

Title Rexroth PNC
Configuration Parameters and
MACODA

Type of Documentation Parameter description

Document Typecode DOK-PNC***-CONFIG*****-PA11-EN-P

Purpose of Documentation The present manual provides information on

- the structure and adjustment of the available MACODA parameters and
- the operation of the MACODA tool.

Record of Revisions

Description	Release Date	Notes
DOK-PNC***-CONFIG*****-PA11-EN-P	07.2003	Valid from V7.3

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Published by Bosch Rexroth AG
Postfach 11 62
D-64701 Erbach
Berliner Straße 25
D-64711 Erbach
Tel.: +49 (0) 60 62/78-0
Fax: +49 (0) 60 62/78-4 28
Abt.: BRC/ESM11 (WE)

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Notes:

Safety Instructions

1 Safety Instructions

Please read this manual before configuring the PNC via the MACODA tool or commissioning it. Store this manual in a place to which all users have access at any time.

1.1 Intended use

This manual contains all information required for the proper use of the control units. For reasons of clarity, however, it cannot contain each and every detail about each and all combinations of functions. Likewise, it is impossible to consider each and any aspect of integration or operation.

The PNC control is used to


- activate feed drives, spindles and auxiliary axes of a machine tool via SERCOS interface for the purpose of guiding a processing tool along a programmed path to process a workpiece (CNC). Furthermore, I/O components are required for the integrated PLC which – in communication with the actual CNC – controls the machine processing cycles holistically and acts as a technical safety monitor.
- program contours and the processing technology (path feedrate, spindle speed, tool change) of a workpiece.

Any other application is deemed improper use!

The products described

- have been developed, manufactured, tested and documented in compliance with the safety standards. These products normally pose no danger to persons or property if they are used in accordance with the handling stipulations and safety notes prescribed for their configuration, mounting, and proper operation.
- comply with the requirements of
 - the EMC Directives (89/336/EEC, 93/68/EEC and 93/44/EEC)
 - the Low-Voltage Directive (73/23/EEC)
 - the harmonized standards EN 50081-2 and EN 50082-2
- are designed for operation in industrial environments, i.e.
 - no direct connection to public low-voltage power supply,
 - connection to the medium- or high-voltage system via a transformer.

In residential environments, in trade and commerce as well as small enterprises class A equipment may only be used if the following warning is attached:

 **This is a Class A device. In a residential area, this device may cause radio interference. In such case, the user may be required to introduce suitable countermeasures, and to bear the cost of the same.**

The faultless, safe functioning of the product requires proper transport, storage, erection and installation as well as careful operation.

Safety Instructions

1.2 Qualified personnel

The requirements as to qualified personnel depend on the qualification profiles described by ZVEI (central association of the electrical industry) and VDMA (association of German machine and plant builders) in:

Weiterbildung in der Automatisierungstechnik

edited by: ZVEI and VDMA

MaschinenbauVerlag

Postfach 71 08 64

D-60498 Frankfurt.

The present manual is designed for **NC project engineers and commissioning personnel**. These persons need special knowledge of

- the possible configurations of PNC and
- the possible adjustments of the PNC for use with a specific machine tool.

Programming, start and operation as well as the modification of program parameters is reserved to properly trained personnel! This personnel must be able to judge potential hazards arising from programming, program changes and in general from the mechanical, electrical, or electronic equipment.

Interventions in the hardware and software of our products, unless described otherwise in this manual, are reserved to specialized Rexroth personnel.

Tampering with the hardware or software, ignoring warning signs attached to the components, or non-compliance with the warning notes given in this manual may result in serious bodily injury or damage to property.

Only electrotechnicians as recognized under IEV 826-09-01 (modified) who are familiar with the contents of this manual may install and service the products described.

Such personnel are

- those who, being well trained and experienced in their field and familiar with the relevant norms, are able to analyze the jobs being carried out and recognize any hazards which may have arisen.
- those who have acquired the same amount of expert knowledge through years of experience that would normally be acquired through formal technical training.

With regard to the foregoing, please note our comprehensive range of training courses. Please visit our website at <http://www.boschrexroth.com>

for the latest information concerning training courses, teachware and training systems. Personal information is available from our Didactic Center Erbach,

Telephone: (+49) (0) 60 62 78-600.

Safety Instructions

1.3 Safety markings on products

Warning of dangerous electrical voltage!



Warning of danger caused by batteries!



Electrostatically sensitive components!

Warning of hazardous light emissions
(optical fiber cable emissions)!

Disconnect mains power before opening!



Lug for connecting PE conductor only!



Connection of shield conductor only

Safety Instructions

1.4 Safety instructions in this manual



DANGEROUS ELECTRICAL VOLTAGE

This symbol is used to warn of a **dangerous electrical voltage**. The failure to observe the instructions in this manual in whole or in part may result in **personal injury**.



DANGER

This symbol is used wherever insufficient or lacking compliance with instructions may result in **personal injury**.



CAUTION

This symbol is used wherever insufficient or lacking compliance with instructions may result in **damage to equipment or data files**.

☞ This symbol is used to draw the user's attention to special circumstances.

★ This symbol is used if user activities are required.

Safety Instructions

1.5 Safety instructions for the described product**DANGER**

Danger of life through inadequate EMERGENCY-STOP devices! EMERGENCY-STOP devices must be active and within reach in all system modes. Releasing an EMERGENCY-STOP device must not result in an uncontrolled restart of the system! First check the EMERGENCY-STOP circuit, then switch the system on!

**DANGER**

Incorrect or undesired axis movement! First, new programs should be tested carefully without axis movement! For this purpose, the control offers the possibility of inhibiting axis movements and/or auxiliary function outputs by appropriate softkeys in the 'Automatic' mode.

**DANGER**

Incorrect or undesired control unit response! Rexroth accepts no liability for damage resulting from the execution of an NC program, an individual NC block or the manual movement of axes!

Furthermore, Rexroth accepts no liability for consequential damage which could have been avoided by programming the PLC appropriately!

**DANGER**

Retrofits or modifications may adversely affect the safety of the products described!

The consequences may include severe injury, damage to equipment, or environmental hazards. Possible retrofits or modifications to the system using third-party equipment therefore have to be approved by Rexroth.

**DANGER**

Do not look directly into the LEDs in the optical fiber connection. Due to their high output, this may result in eye injuries.

When the inverter is switched on, do not look into the LED or the open end of a short connected lead.

Safety Instructions



DANGEROUS ELECTRICAL VOLTAGE

Unless described otherwise, maintenance works must be performed on inactive systems! The system must be protected against unauthorized or accidental reclosing.

Measuring or test activities on the live system are reserved to qualified electrical personnel!



DANGER

Tool or axis movements!

Feed and spindle motors generate very powerful mechanical forces and can accelerate very quickly due to their high dynamics.

- Always stay outside the danger area of an active machine tool!
- Never deactivate safety-relevant functions!
- Report any malfunction of the unit to your servicing and repairs department immediately!



CAUTION

use only spare parts approved by Rexroth!



CAUTION

Danger to the module!

All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

The following protective measures must be observed for modules and components sensitive to electrostatic discharge (ESD)!

- Personnel responsible for storage, transport, and handling must have training in ESD protection.
- ESD-sensitive components must be stored and transported in the prescribed protective packaging.
- ESD-sensitive components may only be handled at special ESD-workplaces.
- Personnel, working surfaces, as well as all equipment and tools which may come into contact with ESD-sensitive components must have the same potential (e.g. by grounding).
- Wear an approved grounding bracelet. The grounding bracelet must be connected with the working surface through a cable with an integrated 1 MΩ resistor.
- ESD-sensitive components may by no means come into contact with chargeable objects, including most plastic materials.
- When ESD-sensitive components are installed in or removed from equipment, the equipment must be de-energized.

Safety Instructions

1.6 Documentation, software release and trademarks**Documentation**

The present manual provides information on

- the structure and adjustment of the available MACODA parameters and
- the operation of the MACODA tool.

Overview of available documentation	Part no.		
	German	English	French
PNC-R – Connectivity Manual for project engineering and maintenance	1070 073 704	1070 073 736	–
PNC-R – Software installation	1070 073 796	1070 073 797	–
PNC-P – Connectivity Manual	1070 073 880	1070 073 881	–
PNC-P – BF2xxT/BF3xxT Control Panel Connectivity Manual	1070 073 814	1070 073 824	–
PNC-P – Software installation	1070 073 882	1070 073 883	–
Description of functions	1070 073 870	1070 073 871	–
MACODA Operation and configuration of the machine parameters	1070 073 705	1070 073 742	–
Operating instructions – Standard operator interface	1070 073 726	1070 073 739	1070 073 876
Operating instructions – Diagnostics Tools	1070 073 779	1070 073 780	–
Error Messages	1070 073 798	1070 073 799	–
PLC project planning manual, Software interfaces of the integrated PLC	1070 073 728	1070 073 741	–
iPCL system description and programming manual	1070 073 874	1070 073 875	–
ICL700 system description (PNC-R only), Program structure of the integrated PLC ICL700	1070 073 706	1070 073 737	–
DIN programming manual for programming to DIN 66025	1070 073 725	1070 073 738	–
CPL programming manual	1070 073 727	1070 073 740	1070 073 877
CPL Debugger Operating Instructions	1070 073 872	–	–
Tool Management – Parameterization	1070 073 782	1070 073 793	–
Software PLC Development environment for Windows NT	1070 073 783	1070 073 792	–
Measuring cycles for touch-trigger switching probes	1070 073 788	1070 073 789	–
Universal Milling Cycles	–	1070 073 795	–

Safety Instructions

Release

 **This manual refers to the following version:**
Software release: V7.3

The current release number of the individual software modules can be viewed by selecting the 'Control-Diagnostics' softkey in the 'Diagnostics' operating mode.

The software version of Windows may be displayed as follows:

1. Click the right mouse button on the **My Computer** icon on your desktop.
2. Select **Properties**.

Trademarks

All trademarks of software installed on Rexroth products upon delivery are the property of the respective manufacturer.

Upon delivery, all installed software is copyright-protected. The software may only be reproduced with the approval of Rexroth or in accordance with the license agreement of the respective manufacturer.

MS-DOS® and Windows™ are registered trademarks of Microsoft Corporation.

PROFIBUS® is a registered trademark of the PROFIBUS Nutzerorganisation e.V. (user organization).

SERCOS interface™ is a registered trademark of Interessengemeinschaft SERCOS interface e.V. (Joint VDW/ZVEI Working Committee).

General

2 General

To facilitate adjustment of the PNC to your respective application, the software tool **MACODA** (Machine Parameter and Configuration Data Administration) has been integrated in the system software. MACODA provides access to all configuration parameters, which are managed centrally by the NC-internal database system.



DANGER

Improper handling of MACODA by inadequately trained or unskilled personnel may cause serious damage to the machine, loss of data or even personal injury!

Therefore, properly trained personnel only may start and operate MACODA or set or modify configuration parameters! Such personnel must be able to recognize and avoid risks arising from changed parameter settings or generally involved in the mechanical, electrical or electronic equipment.

Rexroth accepts no liability for damage resulting from incorrectly programmed, calculated or optimized configuration parameters or noncompliance with data limits!

2.1 MACODA range of functions

MACODA is used to carry out the following functions:

- displaying and changing configuration parameters (see page 3–9 ff.)
- input of configuration parameters by read-in from peripheral equipment (standard commissioning), and
- output of configuration parameters to peripheral equipment (backup, documentation).

Especially for system/application developers, MACODA supports

- the generation of new configuration parameters (see page 3–14 ff.).
When new configuration parameters are generated, their data format and permitted value ranges must be specified. Based on this information, MACODA can check data inputs modifying configuration parameters for permissibility and consistency.
Also, access rights can be specified enabling MACODA to permit or deny data access (for displaying or modifying data). For this purpose, various user groups are defined in the system.
Consequently, every user who starts MACODA has access only to those parameters to which the user group currently set in the system is granted access.

General

2.2 Where to find which parameters

Naturally, a lot of parameters are required to ensure optimum adjustment options to a vast range of applications while offering a wide range of functions.

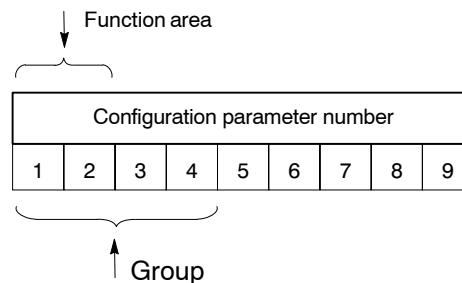
Therefore, it is certainly helpful to arrange these parameters by the various function areas they relate to.

The following function areas have been defined for the PNC:

- Axes and spindles (function area 10)
- PLC and interface (function area 20)
- Programming (function area 30)
- Communication (function area 40)
- Applications (function area 50)
- Operating and display (function area 60)
- Channel parameters (function area 70)
- NC function parameters (function area 80)
- System/Management (function area 90)

These function areas have been further subdivided by issue into groups. Every configuration parameter is assigned to a group.

The first 4 digits of the 9-digit configuration parameter numbers are used to assign configuration parameters to a specific group and function area.



All configuration parameters are described in numerical order in Section 4, "Parameter descriptions".

Operation

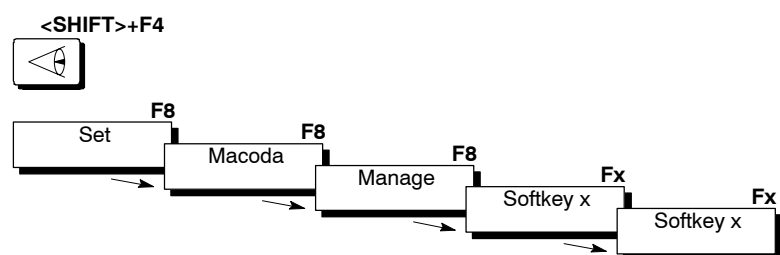
3 Operation

3.1 General declarations

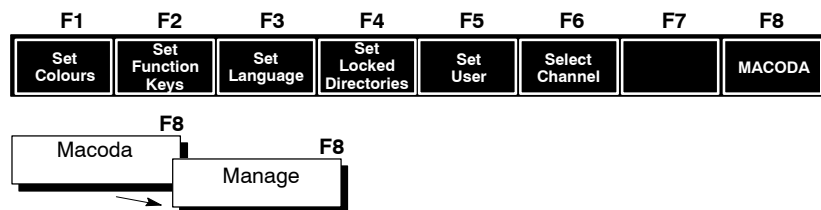
In illustrations showing the softkeys required to select a function, these softkeys are arranged from left to right in the order of their actuation. The function key number of a softkey (F1, F2, ...) is stated in addition.

Different types of illustrations are used in this manual for different starting points:

- The starting point is a random softkey level starting at the uppermost operation level of a main menu



- The starting point for selecting a function is a specific softkey level:



☞ For users of MF2 keyboards (on a development computer, e.g.), the corresponding keys or key combinations are shown above the softkeys.

☞ For information on the various types of softkeys, please see the PNC Operating Instructions manual.

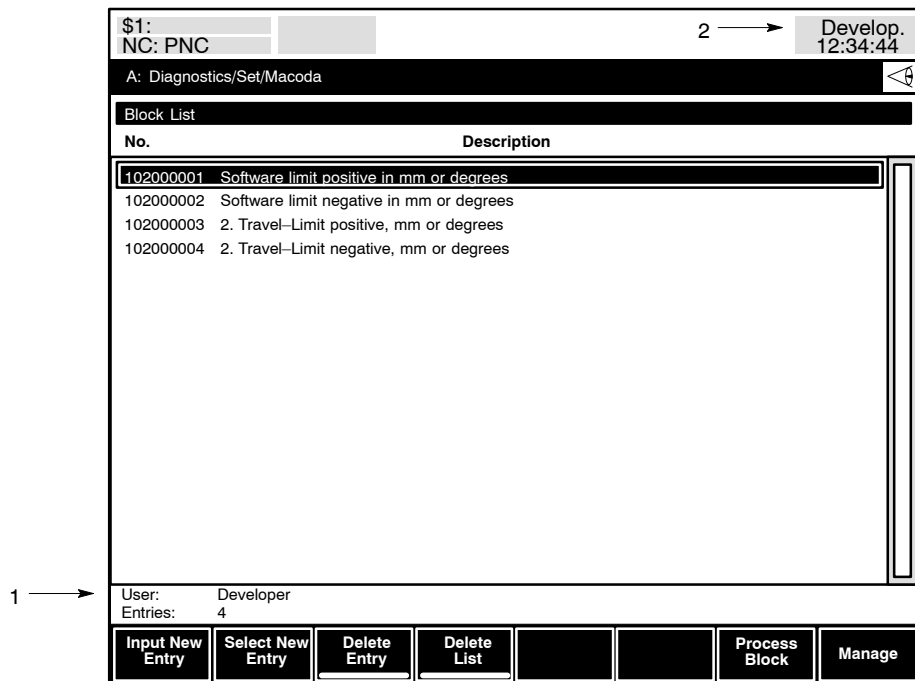
Operation

3.2 Setting the desired security level

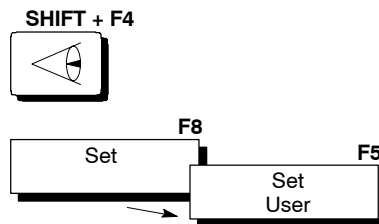
When you identify yourself as a member of a specific group of authorized users, MACODA allows you access to parameters depending on the access rights granted this group (see page 3–16).

The system displays the group of users currently signed on

- in the info area (1) of the top MACODA softkey level and
 - in the date/time display on the NC status line (2).
- The current date is shown only if the user group "User" is signed on. Otherwise, the date is overwritten by the respective other user group currently signed on.

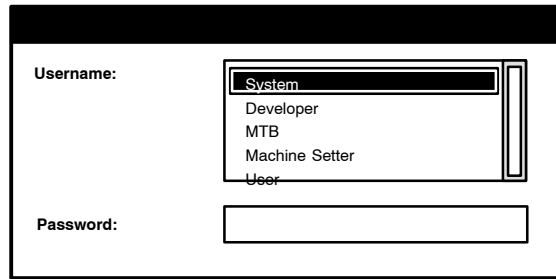


Selecting a user group



- ★ Use cursor keys \blacktriangle and \blacktriangledown or use the mouse (left key) to select the desired user group:

Operation



The user group currently selected is highlighted.

Entering a password

- ☞ **Entries of passwords are case-sensitive, i.e. a distinction is made between uppercase and lowercase letters!**

- ☞ **No password is required by the user group "User".**

- ★ For other user groups, press <tab> to change to the password box and enter the respective password.
Characters entered are displayed on the monitor as "*".
Incorrectly entered characters can be deleted with the <backspace> key.

- ★ To cancel this function:
press the "Level Return" key (MF2 keyboard: F9)
or
the CANCEL softkey (MF2 keyboard: F8).

- ★ To switch to the selected user group:
Press the OK softkey (MF2 keyboard: F1)
or
<enter>.

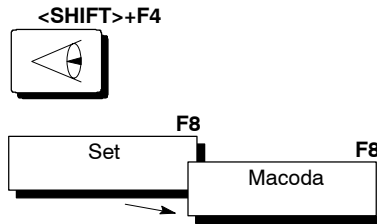
If an incorrect password is entered, the system will issue the error message "Password invalid".

Confirm this error message by pressing the OK softkey (F1).

Operation

3.3 Starting / Quitting MACODA

★ Press



CAUTION

Unauthorized use of MACODA is possible!

As long as another user group is signed on as "User", functions and data are accessible that are otherwise protected!
This may lead to hazards at the machine or system malfunction!

Therefore, always sign on the user group "User" when you
– quit MACODA,
– are finished working on the control unit, or
– leave the control unit unattended.

☞ We recommend the following procedure if you want to modify an existing, operational configuration:

1. First, save the configuration parameters via
 - Save data (see page 3–21).
2. Next, change the configuration parameters as required.
3. Activate the new configuration parameters (see page 3–25).
4. Test the performance of the control unit.
 - If it works properly, save the changes you have made via
 - Save data in FEPR0M (see page 3–22). This concludes the process.
 - If the control unit does not work as planned
 - go back to step 2. **–or–**
 - load the data previously saved (see page 3–24) and activate the new configuration parameter (see page 3–25).

To quit MACODA, either

- change to a different operation level directly, or
- press the "Level Return" key (MF2 keyboard: F9).

Operation

3.4 Creating and editing a parameter list (block list)

You will probably never have to change the default values of all the configuration parameters that exist.

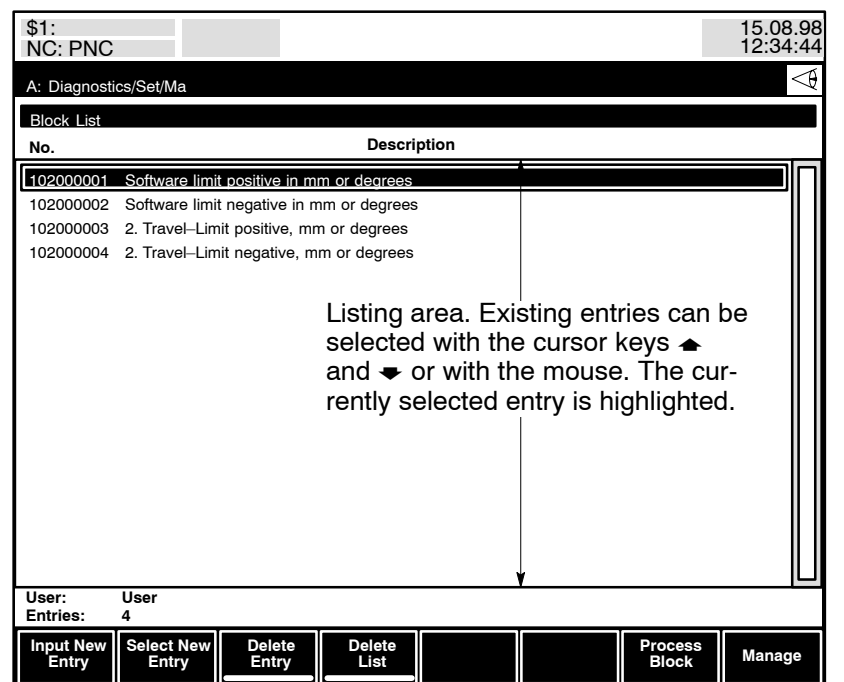
Therefore, configuration parameters required for specific applications can be grouped together. However, this is possible only if the user group currently signed on (see page 3-2) has at least read access (see page 3-16) to the parameters concerned.

 **In order to change parameter values in MACODA, you must first create a list of the configuration parameters concerned.**

Advantages of these parameter lists:

- You get a much better overview (e.g. when commissioning the system) because only the required parameters are displayed.
- Less space and time required for saving (see page 3-21) application-specific configuration parameters in the user FEPRAM or via standard input to/output from peripherals because you need to save only those parameters that are different from the default values.
- Configuration parameters created by the user can be managed and handled like standard parameters.

Upon startup or, respectively, at the top softkey level of MACODA, the block list appears on the monitor:



List editing functions

For a description, see page 3-9 ff.

The following functions are available for list editing:

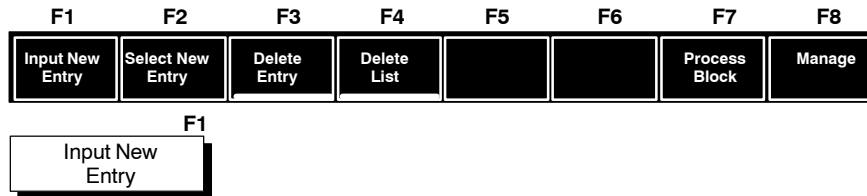
- Input New Entry
- Select New Entry
- Delete Entry
- Delete List.

Operation

3.4.1 Adding parameters to the block list

If you know the number of the configuration parameter...

- ★ Press

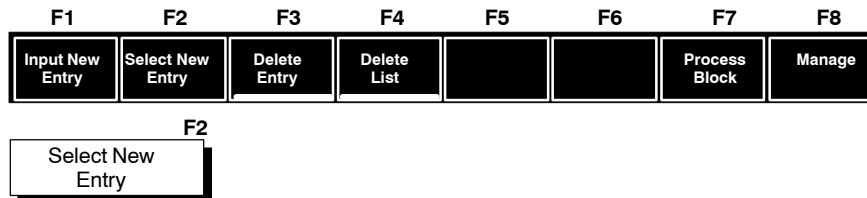


- ★ Enter the 9-digit parameter number.
All configuration parameters defined in the system are described in numerical order in Section 4.
- ★ Use the OK softkey (F1) to confirm your entry.
The system will check whether this parameter actually exists. If it does, the parameter is included in the block list, if not, an error message will appear.

You can cancel your entry with the CANCEL softkey (F9); the system will then return to the top MACODA softkey level.

If you do not know the number of the configuration parameter...

- ★ Press



- ★ In the dialog box "Select group", first select the **function area** where you think the parameter may be listed (see also page 2-2).
Use the cursor keys \blacktriangle , \blacktriangledown , \blacktriangleleft or \blacktriangleright to shift the frame onto the respective function area and press the SEL key on the control unit (MF2 keyboard: space bar or <space>).
A selected function area is marked by a black dot.

The system displays all groups defined in the function area selected.

Operation

No.	Group Designation
1001	Drive parameters
1003	Axis parameters
1005	Axes feedrates
1010	Axis dynamics
1015	Axes positions

- ★ To jump to the list containing the group designations, use the \blacktriangledown key. Use the "Level Return" key (F9) to cancel the "Select group" dialog. With <tab> you can jump from the list of group designations back to the selected function area.
- ★ Use the \blacktriangle or \blacktriangledown cursor keys to select the desired group and confirm your selection with the OK softkey (F1). In the "Select block" dialog box, the system shows all configuration parameters assigned to the selected group.
- ★ Select the desired configuration parameter with cursor keys \blacktriangle or \blacktriangledown .

F1	F2	F3	F4	F5	F6	F7	F8
OK		Activate		Activate All			Cancel

Use the OK softkey (F1) to include the selected configuration parameter in the block list. Subsequently, the system returns automatically to the top MACODA softkey level.

Likewise, you may use the ACTIVATE softkey (F3) to include the selected configuration parameter in the block list. This way you can go right on and select other parameters as well for including them in the block list.

With the ACTIVATE ALL softkey (F5) you can include all existing configuration parameters in the block list.

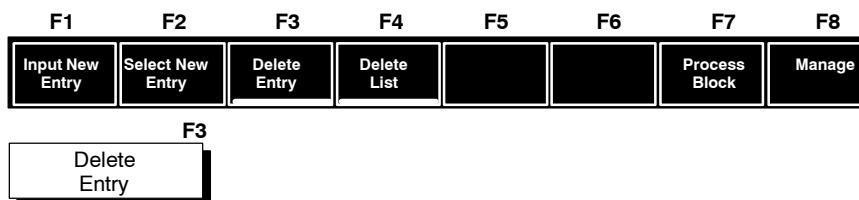
Use the CANCEL softkey (F8) to cancel the "Select block" dialog at any time. Subsequently, the system returns automatically to the top MACODA softkey level.

Operation

3.4.2 Deleting specific parameters from the block list

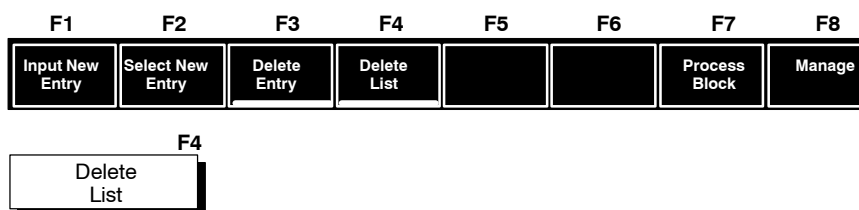
★ Use the cursor keys \blacktriangle and \blacktriangledown or the mouse to select the line on which the parameter concerned is entered.

★ Press



3.4.3 Deleting all parameters from the block list

★ Press



If you answer the confirmation prompt that comes up now with
YES all entries are deleted from the list
NO all entries are retained in the block list.

Operation

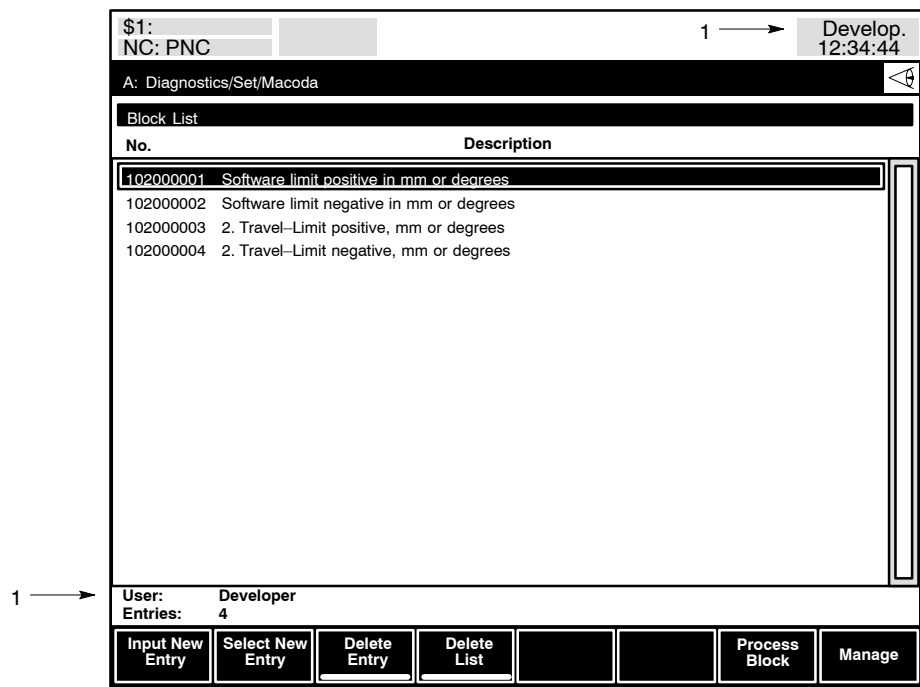
3.5 Displaying and changing configuration parameters

- ☞ **Configuration parameters can be displayed or changed only if**
- they have been included in the block list (see page 3-6) and
 - the access right (see page 3-16) of the user group currently signed on is set to "Read" (for displaying a parameter) or "Write" (for displaying and modifying a parameter) (For changing the user group, see page 3-2).

A configuration parameter is composed of

- one or more **individual parameter values** and
- various **attributes and default values** that apply to all existing individual parameters jointly.

You can change either one of these two components in MACODA provided you belong to the user group currently signed on (1) and are thus authorized to access the parameter concerned.



To change individual parameter values (see page 3-10 ff.)

To change attributes or default values (see page 3-13 ff.)

- ☞ **In order to adjust the PNC to your machine, you only need to adjust the individual parameter values.**

Changing attributes or default values

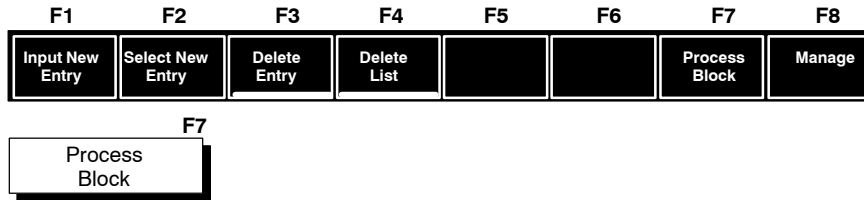
- is possible only on especially configured development computers and
- usually required only for configuration parameters you have added to the system (see page 3-14 ff.).

Operation

3.5.1 Changing individual parameter values

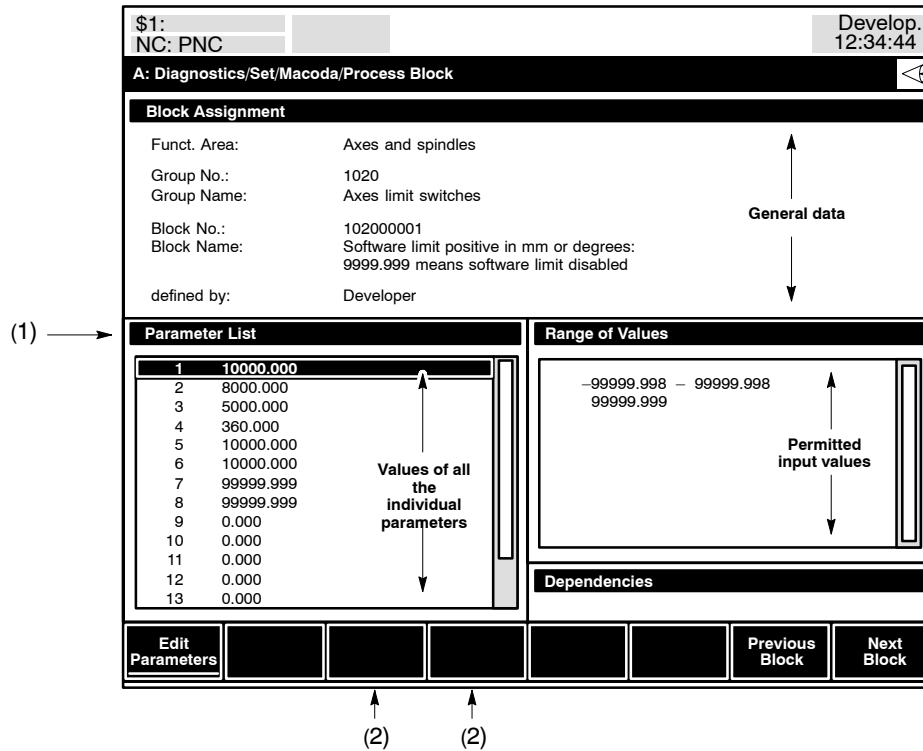
★ In the block list, use the cursor keys \blacktriangle or \blacktriangledown to select the configuration parameter to be changed.

★ Press



The control unit then displays information on the selected configuration parameter.

Example:



☞ You can edit only the values of the individual parameters displayed ("Parameter List" box).

Depending on the configuration parameter concerned, the NC may display additional information on the "Parameter List" line (1) and also show additional softkeys for navigation (2), as the case may be. The cause is that a configuration parameter may be

- independent,
- channel-specific,
- spindle-specific, or
- transformation-specific.

Operation

independent:

The configuration parameter with its individual parameters is unique in the NC. It belongs to the "standard" parameter class (see also page 3–17).

No additional text is displayed on the "Parameter List" line (see screen shot above) for standard configuration parameters.

channel-specific:

Because you can activate several channels at the same time with the PNC, each channel-specific configuration parameter with its individual parameters exists several times in the system:

once for each channel that is activated and once in the form of a "basic setup" configuration parameter. It belongs to the "channel parameter" class.

The "basic setup" configuration parameter is required by the system each time an additional channel is configured. It serves as a master that is copied to create the configuration parameter of the new channel.

For channel-specific configuration parameters, also the channel number or, resp., "Basic Setup" is displayed on the "Parameter List" line (see screen shot above).

To select a channel and its "basic setup" configuration parameter, use the "PREVIOUS CHANNEL" (F3) and "NEXT CHANNEL" (F4) softkeys, which are enabled for channel-specific parameters by the NC.

spindle-specific:

Because you can activate several spindles at the same time with the PNC, each spindle-specific configuration parameter with its individual parameters exists several times in the system:

once for each spindle and once in the form of a "basic setup" configuration parameter. It belongs to the "spindle parameter" class.

The "basic setup" configuration parameter is required by the system each time an additional spindle is configured. It serves as a master that is copied to create the configuration parameter of the new spindle.

For spindle-specific configuration parameters, also the spindle number or, resp., "Basic Setup" is displayed on the "Parameter List" line (see screen shot above).

To select a spindle and its "basic setup" configuration parameter, use the softkeys PREVIOUS SPINDLE (F3) and NEXT SPINDLE (F4), which are enabled for spindle-specific parameters by the NC.

transformation-specific:

Because you can activate several transformations with the PNC, this configuration parameter with its individual parameters exists several times in the system:

once for each transformation and, additionally, once in the form of the "basic setting". It belongs to the group of "transformation parameters".



The system uses the "basic setting" configuration parameter when new transformations are to be added. In this case, the "basic setting" configuration parameter is first copied for the configuration parameter of the transformation to be newly introduced.

Therefore, in the case of transformation-specific configuration parameters, the heading "Parameter list" (see screen display above) also includes the transformation number or "Basic setting".

To enable the selection of the required transformation and of the "basic

Operation

setting" configuration parameter, the control unit also displays the softkeys PREVIOUS TRANSF. (F3) and NEXT TRANSF. (F4).



-  **If you want to view step by step the data of all configuration parameters entered in the block list, use the PREVIOUS BLOCK (F7) and NEXT BLOCK (F8) softkeys. This facilitates viewing or modifying several configuration parameters because you do not have to go back to the block list to select another configuration parameter.**
- ★ Select the individual parameter to be changed in the "Parameter List" box using the ▲ or ▼ cursor keys.
- ★ Press the EDIT PARAMETERS (F1) softkey. Now, a dialog box appears where you can edit the individual parameter. To include the value displayed in the configuration parameter and then to go on editing other individual parameters of the configuration parameter currently selected, use the PREVIOUS PARAMETER (F7) and NEXT PARAMETER (F8) softkeys.
- ★ Activate changes of displayed values to the configuration parameter with the OK (F1) softkey or cancel any such changes with the LEVEL RETURN key (F9). Next, the dialog box is closed.
-  **Just by pressing the OK softkey, configuration parameter changes are not yet activated in the NC. For information on how to activate configuration parameter changes in the NC, please see section 3.7 on page 3-21 ff.**

Operation

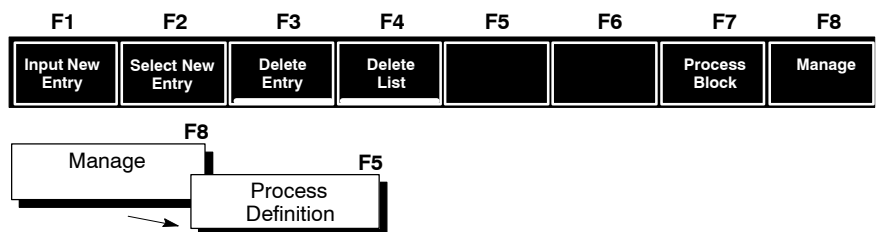
3.5.2 Changing attributes and default values

 **Changing attributes or default values**

- is possible only on especially configured development computers and
- usually required only for configuration parameters you have added to the system (see page 3-14 ff.).

★ Select the configuration parameter to be changed from the block list using cursor keys  or .

★ Press



Now, the system displays information on the selected configuration parameter. To make changes, the same functions or softkeys are available as for creating a configuration parameter of your own (see page 3-15 ff.).

Example:

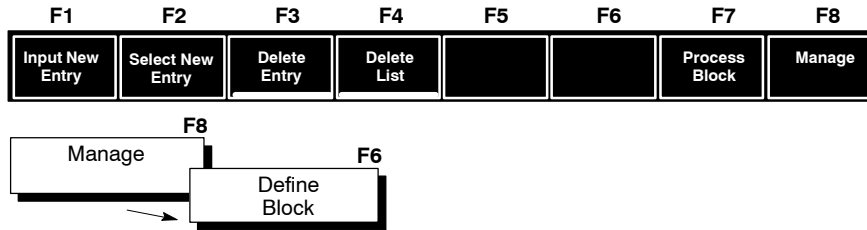
\$1: <input type="text"/>		Develop. 12:34:44								
NC: PNC										
A: Diagnostics/Set/Macoda/Manage/Block Definition										
Block Assignment										
Funct. Area:	Axes and spindles									
Group No.:	1020									
Group Name:	Axes limit switches									
Block No.:	10200001									
Block Name:	Software limit positive in mm or degrees: 9999.999 means software limit disabled									
defined by:	Developer									
Access Rights		Range of Values								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">MTB</th> <th style="text-align: left;">Write</th> </tr> <tr> <td>Machine Setter</td> <td>Read</td> </tr> <tr> <td>User</td> <td>Read</td> </tr> </table>		MTB	Write	Machine Setter	Read	User	Read	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">-99999.998 – 99999.998 99999.999</td> </tr> </table>		-99999.998 – 99999.998 99999.999
MTB	Write									
Machine Setter	Read									
User	Read									
-99999.998 – 99999.998 99999.999										
Data Description		Dependencies								
Param. Class:	Standard									
Param. Number:	16									
Param. Type:	Real, 8 byte									
Param. Format:	8.3f									
Save	Block Assignment	Access Rights	Data Descript.							
Range of Values	Default Values	New Group	Cancel							

Operation

3.6 Creating your own configuration parameters

 An especially configured development computer is required to create your own configuration parameters.

★ Press



The system generates a new configuration parameter, which you can then edit to meet your requirements:

Example:

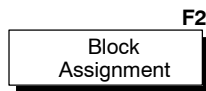
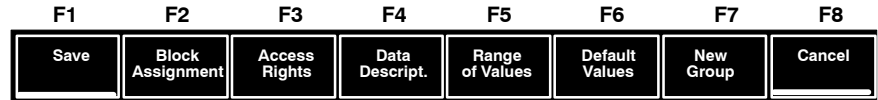
\$1: <input type="text"/>		Develop. 12:34:44	
NC: PNC <input type="text"/>			
A: Diagnostics/Set/Macoda/Manage/Block Definition			
Block Assignment			
Funct. Area: Default Area			
Group No.:	9999		
Group Name:	Default Object		
Block No.:	999999999		
Block Name:	Default Block		
defined by:	Developer		
Access Rights		Range of Values	
MTB	None		
Machine Setter	None		
User	None		
Data Description		Dependencies	
Param. Class:	Standard		
Param. Number:	1		
Param. Type:	Int., 4 byte, w. sign		
Param. Format:	3.3d		
Save	Block Assignment	Access Rights	Data Descript.
Range of Values	Default Values	New Group	Cancel

Operation

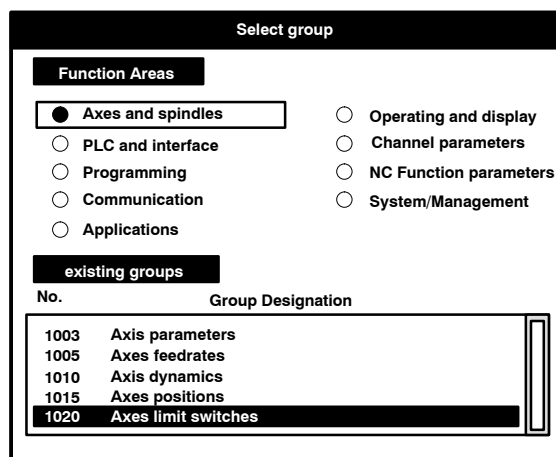
3.6.1 Changing block assignments

This function is used to change configuration parameter numbers and designations.

