31064 $MA_DRIVE_AX_RATIO2_DENOM

31070	DRIVE_ENC_RATIO_DENOM			A02, A11, -	A3,G2,S1	
-	Denominator measuring gearbox			DWORD	PowerOn	
-						
-	2	1, 1	1	2147000000	7/2	

Description: The measuring gearbox denominator is entered in this MD.

The index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31080	DRIVE_ENC_RATIO_NUMERA			A02, A11, -	A3,G2,S1	
-	Numerator measuring gearbox			DWORD	PowerOn	
-						
-	2	1, 1	1	2147000000	7/2	

Description: The measuring gearbox numerator is entered in this MD.

The index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31090	JOG_INCR_WEIGHT			A01, A12	H1,G2	
mm, degrees	Evaluation of an increment with INC/handwheel			DOUBLE	Reset	
CTEQ						
-	2	0.001, 0.00254	-	-	7/2	

Description: The value entered in this MD defines the path of an increment which applies when an axis is traversed with the JOG keys in incremental mode or with the handwheel.

The path traveled by the axis on each increment each time the traversing key is pressed or for each handwheel detent position is defined by the following parameters:

- MD31090 $MA_JOG_INCR_WEIGHT

(Weighting of an increment of a machine axis for INC/handwheel)

- Selected increment size (INC1, ..., INCvar)

The possible increment stages are defined globally for all axes in MD11330 $MN_JOG_INCR_SIZE_TAB [n] and in SD41010 $SN_JOG_VAR_INCR_SIZE.

Entering a negative value reverses the direction of evaluation of the traverse keys and the handwheel rotation.

Related to:

MD11330 $MN_JOG_INCR_SIZE_TAB

SD41010 $SN_JOG_VAR_INCR_SIZE

31100	BERO_CYCLE			A02, EXP, A01	G2	
-	Steps for rotation monitoring			DWORD	PowerOn	
CTEQ						
-	2	2000, 2000, 2000, 2000, 2000, 2000...	10	10000000	7/2	

Description: Repetition cycle from BERO in steps

31110	BERO_EDGE_TOL			A02, A01, A12	H1,G2	
-	Step tolerance for rotation monitoring			DWORD	NEW CONF	
CTEQ						
-	2	50, 50, 50, 50, 50, 50, 50, 50, 50, 50...	10	10000000	7/2	

Description: BERO edge tolerance in steps

31122	BERO_DELAY_TIME_PLUS			A02, A06	S1,R1	
s	BERO delay time Plus			DOUBLE	NEW CONF	
-						
-	2	0.000110, 0.000110	-	-	7/2	

Description: This machine data in combination with the setting in MD34200 $MA_ENC_REFP_MODE (referencing mode) = 7 causes a signal runtime compensation in the positive direction of movement at a position determined by a BERO (zero mark).

The typical total delay time of the BERO message path for overtravel in the positive direction of movement is entered.

This time includes:

- the BERO edge delay time
- the time for digitizing the signal
- the time for processing the measured value, etc.

The periods of time depend on the hardware used. The default value is typical for SIEMENS products. Adjustment by the customer is only required in exceptional cases.

Input of the minimum value "0.0" deactivates the compensation (only active in combination with MD34200 $MA_ENC_REFP_MODE = 7).

The machine data is available for all encoders.

Related to:

MD34200 $MA_ENC_REFP_MODE (referencing mode)

MD34040 $MA_REFP_VELO_SEARCH_MARKER[n]

(reference point creep velocity [Enc. no.])

31123	BERO_DELAY_TIME_MINUS			A02, A06	S1,R1	
s	BERO delay time minus			DOUBLE	NEW CONF	
-						
-	2	0.000078, 0.000078	-	-	7/2	

Description: This machine data in combination with the setting in MD34200 $MA_ENC_REFP_MODE (referencing mode) = 7 causes a signal runtime compensation in the negative direction of movement at a position determined by a BERO (zero mark).

The typical total delay time of the BERO message path for overtravel in the negative direction of movement is entered.

The time includes:

- the BERO edge delay time
- the time for digitizing the signal
- the time for processing the measured value, etc.

The periods of time depend on the hardware used. The default value is typical for SIEMENS products. Adjustment by the customer is only required in exceptional cases.

Input of the minimum value "0.0" deactivates the compensation (only active in combination with MD34200 $MA_ENC_REFP_MODE = 7).

The machine data is available for all encoders.

Related to:

MD34200 $MA_ENC_REFP_MODE (referencing mode)

MD34040 $MA_REFP_VELO_SEARCH_MARKER[n]

(creep velocity [Enc. no.])

31200	SCALING_FACTOR_G70_G71			EXP, A01	G2	
-	Factor for converting values while G70/G71 is active			DOUBLE	PowerOn	
CTEQ						
-	-	25.4	1.e-9	-	7/2	

Description: The inch/metric conversion factor by which the programmed geometry of an axis (position, polynomial coefficients, radius for circular programming,...) is multiplied when the programmed value for G code group G70/G71 differs from the initial setting value (set in MD20150 $MC_GCODE_RESET_VALUES[n]) is entered in this MD.

The factor can be set for each axis individually, so that pure positioning axes are not dependent on G70/G71. The factors within the three geometry axes should not be different.

The data influenced by G70/G71 are described in the Programming Guide.

Related to:

MD20150 $MC_GCODE_RESET_VALUES[n] (G group initial setting).

31350	FREQ_STEP_LIMIT			EXP, A01	G2	
-	Maximum frequency of semi servo			DOUBLE	PowerOn	
CTEQ						
-	1	75000.0	1000.0	2000000.0	7/2	

Description: Maximum frequency in Hz permitted for a semi servo.

This MD is activated only with a semi servo solution.

31400	STEP_RESOL			EXP, A01	G2	
-	Steps per motor revolution (semi servo)			DWORD	PowerOn	
CTEQ						
-	1	1000	100	100000	7/2	

Description: Steps per motor revolution (semi servo)

31600	TRACE_VDI_AX			EXP, N06	-	
-	Trace-specification for axial VDI signals			BOOLEAN	PowerOn	
NBUP						
-	-	FALSE	-	-	2/2	

Description: This machine data determines whether the axial VDI signals for this axis are recorded in the NCSC trace (according to MD18794 $MN_MM_TRACE_VDI_SIGNAL).

32000	MAX_AX_VELO			A11, A04	M3,TE1,TE3,W6,Z3,H1,K3,M1,P2,A3,B2,G2,H2,S1,V1,W1	
mm/min, rev/min	maximum axis velocity			DOUBLE	NEW CONF	
CTEQ						
-	-	10000., 10000., 10000., 10000., 10000....	1.e-9	-	7/2	

Description: Maximum velocity at which the axis can permanently travel. The value limits both the positive and the negative axis velocity. The axis traverses at this velocity, if rapid traverse has been programmed.

Depending on the MD30300 $MA_IS_ROT_AX, the maximum rotary or linear axis velocity has to be entered.

In the machine data, the dynamic behavior of the machine and drive and the limit frequency of the actual value acquisition must be taken into account.

32010	JOG_VELO_RAPID			A11, A04, -	H1	
mm/min, rev/ min	Rapid traverse in jog mode			DOUBLE	Reset	
CTEQ						
-	-	10000., 10000., 10000., 10000., 10000....	-	-	7/2	

Description:

The axis velocity entered applies when the rapid traverse override key is pressed in JOG mode and when the axial feedrate override is set to 100%.

The value entered must not exceed the maximum permissible axis velocity (MD32000 $MA_MAX_AX_VELO).

This machine data is not used for the programmed rapid traverse G0.

MD irrelevant to:

Operating modes AUTOMATIC and MDI

Related to:

MD32000 $MA_MAX_AX_VELO (maximum axis velocity)

MD32040 $MA_JOG_REV_VELO_RAPID

(revolutional feedrate for JOG with rapid traverse override)

NC/PLC interface signal DB3200 DBX1000.5,1004.5,1008.5 (Rapid traverse override)

NC/PLC interface signal DB3200 DBX4 (Feedrate override A-H)

32020	JOG_VELO			A11, A04, -	H1	
mm/min, rev/min	Jog axis velocity			DOUBLE	Reset	
CTEQ						
-	-	2000., 2000., 2000., 2000., 2000., 2000....	-	-	7/2	

Description: The velocity entered applies to traversing in JOG mode when the axial feedrate override switch position is 100%.

This velocity is only used when general SD41110 $SN_JOG_SET_VELO = 0 for linear axes, and linear feedrate is selected (SD41100 $SN_JOG_REV_IS_ACTIVE = 0) or SD41130 $SN_JOG_ROT_AX_SET_VELO = 0 for rotary axes.

If this is the case, the axis velocity is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel jogging

The value entered must not exceed the maximum permissible axis velocity (MD32000 $MA_MAX_AX_VELO).

If DRF is active, the axis velocity for JOG must be reduced with MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR.

Spindles in JOG mode:

This machine data can also be used to define the JOG mode speed for specific spindles (if SD41200 $SN_JOG_SPIND_SET_VELO = 0). However, the speed can be modified with the spindle override switch.

Related to:

MD32000 $MA_MAX_AX_VELO

(maximum axis velocity)

MD32050 $MA_JOG_REV_VELO

(revolutional feedrate for JOG)

MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR

(ratio of JOG velocity to handwheel velocity (DRF))

SD41110 $SN_JOG_SET_VELO

(JOG velocity for G94)

SD41130 $SN_JOG_ROT_AX_SET_VELO

(JOG velocity for rotary axes)

NC/PLC interface signal DB3200 DBX4 (Feedrate override A-H)

32040	JOG_REV_VELO_RAPID			A11, A04	H1,P2,R2,T1,V1,Z1	
mm/rev	Revolutional feedrate in JOG with rapid traverse override			DOUBLE	Reset	
CTEQ						
-	-	2.5, 2.5, 2.5, 2.5, 2.5, 2.5, 2.5, 2.5...	-	-	7/2	

Description: The value entered defines the revolutional feedrate of the axis in JOG mode with rapid traverse override in relation to the revolutions of the master spindle. This feedrate is active when SD41100 $SN_JOG_REV_IS_ACTIVE = 1. (Revolutional feedrate active with JOG)

MD irrelevant for:

SD41100 $SN_JOG_REV_IS_ACTIVE = "0"

Related to:

SD41100 $SN_JOG_REV_IS_ACTIVE (revolutional feedrate with JOG active)

MD32050 $MA_JOG_REV_VELO (revolutional feedrate with JOG)

32050	JOG_REV_VELO			A11, A04	H1,P2,R2,T1,V1,Z1	
mm/rev	Revolutional feedrate in JOG			DOUBLE	Reset	
CTEQ						
-	-	0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5...	-	-	7/2	

Description: The value entered defines the revolutional feedrate of the axis in JOG mode in relation to the revolutions of the master spindle.

This feedrate is active when SD41100 $SN_JOG_REV_IS_ACTIVE= 1 (revolutional feedrate active with JOG).

MD irrelevant for:

Linear feedrate; i.e. SD41100 $SN_JOG_REV_IS_ACTIVE = 0

Related to:

SD41100 $SN_JOG_REV_IS_ACTIVE

(revolutional feedrate for JOG active)

MD32040 $MA_JOG_REV_VELO_RAPID

(JOG revolutional feedrate with rapid traverse override)

32060	POS_AX_VELO			A12, A04	H1,P2,K1,V1,2.4,6.2	
mm/min, rev/min	Initial setting for positioning axis velocity			DOUBLE	Reset	
CTEQ						
-	-	10000., 10000., 10000., 10000., 10000....	-	-	7/2	

Description: If a positioning axis is programmed in the part program without specifying the axis-specific feedrate, the feedrate entered in MD32060 $MA_POS_AX_VELO is automatically used for this axis. The feedrate in MD32060 $MA_POS_AX_VELO applies until an axis-specific feedrate is programmed in the part program for this positioning axis.

MD irrelevant for:

MD32060 $MA_POS_AX_VELO is irrelevant for all axis types other than positioning axis.

Special cases:

If a ZERO velocity is entered in MD32060 $MA_POS_AX_VELO, the positioning axis does not traverse if it is programmed without feed. If a velocity is entered in MD32060 $MA_POS_AX_VELO that is higher than the maximum velocity of the axis (MD32000 $MA_MAX_AX_VELO), the velocity is automatically restricted to the maximum rate.

32070	CORR_VELO			A04	2.4,6.2	
%	Axis velocity for override			DOUBLE	Reset	
CTEQ						
-	-	50.0	-	-	7/2	

Description: Limitation of axis velocity for handwheel override, external zero offset, continuous dressing, distance control $AA_OFF via synchronized actions related to the JOG velocity

MD32020 $MA_JOG_VELO,

MD32010 $MA_JOG_VELO_RAPID,

MD32050 $MA_JOG_REV_VELO,

MD32040 $MA_JOG_REV_VELO_RAPID.

The maximum permissible velocity is the maximum velocity in MD32000 $MA_MAX_AX_VELO. Velocity is limited to this value.

The conversion into linear or rotary axis velocity is made according to MD30300 $MA_IS_ROT_AX.

32074	FRAME_OR_CORRPOS_NOTALLOWED			A01	K5,K2,2.4,6.2	
-	Frame or tool length compensation are not permissible			DWORD	PowerOn	
CTEQ						
-	-	0	0	0xFFF	7/2	

Description: This machine data is used to define the effectiveness of the frames and tool length compensations for indexing axes, PLC axes and command axes started from synchronized actions.

Bit assignment:

Bit 0 = 0:

Programmable zero offset (TRANS) allowed for indexing axis

Bit 0 = 1:

Programmable zero offset (TRANS) forbidden for indexing axis

Bit 1 = 0:

Scale modification (SCALE) allowed for indexing axis

Bit 1 = 1:

Scale modification (SCALE) forbidden for indexing axis

Bit 2 = 0:

Direction change (MIRROR) allowed for indexing axis

Bit 2 = 1:

Direction change (MIRROR) forbidden for indexing axis

Bit 3 = 0:

DRF offset allowed for axis

Bit 3 = 1:

DRF offset forbidden for axis

Bit 4 = 0:

External zero offset allowed for axis

Bit 4 = 1:

External zero offset forbidden for axis

Bit 5 = 0:

Online tool compensation allowed for axis

Bit 5 = 1:

Online tool compensation forbidden for axis

Bit 6 = 0:

Synchronized action offset allowed for axis

Bit 6 = 1:

Synchronized action offset forbidden for axis

Bit 7 = 0:

Compile cycles offset allowed for axis

Bit 7 = 1:

Compile cycles offset forbidden for axis

Bit 8 = 0:

Axial frames and tool length compensation are NOT considered for PLC axes (bit evaluation so for compatibility reasons)

Bit 8 = 1:

Axial frames are considered for PLC axes, and the tool length compensation is considered for PLC axes which are geometry axes.

Bit 9 = 0:

Axial frames are considered for command axes, and the tool length compensation is considered for command axes which are geometry axes.

Bit 9 = 1:

Axial frames and tool length compensation are NOT considered for command axes

Bit 10 = 0:

In JOG mode, too, traversing of a geometry axis as a PLC or command axis is NOT allowed with active rotation.

Bit 10 = 1:

In JOG mode, traversing of a geometry axis as a PLC axis or command axis (static synchronized action) is allowed with active rotation (ROT frame). Traversing must be terminated prior to returning to AUTOMATIC mode (neutral axis state), as otherwise alarm16908 would be output when the mode is changed.

Bit 11 = 0:

In the 'Program interrupted' status, repositioning to the interrupt position (AUTO - JOG) takes place when changing from JOG to AUTO.

Bit 11 = 1:

Prerequisite: Bit 10 == 1 (PLC or command axis motion with active rotation in JOG mode).

In the 'Program interrupted' status, the end point of the PLC or command axis motion is taken over when changing from JOG to AUTOMATIC and the geometry axes are positioned according to the rotation

32075	MAPPED_FRAME			A01	-	
-	Mapping an axial frame			STRING	PowerOn	
-						
-	-	NO_AXIS	-	-	7/2	

Description: Ths machine data can be used to map an axial frame onto an axial frame of another axis. This means that the description of a frame in the data management can simultaneously describe the frame of another axis with the same values. Selected data management frames can be enabled for the mapping in $MN_MAPPED_FRAME_MASK.

32080	HANDWH_MAX_INCR_SIZE			A05, A10	H1	
mm, degrees	Limitation of selected increment			DOUBLE	Reset	
CTEQ						
-	-	0.0	-	-	7/2	

Description: > 0: Limitation of size of selected increment $MN_JOG_INCR_SIZE <Increment/ VDI signal>Ü or SD41010 $SN_JOG_VAR_INCR_SIZE for the associated machine axis

0: No limitation

32082	HANDWH_MAX_INCR_VELO_SIZE			A05, A10, A04	-	
mm/min, rev/ min	Limitation for velocity override			DOUBLE	Reset	
CTEQ						
-	-	500.0, 500.0, 500.0, 500.0, 500.0, 500.0...	-	-	7/2	

Description: For the velocity override of positioning axes:

>0: Limitation of size of selected increment $MN_JOG_INCR_SIZEL<Increment/ VDI signal> 0 or SD41010 $SN_JOG_VAR_INCR_SIZE for the associated machine axis

0: No limitation

32084	HANDWH_STOP_COND			EXP, A10	H1	
-	Handwheel travel behavior			DWORD	Reset	
CTEQ						
-	-	0xFF	0	0x7FF	7/2	

Description: Definition of the response of the handwheel travel to axis-specific VDI interface signals or a context-sensitive interpolator stop:

Bit = 0:

Interruption or collection of the distances preset via the handwheel.

Bit = 1:

Cancellation of the traversing motion or no collection.

Bit assignment:

Bit 0: feedrate override

Bit 1: spindle speed override

Bit 2: feedrate stop/spindle stop or context-sensitive interpolator stop

Bit 3: clamping procedure running (= 0 no effect)

Bit 4: servo enable

Bit 5: pulse enable

For machine axis:

Bit 6 = 0

For handwheel travel, the maximum velodty at which the relevant machine axis can be traversed is the feedrate set in MD32020 $MA_JOG_VELO.

Bit 6 = 1

For handwheel travel, the maximum velodty at which the relevant machine axis can be traversed is the feedrate set in MD32000 $MA_MAX_AX_VELO.

Bit 7 = 0

The override is active in handwheel travel.

Bit 7 = 1

The override is always assumed to be 100% for handwheel travel, regardless of how the override switch is set.

Exception: override 0% is always active.

Bit 8 = 0

The override is active with DRF

Bit 8 = 1

The override is always assumed to be 100% for DRF, regardless of how the override switch is set.

Exception: override 0% is always active.

Bit 9 = 0

For handwheel travel, the maximum possible velocity with revolutional fee-drate is

- with the feedrate in SD41120 $SN_JOG_REV_SET_VELO or
- the feedrate in MD32050 $MA_JOG_REV_VELO or
- in the case of rapid traverse with MD32040 $MA_JOG_REV_VELO_RAPID

of the relevant machine axis calculated with the spindle or rotary axis fee-drate.

Bit 9 = 1

For handwheel travel, the maximum possible velocity is with the revolutional feedrate in MD32000 $MA_MAX_AX_VELO of the relevant machine axis. (see also bit 6)

Bit 10 = 0

For overlaid motions, $AA_OVR is not active.

Bit 10 = 1

For overlaid motions (DRF, $AA_OFF, external work offset, online tool offset), the override $AA_OVR settable via synchronized actions is active.

Bit 11 = 0

With the VDI interface signal "driveReady" (= 0) missing, paths defined by the handwheel are not collected, but a traversing request is displayed. Start of a continuous JOG motion in continuous mode ($SN_JOG_CONT_MODE_LEVELTRIGGRD 41050 = 0) or an incremental JOG motion in continuous mode ($MN_JOG_INC_MODE_LEVELTRIGGRD 11300 = 0) is displayed as a traversing request. With "driveReady" = 1, however, the tool is not traversed, but the procedure is aborted and must be started again.

Bit 11 = 1

With the VDI interface "driveReady" missing, the paths defined by the handwheel are collected. Start of a continuous JOG motion in continuous mode ($SN_JOG_CONT_MODE_LEVELTRIGGRD 41050 = 0) or an incremental JOG motion in continuous mode ($MN_JOG_INC_MODE_LEVELTRIGGRD 11300 = 0) is displayed and saved as a traversing request. With "driveReady" = 1 the traversing motion is started.

32090	HANDWH_VELO_OVERLAY_FACTOR			A10, A04	H1	
-	Ratio of JOG velocity to handwheel velocity (DRF)			DOUBLE	Reset	
CTEQ						
-	-	0.5	-	-	7/2	

Description: The velocity active with the handwheel in DRF can be reduced from the JOG velocity with this machine data.

The following applies to linear axes for the velocity active with DRF:

vDRF = SD41110 $SN_JOG_SET_VELO * MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR

or when SD41110 $SN_JOG_SET_VELO = 0:

vDRF = MD32020 $MA_JOG_VELO * MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR

The velocity setting in SD41130 $SN_JOG_ROT_AX_SET_VELO applies for DRF on rotary axes instead of the value in SD41110 $SN_JOG_SET_VELO.

MD irrelevant for:

JOG handwheel

Related to:

MD32020 $MA_JOG_VELO (JOG axis velocity)

SD41110 $SN_JOG_SET_VELO (JOG velocity for G94)

SD41130 $SN_JOG_ROT_AX_SET_VELO (JOG velocity for rotary axes)

32100	AX_MOTION_DIR			A07, A03, A11, -	G1,TE3,G2	
-	Traversing direction (not control direction)			DWORD	PowerOn	
-						
-	-	1	-1	1	7/2	

Description: The direction of movement of the machine can be reversed with this MD.

The control direction is, however, not destroyed; i.e. closed-loop control remains stable.

-1: Direction reversal

0, 1: No direction reversal

32110	ENC_FEEDBACK_POL			A07, A02, A11	G2	
-	Sign actual value (control direction)			DWORD	PowerOn	
-						
-	2	1, 1	-1	1	7/2	

Description:

```
The evalution direction of the shaft encoder signals is entered in the MD.
  -1:  Actual value reversal
0, 1: No actual value reversal
The index[n] of the machine data is encoded as follows:
[Encoder no.]: 0 or 1
Special cases:
The axis can run off if an incorrect control direction is entered.
Depending on the setting of the corresponding limit values, one of the fol-
lowing alarms is displayed:
Alarm 25040 "Standstill monitoring"
Alarm 25050 "Contour monitoring"
Alarm 25060  "Speed setpoint limitation"
If an uncontrolled setpoint step change occurs on connection of a drive, the
control direction might be incorrect.
```

32200	POSCTRL_GAIN			A07, A11	G1,TE1,TE9,K3,S3,A2,A3,D1, G2,S1,V1	
1000/min	Servo gain factor			DOUBLE	NEW CONF	
CTEQ						
-	6	16.66666667, 16.66666667, 16.66666667, 16.66666667, 16.66666667...	0	2000.	7/2	

Description: Position controller gain, or servo gain factor.

The input/output unit for the user is [(m/min)/mm].

I.e. MD32200 $MA_POSCTRL_GAIN[n] = 1 corresponds to a 1 mm following error at V = 1m/min.

The following machine data have default settings for adapting the standard selected input/output unit to the internal unit [rev/s].

- MD10230 $MN_SCALING_FACTORS_USER_DEF[9] = 16.666667S
- MD10220 $MN_SCALING_USER_DEF_MASK = 0x200; (bit no 9 as hex value).

If the value "0" is entered the position controller is opened.

When entering the servo gain factor it is important to take into account that the gain factor of the whole position control loop is still dependent on other parameters of the controlled system. A distinction should be made between a "desired servo gain factor" (MD32200 $MA_POSCTRL_GAIN) and an "actual servo gain factor" (produced by the machine). Only when all the parameters of the control loop are matched will these servo gain factors be the same.

Other factors are:

- Speed setpoint adjustment (MD32260 $MA_RATED_VELO, MD32250 $MA_RATED_OUTVAL)

or automatic speed setpoint interface adjustment (with MD32250 $MA_RATED_OUTVAL = 0 etc.)

- Correct actual value recording of the position encoder (no. of encoder marks, high resolution, encoder mounting location, gear etc.)
- Correct actual speed recording on the drive (standardization, possibly tacho compensation, tacho generator)

Note:

Axes which interpolate together and are to perform a machining operation, must either have the same gain setting (i.e. have the identical following error = 45° slope at the same velocity) or they must be matched via MD32910 $MA_DYN_MATCH_TIME.

The actual servo gain factor can be checked by means of the following error (in the service display).

In the case of analog axes, a drift compensation must be performed prior to the control.

The index [n] of the machine data has the following coding:

[control parameter set no.]: 0-5

32210	POSCTRL_INTEGR_TIME			A07	G2	
s	Position controller integral time			DOUBLE	NEW CONF	
-						
-	-	1.0	0	10000.0	7/2	

Description: Position controller integral action time for the integral component in s

The MD is only active if MD32220 $MA_POSCTRL_INTEGR_ENABLE = TRUE.

A value of the MD less than 0.001 disables the integral component of the PI controller. The controller is then a P controller, which works with disabled manipulated variable clamping (see also MD32230 $MA_POSCTRL_CONFIG, bit0 = 1).

32220	POSCTRL_INTEGR_ENABLE			A07	G2	
-	Enable integral component position controller			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	

Description: Enable of the integral component position controller; the position controller is then a PI controller in which the manipulated variable clamping is disabled (s.a. MD32230 $MA_POSCTRL_CONFIG, bit0 = 1).

Position overshoots may occur if the integral component is used. For this reason, this functionality may only be used in special cases.

32230	POSCTRL_CONFIG			A07	TE1	
-	Configuration of the position controller structure			BYTE	PowerOn	
-						
-	-	0	0	17	7/2	

Description: Configuration of the position controller structure:

Bit0 = 1: Manipulated variable clamping inactive

Bit4 = 1: Accelerated exact stop signal active

32250	RATED_OUTVAL			A01, A11	A3,D1,G2	
%	Rated output voltage			DOUBLE	NEW CONF	
CTEQ						
-	1	80.0	0.0	200	7/2	

Description:

a.)

Scaling of the manipulated variable with analog drives:

The value of the speed setpoint in percent is to be entered in this MD, in relation to the maximum speed setpoint at which the motor speed specified in MD32260 $MA_RATED_VELO[n] is reached.

Related to:

MD32250 $MA_RATED_OUTVAL[n] only makes sense in combination with MD32260 $MA_RATED_VELO[n].

Example:

1. At a voltage of 5V, the drive reaches a speed of

1875 rpm ==> RATED_OUTVAL = 50%, RATED_VELO = 11250 [degrees/s]

2. At a voltage of 8V, the drive reaches a speed of

3000 rpm ==> RATED_OUTVAL = 80%, RATED_VELO = 18000 [degrees/s]

3. At a voltage of 1.5V, the drive reaches a speed of

562.5 rpm ==> RATED_OUTVAL = 15%, RATED_VELO = 3375 [degrees/s]

All three examples are possible for one and the same drive/converter. The ratio of the two values is decisive; it is the same in all three examples.

MD32250 $MA_RATED_OUTVAL and MD32260 $MA_RATED_VELO describe physical characteristics of converter and drive; they can therefore only be determined by means of a measurement or commissioning instructions (converter, drive).

b.)

Scaling of the manipulated variable with digital PROFIdrive drives:

Default value "0" declares MD32250 $MA_RATED_OUTVAL and MD32260 $MA_RATED_VELO as invalid. Scaling of the manipulated variable is automatically determined and adjusted from the drive parameters instead.

Otherwise (MD32250 $MA_RATED_OUTVAL unequal to zero), the scaling of the manipulated variable is not determined from the drive (for example non-Siemens PROFIdrive drives), but set with RATED_VELO and RATED_OUTVAL, even in the case of these, irrespective of the scaling active on the drive side. In this case, the following applies:

Scaling of the manipulated variable on the drive = RATED_VELO / RATED_OUTVAL

Further scalings from drive parameters, such as torque scaling, are not active if $MA_RATED_OUTVAL is not equal to zero, the values based on it remain zero.

In the case of simultaneous operation of analog and PROFIdrive drives, the settings for the analog axes must be adjusted as described in a.).

32260	RATED_VELO			A01, A11	A3,D1,G2	
rev/min	Rated motor speed			DOUBLE	NEW CONF	
CTEQ						
-	1	3000.0, 3000.0, 3000.0, 3000.0, 3000.0...	-	-	7/2	

Description: Only applies when:

MD32250 $MA_RATED_OUTVAL is set greater than 0.

The drive speed (scaled on the drive) that is reached with the percentual speed setpoint specified in MD32250 $MA_RATED_OUTVAL[n] must be entered in the MD.

Related to:

MD32260 $MA_RATED_VELO[n] only makes sense in combination with MD32250 $MA_RATED_OUTVAL[n].

32300	MAX_AX_ACCEL			A11, A04, -	M3,TE6,Z3,H1,K3,M1,A3,B1, B2,K1,V1,2.4	
m/s², rev/s²	maximum axis acceleration			DOUBLE	NEW CONF	
CTEQ						
-	5	1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0...	1.0e-3	-	7/2	

Description: Maximum acceleration, i.e. change in setpoint velocity, which is to act upon the axis. The value limits both positive and negative axis acceleration.

The maximum angular or linear axis acceleration must be entered dependent upon machine data MD30300 $MA_IS_ROT_AX.

In the case of linear interpolation of the axes in a grouping, the grouping is limited in such a way that no axis is overloaded. With regard to contour accuracy, the control dynamic behavior has to be taken into account.

Not relevant for error states that lead to quick stop.

Each field element corresponds to a G code in the 59th G code group.

Related to:

MD32210 $MA_MAX_ACCEL_OVL_FACTOR
MD32434 $MA_G00_ACCEL_FACTOR
MD32433 $MA_SOFT_ACCEL_FACTOR
MD20610 $MC_ADD_MOVE_ACCEL_RESERVE
MD20602 $MC_CURV_EFFECT_ON_PATH_ACCEL

32310	MAX_ACCEL_OVL_FACTOR			A04	B1	
-	Overload factor for axial velocity steps			DOUBLE	NEW CONF	
CTEQ						
-	5	1.2, 1.2, 1.2, 1.2, 1.2	-	-	7/7	

Description: The overload factor limits the velocity jump of the machine axis on block transition. The value entered is related to the value of MD32300 $MA_MAX_AX_ACCEL (axis acceleration) and states by how much the maximum acceleration can be exceeded for one IPO cycle.

Related to:

MD32300 $MA_MAX_AX_ACCEL (axis acceleration)

MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO (interpolator clock)

Each field element corresponds to a G code in the 59th G group.

32320	DYN_LIMIT_RESET_MASK			A05, A06, A10, A04	-	
-	Reset behavior of dynamic response limitation.			DWORD	Reset	
CTEQ						
-	-	0	0	0x03	7/2	

Description:

MD32320 $MA_DYN_LIMIT_RESET_MASK is used to set the reset response of functions limiting dynamic response for specific axes and groups.

The MD is bit-coded, bit 0 (LSB) and bit 1 are currently allocated.

Bit 0 = 0:

Programmed ACC, VELOLIM and JERKLIM are reset to 100% with channel reset/M30 if the channel-specific MD22410 $MC_F_VALUES_ACTIVE_AFTER_RESET is also zero.

For spindle mode, programmed ACC and VELOLIM are reset to 100% with channel reset/M30 if MD35040 $MA_SPIND_ACTIVE_AFTER_RESET is zero and the channel-specific MD22400 $MC_S_VALUES_ACTIVE_AFTER_RESET is also zero.

Bit 0 = 1:

Programmed ACC, VELOLIM and JERKLIM are retained beyond channel reset/M30.

Bit 1 = 0:

Programmed ACCLIMA, VELOLIMA and JERKLIMA are reset to 100% with channel reset/M30, if MD22410 $MC_F_VALUES_ACTIVE_AFTER_RESET is also zero.

Bit 1 = 1:

Programmed ACCLIMA, VELOLIMA and JERKLIMA are retained beyond channel reset/ /M30.

Notes:

In MD22410 $MC_F_VALUES_ACTIVE_AFTER_RESET, the reset responses of the dynamic instructions ACC, VELOLIM, JERKLIM, ACCLIMA, VELOLIMA and JERKLIMA are set channel specifically. If the MD is set, then the values are also retained.

For spindle mode, the values for ACC and VELOLIM are also retained if MD35040 $MA_SPIND_ACTIVE_AFTER_RESET is not equal to zero or the channel-specific MD22400 $MC_S_VALUES_ACTIVE_AFTER_RESET is not equal to zero.

32400	AX_JERK_ENABLE			A07, A04, -	B2	
-	Axial jerk limitation			BOOLEAN	NEW CONF	
CTEQ						
-	-	FALSE	-	-	7/2	

Description:

Enables the function of an axial jerk limitation.

The limitation is set via a time constant; it is always active.

The limitation works independently of the limitations "path-related maximum jerk", "knee-shaped acceleration characteristic" and the axial jerk limitation of the axes that are operated in JOG mode or positioning axis mode.

Related to:

MD32410 $MA_AX_JERK_TIME (time constant for axial jerk limitation)

32402	AX_JERK_MODE			A07, A04	B2,G2,B3	
-	Filter type for axial jerk limitation			BYTE	PowerOn	
CTEQ						
-	-	1	1	3	7/2	

Description: Filter type for axial jerk limitation:

1: 2nd order filter (as in SW 1 through 4)

2: Moving averaging (SW 5 and higher)

3: Bandstop filter (SW 6 and higher)

Type 2 requires more computing time, but causes smaller contour errors for the same smoothing effect, or smoother movements at the same accuracy.

Type 2 is recommended; type 1 is set as a default value for reasons of compatibility.

The maximum jerk is set in the time constant MD32410 $MA_AX_JERK_TIME.

Recommended values for type 1:

Min. 0.03 s; max. 0.06s.

Recommended values for type 2:

Min. 1 position-control cycle; max. 16 position-control cycles

At a position-control cycle of 2ms, this corresponds to 0.002 to 0.032 seconds.

Type 3 requires the setting of MD32410 $MA_AX_JERK_TIME, MD32412 $MA_AX_JERK_FREQ and MD32414 $MA_AX_JERK_DAMP.

To parameterize a simple bandstop filter, we recommend setting MD32410 $MA_AX_JERK_TIME=0, which automatically sets "denominator frequency = numerator frequency = blocking frequency = MD32412 $MA_AX_JERK_FREQ".

However, MD32410 $MA_AX_JERK_TIME>0 is used to set a specific denominator frequency, which makes it possible to implement a bandstop filter with amplitude increase for frequencies beyond the blocking frequency.

MD32402 $MA_AX_JERK_MODE is only active if MD32400 $MA_AX_JERK_ENABLE has been set to 1.

Special cases, errors:

The machine data must be same for all axes of an axis container.

Related to:

MD32400 $MA_AX_JERK_ENABLE

MD32410 $MA_AX_JERK_TIME

and for type 3: MD32412 $MA_AX_JERK_FREQ and MD32414 $MA_AX_JERK_DAMP

32410	AX_JERK_TIME			A07, A04	G1,TE1,S3,B2,G2	
s	Time constant for axial jerk filter			DOUBLE	NEW CONF	
-						
-	-	0.001	-	-	7/2	

Description: Time constant of the axial jerk filter which causes a smoother axis setpoint characteristic. The jerk filter will only be active, if the time constant is higher than a position control cycle.

Not active in case of errors that cause a change in follow-up mode (for example EMERGENCY STOP99:

Special cases:

Machine axes that are supposed to be interpolating with one another, must have the same effective jerk filtering (for example the same time constant for tapping without compensating chuck).

Related to:

MD32400 $MA_AX_JERK_ENABLE (axial jerk limitation)

32412	AX_JERK_FREQ			A07, A04	-	
-	Blocking frequency of axial jerk filter			DOUBLE	NEW CONF	
-						
-	-	10.0	-	-	7/2	

Description: Blocking frequency of axial jerk filter bandstop MD is only active if MD32402 $MA_AX_JERK_MODE = 3

32414	AX_JERK_DAMP			A07, A04	-	
-	Damping of axial jerk filter			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	

Description: Damping of axial jerk filter bandstop:

Input value 0 means complete blocking with MD32412 $MA_AX_JERK_FREQ, input values >0 can attenuate the blocking effect.

MD is only active if MD32402 $MA_AX_JERK_MODE = 3

32415	EQUIV_CPREC_TIME			A07, A04	$MA_AX_JERK_TIME, $MC_CPREC_WITH_FFW	
s	Time constant for the programmable contour accuracy			DOUBLE	NEW CONF	
-						
-	-	0	-	-	7/2	

Description: The data states the jerk filter time constant at which the contour error with active feedforward control is negligibly small.

32420	JOG_AND_POS_JERK_ENABLE			A04	G1,H1,P2,S3,B2	
-	Default setting of axis jerk limitation			BOOLEAN	Reset	
CTEQ						
-	-	FALSE	-	-	7/2	

Description: Enables the function of the axis-specific jerk limitation for the operating modes JOG, REF and positioning axis mode.

1: Axial jerk limitation for JOG mode and positioning axis mode

0: No jerk limitation for JOG mode and positioning axis mode

The maximum jerk occurring is defined in MD32430 $MA_JOG_AND_POS_MAX_JERK.

Related to:

MD32430 $MA_JOG_AND_POS_MAX_JERK (axial jerk)

32429	MAX_JERK_STOP			A04	B1	
m/s³, rev/s³	Reserved: Maximum axial emergency jerk			DOUBLE	NEW CONF	
-						
-	5	0., 0., 0., 0., 0., 0., 0., 0., 0., 0....	0.	-	3/3	

Description: Reserved for maximum axial jerk in emergency situations. A value of 0 has the same effect as MAX_AX_JERK.

Each field element corresponds to a G code in the 59th G code group.

32430	JOG_AND_POS_MAX_JERK			A04	G1,P2,S3,B2	
m/s³, rev/s³	Axial jerk			DOUBLE	NEW CONF	
CTEQ						
-	-	1000.0, 1000.0, 1000.0, 1000.0, 1000.0...	1.e-9	-	7/2	

Description: The jerk limit value limits the rate of change of axis acceleration in JOG and REF modes as well as in positioning axis mode with $MN_POS_DYN_MODE=0.

The setting and time calculation are made as for MD20600 $MC_MAX_PATH_JERK (path-related maximum jerk).

Not relevant for:

- Path interpolation
- Error states that lead to quick stop.

Related to:

MD32420 $MA_JOG_AND_POS_JERK_ENABLE (initial setting of axial jerk limitation)

MD18960 $MN_POS_DYN_MODE

32431	MAX_AX_JERK			A04	B1,B2	
m/s³, rev/s³	maximum axial jerk for path movement			DOUBLE	NEW CONF	
-						
-	5	1.e6, 1.e6, 1.e6, 1.e6, 1.e6...	1.e-9	-	3/3	

Description: Maximum axial jerk for path motion

Each field element corresponds to a G code in the 59th G code group.

32432	PATH_TRANS_JERK_LIM			A04	B1,B2	
m/s³, rev/s³	maximum axial jerk at block transition in continuous-path mode			DOUBLE	NEW CONF	
CTEQ						
-	5	1.e6, 1.e6, 1.e6, 1.e6, 1.e6...	-	-	3/3	

Description: The control limits the jerk (acceleration jump) at a block transition between contour sections of different curvature to the value set with active jerk limitation.

Not relevant for:

Exact stop

There is an entry for each G code from the 59th G code group (dynamic G code group).

Related to:

Path control, SOFT type of acceleration

32433	SOFT_ACCEL_FACTOR			A04, -	TE9,B1,B2	
-	Scaling of acceleration limitation with SOFT			DOUBLE	NEW CONF	
-						
-	5	1., 1., 1., 1., 1.	1e-9	-	3/3	

Description: Scaling of acceleration limitation with SOFT.

Relevant axial acceleration limitation for SOFT =:

(MD32433 $MA_SOFT_ACCEL_FACTOR[..] * MD32300 $MA_MAX_AX_ACCEL[..])

Each field element corresponds to a G code in the 59th G code group.

32434	G00_ACCEL_FACTOR			A04, -	TE9,B1,B2	
-	Scaling of acceleration limitation with G00.			DOUBLE	NEW CONF	
-						
-	-	1.	1e-9	-	3/3	

Description: Scaling of the acceleration limitation with G00.

Relevant axial acceleration limitation for G00 =:

(MD32433 $MA_G00_ACCEL_FACTOR[..] * MD32300 $MA_MAX_AX_ACCEL[..])

32435	G00_JERK_FACTOR			A04	B1,B2	
-	Scaling of jerk limitation with G00.			DOUBLE	NEW CONF	
-						
-	-	1.	1e-9	-	3/3	

Description: Scaling of the jerk limitation with G00.

Relevant axial jerk limitation for G00 =:

(MD32435 $MA_G00_JERK_FACTOR[..] * MD32431 $MA_MAX_AX_JERK[..])

32437	AX_JERK_VEL0			A04	B1	
mm/min, rev/min	Velocity threshold for linear jerk adjustment			DOUBLE	NEW CONF	
-						
-	5	3000, 3000, 3000, 3000, 3000...	-	-	3/3	

Description: Velocity at and above which the permissible jerk of an axis increases in a linear fashion.

Jerk adjustment only becomes active if MD $MA_MAX_AX_JERK_FACTOR is > 1.0.

There is an entry for each dynamic G code group.

See also MD $MA_AX_JERK_VEL1 and $MA_MAX_AX_JERK_FACTOR.

32438	AX_JERK_VEL1			A04	B1	
mm/min, rev/min	Velocity threshold for linear jerk adjustment			DOUBLE	NEW CONF	
-						
-	5	6000, 6000, 6000, 6000, 6000...	-	-	3/3	

Description: Velocity at and above which the permissible jerk of an axis switches from increasing in a linear fashion

to the saturation defined in MD $MA_MAX_AX_JERK_FACTOR.

The value of this velocity must be greater than the value set with MD $MA_AX_JERK_VEL0.

Jerk adjustment becomes active only if MD $MA_MAX_AX_JERK_FACTOR is > 1.0.

There is an entry for each dynamic G code group.

See also MD $MA_AX_JERK_VEL0 and $MA_MAX_AX_JERK_FACTOR

32439	MAX_AX_JERK_FACTOR			A04	B1	
-	Factor for jerk adjustment at high velocities			DOUBLE	NEW CONF	
-						
-	5	1.0, 1.0, 1.0, 1.0, 1.0	1.0	-	3/3	

Description: Factor for setting adaptive jerk adjustment for an axis.

Jerk adjustment becomes active only if the value of this MD is greater than 1.

The velocity-dependent axis jerk is used only for defining the maximum path velocity and has no influence on the maximum path acceleration and maximum path jerk. For this reason, the velocity-dependent jerk adjustment takes effect only with traversing motions containing a geometric torsion (change in curvature). In the case of linear motions, the curvature and the torsion are zero, and the jerk adjustment takes no effect.

There is an entry for each dynamic G code group.

See also MD $MA_AX_JERK_VEL0 and $MA_AX_JERK_VEL1.

32440	LOOKAH_FREQUENCY			EXP, A04	B1	
-	Smoothing frequency for Look Ahead			DOUBLE	NEW CONF	
-						
-	-	10.	-	-	7/2	

Description: Acceleration procedures in continuous-path mode with Look Ahead which execute with a higher frequency than that parameterized in this MD are smoothed as a function of the parameterization in MD20460 $MC_LOOKAH_SMOOTH_FACTOR.

It is always the minimum of all the axes participating in the path which is determined.

If vibrations are aroused in the mechanics of this axis and if their frequency is known, then this MD should be set to a lower value than this frequency.

32450	BACKLASH			A09	K3,G2	
mm, degrees	Backlash			DOUBLE	NEW CONF	
-						
-	2	0.0, 0.0	-	-	7/2	

Description: Backlash on reversal between positive and negative travel directions.

Input of the compensation value is

- positive, if the encoder is leading the machine part (normal situation)
- negative, if the encoder is behind the machine part.

Backlash compensation is not active when 0 is entered.

Backlash compensation is always active after reference point approach in all operating modes.

Special cases:

A specific backlash on reversal must be entered for each measuring system.

Related to:

MD30200 $MA_NUM_ENCS (number of measuring systems)

MD36500 $MA_ENC_CHANGE_TOL

(Maximum tolerance at actual position value change)

32452	BACKLASH_FACTOR			A09	K3,G2,S1,V1	
-	Evaluation factor for backlash			DOUBLE	NEW CONF	
-						
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	0.01	100.0	7/2	

Description: Evaluation factor for backlash.

The machine data enables the backlash defined in MD32450 $MA_BACKLASH to be changed as a function of the parameter set, in order to take a gear stage dependent backlash into account, for example.

Related to:

MD32450 $MA_BACKLASH[n]

32490	FRICT_COMP_MODE			A09	K3	
-	Type of friction compensation			BYTE	PowerOn	
-						
-	1	1	0	4	7/2	

Description:

0: No friction compensation

1: Friction compensation with constant injection value or adaptive characteristic

2: Friction compensation with learned characteristic via neural network

3: Reserved

4: Reserved

32500	FRICT_COMP_ENABLE			A09	K3,G2	
-	Friction compensation active			BOOLEAN	NEW CONF	
-						
-	-	FALSE	-	-	7/2	

Description:

1: Friction compensation is enabled for this axis.

Depending on the setting of MD32490 $MA_FRICT_COMP_MODE, either "friction compensation with constant modulation factor" or "QEC with neural networks" becomes active.

In the case of neural QEC, the machine data should not be set to "1" until a valid characteristic has been "learnt".

During the learning stage, the compensation values are added on independently of the contents of this machine data.

0: Friction compensation is not enabled for this axis.

Thus, no friction compensation values are entered.

Related to:

MD32490 $MA_FRICT_COMP_MODE

Friction compensation type

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

MD38010 $MA_MM_QEC_MAX_POINTS

Number of interpolation points for QEC with neural networks

32510	FRICT_COMP_ADAPT_ENABLE			EXP, A09	K3	
-	Adaptation friction compensation active			BOOLEAN	NEW CONF	
-						
-	1	FALSE	-	-	7/2	

Description:

1: Friction compensation with amplitude adaptation is enabled for the axis. Quadrant errors on circular contours can be compensated with friction compensation.

The amplitude of the friction compensation value required to be added on is frequently not constant over the entire acceleration range. That is, a lower compensation value needs to be entered for optimum friction compensation for higher accelerations than for lower accelerations.

The parameters of the adaptation curve have to be determined, and entered in the machine data.

0: Friction compensation with amplitude adaptation is not enabled for the axis.

MD irrelevant for:

MD32500 $MA_FRICT_COMP_ENABLE = 0

MD32490 $MA_FRICT_COMP_MODE = 2

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32530 $MA_FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD32550 $MA_FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD32560 $MA_FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD32570 $MA_FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

32520	FRICT_COMP_CONST_MAX			EXP, A09	K3	
mm/min, rev/min	Maximum friction compensation value			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	

Description:

If adaptation is inactive (MD32510=0), the maximum friction compensation is applied throughout the entire acceleration range.

If adaptation is active (MD32510=1), the maximum friction compensation is applied in accordance with the adaptation curve.

In the 1st acceleration range (a < MD32550), the switching amplitude = MD32520 * (a/MD32550).

In the 2nd acceleration range (MD32550 <= a <= MD32560), the switching amplitude = MD32520.

In the 3rd acceleration range (MD32560 < a < MD32570), the switching amplitude = MD32520 + (MD32530-MD32520)/(MD32570-MD32560) * (a - MD32560).

In the 4th acceleration range (MD32570 <= a   ), the switching amplitude = MD32530.

Not relevant for:

MD32500 $MA_FRICT_COMP_ENABLE = 0

MD32490 $MA_FRICT_COMP_MODE = 2 (neural QEC)

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD32530 $MA_FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD32550 $MA_FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD32560 $MA_FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD32570 $MA_FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

32530	FRICT_COMP_CONST_MIN			EXP, A09	K3	
mm/min, rev/min	Minimum friction compensation value			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	

Description: The minimum friction compensation value is active only if "Friction compensation with adaptation" (MD32510 $MA_FRICT_COMP_ADAPT_ENABLE=1) is active.

The amplitude of the friction compensation value is entered in the 4th acceleration range (MD32570 $MA_FRICT_COMP_ACCEL3 <= a).

MD irrelevant for:

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE = 0

MD32490 $MA_FRICT_COMP_MODE = 2 (neural QEC)

Special cases:

In special cases, the value for FRICT_COMP_CONST_MIN may be even higher than for MD32520 $MA_FRICT_COMP_CONST_MAX.

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32550 $MA_FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD32560 $MA_FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD32570 $MA_FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

32540	FRICT_COMP_TIME			EXP, A09	K3	
s	Friction compensation time constant			DOUBLE	NEW CONF	
-						
-	1	0.015	-	-	7/2	

Description: The friction compensation value is entered via a DT1 filter.

The add-on amplitude decays in accordance with the time constant.

MD irrelevant for:

MD32500 $MA_FRICT_COMP_ENABLE = 0

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

32550	FRICT_COMP_ACCEL1			EXP, A09	K3	
m/s², rev/s²	Adaptation acceleration value 1			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	

Description: The adaptation acceleration value is only required if "Friction compensation with adaptation" (MD32510=1) is active.

The adaptation acceleration values 1 to 3 are interpolation points for defining the adaptation curve. The adaptation curve is subdivided into 4 ranges, in each of which a different friction compensation value applies.

For the 1st range (a < MD32550), the add-on amplitude = a * MD32520/ MD32550

MD irrelevant for:

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE = 0

MD32490 $MA_FRICT_COMP_MODE = 2

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32530 $MA_FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD32560 $MA_FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD32570 $MA_FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

32560	FRICT_COMP_ACCEL2			EXP, A09	K3	
m/s², rev/s²	Adaptation acceleration value 2			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	

Description: The adaptation acceleration value is only required if "Friction compensation with adaptation" (MD32510=1) is active.

Adaptation acceleration values 1 to 3 are interpolation points for defining the adaptation curve. The adaptation curve is subdivided into 4 ranges, in each of which a different friction compensation value applies.

In the 1st acceleration range (a < MD32550), the switching amplitude = MD32520 * (a/MD32550).

In the 2nd acceleration range (MD32550 <= a <= MD32560), the switching amplitude = MD32520.

In the 3rd acceleration range (MD32560 < a < MD32570), the switching amplitude = MD32520 + (MD32530-MD32520)/(MD32570-MD32560) * (a - MD32560).

In the 4th acceleration range (MD32570 <= a), the switching amplitude = MD32530.

Not relevant for:

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE = 0

MD32490 $MA_FRICT_COMP_MODE = 2

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32530 $MA_FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD32550 $MA_FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD32570 $MA_FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

32570	FRICT_COMP_ACCEL3			EXP, A09	K3	
m/s², rev/s²	Adaptation acceleration value 3			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	

Description: The adaptation acceleration value is only required if "Friction compensation with adaptation" (MD32510=1) is active.

Adaptation acceleration values 1 to 3 are interpolation points for defining the adaptation curve. The adaptation curve is subdivided into 4 ranges, in each of which a different friction compensation value applies.

In the 1st acceleration range (a < MD32550), the switching amplitude = MD32520 * (a/MD32550).

In the 2nd acceleration range (MD32550 <= a <= MD32560), the switching amplitude = MD32520.

In the 3rd acceleration range (MD32560 < a < MD32570), the switching amplitude = MD32520 + (MD32530-MD32520)/(MD32570-MD32560) * (a - MD32560).

In the 4th acceleration range (MD32570 <= a   ), the switching amplitude = MD32530.

Not relevant for:

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE = 0

MD32490 $MA_FRICT_COMP_MODE = 2

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32530 $MA_FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD32550 $MA_FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD32560 $MA_FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

32580	FRICT_COMP_INC_FACTOR			A09	K3	
%	Weighting of friction compensation value with short travel motions.			DOUBLE	NEW CONF	
-						
-	1	0.0	0	100.0	7/2	

Description:

The optimum friction compensation value determined by the circularity test can cause overcompensation of this axis if compensation is activated and axial positioning movements are short.

In such cases, a better setting can be achieved by reducing the amplitude of the friction compensation value and acts on all positioning blocks that are made within an interpolation cycle of the control.

The factor that has to be entered can be determined empirically and can be different from axis to axis because of the different friction conditions. The input range is between 0 and 100% of the value determined by the circularity test.

The default setting is 0; so that no compensation is performed for short traversing movements.

Related to:

MD32500 $MA_FRICT_COMP_ENABLE Friction compensation active

32610	VELO_FFW_WEIGHT			A07, A09	G1,TE1,K3,S3,A3,G2,S1,V1	
-	Feedforward control factor f. velocity/speed feedforward control			DOUBLE	NEW CONF	
-						
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	-	-	7/2	

Description:

Weighting factor for feedforward control. Is normally = 1.0 on digital drives, since these keep the setpoint speed exactly .

On analog drives, this factor can be used to compensate the gain error of the drive actuator, so that the actual speed becomes exactly equal to the setpoint speed (this reduces the following error with feedforward control).

On both drive types, the effect of the feedforward control can be continuously reduced with a factor of < 1.0, if the machine moves too abruptly and other measures (e.g. jerk limitation) are not to be used. This also reduces possibly existing overshoots; however, the error increases on curved contours, e.g. on a circle. With 0.0, you have a pure position controller without feedforward control.

Contour monitoring takes into account factors < 1.0.

In individual cases, it can, however, become necessary to increase MD CONTOUR_TOL.

32620	FFW_MODE			A07, A09	G1,K3,S3,G2,S1	
-	Feedforward control mode			BYTE	Reset	
-						
-	-	1	0	4	7/2	

Description: FFW_MODE defines the feedforward control mode to be applied on an axis-specific basis:

0 = No feedforward control

1 = Speed feedforward control with PT1 balancing

2 = Torque feedforward control (only for SINAMICS) with PT1 balancing

3 = Speed feedforward control with Tt balancing

4 = Torque feedforward control (only for SINAMICS) with Tt balancing

The high-level language instructions FFWON and FFWOF are used to activate and deactivate feedforward control for specific channels on all axes.

To prevent feedforward control from being affected by these instructions on individual axes, you can define that it is always activated or always deactivated in machine data FFW_ACTIVATION_MODE (see also FFW_ACTIVATION_MODE).

Torque feedforward control must be activated via the global option data $ON_FFW_MODE_MASK.

If a feedforward control mode is selected (speed or torque feedforward control), MD32630 $MA_FFW_ACTIVATION_MODE can be used to program in addition whether feedforward control can be activated or deactivated by the part program.

Torque feedforward control is an option that must be activated.

Related to:

MD32630 $MA_FFW_ACTIVATION_MODE

MD32610 $MA_VELO_FFW_WEIGHT

MD32650 $MA_AX_INERTIA

32630	FFW_ACTIVATION_MODE			A07, A09	K3,G2	
-	Activate feedforward control from program			BYTE	Reset	
CTEQ						
-	-	1	0	2	7/2	

Description:

MD32630 $FFW_ACTIVATION_MODE can be used to define whether the feedforward control for this axis/spindle can be switched on and off by the part program.

0 = The feedforward control cannot be switched on or off by the high-level language elements FFWON and FFWOF respectively.

For the axis/spindle, the state specified by MD32620 $MA_FFW_MODE is therefore always effective.

1 = The feedforward control can be switched on and off by the part program with FFWON and FFWOF respectively.

The instruction FFWON/FFWOF becomes active immediately

2 = The feedforward control can be switched on and off by the part program with FFWON and FFWOF respectively.

The instruction FFWON/FFWOF does not become active until the next axis standstill

The default setting is specified by the channel-specific MD20150 $MC_GCODE_RESET_VALUES. This setting is valid even before the first NC block is executed.

Notes:

The last valid state continues to be active even after Reset (and therefore also with JOG).

As the feedforward control of all axes of the channel is switched on and off by FFWON and FFWOF respectively, MD32630 $MA_FFW_ACTIVATION_MODE should be set identically for axes interpolating with one naother.

Switching feedforward control on or off while the axis/spindle is traversing may cause compensation operations in the control loop. Interpolating axes are therefore stopped by the part program if such switching operations occur (internal stop Stop G09 is triggered).

Related to:

MD32620 $MA_FFW_MODE

MD20150 $MC_GCODE_RESET_VALUES

32640	STIFFNESS_CONTROL_ENABLE			A01, A07	TE3,G2	
-	Dynamic stiffness control			BOOLEAN	NEW CONF	
CTEQ						
-	1	FALSE	-	-	7/2	

Description:

Activate dynamic stiffness control, if bit is set.

Higher servo gain factors are possible if stiffness control is active (MD32200 $MA_POSCTRL_GAIN).

Notes:

The availability of this function is determined by the drive used (the drive has to support the DSC function).

32642	STIFFNESS_CONTROL_CONFIG			A01, A07	-	
-	Dynamic stiffness control configuration (DSC)			BYTE	NEW CONF	
CTEQ						
-	1	0	0	1	7/2	

Description: Configuration of the dynamic stiffness control (DSC):

0: DSC in drive works with indirect measuring system, i.e. motor measuring system (default scenario).

1: DSC in drive works with direct measuring system.

Notes:

The availability of this function is determined by the drive used (the drive must support the DSC function).

32650	AX_INERTIA			EXP, A07, A09	G1,K3,S3,G2	
kgm²	Inertia for torque feedforward control			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	

Description: Only with SINAMICS:

Inertia of axis. Used for torque feedforward control.

With torque feedforward control, an additional current setpoint proportional to the torque is directly injected at the input of the current controller. This value is formed using the acceleration and the moment of inertia. The equivalent time constant of the current control loop must be defined for this purpose and entered in MD32800 $MA_EQUIV_CURRCTRL_TIME.

The total moment of inertia of the axis (drive + load) must also be entered in MD32650 $MA_AX_INERTIA (total moment of inertia referred to motor shaft according to data supplied by machine manufacturer).

When MD32650 $MA_AX_INERTIA and MD32800 $MA_EQUIV_CURRCTRL_TIME are set correctly, the following error is almost zero even during acceleration (check this by looking at the "following error" in the service display).

The torque feedforward control is deactivated if MD32650 $MA_AX_INERTIA is set to 0. However, because the calculations are performed anyway, torque feedforward control must always be deactivated with MD32620 $MA_FFW_MODE = 0 or 1 or 3 (recommended). Because of the direct current setpoint injection, torque feedforward control is only possible on digital drives.

MD irrelevant for:

MD32620 $MA_FFW_MODE = 0 or 1 or 3

Related to:

MD32620 $MA_FFW_MODE

MD32630 $MA_FFW_ACTIVATION_MODE

MD32800 $MA_EQUIV_CURRCTRL_TIME

32652	AX_MASS			EXP, A07, A09	-	
kg	Axis mass for torque feedforward control			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	

Description: SINAMICS only:

Mass of axis for torque feedforward control.

The MD is used on linear drives (MD13040 $MN_DRIVE_TYPE=3 or MD13080 $MN_DRIVE_TYPE_DP=3) instead of MD32650 $MA_AX_INERTIA.

32700	ENC_COMP_ENABLE			A09	K3	
-	Encoder/spindle error compensation.			BOOLEAN	NEW CONF	
-						
-	2	FALSE, FALSE	-	-	7/2	

Description:

1: LEC (leadscrew error compensation) is activated for the measuring system.

This enables leadscrew and measuring system errors to be compensated.

The function is not enabled internally until the relevant measuring system has been referenced (NC/PLC interface signal DB390x DBX0.4 / .5 (Referenced/synchronized 1 or 2) = 1).

write protect function (compensation values) active.

0: LEC is not active for the axis/measuring system.

Related to:

MD38000 $MA_MM_ENC_COMP_MAX_POINTS number of interpolation points with LEC

NC/PLC interface signal DB390x DBX0.4 (Referenced/synchronized 1)

NC/PLC interface signal DB390x DBX0.5 (Referenced/synchronized 2)

32750	TEMP_COMP_TYPE			A09	K3,W1	
-	Temperature compensation type			BYTE	PowerOn	
CTEQ						
-	-	0	0	7	7/2	

Description:

The type of temperature compensation applicable to the machine axis is activated in MD32750 $MA_TEMP_COMP_TYPE.

A distinction is made between the following types:

0: No temperature compensation active

1: Position-independent temperature compensation active

(compensation value with SD43900 $SA_TEMP_COMP_ABS_VALUE)

2: Position-dependent temperature compensation active

(compensation value with SD43910 $SA_TEMP_COMP_SLOPE and SD43920 TEMP_COMP_REF_POSITION)

3: Position-dependent and position-independent temperature compensation active

(compensation values with SD according to types 1 and 2)

Temperature compensation is an option that must be enabled.

Related to:

SD43900 $SA_TEMP_COMP_ABS_VALUE

Position-dependent temperature compensation value

SD43920 $SA_TEMP_COMP_REF_POSITION

Reference point for position-dependent temperature compensation

SD43910 $SA_TEMP_COMP_SLOPE

Gradient for position-dependent temperature compensation

MD32760 $MA_COMP_ADD_VELO_FACTOR

Excessive velocity due to compensation

32760	COMP_ADD_VELO_FACTOR			EXP, A09, A04	K3	
-	Excessive velocity due to compensation			DOUBLE	NEW CONF	
CTEQ						
-	-	0.01	0.	0.10	7/2	

Description:

The maximum distance that can be traversed because of temperature compensation in one IPO cycle can be limited by the axial MD32760 $MA_COMP_ADD_VELO_FACTOR.

If the resulting temperature compensation value is above this maximum, it is traversed over several IPO cycles. There is no alarm.

The maximum compensation value per IPO cycle is specified as a factor referring to the maximum axis velocity (MD32000 $MA_MAX_AX_VELO).

The maximum gradient of the temperature compensation tanbmax is also limited with this machine data.

Example of calculation of the maximum gradient tanb(max):

1. Calculation of the interpolator cycle time (see Description of Functions Velocities, Setpoint/Actual Value Systems, Cycle Times (G2))

Interpolator cycle time = Basic system clock rate * factor for interpolation cycle

Interpolator cycle time = MD10050 $MN_SYSCLOCK_CYCLE_TIME ^ MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO

Example:

MD10050 $MN_SYSCLOCK_CYCLE_TIME = 0.004 [s]

MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO = 3

-> Interpolator cycle time = 0.004 * 3 = 0.012 [s]

2. Calculation of the maximum velocity increase resulting from a change made to the temperature compensation parameter DvTmax

DvTmax = MD32000 $MA_MAX_AX_VELO * MD32760 $MA_COMP_ADD_VELO_FACTOR

```
Example: MD32000 $MA_MAX_AX_VELO = 10 000 [mm/min]
         MD32760 $MA_COMP_ADD_VELO_FACTOR = 0.01
     -> DvTmax = 10 000 * 0.01 = 100 [mm/min]
```

3. Calculation of the traverse distances per interpolator cycle

```
                                  0.012
     S1 (at vmax)      = 10 000 x --------- = 2.0 [mm]
                                    60
                                   0.012
     ST (at DvTmax) =       100 x --------- = 0.02 [mm]
                                     60
```

4. Calculation of tanbmax

```
                         ST      0.02
             tanbmax  =  ----  = ------  = 0.01 (corresponds to value for
                         S1        2               COMP_ADD_VELO_FACTOR)
              -> bmax = arc tan 0.01 = 0.57 degrees
```

With larger values of SD43910 $SA_TEMP_COMP_SLOPE, the maximum gradient (here 0.57 degrees) for the position-dependent temperature compensation value is used internally. There is no alarm.

Note:

Any additional excessive velocity resulting from temperature compensation must be taken into account when defining the limit value for velocity monitoring (MD36200 $MA_AX_VELO_LIMIT).

MD irrelevant for:

MD32750 $MA_TEMP_COMP_TYPE = 0, sag compensation, LEC, backlash compensation

Related to:

MD32750 $MA_TEMP_COMP_TYPE

Temperature compensation type

SD43900 $SA_TEMP_COMP_ABS_VALUE

Position-independent temperature compensation value

SD43910 $SA_TEMP_COMP_SLOPE

Gradient for position-dependent temperature compensation

MD32000 $MA_MAX_AX_VELO

Maximum axis velocity

MD36200 $MA_AX_VELO_LIMIT

Threshold value for velocity monitoring

MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO

Ratio of basic system clock rate to IPO cycle

MD10050 $MN_SYSCLOCK_CYCLE_TIME

Basic system clock rate

32800	EQUIV_CURRCTRL_TIME			EXP, A07, A09	G1,K3,S3,A2,A3,G2,S1,V1	
s	Equiv. time const. current control loop for feedforward control			DOUBLE	NEW CONF	
-						
-	6	0.0005, 0.0005, 0.0005, 0.0005, 0.0005, 0.0005	-	-	7/2	

Description: The time constant is used for parameterizing the torque feedforward control and for calculating the dynamic following error model (contour monitoring).

In order to set the torque feedforward control correctly, the equivalent time constant of the current control loop must be determined exactly by measuring the step response of the current control loop.

Closed-loop control free of following errors can be set by inputting negative values when MD32620 $MA_FFW_MODE=4 (but positioning overshoots may then occur).

Delay values taken into account automatically by the software internally are thus compensated again until the actually active minimum symmetrizing time "0" is reached.

Any other negative input values have no further effect.

Negative values input when MD32620 $MA_FFW_MODE=2 are automatically converted internally to the input value "0", which means that they are not active in this case.

Related to:

MD32620 $MA_FFW_MODE

Type of feedfoward control

MD32650 $MA_AX_INERTIA

Moment of inertia for torque feedforward control

or MD32652 $MA_AX_MASS

Axis mass for torque feedforward control

MD36400 $MA_CONTOUR_TOL

Tolerance band contour monitoring

32810	EQUIV_SPEEDCTRL_TIME			A07, A09	G1,K3,S3,A2,A3,G2,S1,V1	
s	Equiv. time constant speed control loop for feedforward control			DOUBLE	NEW CONF	
-						
-	6	0.008, 0.008, 0.008, 0.008, 0.008, 0.008...	-	-	7/2	

Description: This time constant must be equal to the equivalent time constant of the closed current control loop.

It is used for parameterizing the speed feedforward control and for calculating the dynamic following error model (contour monitoring).

In addition, this MD determines the time behavior of the closed-loop speed control circuit for simulated drives (MD30130 $MA_CTRLOUT_TYPE 0).

In order to set the speed feedforward control correctly, the equivalent time constant of the current control loop must be determined exactly by measuring the step response of the current control loop.

Closed-loop control free of following errors can be set by inputting negative values when MD32620 $MA_FFW_MODE=3 (but positioning overshoots may then occur).

Delay values taken into account automatically by the software internally are thus compensated again until the actually active minimum symmetrizing time "0" is reached.

Any other negative input values have no further effect.

Negative values input when MD32620 $MA_FFW_MODE=1 are automatically converted internally to the input value "0", which means that they are not active in this case.

Related to:

MD32620 $MA_FFW_MODE (type of feedfoward control)

MD32610 $MA_VELO_FFW_WEIGHT (moment of inertia for speed feedforward control)

MD36400 $MA_CONTOUR_TOL (tolerance band contour monitoring)

32900	DYN_MATCH_ENABLE			A07	G21,S3,G2	
-	Dynamic response adaptation			BOOLEAN	NEW CONF	
CTEQ						
-	-	FALSE	-	-	7/2	

Description: With dynamic response adaptation, axes with different servo gain factors can be set to the same following error with MD32910 $MA_DYN_MATCH_TIME.

1: Dynamic response adaptation active.

0: Dynamic response adaptation inactive.

Related to:

MD32910 $MA_DYN_MATCH_TIME[n]

(time constant of dyamic response adaptation)

32910	DYN_MATCH_TIME			A07	G1,K3,S3,A2,A3,G2,S1,V1	
s	Time constant of dynamic response adaptation			DOUBLE	NEW CONF	
-						
-	6	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/2	

Description:

The time constant of the dynamic response adaptation of an axis has to be entered in this MD.

Axes interpolating with each other but having different dynamic responses can be adapted to the "slowest" control loop by means of this value.

The difference of the equivalent time constant of the "slowest" control loop to the individual axis has to be entered here as the time constant of the dynamic response adaptation.

The MD is only active if MD32900 $MA_DYN_MATCH_ENABLE = 1.

Related to:

MD32900 $MA_DYN_MATCH_ENABLE (dynamic response adaptation)

32920	AC_FILTER_TIME			A10	-	
s	Smoothing filter time constant for adaptive control			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	7/2	

Description:

With the main run variables $AA_LOAD, $AA_POWER, $AA_TORQUE, and $AA_CURR, the following drive actual values can be measured:

- Drive utilization
- Drive active power
- Drive torque setpoint value
- Current actual value of the axis or spindle

To compensate any peaks, the measured values can be smoothed with a PT1 filter. The filter time constant is defined with MD32920 $MA_AC_FILTER_TIME (filter smoothing time constant for adaptive control).

When measuring the drive torque setpoint value or the current actual value, the filter is active in addition to the filters available in the drive. The two filters are connected in series, if both significantly and slightly smoothed values are required in the system. The filter is switched off when a smoothing time of 0 seconds is entered.

32930	POSCTRL_OUT_FILTER_ENABLE			A07	G2	
-	Activation of low-pass filter at position controller output			BOOLEAN	NEW CONF	
CTEQ						
-	-	FALSE	-	-	7/2	

Description:

Activation of low-pass filter at position controller output.

Activation of the low-pass filter is only enabled when the dynamic stiffness control is inactive MD32640=0.

32940	POSCTRL_OUT_FILTER_TIME			A07	G2	
s	Time constant of low-pass filter at position controller output			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	

Description:

Time constant of low-pass filter at position controller output

Related to:

MD32640 $MA_STIFFNESS_CONTROL_ENABLE (dynamic stiffness control)

32950	POSCTRL_DAMPING			EXP, A07	G2	
%	Damping of the speed control circuit.			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	

Description:

Application:

Attenuation of an oscillating axis by means of the additional switching of a rotational speed difference, which is determined from the difference between the two measuring systems.

Condition: The axis must have two measuring systems, with one encoder being connected directly and the other indirectly.

Explanation of normalization:

An input value of "100%" means: An additional torque is switched on in accordance with the drive MD if:

- A positional deviation of 1 mm exists in the case of linear motors
- A load-side positional deviation of 360 degrees exists in the case of rotary axes
- A positional deviation corresponding to MD31030 $MA_LEADSCREW_PITCH (e.g. 10 mm as a standard) exists in the case of linear axes (rot. drive).

33000	FIPO_TYPE			EXP, A07	G1,G3,S3,G2	
-	Fine interpolator type			BYTE	PowerOn	
CTEQ						
-	-	2	1	3	7/2	

Description:

The type of the fine interpolator has to be entered in this MD:

1: differential FIPO

2: cubic FIPO

3: cubic FIPO, optimized for operation with feedforward control

Calculation time required and contour quality increase with increasing type of FIPO.

- The default setting is the cubic FIPO.
- If no feedforward control is used in the position control loop, the use of the differential FIPO reduces the calculation time while slightly increasing the contour error.
- If the position control cycle and the interpolation cycle are identical, fine interpolation does not take place, i.e. the different types of fine interpolator do not have different effects.

33050	LUBRICATION_DIST			A03, A10	A2,Z1	
mm, degrees	Traversing path for lubrication from PLC			DOUBLE	NEW CONF	
-						
-	-	1.0e8	-	-	7/2	

Description: After the traversing path defined in the MD has been covered, the state of the axial interface signal "Lubrication pulse" is inverted, this can activate an automatic lubrication device.

The traversing path is summated after Power on.

The "Lubrication pulse" can be used with axes and spindles.

Application example(s):

The machine bed lubrication can be carried out as a function of the relevant traversed path.

Note:

When 0 is entered, the NC/PLC interface signal DB390x DBX1002.0 (Lubrication pulse) is set in every cycle.

Related to:

NC/PLC interface signal DB390x DBX1002.0 (Lubrication pulse)

33060	MAINTENANCE_DATA			A10	W6,2.4,6.2	
-	Configuration of maintenance data recording			DWORD	Reset	
-						
-	-	1	-	-	7/2	

Description: Configuration of axis maintenance data recording:

Bit 0:

Recording the entire traversing path, entire traversing time and number of axis traversing procedures

Bit 1:

Recording the entire traversing path, entire traversing time and number of traversing procedures at high axis speed

Bit 2:

Recording the total sum of axis jerks, the time in which the axis is traversed with jerk, and the number of traversing procedures with jerk.

34000	REFP_CAM_IS_ACTIVE			A03, A11	G1,R1	
-	Axis with reference point cam			BOOLEAN	Reset	
-						
-	-	TRUE	-	-	7/2	

Description: 1: There is at least one reference point cam for this axis

0: This axis does not have a reference point cam (e.g. rotary axis)

The referencing cycle starts immediately with phase 2 (see documentation)

Machine axes that have only one zero mark over the whole travel range or rotary axes that have only one zero mark per revolution do not require an additional reference cam that selects the zero mark (select MD34000 $MA_REFP_CAM_IS_ACTIVE = 0).

The machine axis marked this way accelerates to the velocity specified in MD34040 $MA_REFP_VELO_SEARCH_MARKER (reference point creep velocity) when the plus/minus traversing key is pressed, and synchronizes with the next zero mark.

34010	REFP_CAM_DIR_IS_MINUS			A03, A11	G1,R1	
-	Approach reference point in minus direction			BOOLEAN	Reset	
-						
-	-	FALSE	-	-	7/2	

Description: 0: MD34010 $MA_REFP_CAM_DIR_IS_MINUS Reference point approach in plus direction

1: MD34010 $MA_REFP_CAM_DIR_IS_MINUS Reference point approach in minus direction

For incremental measuring systems:

If the machine axis is positioned in front of the reference cam, it accelerates, depending on the plus/minus traversing key pressed, to the velocity specified in MD34020 $MA_REFP_VELO_SEARCH_CAM (reference point approach velocity) in the direction specified in MD34010 $MA_REFP_CAM_DIR_IS_MINUS. If the wrong traversing key is pressed, reference point approach is not started.

If the machine axis is positioned on the reference cam, it accelerates to the velocity specified in MD34020 $MA_REFP_VELO_SEARCH_CAM and travels in the direction opposite to that specified in MD34010 $MA_REFP_CAM_DIR_IS_MINUS.

For linear measuring systems with distance-coded reference marks:

If the machine axis has a reference cam (linear measuring systems with distance-coded reference marks do not necessarily require a reference cam) and the machine axis is positioned on the reference cam, it accelerates, irrespectively of the plus/minus traversing key pressed, to the velocity specified in MD34040 $MA_REFP_VELO_SEARCH_MARKER (reference point creep velocity) in the direction opposite to that specified in MD34010 $MA_REFP_CAM_DIR_IS_MINUS.

34020	REFP_VELO_SEARCH_CAM			A03, A11, A04	G1,R1	
mm/min, rev/min	Reference point approach velocity			DOUBLE	Reset	
-						
-	-	5000.00, 5000.00, 5000.00, 5000.00...	-	-	7/2	

Description: The reference point approach velocity is the velocity at which the machine axis travels in the direction of the reference cam after the traversing key has been pressed (phase 1). This value should be set at a magnitude large enough for the axis to be stopped to 0 before it reaches a hardware limit switch.

MD irrelevant for:

Linear measuring systems with distance-coded reference marks

34030	REFP_MAX_CAM_DIST			A03, A11	G1,R1	
mm, degrees	Maximum distance to reference cam			DOUBLE	Reset	
-						
-	-	10000.0	-	-	7/2	

Description: If the machine axis travels a maximum distance defined in MD34030 $MA_REFP_MAX_CAM_DIST from the starting position in the direction of the reference cam, without reaching the reference cam (NC/PLC interface signal DB380x DBX1000.7 (Reference point approach delay) is reset), the axis stops and alarm 20000 "Reference cam not reached" is output.

Irrelevant to:

Linear measuring systems with distance-coded reference marks

34040	REFP_VELO_SEARCH_MARKER			A03, A11, A04	G1,R1,S1	
mm/min, rev/min	Creep velocity			DOUBLE	Reset	
-						
-	2	300.00, 300.00, 300.00, 300.00...	-	-	7/2	

Description:

1) For incremental measuring systems:

This is the velocity at which the axis travels during the time between initial detection of the reference cam and synchronization with the first zero mark (phase 2).

Traversing direction: Opposite to the direction specified for the cam search (MD34010 $MA_REFP_CAM_DIR_IS_MINUS)

If MD34050 $MA_REFP_SEARCH_MARKER_REVERSE (direction reversal on reference cam) is enabled, then if the axis is synchronized with a rising reference cam signal edge on the cam, the axis traverses at the velocity defined in MD34020 $MA_REFP_VELO_SEARCH_CAM.

2) Indirect measuring system with BERO on the load-side (preferred for spindles):

At this velocity, a search is made for the zero mark associated with the BERO (zero mark selection per VDI signal). The zero mark is accepted if the actual velocity lies within the tolerance range defined in MD35150 $MA_SPIND_DES_VELO_TOL as a deviation from the velocity specified in MD34040 $MA_REFP_VELO_SEARCH_MARKER[n].

3) For linear measuring systems with distance-coded reference marks:

The axis crosses the two reference marks at this velocity. The maximum velocity must be low enough to ensure that the time required to travel the smallest possible reference mark distance [(x(minimum)] on the linear measuring system is longer than one position controller cycle.

The formula

```
                    Basic dist.                  Meas.length
[x(minimum)] [mm] = ----------- * Grad.cycle - --------------
                         2                       Basic dist.
with    Basic distance [multiple of graduation cycle]
          Graduation cycle [mm]
          Measuring length [mm]     yields:
                           x(minimum) [mm]
    max. velocity [m/s] = ---------------------------------
                           Position controller cycle  [ms]
```

This limiting value consideration also applies to the other measuring systems.

Traversing direction:

- as defined in MD34010 $MA_REFP_CAM_DIR_IS_MINUS;
- if the axis is already positioned on the cam, the axis is traversed in the opposite direction

34050	REFP_SEARCH_MARKER_REVERSE			A03, A11	G1,R1	
-	Direction reversal to reference cam			BOOLEAN	Reset	
-						
-	2	FALSE, FALSE	-	-	7/2	

Description: This MD can be used to set the direction of search for the zero mark:

MD34050 $MA_REFP_SEARCH_MARKER_REVERSE = 0

Synchronization with falling reference cam signal edge

The machine axis accelerates to the velocity specified in MD34040 $MA_REFP_VELO_SEARCH_MARKER (reference point creep velocity) in the opposite direction to that specified in MD34010 $MA_REFP_CAM_DIR_IS_MINUS (reference point approach in minus direction).

If the axis leaves the reference cam (NC/PLC interface signal DB380x DBX1000.7 (Reference point approach delay) is reset) the control is synchronized with the first zero mark.

MD34050 $MA_REFP_SEARCH_MARKER_REVERSE = 1

Synchronization with rising reference cam signal edge

The machine axis accelerates to the velocity defined in MD34020 $MA_REFP_VELO_SEARCH_CAM (reference point creep velocity) in the opposite direction to that specified in the MD34010 $MA_REFP_CAM_DIR_IS_MINUS. If the axis leaves the reference cam (NC/PLC interface signal DB380x DBX1000.7 (Reference point approach delay) is reset), the machine axis decelerates to a halt and accelerates in the opposite direction towards the reference cam at the velocity specified in MD34040: $MA_REFP_VELO_SEARCH_MARKER. When the reference cam is reached (NC/PLC interface signal DB380x DBX1000.7 (Reference point approach delay) is enabled) the control is synchronized with the first zero mark.

MD irrelevant to:

Linear measuring systems with distance-coded reference marks

34060	REFP_MAX_MARKER_DIST			A03, A11	G1,R1,S1	
mm, degrees	maximum distance to reference mark			DOUBLE	Reset	
-						
-	2	20.0, 20.0, 20.0, 20.0, 20.0, 20.0...	-	-	7/2	

Description: For incremental measuring systems:

If, after leaving the reference cam (NC/PLC interface signal DB380x DBX1000.7 (Reference point approach delay) is reset), the machine axis travels a distance defined in MD34060: $MA_REFP_MAX_MARKER_DIST without detecting the zero mark, the axis stops and alarm 20002 "Zero mark missing" is output.

For linear measuring systems with distance-coded reference marks:

If the machine axis travels a distance defined in MD34060 $MA_REFP_MAX_MARKER_DIST from the starting position without crossing two zero marks, the axis stops and alarm 20004 "Reference mark missing" is output.

34070	REFP_VELO_POS			A03, A11, A04	G1,R1	
mm/min, rev/min	Reference point positioning velocity			DOUBLE	Reset	
-						
-	-	10000.00, 10000.00, 10000.00, 10000.00...	-	-	7/2	

Description: For incremental measuring systems:

The axis travels at this velocity between the time of synchronization with the first zero mark and arrival at the reference point.

For linear measuring systems with distance-coded reference marks:

The axis travels at this velocity between the time of synchronization (crossing two zero marks) and arrival at the target point.

34080	REFP_MOVE_DIST			A03, A11	G1,R1,S1,S3,G2	
mm, degrees	Reference point distance			DOUBLE	NEW CONF	
-						
-	2	-2.0, -2.0	-1e15	1e15	7/2	

Description: 1. Standard measuring system (incremental with equidistant zero marks)

Reference point positioning movement: 3rd phase of the reference point approach:

The axis traverses from the position at which the zero mark is detected with the velocity REFP_AX_VELO_POS along the path REFP_MOVE_DIST + REFP_MOVE_DIST_CORR (relative to the marker).

REFP_SET_POS is set as the current axis position at the target point.

2. Irrelevant for distance-coded measuring system.

Override switch and selection jog/continuous mode (MD JOG_INC_MODE_IS_CONT) are active.

34090	REFP_MOVE_DIST_CORR			A03, A02, A08, A11	G1,R1,S1,S3,G2	
mm, degrees	Reference point offset/absolute offset			DOUBLE	NEW CONF	
-, -						
-	2	0.0, 0.0	-1e12	1e12	7/2	

Description:

- Incremental encoder with zero mark(s):

After detection of the zero mark, the axis is positioned away from the zero mark by the distance specified in MD34080 $MA_REFP_MOVE_DIST + MD34090 $MA_REFP_MOVE_DIST_CORR. After traversing this distance, the axis has reached the reference point. MD34100 $MA_REFP_SET_POS is transferred into the actual value.

During traversing by MD34080 $MA_REFP_MOVE_DIST + MD34090 $MA_REFP_MOVE_DIST_CORR, the override switch and MD11300 $MN_JOG_INC_MODE_LEVELTRIGGRD (jog/continuous mode) are active.

- Distance-coded measuring system:

MD34090 $MA_REFP_MOVE_DIST_CORR acts as an absolute offset. It describes the offset between the machine zero and the first reference mark of the measuring system.

- Absolute encoder:

MD34090 $MA_REFP_MOVE_DIST_CORR acts as an absolute offset.

It describes the offset between the machine zero and the zero point of the absolute measuring system.

Note:

In conjunction with absolute encoders, this MD is modified by the control during calibration processes and modulo offset.

With rotary absolute encoders (on linear and rotary axes), the modification frequency also depends on the setting of MD34220 $MA_ENC_ABS_TURNS_MODULO.

Manual input or modification of this MD via the part program should therefore be followed by a Power ON Reset to activate the new value and prevent it from being lost.

The following applies to an NCU-LINK:

If a link axis uses an absolute encoder, every modification of MD34090 $MA_REFP_MOVE_DIST_CORR on the home NCU (servo physically available) is updated only locally and not beyond the limits of the NCU. The modification is therefore not visible to the link axis. Writing MD34090 $MA_REFP_MOVE_DIST_CORR through the link axis is rejected with alarm 17070.

34092	REFP_CAM_SHIFT			A03, A11	G1,R1	
mm, degrees	electronic cam offset for incremental measuring systems			DOUBLE	Reset	
-						
-	2	0.0, 0.0	-	-	7/2	

Description: Electronic cam offset for incremental measuring systems with equidistant zero marks.

When the reference cam signal occurs, the zero mark search does not start immediately but is delayed until after the distance from REFP_CAM_SHIFT.

This ensures the reproducibility of the zero mark search through a defined selection of a zero mark, even with temperature-dependent expansion of the reference cam.

Because the reference cam offset is calculated by the control in the interpolation cycle, the actual cam offset is at least REFP_CAM_SHIFT and at most REFP_CAM_SHIFT+(MD34040 $MA_REFP_VELO_SEARCH_MARKER*interpolation cycle)

The reference cam offset is effective in the search direction of the zero mark.

The reference cam offset is only active if existing cam MD34000 $MA_REFP_CAM_IS_ACTIVE=1.

34093	REFP_CAM_MARKER_DIST			A03, A11	R1	
mm, degrees	Reference cam/reference mark distance			DOUBLE	PowerOn	
-						
-	2	0.0, 0.0	-	-	ReadOnly	

Description: The value displayed corresponds to the distance between exiting the reference cam and the occurrence of the reference mark. If the values are too small, there is a risk of not being able to determine the reference point due to temperature reasons or varying operating times of the cam signal. The distance travelled may serve as a clue for setting the electronic reference cam offset.

This machine data is a display data and can therefore not be changed.

34100	REFP_SET_POS			A03, A11	G1,S3,G2,R1,S1	
mm, degrees	Reference point for incremental system			DOUBLE	Reset	
-						
-	4	0., 0., 0., 0.	-45000000	45000000	7/2	

Description:

- Incremental encoder with zero mark(s):

The position value which is set as the current axis position after detection of the zero mark and traversal of the distance REFP_MOVE_DIST + REFP_MOVE_DIST_CORR (relative to zero mark). REFP_SET_POS of the reference point number, which is set at the instant that the edge of the reference cam signal rises (NC/PLC interface signal DB380x DBX2.4 - .7 (Reference point value 1 to 4)), is set as the axis position.

- Distance-coded measuring system:

Target position which is approached when MD34330 $MA_REFP_STOP_AT_ABS_MARKER is set to 0 (FALSE) and two zero marks have been crossed.

- Absolute encoder:

MD34100 $MA_REFP_SET_POS corresponds to the correct actual value at the calibration position.

The reaction on the machine depends on the status of MD34210 $MA_ENC_REFP_STATE: When MD34210 $MA_ENC_REFP_STATE = 1, the value of MD34100 $MA_REFP_SET_POS is transferred as the absolute value.

When MD34210 $MA_ENC_REFP_STATE = 2 and MD34330 $MA_REFP_STOP_AT_ABS_MARKER = 0 (FALSE), the axis approaches the target position stored in MD34100 $MA_REFP_SET_POS.

The value of MD34100 $MA_REFP_SET_POS that has been set via NC/PLC interface signal DB380x DBX2.4 - .7 (Reference point value 1 to 4) is used.

Related to:

NC/PLC interface signal DB380x DBX2.4 - .7 (Reference point value 1 to 4)

34102	REFP_SYNC_ENCS			A03, A02	R1,Z1	
-	Calibration of measuring systems			BYTE	Reset	
-						
-	-	0	0	1	7/2	

Description:

Calibrating the measuring system to the reference measuring system can be activated for all measuring systems of this axis with this machine data.

The calibration procedure is made during reference point approach or when calibrated absolute encoders selected for the closed-loop control are switched on.

Values:

0: No measuring system calibration, measuring systems must be referenced individually

1: Calibration of all measuring systems of the axis to the position of the reference measuring system

In combination with MD30242 $MA_ENC_IS_INDEPENDENT = 2, the passive encoder is calibrated to the active encoder but NOT referenced.

34104	REFP_PERMITTED_IN_FOLLOWUP			A03, A02	R1	
-	Enable referencing in follow-up mode			BOOLEAN	Reset	
-						
-	-	FALSE	-	-	7/2	

Description:

An axis can also be referenced in the follow-up mode under JOG+REF mode by means of an external motion.

34110	REFP_CYCLE_NR			A03	G1,TE3,D1,R1,Z1	
-	Sequence of axes in channel-specific referencing			DWORD	PowerOn	
-						
-	-	1, 2, 3, 4, 5, 6, 7, 8...	-1	31	7/2	

Description: MD34110 $MA_REFP_CYCLE_NR = 0 -----> axis-specific referencing

Axis-specific referencing is started separately for each machine axis with the NC/PLC interface signal DB380x DBX4.7 / 4.6 (Plus/minus travel keys).

Up to 8 axes (840D) can be referenced simultaneously.

The following alternatives are provided for referencing the machine axes in a specific sequence:

- The operator has to observe the correct sequence on startup.
- The PLC checks the sequence on startup or defines the sequence itself.
- The channel-specific referencing function is used.

MD34110 $MA_REFP_CYCLE_NR = 1 -----> channel-specific referencing

Channel-specific referencing is started with the NC/PLC interface signal DB3200 DBX1.0 (Activate referencing). The control acknowledges a successful start with the NC/PLC interface signal DB3300 DBX1.0 (Referencing active). Each machine axis assigned to the channel can be referenced with channel-specific referencing (this is achieved internally on the control by simulating the plus/minus traversing keys). The axis-specific MD34110 $MA_REFP_CYCLE_NR can be used to define the sequence in which the machine axes are referenced:

-1 means:

The machine axis is not started by channel-specific referencing, and NC start is possible without referencing this axis.

0 means:

The machine axis is not started by channel-specific referencing, and NC start is not possible without referencing this axis.

1 means:

The machine axis is started by channel-specific referencing.

2 means:

The machine axis is started by channel-specific referencing if all machine axes identified by a 1 in MD34110 $MA_REFP_CYCLE_NR are referenced.

3 means:

The machine axis is started by channel-specific referencing if all machine axes identified by a 2 in MD34110 $MA_REFP_CYCLE_NR are referenced.

4 to 8 :

As above for further machine axes.

Setting the channel-specific MD20700 $MC_REF_NC_START_LOCK (NC start disable without reference point) to zero has the effect of entering -1 for all the axes of a channel.

MD irrelevant to:

Axis-specific referencing

Related to:

NC/PLC interface signal DB3200 DBX1.0 (Activate referencing)

NC/PLC interface signal DB3300 DBX1.0 (Referencing active)

34200	ENC_REFP_MODE			A03, A02	G1,R1,S1	
-	Referencing mode			BYTE	PowerOn	
-						
-	2	1, 1	0	8	7/2	

Description: The mounted position measuring systems can be classified for referencing as follows with MD34200 $MA_ENC_REFP_MODE:

- MD34200 $MA_ENC_REFP_MODE = 0

If an absolute encoder is available: MD34100 $MA_REFP_SET_POS is taken over

Other encoders: Reference point approach not possible (SW2.2 and higher)

- MD34200 $MA_ENC_REFP_MODE = 1

Referencing of incremental, rotary or linear measuring systems:

Zero pulse on the encoder track

Referencing of absolute, rotary measuring systems:

Replacement zero pulse based on the absolute information

- MD34200 $MA_ENC_REFP_MODE = 3

Referencing on linear measuring systems with distance-coded reference marks:

Linear measuring system with distance-coded reference marks (as specified by Heidenhain)

- MD34200 $MA_ENC_REFP_MODE = 4 :

Reserved (BERO with 2-edge evaluation)

- MD34200 $MA_ENC_REFP_MODE = 8

Referencing for linear measuring systems with distance-coded reference marks:

Linear measuring system with distance-coded reference marks over 4 zero marks (increased safety).

34210	ENC_REFP_STATE			A07, A03, A02	R1	
-	Adjustment status of absolute encoder			BYTE	Immediately	
-						
-	2	0, 0	0	3	7/4	

Description:

- Absolute encoder:

This machine data contains the absolute encoder status

0: Encoder is not calibrated

1: Encoder calibration enabled (but not yet calibrated)

2: Encoder is calibrated

Default setting for recommissioning: Encoder is not calibrated.

3: No significance, has the same effect as "0"

- Incremental encoder:

This machine data contains the "Referenced status", which can be saved beyond Power On:

0: Default setting: No automatic referencing

1: Automatic referencing enabled, but encoder not yet referenced

2: Encoder is referenced and at exact stop, automatic referencing becomes active at the next encoder activation

3: The last axis position buffered before switch off is restored, no automatic referencing

Default setting for recommissioning: No automatic referencing

34220	ENC_ABS_TURNS_MODULO			A03, A02	R1	
-	Modulo range for rotary absolute encoder			DWORD	PowerOn	
-						
-	2	4096, 4096	1	100000	7/2	

Description: The absolute position of a rotary axis is reduced to this resolvable range when an absolute encoder is switched on:

In other words, a MODULO transformation takes place if the actual position sensed is larger than the position permitted by MD ENC_ABS_TURNS_MODULO.

0 degrees <= position <= n*360 degrees (with n = ENC_ABS_TURNS_MODULO)

Note:

With SW 2.2, the position is reduced to this range when the control/encoder is switched on. With SW 3.6 and higher, half of this value represents the maximum permissible travel distance with the control swiched off/the encoder inactive.

Special cases:

This MD is relevant only for rotary encoders (on linear and rotary axes).

Related to:

34230	ENC_SERIAL_NUMBER			A02	R1	
-	Encoder serial number			DWORD	PowerOn	
-						
-	2	0, 0	-	-	7/2	

Description: The encoder serial number (EnDat encoders) can be read out here.

"0" is supplied for encoders which do not have a serial number available.

Manipulating this MD normally causes automatic absolute encoder maladjustment ($MA_ENC_REFP_MODE returns to "0").

34232	EVERY_ENC_SERIAL_NUMBER			A02	R1	
-	Range of encoder serial number			BOOLEAN	PowerOn	
-						
-	2	TRUE, TRUE	-	-	7/2	

Description: 0 = only valid encoder serial number are entered in the MD, i.e. when the drive supplies a "0" (which corresponds to invalid or unknown) the last valid encoder serial number is retained in the MD (e.g. for add-on axes that are not permanently connected to the machine).

1 = (default, upward compatible): the value supplied by the drive for the encoder serial number is taken over into the MD with every control runup. A validity check is not carried out.

34300	ENC_REFP_MARKER_DIST			A03, A02	R1	
mm, degrees	Basic distance of reference marks of distance-coded encoders.			DOUBLE	PowerOn	
-						
-	2	10.0, 10.0	-	-	7/2	

Description: In addition to the incremental encoder track, a further encoder track is available with distance-coded measuring systems for determining the absolute encoder position. This encoder track has reference marks at defined, different distances. The basic distance between the fixed reference marks (which are the reference marks that are always the same distance from one another) can be taken from the data sheet, and directly transferred into machine data MD34300 $MA_ENC_REFP_MARKER_DIST.

With the basic distance between the fixed reference marks (MD34300 $MA_ENC_REFP_MARKER_DIST), the distance between two reference marks (MD34310 $MA_ENC_MARKER_INC), and the number of encoder marks (MD31020 $MA_ENC_RESOL) on angular measuring systems or the graduation cycle (MD31010 $MA_ENC_GRID_POINT_DIST) on linear measuring systems, the absolute encoder position can be determined once two successive reference marks have been crossed.

MD34300 $MA_ENC_REFP_MARKER_DIST is also used for a plausibility check of reference mark distances.

Examples of application:

For example: Heidenhain LS186 C

MD 31010 = 0.02mm (graduation cycle)

MD 34300 = 20.00mm (basic distance between the reference marks)

MD 34310 = 0.02mm (distance between two reference marks corresponds to one graduation cycle).

34310	ENC_MARKER_INC			A03, A02	R1	
mm, degrees	Interval between two reference marks for distance-coded scales			DOUBLE	Reset	
-						
-	2	0.02, 0.02	-	-	7/2	

Description: The distances between two reference marks are defined variably, so that the position of the crossed reference marks can be determined accurately in linear measuring systems with distance-coded reference marks.

The difference between two reference mark distances is entered in MD34310 $MA_ENC_MARKER_INC.

MD irrelevant for:

Incremental measuring systems

Special cases:

On linear measuring systems with distance-coded reference marks supplied by Heidenhain, the interval between two reference marks is always equal to one graduation cycle.

34320	ENC_INVERS			A03, A02	G2,R1	
-	Length measuring system inverse to axis movement.			BOOLEAN	Reset	
-						
-	2	FALSE, FALSE	-	-	7/2	

Description:

- In the case of a distance-coded measuring system:

When setting a reference point, the actual position (determined by the distance-coded reference marks) on the linear measuring system is assigned to an exact machine axis position (referred to the machine zero point). The absolute offset between the machine zero point and the position of the 1st reference mark on the linear measuring system must therefore be entered in MD34090 $MA_REFP_MOVE_DIST_CORR (reference point/absolute offset). In addition, MD34320 $MA_ENC_INVERS must be used to set whether the linear measuring system is connected in the same or the opposite direction to the machine system.

MD irrelevant to:

Incremental encoders without distance-coded reference marks.

34330	REFP_STOP_AT_ABS_MARKER			A03	G1,R1	
-	Distance-coded linear measuring system without target point			BOOLEAN	Reset	
-						
-	2	TRUE, TRUE	-	-	7/2	

Description:

- Distance-coded measuring system:

REFP_STOP_AT_ABS_MARKER = 0:

At the end of the reference cycle, the position entered in MD34100 $MA_REFP_SET_POS is approached (normal case for phase 2).

REFP_STOP_AT_ABS_MARKER = 1:

The axis is braked after detection of the second reference mark (shortening of phase 2)

- Absolute encoder:

MD34330 $MA_REFP_STOP_AT_ABS_MARKER defines the response of an axis with a valid calibration identifier (MD34210 $MA_ENC_REFP_STATE = 2) with G74 or when a traversing key is actuated in JOG-REF:

REFP_STOP_AT_ABS_MARKER = 0:

Axis traverses to the position entered in MD34100 $MA_REFP_SET_POS

REFP_STOP_AT_ABS_MARKER = 1:

Axis does not traverse.

MD irrelevant for:

Incremental encoders with zero mark (standard encoders)

Related to:

MD34100 $MA_REFP_SET_POS

(reference point distance/target point for distance-coded system)

34400	ENC_SSI_STATUS			A03, A11	G2	
-	Synchronization data for SSI absolute value encoder			BYTE	PowerOn	
-						
-	2	0x0, 0x0	-	-	7/2	

Description:

```
Synchronization data for SSI absolute value encoder:
Bit 0 (LSB) (measured value code)   = 0 -> Gray code
                             = 1 -> binary code
Bit 1 (parity test)          = 0 -> no
                             = 1 -> yes
Bit 2 (parity)               = 0 -> uneven parity
                             = 1 -> even parity
Bit 3 (measurement)          = 0 -> no provision for measurement
                             = 1 -> activate encoder for measurement
Bit 4 (probe selection)      = 0 -> probe with BEROMEPU3
                             = 1 -> probe with BEROMEPU4
Bit 5                        = currently of no relevance
Bit 6                        = currently of no relevance
Bit 7                        = currently of no relevance
```

34410	ENC_SSI_MESSAGE_LENGTH			A02, A03, A11	G2	
-	Telegram length for SSI absolute value encoder			BYTE	PowerOn	
-						
-	2	0, 0	0	3	7/2	

Description:

```
Telegram length for SSI absolute value encoder
Value:       0       Default: 25 bits for multi-turn encoder
            1       13 bits for single-turn encoder
            2       21 bits for multi-turn encoder
            3       25 bits for multi-turn encoder
```

34420	ENC_SSI_MESSAGE_FORMAT			A03, A11, A02	G2	
-	Steps per encoder revolution			BYTE	PowerOn	
-						
-	2	0, 0	0	13	7/2	

Description: In the case of SSI absolute value encoders, the steps per encoder revolution are used
here to define the telegram format within the telegram length.

Value:

0	right-aligned
1	8192 steps/revolution in fir-tree format
2	4096 steps/revolution in fir-tree format
3	2048 steps/revolution in fir-tree format
4	1024 steps/revolution in fir-tree format
5	512 steps/revolution in fir-tree format
6	256 steps/revolution in fir-tree format
7	128 steps/revolution in fir-tree format
8	64 steps/revolution in fir-tree format
9	32 steps/revolution in fir-tree format
10	16 steps/revolution in fir-tree format
11	8 steps/revolution in fir-tree format
12	4 steps/revolution in fir-tree format
13	2 steps/revolution in fir-tree format

34800	WAIT_ENC_VALID			A01	-	
-	Parameter setting for part program command WAITENC			DWORD	PowerOn	
-						
-	-	0	0	1	7/2	

Description: Parameter setting for part program command WAITENC:

0: Axis is not taken into account when waiting for synchronized / referenced or restored position with part program command WAITENC.

1: A delay is applied in part program command WAITENC until a synchronized / referenced or restored position is available for this axis.

34990	ENC_ACTVAL_SMOOTH_TIME			A02	V1	
s	Smoothing time constant for actual values.			DOUBLE	Reset	
-						
-	2	0.0, 0.0	0.0	0.5	7/2	

Description: Using low-resolution encoders, a more continuous motion of coupled path or axis motions can be achieved with smoothed actual values. The bigger the time constant, the better the smoothing of actual values and the larger the over-travel.

Smoothed actual values are used for:

- Thread-cutting (G33, G34, G35)
- Revolutional feedrate (G95, G96, G97, FPRAON)
- Display of actual position and velocity, or speed respectively.

35000	SPIND_ASSIGN_TO_MACHAX			A01, A06, A11	M1,S3,K2,S1		
-	Assignment of spindle to machine axis			BYTE	PowerOn		
-							
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/2		

Description: Spindle definition. The spindle is defined when the spindle number has been entered in this MD.

Example:

If the corresponding axis is to be spindle 1, value "1" must be entered in this MD.

The spindle functions are possible only for modulo rotary axes. For this purpose MD30300 $MA_IS_ROT_AX and MD30310 $MA_ROT_IS_MODULO must be set.

The axis functionality is maintained; transition to axis operation can be performed with M70.

The gear stage-specific spindle data are set in parameter blocks 1 to 5; parameter block 0 is used for axis operation (MD35590 $MA_PARAMSET_CHANGE_ENABLE).

The lowest spindle number is 1, the highest number depends on the number of axes in the channel.

If other spindle numbers are to be assigned, the function "spindle converter" must be used.

With multi-channel systems, the same numbers can be assigned in all channels, except for those spindles active in several channels (replacement axes/spindles MD 30550: $MA_AXCONF_ASSIGN_MASTER_CHAN).

35010	GEAR_STEP_CHANGE_ENABLE			A06, A11	P3 pl,P3 sl,S1	
-	Parameterize gear stage change			DWORD	Reset	
CTEQ						
-	-	0x00	0	0x2B	7/2	

Description:

Meaning of bit places:

Bit 0 = 0 and bit 1 = 0:

There is an invariable gear ratio between motor and load. The MD of the first gear stage is active. Gear stage change is not possible with M40 to M45.

Bit 0 = 1:

Gear stage change at undefined change position. The gear can have up to 5 gear stages, which can be selected with M40, M41 to M45. To support the gear stage change, the motor can carry out oscillating motions, which must be enabled by the PLC program.

Bit 1 = 1:

Same meaning as bit 0 = 1, although the gear stage change is carried out in a configured spindle position (SW 5.3 and higher). The change position is configured in MD35012 $MA_GEAR_STEP_CHANGE_POSITION. The position is approached in the current gear stage before the gear stage change. If this bit is set, bit 0 is not taken into account!

Bit 2: Reserved

Bit 3 = 1:

The gear stage change dialog between NCK and PLC is simulated. The setpoint gear stage is output to the PLC. A checkback signal from the PLC is not awaited. The acknowledgment is generated internally in the NCK.

Bit 4: Reserved

Bit 5 = 1:

The second gear stage data set is used for tapping with G331/G332. The bit must be set for the master spindle used for tapping. Bit 0 or bit 1 must be set.

Related to:

MD35090 $MA_NUM_GEAR_STEPS (number of gear stages 1st data set, see bit 5)

MD35092 $MA_NUM_GEAR_STEPS2 (number of gear stages 2nd data set, see bit 5)

MD35110 $MA_GEAR_STEP_MAX_VELO (max. speed for autom. gear stage change)

MD35112 $MA_GEAR_STEP_MAX_VELO2 (max. speed for autom. gear stage change 2nd data set, see bit 5)

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for autom. gear stage change)

MD35122 $MA_GEAR_STEP_MIN_VELO2 (min. speed for autom. gear stage change 2nd data set, see bit 5)

35012	GEAR_STEP_CHANGE_POSITION			A06, A11	S1	
mm, degrees	Gear stage change position			DOUBLE	NEW CONF	
CTEQ						
-	6	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/2	

Description:

Gear stage change position.

The value range must be within the configured modulo range.

Related to:

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE, bit 1

MD30330 $MA_MODULO_RANGE

35014	GEAR_STEP_USED_IN_AXISMODE			A01, A06, A11	-	
-	Gear stage for axis mode with M70			DWORD	NEW CONF	
CTEQ						
-	-	0	0	5	7/2	

Description: With this MD, a gear stage can be defined which can be loaded into the axis mode during the transition with M70. The parameter set zero used in axis mode is to be optimized on this gear stage.

Significance of the values:

0: There is no implicit gear stage change with M70.

The current gear stage is retained.

1 ... 5:

There is a change into gear stage (1...5) during the execution of M70.

During the transition into axis mode without M70, there is monitoring for this gear stage and alarm 22022 is issued if necessary. The condition for a gear stage change is the general release of the function in MD35010 $MA_GEAR_STEP_CHANGE_ENABLE.

Secondary conditions:

When changing from axis mode into spindle mode, the configured gear stage continues to remain active. There is no automatic return to the last active gear stage in spindle mode.

35020	SPIND_DEFAULT_MODE			A06, A10	S1	
-	Initial spindle setting			BYTE	Reset	
CTEQ						
-	-	0	0	3	7/2	

Description: SPIND_DEFAULT_MODE activates the set operating mode of the spindle at the time specified in MD35030 $MA_SPIND_DEFAULT_ACT_MASK. The appropriate spindle operating modes can be set with the following values:

0 Speed mode, position control deselected

1 Speed mode, position control activated

2 Positioning mode, no check for synchronized/referenced position on NC start

3 Axis mode, MD34110 $MA_REFP_CYCLE_NR can be used to configure / deactivate forced referencing on NC start

Corresponds with:

MD35030 $MA_SPIND_DEFAULT_ACT_MASK (activate spindle initial setting)

MD20700 $MC_REFP_NC_START_LOCK (NC start disable without reference point)

35030	SPIND_DEFAULT_ACT_MASK			A06, A10	S1	
-	Time at which initial spindle setting is effective			BYTE	Reset	
CTEQ						
-	-	0x00	0	0x03	7/2	

Description: SPIND_DEFAULT_ACT_MASK specifies the time at which the operating mode defined in MD35020 $MA_SPIND_DEFAULT_MODE becomes effective. The initial spindle setting can be assigned the following values at the following points in time:

0 POWER ON

1 POWER ON and NC program start

2 POWER ON and RESET (M2/M30)

Special cases:

If MD35040 $MA_SPIND_ACTIVE_AFTER_RESET = 1, the following supplementary conditions are applicable:

- SPIND_DEFAULT_ACT_MASK should be set to 0
- If this is not possible, the spindle must be at a standstill prior to activation.

Related to:

MD35020 $MA_SPIND_DEFAULT_MODE (initial spindle setting)

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET (spindle active after reset)

35032	SPIND_FUNC_RESET_MODE			A06, A10	-	
-	Reset response of individual spindle functions			DWORD	PowerOn	
CTEQ						
-	-	0x00	0	0x01	7/2	

Description: This data allows the "GWPS in every operating mode" function to be selected/deselected.

SPIND_FUNC_RESET_MODE, bit 0 = 0 : "GWPS in every operating mode" is deselected

SPIND_FUNC_RESET_MODE, bit 0 = 1 : "GWPS in every operating mode" is selected

35035	SPIND_FUNCTION_MASK			A06, A10	K1,S1	
-	Spindle functions			DWORD	Reset	
CTEQ						
-	-	0x510	-	-	7/2	

Description: This MD allows spindle-specific functions to be set.

The MD is bit-coded, the following bits are assigned:

Bit 0 = 1: Gear stage changes are suppressed with activated DryRun function for block programming (M40, M41 to M45), programming via FC18, and synchronized actions.

Bit 1 = 1: Gear stage changes are suppressed with activated program test function for block programming (M40, M41 to M45), programming via FC18, and synchronized actions.

Bit 2 = 1: Gear stage change for programmed gear stage will finally be carried out after deselection of DryRun or program test functions with REPOS.

Bit 3: reserved

Bit 4 = 1:

The programmed speed is transferred to SD 43200 $SA_SPIND_S (incl. speed default settings via FC18 and synchronized actions).

S programmings that are not speed programmings are not written to the SD. These include, for example, S value with constant cutting velocity (G96, G961), S value with revolution-related dwell time (G4).

Bit 5 = 1:

The content of SD 43200 $SA_SPIND_S is applied as the speed setpoint for JOG. If the content is zero, then other JOG speed default settings become active (see SD 41200 JOG_SPIND_SET_VELO).

Bit 6: reserved

Bit 7: reserved

Bit 8 = 1:

The programmed cutting velocity is transferred to SD 43202 $SA_SPIND_CONSTCUT_S (incl. default settings via FC18). S programmings, that are not cutting velocity programmings, are not written to the SD. These include, for example, S value outside of constant cutting velocity (G96, G961, G962), S value with revolution-related dwell time (G4), S value in synchronized actions.

Bit 9: reserved

Bit 10 = 0:

SD 43206 $SA_SPIND_SPEED_TYPE is not changed by part program or channel settings,

= 1:

For the master spindle, the value of the 15th G group (type of feedrate) is transferred to SD 43206 $SA_SPIND_SPEED_TYPE. For all other spindles, the corresponding SD remains unchanged.

Bit 11: reserved

Bit 12 = 1:

Spindle override is active with zero mark search for M19, SPOS, and SPOSA

= 0:

Previous response (default)

The following bits 16-20 can be used to set spindle-specific M functions which are output to the VDI interface

if the corresponding M functionality has been generated implicitly for the program sequence.

Bit 16: reserved

Bit 17: reserved

Bit 18: reserved

Bit 19:"Output implicit M19 to PLC"

= 0: If MD20850 $MC_SPOS_TO_VDI = 0 too, no auxiliary function M19 is generated for SPOS and SPOSA. As a result, the acknowledgment time for the auxiliary function is also eliminated. This can cause problems in the case of short blocks.

= 1: The implicit auxiliary function M19 is generated with the programming of SPOS and SPOSA and output to the PLC. The address is expanded in accordance with the spindle number.

Bit 20:"Output implicit M70 to PLC"

= 0: No generation of implicit auxiliary function M70. Note: A programmed auxiliary function M70 is always output to the PLC.

= 1: Auxiliary function M70 is generated implicitly and output to the PLC on transition to axis mode. The address is expanded in accordance with the spindle number.

Bit 21: reserved

Bit 22 = 0: As of NCK version 78.00.00: The NC/PLC interface signal DB380x DBX2001.6 (invert M3/M4) is applied to the function for interpolatory tapping G331/G332.

Bit 22 = 1: Response is compatible with SW releases prior to NCK version 78.00.00: The NC/PLC interface signal DB380x DBX2001.6 (invert M3/M4) is not applied to the function for interpolatory tapping G331/G332.

MD is Corresponds with:

MD20850 $MC_SPOS_TO_VDI

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET

MD35020 $MA_SPIND_DEFAULT_MODE

SD43200 $SA_SPIND_S

35040	SPIND_ACTIVE_AFTER_RESET			A06, A10	S1,Z1,2.7	
-	Own spindle RESET			BYTE	PowerOn	
CTEQ						
-	-	0	0	2	7/2	

Description:

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET defines the response of the spindle after channel reset NC/PLC interface signal DB3000 DBX0.7 (Reset) and program end (M2, M30).

This MD is only active in the spindle mode open-loop control mode. In positioning mode or oscillation mode, the spindle is always stopped.

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET = 0:

- Spindle stops (with M2/M30 and channel and mode group reset).
- Program is aborted.
- For spindle mode, the programmed ACC and VELOLIM are reset to 100% if MD22400 $MC_S_VALUES_ACTIVE_AFTER_RESET and the axis-specific MD32320 $MA_DYN_LIMIT_RESET_MASK do not specify anything else.

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET= 1:

- Spindle does not stop.
- Program is aborted.
- For spindle mode, the programmed ACC and VELOLIM are retained.

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET= 2:

- Spindle does not stop at the M function configured via MD10714 $MN_M_NO_FCT_EOP (e.g. M32).
- However, the spindle stops at channel or mode group reset.
- For spindle mode, the programmed ACC and VELOLIM are retained.