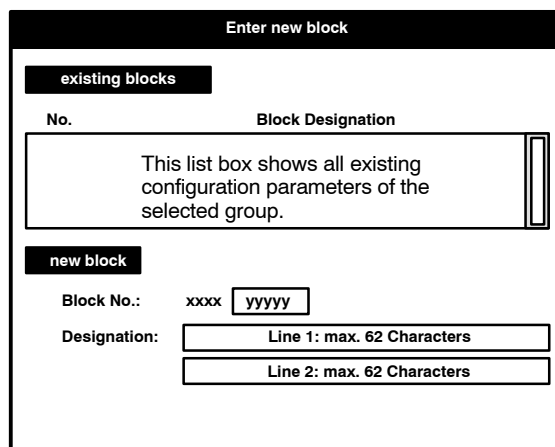
★ Press



★ First, select the function area and the group to which a configuration parameter is to be assigned. By making this selection you have already defined the first 4 digits of the 9-digit configuration parameter number.



★ Press the OK (F1) softkey. Next, the "Enter new block" dialog box appears.



XXXX:
pre-defined group number

YYYYY:
part of the configuration parameter number yet to be entered

- ★ Use <tab> to select the required input field. Edit entries as required.
- ★ Press the OK (F1) softkey to accept all the values displayed or press the CANCEL (F8) softkey to leave these values unchanged. In either case, the dialog boxes "Enter new block" and "Select group" are closed.

Operation

3.6.2 Changing access rights

Access rights provide protection against unauthorized access to individual configuration parameters. For each user group, access to configuration parameters can thus be

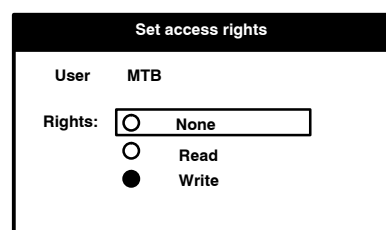
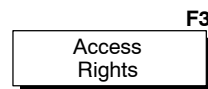
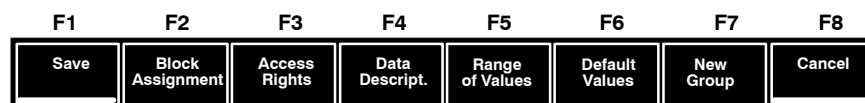
- denied altogether (NONE),
- granted for reading (READ; parameters can be displayed) or
- granted for reading and writing (WRITE; parameter values can be changed as described on page 3–10, ff.).

User groups that have entered configuration parameters in the system are always granted READ and WRITE access to these configuration parameters. The user group that generated a parameter is shown after "defined by:" under "Block Assignment".

 **Access rights can be changed by that user group only which generated the configuration parameter.**

★ Under "Access Rights", use <tab> and the ▲ or ▼ cursor keys to select the user group whose access rights are to be changed. The selected user group is highlighted.

★ Press



★ Use the ▲ or ▼ cursor keys to shift the frame onto the respective access right to be granted and press the SEL key on the control unit (MF2 keyboard: space bar or <space>). The access right currently selected is marked by a black dot.

★ Press the OK softkey (F1) to confirm your access right selection or cancel your selection with the CANCEL softkey (F8). In either case, the dialog box "Set access rights" is closed.

Operation

3.6.3 Changing data descriptions

Here, you can change the data description of configuration parameters in respect of their

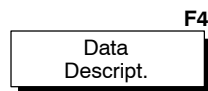
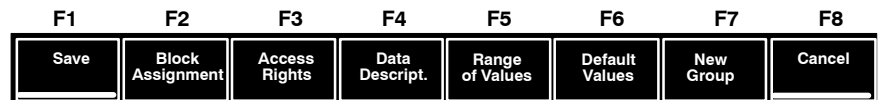
- parameter class,
- number of individual parameters,
- data type, and
- spelling format of all their individual parameters.

By selecting the parameter class you define whether a configuration parameter is to be

- independent (Class: standard),
- channel-specific (Class: channel parameter),
- spindle-specific (Class: spindle parameter),
- axis-specific (Class: axis parameter), or
- transformation-specific (Class: transformation).

 **For information on the classes: see page 3-11 ff.**

★ Press



Set data description

Parameter Class	
Class:	Standard
Parameter Number	
Number:	16
Parameter Type	
Type:	real, 8 bytes
Parameter Format	
No. of Characters:	8 1 - 12
Decimal Places:	3 0 - 7
Exponent. Display:	<input type="checkbox"/> yes/no

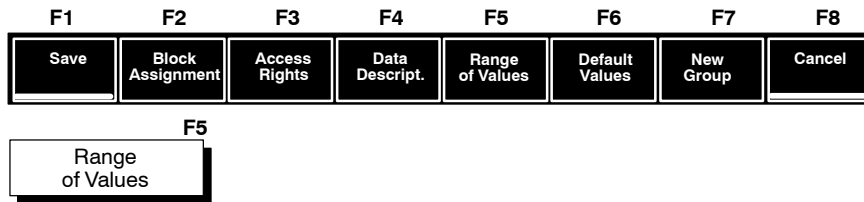
Operation

- ☞ **To select an input field:**
Use <▲>, <▼> cursor keys or the left mouse key.
- To edit entries in the input fields:**
Press the space bar to open a list box and use <▲> or <▼> cursor keys to select an input field (to close the list box, press space bar)
or keep the left mouse key pressed while moving the cursor and select the required function by releasing the mouse key.
- ★ To confirm your data description entries, press the OK (F1) softkey. To cancel your entries, press the Level Return (F9) key. In either case, the "Set data description" dialog box is closed.

3.6.4 Changing the range of values

With this function you can change the common range of values of all the individual parameters of a configuration parameter.

- ★ Press



The layout of the softkey bar changes to



Press the NEW INTERVAL softkey to extend the existing range of values by an additional interval:

The screenshot shows a dialog box titled "Enter new interval". It contains two input fields: "Upper limit:" followed by a text box, and "Lower limit:" followed by a text box.

Press the NEW INDIVIDUAL VALUE softkey to extend the existing range of values by an additional individual value:

The screenshot shows a dialog box titled "Enter new individual value". It contains one input field: "Value:" followed by a text box.

Press the PROCESS softkey to edit a selected range of values.

Operation

Press the DELETE softkey to delete a selected range of values.

☞ **After pressing the softkeys NEW INTERVAL, NEW INDIVIDUAL VALUE, or PROCESS, you can activate your changes by pressing the softkeys OK or ACTIVATE. If you want to enter several intervals or individual values one after another, use the ACTIVATE softkey because then the dialog box will not be closed and you can make the next entry.**

★ To jump back from the "Range of Values" level, press the Level Return key (F9).

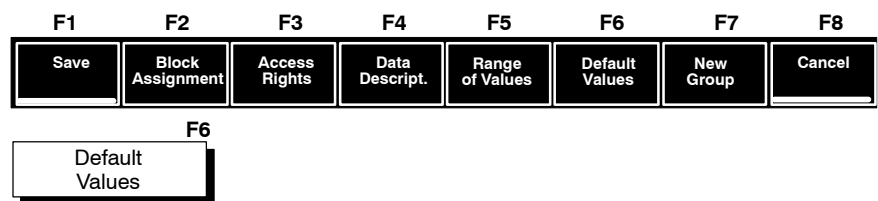
3.6.5 Changing default values

With this function you can change the individual parameter default values of configuration parameters.

Other functions involved in changing individual parameter default values are

- the function "Changing individual parameter values" (see page 3–10 ff.). If you have not changed the respective configuration parameter there before, its default values are displayed when you edit this configuration parameter for the first time.
- the function "Save all data" (see page 3–23). All configuration parameters stored in the control unit are exported to backup files with this function. Configuration parameters that have never been edited before with the function "Changing individual parameter values" (see page 3–10 ff.) are exported by the control unit with their default values.

★ Press



From here on, the procedure is identical with the function "Changing individual parameter values" (see page 3–10 ff.).

★ To jump back from the "Changing default values" level, press the Level Return key (F9).

Operation

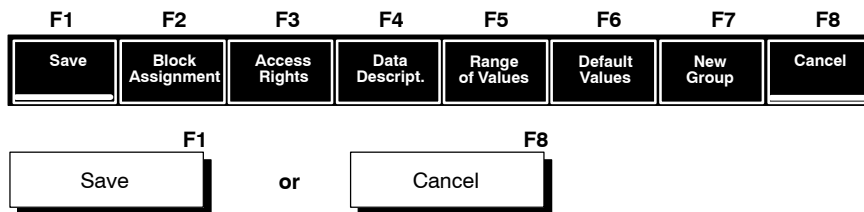
3.6.6 Creating a new group

This function is not yet implemented.
The NEW GROUP softkey is inoperable.

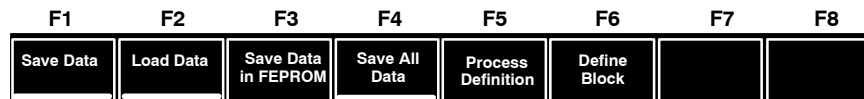
3.6.7 Save or Cancel

Changes made to attributes or default values can be saved or canceled jointly.

★ Press



The system then returns to the "Manage" operation level:



☞ When you press **SAVE**, newly defined configuration parameters are automatically included in the block list (see page 3-5).

☞ Just by pressing the **SAVE** softkey, configuration parameter changes are not yet activated in the NC. For information on how to activate configuration parameter changes, please see section 3.8 on page 3-25 ff.

★ Use the Level Return key (F9) to return to the MACODA top softkey level.

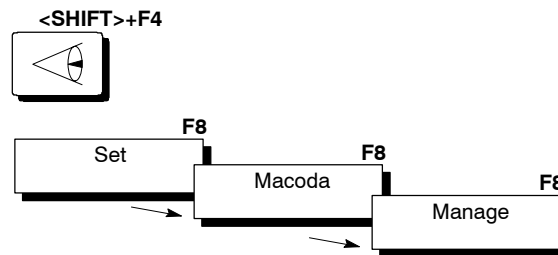
Operation

3.7 Saving and loading configuration parameters

When you change existing configuration parameters or program new ones, you also need to update or create the corresponding backup files.

- ★ To become familiar with the various backup options, please read the sections on
 - Save data (see page 3-21)
 - Save data in FEPROM (see page 3-22)
 - Save all data (see page 3-23), and
 - Load data (see page 3-24).

The softkeys described in these sections are enabled by pressing

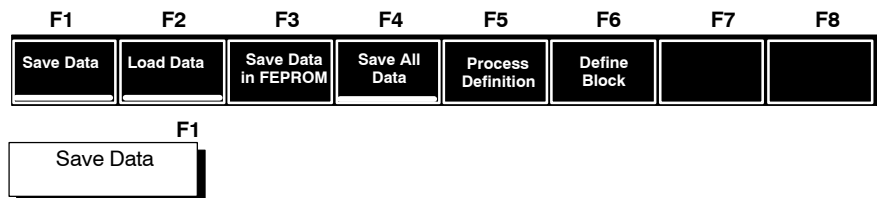


3.7.1 Save data

Use this function to

- protect a current and operational configuration in the NC from being "malconfigured" **before** any changes are made.

- ★ Press



This function is designed exclusively for saving any changes in configuration parameters or newly programmed configuration parameters – relative to the existing default configuration parameters – in the ASCII file "mcaadbpar.txt" in the root directory.

- ☞ For information on how to restore configurations backed up with this function, see "Load data" on page 3-24.



CAUTION

The "mcaadbpar.txt" file is deleted with the next start-up of the control unit if S1 on the osa master is set to

- "6" (delete RAM file system) or
- "7" (delete user FEPROM).

If this is the case, you will lose all configurations backed up with this function. Therefore, to make an NC-independent backup copy of the "mcaadbpar.txt" file, copy this file via the "Disk" or "Mount" directories to an external data carrier or your PC.

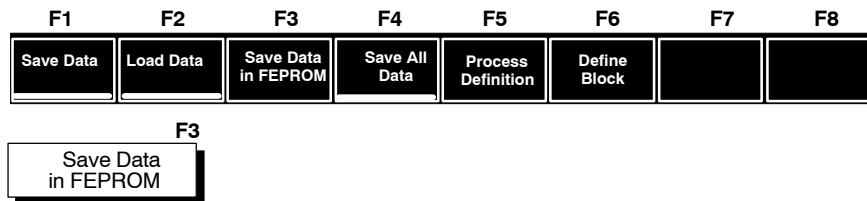
Operation

3.7.2 Save data in FEPR0M

Use this function to

- save a current and operational configuration in the NC by making a backup copy in the user FEPR0M of the control unit, e.g. before making a software update.

★ Press



This function is designed exclusively for saving any changes in configuration parameters or newly programmed configuration parameters – relative to the existing default configuration parameters – in the ASCII file "mcaadbpar.txt" in the root directory.

Subsequently, the "mcaadbpar.txt" file is copied also to the user FEPR0M in the control unit.

☞ **To restore configurations backed up this way, first copy the "mcaadbpar.txt" file from the user FEPR0M to the root directory (unless it already exists in the root directory or if the version existing there is a more recent one) and carry out the "Load data" function (see page 3–24).**



CAUTION

The "mcaadbpar.txt" file is deleted with the next start-up of the control unit if S1 on the osa master is set to – "7" (delete user FEPR0M).

If this is the case, you will lose all configurations backed up with this function.

Therefore, to make an NC-independent backup copy of the "mcaadbpar.txt" file, copy this file via the "Disk" or "Mount" directories to an external data carrier or your PC.

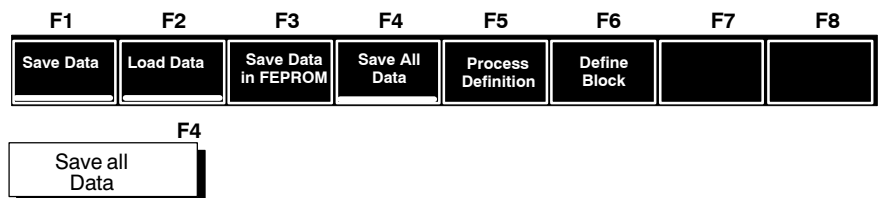
Operation

3.7.3 Save all data

Use this function if you want

- to create a new ASCII file containing not only changed or new configuration parameters, but all configuration parameters stored in the NC.

★ Press



This function is designed to save all configuration parameters in the "mcaeball.txt" and "mcaeball.doc" ASCII files in the root directory.

The "mcaeball.txt" is designed to allow reading of all configuration parameters to the control unit.

☞ **To restore configurations backed up this way, you must first copy "mcaeball.txt" to "mcaebpar.txt" and then carry out the "Load data" function (see page 3–24).**

The "mcaeball.doc" file is designed exclusively for documentation purposes (printouts, e.g.) and **cannot** be read into the control unit to restore configurations!

**CAUTION**

The files "mcaeball.txt" and "mcaeball.doc" are deleted with the next start-up of the control unit if

S1 on the osa master is set to

- "6" (delete RAM file system) or
- "7" (delete user FEPR0M).

If this is the case, you will lose all configurations backed up with this function.

Therefore, to make an NC-independent backup copy of the "mcaebpar.txt" file, copy this file via the "Disk" or "Mount" directories to an external data carrier or your PC.

Operation

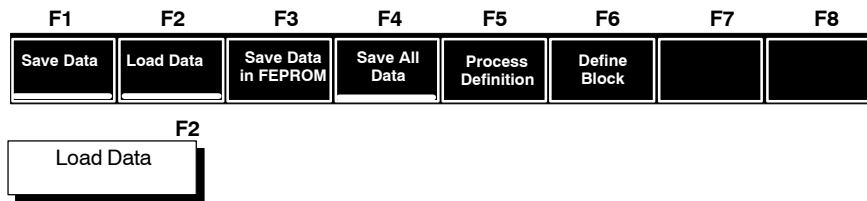
3.7.4 Load data

Use this function to

- restore a configuration of the control unit backed up previously. To do so, the "mcadbpar.txt" file must be available in the root directory of the control unit.

 **Access to this function is barred for the "User" user group.**

★ Press



This function loads the "mcadbpar.txt" ASCII file from the root directory to the control unit. All configuration parameters that have been changed or newly programmed since the "mcadbpar.txt" file was created are lost.

 **The backup file "mcadbpar.txt" is version-dependent. It can only be loaded if it was created with the same or an older software version.**

★ Activate the configuration parameters (see Sect.3.8).
The control unit must be started up each time after carrying out the "Load data" function.

Operation

3.8 Activating configuration parameters

A complete set of all configuration parameters defined by Rexroth (=default configuration parameters) is stored in the PNC and thus available anytime.

Whenever you change an existing configuration parameter or program a new one, it is stored in the system, but normally not yet activated.



CAUTION

Tool or workpiece damage may occur because the operating steps described hereunder will cancel any machining work in progress!

Make sure that no machining function is active and no program is being executed.

- ★ To activate changed or newly programmed configuration parameters, proceed as follows:
 1. Reset the system control (DIAGNOSTICS ► RESET FUNCTIONS ► SYSTEM CONTROL RESET).
Many configuration parameters will be activated in this process.
 2. If the message "MACODA parameter xy can only be activated with control startup" is displayed, you must restart the PNC. To do so, you can optionally
 - press the reset key on the front of the osa master module
– or –
 - press the SYSTEM RESTART softkey (DIAGNOSTICS ► RESET FUNCTIONS ► SYSTEM RESTART).

3.8.1 Additional information on control start-up

The startup behavior of the control unit depends on:

- the position of the S1 rotary control switch on the osa master module of the PNC-R
- the selected startup mode in PNC Control of the PNC-P.

Position "0"

Switch position for normal operation.

If no configuration parameters have been changed, newly programmed or read in with the "Load data" function (e.g., following a software update or change) before, the NC will search first the root directory, then the user FEPROM, and then the FEPROM for the "mcaadbpar.txt" file (for information on the "mcaadbpar.txt" file, see Sect. 3.7).

If this file is not found, the NC activates the default configuration parameters.

If this file is found, it is read in by the control unit. Subsequently, the con-

Operation

figuration of the control is identical with the configuration active at the time the "mcadbpar.txt" file was created.

If configuration parameters have been changed, newly created or read in with the "Load data" function, the NC will not search for the "mcadbpar.txt" file.

Now, all configuration parameters that were changed, newly programmed or read in with the "Load data" function before the startup are stored in the control unit.

- Position "6"** For the first start-up of a newly installed control unit. The control unit deletes the whole RAM file system and replaces it by a new one. This means that all configuration parameter backup files stored in the root directory, e.g., are lost. Unless the configuration parameters were saved previously in the user FEPRM, on an external data carrier, or the PC, you will have to configure the whole NC again. If the configuration parameters were saved in the user FEPRM, simply restart the control unit with position "0". If the configuration parameters were saved externally, copy the "mcadbpar.txt" file (or the "mcadball.txt" file, renaming it "mcadbpar.txt") to the user FEPRM and then restart the control unit with position "0".
- Position "7"** The control unit deletes the whole RAM file system and the user FEPRM and replaces these two subsystems by new ones. This means that you will not only lose the configuration parameter backup files stored in the root directory, but also the backup files stored in the user FEPRM. Unless the configuration parameters were saved previously on an external data carrier or the PC, you will have to configure the whole NC again. If the configuration parameters were saved externally, copy the "mcadbpar.txt" file (or the "mcadball.txt" file, renaming it "mcadbpar.txt") to the user FEPRM and then restart the control unit with position "0".

Parameter descriptions

4 Parameter descriptions

☞ Together with the update to software version 5.1x, some new groups have been implemented and parameter numbers previously used have been revised.

All the following descriptions refer to the new parameter numbers. For changes from the former parameter numbers to the new ones, please see page A-16 in the Appendix, which shows a reference list.

4.1 General

From page 4-6 onwards, you will find descriptions of all configuration parameters, sorted by number. Every parameter description starts with the following two items:

Number

Name of the configuration parameter

In addition to a description of the function of every parameter, you will also find important information on parameter changes.

This information is collocated in tables.

Example:

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes			
0...4	1	–	16	integer	1 byte	1	–	unsigned	w,w,r	ch.-spec.			
Presettings [x] = element index													
[1]	1	[2]	1	[3]	1	[4]	1	[5]	1	[6]	3	[7]	4
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0

- **Input values:**
Upper and lower input limits.
Values above or below this range are not permitted.
- **Increment:**
Incremental dimension at which values may be entered between the lower and the upper limits. Usually, the incremental dimension is stated in decimal values (e.g. "1", "0.01").
However, sometimes no linear increments are permitted within a specified range of values. In those cases, the increment is stated as, e.g.
 "2^x" (incremental dimension: "1", "2", "4", "8", "16"...), or
 "10^x" (incremental dimension: "1", "10", "100", "1000"...), or
 "a2^x" (incremental dimension: "a", "2a", "4a", "8a"...).
 If the incremental dimension cannot be reduced to a formula, all permissible values are listed between commas in the "input values" column.
- **Unit:**
Physical unit of the input value.

Parameter descriptions

- **Elements:**
Here, the number of individual parameters is shown of which the described parameter is composed.
The values of all individual parameters are identified by an element index (beginning with “1”). For the default values of the individual parameters, see table section **Presettings**.
As regards configuration parameters assigned to the classes of “channel parameters”, “spindle parameters” or “axis parameters”, you may find several table sections showing presettings (see also under “Notes” on the next page).
- **Type of data:**
Display and input format. Applies to all individual parameters.
Integer: a whole or natural number (depending on the “Format” column)
Real: real number
string: text
- **Element length:**
Internal memory available for storing an individual parameter value.

1 byte (integer, unsigned):	0...255
1 byte (integer, signed):	-127...+127
1 byte (string):	1 character
2 bytes (integer, unsigned):	0...0.65535
2 bytes (integer, signed):	-32767...+32767
2 bytes (string):	2 characters
4 bytes (integer, unsigned):	0...0.4294967295
4 bytes (integer, signed):	-2147483647...+2147483647
4 bytes (string):	4 characters
4 bytes (real, floating decimal point)	
4 bytes (real, with exponent)	
8 bytes (string):	8 characters
8 bytes (real, floating decimal point)	
8 bytes (real, with exponent)	
- **TD:**
Total number of digits (integer digit and decimal positions).
With strings: Max. number of digits that may be entered.
Applies to all individual parameters.
- **DP:**
Maximum number of decimal positions. Applies to all individual parameters.
- **Format:**
Supplementary data to “Type of data”.
signed: with sign
unsigned: without sign
float: with floating decimal point
exp: fixed decimal point, with an exponent
- **Access:**
Authorization of access to the configuration parameter described.
Applies to all individual parameters.
The access rights granted to the groups “MTB”, “tool setter” and “user” are shown from left to right, separated by commas:
w: write and read access authorization
r: read access authorization only
-: no access

Parameter descriptions

● **Notes:**

Space for special notes and parameter class indication.

“_”:
The configuration parameter belongs to the “standard” class. It exists, including the individual parameters it is composed of, just once within the whole system.

“ch.-spec.”: the configuration parameter belongs to the “channel parameter” class.

It exists, together with the individual parameters it is composed of, once for each channel configured and once as “basic setup”. The “basic setup” configuration parameter is required so it can be copied by the system whenever you want to apply additional channels.

The table section “Presettings” contains the presettings of all individual parameters both as a master for copying and for any other channels to be configured (unless they are different from the basic setup).

“sp.-spec.”: the configuration parameter belongs to the “spindle parameter” class. Other than that, compare for “ch.-spec.”.

“a.-spec.”: the configuration parameter belongs to the “axis parameter” class. Other than that, compare for “ch.-spec.”.

“t.-spec.”: the configuration parameter belongs to the “transformation parameter” class. Other than that, compare for “ch.-spec.”.

Definitions

4.2 Definitions

☞ For a detailed description of axes, spindles and coordinates, please refer to the “PNC Description of Functions” manual.

SERCOS Protocol for data exchange between the PNC (master) and the drives (slaves) connected via the optical waveguide ring.
Two SERCOS rings may be configured. Both run completely independently of each other.

Drive Generic term for spindles and axes.
Every drive is a SERCOS node and assigned to a SERCOS ring.

Spindle A drive which is assigned parameters “3” or “4” in 1001 00001.
Normally operated in closed-loop speed control mode.
Spindles are used to drive tools (in the case of lathes: to drive workpieces).
A spindle may also be used to carry out simple positioning tasks (“Spindle orientation”) in position mode.
A spindle with C axis operation is a drive that can be operated both as a spindle and as an axis.

Axis A drive which is assigned parameter “1” in 1001 00001.
Normally operated in closed-loop position control mode.
Axes are used to move and position tools, workpieces, etc.
Depending on the axis function, a distinction is made between “machining axes” and “auxiliary axes”.

Machining axis (also: synchronous axis, feed axis)

An axis which is assigned to a channel (see parameter 1003 00002; settings > 0).

Machining axes only can form an interpolative relationship. For this, they must be assigned to one and the same channel (axis group).

Axis groups consisting of a minimum of 2 machining axes are used to carry out motions on a plane, while axis groups consisting of a minimum of 3 machining axes are used to carry out motions in space.

It depends on the design of the machine used, whether the tool or the workpiece is moved by machining axes.

Definitions

- Auxiliary axis** (also: asynchronous axis)
An axis which is not assigned to a channel (see parameter 1003 00002; setting = 0).
These axes can be activated from any channel and are usually used for handling or infeed tasks on the machine.
- Linear axis** An axis which is assigned parameter "1" in 1003 00004.
For a description, see parameter 1003 00004.
- Rotary axis** An axis which is assigned parameter "3" in 1003 00004.
For a description, see parameter 1003 00004.
- Endless axis** An axis which is assigned parameter "2" in 1003 00004 (rotary axis with modulo calculation).
For a description, see parameter 1003 00004.
- Hirth axis** An axis which is assigned parameter >0 in 1003 00055.
For a description, see parameter 1003 00055.
- Coordinate** Coordinate identifiers describe a point (position of the tool) on the machine via working-range coordinates and/or pseudo coordinates (logical axis names) with active axis transformation. The axis transformation converts positions to physical axes internally.
- Channel** (machining channel) Part program unit which can activate interpolatively an axis group (see machining axis) assigned to it. Additionally, every spindle and every auxiliary axis in the system can be activated from every channel.
- Auxiliary channel**
A special channel which is reserved for the internal management of auxiliary axes or machine functions, e.g. axes on an auxiliary channel cannot form an interpolation relationship but they can be programmed or activated from every machining channel.

Functions relating to axes and spindles

4.3 Functions relating to axes and spindles

4.3.1 Drive parameters (group 1001)

1001 00001

Drive function type

Configures


- the number of drives used on a machine,
- the basic function of a drive on a machine, and
- the assignment of drives to indices which are unique within the entire system. These indices are of significance in the assignment of MA-CODA parameters, interfaces, CPL and DIN programming, etc.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0...4	1	–	64	integer	1 byte	1	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	1	[2]	1	[3]	1	[4]	1	[5]	1	[6]	1	[7]	3	[8]	4
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

The PNC can activate a maximum of 64 drives simultaneously, divided into 2 SERCOS rings with PNC-R, 1 SERCOS ring with PNC-P (see SERCOS parameters, page 4–64 ff.) Therefore, 64 individual parameters are available for parameterization.

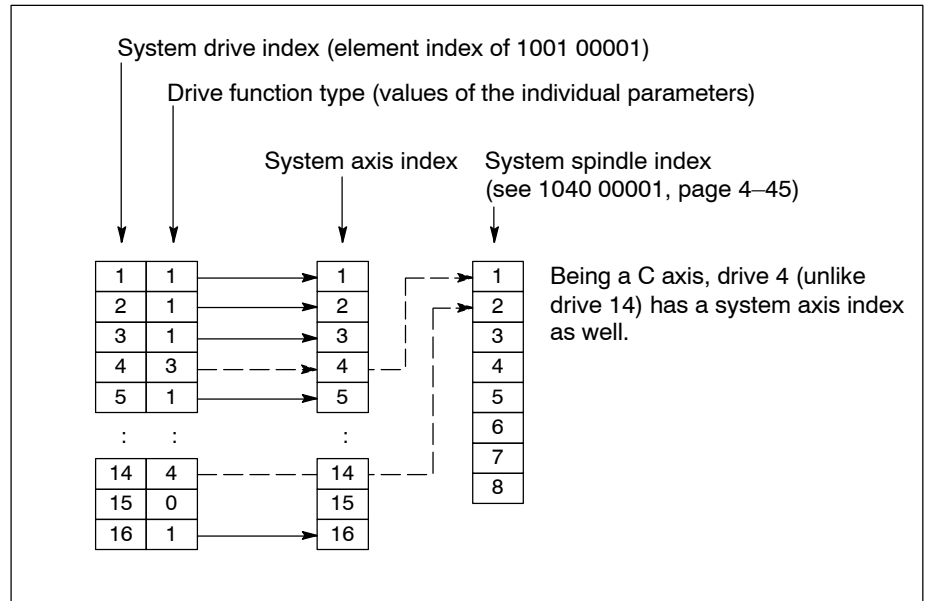
Meaning of parameter values:

- 0 No drive defined.
- 1 Drive moves a rotary or a linear axis. The axis may be employed as an auxiliary (asynchronous) or as a machining axis (synchronous axis; feed axis).
- 2 No meaning assigned as yet.
- 3 Drive moves a spindle which may also be switched over temporarily to C axis operation (e.g., for function G32, “Tapping without compensation chuck”).
- 4 Drive moves a spindle. No C axis operation possible.

 **The individual parameters may be assigned or used in random order. However, for matters of clarity, it is recommended to assign individual parameters in ascending order.**

Functions relating to axes and spindles

- ★ Assign the appropriate value to one individual parameter for every drive used on the machine.
The following order is recommended for parameter assignments:
 - synchronous linear axes (e.g. X,Y,Z),
 - synchronous rotary axes (e.g. A,B,C),
 - spindles,
 - asynchronous axes
- ★ Assign the value “0” to all individual parameters not in use.

Example:

- ☞ **If the number of drives used on the machine may still vary with further expansion options yet to come, we recommend that the final, maximum expansion option be taken into account by setting the parameters of all present and future drives.**
- If the number of drives on a machine is still below final expansion stage of the machine, simply assign the value “0” to the respective individual parameters of 1001 00001. The PNC automatically resets MACODA parameters referring to those “inactive drives” or also suppresses their display.**
- If required, the display of spindles can be disabled using 1040 00001.**

Functions relating to axes and spindles

4.3.2 Axis parameters (group 1003)

1003 00001

Physical axis designation

Specifies for every **axis**

- a channel-independent name which is unique within the whole system.

 **Spindles must not be entered here, but in group 1040!**

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	64	string	8 bytes	8	–	–	w,w,r	–
Presettings [x] = element index										
[1] X	[2] Y	[3] Z	[4] B	[5] UA	[6] VA	[7] WA0	[8]			
[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]			
[17]	[18]	[19]	[20]	[21]	[22]	[23]	[24]			
[25]	[26]	[27]	[28]	[29]	[30]	[31]	[32]			
[33]	[34]	[35]	[36]	[37]	[38]	[39]	[40]			
[41]	[42]	[43]	[44]	[45]	[46]	[47]	[48]			
[49]	[50]	[51]	[52]	[53]	[54]	[55]	[56]			
[57]	[58]	[59]	[60]	[61]	[62]	[63]	[64]			

Permissible parameter values:

- <letters>, e.g. “X”
Letters denoting an internal NC functionality (e.g. D, G, H, R, S, F, A, FA) are not allowed here. See Table of Standard Programming Formats, Section 2, DIN Programming Manual.
- <letters><digit>, e.g. “X2”
To distinguish between the axis designation and the following position data, write either “=” or a “blank” between them.




CAUTION

Danger of damage to the workpiece or the machine!

If a long axis designation begins with another, shorter one (there are axes “X” and “X2”) and a decimal point is programmed behind it, the longer designation always applies (X2.5 → the X2 axis moves to 0.5).

If axis X is to move to 2.5, “=” or a “blank” must be programmed to distinguish between the axis designation and the position data.

 **Physical axis designations can be faded over by logical axis designations (see 7010 00010, page 4–160).**

Functions relating to axes and spindles

1003 00002

Channel assignment

Specifies for every axis


- whether the axis is a machining or an auxiliary axis, and
- the channel to which a machining axis is to be assigned.

 **A maximum of 8 axes may be assigned to any one channel.**

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0...12	1	–	64	integer	1 byte	2	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	1	[2]	1	[3]	1	[4]	2	[5]	2	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

Meaning of parameter values:

- 0 The axis is an auxiliary axis.
Auxiliary axes can be activated from any channel.
Auxiliary axes cannot be interpolated with other axes.
- 1...12 The axis is a machining axis and assigned to the channel specified.
As a rule, machining axes can be activated only by those part programs which are assigned to the channel specified here.
The same applies to manual data input mode.

 **From SW version V5.1 on, you can use function G510, “axis transfer”, to change the assignment of axes to channels, both in the part program and in “manual data input” mode.**

Functions relating to axes and spindles

1003 00004

Axis movement type

Specifies for every **axis**

- whether the axis is a rotary or a linear axis, and
- whether or not the axis is operated with modulo calculation.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0...4	1	–	64	integer	1 byte	1	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	1	[2]	1	[3]	1	[4]	2	[5]	1	[6]	1	[7]	2	[8]	2
[9]	1	[10]	1	[11]	1	[12]	1	[13]	1	[14]	1	[15]	1	[16]	1
[17]	1	[18]	1	[19]	1	[20]	1	[21]	1	[22]	1	[23]	1	[24]	1
[25]	1	[26]	1	[27]	1	[28]	1	[29]	1	[30]	1	[31]	1	[32]	1
[33]	1	[34]	1	[35]	1	[36]	1	[37]	1	[38]	1	[39]	1	[40]	1
[41]	1	[42]	1	[43]	1	[44]	1	[45]	1	[46]	1	[47]	1	[48]	1
[49]	1	[50]	1	[51]	1	[52]	1	[53]	1	[54]	1	[55]	1	[56]	1
[57]	1	[58]	1	[59]	1	[60]	1	[61]	1	[62]	1	[63]	1	[64]	1

Meaning of parameter values:

- 0 The drive is not defined as an axis in 1001 00001.
- 1 The axis is a linear axis.
Linear axes can be moved within their respective travel limit range only and are programmed in “mm” or “inch”.
- 2 The axis is a rotary axis with modulo calculation (endless axis).
Special variety of rotary axes; no travel limit. Endless axes can be rotated any number of times in the same direction.
Using the “modulo value” (sometimes also referred to as the “modulo factor”), the current position of the axis is re-transformed upon reaching its setpoint position into a corresponding position range between 0 and the modulo value.
The PNC automatically reads the modulo value from the drive (parameter S-0-0103) during SERCOS start-up.
Additional characteristics of endless axes can be configured via MP 1003 00005.
- 3 The axis is a rotary axis.
Rotary axes can be moved within their respective travel limit range only and are programmed in “degrees”.
- 4 The axis is a linear axis with modulo calculation.
Special variety of linear axes.
If the absolute position value programmed is greater than the modulo value, the PNC responds with a runtime error.
If the absolute position value programmed is smaller than or equal to the modulo value, the PNC immediately re-transforms the current axis position into a corresponding position range between 0 and the modulo value as soon as the modulo value is exceeded.
The PNC automatically reads the modulo value from the drive (parameter S-0-0103) during SERCOS start-up.
The programming zero point can be defined using function G105, “Zero setting of modulo axis”.

Functions relating to axes and spindles

1003 00005**Positioning logic**Specifies for every **endless axis**

- its direction of rotation when moving to its programmed target position.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0...3	1	–	64	integer	1 byte	1	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	1	[5]	0	[6]	0	[7]	1	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

For machining axes, all of the following parameter values may be used, while parameter values 0 and 1 only may be used for auxiliary axes:

0 no positioning logic

The direction of rotation when moving into a target position is determined exclusively by the balance of the new and the previous position:

- positive result – clockwise rotation
- negative result – counterclockwise rotation.

1 Shortest possible path.

The endless axis always moves on the shortest possible path to its physical target position. Programmed signs, if any, are ignored. Therefore, the maximum motion is 180 degrees or half of the current modulo value.


2 Sign.

The direction of rotation for moving into the target position is determined exclusively by the signs programmed:

- + = clockwise rotation ("+" does not have to be programmed),
- = counterclockwise rotation.

The maximum motion per block is always less than 360 degrees or smaller than the current modulo value.

If function G91 (Incremental data input) is active, it will remain active.

 **While function G91 (Incremental data input) is active, modulo calculation is disabled by the NC, with the exception of the setpoint output and its display.**

3 G90/91/189.

Which positioning logic is used depends on functions G90/189:

G90 is active: in accordance with the “sign”

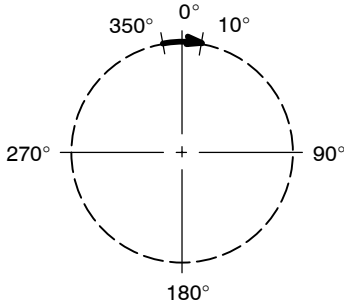
G189 is active: in accordance with “shortest possible path”.

When G90 is active, an endless axis moves in accordance with the sign logic, whereas when G189 is active, it moves in accordance with the shortest-possible-path logic.

Functions relating to axes and spindles

Example as to 1 (shortest possible path)

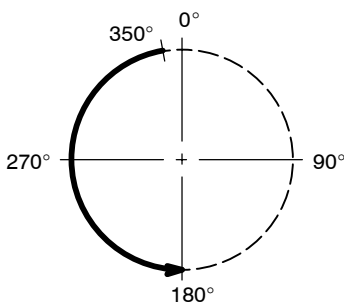
actual position: 350°
 programming: N100A10 or N100A370
 new actual position: 10°



actual position: 350°
 programming: N100A-10

as above
 (the sign is ignored)

actual position: 350°
 programming: N100A180
 new actual position: 180°

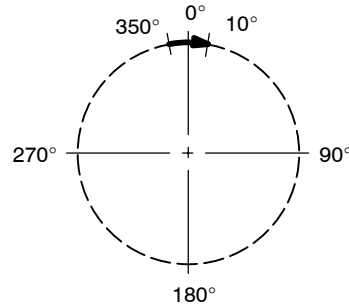


actual position: 350°
 programming: N100A710
 new actual position: 350°

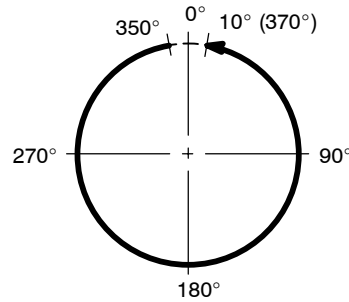
The axis will not move because the 710° position is physically equivalent to its current 350° position.

Examples as to 2 (sign)

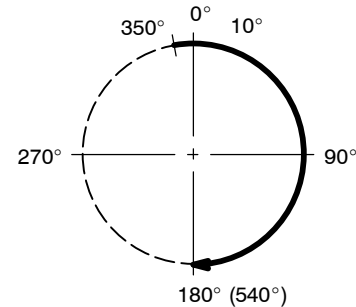
actual position: 350°
 programming: N100A10 or N100A+10
 new actual position: 10°



actual position: 350°
 programming: N100A-10 or N100A-370
 new actual position: 10°



actual position: 350°
 programming: N100A180 or N100A+180 or N100A540
 new actual position: 180°



actual position: 350°
 programming: N100A350

The axis will not move.

actual position: 350°
 programming: N100A-710
 new actual position: 350°

The axis will not move because the 710° position is physically equivalent to its current 350° position.

Functions relating to axes and spindles

1003 00008

Order of shape for axis

Specifies for every **machining axis**

- the default setting of function G608 (axis-by-axis programmable shape).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
1...99	1	–	64	integer	1 byte	2	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	1	[2]	1	[3]	1	[4]	1	[5]	1	[6]	1	[7]	1	[8]	1
[9]	1	[10]	1	[11]	1	[12]	1	[13]	1	[14]	1	[15]	1	[16]	1
[17]	1	[18]	1	[19]	1	[20]	1	[21]	1	[22]	1	[23]	1	[24]	1
[25]	1	[26]	1	[27]	1	[28]	1	[29]	1	[30]	1	[31]	1	[32]	1
[33]	1	[34]	1	[35]	1	[36]	1	[37]	1	[38]	1	[39]	1	[40]	1
[41]	1	[42]	1	[43]	1	[44]	1	[45]	1	[46]	1	[47]	1	[48]	1
[49]	1	[50]	1	[51]	1	[52]	1	[53]	1	[54]	1	[55]	1	[56]	1
[57]	1	[58]	1	[59]	1	[60]	1	[61]	1	[62]	1	[63]	1	[64]	1

If G608 is programmed alone, all values entered here become active. If G608 is programmed in combination with an axis address, the values of all machining axes which have not been programmed on the respective channel become active.

1003 00009

The function “Zero following error motion” (feed forward control function) can be activated

Specifies for every **axis**

- whether or not it shall be switched over to secondary operation mode 1 as soon as G114 is programmed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	64	integer	4 bytes	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

Meaning of parameter values:

- 0 No switching of drive to secondary operation mode 1 after programming of G114.
- 1 Drive is switched to secondary operation mode 1 after programming of G114.

 **UnderS-0-0033 (secondary operation mode 1), there must be a parameter entered for an operation mode which provides the function “Zero following error motion”.**

The SERCOS parameters used for configuring the function “Zero following error motion” varies with the drive. Servodyn-D drives use P-0-0500 and P-0-0501, DIAX/Eco-Drive uses P-0-0050.


Functions relating to axes and spindles

1003 00010**Presetting for reduced maximum axis torque**

Specifies for every axis

- the value used for (temporarily) overwriting S-0-0092 in the drive as soon as the axis interface signal NC-I3.7, "Torque reduction", is set to true.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0...500.00	0.01	%	64	real	4 bytes	5	2	float	w,w,r	–					
Presettings [x] = element index															
[1]	1.00	[2]	1.00	[3]	1.00	[4]	1.00	[5]	1.00	[6]	1.00	[7]	1.00	[8]	1.00
[9]	1.00	[10]	1.00	[11]	1.00	[12]	1.00	[13]	1.00	[14]	1.00	[15]	1.00	[16]	1.00
[17]	1.00	[18]	1.00	[19]	1.00	[20]	1.00	[21]	1.00	[22]	1.00	[23]	1.00	[24]	1.00
[25]	1.00	[26]	1.00	[27]	1.00	[28]	1.00	[29]	1.00	[30]	1.00	[31]	1.00	[32]	1.00
[33]	1.00	[34]	1.00	[35]	1.00	[36]	1.00	[37]	1.00	[38]	1.00	[39]	1.00	[40]	1.00
[41]	1.00	[42]	1.00	[43]	1.00	[44]	1.00	[45]	1.00	[46]	1.00	[47]	1.00	[48]	1.00
[49]	1.00	[50]	1.00	[51]	1.00	[52]	1.00	[53]	1.00	[54]	1.00	[55]	1.00	[56]	1.00
[57]	1.00	[58]	1.00	[59]	1.00	[60]	1.00	[61]	1.00	[62]	1.00	[63]	1.00	[64]	1.00

 **The parameters of the drive must be set so that the value in S-0-0092 is interpreted as a percentage of the nominal torque!**

1003 00011**Measuring probe edge**

Specifies for every axis


- the edge to be evaluated by the measuring probe logic (G75, G175).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	64	integer	4 bytes	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	1	[2]	1	[3]	1	[4]	1	[5]	1	[6]	1	[7]	1	[8]	1
[9]	1	[10]	1	[11]	1	[12]	1	[13]	1	[14]	1	[15]	1	[16]	1
[17]	1	[18]	1	[19]	1	[20]	1	[21]	1	[22]	1	[23]	1	[24]	1
[25]	1	[26]	1	[27]	1	[28]	1	[29]	1	[30]	1	[31]	1	[32]	1
[33]	1	[34]	1	[35]	1	[36]	1	[37]	1	[38]	1	[39]	1	[40]	1
[41]	1	[42]	1	[43]	1	[44]	1	[45]	1	[46]	1	[47]	1	[48]	1
[49]	1	[50]	1	[51]	1	[52]	1	[53]	1	[54]	1	[55]	1	[56]	1
[57]	1	[58]	1	[59]	1	[60]	1	[61]	1	[62]	1	[63]	1	[64]	1

Meaning of parameter values:

0 negative edge

1 positive edge

 **If more than one axis on a channel is to be programmed for measuring in one and the same block, the parameters of the measuring probe edges of these axes must be identical.**

Functions relating to axes and spindles

1003 00012**Measuring probe function can be activated**Specifies for every **machining axis**

- whether or not the measuring probe function can be activated via G75.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	64	integer	1 byte	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	1	[2]	1	[3]	1	[4]	1	[5]	1	[6]	1	[7]	1	[8]	1
[9]	1	[10]	1	[11]	1	[12]	1	[13]	1	[14]	1	[15]	1	[16]	1
[17]	1	[18]	1	[19]	1	[20]	1	[21]	1	[22]	1	[23]	1	[24]	1
[25]	1	[26]	1	[27]	1	[28]	1	[29]	1	[30]	1	[31]	1	[32]	1
[33]	1	[34]	1	[35]	1	[36]	1	[37]	1	[38]	1	[39]	1	[40]	1
[41]	1	[42]	1	[43]	1	[44]	1	[45]	1	[46]	1	[47]	1	[48]	1
[49]	1	[50]	1	[51]	1	[52]	1	[53]	1	[54]	1	[55]	1	[56]	1
[57]	1	[58]	1	[59]	1	[60]	1	[61]	1	[62]	1	[63]	1	[64]	1

Meaning of parameter values:

- 0 The measuring probe function G75 is disabled.
- 1 The measuring probe function of the axis can be activated via G75.

If G75 is programmed, the measuring probe is activated only for those axes on the respective channel for which the value 1 is entered here. The fact that not all the machining axes on the channel need to be taken into account but only those that are actually required results in shorter execution times of the measuring probe function and less hardware wiring required.

 **This parameter has no relevance to auxiliary axes.**

Functions relating to axes and spindles

1003 00020

The axis is not taken into account for feedrate calculation with G594 active


Specifies for every **machining axis**

- whether it is taken into account for feedrate calculation while G594 is active, or whether the axis is moved along in coupled motion with the axes contributing to the feedrate.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	64	integer	1 byte	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

Meaning of parameter values:

- 0 The machining axis is taken into account for feedrate calculation while G594 is active.
- 1 The machining axis is moved along while G594 is active. The dynamic limit values of these axes are taken into account and the interpolative relationship of these axes is retained (axes running synchronously).

 **This parameter has no relevance to auxiliary axes. If no axes have been programmed in a block to contribute to the feedrate calculation, there is the option to program the feedrate of the other axes via the 2nd feedrate value (omega).**

Functions relating to axes and spindles

1003 00030**Fixed stop allowed**Specifies for every **machining axis**

- whether G375 measuring fixed stop is allowed
- whether G475 move to fixed stop is allowed

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	64	integer	1 byte	1	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

Meaning of parameter values:

- 0 “Measuring fixed stop” and “Move to fixed stop” are not available
- 1 The axes identified with “1” of the corresponding channel may be:
- selected for measurement under G375 using **MfsAxis ***
 - moved to fixed stop under G475.


1003 00031**Torque limit fixed stop**Specifies for every **machining axis**

- the torque limit (S-0-0092) used to move to fixed stop.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0..500.00	0.01	%	64	real	4 bytes	5	2	float	w,w,r	–					
Presettings [x] = element index															
[1]	20.0	[2]	20.0	[3]	20.0	[4]	20.0	[5]	20.0	[6]	20.0	[7]	20.0	[8]	20.0
[9]	20.0	[10]	20.0	[11]	20.0	[12]	20.0	[13]	20.0	[14]	20.0	[15]	20.0	[16]	20.0
[17]	20.0	[18]	20.0	[19]	20.0	[20]	20.0	[21]	20.0	[22]	20.0	[23]	20.0	[24]	20.0
[25]	20.0	[26]	20.0	[27]	20.0	[28]	20.0	[29]	20.0	[30]	20.0	[31]	20.0	[32]	20.0
[33]	20.0	[34]	20.0	[35]	20.0	[36]	20.0	[37]	20.0	[38]	20.0	[39]	20.0	[40]	20.0
[41]	20.0	[42]	20.0	[43]	20.0	[44]	20.0	[45]	20.0	[46]	20.0	[47]	20.0	[48]	20.0
[49]	20.0	[50]	20.0	[51]	20.0	[52]	20.0	[53]	20.0	[54]	20.0	[55]	20.0	[56]	20.0
[57]	20.0	[58]	20.0	[59]	20.0	[60]	20.0	[61]	20.0	[62]	20.0	[63]	20.0	[64]	20.0

Meaning of parameter values:

- 0..500.00 Torque limit in % of M_N for the SERCOS parameter S-0-0092

 **The parameters of the drive must be set so that the value in S-0-0092 is interpreted as a percentage of the nominal torque!**

Functions relating to axes and spindles

1003 00032**Monitoring window fixed stop**Specifies for every **machining axis**

- the maximum position deviation at the fixed stop.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0..100.000	0.001	mm or de-grees	64	real	8 bytes	6	3	float	w,w,r	–					
Presettings [x] = element index															
[1]	0.001	[2]	0.001	[3]	0.001	[4]	0.001	[5]	0.001	[6]	0.001	[7]	0.001	[8]	0.001
[9]	0.001	[10]	0.001	[11]	0.001	[12]	0.001	[13]	0.001	[14]	0.001	[15]	0.001	[16]	0.001
[17]	0.001	[18]	0.001	[19]	0.001	[20]	0.001	[21]	0.001	[22]	0.001	[23]	0.001	[24]	0.001
[25]	0.001	[26]	0.001	[27]	0.001	[28]	0.001	[29]	0.001	[30]	0.001	[31]	0.001	[32]	0.001
[33]	0.001	[34]	0.001	[35]	0.001	[36]	0.001	[37]	0.001	[38]	0.001	[39]	0.001	[40]	0.001
[41]	0.001	[42]	0.001	[43]	0.001	[44]	0.001	[45]	0.001	[46]	0.001	[47]	0.001	[48]	0.001
[49]	0.001	[50]	0.001	[51]	0.001	[52]	0.001	[53]	0.001	[54]	0.001	[55]	0.001	[56]	0.001
[57]	0.001	[58]	0.001	[59]	0.001	[60]	0.001	[61]	0.001	[62]	0.001	[63]	0.001	[64]	0.001

1003 00050**Switching the positioning logic of endless axes using G151**Specifies for every **endless axis**

- whether or not its positioning logic can be switched using G151.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	64	integer	4 bytes	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

Meaning of parameter values:

- 0 Positioning logic cannot be switched using G151.
- 1 Positioning logic can be switched using G151.

Functions relating to axes and spindles

1003 00055

Places on circle for Hirth axis

Specifies for **rotary or endless axes**

- which one is to be configured as the Hirth axis, and
- the number of corresponding grid positions.

Hirth axes can only traverse to positions located on a fixed grid. All notch positions are equally distanced.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0...360000	1	–	64	integer	4 bytes	6	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

Meaning of parameter values:

0 No Hirth axis.

>0 Hirth axis. Number of notch positions.

For rotary axes: number of notch positions per revolution.

For endless axes: number of notch positions per modulo range.

 **This parameter has no relevance to axes that are neither rotary nor endless axes.**

Functions relating to axes and spindles

1003 00056

Place programming for Hirth axis

Specifies for **Hirth axes**

- whether their position values are to be programmed and displayed in “degrees” or as “place numbers”.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	64	integer	1 byte	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

Meaning of parameter values:

0 No Hirth axis or Hirth axis to be programmed in degrees.

1 Place programming.

The target position of the Hirth axis is programmed as a place number.

The individual places are numbered from 1 up to the total number of notch positions (see 1003 00055), with place 1 always being assigned to the 0 degrees position.

 **Notwithstanding the above, all shift values (resulting from a zero shift, e.g.) are interpreted in degrees.**

1003 00057

Endpoint correction for Hirth axes

Specifies for **Hirth axes**

- whether or not the control unit shall automatically correct programmed position values not coinciding with the Hirth grid.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	64	integer	1 byte	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

Functions relating to axes and spindles

Meaning of parameter values:

- 0 No Hirth axis, or no automatic correction.
Positions not coinciding with the Hirth grid will trigger a runtime error.
- 1 Automatic correction of programmed positions.
Every position programmed will be corrected with the effect that the Hirth axis moves to the nearest notch position.

 **Corrected positions and shifted zero points must coincide with Hirth grid positions.**

1003 00060

Max. following error for coupled axes

Specifies for every axis

- whether or not following error monitoring with active axis coupling is active and
- the max. allowable following error of a slave axis.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...999.999	0.001	mm or de-grees	64	real	8 bytes	6	3	float	w,w,r	–

Presettings [x] = element index											
[1]	0.000	[2]	0.000	[3]	0.000	[4]	0.000	[5]	0.000	[6]	0.000
[9]	0.000	[10]	0.000	[11]	0.000	[12]	0.000	[13]	0.000	[14]	0.000
[17]	0.000	[18]	0.000	[19]	0.000	[20]	0.000	[21]	0.000	[22]	0.000
[25]	0.000	[26]	0.000	[27]	0.000	[28]	0.000	[29]	0.000	[30]	0.000
[33]	0.000	[34]	0.000	[35]	0.000	[36]	0.000	[37]	0.000	[38]	0.000
[41]	0.000	[42]	0.000	[43]	0.000	[44]	0.000	[45]	0.000	[46]	0.000
[49]	0.000	[50]	0.000	[51]	0.000	[52]	0.000	[53]	0.000	[54]	0.000
[57]	0.000	[58]	0.000	[59]	0.000	[60]	0.000	[61]	0.000	[62]	0.000
										[63]	0.000
										[64]	0.000

Meaning of parameter values:

- 0.000 No following error monitoring.
- >0.000 Following error monitoring activated.
Maximum allowable following error.
If the maximum permissible following error between master and slave is exceeded while axis coupling is active, the control unit will trigger a coupling error.

The following error results from the balance of the actual slave position and the setpoint slave position derived from the actual master position:

$$\text{following error (slave)} = \text{dist. (actual}_{\text{slave}} - \text{setpoint}_{\text{slave}} (\text{actual}_{\text{master}}))$$

 **For information on axis coupling, see G580/G581, DIN Programming Manual.**

Functions relating to axes and spindles

1003 00061**Index of the leading gantry axis**Specifies for every **axis**

- whether or not it belongs to a gantry group and
- whether or not it is a leading axis.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0...64	1	–	64	integer	1 byte	2	–	signed	w,w,r	–					
Presettings [x] = element index															
[1]	00	[2]	00	[3]	00	[4]	00	[5]	00	[6]	00	[7]	00	[8]	00
[9]	00	[10]	00	[11]	00	[12]	00	[13]	00	[14]	00	[15]	00	[16]	00
[17]	00	[18]	00	[19]	00	[20]	00	[21]	00	[22]	00	[23]	00	[24]	00
[25]	00	[26]	00	[27]	00	[28]	00	[29]	00	[30]	00	[31]	00	[32]	00
[33]	00	[34]	00	[35]	00	[36]	00	[37]	00	[38]	00	[39]	00	[40]	00
[41]	00	[42]	00	[43]	00	[44]	00	[45]	00	[46]	00	[47]	00	[48]	00
[49]	00	[50]	00	[51]	00	[52]	00	[53]	00	[54]	00	[55]	00	[56]	00
[57]	00	[58]	00	[59]	00	[60]	00	[61]	00	[62]	00	[63]	00	[64]	00

Meaning of parameter values:

00 The axis does not belong to a gantry group.

>00 The axis belongs to a gantry group.

Enter the axis index (= the axis number) of the leading axis for all axes (incl. the leading axis) belonging to a gantry group.

Example:The gantry group is composed of axes 2, 5 and 6;
the leading axis is no. 2:

[1]	00	[2]	02	[3]	00	[4]	00	[5]	02	[6]	02	[7]	00	[8]	00
[9]	00	[10]	00	[11]	00	[12]	00	[13]	00	[14]	00	[15]	00	[16]	00

Functions relating to axes and spindles

1003 00062**Max. total static torque of a gantry group**Specifies for every **leading axis** of a gantry group

- whether or not static torque monitoring of the group concerned shall be activated and
- its torque limit.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0..10000.00	0.01	%	16	real	8 bytes	10	2	float	w,w,r	–					
Presettings [x] = element index															
[1]	0.00	[2]	0.00	[3]	0.00	[4]	0.00	[5]	0.00	[6]	0.00	[7]	0.00	[8]	0.00
[9]	0.00	[10]	0.00	[11]	0.00	[12]	0.00	[13]	0.00	[14]	0.00	[15]	0.00	[16]	0.00

Meaning of parameter values:

0.00 Monitoring is deactivated.

>0.00 Monitoring is activated; maximum static torque of all axes in the group.

The total static torque results from the static torque values of all individual axes of the group.

The total value is entered only for leading axes.

 **The parameters of all drives involved must be set so that the value is interpreted in S-0-0092 as a percentage of the nominal torque!**

1003 00070**Max. static torque of a single axis**Specifies for every **axis**

- whether or not its static torque monitoring function is to be activated and
- its torque limit.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0..10000.00	0.01	%	64	real	8 bytes	10	2	float	w,r,r	–					
Presettings [x] = element index															
[1]	0.00	[2]	0.00	[3]	0.00	[4]	0.00	[5]	0.00	[6]	0.00	[7]	0.00	[8]	0.00
[9]	0.00	[10]	0.00	[11]	0.00	[12]	0.00	[13]	0.00	[14]	0.00	[15]	0.00	[16]	0.00
[17]	0.00	[18]	0.00	[19]	0.00	[20]	0.00	[21]	0.00	[22]	0.00	[23]	0.00	[24]	0.00
[25]	0.00	[26]	0.00	[27]	0.00	[28]	0.00	[29]	0.00	[30]	0.00	[31]	0.00	[32]	0.00
[33]	0.00	[34]	0.00	[35]	0.00	[36]	0.00	[37]	0.00	[38]	0.00	[39]	0.00	[40]	0.00
[41]	0.00	[42]	0.00	[43]	0.00	[44]	0.00	[45]	0.00	[46]	0.00	[47]	0.00	[48]	0.00
[49]	0.00	[50]	0.00	[51]	0.00	[52]	0.00	[53]	0.00	[54]	0.00	[55]	0.00	[56]	0.00
[57]	0.00	[58]	0.00	[59]	0.00	[60]	0.00	[61]	0.00	[62]	0.00	[63]	0.00	[64]	0.00

Meaning of parameter values:

0.00 Monitoring is deactivated.

>0.00 Monitoring is activated; value of maximum torque permitted with axis at rest.

 **The parameters of the respective drive must be set so that the value in S-0-0092 is interpreted as a percentage of the nominal torque!**

Functions relating to axes and spindles

1003 00100

Override for auxiliary axis

Specifies for every **auxiliary axis**

- whether or not the override function for auxiliary axes is to be activated.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-01, 00	-	-	64	integer	1 byte	2	-	signed	w,w,r	-

Presettings [x] = element index

[1]	00	[2]	00	[3]	00	[4]	00	[5]	00	[6]	00	[7]	00	[8]	00
[9]	00	[10]	00	[11]	00	[12]	00	[13]	00	[14]	00	[15]	00	[16]	00
[17]	00	[18]	00	[19]	00	[20]	00	[21]	00	[22]	00	[23]	00	[24]	00
[25]	00	[26]	00	[27]	00	[28]	00	[29]	00	[30]	00	[31]	00	[32]	00
[33]	00	[34]	00	[35]	00	[36]	00	[37]	00	[38]	00	[39]	00	[40]	00
[41]	00	[42]	00	[43]	00	[44]	00	[45]	00	[46]	00	[47]	00	[48]	00
[49]	00	[50]	00	[51]	00	[52]	00	[53]	00	[54]	00	[55]	00	[56]	00
[57]	00	[58]	00	[59]	00	[60]	00	[61]	00	[62]	00	[63]	00	[64]	00

Meaning of parameter values:

- 01 No auxiliary axis, or
override function for auxiliary axes is not activated (= override is fixed to 100%).
- 00 Override function for auxiliary axes is activated.
The currently active override step is preset in each case via the axis interface of the axis involved (NC-I4.0 through NC-I4.4). The various override values under 7030 00010 (see page 4-170) are applicable in all operating modes. There, you can parameterize the override values globally for all auxiliary axes **under channel number 0**.

 **This parameter has no relevance to machining axes.**

Functions relating to axes and spindles

4.3.3 Axis velocities (feedrates) (group 1005)


1005 00002

Maximum axis and rapid traverse rates

Specifies for every axis

- its maximum allowable speed, and
- its rapid traverse speed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 36000000.000	0.001	mm/min or degrees/ min	64	real	8 bytes	11	3	float	w,r,r	–
Presettings [x] = element index										
[1] 15000.000	[2] 15000.000	[3] 15000.000	[4] 1548.000	[5] 10000.000	[6] 10000.000	[7] 1200.000	[8] 10000.000	[9] 10000.000	[10] 10000.000	[11] 10000.000
[12] 10000.000	[13] 10000.000	[14] 10000.000	[15] 10000.000	[16] 10000.000	[17] 10000.000	[18] 10000.000	[19] 10000.000	[20] 10000.000	[21] 10000.000	[22] 10000.000
[23] 10000.000	[24] 10000.000	[25] 10000.000	[26] 10000.000	[27] 10000.000	[28] 10000.000	[29] 10000.000	[30] 10000.000	[31] 10000.000	[32] 10000.000	[33] 10000.000
[34] 10000.000	[35] 10000.000	[36] 10000.000	[37] 10000.000	[38] 10000.000	[39] 10000.000	[40] 10000.000	[41] 10000.000	[42] 10000.000	[43] 10000.000	[44] 10000.000
[45] 10000.000	[46] 10000.000	[47] 10000.000	[48] 10000.000	[49] 10000.000	[50] 10000.000	[51] 10000.000	[52] 10000.000	[53] 10000.000	[54] 10000.000	[55] 10000.000
[56] 10000.000	[57] 10000.000	[58] 10000.000	[59] 10000.000	[60] 10000.000	[61] 10000.000	[62] 10000.000	[63] 10000.000	[64] 10000.000	[65] 10000.000	[66] 10000.000

 The drive, in turn, monitors the axis speed with the aid of SERCOS parameter S-0-0091. The value set in the control unit must be parametrized smaller than this drive limit value.

1005 00003

Manual feed slow

Specifies for every axis

- its feedrate in the velocity range "Manual feed slow" for jog mode.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 36000000.000	0.001	mm/min or degrees/ min	64	real	8 bytes	11	3	float	w,w,r	–
Presettings [x] = element index										
[1] 160.000	[2] 160.000	[3] 160.000	[4] 16.000	[5] 160.000	[6] 160.000	[7] 16.000	[8] 16.000	[9] 160.000	[10] 160.000	[11] 160.000
[12] 160.000	[13] 160.000	[14] 160.000	[15] 160.000	[16] 160.000	[17] 160.000	[18] 160.000	[19] 160.000	[20] 160.000	[21] 160.000	[22] 160.000
[23] 160.000	[24] 160.000	[25] 160.000	[26] 160.000	[27] 160.000	[28] 160.000	[29] 160.000	[30] 160.000	[31] 160.000	[32] 160.000	[33] 160.000
[34] 160.000	[35] 160.000	[36] 160.000	[37] 160.000	[38] 160.000	[39] 160.000	[40] 160.000	[41] 160.000	[42] 160.000	[43] 160.000	[44] 160.000
[45] 160.000	[46] 160.000	[47] 160.000	[48] 160.000	[49] 160.000	[50] 160.000	[51] 160.000	[52] 160.000	[53] 160.000	[54] 160.000	[55] 160.000
[56] 160.000	[57] 160.000	[58] 160.000	[59] 160.000	[60] 160.000	[61] 160.000	[62] 160.000	[63] 160.000	[64] 160.000	[65] 160.000	[66] 160.000

Functions relating to axes and spindles

1005 00004

Manual feed medium

Specifies for every **axis**

- its feedrate in the velocity range "Manual feed medium" for jog mode.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 36000000.000	0.001	mm/min or degrees/ min	64	real	8 bytes	11	3	float	w,w,r	–

Presettings [x] = element index

[1] 2000.000	[2] 2000.000	[3] 2000.000	[4] 200.000	[5] 2000.000	[6] 2000.000	[7] 200.000	[8] 200.000
[9] 2000.000	[10] 2000.000	[11] 2000.000	[12] 2000.000	[13] 2000.000	[14] 2000.000	[15] 2000.000	[16] 2000.000
[17] 2000.000	[18] 2000.000	[19] 2000.000	[20] 2000.000	[21] 2000.000	[22] 2000.000	[23] 2000.000	[24] 2000.000
[25] 2000.000	[26] 2000.000	[27] 2000.000	[28] 2000.000	[29] 2000.000	[30] 2000.000	[31] 2000.000	[32] 2000.000
[33] 2000.000	[34] 2000.000	[35] 2000.000	[36] 2000.000	[37] 2000.000	[38] 2000.000	[39] 2000.000	[40] 2000.000
[41] 2000.000	[42] 2000.000	[43] 2000.000	[44] 2000.000	[45] 2000.000	[46] 2000.000	[47] 2000.000	[48] 2000.000
[49] 2000.000	[50] 2000.000	[51] 2000.000	[52] 2000.000	[53] 2000.000	[54] 2000.000	[55] 2000.000	[56] 2000.000
[57] 2000.000	[58] 2000.000	[59] 2000.000	[60] 2000.000	[61] 2000.000	[62] 2000.000	[63] 2000.000	[64] 2000.000

1005 00005

Manual feed fast

Specifies for every **axis**

- its feedrate in the velocity range "Manual feed fast" for jog mode.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 36000000.000	0.001	mm/min or degrees/ min	64	real	8 bytes	11	3	float	w,w,r	–

Presettings [x] = element index

[1] 7500.000	[2] 7500.000	[3] 7500.000	[4] 750.000	[5] 7500.000	[6] 7500.000	[7] 750.000	[8] 750.000
[9] 7500.000	[10] 7500.000	[11] 7500.000	[12] 7500.000	[13] 7500.000	[14] 7500.000	[15] 7500.000	[16] 7500.000
[17] 7500.000	[18] 7500.000	[19] 7500.000	[20] 7500.000	[21] 7500.000	[22] 7500.000	[23] 7500.000	[24] 7500.000
[25] 7500.000	[26] 7500.000	[27] 7500.000	[28] 7500.000	[29] 7500.000	[30] 7500.000	[31] 7500.000	[32] 7500.000
[33] 7500.000	[34] 7500.000	[35] 7500.000	[36] 7500.000	[37] 7500.000	[38] 7500.000	[39] 7500.000	[40] 7500.000
[41] 7500.000	[42] 7500.000	[43] 7500.000	[44] 7500.000	[45] 7500.000	[46] 7500.000	[47] 7500.000	[48] 7500.000
[49] 7500.000	[50] 7500.000	[51] 7500.000	[52] 7500.000	[53] 7500.000	[54] 7500.000	[55] 7500.000	[56] 7500.000
[57] 7500.000	[58] 7500.000	[59] 7500.000	[60] 7500.000	[61] 7500.000	[62] 7500.000	[63] 7500.000	[64] 7500.000

Functions relating to axes and spindles

1005 00006**Manual feed rapid**

Specifies for every axis

- its feedrate in the velocity range "Manual feed rapid" for jog mode.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 36000000.000	0.001	mm/min or degrees/ min	64	real	8 bytes	11	3	float	w,w,r	–
Presettings [x] = element index										
[1] 15000.000	[2] 15000.000	[3] 15000.000	[4] 1548.000	[5] 10000.000	[6] 10000.000	[7] 1548.000	[8] 1548.000	[9] 10000.000	[10] 10000.000	[11] 10000.000
[12] 10000.000	[13] 10000.000	[14] 10000.000	[15] 10000.000	[16] 10000.000	[17] 10000.000	[18] 10000.000	[19] 10000.000	[20] 10000.000	[21] 10000.000	[22] 10000.000
[23] 10000.000	[24] 10000.000	[25] 10000.000	[26] 10000.000	[27] 10000.000	[28] 10000.000	[29] 10000.000	[30] 10000.000	[31] 10000.000	[32] 10000.000	[33] 10000.000
[34] 10000.000	[35] 10000.000	[36] 10000.000	[37] 10000.000	[38] 10000.000	[39] 10000.000	[40] 10000.000	[41] 10000.000	[42] 10000.000	[43] 10000.000	[44] 10000.000
[45] 10000.000	[46] 10000.000	[47] 10000.000	[48] 10000.000	[49] 10000.000	[50] 10000.000	[51] 10000.000	[52] 10000.000	[53] 10000.000	[54] 10000.000	[55] 10000.000
[56] 10000.000	[57] 10000.000	[58] 10000.000	[59] 10000.000	[60] 10000.000	[61] 10000.000	[62] 10000.000	[63] 10000.000	[64] 10000.000	[65] 10000.000	[66] 10000.000

1005 00007**Manual feed for defined steps**

Specifies for every axis

- its feedrate in the velocity range "Manual feed for defined steps" for jog mode.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 36000000.000	0.001	mm/min or degrees/ min	64	real	8 bytes	11	3	float	w,w,r	–
Presettings [x] = element index										
[1] 160.000	[2] 160.000	[3] 160.000	[4] 16.000	[5] 160.000	[6] 160.000	[7] 16.000	[8] 16.000	[9] 160.000	[10] 160.000	[11] 160.000
[12] 160.000	[13] 160.000	[14] 160.000	[15] 160.000	[16] 160.000	[17] 160.000	[18] 160.000	[19] 160.000	[20] 160.000	[21] 160.000	[22] 160.000
[23] 160.000	[24] 160.000	[25] 160.000	[26] 160.000	[27] 160.000	[28] 160.000	[29] 160.000	[30] 160.000	[31] 160.000	[32] 160.000	[33] 160.000
[34] 160.000	[35] 160.000	[36] 160.000	[37] 160.000	[38] 160.000	[39] 160.000	[40] 160.000	[41] 160.000	[42] 160.000	[43] 160.000	[44] 160.000
[45] 160.000	[46] 160.000	[47] 160.000	[48] 160.000	[49] 160.000	[50] 160.000	[51] 160.000	[52] 160.000	[53] 160.000	[54] 160.000	[55] 160.000
[56] 160.000	[57] 160.000	[58] 160.000	[59] 160.000	[60] 160.000	[61] 160.000	[62] 160.000	[63] 160.000	[64] 160.000	[65] 160.000	[66] 160.000

Functions relating to axes and spindles

1005 00008

Manual feed for variable steps

Specifies for every **axis**

- its feedrate in the velocity range "Manual feed for variable steps" for jog mode.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 36000000.000	0.001	mm/min or degrees/ min	64	real	8 bytes	11	3	float	w,w,r	–
Presettings [x] = element index										
[1] 160.000	[2] 160.000	[3] 160.000	[4] 16.000	[5] 160.000	[6] 160.000	[7] 16.000	[8] 16.000	[9] 160.000	[10] 160.000	[11] 160.000
[12] 160.000	[13] 160.000	[14] 160.000	[15] 160.000	[16] 160.000	[17] 160.000	[18] 160.000	[19] 160.000	[20] 160.000	[21] 160.000	[22] 160.000
[23] 160.000	[24] 160.000	[25] 160.000	[26] 160.000	[27] 160.000	[28] 160.000	[29] 160.000	[30] 160.000	[31] 160.000	[32] 160.000	[33] 160.000
[34] 160.000	[35] 160.000	[36] 160.000	[37] 160.000	[38] 160.000	[39] 160.000	[40] 160.000	[41] 160.000	[42] 160.000	[43] 160.000	[44] 160.000
[45] 160.000	[46] 160.000	[47] 160.000	[48] 160.000	[49] 160.000	[50] 160.000	[51] 160.000	[52] 160.000	[53] 160.000	[54] 160.000	[55] 160.000
[56] 160.000	[57] 160.000	[58] 160.000	[59] 160.000	[60] 160.000	[61] 160.000	[62] 160.000	[63] 160.000	[64] 160.000	[65] 160.000	[66] 160.000

 See also MACODA parameter 1015 00002.


1005 00030

Maximum feedrate move to fixed stop

Specifies for every **machining axis**

- which maximum axis speed can be used to move to fixed stop (G475).
- which maximum path speed can be used to carry out G375 "Measuring fixed stop". The path speed is calculated from the axis speed of the axes involved.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0..10000.000	0.001	mm/min or de- grees/min	64	real	8 bytes	8	3	float	w,w,r	–
Presettings [x] = element index										
[1] 1.000	[2] 1.000	[3] 1.000	[4] 1.000	[5] 1.000	[6] 1.000	[7] 1.000	[8] 1.000	[9] 1.000	[10] 1.000	[11] 1.000
[12] 1.000	[13] 1.000	[14] 1.000	[15] 1.000	[16] 1.000	[17] 1.000	[18] 1.000	[19] 1.000	[20] 1.000	[21] 1.000	[22] 1.000
[23] 1.000	[24] 1.000	[25] 1.000	[26] 1.000	[27] 1.000	[28] 1.000	[29] 1.000	[30] 1.000	[31] 1.000	[32] 1.000	[33] 1.000
[34] 1.000	[35] 1.000	[36] 1.000	[37] 1.000	[38] 1.000	[39] 1.000	[40] 1.000	[41] 1.000	[42] 1.000	[43] 1.000	[44] 1.000
[45] 1.000	[46] 1.000	[47] 1.000	[48] 1.000	[49] 1.000	[50] 1.000	[51] 1.000	[52] 1.000	[53] 1.000	[54] 1.000	[55] 1.000
[56] 1.000	[57] 1.000	[58] 1.000	[59] 1.000	[60] 1.000	[61] 1.000	[62] 1.000	[63] 1.000	[64] 1.000	[65] 1.000	[66] 1.000

 It is determined in MP 1003 00030 whether G375 or G475 can be activated.

Functions relating to axes and spindles

4.3.4 Axis dynamics (group 1010)

1010 00001

Maximum axis acceleration

Specifies for every axis

- the maximum acceleration at which the CNC may activate the axis.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.001 ... 999.999	0.001	m/s ² or 1000 de- grees/s ²	64	real	8 bytes	7	3	float	w,r,r	–

Presettings [x] = element index

[1]	0.400	[2]	0.400	[3]	0.400	[4]	1.000	[5]	0.400	[6]	0.400	[7]	1.000	[8]	1.000
[9]	0.400	[10]	0.400	[11]	0.400	[12]	0.400	[13]	0.400	[14]	0.400	[15]	0.400	[16]	0.400
[17]	0.400	[18]	0.400	[19]	0.400	[20]	0.400	[21]	0.400	[22]	0.400	[23]	0.400	[24]	0.400
[25]	0.400	[26]	0.400	[27]	0.400	[28]	0.400	[29]	0.400	[30]	0.400	[31]	0.400	[32]	0.400
[33]	0.400	[34]	0.400	[35]	0.400	[36]	0.400	[37]	0.400	[38]	0.400	[39]	0.400	[40]	0.400
[41]	0.400	[42]	0.400	[43]	0.400	[44]	0.400	[45]	0.400	[46]	0.400	[47]	0.400	[48]	0.400
[49]	0.400	[50]	0.400	[51]	0.400	[52]	0.400	[53]	0.400	[54]	0.400	[55]	0.400	[56]	0.400
[57]	0.400	[58]	0.400	[59]	0.400	[60]	0.400	[61]	0.400	[62]	0.400	[63]	0.400	[64]	0.400

 **The values set here must be smaller than the limits stored under S-0-0138 for the respective drive!**

 **If block transitions occur within an interpolator clock pulse, parameter 1010 00012 applies.**

1010 00002

Jog acceleration

Specifies for every axis

- its acceleration and deceleration for jogging in manual operation mode.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.001 ... 999.999	0.001	m/s ² or 1000 de- grees/s ²	64	real	8 bytes	7	3	float	w,r,r	–

Presettings [x] = element index

[1]	0.000	[2]	0.000	[3]	0.000	[4]	0.000	[5]	0.000	[6]	0.000	[7]	0.000	[8]	0.000
[9]	0.000	[10]	0.000	[11]	0.000	[12]	0.000	[13]	0.000	[14]	0.000	[15]	0.000	[16]	0.000
[17]	0.000	[18]	0.000	[19]	0.000	[20]	0.000	[21]	0.000	[22]	0.000	[23]	0.000	[24]	0.000
[25]	0.000	[26]	0.000	[27]	0.000	[28]	0.000	[29]	0.000	[30]	0.000	[31]	0.000	[32]	0.000
[33]	0.000	[34]	0.000	[35]	0.000	[36]	0.000	[37]	0.000	[38]	0.000	[39]	0.000	[40]	0.000
[41]	0.000	[42]	0.000	[43]	0.000	[44]	0.000	[45]	0.000	[46]	0.000	[47]	0.000	[48]	0.000
[49]	0.000	[50]	0.000	[51]	0.000	[52]	0.000	[53]	0.000	[54]	0.000	[55]	0.000	[56]	0.000
[57]	0.000	[58]	0.000	[59]	0.000	[60]	0.000	[61]	0.000	[62]	0.000	[63]	0.000	[64]	0.000

Meaning of parameter values:

- 0.000 The value set for parameter 1010 00001 is applied to the axis
- >0.000 Jog acceleration/deceleration in manual operation mode.

Functions relating to axes and spindles

1010 00011

Max. axis step change

Specifies for every **machining axis**

- the maximum axis step change allowed at block transitions while G8 (path slope) is active.

Here, you can define the maximum allowed difference at block transitions between two subsequent velocity setpoint values from one interpolator clock pulse to the next.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 99999.999	0.001	mm/min or degrees/ min	64	real	8 bytes	8	3	float	w,r,r	–
Presettings [x] = element index										
[1] 2000.000	[2] 2000.000	[3] 2000.000	[4] 2000.000	[5] 2000.000	[6] 2000.000	[7] 2000.000	[8] 2000.000	[9] 2000.000	[10] 2000.000	[11] 2000.000
[12] 2000.000	[13] 2000.000	[14] 2000.000	[15] 2000.000	[16] 2000.000	[17] 2000.000	[18] 2000.000	[19] 2000.000	[20] 2000.000	[21] 2000.000	[22] 2000.000
[23] 2000.000	[24] 2000.000	[25] 2000.000	[26] 2000.000	[27] 2000.000	[28] 2000.000	[29] 2000.000	[30] 2000.000	[31] 2000.000	[32] 2000.000	[33] 2000.000
[34] 2000.000	[35] 2000.000	[36] 2000.000	[37] 2000.000	[38] 2000.000	[39] 2000.000	[40] 2000.000	[41] 2000.000	[42] 2000.000	[43] 2000.000	[44] 2000.000
[45] 2000.000	[46] 2000.000	[47] 2000.000	[48] 2000.000	[49] 2000.000	[50] 2000.000	[51] 2000.000	[52] 2000.000	[53] 2000.000	[54] 2000.000	[55] 2000.000
[56] 2000.000	[57] 2000.000	[58] 2000.000	[59] 2000.000	[60] 2000.000	[61] 2000.000	[62] 2000.000	[63] 2000.000	[64] 2000.000	[65] 2000.000	[66] 2000.000

 See also MACODA parameter 7030 00310 (Seite 4–172).

1010 00012

Max. axis step change acceleration

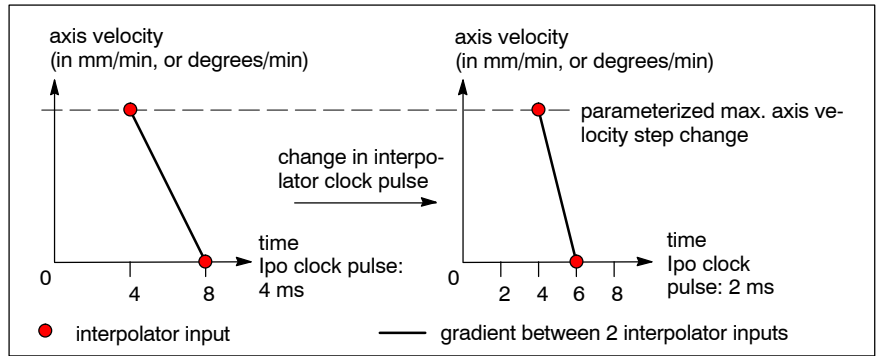
Limits for every machining axis

- the maximum acceleration allowable for axis velocity step changes at block transitions.

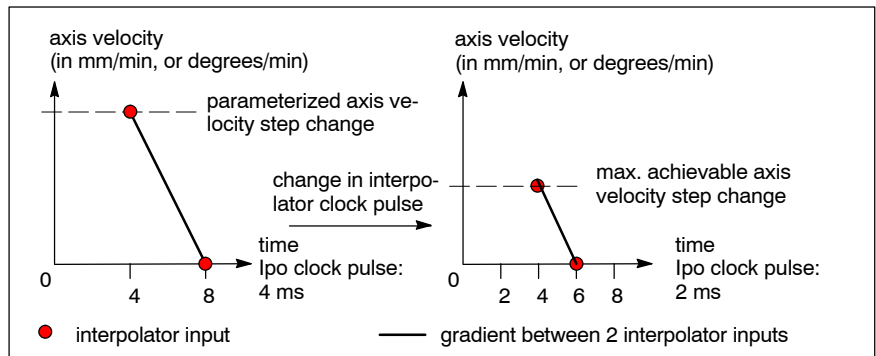
Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 199.999	0.001	m/s ² or 1000 de- grees/s ²	64	real	4 bytes	6	3	float	w,r,r	–
Presettings [x] = element index										
[1] 8.000	[2] 8.000	[3] 8.000	[4] 8.000	[5] 8.000	[6] 8.000	[7] 8.000	[8] 8.000	[9] 8.000	[10] 8.000	[11] 8.000
[12] 8.000	[13] 8.000	[14] 8.000	[15] 8.000	[16] 8.000	[17] 8.000	[18] 8.000	[19] 8.000	[20] 8.000	[21] 8.000	[22] 8.000
[23] 8.000	[24] 8.000	[25] 8.000	[26] 8.000	[27] 8.000	[28] 8.000	[29] 8.000	[30] 8.000	[31] 8.000	[32] 8.000	[33] 8.000
[34] 8.000	[35] 8.000	[36] 8.000	[37] 8.000	[38] 8.000	[39] 8.000	[40] 8.000	[41] 8.000	[42] 8.000	[43] 8.000	[44] 8.000
[45] 8.000	[46] 8.000	[47] 8.000	[48] 8.000	[49] 8.000	[50] 8.000	[51] 8.000	[52] 8.000	[53] 8.000	[54] 8.000	[55] 8.000
[56] 8.000	[57] 8.000	[58] 8.000	[59] 8.000	[60] 8.000	[61] 8.000	[62] 8.000	[63] 8.000	[64] 8.000	[65] 8.000	[66] 8.000

Functions relating to axes and spindles

The axis acceleration applied at block transitions by the axis velocity step change depends on the max. velocity step change value entered and the interpolator clock pulse (see 1090 00001) currently set. If maximum axis step change acceleration values are identical, maximum acceleration (gradient) changes in dependence on the configuration of the interpolator clock pulse. Therefore, an increased clock frequency will always lead to a steeper slope, which the drives may not be able to carry out properly.



Parameter 1010 00012 prevents this effect by limiting the maximum acceleration to be applied at block transitions. If parameter values are set too low (= low gradient), the set axis velocity step change may not be achieved in operation.



Functions relating to axes and spindles

1010 00030**Maximum acceleration moving to fixed stop**Specifies for every **machining axis**

- which maximum axis acceleration is used to move to fixed stop (G475).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.001..999.999	0.001	m/s ² or 1000 degrees/s ²	64	real	8 bytes	7	3	float	w,w,r	—

Presettings [x] = element index

[1]	0.100	[2]	0.100	[3]	0.100	[4]	0.100	[5]	0.100	[6]	0.100	[7]	0.100	[8]	0.100
[9]	0.100	[10]	0.100	[11]	0.100	[12]	0.100	[13]	0.100	[14]	0.100	[15]	0.100	[16]	0.100
[17]	0.100	[18]	0.100	[19]	0.100	[20]	0.100	[21]	0.100	[22]	0.100	[23]	0.100	[24]	0.100
[25]	0.100	[26]	0.100	[27]	0.100	[28]	0.100	[29]	0.100	[30]	0.100	[31]	0.100	[32]	0.100
[33]	0.100	[34]	0.100	[35]	0.100	[36]	0.100	[37]	0.100	[38]	0.100	[39]	0.100	[40]	0.100
[41]	0.100	[42]	0.100	[43]	0.100	[44]	0.100	[45]	0.100	[46]	0.100	[47]	0.100	[48]	0.100
[49]	0.100	[50]	0.100	[51]	0.100	[52]	0.100	[53]	0.100	[54]	0.100	[55]	0.100	[56]	0.100
[57]	0.100	[58]	0.100	[59]	0.100	[60]	0.100	[61]	0.100	[62]	0.100	[63]	0.100	[64]	0.100

Functions relating to axes and spindles

4.3.5 Axis positions / axis accuracy (group 1015)

1015 00001

Axis resolution

Specifies for every axis

- how the individual increments in jog or handwheel mode are to be weighted.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.001 ... 100.000	0.001	µm or 0.001 de- grees	64	real	4 bytes	6	3	float	w,w,r	–
Presettings [x] = element index										
[1] 1.000	[2] 1.000	[3] 1.000	[4] 0.100	[5] 1.000	[6] 1.000	[7] 0.100	[8] 0.100	[9] 1.000	[10] 1.000	[11] 1.000
[12] 1.000	[13] 1.000	[14] 1.000	[15] 1.000	[16] 1.000	[17] 1.000	[18] 1.000	[19] 1.000	[20] 1.000	[21] 1.000	[22] 1.000
[23] 1.000	[24] 1.000	[25] 1.000	[26] 1.000	[27] 1.000	[28] 1.000	[29] 1.000	[30] 1.000	[31] 1.000	[32] 1.000	[33] 1.000
[34] 1.000	[35] 1.000	[36] 1.000	[37] 1.000	[38] 1.000	[39] 1.000	[40] 1.000	[41] 1.000	[42] 1.000	[43] 1.000	[44] 1.000
[45] 1.000	[46] 1.000	[47] 1.000	[48] 1.000	[49] 1.000	[50] 1.000	[51] 1.000	[52] 1.000	[53] 1.000	[54] 1.000	[55] 1.000
[56] 1.000	[57] 1.000	[58] 1.000	[59] 1.000	[60] 1.000	[61] 1.000	[62] 1.000	[63] 1.000	[64] 1.000	[65] 1.000	[66] 1.000

 If the input signal “Inch increment” is set on the axis interface of a linear axis, the PNC multiplies the value set here by the factor 2.54. This allows traversing in jog mode also by increments in inch.