The NC/PLC interface signal DB380x DBX2.2 (Delete distance-to-go/Spindle reset) is always effective, independent of MD35040 $MA_SPIND_ACTIVE_AFTER_RESET.

Not relevant to:

- Spindle modes other than open-loop control mode.

Related to:

NC/PLC interface signal DB3000 DBX0.7 (Reset)

NC/PLC interface signal DB380x DBX2.2 (Delete distance-to-go/Spindle reset)

35090	NUM_GEAR_STEPS			A06, A10	S1	
-	Number of gear stages			DWORD	Reset	
-						
-	-	5	1	5	2/2	

Description: Number of set gear stages.

The first gear stage is always available.

Corresponding MDs:

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stages available/functions)

MD35012 $MA_GEAR_STEP_CHANGE_POSITION (gear stage change position)

MD35014 $MA_GEAR_STEP_USED_IN_AXISMODE (gear stage for axis mode with M70)

MD35110 $MA_GEAR_STEP_MAX_VELO (max. speed for gear stage change)

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for gear stage change)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (max. speed of gear stage)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (min. speed of gear stage)

MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL (acceleration in speed control mode)

MD35210 $MA_GEAR_STEP_POSCTRL_ACCEL (acceleration in position control mode)

MD35310 $MA_SPIND_POSIT_DELAY_TIME (positioning delay time)

MD35550 $MA_DRILL_VELO_LIMIT (maximum speeds for tapping)

MD35092 $MA_NUM_GEAR_STEPS2 (number of gear stages 2nd gear stage data set)

35092	NUM_GEAR_STEPS2			A06, A10	S1	
-	Number of gear stages of 2nd gear stage data set			DWORD	Reset	
-						
-	-	5	1	5	2/2	

Description: Number of set gear stages of the second gear stage data set for the function 'Tapping with G331/G332'.

Activation (only makes sense for master spindle on tapping): MD 35010 $MA_GEAR_STEP_CHANGE_ENABLE, bit 5.

The number of gear stages must not be the same in the first and second gear stage data sets.

Corresponding MD:

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stages available/functions)

MD35112 $MA_GEAR_STEP_MAX_VELO2 (2nd gear stage data set: max. speed for gear stage change)

MD35122 $MA_GEAR_STEP_MIN_VELO2 (2nd gear stage data set: min. speed for gear stage change)

MD35212 $MA_GEAR_STEP_POSCTRL_ACCEL2 (2nd gear stage data set: acceleration in position control mode)

35100	SPIND_VELO_LIMIT			A06, A11, A04	TE3,G2,S1,V1,Z1	
rev/min	Maximum spindle speed			DOUBLE	Reset	
CTEQ						
-	-	10000.0	1.0e-3	-	7/2	

Description: MD35100 $MA_SPIND_VELO_LIMIT defines the maximum spindle speed that the spindle (the spindle chuck with the workpiece or the tool) must not exceed. The NCK limits an excessive spindle setpoint speed to this value. If the maximum spindle actual speed is exceeded, even allowing for the spindle speed tolerance (MD35150 $MA_SPIND_DES_VELO_TOL), there is a fault with the drive and the NC/PLC interface signal DB390x DBX2001.0 (speed limit exceeded) is set. Alarm 22100 "Maximum speed reached" is also output and all axes and spindles on the channel are decelerated (provided the encoder is still functioning correctly). The spindle has to be brought to a standstill before modifying the MD.

Corresponds with:

MD35150 $MA_SPIND_DES_VELO_TOL (spindle speed tolerance)

SD43235 $SA_SPIND_USER_VELO_LIMIT (user-side velocity limiting)

NC/PLC interface signal DB390x DBX2001.0 (speed limit exceeded)

Alarm 22100 "Maximum speed reached"

35110	GEAR_STEP_MAX_VELO			A06, A11, A04	A3,S1	
rev/min	Maximum speed for gear stage change			DOUBLE	NEW CONF	
CTEQ						
-	6	500., 500., 1000., 2000., 4000., 8000.	-	-	7/2	

Description: MD35110 $MA_GEAR_STEP_MAX_VELO defines the maximum speed (upper switching threshold) of the gear stage for automatic gear stage change M40 S... The speed ranges for the gear stages must be defined without gaps between them or can overlap.

Incorrect

MD35110 $MA_GEAR_STEP_MAX_VELO [gear stage1] =1000

MD35120 $MA_GEAR_STEP_MIN_VELO [gear stage2] =1200

Correct

MD35110 $MA_GEAR_STEP_MAX_VELO [gear stage1] =1000

MD35120 $MA_GEAR_STEP_MIN_VELO [gear stage2] = 950

Note:

- Programming a spindle speed which exceeds the highest numbered gear stage MD35110 $MA_GEAR_STEP_MAX_VELO [MD35090] triggers a switch to the highest gear stage (MD35090).

Related to:

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for automatic gear stage selection M40)

MD35090 $MA_NUM_GEAR_STEPS (number of gear stages)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage change is possible)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of gear stage with speed control

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of gear stage with position control

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (min. speed of gear stage)

35112	GEAR_STEP_MAX_VELO2			A06, A11, A04	S1	
rev/min	2nd data set: Maximum speed for gear stage change			DOUBLE	NEW CONF	
CTEQ						
-	6	500., 500., 1000., 2000., 4000., 8000.	0	-	2/2	

Description: -

The 2nd gear stage data blockfor tapping with G331/G332 is activated with MD 35010:$MA_GEAR_STEP_CHANGE_ENABLE bit 5 for the master spindle.

Related to:

MD35122 $MA_GEAR_STEP_MIN_VELO2 (minimum speed for 2nd data block gear stage selection)

MD35092 $MA_NUM_GEAR_STEPS2 (number of gear stages 2nd gear stage data block)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage change, 2nd data block is possible)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of gear stage with speed control)

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of gear stage with position control)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (min. speed of gear stage)

35120	GEAR_STEP_MIN_VELO			A06, A11, A04	S1	
rev/min	Minimum speed for gear stage change			DOUBLE	NEW CONF	
CTEQ						
-	6	50., 50., 400., 800., 1500., 3000.	-	-	7/2	

Description: -

See MD35120 $MA_GEAR_STEP_MAX_VELO for more information.

Note:

- Programming a spindle speed which undershoots the lowest speed of the first gear stage MD35120 $MA_GEAR_STEP_MIN_VELO[1] triggers a switch to the first gear stage.

Not relevant for:

- Programming of speed 0 (S0) if MD35120 $MA_GEAR_STEP_MIN_VELO[1] > 0

Related to:

MD35110 $MA_GEAR_STEP_MAX_VELO (maximum speed for automatic gear stage selection M40)

MD35090 $MA_NUM_GEAR_STEPS (number of gear stages)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage change is possible)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of the gear stage with speed control)

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of the gearstage with position control)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (min. speed of the gear stage)

35122	GEAR_STEP_MIN_VELO2			A06, A11, A04	S1	
rev/min	2nd data set: Minimum speed for gear stage change			DOUBLE	NEW CONF	
CTEQ						
-	6	50., 50., 400., 800., 1500., 3000.	0	-	2/2	

Description: The minimum speed (lower switching threshold) of the gear stage for automatic gear stage change M40 G331 S.. is set in GEAR_STEP_MIN_VELO2 for interpolatory tapping G331, G332. The speed ranges of the gear stages must be defined so that there are no gaps between them or they can overlap.

The 2nd gear stage data block for tapping with G331/G332 is activated with MD35010 $MA_GEAR_STEP_CHANGE_ENABLE bit 5 for the master spindle.

Related to:

MD35112 $MA_GEAR_STEP_MAX_VELO2 (maximum speed for 2nd data block gear stage change)

MD35092 $MA_NUM_GEAR_STEPS2 (number of gear stages 2nd gear stage data block)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage change, 2nd data block is possible)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of gear stage with speed control)

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of gear stage with position control)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (min. speed of gear stage)

35130	GEAR_STEP_MAX_VELO_LIMIT			A06, A11, A04	A2,S1,V1	
rev/min	Maximum speed of gear stage			DOUBLE	NEW CONF	
CTEQ						
-	6	500., 500., 1000., 2000., 4000., 8000.	1.0e-3	-	7/2	

Description: The maximum speed of the current gear stage for speed control mode (position control not active) is configured in MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT. The speed setpoints generated taking the override into account are limited to this speed.

Note:

- The configured speed cannot exceed the value from MD35100 $MA_SPIND_VELO_LIMIT.
- If position control is active for the spindle, the speed is limited to the maximum speed of MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT.
- The NC/PLC interface signal "Setpoint speed limited" is set to indicate that the speed is being limited.
- The maximum speed entered here has no effect on the automatic gear stage selection M40 S..
- The upper switching threshold for the automatic gear stage selection M40 is configured in MD35110 $MA_GEAR_STEP_MAX_VELO.

Related to:

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of the gear stage with position control)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (minimum speed of the gear stage)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage selection is possible)

MD35110 $MA_GEAR_STEP_MAX_VELO (max. speed for automatic gear stage selection M40)

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for automatic gear stage selection M40)

35135	GEAR_STEP_PC_MAX_VELO_LIMIT			A06, A11, A04	S1		
rev/min	Maximum speed of the gear stage with position control			DOUBLE	NEW CONF		
CTEQ							
-	6	0., 0., 0., 0., 0., 0.	0	-	7/2		

Description:

The maximum speed of the current gear stage is configured in MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT with position control active. The speed setpoints generated taking the override into account are limited to this speed.

If a value of 0 is set (default), 90% of the value from MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT will become the maximum speed with position control active.

Note:

- The configured speed cannot exceed the value from MD35100 $MA_SPIND_VELO_LIMIT.
- The NC/PLC interface signal "Setpoint speed limited" is set to indicate that the speed is being limited.
- The maximum speed entered here has no effect on the automatic gear stage selection M40 S..
- The upper switching threshold for the automatic gear stage selection M40 is configured in MD35110 $MA_GEAR_STEP_MAX_VELO.

Related to:

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of the gear stage with spee control)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (minimum speed of the gear stage)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage selection is possible)

MD35110 $MA_GEAR_STEP_MAX_VELO (max. speed for automatic gear stage selection M40)

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for automatic gear stage selection M40)

35140	GEAR_STEP_MIN_VELO_LIMIT			A06, A11, A04	S1,V1	
rev/min	Minimum speed of gear stage			DOUBLE	NEW CONF	
CTEQ						
-	6	5., 5., 10., 20., 40., 80.	-	-	7/2	

Description: The minimum speed of the current gear stage is configured in MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT. The minimum speed is applied only if the spindle is in speed control mode. The speed setpoints generated taking the override into account do not undershoot the minimum speed.

Note:

- If an S value lower than the minimum speed is programmed, the setpoint speed is increased to the minimum speed.
- The NC/PLC interface signal "Setpoint speed increased" is set to indicate that the speed has been increased.
- The minimum speed entered here has no effect on the automatic gear stage selection M40 S..
- The lower switching threshold for the automatic gear stage selectionM40 is configured in MD35120 $MA_GEAR_STEP_MIN_VELO.

Not relevant for:

- Spindle oscillation mode(gear stage change)
- Positioning and axis spindle modes
- Signals which cause the spindle to stop

Related to:

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of gear stage with speed control)

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of gear stage with position control)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage change is possible)

MD35110 $MA_GEAR_STEP_MAX_VELO (max. speed for automatic gear stage selection M40)

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for automatic gear stage selection M40)

35150	SPIND_DES_VELO_TOL			A03, A05, A06, A10, A04	R1,S1,Z1	
-	Spindle speed tolerance			DOUBLE	Reset	
-						
-	-	0.1	0.0	1.0	7/2	

Description: In spindle control mode, the set speed (programmed speed x spindle offset, allowing for limits) is compared with the actual speed.

- If the actual speed deviates from the set speed by more than MD35150 $MA_SPIND_DES_VELO_TOL, the NC/PLC interface signal is DB390x DBX2001.5 (Spindle in setpoint range) is set to zero.
- If the actual speed deviates from the set speed by more than MD35150 $MA_SPIND_DES_VELO_TOL, the path feed is disabled (positioning axes continue traversing).
- If the actual speed exceeds the maximum spindle speed (MD35100 $MA_SPIND_VELO_LIMIT) by more than MD35150 $MA_SPIND_DES_VELO_TOL, the NC/PLC interface signal is DB390x DBX2001.0 (Speed limit exceeded) is enabled and alarm 22050 "Maximum speed reached" is output. All axes and spindles on the channel are decelerated.

MD irrelevant to:

- Spindle oscillation mode
- Spindle positioning mode

Example:

MD 35150 $MA_SPIND_DES_VELO_TOL = 0.1

The actual spindle speed must not deviate from the set speed by more than +/- 10%.

Related to:

MD35500 $MA_SPIND_ON_SPEED_AT_IPO_START

(feed enable for spindle in setpoint range)

MD35100 $MA_SPIND_VELO_LIMIT

(maximum spindle speed)

NC/PLC interface signal DB390x DBX2001.5 (Spindle in setpoint range)

NC/PLC interface signal DB390x DBX2001.0 (Speed limit exceeded)

Alarm 22050 "Maximum speed reached"

35160	SPIND_EXTERN_VELO_LIMIT			A06, A04	A3,S1,V1,Z1	
rev/min	Spindle speed limitation from PLC			DOUBLE	NEW CONF	
CTEQ						
-	-	1000.0	1.0e-3	-	7/2	

Description: A limiting value for the maximum spindle speed is entered in MD35160 $MA_SPIND_EXTERN_VELO_LIMIT, which is taken into account exactly when the NC/PLC interface signal DB380x DBX3.6 (Velocity/speed limitation) is set.

The control limits a spindle speed which is too high to this value.

35200	GEAR_STEP_SPEEDCTRL_ACCEL			A06, A11, A04, -	S1	
rev/s²	Acceleration in speed control mode			DOUBLE	NEW CONF	
CTEQ						
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	7/2	

Description: If the spindle is in speed control mode, the acceleration is entered in MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL.

The spindle is in speed control mode with the function SPCOF.

Special cases:

The acceleration in speed control mode (MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL) can be set so that the electric current limit is reached.

Related to:

MD35210 $MA_GEAR_STEP_POSCTRL_ACCEL(acceleration in position control mode)

MD35220 $MA_ACCEL_REDUCTION_SPEED_POINT (speed limit for reduced acceleration)

35210	GEAR_STEP_POSCTRL_ACCEL			A06, A11, A04, -	S1	
rev/s²	Acceleration in position control mode			DOUBLE	NEW CONF	
CTEQ						
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	7/2	

Description: The acceleration in position control mode must be set so that the electric current limit is not reached.

Related to:

MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL

MD35212 $MA_GEAR_STEP_POSCTRL_ACCEL2

35212	GEAR_STEP_POSCTRL_ACCEL2			A06, A11, A04, -	S1	
rev/s²	2nd data set: Acceleration in position control mode			DOUBLE	NEW CONF	
CTEQ						
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	2/2	

Description: Second gear stage data set for maximum acceleration capability of the gear stages in position control mode.

The acceleration in position control mode must be set so that the electric current limit is not reached.

The 2nd data set for tapping with G331/G332 is activated by MD35010 $MA_GEAR_STEP_CHANGE_ENABLE, bit 5 for the master spindle.

Related to:

MD35210 $MA_GEAR_STEP_POSCTRL_ACCEL

MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL

MD35220 $MA_ACCEL_REDUCTION_SPEED_POINT

35220	ACCEL_REDUCTION_SPEED_POINT			A06, A04	S1,S3,B2	
-	Speed for reduced acceleration			DOUBLE	Reset	
-						
-	-	1.0	0.0	1.0	7/2	

Description: This machine data defines the threshold speed/velocity for spindles/positioning/path axes from which the acceleration reduction is to start. The reference is the defined maximum speed/velocity. The starting point is a percentage of the maximum values.

Example: MD35220 $MA_ACCEL_REDUCTION_SPEED_POINT = 0.7, the maximum speed is 3000 rpm. Acceleration reduction starts at v_on = 2100 rpm, i.e. the maximum acceleration capacity is utilized in the speed range 0...2099.99 rpm. Reduced acceleration is used from 2100 rpm to the maximum speed.

Related to:

MD32000 $MA_MAX_AX_VELO

(maximum axis velocity)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT

(maximum gear stage speed)

MD35230 $MA_ACCEL_REDUCTION_FACTOR

(reduced acceleration)

35230	ACCEL_REDUCTION_FACTOR			A06, A04	S1,S3,B2	
-	Reduced acceleration			DOUBLE	Reset	
CTEQ						
-	-	0.0	0.0	0.95	7/2	

Description: The machine data contains the factor by which the acceleration of the spindle/positioning/path axes is reduced with reference to the maximum speed/velocity. The acceleration is reduced by this factor between the threshold speed/velocity defined in MD35220 $MA_ACCEL_REDUCTION_SPEED_POINT and the maximum speed/velocity.

Example:

a= 10 rev/s², v_on = 2100 rpm, MD35230 $MA_ACCEL_REDUCTION_FACTOR = 0.3.

Acceleration and deceleration take place within the speed range 0...2099.99 rpm with an acceleration of 10 rev/s². From a speed of 2100 rpm up to the maximum speed, the acceleration is reduced from 10 rev/s² to 7 rev/s².

MD irrelevant to:

Errors that lead to rapid stop.

Related to:

MD32300 $MA_MAX_AX_ACCEL (axis acceleration)

MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL

(acceleration in speed control mode)

MD35210 $MA_GEAR_STEP_POSCTRL_ACCEL

(acceleration in position control mode)

MD35242 $MA_ACCEL_REDUCTION_SPEED_POINT

(speed for reduced acceleration)

35240	ACCEL_TYPE_DRIVE			A04	B1,B2	
-	Acceleration curve DRIVE for axes ON/OFF			BOOLEAN	Reset	
CTEQ						
-	-	FALSE	-	-	7/2	

Description: Basic setting of the acceleration response of the axis (positioning, oscillation, JOG, path motions):

FALSE: No acceleration reduction

TRUE: Acceleration reduction active

MD is active only when MD32420 $MA_JOG_AND_POS_JERK_ENABLE = FALSE.

The settings in MD35220 $MA_ACCEL_REDUCTION_SPEED_POINT and MD35230 $MA_ACCEL_REDUCTION_FACTOR are always active for spindles (in spindle mode).

Remark:

This MD also influences the path motion with SOFT, BRISK, TRAFO

35242	ACCEL_REDUCTION_TYPE			A04	B1,B2	
-	Type of acceleration reduction			BYTE	Reset	
CTEQ						
-	-	1	0	2	7/2	

Description: Shape of acceleration reduction characteristic with DRIVE velocity control

0: Constant

1: Hyperbolic

2: Linear

35300	SPIND_POSCTRL_VELO			A06, A04	P3 pl,P3 sl,R1,S1	
rev/min	Position control activation speed			DOUBLE	NEW CONF	
CTEQ						
-	6	500.0, 500.0, 500.0, 500.0, 500.0, 500.0	-	-	7/2	

Description: When positioning a spindle that is not in position control mode from a high speed, the position control is not activated until the spindle has reached or falls below the velocity defined in MD35300 $MA_SPIND_POSCTRL_VELO.

The speed can be changed with FA[Sn] from the part program. Please refer to the documentation:

/FB1/ Function Manual, Basic Functions; Spindles (S1), section "Spindle mode 'positioning operation" for a description of the spindle behavior under various supplementary conditions (positioning from rotation, positioning from standstill).

Note:

The active speed from MD35300 $MA_SPIND_POSCTRL_VELO cannot exceed the max. speed set in MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT. If MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT = 0, the value is limited to 90% of MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT.

Related to:

MD35350 $MA_SPIND_POSITIONING_DIR (direction of rotation during positioning from standstill, if no synchronization is available)

MD35100 $MA_SPIND_VELO_LIMIT (chuck speed)

35310	SPIND_POSIT_DELAY_TIME			A06, A04	S1	
s	Positioning delay time			DOUBLE	NEW CONF	
CTEQ						
-	6	0.0, 0.05, 0.1, 0.2, 0.4, 0.8	-	-	7/2	

Description: Positioning delay time.

After reaching the positioning end (exact stop fine), there is awaiting time equal to the time set in this MD. The position matching the currently set gear stage is selected.

The delay time is activated for:

- Gear stage change at defined spindle position. After reaching the position configured in MD35012 $MA_GEAR_STEP_CHANGE_POSITION, there is a waiting period equal to the time specified here. After expiry of this time, the position control is switched off for an active direct measuring system, and the NC/PLC interface signals DB390x DBX2000.3 (Change gear) and DB390x DBX2000.0 - .2 (Setpoint gear stage A-C) are output.
- Block search upon the output of an accumulated positioning block (SPOS, SPOSA, M19).

35350	SPIND_POSITIONING_DIR			A06	S1	
-	Direction of rotation when positioning			BYTE	Reset	
CTEQ						
-	-	3	3	4	7/2	

Description: When SPOS or SPOSA is programmed, the spindle is switched to position control mode and accelerates with the acceleration defined in MD35210 $MA_GEAR_STEP_POSCTRL_ACCEL (acceleration in position control mode) if the spindle is not synchronized. The direction of rotation is defined by MD35350 $MA_SPIND_POSITIONING_DIR (direction of rotation for positioning from standstill).

MD35350 $MA_SPIND_POSITIONING_DIR = 3 ---> Clockwise direction of rotation

MD35350 $MA_SPIND_POSITIONING_DIR = 4 ---> Counterclockwise direction of rotation

Related to:

MD35300 $MA_SPIND_POSCTRL_VELO (position control activation speed)

35400	SPIND_OSCILL_DES_VELO			A06, A04	P3 pl,P3 sl,S1	
rev/min	Oscillation speed			DOUBLE	NEW CONF	
CTEQ						
-	-	500.0	-	-	7/2	

Description: During oscillation, the NC/PLC interface signal DB380x DBX2002.5 (Oscillation speed) is used to select a motor speed for the spindle motor. This motor speed is defined in MD35400 $MA_SPIND_OSCILL_DES_VELO. The motor speed defined in this MD is independent of the current gear stage In the AUTOMATIC and MDI displays, the oscillation speed is displayed in the "Spindle set-point" window until the gear is changed.

MD irrelevant to:

All spindle modes except oscillation mode

Special cases:

The acceleration during oscillation (MD35410 $MA_SPIND_OSCILL_ACCEL) is valid for the oscillation speed defined in this MD.

Related to:

MD35410 $MA_SPIND_OSCILL_ACCEL (acceleration during oscillation)

NC/PLC interface signal DB380x DBX2002.5 (Oscillation speed)

NC/PLC interface signal DB380x DBX2002.4 (Oscillation via PLC)

35410	SPIND_OSCILL_ACCEL			A06, A04, -	S1,Z1	
rev/s²	Acceleration during oscillation			DOUBLE	NEW CONF	
CTEQ						
-	-	16.0	1.0e-3	-	7/2	

Description: The acceleration specified here is only effective for the output of the oscillation speed (MD35400 $MA_SPIND_OSCILL_DES_VELO) to the spindle motor. The oscillation speed is selected using the NC/PLC interface signal DB380x DBX2002.5 (Oscillation speed).

MD irrelevant to:

All spindle modes except oscillation mode

Related to:

MD35400 $MA_SPIND_OSCILL_DES_VELO (oscillation speed)

NC/PLC interface signal DB380x DBX2002.5 (Oscillation speed)

NC/PLC interface signal DB380x DBX2002.4 (Oscillation via PLC)

35430	SPIND_OSCILL_START_DIR			A06	S1	
-	Start direction during oscillation			BYTE	Reset	
CTEQ						
-	-	0	0	4	7/2	

Description: With the NC/PLC interface signal DB380x DBX2002.5 (Oscillation speed), the spindle motor accelerates to the speed specified in MD35400: $MA_SPIND_OSCILL_DES_VELO.

The start direction is defined by MD35430 $MA_SPIND_OSCILL_START_DIR if the NC/PLC interface signal DB380x DBX2002.4 (Oscillation via PLC) is not enabled.

MD35430 $MA_SPIND_OSCILL_START_DIR = 0 ---> Start direction same as the last direction of rotation

MD35430 $MA_SPIND_OSCILL_START_DIR = 1 ---> Start direction counter to the last direction of rotation

MD35430 $MA_SPIND_OSCILL_START_DIR = 2 ---> Start direction counter to the last direction of rotation

MD35430 $MA_SPIND_OSCILL_START_DIR = 3 ---> Start direction is M3

MD35430 $MA_SPIND_OSCILL_START_DIR = 4 ---> Start direction is M4

MD irrelevant to:

All spindle modes except oscillation mode

Related to:

MD35400 $MA_SPIND_OSCILL_DES_VELO (oscillation speed)

NC/PLC interface signal DB380x DBX2002.5 (Oscillation speed)

NC/PLC interface signal DB380x DBX2002.4 (Oscillation via PLC)

35440	SPIND_OSCILL_TIME_CW			A06	S1,Z1	
s	Oscillation time for M3 direction			DOUBLE	NEW CONF	
CTEQ						
-	-	1.0	-	-	7/2	

Description: The oscillation time defined here is active in the M3 direction.

MD irrelevant to:

- All spindle modes except oscillation mode
- Oscillation via PLC (NC/PLC interface signal DB380x DBX2002.4 (Oscillation via PLC) enabled)

Related to:

MD35450 $MA_SPIND_OSCILL_TIME_CCW (oscillation time for M4 direction)

MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO (interpolator cycle)

NC/PLC interface signal DB380x DBX2002.5 (Oscillation speed)

NC/PLC interface signal DB380x DBX2002.4 (Oscillation via PLC)

35450	SPIND_OSCILL_TIME_CCW			A06	S1,Z1	
s	Oscillation time for M4 direction			DOUBLE	NEW CONF	
CTEQ						
-	-	0.5	-	-	7/2	

Description: The oscillation time defined here is active in the M4 direction.

MD irrelevant to:

- All spindle modes except oscillation mode
- Oscillation via PLC (NC/PLC interface signal DB380x DBX2002.4 (Oscillation via PLC) enabled)

Related to:

MD35440 $MA_SPIND_OSCILL_TIME_CW (oscillation time for M3 direction)

MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO (interpolator cycle)

NC/PLC interface signal DB380x DBX2002.5 (Oscillation speed)

NC/PLC interface signal DB380x DBX2002.4 (Oscillation via PLC)

35500	SPIND_ON_SPEED_AT_IPO_START			A03, A06, A10	S1,Z1	
-	Feedrate enable for spindle in the set range			BYTE	Reset	
CTEQ						
-	-	1	0	2	7/2	

Description: For SW 4.2 and higher:

Byte = 0:

The path interpolation is not affected

Byte = 1:

The path interpolation is not enabled (positioning axes continue traversing) until the spindle has reached the specified speed. The tolerance range can be set in MD 35150: $MA_SPIND_DES_VELO_TOL. If a measuring system is active, then the actual speed is monitored, otherwise the set speed. Path axes traversing in continuous-path mode (G64) are not stopped.

Byte = 2:

In addition to 1, traversing path axes are also stopped before machining begins, e.g. continuous-path mode (G64) and the change from rapid traverse (G0) to a machining block (G1, G2,..). The path is stopped at the last G0 block, and does not start traversing until the spindle is within the set speed range.

Restriction:

If the spindle is newly programmed by the PLC (FC18) or asynchronized action "shortly" before the end of the last G0 block, then the path decelerates taking the dynamic limitations into account. Because the spindle programming is asynchronous, a traverse can be made into the machining block if necessary. If the spindle has reached the setpoint speed range, then machining starts from this position.

Byte = 3:

No longer available for SW 5.3 and higher.

Related to:

MD35150 $MA_SPIND_DES_VELO_TOL (spindle speed tolerance)

NC/PLC interface signal DB390x DBX2001.5 (Spindle in setpoint range)

35510	SPIND_STOPPED_AT_IPO_START			A03, A06, A10	S1	
-	Feedrate enable for spindle stopped			BOOLEAN	Reset	
CTEQ						
-	-	FALSE	-	-	7/2	

Description: When a spindle is stopped (M5), the path feed is disabled (positioning axes continue traversing) if MD35510 $MA_SPIND_STOPPED_AT_IPO_START is enabled and the spindle is in control mode.

When the spindle has come to a standstill (NC/PLC interface signal DB390x DBX1.4 (Axis/spindle stationary) enabled), the path feed is enabled.

Related to:

MD35500 $MA_SPIND_ON_SPEED_AT_IPO_START (feed enable for spindle in setpoint range)

35550	DRILL_VELO_LIMIT			A06, A11, A04	-	
rev/min	Maximum speeds for tapping			DOUBLE	NEW CONF	
CTEQ						
-	6	10000., 10000., 10000., 10000., 10000., 10000.	1	-	7/2	

Description: Limit speed values for tapping without compensating chuck with G331/G332.

The maximum speed of the linear motor characteristic range (constant acceleration capacity) must be specified depending on the gear stage.

35590	PARAMSET_CHANGE_ENABLE			EXP, A05	TE3,A2,S1,Z1	
-	Parameter set can be changed			BYTE	PowerOn	
CTEQ						
-	-	0	0	2	7/2	

Description:

0: Parameter set changes cannot be controlled.

For axes and spindles in axis mode: The first parameter set is always active. In the case of spindles the parameter set is set as appropriate for the gear stage (1st gear stage uses 2nd parameter set). Exceptions: See below.

1: The parameter set applied in the servo is defined via the VDI interface or SCPARA. Parameter sets 1 to 6 can be selected. Sets are selected using the NC/PLC interface signal DB380x DBX9.0 - .2 (selection of parameter set servo A, B, C) in the binary-coded value range 0 to 5. Binary values 6 and 7 select parameter set no. 6. Exceptions: See below.

For 0 and 1:

With G33, G34, G35, G331, G332, the parameter set number for the axes involved is ativated in accordance with the master spindle gear stage, increased by one (corresponds with parameter set numbers 2 to 6).

For spindles, parameter sets 2 to 6 are always active, depending on the set gear stage plus one.

2: The parameter set is only ever defined via the VDI interface or SCPARA. Parameter sets 1 to 6 can be selected. Sets are selected using the NC/PLC interface signal DB380x DBX9.0 - .2 (selection of parameter set servo A, B, C) in the binary-coded value range 0 to 5. Binary values 6 and 7 select parameter set no. 6.

Secondary conditions:

Changeover response is determined by whether the KV factor differs between the active parameter set and the new parameter set.

Changing a parameter set where the load gearbox factors differ between the active parameter set and the new parameter set will reset the referenced signal, provided that the axis has an indirect measuring system.

The parameter set contains the following axial machine data:

MD36200 $MA_AX_VELO_LIMIT

MD32200 $MA_POSCTRL_GAIN

MD32800 $MA_EQUIV_CURRCTRL_TIME

MD32810 $MA_EQUIV_SPEEDCTRL_TIME

MD32910 $MA_DYN_MATCH_TIME

MD31050 $MA_DRIVE_AX_RATIO_DENOM

MD31060 $MA_DRIVE_AX_RATIO_NUMERA

Corresponds with:

NC/PLC interface signals DB380x DBX9.0 - .2 (selection of parameter set servo A, B, C) and DB390x DBX9.0 - .2 (selected parameter set servo A, B, C)

References:

/FB/, H2, "Output of Auxiliary Functions to PLC"

36000	STOP_LIMIT_COARSE			A05	TE1,A3,B1,G2,S1,Z1	
mm, degrees	Exact stop coarse			DOUBLE	NEW CONF	
-						
-	-	0.04, 0.04, 0.04, 0.04, 0.04, 0.04, 0.04...	-	-	7/2	

Description:

Threshold for exact stop coarse

An NC block is considered as terminated if the actual position of the path axes is away from the setpoint position by the value entered for the exact stop limit. If the actual position of a path axis is not within this limit, the NC block is considered as not terminated, and further part program execution is not possible. The magnitude of the value entered influences the transition to the next block. The larger the value, the earlier the block change is initiated.

If the specified exact stop limit is not reached, then

- the block is considered as not terminated,
- further traversing of the axis is not possible,
- alarm 25080 Positioning monitoring is output after expiry of the time specified in MD36020 $MA_POSITIONING_TIME (monitoring time for exact stop fine),
- the direction of movement +/- is indicated for the axis in the positioning display. The exact stop window is also evaluated for spindles in position control mode (SPCON instruction).

Special cases:

MD36000 $MA_STOP_LIMIT_COARSE must not be set smaller than MD36010 $MA_STOP_LIMIT_FINE (exact stop fine). To achieve the identical block change behavior as with the "exact stop fine" criterion, the exact stop coarse window may be identical to the exact stop fine window. MD36000 $MA_STOP_LIMIT_COARSE must not be set equal to or greater than MD36030 $MA_STANDSTILL_POS_TOL (standstill tolerance).

Related to:

MD36020 $MA_POSITIONING_TIME (delay time, exact stop fine)

36010	STOP_LIMIT_FINE			A05	TE1,A3,B1,D1,G2,S1,Z1	
mm, degrees	Exact stop fine			DOUBLE	NEW CONF	
-						
-	-	0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01...	-	-	7/2	

Description:

Threshold for exact stop fine

See also MD36000 $MA_STOP_LIMIT_COARSE (exact stop coarse)

Special cases:

MD36010 $MA_STOP_LIMIT_FINE must not be set greater than MD36000 $MA_STOP_LIMIT_COARSE (exact stop coarse).

MD36010 $MA_STOP_LIMIT_FINE must not be set greater than or equal to MD36030 $MA_STANDSTILL_POS_TOL (standstill tolerance).

Related to:

MD 36020: $MA_POSITIONING_TIME (delay time, exact stop fine)

36012	STOP_LIMIT_FACTOR			A05	G1,A3,B1,G2,S1,Z1	
-	Factor for exact stop coarse/fine and standstill			DOUBLE	NEW CONF	
-						
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	0.001	1000.0	7/2	

Description:

With this factor,

MD36000 $MA_STOP_LIMIT_COARSE,

MD36010 $MA_STOP_LIMIT_FINE,

MD36030 $MA_STANDSTILL_POS_TOL

can be re-assessed as a function of the parameter set. The relationship between these three values always remains the same.

Application examples:

Adapting the positioning behavior if the mass relationships change significantly with a gear change, or if it is desired to save on machine positioning time at the cost of accuracy in various operating conditions.

Related to:

MD36000 $MA_STOP_LIMIT_COARSE,

MD36010 $MA_STOP_LIMIT_FINE,

MD36030 $MA_STANDSTILL_POS_TOL

36020	POSITIONING_TIME			A05	TE1,A3,B1,G2	
s	Delay time exact stop fine			DOUBLE	NEW CONF	
-						
-	-	1.0	-	-	7/2	

Description:

The following error must have reached the limit value for exact stop fine by the expiry of the time entered in this MD for traveling into the position (position setpoint has reached the destination).

The current following error is therefore continuously monitored for the time limit MD36010 $MA_STOP_LIMIT_FINE. If this time is exceeded, alarm 25080 "Positioning monitoring" is output, and the axis stopped. The time entered in this MD should be long enough to ensure that the monitoring function is not triggered under normal operating conditions, taking into account any settling times.

Related to:

MD 36010: $MA_STOP_LIMIT_FINE (exact stop fine)

36030	STANDSTILL_POS_TOL			A05	G1,A3,D1,G2	
mm, degrees	Standstill tolerance			DOUBLE	NEW CONF	
-						
-	-	0.2, 0.2, 0.2, 0.2, 0.2, 0.2, 0.2, 0.2...	-	-	7/2	

Description: This MD serves as a tolerance band for the following monitoring functions:

- After termination of a traversing block (position partial setpoint=0 at the end of the movement), whether the following error has reached the limit value for MD36030 $MA_STANDSTILL_POS_TOL (standstill tolerance) is monitored after the programmable MD36040 $MA_STANDSTILL_DELAY_TIME (delay time, standstill monitoring).
- After termination of a positioning action (exact stop fine reached), positioning monitoring is replaced by standstill monitoring. The axis is monitored for moving from its position by more than defined in MD36030 $MA_STANDSTILL_POS_TOL (standstill tolerance).

If the setpoint position is over- or undershot by the standstill tolerance, alarm 25040 "Standstill monitoring" is output and the axis stopped.

Special cases:

The standstill tolerance must be greater than the "exact stop limit coarse".

Related to:

MD36040 $MA_STANDSTILL_DELAY_TIME (delay time, standstill monitoring)

36040	STANDSTILL_DELAY_TIME			A05	TE1,A3,F1,G2	
s	Delay time for standstill monitoring			DOUBLE	NEW CONF	
-						
-	-	0.4	-	-	7/2	

Description: See MD36030 $MA_STANDSTILL_POS_TOL (standstill tolerance)

36050	CLAMP_POS_TOL			A05	A3,D1,Z1	
mm, degrees	Clamping tolerance			DOUBLE	NEW CONF	
-						
-	-	0.5	-	-	7/2	

Description: With NC/PLC interface signal DB380x DBX2.3 (Blocking action active), blocking monitoring is activated. If the monitored axis is forced away from the set-point position (exact stop limit) by more than the blocking tolerance, alarm 26000 "Blocking monitoring" is output and the axis stopped.

Threshold value for clamping tolerance (half width of window).

Special cases:

The clamping tolerance must be greater than the "exact stop limit coarse".

Related to:

NC/PLC interface signal DB380x DBX2.3 (Blocking action active)

36052	STOP_ON_CLAMPING			A10	A3	
-	Special functions with clamped axis			BYTE	NEW CONF	
CTEQ						
-	-	0	0	0x07	2/1	

Description: This MD defines how a blocked axis is taken into account.

Bit 0 =0:

If a blocked axis is to be traversed again in continuous-path mode, it must be ensured via the part program that the path axes are stopped and that there is time for releasing the blockage.

Bit 0 =1:

If a blocked axis is to be traversed again in continuous-path mode, the LookAhead function stops the path motion if required until the position controller is allowed to traverse the blocked axis again, i.e. until the controller enable is set again.

Bit 1 is relevant only if bit 0 is set:

Bit 1 =0:

If a blocked axis is to be traversed again in continuous-path mode, the LookAhead function does not release the blockage.

Bit 1 =1:

If a blocked axis is to be traversed again in continuous-path mode, a traversing command for the blocked axis is given in the preceding G0 blocks so that the PLC releases the axis blockage again.

Bit 2 =0:

If an axis is to be blocked in continuous-path mode, it must be ensured in the part program that the path axes are stopped to make sure that there is time for setting the blockage.

Bit 2 =1:

If an axis is to be blocked in continuous-path mode, the LookAhead function stops the path motion prior to the next non-G0 block, if the axis has not yet been blocked by that time, i.e. the PLC has not yet set the feedrate override to zero.

36060	STANDSTILL_VELO_TOL			A05, A04	TE1,A2,A3,D1,Z1	
mm/min, rev/min	Threshold velocity/speed 'Axis/spindle in stop'			DOUBLE	NEW CONF	
-						
-	-	5.00, 5.00, 5.00, 5.00, 5.00, 5.00, 5.00...	-	-	7/2	

Description: This MD defines the standstill range for the axis velocity / spindle speed. If the current actual velocity of the axis or the actual speed of the spindle is less than the value entered in this MD, the NC/PLC interface signal DB390x DBX1.4 (Axis/spindle stationary) is set.

To bring the axis/spindle to a standstill under control, the pulse enable should not be removed until the axis/spindle is at a standstill. Otherwise the axis will coast down.

Related to:

NC/PLC interface signal DB390x DBX1.4 (Axis/spindle stationary)

36100	POS_LIMIT_MINUS			A03, A05, A11, -	TE1,R2,T1,A3,Z1	
mm, degrees	1st software limit switch minus			DOUBLE	NEW CONF	
CTEQ						
-	-	-1.0e8	-	-	7/2	

Description: Same meaning as 1st software limit switch plus, however the traversing range limitation is in the negative direction.

The MD becomes active after reference point approach if the NC/PLC interface signal DB380x DBX1000.2 (2nd software limit switch minus) is not set.

MD irrelevant:

if axis is not referenced.

Related to:

NC/PLC interface signal DB380x DBX1000.2 (2nd software limit switch minus)

36110	POS_LIMIT_PLUS			A03, A05, A11, -	TE1,R2,T1,G2,A3,Z1	
mm, degrees	1st software limit switch plus			DOUBLE	NEW CONF	
CTEQ						
-	-	1.0e8	-	-	7/2	

Description: A software limit switch can be activated in addition to the hardware limit switch. The absolute position in the machine axis system of the positive range limit of each axis is entered.

The MD is active after reference point approach if NC/PLC interface signal DB380x DBX1000.3 (2nd software limit switch plus) has not been set.

MD irrelevant:

if axis is not referenced.

Related to:

NC/PLC interface signal DB380x DBX1000.3 (2nd software limit switch plus)

36120	POS_LIMIT_MINUS2			A03, A05, -	TE1,A3,Z1	
mm, degrees	2nd software limit switch minus			DOUBLE	NEW CONF	
CTEQ						
-	-	-1.0e8	-	-	7/2	

Description: Same meaning as 2nd software limit switch plus, but the traversing range limitation is in the negative direction.

The PLC can select whether software limit switch 1 or 2 is to be active by means of the interface signal.

For example:

DB380x DBX1000.2 = 0 (1st software limit switch minus) active for 1st axis

DB380x DBX1000.2 = 1 (2nd software limit switch minus) active for 1st axis

MD irrelevant:

if axis is not referenced.

Related to:

NC/PLC interface signal DB380x DBX1000.2 (2nd software limit switch minus)

36130	POS_LIMIT_PLUS2			A03, A05, -	TE1,A3,Z1	
mm, degrees	2nd software limit switch plus			DOUBLE	NEW CONF	
CTEQ						
-	-	1.0e8	-	-	7/2	

Description: This machine data can define a 2nd software limit switch position in the positive direction in the machine axis system. The PLC can select which of the two software limit switches 1 or 2 is to be active by means of an interface signal.

For example:

DB380x DBX1000.3 = 0 (1st software limit switch plus) active for 1st axis

DB380x DBX1000.3 = 1 (2nd software limit switch plus) active for 1st axis

MD irrelevant:

if axis is not referenced.

Related to:

NC/PLC interface signal DB380x DBX1000.3 (2nd software limit switch plus)

36200	AX_VELO_LIMIT			A05, A11, A04	TE3,A3,G2,S1,V1	
mm/min, rev/min	Threshold value for velocity monitoring			DOUBLE	NEW CONF	
CTEQ						
-	6	11500., 11500., 11500., 11500., 11500., 11500....	-	-	7/2	

Description: The threshold value for actual velocity monitoring is entered in this machine data.

If the axis has at least one active encoder and if this encoder is below its limit frequency, alarm 25030 "Actual velocity alarm limit" is triggered when the treshold value is exceeded, and the axis is stopped.

Settings:

- For axes, a value should be selected that is 10 to 15 % higher than that in MD32000 $MA_MAX_AX_VELO (maximum axis velocity). With active temperature compensation MD32750 $MA_TEMP_COMP_TYPE, the maximum axis velocity is increased by an additional factor which is determined by MD32760 $MA_COMP_ADD_VELO_FACTOR (velocity overshoot through compensation). The following should therefore apply to the velocity monitoring threshold value:

MD36200 $MA_AX_VELO_LIMIT[n] > MD32000 $MA_MAX_AX_VELO * (1.1 ... 1.15 + MD32760 $MA_COMP_ADD_VELO_FACTOR)

- For spindles, a value should be selected for each gear stage that is 10 to 15 % higher than the corresponding values in MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT[n] (maximum speed of gear stage).

The index of the machine data has the following coding: [control parameter set no.]: 0-5

36210	CTRLOUT_LIMIT			EXP, A05	A3,D1,G2	
%	Maximum speed setpoint			DOUBLE	NEW CONF	
CTEQ						
-	1	110.0	0	200	7/2	

Description: The maximum speed setpoint depends on whether there are any setpoint limitations in the speed and current controller.

An alarm is output and the axis is stopped when the limit is exceeded.

The limit is to be selected so that the maximum velodty (rapid traverse) can be reached, and an appropriate additional control margin is available.

36220	CTRLOUT_LIMIT_TIME			EXP, A05	A3	
s	Delay time for speed setpoint monitoring			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	

Description: This MD defines how long the speed setpoint may be within the limit CTRLOUT_LIMIT[n] (max. speed setpoint) until the monitoring function is triggered.

Monitoring (and with it also this machine data) is always active.

Reaching the limit renders the position control loop non-linear, which results in contour errors provided that the speed setpoint limited axis is participating in contour generation. That is why this MD has default value 0, i.e. the monitoring function responds as soon as the speed setpoint reaches the limit.

36300	ENC_FREQ_LIMIT			EXP, A02, A05, A06	A3,D1,R1,Z1	
-	Encoder limit frequency			DOUBLE	PowerOn	
-						
-	2	3.0e5, 3.0e5	-	-	7/2	

Description: This MD is used to enter the encoder frequency, which,
in general, is a manufacturer specification (type plate, documentation).

36302	ENC_FREQ_LIMIT_LOW			EXP, A02, A05, A06	A3,R1,S1,Z1	
%	Encoder limit frequency for new encoder synchronization.			DOUBLE	NEW CONF	
-						
-	2	99.9, 99.9	0	100	7/2	

Description: Encoder frequency monitoring uses a hysteresis.

MD36300 $MA_ENC_FREQ_LIMIT defines the encoder limit frequency. The encoder is switched off when this frequency is exceeded. The encoder is switched on again when the frequency falls below that defined in MD36302 $MA_ENC_FREQ_LIMIT_LOW.

MD36300 $MA_ENC_FREQ_LIMITis entered directly in Hertz,

whereas MD36302 $MA_ENC_FREQ_LIMIT_LOW is a fraction, expressed as a percentage, of MD36300 $MA_ENC_FREQ_LIMIT.

MD36302 $MA_ENC_FREQ_LIMIT_LOW is therefore already correctly preset for most of the encoders used.

Exception: In the case of absolute encoders with an En-Dat interface, the limit frequency of the absolute track is significantly lower than the limit frequency of the incremental track. A low value in MD36302 $MA_ENC_FREQ_LIMIT_LOW ensures that the encoder is not switched on again until it falls below the limit frequency of the absolute track, and therefore is not referenced until permitted by the absolute track. For spindles, this referencing is carried out automatically.

Example EnDat encoder EQN 1325:

Limit frequency of the electronics of the incremental track: 430 kHz

===> MD36300 $MA_ENC_FREQ_LIMIT = 430 kHz

The limit frequency of the absolute track is approx. 2000 encoder rpm at 2048 increments/encoder revolution, i.e. the limit frequency is 2000/60 * 2048 Hz = 68 kHz

===> MD36302 $MA_ENC_FREQ_LIMIT_LOW = 68/430 = 15%

36310	ENC_ZERO_MONITORING			EXP, A02, A05	A3,R1	
-	Zero mark monitoring			DWORD	NEW CONF	
-						
-	2	0, 0	-	-	7/2	

Description: This MD is used to activate zero mark monitoring.

36312	ENC_ABS_ZEROMON_WARNING			EXP, A02, A05	A3	
-	Zero mark monitoring warning level			DWORD	NEW CONF	
-						
-	2	10, 10	-	-	7/2	

Description: Only for absolute measuring systems ($MA_ENC_TYPE=4):

This MD activates zero mark diagnostics.

0: no zero mark diagnostics

>0: permissible deviation in 1/2 coarse increments between the absolute and the incremental encoder track (one 1/2 coarse increment is sufficient).

36314	ENC_ABS_ZEROMON_INITIAL			EXP, A02, A05	A3	
-	Warning level for absolute encoder power ON			DWORD	NEW CONF	
-						
-	2	1000, 1000	-	-	7/2	

Description: Only for absolute measuring systems ($MA_ENC_TYPE=4):

Parameterization in 1/2 coarse increments

At absolute encoder power ON (deselect parking and similar) this MD parameterizes the previously permissible position offset (comparison of the new absolute position with the information last saved in SRAM). When the warning level is exceeded, system variable $VA_ENC_ZERO_MON_ERR_CNT is incremented in coarse increments by the value 10000.

36400	CONTOUR_TOL			A05, A11	A3,D1,G2	
mm, degrees	Tolerance band for contour monitoring			DOUBLE	NEW CONF	
-						
-	-	1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0...	-	-	7/2	

Description: Tolerance band for axial contour monitoring (dynamic following error monitoring).

The permissible deviation between the real and the modelled following error is entered in this MD.

The input of the tolerance band is intended to avoid spurious tripping of the dynamic following error monitoring caused by minor speed fluctuations, which occur during normal closed-loop control operations (e.g. during first cut).

Following error modelling and thus the input of this MD depend on the position control gain MD32200 $MA_POSCTRL_GAIN and, in the case of precontrol or simulation, on the accuracy of the controlled system model MD32810 $MA_EQUIV_SPEEDCTRL_TIME (equivalent time constant for precontrol of speed control loop), as well as on the accelerations and velocities used.

36480	AXSPDCTRL_ACT_POS_TOL			A11, A05	-	
mm, degrees	Tolerance for speed control mode			DOUBLE	NEW CONF	
-						
-	-	5.0	-	-	7/2	

Description: Permissible deviation between actual and setpoint positions of an axis in speed control mode ("control axis").

This MD has to be adapted to the accuracy of the speed controller as well as the permissible accelerations and velocities.

36500	ENC_CHANGE_TOL			A02, A05	G1,K6,K3,A3,D1,G2,Z1	
mm, degrees	Tolerance at actual position value change.			DOUBLE	NEW CONF	
-						
-	-	0.1	-	-	7/2	

Description: The permissible deviation between the actual values of the two measuring systems is entered in this MD.

This difference must not be exceeded when switching over the measuring system used for closed-loop control, in order to avoid compensating processes that are too strong. Otherwise, the error message 25100 "Axis %1 Switchover of measuring system not possible" is generated and the switchover does not take place.

MD irrelevant for:

MD30200 $MA_NUM_ENCS = 0 or 1.

36510	ENC_DIFF_TOL			A02, A05	A3,G2	
mm, degrees	Tolerance of measuring system synchronization			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	

Description: Permissible deviation between the actual values of the two measuring systems. This difference must not be exceeded during the cyclic comparison of the two measuring systems used, as otherwise error message 25105 (measuring systems deviate) would be generated.

The corresponding monitoring function is not active

- with MD input value=0,
- if less than 2 measuring systems are active/available in the axis
- or if the axis has not been referenced (at least act. closed-loop control meas. system).

With modulo axes, it is always the absolute value of the shortest/direct position difference that is monitored.

36520	DES_VELO_LIMIT			A02, A05	-	
%	Threshold for setpoint velocity monitoring			DOUBLE	NEW CONF	
-						
-	-	125.0	-	-	7/2	

Description: Maximum permissible setpoint velocity as a percentage of the maximum axis velocity/spindle speed.

With MD36520 $MA_DES_VELO_LIMIT, the position setpoint is monitored for abrupt changes. If the permissible limit value is exceeded, alarm 1016 error code 550010 is output.

With axes, this machine data refers to MD32000 $MA_MAX_AX_VELO.

With spindles, this MD refers to the lower of the speeds set in

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT of the current gear stage and MD35100 $MA_SPIND_VELO_LIMIT.

36600	BRAKE_MODE_CHOICE			EXP, A05	A3,Z1	
-	Deceleration response on hardware limit switch			BYTE	PowerOn	
CTEQ						
-	-	1	0	1	7/2	

Description: If a rising edge of the axis-specific hardware limit switch is detected while the axis is traversing, the axis is braked immediately.

The type of braking is determined by this machine data:

Value = 0:

Controlled braking along the acceleration ramp defined by MD32300 $MA_MAX_AX_ACCEL (axis acceleration).

Value = 1:

Rapid braking (selection of setpoint = 0) with reduction of following error.

Related to:

NC/PLC interface signal DB380x DBX1000.1 und .0 (Hardware limit switch plus or minus)

36610	AX_EMERGENCY_STOP_TIME			A05, -	TE3,K3,A2,A3,N2,Z1	
s	Maximum time for braking ramp in case of error.			DOUBLE	NEW CONF	
-						
-	-	0.05	0.0	1.0e15	7/2	

Description: This MD defines the braking ramp time that an axis or spindle requires to brake from maximum velocity/speed to a standstill in the event of errors (e.g. emergency stop). At the same lead/brake acceleration, standstill is reached correspondingly earlier from lower velocities/speeds.

Mechanically robust axes are normally stopped abruptly with speed setpoint 0; values in the lower ms range are appropriate in these cases (default setting).

However, high moving masses or limited mechanical conditions (e.g. gear load capacity) often have to be taken into account for spindles. This means that the MD has to be changed to set a longer braking ramp.

Notice:

- With interpolating axes or axis/spindle couplings, it cannot be ensured that the contour or coupling will be maintained during the braking phase.
- If the time set for the braking ramp for error states is too long, the controller enable will be removed although the axis/spindle is still moving. Depending on the drive type used and the activation of the pulse enable, either an immediate stop with speed setpoint 0 will be initiated or the axis/spindle will coast down without power. The time selected in MD36610 $MA_AX_EMERGENCY_STOP_TIME should therefore be shorter than the time in MD36620 $MA_SERVO_DISABLE_DELAY_TIME (cutout delay, controller enable) so that the configured braking ramp can be fully active throughout the entire braking operation.
- The braking ramp may be ineffective or not maintained if the active drive follows its own braking ramp logic (e.g. SINAMICS).

Related to:

MD36620 $MA_SERVO_DISABLE_DELAY_TIME (cutout delay controller enable)

MD36210 $MA_CTRLOUT_LIMIT (maximum speed setpoint)

36620	SERVO_DISABLE_DELAY_TIME			A05, -	TE3,K3,A2,A3,N2,Z1	
s	Cutout delay servo enable			DOUBLE	NEW CONF	
-						
-	-	0.1	0.0	1.0e15	7/2	

Description: Maximum time delay for removal of "controller enable" after faults. The speed enable (controller enable) of the drive is removed internally within the controller after the set delay time, at the latest.

The delay time entered becomes active as a result of the following events:

- Errors that lead to immediate stopping of the axes
- Removal of the interface signal DB380x DBX2.1 (Controller enable) from the PLC

As soon as the actual speed reaches the standstill range (MD36060 $MA_STANDSTILL_VELO_TOL), the "controller enable" for the drive is removed.
The time set should be long enough to enable the axis / spindle to brake down to a standstill from maximum traversing velocity or maximum speed. If the axis / spindle is stationary, the "controller enable" for the drive is removed immediately (i.e. the time defined in MD36620 $MA_SERVO_DISABLE_DELAY_TIME is terminated prematurely).

Application example(s):

Speed control of the drive should be retained long enough to enable the axis / spindle to brake down to standstill from maximum traversing velocity or maximum speed.

Notice:

If the cutout delay controller enable is set too short, controller enable will be removed although the axis/spindle is still moving. This axis/spindle then coasts down without power (which may be appropriate for grinding wheels, for example); otherwise the time set in MD36620 $MA_SERVO_DISABLE_DELAY_TIME should be longer than the duration of the braking ramp for error states (MD36610 $MA_AX_EMERGENCY_STOP_TIME).

Related to:

NC/PLC interface signal DB380x DBX2.1 (Controller enable)

MD36610 $MA_AX_EMERGENCY_STOP_TIME

36700	DRIFT_ENABLE			EXP, A07, A09	G2	
-	Automatic drift compensation			BOOLEAN	NEW CONF	
-						
-	-	FALSE	-	-	1/1	

Description: Automatic drift compensation is activated with MD36700 $MA_DRIFT_ENABLE.

1: Automatic drift compensation active (only for position-controlled axes/ spindles).

With automatic drift compensation, while the axis is at a standstill, the control continually calculates the additional drift value still required to ensure that the following error reaches the value 0 (compensation criterion). The total drift value is, therefore, formed from the drift basic value (MD36720 $MA_DRIFT_VALUE) and the drift additional value.

0: Automatic drift compensation not active.

The drift value is formed only from the drift basic value (MD36720 $MA_DRIFT_VALUE).