1015 00002

Variable increment step

Specifies for every axis

- by how many increments the axis is to traverse in traversing step “X increments” when the jog key is pressed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1 ... 1000000	1	increment	64	integer	4 bytes	7	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1] 20000	[2] 20000	[3] 20000	[4] 20000	[5] 20000	[6] 20000	[7] 20000	[8] 20000	[9] 20000	[10] 20000	[11] 20000
[12] 20000	[13] 20000	[14] 20000	[15] 20000	[16] 20000	[17] 20000	[18] 20000	[19] 20000	[20] 20000	[21] 20000	[22] 20000
[23] 20000	[24] 20000	[25] 20000	[26] 20000	[27] 20000	[28] 20000	[29] 20000	[30] 20000	[31] 20000	[32] 20000	[33] 20000
[34] 20000	[35] 20000	[36] 20000	[37] 20000	[38] 20000	[39] 20000	[40] 20000	[41] 20000	[42] 20000	[43] 20000	[44] 20000
[45] 20000	[46] 20000	[47] 20000	[48] 20000	[49] 20000	[50] 20000	[51] 20000	[52] 20000	[53] 20000	[54] 20000	[55] 20000
[56] 20000	[57] 20000	[58] 20000	[59] 20000	[60] 20000	[61] 20000	[62] 20000	[63] 20000	[64] 20000	[65] 20000	[66] 20000

 See also MACODA parameter 1005 00008.


Functions relating to axes and spindles

1015 00010

Distance to endpoint

Specifies for every axis

- whether or not monitoring of the distance to the programmed endpoint is to be activated and
- the distance from the programmed endpoint at which the signal "Axis near endpoint" is to be output on the respective axis interface.

 **Distance monitoring has no relevance to**
 – slave axes when axes coupling is active,
 – axes traversing on an inclined plane,
 – handwheel mode, and
 – in operating mode "Traverse to reference point".


Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-1.0...999.000	0.001 (for values ≥ 0.0)	mm or degrees	64	real	4 bytes	6	3	signed	w,w,r	-

Presettings [x] = element index

[1] -1.0	[2] -1.0	[3] -1.0	[4] -1.0	[5] -1.0	[6] -1.0	[7] -1.0	[8] -1.0	[9] -1.0	[10] -1.0	[11] -1.0	[12] -1.0	[13] -1.0	[14] -1.0	[15] -1.0	[16] -1.0	[17] -1.0	[18] -1.0	[19] -1.0	[20] -1.0	[21] -1.0	[22] -1.0	[23] -1.0	[24] -1.0	[25] -1.0	[26] -1.0	[27] -1.0	[28] -1.0	[29] -1.0	[30] -1.0	[31] -1.0	[32] -1.0	[33] -1.0	[34] -1.0	[35] -1.0	[36] -1.0	[37] -1.0	[38] -1.0	[39] -1.0	[40] -1.0	[41] -1.0	[42] -1.0	[43] -1.0	[44] -1.0	[45] -1.0	[46] -1.0	[47] -1.0	[48] -1.0	[49] -1.0	[50] -1.0	[51] -1.0	[52] -1.0	[53] -1.0	[54] -1.0	[55] -1.0	[56] -1.0	[57] -1.0	[58] -1.0	[59] -1.0	[60] -1.0	[61] -1.0	[62] -1.0	[63] -1.0	[64] -1.0
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Meaning of parameter values:

- 1.0 No distance monitoring.
- ≥ Desired distance to programmed endpoint.
 As soon as the axis moves within this distance, the control unit sets the output signal "Axis near endpoint" on the respective axis interface.
 The signal is reset with every new position data input, provided the programmed path is longer than the distance to the endpoint as set in the parameter.

 **If axes are to traverse at high feedrates and with interpolation across blocks, distances that are set too short may have the effect that, from an NC perspective, reaching the distance to the endpoint coincides with the beginning of the next block. In this case it may happen that the interface signal is not output.**

Functions relating to axes and spindles

1015 00100

In-position window

Specifies for every axis

- the "In-position window, rough" when G165 is active.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-20.000 ... 20.000	0.001	mm or degrees	64	real	4 bytes	5	3	float	w,w,r	–
Presettings [x] = element index										
[1] 0.010	[2] 0.010	[3] 0.010	[4] 0.010	[5] 0.010	[6] 0.010	[7] 0.010	[8] 0.010	[9] 0.010	[10] 0.010	[11] 0.010
[12] 0.010	[13] 0.010	[14] 0.010	[15] 0.010	[16] 0.010	[17] 0.010	[18] 0.010	[19] 0.010	[20] 0.010	[21] 0.010	[22] 0.010
[23] 0.010	[24] 0.010	[25] 0.010	[26] 0.010	[27] 0.010	[28] 0.010	[29] 0.010	[30] 0.010	[31] 0.010	[32] 0.010	[33] 0.010
[34] 0.010	[35] 0.010	[36] 0.010	[37] 0.010	[38] 0.010	[39] 0.010	[40] 0.010	[41] 0.010	[42] 0.010	[43] 0.010	[44] 0.010
[45] 0.010	[46] 0.010	[47] 0.010	[48] 0.010	[49] 0.010	[50] 0.010	[51] 0.010	[52] 0.010	[53] 0.010	[54] 0.010	[55] 0.010
[56] 0.010	[57] 0.010	[58] 0.010	[59] 0.010	[60] 0.010	[61] 0.010	[62] 0.010	[63] 0.010	[64] 0.010	[65] 0.010	[66] 0.010

-  **This parameter is only relevant to axes with:**
- DIAX/Eco-Drive (type of drive in MP 1050 00001 = 1), and
 - HNC100 (type of drive in MP 1050 00001 = 4).

In this case, the control unit itself generates the signal "Axis in position" for the respective axes when G165 is active. Instead of the SERCOS parameter S-0-0261 stored in the drive, which is normally required, the control unit uses the setpoint and the actual values available in the NC and the settings of this parameter.

As soon as the axis has finished a traversing motion and is within the set position window, the signal "Axis in position" is output on the respective axis interface.

-  **In the context of the "Exact positioning" function, the PNC allows switching between 2 different in-position windows using functions G164 or G165.**

As a prerequisite for using G164, the SERCOS parameter S-0-0057 must be available in the drive.

If the drive used does not support a second in-position window via SERCOS parameter S-0-0261, this parameter allows to use function G165 nevertheless.

Functions relating to axes and spindles

4.3.6 Axis limit switches (group 1020)

1020 00001

Software limit, positive

Limits for the respective **axis**

- the maximum allowable position input in positive traversing direction.

If a position beyond this maximum allowable position is entered, a run-time error will occur unless the limit switches are deactivated.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-99999.998 ... 99999.999	0.001	mm or degrees	64	real	8 bytes	8	3	float	w,r,r	-

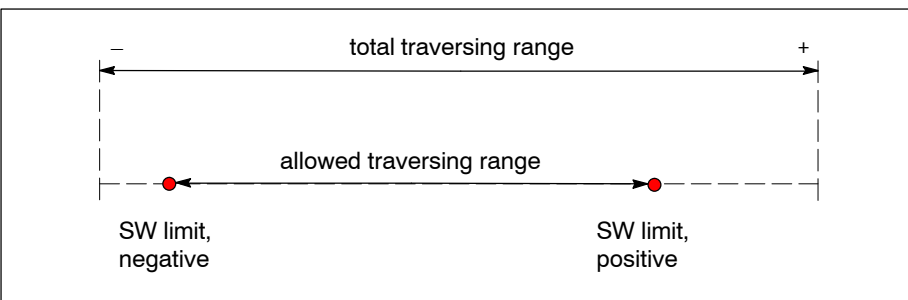
Presettings [x] = element index									
[1] 10000.000	[2] 8000.000	[3] 5000.000	[4] 360.000	[5] 10000.000	[6] 0.000	[7] 0.000	[8] 0.000	[9] 0.000	[10] 0.000
[11] 0.000	[12] 0.000	[13] 0.000	[14] 0.000	[15] 0.000	[16] 0.000	[17] 0.000	[18] 0.000	[19] 0.000	[20] 0.000
[21] 0.000	[22] 0.000	[23] 0.000	[24] 0.000	[25] 0.000	[26] 0.000	[27] 0.000	[28] 0.000	[29] 0.000	[30] 0.000
[31] 0.000	[32] 0.000	[33] 0.000	[34] 0.000	[35] 0.000	[36] 0.000	[37] 0.000	[38] 0.000	[39] 0.000	[40] 0.000
[41] 0.000	[42] 0.000	[43] 0.000	[44] 0.000	[45] 0.000	[46] 0.000	[47] 0.000	[48] 0.000	[49] 0.000	[50] 0.000
[51] 0.000	[52] 0.000	[53] 0.000	[54] 0.000	[55] 0.000	[56] 0.000	[57] 0.000	[58] 0.000	[59] 0.000	[60] 0.000
[61] 0.000	[62] 0.000	[63] 0.000	[64] 0.000	[65] 0.000	[66] 0.000	[67] 0.000	[68] 0.000	[69] 0.000	[70] 0.000

Meaning of parameter values:

99999.999 No limit switches; limit switches are deactivated.

<99999.999 Limit switches are active.
Maximum allowable position input in positive traversing direction.

The values set here must not exceed the limits stored under S-0-0049 (position limit, positive) in the respective drive!



"Software limit, positive" < "software limit, negative" will result in a run-time error as soon as a position is entered.

☞ Software limits can also be deactivated dynamically via the corresponding axis interface.

Functions relating to axes and spindles


1020 00002**Software limit, negative**Limits for the respective **axis**

- the minimum allowable position input in negative traversing direction.
- If a position beyond this maximum allowable position is entered, a runtime error will occur unless the limit switches are deactivated.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-99999.998 ... 99999.998	0.001	mm or degrees	64	real	8 bytes	8	3	float	w,r,r	-
Presettings [x] = element index										
[1]-10000.000	[2]-8000.000	[3]-5000.000	[4]-360.000	[5]-10000.000	[6] 0.000	[7] 0.000	[8] 0.000	[9] 0.000	[10] 0.000	[11] 0.000
[12] 0.000	[13] 0.000	[14] 0.000	[15] 0.000	[16] 0.000	[17] 0.000	[18] 0.000	[19] 0.000	[20] 0.000	[21] 0.000	[22] 0.000
[23] 0.000	[24] 0.000	[25] 0.000	[26] 0.000	[27] 0.000	[28] 0.000	[29] 0.000	[30] 0.000	[31] 0.000	[32] 0.000	[33] 0.000
[34] 0.000	[35] 0.000	[36] 0.000	[37] 0.000	[38] 0.000	[39] 0.000	[40] 0.000	[41] 0.000	[42] 0.000	[43] 0.000	[44] 0.000
[45] 0.000	[46] 0.000	[47] 0.000	[48] 0.000	[49] 0.000	[50] 0.000	[51] 0.000	[52] 0.000	[53] 0.000	[54] 0.000	[55] 0.000
[56] 0.000	[57] 0.000	[58] 0.000	[59] 0.000	[60] 0.000	[61] 0.000	[62] 0.000	[63] 0.000	[64] 0.000	[65] 0.000	[66] 0.000

The values set here must not lie below the limits stored under S-0-0050 (position limit, negative) in the respective drive!

"Software limit, positive" < "software limit, negative" will result in a runtime error as soon as a position is entered.

 **Software limits of axes can be deactivated statically by entering 99999.999 in parameter 1020 00001 or dynamically via the respective axis interface.**

Functions relating to axes and spindles

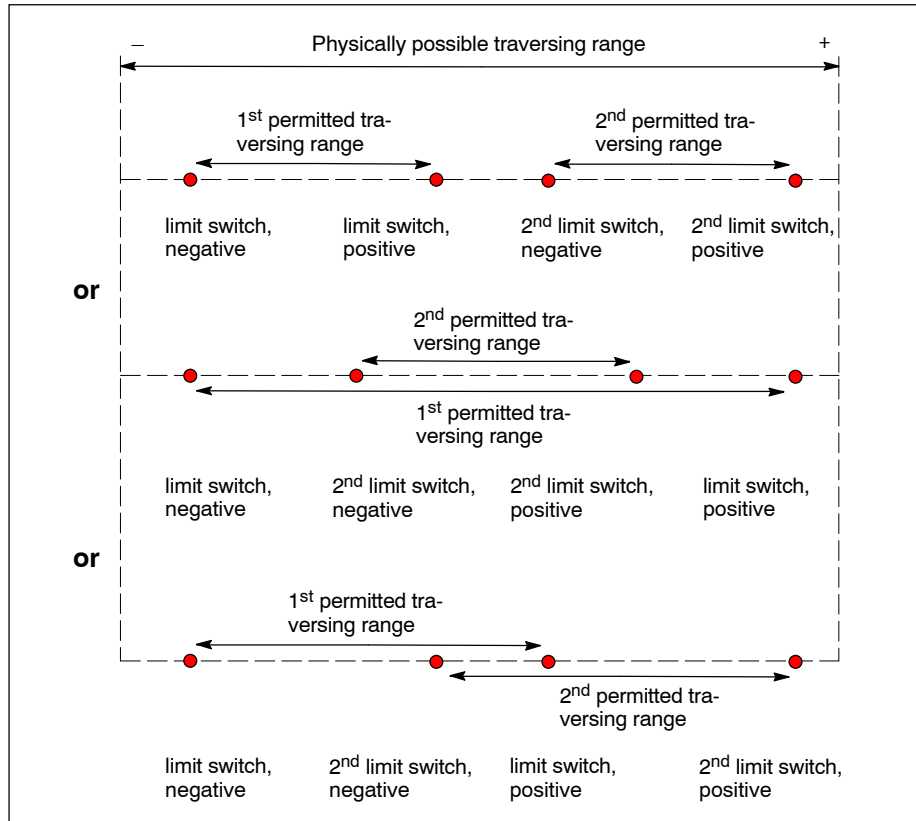
1020 00003

2nd software limit, positive

Same functionality and effects of parameter values as for 1020 00001.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-99999.998 ... 99999.999	0.001	mm or degrees	64	real	8 bytes	8	3	float	w,r,r	-
Presettings [x] = element index										
[1] 99999.999	[2] 99999.999	[3] 99999.999	[4] 99999.999	[5] 99999.999	[6] 99999.999	[7] 99999.999	[8] 99999.999	[9] 0.000	[10] 0.000	[11] 0.000
[12] 0.000	[13] 0.000	[14] 0.000	[15] 0.000	[16] 0.000	[17] 0.000	[18] 0.000	[19] 0.000	[20] 0.000	[21] 0.000	[22] 0.000
[23] 0.000	[24] 0.000	[25] 0.000	[26] 0.000	[27] 0.000	[28] 0.000	[29] 0.000	[30] 0.000	[31] 0.000	[32] 0.000	[33] 0.000
[34] 0.000	[35] 0.000	[36] 0.000	[37] 0.000	[38] 0.000	[39] 0.000	[40] 0.000	[41] 0.000	[42] 0.000	[43] 0.000	[44] 0.000
[45] 0.000	[46] 0.000	[47] 0.000	[48] 0.000	[49] 0.000	[50] 0.000	[51] 0.000	[52] 0.000	[53] 0.000	[54] 0.000	[55] 0.000
[56] 0.000	[57] 0.000	[58] 0.000	[59] 0.000	[60] 0.000	[61] 0.000	[62] 0.000	[63] 0.000	[64] 0.000		

The "2nd software limits" allow to specify two permitted traversing ranges within the physically possible traversing range of an axis. These two traversing ranges permitted may overlap. To switch from one range to the other, the limit switches may have to be deactivated temporarily via the axis interface.



The 2nd software limits of axes can be deactivated statically by entering 99999.999 in parameter 1020 00001 or dynamically via the respective axis interface.

Functions relating to axes and spindles

1020 00004**2nd software limit, negative**

Same functionality and effects of parameter values as for 1020 00002.


Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-99999.998 ... 99999.998	0.001	mm or degrees	64	real	8 bytes	8	3	float	w,r,r	-
Presettings [x] = element index										
[1] 0.000	[2] 0.000	[3] 0.000	[4] 0.000	[5] 0.000	[6] 0.000	[7] 0.000	[8] 0.000	[9] 0.000	[10] 0.000	[11] 0.000
[12] 0.000	[13] 0.000	[14] 0.000	[15] 0.000	[16] 0.000	[17] 0.000	[18] 0.000	[19] 0.000	[20] 0.000	[21] 0.000	[22] 0.000
[23] 0.000	[24] 0.000	[25] 0.000	[26] 0.000	[27] 0.000	[28] 0.000	[29] 0.000	[30] 0.000	[31] 0.000	[32] 0.000	[33] 0.000
[34] 0.000	[35] 0.000	[36] 0.000	[37] 0.000	[38] 0.000	[39] 0.000	[40] 0.000	[41] 0.000	[42] 0.000	[43] 0.000	[44] 0.000
[45] 0.000	[46] 0.000	[47] 0.000	[48] 0.000	[49] 0.000	[50] 0.000	[51] 0.000	[52] 0.000	[53] 0.000	[54] 0.000	[55] 0.000
[56] 0.000	[57] 0.000	[58] 0.000	[59] 0.000	[60] 0.000	[61] 0.000	[62] 0.000	[63] 0.000	[64] 0.000	[65] 0.000	[66] 0.000

Functions relating to axes and spindles

4.3.7 Axis transformations (group 1030)

The kinematics of an axis is defined in MACODA parameters 1030 00110 through 1030 00150. Each of these MACODA parameters is available ten times. Therefore, you can configure the kinematics of up to ten axes.

N... Coord(<i>) is used to activate any of these ten configurations in the NC program (see DIN Programming Manual). Their transformation number i (i=1,...,10) indicates the MACODA parameter set where the respective configuration is stored.

 **For further information on the parameters used for axis transformation in the various MACODA parameters, see the “PNC Description of Functions” manual and the “DIN Programming Manual”.**

1030 00110

Axis transformation type

This is the default identification number of an axis transformation set by Rexroth. For detailed information, see “PNC Description of Functions”.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
any	–	–	1	integer	4 bytes	7	–	unsigned	–,–,–	t.-spec.
Presettings: basic setup. [x]=element index										
[1]	0									
Presettings: transformation 1 [x]=element index										
[1]	3232201									
Presettings: transformation 2 [x]=element index										
[1]	3032101									
Presettings: transformation 3 through 10 [x]=element index										
[1]	0									

The following axis transformation types are available:

- 0 no axis transformation activated.
- 3232201 Rexroth 5 axis transformation active
- 3232101 Rexroth 5 axis transformation active
- 3032101 Rexroth 5 axis transformation active
- 3333301 Rexroth 6 axis transformation active
- 3033101 Rexroth 6 axis transformation active
- 2011001 Rexroth polar coordinate transformation active

Functions relating to axes and spindles

1030 00120**System axes of transformation**

Specifies

- the system axis numbers of the transformation axes.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
1...64	1	–	8	integer	1 byte	2	–	unsigned	w,r,r	t.-spec.					
Presettings: basic setup. [x]=element index															
[1]	00	[2]	00	[3]	00	[4]	00	[5]	00	[6]	00	[7]	00	[8]	00
Presettings: transformation 1 and 2 [x]=element index															
[1]	01	[2]	02	[3]	03	[4]	05	[5]	04	[6]	00	[7]	00	[8]	00
Presettings: transformation 3 through 10 [x]=element index															
[1]	00	[2]	00	[3]	00	[4]	00	[5]	00	[6]	00	[7]	00	[8]	00

Meaning of the individual parameters:

[1] 1st transformation axis[2] 2nd transformation axis

etc.

Meaning of parameter values:

1...64 Number of the system axis

Functions relating to axes and spindles

1030 00130

Axis positions of the reference pose (zero position of coordinates)

Specifies

- the resulting axis positions with axis transformation active, based on the reference position (TCP position: $x=0$, $y=0$, $z=0$ and TCS orientation: $\varphi=0$, $\vartheta=0$, $\psi=0$).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
any	–	mm or degrees	8	real	8 bytes	9	4	float	w,r,r	t.-spec.

Presettings: basic setup. [x]=element index

[1]	0.0000	[2]	0.0000	[3]	0.0000	[4]	0.0000	[5]	0.0000	[6]	0.0000	[7]	0.0000	[8]	0.0000
-----	--------	-----	--------	-----	--------	-----	--------	-----	--------	-----	--------	-----	--------	-----	--------

Presettings: transformation 1 and 2 [x]=element index

[1]	-100.0000	[2]	0.0000	[3]	100.0000	[4]	0.0000	[5]	0.0000	[6]	0.0000	[7]	0.0000	[8]	0.0000
-----	-----------	-----	--------	-----	----------	-----	--------	-----	--------	-----	--------	-----	--------	-----	--------

Presettings: transformation 3 through 10 [x]=element index

[1]	0.0000	[2]	0.0000	[3]	0.0000	[4]	0.0000	[5]	0.0000	[6]	0.0000	[7]	0.0000	[8]	0.0000
-----	--------	-----	--------	-----	--------	-----	--------	-----	--------	-----	--------	-----	--------	-----	--------

Meaning of the individual parameters:

- [1] 1st transformation axis
- [2] 2nd transformation axis
- etc.

Meaning of parameter values:
Axis position in mm or degrees.

 **The meaning of the transformation axes is determined by the axis transformation type.**

Functions relating to axes and spindles

1030 00140**Length and angle parameters**

Specifies

- the geometry of axis kinematics, i.e. the distances and angles of the transformation axes in their reference positions.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
any	–	mm or degrees	16	real	8 bytes	9	4	float	w,r,r	t.-spec.
Presettings: basic setup. [x]=element index										
[1] 0.0000	[2] 0.0000	[3] 0.0000	[4] 0.0000	[5] 0.0000	[6] 0.0000	[7] 0.0000	[8] 0.0000	[9] 0.0000	[10] 0.0000	[11] 0.0000
[12] 0.0000	[13] 0.0000	[14] 0.0000	[15] 0.0000	[16] 0.0000						
Presettings: transformation 1 and 2 [x]=element index										
[1] 100.0000	[2] 0.0000	[3] 0.0000	[4] 0.0000	[5] 0.0000	[6] -100.0000	[7] 0.0000	[8] 0.0000	[9] 0.0000	[10] 0.0000	[11] 0.0000
[12] 0.0000	[13] 0.0000	[14] 0.0000	[15] 0.0000	[16] 0.0000						
Presettings: transformation 3 through 10 [x]=element index										
[1] 0.0000	[2] 0.0000	[3] 0.0000	[4] 0.0000	[5] 0.0000	[6] 0.0000	[7] 0.0000	[8] 0.0000	[9] 0.0000	[10] 0.0000	[11] 0.0000
[12] 0.0000	[13] 0.0000	[14] 0.0000	[15] 0.0000	[16] 0.0000						

 **The meaning of the individual parameters is determined by the axis transformation type.**

Functions relating to axes and spindles

1030 00150

Reference orientation of tool coordinate system

Specifies

- the orientation of the tool coordinate system (TCS) with its coordinates x_t , y_t , and z_t with reference to the basic workpiece coordinate system (BCS) in its reference position (see MACODA parameter 1030 00130).

 **This parameter is relevant to 6 axis transformation, 3333301.**

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
any	1	–	8	integer	1 byte	3	–	signed	w,r,r	t-spez.					
Presettings: basic setup. [x]=element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
Presettings: transformation 1 and 2 [x]=element index															
[1]	1	[2]	2	[3]	3	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
Presettings: transformation 3 to 10 [x]=element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0

Meaning of parameter values:

- [1] direction of TCS coordinate x_t
- [2] direction of TCS coordinate y_t
- [3] direction of TCS coordinate z_t
- [4]..[8] not meaningful

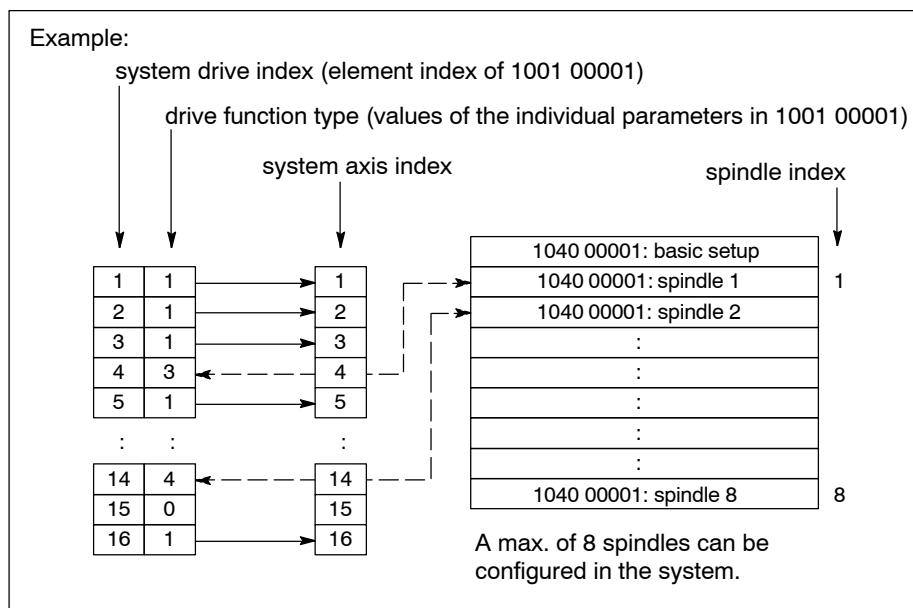
Functions relating to axes and spindles

4.3.8 Spindle parameters (group 1040)

Spindles are automatically assigned to the system-wide drive index in accordance with the following rule:

- Spindle 1 in 1040 00001 is assigned to the 1st drive which is configured as a spindle or as a spindle/C-axis in 1001 00001, spindle 2 is assigned to the 2nd drive which is configured correspondingly, etc. The order in which spindles are assigned is independent of the type of spindle configured in 1040 00001.

Basic parameter setups are used by the system as masters to be copied for another spindle if you wish to configure another drive correspondingly in 1001 00001.



For the display of configured spindles, see 6005 00030.

Functions relating to axes and spindles

1040 00001

Selection of spindle type

Specifies for a maximum of 8 **spindles**

- the type of spindle and
- whether or not a spindle is to be deactivated.


Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...3	1	–	1	integer	1 byte	1	–	unsigned	w,w,r	sp.-spec.
Presettings: basic setup. [x]=element index										
[1]	0									
Presettings: spindles 1 and 2. [x] = element index										
[1]	1									

Meaning of parameter values:


- 0 The spindle is deactivated.
You may use this function if, e.g., in the case of a whole series of machines, the number of spindles used can be configured. First, you should configure all spindles in view of the final, maximum expansion options and then you can simply deactivate those spindles that are not required on a machine.
- 1 The spindle is a SERCOS spindle.
- 2 The spindle is an auxiliary spindle.
- 3 The spindle is an analog spindle.

The following types of spindles are distinguished:

	SERCOS spindle	Aux. spindle	Analog spindle	External spindle
Spindle functionality implemented in the CNC	yes	no; only aux. function	yes	no
Syntax elements of the various spindle functions are specified via MACODA	yes	yes	yes	no; only aux. function
There is a spindle-specific I/O interface available for each spindle	yes	no	yes	no
Spindles can be assigned to spindle groups (parallel sp.) irrespective of sp. type	yes	yes	yes	no
Spindle is activated by	CNC	PLC	CNC	PLC
Max. number of spindles which can be configured per type	8	8	4	16

 **The assignment of analog spindles to the desired analog outputs can be specified in 4075 00104 (see page 4–131). The max. number of analog spindles is limited to 4 due to the number of analog outputs available on the DCIO.**

Functions relating to axes and spindles

 **You can specify the number of external spindles in 1040 00003. Although the number of external spindles configured is independent of the max. number of spindles (max. 8), it is limited to 16 by the max. number of spindles which can be shown on the channel-independent spindle overview.**

The number of spindle I/O interfaces available is shown by the spindle index of the last SERCOS or analog spindle configured in the system. Auxiliary spindles entered before the last SERCOS or analog spindle may occupy quite unnecessarily a spindle I/O interface. Therefore, we recommend that auxiliary spindles be entered **after** all SERCOS and analog spindles in 1040 00001. Thus, for auxiliary spindles entered in this order no entry specifying the drive function type is required in parameter 1001 00001 and these auxiliary spindles are not included in the maximum allowed number of drives, which is limited to 64. As a result, the following drive configurations can be entered for the final, maximum expansion option:

64 axes + 0 SERCOS spindles	+ 8 aux. spindles
63 axes + 1 SERCOS spindle	+ 7 aux. spindles
62 axes + 2 SERCOS spindles	+ 6 aux. spindles
:	
56 axes + 8 SERCOS spindles	+ 0 aux. spindles.

Functions relating to axes and spindles

1040 00002

Assignment of a physical spindle to a spindle group

Specifies for every **spindle** in the system

- whether or not the spindle is assigned to a spindle group and if so, to which one.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...4	1	–	1	integer	1 byte	1	–	unsigned	w,w,r	sp.-spec.
Presettings: basic setup. [x]=element index										
[1]	0									
Presettings: spindle 1. [x]=element index										
[1]	1									

Meaning of parameter values:

- 0 The spindle is not assigned to a spindle group.
- 1 The spindle is assigned to spindle group 1.
- 2 The spindle is assigned to spindle group 2.
- 3 The spindle is assigned to spindle group 3.
- 4 The spindle is assigned to spindle group 4.

No spindle may be assigned to more than one spindle group. A spindle group may include SERCOS, analog and auxiliary spindles. In an extreme case, a single spindle group may thus include up to 8 spindles.

All spindles of a spindle group can be activated (programmed) jointly with the appropriate spindle group syntax (see 1040 00201, ff.). However, this is subject to the following condition:

- Auxiliary spindles can only be programmed jointly with the whole spindle group they belong to if the function concerned (e.g. "Spindle stop") has been
 - programmed before as an auxiliary function (see group 3010, "Auxiliary functions") **and**
 - its syntax has been assigned to the spindle (see 1040 00101, ff.).

1040 00003

Number of external spindles

Specifies

- the number of **external spindles** in the system.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...16	1	–	1	integer	1 byte	2	–	unsigned	w,r,r	–
Presettings. [x]=element index										
[1]	0									

An external spindle is defined as an auxiliary spindle with a function-specific syntax which only has an auxiliary function as opposed to a spindle syntax which can be set in the spindle parameters. Thus, an external spindle is controlled exclusively via PLC by means of auxiliary functions.

Functions relating to axes and spindles

The number of adjustable external spindles is independent of the number of those axes and SERCOS, analog and auxiliary spindles configured in configuration parameters 1001 00001 and 1040 00001. The limitation in the number of external spindles is due only to the listing capacity on the channel-independent overview of system spindles, where a maximum of 16 spindles can be displayed.

 **External spindles do not have a spindle interface and cannot be assigned to spindle groups. For the scaling of spindle speed values transferred by the PLC for display purposes, see 9020 00110.**

1040 00010

Number of gears

Specifies for every **spindle** in the system

- its number of gears.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1...4	1	–	1	integer	1 byte	1	–	unsigned	w,r,r	sp.-spec.

Presettings: basic setup. [x]=element index

[1] 4

1040 00011

Min. spindle speed in each gear

Specifies for every spindle and for each of its gears (number parameterized in 1040 00010)


- the minimum spindle speed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.00 ... 99999.99	0.01	rpm	depending on 1040 00010	real	8 bytes	7	2	float	w,r,r	sp.-spec.

Presettings: basic setup. [x]=element index

[1] 0.00 | [2] 0.00 | [3] 0.00 | [4] 0.00

If a lower setpoint value than the min. spindle speed specified in this parameter is entered for the gear currently set, either a change of gear is suggested, or the next-lower gear is selected automatically.

 **Automatic gear select: For the syntax for individual spindles, see 1040 00107, and for spindle groups, see 1040 00207.**

Functions relating to axes and spindles

1040 00012

Max. spindle speed in each gear

Specifies for every spindle and for each of its gears (number parameterized in 1040 00010)

- the maximum spindle speed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.00 ... 99999.99	0.01	rpm	depending on 1040 00010	real	8 bytes	7	2	float	w,r,r	sp.-spec.

Presettings: basic setup. [x]=element index

[1] 400.00 | [2] 830.00 | [3] 1720.00 | [4] 6000.00

If a higher setpoint value than the max. spindle speed specified in this parameter is entered for the gear currently set, either a change of gear is suggested, or the next-higher gear is selected automatically.

1040 00015

Spindle jog speed

Provides for every spindle with respect to function M3 and M4

- a table with spindle-specific speeds where you can select one spindle speed each per spindle-related interface signals 1.0 through 1.2.

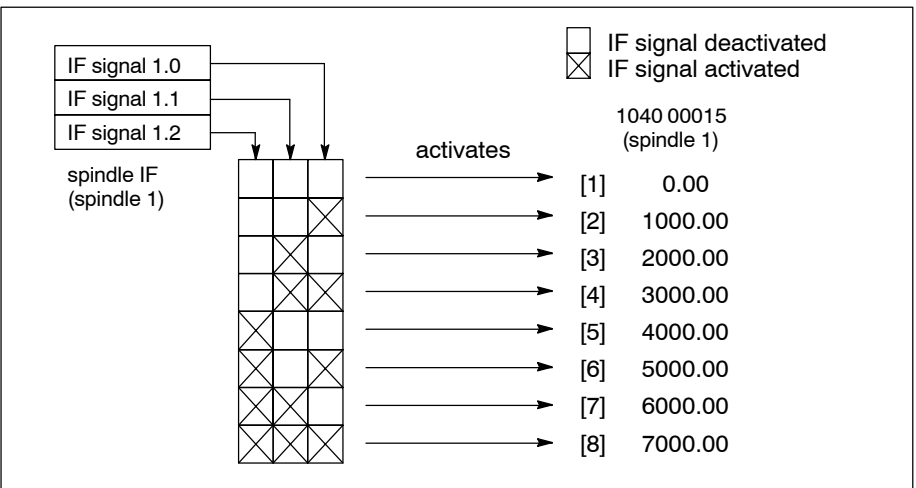
Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.00 ... 99999.99	0.01	rpm	8	real	8 bytes	7	2	float	w,w,r	sp.-spec.

Presettings: basic setup. [x]=element index

[1] 0.00 | [2] 1000.00 | [3] 2000.00 | [4] 3000.00 | [5] 4000.00 | [6] 5000.00 | [7] 6000.00 | [8] 7000.00

Example:

Activating the respective spindle jog speed via spindle interface (IF) signal:



Functions relating to axes and spindles

- ☞ **Because spindle speeds are stored without any relation to gear ranges, the spindle speed activated may be limited by the respective gear range.**

1040 00020**Spindle speed window**Specifies for every **spindle**

- its speed window where the interface signal "Progr. spindle speed reached" is output.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.00...999.99	0.01	rpm	1	real	8 bytes	5	2	float	w,r,r	sp.-spec.
Presettings: basic setup. [x]=element index										
[1]	2.00									

If the balance of the programmed spindle speed (offset against the spindle override) and the actual spindle speed lies within the configured window, the control unit activates the spindle-specific interface signal "Progr. spindle speed reached" provided that the value "0" is set for the corresponding spindle in parameter 1040 00021.

1040 00021**Spindle speed window**Specifies for every **spindle**

- its speed window where the interface signal "Progr. spindle speed reached" is output.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.00...100.00	0.01	%	1	real	4 bytes	5	2	float	w,r,r	sp.-spec.
Presettings: basic setup. [x]=element index										
[1]	0.00									

If the balance of the actual spindle speed and the programmed spindle speed (weighted by the spindle override) is less than or equal to the % rate specified here, the control unit activates the spindle-specific interface signal "Progr. spindle speed reached".

To ensure that for the calculation of the above balance required for the interface signal output the **absolute** value of the difference of actual and programmed spindle speeds is used (see 1040 00020), enter the value "0".

Functions relating to axes and spindles

1040 00031

Max. spindle acceleration

Specifies for each **gear** (total number of gears is set by the respective parameter in 1040 00010) of every spindle

- the spindle acceleration for clockwise rotation, counterclockwise rotation and "Spindle stop".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.00 ... 99999.99	0.01	rad/s ²	depending on 1040 00010	real	8 bytes	7	2	float	w,r,r	sp.-spec.

Presettings: basic setup. [x]=element index

[1] 400.00 | [2] 100.00 | [3] 100.00 | [4] 100.00

 **Acceleration values of drive-controlled functions, e.g. spindle positioning or spindle oscillation are stored in the drive and, therefore, not affected by this parameter.**

1040 00041

Spindle override in 32 steps

Specifies for every **spindle**


- its maximum override allowed and
- the values of the individual steps of the spindle override.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.00...150.00	0.01	%	33	real	4 bytes	5	2	float	w,r,r	sp.-spec.

Presettings: basic setup. [x]=element index

[1] 120.00 | [2] 0.00 | [3] 2.50 | [4] 5.00 | [5] 7.50 | [6] 10.00 | [7] 20.00 | [8] 30.00
 [9] 40.00 | [10] 50.00 | [11] 60.00 | [12] 70.00 | [13] 80.00 | [14] 90.00 | [15] 100.00 | [16] 110.00
 [17] 120.00 | [18] 130.00 | [19] 132.50 | [20] 135.00 | [21] 137.50 | [22] 140.00 | [23] 142.50 | [24] 145.00
 [25] 147.50 | [26] 150.00 | [27] 150.00 | [28] 150.00 | [29] 150.00 | [30] 150.00 | [31] 150.00 | [32] 150.00
 [33] 150.00

Enter the maximum allowable override value in individual parameter [1]. This value represents the NC-internal upper limit of the override (irrespective of the value set for the currently selected override step).

 **If the interface signal "Spindle override 100%" (I3.3) is set, this 100% value is effective even if a lower value is set in individual parameter [1].**

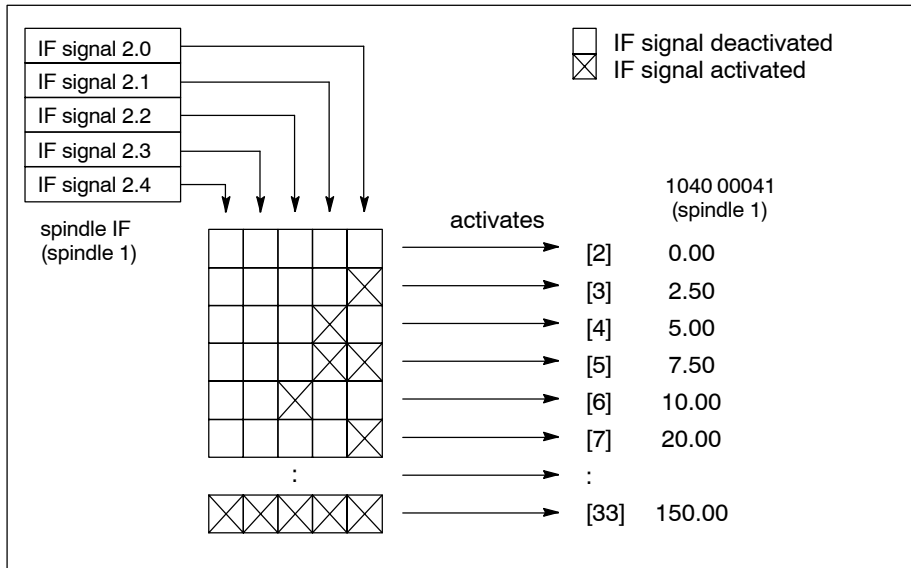
Individual parameters [2] through [33] contain the percentage rates for the 32 override steps. Values can be freely selected and programmed up to 150%. Because the individual steps do not have to be in ascending order, a Gray-code-based override is possible as well.

Functions relating to axes and spindles

The override step to be currently active is selected via the spindle-related interface signals "Override bit x" (I2.0...2.4).

Example:

Activating the various steps via spindle interface (IF) signals:



1040 00051

Position mode: 1st acceleration

Specifies for every **spindle**

- with position mode active (e.g. operation with positional synchronism) its acceleration in the range **below** the speed for acceleration switching set in 1040 00053.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.00 ... 99999.99	0.01	rad/s ²	1	real	8 bytes	7	2	float	w,w,r	sp.-spec.

Presettings: basic setup. [x]=element index

[1] 0.00

If you enter the value "0"

- the acceleration set in 1040 00031 (maximum spindle acceleration within the active gear) is applied and
- parameters 1040 00052 and 1040 00053 have no effect.

Functions relating to axes and spindles

1040 00052

Position mode: 2nd acceleration

Specifies for every **spindle**

- with position mode active its acceleration in the range **above** the speed for acceleration switching set in 1040 00053.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.01 ... 99999.99	0.01	rad/s ²	1	real	8 bytes	7	2	float	w,w,r	sp.-spec.

Presettings: basic setup. [x]=element index

[1] 0.01 |

1040 00053

Position mode: Speed for 2nd acceleration switching

Specifies for every **spindle**

- the speed at which switching from the 1st (1040 00051) to the 2nd acceleration (1040 00052) occurs.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.00 ... 99999.99	0.01	rpm	1	real	8 bytes	7	2	float	w,w,r	sp.-spec.

Presettings: basic setup. [x]=element index

[1] 0.00 |

1040 00052 applies above the specified speed, while 1040 00051 applies below it.
If "0" is entered, 1040 00051 alone applies throughout the whole speed range.

1040 00060

C axis: tool turret

Serves

- to adapt spindle/C-axis switching when using a combination of (cutter) spindle and tool turret on a lathe.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1, 2	1	–	1	integer	1 byte	1	–	unsigned	w,r,r	sp.-spec.

Presettings: basic setup. [x]=element index

[1] 0 |

Meaning of parameter values:

- 0 Normal operation (no tool turret)
- 1 The tool turret has its own gear range for driving the turret. Separate measuring systems are used for the spindle and the turret.

Functions relating to axes and spindles

If this parameter has been set, the SERCOS parameter set 4 (S-4-xxxx, P-4-xxxx) in the phase 2 and phase 3 SERCOS files must be initialized.

2 Possible with Servodyn-D drives only!

The tool turret has its own gear range for driving the turret. The measuring system available in the motor is used jointly for both the spindle and the turret.

In this case, the SERCOS parameter set 4 (S-4-xxxx, P-4-xxxx) in the phase 2 and phase 3 SERCOS files must be initialized.

An internally defined, permanent CPL variable (@_C_AXISxy_POS!) is used to secure the turret position when changing over to spindle operation. Upon change-over to turret operation, the axis position with the defining elements of this variable is downloaded.

1040 00101

Spindle syntax: Turn right (clockwise rotation)

Specifies for every **spindle** (1 through 8)

- the syntax of the function "clockwise rotation".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1] M103	[2] M203	[3]	[4]	[5]	[6]	[7]	[8]			

Please note the following for setting the individual parameters:

- If the function is also to be output as an auxiliary function on the interface, the respective syntax must be entered as an auxiliary function in group "3010, Auxiliary functions".
- In the case of spindles which are not assigned a syntax, individual programming of this function is inhibited.
However, if the spindle concerned is assigned to a spindle group (see 1040 00002), this function can be activated via the spindle group provided that the syntax has been declared there (see 1040 00201).
- Every syntax must be unique.

Functions relating to axes and spindles

1040 00102

Spindle syntax: Turn right (clockwise rotation) – coolant ON

Specifies for every **spindle** (1 through 8)

- the syntax of the function "clockwise rotation – coolant ON"

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1] M113	[2] M213	[3]	[4]	[5]	[6]	[7]	[8]			

For individual parameter values, please see the notes under MP 1040 00101.

1040 00103

Spindle syntax: Turn left (counter-clockwise rotation)

Specifies for every **spindle** (1 through 8)

- the syntax of the function "counter-clockwise rotation".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1] M104	[2] M204	[3]	[4]	[5]	[6]	[7]	[8]			

For individual parameter values, please see the notes under MP 1040 00101.

1040 00104

Spindle syntax: Turn left (counter-clockwise rotation) – coolant ON

Specifies for every **spindle** (1 through 8)

- the syntax of the function "counter-clockwise rotation – coolant ON".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1] M114	[2] M214	[3]	[4]	[5]	[6]	[7]	[8]			

For individual parameter values, please see the notes under MP 1040 00101.

Functions relating to axes and spindles

1040 00105

Spindle syntax: Stop

Specifies for every **spindle** (1 through 8)

- the syntax of the function "Stop".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M105	[2]	M205	[3]	[4]	[5]	[6]	[7]	[8]	

For individual parameter values, please see the notes under MP 1040 00101.

1040 00106

Spindle syntax: Spindle orientate

Specifies for every **spindle** (1 through 8)

- the syntax of the function "Spindle orientate".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M119	[2]	M219	[3]	[4]	[5]	[6]	[7]	[8]	

For individual parameter values, please see the notes under MP 1040 00101.

1040 00107

Spindle syntax: Automatic gear select

Specifies for every **spindle** (1 through 8)

- the syntax of the function "Automatic gear select".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M140	[2]	M240	[3]	[4]	[5]	[6]	[7]	[8]	

For individual parameter values, please see the notes under MP 1040 00101.

Functions relating to axes and spindles

1040 00108

Spindle syntax: Manual gear select, step 1

Specifies for every **spindle** (1 through 8)

- the syntax of the function "Manual gear select, step 1".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1] M141	[2] M241	[3]	[4]	[5]	[6]	[7]	[8]			

For individual parameter values, please see the notes under MP 1040 00101.

1040 00109

Spindle syntax: Manual gear select, step 2

Specifies for every **spindle** (1 through 8)

- the syntax of the function "Manual gear select, step 2".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1] M142	[2] M242	[3]	[4]	[5]	[6]	[7]	[8]			

For individual parameter values, please see the notes under MP 1040 00101.

1040 00110

Spindle syntax: Manual gear select, step 3

Specifies for every **spindle** (1 through 8)

- the syntax of the function "Manual gear select, step 3".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1] M143	[2] M243	[3]	[4]	[5]	[6]	[7]	[8]			

For individual parameter values, please see the notes under MP 1040 00101.

Functions relating to axes and spindles

1040 00111

Spindle syntax: Manual gear select, step 4

Specifies for every **spindle** (1 through 8)

- the syntax of the function "Manual gear select, step 4".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes				
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–				
Presettings. [x]=element index														
[1]	M144	[2]	M244	[3]		[4]		[5]		[6]		[7]		[8]

For individual parameter values, please see the notes under MP 1040 00101.

1040 00112

Spindle syntax: Neutral gear

Specifies for every **spindle** (1 through 8)

- the syntax of the function "Neutral gear".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes				
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–				
Presettings. [x]=element index														
[1]	M148	[2]	M248	[3]		[4]		[5]		[6]		[7]		[8]

For individual parameter values, please see the notes under MP 1040 00101.

1040 00201

Spindle group syntax: Turn right (clockwise rotation)

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "clockwise rotation".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M3	[2]		[3]		[4]				

Please note for individual parameter values:

- If the function is also to be output as an auxiliary function on the interface, the respective syntax must be entered as an auxiliary function in group "3010, Auxiliary functions".
- Spindle groups which are not assigned a syntax cannot be programmed with the respective function.
- Every syntax must be unique.

 **Which spindles are to be assigned to the various spindle groups is specified by configuring parameter 1040 00002. This assignment can be modified for a specific channel in the part program.**

Functions relating to axes and spindles

1040 00202

Spindle group syntax: Turn right (clockwise rotation) – coolant ON

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "clockwise rotation – coolant ON".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M13	[2]	[3]	[4]						

For individual parameter values, please see the notes under MP 1040 00201.

1040 00203

Spindle group syntax: Turn left (counter-clockwise rotation)

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "counter-clockwise rotation".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M4	[2]	[3]	[4]						

For individual parameter values, please see the notes under MP 1040 00201.

1040 00204

Spindle group syntax: Turn left (counter-clockwise rotation) – coolant ON

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "counter-clockwise rotation – coolant ON".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M14	[2]	[3]	[4]						

For individual parameter values, please see the notes under MP 1040 00201.

Functions relating to axes and spindles

1040 00205

Spindle group syntax: Stop

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "Stop".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M5	[2]	[3]	[4]						

For individual parameter values, please see the notes under MP 1040 00201.

1040 00206

Spindle group syntax: Spindle orientate

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "Spindle orientate".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M19	[2]	[3]	[4]						

For individual parameter values, please see the notes under MP 1040 00201.

1040 00207

Spindle group syntax: Automatic gear select

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "Automatic gear select".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M40	[2]	[3]	[4]						

For individual parameter values, please see the notes under MP 1040 00201.

Functions relating to axes and spindles

1040 00208

Spindle group syntax: Manual gear select, step 1

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "Manual gear select, step 1".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M41	[2]	[3]	[4]						

For individual parameter values, please see the notes under MP 1040 00201.

1040 00209

Spindle group syntax: Manual gear select, step 2

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "Manual gear select, step 2".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M42	[2]	[3]	[4]						

(For explanations on columns, please refer to page 4-1)

For individual parameter values, please see the notes under MP 1040 00201.

1040 00210

Spindle group syntax: Manual gear select, step 3

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "Manual gear select, step 3".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M43	[2]	[3]	[4]						

For individual parameter values, please see the notes under MP 1040 00201.

Functions relating to axes and spindles

1040 00211

Spindle group syntax: Manual gear select, step 4

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "Manual gear select, step 4".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M44	[2]	[3]	[4]						

For individual parameter values, please see the notes under MP 1040 00201.

1040 00212

Spindle group syntax: Neutral gear

Specifies for every **spindle group** (1 through 4)

- the syntax of the function "Neutral gear".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings. [x]=element index										
[1]	M48	[2]	[3]	[4]						

For individual parameter values, please see the notes under MP 1040 00201.

Functions relating to axes and spindles

4.3.9 SERCOS parameters (group 1050)

For SERCOS interface start-up and operation, a number of special files (see page 5-1, Section 5) are used in addition to the parameters of this group 1050.

 **Individual parameters of this group 1050 are transmitted by the NC to the drives in start-up phase 2.**

1050 00001


Type of drive

Specifies series and manufacturer for each **drive**.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	64	integer	1 byte	1	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

Meaning of parameter values:

- 0 Servodyn-D Rexroth
- 1 DIAX/Eco-Drive Rexroth
- 2 IndraDrive Rexroth
- 3 SERCOS standard, with S parameters defined functions
- 4 HNC100 Rexroth hydraulic axis
- 5 REFU spindle Rexroth
- 6 Hitachi

 **The in-position logic of drives varies with the type of the drive. Therefore, note MP 1015 00100 too.**

Functions relating to axes and spindles

Meaning of parameter values:

- 0 The drive is not configured in 1001 00001, or the drive is connected to ring 0.
- 1 The drive is connected to ring 1.

- ☞ **Ring 0: input X71, output X72**
- Ring 1: input X73, output X74**

1050 00004

Assignment of drives to SERCOS address

Specifies for every **drive**

- the SERCOS address set on the drive.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
000...255	1	–	64	integer	1 byte	3	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	001	[2]	002	[3]	003	[4]	004	[5]	005	[6]	006	[7]	007	[8]	008
[9]	009	[10]	010	[11]	011	[12]	012	[13]	013	[14]	014	[15]	015	[16]	016
[17]	017	[18]	018	[19]	019	[20]	020	[21]	021	[22]	022	[23]	023	[24]	024
[25]	025	[26]	026	[27]	027	[28]	028	[29]	029	[30]	030	[31]	031	[32]	032
[33]	033	[34]	034	[35]	035	[36]	036	[37]	037	[38]	038	[39]	039	[40]	040
[41]	041	[42]	042	[43]	043	[44]	044	[45]	045	[46]	046	[47]	047	[48]	048
[49]	049	[50]	050	[51]	051	[52]	052	[53]	053	[54]	054	[55]	055	[56]	056
[57]	057	[58]	058	[59]	059	[60]	060	[61]	061	[62]	062	[63]	063	[64]	064

Meaning of parameter values:

- 000 The drive is not configured in 1001 00001.
- 001...255 SERCOS address

- ☞ **No SERCOS address (001...255) must be assigned more than once in each ring. 2 drives may have the same SERCOS address only if they are assigned to different rings.**
The value entered here must be identical with the value set in the drive module.

Functions relating to axes and spindles

1050 00010

Automatic SERCOS timing

Defines for the control system

- whether or not the SERCOS transmissions times are determined automatically.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0..2	–	–	1	integer	1 byte	1	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1]	0									

Meaning of parameter values:


0 The function is deactivated.

1 Optimum actual T4 time value.

The actual position values given in the (telegram) message are as up to date as possible ("recommended setting").

2 Optimum setpoint T4 time value.

The setpoint position values are applied at the earliest possible time.

 **When this function is activated (value = 1,2), MACODA parameters 1050 00011, "Transmission time of drive messages" and 1050 00012, "Transmission time of master data telegram" are disabled. Ident. numbers S-0-0007, "Time of measurement of actual values", and S-0-0008, "Time for setpoint valid", must be deleted from the start-up file "p2common.scs".**

Functions relating to axes and spindles

1050 00011

Transmission time of drive telegrams (messages)

Specifies for every **drive**

- the time elapsed after the end of the master synchronization telegram (MST) in the ring when the respective drive telegrams (DT) are to be transmitted.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00000 ... 65000	1	µs	64	integer	2 bytes	5	–	unsigned	w,r,r	–

Presettings [x] = element index

[1] 00150	[2] 00300	[3] 00450	[4] 00600	[5] 00750	[6] 00900	[7] 01050	[8] 01200
[9] 00150	[10] 00300	[11] 00450	[12] 00600	[13] 00750	[14] 00900	[15] 01050	[16] 01200
[17] 00150	[18] 00300	[19] 00450	[20] 00600	[21] 00750	[22] 00900	[23] 01050	[24] 01200
[25] 00150	[26] 00300	[27] 00450	[28] 00600	[29] 00750	[30] 00900	[31] 01050	[32] 01200
[33] 00150	[34] 00300	[35] 00450	[36] 00600	[37] 00750	[38] 00900	[39] 01050	[40] 01200
[41] 00150	[42] 00300	[43] 00450	[44] 00600	[45] 00750	[46] 00900	[47] 01050	[48] 01200
[49] 00150	[50] 00300	[51] 00450	[52] 00600	[53] 00750	[54] 00900	[55] 01050	[56] 01200
[57] 00150	[58] 00300	[59] 00450	[60] 00600	[61] 00750	[62] 00900	[63] 01050	[64] 01200

- The time set here must be equal to or longer than the transmission reaction time (Ident. No. S-0-0003 in the drive).
- If “preferred telegrams” are used (for their configuration, see description of the respective drive), the minimum time lag between two drives in one and the same ring should be 80 µs, and if rather complex telegrams (messages) are used, the time lag should be increased so as to allow for the telegram lengths involved.
- 2 drives may have the same transmission time only if they belong to different SERCOS rings.

 **The SERCOS timing can be logged during start-up. See page 5–3.**

1050 00012

Transmission time of master data telegram (T2)

Specifies for every **SERCOS ring** (ring 0 and ring 1)


- The time elapsed after the end of the master synchronization telegram (MST) when the master data telegram (MDT) is to be transmitted.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00062 ... 65000	1	µs	2	integer	2 bytes	5	–	unsigned	w,r,r	–

Presettings [x] = element index

[1] 01722	[2] 01722
-----------	-----------

Functions relating to axes and spindles

 **As a rule of thumb, the minimum time set here should be the sum total of the time of the previous drive telegram transmitted (see 1050 00011) plus approx. 100 µs (depending on the drive telegram set).**

1050 00021

Timeout for SERCOS start-up

Specifies for every **SERCOS ring** (ring 0 and ring 1)

- the maximum period of time the control waits for the ring to run up (i.e. till all users of the ring have reached phase 4).

 **The time required for SERCOS start-up depends on the number of drives configured.**

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000...999	1	s	2	integer	4 bytes	3	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1]	000	[2]	060							

Unless all users of both rings have reached phase 4 upon the expiration of the time set here, the control unit automatically switches to "Test mode". In test mode, no setpoint values are output via the SERCOS interface.

If the SERCOS rings reach phase 4 after the timeout, test mode can be switched off manually.

 **Test mode on a channel can be controlled at the softkey level PRE-PARE MACHINING in AUTOMATIC mode.**

1050 00022

SCS files – Allow disable of phase 3 download

Defines for the control system

- whether or not parameters for phase 3 are saved in the drive to accelerate SERCOS start-up.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...1	–	–	1	integer	1 byte	1	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1]	0									

Meaning of parameter values:

- 0 Parameters are set through SCS files.

Functions relating to axes and spindles

- Parameters are saved in the drive; SCS files are downloaded only when parameters are modified.

 **Parameters saved in the drive are retained when the control system is switched off if the command "Save main memory" is executed before.**

In DIAGNOSTICS mode, go to ► Drive Diagnosis ► SERCOS Monitor and press the ► Save drive data softkey.

1050 00031

Optical transmission power

Specifies for every **SERCOS ring** (ring 0 and ring 1)

- the output power of the LED.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1...8	1	–	2	integer	1 byte	1	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1]	8		[2]	8						

Meaning of parameter values:

- Lowest output power
- Highest output power

Transmission power values set too low may cause communication errors in the ring. Transmission power values set too high may override the input modules of the connected slaves.

1050 00032

Baud rate

Specifies for every **SERCOS ring** (ring 0 and ring 1)

- its nominal baud rate (Mbit/s), measured on the optical output of the master (here: PNC-R: ring 0 and ring 1, PNC-P: ring 0).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
2...4	2	Mbit/s	2	integer	1 byte	1	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1]	2		[2]	2						

 **The same baud rate must be set for all users connected to the ring.**

Functions relating to PLC and interfaces

4.4 Functions relating to PLC and interfaces

4.4.1 Position monitoring (group 2010)

The PNC can monitor up to 64 positions throughout the system, with a maximum of 8 monitored positions that can be assigned to each axis. As long as the current setpoint position value of an axis (with compensation values taken into account, e.g. LSEC) is greater than/equal to the value of the monitored position, the corresponding bit is set within the signal range of 18.0 through 18.7 on the axis-specific interface.

 **You can monitor position ranges by linking the respective bits of an axis via the PLC.**

For rotary axes, you can also specify whether a position is to be monitored in respect of the whole traversing range of the axis or in respect of its range between 0° and 360°.

2010 00100

Monitored axis

Specifies for every of the 64 **monitored positions** available

- the axis to which a position is assigned and
- whether this position is to be monitored all the time, or only upon the completion of axis referencing.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-064...064	1	–	64	integer	1 byte	3	–	signed	w,r,r	–
Presettings [x] = element index										
[1] 000	[2] 000	[3] 000	[4] 000	[5] 000	[6] 000	[7] 000	[8] 000	[9] 000	[10] 000	[11] 000
[12] 000	[13] 000	[14] 000	[15] 000	[16] 000	[17] 000	[18] 000	[19] 000	[20] 000	[21] 000	[22] 000
[23] 000	[24] 000	[25] 000	[26] 000	[27] 000	[28] 000	[29] 000	[30] 000	[31] 000	[32] 000	[33] 000
[34] 000	[35] 000	[36] 000	[37] 000	[38] 000	[39] 000	[40] 000	[41] 000	[42] 000	[43] 000	[44] 000
[45] 000	[46] 000	[47] 000	[48] 000	[49] 000	[50] 000	[51] 000	[52] 000	[53] 000	[54] 000	[55] 000
[56] 000	[57] 000	[58] 000	[59] 000	[60] 000	[61] 000	[62] 000	[63] 000	[64] 000	[65] 000	[66] 000

Meaning of parameter values:

–064 ... –001 System axis index of the axis to which the monitored position is assigned.

The position is monitored permanently.

000 The position is not monitored.

001 ... 064 System axis index of the axis to which the monitored position is assigned. The position is monitored only after the axis was referenced.

 **One axis may be assigned a maximum of 8 positions.**

Functions relating to PLC and interfaces

2010 00110**Position**Specifies for every of the 64 **monitored positions** available

- its position value in mm or degrees.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-999999.9999 ... 999999.9999	0.0001	mm or degrees	64	real	8 bytes	10	4	float	w,r,r	–
Presettings [x] = element index										
[1] 0.0000	[2] 0.0000	[3] 0.0000	[4] 0.0000	[5] 0.0000	[6] 0.0000	[7] 0.0000	[8] 0.0000	[9] 0.0000	[10] 0.0000	[11] 0.0000
[12] 0.0000	[13] 0.0000	[14] 0.0000	[15] 0.0000	[16] 0.0000	[17] 0.0000	[18] 0.0000	[19] 0.0000	[20] 0.0000	[21] 0.0000	[22] 0.0000
[23] 0.0000	[24] 0.0000	[25] 0.0000	[26] 0.0000	[27] 0.0000	[28] 0.0000	[29] 0.0000	[30] 0.0000	[31] 0.0000	[32] 0.0000	[33] 0.0000
[34] 0.0000	[35] 0.0000	[36] 0.0000	[37] 0.0000	[38] 0.0000	[39] 0.0000	[40] 0.0000	[41] 0.0000	[42] 0.0000	[43] 0.0000	[44] 0.0000
[45] 0.0000	[46] 0.0000	[47] 0.0000	[48] 0.0000	[49] 0.0000	[50] 0.0000	[51] 0.0000	[52] 0.0000	[53] 0.0000	[54] 0.0000	[55] 0.0000
[56] 0.0000	[57] 0.0000	[58] 0.0000	[59] 0.0000	[60] 0.0000	[61] 0.0000	[62] 0.0000	[63] 0.0000	[64] 0.0000	[65] 0.0000	[66] 0.0000

2010 00120**Interface signal**Specifies for each of the 64 **monitored positions** available

- the bit of the 18.x output byte of the respective axis interface that is to serve as the monitoring signal.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000...007	1	–	64	integer	1 byte	3	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1] 000	[2] 000	[3] 000	[4] 000	[5] 000	[6] 000	[7] 000	[8] 000	[9] 000	[10] 000	[11] 000
[12] 000	[13] 000	[14] 000	[15] 000	[16] 000	[17] 000	[18] 000	[19] 000	[20] 000	[21] 000	[22] 000
[23] 000	[24] 000	[25] 000	[26] 000	[27] 000	[28] 000	[29] 000	[30] 000	[31] 000	[32] 000	[33] 000
[34] 000	[35] 000	[36] 000	[37] 000	[38] 000	[39] 000	[40] 000	[41] 000	[42] 000	[43] 000	[44] 000
[45] 000	[46] 000	[47] 000	[48] 000	[49] 000	[50] 000	[51] 000	[52] 000	[53] 000	[54] 000	[55] 000
[56] 000	[57] 000	[58] 000	[59] 000	[60] 000	[61] 000	[62] 000	[63] 000	[64] 000	[65] 000	[66] 000

Example:

If you enter the value "005", the signal is output on bit 18.5 of the corresponding axis interface.



Please make sure that individual parameters set at the same value are actually assigned to different axes in 2010 00100.

Functions relating to PLC and interfaces

2010 00130**Cyclical monitoring of rotary axes**Specifies for each of the 64 **monitored positions** available

- whether a position is to be monitored in respect of the whole rotation of the axis or in respect of its range between 0° and 360°.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000, 001	–	–	64	integer	1 byte	3	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1] 000	[2] 000	[3] 000	[4] 000	[5] 000	[6] 000	[7] 000	[8] 000	[9] 000	[10] 000	[11] 000
[12] 000	[13] 000	[14] 000	[15] 000	[16] 000	[17] 000	[18] 000	[19] 000	[20] 000	[21] 000	[22] 000
[23] 000	[24] 000	[25] 000	[26] 000	[27] 000	[28] 000	[29] 000	[30] 000	[31] 000	[32] 000	[33] 000
[34] 000	[35] 000	[36] 000	[37] 000	[38] 000	[39] 000	[40] 000	[41] 000	[42] 000	[43] 000	[44] 000
[45] 000	[46] 000	[47] 000	[48] 000	[49] 000	[50] 000	[51] 000	[52] 000	[53] 000	[54] 000	[55] 000
[56] 000	[57] 000	[58] 000	[59] 000	[60] 000	[61] 000	[62] 000	[63] 000	[64] 000		

Meaning of parameter values:

- 000 Monitoring in respect of absolute position data. The configured position to be monitored may be anywhere in the whole rotation range of the rotary axis.
- 001 Monitoring in respect of rotary axis "cycles". The configured position to be monitored may be anywhere in the range of 0° through 360°.

 **This parameter is only relevant to axes of the "Rotary" axis movement type (see 1003 00004).**

Functions relating to PLC and interfaces


The individual parameters define the start addresses of the following PLC address ranges relating to the operand type defined in 2060 00002:

- [1] Axis interfaces.
It is only for matters of compatibility that start addresses are required for configuration parameters that were saved in software versions prior to 4.1.1. (If so, all axis interfaces are stored one directly after another in ascending order.)
From software version 4.1.1 up, the start addresses of the various axis interfaces must be defined individually via 2060 00005.
If you want to continue using former configuration parameters that differ from the default settings, you must adjust the corresponding values in 2060 00005.
- [2] Spindle interfaces. For the function of this individual parameter, see [1].
From software version 4.1.1 up, the start addresses of the various spindle interfaces must be defined individually via 2060 00006.
If you want to continue using former configuration parameters that differ from the default settings, you must adjust the corresponding values in 2060 00006.
- [3] Channel interfaces (excluding the auxiliary channel). For the function of this individual parameter, see [1].
From software version 4.1.1 up, the start addresses of the various channel interfaces must be defined individually via 2060 00007.
If you want to continue using former configuration parameters that differ from the default settings, you must adjust the corresponding values in 2060 00007.
- [4] MSD.
- [5] Bit-coded auxiliary functions.
It is only for matters of compatibility that start addresses are required for configuration parameters that were saved in software versions that did not permit channel-specific start addresses for bit-coded auxiliary functions.
From software version 5.1.17 up, the start addresses of bit-coded auxiliary functions must be defined individually for each channel (0 through 12) via 2060 00009. For the advantages of this procedure, see page 4–80.
If you want to continue using former configuration parameters that differ from the default settings, you must adjust the corresponding values in 2060 00009.
- [6] Channel-independent 32-bit BCD auxiliary functions.
- [7] Channel-independent 64-bit BCD auxiliary functions.
- [8] External spindles (actual spindle speeds).
- [9] External spindle override.
- [10] Channel-specific 32-bit BCD auxiliary functions.
It is only for matters of compatibility that start addresses are required for configuration parameters that were saved in software versions that did not permit channel-specific start addresses for 32-bit BCD auxiliary functions.
From software version 5.1.17 up, the start addresses of 32-bit

Functions relating to PLC and interfaces

auxiliary functions must be defined individually for each channel (0 through 12) via 2060 00010.

- [11] Channel-specific 64-bit BCD-coded auxiliary functions. It is only for matters of compatibility that start addresses are required for configuration parameters that were saved in software versions that did not permit channel-specific start addresses for 64-bit BCD auxiliary functions. From software version 5.1.17 up, the start addresses of 64-bit auxiliary functions must be defined individually for each channel (0 through 12) via 2060 00011.

 **If the value “-1” is specified as address, this interface is not used and the signals are not copied.**

2060 00004

Time interval for copying the NC bit interface

Specifies

- the time interval in steps of 10 ms that must have elapsed before the NC bit interface is copied.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000...999	1	10ms	1	integer	2 bytes	3	-	unsigned	w,r,r	-
Presettings [x] = element index										

[1] 001 |

Meaning of parameter values:

- 000 The interface is copied after every PLC cycle completed.
- >000 The interface is copied after a period of 10 ms x *<parameter value>* at the earliest.

Functions relating to PLC and interfaces

2060 00005

Addresses of axis interfaces

Specifies for every axis

- the start address of its interface relating to the operand type defined in 2060 00002.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
00000...99999	1	–	64	integer	4 bytes	5	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1] 4000	[2] 4028	[3] 4056	[4] 4084	[5] 4112	[6] 4140	[7] 4168	[8] 4196	[9] 2200	[10] 2228	[11] 2256	[12] 2284	[13] 2312	[14] 2340	[15] 2368	[16] 2396
[17] 2424	[18] 2452	[19] 2480	[20] 2508	[21] 2536	[22] 2564	[23] 2592	[24] 2620	[25] 2648	[26] 2672	[27] 2704	[28] 2732	[29] 2760	[30] 2788	[31] 2816	[32] 2844
[33] 2872	[34] 2900	[35] 2928	[36] 2956	[37] 2984	[38] 3012	[39] 3040	[40] 3068	[41] 3096	[42] 3124	[43] 3152	[44] 3180	[45] 3208	[46] 3236	[47] 3264	[48] 3292
[49] 3320	[50] 3348	[51] 3376	[52] 3404	[53] 3432	[54] 3460	[55] 3488	[56] 3516	[57] 3544	[58] 3572	[59] 3600	[60] 3628	[61] 3656	[62] 3684	[63] 3712	[64] 3740

Meaning of the individual parameters:

- [1] start address for axis 1
- [2] start address for axis 2
- [3] start address for axis 3
- :
- [64] start address for axis 64

Advantage of axis-specific start addresses:

- There is no need to adjust the addresses of existing axis-specific signals in the PLC program whenever an axis is deactivated or newly implemented in the system (see 1001 00001).

 **If the start addresses of axis interfaces are defined via 2060 00005, PLC program module B01APSMN.PAH must be added and linked to the PLC program with version 4.1.1 and later.**

If the number of axes used on the machine may vary with further expansion options yet to come, we recommend that the final, maximum expansion option be taken into account by setting the parameters of the start address of all present and future axis interfaces.

Functions relating to PLC and interfaces

2060 00006

Addresses of spindle interfaces

Specifies for every **spindle**

- the start address of its interface relative to the operand type defined in 2060 00002.


Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
00000...99999	1	–	8	integer	4 bytes	5	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	04224	[2]	04252	[3]	3800	[4]	3828	[5]	3856	[6]	3884	[7]	3912	[8]	3940

Meaning of the individual parameters:

- [1] Start address, spindle 1
- [2] Start address, spindle 2
- [3] Start address, spindle 3
- :

Advantage of spindle-specific start addresses:

- There is no need to adjust the addresses of existing spindle-specific signals in the PLC program whenever a spindle is deactivated (see 1040 00001) or newly implemented in the system (see 1001 00001).

 **If the start addresses of spindle interfaces are defined individually, PLC program module B01APSMN.PAH must be added and linked to the PLC program with version 4.1.1 and later. If the number of spindles used may vary with further expansion options yet to come, we recommend that the final, maximum expansion option be taken into account by setting the parameters of the start address of all present and future spindle interfaces.**

2060 00007

Addresses of channel interfaces

Specifies for every **channel**

- the start address of its interface relating to the operand type defined in 2060 00002.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
00000...99999	1	–	13	integer	4 bytes	5	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	04282	[2]	04308	[3]	04334	[4]	04360	[5]	00000	[6]	00000	[7]	00000	[8]	00000
[9]	00000	[10]	00000	[11]	00000	[12]	00000	[13]	00000						

Meaning of the individual parameters:

- [1] Start address of the "auxiliary channel". The PNC uses the auxiliary channel for internally controlling machine functions, e.g.
- [2] Start address, channel 1
- [3] Start address, channel 2

Functions relating to PLC and interfaces

:
[13] Start address, channel 12

☞ **The number of channels applied is specified in 9040 00001. It is only with software version 4.1.0 and later that the auxiliary channel is assigned an interface of its own. Therefore, the start address of the auxiliary channel is not included in the channel interface start addresses of individual parameter [3] of 2060 00003.**

Advantage of channel-specific start addresses:

- There is no need to adjust the addresses of existing channel-specific signals in the PLC program whenever a channel is deactivated or newly implemented in the system (see 9040 00001).

☞ **If the start addresses of channel interfaces are defined individually, PLC program module B01APSMN.PAH must be added and linked to the PLC program for version 4.1.1 and later. If the number of channels used may vary with further expansion options yet to come, we recommend that the final, maximum expansion option be taken into account by setting the parameters of the start address of all present and future channel interfaces.**

2060 00008

Address of the general interface

Specifies

- the start address of the general interface relating to the operand type defined in 2060 00002.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-00001 ... 32768	1	-	1	integer	4 bytes	5	-	signed	w,r,r	-
Presettings [x] = element index										

[1] -00001 |

Meaning of parameter values:

-00001 General interface not available.

> (-00001) Start address of the general interface.

The interface has 4 byte inputs and 4 byte outputs (i.e. 32 inputs and 32 outputs). The addresses of the outputs are stored right after the addresses of the inputs.

Functions relating to PLC and interfaces

2060 00009

Addresses of channel-specific, bit-coded auxiliary functions

Specifies for every **channel**

- the start addresses of bit-coded auxiliary function ranges relating to the operand type defined in 2060 00002.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00000 ... 08192	1	–	13	integer	4 bytes	5	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1] 04662	[2] 04700	[3] 04738	[4] 04776	[5] 00000	[6] 00000	[7] 00000	[8] 00000	[9] 00000	[10] 00000	[11] 00000
[12] 00000	[13] 00000									

Meaning of the individual parameters:

- [1] Start address of the bit-coded auxiliary function range for the auxiliary channel (channel 0). The PNC uses the auxiliary channel for internal control of machine functions, e.g.
- [2] Start address of the bit-coded auxiliary function range for channel 1
- :
- [13] Start address of the bit-coded auxiliary function range for channel 12

Meaning of parameter values:

The value range for setting of the address is dependent on the type of operand set (MP 2060 00001), the size of which is also dependent on the active PLC.

0000 ... 6143: Start address (for ICL 700, KNS only)

0000 ... 8192: Start address (for iPCL only)

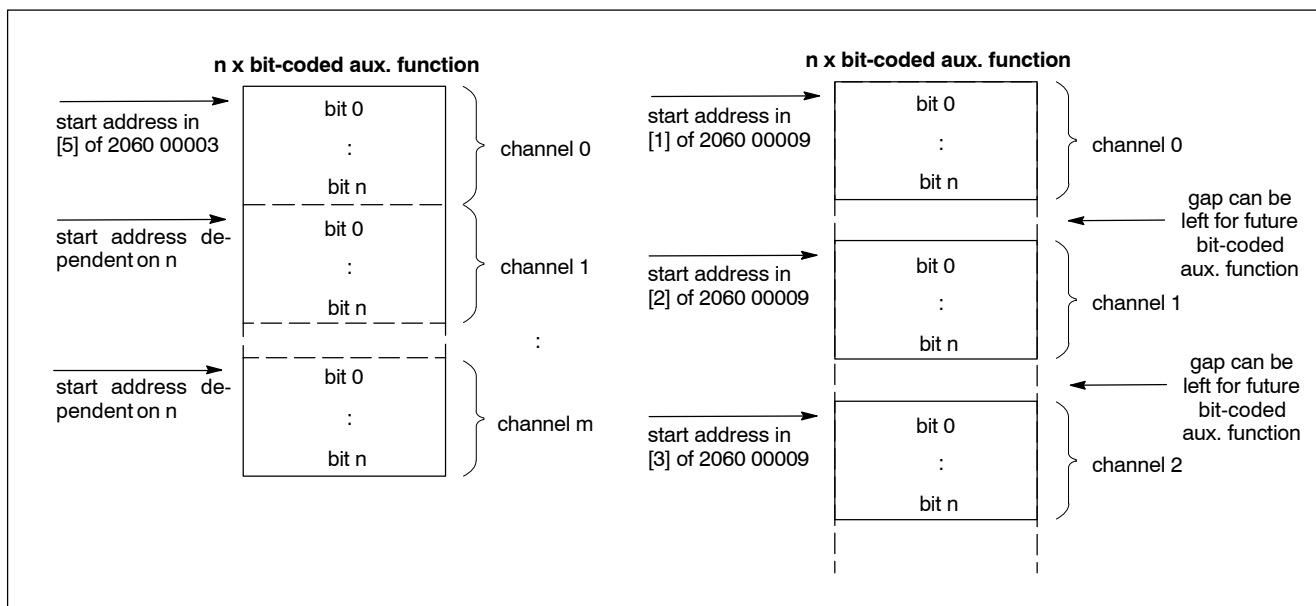
 **The number of channels applied is specified in 9040 00001.**

Advantages of channel-specific start addresses:

- When specifying various address ranges, you can plan gaps for a future expansion of bit-coded auxiliary functions. Thus, you will not have to adjust the addresses of existing bit-coded auxiliary functions in the PLC program when additional bit-coded auxiliary functions are implemented in the system.
- When additional channels are applied, the corresponding new marker fields can be placed right in some free PLC address ranges.

Functions relating to PLC and interfaces

Example: Differences between [5] of 2060 00003 and 2060 00009.



In the absence of sufficiently large gaps, you must ensure that existing ranges do not overlap with new ones when adding new auxiliary functions!

2060 00010

Addresses of channel-specific, 32-bit BCD-coded auxiliary functions

Specifies for every **channel**

- the start addresses of the ranges of 32-bit BCD-coded auxiliary functions, relating to the operand type defined in 2060 00002.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
00000 ... 08192	1	—	13	integer	4 bytes	5	—	unsigned	w,r,r	—					
Presettings [x] = element index															
[1]	00000	[2]	00000	[3]	00000	[4]	00000	[5]	00000	[6]	00000	[7]	00000	[8]	00000
[9]	00000	[10]	00000	[11]	00000	[12]	00000	[13]	00000						

For a description, see MP 2060 00009.

Functions relating to PLC and interfaces

2060 00011

Addresses of channel-specific, 64-bit BCD-coded auxiliary functions

Specifies for every **channel**

- the start addresses of the ranges of 64-bit BCD-coded auxiliary functions, relating to the operand type defined in 2060 00002.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00000 ... 08192	1	–	13	integer	4 bytes	5	–	unsigned	w,r,r	–

Presettings [x] = element index

[1] 05300	[2] 05312	[3] 05324	[4] 05336	[5] 00000	[6] 00000	[7] 00000	[8] 00000
[9] 00000	[10] 00000	[11] 00000	[12] 00000	[13] 00000			

For a description, see MP 2060 00009.

2060 00090

Cycle time of machine status display (MSD)

Specifies

- the frequency at which MSD files are requested and evaluated and
- the updating frequency in the MSD dialog.

With the MSD, machine error displays, warnings or notes can be generated.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000...999	1	ms	1	integer	2 bytes	3	–	unsigned	w,w,r	–

Presettings [x] = element index

[1] 300

Meaning of parameter values:

- 000 MSD is not in use.
- > 000 Interval for updating MSD data.

Functions relating to PLC and interfaces

2060 00100**Data module no. allowing write access by CPL**

Specifies

- the number of the first data module for which write access by CPL command "PLC" (see CPL Programming Manual) is allowed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-001...511	1	–	1	integer	4 bytes	3	–	signed	w,r,r	–
Presettings [x] = element index										
[1]	-001									

Meaning of parameter values:

–001 No write access allowed.

> (–001)Number of the first data module.

2060 00110**Number of data modules allowing write access by CPL**

Specifies

- the number of data modules (beginning with the data module number defined in 2060 00100) for which write access via the CPL command "PLC" is allowed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
001...511	1	–	1	integer	4 bytes	3	–	signed	w,r,r	–
Presettings [x] = element index										
[1]	001									

2060 00120**Marker address of the status "CPL dialog in the foreground"**

Specifies

- the address of the marker used for manipulating or requesting information on the status "CPL dialog in the foreground".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–0001...8192	1	–	1	integer	4 bytes	4	–	signed	w,w,r	–
Presettings [x] = element index										
[1]	–0001									

Meaning of parameter values:

–0001 The function is deactivated.

0000 ... 6143: Address of the marker (for ICL 700, KNS only)

0000 ... 8192: Address of the marker (for iPCL only)

 **The value range for setting the address is dependent on the active PLC.**

Functions relating to PLC and interfaces

2060 00200

PLC selection

Specifies

- the desired PLC interface.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...4	1	–	1	integer	1 byte	1	–	unsigned	w,r,r	–
Presettings [x] = element index										

[1] 4

Meaning of parameter values:

- 0 ICL 700 (active only if “osa plc” module has been plugged)
- 1 KNS; Trumpf application
- 2 KNS; standard application
- 3 KNS; interface compatible with ICL 700
- 4 iPCL

2060 00202

iPCL, KNS cycle time

Specifies

- the period of time that must have elapsed before a PLC cycle is initiated.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000; 001 ... 500	1	ms	1	integer	2 bytes	3	–	unsigned	w,r,r	–
Presettings [x] = element index										

[1] 000

Meaning of parameter values:

- 000 **Only iPCL:** cycle time dependent on the program run time.
The PLC program has to be started again at the end of the program after a waiting time of approx. 1 ms. The processing of the PLC program is interrupted every 500µs for 500µs, so that the remaining system has sufficient computing time. The cycle time then results from the PLC program run time only. Monitoring of the computing time according to MP 2060 00211 is not performed in this case.
- 001 ... 500: Cycle time in ms.
PLC processing is started cyclically according to the specified timing.
The cycle time of the PLC program is the total of:
 - PLC processing time,
 - Computing time of all processed interrupts (IPO interrupt),
 - Processing time of all higher priority tasks.

Functions relating to PLC and interfaces

If the cycle time increases to an extent that the remaining system has too little computing time (see MP 2060 00211), a warning will be generated.

A multiple of the system clock frequency (SERCOS clock frequency, NC cycle time) has to be chosen as input value; the value may be adapted to the current system clock frequency automatically, if required.

Response when the cycle time is exceeded:

- **KNS:**
If the next EP (end of program) is not reached even after the double cycle time the internal timeout monitoring will be activated.

 **For KNS only: To ensure compatibility with older software, a cycle time of 40 ms (old default value) is used for parameter value “0”.**

- **iPCL**
When the set cycle is exceeded, the control unit generates the “Cycle time-out” error and changes to the stop status, even if the cycle time set in OM2 has not been exceeded yet.

2060 00203

Simulation KNS

Specifies


- whether the simulation logic for the machine is activated or deactivated in the APS.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	1	integer	4 bytes	1	–	unsigned	w,r,r	–
Presettings [x] = element index										

[1] 0

Meaning of parameter values:

- 0 simulation deactivated
- 1 simulation activated

 **You can read out the setting of this configuration parameter from the KNS via function “Aps_GetSimulationState()” and from the KNB via function “Mca_GetSimulationState()”.**

Functions relating to PLC and interfaces

2060 00204

Name of simulation description file (KNS)

Specifies

- the name of the file containing the data required for machine simulation.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	2	string	8 bytes	8	–	–	w,r,r	–

Presettings [x] = element index

[1] SimDat | [2] txt

Meaning of the individual parameters:

[1] file name, without extension

[2] file name extension

2060 00210

Max. size of the user program (iPCL only)

Specifies

- the memory reserved for the PLC user program

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0 ... 9999	1	Kbyte	1	integer	2 bytes	4	–	unsigned	w,r,r	–

Presettings [x] = element index

[1] 200

Meaning of parameter values:

0 ... 9999 Max. size of the PLC user program in Kbytes
 During control unit start-up, the “iPCL” occupies memory of this size. If the stored PLC program is larger, it will not be loaded and the PLC will not start.

For control unit start-up at switch position 3: in case of a secure start-up, the PLC only allocates the 200 Kbyte standard memory.

 **Changes become effective after control unit start-up only.
 The size of the user program memory may be limited by licensing!**

Functions relating to PLC and interfaces

2060 00211**Max. PLC computing time**

Specifies

- the percentage of system computing time the KNS or iPCL may use for itself.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1 ... 99	1	%	1	integer	1 byte	2	–	unsigned	w,r,r	–
Presettings [x] = element index										

[1] 30 |

Meaning of parameter values:

1 .. 99: PLC computing time in percent.

A warning is generated when this value is exceeded, but the PLC continues to run.

Functions relating to programming

4.5 Functions relating to programming

4.5.1 Auxiliary functions (group 3010)

All “auxiliary functions” of the PNC are defined via group 3010 configuration parameters.

 **For information on auxiliary functions, see also the “PLC Project Planning“ manual.**

Basic information on auxiliary functions

Auxiliary functions

- are components of the NC syntax which may be programmed both in a part program and in “Manual” mode,
- are used to exchange information with the PLC via markers, e.g., to switch machine functions on or off, to switch from one machine function to another, or to transmit or receive numeric data,
- may or may not require acknowledgement. In the case of auxiliary functions requiring acknowledgement, the control unit waits until a positive acknowledgement is received (e.g. by markers being reset by the PLC) before processing the next program block or changing to READY state.

The PNC provides various types (classes) of auxiliary functions. The type to be assigned to an auxiliary function depends on the kind of information to be exchanged and the desired range of action (channel-dependent or channel-independent).

Channel-dependent and channel-independent auxiliary functions:

- Every channel-independent auxiliary function exists only once within the system. Therefore, its current state is identical on each channel applied.
- Every channel-dependent auxiliary function exists once on each channel applied (incl. “auxiliary” channel 0).
Therefore, channel-dependent auxiliary functions may have a different status on every channel applied.

Bit-coded auxiliary functions:

This type of auxiliary function may be used for exchanging individual binary information with the PLC (e.g., to switch machine functions on or off, or to switch from one machine function to another).

A bit-coded auxiliary function may be assigned to

- a **bit array** having a “starting bit address” and an “end bit address” or
- just a **single bit** having a specific “bit address”.

Functions relating to programming

Bit-coded auxiliary functions assigned to a **bit array** are invariably channel-dependent auxiliary functions. This means that the bit array exists once on each channel applied.