Not relevant for:

Non-position-controlled spindles

Related to:

MD36710 $MA_DRIFT_LIMIT drift limit value for automatic drift compensation

MD36720 $MA_DRIFT_VALUE drift basic value

36710	DRIFT_LIMIT			EXP, A07, A09	-	
%	Drift limit value for automatic drift compensation			DOUBLE	NEW CONF	
-						
-	1	0.0	0	1.e9	1/1	

Description: The magnitude of the drift additional value calculated during automatic drift compensation can be limited with MD36710 $MA_DRIFT_LIMIT.

If the drift additional value exceeds the limit value entered in MD36710 $MA_DRIFT_LIMIT, alarm 25070 "Drift value too large" is output and the drift additional value is limited to this value.

Not relevant for:

MD36700 $MA_DRIFT_ENABLE = 0

36720	DRIFT_VALUE			EXP, A07, A09	-	
%	Basic drift value			DOUBLE	NEW CONF	
-						
-	1	0.0	-1e15	1e15	1/1	

Description: The value entered in MD36720 $MA_DRIFT_VALUE is always added as an offset to the manipulated variable. Whereas automatic drift compensation is active only for position-controlled axes, this machine data is always active.

Note:

Drift compensation must not be active if the DSC function (MD32640 $MA_STIFFNESS_CONTROL_ENABLE=1) is being used, otherwise unexpected speed oscillations will occur when DSC is enabled/disabled.

Standardization: The input value is related to the corresponding interface standardization in

MD32250 $MA_RATED_OUTVAL,

MD32260 $MA_RATED_VELO, and

MD36210 $MA_CTRLOUT_LIMIT.

36730	DRIVE_SIGNAL_TRACKING			A10	B3	
-	Acquisition of additional drive actual values			BYTE	PowerOn	
-						
-	-	0	0	4	7/2	

Description: MD36730 $MA_DRIVE_SIGNAL_TRACKING = 1 activates the acquisition of the following drive actual values (if they are made available by the drive):

- $AA_LOAD Drive load
- $AA_POWER Drive active power
- $AA_TORQUE Drive torque setpoint
- $AA_CURR Smoothed current setpoint (q-axis current) of drive

MD36730 $MA_DRIVE_SIGNAL_TRACKING = 2 activates the acquisition of the following drive actual values:

- $VA_DP_ACT_TEL shows actual value message frame words

Note: Values 3 and 4 are reserved

Note: The value range of MD36730 $MA_DRIVE_SIGNAL_TRACKING can be restricted because of reduced functions of control systems

36750	AA_OFF_MODE			A10	2.4,5.3,6.2	
-	Effect of value assignment for axial override of synchr. action.			BYTE	PowerOn	
CTEQ						
-	-	0	0	7	7/2	

Description: Mode setting for axial offset $AA_OFF

Bit 0: Effect of value assignment within a synchronized action

0: Absolute value

1: Incremental value (integrator)

Bit 1: Response of $AA_OFF on RESET

0: $AA_OFF is deselected on RESET

1: $AA_OFF is retained beyond RESET

Bit 2: $AA_OFF in JOG mode

0: No superimposed motion due to $AA_OFF

1: A superimposed motion due to $AA_OFF is interpolated

37500	ESR_REACTION			EXP, A01, A10, -	M3,P2	
-	Axial mode of "Extended Stop and Retract"			BYTE	NEW CONF	
CTEQ						
-	-	0	0	22	7/2	

Description: Selection of the response to be triggered via system variable "$AN_ESR_TRIGGER".

0 = No response Reaktion (or only external response through synchronized action programming of rapid digital outputs).

21 = NC-controlled retraction axis

22 = NC-controlled stopping axis

37510	AX_ESR_DELAY_TIME1			EXP, A01, A10, -	P2	
s	Delay time ESR single axis			DOUBLE	NEW CONF	
CTEQ						
-	-	0.0	-	-	7/2	

Description: If, for example, an alarm occurs, the deceleration time can be delayed by means of this MD, e.g. to allow in case of gear hobbing the retraction from the tooth gap first.

37511	AX_ESR_DELAY_TIME2			EXP, A01, A10, -	P2	
s	ESR time for interpolatory deceleration of single axis			DOUBLE	NEW CONF	
CTEQ						
-	-	0.0	-	-	7/2	

Description: The time for interpolatory braking specified here in MD37511 $MA_AX_ESR_DELAY_TIME2 still remains after expiry of the time MD37510 $MA_AX_ESR_DELAY_TIME1.

Rapid braking with subsequent tracking is initiated after expiry of the time MD37511 $MA_AX_ESR_DELAY_TIME2.

37800	OEM_AXIS_INFO			A01, A11	-	
-	OEM version information			STRING	PowerOn	
-						
-	2	,	-	-	7/2	

Description: A version information freely available to the user
(is indicated in the version screen)

38000	MM_ENC_COMP_MAX_POINTS			A01, A09, A02	K3	
-	Number of intermediate points for interpol. compensation (SRAM)			DWORD	PowerOn	
-						
-	2	0, 0	0	5000	7/2	

Description:

```
The number of interpolation points required per measuring system must be
defined for the leadscrew error compensation.
The required number can be calculated as follows using the defined parame-
ters:
                                           $AA_ENC_COMP_MAX - $AA_ENC_COMP_MIN
MD38000 $MA_MM_ENC_COMP_MAX_POINTS = ----------------------------------  + 1
                                                     $AA_ENC_COMP_STEP
$AA_ENC_COMP_MIN     Initial position (system variable)
$AA_ENC_COMP_MAX     End position (system variable)
$AA_ENC_COMP_STEP    Distance between interpolation points (system variable)
When selecting the number of interpolation points and/or the distances
between them, it is important to take into account the size of the resulting
compensation table and the space required in the buffered NC user memory
(SRAM). 8 bytes are required for each compensation value (interpolation
point).
The index [n] has the following coding: [encoder no.]: 0 or 1
Special cases:                      Notice:
After any change in MD38000 $MA_MM_ENC_COMP_MAX_POINTS, the buffered NC user
memory is automatically re-allocated on system power-on.
All data in the buffered NC user memory are then lost (e.g. part programs,
tool offsets etc.). Alarm 6020 "Machine data changed - memory reallocated" is
output.
If reallocation of the NC user memory fails because the total memory capacity
available is insufficient, alarm 6000 "Memory allocation made with standard
machine data" is output.
In this case, the NC user memory division is allocated using the default val-
ues of the standard machine data.
References:
/FB/, S7, "Memory Configuration"
/DA/, "Diagnostics Guide"
Related to:
MD32700 $MA_ENC_COMP_ENABLE[n]LEC active
References:
/FB/, S7, "Memory Configuration"
```

NC setting data

3

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	

Description: Description

41010	JOG_VAR_INCR_SIZE			-	H1	
-	Size of the variable increment for JOG			DOUBLE	Immediately	
-						
-	-	0.	-	-	7/7	

Description: This setting data defines the number of increments when variable increment (INCvar) is selected. This increment size is traversed by the axis in JOG mode each time the traverse key is pressed or the handwheel is turned one detent position and variable increment is selected (PLC interface signal "Active machine function: INC variable" for machine or geometry axes is set to 1). The defined increment size also applies to DRF.

Note:

Please note that the increment size is active for incremental jogging and handwheel jogging. So, if a large increment value is entered and the handwheel is turned, the axis might cover a large distance (depends on setting in MD31090 $MA_JOG_INCR_WEIGHT).

SD irrelevant to ......

JOG continuous

Related to ....

NC/PLC interface signal DB3300 DBX1001.5,1005.5,1009.5 (Geometry axis 1-3 active machine function: INC variable) or NC/PLC interface signal DB390x DBX5.5 (Active machine function: INC variable)

MD31090 $MA_JOG_INCR_WEIGHT (weighting of an increment for INC/handwheel)

41050	JOG_CONT_MODE_LEVELTRIGGRD			-	H1	
-	Jog mode / continuous operation with continuous JOG			BOOLEAN	Immediately	
-						
-	-	TRUE	-	-	7/7	

Description: 1: Jog mode for JOG continuous

In jog mode (default setting) the axis traverses as long as the traverse key is held down and an axis limitation has not been reached. When the key is released the axis is decelerated to zero speed and the movement is considered complete.

0: Continuous operation for JOG continuous

In continuous operation the traverse movement is started with the first rising edge of the traverse key and continues to move even after the key is released. The axis can be stopped again by pressing the traverse key again (second rising edge).

SD irrelevant for ......

Incremental jogging (JOG INC)

Reference point approach (JOG REF)

41100	JOG_REV_IS_ACTIVE			-	-	
-	JOG mode: revolutional feedrate / linear feedrate			BYTE	Immediately	
-						
-	-	0x0E	-	-	7/7	

Description:

Bit 0 = 0:

The behavior depends on the following:

- in the case of an axis/spindle:
  on the axial SD43300 $SA_ASSIGN_FEED_PER_REV_SOURCE
- in the case of a geometry axis with an active frame with rotation:
  on the channel-specific SD42600 $SC_JOG_FEED_PER_REV_SOURCE
- in the case of an orientation axis:
  on the channel-specific SD42600 $SC_JOG_FEED_PER_REV_SOURCE

Bit 0 = 1:

A JOG motion with revolutional feedrate shall be traversed depending on the master spindle.

The following must be considered:

- If a spindle is the master spindle itself, it will be traversed without revolutional feedrate.
- If the master spindle is in stop position and if SD43300 $SA_ASSIGN_FEED_PER_REV_SOURCE (with an axis/spindle) or SD42600 $SC_JOG_FEED_PER_REV_SOURCE (with a geometry axis with an active frame with rotation, or with an orientation axis) = -3, traversing will be carried out without revolutional feedrate.

Bit 1 = 0:

The axis/spindle, geometry axis or orientation axis will be traversed with revolutional feedrate even during rapid traverse (see bit 0 for selection).

Bit 1 = 1:

The axis/spindle, geometry axis or orientation axis is always traversed without revolutional feedback during rapid traverse.

Bit 2 = 0:

The axis/spindle, geometry axis or orientation axis is traversed with revolutional feedrate during JOG handwheel travel, too (see bit 0 for selection).

Bit 2 = 1:

The axis/spindle, geometry axis or orientation axis is always traversed without revolutional feedrate during JOG handwheel travel.

Bit 3 = 0:

The axis/spindle is traversed with revolutional feedrate during DRF handwheel travel, too (see bit 0 for selection).

Bit 3 = 1:

The axis/spindle is always traversed without revolutional feedrate during DRF handwheel travel.

41110	JOG_SET_VELO			-	H1	
mm/min	Axis velocity in JOG			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description:

Value not equal to 0:

The velocity value entered applies to linear axes traversed in JOG mode if linear feedrate (G94) is active for the relevant axis (SD41100 $SN_JOG_REV_IS_ACTIVE = 0).

The axis velocity is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing.

The value entered is valid for all linear axes and must not exceed the maximum permissible axis velocity (MD32000 $MA_MAX_AX_VELO).

In the case of DRF, the velocity defined by SD41110 $SN_JOG_SET_VELO is reduced by

MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR.

Value = 0:

If 0 has been entered in the setting data, the active linear feedrate in JOG mode is

MD32020 $MA_JOG_VELO "Jog axis velocity". Each axis can be given its own JOG velocity with this MD (axial MD).

SD irrelevant for ......

- Linear axes if SD41100 $SN_JOG_REV_IS_ACTIVE = 1
- Rotary axes (SD41130 $SN_JOG_ROT_AX_SET_VELO is active here)

Application example(s)

The operator can thus define a JOG velocity for a specific application.

Related to ....

SD41100 $SN_JOG_REV_IS_ACTIVE (revolutional feedrate with JOG active)

Axial MD32020 $MA_JOG_VELO (JOG axis velocity)

Axial MD32000 $MA_MAX_AX_VELO (maximum axis velocity)

Axial MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR (ratio of JOG velocity to handwheel velocity (DRF))

SD41130 $SN_JOG_ROT_AX_SET_VELO (JOG speed with rotary axes)

41120	JOG_REV_SET_VELO			-	H1	
mm/rev	Revolutional feedrate of axes in JOG mode			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description:

Value not equal to 0:

The velocity value entered applies to axes traversed in JOG mode if revolutional feedrate (G95) is active for the relevant axis (SD41100 $SN_JOG_REV_IS_ACTIVE = 1). The axis velocity is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing. The value entered is valid for all axes and must not exceed the maximum permissible axis velocity (MD32000 $MA_MAX_AX_VELO).

Value = 0:

If 0 has been entered in the setting data, the active revolutional feedrate in JOG mode is MD32050 $MA_JOG_REV_VELO "revolutional feedrate with JOG".

Each axis can be given its own revolutional feedrate with this MD (axial MD).

SD irrelevant for ......

- For axes if SD41100 $SN_JOG_REV_IS_ACTIVE = 0

Application example(s)

The operator can define a JOG velocity for a particular application.

Related to ....

Axial SD41100 $SN_JOG_REV_IS_ACTIVE (revolutional feedrate for JOG active)

Axial MD32050 $MA_JOG_REV_VELO (revolutional feedrate with JOG)

Axial MD32000 $MA_MAX_AX_VELO (maximum axis velocity)

41130	JOG_ROT_AX_SET_VELO			-	H1	
rev/min	Axis velocity for rotary axes in JOG mode			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description:

Value not equal to 0:

The velocity entered applies to rotary axes in JOG mode (to continuous jogging, incremental jogging, jogging with handwheel). The value entered is common to all rotary axes, and must not exceed the maximum permissible axis velocity (MD32000 $MA_MAX_AX_VELO).

With DRF, the velocity set with SD41130 $SN_JOG_ROT_AX_SET_VELO must be reduced by MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR.

Value equal to 0:

If the value 0 is entered in the setting data, the velocity applied to rotary axes in JOG mode is the axial MD32020 $MA_JOG_VELO (jog axis velocity). In this way, it is possible to define a separate JOG velocity for each axis.

Application example(s)

The operator can define a JOG velocity for a particular application.

Related to ....

MD32020 $MA_JOG_VELO (JOG axis velocity)

MD32000 $MA_MAX_AX_VELO (maximum axis velocity)

MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR (ratio JOG velocity to handwheel velocity (DRF)

41200	JOG_SPIND_SET_VELO			-	H1	
rev/min	Speed for spindle JOG mode			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description:

Value not equal to 0:

The speed entered applies to spindles in JOG mode if they are traversed manually by the "Plus and minus traversing keys" or the handwheel. The speed is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing. The value entered is valid for all spindles, and must not exceed the maximum permissible speed (MD32000 $MA_MAX_AX_VELO).

Value = 0:

If 0 has been entered in the setting data, MD32020 $MA_JOG_VELO (JOG axis velocity) acts as the JOG velocity. Each axis can thus be given its own JOG velocity with this MD (axial MD).

The maximum speeds of the active gear stage (MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT) are taken into account when traversing the spindle with JOG.

SD irrelevant for ......

Application example(s). The operator can thus define a JOG speed for the spindles for a specific application.

Related to ....

Axial MD32020 $MA_JOG_VELO (JOG axis velocity)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speeds of the gear stages)

41600	COMPAR_THRESHOLD_1			-	A4	
-	Threshold value of the 1st comparator			DOUBLE	Immediately	
-						
-	8	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/7	

Description:

COMPAR_THRESHOLD_1[b] defines the threshold values for the individual input bits [b] of comparator byte 1.

The output bit n of the 1st comparator is created by comparing the threshold value n according to the comparison type defined in bit n of COMPAR_TYPE_1.

For example:

```
COMPAR_ASSIGN_ANA_INPUT_1[2] = 4
COMPAR_TRESHOLD_1[2]         = 5000.0
COMPAR_TYPE_1                = 5
```

The 3rd output bit of comparator 1 is set if the input value at AnalogIn 4 is greater than or equal to 5 volts.

Index [b]: Bits 0 - 7

Related to ....

MD10530 $MN_COMPAR_ASSIGN_ANA_INPUT_1

MD10531 $MN_COMPAR_ASSIGN_ANA_INPUT_2

MD10540 $MN_COMPAR_TYPE_1

MD10541 $MN_COMPAR_TYPE_2

41601	COMPAR_THRESHOLD_2			-	A4	
-	Threshold value of the 2nd comparator			DOUBLE	Immediately	
-						
-	8	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/7	

Description: COMPAR_THRESHOLD_1[b] defines the threshold values for the individual input bits [b] of comparator byte 1.

Output bit n of the 1st comparator is created by comparing the threshold value n according to the comparison type defined in bit n of COMPAR_TYPE_2.

Index [b]: Bits 0 - 7

Related to ....

MD10530 $MN_COMPAR_ASSIGN_ANA_INPUT_1

MD10531 $MN_COMPAR_ASSIGN_ANA_INPUT_2

MD10540 $MN_COMPAR_TYPE_1

MD10541 $MN_COMPAR_TYPE_2

42000	THREAD_START_ANGLE			-	K1	
degrees	Starting angle for thread			DOUBLE	Immediately	
-						
-	-	0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7	

Description: In the case of multiple thread cutting, the offset of the individual threads can be programmed with the aid of this setting data.

This SD can be changed by the part program with the command SF.

Note:

MD10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

42010	THREAD_RAMP_DISP			-	V1	
mm	Acceleration behavior of axis when thread cutting			DOUBLE	Immediately	
-						
-	2	-1., -1., -1., -1., -1., -1., -1., -1....	-1.	999999.	7/7	

Description: The SD is active for thread cutting with G33 (G34, G35).

It features two elements that define the behavior of the thread axis during runup (1st element) and during deceleration/smoothing (2nd element).

The values have the same properties for thread run-in and thread run-out:

<0:

The thread axis is started/decelerated with configured acceleration. Jerk is according to the current programming of BRISK/SOFT. Behavior is compatible with MD 20650__THREAD_START_IS_HARD = FALSE used until now.

0:

Starting/deceleration of the feed axis during thread cutting is stepped. Behavior is compatible with MD 20650__THREAD_START_IS_HARD = TRUE used until now.

>0:

The maximum thread starting or deceleration path is specified. The specified distance can lead to acceleration overload of the axis. The SD is written from the block when DITR (displacement thread ramp) is programmed.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

42100	DRY_RUN_FEED			-	V1	
mm/min	Dry run feedrate			DOUBLE	Immediately	
-						
-	-	5000., 5000., 5000., 5000., 5000., 5000....	-	-	7/7	

Description: The feedrate for the active dry run is entered in this setting data. The setting data can be altered on the operator panel in the "Parameters" operating area.

The entered dry run feedrate is always interpreted as a linear feed (G94). If the dry run feedrate is activated via the PLC interface, the dry run feedrate is used as the path feed after a reset instead of the programmed feed. The programmed velocity is used for traversing if it is greater than the velocity stored here.

Application example(s)

Program testing

Related to ....

NC/PLC interface signal DB3200 DBX0.6 (Activate dry run feedrate)

NC/PLC interface signal DB1700 DBX0.6 (Dry run feedrate selected)

42101	DRY_RUN_FEED_MODE			-	V1	
-	Mode for dry run velocity			BYTE	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	12	7/7	

Description: This SD can be used to set the method of operation of the dry run velocity set by SD42100 $SC_DRY_RUN_FEED.

The following values are possible:

0:

The maximum of SD42100 $SC_DRY_RUN_FEED and the programmed velocity become active. This is the standard setting and corresponds to the behavior up to SW 5.

1:

The minimum of SD42100 $SC_DRY_RUN_FEED and the programmed velocity become active.

2:

SD42100 $SC_DRY_RUN_FEED becomes active directly, irrespective of the programmed velocity.

The values 3...9 are reserved for extensions.

10:

As configuration 0, except for thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed.

11:

As configuration 1, except for thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed.

12:

As configuration 2, except for thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed.

42110	DEFAULT_FEED			-	V1,FBFA	
mm/min	Path feed default value			DOUBLE	Immediately	
-						
-	-	0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7	

Description: Default value for path feedrate, This setting data is evaluated when the part program starts taking into account the feedrate type active at this time (see MD20150 $MC_GCODE_RESET_VALUES and MD20154 $MC_EXTERN_GCODE_RESET_VALUES).

42120	APPROACH_FEED			-	-	
mm/min	Path feedrate in approach blocks			DOUBLE	Immediately	
-						
-	-	0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7	

Description: Default value for path feedrate in approach blocks (after repos., block search, SERUPRO etc).

The contents of this settting data are only used when it is non-zero.

It is evaluated like an F word programmed for G94.

42122	OVR_RAPID_FACTOR			-	$MN_OVR_FACTOR_RAPID_TRA,$AC_OVR		
%	Add. rapid traverse override can be specified through operation			DOUBLE	Immediately		
-							
-	-	100., 100., 100., 100., 100., 100., 100....	-	-	7/7		

Description: Additional channel-specific rapid traverse override in %. The value is calculated to the path depending on OPI variable enablOvrRapidFactor. The value multiplies the other rapid traverse overrides (rapid traverse override of the machine control panel, override default through synchronized actions $AC_OVR).

42125	SERUPRO_SYNC_MASK			-	-		
-	Synchronization in approach blocks			DWORD	Immediately		
-							
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7		

Description:

A synchronized approach can be set for the search type SERUPRO with the setting data SERUPRO_SYNC_MASK.

SERUPRO uses the function REPOS to move from the current machine position to the target block of the search. A synchronization of the channels can be forced between the reapproach block and the target block via SERUPRO_SYNC_MASK which would correspond to the use of WAIT markers.

Note:

The user cannot program WAIT markers between reapproach block and target block in a part program.

SERUPRO_SYNC_MASK activates this intermal WAIT marker, and defines for which other channels this channel is to wait.

Example for channel 3: $SC_SERUPRO_SYNC_MASK= 0x55

A new block is now inserted in the Serupro approach between the reapproach block and the target block, the function of which corresponds to the following programming: WAITM(101, 1,3,5,7), i.e. a WAIT marker synchronizes the channels 1, 3, 5 and 7.

The WAIT markers used internally cannot be explicitly programmed by the user.

NOTICE:

Similarly to the part program, the user can make the error of not setting the marker in a channel, so that the other channels naturally wait for ever!

Note:

The bit mask can contain a channel that does not exist (channel gaps) without a deadlock occurring.

Example for channel 3: $SC_SERUPRO_SYNC_MASK= 0x55 and channel 5 do not exist, so WAITM(101, 1,3,7) is set.

Note: The block content corresponds to "WAITM(101, 1,3,5,7)", the user does not see this block content, he sees REPOSA!

Note:

SERUPRO_SYNC_MASK is evaluated as soon as the part program command REPOSA is interpreted.

SERUPRO_SYNC_MASK can still be changed if SERUPRO is in the state "search target found".

If REPOSA has already been executed, a change to SERUPRO_SYNC_MASK can only become active if a new REPOS is set. This occurs, for example, by:

- Starting a new ASUB.
- STOP-JOG-AUTO-START
- STOP - select a new REPOS mode RMI/RMN/RME/RMB - START

Note:

If one uses the prog. event for search and if the NCK is at alarm 10208 then a change of SERUPRO_SYNC_MASK is not active unless one sets a new REPOS.

SERUPRO_SYNC_MASK == 0 A block is NOT inserted.

Note:

If the bit for the current channel is not set in SD42125 $SC_SERUPRO_SYNC_MASK then a block is NOT inserted.

Example:

If $SC_SERUPRO_SYNC_MASK= 0xE is programmed in channel 1, then a block is NOT inserted.

This assignment is reserved for a future function!

42140	DEFAULT_SCALE_FACTOR_P			-	FBFA	
-	Default scaling factor for address P			DWORD	Immediately	
-						
-	-	1, 1, 1, 1, 1, 1, 1, 1...	-	-	7/7	

Description: The value in this machine data is active if no scaling factor P has been programmed in the block.

Related to:

WEIGHTING_FACTOR_FOR_SCALE

42150	DEFAULT_ROT_FACTOR_R			-	-	
-	Default rotation factor for address R			DOUBLE	Immediately	
-						
-	-	0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7	

Description: The value in this machine data is active if no factor for rotation R is programmed in the block.

42160	EXTERN_FIXED_FEEDRATE_F1_F9			-	FBFA	
-	Fixed feedrates F1 - F9			DOUBLE	Immediately	
-						
-	10	0., 0., 0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7	

Description: Fixed feedrate values for programming with F1 - F9. If the machine data $MC_FEEDRATE_F1_F9_ON = TRUE is set with the programming of F1 - F9, the feedrate values are read from SD42160 $SC_EXTERN_FIXED_FEEDRATE_F1_F9[0] - $SC_EXTERN_FIXED_FEEDRATE_F1_F9[8], and activated as the machining feedrate.

The rapid traverse feedrate must be entered in SD42160 $SC_EXTERN_FIXED_FEEDRATE_F1_F9[0].

42162	EXTERN_DOUBLE_TURRET_DIST			-	FBFA	
-	Double turret head tool distance			DOUBLE	Immediately	
-						
-	-	0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7	

Description: Distance between both tools of a double turret head.

The distance is activated using G68 as additive zero point offset if MD10812 $MN_EXTERN_DOUBLE_TURRET_ON is set to TRUE.

42200	SINGLEBLOCK2_STOPRE			-	BA	
-	Activate SBL2 debug mode			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description: Value = TRUE:

A preprocessing stop is made with every blockif SBL2 (single block with stop after every block) is active. This suppresses the premachining of part program blocks. This variant of the SBL2 is not true-to-contour.

This means that a different contour characteristic might be generated as a result of the preprocessing stop than without single block or with SBL1.

Application: Debug mode for testing part programs.

42440	FRAME_OFFSET_INCR_PROG			-	K1,K2	
-	Work offsets in frames			BOOLEAN	Immediately	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/7	

Description: 0: When incremental programming is used on an axis, only the programmed position delta is traversed after a frame change. Zero offsets in FRAMES are only traversed when an absolute position is specified.

1: When incremental programming is used on an axis, changes to zero offsets are traversed after a frame change (standard response up to software version 3).

Related to ....

SD42442 $SC_TOOL_OFFSET_INCR_PROG

42442	TOOL_OFFSET_INCR_PROG			-	W1,K1	
-	Tool length compensations			BOOLEAN	Immediately	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/7	

Description: 0: When incremental programming is used on an axis, only the programmed position delta is traversed after a frame change. Tool length offsets in FRAMES are only traversed when an absolute position is specified.

1: When incremental programming is used on an axis, changes to tool length offsets are traversed after a tool change (standard response up to SW version 3).

Related to ....

SD42440 $SC_FRAME_OFFSET_INCR_PROG

42444	TARGET_BLOCK_INCR_PROG			-	BA	
-	Set down mode after search run with calculation			BOOLEAN	Immediately	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/7	

Description: If the first programming of an axis after "Search run with calculation to end of block" is incremental, the incremental value is added as a function of SD42444 $SC_TARGET_BLOCK_INCR_PROG to the value accumulated up to the search target :

SD = TRUE: Incremental value is added to accumulated position

SD = FALSE: Incremental value is added to current actual value

The setting data is evaluated on NC start for output of the action blocks.

42450	CONTPREC			-	B1,K6	
mm	Contour accuracy			DOUBLE	Immediately	
-						
-	-	0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1...	0.000001	999999.	7/7	

Description: Contour accuracy. This setting data can be used to define the accuracy to be maintained for the path of the geometry axes on curved contours. The lower the value and the lower the servogain factor of the geometry axes, the greater the reduction of path feed on curved contours.

Related to ....

MD20470 $MC_CPREC_WITH_FFW

SD42460 $SC_MINFEED

42460	MINFEED			-	B1,K6	
mm/min	Minimum path feedrate for CPRECON			DOUBLE	Immediately	
-						
-	-	1., 1., 1., 1., 1., 1., 1., 1....	0.000001	999999.	7/7	

Description: Minimum path feedrate with the "Contour accuracy" function active. The feedrate is not limited to below this value unless a lower F value has been programmed or the axis dynamics do not permit it.

Related to ....

MD20470 $MC_CPREC_WITH_FFW

SD42450 $SC_CONTPREC

42466	SMOOTH_ORI_TOL			-	B1	
degrees	Maximum deviation of tool orientation during smoothing.			DOUBLE	Immediately	
-						
-	-	0.05, 0.05, 0.05, 0.05, 0.05, 0.05, 0.05...	0.000001	90.	7/7	

Description: This setting data defines the maximum tool orientation tolerance during smoothing.

The data determines the maximum permissible

angular displacement of the tool orientation.

This data only applies if an orientation tranformation

is active.

Related to:

MD20480 $MC_SMOOTHING_MODE,

SD42465 $SC_SMOOTH_CONTUR_TOL

42470	CRIT_SPLINE_ANGLE			-	W1,PGA	
degrees	Corner limit angle for compressor			DOUBLE	Immediately	
-						
-	-	36.0, 36.0, 36.0, 36.0, 36.0, 36.0, 36.0...	0.0	89.0	7/7	

Description: The setting data defines the limit angle from which the compressor COMPCAD interprets a block transition as a corner. Practical values lie between 10 and 40 degrees. Values from 0 to 89 degrees inclusive are permitted.

The angle only serves as an approximate measure for corner detection. The compressor can also classify flatter block transitions as corners and eliminate larger angles as outliers on account of plausibility considerations.

42477	COMPRESS_ORI_ROT_TOL			-	F2,PGA	
degrees	Maximum deviation of tool rotation with compressor			DOUBLE	Immediately	
-						
-	-	0.05, 0.05, 0.05, 0.05, 0.05, 0.05, 0.05...	0.000001	90.	7/7	

Description: This setting data defines the maximum tolerance in the compressor for turning the tool orientation. This data defines the maximum permissible angular displacement of the tool rotation.

This data is only active if an orientation transformation is active.

Turning the tool orientation is only possible with 6-axis machines.

42480	STOP_CUTCOM_STOPRE			-	W1	
-	Alarm response with tool radius compensation and preproc. stop			BOOLEAN	Immediately	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/7	

Description: If this setting data is TRUE, block execution is stopped by preprocessing stop and active tool radius compensation, and does not resume until after a user acknowledgement (START).

If it is FALSE, machining is not interrupted at such a program point.

42490	CUTCOM_G40_STOPRE			-	W1	
-	Retraction behavior of tool radius compensation with prep. stop			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description: FALSE:

If there is a preprocessing stop (either programmed or generated internally by the control) before the deselection block (G40) when tool radius compensation is active, then firstly the starting point of the deselection block is approached from the last end point before the preprocessing stop. The deselection block itself is then executed, i.e. the deselection block is usually replaced by two traversing blocks. Tool radius compensation is no longer active in these blocks. The behavior is thus identical with that before the introduction of this setting data.

TRUE:

If there is a preprocessing stop (either programmed or generated internally by the control) before the deselection block (G40) when tool radius compensation is active, the end point of the deselection point is traversed in a straight line from the last end point before the preprocessing stop.

42494	CUTCOM_ACT_DEACT_CTRL			-	W1	
-	Approach & retraction behavior with 2-1/2D tool radius compens.			DWORD	Immediately	
-						
-	-	2222, 2222, 2222, 2222, 2222, 2222, 2222...	-	-	7/7	

Description: This setting data controls the approach and retraction behavior with tool radius compensation if the activation or deactivation block does not contain any traversing information. It is only evaluated with 2-1/2D TRC (CUT2D or CUT2DF).

The decimal coding is as follows:

```
N N N N
|   |   |   |____  Approach behavior for tools with tool point direction
|   |   |             (turning tools)
|   |   |______ Approach behavior for tools without tool point direction
|   |              (milling tools)
|   |________  Retract behavior for tools with tool point direction
|               (turning tools)
|__________   Retract behavior for tools without tool point direction
             (milling tools)
```

If the position in question contains a 1, approach or retraction is always performed, even if G41/G42 or G40 stands alone in a block.

For example:

N100 x10 y0

N110 G41

N120 x20

If a tool radius of 10mm is assumed in the above example, position x10y10 is approached in block N110.

If the position in question contains the value 2, the approach or retraction movement is only performed if at least one geometry axis is programmed in the activation/deactivation block. To obtain the same results as the above example with this setting, the program must be altered as follows:

N100 x10 y0

N110 G41 x10

N120 x20

If axis information x10 is missing in block N110, activation of TRC is delayed by one block, i.e. the activation block would now be N120.

If the position in question contains a 3, retraction is not performed in a deactivation block (G40) if only the geometry axis perpendicular to the compensation plane is programmed. In this case, the motion perpendicular to the compensation plane is performed first. This is followed by the retraction motion in the compensation plane. In this case, the block after G40 must contain motion information in the compensation plane. The approach motions for values 2 and 3 are identical.

If the position in question contains a value other than 1, 2 or 3, i.e. in particular the value 0, an approach or retraction movement is not performed in a block that does not contain any traversing information.

About the term "Tools with tool point direction":

These are tools with tool numbers between 400 and 599 (turning and grinding tools), whose tool point direction has a value between 1 and 8. Turning and grinding tools with tool point direction 0 or 9 or other undefined values are treated like milling tools.

Note:

If the value of this setting data is changed within a program, we recommend programming a preprocessing stop (stopre) before the description to avoid the new value being used in program sections before that point. The opposite case is not serious, i.e. if the setting data is written, subsequent NC blocks will definitely access the new value.

42496	CUTCOM_CLSD_CONT			-	-	
-	Tool radius compensation behavior with closed contour			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description: FALSE:

If two intersections are created on correction of the inner side of an (almost) closed contour consisting of two successive circle blocks or a circle and a linear block, the intersection that lies on the first part contour nearer to the block end will be selected as per the default behavior.

A contour will be considered as (almost) closed if the distance between the starting point of the first block and the end point of the second block is smaller than 10% of the active compensation radius, but not larger than 1000 path increments (corresponds to 1mm to 3 decimal places).

TRUE:

Under the same condition as described above, the intersection that lies on the first part contour nearer to block start is selected.

42500	SD_MAX_PATH_ACCEL			-	B2	
m/s²	maximum path acceleration			DOUBLE	Immediately	
-						
-	-	10000., 10000., 10000., 10000., 10000....	1.0e-3	-	7/7	

Description: Setting data for additional limitation of (tangential) path acceleration

Related to ...

MD32300 $MA_MAX_AX_ACCEL

SD42502 $SC_IS_SD_MAX_PATH_ACCEL

42502	IS_SD_MAX_PATH_ACCEL			-	B2	
-	Evaluate SD42500 SC_SD_MAX_PATH_ACCEL			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description: SD42500 $SC_SD_MAX_PATH_ACCEL is included in the limit calculations if SD42502 $SC_IS_SD_MAX_PATH_ACCEL=TRUE

Related to ...

SD42500 $SC_SD_MAX_PATH_ACCEL

42510	SD_MAX_PATH_JERK			-	B2	
m/s³	maximum path-related jerk as setting data			DOUBLE	Immediately	
-						
-	-	100000., 100000., 100000., 100000....	1.e-9	-	7/7	

Description: As well as MD20600 $MC_MAX_PATH_JERK, the maximum path-related jerk can also limit the jerk.

Related to ...

MD20600 $MC_MAX_PATH_JERK

SD42512 $SC_IS_SD_MAX_PATH_JERK

42512	IS_SD_MAX_PATH_JERK			-	B2	
-	Evaluate SD42510 SD_MAX_PATH_JERK			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description: SD42510 $SC_SD_MAX_PATH_JERK is included in the limit calculations if SD42512 $SC_IS_SD_MAX_PATH_JERK=TRUE

Related to ...

SD42510 $SC_SD_MAX_PATH_JERK (SD for additional limitation of (tangential) path jerk)

42520	CORNER_SLOWDOWN_START			-	-	
mm	Start of feed reduction at G62.			DOUBLE	Immediately	
-						
-	-	0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7	

Description: Traverse path distance from which the feed is reduced before the corner with G62.

42522	CORNER_SLOWDOWN_END			-	-	
mm	End of feed reduction at G62.			DOUBLE	Immediately	
-						
-	-	0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7	

Description: Traverse path distance up to which the feed remains reduced after a corner with G62.

42524	CORNER_SLOWDOWN_OVR			-	-	
%	Feed override reduction at G62			DOUBLE	Immediately	
-						
-	-	0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7	

Description: Override used to multiply the feed at the corner with G62.

42526	CORNER_SLOWDOWN_CRIT			-	-	
degrees	Corner detection at G62			DOUBLE	Immediately	
-						
-	-	0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7	

Description: Angle from which a corner is taken into account when reducing the feed with G62.

For example SD42526 $SC_CORNER_SLOWDOWN_CRIT = 90 means that all corners of 90 degrees or a more acute angle are traversed slower with G62.

42528	CUTCOM_DECEL_LIMIT			-	-	
-	Feed lowering on circles with tool radius compensation			DOUBLE	Immediately	
-						
-	-	0., 0., 0., 0., 0., 0., 0., 0....	0.	1.	7/7	

Description: The setting data limits feed lowering of the tool center point on concave circle segments with tool radius compensation active and CFC or CFIN selected.

With CFC, the feed is defined at the contour. On concave circular arcs, feed lowering of the tool center point is created by the ratio of the contour curvature to the tool center point path curvature. The setting data is limiting this effect, reducing backing off and overheating of the tool.

For contours with varying curvatures, a mid-range curvature is used.

0: Provides the previous behavior: If the ratio between contour radius and tool center point path radius is less than or equal to 0.01 the feed is applied to the tool center point path. Less pronounced feed reductions are executed.

>0: Feed lowering is limited to the programmed factor. At 0.01, this means that the feed of the tool center point path is possibly only 1 percent of the programmed feed value.

1: On concave contours, the tool center point feed equals the programmed feed (the behavior then corresponds to CFTCP).

42600	JOG_FEED_PER_REV_SOURCE			-	V1	
-	Control revolutional feedrate in JOG			DWORD	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-3	31	7/7	

Description: The revolutional feedrate in JOG mode for geometry axes on which a frame with rotation acts.

0= No revolutional feedrate is active.

>0= Machine axis index of the rotary axis/spindle from which the revolutional feedrate is derived.

-1= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active.

-2= The revolutional feedrate is derived from the axis with machine axis index == 0.

-3= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active. No revolutional feedrate is active if the master spindle is at a standstill.

Related to ....

SD43300: $SA_ASSIGN_FEED_PER_REV_SOURCE (revolutional feedrate for position axes/spindles)

42660	ORI_JOG_MODE			-	-	
-	Definition of virtual kinematics for JOG			DWORD	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	5	7/7	

Description: This SD can be used to define virtual kinematics, which become active for the manual travel of orientations.

This setting data is evaluated only by the generic 5/6-axis transformation. This data has no meaning for OEM transformations.

The following setting options are available:

0: The virtual kinematics are defined by the transformation.

1: Euler angles are traversed during jog, that is the 1st axis turns round the Z direction, the 2nd axis turns around the X direction and, if present, the 3rd axis turns aound the new Z direction.

2: RPY angles are traversed during jog with the turning sequence XYZ, that is the 1st axis turns around the x direction, the 2nd axis turns around the Y direction and, if present, the 3rd axis turns around the new Z direction.

3: RPY angles are traversed during jog with the turning sequence ZYX, that is the 1st axis turns around the Z direction, the 2nd axis turns around the Y direction and, if present, the 3rd axis turns around the new X direction.

4: The turning sequence of the rotary axes is set by means of MD21120 $MC_ORIAX_TURN_TAB_1.

5: The turning sequence of the rotary axes is set by means of MD21130 $MC_ORIAX_TURN_TAB_2.

42690	JOG_CIRCLE_CENTRE			-	-	
mm	Center of the circle			DOUBLE	Immediately	
-						
-	3	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7	

Description: This setting data is used to define the circle center point in the workpiece coordinate system during JOG of circles.

Only the relevant center point coordinates of the geometry axes in the active plane are evaluated, not the coordinate of the geometry axis vertical to the plane. This setting data is written via the user interface.

By default the coordinate of an axis with diameter programming is in the diameter. This can be changed with MD20360 $MC_TOOL_PARAMETER_DEF_MASK Bit 13 = 1 by indicating a radius.

42691	JOG_CIRCLE_RADIUS			-	-	
mm	Circle radius			DOUBLE	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7	

Description: With this setting data, the circle radius in the WCS, the maximum circle during inner machining or the minimum circle during outer machining are defined when jogging circles. This setting data is written via the user interface.

42692	JOG_CIRCLE_MODE			-	-	
-	JOG of circles mode			DWORD	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	0xf	7/7	

Description: This setting data sets the following during JOG of circles:

Bit 0 = 0 :

Travel to + creates traversing on a circular path in counterclockwise direction; travel to - creates traversing in clockwise direction.

Bit 0 = 1 :

Travel to + creates traversing on a circular path in clockwise direction; travel to - creates traversing in counterclockwise direction.

Bit 1 = 0 :

The tool radius is not taken into account in checking the limitation produced by the specified circle or by the circle segment limited by the start and end angles.

Bit 1 = 1 :

The tool radius is taken into account in checking the limitation produced by the specified circle or by the circle segment limited by the start and end angles.

Bit 2 = 0 :

Internal machining is performed. The circle radius in SD42691 $SC_JOG_CIRCLE_RADIUS is the maximum possible radius.

Bit 2 = 1 :

External machining is performed. The circle radius in SD42691 $SC_JOG_CIRCLE_RADIUS is the minimum possible radius.

Bit 3 = 0 :

Given a full circle, the radius is enlarged starting from the circle center point in the direction of the ordinate (2nd geometry axis) of the plane.

Bit 3 = 1 :

Given a full circle, the radius is enlarged starting from the circle center point in the direction of the abscissa (1st geometry axis) of the plane.

This setting data should be written via the user interface.

42693	JOG_CIRCLE_START_ANGLE			-	-	
degrees	Circle start angle			DOUBLE	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	360	7/7	

Description: This setting data defines the start angle during JOG of circles.

The start angle refers to the abscissa of the current plane. Traversing is only possible within the range

between the start and the end angle. SD42692 $SC_JOG_CIRCLE_MODE bit 0 defines the direction from the start to the end angle. If start and end angle equal zero, no limitation is active.

This setting data is written via the user interface.

42694	JOG_CIRCLE_END_ANGLE			-	-	
degrees	Circle end angle			DOUBLE	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	360	7/7	

Description: This setting data defines the end angle during JOG of circles.

The end angle refers to the abscissa of the current plane. Traversing is only possible within the range

between the start and the end angle. SD42692 $SC_JOG_CIRCLE_MODE bit 0 defines the direction from the start to the end angle. If start and end angle equal zero, no limitation is active.

This setting data is written via the user interface.

42750	ABSBLOCK_ENABLE			-	K1	
-	Enable base block display			BOOLEAN	Immediately	
-						
-	-	TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE...	-	-	7/7	

Description: Value 0: Disable basic blocks with absolute values (basic block display)

Value 1: Enable basic blocks with absolute values (basic block display)

42900	MIRROR_TOOL_LENGTH			-	W1	
-	Sign change of tool length with mirror image machining			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description: TRUE:

If a frame with mirror image machining is active, the tool components ($TC_DP3[..., ...] to $TC_DP5[..., ...]) and the components of the base dimensions

($TC_DP21[..., ...] to $TC_DP23[..., ...]) whose associated axes

are mirrored, are also mirrored, i.e. their sign is inverted. The wear values

are not mirrored. If the wear values are to be mirrored too,

SD42910 $SC_MIRROR_TOOL_WEAR must be set.

FALSE:

The sign for tool length components is unaffected by whether a frame with mirror image machining is active.

42910	MIRROR_TOOL_WEAR			-	W1	
-	Sign change of tool wear with mirror image machining			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description:

```
TRUE:
If a frame with mirror image machining is activated, the signs of the wear
values of the components in question are inverted. The wear values of the
components that are not assigned to mirrored axes remain unchanged.
FALSE:
The signs for wear values are unaffected by whether a frame with mirror image
machining is active.
```

42920	WEAR_SIGN_CUTPOS			-	W1	
-	Sign of tool wear depending on tool point direction			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description:

```
TRUE:
In the case of tools with a relevant tool point direction (turning and grind-
ing tools), the sign for wear of the tool length components depends on the
tool point direction.
The sign is inverted in the following cases (marked with an X):
Tool point direction    Length 1          Length 2
1
2                              X
3                              X                 X
4                                                X
5
6
7                              X
8                                                X
9
The sign for wear value of length 3 is not influenced by this setting data.
The SD42930 $SC_WEAR_SIGN acts in addition to this setting data.
FALSE:
The sign for wear of the tool length components is unaffected by the tool
point direction.
```

42930	WEAR_SIGN			-	W1	
-	Sign of wear			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description:

TRUE:

The sign for wear of the tool length components and the tool radius are inverted, i.e. if a positive value in entered, the total dimension is decreased.

FALSE:

The sign for wear of the tool length components and the tool radius is not inverted.

42935	WEAR_TRANSFORM			-	W1,W4	
-	Transformations for tool components			DWORD	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7	

Description:

This setting data is bit-coded.

It determines which of the three wear components

wear

($TC_DP12 - $TC_DP14),

additive offsets fine ($TC_SCPx3 - $TC_SCPx5),

and additive offsets coarse ($TC_ECPx3 - $TC_ECPx5)

are subject to adapter transformation and transformation by an orientable tool holder, if one of the two G codes TOWMCS or TOWWCS from G code group 56 is active. If initial-setting G code TOWSTD is active, this setting data will not become active.

Then, the following assignment is valid:

Bit 0 = TRUE: Do not apply transformations to $TC_DP12 - $TC_DP14.

Bit 1 = TRUE: Do not apply transformations to $TC_SCPx3 - $TC_SCPx5.

Bit 2 = TRUE: Do not apply transformations to $TC_ECPx3 - $TC_ECPx5.

The bits not mentioned here are (currently) not assigned.

42940	TOOL_LENGTH_CONST			-	W1	
-	Change of tool length components with change of active plane			DWORD	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7	

Description:

If this setting data is not equal to 0, the assignment of tool length components (length, wear, base dimensions) to geometry axes is not changed when the machining plane (G17 - G19) is changed.

The assignment of tool length components to geometry axes can be derived from the value of the setting data acc. to the following tables.

A distinction is made between turning and grinding tools (tool types 400 to 599) and other tools (typically milling tools) in the assignment.

Representation of this information in tables assumes that geometry axes 1 to 3 are called X, Y and Z. For assignment of an offset to an axis, not the axis identifier but the axis sequence is relevant.

Assignment for turning tools and grinding tools (tool types 400 to 599):

Content	Length 1	Length 2	Length 3
17	Y	X	Z
18*	X	Z	Y
19	Z	Y	X
-17	X	Y	Z
-18	Z	X	Y
-19	Y	Z	X

* Any value which is not 0 and is not one of the six values listed, is treated as value 18.

For values that are the same but with a different sign, assignment of length 3 is always the same, lengths 1 and 2 are reversed. Assignment for all tools which are neither turning nor grinding tools (tool types < 400 or > 599):

Content	Length 1	Length 2	Length 3
17*	Z	Y	X
18	Y	X	Z
19	X	Z	Y
-17	Z	X	Y
-18	Y	Z	X
-19	X	Y	Z

* Any value which is not 0 and is not one of the six values listed, is treated as value 17.

For values that are the same but with a different sign, assignment of length 1 is always the same, lengths 2 and 3 are reversed.

42950	TOOL_LENGTH_TYPE			-	W1	
-	Assignment of tool length compensation independent of tool type			DWORD	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7	

Description: This setting data defines the assignment of the tool length components to the geometry axes independently of the tool type. It can assume any value between 0 and 2. Any other value is interpreted as 0.

Value

0: Standard assignment. A distinction is made between turning and grinding tools (tool types 400 to 599) and other tools (milling tools).

1: The assignment of the tool length components is independent of the actual tool type, always as for milling tools.

2. The assignment of the tool length components is independent of the actual tool type, always as for turning tools.

The setting data also affects the wear values assigned to the length components.

If SD42940 $SC_TOOL_LENGTH_CONST is set, the tables defined there access the table for milling and turning tools defined by SD42950 $SC_TOOL_LENGTH_TYPE irrespective of the actual tool type, if the value of the table is not equal to 0.

42960	TOOL_TEMP_COMP			-	W1	
-	Temperature compensation for tool			DOUBLE	Immediately	
-						
-	3	0.0, 0.0, 0.0, 0.0, 0.0, 0.0...	-	-	7/7	

Description: Temperature compensation value for the tool. The compensation value acts as vector according to the current rotation of the tool direction.

This setting data will only be evaluated, if temperature compensation has been activated for tools with MD20390 $MC_TOOL_TEMP_COMP_ON.

Apart from that, the temperature compensation type must be set in bit 2 for the "Compensation in tool direction" MD32750 $MA_TEP_COMP_TYPE.

The "Temperature compensation" is an option that has to be previously enabled.

42970	TOFF_LIMIT			-	F2	
mm	Upper limit of correction value via $AA_TOFF			DOUBLE	Immediately	
-						
-	3	100000000.0, 100000000.0, 100000000.0...	-	-	7/7	

Description: Upper limit of the offset value which can be defined by means of synchronized actions via the $AA_TOFF system variable.

This limit value influences the absolutely effective amount of offset through $AA_TOFF.

Whether the offset value is within the limit range can be checked via the $AA_TOFF_LIMIT system variable.

42974	TOCARR_FINE_CORRECTION			C08	-	
-	Fine offset TCARR ON / OFF			BOOLEAN	Immediately	
-						
-	-	FALSE, FALSE, FALSE, FALSE, FALSE, FALSE...	-	-	7/7	

Description:

TRUE:

On activating an orientable tool holder, the fine offset values are considered.

FALSE:

On activating an orientable tool holder, the fine offset are not considered.

42980	TOFRAME_MODE			-	K2	
-	Frame definition at TOFRAME, TOROT and PAROT			DWORD	Immediately	
-						
-	-	1000, 1000, 1000, 1000, 1000, 1000, 1000...	-	-	7/7	

Description: This setting data defines the direction of the geometry axes on the machining plane (XY in the case of G17) in the case of the frame definition by means of (TOROTY, TOROTX) or for PAROT.

When a frame is calculated, the tool direction (Z in the case of G17) is uniquely defined so that the tool direction and vertical axis (Z in the case of G17) of the frame are parallel and lie perpendicular on the machining plane.

Rotation around the tool axis is free at first. This free rotation can be defined using this setting data so that the newly defined frame deviates as little as possible from a previously active frame.

In all cases in which the setting data is not zero, an active frame remains unchanged if the tool direction (Z in the case of G17) of the old and the new frame are the same.

SD42980 >= 2000:

In the case of TOROT (or TOROTY and TOROTX), the rotations and translations of the frame chain are used to calculate a frame in the tool reference system frame ($P_TOOLFRAME) berechnet.

Machine data 21110 $MC_X_AXIS_IN_OLD_X_Z_PLANE is not evaluated.

The explantory notes below refer to the G17 plane with the XY axes in the machining plane and the tool axis being Z.

SD42980 = 2000:

Rotation around the Z axis is selected so that the angle between the new X axis and the old X-Z plane has the same absolute value as the angle between the new Y axis and the old Y-Z plane. This setting corresponds to the mean value of both settings which would result for values 2001 and 2002 of this setting data.

It is also applied if the value of the units digit is greater than 2.

SD42980 = 2001:

The new X direction is selected so that it lies in the X-Z plane of the old coordinate system. The angular difference between the old and new Y axes is minimal with this setting.

SD42980 = 2002:

The new Y direction is selected so that it lies in the Y-Z plane of the old coordinate system. The angular difference between the old and new X axes is minimal with this setting.

None of the other settings of SD42980 (0,1,2,...1000,1001..) should be used for recommissioning.

For compatibility reasons, the following settings remain valid:

0: The orientation of the coordinate system is determined by the value of machine data 21110 $MC_X_AXIS_IN_OLD_X_Z_PLANE.

1: The new X direction is selected so that it lies in the X-Z plane of the old coordinate system. The angular difference between the old and new Y axes is minimal with this setting.

2: The new Y direction is selected so that it lies in the Y-Z plane of the old coordinate system. The angular difference between the old and new X axes is minimal with this setting.

3: The average of the two settings resulting from 1 and 2 is selected.

Addition of 100: In the case of a plane change from G17 to G18 or G19, a tool matrix is generated, in which the new axis directions are parallel to the old directions. The axes are swapped cyclically accordingly (standard transformation on plane changes). If the hundreds digit equals zero, a matrix is supplied in the cases of G18 and G19 which is derived from the unit matrix by simply rotating through 90 degrees around the X axis (G18) or through 90 degrees around the Y axis (G19). Thus in each case one axis is antiparallel to an initial axis. This setting is required to remain compatible with old software versions.

Addition of 1000: The tool-frame is linked to any active basic frames and settable frames. The response is thus compatible with earlier software versions (before 5.3). If the thousands digit is not set, the tool frame is calculated so that any active basic frames and settable frames are taken into account.

42984	CUTDIRMOD			C08	-	
-	Modification of $P_AD[2] or $P_AD[11]			STRING	Immediately	
-						
-	-	...	-	-	7/7	

Description: States whether the tool point direction and cutting direction are to be modified on reading the corresponding system variables $P_AD[2] and $P_AD[11].

Modification is made by rotating the vector of the tool point direction or cutting direction by a specific angle in the active machining plane (G17-G19). The resulting output value is always the tool point direction or cutting direction created by the rotation or to which the rotated value is closest. the angle of rotation can be defined by one of the following six options:

1: The string is empty. The stated data are output unchanged.

2: The contents of the string is "P_TOTFRAME". The resulting rotation is determined from the total frame.

3: The contents of the string is a valid frame name (e.g. $P_NCBFRAME[3]). The resulting rotation is then calculated from this frame.

4: The contents of the string has the form "Frame1 : Frame2". The resulting rotation is determined from the part frame chain that is created by chaining all frames from Frame1 to Frame2 (in each case inclusive). Frame1 and Frame2 are valid frame names such as $P_PFRAME or $P_CHBFRAME[5]"

5: The contents of the frame is the valid name of a rotary axis (machine axis). The resulting rotation is determined from the programmed end position of this rotary axis. Additionally, an offset can be stated (in degrees, e.g. "A+90).

6: The rotation is programmed explicitly (in degrees).

Optionally, the first character of the string can be written as sign (+ or -). A plus sign will not have any effect on the angle calculation, but a minus sign will invert the sign of the calculated angle.

42990	MAX_BLOCKS_IN_IPOBUFFER			-	K1	
-	maximum number of blocks in IPO buffer			DWORD	Immediately	
-						
-	-	-1, -1, -1, -1, -1, -1, -1, -1...	-	-	7/7	

Description: This setting data can be used to limit the maximum number of blocks in the interpolation buffer to the maximum number specified in MD28060 $MC_MM_IPO_BUFFER_SIZE.

A negative value means that no limitation of the number of blocks is active in the interpolation buffer, and the number of blocks is determined solely by MD28060 $MC_MM_IPO_BUFFER_SIZE (default setting).

42995	CONE_ANGLE			-	-	
-	Taper angle			DOUBLE	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	-359.9	359	7/7	

Description: This setting data writes the taper angle for taper turning. This setting data is written via the operator interface.

42996	JOG_GEOAX_MODE_MASK			-	-	
-	JOG of geometry axis mode			DWORD	Immediately	
-						
-	-	0, 0, 0, 0, 0, 0, 0, 0...	0	0x7	7/7	

Description: This setting data sets the following during JOG of geometry axes:

Bit 0 = 1 :

A traversing request for the 1st geometry axis is inverted, i.e. a traversing request to + triggers a traversing motion to - .

Bit 1 = 1 :

A traversing request for the 2nd geometry axis is inverted, i.e. a traversing request to + triggers a traversing motion to -.

Bit 2 = 1:

A traversing request for the 3rd geometry axis is inverted, i.e. a traversing request to + triggers a traversing motion to -.

43120	DEFAULT_SCALE_FACTOR_AXIS			-	FBFA	
-	Axial default scaling factor with G51 active			DWORD	Immediately	
-						
-	-	1	-	-	7/7	

Description: If no axial scaling factor I, J, or K is programmed in the G51 block, SD43120 $SA_DEFAULT_SCALE_FACTOR_AXIS is active. The scaling factor is only active if MD22914 $MC_AXES_SCALE_ENABLE is set.

Related to:

MD22914 $MC_AXES_SCALE_ENABLE,

MD22910 $MC_WEIGHTING_FACTOR_FOR_SCALE

43200	SPIND_S			-	S1	
rev/min	Speed for spindle start by VDI			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description: Spindle speed at spindle start by NC/PLC interface signals DB380x DBX5006.1 (Spindle start clockwise rotation) and DB380x DBX5006.2 (Spindle start counterclockwise rotation).