The individual bits of any such bit array are programmed with the NC syntax stating the respective name of the auxiliary function (letters only!) directly followed by an integer. The integer range is specified by a "start code" and an "end code".

Bit-coded auxiliary functions assigned just to a **single bit** may be either "discrete bit-coded auxiliary functions" or "individually defined bit-coded auxiliary functions".

- A "discrete" bit-coded auxiliary function may be assigned to a bit address in the marker area of **just one channel**. Because this makes the function unique within the system, it is called "channel-independent".
- Although an "individually defined" bit-coded auxiliary function may also be assigned to a bit address, it exists in the marker area of **every** channel. Because it exists once on every channel, it is called channel-dependent.

Both "discrete" and "individually defined" auxiliary functions may be assigned names composed of character strings including letters as well as digits and the "_" character.

BCD-coded auxiliary functions:

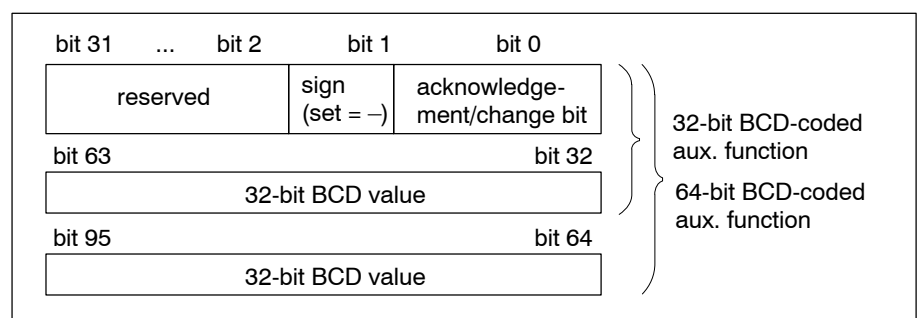
This type of auxiliary function may be used for exchanging numeric information in BCD format with the PLC (e.g., to transmit additional data to certain functions).

Apart from letters, names of a BCD-coded auxiliary functions may be composed of digits and the "_" character. The name is followed directly by the data value:

Example: auxiliary function name: "T"; data value: "12345"
⇒ to be entered as "T12345".

Depending on the required value range of the data to be transmitted, 32-bit or 64-bit BCD-coded auxiliary functions are used:

- A 32-bit BCD-coded auxiliary function must have an 8-byte marker area (= 64 bits) and can transmit up to 8-digit data values.
- A 64-bit BCD-coded auxiliary functions must have a 12-byte marker area (= 96 bits) and can transmit up to 16-digit data values.



Functions relating to programming

The number of integer and decimal positions can be configured by setting the corresponding parameters. Please note:

- for 32-bit BCD-coded aux. functions: max. total number of integer and decimal positions allowed: 8,
- for 64-bit BCD-coded aux. functions: max total number of integer and decimal positions allowed: 16.

Overview of individual configuration parameter effects:

3010 00010 (number of auxiliary functions):


- restricts – if required – the total number of auxiliary functions defined via 3010 00030 through 3010 00090 to a number of auxiliary functions available to the user. This way, auxiliary functions which are elements of extended machine functions, e.g., can be quickly locked or released.
- specifies how many auxiliary functions of the various classes of auxiliary functions may be used (bit aux., channel-independent 32-bit or 64-bit BCD-coded aux. functions, channel-dependent 32-bit or 64-bit BCD-coded aux. functions).

3010 00020 (compulsory acknowledgement with bit-coded aux. functions):

- specifies whether or not acknowledgement is required with bit-coded auxiliary functions.

3010 00030 through 3010 00090 (definition of the individual auxiliary functions):

- defines up to 30 auxiliary functions. All individual parameters having the same index [X] refer to one and the same auxiliary function.

 **Changed settings in 3010 00010 and 3010 00030 are not accepted before the next control start-up, while changed settings in any other configuration parameter of the 3010 group are accepted already with the next control reset.**

Parameterizing an auxiliary function

 **For a complete parameterization example, see page 4–104 ff.**

★ Please proceed as follows:

1. Adjust individual parameter [1] in 3010 00010.
Unless you want to suppress some auxiliary functions, enter the aggregate number of all auxiliary functions defined.
2. Define in 3010 00030 the NC syntax of the auxiliary function to be created. For more detailed information, see page 4–95.

Functions relating to programming

3. Define in 3010 00040 the class of the auxiliary function:
 - 1: bit aux. function
 - 2: channel-independent 32-bit BCD-coded aux. function
 - 3: channel-independent 64-bit BCD-coded aux. function
 - 4: channel-dependent 32-bit BCD-coded aux. function
 - 5: channel dependent 64-bit BCD-coded aux. function
4. Adjust the corresponding individual parameter ([2] through [6]) in 3010 00010 as required.
5. For BCD-coded aux. functions only:
 - Define the number of integer positions in 3010 00060
(value range of 32-bit BCD-coded aux.: 0 through 8
value range of 64-bit BCD-coded aux.: 0 through 16)
and the number of decimal positions in 3010 00070
(value range of 32-bit BCD-coded aux.: depends on number
of integer positions
value range of 64-bit BCD-coded aux.: depends on number
of integer positions)
 - Enter the index of the BCD-coded aux. function in 3010 00080.
This allows you to arrange the sequence in which several auxiliary
functions of the same auxiliary function class are stored in the
marker field of this class.
Value range: 0, 1, 2, ..., n, with n depending on the number of ex-
isting BCD-coded aux. functions of the respective class. See
paragraph 4. above.

Example:

Names and indices of 32-bit BCD-coded aux. functions in use	Sequence in the marker field of aux. functions in use
STEVE (index: 2)	SANDY
SANDY (index: 0)	64 bits unassigned
	STEVE

Please note: STEVE can be given the index 2 only if at least 3 BCD-coded aux. functions of this class are defined in 3010 00010!

- Specify the acknowledgement requirement in 3010 00090:
 - 0: no acknowledgement required
 - 1: acknowledgement required
 - Make sure that the value in 3010 00050 is set to "0".
6. If it is a BCD-coded aux. function you want to create, its definition is complete now. If you are creating a bit-coded aux. function, continue with paragraph 7. below.
 7. For bit-coded aux. functions only:
Specify in 3010 00050 whether the bit-coded function you are creating is to be channel-dependent, discrete or individually defined:
 - 1: channel-dependent
 - 3: discrete
 - 4: individually defined

Functions relating to programming

8. For discrete aux. functions only:
 - Specify in 3010 00070 the channel (0 through 12), in the marker area of which the auxiliary function bit is to be stored.
9. For discrete or individually defined bit-coded aux. functions only:
 - Specify in 3010 00060 the address of the aux. function bit.
10. For channel-dependent bit-coded aux. functions only:
 - Specify in 3010 00060 the address of the first bit and in 3010 00070 the address of the last bit of the auxiliary function.
 - Enter in 3010 00080 the programming code of the first bit and in 3010 00090 the programming code of the last bit of the auxiliary function.

Example: channel-dependent bit-coded aux. function with the name "RUDI"

address of the first bit: 301

address of the last bit: 320

programming code of the first bit: 1

programming code of the last bit: 20

⇒ The programming of "RUDI1" sets bit 301 in the marker field.

⇒ The programming of "RUDI20" sets bit 320 in the marker field.

11. Define the acknowledgement requirement in 3010 00020 (for information, see page 4-94).
12. This concludes the definition of a bit-coded aux. function.

Functions relating to programming

3010 00010**Number of auxiliary functions**

This configuration parameter

- restricts – if required – the total number of auxiliary functions defined via 3010 00030 through 3010 00090 to a number of auxiliary functions available to the user. This way, auxiliary functions which are elements of extended machine functions, e.g., can be quickly locked or released.
- specifies how many auxiliary functions of the various classes of auxiliary functions may be used (bit aux., channel-independent 32-bit or 64-bit BCD-coded aux. functions, channel-dependent 32-bit or 64-bit BCD-coded aux. functions).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes	
0000...1536	1	–	6	integer	4 bytes	4	–	unsigned	w,r,r	–	
Presettings [x] = element index											
[1]	0004	[2]	0304	[3]	0001	[4]	0000	[5]	0000	[6]	0001

Meaning of the individual parameters:

- [1] Number of all auxiliary functions defined via 3010 00030 through 3010 00090 and available for use in the system.
If the total number of auxiliary functions in the system is greater than the number specified here, only the auxiliary functions up to the limit (relating to individual parameter index) specified here are made available.

Example:

3010 00010	3010 00030	Aux. function is valid
[1] 3	[1] M	yes
	[2] M500	yes
	[3] M999	yes
	[4] O	no
	[5] S?	no

- [2] Size of the bit memory area in the PLC used for all bit-coded auxiliary functions defined per channel.
Add the value 1 to the highest bit address of all bit-coded auxiliary functions defined and enter the result here.
If there are 3 bit-coded auxiliary functions to be provided, e.g., with 128 being the highest bit address among them, you must enter "129" here.
For the start address of the PLC memory area for bit-coded auxiliary functions, see 2060 00009.
- [3] Number of channel-independent 32-bit BCD-coded auxiliary functions.
If there are 2 channel-independent 32-bit BCD-coded auxiliary functions to be provided, e.g., enter the value "2" here.
For the start address of the PLC memory area for channel-independent 32-bit BCD-coded auxiliary functions, see individual parameter [6] of 2060 00003.

Functions relating to programming

- [4] Number of channel-independent 64-bit BCD-coded auxiliary functions.
 If there are 4 channel-independent 64-bit BCD-coded auxiliary functions to be provided, e.g., enter the value "4" here.
 For the start address of the PLC memory area for channel-independent 64-bit BCD-coded auxiliary functions, see individual parameter [7] of 2060 00003.
- [5] Number of "channel-dependent 32-bit BCD-coded auxiliary functions".
 If there are 3 channel-dependent 32-bit BCD-coded auxiliary functions to be provided, e.g., enter the value "3" here.
 For the start address of the PLC memory area for channel-dependent 32-bit BCD-coded auxiliary functions, see 2060 00010.
- [6] Number of "channel-dependent 64-bit BCD-coded auxiliary functions".
 If there are 4 channel-dependent 64-bit BCD-coded auxiliary functions to be provided, e.g., enter the value "4" here.
 For the start address of the PLC memory area for channel-dependent 64-bit BCD auxiliary functions, see 2060 00011.

3010 00020

Acknowledgement requirement for bit-coded auxiliary functions

Specifies for all bits of **bit-coded auxiliary functions** across all channels

- whether or not acknowledgement is required.

The acknowledgement requirement for BCD-coded auxiliary functions is defined in 3010 00090.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0000000000 ... 4294967295	1	–	48	integer	4 bytes	10	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1] 524288	[2] 73472	[3] 0	[4] 0	[5] 0	[6] 0	[7] 0	[8] 0	[9] 0	[10] 0	[11] 0
[17] 0	[18] 0	[19] 0	[20] 0	[21] 0	[22] 0	[23] 0	[24] 0	[25] 0	[26] 0	[27] 0
[33] 0	[34] 0	[35] 0	[36] 0	[37] 0	[38] 0	[39] 0	[40] 0	[41] 0	[42] 0	[43] 0
[41] 0	[42] 0	[43] 0	[44] 0	[45] 0	[46] 0	[47] 0	[48] 0	[49] 0	[50] 0	[51] 0

Meaning of the individual parameters:

The address range available for bit-coded auxiliary functions has a size of 1536 bits per channel. This range is subdivided into 48 consecutive segments.

Each segment is represented by a 32-bit binary number (bit mask) (individual parameters [1] through [48]; 48x32 = 1536); a high bit in this bit mask indicates that the respective auxiliary function bit requires acknowledgement.

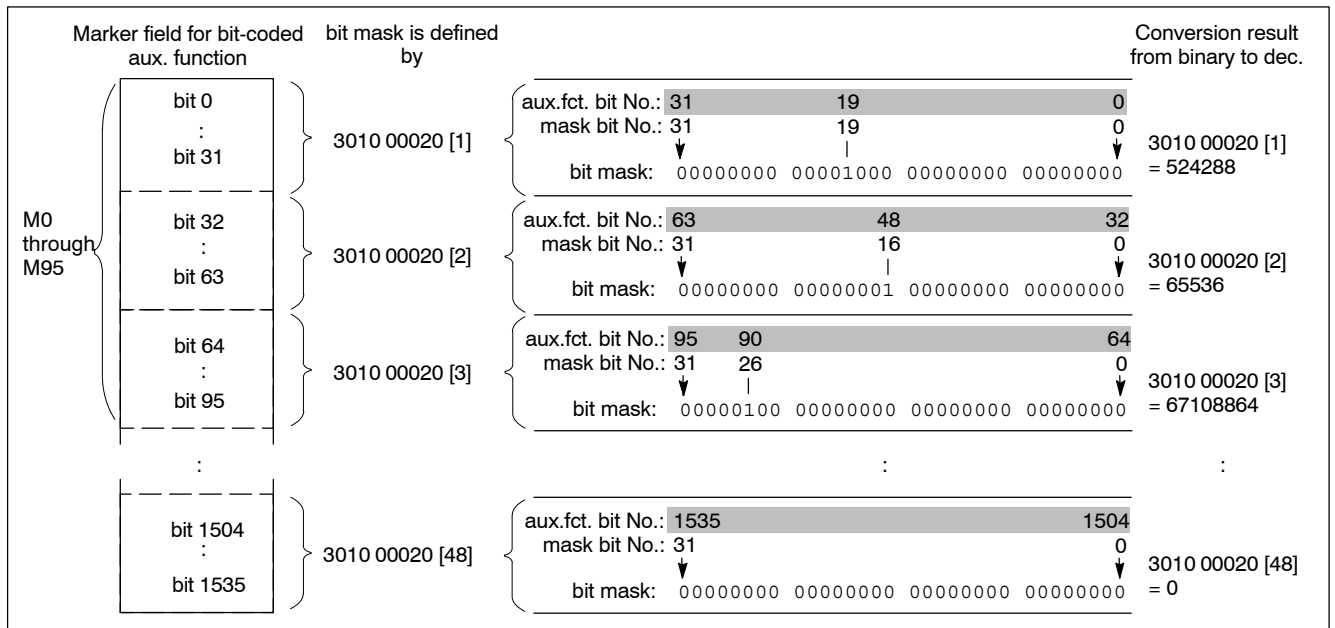
Functions relating to programming

Convert the resulting binary number into a decimal number, and enter the result in the corresponding individual parameter.
For the above conversion, you may use Excel table "M-Quittung.xls". You will find it in the doku/support directory on the PNC-CD (see parametrization example on page 4-104 ff.).

Example: There is, e.g., a bit-coded auxiliary function defined with the name "M" and a bit array size of 96 bits (start bit address in [1] of 301000060: 0; end bit address in [1] of 301000070: 95).

The individual bits can be set via NC syntax "M0" through "M95" (programming code for 1st bit in [1] of 301000080: 0; programming code for the last bit in [1] of 301000090: 95).

Let's say that M19, M48 and M90 are to require acknowledgement:



3010 00030

Names of auxiliary functions

Specifies for every auxiliary function

- its name.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
-	-	-	30	string	8 bytes	8	-	-	w,r,r	-					
Presettings [x] = element index															
[1]	M	[2]	S?	[3]	T	[4]	M999	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0				

If the desired name is identical with a starting word of an NC-internal syntax, the name must be followed directly by a "?" to distinguish it (e.g., the desired name "S" is the starting word of "S1=").

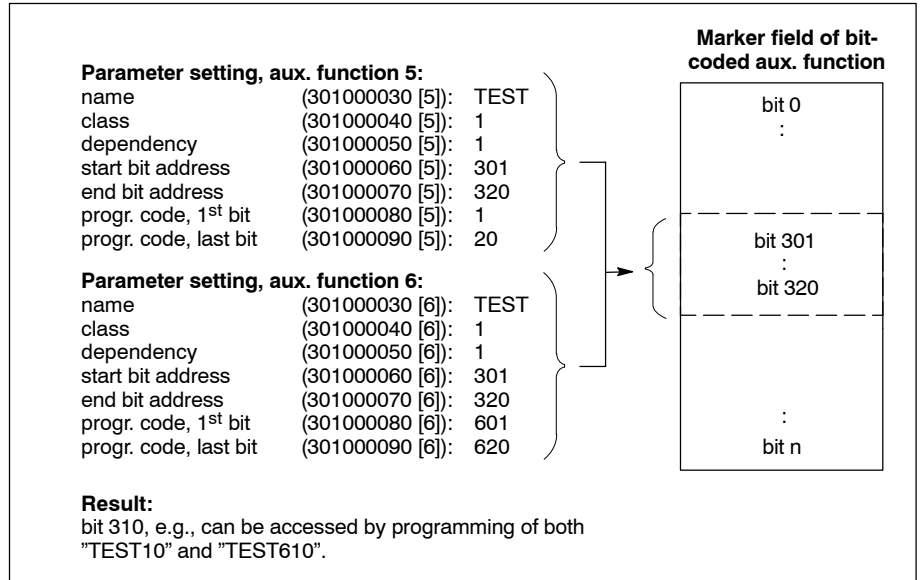
Functions relating to programming

Example 2:

For matters of compatibility, a bit memory area shall be accessible through 2 different programming code areas. At the same time, the name of the auxiliary function concerned shall not be changed.

This problem can be solved only because the name TEST may be assigned more than once.

Set the parameters of 2 auxiliary functions, both called TEST, that are different only in respect of their programming code areas:



Functions relating to programming

3010 00040

Classes of auxiliary functions

Specifies for every **auxiliary function**

- the type or class of auxiliary function it belongs to.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0...5	1	–	30	integer	4 bytes	1	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	1	[2]	2	[3]	5	[4]	1	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0				

Meaning of parameter values:

- 0 no auxiliary function defined
- 1 bit-coded aux. function
This type of auxiliary function can be further specified in 3010 00050.
- 2 channel-independent 32-bit BCD-coded aux. function
- 3 channel-independent 64-bit BCD-coded aux. function
- 4 channel-dependent 32-bit BCD-coded aux. function
- 5 channel-dependent 64-bit BCD-coded aux. function

 **For more detailed information on the various types of aux. functions, see page 4-88 ff, "Basic information on auxiliary functions".**

Functions relating to programming

3010 00050**Dependencies of bit-coded auxiliary functions**Specifies for every **bit-coded auxiliary function**

- its range of action.


Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0...4	1	–	30	integer	4 bytes	1	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	1	[2]	0	[3]	0	[4]	4	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0				

Meaning of parameter values:

- 0 No auxiliary function defined or the defined auxiliary function is of the BCD type.
- 1 The auxiliary function is channel-dependent.
Set this parameter value for bit-coded auxiliary functions which are assigned to a whole bit array. In this case, the individual bits of the bit array are addressed by means of a constant aux. function name (see 3010 00030) directly followed by an integer.
The bit array of a channel-dependent auxiliary function exists once on every channel, i.e. in the marker area of every channel applied; therefore, the individual bits may have a different status on every channel.
- 2 Reserved.
- 3 The auxiliary function is of the "discrete" type.
A discrete auxiliary function is assigned to a **single-bit address** (see 3010 00060) in the marker area of **just one channel** (see 3010 00070).
Because it thus exists **only once in the whole system**, it is called channel-independent.
- 4 The auxiliary function is "individually defined".
Although an individually defined auxiliary function can also be assigned to a **single-bit address** (via 3010 00060), it exists in the marker areas of **all channels**.
Because it thus exists **once on every channel**, it is called channel-dependent. Consequently, its status may be different on every activated channel.

 **Channel-dependent auxiliary functions can be programmed on any channel also as being channel-independent. Examples:**

M3=7 output of M7 on channel 3
T2=123 output of T123 on channel 2

 **Arbitrary assignment of auxiliary functions to channels is possible only for functions which are not associated with an NC function.**

Example: S2=1

S1 and S2 are the NC's internal speed setpoint values of spindle 1 or spindle 2, respectively.

Functions relating to programming

Example: Differences between parameter values 1, 3 and 4

Note:

According to this example, [2] of 301000010 would have to be assigned the value 451!

Example of parameter value "1":

Auxiliary function 2 is "channel-dependent".

name	(301000030 [2]):	CHANDEP
class	(301000040 [2]):	1
dependency	(301000050 [2]):	1
start bit address	(301000060 [2]):	301
end bit address	(301000070 [2]):	320
programming code, 1 st bit	(301000080 [2]):	1
programming code, last bit	(301000090 [2]):	20

Example of parameter value "3":

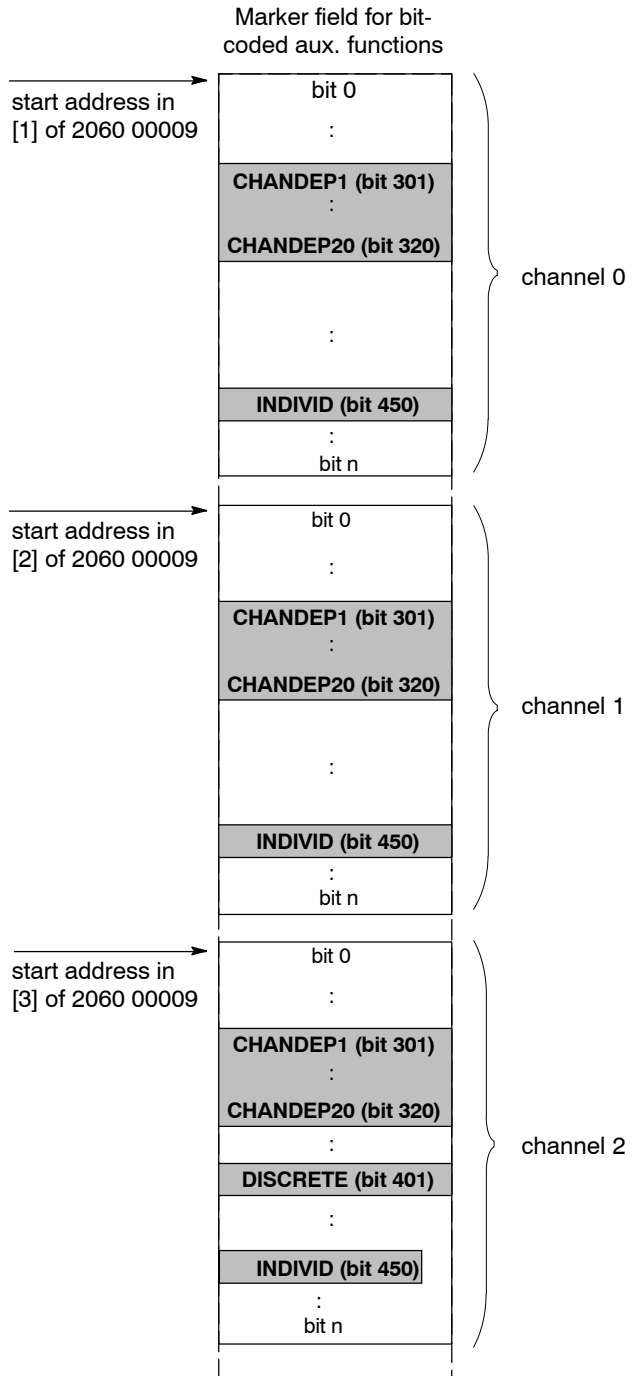
Auxiliary function 3 is "discrete"

name	(301000030 [3]):	DISCRETE
class	(301000040 [3]):	1
dependency	(301000050 [3]):	3
start bit address	(301000060 [3]):	401
channel number	(301000070 [3]):	2
programming code, 1 st bit	(301000080 [3]):	0
programming code, last bit	(301000090 [3]):	0

Example of parameter value "4":

Auxiliary function 4 is "defined individually"

name	(301000030 [4]):	INDIVID
class	(301000040 [4]):	1
dependency	(301000050 [4]):	4
start bit address	(301000060 [4]):	450
channel number	(301000070 [4]):	0
programming code, 1 st bit	(301000080 [4]):	0
programming code, last bit	(301000090 [4]):	0



Functions relating to programming

3010 00060

BCD format of integer positions, starting bit addresses or bit addresses of individually defined auxiliary functions

Specifies for

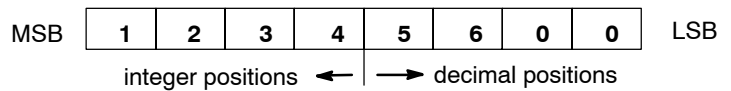
- a BCD-coded auxiliary function the number of its integer positions,
- a bit-coded auxiliary function assigned to a whole bit array the address of the first bit (see example on page 4-100), and for
- a bit-coded auxiliary function assigned to a single bit the address of this bit (see example on page 4-100).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00000 ... 32767	1	-	30	integer	2 bytes	5	-	unsigned	w,r,r	-
Presettings [x] = element index										
[1] 00000	[2] 00008	[3] 00016	[4] 00199	[5] 00000	[6] 00000	[7] 00000	[8] 00000	[9] 00000	[10] 00000	[11] 00000
[12] 00000	[13] 00000	[14] 00000	[15] 00000	[16] 00000	[17] 00000	[18] 00000	[19] 00000	[20] 00000	[21] 00000	[22] 00000
[23] 00000	[24] 00000	[25] 00000	[26] 00000	[27] 00000	[28] 00000	[29] 00000	[30] 00000	[31] 00000	[32] 00000	[33] 00000

For parameter values, please note the following:

- All address statements are offset values relating to the start address of the marker area of the bit-coded aux. function (see also 3010 00010; individual parameter [2]).
- When stating the number of integer positions, please note that
 - for 32-bit BCD-coded aux. functions: sum total of integer and decimal positions = max. 8
 - for 64-bit BCD-coded aux. functions: sum total of integer and decimal positions = max. 16.

Example: Having 4 integer and 4 decimal positions, aux. function T1234.56 is stored as follows in the PLC memory:



Functions relating to programming

3010 00070

BCD format of decimal positions, end bit addresses or channel numbers

Specifies for

- a BCD-coded auxiliary function the number of decimal positions,
- a bit-coded auxiliary function assigned to a whole bit array the address of the last bit (see example on page 4-100), and for
- a bit-coded, discrete auxiliary function the channel where the corresponding bit exists (see example on page 4-100).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00000 ... 32767	1	–	30	integer	2 bytes	5	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1] 00299	[2] 00000	[3] 00000	[4] 00199	[5] 00000	[6] 00000	[7] 00000	[8] 00000	[9] 00000	[10] 00000	[11] 00000
[12] 00000	[13] 00000	[14] 00000	[15] 00000	[16] 00000	[17] 00000	[18] 00000	[19] 00000	[20] 00000	[21] 00000	[22] 00000
[23] 00000	[24] 00000	[25] 00000	[26] 00000	[27] 00000	[28] 00000	[29] 00000	[30] 00000			

 **Please note the information in paragraph "For parameter values, please note the following:" under 3010 00060.**

3010 00080

BCD index, starting code of bit-coded auxiliary functions

Specifies for

- a BCD-coded auxiliary function its index and for
- a bit-coded auxiliary function assigned to a whole bit array the number that may be programmed for addressing the first bit (starting code).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00000 ... 65535	1	–	30	integer	2 bytes	5	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1] 00000	[2] 00000	[3] 00000	[4] 00000	[5] 00000	[6] 00000	[7] 00000	[8] 00000	[9] 00000	[10] 00000	[11] 00000
[12] 00000	[13] 00000	[14] 00000	[15] 00000	[16] 00000	[17] 00000	[18] 00000	[19] 00000	[20] 00000	[21] 00000	[22] 00000
[23] 00000	[24] 00000	[25] 00000	[26] 00000	[27] 00000	[28] 00000	[29] 00000	[30] 00000			

Please note for BCD-coded auxiliary functions:

- Their index determines the sequence in which several auxiliary functions belonging to a specific class of auxiliary functions are stored in the marker filed of this class.
Value range: 0, 1, 2, ..., n, with n being dependent on the number of

Functions relating to programming

BCD-coded aux. functions that exist within the respective class (individual parameters [3] through [6] of 3010 00010).

Please note for bit-coded auxiliary functions:

- Their starting and end codes determine how the bits of a bit-coded auxiliary function can be addressed with the NC syntax.
For starting and end codes, see also example 2 on page 4–97.

3010 00090

BCD acknowledgement requirement or end code of bit-coded auxiliary functions

Specifies for


- a BCD-coded auxiliary function whether or not it requires acknowledgement and for
- a bit-coded auxiliary function assigned to a whole bit array the number that may be programmed for addressing the last bit (end code).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00000 ... 65535	1	–	30	integer	2 bytes	5	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1] 00299	[2] 00000	[3] 00000	[4] 00000	[5] 00000	[6] 00000	[7] 00000	[8] 00000	[9] 00000	[10] 00000	[11] 00000
[12] 00000	[13] 00000	[14] 00000	[15] 00000	[16] 00000	[17] 00000	[18] 00000	[19] 00000	[20] 00000	[21] 00000	[22] 00000
[23] 00000	[24] 00000	[25] 00000	[26] 00000	[27] 00000	[28] 00000	[29] 00000	[30] 00000			

Meaning of parameter values applying to BCD-coded functions:

00000 no acknowledgement required

00001 acknowledgement required

 **For information on the acknowledgement of BCD-coded auxiliary functions, see page 4–88 ff, under "Basic information on auxiliary functions".**

Functions relating to programming

Example of parameterizing a complete auxiliary function

Entering the number of auxiliary functions
3010 00010 [x]

Individual parameter	Description	Value
[1]	Total number of auxiliary functions required: M, M500, M999, O, S, S1, S2, V and T. Sum total ⇒	9
[2]	Bit-coded auxiliary functions: M, M500, M999 and O, with – M being assigned to a bit array of 300 bits, – O being assigned to a bit array of 20 bits, and – M500 and M999 being assigned to a single bit, each. The highest bit address used of all bit-coded aux. functions is 320 (see under "O"). Therefore, individual parameter [2] could be assigned the value "321". However, in anticipation of bit-coded auxiliary functions to be added in the future and in order to set the end of the area of bit-coded aux. functions on a byte boundary, this individual parameter [2] is assigned the value "336".	336
[3]	Channel-independent 32-bit BCD-coded auxiliary functions: No more than S. Sum total ⇒	1
[4]	Channel-independent 64-bit BCD-coded auxiliary functions: No more than V. Sum total ⇒	1
[5]	Channel-dependent 32-bit BCD-coded auxiliary functions: S1 and S2. Sum total ⇒	2
[6]	Channel-dependent 64-bit BCD-coded auxiliary functions: No more than T. Sum total ⇒	1

Defining auxiliary functions
3010 00030 [x]
through 3010 00090 [x]

M:
Bit-coded aux. function, channel-dependent.
Composed of a bit array of 300 bits.
The first bit has the start bit address of 0, the last bit the end bit address of 299.
To be programmed from "M0" through "M299".
M19, M40 through M44, M48, and M95 require acknowledgement (For setting, see page 4-107).

M500:
Bit-coded aux. function, discrete.
Bit address is allocated to bit 300.
Assigned to channel 1.
No acknowledgement required (For setting, see page 4-107).

Functions relating to programming

M999:

Bit-coded aux. function, defined individually.

Bit address is allocated to bit 199. Thus, bit 199 can be programmed for access both by "M999" and "M199" (see under "M")!

No acknowledgement required (For setting, see page 4-107).

O:

Bit-coded aux. function, channel-dependent.

Composed of a bit array of 20 bits.

The first bit has the start bit address of 301, the last bit the end bit address of 320.

To be programmed from "O1" through "O20".

Every bit requires acknowledgement (For setting, see page 4-107).

S:

Channel-independent 32-bit BCD-coded aux. function.

Number of integer positions: 8; number of decimal positions: 0.

Located in the first place in the marker area of channel-independent 32-bit BCD-coded aux. functions: index "0".

No acknowledgement required.

S1:

Channel-dependent 32-bit BCD-coded aux. function.

Number of integer positions: 8; number of decimal positions: 0.

Located in the first place in the marker area of channel-dependent 32-bit BCD-coded aux. functions: index "0".

Acknowledgement required.

S2:

Channel-dependent 32-bit BCD-coded aux. function.

Number of integer positions: 8; number of decimal positions: 0.

Located in the second place in the marker area of channel-dependent 32-bit BCD-coded aux. functions: index "1".

Acknowledgement required.

V:

Channel-independent 64-bit BCD-coded aux. function:

Number of integer positions: 10; number of decimal positions: 0.

No acknowledgement required.

T:

Channel-dependent 64-bit BCD-coded aux. function.

Number of integer positions: 16; number of decimal positions: 0.

No acknowledgement required.

Functions relating to programming

Required parameter settings:

Individual parameter	Configuration parameters						
	3010 00030	3010 00040	3010 00050	3010 00060	3010 00070	3010 00080	3010 00090
[1]	M	1	1	0	299	0	299
[2]	M500	1	3	300	1	0	0
[3]	M999	1	4	199	0	0	0
[4]	O	1	1	301	320	1	20
[5]	S?	2	0	8	0	0	0
[6]	S1?	4	0	8	0	0	1
[7]	S2?	4	0	8	0	1	1
[8]	V	3	0	10	0	0	0
[9]	T	5	0	16	0	0	0

3010 00030 name

3010 00060 BCD-coded aux. fct.: no. of integer positions
bit-coded aux. fct. (bit array): address of 1st bit
bit-coded aux. fct. (single bit): bit address

3010 00040 auxiliary function type (class):

- 0 no aux. function defined
- 1 bit-coded aux. function
- 2 channel-independent 32-bit BCD-coded aux. fct.
- 3 channel-independent 64-bit BCD-coded aux. fct.
- 4 channel-dependent 32-bit BCD-coded aux. fct.
- 5 channel-dependent 64-bit BCD-coded aux. fct.

3010 00070 BCD-coded aux. fct.: no. of decimal positions
bit-coded aux. fct. (bit array): address of last bit
discrete bit-coded aux. fct.: channel number

3010 00050 dependencies of bit-coded aux. functions:

- 0 no aux. function defined or defined aux. function is BCD-coded
- 1 channel-dependent
- 2 not assigned
- 3 discrete
- 4 individually defined

3010 00080 BCD-coded aux. fct.: index
bit-coded aux. fct. (bit array): starting code for programming

3010 00090 BCD-coded aux. fct.: acknowledgement required
bit-coded aux. fct. (bit array): end code for programming

Functions relating to programming

Acknowledgement requirements of bit-coded auxiliary functions, 3010 00020 [x]

Among the M functions, acknowledgment is required only for M19, M40 through M44, M48, and M95. No acknowledgment is required for M500 and M999. With O, acknowledgment is required for all bits.

Marker field for bit-coded aux. functions	bit mask is defined by	aux.fct. bit No. / mask bit No. / bit mask	Result of conversion from binary to dec.	
M0 through M299	bit 0 : bit 31	3010 00020 [1]	aux.fct. bit No.: 31 19 0 mask bit No.: 31 19 0 bit mask: 00000000 00001000 00000000 00000000 3010 00020 [1] = 524288	
	bit 32 : bit 63	3010 00020 [2]	aux.fct. bit No.: 63 48 40 32 mask bit No.: 31 16 8 0 bit mask: 00000000 00000001 00011111 00000000 3010 00020 [2] = 73472	
	bit 64 : bit 95	3010 00020 [3]	aux.fct. bit No.: 95 64 mask bit No.: 31 0 bit mask: 10000000 00000000 00000000 00000000 3010 00020 [3] = 2147483648	
(M999)	bit 192 : bit 223	3010 00020 [7]	aux.fct. bit No.: 223 199 192 mask bit No.: 31 7 0 bit mask: 00000000 00000000 00000000 00000000 3010 00020 [7] = 0	
	(M500)	bit 288 : bit 301	3010 00020 [10]	aux.fct. bit No.: 319 300 288 mask bit No.: 31 12 0 bit mask: 11111111 11111111 11100000 00000000 3010 00020 [10] = 4294959104
		bit 320 : bit 351	3010 00020 [11]	aux.fct. bit No.: 351 320 mask bit No.: 31 0 bit mask: 00000000 00000000 00000000 00000001 3010 00020 [11] = 1
O1 through O20	bit 1504 : bit 1535	3010 00020 [48]	aux.fct. bit No.: 1535 1504 mask bit No.: 31 0 bit mask: 00000000 00000000 00000000 00000000 3010 00020 [48] = 0	

 For the conversion, you may use Excel table "M-Quittung.xls". You will find it in the doku\support directory on the PNC CD.

Functions relating to programming

Parameter settings required for 3010 00020 [x]

Individual parameter	Value
[1]	524288
[2]	73472
[3]	2147483648
[4] through [9]	0
[10]	4294959104
[11]	1
[12] through [48]	0

Representation of the marker fields of

bit-coded auxiliary functions: M, M999, M500, and O

starting address IAW 2060 00009 [1]	bit 0 : bit 199 : bit 299 bit 300 bit 301 : bit 320 : bit 335	M0 : M199 / M999 : M299 : O1 : O20 : :	channel 0
starting address IAW 2060 00009 [2]	bit 0 : bit 199 : bit 299 bit 300 bit 301 : bit 320 : bit 335	M0 : M199 / M999 : M299 M500 O1 : O20 : :	channel 1
:			
starting address IAW 2060 00009 [13]	bit 0 :	M0 :	channel 12

channel-independent 32-bit BCD-coded auxiliary functions: S

starting address IAW 2060 00003 [6]	bit 0 (acknowledgement) bit 1 (sign) : bit 32 (BCD value) through bit 63	S
--	---	---

channel-independent 64-bit BCD-coded auxiliary functions: V

starting address IAW 2060 00003 [7]	bit 0 (acknowledgement) bit 1 (sign) : bit 32 (BCD value) through bit 95	V
--	---	---

Functions relating to programming

channel-dependent 32-bit BCD-coded auxiliary functions: S1 and S2

starting address IAW 2060 00010 [1]	bit 0 (acknowledgement) S1 channel 0 bit 1 (sign) : bit 32 through bit 63 (BCD value) bit 64 (acknowledgement) S2 bit 65 (sign) : bit 96 through bit 127 (BCD value)
--	---

starting address IAW 2060 00010 [2]	bit 0 (acknowledgement) S1 channel 1 bit 1 (sign) : bit 32 through bit 63 (BCD value) bit 64 (acknowledgement) S2 bit 65 (sign) : bit 96 through bit 127 (BCD value)
--	---

:

starting address IAW 2060 00010 [13]	bit 0 S1 channel 12 : :
---	-------------------------------

channel-dependent 64-bit BCD-coded auxiliary functions: T

starting address IAW 2060 00011 [1]	bit 0 (acknowledgement) T channel 0 bit 1 (sign) : bit 32 through bit 95 (BCD value)
--	---

starting address IAW 2060 00011 [2]	bit 0 (acknowledgement) T channel 1 bit 1 (sign) : bit 32 through bit 95 (BCD value)
--	---

:

starting address IAW 2060 00011 [13]	bit 0 T channel 12 : :
---	------------------------------

Functions relating to programming

4.5.2 Part programs (group 3080)

3080 00001

Search path for subprograms

Specifies

- the PNC directories where (sub)programs called up are to be searched.

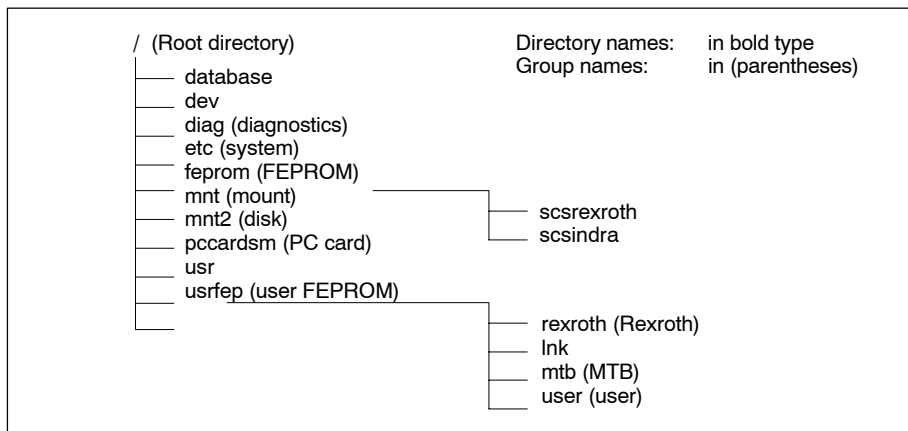
Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	10	string	8 bytes	8	–	–	w,w,r	–
Presettings [x] = element index										
[1] .	[2] /usr/	[3] user	[4] mtb	[5] Rexroth	[6] /usrfep	[7] /feprom	[8] /pccard>			
[9] sm	[10]									

Meaning of parameter values:

Starting with the root directory, you can lay out paths by making various text entries, thus specifying the directories to be searched. Please note the following:

- The "." character marks the beginning of a new path that starts with the directory of the program from which another (sub)program is called. No other characters may be entered together with "." in the same individual parameter.
- A preceding "/" marks the beginning of a new path that starts with the root directory.
- A "/" following the text entry turns the path specified so far into a prefix of all subsequent entries (until the next parameter entry beginning with "/" or ".").
- Only directory names may be entered here as text. If a directory name consists of more than the 8 characters permitted, enter ">" for the 8th character. This allows you to continue writing the directory name in the next individual parameter.

PNC default directory tree:



Functions relating to programming

Example: Due to the above default settings, the search is conducted in the following order:

1. . (Character ".": directory of the calling program)
2. /usr/user
3. /usr/mtb
4. /usr/Rexroth
5. /usrfep
6. /feprom
7. /pccardsm

3080 00002

Buffer size for program execution via NFS

Specifies

- the size of a buffer where data received from active NFS servers is stored temporarily.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000002048 ... 004194304	1	byte	1	integer	4 bytes	9	–	unsigned	w,w,r	–

Presettings [x] = element index

[1] 8192

With its integrated NFS client, the PNC allows to mount 2 directories which are stored externally to its internal file system. This is possible only if the Rexroth NFS server provides access to these directories on the respective source computers in the network.

Part programs for the entire machine outfit, e.g., are very often stored centrally in these external directories.

If such programs are called up for execution, the NC receives the data through the network, also during the machining process.

However, if extremely large data volumes (part programs for freeform machining, e.g.) are involved and big network loads occur, this may slow down the flow of data required by the NC with the result that machining stalls.

This can be prevented by a buffer of adequate size.

Functions relating to programming

3080 00004

Directory name of link tables

Specifies

- the PNC directory where all link tables generated are to be stored.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	10	string	8 bytes	8	–	–	w,w,r	–
Presettings [x] = element index										
[1] [9]	/usr/	[2] [10]	lnk/	[3]	[4]	[5]	[6]	[7]	[8]	

Meaning of parameter values:

The path is created by stringing all individual parameters together. This limits the path length to a maximum of 80 characters.

 **The path must begin and end with the "/" character. The "/" character must also be entered between directory names.**

Example: The above defaults result in the following path:
/usr/lnk/

3080 00005

CPL dialog channel

Specifies

- the channel where the NC processes the CPL programs called up with the CPL DIALOG softkey.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
01 ... 12	1	–	1	integer	1 byte	2	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1]	02									

 **See also MACODA parameter 9040 00001.**

Functions relating to programming

3080 00006**Assignment of cycle names to CPL dialog programs, list of cycle names**

Specifies

- up to 40 subprogram calls that can be searched in the current NC block when the CPL DIALOG softkey is pressed in the editor.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
–	–	–	10	string	8 bytes	8	–	–	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0

Meaning of parameter values:

Subprogram calls permitted are G functions, auxiliary function names (see page 4–95) and (sub)program names.

When a matching subprogram call is found, the NC starts the CPL dialog program that is entered in the corresponding individual parameter of 3080 00007.

3080 00007**Assignment of cycle names to CPL dialog programs, list of CPL dialog programs**

Specifies

- up to 40 names of CPL dialog programs that are called up depending on the settings in 3080 00006.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
–	–	–	10	string	8 bytes	8	–	–	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0

For the meaning of the parameter values, see 3080 00006.

Functions relating to programming

3080 00200**File extensions for tables**

Specifies

- which files are recognized by the NC as zero shift tables (offset or NPV tables) and which are recognized as geometry compensation tables (GEO tables).

The NC uses the file extension as a distinguishing mark.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	2	string	4 bytes	3	–	–	w,r,r	–

Presettings [x] = element index

[1]	npv	[2]	geo
-----	-----	-----	-----

Meaning of the individual parameters:

[1] file extension selected for NPV (zero shift) tables

[2] file extension selected for GEO tables

 **Enter the desired file extension without a preceding dot!**

Functions relating to programming

4.5.3 Cycle definition (group 3090)

3090 00001

Non-modal G functions (G codes)

Specifies

- up to 16 G functions from which non-modal subprograms can be called up.

This allows you to include your own "G functions" in the NC syntax. "Non-modal" means in this context that the respective subprogram is called once only.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0 ... 9999	1	–	16	integer	4 bytes	4	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1] 1234	[2] 5678	[3] 0000	[4] 0000	[5] 0000	[6] 0000	[7] 0000	[8] 0000	[9] 0000	[10] 0000	[11] 0000
[9] 0000	[10] 0000	[11] 0000	[12] 0000	[13] 0000	[14] 0000	[15] 0000	[16] 0000			

Meaning of parameter values:

0 The individual parameter does not define a G function.

>0 The individual parameter defines a customer-specific G function. Digit strings entered here are limited to 4 digits.

If the NC finds a G function defined in the NC block currently active, it starts the program that is entered in the corresponding individual parameter of 3090 00002.

Examples:

3090 00001 [1]: 1234 3090 00002 [1]: SP1234
⇒ Programming "G1234" will start subprogram "SP1234".

3090 00001 [2]: 5678 3090 00002 [2]: 56789010
⇒ Programming "G5678" will start subprogram "56789010".

3090 00002

Non-modal G functions (subprogram names)

Specifies

- up to 16 names of subprograms that can be called depending on the setting in 3090 00001.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	16	string	8 bytes	8	–	–	w,w,r	–
Presettings [x] = element index										
[1] Up1234	[2]56789010	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]			

For the meaning of the parameter values, see 3090 00001.

Functions relating to programming

3090 00003

Non-modal M functions (M codes)

Specifies

- up to 8 M functions from which non-modal subprograms can be called up.

This allows you to include your own “M functions” in the NC syntax. “Non-modal” means in this context that the respective subprogram is called once only.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0 ... 9999	1	–	8	integer	4 bytes	4	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	0000	[2]	0000	[3]	0000	[4]	0000	[5]	0000	[6]	0000	[7]	0000	[8]	0000

Meaning of parameter values:

- 0 The individual parameter does not define an M function.
- >0 The individual parameter defines a customer-specific M function. Digit strings entered here are limited to 4 digits.

If the NC finds an M function defined in the NC block currently active, it starts the program that is entered in the corresponding individual parameter of 3090 00004.

Example:

3090 00003 [1]: 6 3090 00004 [1]: SPofM6
 ⇒ programming “M6” will start subprogram “SPofM6”.

3090 00004

Non-modal M functions (subprogram names)

Specifies

- up to 8 names of subprograms that can be called in dependence on 3090 00003.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings [x] = element index										
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]

For the meaning of the parameter values, see 3090 00003.

Functions relating to programming

3090 00005**Modal subprograms (NC syntax)**

Specifies

- the NC syntax of up to 16 functions from which **15** modal subprograms can be called up.

This allows you to include your own, modally acting functions in the NC syntax.

"Modal" means that the respective subprogram is called up after each **path information programmed** until the NC finds another NC syntax in the currently active NC block, that was defined in 3090 00005.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
–	–	–	16	string	8 bytes	8	–	–	w,w,r	–					
Presettings [x] = element index															
[1]	G80	[2]	G81	[3]	G82	[4]	G83	[5]	G84	[6]	G85	[7]	G86	[8]	G184
[9]		[10]		[11]		[12]		[13]		[14]		[15]		[16]	

Meaning of the individual parameters:

All these 16 functions in 3090 00005 form a "modal group", i.e. only one of these functions can be active at any given time.

Functions defined in the individual parameters [2] through [16] of 3090 00005 deselect one another.

The functions defined in individual parameter [1] of 3090 00005 deactivates the modal effect (switch-off function).

If the NC finds in the NC block currently active a function defined in the individual parameters [2] through [16] of 3090 00005, it starts the program that is entered in the corresponding individual parameter of 3090 00006.

Using the standard NC syntax, you can also transfer data to the program called up. This data remains available until the respective function or, resp., the modal effect is deselected. You can specify the maximum number of parameters to be transferred in the corresponding individual parameter of 3090 00007.

 **Changes made to 3090 00005 will not be accepted before the next control start-up.**

Functions relating to programming

3090 00006**Modal subprograms (subprogram names)**

Specifies

- up to 16 names of subprograms that can be called up depending on the setting in 3090 00005.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
–	–	–	16	string	8 bytes	8	–	–	w,w,r	–					
Presettings [x] = element index															
[1] <off>	[2]99999081	[3]99999082	[4]99999083	[5]99999084	[6]99999085	[7]99999086	[8]99999184	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]

The value set in individual parameter [1] is irrelevant.
For more detailed information, see 3090 00005.

3090 00007**Modal subprograms (number of parameters)**

Specifies for each subprogram referenced in 3090 00006

- the maximum number of parameter values that can be transferred.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
00 ... 99	1	–	16	integer	1 byte	2	–	signed	w,w,r	–					
Presettings [x] = element index															
[1] 00	[2] 05	[3] 05	[4] 07	[5] 05	[6] 05	[7] 05	[8] 08	[9] 00	[10] 00	[11] 00	[12] 00	[13] 00	[14] 00	[15] 00	[16] 00

The value set in individual parameter [1] is irrelevant.
For more detailed information, see 3090 00005.

Functions relating to communication

4.6 Functions relating to communication

4.6.1 Peripheral selection (group 4055)

 **The parameters of group 4055 are relevant for the PNC-R only.**

In this group, appropriate interfaces can be configured for up to 8 input/output devices with serial V24 interfaces.

When you select a specific device on the user interface of the control unit, the PNC-R activates the corresponding configuration.

 **All individual parameters having the same index [x] relate to the configuration of a specific interface.**

4055 00001

Peripheral designation

Specifies for each interface configuration

- its name.

Designations entered here can be selected via **MANAGE ► SAVE FILES ► FILE TRANSFER ► OUTPUT/LOAD ► INTERFACE PARAMETERS**.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings [x] = element index										
[1] Unix-PC	[2]	[3]	[4]	[5]	[6]	[7]	[8]			


4055 00002

Transmission rate

Specifies for each of the interface configurations stated in 4055 00001

- its baud rate.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
110, 200, 300...115200	300*2 ^x	bit/s	8	integer	4 bytes	8	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1] 00009600	[2] 00009600	[3] 00009600	[4] 00009600	[5] 00009600	[6] 00009600	[7] 00009600	[8] 00009600			

 **Maximum baud rate via X35 of the osa master module: 19200 bits/s.**

Functions relating to communication

4055 00003**Number of data bits**

Specifies for each of the interface configurations stated in 4055 00001

- the number of data bits.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
5 ... 8	1	bit	8	integer	1 byte	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	8	[2]	8	[3]	8	[4]	8	[5]	8	[6]	8	[7]	8	[8]	8

4055 00004**Number of stop bits**

Specifies for each of the interface configurations stated in 4055 00001

- the number of stop bits.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
1.0 ... 2.0	0.5	bit	8	real	4 bytes	2	1	float	w,w,r	–					
Presettings [x] = element index															
[1]	1.0	[2]	1.0	[3]	1.0	[4]	1.0	[5]	1.0	[6]	1.0	[7]	1.0	[8]	1.0

4055 00005**Parity**

Specifies for each of the interface configurations stated in 4055 00001

- the kind of parity check desired.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0 ... 2	1	–	8	integer	1 byte	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0

Meaning of parameter values:

- 0 none
- 1 odd
- 2 even

Functions relating to communication

4055 00006**Loading timeout**

Specifies for each of the interface configurations stated in 4055 00001

- the period of time after which loading is aborted if no data is received.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.0, 0.5 ... 99.9	0.1	sec	8	real	4 bytes	3	1	float	w,w,r	–
Presettings [x] = element index										
[1] 10.0	[2] 10.0	[3] 10.0	[4] 10.0	[5] 10.0	[6] 10.0	[7] 10.0	[8] 10.0			

Meaning of parameter values:

0.0 No time monitoring

≥ 0.5 Time monitoring is active.

When a loading process is started, the NC expects to receive data from the connected device within the specified time. If no data is received within the set time or if data transfer is interrupted for an extended period, loading is aborted and an error message displayed.

4055 00007**Saving timeout**

Specifies for each of the interface configurations stated in 4055 00001

- the period of time after which saving is aborted if no ready-to-receive signal is received from the connected device.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.0, 0.5 ... 99.9	0.1	sec	8	real	4 bytes	3	1	float	w,w,r	–
Presettings [x] = element index										
[1] 10.0	[2] 10.0	[3] 10.0	[4] 10.0	[5] 10.0	[6] 10.0	[7] 10.0	[8] 10.0			

Meaning of parameter values:

0.0 No time monitoring.

≥ 0.5 Time monitoring is active.

When a saving process is started, the NC expects to receive a ready-to-receive signal from the connected device within the specified period. If the specified time is exceeded or if data transfer is interrupted for an extended period, the saving process is aborted and an error message displayed.

Functions relating to communication

4055 00008

Hardware handshake RTS/CTS

Specifies for each of the interface configurations stated in 4055 00001

- whether or not the hardware handshake via RTS/CTS is to be activated.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	8	integer	1 byte	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0

Meaning of parameter values:

0 No hardware handshake via RTS/CTS.

1 Activate hardware handshake via RTS/CTS.

 **The X35 interface of the osa master module only supports software handshakes via Xon and Xoff control characters. The RTS (pin 7) signal is set permanently to high.**

4055 00009

Hardware handshake DTR/DSR

Specifies for each of the interface configurations stated in 4055 00001

- whether or not the hardware handshake via DTR/DSR is to be activated.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	8	integer	1 byte	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0

Meaning of parameter values:

0 No hardware handshake via DTR/DSR.

1 Activate hardware handshake via DTR/DSR.

 **The X35 interface of the osa master module only supports software handshakes via Xon and Xoff control characters. The DTR (pin 4) signal is set permanently to high.**

Functions relating to communication

4055 00010**Software handshake Xon/Xoff**

Specifies for each of the interface configurations stated in 4055 00001

- whether or not the software handshake via Xon/Xoff is to be activated.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	8	integer	1 byte	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	1	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0

Meaning of parameter values:

0 No software handshake via Xon/Xoff.

1 Activate software handshake via Xon/Xoff.

ASCII control characters Xon: <DC1> (17 dec.)

Xoff: <DC3> (19 dec.)

4055 00011**Tape punch control DC2/DC4**

Specifies for each of the interface configurations stated in 4055 00001

- whether or not control characters for a connected tape punch are to be generated.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	8	integer	1 byte	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0

Meaning of parameter values:

0 No.

1 Yes. With every output, the ASCII control character <DC2> (18 dec.) is inserted before each data block, and <DC4> (20 dec.) is inserted after each data block.

Functions relating to communication

4055 00012

Output with leader/trailer

Specifies for each of the interface configurations stated in 4055 00001

- whether or not a leader and a trailer are to be generated with every file output.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	8	integer	1 byte	1	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1] 0	[2] 0	[3] 0	[4] 0	[5] 0	[6] 0	[7] 0	[8] 0			

Meaning of parameter values:

0 No.

1 Yes. With every output, 110 ASCII control characters <NUL> (0 dec.) each are generated before and after every file.

4055 00013

Mode of operation

Currently irrelevant. Currently irrelevant.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	8	integer	1 byte	1	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1] 0	[2] 0	[3] 0	[4] 0	[5] 0	[6] 0	[7] 0	[8] 0			

4055 00014

Compiler table

Specifies for each of the interface configurations stated in 4055 00001

- the name of an ASCII file designed to replace or filter ASCII characters in data flows for loading and saving.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	–
Presettings [x] = element index										
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]			

If no file name is specified here, data flows remain unchanged.

Please note for this ASCII file:

- General comment lines must begin with the ";" character.
- A separate line is required for every rule defining a character manipulation. The following syntax applies to such rules:
 <character> <replacement character> <comment>
 Words must be separated by blanks. <character> and <re-

Functions relating to communication

placement character> may be entered in octal, decimal or hexadecimal ASCII code.

Example: decimal: 65 66 A is replaced by B
 hex: 0x41 0x42 A is replaced by B
 octal: 0101 0102 A is replaced by B

- First, program line by line the rules for loading, then the rules for saving. These two sets of rules must be separated by a blank line.

4055 00015

V.24 interface/RS422 interface

Currently irrelevant.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	8	integer	1 byte	1	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1] 0	[2] 0	[3] 0	[4] 0	[5] 0	[6] 0	[7] 0	[8] 0			

Functions relating to communication

4.6.2 CAN interface (group 4060)

 **The parameters of group 4060 are relevant for the PNC-R only.**

The CAN interface is provided on the “osa master” module (X51).

4060 00001

Use of CAN interface

Specifies

- the use of the CAN interface. Most commonly, it is used for a machine operating panel.

 **The CAN interface cannot be used for a machine operating panel and other CAN stations simultaneously.**

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 2	–	–	1	integer	4 bytes	1	–	unsigned	w,r,r	–
Presettings: basic setup. [x]=element index										

[1] 0

Meaning of parameter values:

- 0 Machine operating panel (default)
- 2 user defined, additional settings are required in parameters 4060 00011 through 4060 00015.

4060 00011

Baudrate

Specifies

- the baud rate of the CAN interface.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
20k, 50k, 125k, 250k, 500k, 800k, 1M	–	–	1	string	8 bytes	5	–	–	w,r,r	–
Presettings [x] = element index										

[1] 1M

Meaning of parameter values:

- 20k.. 800k: baud rate of 20 Kbits/s ... 800 Kbits/s
- 1M: baud rate of 1 Mbit/s

 **This parameter is only relevant if the value of parameter 4060 00001 is set to 2 (freely configurable).**

Functions relating to communication

4060 00012**Identifier of CAN messages**

 **This parameter is only relevant if the value of parameter 4060 00001 is set to 2 (freely configurable).**

Specifies

- the possibility to set a maximum of 14 CAN message identifiers.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-1, 0 .. 65535	–	–	14	integer	4 bytes	1	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1] 008	[2] -1	[3] 0	[4] 0	[5] 0	[6] 0	[7] 0	[8] 0	[9] 0	[10] 0	[11] 0
[9] 0	[10] 0	[11] 0	[12] 0	[13] 0	[14] 0					

Meaning of the individual parameters:

[1]..[14]: 14 CAN message identifiers

Meaning of parameter values:

-1 must be entered after the last identifier as a termination if less than the maximum number of identifiers is used.

0..65535 The value range depends on the settings in parameter 4060 00014:

Standard format (CAN 2.0A) identifiers are limited to a value range from 000 through 7F0 (2032).

Extended format (CAN 2.0B) identifiers have a value range from 0000 through FFFF (65535).

4060 00013**Type of CAN messages**

 **This parameter is only relevant if the value of parameter 4060 00001 is set to 2 (freely configurable).**

Specifies

- whether a CAN message is to be received or sent.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	14	integer	1 byte	1	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1] 0	[2] 0	[3] 0	[4] 0	[5] 0	[6] 0	[7] 0	[8] 0	[9] 0	[10] 0	[11] 0
[9] 0	[10] 0	[11] 0	[12] 0	[13] 0	[14] 0					

Meaning of the individual parameters:

[1]..[14]: type of CAN message with reference to one of the 14 CAN message identifiers set in parameter 4060 00012

Meaning of parameter values:


0 CAN messages will be received

1 CAN messages will be sent

Functions relating to communication

4060 00014

Identifier of CAN send objects

 **This parameter is only relevant if the value of parameter 4060 00001 is set to 2 (freely configurable). The settings impact the value ranges of the individual parameters in parameter 4060 00012.**

Specifies

- whether the respective message has a standard identifier (CAN 2.0A) or an extended identifier (CAN 2.0B).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	14	integer	1 byte	1	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0				

Meaning of the individual parameters:

[1]..[14]: Format of the CAN identifiers with reference to one of the 14 CAN message identifiers set in parameter 4060 00012.

Meaning of parameter values:

- 0 standard format identifier (CAN 2.0A)
- 1 extended format identifier (CAN 2.0B)

4060 00015

Length of CAN messages


Specifies

- the length of the user data record in CAN messages.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0..8	–	–	14	integer	1 byte	1	–	unsigned	w,r,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0				

Meaning of the individual parameters:

[1]..[14]: Length of CAN messages with reference to one of the 14 CAN message identifiers set in parameter 4060 00012.

 **The data record length must be specified for each message defined in parameter 4060 00012. This parameter is only relevant if the value of parameter 4060 00001 is set to 2 (freely configurable).**

Functions relating to communication

4.6.3 Analog and digital I/Os (group 4075)

For PNC control units, additional high-speed inputs/outputs are available:

- for the PNC-R on the module:
 - osa dc I/O: 8 digital inputs; 6 digital outputs, or
 - osa dc I/O ana: 8 digital inputs; 6 digital outputs
8 analog inputs; 4 analog outputs
- for the PNC-P on the “PNC Highspeed I/O” plug-in card:
8 digital inputs; 8 digital outputs

4075 00101

Assignment of the digital inputs

Assigns each digital input

- to a specific functional unit.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–9999 ... 9999	1	–	8	integer	4 bytes	4	–	unsigned	w,w,r	–

Presettings [x] = element index

[1]	0000	[2]	0000	[3]	0000	[4]	0000	[5]	0000	[6]	0000	[7]	0000	[8]	0000
-----	------	-----	------	-----	------	-----	------	-----	------	-----	------	-----	------	-----	------

Meaning of parameter values:

0000 Digital input is not in use.

0001 Digital input is assigned to function “Punching”.
See also 8001 00030, page 4–216.

0002 Digital input is assigned to the PLC. See also 4075 00105.

0003 Digital input is assigned to function “G575”.

Functions relating to communication

4075 00102

Assignment of digital outputs

Assigns each digital output

- to a specific functional unit.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0000..0006, 0501...0513	1	–	8	integer	4 bytes	4	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1] 0000	[2] 0000	[3] 0000	[4] 0000	[5] 0000	[6] 0000	[7] 0000	[8] 0000			

Meaning of parameter values:

- 0000 Digital input is not in use.
- 0001 Digital output is assigned to function "Punching".
- 0002 Digital input is assigned to the PLC. See also MP 4075 00106.
- 0006 Digital output is assigned to the "Digitizing" function.
- 0501..0513 Channel 1..13 uses this output for the "Position-dependent HS output (PDHSO)".

4075 00103

Assignment of the analog inputs (PNC-R only)

Assigns each analog input

- to a specific functional unit.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0000, 0002	–	–	8	integer	4 bytes	4	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1] 0000	[2] 0000	[3] 0000	[4] 0000	[5] 0000	[6] 0000	[7] 0000	[8] 0000			

Meaning of parameter values:

- 0000 Analog input is not in use.
- 0002 Analog input is assigned to the PLC. See also 4075 00107.

Functions relating to communication

4075 00104**Assignment of analog outputs (PNC-R only)**

Assigns each analog output

- to a specific functional unit.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0000, 0002 0401...0408 0701...0712	1	–	8	integer	4 bytes	4	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1] 0000	[2] 0000	[3] 0000	[4] 0000							

Meaning of parameter values:

0000: Analog output is not in use.

0002 Analog output is assigned to the PLC. See also 4075 00108.

0401...0408: Spindles 1 through 8 are analog spindles (see page 4–46).

0701...0712: Channels 1 through 12 use this output for the "Laser power control" function.

4075 00105**Starting address of the digital inputs**

Specifies

- onto which byte in the input range of the PLC the digital inputs are mapped.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00000, I0 ... I8191 EI0..EI255	1	–	1	string	8 bytes	5	–	–	w,w,r	–
Presettings [x] = element index										
[1] 00000										

Meaning of parameter values:

00000 The digital inputs are not used by the PLC.

I0 – I255 Input bytes 0 through 255 (ICL 700, KNS)

I0 – I8191 Input bytes 0 through 8191 (iPCL)

EI0 – EI255 Bytes 0 through 255 in the extended input range (ICL 700 only)

 **The value range is dependent on the PLC used.**

Functions relating to communication

4075 00106

Starting address of the digital outputs

Specifies

- onto which byte in the output range of the PLC the digital outputs are mapped.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00000, O0 ... O8191 EO0..EO255	1	–	1	string	8 bytes	5	–	–	w,w,r	–

Presettings [x] = element index

[1] 00000

Meaning of parameter values:

00000 The digital outputs are not used by the PLC.

O0 – O255 Output bytes 0 through 255 (ICL 700, KNS)

O0 – O8191 Output bytes 0 through 8191 (iPCL)

EO0 – EO255 Bytes 0 through 255 in the extended output range (ICL 700 only)

 **The value range is dependent on the PLC used.**

4075 00107

Starting address of the analog inputs

Specifies

- the starting address of the analog PNC-R inputs in the input range of the PLC.

 **The analog inputs occupy 8 consecutive data words of 16 bits each in the input range of the PLC.**

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00000, I0 ... I8176 EI0..EI240	1	–	1	string	8 bytes	5	–	–	w,w,r	–

Presettings [x] = element index

[1] 00000

Meaning of parameter values:

00000 The analog inputs are not used by the PLC.

I0 – I240 Input bytes 0 through 240 (ICL 700, KNS)

I0 – I8176 Input bytes 0 through 8176 (iPCL)

EI0 – EI240 Bytes 0 through 240 in the extended input range (ICL 700 only)

 **The value range is dependent on the PLC used.**

Functions relating to communication

4075 00108**Starting address of the analog outputs**

Specifies

- the starting address of the analog PNC-R outputs in the output range of the PLC.

 **The analog outputs occupy 4 consecutive data words of 16 bits each in the output range of the PLC.**

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00000, 00 ... O8184 EO0..EO248	1	–	1	string	8 bytes	5	–	–	w,w,r	–

Presettings [x] = element index

[1] 00000

Meaning of parameter values:

00000 The analog outputs are not used by the PLC.

00 – O248 Output bytes 0 through 248 (ICL 700, KNS)

00 – O8184 Output bytes 0 through 8184 (iPCL)


EO0 – EO248 Bytes 0 through 248 in the extended output range (ICL 700 only)

 **The value range is dependent on the PLC used.**

4075 00200**High-speed I/O via PROFIBUS-DP or hardware (PNC-P)**

Specifies

- whether the high-speed I/Os of the PNC-P are linked via PROFIBUS-DP or via the “PNC high-speed I/O” plug-in card.

 **The 4 analog outputs of the PNC-P are always linked via PROFIBUS-DP. Analog inputs are not available.**

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	1	integer	1 byte	1	0	unsigned	w,r,r	–

Presettings [x] = element index

[1] 0

Meaning of parameter values:

0: High-speed I/O via plug-in card

1: High-speed I/O via PROFIBUS-DP

Functions relating to communication

4075 00201

Offset of the D/A converter (PNC-P)

Compensates

- the offset of the D/A converter of the 4 analog outputs of the PNC-P.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-10 ... 10	-	volts	1	real	4 bytes	6	4	float	w,r,r	-
Presettings [x] = element index										
[1]	0	[2]	0	[3]	0	[4]	0			

Meaning of parameter values:

-10 ... 10: Offset compensation in volts

4075 00202

Gain of the D/A converter (PNC-P)

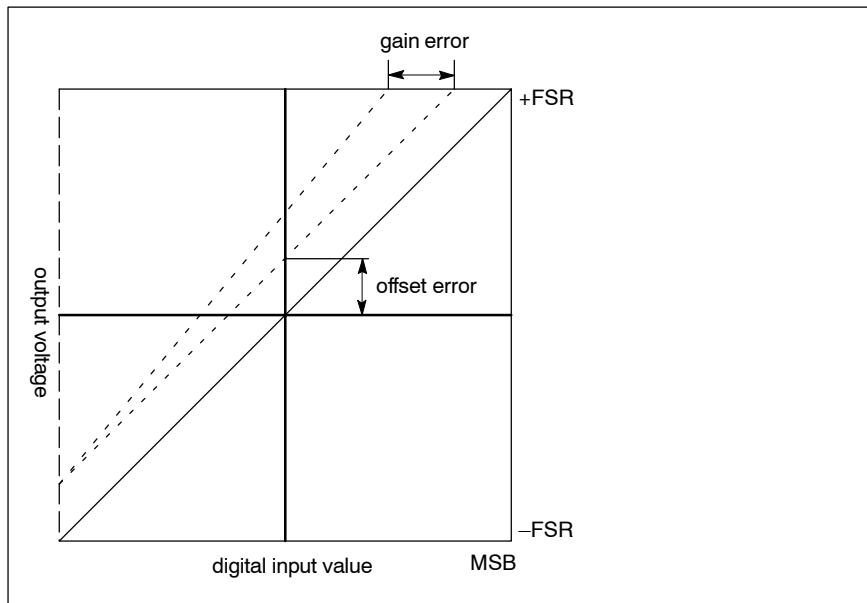
Specifies for the 4 analog outputs of the PNC-P

- the gain of the D/A converter.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-10 ... 10	-	volts	1	real	4 bytes	6	4	float	w,r,r	-
Presettings [x] = element index										
[1]	0	[2]	0	[3]	0	[4]	0			

Meaning of parameter values:

-10 ... 10: Gain in volts



Functions relating to communication

4075 00203**D/A converter type (PNC-P)**

Specifies for the 4 analog outputs of the PNC-P

- the D/A converter type.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1, 2, 10, 11, 12	–	–	1	integer	1 byte	1	0	unsigned	w,r,r	–
Presettings [x] = element index										
[1] 0	[2] 0	[3] 0	[4] 0							

Meaning of parameter values:

- 0: 16-bit converter, –10 V to 10 V, 2's complement
- 1 12-bit converter, left-justified, –10 V to 10 V, 2's complement
- 2 12-bit converter, right-justified, –10 V to 10 V, 2's complement
- 10 16-bit converter, 0 V to 10 V
- 11 12-bit converter, left-justified, 0 V to 10 V
- 12 12-bit converter, right-justified, 0 V to 10 V

Functions relating to communication

4.6.4 PROFIBUS-DP (group 4080)

The **PNC-P** is always configured as DP master. MP 4080 00011 and 4080 00012 are effective.

The **PNC-R** can optionally use the PROFIBUS-DP interface on the “osa dc I/O” or “osa dc I/O ana” modules. In this case, the PNC-R can be configured as:

- DP master: 4080 00001 = 0 or 2
MP 4080 00011 and 4080 00012 are effective.
- DP slave: 4080 00001 = 1
MP 4080 00021 through 4080 00024 are effective.

4080 00001

DCIO mode

Specifies

- the DP operating mode for the PNC-R .

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0 ... 2	1	–	1	integer	1 byte	1	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1]	0									

Meaning of parameter values:

- 0 PNC-R is master with KNS
- 1 PNC-R is slave with KNS
- 2 PNC-R is master with iPCL or ICL700.

 See also MP 2060 00200.

4080 00011

File name of master parameter set (DP master)

Specifies

- the name of the file containing the master parameter set for the configuration of the DP master.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	2	string	8 bytes	8	–	–	w,r,r	–
Presettings [x] = element index										
[1] pdpkonf	[2]	mca								

The master parameter set can be generated using your PC-based configuration tool (WinDP). It is then stored as a file in the control unit.

Functions relating to communication

4080 00012**Asynchronous handling of DP channels (DP master)**

Specifies

- the type of data exchange with the DP slave.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	1	integer	1 byte	1	–	unsigned	w,r,r	–
Presettings [x] = element index										

[1] 1

Meaning of parameter values:

0 synchronous with the PLC cycle

1 asynchronous with the PLC cycle

4080 00021**Slave address (DP slave)**

Specifies

- the address of the osa dc I/O as a DP slave.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000... 125	1	–	1	integer	1 byte	3	–	unsigned	w,r,r	–
Presettings [x] = element index										

[1] 000

 **The address assigned must be unique on the bus.**

4080 00022**Baud rate (DP slave)**

Specifies

- the baud rate of data transmission between the DP master and a DP slave.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
12 M 6 M 3 M 1.5 M 500 k 187.5 k 93.75 k 19.2 k 9.6 k	–	–	1	string	8 bytes	8	–	–	w,r,r	–
Presettings [x] = element index										

[1] 12 M

Functions relating to communication

4080 00023**Number of input bytes (DP slave)**

Specifies

- the number of reserved input bytes in the DP slave.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000... 244	1	–	1	integer	1 byte	3	–	unsigned	w,r,r	–

Presettings [x] = element index

[1] 116

While the bus system is being initialized, the DP master transmits the scheduled configuration as set in the master parameter set to the DP slave.

If there is a difference between the value in the master parameter set and the value as set in the DP slave, initialization is bound to fail.

4080 00024**Number of output bytes (DP slave)**

Specifies

- the number of reserved output bytes in the DP slave.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000... 244	1	–	1	integer	1 byte	3	–	unsigned	w,r,r	–

Presettings [x] = element index

[1] 116

Functions relating to communication

4085 00003

Baud rate

Specifies

- the baud rate on the bus.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1500 500 187.5 93.75 19.2 9.6	–	Kbit/s	1	string	8 bytes	8	–	–	w,r,r	–

Presettings [x] = element index

[1] 500

 **1500 Kbits/s is not defined in Part 1 of DIN 19245.**

4085 00004

Identification of manufacturer, model and version

Specifies information that

- can be read out by the FMS Service Identify for identification purposes.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,r,r	–

Presettings [x] = element index

[1] Robert B | [2] osch Gmb | [3] H|Typ3 o | [4] sa|Janua | [5] ry| 1995 | [6] | [7] | [8]

Meaning of parameter values:

The whole character string containing the information consists of 3 inputs: "manufacturer's name", "model designation" and "version". These individual parameter values are written one after another, with a maximum string length of 60 characters.

The length of each input is limited to 32 characters. The "|" character is used to separate the elements from one another.

Example: The default settings shown above provide the following information:

manufacturer's name: Robert Bosch GmbH
 model designation: Typ3 osa
 version: January 1995

Functions relating to communication

4085 00005

Project name

Specifies

- the file name prefix (max. 5 characters) of the file containing the PROFIBUS interface configuration data.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	1	string	8 bytes	5	–	–	w,r,r	–

Presettings [x] = element index

[1] profi |

The PC-based configuration tool "Profibus configurator" is used to configure the PROFIBUS interface. The names of the configuration files generated are derived from the project name and the PROFIBUS user address selected in the Profibus configurator. These files are then transferred to the PNC-R and evaluated during start-up of the NC.

Functions relating to communication

4.6.6 DNC interface with LSV2 protocol (group 4086)

 **The parameters of group 4086 are relevant for the PNC-R only.**

The V24 interface (X35) of the osa master module can also be used as a DNC interface with an LSV2 protocol.

For this purpose, DNC operation can be switched on and off by using the LSV2 DNC softkey under DIAGNOSTICS ► RESET FUNCTIONS.

The number of data bits is fixed to 8 bits per character because LSV2 messages may also contain binary data.

4086 00002

Transmission rate

Specifies

- the transmission rate.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
110, 200, 300...115200	300*2 ^x	bit/s	1	integer	4 bytes	10	–	unsigned	w,w,r	–

Presettings [x] = element index

[1] 19200

 **Max. baud rate via X35 of the osa master module: 19200 bits/s.**

4086 00003

Number of stop bits

Specifies

- the number of stop bits.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1.0 ... 2.0	0.5	bit	1	real	4 bytes	2	1	float	w,w,r	–

Presettings [x] = element index

[1] 1.0

Functions relating to communication

4086 00004**Parity**

Specifies

- the kind of parity check to be performed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0 ... 2	1	–	1	integer	1 byte	1	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1]	2									

Meaning of parameter values:

- 0 none
- 1 odd
- 2 even

4086 00005**Timeout**

Specifies

- various timeout intervals in the LSV2 data link protocol.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.0, 0.5 ... 99.9	0.1	sec	3	real	4 bytes	3	1	float	w,w,r	–
Presettings [x] = element index										
[1]	1.0	[2]	1.0	[3]	1.0					

Meaning of parameter values:

- 0.0 No timeout.
- ≥ 0.5 Timeout is activated.

Meaning of the individual parameters:

- [1] T0
- [2] T1
- [3] T2

Upon receiving the <STX> control character, the receiver station starts a **T0** timeout. Unless an <ETX> signal is received within the set interval, the receiver station returns to its initial status.

Upon transmission of <ENQ> and <BCC>, the transmitting station starts a **T1** timeout. Unless a valid acknowledgement is received within the set interval, the partner station is prompted by an <ENQ> signal to send a valid acknowledgement.

Upon transmission of <DLE0>, <DLE1> or <NAK>, the receiver station starts a **T2** timeout. Unless a valid response is received from the transmitting station within the set interval, the receiver station returns to its initial status.

Functions relating to communication

4086 00006**Priority with NC in event of collision**

Specifies for LSV2

- the handling in the event of a collision (simultaneous transmission requests of both LSV2 partners).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	1	integer	1 byte	1	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1]	0									

Meaning of parameter values:

0 PNC-R has priority

1 DNC computer (host) has priority.

A collision occurs if instead of the expected <DLE0> an <ENQ> signal is received following transmission of an <ENQ> signal.


In this case, the high-priority station ignores the <ENQ> signal received. The low-priority station postpones its own transmission request and sends a <DLE0> acknowledgement.

4086 00007**Maximum telegram length**

Specifies for LSV2

- the maximum permitted telegram (message) length.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
120 ... 256	1	byte	1	integer	2 bytes	3	–	unsigned	w,r,r	–
Presettings [x] = element index										
[1]	256									

 **An LSV2 telegram (message) is composed of a message identifier of 8 characters, an error code of 2 characters, and a variable user data part of up to 246 characters.**

Functions relating to communication

4086 00008**Power-up condition of DNC**

Specifies

- the power-up condition of the LSV2 DNC upon NC start-up

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
120 ... 256	1	byte	1	integer	2 bytes	3	–	unsigned	w,w,r	–
Presettings [x] = element index										

[1] 256 |

Meaning of parameter values:

0 Switched off.

The LSV2 DNC checkbox softkey (under DIAGNOSTICS ► RESET FUNCTIONS) is not selected in this case.

1 Switched on.

The LSV2 DNC checkbox softkey is selected.

4086 00009**Compiler table**

Specifies – with LSV2 DNC switched on –

- the name of an ASCII file designed to replace or filter ASCII characters in the data flow of loading and saving operations.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	1	string	8 bytes	8	–	–	w,r,r	–
Presettings [x] = element index										

[1] |

If no file name is entered here, the data flow remains unchanged.
For the rules on creating this ASCII file, see 4055 00014 on page 4–124.

Functions relating to applications

4.7 Functions relating to applications

4.7.1 Application parameters (group 5090)

The configuration parameters of this group 5090 provide an area for saving your own data.

 **You can read the data with the CPL command "MCA" or by using an appropriate PLC module.**

The standard data storage area is designed for:

- 50 signed integer values (max. 10 digits) and
- 50 signed real values (max. 7 integer and 5 decimal positions).

 **In order to save text, you must create an additional configuration parameter of the "string" type.**

5090 00001

Signed integer values

Designed

- for saving signed integers.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-2147483647 ... 2147483647	1	–	50	integer	4 bytes	10	–	signed	w,r,r	–
Presettings [x] = element index										
[1] 0	[2] 0	[3] 0	[4] 0	[5] 0	[6] 0	[7] 0	[8] 0	[9] 0	[10] 0	[11] 0
[12] 0	[13] 0	[14] 0	[15] 0	[16] 0	[17] 0	[18] 0	[19] 0	[20] 0	[21] 0	[22] 0
[23] 0	[24] 0	[25] 0	[26] 0	[27] 0	[28] 0	[29] 0	[30] 0	[31] 0	[32] 0	[33] 0
[34] 0	[35] 0	[36] 0	[37] 0	[38] 0	[39] 0	[40] 0	[41] 0	[42] 0	[43] 0	[44] 0
[45] 0	[46] 0	[47] 0	[48] 0	[49] 0	[50] 0					

5090 00002

Signed real values

Designed

- for saving signed floating-point numbers.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-9999999.99999 ... 9999999.99999	0.99999	–	50	real	8 bytes	12	5	float	w,r,r	–
Presettings [x] = element index										
[1] 0	[2] 0	[3] 0	[4] 0	[5] 0	[6] 0	[7] 0	[8] 0	[9] 0	[10] 0	[11] 0
[12] 0	[13] 0	[14] 0	[15] 0	[16] 0	[17] 0	[18] 0	[19] 0	[20] 0	[21] 0	[22] 0
[23] 0	[24] 0	[25] 0	[26] 0	[27] 0	[28] 0	[29] 0	[30] 0	[31] 0	[32] 0	[33] 0
[34] 0	[35] 0	[36] 0	[37] 0	[38] 0	[39] 0	[40] 0	[41] 0	[42] 0	[43] 0	[44] 0
[45] 0	[46] 0	[47] 0	[48] 0	[49] 0	[50] 0					

Functions relating to operator control and display

4.8 Functions relating to operator control and display

4.8.1 Power-up condition of MMI (group 6001)

6001 00010

Active channel displayed after switching on

Specifies for each of the two NC display windows (A and B) separately

- the (machining) channel that is selected for display upon power-up of the operator interface.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
01...32	1	–	2	integer	1 byte	2	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1]	01		[2]	01						

Meaning of the individual parameters:

[1] channel to be shown in NC display window A

[2] channel to be shown in NC display window B

 **The desired channels can be set also via the "-nc1" and "-nc2" request parameters when switching on the standard operator interface.**

6001 00020

Multiple selection of CPL dialog

Specifies

- the response of the standard operator interface when a CPL dialog softkey is activated while another CPL dialog program is already active.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...2	1	–	1	integer	4 bytes	1	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1]	0									

Meaning of parameter values:

- The previously active program is brought to the foreground. The program selected subsequently is not started.
- Deselecting the previously active program by resetting the CPL dialog channel (see page 4–112) and starting the new program.
- The operator will be prompted to specify whether he wants to continue the active program or to start the new program.

 **For querying or setting the status of the CPL dialog window, see 2060 00120 on page 4–83.**

Functions relating to operator control and display

6001 00030

Configuration of the jog mode softkey

Specifies

- the response of the "Jog mode" softkey in the main menu "Machine".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1 ... 3	1	–	1	integer	1 byte	1	–	unsigned	w,r,r	–
Presettings [x] = element index										

[1] 1 |

Meaning of parameter values:

When the "Jog mode" softkey is actuated

- 1 Jogging in axes is activated
- 2 Jogging in workpiece coordinates (WCS) is activated
- 3 Another softkey level is opened using the "Jog axis" and "Jog WCS" softkeys.

Functions relating to operator control and display

4.8.2 Channel-specific displays (Gruppe 6005)

Suppress display

6005 00010

Suppress display of channel

Specifies for each applied channel separately

- whether or not it is suppressed on the operator interface.
Channels that are suppressed on the operator interface cannot be shown in channel dialog nor can they be selected via channel selection.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	1	integer	1 byte	1	–	unsigned	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 0

Meaning of parameter values:

- 0 Channel is shown on the display.
- 1 Channel is suppressed on the display.

Configuration of axis display

A maximum of 8 axes are displayed in the PNC user interface (MMI). If an axis transformation is active, the working range coordinates, which are programmed as well, are displayed instead of the axes linked to the transformation. Which axes are linked to which of the maximum 6 possible working range coordinates (X, Y, Z coordinate and 3 orientation coordinates) is specified in the selected axis transformation (MP 1030 00110).

The names of the working range coordinates are entered channel-specifically in MP 7080 00010. All active working range coordinates constitute the channel coordinate package (CCP).

Please note for the order of display:

- The elements of the **channel sequence** are displayed first:
 - **Without axis transformation**, the axis sequence according to MP 6005 00022 (axes of the current channel) is applicable
 - **With axis transformation**, the channel coordinate package (CCP) is displayed first. Below this, further axes of the channel which are not involved in the axis transformation but have been selected in MP 6005 00022.
The display position of the CCP can be shifted to the area of the total sequence using MP 6005 00021; however, the sequence of the working range coordinates within the CCP is unchangeable.
- Below this, the elements of the **total sequence** are displayed:
The remaining axes of the channel, asynchronous axes, axes of other channels and CCPs of other channels, as determined in MP 6005 00020 (axes) and MP 6005 00021 (CCPs).

Functions relating to operator control and display

MP 6005 00020 (axes in the total sequence):

Axis	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos. No.	0	0	2	1	0	0	0	0	0	0	0	0	-4	5	0

Display without axis transformation if:

- axes 1, 2, 3 and 8 are assigned to channel 1
- axis 13 is assigned to channel 2
- no transformation is active in channel 1 and 2

Order of display	determined by:
Synchronous axis 1	Channel sequence
Synchronous axis 2	Channel sequence
Synchronous axis 3	Channel sequence
Synchronous axis 8	Channel sequence
Asynchronous axis 4	Total sequence
Synchronous axis 13	Total sequence
Asynchronous axis 14	Total sequence

Axis 10 is not represented because it does not belong to channel 1 or nothing is specified with regard to what other channel it might pertain to or about an asynchronous property it might have.

Display with axis transformation if:

- axes 1, 2, 3, 4 and 8 are assigned to channel 1
- a transformation is active on channel 1, with the coordinates x, y, z, psi and the axes 1, 2, 4 and 8.
- a transformation is active on channel 3, with the coordinates x3 and y3
- axis 13 is assigned to channel 2.

Order of display	determined by:
x	CCP channel 1
y	
z	
psi	
Synchronous axis 3	Channel sequence
x3	CCP channel 3 (total sequence)
y3	
Synchronous axis 13	Total sequence

The asynchronous axis 14 cannot be represented anymore because the display is limited to max. 8 axes.