Example: $SA_SPIND_S[S1] = 600

Spindle 1 is started at a speed of 600 rpm upon detection of the positive edge of one of the above-mentioned VDI starting signals.

Speed programming values are entered in the SD by setting bit 4=1 in MD35035 $MA_SPIND_FUNCTION_MASK.

The SD becomes active in JOG mode as a default speed by setting bit 5=1 in MD35035 $MA_SPIND_FUNCTION_MASK (exception: the value is zero).

Related to:

MD35035 $MA_SPIND_FUNCTION_MASK

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43202	SPIND_CONSTCUT_S			-	S1	
m/min	Const cut speed for spindle start by VDI			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description: Definition of the constant cutting speed for the master spindle.

The setting data is evaluated at spindle start by the NC/PLC interface signals DB380x DBX5006.1 (Spindle start clockwise rotation) and DB380x DBX5006.2 (Spindle start counterclockwise rotation)

Cutting speed programming values are entered in the SD by setting bit 8=1 in MD35035 $MA_SPIND_FUNCTION_MASK.

Related to:

MD35035 $MA_SPIND_FUNCTION_MASK

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43206	SPIND_SPEED_TYPE			A06	-	
-	Spindle speed type for spindle start through VDI			DWORD	Immediately	
-						
-	-	94	93	973	7/7	

Description: Definition of the spindle speed type for the master spindle.

The range of values and the functionality correspond to the 15th G group "feed type".

Permissible values are the G values: 93, 94, 95, 96, 961, 97, 971 and 973.

The stated values make a functional distinction between the following variants:

==> 93, 94, 95, 97 and 971: The spindle is started at the speed in SD 43200 $SA_SPIND_S.

==> 96 and 961: The speed of the spindle is derived from the cutting speed of SD 43202 $SA_SPIND_CONSTCUT_S and the radius of the transverse axis.

==> 973: G973 behaves like G97, however, the spindle speed limitation is not active

The default value is 94 (corresponds to G94).

The default value becomes active if the SD is written with impermissible values.

43210	SPIND_MIN_VELO_G25			-	S1	
rev/min	Programmed spindle speed limitation G25			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description: A minimum spindle speed limit below which the spindle must not fall is entered in SPIND_MIN_VELO_G25. The NCK limits the set spindle speed to this value if it is too low.

The spindle speed may only fall below the minimum as a result of:

- Spindle offset 0%
- M5
- S0
- NC/PLC interface signal DB380x DBX4.3 (Spindle stop)
- NC/PLC interface signal DB380x DBX2.1 (Servo enable)
- NC/PLC interface signal DB3300 DBX3.7 (Channel status: Reset)
- NC/PLC interface signal DB380x DBX2.2 (Delete distance-to-go/Spindle reset)
- NC/PLC interface signal DB380x DBX2002.5 (Oscillation speed)
- Cancel S value

SD irrelevant to ......

other spindle modes used in open-loop control mode (SPOS, M19, SPOSA)

Related to:

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43220	SPIND_MAX_VELO_G26			-	S1	
rev/min	Programmable upper spindle speed limitation G26			DOUBLE	Immediately	
-						
-	-	1000.0	-	-	7/7	

Description: A maximum spindle speed is entered in SD43220 $SA_SPIND_MAX_VELO_G26, which the spindle must not exceed. The NCK limits an excessive spindle speed setpoint to this value.

SD irrelevant for ......

all spindle modes except open-loop control mode.

Special cases, errors, ...

The value in SD43210 $SA_SPIND_MIN_VELO_G26 can be altered by means of:

- G26 S.... in the part program
- Operator commands via HMI

The value in SD43210 $SA_SPIND_MIN_VELO_G26 is retained after a reset or Power Off.

Related to ....

SD43210 $SA_SPIND_MIN_VELO_G25 (programmed spindle speed limit G25)

SD43230 $SA_SPIND_MAX_VELO_LIMS (programmed spindle speed limit G96/961)

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43230	SPIND_MAX_VELO_LIMS			-	S1,Z1	
rev/min	Spindle speed limitation with G96			DOUBLE	Immediately	
-						
-	-	100.0	-	-	7/7	

Description: Limits the spindle speed with G96, G961, G97 to the stated maximum value [degrees/second]. This setting data can be written from the block with LIMS.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be set so that the value written by the part program is transferred into the active file system on reset (that is the value is retained after reset).

Related to ....

SD43210 $SA_SPIND_MIN_VELO_G25 (programmed spindle speed limit G25)

SD43230 $SA_SPIND_MAX_VELO_LIMS (programmed spindle speed limit with G96/961)

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43235	SPIND_USER_VELO_LIMIT			A06	S1,Z1	
rev/min	Maximum spindle speed			DOUBLE	Immediately	
-						
-	-	1.0e+8	-	-	7/7	

Description: The user can enter a maximum spindle speed.

The NCK limits an excessive spindle setpoint speed to this value. The SD is effective immediately.

Corresponds with:

MD35100 $MA_SPIND_VELO_LIMIT (maximum spindle speed)

MD35110 $MA_GEAR_STEP_MAX_VELO (maxmum speed for gear stage change)

43240	M19_SPOS			-, A12	S1	
degrees	Spindle position for spindle positioning with M19.			DOUBLE	Immediately	
-						
-	-	0.0	-10000000.0	10000000.0	7/7	

Description:

Spindle position in [DEGREES] for spindle positioning with M19.

The position approach mode is defined in $SA_M19_SPOSMODE.

Default positions must lie in the range 0 <= pos < MD30330 $MA_MODULO_RANGE.

Path defaults (SD43250 $SA_M19_SPOSMODE = 2) can be positive or negative and are only limited by the input format.

43250	M19_SPOSMODE			-, A12	S1	
-	Spindle position approach mode for spindle positioning with M19.			DWORD	Immediately	
-						
-	-	0	0	5	7/7	

Description:

Spindle position approach mode for spindle positioning with M19.

In which signify:

0: DC (default) approach position on the shortest path.

1: AC approach position normally.

2: IC approach incrementally (as path), sign gives the traversing direction

3: DC approach position on the shortest path.

4: ACP approach position from the positive direction.

5: ACN approach position from the negative direction.

43300	ASSIGN_FEED_PER_REV_SOURCE			-	V1,P2,S1	
-	Revolutional feedrate for positioning axes/spindles			DWORD	Immediately	
CTEQ						
-	-	0	-3	31	7/7	

Description:

0= No revolutional feedrate is active.

>0= Machine axis index of the rotary axis/spindle, from which the revolutional feedrate is derived.

-1= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active

-2= The revolutional feedrate is derived from the axis with machine axis index == 0 or the axis with an index in MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB == 0.

-3= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active. No revolutional feedrate is active if the master spindle is at a standstill.

Related to ....

SD42600 $SC_JOG_FEED_PER_REV_SOURCE (revolutional feedrate for geometry axes on which a frame with rotation acts in JOG mode.)

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43320	JOG_POSITION			-	-	
mm, degrees	JOG position			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description: Position to be approached in JOG. Depending on MD10735 $MN_JOG_MODE_MASK bit 4 axial frames and, with an axis configured as geometry axis, the tool length offset are considered.

43340	EXTERN_REF_POSITION_G30_1			-, A12	FBFA	
-	Reference point position for G30.1			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description: Reference point position for G30.1.

This setting data will be evaluated in CYCLE328.

43350	AA_OFF_LIMIT			-	S5,FBSY	
mm, degrees	Upper limit of offset value $AA_OFF with clearance control			DOUBLE	PowerOn	
CTEQ						
-	-	100000000.0	0.0	1e15	7/7	

Description: The upper limit of the offset value, which can be defined by means of synchronized actions via the variable $AA_OFF.

This limit value acts on the absolutely effective amount of offset by means of $AA_OFF.

It is used for clearance control in laser machining:

The offset value is limited so that the laser head cannot get caught in the plate recesses.

Whether the offset value lies within the limit range can be queried via system variable $AA_OFF_LIMIT.

43400	WORKAREA_PLUS_ENABLE			-	A3	
-	Working area limitation active in positive direction			BOOLEAN	Immediately	
CTEQ						
-	-	FALSE	-	-	7/7	

Description: 1: The working area limitation of the axis concerned is active in the positive direction.

0: The working area limitation of the axis concerned is switched off in the positive direction.

The setting data is parameterized via the operator panel in the operating area "Parameters" by activating/deactivating the working area limitation.

SD irrelevant for ......

G code: WALIMOF

43410	WORKAREA_MINUS_ENABLE			-	A3	
-	Working area limitation active in the negative direction			BOOLEAN	Immediately	
CTEQ						
-	-	FALSE	-	-	7/7	

Description: 1: The working area limitation of the axis concerned is active in the negative direction.

0: The working area limitation of the axis concerned is switched off in the negative direction.

The setting data is parameterized via the operator panel in the operating area "Parameters" by activating/deactivating the working area limitation.

SD irrelevant for ......

G code: WALIMOF

43420	WORKAREA_LIMIT_PLUS			-	A3	
mm, degrees	Working area limitation plus			DOUBLE	Immediately	
-						
-	-	1.0e+8	-	-	7/7	

Description: The working area defined in the basic coordinate system in the positive direction of the axis concerned can be limited with axial working area limitation.

The setting data can be changed on the operator panel in the operating area "Parameters".

The positive working area limitation can be changed in the program with G26.

SD irrelevant for ......

G code: WALIMOF

Related to ....

SD43400 $SA_WORKAREA_PLUS_ENABLE

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43430	WORKAREA_LIMIT_MINUS			-	A3	
mm, degrees	Working area limitation minus			DOUBLE	Immediately	
-						
-	-	-1.0e+8	-	-	7/7	

Description: The working area defined in the basic coordinate system in the negative direction of the axis concerned can be limited with axial working area limitation.

The setting data can be changed on the operator panel in the operating area "Parameters".

The negative working area limitation can be changed in the program with G25.

SD irrelevant for ......

G code: WALIMOF

Related to ....

SD43410 $SA_WORKAREA_MINUS_ENABLE

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43600	IPOBRAKE_BLOCK_EXCHANGE			A06, A10	K1	
%	Block change criterion 'braking ramp'			DOUBLE	Immediately	
-						
-	-	0.0	0	100.0	7/7	

Description: Specifies the application time at single axis interpolation for the block change criterion braking ramp: At 100%, the block change criterion is fulfilled at the time of application of the braking ramp. At 0%, the block change criterion is identical with IPOENDA.

Note:

MD10710 $MN_PROG_SD_RESET_SAVE_TAB can be set so that the value written by the part program is transferred into the active file system on reset (i.e. the value is retained even after reset).

43610	ADISPOSA_VALUE			A06, A10	P2	
mm, degrees	Tolerance window 'braking ramp'			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description: In case of single-axis interpolation, this value defines the size of the tolerance window which the axis must have reached in order to enable a block change in case of the block-change criterion 'braking ramp with tolerance window valid' and when reaching the corresponding % value of the braking ramp (SD43600 $SA_IPOBRAKE_BLOCK_EXCHANGE).

Note:

By means of the MD 10710 $MN_PROG_SD_RESET_SAVE_TAB, the user can specify that the value written by the part program is transferred into the active file system in case of a reset (i.e. the value is retained even after the reset).

43790	OSCILL_START_POS			-	-	
mm, degrees	Start position of reciprocating axis			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description: Position approached by the oscillating axis at the start of oscillation if this is set in SD43770 $SA_OSCILL_CTRL_MASK.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

43900	TEMP_COMP_ABS_VALUE			-	K3	
-	Position-independent temperature compensation value			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description: The position-independent temperature compensation value is defined by SD43900 $SA_TEMP_COMP_ABS_VALUE.

-

The machine axis traverses this additional compensation value as soon as the position-independent temperature compensation has been activated (MD32750 $MA_TEMP_COMP_TYPE = 1 oder 3).

SD irrelevant for ......

MD32750 $MA_TEMP_COMP_TYPE = 0 or 2

Related to ....

MD32750 $MA_TEMP_COMP_TYPE Temperature compensation type

MD32760 $MA_COMP_ADD_VELO_FACTOR Velocity overshoot caused by compensation

43910	TEMP_COMP_SLOPE			-	K3	
-	Lead angle for position-dependent temperature compensation			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description: In the case of position-dependent temperature compensation, the error curve characteristic of the temperature-dependent actual-value deviation can often be approximated by a straight line. This straight line is defined by a reference point P_0 and a slope tan-ß.

SD43910 $SA_TEMP_COMP_SLOPE defines the slope tan-ß. This slope can be changed by the PLC user program as a function of the current temperature.

The axis traverses additionally the compensation value calculated for the current actual position as soon as the position-dependent temperature compensation becomes active (MD32750 $MA_TEMP_COMP_TYPE = = 2 or 3).

MD32760 $MA_COMP_ADD_VELO_FACTOR limits the maximum angle of slope tan-ß_max of the error curve. This maximum angle of slope cannot be exceeded.

SD irrelevant for ......

MD32750 $MA_TEMP_COMP_TYPE = 0 or 1

Special cases, errors, ...

When SD43910 $SA_TEMP_COMP_SLOPE is greater than tan-ß_max, the slope tan-ß_max is used to calculate the position-dependent temperature compensation value internally. No alarm is output.

Related to ....

MD32750 $MA_TEMP_COMP_TYPE Temperature compensation type

SD43920 $SA_TEMP_COMP_REF_POSITION Reference position for position-dependent temperature compensation

MD32760 $MA_COMP_ADD_VELO_FACTOR Velocity overshoot caused by compensation

43920	TEMP_COMP_REF_POSITION			-	K3	
-	Ref. position of position-dependent temperature compensation			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	

Description: In the case of position-dependent temperature compensation, the error curve characteristic of the temperature-dependent actual-value deviation can often be approximated by a straight line. This straight line is defined by a reference point P_0 and a slope tan-ß.

SD43920 $SA_TEMP_COMP_REF_POSITION defines the position of the reference point P_0. This reference position can be changed by the PLC user program as a function of the current temperature.

The axis traverses additionally the compensation value calculated for the current actual position as soon as the position-dependent temperature compensation becomes active (MD32750 $MA_TEMP_COMP_TYPE = 2 or 3).

SD irrelevant for ......

MD32750 $MA_TEMP_COMP_TYPE = 0 or 1

Related to ....

MD32750 $MA_TEMP_COMP_TYPE Temperature compensation type

SD43910 $SA_TEMP_COMP_SLOPE Angle of slope for position-dependent temperature compensation

Detailed descriptions of interface signals 4

4.1 General information

Interfaces

The PLC user interface exchanges signals and data with the following units via the PLC user program:

- NCK (NC kernel),
- HMI (display unit)

Signal and data are exchanged via different data areas.

The PLC user program need not take care of the exchange which is performed automatically from the user's view.

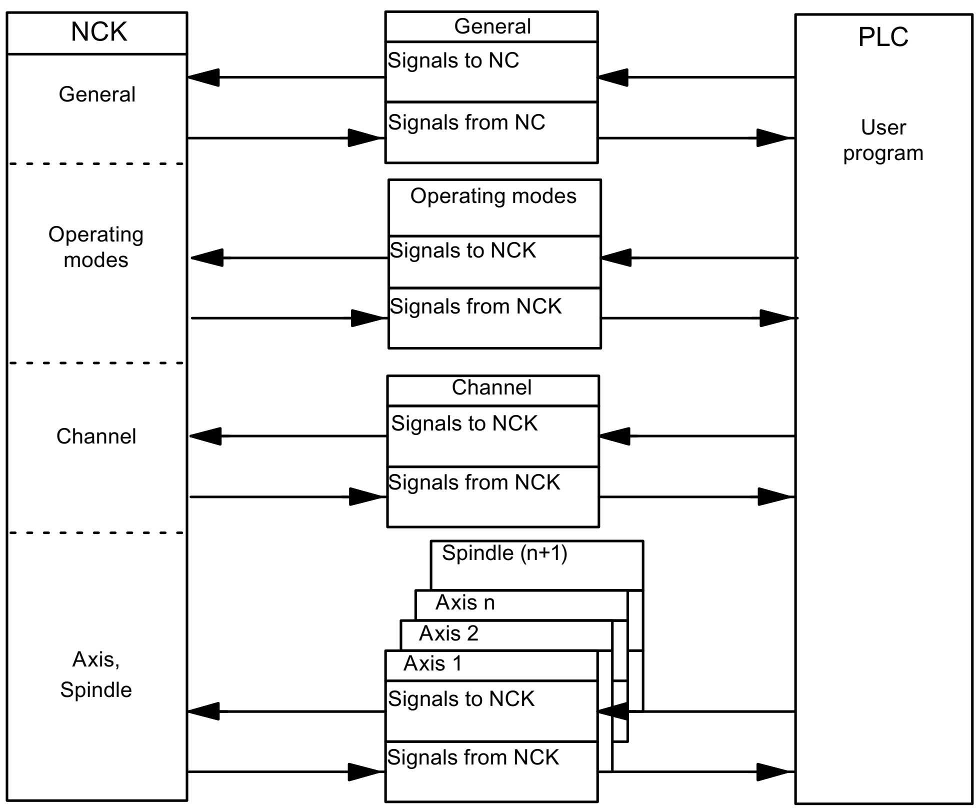


Figure 4-1 PLC user interface

Cyclic signal exchange

The control and status signals of the PLC/NCK interface are updated cyclically.

The signals can be subdivided into the following groups (see Figure 4-1):

- General signals
- Mode signals
- Channel signals
- Axis / spindle signals

4.2 User alarm

Active alarm response

DB1600 DBX2000.0	NC start disable Signal(s) from PLC → HMI	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The NC start disable prevents a part program from being started with the NC start signal DB3200 DBX7.1 (NC start) == 1.	
Signal state 0	The NC start disable is not active.	
Special cases, errors, ...	The start of a part program selected in the channel by part program command START in another channel (program coordination) is not prevented by the interface signal: DB3200 DBX7.0 (NC start disable) == 1.	
corresponding to ...	IS "NC start"	
Note for the reader		

DB1600 DBX2000.1	Read-in disable Signal(s) from PLC → HMI	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The main run reads in no more preprocessed part program blocks. Note: The signal is only active in the AUTOMATIC and MDI modes.	
Signal state 0	The main run reads in preprocessed part program blocks.	
corresponding to ...	IS "Program status running"	
Note for the reader		

4.3 Signals from / to HMI

4.3.1 Program control signals from HMI

DB1700 DBX0.3	DRF selected Signal(s) from HMI → PLC	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The operator has selected DRF on the operator panel front. The PLC program (basic PLC program or user program) transfers this HMI interface signal to the interface signal corresponding to the logic operation: Activate DRF. As soon as DRF is active, the DRF offset can be changed in the AUTOMATIC or MDI mode using the handwheel assigned to the axis.	
Signal state 0	The operator has not selected DRF on the operator panel front.	
corresponding to ...	JOG mode	
Note for the reader	Activate DRF	

DB1700 DBX0.5	M01 selected Signal(s) from HMI → PLC	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Activate program control M1 has been selected from the operator interface. This does not activate the function.	
Signal state 0	Activate program control M1 has not been selected from the operator interface.	
corresponding to ...	IS "Activate M01" IS "M0/1 active"	
Note for the reader	Function Manual Basic Functions K1	

DB1700 DBX0.6	Dry run feedrate selected Signal(s) to channel (HMI → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Dry run feedrate is selected. Instead of the programmed feedrate, the dry run feedrate entered in SD 42100: DRY_RUN_FEED is active. When activated from the operator panel, the dry run feedrate signal is automatically entered in the PLC interface and transferred by the PLC basic program to the PLC interface signal "Activate dry run feedrate".	
Signal state 0	Dry run feedrate is not selected. The programmed feedrate is active.	

corresponding to ...	IS "Activate dry run feedrate" (DB3200 DBX0.6) SD: DRY_RUN_FEED (dry run feedrate)
Note for the reader	Function Manual Basic Functions V1, K1

DB1700 DBX1.3	Feedrate override selected for rapid traverse Signal(s) to channel (HMI → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The feedrate override switch should also be active as rapid traverse override switch. Override values above 100% are limited to the maximum value for 100% rapid traverse override. The IS "Feedrate override for rapid traverse selected" is automatically entered from the operator panel into the PLC interface and is transferred from the basic PLC program to the PLC interface signal "Rapid traverse override active". Further, the IS "Feedrate override" (DB3200 DBB4) is copied from the basic PLC program into the IS "Rapid traverse override" (DB3200 DBB5).	
Signal state 0	The feedrate override switch should not be activated as rapid traverse override switch.	
Application	The signal is used when no separate rapid traverse override switch is available.	
Note for the reader	Function Manual Basic Functions V1	

DB1700 DBX1.7	Program test selected Signal(s) from HMI → PLC	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Program control program test has been selected from the operator interface. This does not activate the function.	
Signal state 0	Program control program test has not been selected from the operator interface.	
corresponding to ...	IS "Activate program test" IS "Program test active"	
Note for the reader	Function Manual Basic Functions V1	

DB1700 DBX2.0 to 3.1	Skip block selected Signal(s) from HMI → PLC	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Program control – skip block – has been selected from the operator interface. This does not activate the function.	
Signal state 0	Program control – skip block – has not been selected from the operator interface.	
corresponding to ...	IS "Activate skip block"	
Note for the reader	Function Manual Basic Functions K1	

DB1700 DBX7.1	NC start Signal(s) to PLC (HMI → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	AUTOMATIC mode: The selected NC program is started or continued, or the auxiliary functions that were saved during the program interruption are output. If data is transferred from the PLC to the NC during program status "Program interrupted," then this data is immediately processed with NC start. MDI mode: The entered block information or part program blocks are released for execution.	
Signal state 0 or edge change 1 → 0	No effect.	
Note for the reader	Function Manual Basic Functions K1	

DB1700 DBX7.3	NC stop Signal(s) to PLC (HMI → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	AUTOMATIC or MDI mode: Execution of the active part program in the channel is stopped. The axes (not spindles) are braked to a standstill maintaining the parameterized acceleration rates. • Program status: Stopped • Channel status: Interrupted JOG mode: In the JOG mode, incompletely traversed incremental paths (INC...) are executed at the next NC start. Note: If data is transferred to the NCK after NC stop (e.g. tool offset), then this data is processed with the next NC start.	
Signal state 0	No effect.	
corresponding to ...	DB3300 DBX3.2 (program status stopped) DB3300 DBX3.6 (channel status interrupted)	
Note for the reader	Function Manual Basic Functions K1	

DB1700 DBX7.7	Reset Signal(s) to PLC (HMI → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The channel is reset. The initial settings are made (e.g. for G functions). The channel alarms are deleted if they are not POWER ON alarms. The "Reset" signal must be issued by the PLC (e.g. using a logic operation with the reset key on the MCP). The signal is only evaluated by the selected channel. The program status changes to "Interrupted".	
Signal state 0	No effect.	
corresponding to ...	DB3300 DBX3.7 (channel status reset)	
Note for the reader	Function Manual Basic Functions K1	

4.3.2 Signals from HMI

DB1800 DBX0.0	AUTOMATIC mode Signal(s) to PLC (HMI → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	AUTOMATIC mode is selected from the HMI. The signal state 1 is only available for one PLC cycle.	
Signal state 0	AUTOMATIC mode is not selected by HMI.	
Signal irrelevant for ...	if signal "Mode change disable"	
Note for the reader	Function Manual Basic Functions M5	

DB1800 DBX0.1	MDI mode Signal(s) to PLC (HMI → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	MDI mode is selected from the HMI. The signal state 1 is only available for one PLC cycle.	
Signal state 0	MDI mode is not selected by HMI.	
Signal irrelevant for ...	if signal "Mode change disable"	
Note for the reader	Function Manual Basic Functions M5	

DB1800 DBX0.2	JOG mode Signal(s) to PLC (HMI → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	JOG mode is selected from the HMI. The signal state 1 is only available for one PLC cycle.	
Signal state 0	JOG mode is not selected by HMI.	

Signal irrelevant for ...	if signal "Mode change disable"
Note for the reader	Function Manual Basic Functions M5

DB1800 DBX0.7	Reset	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	A reset is initiated for the channel period. All of the current programs are then in the program status "Aborted". All moving axes and spindles are decelerated to zero speed according to their acceleration ramp without contour violation. The initial settings are set (e.g. for G functions). The alarms are cleared if they are not POWER ON alarms.	
Signal state 0 or edge change 1 → 0	Channel status and program execution are not influenced by this signal.	
Special cases, errors, ...	An alarm that withdraws the IS "808D READY" (DB3100 DBX0.3), ensures that the channel is no longer in the reset state. In order to switch to another mode, a reset (DB1800 DBX0.7) must be initiated.	
Note for the reader		

DB1800 DBX1.0	Active machine function TEACH IN Signal(s) to PLC (HMI → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The machine function TEACH IN is selected in the JOG mode. The signal state 1 is only available for one PLC cycle.	
Signal state 0	The machine function TEACH IN is not selected.	
Signal irrelevant for ...	if JOG mode is not active.	
Note for the reader	Function Manual Basic Functions M5	

DB1800 DBX1.2	Active machine function REF Signal(s) to PLC (HMI → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The machine function REF is selected in the JOG mode The signal state 1 is only present for one PLC cycle.	
Signal state 0	The machine function REF is not selected.	
Signal irrelevant for ...	if JOG mode is not active.	
Note for the reader	Function Manual Basic Functions M5	

4.3.3 Signals from PLC

DB1800 DBX1000.6	Commissioning archive was read in	
Edge evaluation:	Signal(s) updated:	
Meaning	Is set, if a commissioning archive or a data class file tree was read in and is present for one PLC cycle. The PLC system then deletes the signal.	

4.3.4 Signals from operator panel

DB1900 DBX0.6	Simulation active Signal(s) from HMI → PLC	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The function – Simulation – has been selected from the operator interface.	
Signal state 0	The function – Simulation – has not been selected from the operator interface.	
corresponding to ...	if JOG mode is not active.	
Note for the reader	Function Manual Basic Functions K1	

DB1900 DBX0.7	Switch over Machine/Work Signal(s) from HMI → PLC	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The coordinate system is switched over from workpiece coordinate system (Work) to machine coordinate system (Machine) or from Machine to Work. After actuation, the signal is present for 1 PLC cycle.	
Signal state 0	No effect.	
Application example	The interface signal: DB1900 DBX0.7 (switchover Machine/Work) must be transferred to the interface signal: DB1900 DBX5000.7 (actual value in Work) in order that switchover becomes effective.	
corresponding to ...	DB1900 DBX5000.7 (actual value in Work)	

4.3.5 General selection / status signals from HMI

DB1900 DBX1003.0 to .2 DBX1004.0 to .2	Axis number for handwheel 1 for handwheel 2 Signal(s) from NC (HMI → PLC)			
Edge evaluation: No	Signal(s) updated: Cyclic			
Significance of signal	The operator can assign an axis to every handwheel directly at the operator panel. To do so, he defines the required axis (e.g. X). The axis number associated with the axis and the information "machine or geometry axis" (IS "machine axis") is made available as HMI interface signal in the PLC user interface. The interface signal "Activate handwheel" must be set for the specified axis from the PLC user program. Depending on the setting in the HMI interface signal "machine axis", either the interface for the geometry axis or for the machine axis is used. The following must be noted when assigning the axis identifier to the axis number: • IS "Machine axis" = 1; i.e. the machine axis - not the geometry axis: The assignment is made via MD10000 AXCONF_MACHAX_NAME_TAB[n] (machine axis name). • IS "Machine axis" = 0; i.e. geometry axis (axis in the Work): The assignment is made via MD20060 AXCONF_GEOAX_NAME_TAB[n] (geometry axis name in the channel). The channel number assigned to the handwheel is specified using IS "Channel number geometry axis handwheel n". The following codes are used for the axis number:			
	Bit 2	Bit 1	Bit 0	Axis number
	0	0	0	-
	0	0	1	1
	0	1	0	2
	0	1	1	3
	1	0	0	4
	1	0	1	5
	Note: Bit 3 and bit 4 must always be kept at the value = 0..			
corresponding to ...	IS "Machine axis" (DB1900 DBX1003.7, DB1900 DBX1004.7) IS "Activate handwheel" 1 to 2 / geometry axes 1, 2 (DB3200 DBX1000.0 to .2, DB3200 DBX1004.0 to .2, DB3200 DBX1008.0 to .2) IS "Activate handwheel" 1 to 2 (DB380x DBX4.0 to .1) MD10000 AXCONF_MACHAX_NAME_TAB [n] (machine axis name) MD20060 AXCONF_GEOAX_NAME_TAB [n] (geometry axis name in the channel)			
Note for the reader	Function Manual Basic Functions H1			

DB1900 DBX1003.5 DBX1004.5	Define handwheel 1 as contour handwheel Define handwheel 2 as contour handwheel Signal(s) from NC (HMI → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The handwheel is defined as contour handwheel via the HMI.	
Signal state 0	The handwheel is not defined as contour handwheel.	
Application	In order that the handwheel, defined from the HMI, is effective as contour handwheel, then the IS "Activate handwheel 1/2 as contour handwheel" must also be set to "1".	
corresponding to ...	DB3200 DBX14.0/.1 (activate handwheel 1/2 as contour handwheel)	
Note for the reader	Function Manual Basic Functions H1	

DB1900 DBX1003.6 DBX1004.6	Handwheel selected for handwheel 1 for handwheel 2 Signal(s) from NC (HMI → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The operator has selected the handwheel for the defined axis via the operator panel front (i.e. activated). The basic PLC program provides this information to the HMI interface. The basic PLC program sets the interface signal "Activate handwheel" for the defined axis to "1". The associated axis is also displayed at the HMI interface via the IS "Machine axis" and "Axis number for handwheel". As soon as the handwheel is active, the axis can be traversed in JOG mode with the handwheel: IS "Handwheel active" = 1.	
Signal state 0	The operator has disabled the handwheel for the defined axis at the operator panel front. The basic PLC program provides this information to the HMI interface. This means that for the specified axis, the IS "Activate handwheel" can be set to "0" from the basic PLC program.	
corresponding to ...	DB1900 DBX1003.0 - .2 (axis number for handwheel 1) DB1900 DBX1004.0 - .2 (axis number for handwheel 2) DB1900 DBX1003.7/1004.7 (machine axis for handwheel 1/2) DB380x DBX4.0/.1 (activate handwheel 1/2) DB390x DBX4.0/.1 (handwheel 1/2 active)	
Note for the reader	Function Manual Basic Functions H1	

DB1900 DBX1003.7 DBX1004.7	Machine axis for handwheel 1 for handwheel 2 Signal(s) from NC (HMI → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	

Signal state 1	The operator has assigned an axis to the handwheel (1, 2) directly at the operator panel. This axis is a machine axis – no geometry axis (axis in the Work). For further information see IS "Axis number".
Signal state 0	The operator has assigned an axis to the handwheel (1, 2) directly at the operator panel. This axis is a geometry axis (axis in the Work). For further information see IS "Axis number".
corresponding to ...	IS "Axis number" (DB1900 DBX3.0 to .4, ff)
Note for the reader	Function Manual Basic Functions H1

4.3.6 General selection / status signals to HMI

DB1900 DBX5000.2	OP key lock Signal(s) from PLC → HMI	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The OP keyboard is locked for the user.	
Signal state 0	The OP keyboard is enabled for the user.	

DB1900 DBX5000.7	Actual value in the Work Signal(s) from PLC → HMI	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The PLC selects the display of actual values in the workpiece coordinate system (Work). This means that when the machine area is selected, the Work display is activated; i.e. the machine and the supplementary axes as well as their actual positions and distances to go are displayed in the Work in the "Position" window. The interface signal is only evaluated when it enters the basic machine screen; this means that the operator, within the machine area, can toggle as required between the particular coordinate systems using the softkeys "actual values Machine" and "actual values Work".	
Signal state 0	This means that when the machine area is selected the coordinate system previously selected (Work or Machine) is reactivated and displayed.	
corresponding to ...	DB1900 DBX0.7 (switchover Machine/Work)	
Note for the reader	Operating manual (corresponding to the software being used)	

4.4 Auxiliary function transfer from NC channel

DB2500 DBX4.0 to .4 DBX6.0 DBX8.0 DBX10.0 DBX12.0 to .2	M function Change 1 to 5 S function Change 1 T function Change 1 D function Change 1 H function Change 1 to 3 Signal(s) from channel (PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	M, S, T, D, H information was output at the interface together with a new value and the associated change signal. In this case, the change signal indicates that the corresponding value is valid. The change signals are only valid for one PLC cycle! This means that if the signal is 1, then a change is pending for this cycle.	
Signal state 0	The value of the data involved is not valid.	
Note for the reader	Function Manual Basic Functions H2	

DB2500 DBB1000 to DBB1012	Decoded M signals: M0 - M99 Signal(s) from channel (NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The dynamic M signal bits are set by decoded M functions.	
Signal state 0	For a general auxiliary function output, the dynamic M signal bits are acknowledged by the PLC system program after the user program has been completely run-through (executed once).	
Application	Spindle clockwise/counterclockwise rotation, switch coolant on/off	
corresponding to ...	IS "M function for the spindle (DINT), axis-specific" (DB370x DBD0)	
Note for the reader	Function Manual Basic Functions H2	

DB2500 DBD2000	T function 1 Signal(s) from channel (PLC)	
Edge evaluation: No	Signal(s) updated: job-controlled by NCK	
Signal state 1	The T function programmed in an NC block is made available here as soon as the T change signal is available. Value range of the T function: 0-32000 ; integer number The T function remains valid until it is overwritten by a new T function.	
Signal state 0	• After the PLC has ramped-up. • All auxiliary functions are deleted before a new function is entered.	
Application	Control of automatic tool selection.	
Special cases, errors, ...	With T0, the actual tool is removed from the tool holder but not replaced by a new tool (default configuration of the machine manufacturer).	
Note for the reader	Function Manual Basic Functions H2	

DB2500 DBD3000 DBD3008 DBD3016 DBD3024 DBD3032 DBB3004 DBB3012 DBB3020 DBB3028 DBB3036	 M function 1 M function 2 M function 3 M function 4 M function 5 Extended address of M function 1 Extended address of M function 2 Extended address of M function 3 Extended address of M function 4 Extended address of M function 5 Signal(s) from channel (PLC)		
Edge evaluation: No		Signal(s) updated: job-controlled by NCK	
Signal state 1	Up to 5 M functions programmed in an NC block are simultaneously made available here as soon as the M change signals are available. Value range of the M functions: 0 to 99; integer number Value range of the extended address: 1-2; integer number (spindle number) The M functions remain valid until they are overwritten by new M functions.		
Signal state 0	• After the PLC has ramped-up. • All auxiliary functions are deleted before a new function is entered.		
Application	Control of automatic tool selection.		
corresponding to ...	IS "M function for the spindle (DINT), axis-specific" (DB370x DBD0)		
Note for the reader	Function Manual Basic Functions H2		

DB2500 DBD4000 DBD4008 DBB4004 DBB4012	 S function 1 S function 2 Extended address of S function 1 Extended address of S function 2 Signal(s) from channel (PLC)		
Edge evaluation: No		Signal(s) updated: job-controlled by NCK	
Signal state 1	Here, an S function programmed in an NC block (speed or cutting value for G96) is provided as soon as the S change signal is available. Value range of the S function: Floating point (REAL format/4 bytes) Value range of the extended address: 1 ... 2; integer number (spindle number) The S function remains valid until it is overwritten by a new S function.		
Signal state 0	• After the PLC has ramped-up. • All auxiliary functions are deleted before a new function is entered.		
Application	Control of automatic tool selection.		
corresponding to ...	IS "S function for the spindle (REAL), axis-specific" (DB370x DBD4)		
Note for the reader	Function Manual Basic Functions H2		

DB2500 DBD5000	D function 1 Signal(s) from channel (PLC)	
Edge evaluation: No	Signal(s) updated: job-controlled by NCK	
Signal state 1	The D function programmed in an NC block is made available here as soon as the D change signal is available. Value range of the D function: 0-9; integer number The D function remains valid until it is overwritten by a new D function.	
Signal state 0	• After the PLC has ramped-up. • All auxiliary functions are deleted before a new function is entered.	
Application		
corresponding to ...	D0 is reserved for deselecting the actual tool offset.	
Note for the reader	Function Manual Basic Functions H2	

DB2500 DBD6000 DBD6008 DBD6016 DBW6004 DBW6012 DBW6020	 H function 1 H function 2 H function 3 Extended address of H function 1 Extended address of H function 2 Extended address of H function 3 Signal(s) from channel (PLC)	
Edge evaluation: No	Signal(s) updated: job-controlled by NCK	
Signal state 1	Up to 3 H functions programmed in an NC block are simultaneously made available here as soon as the H change signals are available. Value range of the H functions: Floating point (REAL format/4 bytes) Value range of the extended address: 0 to 99; integer number The H functions remain valid until they are overwritten by new H functions.	
Signal state 0	• After the PLC has ramped-up. • All auxiliary functions are deleted before a new function is entered.	
Application	Switching functions on the machine.	
Note for the reader	Function Manual Basic Functions H2	

4.5 NCK signals

4.5.1 General signals to NCK

DB2600 DBX0.1	EMERGENCY OFF Signal(s) to NC (PLC → NCK)
Edge evaluation: No	Signal(s) updated: Cyclic
Signal state 1 or edge change 0 → 1	The NC is brought into the EMERGENCY OFF state and the EMERGENCY OFF sequence in the NC is started.
Signal state 0 or edge change 1 → 0	• The NC is not in the EMERGENCY OFF state • The EMERGENCY OFF state is (still) active, however, it can be reset with IS: "Acknowledge EMERGENCY OFF" and IS "Reset".
corresponding to ...	IS "Acknowledge EMERGENCY OFF" (DB2600 DBX0.2) IS "EMERGENCY OFF active" (DB2700 DBX0.1)

DB2600 DBX0.2	Acknowledge EMERGENCY OFF Signal(s) to NC (PLC → NCK)
Edge evaluation: No	Signal(s) updated: Cyclic
Signal state 1 or edge change 0 → 1	The EMERGENCY OFF state is only reset if IS "Acknowledge EMERGENCY OFF" is first set and then IS "Reset" (DB3000 DBX0.7) is set. It must be noted in this respect that IS "Acknowledge EMERGENCY OFF" and IS "Reset" must be set together for a long enough period until the IS "EMERGENCY OFF active" (DB2600 DBX0.1) was reset. By resetting the EMERGENCY OFF state, the following happens: • IS "EMERGENCY OFF active" is reset • The controller enable is switched in • IS "Position control active" is set • IS "808D-Ready" is set. • Alarm 3000 is cleared • The part program processing is aborted.
corresponding to ...	IS "EMERGENCY OFF" (DB2600 DBX0.1) IS "EMERGENCY OFF active" (DB2700 DBX0.1) IS "Reset" (DB3000 DBX0.7)

DB2600 DBX1.0	INC inputs in the mode signal range active Signal(s) from channel (PLC → NCK)
Edge evaluation: No	Signal(s) updated: job-controlled by NCK
Signal state 1 or edge change 0 → 1	The IS "1 INC", "10 INC", ..., "continuous" in the mode area are used as input signals (DB3000 DBX2.0 to .6).
Signal state 0 or edge change 1 → 0	The IS "1 INC", "10 INC", ..., "continuous" in the axis and geometry axis area are used as input signals.

corresponding to ...	IS "Machine function 1 INC up to continuous" in the mode area (DB3000 DBX2.0 to .6) IS "Machine function 1 INC, ..., continuous" for axis 1 in the Work (DB3200 DBX1001.0 to .6) for axis 2 in the Work (DB3200 DBX1005.0 to .6) for axis 3 in the Work (DB3200 DBX1009.0 to .6) IS "Machine function 1 INC, ..., continuous" in the axis area (DB380x DBX5.0 to .6)
Note for the reader	Function Manual Basic Functions H2

4.5.2 General signals from NCK

DB2700 DBX0.1	EMERGENCY OFF active Signal(s) from NC (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The NC is in the EMERGENCY OFF state.	
corresponding to ...	IS "EMERGENCY OFF" (DB2600 DBX0.1) IS "Acknowledge EMERGENCY OFF" (DB2600 DBX0.2)	

DB2700 DBX1.0 and .1	Probe actuated Signal(s) from NC (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Probe 1 or 2 is actuated.	
Signal state 0 or edge change 1 → 0	Probe 1 or 2 is not actuated.	
Note for the reader	Function Manual Basic Functions M5	

DB2700 DBX1.7	Inch measuring system Signal(s) from NC (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The NC operates with the inch measuring system.	
Signal state 0	The NC operates with the metric measuring system.	
Note for the reader	Function Manual Basic Functions G2	

DB2700 DBX2.3	HMI ready Signal(s) from NC (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	

Signal state 1 or edge change 0 → 1	The CPU is ready and registers itself cyclically with the NCK.
Signal state 0 or edge change 1 → 0	The CPU is not ready.
Note for the reader	Function Manual Basic Functions G2

DB2700 DBX2.6	Drive ready Signal(s) from NC (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	All existing drives signal the status drive ready (summary of axial interface signals "DRIVE ready").	
Signal state 0 or edge change 1 → 0	As soon as the drive not ready status is signaled from a drive (i.e. IS "DRIVE ready" = 0).	
corresponding to ...	DB390x DBX4001.5 (DRIVE ready)	
Note for the reader	Function Manual Basic Functions G2	

DB2700 DBX2.7	NC ready Signal(s) from NC (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The control system is ready. This interface signal is an image of the relay contact "NC Ready". This signal is set if: • Relay contact "NC Ready" is closed • All the voltages in the control have been established • The control is in the cyclic mode	
Signal state 0 or edge change 1 → 0	The control is not ready. The relay contact "NC Ready" is open. The following faults will cause NC Ready to be canceled: • Undervoltage and overvoltage monitoring function has responded • Individual components are not ready (NCK CPU Ready) • NC CPU watchdog If the signal "NC Ready" goes to 0 the following measures are introduced by the control if they are still possible: • The controller enable signals are withdrawn (this stops the drives) • The following measures are introduced by the PLC basic program: – Status signals from NCK to PLC (user interface) are deleted (cleared) – Change signals for auxiliary functions are deleted – Cyclic processing of the user interface is exited The control is not ready again until after POWER ON.	
Note for the reader	Function Manual Basic Functions G2	

DB2700 DBX3.0	NCK alarm is active Signal(s) from NC (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	At least one NCK alarm is present. This is a group signal for the interface signals of all available channels: DB3300 DBX4.6 (channel-specific NCK alarm pending).	
Signal state 0 or edge change 1 → 0	No NCK alarm is active.	
corresponding to ...	DB3300 DBX4.6 (channel-specific NCK alarm pending) DB3300 DBX4.7 (NCK alarm with processing stop active)	
Note for the reader	Function Manual Basic Functions G2	

DB2700 DBX3.6	NCK alarm is active Signal(s) from NC (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The temperature monitoring has identified an ambient temperature that is too high (approx. 60). Alarm 2110 "NCK temperature alarm" is output.	
Signal state 0 or edge change 1 → 0	The temperature monitoring has not responded.	
Note for the reader	Function Manual Basic Functions G2	

4.6 Mode signals

DB3000 DBX0.0	AUTOMATIC mode Signal(s) to NCK (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	AUTOMATIC mode is selected by the PLC program.	
Signal state 0 or edge change 1 → 0	AUTOMATIC mode is not selected by the PLC program.	
Signal irrelevant for ...	if signal "Mode change disable"	
corresponding to ...	IS "active AUTOMATIC mode"	
Note for the reader	Function Manual Basic Functions K1	

DB3000 DBX0.1	MDI mode Signal(s) to NCK (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	MDI mode is selected by the PLC program.	

Signal state 0 or edge change 1 → 0	MDI mode is not selected by the PLC program.
Signal irrelevant for ...	if signal "Mode change disable"
corresponding to ...	IS "active MDI mode"
Note for the reader	Function Manual Basic Functions K1

DB3000 DBX0.2	JOG mode Signal(s) to NCK (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	JOG mode is selected by the PLC program.	
Signal state 0 or edge change 1 → 0	JOG mode is not selected by the PLC program.	
Signal irrelevant for ...	if signal "Mode change disable"	
corresponding to ...	IS "active JOG mode"	
Note for the reader	Function Manual Basic Functions K1	

DB3000 DBX0.4	Mode change disable Signal(s) to NCK (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The currently active mode (JOG, MDI or Automatic) cannot be changed.	
Signal state 0	The mode can be changed.	
Note for the reader	Function Manual Basic Functions K1	

DB3000 DBX0.7	Reset Signal(s) to NCK (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The channel should change into the "RESET" state. The program being executed is then in the program "Aborted" program state. All moving axes and spindles are decelerated to zero speed according to their acceleration ramp without contour violation. The initial settings are set (e.g. for G functions). The alarms are cleared if they are not POWER ON alarms.	
Signal state 0 or edge change 1 → 0	Channel status and program execution are not influenced by this signal.	
corresponding to ...	IS "Channel reset" IS "all channels in the Reset state"	
Special cases, errors, ...	An alarm that withdraws the IS "808D-Ready" ensures that the channel is no longer in the Reset state. A "Reset" must be initiated in order to be able to switch over to another mode.	
Note for the reader	Function Manual Basic Functions K1	

DB3000 DBX1.0	Machine function TEACH IN Signal(s) to NCK (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Machine function TEACH IN is activated in the JOG mode.	
Signal state 0 or edge change 1 → 0	Machine function TEACH IN is not activated.	
Signal irrelevant for ...	if JOG mode is not active.	
Note for the reader	Function Manual Basic Functions K1	

DB3000 DBX1.2	Machine function REF Signal(s) to NCK (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Machine function REF is activated in the JOG mode.	
Signal state 0 or edge change 1 → 0	Machine function REF is not activated.	
Signal irrelevant for ...	if JOG mode is not active.	
Note for the reader	Function Manual Basic Functions K1	

DB3000 DBX1.6	Single block type B	
Edge evaluation: No	Signal(s) updated:	
Signal state 1 or edge change 0 → 1	Bit set and DB3000 DBX1.7 not set: Response across mode groups • Channel is stopped. • Channel receives a start command. • Channel KS stops at the end of the block. (If DB3000 DBX1.6 and DB3000 DBX1.7 are set simultaneously, it is impossible to determine which single block type is required. The control then assumes: No single block across mode groups.)	
Signal state 0 or edge change 1 → 0	If bit DB3000 DBX1.6 is not set and bit DB3000 DBX1.7 is set, then it is single block type A. (If DB3000 DBX1.6 and DB3000 DBX1.7 are not set, it is impossible to determine which single block type is required. The control then assumes: No single block across mode groups).	
corresponding to ...	Single block type A	
Note for the reader		

DB3000 DBX1.7	Single block type A	
Edge evaluation: No	Signal(s) updated:	

Signal state 1 or edge change 0 → 1	DB3000 DBX1.7 set and DB3000 DBX1.6 not set: Response across modes • Channel is stopped. • Channel receives a start command. • Channel KS stops at the end of the block. (If DB3000 DBX1.6 and DB3000 DBX1.7 are set simultaneously, it is impossible to determine which single block type is required. The control then assumes: No single block access across modes).
Signal state 0 or edge change 1 → 0	If DB3000 DBX1.7 is not set and DB3000 DBX1.6 is set, then it is single block type B. (If DB3000 DBX1.6 and DB3000 DBX1.7 are not set, it is impossible to determine which single block type is required. The control then assumes: No single block access across modes).
corresponding to ...	Single block type B
Note for the reader	

DB3000 DBX2.0 to .6	Machine function 1 INC, 10 INC, 100 INC, 1000 INC, 10000 INC, var. INC, continuous Signal(s) to modes (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The input range is only used if IS "INC inputs active in the mode area" (DB2600 DBX1.0) **is set**. These signals are valid for all axes and geometry axes. With the IS "INC..." it is defined by how many increments the axis moves when actuating the traversing key or when rotating the handwheel for each grid position. In this case, the JOG mode must be active. For "var. INC", the value generally applies in SD41010 JOG_VAR_INCR_SIZE. For "continuous" the associated axis can be traversed with the plus or minus traversing key by keeping the traversing key pressed. As soon as the selected machine function becomes active, this is signaled to the PLC interface (IS "Active machine function 1 INC; ..."). If several machine function signals (1 INC, INC... or "Continuous traversing") are selected at the interface simultaneously, then no machine function is activated by the control. **Note:** The input IS "INC..." or "continuous" to change an active machine function must be present for at least one PLC cycle. A steady-state signal is not required.	
Signal state 0 or edge change 1 → 0	The machine function in question is not selected. No change is requested to the active machine function. If an axis is currently traversing an increment, this movement is also aborted if this machine function is deselected or switched over.	

corresponding to ...	IS "INC inputs active in the mode area" (DB2600 DBX1.0) IS "Machine function 1 INC, ..., continuous" for axis 1 in the Work (DB3200 DBX1001.0 to .6) for axis 2 in the Work (DB3200 DBX1005.0 to .6) for axis 3 in the Work (DB3200 DBX1009.0 to .6) IS "Machine function 1 INC, ..., continuous" in the axis area (DB380x DBX5.0 to .6) IS "Active machine function 1 INC, ..., continuous" for axis 1 in the Work (DB3300 DBX1001.0 to .6) for axis 2 in the Work (DB3300 DBX1005.0 to .6) for axis 3 in the Work (DB3300 DBX1005.0 to .6) IS "Active machine function 1 INC, ..., continuous" in the axis area (DB390x DBX5.0 to .6)
Note for the reader	Function Manual Basic Functions H1

DB3100 DBX0.0	Active AUTOMATIC mode Signal(s) from NCK (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	AUTOMATIC mode is active.	
Signal state 0 or edge change 1 → 0	AUTOMATIC mode is not active.	
Note for the reader	Function Manual Basic Functions K1	

DB3100 DBX0.1	Active MDI mode Signal(s) from NCK (NCK → PLC)	
Edge evaluation:	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	MDI mode is active.	
Signal state 0 or edge change 1 → 0	MDI mode is not active.	
Note for the reader	Function Manual Basic Functions K1	

DB3100 DBX0.2	Active JOG mode Signal(s) from NCK (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	JOG mode is active.	
Signal state 0 or edge change 1 → 0	JOG mode is not active	
Note for the reader	Function Manual Basic Functions K1	

DB3100 DBX0.3	808D READY Signal(s) from NCK (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	This signal is set after power on and all of the voltage have been established. The mode group is now ready and part programs can be executed and axes traversed.	
Signal state 0 or edge change 1 → 0	The mode group/channel is not ready. Possible causes for this are: • There is a critical axis or spindle alarm present • Hardware fault • Mode group incorrectly configured (machine data) If the mode group ready changes to signal state "0", then • the axis and spindle drives are braked down to standstill with the max. braking current. • the signals from the PLC to the NCK are brought into an inactive state (initial setting).	
Special cases, errors, ...	An alarm that withdraws IS "808D READY" ensures that the channel is no longer in the reset state. A reset is required to switch over to another mode. (DB3000 DBX0.7)	
Note for the reader	Function Manual Basic Functions K1	

DB3100 DBX1.0	Active machine function TEACH IN Signal(s) from NCK (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Machine function TEACH IN is active within JOG.	
Signal state 0 or edge change 1 → 0	Machine function TEACH IN is not active.	
Note for the reader	Function Manual Basic Functions K1	

DB3100 DBX1.2	Active machine function REF Signal(s) from NCK (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Machine function REF is active within JOG.	
Signal state 0 or edge change 1 → 0	Machine function REF is not active.	
Note for the reader	Function Manual Basic Functions K1	

4.7 Channel-specific signals

4.7.1 Signals to channel

DB3200 DBX0.3	Activate DRF Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The function DRF is selected. The function can either be selected directly from the PLC user program or from the operator panel front via HMI interface signal: DB1700 DBX0.3 (DRF selected) As soon as the function DRF is active, DRF offset can be modified in the AUTOMATIC or MDI modes.	
Signal state 0 or edge change 1 → 0	The DRF function is not selected.	
Application	The DRF function can be specifically enabled from the PLC user program using the IS "Activate DRF".	
corresponding to ...	DB1700 DBX0.3 (DRF selected)	
Note for the reader	Function Manual Basic Functions K1	

DB3200 DBX0.4	Activate single block Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	In the AUTOMATIC mode, the program is executed in the single block mode; only 1 block can be entered anyway in MDI.	
Signal state 0 or edge change 1 → 0	No effect	
Application	A new program can first be tested in single block mode in order to monitor the individual program steps more exactly.	
Special cases, errors, ...	• When tool radius correction (offset) (G41, G42) is selected, then where necessary, intermediate blocks are inserted. • In a series of G33 blocks single block is effective only if "dry run feedrate" is selected. • For "individual block coarse", pure computation blocks are not processed in the single step, but only for "single block fine". The pre-selection is made by pressing the "Program control" softkey.	
corresponding to ...	IS "Single block selected" IS "Program status stopped"	
Note for the reader	Function Manual Basic Functions K1	

DB3200 DBX0.5	Activate M01 Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	M1 programmed in the part program leads to a programmed stop when being executed in the AUTOMATIC or MDI mode.	
Signal state 0 or edge change 1 → 0	M1 programmed in the part program does not lead to a programmed stop.	
corresponding to ...	IS "M01 selected" (DB1700 DBX0.5) IS "M0/M1 active" (DB3300 DBX0.5)	
Note for the reader	Function Manual Basic Functions K1	

DB3200 DBX0.6	Activate dry run feedrate Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Instead of with the programmed feedrate (for G1, G2, G3, CIP, CT), the axis moves with the dry run feedrate specified using SD 42100: DRY_RUN_FEED if the dry run feedrate is greater than the one that has been programmed. This interface signal is evaluated at NC start when the channel was in the "Reset" state. When selected using the PLC, the IS "activate dry run feedrate" should be set from the PLC user program.	
Signal state 0 or edge change 1 → 0	The axis travels with the programmed feedrate. Effective after reset state.	
Application	Testing a workpiece program with an increased feedrate.	
corresponding to ...	IS "Dry run feedrate selected" (DB1700 DBX0.6) SD 42100: DRY_RUN_FEED (dry run feedrate)	
Note for the reader	Function Manual Basic Functions V1	

DB3200 DBX1.0	Activate referencing Signal(s) to channel (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Channel-specific referencing is started with the IS "Activate referencing". The control acknowledges a successful start with the IS "Referencing active". Each machine axis assigned to the channel can be referenced with channel-specific referencing (this is achieved internally in the control by simulating the plus/minus traversing keys). Via the axis-specific MD 34110: REFP_CYCLE_NR (axis sequence for channel-specific referencing) can be used to define the sequence in which the machine axes are referenced. If all of the axes entered in MD: REFP_CYCLE_NR have reached there reference point, then IS "all axes referenced" (DB3300 DBX4.2) is set.	
Application	If the machine axes are to be referenced in a particular sequence, the following options are available: • The operator must observe the correct sequence when starting. • The PLC must check the sequence when starting or define it itself. • The function channel specific referencing is used.	

corresponding to ...	IS "Referencing active" (DB3300 DBX1.0) IS "All axes that must have a reference point are referenced" (DB3300 DBX4.2)
Note for the reader	Function Manual Basic Functions R1

DB3200 DBX1.1	Enable protection zones Signal(s) to channel (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	When a positive edge of this signal appears, a protection zone is enabled and the active alarm cleared. Then, motion can start in the same protection zone. As a result of the start of motion, the protection zone is enabled, the IS "machine or channel-specific protection zone violated" is set, and the axis starts to move. The enable signal is not required if a motion is started that does not lead into the enabled protection zone.	
Signal state 0 or edge change 1 → 0	No effect	
Application example	This allows protection zones to be enabled: • if the actual position is within a protection zone (alarm 2 present) • if motion is to be started towards the protection zone limit (alarm 1 or 2 present)	
Note for the reader	Function Manual Basic Functions K1	

DB3200 DBX1.7	Activate the program test Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Axis disable is set internally for all axes (not spindles). Therefore the machine axes do not move when a part program block or a part program is being processed. The axis movements are simulated on the operator interface with changing axis position values. The axis position values for the display are generated from the calculated setpoints. Otherwise, the part program is executed normally.	
Signal state 0 or edge change 1 → 0	The part program execution is not affected by the program test function.	
corresponding to ...	IS "Program test selected" IS "Program test active"	
Note for the reader	Function Manual Basic Functions K1	

DB3200 DBB2 DBX15.6 and .7	Activate skip block Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	

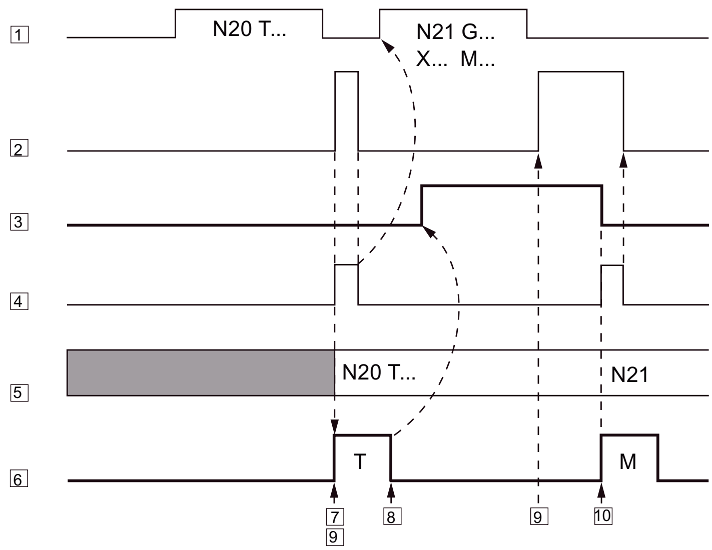
Signal state 1 or edge change 0 → 1	Blocks marked in the part program with a slash (/) are skipped. If there is a series of skip blocks, this signal is only active if it is present before decoding of the first block of the series, ideally before "NC start".
Signal state 0 or edge change 1 → 0	The marked part program blocks are not skipped.
corresponding to ...	IS "Skip block selected"
Note for the reader	Function Manual Basic Functions K1

DB3200 DBB4	Feedrate override Signal(s) to channel (PLC → NCK)		
Edge evaluation: No		Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Gray coding for feedrate override		
	Switch setting	Code	Feedrate override factor
	1	00001	0.0
	2	00011	0.01
	3	00010	0.02
	4	00110	0.04
	5	00111	0.06
	6	00101	0.08
	7	00100	0.10
	8	01100	0.20
	9	01101	0.30
	10	01111	0.40
	11	01110	0.50
	12	01010	0.60
	13	01011	0.70
	14	01001	0.75
	15	01000	0.80
	16	11000	0.85
	17	11001	0.90
	18	11011	0.95
	19	11010	1.00
	20	11110	1.05
	21	11111	1.10
	22	11101	1.15
	23	11100	1.20
	24	10100	1.20
	25	10101	1.20
	26	10111	1.20
	27	10110	1.20
	28	10010	1.20
	29	10011	1.20
	30	10001	1.20
	31	10000	1.20
corresponding to ...	IS "Feedrate override active" (DB3200 DBX6.7)		
Note for the reader	Function Manual Basic Functions V1		

DB3200 DBB5	Rapid traverse override Signal(s) to channel (PLC → NCK)		
Edge evaluation: No		Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Gray coding for rapid traverse override		
	Switch setting	Code	Rapid traverse override
	1	00001	0.0
	2	00011	0.01
	3	00010	0.02
	4	00110	0.04
	5	00111	0.06
	6	00101	0.08
	7	00100	0.10
	8	01100	0.20
	9	01101	0.30
	10	01111	0.40
	11	01110	0.50
	12	01010	0.60
	13	01011	0.70
	14	01001	0.75
	15	01000	0.80
	16	11000	0.85
	17	11001	0.90
	18	11011	0.95
	19	11010	1.00
	20	11110	1.00
	21	11111	1.00
	22	11101	1.00
	23	11100	1.00
	24	10100	1.00
	25	10101	1.00
	26	10111	1.00
	27	10110	1.00
	28	10010	1.00
	29	10011	1.00
	30	10001	1.00
	31	10000	1.00
corresponding to ...	IS "Rapid traverse override active" (DB3200 DBX6.6)		
Note for the reader	Function Manual Basic Functions V1		

DB3200 DBX6.0	Feedrate disable Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The signal is active in one channel in all modes. • Signal causes a feedrate disable of all of the axes that are interpolating relative to each other if no G33 (thread) is present. All axes are brought to a standstill, maintaining the path contour. When the feedrate disable is canceled (0 signal), the interrupted part program is continued. • The position control is kept, i.e. the following error is eliminated. • If a travel request is issued for an axis with an active "Feedrate disable", then this is kept. This pending travel request is executed directly when "Feedrate disable" is withdrawn. If the axis is interpolating relative to others, then this also applies to these axes.	
Signal state 0 or edge change 1 → 0	• The feedrate is enabled for all axes of the channel. • If a travel request ("travel command") exists for an axis or group of axes when the "feedrate disable" is canceled, then this is executed immediately.	
Special cases, errors, ...	The feedrate disable is inactive when G33 is active.	
Note for the reader	Function Manual Basic Functions V1	

DB3200 DBX6.1	Read-in disable Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The data transfer for the next block is locked in the interpolator. This signal is only active in the AUTOMATIC and MDI modes.	
Signal state 0 or edge change 1 → 0	The data transfer for the next block in the interpolator is released. This signal is only active in the AUTOMATIC and MDI modes.	

Application	In a case there an auxiliary function has to have been executed before the next block can be processed (e.g. for a tool change), automatic block change must be inhibited with read-in disable.  1 Reading into buffer 2 Reading into buffer 3 Read-in disable signal 4 Data transfer 5 Contents of the interpolator 6 Output of the auxiliary function 7 Data transfer into the interpolator 8 Read-in disable for tool change 9 Query point of the read-in enable 10 Remove read-in disable
corresponding to ...	IS "Program status running"
Note for the reader	Function Manual Basic Functions K1

DB3200 DBX6.2	Delete distance-to-go Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	IS "Delete distance-to-go" for path axes is only active in AUTOMATIC mode. The rising edge of the interface signal is only effective for the axes involved in the geometry grouping. These are also stopped with a ramp stop and their distance-to-go deleted (setpoint - actual value difference). Any remaining following error is still removed. The next program block is then started. Remark: IS "Delete distance-to-go" does not influence the running dwell time in a program block with dwell time.	
Signal state 0 or edge change 1 → 0	No effect	
Signal irrelevant for ...	Positioning axes	
Application example	Terminating motion because of an external signal (e.g. probe)	

Special cases, errors, ...	When the axes have been stopped with IS "Delete distance-to-go" the next program block is prepared with the new positions. After a "Delete distance-to-go", geometry axes thus follow a different contour to the one originally defined in the part program. If G90 is programmed in the block after "Delete distance-to-go" it is at least possible to approach the programmed absolute position. On the other hand, with G91, the position originally defined in the part program is not reached in the following block.
corresponding to ...	DB380x DBX2.2 (Distance-to-go / Spindle reset)
Note for the reader	Function Manual Basic Functions K1

DB3200 DBX6.4	Program level abort Signal(s) to channel (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	At each edge change 0 → 1 the actual program level being processed (subprogram level) is immediately aborted. Processing of the part program continues at the next higher program level from the exit point.	
Signal state 0 or edge change 1 → 0	No effect	
Special cases, errors, ...	The main program level cannot be interrupted with the IS, but only with the IS "Reset".	
Note for the reader	Function Manual Basic Functions K1	

DB3200 DBX6.6	Rapid traverse override active Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The rapid traverse override between 0 and a maximum of 100% entered in the PLC interface is channel-specific.	
Signal state 0 or edge change 1 → 0	The rapid traverse override entered at the PLC interface is ignored. When the rapid traverse override is inactive, the NC always uses 100% as the internal override factor. **Note:** The 1st switch position of the gray-coded interface for the value is an exception. Also here for "Rapid traverse override inactive", this override factor is used and for axes, **0%** is output as override value.	
Special cases, errors, ...	The rapid traverse override is inactive when G33 is active.	
corresponding to ...	IS "Rapid traverse override" (DB3200 DBX5)	
Note for the reader	Function Manual Basic Functions V1	

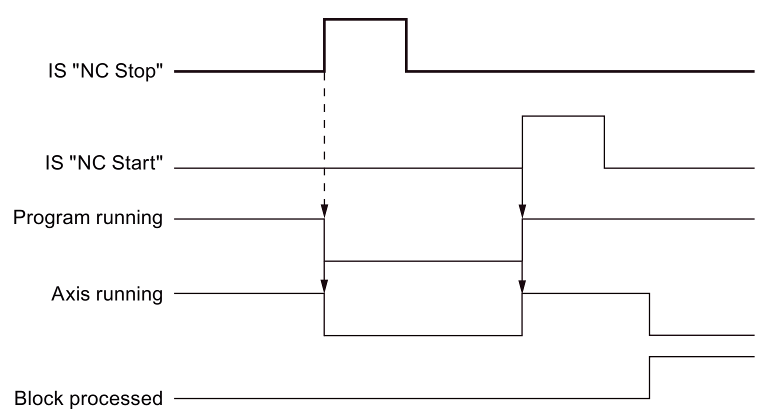
DB3200 DBX6.7	Feedrate override active Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The feedrate override between 0 and a maximum of 120% entered at the PLC interface is active for the path feedrate and therefore automatically for the related axes. In JOG mode, the feedrate override acts directly on the axes.	
Signal state 0 or edge change 1 → 0	The feedrate override entered at the PLC interface is ignored. When the feedrate override is inactive, the NC always uses 100% as the internal override factor. **Note:** The 1st switch position of the gray-coded interface for the value is an exception. Also here, for "Feedrate override inactive", this override factor is used and for axes, **0%** is output as override value (acts the same as "feedrate disable").	
Special cases, errors, ...	The feedrate override is inactive when G33 is active.	
corresponding to ...	IS "Feedrate override" (DB3200 DBX4)	
Note for the reader	Function Manual Basic Functions V1	

DB3200 DBX7.0	NC start disable Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	IS "NC start" is inactive.	
Signal state 0 or edge change 1 → 0	IS "NC start" is active.	
Application	This signal is used to suppress renewed program execution because, for example, there is no lubricant.	
corresponding to ...	IS "NC start"	
Note for the reader	Function Manual Basic Functions K1	

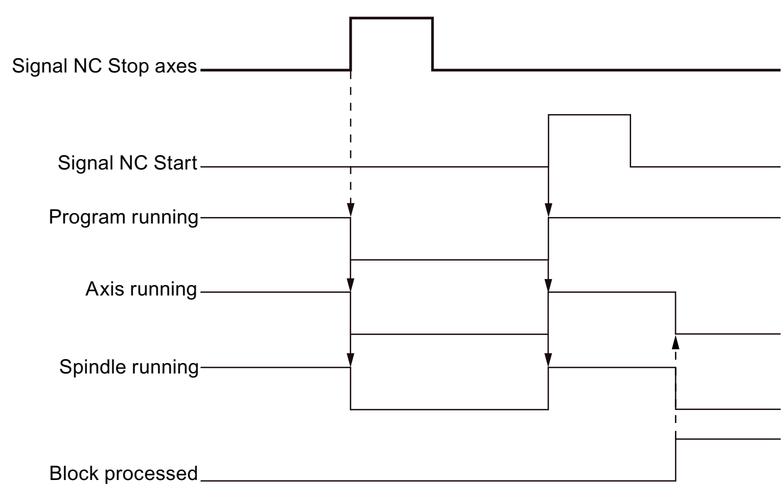
DB3200 DBX7.1	NC start Signal(s) to channel (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	AUTOMATIC mode: The selected NC program is started or continued. If data is transferred from the PLC to the NC during program status "Program interrupted," then this data is immediately processed with NC start. MDI mode: The part program blocks that were entered are enabled for execution or are continued.	
Signal state 0 or edge change 1 → 0	No effect	

corresponding to ...	IS "NC start disable"
Note for the reader	Function Manual Basic Functions K1

DB3200 DBX7.2	NC stop at block limit Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The NC program being executed is stopped after the part program block being executed has been completely processed. Otherwise, as for "NC stop".	
Signal state 0 or edge change 1 → 0	No effect	
corresponding to ...	IS "NC stop" IS "NC stop axes plus spindles" IS "Program status stopped" IS "Channel status interrupted"	
Note for the reader	Function Manual Basic Functions K1	

DB3200 DBX7.3	NC stop Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The NC program being executed is immediately stopped, the actual block is not completed. Only the axes are stopped without contour violation. Distances to go are only traversed through after a new start. The program status changes to "stopped", the channel status changes to "interrupted".	
Signal state 0 or edge change 1 → 0	No effect	
Application	On NC start the program is continued at the point of interruption.  	
Special cases, errors, ...	The signal NC stop must be active for at least one PLC cycle.	

corresponding to ...	IS "NC stop at block limit" IS "NC stop axes plus spindles" IS "Program status stopped" IS "Channel status interrupted"
Note for the reader	Function Manual Basic Functions K1

DB3200 DBX7.4	NC stop axes plus spindles Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The NC program being executed is immediately stopped, the actual block is not completed. Distances-to-go are only completed after a new start. The axes and spindle are stopped. However, these are stopped in a controlled fashion. The program status changes to stopped, the channel status changes to interrupted.	
Signal state 0 or edge change 1 → 0	No effect	
Signal irrelevant for ...	Channel status reset Program status interrupted	
Special cases, errors, ...	All axes and spindles that were not caused to move by program or program block (e.g. axes are moved by pressing the traverse keys on the machine control panel) are not decelerated to zero speed with "NC stop axes plus spindles". The program is continued at the interrupted place with NC Start. The signal "NC stop axes plus spindles" must be pending for at least one PLC cycle.  	
corresponding to ...	IS "NC stop at block limit" IS "NC stop" IS "Program status stopped" IS "Channel status interrupted"	
Note for the reader	Function Manual Basic Functions K1	

DB3200 DBX13.5	Deactivate workpiece counter Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The workpiece count monitoring is deactivated with activated tool monitoring.	
Signal state 0	No effect	
Note for the reader	Function Manual Basic Functions W1	

DB3200 DBX14.0 DBX14.1	Activate handwheel 1 as contour handwheel Activate handwheel 2 as contour handwheel Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Handwheel 1/2 is selected as contour handwheel.	
Signal state 0	Handwheel 1/2 is deselected as contour handwheel.	
Application	Enabling/disabling the contour handwheel can be performed in the middle of a block. When enabled, the movement is first decelerated and then traversed according to the contour handwheel. When disabled, the movement is decelerated and the NC program is continued immediately. If the NC program is to be continued only after a new NC start, then disabling the contour handwheel in the PLC user program must be logically combined with an NC stop.	
Special cases, errors, ...	The signal is kept beyond an NC reset.	
corresponding to ...	DB3300 DBX5.0 and 5.1 (handwheel 1/2 active as contour handwheel)	
Note for the reader	Function Manual Basic Functions H1	

DB3200 DBX14.3 DBX14.4	Simulation contour handwheel on Negative direction simulation contour handwheel Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Description	For enabling/disabling simulation of the contour handwheel and to define the traversing direction, these signals have to be set as follows: • Bit 3 = 0: Simulation off • Bit 3 = 1: Simulation on • Bit 4 = 0: Direction as programmed • Bit 4 = 1: Direction opposite to what was programmed	

Application	During simulation the feedrate is no longer defined by the contour handwheel, but traversing occurs with the programmed feedrate along the contour. When the function is deselected, the movement is decelerated along the braking ramp. When the traversing direction is reversed, axis motion is decelerated along the braking ramp and the axis traverses in the opposite direction.
Special cases, errors, ...	The simulation is only effective in the AUTOMATIC mode and can only be enabled if the contour handwheel has been activated.
Note for the reader	Function Manual Basic Functions H1

DB3200 DBX14.5	Activate associated M01 Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated:	
Signal state 1	PLC signals the NCK that the associated M01 (auxiliary function) should be activated.	
Signal state 0	Deactivate the associated M01 (auxiliary function).	
corresponding to ...	DB21, ... DBX 318.5 (associated M01 active) ???	
Note for the reader	Function Manual Basic Functions H1	

DB3200 DBX16.0	Control program branching Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated:	
Signal state 1	GOTOS in the part program initiates a return jump to the program start. The program is then processed again.	
Signal state 0	GOTOS does not initiate a return jump. Program execution is continued with the next part program block after GOTOS.	
corresponding to ...	MD27860 PROCESSTIMER_MODE MD27880 PART_COUNTER	
Note for the reader	Function Manual Basic Functions H1	

DB3200 DBX1000.0 to .1 DBX1004.0 to .1 DBX1008.0 to .1	Activate handwheel (1 and 2) for axis 1 in the Work for axis 2 in the Work for axis 3 in the Work Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	

Signal state 1 or edge change 0 → 1	These PLC interface signals are used to define whether this geometry axis is assigned to handwheel 1 or 2 or is not assigned to any handwheel. Only one handwheel can be assigned to an axis at any one time. If several interface signals "activate handwheel" are set, then 'Handwheel 1' has a higher priority than 'Handwheel 2'. **Note:** Two geometry axes can be simultaneously traversed using handwheels 1 to 2!
Signal state 0 or edge change 1 → 0	Neither handwheel 1 or 2 is assigned to this axis.
Application	The PLC user program can use this interface signal to interlock the influence on the geometry axis when turning a handwheel.
corresponding to ...	IS "Handwheel active" 1 to 2 for axis 1 in the Work: DB3300 DBX1000.0 to .2 for axis 2 in the Work: DB3300 DBX1004.0 to .2 for axis 3 in the Work: DB3300 DBX1008.0 to .2
Note for the reader	Function Manual Basic Functions H1

DB3200 DBX1000.3 DBX1004.3 DBX1008.3	Feedrate stop for axes in the Work Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The signal is only active in the JOG mode (axes are traversed in the Work). • The signal triggers a feedrate stop for the axis. For a traversing axis, this signal brings it to a standstill with a controlled braking (ramp stop). No alarm is output. • The position control is kept, i.e. the following error is eliminated. • If a travel request is issued for an axis with an active "feedrate stop", then this is kept. This queued travel request is executed immediately after the "feedrate stop" has been withdrawn.	
Signal state 0 or edge change 1 → 0	• The feedrate is enabled for the axis. • If a travel request ("travel command") is active when the "feedrate stop" is withdrawn, this is executed immediately.	
Note for the reader	Function Manual Basic Functions V1	

DB3200 DBX1000.4 DBX1004.4 DBX1008.4	Traversing key disable for axis 1 in the Work for axis 2 in the Work for axis 3 in the Work Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	

Signal state 1 or edge change 0 → 1	The plus and minus traversing keys have no effect on the geometry axes in question. It is thus not possible to traverse the geometry axis in JOG with the traversing keys on the machine control panel. If the traversing key disable is activated while traversing, the geometry axis is stopped.
Signal state 0	The plus and minus traversing keys are enabled.
Application	It is thus possible, depending on the operating state, to interlock traversing of the geometry axis in JOG mode using the traversing keys from the PLC user program.
corresponding to ...	IS "Traversing key plus" and " ... minus" for axis 1 in the Work (DB3200 DBX1000.7 and .6) for axis 2 in the Work (DB3200 DBX1004.7 and .6) for axis 3 in the Work (DB3200 DBX1008.7 and .6)
Note for the reader	Function Manual Basic Functions H1

DB3200 DBX1000.5 DBX1004.5 DBX1008.5	Rapid traverse override for axis 1 in the Work for axis 2 in the Work for axis 3 in the Work Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	If, together with the "Traversing key plus" or "Traversing key minus" the PLC interface signal "Rapid traverse override" is issued, then the geometry axis that is addressed traverses with the rapid traverse - intended for JOG - of the associated machine axis (e.g.: X → X1). This rapid traverse velocity is defined using MD32010 JOG_VELO_RAPID. The rapid traverse override is effective in the JOG mode for the following versions: • for continuous travel • for incremental travel If rapid traverse override is active, the velocity can be modified with the rapid traverse override switch.	
Signal state 0 or edge change 1 → 0	The geometry axis traverses with the specified JOG velocity (SD41110 JOG_SET_VELO or MD32020 JOG_VELO).	
Signal irrelevant for ...	• AUTOMATIC and MDI modes • Reference point approach (JOG mode)	
corresponding to ...	IS "Traversing key plus" and " ... minus" for axis 1 in the Work (DB3200 DBX1000.7 and .6) for axis 2 in the Work (DB3200 DBX1004.7 and .6) for axis 3 in the Work (DB3200 DBX1008.7 and .6)	
Note for the reader	Function Manual Basic Functions H1, V1	

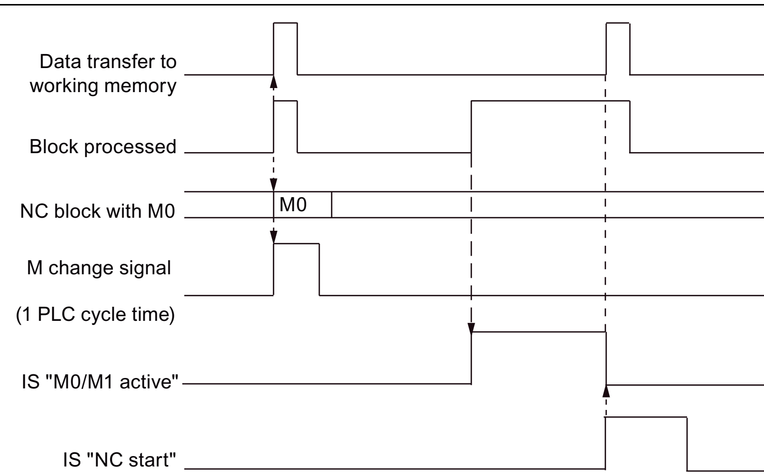
DB3200 DBX1000.7 and .6 DBX1004.7 and .6 DBX1008.7 and .6	Traversing keys plus and minus for axis 1 in the Work for axis 2 in the Work for axis 3 in the Work Signal(s) to channel (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The selected axis can be traversed in both directions in JOG mode using the plus and minus traversing keys. **Incremental travel** With signal state 1 the axis starts to traverse the set increment. If the signal changes to the 0 state before the increment is traversed, the traversing movement is interrupted. With a new signal state 1, the traversing motion is continued. Until the increment has been completely traversed, the axis traversing motion can be stopped and continued a multiple number of times as described above. **Continuous traversing** If an INC dimension has not been selected, but "continuous", then the axis traverses as long as the traversing key is kept pressed. If both traverse signals (plus and minus) are set at the same time, no movement occurs, or any current movement is aborted! The effect of the traversing keys can be disabled for every axis individually using the PLC interface signal "Traversing key disable". **Notice:** In contrast to machine axes, for geometry axes, only one geometry axis can be traversed at any one time using the traversing keys. Alarm 20062 is output if an attempt is made to traverse more than one axis using the traversing keys.	
Signal state 0 or edge change 1 → 0	No traversing	
Signal irrelevant for ...	AUTOMATIC and MDI modes	
Special cases, errors, ...	The geometry axis cannot be traversed in JOG mode: • If it is already being traversed via the axis-specific PLC interface (as a machine axis). • If another geometry axis is already being traversed with the traversing keys. Alarm 20062 "Axis already active" is output.	
corresponding to ...	IS "Traversing keys plus and minus" for machine axes (DB380x DBX4.7 and .6) IS "Traversing key disable" for axis 1 in the Work (DB3200 DBX1000.4) for axis 2 in the Work (DB3200 DBX1004.4) for axis 3 in the Work (DB3200 DBX1008.4)	
Note for the reader	Function Manual Basic Functions H1	

DB3200 DBX1001.0 to .6 DBX1005.0 to .6 DBX1009.0 to .6	Machine function 1 INC, 10 INC, 100 INC, 1000 INC, 10000 INC, var. INC, continuous for axis 1 in the Work for axis 2 in the Work for axis 3 in the Work Signal(s) to channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	This input range is only used if IS "INC inputs active in the mode area" (DB2600 DBX1.0) **is not set**. Interface signals INC... is used to define how many increments the geometry axis traverses when the traversing key is pressed or the handwheel is turned one detent position. In this case, the JOG mode must be active. For "var. INC", generally the value in SD41010 JOG_VAR_INCR_SIZE applies. For "continuous", the associated geometry axis can be traversed with the plus or minus traversing key by keeping the traversing key pressed. As soon as the selected machine function becomes active, this is signaled to the PLC interface (IS "Active machine function 1 INC; ..."). If several machine function signals (1 INC, INC... or "Continuous traversing") are selected at the interface simultaneously, then no machine function is activated by the control. Note: The input IS "INC..." or "continuous" to change an active machine function must be present for at least one PLC cycle. A steady-state signal is not required.	
Signal state 0 or edge change 1 → 0	The machine function in question is not selected. No request is made to change an active machine function. If an axis is currently traversing an increment, this movement is also aborted if this machine function is deselected or switched over.	
corresponding to ...	IS "Active machine function 1 INC, ..." for axis 1 in the Work (DB3300 DBX1001.0 ... .6) for axis 2 in the Work (DB3300 DBX1005.0 ... .6) for axis 3 in the Work (DB3300 DBX1009.0 ... .6) IS "INC inputs active in the mode group area" (DB2600 DBX1.0)	
Note for the reader	Function Manual Basic Functions H1	

4.7.2 Signals from NC channel

DB3300 DBX0.3	Action block active Signal(s) from channel (NCK → PLC)
Edge evaluation: No	Signal(s) updated: Cyclic
Signal state 1	Block search: Output of the collective auxiliary functions running.
Note for the reader	Function Manual Basic Functions K1

DB3300 DBX0.4	Approach block active Signal(s) from channel (NCK → PLC)
Edge evaluation: No	Signal(s) updated: Cyclic
Signal state 1	Block search with calculation / at contour: Approach block running
Note for the reader	Function Manual Basic Functions K1

DB3300 DBX0.5	M0/M1 active Signal(s) from channel (NCK → PLC)
Edge evaluation: No	Signal(s) updated: Cyclic
Signal state 1	The part program block is executed, the auxiliary functions are output, and • M0 is located in the work memory, or • M1 is in the work memory and IS "Activate M01" is active The program status changes to stopped.
Signal state 0	• With IS "NC start" • For a program abort as a result of a reset
Application	
corresponding to ...	IS "Activate M01" IS "M01 selected"
Note for the reader	Function Manual Basic Functions K1

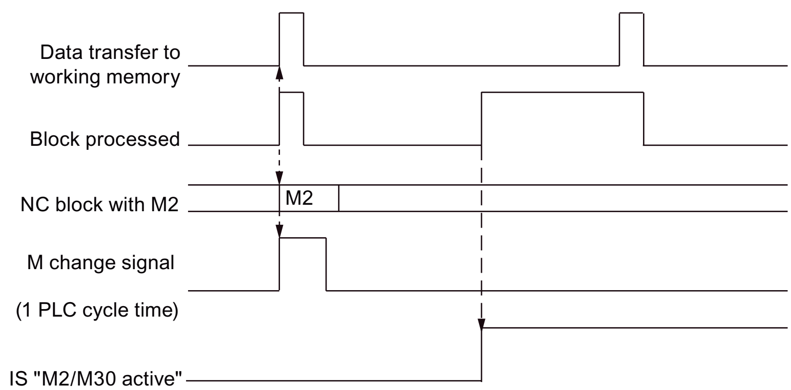
DB3300 DBX0.6	Last action block active Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Block search: Last block of the output with collected auxiliary functions.	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX1.0	Referencing active Signal(s) from channel (NCK → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The channel-specific referencing was started using the IS: "Activate referencing" and the successful start was acknowledged using IS "Referencing active". The channel-specific referencing is running.	
Signal state 0 or edge change 1 → 0	• Channel-specific referencing has been completed • Axis-specific referencing is running • No referencing active	
Signal irrelevant for ...	Spindles	
corresponding to ...	IS "Activate referencing" (DB3200 DBX1.0)	
Note for the reader	Function Manual Basic Functions R1	

DB3300 DBX1.2	Revolutional feedrate active Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	When programming of G95 (revolutional feedrate) in the JOG or automatic mode.	
corresponding to ...	SD41100 JOG_REV_IS_ACTIVE (JOG: Revolutional / linear feedrate) SD42600 JOG_FEED_PER_REV_SOURCE (control revolutional feedrate in JOG) SD43300 ASSIGN_FEED_PER_REV_SOURCE (revolutional feedrate for positioning axes / spindles) MD32040 JOG_REV_VELO_RAPID (revolutional feedrate for JOG with rapid traverse override) MD32050 JOG_REV_VELO (revolutional feedrate for JOG)	
Note for the reader	Function Manual Basic Functions V1	

DB3300 DBX1.3	Handwheel override active Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The function "Handwheel override in AUTOMATIC mode" is active for the programmed path axes. Handwheel pulses of the 1st geometry axis function as a velocity override over the programmed path feedrate.	
Signal state 0	The function "Handwheel override in AUTOMATIC mode" is not active for the programmed path axes. An active handwheel override is not active if: • The path axes have reached the target position • The distance-to-go is deleted by the channel-specific interface signal DB21, ... DBX6.2 (delete distance-to-go) • A RESET is performed.	
Note for the reader	Function Manual Basic Functions H2	

DB3300 DBX1.4	Block search active Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The block search function is active. It was selected and started from the operator interface.	
Signal state 0	The block search function is not active.	
Application	The block search function makes it possible to jump to a certain block within a part program and to start processing the part program from this block.	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX1.5	M2/M30 active Signal(s) from channel (NCK → PLC)
Edge evaluation: No	Signal(s) updated: Cyclic
Signal state 1	NC block with M2 has been completely executed. If traversing motion is also programmed in this block, the signal is only output when the target position has been reached.
Signal state 0	No end of program or program abort Status after the control has been switched on Start of an NC Program
Application	 The PLC can detect the end of program processing with this signal and react appropriately.
Special cases, errors, ...	• The M2 and M30 functions have equal priority. Only M2 should be used. • The IS "M2/M30 active" is present as steady-state signal after the end of the program. • Not suitable for automatic follow-on functions such as workpiece counting, bar feed, etc. For these functions, M2 should be written into a separate block and the word M2 or the decoded M signal should be used. • Auxiliary functions must not be written in the last block of a program that should result in a read-in stop.
Note for the reader	Function Manual Basic Functions K1

DB3300 DBX1.7	Program test active Signal(s) from channel (NCK → PLC)
Edge evaluation: No	Signal(s) updated: Cyclic
Signal state 1	Program control "Program test" is active. Axis disable is set internally for all axes (not spindles). Therefore the machine axes do not move when a part program block or a part program is being processed. The axis movements are simulated on the operator interface with changing axis position values. The axis position values for the display are generated from the calculated setpoints. Otherwise, the part program is executed in the normal way.
Signal state 0	Program control program test is not active.

corresponding to ...	IS "Activate program test" IS "Program test selected"
Note for the reader	Function Manual Basic Functions K1

DB3300 DBX3.0	Program status running Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The part program was started with IS "NC start" and is running.	
Signal state 0	• Program stopped by M0/M1 or NC stop or mode change. • For single block mode, the block is executed. • End of program reached (M2) • Program aborted due to a reset • The actual block cannot be executed	
Special cases, errors, ...	The IS "Program status running" does not change to 0 if workpiece machining is stopped due to the following events: • A feedrate disable or spindle disable was output • IS "Read-in disable" • Feedrate override to 0% • The spindle and axis monitoring functions respond	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX3.1	Program status wait Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The running program has come to a program command WAIT_M or WAIT_E in an NC block. The wait condition specified in the WAIT command for the channel or channels has not yet been fulfilled.	
Signal state 0	Program status wait is not active.	
corresponding to ...		
Note for the reader	/PG/ Programming Manual, Fundamentals	

DB3300 DBX3.2	Program status stopped Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The NC part program has been stopped by an "NC stop", "NC stop axes plus spindles", "NC stop at the block limit", programmed M0 or M1 or single block mode.	
Signal state 0	Program status "stopped" is not present.	

corresponding to ...	IS "NC stop" IS "NC stop axes plus spindles" IS "NC stop at block limit"
Note for the reader	Function Manual Basic Functions K1

DB3300 DBX3.3	Program status interrupted Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	When the mode changes from AUTOMATIC or MDI (in stopped program status) to JOG, the program status changes to "interrupted". The program can be continued at the point of interruption in AUTOMATIC or MDI mode when "NC start" is issued.	
Signal state 0	Program status interrupted is not active.	
Special cases, errors, ...	The IS "Program status interrupted" indicates that the part program can continue to be processed by restarting it.	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX3.4	Program status aborted Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The program has been selected but not started, or the program was aborted with a reset.	
Signal state 0	Program status interrupted is not active.	
corresponding to ...	IS "Reset"	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX3.5	Channel status active Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	In this channel • A part program or block is presently being executed in the automatic or MDI mode. • At least one axis is being traversed in JOG mode	
Signal state 0	"Channel status interrupted" or "Channel status reset" is active.	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX3.6	Channel status interrupted Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The NC part program in AUTOMATIC or MDI can be interrupted by "NC stop", "NC stop axes plus spindles", "NC stop at the block limit", programmed M0 or M1 or single block mode. With an NC start, the part program or the interrupted traversing movement can be continued.	
Signal state 0	"Channel status active" or "Channel status reset" is active.	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX3.7	Channel status reset Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The signal is set to 1 as soon as the channel goes into the reset state, i.e. no processing taking place.	
Signal state 0	The signal is set to 0 as soon as processing takes place in the channel, e.g.: a program is being executed or block search.	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX4.2	All axes referenced Signal(s) from channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	All axes that must have a reference point have been referenced. (Note for axes that must have a reference point: MD34110 REFP_CYCLE_NR, MD20700 REFP_NC_START_LOCK)	
Signal state 0	One or more axes of the channel have not been referenced.	
Special cases, errors, ...	The spindles of the channel have no effect on this IS.	
corresponding to ...	IS "Referenced/synchronized 1" (DB390x DBX0.4)	
Note for the reader	Function Manual Basic Functions R1	

DB3300 DBX4.3	All axes stationary Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	All axes assigned to the channel are stationary with interpolator end. No other traversing motions are active.	
Note for the reader	Function Manual Basic Functions B1	

DB3300 DBX4.6	Channel-specific NCK alarm is active Signal(s) from channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	At least one NCK alarm is present for the channel. Thus the following group interface signal is also set: DB2700 DBX3.0 (NCK alarm is present) The PLC user program can interrogate whether processing for the channel in question has been interrupted because of an NCK channel: DB3300 DBX4.7 (NCK alarm with processing stop active).	
Signal state 0	No NCK alarm is present for the channel.	
corresponding to ...	DB3300 DBX4.7 (NCK alarm with processing stop active) DB2700 DBX3.0 (NCK alarm present)	
Note for the reader	/DA/ Diagnostics Guide	

DB3300 DBX4.7	NCK alarm with processing stop active Signal(s) from channel (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	At least one NCK alarm, which is causing a processing stop of the part program running in the channel, is active.	
Signal state 0	There is no alarm active for the channel that is causing a processing stop.	
corresponding to ...	DB2700 DBX3.0 (NCK alarm present)	
Note for the reader	/DA/ Diagnostics Guide	

DB3300 DBX1000.0 and .1 DBX1004.0 and .1 DBX1008.0 and .1	Handwheel active (1 to 2) for axis 1 in the Work for axis 2 in the Work for axis 3 in the Work Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	These PLC interface signals are used to define whether this geometry axis is assigned to handwheel 1/2 or is not assigned to any handwheel. Only one handwheel can be assigned to an axis at any one time. If several interface signals "activate handwheel" are set, then 'Handwheel 1' has a higher priority than 'Handwheel 2'. If the assignment is active, then the geometry axis can be traversed using the handwheel in the JOG mode.	
Signal status	This geometry axis is not assigned to handwheel 1/2.	
corresponding to ...	IS "Activate handwheel" (DB3200 DBX1000.0/.1, DB3200 DBX1004.0/.1, DB3200 DBX1008.0/.1)	
Note for the reader	Function Manual Basic Functions H1	

DB3300 DBX1000.5 and .4 DBX1004.5 and .4 DBX1008.5 and .4	Plus and minus travel request (for axis in the Work) Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 0	A travel command in the relevant axis direction has not been given or a traverse movement has been completed. • JOG mode: The travel command is reset depending on the actual setting "Jog or continuous mode". While traversing with the handwheel. • Under REF mode: When the reference point is reached • AUT/MDI mode: The program block has been executed (and the next block does not contain any coordinate values for the axis in question). Cancel using "RESET", etc. IS "Axis disabled" is active.	
corresponding to ...	DB3300 DBX1000.7 or .6 DB3300 DBX1004.7 or .6 DB3300 DBX1008.7 or .6 (travel command plus and travel command minus)	

DB3300 DBX1000.7 and .6 DBX1004.7 and .6 DBX1008.7 and .6	Travel command plus and minus for axis 1 in the Work for axis 2 in the Work for axis 3 in the Work Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Travel is to be executed in the axis direction involved. Depending on the mode selected, the travel command is triggered in different ways. • JOG mode: With the plus or minus traversing key • Under REF mode: With traversing key that takes the axis to the reference point • AUTO/MDI mode: A program block containing a coordinate value for the axis in question is executed.	
Signal state 0	A travel command in the relevant axis direction has not been given or a traverse movement has been completed. • JOG mode: – Withdrawing the traversing key – When ending traversing with the handwheel. • Under REF mode: When the reference point is reached • AUTO/MDI mode: – The program block has been executed (and the next block does not contain any coordinate values for the axis in question) – Cancel using "RESET", etc. – IS "Axis disable" is active	

Application	Releasing the clamping for axes with clamping Note: If the clamping is not released until the travel command is given, these axes cannot be operated under continuous path control!
corresponding to ...	IS "Traversing key plus" and " ...minus" for axis 1 in the Work (DB3200 DBX1000.7 and .6) for axis 2 in the Work (DB3200 DBX1004.7 and .6) for axis 3 in the Work (DB3200 DBX1008.7 and .6)
Note for the reader	Function Manual Basic Functions H1

DB3300 DBX1001.0 to .6 DBX1005.0 to .6 DBX1009.0 to .6	Active machine function 1 INC, ..., continuous for axis 1 in the Work for axis 2 in the Work for axis 3 in the Work Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The PLC interface receives a signal stating which machine function is active in the JOG mode for the geometry axes.	
Signal state 0	The machine function in question is not active.	
corresponding to ...	IS "Machine function 1 INC, ..., continuous" for axis 1 in the Work (DB3200 DBX1001.0 ... .6) for axis 2 in the Work (DB3200 DBX1005.0 ... .6) for axis 3 in the Work (DB3200 DBX1009.0 ... .6)	
Note for the reader	Function Manual Basic Functions H1	

DB3300 DBX4001.1	Workpiece setpoint reached Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The specified workpiece target has been reached. Depending on the setting in MD27880 PART_COUNTER: Bit 1 = 0:for $AC_REQUIRED_PARTS equal to $AC_ACTUAL_PARTS Bit 1 = 1:for $AC_REQUIRED_PARTS equal to $AC_SPECIAL_PARTS	
Signal state 0	The specified workpiece target has not been reached.	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX4002.0	ASUB is stopped Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The signal is set to 1 if the control stops automatically prior to the end of ASUB (interrupt in a program mode and channel status stopped).	
Signal state 0	The IS is set to 0 with start and reset.	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX4002.5	Associated M01/M00 active Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The IS is used to display that for a corresponding previous enable / activation, an associated M00 or M01 auxiliary function is active.	
Signal state 0	No associated M00/M01 auxiliary functions active.	
corresponding to ...	DB3200 DBX14.5 (activate associated M01)	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX4002.6	Dry run feedrate active Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The dry run feedrate is active. Instead of the programmed feedrate, the dry run feedrate entered in setting data: SD42100 $SC_DRY_RUN_FEED is active. When activated from the operator panel, the dry run feedrate signal is automatically entered in the PLC interface and transmitted by the PLC basic program to the PLC interface signal: DB3200 DBX0.6 (activate dry run feedrate).	
Signal state 0	Dry run feedrate is not active. The programmed feedrate is active.	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBB4004	PROG-EVENT-DISPLAY Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Event-controlled	
Signal state 1	The event assigned to the bit has activated the "Event-driven program call" function: Bit 0 → Part program start from channel status RESET Bit 1 → End of part program Bit 2 → Operator panel reset Bit 3 → Boot Bit 4 → 1st start after search run Bit 5 - 7 → Reserved, currently always 0 Signal duration: At least one complete PLC cycle	
Signal state 0	• The event assigned to the bit has not activated the "Event-driven program call" function. • The event-driven user program has expired or was cancelled with RESET.	
Note for the reader		

DB3300 DBX4006.0	ASUB active Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	One ASUB is active.	
Signal state 0	No ASUB is active.	
Note for the reader	Function Manual Basic Functions K1	

DB3300 DBX4006.0	ASUB active Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	An ASUB with suppressed display update is active (refer to MD20191).	
Signal state 0	No ASUB with suppressed display update is active.	
corresponding to ...	MD20191 IGN_PROG_STATE_ASUP (do not display execution of the interrupt program on the OPI)	
Note for the reader	Function Manual Basic Functions K1	

DB3500 DBB0 - 63	Active G function of groups 1 to 64 Signal(s) from channel (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Event-controlled	
Signal status > 1	A G function of the G group is active. The active G group is saved in the dual format in the byte involved, e.g. G90: 0 1 0 1 1 0 1 0	
Signal state 0	No G function of the G group is active.	
Special cases, errors, ...	In contrast to auxiliary functions, G functions are not output to the PLC subject to acknowledgement, i.e. processing of the part program is continued immediately after the G function output.	
Note for the reader	Programming Manual, Fundamentals	

4.8 Axis / spindle-specific signals

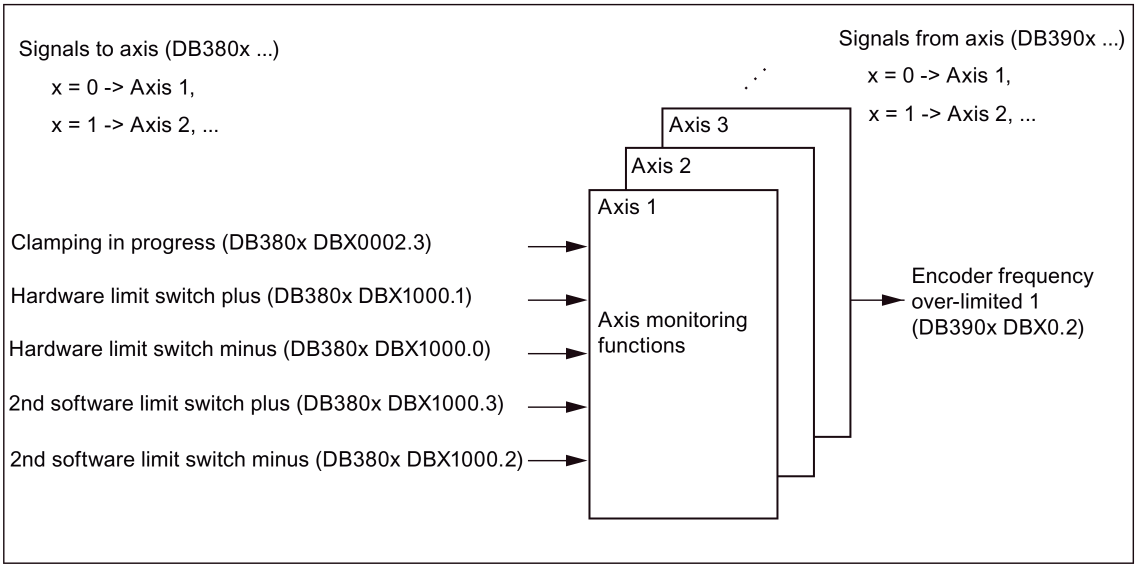


Figure 4-2 PLC interface signals for axis monitoring

4.8.1 Transferred axis-specific M, S functions

DB370x DBD0	M function for spindle Signal(s) from axis/spindle (NCK → PLC), axis-specific	
Edge evaluation:	Signal(s) updated: Cyclic	
Application	Generally, the M functions are output for specific channels in DB2500. In the range DB2500 DBB1000 ... these are only present for one PLC cycle; in DB2500 DBD3000 ... up to a new output. Selected "M functions for the spindle" are available as **integer number actual value of the** PLC in this IS "M function for spindle". • M3 → Value: 3 • M4 → Value: 4 • M5 → Value: 5	
corresponding to ...	IS "S function for spindle" (DB370x DBD4), axis-specific IS auxiliary function transfer from NC channel (DB2500)	
Note for the reader	Function Manual Basic Functions S1	

DB370x DBD4	S function for spindle Signal(s) from axis/spindle (NCK → PLC), axis-specific	
Edge evaluation:	Signal(s) updated: Cyclic	

Application	Generally, the S function is transferred channel-specific in DB2500 DBD4000 ... as floating-point value to the PLC. In this IS "S function for the spindle", this output is realized to the PLC as floating-point value for specific axes: • S... as spindle speed in rpm (programmed value) • S... as constant cutting speed in m/min or ft/min for G96 The following S functions are not output here: • S... as programmed spindle speed limiting G25 • S... as programmed spindle speed limiting G26 • S... as the dwell time in spindle revolutions
corresponding to ...	IS "M function for spindle" (DB370x DBD0), axis-specific IS "Transferred S function" (DB2500 DBD4000 ...), channel-specific
Note for the reader	Function Manual Basic Functions S1

4.8.2 Signals to axis / spindle

DB380x DBB0	Feedrate override (axis-specific) Signal(s) to axis (PLC → NCK)		
Edge evaluation: No		Signal(s) updated: Cyclic	
Signal state 1	The axis-specific feedrate override is entered from the PLC gray-coded. Gray coding for axis-specific feedrate override		
	Switch setting	Code	Axial feedrate override factor
	1	00001	0.0
	2	00011	0.01
	3	00010	0.02
	4	00110	0.04
	5	00111	0.06
	6	00101	0.08
	7	00100	0.10
	8	01100	0.20
	9	01101	0.30
	10	01111	0.40
	11	01110	0.50
	12	01010	0.60
	13	01011	0.70
	14	01001	0.75
	15	01000	0.80
	16	11000	0.85
	17	11001	0.90
	18	11011	0.95
	19	11010	1.00
	20	11110	1.05
	21	11111	1.10
	22	11101	1.15
	23	11100	1.20
	24	10100	1.20
	25	10101	1.20
	26	10111	1.20
	27	10110	1.20
	28	10010	1.20
	29	10011	1.20
	30	10001	1.20
	31	10000	1.20
corresponding to ...	IS "Override active" (DB380x DBX1.7)		
Note for the reader	Function Manual Basic Functions V1		

DB380x DBX1.3	Axis/spindle disable Signal(s) to axis/spindle (PLC → NCK)
Edge evaluation: No	Signal(s) updated: Cyclic
Signal state 1	Axis disable; If the interface signal "Axis disable" is output - for this axis - no more setpoints are output to the position controller; the axis travel is therefore disabled. The position control loop remains closed and the remaining following error is reduced to zero. A moving axis is stopped with a ramp stop. If an axis is moved with axis disable the actual value position display shows the setpoint position and the actual velocity value display shows the setpoint velocity even though the machine axis is not actually moving. With a RESET the position actual value display is set to the real actual value of the machine. Travel commands continue to be output to the PLC for this axis. If the interface signal is canceled again the associated axis can again traverse normally. Spindle disable: If the interface signal "Spindle disable" is issued, then for this spindle no more setpoints are output to the speed controller in the open-loop controlled mode or to the position controller in positioning mode. The movement of the spindle is thus disabled. For a rotating spindle, the spindle is stopped corresponding to its acceleration characteristic. The speed actual value display displays the speed setpoint value. Spindle disable can only be canceled per "Reset" or with M2 followed by a program restart.
Signal state 0	The position setpoint values are transferred to the position controller cyclically. The speed setpoint values are transferred to the speed controller cyclically. Cancellation of the "Axis / spindle disable" does not take effect until the axis / spindle is stationary (i.e. an interpolation setpoint is no longer present).
Application	The interface signal "Axis / spindle disable" is used when running-in and testing a new NC part program. In so doing, the machine axes and spindles should not execute any traversing or rotational movement.
Special cases, errors, ...	If the IS "Axis / spindle disable" is active, then the interface signals: DB380x DBX2.1 (controller enable), DB380x DBX4.3 (feedrate / spindle stop) and where relevant DB380x DBX1000.0/.1 (hardware limit switch) are ineffective with reference to braking the axis / spindle. The axis / spindle can however be brought into the "follow up" or "hold" state (see DB380x DBX1.4 (follow-up mode)). For response together with synchronized operation, see: /FB2/ Function Manual Basic Functions; Expanded Functions; Synchronized Spindle (S3)
corresponding to ...	DB3300 DBX1.7 (program test active)
Note for the reader	Function Manuals

DB380x DBX1.4	Follow-up mode Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Follow-up mode is selected for the axis / spindle by the PLC. The means that the position setpoint continually tracks the actual value if the controller enable for the drive is withdrawn. As soon as the follow-up mode is effective, the interface signal: DB390x DBX1.3 (follow-up mode active) is set. The actual value continues to be acquired and updated. If the axis / spindle is moved from its current position by an external effect the zero speed and clamping monitoring do not issue an alarm. When the closed-loop control system is switched-on again, a control internal repositioning operation is performed (REPOSA: linear approach with all axes) to the last programmed position if a part program is active.	
Signal state 0	Follow-up mode is not selected (so-called holding). When "controller enable" is removed the previous position setpoint is kept in the control. If the axis / spindle is pushed out of position during this time a following error occurs between the position setpoint and the position actual value. This position difference is reduced to zero immediately by issuing "controller enable" so that the previous setpoint position is restored. Then, all the other axis movements start from the setpoint position valid before "controller enable" was removed. When the position control is switched in again the axis may make a speed setpoint jump. Zero speed monitoring or clamping monitoring is still active. In order to disable (switch-out) the zero speed monitoring, when clamping an axis, the interface signal: DB380x DBX2.3 (clamping operation running) should be set.	
Special cases, errors, ...	If the drive controller enable is withdrawn inside the control due to faults, then the following should be carefully observed: Before an NC start, after the queued alarms have been successfully deleted (i.e. inside the control, the controller enable is re-issued), then "holding" should be activated. Otherwise, for an NC start and selected follow-up mode, the traversing distance of the previous NC block would not be executed due to the internal delete distance to go. Notice: When changing over from the "follow-up" state to the "hold" state and in the control mode (a controller enable is issued), a delete distance-to-go command is activated in the control. As a consequence, for example, an NC block - in which only this axis is traversed - is ended directly.	
corresponding to ...	DB380x DBX2.1 (controller enable)	
Note for the reader	Function Manual Basic Functions R1	

DB380x DBX1.5 / 1.6	Position measuring system 1 (PMS1) / Position measuring system 2 (PMS2) Signal(s) to axis / spindle (PLC → NCK)
Edge evaluation: No	Signal(s) updated: Cyclic
PMS1: Signal state 1 PMS2: Signal state 0	Position measuring system 1 is used for the axis / spindle (e.g. for position control, absolute value calculation, display). If a position measuring system 2 also exists (MD30200 NUM_ENCS = 2), this actual value is also acquired.
PMS1: Signal state 0 PMS2: Signal state 1	Position measuring system 2 is used for the axis / spindle (e.g. for position control, absolute value calculation, display). If a position measuring system 2 also exists, this actual value is also acquired.
PMS1: Signal state 1 PMS2: Signal state 1	As it is not possible to use both position measuring systems simultaneously for the position control of an axis / spindle, the control automatically selects position measuring system 1. If a position measuring system 2 also exists, this actual value is also acquired.
Signal state 0	1. The axis is in the park position. This means that the following features are valid: – The position measuring system is inactive. – There is no actual value acquisition. – The monitoring functions of the position measuring system have been disabled (among others, the cable connection of the measuring value encoder). The reference point is ineffective: The IS "Referenced/synchronized 1/2" has signal state 0. As soon as an axis is in the parked position, the interface signals: DB390x DBX1.5 (position controller active), DB390x DBX1.6 (speed controller active) and DB390x DBX1.7 (current controller active) are set to a 0 signal. After parking has been completed the axis must be re-referenced (reference point approach). If IS "Position measuring system 1" is set to a 0 signal while the axis is moving, the axis is stopped with a ramp stop without the controller enable being internally withdrawn in the control. This is appropriate for the following situations: – Spindle encoder no longer outputs a signal above a certain speed (no longer supplies any pulses). – Spindle encoder is decoupled mechanically because it would not be able to handle the speed. As a consequence, the spindle can then continue to run in speed-controlled mode. In order to really bring the axis / spindle to a stop, the controller enable must always be removed additionally by the PLC. 2. The spindle does not have a position measuring system and is only speed controlled. In this case, IS "Controller enable" should be set to a 1 signal.

Application	1. Switching over from position measuring system 1 to position measuring system 2 (and vice versa): If the axis was referenced in both position measuring systems and in the meantime, the limit frequency of the measuring encoder used was not exceeded, i.e. IS "Referenced/synchronized 1/2" has a signal state 1, then after the switchover, a new reference point approach is not required. At switchover, the actual difference between position measuring system 1 and 2 is traversed immediately. Using MD36500 ENC_CHANGE_TOL, a tolerance bandwidth can be specified in which the deviation between the two actual values may lie at the switchover. If the actual value difference is greater than the tolerance, a switchover between the two systems does not take place and alarm 25100 "Measuring system switchover" not possible is triggered. 2. Parking axis (i.e. no PMS is active: If the encoder has to be removed - e.g. if a rotary table has to be removed from the machine - the position measuring system monitoring is switched off in the parking position. The mounted axis / spindle encoder turns so quickly in certain applications that it can no longer maintain its electrical characteristics (edge rate-of-rise, etc.). 3. Switching-off the measuring system: When the measuring system is switched-off, the associated IS "Referenced/synchronized 1/2" is reset. 4. Reference point approach: The reference point approach of the axis is executed with the selected position measuring system.
Special cases, errors, ...	If the "parking axis" state is active, then the interface signal "Referenced/ synchronized 1/2" is ignored at NC start for this axis.
corresponding to ...	DB390x DBX0.4/.5 (referenced/synchronized 1/2) DB380x DBX2.1 (controller enable) MD36500 ENC_CHANGE_TOL (max. tolerance for the actual position value switchover) MD30200 NUM_ENCS (number of encoders)
Note for the reader	Function Manual Basic Functions G2

DB380x DBX1.7	Override active Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Feedrate override active (for axes): • The axis-specific feedrate override between 0 and a maximum of 120% entered in the PLC interface is used. Spindle override active (for spindle): • The spindle override - input at the PLC interface - of 50 to a maximum of 120% is taken into account.	

Signal state 0	The existing axis-specific feedrate override or spindle override is not active. If the feedrate override is inactive, "100%" is used as the internal override factor. **Note:** The 1st switch position of the gray-coded interface for the value is an exception. Also here, for "Override inactive", the override factor of the 1st switch position is used and for axes, 0% is output as override value (acts the same as "Feedrate disable"); correspondingly 50% for the spindle.
Special cases, errors, ...	• The spindle override is always accepted with 100% in the spindle "Oscillation mode". • The spindle override acts on the programmed values before limits (e.g. G26) intervene. • The feedrate override is inactive when G33 is active.
corresponding to ...	IS "Feedrate override" and IS "Spindle override"
Note for the reader	Function Manual Basic Functions V1

DB380x DBX2.1	Controller enable Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The position control loop of the axis / spindle is closed; the axis / spindle is in closed-loop control. When "controller enable" is set by the PLC user program: • Position control loop of axis is closed. • Position actual value is no longer switched to the position setpoint. • The controller enable of the drive is output. • The interface signal: DB390x DBX1.5 (position controller active) is set to a 1 signal. When "controller enable" has been issued no new actual value synchronization of the axis (reference point approach) of the axis is necessary if the maximum permissible limit frequency of the axis measuring system has not been exceeded during follow-up mode. As a function of the interface signal: DB380x DBX1.4 (follow-up mode) it is possible to select whether or not the axis first traverses back to the earlier setpoint position (i.e. the positional deviation caused by the clamping process is moved through to eliminate the deviation).	

Signal state 0	"Controller enable" will be/is removed. The interface signals: DB390x DBX1.5 (position controller active) DB390x DBX1.6 (speed controller active) DB390x DBX1.7 (current controller active) are set to a 0 signal. The procedure for removing "controller enable" depends on whether the axis / spindle or an axis of the geometry grouping is stationary or traversing at this point in time. • Axis / spindle stationary: – Position control loop of axis is opened. For IS "follow-on mode" = 1, the position actual value is switched to the position setpoint (i.e. the position setpoint tracks the actual position). The position actual value of the axis / spindle continues to be acquired by the control. – The controller enable of the drive is removed. • Axis / spindle traverses: – The axis is stopped with rapid stop. – Alarm 21612 "VDI signal controller enable reset during movement" is output. – The position control loop of the axis / spindle is opened. – Independent of IS: "Follow-up mode" at the end of braking the position actual value is switched to the position setpoint (i.e. the setpoint position is corrected to track the actual value position). – The position actual value of the axis / spindle continues to be acquired by the control. IS "Follow-up mode" is set. The axis status cannot be changed again until after RESET.
Application	Using the controller enable when clamping the axis: The axis is positioned to the clamping position. As soon as it has stopped it is clamped and then controller enable is removed. Controller enable is removed because the axis could be mechanically pressed out of position slightly by clamping and the position controller would continuously have to work against the clamping. When clamping is to be withdrawn again, a controller enable signal is first set again and then the axis is freed from clamping.
Special cases, errors, ...	If an attempt is made to traverse the axis without controller enable, the axis remains stationary but sends a travel command to the PLC. The travel command is kept and is executed when the controller enable is re-activated. If the controller enable of a traversing geometry axis is removed the programmed contour cannot be maintained. Controller enable is automatically cancelled by the control when certain faults occur at the machine, the position measuring system or the control.
corresponding to ...	MD36620 SERVO_DISABLE_DELAY_TIME (switch-off delay controller enable) MD36610 AX_EMERGENCY_STOP_TIME (time for braking ramp when fault conditions occur)
Note for the reader	Function Manual Basic Functions G2

DB380x DBX2.2	Distance-to-go / Spindle reset Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Independent of MD35040 SPIND_ACTIVE_AFTER_RESET selects a spindle reset for the various spindle modes in the following fashion: Control mode: • Spindle stops • Program continues to run • Spindle continues to run with subsequent M and S program commands Oscillating mode: • Oscillation is interrupted • Axes continue to run • Program continues with the actual gearbox stage • With subsequent M value and higher S value, it is • possible that IS "Setpoint speed limited" (DB390x DBX2001.1) is set. Positioning mode: • Is stopped	
Signal state 0 or edge change 1 → 0	No effect	
corresponding to ...	MD35040 SPIND_ACTIVE_AFTER_RESET (own spindle reset) IS "Reset" (DB3000 DBX0.7) IS "Delete distance to go" (DB380x DBX2.2), another name applies for the same signal, however, for an axis	
Note for the reader	Function Manual Basic Functions S1	

DB380x DBX2.4 - .7	Reference point values 1 to 4 Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	When the reference cam is reached, the NCK is signaled which coded reference cam is actuated. The IS must remain set until the reference point is reached or until a new coded reference cam is approached. If the machine axis has reached the reference point (axis stationary) then reference point value, pre-selected via the IS from MD34100 is accepted as new reference position in the control.	
Signal state 0	No effect.	
Signal irrelevant for ...	Length measurement systems with distance-coded reference marks	
Application	On a machine tool with large traversing distances, four coded reference cams can be distributed over the entire distance traveled by the axis, four different reference points approached and the time required to reach a valid referenced point reduced.	
Special cases, errors	If the machine axis has reached the reference point and none of the four IS are set, then reference point value 1 is automatically valid.	

corresponding to ...	MD34100 REFP_SET_POS (reference point value) MD36050 CLAMP_POS_TOL (clamping tolerance)
Note for the reader	Function Manual Basic Functions R1

DB380x DBX3.1	Enable travel to fixed stop Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Meaning when the "FXS" function is selected via part program, (IS "Activate travel to fixed stop" = 1): Travel to fixed stop is enabled and the axis traverses from the start position at the programmed velocity to the programmed target position.	
Signal state 0	Meaning when function "FXS" is selected via part program (IS "Activate travel to fixed stop" = 1): → Travel to fixed stop is locked. → The axis remains at the start position with reduced torque. → The channel message "Wait: Aux fct ackn missing" is displayed.	
Edge change 1 → 0	Meaning **before** the fixed stop has been reached IS "Fixed stop reached" = 0. → Travel to fixed stop is interrupted → Alarm "20094: Axis%1 function was aborted" is displayed Meaning **once** fixed stop has been reached IS "Fixed stop reached" = 1. Torque limiting and the monitoring of the fixed stop monitoring window are canceled.	
IS irrelevant for ...	MD 37060: FIXED_STOP_ACKN_MASK (observing PLC acknowledgments for travel to fixed stop) = 0 or 2	
corresponding to ...	MD 37060: FIXED_STOP_ACKN_MASK (observe PLC acknowledgments for travel to fixed stop) IS "Activate travel to fixed stop"	
Note for the reader	Function Manual Basic Functions F1	

DB380x DBX3.6	Velocity / spindle speed limitation Signal(s)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The NCK limits the velocity / spindle speed to the limit value set in MD35160 SPIND_EXTERN_VELO_LIMIT.	
Signal state 0	No limiting active.	
corresponding to ...	MD35100 SPIND_VELO_LIMIT (max. spindle speed) SD43220 SPIND_MAX_VELO_G26 (prog. spindle speed limit G26) SD43230 SPIND_MAX_VELO_LIMIT (spindle speed limit G96)	
Note for the reader	Function Manual Basic Functions A3	

DB380x DBX4.0 to .1	Activate handwheel (1 to 2) Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	These PLC interface signals are used to define whether this machine axis is assigned to handwheel 1 or 2 or is not assigned to any handwheel. Only one handwheel can be assigned to an axis at any one time. If several interface signals "Activate handwheel" are set, then the following priority applies: Handwheel 1 before handwheel 2. If the assignment is active, then the machine axis can be traversed using the handwheel in the JOG mode.	
Signal state 0	This machine axis is neither assigned to handwheel 1 nor 2.	
Application	The PLC user program can use this interface signal to interlock the influence on the axis by turning a handwheel.	
corresponding to ...	IS "Handwheel 1/2 active" (DB390x DBX4.0/.1)	
Note for the reader	Function Manual Basic Functions H1	

DB380x DBX4.3	Feedrate stop / spindle stop (axis-specific) Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The signal is active in all modes. Feedrate stop: • The signal triggers a feedrate stop for the axis. For a traversing axis, this signal brings it to a standstill with a controlled braking (ramp stop). No alarm is output. • The signal triggers a "feedrate stop" for all path axes interpolating relative to each other when the "feedrate stop" is activated for any one of these path axes. In this case, all the axes are brought to a stop maintaining the path contour. When the feedrate stop signal is withdrawn, execution of the interrupted parts program is resumed. • The position control is kept, i.e. the following error is eliminated. • If a travel request is issued for an axis with an active "feedrate stop", then this is kept. This pending travel request is executed directly when "Feedrate stop" is withdrawn. If the axis is interpolating in relation to others, this also applies to these axes. Spindle stop: • The spindle is brought to a standstill along the acceleration characteristic. • In the positioning mode, when the "Spindle stop" signal is set positioning is interrupted. The above response applies with respect to individual axes.	

Signal state 0	Feedrate stop: • The feedrate is enabled for the axis. • If a travel request ("travel command") is active when the "feedrate stop" is withdrawn, this is executed immediately. Spindle stop: • The speed is enabled for the spindle. • When "spindle stop" is withdrawn, the spindle is accelerated to the previous speed setpoint with the acceleration characteristic or, in the positioning mode, positioning is resumed.
Application	Feedrate stop: The traversing motion of the machine axes is not started with "feedrate stop", if, for example, certain operating states exist at the machine that do not permit the axes to be moved (e.g. a door is not closed). Spindle stop: In order to change a tool.
Note for the reader	Function Manual Basic Functions V1

DB380x DBX4.4	Traversing key disable Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The traversing keys plus and minus have no effect on the machine axes in question. It is thus not possible to traverse the machine axis in JOG using the traversing keys on the machine control panel. If the traversing key disable is activated during a traversing movement, the machine axis is stopped.	
Signal state 0	The plus and minus traversing keys are enabled.	
Application	It is thus possible, depending on the mode, to interlock manual traversing of the machine axis in JOG mode using the traversing keys from the PLC user program.	
corresponding to ...	IS "Traversing key plus" and "Traversing key minus" (DB380x DBX4.7 and .6)	
Note for the reader	Function Manual Basic Functions H1	

DB380x DBX4.5	Rapid traverse override Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	If the PLC interface signal "Rapid traverse override" is issued together with the "Traversing key plus" or "Traversing key minus", then the machine axis involved moves with rapid traverse. MD32010 JOG_VELO_RAPID defines the rapid traverse velocity. The rapid traverse override is effective in the JOG mode for the following versions: • For continuous travel • For incremental travel If rapid traverse override is active, the velocity can be modified using the axis-specific feedrate override switch.	
Signal state 0	The machine axis traverses with the specified JOG velocity (SD41110 JOG_SET_VELO or SD41130 or MD32020 JOG_VELO).	
Signal irrelevant for ...	• AUTOMATIC and MDI modes • Reference point approach (JOG mode)	
corresponding to ...	IS "Traversing key plus" and "Traversing key minus" (DB380x DBX4.7 and .6) IS "Axis-specific feedrate override" (DB380x DBX0)	
Note for the reader	Function Manual Basic Functions H1	

DB380x DBX4.7 and .6	Plus and minus traversing keys Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The selected axis can be traversed in both directions in JOG mode using the plus and minus traversing keys. **Incremental travel** With signal state 1 the axis starts to traverse the set increment. If the signal changes to the 0 state before the increment is traversed, the traversing movement is interrupted. With a new signal state 1, the traversing motion is continued. Until the increment has been completely traversed, the axis traversing motion can be stopped and continued a multiple number of times as described above. **Continuous traversing** If an INC dimension has not been selected, but "continuous", then the axis traverses as long as the traversing key is kept pressed. If both traversing signals (plus and minus) are set at the same time there is no movement or a current movement is aborted. The effect of the traversing keys can be disabled for a specific axis using the PLC interface signal "Traversing key disable".	
Signal state 0 or edge change 1 → 0	No traversing	
Signal irrelevant for ...	AUTOMATIC and MDI modes	

Application	The machine axis cannot be traversed in JOG mode if it is already being traversed via the channel-specific PLC interface (as a geometry axis). Alarm 20062 is signaled.
Special cases, ...	Indexing axes
corresponding to ...	IS "Traversing key plus" and " ...minus" for axis 1 in the Work (DB3200 DBX1000.7 and .6) for axis 2 in the Work (DB3200 DBX1004.7 and .6) for axis 3 in the Work (DB3200 DBX1008.7 and .6) IS "Traversing key disable" (DB380x DBX4.4)
Note for the reader	Function Manual Basic Functions H1

DB380x DBX5.0 and .6	Machine function 1 INC, 10 INC, 100 INC, 1000 INC, 10000 INC, var. INC, continuous Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	This input range is only used if IS "INC inputs active in the mode group area" (DB2600 DBX1.0) **is not set**. IS "INC... is used to define how many increments the machine axis traverses when the traversing key is pressed or the handwheel is turned one detent position. In this case, the JOG mode must be active. For "var. INC", the value in SD41010 JOG_VAR_INCR_SIZE is generally valid. For "continuous", the associated axis can be traversed using either the plus or minus traversing key by keeping the key pressed. As soon as the selected machine function becomes active, this is signaled at the PLC interface (IS "Active machine function 1 INC..."). If several machine function signals (1 INC, INC... or "Continuous traversing") are selected at the interface simultaneously, then no machine function is activated by the control. **Note:** The input IS "INC..." or "continuous" to change an active machine function must be present for at least one PLC cycle. A steady-state signal is not required.	
Signal state 0	The machine function in question is not selected. No request is made to change an active machine function. If an axis is currently traversing an increment, this movement is also aborted if this machine function is deselected or switched over.	
corresponding to ...	IS "Active machine function 1 INC, ..." (DB390x DBX5.0 ... .6) IS "INC inputs active in the mode group area" (DB2600 DBX1.0)	
Note for the reader	Function Manual Basic Functions H1	

DB380x DBX1000.1 and .0	Hardware limit switches plus and minus Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	A switch can be mounted at each end of the travel range of a machine axis which will cause a signal "hardware limit switch plus or minus" to be signaled to the NC via the PLC if it is actuated. If the signal is recognized as set, alarm 021614 "Hardware limit switch plus or minus" is output and the axis is immediately braked. The braking type is defined using MD 36600: BRAKE_MODE_CHOICE (braking behavior with hardware limit switch).	
Signal state 0	Normal condition - a hardware limit switch has not responded.	
corresponding to ...	MD36600 BRAKE_MODE_CHOICE (braking behavior for the hardware limit switch)	
Note for the reader	Function Manual Basic Functions A3	

DB380x DBX1000.3 or .2	2. software limit switch plus or minus Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	2nd software limit switch for the plus or minus direction is active. 1st software limit switch for the plus or minus direction is inactive. In addition to the 1st software limit switches (plus or minus), 2nd software limit switch (plus or minus) can be activated via these interface signals. The position is defined using MD36130 POS_LIMIT_PLUS2, MD36120 POS_LIMIT_MINUS2 (2nd software limit switch plus, 2nd software limit switch minus).	
Signal state 0	1st software limit switch for the plus or minus direction is active 2nd software limit switch for the plus or minus direction is inactive	
Note for the reader	Function Manual Basic Functions A3	

DB380x DBX1000.7	Reference point approach deceleration Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The machine axis is positioned at the reference cam.	
Signal state 0	The machine axis is positioned in front of the reference cam. An appropriately long reference cam (up to the end of the traversing range) should be used to prevent the machine axis from being located behind (after) the referencing cam.	
Note for the reader	Function Manual Basic Functions R1	

DB380x DBX1002.1	Activate the program test Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Activation of the program test is requested. During the program test, all motion commands of axes (not spindles) take place under "Axis disable." Notice! Because of the axis disable, the assignment of a tool magazine is not changed during program testing. The user/machine manufacturer must utilize a suitable PLC user program to ensure that the NCK-internal tool management and the actual assignment of the tool magazine remain consistent. Refer to the program example included in the PLC Toolbox.	
Signal state 0	Activation of the program test is not requested.	
corresponding to ...	DB1700 DBX1.7 (program test selected) DB3300 DBX1.7 (program test active)	
Note for the reader	Function Manual Basic Functions K1	

DB380x DBX2000.0 to .2	Actual gear stage A to C Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1(status-controlled)	If the new gearbox stage is engaged, then the PLC user sets the IS "Actual gear stage A" to "...C" and the IS "Gear is changed over". This signals to the NCK that the correct gear stage has been successfully engaged. The gear change is considered to have been completed (spindle oscillation mode is deselected), the spindle accelerates in the new gear stage to the last programmed spindle speed and the next block in the parts program can be executed. The actual gear stage is specified coded (ABC values). There is one parameter set for each of the 5 gear stages, which is parameterized as follows:	

Parameter set No.	Code CBA	Data of the data set	Content
0	-	Data for axis mode	Kv factor
			Monitoring
1	000	Data for the 1st gear stage	M40 speed
	001		Min / max speed
			Acceleration
2	010	Data for the 2nd gear stage	etc.
3	011	Data for the 3rd gear stage	
4	100	Data for the 4th gear stage	
5	101	Data for the 5th gear stage	
	110		
	111		

Special cases, errors, ...	If the PLC user signals back to the NCK with a different actual gear stage than issued by the NCK as the setpoint gear stage, the gear change is still considered to have been successfully completed and the actual gear stage A to C is activated.
corresponding to ...	IS "Setpoint gear stage A" to "...C" (DB390x DBX2000.0 to .2) IS "Change gear stage" (DB390x DBX2000.3) IS "Gear stage is changed over" (DB380x DBX2000.3) IS "Oscillation speed" (DB380x DBX2002.5) Parameter sets (MDs) for gear stages
Note for the reader	Function Manual Basic Functions S1

DB380x DBX2000.3	Gear is changed over Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	If the new gearbox stage is engaged, then the PLC user program sets the IS "Actual gear stage A to C" and the IS "Gear stage is changed over". This signals the NCK that the correct gear stage has been successfully engaged. The gear stage change is complete (spindle oscillation mode is deselected), the spindle accelerates in the new gear stage to the last programmed spindle speed and the next block in the parts program can be executed. The NCK resets the IS "Change gear stage" and then the PLC user program resets the IS "Gear stage is changed over".	
Signal state 0 or edge change 1 → 0	No effect	
Signal irrelevant for ...	spindle modes other than the oscillation mode	
Special cases, errors, ...	If the PLC user signals back to the NCK with a different actual gear stage than issued by the NCK as the setpoint gear stage, the gear change is still considered to have been successfully completed and the actual gear stage A to C is activated.	
corresponding to ...	IS "Actual gear stage A" to "...C "(DB380x DBX2000.0 to .2) IS "Setpoint gear stage A" to "...C" (DB390x DBX2000.0 to .2) IS "Change gear stage" (DB390x DBX2000.3) IS "Oscillation speed" (DB380x DBX2002.5)	
Note for the reader	Function Manual Basic Functions S1	

DB380x DBX2000.4 and .5	Re-synchronizing spindles 1 and 2 Signal(s) from axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The spindle should be resynchronized, as the synchronization between the position measuring system of the spindle and the 0° position has been lost.	
Signal state 0 or edge change 1 → 0	No effect.	
Signal irrelevant for ...	... spindle modes other than the control mode.	

Application	The machine has a selector switch for a vertical and horizontal spindle. Two different position measuring encoders are required, but only one actual value input is used at the control. When the system switches from the vertical to the horizontal spindle, the spindle must be resynchronized. This synchronization is triggered by the IS "Re-synchronize spindle 1 or 2".
corresponding to ...	DB390x DBX0.4/.5 (referenced / synchronized 1/2)
Note for the reader	Function Manual Basic Functions V1

DB380x DBX2000.7	Delete S value Signal(s) from axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Control mode: • Spindle stops • Program continues to run • Spindle continues to run with the following S value, if M3 or M4 were active Oscillation mode, axis mode, positioning mode: Signal is inactive. However, if the open-loop control mode is selected again, a new S value must be programmed.	
Signal state 0 or edge change 1 → 0	No effect.	
Application	Terminating traversing motion on account of an external signal (e.g. probe).	
Note for the reader	Function Manual Basic Functions S1	

DB380x DBX2001.0	Feedrate override for spindle valid (instead of spindle override) Signal(s) from axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Instead of the value for "Spindle override" the value of "feedrate override" (DB380x DBB0) is used for the spindle.	
Signal state 0 or edge change 1 → 0	The value of "spindle override" is used.	
corresponding to ...	IS"Spindle override" (DB380x DBB2003) IS"Feedrate override" (DB380x DBB0) IS"Override active" (DB380x DBX1.7)	
Note for the reader	Function Manual Basic Functions V1	

DB380x DBX2001.4	Re-synchronize spindle during positioning 1 Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1	When positioning, the spindle must be re-synchronized.	
Signal state 0 or edge change 1 → 0	No effect	

Signal irrelevant for ...	... spindle modes other than the positioning mode
Application	The spindle has an indirect measuring system and slip may occur between the motor and clamp. If the signal = 1, when positioning is started, the old reference is deleted and the zero mark is searched for again before the end position is approached.
corresponding to ...	IS "Referenced / synchronized 1" (DB390x DBX0.4)
Note for the reader	Function Manual Basic Functions S1

DB380x DBX2001.6	Invert M3/M4 Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The direction of rotation of the spindle motor changes for the following functions: • M3 • M4 • M5 • SPOS from the motion; not active for SPOS from standstill	
Application	The machine has a selector switch for a vertical and horizontal spindle. The mechanical design is implemented so that for the horizontal spindle, one more gearwheel is engaged than for the vertical spindle. The direction of rotation must therefore be changed for the vertical spindle if the spindle is always to rotate clockwise with M3.	
Note for the reader	Function Manual Basic Functions S1	

DB380x DBX2002.4	Oscillation via PLC Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	If the IS "Oscillation via PLC" is set, then with the IS "Oscillation speed", a speed is output in conjunction with the IS "Setpoint direction of rotation, clockwise and counter-clockwise).	
Signal state 0 or edge change 1 → 0	If the IS "Oscillation via the PLC" is not set, then automatic oscillation is executed in the NCK using the IS "Oscillation speed". The two times for the directions of rotation are entered into MD35440 and MD35450.	
Application	If the new gear stage cannot be engaged in spite of several oscillation attempts by the NCK, the system can be switched to oscillation via the PLC. Both of the times for the directions of rotation can then be altered by the PLC user program as required. This ensures that the gear stage is reliably changed - even with unfavorable gear wheel positions.	
corresponding to ...	MD35440 SPIND_OSCILL_TIME_CW (oscillation time for M3direction) MD35450 SPIND_OSCILL_TIME_CCW (oscillation time for M4 direction) IS "Oscillation speed" (DB380x DBX2002.5) IS "Setpoint direction of rotation counter-clockwise" (DB380x DBX2002.7) IS "Setpoint direction of rotation clockwise" (DB380x DBX2002.6)	
Note for the reader	Function Manual Basic Functions S1	

DB380x DBX2002.5	Oscillation speed Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	If the gear stage is to be changed (IS "Change gear stage" (DB390x DBX2000.3) is set), then the spindle operating mode changes to the oscillation mode. Depending on the instant in time that IS "Oscillation speed" is set, the spindle brakes down to standstill with different acceleration levels: 1. The IS "Oscillation speed" is set **before** the IS "Change gear stage" is set by the NCK. The spindle is braked down to standstill with the acceleration when oscillating (MD35410). Oscillation starts immediately once the spindle is stationary. 2. The IS "Oscillation speed" is set **after** the IS "Change gear stage" is set by the NCK and after the spindle is stationary. The position controller is disabled. The spindle is braked with the acceleration in the speed controlled mode. After the IS "Oscillation speed" is set, the spindle starts to oscillate with the oscillation acceleration (MD35410).	
	If the IS "Oscillation via the PLC" (DB380x DBX2002.4) is **not set**, then automatic oscillation is executed in the NCK using the IS "Oscillation speed". The two times for the directions of rotation are entered into MD35440 and MD35450. If the IS "Oscillation via PLC" is **set**, then with the IS "Oscillation speed", a speed is output in conjunction with the IS "Setpoint direction of rotation, clockwise and counter-clockwise).	
Signal state 0	The spindle does not oscillate.	
Signal irrelevant for ...	... all spindle modes except for the oscillation mode	
Application	The oscillation speed is used to make it easier to engage a new gear stage.	
corresponding to ...	IS oscillation via the PLC (DB380x DBX2002.4) IS setpoint direction of rotation counter-clockwise (DB380x DBX2002.7) IS setpoint of rotation clockwise (DB380x DBX2002.6)	
Note for the reader	Function Manual Basic Functions S1	

DB380x DBX2002.7 and .6	Setpoint direction of rotation, counter-clockwise and clockwise Signal(s) to axis / spindle (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	If the IS "Oscillation via the PLC" is set, then the direction of rotation for the oscillation speed can be specified using the two IS "Setpoint direction of rotation counter-clockwise and clockwise". The times for the oscillation movement of the spindle motor are defined by setting the IS "Setpoint direction of rotation counter-clockwise and clockwise" for a corresponding length of time.	
Signal irrelevant for ...	... spindle modes other than the oscillation mode	
Application	see IS "Oscillation via PLC"	
Special cases, errors, ...	• If both IS are set simultaneously, no oscillation speed is output. • If no IS is set, then an oscillation speed is not output.	

corresponding to ...	IS "Oscillation via the PLC" (DB380x DBX2002.4) IS "Oscillation speed" (DB380x DBX2002.5)
Note for the reader	Function Manual Basic Functions S1

DB380x DBB2003	Spindle override Signal(s) to spindle (PLC → NCK)		
Edge evaluation: No		Signal(s) updated: Cyclic	
Signal state 1	The spindle override is specified via the PLC in the Gray code. The override value determines the percentage of the programmed speed setpoint that is issued to the spindle. Gray coding for spindle override		
	Switch setting	Code	Spindle override factor
	1	00001	0.5
	2	00011	0.55
	3	00010	0.60
	4	00110	0.65
	5	00111	0.70
	6	00101	0.75
	7	00100	0.80
	8	01100	0.85
	9	01101	0.90
	10	01111	0.95
	11	01110	1.00
	12	01010	1.05
	13	01011	1.10
	14	01001	1.15
	15	01000	1.20
	16	11000	1.20
	17	11001	1.20
	18	11011	1.20
	19	11010	1.20
	20	11110	1.20
	21	11111	1.20
	22	11101	1.20
	23	11100	1.20
	24	10100	1.20
	25	10101	1.20
	26	10111	1.20
	27	10110	1.20
	28	10010	1.20
	29	10011	1.20
	30	10001	1.20
	31	10000	1.20
corresponding to ...	IS "Override active" (DB380x DBX1.7) IS "Feedrate override for spindle valid" (DB380x DBX2001.0)		
Note for the reader	Function Manual Basic Functions V1		

DB380x DBX4001.0 to .2	Parameter set selection A, B, C Signal(s) to drive (PLC → NCK)		
Edge evaluation: No		Signal(s) updated: Cyclic	
Signal state 1	With bit combinations A, B and C, 8 different drive parameter sets can be selected. The following assignment applies:		
	Drive parameter set	C	B	A
	1 2 3 4 5 6 7 8	0 0 0 0 1 1 1 1	0 0 1 1 0 0 1 1	0 1 0 1 0 1 0 1
	The switchable drive parameters are as follows: • Current setpoint filters (lowpass, bandstop); for adaptation to the mechanic system • Motor speed normalization • Speed controller parameters • Speed setpoint filter • Speed monitoring data As soon as the new drive parameter becomes effective, the drive signals this to the PLC using the interface signals: DB390x DBX4001.0 to 2 (active drive parameter set).			
Application	Drive parameter switchover can be used, for example, for the following: • To change the gear stage • To change over the measuring circuit			
Special cases, errors, ...	In principle it is possible to switch over drive parameter sets at any time. However, as torque jumps can occur when switching over speed controller parameters and motor speed normalization, parameters should only be switched over when stationary at zero speed (especially when the axis is stationary).			
corresponding to ...	DB390x DBX4001.0 to 2 (active parameter set)			
Note for the reader	Commissioning Manual, Turning and Milling			

DB380x DBX4001.6	Speed controller integrator disable Signal(s) to drive (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	For the drive, the interface signal is used to disable the speed controller integrator. The speed controller is thus changed over from a PI to a P controller. Note: If the speed controller integrator disable is activated, compensation operations might take place in certain applications (e.g. if the integrator was already holding a load while stationary). The drive acknowledges the integrator disable: DB390x DBX4001.6 (speed controller integrator disabled)	
Signal state 0	The integrator of the speed controller is enabled.	
corresponding to ...	DB390x DBX4001.6 (integrator n-controller disabled)	
Note for the reader	Commissioning Manual, Turning and Milling	

DB380x DBX4001.7	Pulse enable. Signal(s) to drive (PLC → NCK)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Pulse enable is signaled by the PLC for this drive (axis / spindle). The pulses are only enabled if the drive signals IS: DB390x DBX4001.5 (drive ready) using a 1 signal. In this case, the interface signal: DB390x DBX4001.7 (pulses enabled) is signaled to the PLC with a 1 signal.	
Signal state 0	The pulses are disabled by the PLC for this drive.	
Application	Signal-oriented signal.	
Special cases, errors, ...	If pulse enable is withdrawn for a moving axis / spindle the axis / spindle is not longer braked in a controlled fashion. The axis / spindle coasts down.	
corresponding to ...	DB390x DBX4001.7 (pulses enabled)	
Note for the reader	Commissioning Manual, Turning and Milling	

DB380x DBX5000.4	Torque equalization controller on Signal(s) to drive (PLC → NCK)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Torque compensation controller is to be activated.	
Signal state 0 or edge change 1 → 0	Torque compensation controller is to be deactivated.	
Note for the reader	Function Manual, Special functions TE3	

4.8.3 Signals from axis / spindle

DB390x DBX0.0	Spindle / no axis Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The machine axis is operated as spindle in the following spindle modes: • Control mode • Oscillation mode • Positioning mode • Rigid tapping The IS's to the axis (DB380x DBX1000 to DB380x DBX1003) and from the axis (DB390x DBX1000 to DB390x DBX1003) are invalid. The IS's to the spindle (DB380x DBX2000 to DB380x DBX2003) and from the spindle (DB380x DBX2000 to DB380x DBX2003) are valid.	
Signal state 0 or edge change 1 → 0	The machine axis is operated as an axis. The IS's to the axis (DB380x DBX1000 to DB380x DBX1003) and from the axis (DB390x DBX1000 to DB390x DBX1003) are valid. The IS's to the spindle (DB380x DBX2000 to DB380x DBX2003) and from the spindle (DB380x DBX2000 to DB380x DBX2003) are invalid.	
Application	If a spindle is sometimes also used as a rotary axis on a machine tool (lathe with spindle / Caxis or milling machine with spindle / rotary axis for rigid tapping), then the IS "Spindle / no axis" can be used to identify as to whether the machine axis is in the axis or spindle mode.	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX0.2	Encoder limit frequency exceeded 1 Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The limit frequency set in MD36300 ENC_FREQ_LIMIT (encoder limit frequency) has been exceeded. The reference point for the position measuring system involved has been lost (IS: Referenced/synchronized is in signal state 0). Closed-loop position control is no longer possible. Spindles continue to operate with closed-loop speed control. Axes are stopped with a fast stop (with open-circuit position control loop) along a speed setpoint ramp.	
Signal state 0	The limit frequency set in MD36300 is no longer exceeded. For the edge change 1 → 0, the encoder frequency must have fallen below the value of MD36302 ENC_FREQ_LIMIT_LOW (% value of MD 36300).	
Note for the reader	Function Manual Basic Functions A3	

DB390x DBX0.4	Referenced / synchronized 1 Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation:	Signal(s) updated:	
Signal state 1 or edge change 0 → 1	Axes: When being referenced, if the machine axis has reached the reference point (incremental measuring systems) or the target point (for length measuring system with distance-coded reference marks), then the machine axis is referenced and the IS "Referenced / synchronized 1" (for position measuring system 1) is set. Spindles: After "power-on", a spindle is synchronized the latest after one spindle revolution (zero mark) or when passing the BERO.	
Signal state 0 or edge change 1 → 0	The machine axis / spindle with position measuring system 1 is not referenced/synchronized.	
corresponding to ...	DB380x DBX0.5 (position measuring system 1)	
Note for the reader	Function Manual Basic Functions R1, S1	

DB390x DBX0.5	Referenced / synchronized 2 Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation:	Signal(s) updated:	
Signal state 1 or edge change 0 → 1	Axes: When being referenced, if the machine axis has reached the reference point (incremental measuring systems) or the target point (for length measuring system with distance-coded reference marks), then the machine axis is referenced and the IS "Referenced / synchronized 2" (for position measuring system 2) is set. Spindles: After "power-on", a spindle is synchronized the latest after one spindle revolution (zero mark) or when passing the BERO.	
Signal state 0 or edge change 1 → 0	The machine axis / spindle with position measuring system 2 is not referenced / synchronized.	
corresponding to ...	DB380x DBX0.6 (position measuring system 2) MD34102 REFP_SYNC_ENCS (measuring system calibration) = 0	
Note for the reader	Function Manual Basic Functions R1, S1	

DB390x DBX0.6	Position reached with exact stop coarse Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	

Signal state 1	The axis is in the appropriate exact stop and no interpolator is active for the axis and • the control is in the reset state (reset key or end of program). • the axis was last programmed as a positioning spindle. • the path motion was terminated with NC stop. • the spindle is in position-controlled mode and is stationary. • the axis is switched from closed-loop speed-controlled to closed-loop position-controlled mode with IS "position measuring system".
Signal state 0	The axis is not in the appropriate exact stop or the interpolator is active for the axis or • the path motion was terminated with NC stop. • the spindle is in the speed-controlled mode. • the "parking" mode is active for the axis. • the axis is switched-over from the position-controlled to the speed-controlled mode with using the IS "Position measuring system".
corresponding to ...	MD36000 STOP_LIMIT_COARSE (exact stop coarse)
Note for the reader	Function Manual Basic Functions B1

DB390x DBX0.7	Position reached with exact stop fine Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	See IS "Position reached with exact stop coarse".	
Signal state 0	See IS "Position reached with exact stop coarse"	
corresponding to ...	MD36010 STOP_LIMIT_FINE (exact stop fine)	
Note for the reader	Function Manual Basic Functions B1	

DB390x DBX1.2	Axis ready Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated:	
Meaning	The signal is fed to the PPU, to which the axis is physically connected.	
Signal state 1	Axis is ready.	
Signal state 0	Axis is not ready. This status is set if the channel, the mode group or the NCK have generated the alarm "Not ready".	

DB390x DBX1.3	Follow-up mode active Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	

Signal state 1	The control signals that the follow-up mode for the axis / spindle is active. Prerequisites for this are: • The controller enable for the drive has been withdrawn (either by the PLC with "controller enable " = 0 signal or inside the control for faults). • Follow-up operation is selected (either by the PLC with IS "follow-up operation" = 1 signal or in the control, e.g. when withdrawing the controller enable from an axis that is moving) The position setpoint continually tracks the actual value while the follow-up mode is active. The standstill and clamping monitoring are not active.
Signal state 0	The control signals that follow-up mode for the axis / spindle is not active, i.e. the above mentioned prerequisites are not fulfilled. Zero speed and clamping monitoring are active. In the "Hold" state, the IS "Follow-up mode active" has a 0 signal.
Special cases, errors, ...	Notice: A delete distance-to-go is triggered internally in the control at the transition from "Follow up" to "Hold" (IS "Follow-up mode" = 0) or in the closed-loop control mode (IS "Controller enable" = 1).
corresponding to ...	DB380x DBX2.1 (controller enable) DB380x DBX1.4 (controller enable!)
Note for the reader	Function Manual, Special Functions; M3/T3

DB390x DBX1.4	Axis / spindle stationary (n < n_{min}) Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The actual velocity of the axis or the actual speed of the spindle lies under the limit defined using the MD36060.	
Signal state 0	The actual velocity of the axis or the actual spindle speed is greater than the value specified in MD36060 (standstill / zero speed range). If a travel command is present, e.g. for a spindle, then the signal is always = 0 - even if the actual speed lies below that specified in MD36060. If the IS "Axis / spindle stationary" is signaled and there is no closed-loop position control active for the spindle, then at the operator interface, an actual speed of zero is displayed and with the system variable $AA_S[n] zero is read.	
Application	• Enable signal for opening a protective device (e.g. "Open door"). • The workpiece chuck or the tool clamping device is only opened when the spindle is stationary. • The oscillation mode can be switched-in during gear stage change after the spindle has been braked down to standstill. • The tool clamping device must have been closed before the spindle can be accelerated.	
corresponding to ...	MD36060 STANDSTILL_VELO_TOL (maximum velocity / speed for signal "Axis / spindle stationary")	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX1.5	Position controller active Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The control signals that the position controller is closed.	
Signal state 0	The control signals that the position controller is open. If "controller enable" is withdrawn because of a fault or from the PLC user program the position controller is opened and therefore the interface signal "Position controller active" is set to a 0 signal. Spindle without position control: Signal "Position controller active" is always "0".	
Application	• The IS "Position controller active" can be used as feedback signal for the IS "Controller enable". • The holding brake of a vertical axis must be activated as soon as the position control is no longer active. • If a spindle has been technically designed/dimensioned for the purpose, in the part program, it can be changed-over into the closed-loop position controlled mode as spindle or as axis (with SPCON or M70). In these cases, the interface signal "position controller active" is set.	
Special cases, errors, ...	The IS "Position controller active" is also set for simulation axes as soon as MD30350 = 1.	
corresponding to ...	DB380x DBX2.1 (controller enable) DB380x DBX1.5 (position measuring system 1) MD30350 SIMU_AX_VDI_OUTPUT (output of axis signals for simulation axes)	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX1.6	Speed controller active Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The control signals that the speed controller is closed.	
Signal state 0	The control signals that the speed controller is open. The speed controller output is cleared.	
Application	For spindles without closed-loop position control, the interface signal can be used as feedback for the IS "Controller enable".	
Special cases, errors, ...	The IS "Speed controller active" is also set for simulation axes, as soon as MD30350 = 1.	
corresponding to ...	DB380x DBX2.1 (controller enable) DB390x DBX1.5 (position controller active) MD30350 SIMU_AX_VDI_OUTPUT (output of axis signals for simulation axes)	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX1.7	Current controller active Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The control signals that the current controller is closed.	
Signal state 0	The control signals that the current controller is open. The current controller output (including the feedforward quantities on the manipulated variable for the voltage) is cleared.	
corresponding to ...	DB390x DBX1.5 (position controller active) DB390x DBX1.6 (speed controller active)	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX2.1	Handwheel override active Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The function "Handwheel override in Automatic mode" is active for the programmed positioning axis (FDA[AXi]). Handwheel pulses for this axis affect the programmed axis feedrate either as path definition (FDA = 0) or as velocity override (FDA > 0).	
Signal state 0	The function "Handwheel override in Automatic mode" is not active for the programmed positioning axis (or concurrent positioning axis). An active handwheel override is not active if: • The positioning axis has reached the target position. • The distance-to-go is deleted by the axis-specific interface signal DB3200 DBX6.2 (delete distance to go). • A RESET is performed.	
Note for the reader	Function Manual, Expansion Functions H1	

DB390x DBX2.2	Revolutional feedrate active Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	When programming G95 (revolutional feedrate) in the JOG mode or automatic mode.	
corresponding to ...	SD41100 JOG_REV_IS_ACTIVE (revolutional feedrate for JOG active) SD42600 JOG_FEED_PER_REV_SOURCE (In the JOG mode revolutional feedrate for geometry axes, on which the frame with rotation acts) SD43300 ASSIGN_FEED_PER_REV_SOURCE (Revolutional feedrate for position axes/spindles) MD32040 JOG_REV_VELO_RAPID (Revolutional feedrate for JOG with rapid traverse override) MD32050 JOG_REV_VELO (revolutional feedrate for JOG)	
Note for the reader	Function Manual, Expansion Functions P2 Function Manual, Special Functions M3	

DB390x DBX2.3	Measurement active Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The "Measuring" function is active. The instantaneous measurement status of the axis is displayed (measuring set with this axis is running).	
Signal state 0	The "Measuring" function is not active.	
Note for the reader	Function Manual, Expansion Functions M5	

DB390x DBX2.4	Activate travel to fixed endstop Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The "Travel to fixed stop" function is active.	
Signal state 0	The "Travel to fixed stop" function is not active.	
Note for the reader	Function Manual Basic Functions F1	

DB390x DBX2.5	Fixed stop reached Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The fixed stop was reached after selecting the "FXS" function.	
Signal state 0	The fixed stop has still not been reached after selecting the "FXS" function.	
Note for the reader	Function Manual Basic Functions F1	

DB390x DBX4.0 to .1	Handwheel active (1 to 2) Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	These PLC interface signals provide feedback as to whether this machine axis is assigned to handwheel 1 or 2 or is not assigned to any handwheel. Only one handwheel can be assigned to an axis at any one time. If several interface signals "activate handwheel" are set, then 'Handwheel 1' has a higher priority than 'Handwheel 2'. If the assignment is active, then the machine axis can be traversed using the handwheel in the JOG mode.	
Signal state 0	This machine axis is neither assigned to handwheel 1 nor 2.	
corresponding to ...	DB380x DBX4.0 to .1 (activate handwheel) DB1900 DBX?, ff (handwheel selected)	
Note for the reader	Function Manual Basic Functions H1	

DB390x DBX4.5 and.4	Plus and minus travel request Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Travel is to be executed in the axis direction involved. Depending on the mode selected, the travel command is triggered in different ways: • JOG mode: Using the plus or minus traversing key • REF mode: With traversing key that takes the axis to the reference point. • AUTO/MDI mode: A program block containing a coordinate value for the axis in question is executed.	
Signal state 0	A travel command in the relevant axis direction has not been given or a traverse movement has been completed. • JOG mode: The travel command is reset depending on the setting "Jog or continuous mode". • REF mode: When the reference point is reached. • AUTO/MDI mode: – The program block has been executed (and the next block does not contain any coordinate values for the axis in question). – Cancel using "RESET", etc. – IS "Axis / spindle disable" is active	
Application	To release clamped axes (e.g. on a rotary table). Note: If the clamping is not released until the travel command is given, these axes cannot be operated under continuous path control!	
corresponding to ...	DB380x DBX1.3 (axes/spindle disable) DB380x DBX4.7 and .6 (plus and minus traversing key) DB390x DBX4.7 and .6 (plus and minus travel command)	
Note for the reader	Function Manual Basic Functions H1	

DB390x DBX4.7 and .6	Plus and minus travel command Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Travel is to be executed in the axis direction involved. Depending on the mode selected, the travel command is triggered in different ways. • JOG mode: With the plus or minus traversing key • Under REF mode: With traversing key that takes the axis to the reference point • AUTO/MDI mode: A program block containing a coordinate value for the axis in question is executed.	

Signal state 0	A travel command in the relevant axis direction has not been given or a traverse movement has been completed. • JOG mode: – Withdrawing the traversing key. – When ending traversing with the handwheel. – Under REF mode: When the reference point is reached • AUTO/MDI mode: – The program block has been executed (and the next block does not contain any coordinate values for the axis in question) – Cancel using "RESET", etc. – IS "Axis disable" is active
Application	To release clamped axes (e.g. on a rotary table). **Note:** If the clamping is not released until the travel command is given, these axes cannot be operated under continuous path control!
corresponding to ...	IS "Traversing key plus" and "Traversing key minus" (DB380x DBX4.7 and .6)
Note for the reader	Function Manual Basic Functions H1

DB390x DBX5.0 to .6	Active machine function 1 INC, ..., continuous Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The PLC interface receives a signal stating which JOG mode machine function is active for the machine axes.	
Signal state 0	The machine function in question is not active.	
corresponding to ...	IS "Machine function 1 INC, ..., continuous" (DB380x DBX5.0 ... .6)	
Note for the reader	Function Manual Basic Functions H1	

DB390x DBX1002.0	Lubrication pulse Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Edge change 0 → 1 or 1 → 0	As soon as the axis / spindle has traveled through the distance set in MD33050, the "lubrication pulse" interface signal is inverted and lubrication is started. The position measurement is restarted after each Power On.	
Application	The lubrication pump for the axis / spindle can be activated with IS "Lubrication pulse". Machine bed lubrication therefore depends on the distance traveled.	
corresponding to ...	MD33050 LUBRICATION_DIST (lubrication pulse distance)	
Note for the reader	Function Manual Basic Functions A2	

DB390x DBX1002.4	Path axis Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The axis is involved in the path (path axis).	
Signal state 0	The axis is not involved in the path.	
Note for the reader	Function Manuals	

DB390x DBX1002.5	Positioning axis Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The NCK handles the axis as positioning axis. This means that it has: • its own axis interpolator (linear interpolator) • its own feedrate (F value) • its own feedrate override • exact stop (G09) at the progr. end position	
Signal state 0	The axis is not a positioning axis.	
Note for the reader	Function Manual, Expansion Functions P2	

DB390x DBX1002.6	Indexing axis in position Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The signal is dependent on "Exact stop fine": The signal is set if "Exact stop fine" is reached. The signal is reset when exiting "Exact stop fine". • The indexing axis is located on an indexing position. • The indexing axis has been positioned with instructions for "Coded Position".	

Signal state 0	The axis is not defined as an indexing axis.
	• The indexing axis travels: DB390x DBX4.7/.6 (travel command +/-) is present.
	• The indexing axis is located at a position which is not an indexing position, e.g.:
	  – For JOG after termination of travel movement, e.g. with RESET
	  – in the Automatic mode: the indexing axis has, for example, approached a selected position controlled by an AC or DC instruction
	• The indexing axis has not been positioned with instructions for "coded position" (CAC, CACP, CACN, CDC, CIC) in the automatic mode.
	• The "Controller enable" signal for the indexing axis has been withdrawn: DB380x DBX2.1 (controller enable)	

Application	Tool magazine: Activation of the gripper to remove the tool from the magazine is initiated as soon as the indexing axis is in position. The PLC user program must ensure this happens.	

Special cases, errors, ...	• The axis positions entered in the indexing position table for the individual divisions can be changed using work offsets (including DRF). • If a DRF is applied to an indexing axis in AUTOMATIC mode, then interface signal "Indexing axis in position" remains active even though the axis is no longer at an indexing position.
corresponding to ...	MD30500 INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)
Note for the reader	Function Manual, Expansion Functions T1

DB390x DBX2000.0 to .2	Setpoint gear stage A to C Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	A gear stage can be defined as follows: • Permanently by the part program (M41 to M45) • Automatically by the programmed spindle speed (M40) M41 to M45: • The gear stage can be permanently defined in the part program with M41 to M45. If a gear stage is specified using M41 to M45, which is not equal to the actual (actual) gear stage, then the IS "Change gear stage" and the IS "Setpoint gear stage" A" to "...C" are set. M40: • The control automatically defines the gear stage with M40 in the part program. The control checks which gear stage is possible for the programmed spindle speed (S function). If a gear stage is selected that is not the same as the actual (actual) gear stage, then the IS "Change gear stage" and the IS "Setpoint gear stage" A" to "...C" are set. The setpoint gear stage is output in coded format:	
	1. Gear stage 1st gear stage 2nd gear stage 3rd gear stage 4th gear stage 5th gear stage invalid value invalid value	0 0 0 (C B A) 0 0 1 0 1 0 0 1 1 1 0 0 1 0 1 1 1 0 1 1 1
Signal irrelevant for ...	Other spindle modes except oscillation mode	
corresponding to ...	IS "Change gear stage" (DB390x DBX2000.3) IS "Actual gear stage A" to "...C" (DB380x DBX2000.0 to .2) IS "Gear stage is changed over" (DB380x DBX2000.3)	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX2000.3	Change gear stage Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	

Signal state 1 or edge change 0 → 1	A gear stage can be defined as follows: • Permanently by the part program (M41 to M45) • Automatically by the programmed spindle speed (M40) M41 to M45: • The gear stage can be permanently defined in the part program with M41 to M45. If a gear stage is specified using M41 to M45, which is not equal to the actual (actual) gear stage, then the IS "Change gear stage" and the IS "Setpoint gear stage" A" to ...C" are set. M40: • The control automatically defines the gear stage with M40 in the part program. The control checks which gear stage is possible for the programmed spindle speed (S function). If a gear stage is selected that is not the same as the actual (actual) gear stage, then the IS "Change gear stage" and the IS "Setpoint gear stage" A" to "...C" are set. • While the signal = 1, the text "Wait for gear stage change" is displayed in the channel operating message".
Special cases, errors, ...	The IS "Change gear stage" is only set if a new gear stage is defined that is **not the same** as the actual gear stage.
corresponding to ...	IS "Setpoint gear stage A" to "...C" (DB390x DBX2000.0 to .2) IS "Actual gear stage A" to "...C" (DB380x DBX2000.0 to .2) IS "Gear stage has been changed over" (DB380x DBX2000.3)
Note for the reader	Function Manual Basic Functions S1

DB390x DBX2001.0	Speed limit exceeded Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	If the actual speed exceeds the max. spindle speed MD35100, by more than the spindle speed tolerance MD35150, the IS "Speed limit exceeded" is set and alarm 22050 "Maximum speed reached" is output. All axes and spindles of the channel are braked.	
corresponding to ...	MD35150 SPIND_DES_VELO_TOL (spindle speed tolerance) MD35100 SPIND_VELO_LIMIT (maximum spindle speed) Alarm 22050 "maximum speed reached"	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX2001.1	Set speed limited (programmed speed too high) Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	If a spindle speed (rpm) or a constant cutting speed (m/min or ft/min) is programmed, one of the following limits has been **exceeded**: • Maximum speed of specified gear stage • Maximum spindle speed • Speed limiting by the interface signal from the PLC • Progr. spindle speed limiting G26 • Progr. spindle speed limiting for G96 The spindle speed is limited to the maximum value.	

Signal state 0 or edge change 1 → 0	If a spindle speed (rpm) or a constant cutting speed (m / min or ft / min) is programmed, no limit values were exceeded.
Application	The IS "Setpoint speed limited" can be used to determine if the programmed speed cannot be reached. The PLC user program can identify this state as not permissible and disable path feed, or it can disable the path feed or the complete channel. For IS "Spindle in setpoint range" processing is executed.
Note for the reader	Function Manual Basic Functions S1

DB390x DBX2001.2	Setpoint speed increased (programmed speed too low) Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	If a spindle speed (rpm) or a constant cutting speed (m/min or ft/min) is programmed, one of the following limits was **fallen below**: • Minimum speed of the specified gear stage • Minimum spindle speed • Speed limiting by the PLC • Progr. spindle speed limiting G25 • Progr. spindle speed limiting with G96 The spindle speed is limited to the minimum limit value.	
Signal state 0 or edge change 1 → 0	If a spindle speed (rpm) or a constant cutting speed (m / min or ft / min) is programmed, no limit values were fallen below.	
Application	The IS "Setpoint speed increased" can be used to detect that the programmed speed cannot be reached. The PLC user program can identify this state as not permissible and disable path feed, or it can disable the path feed or the complete channel. For IS "Spindle in setpoint range" processing is executed.	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX2001.5	Spindle in setpoint range Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	The IS "Spindle in setpoint range" is used to signal whether the programmed - and if relevant - limited spindle speed is reached. In the spindle control mode, the speed setpoint (programmed speed + spindle override including limits) is compared with the actual speed. If the actual speed deviates from the setpoint speed by **less** than the spindle speed tolerance MD35150, then the IS "Spindle in the setpoint range" is set.	
Signal state 0 or edge change 1 → 0	The IS "Spindle in setpoint range" signals whether the spindle is accelerating or braking. In the spindle control mode, the speed setpoint (programmed speed * spindle override including limits) is compared with the actual speed. If the actual speed deviates from the setpoint speed by **more** than the spindle speed tolerance MD35150, then the IS "Spindle in the setpoint range" is reset.	
Signal irrelevant for ...	all spindle modes except for speed mode (control mode).	

Application	The path feed must generally be disabled when the spindle is in the acceleration phase (programmed speed setpoint not yet reached). This can be done in the following way: • The IS "Spindle in the setpoint range" is evaluated and the IS "Feedrate disable" (DB3200 DBX6.0) is set. • MD35500 is set and the NCK evaluates internally as to whether the spindle is in the setpoint range. The path feed is only enabled if the spindle is within the setpoint range. Positioning axes are never stopped by this function.
corresponding to ...	MD35150 SPIND_DES_VELO_TOL (spindle speed tolerance) MD35500 SPIND_ON_SPEED_AT_IPO_START (feedrate enable with spindle in the setpoint range)
Note for the reader	Function Manual Basic Functions S1

DB390x DBX2001.7	Actual direction of rotation clockwise Signal(s) from axis / spindle (NCK → PLC)		
Edge evaluation: Yes		Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	If the spindle is rotating, the CLOCKWISE direction of rotation is signaled using IS "Actual direction or rotation, clockwise" = 1. The actual direction of rotation is derived from the spindle position measuring encoder.		
Signal state 0 or edge change 1 → 0	If the spindle is rotating, then the COUNTER-CLOCKWISE direction of rotation is signaled using IS "Actual direction or rotation, clockwise" = 0.		
Signal irrelevant for ...	• Spindle stationary, IS "Axis / spindle stationary" = 1(at standstill it is not possible to evaluate a direction of rotation) • Spindles without position measuring encoder		
corresponding to ...	IS "Spindle stationary" (DB390x DBX1.4)		
Note for the reader	Function Manual Basic Functions S1		

DB390x DBX2002.5	Active spindle positioning mode Signal(s) from axis / spindle (NCK → PLC)		
Edge evaluation: Yes		Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	When programming SPOS=... the spindle is in positioning mode.		
corresponding to ...	IS "Active spindle control mode" (DB390x DBX2002.7) IS "Active spindle mode, oscillating mode" (DB390x DBX2002.6)		
Note for the reader	Function Manual Basic Functions S1		

DB390x DBX2002.6	Active spindle mode oscillation mode Signal(s) from axis / spindle (NCK → PLC)		
Edge evaluation: Yes		Signal(s) updated: Cyclic	

Signal state 1 or edge change 0 → 1	The spindle is in the oscillation mode if a new gear stage was defined using the automatic gear stage selection (M40) or using M41 to M45 (IS "Change gear stage" is set). The IS "Change gear stage" is only set if a new gear stage is defined that is **not the same** as the actual gear stage.
corresponding to ...	IS "Active spindle control mode" (DB390x DBX2002.7) IS "Active spindle positioning mode" (DB390x DBX2002.5) IS "Change gear stage" (DB390x DBX2000.3)
Note for the reader	Function Manual Basic Functions S1

DB390x DBX2002.7	Active spindle control mode Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	With the following function, the spindle is in the control mode: Spindle direction of rotation input M3/M4 or spindle stop M5	
corresponding to ...	IS "Active spindle oscillating mode" (DB390x DBX2002.6) IS "Active spindle positioning mode" (DB390x DBX2002.5)	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX2003.5	Spindle in position Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: Yes	Signal(s) updated: Cyclic	
Signal state 1 or edge change 0 → 1	Precondition for the output of IS "Spindle in position" is reaching the IS "Exact stop fine". Additionally, the last programmed spindle position must have been reached on the setpoint side. If the spindle is already at the programmed position after a positioning, then the signal "Spindle in position" is set.	
Signal state 0 or edge change 1 → 0	The IS "Spindle in position" is always reset when withdrawing IS "Exact stop fine".	
Application	The interface signal is processed exclusively with the function spindle positioning. This includes: • SPOS, SPOSA and M19 in the part program • SPOS and M19 in synchronized actions Spindle in position for the tool change. If the tool change cycle is interrupted by the machine operator e.g. with NC stop, NC stop axis plus spindle, mode stop etc., then the correct position to which the spindle is to travel in the tool changer can be queried using the IS "Spindle in position".	
Special cases, errors, ...	If the spindle is traversed after a positioning for already set "Spindle in position" signal, e.g. in the JOG mode, then this signal is deleted. If the spindle returns to its original position in the JOG mode, then the signal "Spindle in position" is set again. The last position selection is maintained.	
corresponding to ...	DB390x DBX0.7 (exact stop fine)	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX4001.0 to .2	Active parameter set A, B, C Signal(s) to drive (NCK → PLC)			
Edge evaluation: No		Signal(s) updated: Cyclic		
Meaning	The drive signals back to the PLC which drive parameter set is presently active. With bit combinations A, B and C, 8 different drive parameter sets can be selected. The following assignment applies:			
	Drive parameter set	C	B	A
	1 2 3 4 5 6 7 8	0 0 0 0 1 1 1 1	0 0 1 1 0 0 1 1	0 1 0 1 0 1 0 1
Application	Drive parameter switchover can be used, for example, for the following: • To change the gear stage • To change over the measuring circuit			
corresponding to ...	DB380x DBX4001.0 to 2 (parameter set selection)			
Note for the reader	Commissioning Manual, Turning and Milling			

DB390x DBX4001.5	Drive ready Signal(s) to drive (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	Feedback signal from the drive to the PLC that the drive is ready.	
Signal state 0	The drive is not ready. The drive might be disabled for the following reasons: • Drive alarm active (e.g. motor temperature has reached switch-off threshold). • DC link voltage is too low. • Drive has not yet reached the cyclic state. • Hardware fault present. • No position measuring system is active ("parking axis" state). • I/R is not switched on. As soon as the drive is not ready, it is stopped (depending on the fault state either with pulse disable or fast stop) or pulses remain disabled while powering up. The interface signals: DB2700 DBX2.6 (drive ready) DB390x DBX1.7 (current controller active) DB390x DBX1.6 (speed controller active) are also withdrawn.	
Note for the reader	Commissioning Manual, Turning and Milling	

DB390x DBX4001.6	Speed controller integrator disable Signal(s) to drive (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The request from the PLC to disable the integrator of the speed controller using the interface signal "Speed controller integrator disable" is active for the drive. The speed controller has therefore switched from a PI to a P controller.	
Signal state 0	The integrator of the speed controller is enabled. The speed controller functions as a PI controller.	
corresponding to ...	DB380x DBX4001.6 (speed controller integrator disable)	
Note for the reader	Commissioning Manual, Turning and Milling	

DB390x DBX4001.7	Pulses enabled Signal(s) to drive (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The pulse enable for the drive is present. The axis / spindle can now be traversed.	

Signal state 0	The drive pulses are disabled. Therefore, the axis / spindle cannot be traversed. The pulses are disabled as soon as there is no enable signal. Also, if the "controller enable of drive" is withdrawn, the drive is stopped with setpoint 0 (regenerative braking). Pulse disable is also triggered if there is no position measuring system ("parking axis" state). As soon as the pulses are disabled, then the following IS are also reset: DB390x DBX1.7 (current controller active) DB390x DBX1.6 (speed controller active)
Application	Signal-oriented signal.
Special cases, errors, ...	If pulse enable is withdrawn for a moving axis / spindle the axis / spindle is not longer braked in a controlled fashion. The axis / spindle coasts down.
corresponding to ...	DB380x DBX4001.7 (pulse enable)
Note for the reader	Commissioning Manual, Turning and Milling

DB390x DBX4002.2	Ramp-up completed Signal(s) to drive (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The PLC is signaled that after a new speed setpoint input, the speed actual value has reached the speed tolerance bandwidth and has remained within this tolerance bandwidth for the specified time. Even if the speed actual value leaves the tolerance bandwidth (because of speed fluctuations resulting from load changes) the "ramp-up completed" signal remains.	
Signal state 0	The conditions described above have not yet been fulfilled. Ramp-up has therefore not yet been completed.	
corresponding to ...	DB390x DBX4002.6 ($n_{act} = n_{set}$) DB390x DBX4002.3 ($M_d = M_{dx}$)	
Note for the reader	Commissioning Manual, Turning and Milling	

DB390x DBX4002.2	Ramp-up completed Signal(s) to drive (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The PLC is signaled that after a new speed setpoint input, the speed actual value has reached the speed tolerance bandwidth and has remained within this tolerance bandwidth for the specified time. Even if the speed actual value leaves the tolerance bandwidth (because of speed fluctuations resulting from load changes) the "ramp-up completed" signal remains.	
Signal state 0	The conditions described above have not yet been fulfilled. Ramp-up has therefore not yet been completed.	

corresponding to ...	DB390x DBX4002.6 ($n_{act} = n_{set}$) DB390x DBX4002.3 ($M_d < M_{dx}$)
Note for the reader	Commissioning Manual, Turning and Milling

DB390x DBX4002.3	$M_d < M_{dx}$ Signal(s) to drive (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The drive signals to the PLC that the torque setpoint M_d does not exceed the threshold torque M_{dx} in the steady-state condition (i.e. ramp-up completed). The torque threshold characteristic is speed-dependent. While ramping-up, the IS "$M_d < M_{dx}$" remains at 1. The signal only becomes active after ramp-up has been completed (DB390x DBX4002.2 = 1) and the signal interlock time for the threshold torque has expired.	
Signal state 0	The torque setpoint M_d is greater than the threshold torque M_{dx}. If necessary, the PLC user program can initiate a response.	
corresponding to ...	DB390x DBX4002.2 (ramp-up completed)	
Note for the reader	Commissioning Manual, Turning and Milling	

DB390x DBX4002.4	$n_{act} < n_{min}$ Signal(s) to drive (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The drive signals to the PLC that the actual speed value n_{act} is less than the minimum speed (n_{min}).	
Signal state 0	The speed actual value is higher than the minimum speed.	
Note for the reader	Commissioning Manual, Turning and Milling	

DB390x DBX4002.5	$n_{act} < n_x$ Signal(s) to drive (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The drive signals to the PLC that the speed actual value n_{act} is less than the threshold speed (n_x).	
Signal state 0	The speed actual value is higher than the threshold speed.	
Note for the reader	Commissioning Manual, Turning and Milling	

DB390x DBX4002.6	n_{act} = n_{set} Signal(s) to drive (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The PLC is signaled that after a new speed setpoint input, the speed actual value has reached the speed tolerance bandwidth and has remained within this tolerance bandwidth for the specified time. If the actual speed value then leaves the tolerance band, then contrary to the "Ramp-up completed" signal, the interface signal "n_{act} = n_{set}" is set to 0.	
Signal state 0	The conditions described above have not yet been fulfilled. The speed actual value is outside the speed tolerance bandwidth.	
corresponding to ...	DB390x DBX4002.2 (ramp-up completed)	
Note for the reader	Commissioning Manual, Turning and Milling	

DB390x DBX4002.7	Variable signaling function Signal(s) to drive (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The drive signals to the PLC that the threshold value of the quantity to be monitored has been exceeded. Using the variable signaling function, it is possible to monitor for any axis any quantity from the drive, which can be parameterized, to check if it violates a certain threshold, which can then be signaled as interface signal to the PLC. Monitoring: The parameterized variable is monitored to check whether it exceeds a defined threshold. In addition, a tolerance band (hysteresis) can be defined which is considered when scanning for violation of the threshold value. Further, the "threshold value exceeded" signal can be logically combined with a pull-in and drop-out delay time. Selection: The quantity to be monitored can be selected by entering a signal number or by entering a symbolic address.	
Signal state 0	The drive signals the PLC that the threshold value of the quantity to be monitored has not been exceeded or the specified conditions are not fulfilled. If the variable signaling function is disabled the signal state "0" is output to the PLC.	
Application	With the variable signaling function the machine tool manufacturer can monitor one additional threshold value for specific applications for each axis / spindle and evaluate the result in the PLC user program. Example: The interface signal "Variable signaling function" should be set to 1 when the motor torque exceeds 50% of the rated torque.	
Note for the reader	Commissioning Manual, Turning and Milling	

DB390x DBX4003.0	V_{DClink} < $V_{DClinkx}$ Signal(s) to drive (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The drive signals the PLC that the DC link voltage V_{DClink} is less than the DC link undervoltage threshold $V_{DClinkx}$. The DC link undervoltage threshold is defined using r0296. The DC link undervoltage threshold should be defined to be greater than 400 V. If the DC link voltage drops below 280 V, the unit is powered-down by the hardware.	
Signal state 0	The DC link voltage is less than the DC link undervoltage alarm threshold.	
corresponding to ...	r0296 (DC link voltage, undervoltage threshold)	
Note for the reader	Commissioning Manual, Turning and Milling	

DB390x DBX5002.4	Superimposed motion Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The following spindle executes an additional motion component, that is superimposed on the motion from the coupling with the leading spindle. Example for superimposed motion of the following spindle: • Activating the synchronous mode with a defined angular offset between the following spindle and leading spindle. • Activating the synchronous mode for rotating leading spindle. • Changing the ratio while the synchronous mode is active. • Entering a new defined angular offset when the synchronous mode is active • Traversing the following spindle with plus or minus traversing keys or handwheel in JOG when the synchronous mode is active. As soon as the following spindle executes a superimposed motion, IS "Fine synchronism" or IS "Coarse synchronism" (depending on threshold value) may be canceled immediately.	
Signal state 0	The following spindle does not traverse through any additional motion component or this has been completed.	
corresponding to ...	DB390x DBX2002.4 (synchronous mode)	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX5002.5	Velocity alarm threshold reached Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	When the velocity of the following axis in the axis grouping of the electronic gear reaches or exceeds the percentage of the velocity entered in MD37550 , which is set in MD32000, then the signal is set to 1.	
Signal state 0	The velocity of the following axis in the axis grouping of the electronic gear falls below the threshold value described above.	

corresponding to ...	MD37550 EG_VEL_WARNING (threshold value, velocity alarm threshold) MD32000 MAX_AX_VELO (maximum axis velocity)
Note for the reader	Function Manual Basic Functions S1

DB390x DBX5002.6	Acceleration alarm threshold reached Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	When the acceleration of the following axis in the axis grouping of the electronic gear reaches or exceeds the percentage of the acceleration entered in MD37550, which is set in MD32300, then the signal is set to 1.	
Signal state 0	The acceleration of the following axis in the axis grouping of the electronic gear falls below the threshold value described above.	
corresponding to ...	MD37550 EG_VEL_WARNING (threshold value, velocity alarm threshold) MD32300 MAX_AX_ACCEL (axis acceleration)	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX5003.3	Axis is accelerating Signal(s) from axis / spindle (NCK → PLC)	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	When the acceleration of the following axis in the axis grouping of the electronic gear reaches or exceeds the percentage of the acceleration entered in MD37560, which is set in MD32300, then the signal is set to 1.	
Signal state 0	The acceleration of the following axis in the axis grouping of the electronic gear falls below the response value described above.	
corresponding to ...	MD37560 EG_ACC_TOL (threshold value for "accelerate axis") MD32300 MAX_AX_ACCEL (axis acceleration)	
Note for the reader	Function Manual Basic Functions S1	

DB390x DBX5008.0 to .5	Active infeed axes Signal(s) from axis / spindle	
Edge evaluation: No	Signal(s) updated: Cyclic	
Signal state 1	The axis, from which the signal is received is presently the oscillating axis and in this field, signals its active infeed axes (DBX5008.0 axis 1 is the infeed axis, DBX5008.1 axis 2 is the infeed axis, etc.)	
Signal state 0	The associated axis is not an infeed axis.	
corresponding to ...	DB390x DBX5004.7 (oscillation active)	
Note for the reader	Function Manual, Expansion Functions P5	

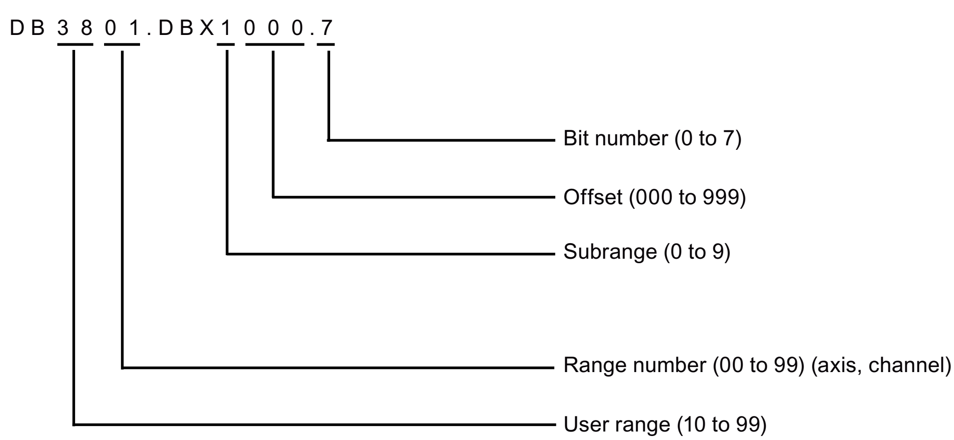
5 PLC User Interface

5.1 Addressing ranges

Table 5-1 Operand identifier

Address identifier	Description	Range
DB	Data	DB1000 to DB7999 DB9900 to DB9906
T	Times	T0 to T15 (100 ms) T16 to T63 (10 ms)
C	Counters	C0 to C63
I	Image of digital inputs	I0.0 to I8.7
Q	Image of digital outputs	Q0.0 to Q5.7
M	Bit memory	M0.0 to M255.7
SM	Special bit memory	SM0.0 to SM0.6 ()
AC	ACCU	AC0 to AC3

Structure of the DB-range address



Access	Example	Description
Bit	DB3801.DBX1000.7	Bit 7 of the byte with offset 0 in subrange 1 for axis 2, user range 38
Byte	DB3801.DBB0	Byte with offset 0 in subrange 0 for axis, user range 38
Word	DB4500.DBW2	Work with offset 2 in subrange 0, range 0, user range 45
Double Word	DB2500.DBD3004	Double word with offset 4 in subrange 3, range 0, user range 25

Note

The permitted offset for an address depends on the access:

- Bit or byte access: any offset.
  Byte-size variables are placed one beside another seamlessly in a DB.
- Word access: the offset must be divisible by 2.
  Word-size variables (2 bytes) are always saved on straight offsets.
- Double word access: the offset must be divisible by 4.
  Double word-size variables (4 bytes) are always saved on offsets that are divisible by 4.

Table 5-2 Special Marker SM Bit Definition

SM bits	Description
SM 0.0	Bit memory with the defined ONE signal
SM 0.1	Initial setting: first PLC cycle '1', subsequent cycles '0'
SM 0.2	buffered data lost - only valid in first PLC cycle ('0' data ok, '1' data lost)
SM 0.3	POWER ON: first PLC cycle '1', subsequent cycles '0'
SM 0.4	60 s clock (alternating '0' for 30 s, then '1' for 30 s)
SM 0.5	1 s clock (alternating '0' for 0.5 s, then '1' for 0.5 s)
SM 0.6	PLC cycle clock (alternating one cycle '0', then one cycle'1')

Special bit memory SM bit definition (read-only)

Table 5-3 Variable access rights

[r]	You can "read only" designated area
[r/w]	You can "read and write" designated area

Table 5-4 Data format information

1	BIT
8	BYTE
16	INT/WORD
32	DINT/DWORD/REAL

Note

All of the empty fields in the user interface are "reserved for Siemens" and may neither be writted to nor evaluated.

Fields designated with "0" always have the value "logical 0".

If there is no data format information, you can read or write to all the specified data formats.

5.2 MCP

5.2.1 Signals from the MCP

DB1000	From the MCP [r]							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	MCP							
DBB0	M01	PROGRAM TEST	MDA	SINGLE BLOCK	AUTO	REF. POINT	JOG	Hand-wheel
	MCP							
DBB1	Key 16	Key 15	Key 14	Key 13	Key 12	Key 11	Key 10	ROV
	MCP							
DBB2	100 (INC)	10 (INC)	1 (INC)	Key 21	Key 20	Key 19	Key 18	Key 17
	MCP							
DBB3	Key 32	Key 31	CYCLE START	CYCLE STOP	RESET	SPINDLE RIGHT	SPINDLE STOP	SPINDLE LEFT
	MCP							
DBB4	Key 40	Key 39	Key 38	Key 37	Key 36	RAPID	Key 34	Key 33
	MCP							
DBB5	Key 48	Key 47	Key 46	Key 45	Key 44	Key 43	Key 42	Key 41
	MCP							
DBB6	Key 56	Key 55	Key 54	Key 53	Key 52	Key 51	Key 50	Key 49
	MCP							
DBB7	Key 64	Key 63	Key 62	Key 61	Key 60	Key 59	Key 58	Key 57
	Feed override value (in Gray code)							
DBB8								
	Feed override value (in Gray code)							
DBB9								
	MCP							
DBB10								

5.2.2 Signals to MCP

DB1100	To MCP [r/w]							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	MCP							
DBB0	LED 8	LED 7	LED 6	LED 5	LED 4	LED 3	LED 2	LED 1
	MCP							
DBB1	LED 16	LED 15	LED 14	LED 13	LED 12	LED 11	LED 10	LED 9
	MCP							
DBB2	LED 24	LED 23	LED 22	LED 21	LED 20	LED 19	LED 18	LED 17
	MCP							
DBB3	LED 32	LED 31	LED 30	LED 29	LED 28	LED 27	LED 26	LED 25
	MCP							
DBB4	LED 40	LED 39	LED 38	LED 37	LED 36	LED 35	LED 34	LED 33
	MCP							
DBB5	LED 48	LED 47	LED 46	LED 45	LED 44	LED 43	LED 42	LED 41
	MCP							
DBB6	LED 56	LED 55	LED 54	LED 53	LED 52	LED 51	LED 50	LED 49
	MCP							
DBB7	LED 64	LED 63	LED 62	LED 61	LED 60	LED 59	LED 58	LED 57
	7 SEG LED1							
DBB8								
	7 SEG LED2							
DBB9								
	7 SEG LED3							
DBB10								
	7 SEG LED4							
DBB11								
	MCP							
DBB12					DP 4	DP 3	DP 2	DP 1

5.2.3 Reading/writing NC data: Job

DB1200	Reading / writing NC data [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0							Write variable	Start
1	Number of variables							
2								
3								

DB1200 ... 1203	Reading / writing NC data [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000	Variable index							
1001	Area number							
1002	Column index fort he NCK variable x (WORD)							
1003	LIne index fort he NCK variable x (WORD)							
1006								
1008	Writing: data to NCK variable x (data type of the variables: 1 to 4 bytes)							

5.2.4 Reading/writing NC data: Result

DB1200	Reading / writing NC data [r] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2000							Error in job	Job completed
2001								
2002								

DB1200 ... 1203	Reading / writing NC data [r] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
3000							Error has occurred	Valid variable
3001	Access result [1)]							

1) 0: no error; 3: illegal access to object; 5: invalid address; 10: object does not exist

3002	
3004	Reading: data from NCK variable x (data type of the variables: 1 to 4 bytes)

1) 0: no error; 3: illegal access to object; 5: invalid address; 10: object does not exist

5.2.5 PI service: Job

DB1200	PI service [r/w] PLC -> NCK interface						
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4000								Start
4001	PI index							
4002								
4003								
4004	PI parameter 1							
4006	PI parameter 2							
4008	PI parameter 3							
4010	PI parameter 4							
4012	PI parameter 5							
4014	PI parameter 6							
4016	PI parameter 7							
4018	PI parameter 8							
4020	PI parameter 9							
4022	PI parameter 10							

5.2.6 PI service: Result

DB1200	Reading / writing NC data [r] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
5000							Error in job	Job completed
5001								
5002								

5.3 Retentative data area

DB1400	Retentative data [r/w]							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	User data							
0								
	User data							
1								
	User data							
2								
	...							
...								
32								
	...							
...								
	User data							
126								
	User data							
127								

5.4 User Alarms

5.4.1 User alarms: Activating

DB1600	Activating alarm [r/w] PLC -> HMI interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Activation of alarm no.							
	700007	700006	700005	700004	700003	700002	700001	700000
1	Activation of alarm no.							
	700015	700014	700013	700012	700011	700010	700009	700008
2	Activation of alarm no.							
	700023	700022	700021	700020	700019	700018	700017	700016
3	Activation of alarm no.							
	700031	700030	700029	700028	700027	700026	700025	700024
4	Activation of alarm no.							
	700039	700038	700037	700036	700035	700034	700033	700032
5	Activation of alarm no.							
	700047	700046	700045	700044	700043	700042	700041	700040
...	...							
15	Activation of alarm no.							
	700127	700126	700125	700124	700123	700122	700121	700120

5.4.2 Variables for user alarms

DB1600	Variables for user alarms [r32/w32] PLC -> HMI interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DBD1000	Variable for alarm 700000							
DBD1004	Variable for alarm 700001							
DBD1008	Variable for alarm 700002							
…	…							
DBD1500	Variable for alarm 700125							
DBD1504	Variable for alarm 700126							
DBD1508	Variable for alarm 700127							

5.4.3 Active alarm response

DB1600	Active alarm reponse [r] PLC -> HMI interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2000	Acknowledge POWER ON	Acknowledge with DB1600DBX3000.0		PLC STOP	EMERGENCY STOP	Feedrate disbale all axes	Read-in disable	NC start disable
2001								
2002								
2003								

5.4.4 Alarm acknowledgement

DB1600	Alarm acknowledgement [r/w] PLC -> HMI interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
3000								Ack
3001								
3002								
3003								

5.5 Signals from/to HMI

5.5.1 Program control signals from the HMI (retentive area)

DB1700	Signals, HMI [r/w] HMI -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		Dry run feedrate selected	M01 selected		DRF selected			
1	Program test selected				Feedrate override selected for rapid traverse			
2	Skip block 7 selected	Skip block 6 selected	Skip block 5 selected	Skip block 4 selected	Skip block 3 selected	Skip block 2 selected	Skip block 0 selected	Skip block 0 selected
3	Measurmen t in JOG active	Calculation of measureme nt value not finished					Skip block 9 selected	Skip block 8 selected
4								
5								
6								
7	Reset				NC stop		NC start	

5.5.2 Program selection from PLC (retentive area)

DB1700	Program selection [r/w] PLC -> HMI interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000	Program selection from the PLC: Program number							
1001	Command job from the PLC: Command							
1002								
1003								

5.5.3 Checkback signal: Program selection from HMI (retentive area)

DB1700	Program selection [r] HMI -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2000							Error program selection	Program selected
2001							Error command execution	Execute command
2002								
2003								

5.5.4 Signals from HMI

DB1800	Signals from HMI [r] HMI -> PLC interface (signals are only present for PLC cycle)							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reset	Start measurement in JOG				JOG	Mode MDI	AUTOMATIC
1						Active the machine function		
						REF		
2								
3								

5.5.5 Signals from PLC

DB1800	Signals from PLC [r]							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000		Commissioning archive has been read in					Boot with saved data	Boot with default values
1001								
1002								
1003								
1004	PLC cycle in µs [DINT]							
1008	Year: Tens digit, BCD				Year: Units digit, BCD			
1009	Month: Tens digit, BCD				Month: Units digit, BCD			

1010	Day: Tens digit, BCD	Day: Units digit, BCD
1011	Hour: Tens digit, BCD	Hour: Units digit, BCD
1012	Minute: Tens digit, BCD	Minute: Units digit, BCD
1013	Second: Tens digit, BCD	Second: Units digit, BCD
1014	Millisecond: Hundreds digit, BCD	Millisecond: Tens digit, BCD
1015	Millisecond: Units digit, BCD	Weekday, BCD {1, 2, ... 7} (1 = Sunday)

5.5.6 Signals to maintenance planners

DB1800	Deactivation [r/w]							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2000	Deactivation 8	Deactivation 7	Deactivation 6	Deactivation 5	Deactivation 4	Deactivation 3	Deactivation 2	Deactivation 1
2001	Deactivation 16	Deactivation 15	Deactivation 14	Deactivation 13	Deactivation 12	Deactivation 11	Deactivation 10	Deactivation 9
2002	Deactivation 24	Deactivation 23	Deactivation 22	Deactivation 21	Deactivation 20	Deactivation 19	Deactivation 18	Deactivation 17
2003	Deactivation 32	Deactivation 31	Deactivation 30	Deactivation 29	Deactivation 28	Deactivation 27	Deactivation 26	Deactivation 25

DB1800	Deactivation [r/w]							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4000	Acknowledgement 8	Acknowledgement 7	Acknowledgement 6	Acknowledgement 5	Acknowledgement 4	Acknowledgement 3	Acknowledgement 2	Acknowledgement 1
4001	Acknowledgement 16	Acknowledgement 15	Acknowledgement 14	Acknowledgement 13	Acknowledgement 12	Acknowledgement 11	Acknowledgement 10	Acknowledgement 9
4002	Acknowledgement 24	Acknowledgement 23	Acknowledgement 22	Acknowledgement 21	Acknowledgement 20	Acknowledgement 19	Acknowledgement 18	Acknowledgement 17
4003	Acknowledgement 32	Acknowledgement 31	Acknowledgement 30	Acknowledgement 29	Acknowledgement 28	Acknowledgement 27	Acknowledgement 26	Acknowledgement 25

DB1800	Deactivation [r/w]							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
5000	Acknowledgement 8	Acknowledgement 7	Acknowledgement 6	Acknowledgement 5	Acknowledgement 4	Acknowledgement 3	Acknowledgement 2	Acknowledgement 1
5001	Acknowledgement 16	Acknowledgement 15	Acknowledgement 14	Acknowledgement 13	Acknowledgement 12	Acknowledgement 11	Acknowledgement 10	Acknowledgement 9
5002	Acknowledgement 24	Acknowledgement 23	Acknowledgement 22	Acknowledgement 21	Acknowledgement 20	Acknowledgement 19	Acknowledgement 18	Acknowledgement 17
5003	Acknowledgement 32	Acknowledgement 31	Acknowledgement 30	Acknowledgement 29	Acknowledgement 28	Acknowledgement 27	Acknowledgement 26	Acknowledgement 25

5.5.7 Signals from maintenance planners

DB1800	Warnings/Alarms [r]							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
3000	Alarm 8	Alarm 7	Alarm 6	Alarm 5	Alarm 4	Alarm 3	Alarm 2	Alarm 1
3001	Alarm 16	Alarm 15	Alarm 14	Alarm 13	Alarm 12	Alarm 11	Alarm 10	Alarm 9
3002	Alarm 24	Alarm 23	Alarm 22	Alarm 21	Alarm 20	Alarm 19	Alarm 18	Alarm 17
3003	Alarm 32	Alarm 31	Alarm 30	Alarm 29	Alarm 28	Alarm 27	Alarm 26	Alarm 25

5.5.8 Signals from operator panel (retentive area)

DB1900	Signals from operator panel [r/w] HMI -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Switch over Machine/ Work	Simulation active						
1								
2								
3								
4								
6								
7								

5.5.9 General selection/status signals from HMI (retentive area)

DB1900	Signals from HMI [r] HMI -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000								
1001								
1002								
1003					Axis number for handwheel 1			
	Machine axis	Handwheel selected	Contour handwheel			C	B	A
1004					Axis number for handwheel 2			
	Machine axis	Handwheel selected	Contour handwheel			C	B	A
1005								

1006								
1007								

5.5.10 General selection/status signals to HMI (retentive area)

DB1900	Signals to HMI [r/w] PLC -> HMI interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
5000						OP key block		
5001								
5002								Enable measurement in JOG
5003								
5004 ... 5007	T-number for tool measurement in JOG (DINT)							
5008 ... 5011								
5012 ... 5015								
5016 ... 5019								

5.6 Auxiliary functions transfer from NC channel

5.6.1 Overview

DB2500	Auxiliary functions from NCK channel [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0								
1								
2								
3								
4				M fct. 5 change	M fct. 4 change	M fct. 3 change	M fct. 2 change	M fct. 1 change
5								
6								S fct. 1 change
7								
8								T fct. 1 change
9								
10								D fct. Change
11								
12						H fct. 3 change	H fct. 2 change	H fct. change
13								
14								
15								
16								
17								
18								
19								

5.6.2 Decoded M signals (M0 to M99)

Note

The signals are output for the duration of a PLC cycle.

DB2500	M functions from NCK channel [r] 1) 2) NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000	Dynamic M functions							
	M7	M6	M5	M4	M3	M2	M1	M0
1001	Dynamic M functions							
	M15	M14	M13	M12	M11	M10	M9	M8
1002	Dynamic M functions							
	M23	M22	M21	M20	M19	M18	M17	M16
…	...							
1012	Dynamic M functions							
					M99	M98	M97	M96
1013								
1014								
1015								

1) As the PLC user, you must generate basic functions yourself from the dynamic M functions.

2) The basic program decodes dynamic M functions (M0 to M99).

5.6.3 Transferred T functions

DB2500	T functions from NCK channel [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2000	T function 1 (DINT)							
2004								
2005								
2006								
2007								

5.6.4 Transferred M functions

DB2500	M functions from NCK channel [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
3000	M function 1 (DINT)							
3004	Extended address M function 1 (byte)							
3008	M function 2 (DINT)							
3012	Extended address M function 2 (byte)							
3016	M function 3 (DINT)							
3020	Extended address M function 3 (byte)							
3024	M function 4 (DINT)							
3028	Extended address M function 4 (byte)							
3032	M function 5 (DINT)							
3036	Extended address M function 5 (byte)							

5.6.5 Transferred S functions

DB2500	S functions from NCK channel [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4000	S function 1 (REAL) (DINT)							
4004	Extended address S function 1 (byte)							
4008	S function 2 (REAL)							
4012	Extended address S function 2 (byte)							
4016								
4020								

5.6.6 Transferred D functions

DB2500	D functions from NCK channel [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
5000	D function 1 (DINT)							
5004								

5.6.7 Transferred H functions

DB2500	H functions from NCK channel [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
6000	H function 1 (REAL) (DINT)							
6004	Extended address H function 1 (byte)							
6008	H function 2 (REAL)							
6012	Extended address H function 2 (byte)							
6016	H function 3 (REAL)							
6020	Extended address H function 3 (byte)							

5.7 NCK signals

5.7.1 General signals to NCK

DB2600	General signals to NCK [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Protection level Keyswitch position 0 to 3					Acknowledge EMERGENCY STOP	Acknowledge EMERGENCY STOP	Braking along the contour in case of EMERGENCY STOP
	4	5	6	7				
1						Request axis distances to go	Request axis actual values	INC inputs in mode signal range active 1)
2								
3								

1) Refer to mode signals

5.7.2 General signals from NCK

DB2700	General signals from NCK [r/w] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0							EMERGENCY OFF active	
1	Inch measuring system						Probe actuated Probe 2	 Probe 1
2	NC ready	Drive ready	Drives in cyclic operation					
3		Air temperature alarm						NCK alarm is active
4								
5								
6								
7								
8								
9								
10								
11								
12	Change counter for motion, handwheel 1							
13	Modification counter for motion, handwheel 2							
14								
15	Change counter , inch/metric measuring system							
16								
17								
18								
19								

5.7.3 Signals at fast inputs and outputs

DB2800	Signals at fast inputs and outputs [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000	Block digital NCK inputs							
	Input 8	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1
1001	Value from PLC for NCK inputs							
	Input 8	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1
1008	Block digital NCK outputs							
	Output 8	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1
1009	Overwrite mask for digital NCK outputs							
	Output 8	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1
1010	Value from PLC for digital NCK outputs							
	Output 8	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1
1011	Setting mask for NCK outputs							
	Output 8	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1

DB2800	Signals at fast inputs and outputs [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000	Block external digital NCK inputs							
	Input 16	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9
1001	Value from PLC for external digit NCK inputs							
	Input 16	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9
1008	Block external digital NCK outputs							
	Output 16	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9
1009	Overwrite mask for external digital NCK outputs							
	Output 16	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9
1010	Value from PLC for external digital NCK outputs							
	Output 16	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9
1011	Setting mask for external NCK outputs							
	Output 16	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9

5.7.4 Signals from fast inputs and outputs

DB2900	Signals from the fast inputs and outputs [r] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Actual value for digital NCK inputs							
	Input 8	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1
4	Setpoint for digital NCK outputs							
	Output 8	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1

DB2900	Signals from fast inputs and outputs [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000	Actual value for external digital NCK inputs							
	Input 8	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1
1004	NCK setpoint for external digital NCK outputs							
	Output 8	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1

DB3000	Mode signals to NCK [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reset			Mode change block		Mode		
						JOG	MDI	AUTO
1	Single block					Machine function		
	Type A	Type B				REF		TEACH IN
2	Machine function 1)							
		Continuous traversing	Var. INC	10000 INC	1000 INC	100 INC	10 INC	1 INC
3								

1) To use the machine function signals in DB3000.DBB2, you must set the "INC inputs in the operating-mode signal range active" signal (DB2600.DBX1.0) to "1".

DB3100	Mode signals from NCK [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reset				808 READY	Mode		
						JOG	MDI	AUTO

1						Active machine function		
						REF		TEACH IN
2	Machine function							
		Continuous traversing active	Var. INC active	10000 INC active	1000 INC active	100 INC active	10 INC active	1 INC active
3								

5.8 Channel signals

5.8.1 Signals to NC channel

Control signals to NC channel

DB3200	Signals to NCK channel [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		Activate test run feedrate	Activate M01	Activate single block [1]	Activate DRF	Activate traverse forwards	Activate traverse backwards	
1	Activate program test						Enable protection zones	Activate referencing
2	Activate skip block							
	7	6	5	4	3	2	1	0
3								
4	Feedrate offset [2]							
	H	G	F	E	D	C	B	A
5	Rapid traverse override							
	H	G	F	E	D	C	B	A
6	Feedrate override active [3]	Rapid traverse override active	Path velocity limiting	Program level abort	Delete number of subroutine cycles	Delete distance - to-go	Read-in disable	Federate disable
7			Suppress start lock	NC stop axes plus spindle	NC stop	NC stop at block limit	NC start	NC start disable

1) Select single-block type selection using the softkey.

2) 31 positions (Gray code)

<table>
<tr><td rowspan="2">8</td><td colspan="8">Activate machine-related protection zone</td></tr>
<tr><td>Area 8</td><td>Area 7</td><td>Area 6</td><td>Area 5</td><td>Area 4</td><td>Area 3</td><td>Area 2</td><td>Area 1</td></tr>
<tr><td rowspan="2">9</td><td colspan="8">Activate machine-related protection zone</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Area 10</td><td>Area 9</td></tr>
<tr><td rowspan="2">10</td><td colspan="8">Activate channel-specific protection zone</td></tr>
<tr><td>Area 5</td><td>Area 5</td><td>Area 5</td><td>Area 5</td><td>Area 5</td><td>Area 5</td><td>Area 5</td><td>Area 5</td></tr>
<tr><td rowspan="2">11</td><td colspan="8">Activate channel-specific protection zone</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Area 10</td><td>Area 9</td></tr>
<tr><td>12</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">13</td><td rowspan="2">Do not block tool</td><td rowspan="2"></td><td rowspan="2">Deactivate workpiece counter</td><td rowspan="2"></td><td colspan="4">Activate fixed feedrate</td></tr>
<tr><td>Feed 4</td><td>Feed 3</td><td>Feed 2</td><td>Feed 1</td></tr>
<tr><td rowspan="2">14</td><td rowspan="2">No tool change commands</td><td rowspan="2">JOG circle</td><td rowspan="2">Activate associated M01</td><td rowspan="2">Negative direction for simulation contour handwheel</td><td rowspan="2">Simulation contour handwheel ON</td><td colspan="3">Activate contour handwheel (bit/binary coded)</td></tr>
<tr><td></td><td>Handwheel 1</td><td>Handwheel 2</td></tr>
<tr><td>15</td><td>Activate skip block 9</td><td>Activate skip block 8</td><td>Invert contour handwheel direction</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>16</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Program branches (GOTOS) control</td></tr>
<tr><td>17</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>18</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>19</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

1) Select single-block type selection using the softkey.

2) 31 positions (Gray code)

Controls signals to axes in Work

DB3200	Signals to NCK channel [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000	Axis 1 in Work							
	Traversing keys		Rapid traverse override	Traversing key distance disable	Feedrate stop	Activate handwheel (bit/binary coded) 1)		
	Plus	Minus					2	1
1001	Axis 1 in Work Machine function 2)							
		Continuous traversing	Var. INC	10000 INC	1000 INC	100 INC	10 INC	1 INC
1002								
1003								
								Handwheel direction of rotation inverted
1004	Axis 2 in Work							
	Traversing keys		Rapid travers override	Traversing key disable	Feedrate stop	Activate handwheel (bit/binary coded)		
	Plus	Minus					2	1
1005	Axis 2 in Work Machine function							
		Continuous traversing	Var. INC	10000 INC	1000 INC	100 INC	10 INC	1 INC
1006								
1007								
								Invert contour handwheel direction
1008	Axis 3 in Work							
	Traversing keys		Rapid traverse override	Traversing key disable	Feedrate stop	Activate handwheel (bit/binary coded)		
	Plus	Minus					2	1
1009	Axis 3 in Work Machine function							
		Continuous traversing	Var. INC	10000 INC	1000 INC	100 INC	10 INC	1 INC

1) The handwheel number is represented according to the $MD_HANDWH_VDI_REPRESENTATION machine data in a bit-coded (=0) or binary-coded (=1) manner.

2) Machine function: the machine function is only entered if the "INC inputs in the operating-mode signal range active" signal (DB2600DBX1.0) is not set.

1010								
1011								Invert contour handwheel direction

1) The handwheel number is represented according to the $MD_HANDWH_VDI_REPRESENTATION machine data in a bit-coded (=0) or binary-coded (=1) manner.

2) Machine function: the machine function is only entered if the "INC inputs in the operating-mode signal range active" signal (DB2600DBX1.0) is not set.

5.8.2 Signals from NC channel

Status signals from NC channel

DB3300	Signals from NCK channel [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		Last action block active	M0/M1 active	Approach block active	Action block active	Forwards traverse active	Backwards traverse active	Execution from external active
1	program test active		M2/M30 active	Block search active	Handwheel override active	Rev. federate active		Referencing active
2								
3	Channel status			Program status				
	Reset	Interrupted	Active	Aborted	Interrupted	Stopped	Waiting	Running
4	NCK alarm with processing stop present	Channel specific NCK alarm is active	Channel operational		All axes		Stop request	Start request
					Stationary	Referenced		
5						Contuour handwheel active (bit/binary coded)		
							Handwheel 2	Handwheel 1
6								
7			Invert contuour handwheel direction					Protection zone not guranteed
8	Machine-related protection zone preactivated							
	Area 8	Area 7	Area 6	Area 5	Area 4	Area 3	Area 2	Area 1

9	Machine-related protection zone preactivated							
							Area 10	Area 9
10	Channel-specific protection zone preactivated							
	Area 8	Area 7	Area 6	Area 5	Area 4	Area 3	Area 2	Area 1
11	Channel-specific protection zone preactivated							
							Area 10	Area 9
12	Machine-related protection zone violated							
	Area 8	Area 7	Area 6	Area 5	Area 4	Area 3	Area 2	Area 1
13	Machine-related protection zone violated							
							Area 10	Area 9
14	Channel-specific protection zone violated							
	Area 8	Area 7	Area 6	Area 5	Area 4	Area 3	Area 2	Area 1
15	Channel-specific protection zone violated							
							Area 10	Area 9

Status signals, axes in Work

DB3300	Signals from NCK channel [r] NCK -> PLC interface							
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
1000	**Axis 1 in Work**							
	Travel command		Travel request			Handwheel active (bit/binary coded) 1)		
	Plus	Minus	Plus	Minus			2	1
1001	**Axis 1 in Work** Machine function 2)							
		Continuous traversing	Var. INC	10000 INC	1000 INC	100 INC	10 INC	1 INC
1002								
1003								
								Contuour handwheel direction of rotation inverted
1004	**Axis 2 in Work**							
	Traversing command		Travel request			Handwheel active (bit/binary coded)		
	Plus	Minus	Plus	Minus			2	1
1005	**Axis 2 in Work** Machine function							
		Continuous traversing	Var. INC	10000 INC	1000 INC	100 INC	10 INC	1 INC
1006								

1007								
								Contuour handwheel direction of rotation inverted
1008	**Axis 3 in Work**							
	Traversing command		Travel request			Handwheel active (bit/binary coded)		
	Plus	Minus	Plus	Minus			2	1
1009	**Axis 3 in Work** Machine function							
		Continuous traversing	Var. INC	10000 INC	1000 INC	100 INC	10 INC	1 INC
1010								
1011								Contuour handwheel direction of rotation inverted

Addtitional status signals from NC channel

DB3300	Signals from NCK channel [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4000								G00 active
4001			Travel request, drive test present				Workpiece setpoint reached	External language mode active
4002		Dri run feedrate Active	Associated M01/M00 Active	STOP_DELAYED				ASUB is stopped
4003	No tool change command active	DELAY FST SUPPRESS		DELAY FST				
4004	ProgEvent display							
				Start after block search	Boot	Operator panel Reset	Part program End	Part program Start from RESET
4005		Jog circle Active					Stop condition	StopByColl Danger
4006							Dormant ASUB Active	ASUB active
4007								
4008	Active transformation number							
4009	Reserved							
4010	Reserved							
4011	Reserved							

Asynchronous subroutines (ASUBs): Job

DB3400	ASUB: Result [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0								INT1 Start
1								INT2 Start
2								
3								

Asynchronous subroutines (ASUBs): Result

DB3400	ASUB: Result [r] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000	INT1							
					ASUB execution not possible	Interrupt no. not allocated	ASUB is being executed	ASUB ended
1001	INT2							
					ASUB execution not possible	Interrupt no. not allocated	ASUB is being executed	ASUB ended
1002								
1003								

G functions from NCK channel

DB3500	G functions from NCK channel [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Active G function of group 1 (8 bit int)							
1	Active G function of group 2 (8 bit int)							
2	Active G function of group 3 (8 bit int)							
...	...							
62	Active G function of group 63 (8 bit int)							
63	Active G function of group 64 (8 bit int)							

5.9 Axis/spindle signals

5.9.1 Transferred M and S functions, axis specific

DB3700 … 3703	**M, S functions [r]** NCK -> PLC interface							
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	M function for spindle (DINT)							
4	S function for spindle (REAL)							

5.9.2 Signals to axis/spindle

Common signals to axis/spindle

DB3800 ... 3803	**Signals to axis/spindle [r/w]** PLC -> NCK interface							
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Feedrate override							
	H	G	F	E	D	C	B	A
1	Override active	Position measuring system 2	Position measuring system 1	Follow up mode	Axis spindle disable			
2	Reference point value				Clamping in progress	Distance-to-go/ spindle reset	Controller enable	
	4	3	2	1				
3	Axis/spindle enable program test	Velocity/ spindle speed limiting	Activate fixed feedrate				Enable approach to fixed stop	
			Feed 4	Feed 3	Feed 2	Feed 1		
4	Traversing keys		Rapid traverse override	Traverse key disable	Feedrate stop/spindle stop	Activate handwheel		
	Plus	Minus					2	1
5	Machine function 1)							
		Continuous traversing	Var. INC	1000 INC	1000 INC	100 INC	10 INC	1 INC
6								

1) The machine function is only entered if the signal "INC inputs in the operating-mode signal range active" (DB2600.DBX1.0) is set.

7								Contour-handwheel direction of rotation inverted
8								
9								
10								
11								

1) The machine function is only entered if the signal "INC inputs in the operating-mode signal range active" (DB2600.DBX1.0) is set.

Signals to axis

DB3800 ... 3803	Signals to axis [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000	Delay Ref. pt. approach			Module limit enabled	Software limit switch		Hardware limit switch	
					Plus	Minus	Plus	Minus
1001								
1002							Activate program test	Suppress program test
1003								

Signals to spindle

DB3800 ... 3803	Signals to axis [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2000	Delete S value	No speed monitoring for gear change	Resynchronize spindle		Gear changed	Actual gear stage		
			2	1		C	B	A
2001		Invert M3/ M4		Resynchronize during positioning				Feedrate override for spindle valid
2002	Setpoint direction of rotation		Oscillation speed	Oscillation controlled by PLC				
	Counter-clockwise	Clockwise						
2003	Spindle override							
	H	G	F	E	D	C	B	A

Signals to drive

DB3800 ... 3803	Signals to axis/spindle [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4000			Holding brake					
4001	Pulse enable	Integrator disable speed controller						
4002								
4003								

Signals to technology functions

DB3800 ... 3803	Signals to axis/spindle [r/w] PLC -> NCK interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
5000				Torque equalization controller on				
5001								
5002								
5003	Stop HIAxMove							Resume DEPMCS
5004								
5005								
5006 (spindle)				Spindle positioning	Automatic gear stage change	Setpoint direction of rotation Counter-clockwise	Setpoint direction of rotation Clockwise	Spindle stop
5007 (couplings)	Delete synchronism override							
5008 (SISI-TECH)								
5009 (SISI-TECH)								
5010								
5011								

5.9.3 Signals from axis/spindle

General singlas from axis/spindle

DB3900 ... 3903	Signals from axis/spindle [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Position reached		Referenced		Encoder limit freq. exceeded			Spindle/no axis
	With exact/ stop, fine	With exact stop, coarse	Synchronized 2	Synchronized 1	2	1		
1	Current controller active	Speed controller active	Position controller active	Axis/spindle stationary ($n < n_{mm}$)	Follow up mode active	Axis ready for operation		Traversing requests
2		Force fixed stop limited	Fixed stop reached	Activate travel to fixed stop	Measurement active		Handwheel override active	
3						AxStop active		
4	Travel command		Travel request			Handwheel active (bit/binary coded)		
	Plus	Minus	Plus	Minus			2	1
5	Active machine function							
		Continuous	Var. INC	10000 INC	1000 INC	100 INC	10 INC	1 INC
6								
7								Contour-handwheel direction of rotation inverted
8								
9								
10								
11	PLC axis, permanently assigned		POS_RESTORED					
			RED 2	RED 1				

Signals from axis

DB3900 ... 3903	Signals from axis [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000				Module limit enabled active				

1001								
1002	Rotary axis in position	Indexing axis in position	Positioning axis	Path axis				Lubrication pulse
1003								

Signals from spindle

DB3900 ... 3903	Signals from spindle [r] NCK -> PLC interface							
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
2000					Change gear stage	Setpoint gear stage		
						C	B	A
2001	Actual direction of rotation, clockwise	Speed monitoring	Spindle in setpoint range	Overlay range limit violated		Setpoint		Speed limit exceeded
						Increased	Limited	
2002	Active spindle mode				Rigid tapping		GWPS active	Const. Cutting velocity active
	Control mode	Oscillation mode	Positioning mode					
2003		Spindle in position reache						Tool with dynamic limiting

Signals from drive

DB3900 ... 3903	Signals from axis/spindle [r] NCK -> PLC interface							
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
4000			Holding brake opened	RLI active				
4001	Pulse enabled	Speed controller integrator disabled	Drive ready					
4002		nact = n_{set}	$n_{act} < n_x$	$n_{act} < n_{min}$	$M_d < M_{dx}$	Ramp-up completed		
4003					Generator operation, minimum speed falled below			VDClink < alarm threshold

Signals from technology functions

DB3900 ... 3903	Signals from axis/spindle [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
5000								
5001								
5002		Acceleration warning threshold reached	Velocity warning threshold reached	Superimposed motion		Actual value coupling	Synchronous operation	
							Coarse	Fine
5003		Max. acceleration reached	Max. velocity reached	Synchronization in progress	Axis is accelerating	Synchronism override travel		
5004								
5005								
5006								
5007								Synchronism override is factored in
5008 (grinding)	Active special axis							
			Axis 6	Axis 5	Axis 4	Axis 3	Axis 2	Axis 1

5.10 PLC machine data

5.10.1 INT values (MD 14510 USER_DATA_INT)

DB4500	Signals from NCK [r16] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Int value (WORD/2 byte)							
2	Int value (WORD/2 byte)							
4	Int value (WORD/2 byte)							
6	Int value (WORD/2 byte)							
...	...							
60	Int value (WORD/2 byte)							
62	Int value (WORD/2 byte)							

5.10.2 HEX values (MD 14512 USER_DATA_HEX)

DB4500	Signals from NCK [r8] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1000	Hex value (BYTE)							
1001	Hex value (BYTE)							
1002	Hex value (BYTE)							
1003	Hex value (BYTE)							
...	...							
1030	Hex value (BYTE)							
1031	Hex value (BYTE)							

5.10.3 FLOAT values (MD 14514 USER_DATA_FLOAT)

DB4500	Signals from NCK [r32] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2000	Float value (REAL/4 byte)							
2004	Float value (REAL/4 byte)							
2008	Float value (REAL/4 byte)							
2012	Float value (REAL/4 byte)							
2016	Float value (REAL/4 byte)							
2020	Float value (REAL/4 byte)							
2024	Float value (REAL/4 byte)							
2028	Float value (REAL/4 byte)							

5.10.4 User alarm: Configuring (MD 14516 USER_DATA_PLC_ALARM)

DB4500	Signals from NCK [r8] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
3000	Alarm response/cancel criteria, alarm 700000							
3001	Alarm response/cancel criteria, alarm 700001							
3002	Alarm response/cancel criteria, alarm 700002							
...	...							
3247	Alarm response/cancel criteria, alarm 700247							

Note

You can refer to the *Commissioning Manual* for the information about how to configure the user alarms.

5.11 Signals, synchronized actions

5.11.1 Signals, synchronized actions to channel

DB4600	Signals, synchronized actions to channel [r/w] PLC -> HMI interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Deactivate synchronized action with ID...							
	ID8	ID7	ID6	ID5	ID4	ID3	ID2	ID1
1	Deactivate synchronized action with ID...							
	ID16	ID15	ID14	ID13	ID12	ID11	ID10	ID9
2	Deactivate synchronized action with ID...							
	ID24	ID23	ID22	ID21	ID20	ID19	ID18	ID17

5.11.2 Signals, synchronized actions from channel

DB4700	Signals, synchronized actions from channel [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Synchronized action with ID...can be blocked from the PLC							
	ID8	ID7	ID6	ID5	ID4	ID3	ID2	ID1
1	Synchronized action with ID...can be blocked from the PLC							
	ID16	ID15	ID14	ID13	ID12	ID11	ID10	ID9
2	Synchronized action with ID...can be blocked from the PLC							
	ID24	ID23	ID22	ID21	ID20	ID19	ID18	ID17

5.11.3 Reading and writing PLC variables

DB4900	PLC variables [r/w] PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Offset [0]							
1	Offset [1]							
2	Offset [2]							
…	…							
4094	Offset [4094]							
4095	Offset [4095]							

Note

The programming engineer (NCK and PLC) is responsible for organizing (structuring) this memory area. Every storage position in the memory can be addressed provided that the limit is selected according to the appropriate data format (i.e. a 'DWORD' for a 4byte limit, a WORD for a 2byte limit, etc.). The memory area is always accessed with the information about the data type and the position offset within the memory area.

5.12 Axis actual values and distance-to-go

DB5700 ... 5704	Signals from axis/spindle [r] NCK -> PLC interface							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Axis actual value (REAL)							
4	Axis distance-to-go (REAL)							

Note

The axis actual values and distances-to-go can be separately requested:

- DB2600.DBX0001.1 Request axis actual values
- DB2600.DBX0001.2 Request axis distances-to-go

If the particular request is set, then the NCK supplies these values for all axes.

5.13 Maintenance scheduler: User interface

5.13.1 Initial (start) data

DB9903	Initial data table [r16]							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Interval 1 [h]							
2	Time of first warning 1 [h]							
4	Number of warnings to be output 1							
6	Reserved 1							
8	Interval 2 [h]							
10	Time of first warning 2 [h]							
11	Number of warnings to be output 2							
14	Reserved 2							
...	...							
248	Interval 32 [h]							
250	Time of first warning 32 [h]							
252	Number of warnings to be output 32							
254	Reserved 32							

5.13.2 Actual data

DB9904	Actual data table [r16]							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Interval 1 [h]							
2	Number of warnings to be output 1							
4	Reserved_1 1							
6	Reserved_2 1							
8	Interval 2 [h]							
10	Number of warnings to be output 2							
11	Reserved_1 2							
14	Reserved_2 2							
...	...							
248	Interval 32 [h]							
250	Number of warnings to be output 32							
252	Reserved_1 32							
254	Reserved_2 32							

5.14 User interface for ctrl energy

Table 5-5 Energy saving profile

DB9906	Ctrl energy							
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Control signals							
							Set time to pre-warning limit	Immeadiately activate energy saving profile
1	Control signals (HMI -> PLC)							
								Immeadiately activate energy saving profile
2	Signals to check/test the energy-saving profile							
							PLC user singal	Master computer signal
3	Reserved							
4	Status signal							
							Activation time T1 expired	Energy saving profile active
5	Reversed							
6	Actual value: actual value T1							
8	Actual value: actual value T2							
10	Effectiveness, profile							
							Disable energy saving profile	Energy saving profile configured
11	State conditions (HMI -> PLC)							
						Screen change	Data transfer	Operator panel
12	State conditions (HMI -> PLC)							
								Machine control panel

Table 5-5 Energy saving profile

13	State conditions (HMI -> PLC)							
								NC channel 1 in reset
14								
15	State conditions (HMI -> PLC)							
							PLC user signal	Master computer signal
16	State conditions (HMI -> PLC) Activation time T1							
18	State conditions (HMI -> PLC) Activation time T2							

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Par. No.	Name	Range	Default	Increment	Unit	Effective
P01	Parameter write protection	0 - 1	0	1	-	Immediately
	0: Sets all parameters other than P01 as read-only parameters. 1: Sets all parameters to be both readable and writable. **P01 automatically resets to 0 after power-on!**					
P05	Internal enable	0-1	0	1	-	Immediately
	0: JOG mode can be enabled externally. 1: JOG mode can be enabled internally. **P05 automatically resets to 0 after power-on!**					
P16	Maximum motor current	0-100	100	1	%	Power On
	Specifies the maximum motor current (2 x rated motor current) of your choice.					
P20	Speed loop proportional gain	0.01-5.00	Depends on drive version	0.01	Nm*s/rad	Immediately
	Factory defaults*: 4 Nm: 0.81 (0.54); 6 Nm: 1.19 (0.79); 7.7 Nm: 1.50 (1.00); 10 Nm: 2.10 (1.40)					
	Note: Default value varies with software version.					
	This parameter specifies the proportional gain (K_p, proportional component) of speed control loop. The bigger the value, the higher the gain and rigidity. The setting depends on specific drive and load. Generally, the bigger the load inertia, the bigger the value is to set. If however, there is no oscillation occurred in the system, you can set the value as big as possible.					
P21	Speed loop integral time constant	0.1-300.0	Depends on drive version	0.1	ms	Immediately
	Factory defaults*: 4 Nm: 17.7 (44.2); 6 Nm: 17.7 (44.2); 7.7 Nm: 17.7 (44.2); 10 Nm: 18.0 (45.0)					
	Note: Default value varies with software version.					
	This parameter specifies the integral action time (T_n, integral component) of speed control loop. The smaller the value, the higher the gain and rigidity. The setting depends on specific drive and load.					
P26	Maximum motor speed	0-2,200	2,200	20	rpm	Power On
	Sets the maximum possible motor speed.					
P30	Position loop proportional gain	0.1-3.2	3.0 (2.0)*	0.1	1,000/min	Immediately
	1. This parameter specifies the proportional gain of position loop. 2. The bigger the value, the higher both the gain and rigidity, and at the same pulse command frequency the smaller the position hysteresis. However, excessively high value setting may cause system oscillation or overshooting. 3. The setting depends on specific drive and load.					

* The default values in brackets are the second default values.

Par. No.	Name	Range	Default	Increment	Unit	Effective
P31	**Position loop feedforward gain**	0-100	85 (0)*	1	%	Immediately
	1. This parameter specifies the feedforward gain of position loop. 2. Setting the value to 100 % means position hysteresis is always 0 at any pulse command frequency. 3. Increasing the feedforward gain of position loop improves the high-speed response characteristics of the control system, but meanwhile causes the system's position loop unstable and liable to oscillation. 4. Unless very high response characteristics are necessary, set the feedforward gain of position loop to 0.					
P34	**Maximum following error**	20-999	500	1	100 pulses	Immediately
	This parameter specifies the maximum possible following error. When the actual following error is larger than the setpoint, the drive sends an over-position alarm (A43)					
P36	**Input pulse multiplier**	1, 2, 4, 5, 8, 10, 16, 20, 100, 1,000	1	-	-	Power On
	This parameter specifies the input pulse multiplier. For example, when P36 = 100, input frequency = 1 kHz, output frequency = 1 kHz x 100 = 100 kHz.					
	Note: Pulse frequency setpoint = Actual pulse frequency x input pulse multiplier; This parameter is applicable only when the software version is V01.06 or later; When P36 = 100 or 1,000, speed stability will decrease with higher multiplication factor.					
P41	**Brake open delay**	20-2,000	100	10	ms	Power On
	The setpoint transfer after drive enable is delayed by this time. Drive can be enabled under the following conditions: **A:** When the following three conditions are all met: 1. Terminal 65 (external enable) has been enabled; 2. The drive has received an enable signal from NC; 3. No alarm is detected by the drive. **B:** When the following two conditions are both met: 1. Terminal 65 (control enable) has been activated; 2. Motor operates in "**JOG-RUN**" mode (enabled from function menu) **C:** When the following two conditions are both met: 1. P05 = 1 (The **JOG** mode can be enabled internally); 2. Motor operates in "**JOG-RUN**" mode (enabled from function menu)					
P42	**Brake close time while motor operation**	20-2,000	100	10	ms	Power On
	When motor speed exceeds 30 rpm, the drive generates an alarm. If, within the specified brake close time (P42), actual motor speed remains bigger than brake close speed setpoint (P43), brake is closed after the specified brake close time (P42) expires.					
P43	**Brake close speed while motor operation**	0-2,000	100	20	r/min	Power on
	When motor speed exceeds 30 rpm, the drive generates an alarm. If, within the specified brake close time (P42), the actual motor speed becomes smaller than the P43 setpoint, brake is closed when the actual speed reaches the speed setpoint.					

* The default values in brackets are the second default values.

Par. No.	Name	Range	Default	Increment	Unit	Effective
P44	Drive enable time after the brake close	20-2,000	600	10	ms	Power on
	When motor speed is lower than 30 rpm, the drive remains enabled within the time period set by P44 after brake close.					
P46	JOG speed	0-2,000	200	10	rpm	Immediately
	This parameter specifies the motor speed in JOG mode.					
P47	Ramp-up/-down time constant	0.0 – 10.0	4.0	0.1	s	Power on
	This parameter defines the time period when the motor ramps up from 0 rpm to 2,000 rpm or ramps down from 2, 000 rpm to 0 rpm.					
P99	Reserved for Siemens internal use only					

* The default values in brackets are the second default values.

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