Functions relating to operator control and display

6005 00020

Position of the axis in the total sequence

Specifies for every axis (both auxiliary and machining axes) applied on a specific channel

- whether or not such axis is shown on the axis display and, if so, in which position of the **total sequence**.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-1 ... -64 0 1 ... 64	1	-	64	integer	4 bytes	!2	-	signed	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1]	1	[2]	1	[3]	1	[4]	1	[5]	1	[6]	1	[7]	1	[8]	1
[9]	1	[10]	1	[11]	1	[12]	1	[13]	1	[14]	1	[15]	1	[16]	1
[17]	1	[18]	1	[19]	1	[20]	1	[21]	1	[22]	1	[23]	1	[24]	1
[25]	1	[26]	1	[27]	1	[28]	1	[29]	1	[30]	1	[31]	1	[32]	1
[33]	1	[34]	1	[35]	1	[36]	1	[37]	1	[38]	1	[39]	1	[40]	1
[41]	1	[42]	1	[43]	1	[44]	1	[45]	1	[46]	1	[47]	1	[48]	1
[49]	1	[50]	1	[51]	1	[52]	1	[53]	1	[54]	1	[55]	1	[56]	1
[57]	1	[58]	1	[59]	1	[60]	1	[61]	1	[62]	1	[63]	1	[64]	1

Meaning of parameter values:

-1 through -64 The value indicates the position number within the axis display.

A negative sign before the value specifies that the axis is to be displayed always, even if it is assigned to a different channel. Axes having the same position number are shown in the order of their physical axis index.

0 The axis is not shown on the display.

1 through 64 Position number within the axis display.

In case of a positive position number, the axis is displayed only if it is an auxiliary axis or a synchronous axis of the channel. Axes having the same position number are shown in the order of their physical axis index.

 **Since the position numbers are interpreted as priorities, gaps cannot occur in the order of display.**

MP 6005 00022 has priority over MP 6005 00020.

Functions relating to operator control and display

6005 00021

Position of the CCP in the total sequence

Specifies for every channel

- whether or not the channel coordinate packages of channels 1 through 13 are shown on the axis display and, if so, in which position of the **total sequence**.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0 1 ... 64	1	–	13	integer	4 bytes	!2	–	signed	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1] 0	[2] 0	[3] 0	[4] 0	[5] 0	[6] 0	[7] 0	[8] 0	[9] 0	[10] 0	[11] 0
[9] 0	[10] 0	[11] 0	[12] 0	[13] 0						

Meaning of parameter values:

- 0 CCP is shown in the first position on the current channel, but not throughout the total sequence on other channels.
- 1 through 64 Position number of the CCP in the total sequence.

6005 00022

Position of the axis in the channel sequence

Specifies for every applied axis

- whether or not such an axis is shown on the axis display of its channel and, if so, in which position (**channel sequence**).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0 1 ... 64	1	–	64	integer	4 bytes	!2	–	signed	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1] 0	[2] 0	[3] 0	[4] 0	[5] 0	[6] 0	[7] 0	[8] 0	[9] 0	[10] 0	[11] 0
[9] 0	[10] 0	[11] 0	[12] 0	[13] 0	[14] 0	[15] 0	[16] 0	[17] 0	[18] 0	[19] 0
[17] 0	[18] 0	[19] 0	[20] 0	[21] 0	[22] 0	[23] 0	[24] 0	[25] 0	[26] 0	[27] 0
[25] 0	[26] 0	[27] 0	[28] 0	[29] 0	[30] 0	[31] 0	[32] 0	[33] 0	[34] 0	[35] 0
[33] 0	[34] 0	[35] 0	[36] 0	[37] 0	[38] 0	[39] 0	[40] 0	[41] 0	[42] 0	[43] 0
[41] 0	[42] 0	[43] 0	[44] 0	[45] 0	[46] 0	[47] 0	[48] 0	[49] 0	[50] 0	[51] 0
[49] 0	[50] 0	[51] 0	[52] 0	[53] 0	[54] 0	[55] 0	[56] 0	[57] 0	[58] 0	[59] 0
[57] 0	[58] 0	[59] 0	[60] 0	[61] 0	[62] 0	[63] 0	[64] 0			

Meaning of parameter values:

- 0 Do not display axis via channel sequence.
- 1 through 64 Position number in the axis display.
Axes of the active channel are displayed only.

Functions relating to operator control and display

Configuration of spindle display

6005 00030

Configuration of spindle display

Specifies for every channel

- whether or not applied **spindles** (see 1040 00001) or **spindle groups** (see 1040 00002) are to be shown on the spindle display and, if so, in which position.

A maximum of 2 spindles/spindle groups can be shown in the "Process Data" display area of group operating modes MANUAL or AUTOMATIC.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-01...-04 00 01...16	1	-	2	integer	4 bytes	2	-	signed	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 01 | [2] 02 |

Meaning of the individual parameters:

- [1] first position on the spindle display
- [2] second position on the spindle display

Meaning of parameter values:

- 01 through -04 The parameter value represents the spindle group to be displayed.
If there are no spindles assigned (via 1040 00002) to the spindle group entered here, same effect as "00".
- 00 The respective display position is not being used.
- 01 through 16 Number of the spindle to be displayed.
If this spindle does not exist, same effect as "00".

Functions relating to operator control and display

4.8.3 Internal parameters (change in dialog) (group 6010)

Modifications of the configuration parameters of this group are made on the PNC user interface.

6010 00010

File extension of the text file for active language

Serves

- to save the current language setting and
- to identify the respective language in which text files required for internal NC purposes are written. The NC uses the file extension to identify the language of such files.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	1	string	4 bytes	3	–	–	–,–,–	–
Presettings [x] = element index										

[1] 049 |

 **Never change this parameter value manually!**
To set the language, always follow the dialog on the NC operator interface (DIAGNOSTICS ► SET ► SET LANGUAGE)!

The international country codes of countries typical of the respective language are used as file extensions (e.g., "049" for German, "044" for English). Some file examples are:

- systexte.xxx: system text file
- tooldiag.xxx, toolprms.xxx: standard tool management
- mzatexte.xxx: machine status and error display

When running up, the NC reads out this parameter and re-activates the language last set.

If the required system text file is not found (e.g., because the file was deleted), the system changes to its "internal" language. This internally preset language is marked by the note "(internal)" in the dialog for setting the language.

Functions relating to operator control and display

6010 00020

Function key configuration

Serves

- to save the assignment of user-defined function keys (e.g. F10 through F12).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000...999 -001	-	-	4	integer	2 bytes	3	-	signed	-, -, -	-
Presettings [x] = element index										
[1] 302	[2] 310	[3] 201	[4] 203							

 **Never change these parameter values manually!**
To assign function keys, always follow the NC operator interface dialog (DIAGNOSTICS ► SET ► DEFINE FUNCTION KEYS)!

6010 00030

Parameters for file transfer

Serves

- to save various settings for file transfer.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...7	1	-	4	integer	1 byte	1	-	unsigned	-, -, -	-
Presettings [x] = element index										
[1] 0	[2] 0	[3] 1	[4] 0							

 **Never change these parameter values manually!**
To set the various options, always follow the NC operator interface dialog!

Meaning of the individual parameters:

- [1] reserved
- [2] selected device (0-7; see also 4055 00001).
The respective device can be set via **MANAGE ► SAVE FILES ► FILE TRANSFER ► OUTPUT/LOAD ► INTERFACE PARAMETERS** under "Device:".
- [3] DFS identification activated (0: No; 1: Yes).
This can be set under **MANAGE ► SAVE FILES ► FILE TRANSFER ► OUTPUT** via **DFS IDENTIFICATION** checkbox softkey.
- [4] reserved

Functions relating to operator control and display

4.8.4 Display format settings (group 6020)

6020 00001

Number of decimal places for feed display (metric)

Specifies

- the number of decimal positions to be shown on the feed display for a channel while G71 is active (programming in metric units).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...7	1	–	1	integer	1 byte	1	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1]	1									

6020 00002

Number of decimal places for feed display (inch)

Specifies

- the number of decimal positions to be shown on the feed display for a channel while G70 is active (programming in inches).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...7	1	–	1	integer	1 byte	1	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1]	2									

6020 00011

Number of decimal places for axis display (metric)

Specifies for every axis

- the number of decimal positions to be shown on the position display while the metric measuring system is active.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0...9	1	–	64	integer	4 bytes	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	3	[2]	3	[3]	3	[4]	4	[5]	3	[6]	3	[7]	4	[8]	4
[9]	3	[10]	3	[11]	3	[12]	3	[13]	3	[14]	3	[15]	3	[16]	3
[17]	3	[18]	3	[19]	3	[20]	3	[21]	3	[22]	3	[23]	3	[24]	3
[25]	3	[26]	3	[27]	3	[28]	3	[29]	3	[30]	3	[31]	3	[32]	3
[33]	3	[34]	3	[35]	3	[36]	3	[37]	3	[38]	3	[39]	3	[40]	3
[41]	3	[42]	3	[43]	3	[44]	3	[45]	3	[46]	3	[47]	3	[48]	3
[49]	3	[50]	3	[51]	3	[52]	3	[53]	3	[54]	3	[55]	3	[56]	3
[57]	3	[58]	3	[59]	3	[60]	3	[61]	3	[62]	3	[63]	3	[64]	3

The metric measuring system is active with

- linear machining axes if "Programming mode" (all operating modes except "Jog" and "Traverse to reference point") has been selected **and** metric programming (G71) is active on the respective channel. **Never** set the "Inch increment step" signal on the corresponding axis interface if "Jog" or "Traverse to reference point" have been selected.

Functions relating to operator control and display

- linear auxiliary axes if the respective axis is in programming mode, i.e. the signals for **neither** axis "Jog" mode **nor** "Traverse to reference point" are set on the axis interface.
If signals for these axes modes are set on the interface, the "Inch increment step" signal **must not** be set on the corresponding axis interface.


This parameter always applies to rotary and endless axes; their position values are invariably shown in degrees and are marked by the degree sign after the value.

6020 00012

Number of decimal places for axis display (inch)

Specifies for every **axis**

- the number of decimal positions to be shown on the position display while the inch measuring system is active.

 **This parameter is irrelevant for rotary and endless axes because these axes are always programmed in degrees. The number of their decimal positions can be programmed in 6020 00011.**

 **The measuring system for linear auxiliary axes is always "metric" provided the axis is in "Programming mode".**

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0...9	1	–	16	integer	4 bytes	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	4	[2]	4	[3]	4	[4]	4	[5]	4	[6]	4	[7]	4	[8]	4
[9]	4	[10]	4	[11]	4	[12]	4	[13]	4	[14]	4	[15]	4	[16]	4
[17]	4	[18]	4	[19]	4	[20]	4	[21]	4	[22]	4	[23]	4	[24]	4
[25]	4	[26]	4	[27]	4	[28]	4	[29]	4	[30]	4	[31]	4	[32]	4
[33]	4	[34]	4	[35]	4	[36]	4	[37]	4	[38]	4	[39]	4	[40]	4
[41]	4	[42]	4	[43]	4	[44]	4	[45]	4	[46]	4	[47]	4	[48]	4
[49]	4	[50]	4	[51]	4	[52]	4	[53]	4	[54]	4	[55]	4	[56]	4
[57]	4	[58]	4	[59]	4	[60]	4	[61]	4	[62]	4	[63]	4	[64]	4

The inch measuring system is active with

- linear machining axes if programming mode (all operating modes except "Jog" and "Traverse to reference point") has been selected **and** inch-programming (G70) is active on the respective channel.
Always set the "Increment in inch" signal on the corresponding axis interface if "Jog" or "Traverse to reference point" have been selected.
- linear auxiliary axes if the respective axis is in manual mode, i.e. the signals for axis modes "Jog" and "Traverse to reference point" are set on the axis interface and the "Increment in inch" signal is set.

Functions relating to operator control and display

6020 00021

Number of decimal places for correction data (metric)


Specifies

- the number of decimal positions that may be entered and are to be displayed in the zero shift and geometry compensation tables if the editor is set to "mm".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...9	1	–	2	integer	4 bytes	1	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1]	3		[2]	4						

Meaning of the individual parameters:

- [1] Number of decimal positions that may be entered and are to be displayed
- in zero shift tables for linear axes, or
 - in geometry compensation tables for all types of axis movements.
- [2] Number of decimal positions that may be entered and are to be displayed
- in zero shift tables for rotary axes.

 **If the currently active measuring system is "metric", the number of decimal positions entered in [1] is used for displaying the current geometry compensation values.**

6020 00022

Number of decimal places for correction data (inch)

Specifies

- the number of decimal positions that may be entered and are to be displayed in the zero shift and geometry tables if the editor is set to "Inch".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...9	1	–	2	integer	4 bytes	1	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1]	4		[2]	4						

For the meaning of the individual parameters, see 6020 00021.

 **If the measuring system currently active on the channel is "inch", the number of decimal positions entered in [1] is used for displaying the current geometry compensation values.**

Functions relating to channel parameters

4.9 Functions relating to channel parameters

4.9.1 Axes (group 7010)

7010 00010

Logical axis designation

For up to **8 axes** on a channel,


- their original, physical axis designations (specified in 1003 00001) can be faded over by their "logical axis designations".

This allows you to address various system axes under the same axis address from different channels.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]			

Permissible parameter values:

- <letters>, e.g. "X"
Letters denoting an internal NC functionality (e.g. D, G, H, R, S, F, A, FA) are not allowed here. See Table of Standard Programming Formats, Section 2, DIN Programming Manual.
- <letters><digit>, e.g. "X2"
To distinguish between the axis designation and the following position data, write either "=" or a "blank" between them.

 **If a long axis designation begins with another, shorter one (there are axes "X" and "X2") and a decimal point is programmed behind it, the longer designation always applies (X2.5 → the X2 axis moves to 0.5).**

If axis X is to move to 2.5, "=" or a "blank" must be programmed to distinguish between the axis designation and the position data.

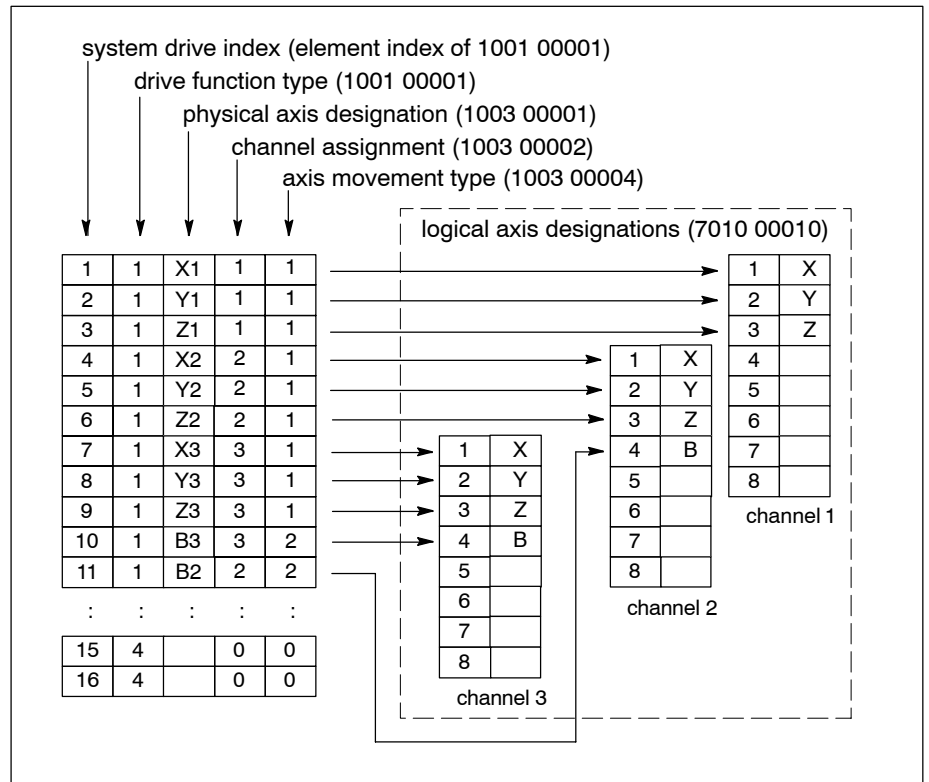
The axis designations entered here will fade over in ascending order the names of those system axes that are assigned in 1003 00002 to the respective channel.

Any surplus names entered in 7010 00010 are recognized by the NC as "optional axis designation" (see 7010 00020).

Functions relating to channel parameters

Example:

Although the machining axes on channels 1, 2 and 3 are programmed under identical names, they address different system axes. Axis "B" can be programmed on channels 2 and 3 only.



7010 00020

Optional axis designation

Specifies on each channel

- up to 8 optional axis designations.

Via G51x, these optional axis designations allow you temporarily

- to transfer axes from other channels to the channel currently selected and
- to rename axes on a channel.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	8	string	8 bytes	8	–	–	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]			

Permissible parameter values:

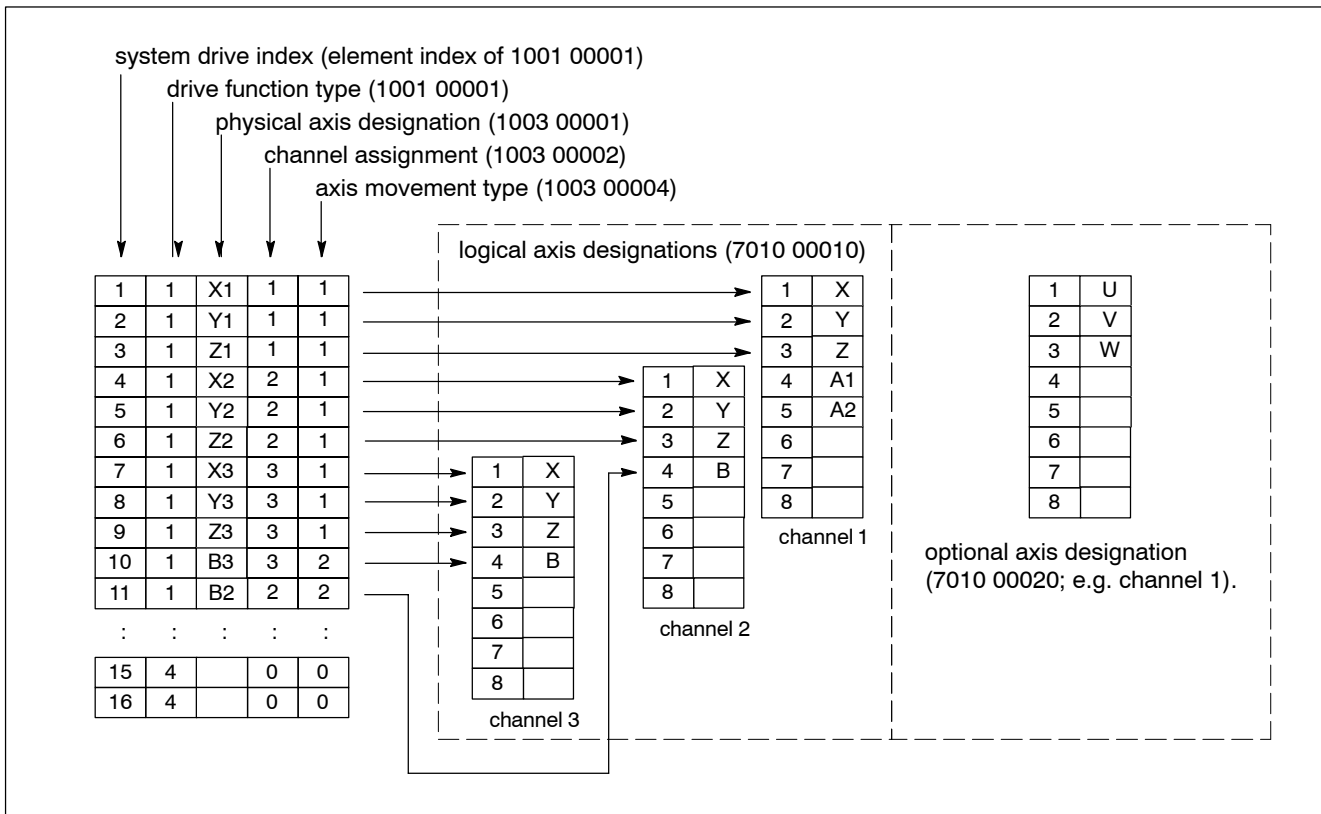
- <letters>, e.g. "X"
Letters denoting an internal NC functionality (e.g. D, G, H, R, S, F, A, FA) are not allowed here. See Table of Standard Programming Formats, Section 2, DIN Programming Manual.

Functions relating to channel parameters

- <letters><digit>, e.g. "X2"
To distinguish between the axis designation and the following position data, write either "=" or a "blank" between them.
- ☞ If a long axis designation begins with another, shorter one (there are axes "X" and "X2") and a decimal point is programmed behind it, the longer designation always applies (X2.5 → the X2 axis moves to 0.5).

If axis X is to move to 2.5, "=" or a "blank" must be programmed to distinguish between the axis designation and the position data.

Example:



In respect of channel 1, this allows you

- to transfer temporarily up to a total of 5 axes with the designations "A1", "A2", "U", "V" and "W" from other channels to channel 1 and
- to assign the optional axis designations "A1", "A2", "U", "V" and "W" to axes "X", "Y" and "Z" on channel 1.

Functions relating to channel parameters

7010 00030

Axis classification for logical axes

Specifies for **every axis** of a channel (= logical axes; max.: 8)

- its function in terms of machining (e.g. main axis, secondary axis, feed axis).

The axis classification determines the axis interpolation parameter required for center point programming with circular or helical interpolation.

You can explicitly state here if an axis is not to be of any significance in the machining process proper. However, no such axis can be assigned to a plane (G17, G18, G19, G20) and, therefore, it cannot be included in plane-related functions, e.g. circular interpolation.

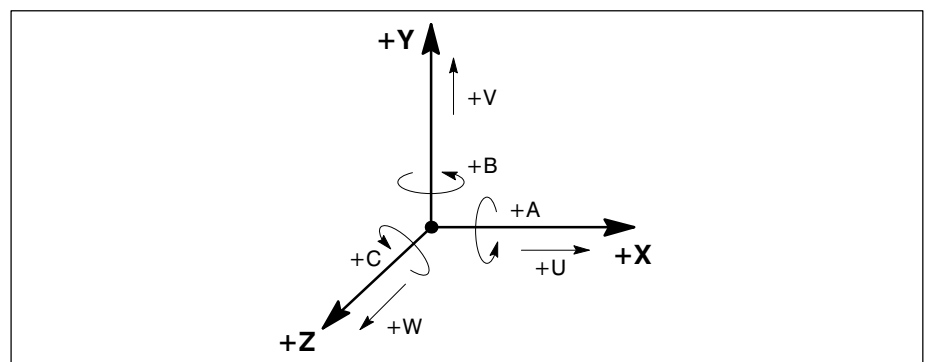
Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000 001,002,003 010,020,030 100,200,300 999	–	–	8	integer	4 bytes	3	–	unsigned	w,r,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1] 001	[2] 002	[3] 003	[4] 200	[5] 300	[6] 10	[7] 20	[8] 30			

Meaning and purpose of axis classifications

According to DIN, machine tools may have the following axis designations:

- X, Y and Z are used to designate the axes in the 3 principal Cartesian directions of a machine, with X designating the main (principal) axis, Y the secondary axis, and Z the feed axis.
- U, V and W designate axes running in parallel with X, Y and Z.
- A, B and C designate rotary axes rotating around X, Y and Z.

Each of these axes has its own, clearly defined function in the machining process.



Because the PNC allows you to assign every axis that exists in the system to any channel and – controlled by the respective program – temporarily to transfer axes from one channel to another, identification of the significance of a specific axis in respect of the machining process by means of the unique designation of this axis in the system is too restrictive.

Functions relating to channel parameters

Additionally, maximum freedom in the creation of individual axis designations is required, particularly so on the various channels available in the system.

Therefore, we use an axis classification system. Here, instead of the axis designations of the axes referred to in the DIN, the "machining-related axis functions" are assigned classification number (CLx):

- Axes running in the principal Cartesian directions:

principal axis (IAW DIN: X):	CL1
secondary axis (IAW DIN: Y):	CL2
feed axis (IAW DIN: Z):	CL3
- Axes running in parallel with the above axes:

in parallel with the principal axis (IAW DIN: U):	CL10
in parallel with the secondary axis (IAW DIN: V):	CL20
in parallel with the feed axis (IAW DIN: W):	CL30
- Rotary axes rotating around the

principal axis (IAW DIN: A):	CL100
secondary axis (IAW DIN: B):	CL200
feed axis (IAW DIN: C):	CL300
- Axes of no machining-related significance: CL999

Without any reference to axis designations, information on the machining-related significance of every axis of a channel can thus be transmitted to the control unit by entering the respective classification in the individual axis parameters.

Please note the following general rules:

- Each logical axis on every channel must be assigned a class index.
- Each class index assigned – except CL999 – must be unique on any one channel.
- The class indices entered in 7010 00030 can be changed in the part program using G21.
- With G513, you can restore the original class indices as set in 7010 00030.

Establishing the I, J and K interpolation parameters for G17, G18, G19 and G20

- ★ Establish the axis classifications of the principal and the secondary axis. You may use Table 1 below to do so for G17, G18 and G19.
- ★ Next, go to Table 2 below. If both classifications found there
 - are entered **in the same column**, the corresponding interpolation parameters shown in the **very left column** apply to these classifications.
 - are entered **in different columns**, the corresponding interpolation parameters shown in the **bottom line** apply to these classifications.

Functions relating to channel parameters

Table 1:

	Principal axis is the logical axis with the class index:	Secondary axis is the logical axis with the class index:	Feed axis (normal axis) is the logical axis with the class index:
G17:	CL1	CL2	(CL3)
G18:	CL3	CL1	(CL2)
G19:	CL2	CL3	(CL1)

Table 2:

I	CL1	CL10	CL100
J	CL2	CL20	CL200
K	CL3	CL30	CL300
	I	J	K

Example: G17

Results from table 1: principal axis = CL1; secondary axis = CL2.

Results from table 2:

Both class indices are shown in the same column. The interpolation parameters in the very left column apply:

principal axis: CL1 \Rightarrow interpolation parameter I

secondary axis: CL2 \Rightarrow interpolation param. J

Functions relating to channel parameters

Determining axis classifications with freely defined axis configurations

 **Each classification assigned – except CL999 – must be unique on any one channel!**

The following classification order is recommended for the axes available in the system:

Step	Description	Recommended classification
0	All axes of no machining-related significance or not involved in defining planes (G17, G18, G19, G20)	CL999
1	Axis in parallel with the main spindle	CL3
2	Axis in parallel with and horizontal to the workpiece clamping table	CL1
3	Axis vertical to the two axes above and in parallel with and horizontal to the workpiece clamping table	CL2
5	Axis running parallel with the CL1 axis	CL10
6	Axis running parallel with the CL2 axis	CL20
4	Axis running parallel with the CL3 axis	CL30
8	Axis rotating around the CL1 axis	CL100
9	Axis rotating around the CL2 axis	CL200
7	Axis rotating around the CL3 axis	CL300
10	For additional parallel or rotary axis, appropriate class indices not otherwise assigned may be used.	–

Example:

The following axes are available on a machine channel:

X, Y, Z, V1, V2, C1 and C2

The following classifications are assigned to them:

- Z ⇒ CL3 (axis running parallel with the main spindle)
- X ⇒ CL1 (axis running in parallel with and horizontal to the workpiece clamping table)
- Y ⇒ CL2 (axis vertical to the two axes above and running in parallel with and horizontal to the workpiece clamping table)
- V1 ⇒ CL20 (axis running in parallel with the CL2 axis)
- C1 ⇒ CL300 (axis rotating around the CL3 axis)

Functions relating to channel parameters

Consequently, class indices CL10, CL30, CL100 and CL200 are remaining unassigned.

Appropriate class indices for V2 are CL10 or CL30, while CL100 or CL200 suggest themselves for C2:

V2 ⇒ CL10 (axis running in parallel with the CL1 axis)

C2 ⇒ CL100 (axis rotating around the CL1 axis)

Implications of the class indices chosen regarding the interpolation parameters:

- The same interpolation parameters apply on planes X | C1, Y | C1, Z | C1, V1 | C1 and V2 | C1 as on planes X | C2, Y | C2, Z | C2, V1 | C2, and V2 | C2.
- The same interpolation parameters apply on planes X | V1, Y | V1, Z | V1, C1 | V1 and C2 | V1 as on planes X | V2, Y | V2, Z | V2, C1 | V2, and C2 | V2.

Circular interpolation between C1 and C2 or V1 and V2 is rather unlikely.

The following table of interpolation parameter assignments results from the above classifications:

I	X	V2	C2
J	Y	V1	CL200
K	Z	CL30	C1
	I	J	K

7010 00110

Channel axis index of reference axis for constant cutting velocity (G196)

Specifies

- the axis on the channel the position of which is used by the NC internally to compute the required speed when G196 is active.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
01...08	1	–	1	integer	1 byte	2	–	unsigned	w,r,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 01 |

Enter the channel-specific axis index.

 **This parameter is irrelevant to G96. The reference axis for G96 results from the setting in parameter 7050 00420 [6].**

Functions relating to channel parameters

4.9.2 Spindles (group 7020)

7020 00010

Main spindle

Specifies for each channel

- the spindle the speed of which determines the feed on the respective channel when G95 is active.
- the master spindle for threading, G33.
- the master spindle for dwell time in revolutions, G104.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
depends on spindles activated	1	–	1	integer	1 byte	1	–	unsigned	w,r,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 1 |

Enter the spindle index (see page 4–45) of the relevant spindle.

 **The main spindle can be modified in the part program using MAINSP().**

Functions relating to channel parameters

4.9.3 Override/Velocity/Acceleration (group 7030)

7030 00010

Feedrate override for channel

Specifies

- the maximum override permitted and
- the percentage values of the individual steps of the feedrate override.

Entries under "channel 0" apply to **auxiliary axes**. See also 1003 00100.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.00...150.00	0.01	%	33	real	4 bytes	5	2	float	w,r,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1] 120.00	[2] 0.00	[3] 2.50	[4] 5.00	[5] 7.50	[6] 10.00	[7] 20.00	[8] 30.00	[9] 40.00	[10] 50.00	[11] 60.00
[12] 70.00	[13] 80.00	[14] 90.00	[15] 100.00	[16] 110.00	[17] 120.00	[18] 130.00	[19] 132.50	[20] 135.00	[21] 137.50	[22] 140.00
[23] 142.50	[24] 145.00	[25] 147.50	[26] 150.00	[27] 150.00	[28] 150.00	[29] 150.00	[30] 150.00	[31] 150.00	[32] 150.00	[33] 150.00

Meaning of the individual parameters:

[1] Maximum permitted override value.
The NC will always limit internally the override on the channel to the value entered here (irrespective of the value of the step currently selected).

☞ **If the interface signal "1st override 100%" (I1.2) is set or G63 is active on the channel, 100% apply even though a lower value may be entered in individual parameter [1].**

[2] .. [33] Percentage values for 32 override steps.
Any value up to 150% may be entered here. Because the individual steps do not have to be in ascending order, a Gray-code-based override is possible as well.

The override step to be active is selected via the channel-related interface signals "1st override bit x" (I4.0...4.4) unless "0.00" is entered for all individual parameters from [2] to [33].

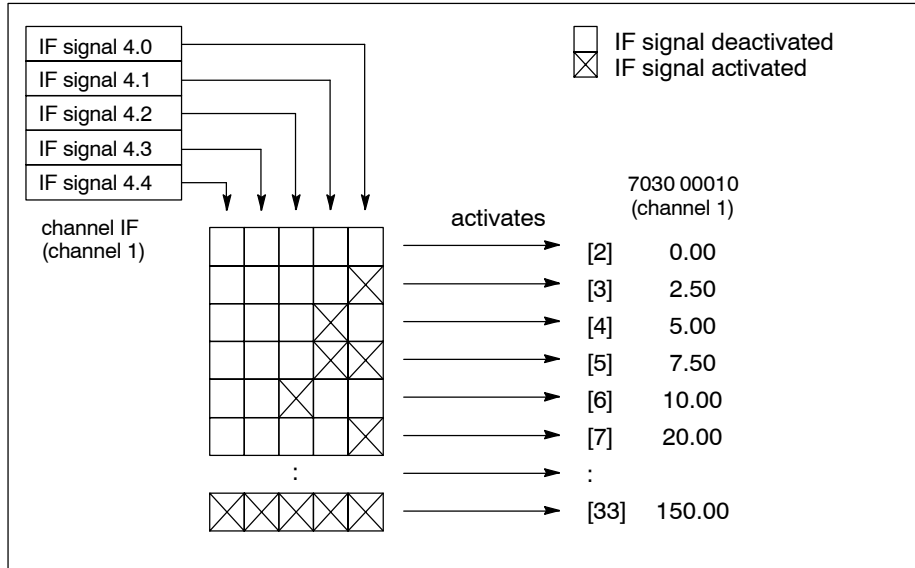
If "0" is entered for all individual parameters from [2] to [33], the NC interprets all signals on the channel-related input bytes 4 and 5 as **direct** override values with a 0.01% weighting. This allows you to set the override in steps of 0.01% in the range from 0% to 655.35% (see example 2 below).

☞ **However, the override is always limited to the value in parameter 7030 00010[1].**

Functions relating to channel parameters

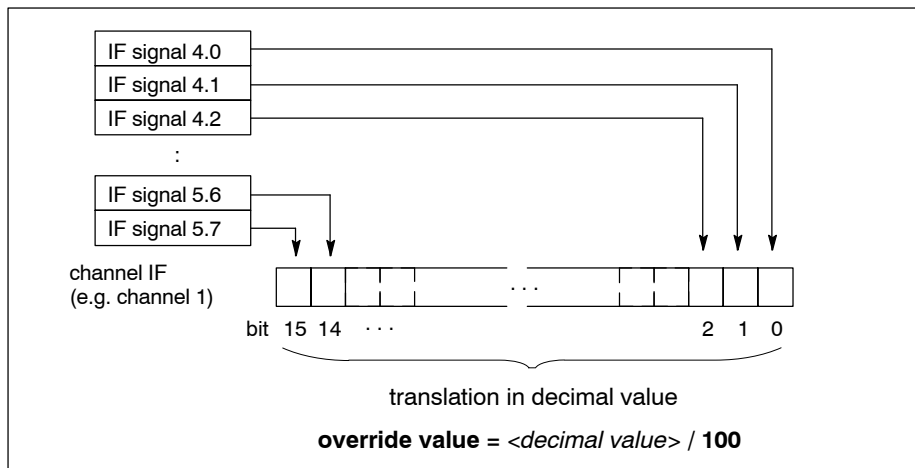
Example 1:

Activating the various steps via channel-related interface (IF) signals:



Example 2:

Channel-related override via "direct input":



Specifying the feedrate override for auxiliary axes

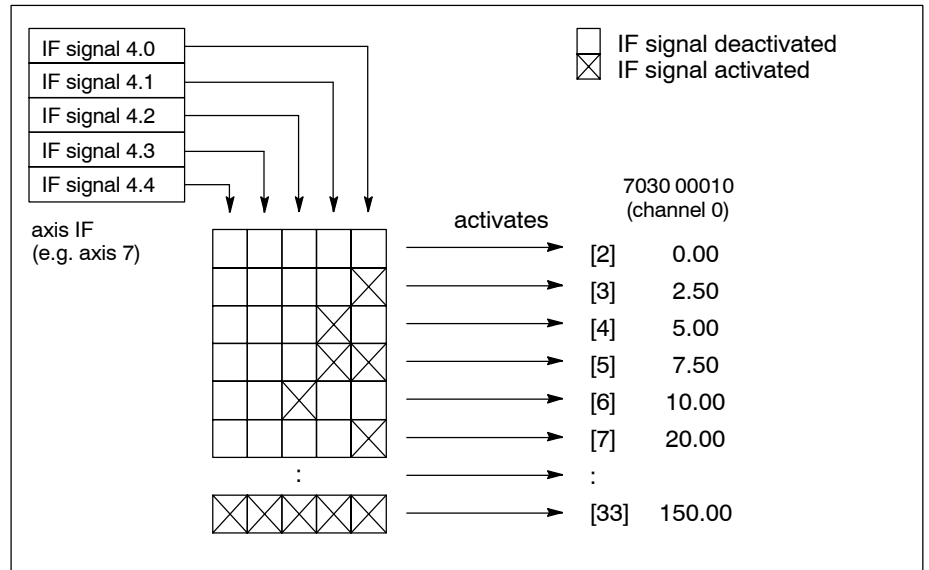
The maximum override permitted and the percentage values of the various override steps for auxiliary axes are entered under "channel 0". These entries apply to all auxiliary axes jointly.

Override steps for a specific auxiliary axis are selected via signals I4.0 through I4.4 on the axis-related interface. However, this is possible only if the override function is enabled for the respective auxiliary axis (see 1003 00100, page 4-24). Unless the override function is enabled, the effective feedrate override for the auxiliary axis concerned is always 100%.

Functions relating to channel parameters

Example 3:

Activating the various steps via axis-related IF signals:



The axis interface does not support "direct input" of the override.

7030 00110

Value of limited rapid traverse velocity

Specifies

- the velocity to which all rapid traversing motions of synchronous axes (G0, G10, G200, ...) are to be limited by the NC when the channel-related IF signal NC-I1.7, "Limit Rapid Travel", is activated.

This has no impact on the spindle speed and the feedrate on the respective channel.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 99999.999	0.001	mm/min	1	real	8 bytes	8	3	float	w,r,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 0.000

Meaning of parameter values:

0.000 Limited rapid traverse velocity is equal to the feedrate velocity programmed last on the channel.

>0.000 Limited rapid traverse velocity in mm/min.

Functions relating to channel parameters

7030 00210

Path acceleration

Specifies

- the maximum positive acceleration permitted on the programmed path (contour).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 99.999	0.001	m/s ²	1	real	4 bytes	5	3	float	w,r,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 0.800 |

7030 00220

Path deceleration

Specifies

- die maximal zulässige negative Beschleunigung auf der programmierten Bahn (Kontur) fest.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 99.999	0.001	m/s ²	1	real	4 bytes	5	3	float	w,r,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 0.800 |

7030 00310

Minimal angle for calculation of step velocity

Specifies

- the minimum angle from which on up the path velocity at a transition from one segment to the next is reduced to the programmed axis step velocity (see page 4-30) when G8 is active.
For this process, the NC compares the transition angle at an identified knee in the contour with the value entered here.

The tool path feedrate is not reduced for smaller transition angles provided that this is not prevented by the deceleration distance monitoring performed as part of the look-ahead.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000...50.000	0.001	degrees	1	real	8 bytes	5	3	float	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 0.000 |

 **The angle effective on the respective channel can be modified by programming G228 in the part program.**

Functions relating to channel parameters

4.9.4 Units and scaling factors (group 7040)

7040 00010

Unit of feedrate programmed in metric

Specifies

- the unit for programming feedrates.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1, 1000, 60, 60000	–	–	1	real	4 bytes	5	0	float	w,w,r	ch.- spec.

Presettings: basic setup. [x]=element index

[1] 1

Meaning of parameter values:

1	mm/min	(inch/min)
1000	m/min	(1000 inch/min)
60	mm/s	(inch/s)
60000	m/s	(1000 inch/s)

The units shown in parentheses apply with inch programming (G70).

7040 00020

Unit for programmed feed per revolution

Specifies

- the unit for programming the "feedrate per revolution".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.001, 0.010, 1.000, 1000.000	–	–	1	real	8 bytes	7	3	float	w,r,r	ch.- spec.

Presettings: basic setup. [x]=element index

[1] 1.000

Meaning of parameter values:

0.001	0.001 mm/rev	(0.001 inch/rev)
0.010	0.010 mm/rev	(0.010 inch/rev)
1.000	1 mm/rev	(inch/rev)
1000.000	1000 mm/rev	(1000 inch/rev)

The units shown in parentheses apply with inch programming (G70).

Functions relating to channel parameters

7040 00110

Velocity scaling for roundaxis with G70 or G71

Specifies

- whether the NC handles the velocities of rotary and endless axes like a typical European or a typical US control unit.

Individual settings are required for G70 (programming in inch) and G71 (programming in metric units) to specify whether 1 degree is to be handled like 1 mm or like 1 inch for velocity computation.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1, 2	–	–	2	integer	1 byte	1	0	unsigned	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 1 | [2] 1

Meaning of the individual parameters:

- [1] scaling for G70
- [2] scaling for G71

Meaning of parameter values:

- 1 1 degree is handled (weighted) like 1 mm
- 2 1 degree is handled (weighted) like 1 inch

1. European setting: [1]:1
[2]:1

- Both with metric and with inch programming, 1 degree is always interpreted to be equivalent to 1 mm. If with G71 the rotary axis alone has been programmed, the feedrate unit is interpreted as degrees/min.
- If with G70 the rotary axis alone has been programmed, the rotary axis will move too fast by the factor 25.4 (the feedrate unit is interpreted as degrees/min, e.g. F100=100 inch/min=2540 mm/min=2540 degrees/min).
- If the rotary and the linear axes traverse jointly with G71, both are weighted equally.
Example:
The linear axis moves by 100 mm, the rotary axis by 100 degrees; both these axes move at a velocity of 0.7071 x programmed feedrate in [mm/min] or, respectively, [degrees/min] because the distances to be traveled by both these axes are interpreted to be of equal length.
- If with G70 the linear axis traverses by 100 inch and the rotary axis by 100 degrees, the linear axis travels at almost 100% of the programmed velocity because the distance traveled by the linear axis is interpreted to be 25.4 times longer than the distance to be traveled by the rotary axis.

Functions relating to channel parameters

2. US setting [1]:2
[2]:2

- Both with metric and with inch programming, 1 degree is always interpreted to be equivalent to 1 inch. If with G70 the rotary axis alone has been programmed, the feedrate unit is interpreted as degrees/min.
- If with G71 the rotary axis alone has been programmed, the rotary axis will move too slow by the factor 25.4 (the feedrate unit is not interpreted as degrees/min, e.g. F100=100 mm/min=3.937 inch/min=3.397 degrees/min).
- If the rotary and the linear axes traverse jointly with G70, both are weighted equally.

Example:

The linear axis moves by 100 inch, the rotary axis by 100 degrees; both these axes move at a velocity of 0.7071 x programmed feedrate in [inch/min] or, respectively, [degrees/min] because the distances to be traveled by both these axes are interpreted to be of equal length.

- If with G71 the linear axis traverses by 100 mm and the rotary axis by 100 degrees, the rotary axis travels at almost 100% of the programmed velocity because the distance traveled by the rotary axis is interpreted to be 25.4 times longer than the distance to be traveled by the linear axis.

3. Universal setting [1]:2
[2]:1

- Both with G70 and with G71, if the rotary axis alone has been programmed, the feedrate unit is interpreted as degrees/min.
- With G70 and G71, if the rotary and the linear axes traverse jointly, they are weighted equally.

Example with G70: The linear axis traverses by 100 inch, the rotary axis traverses by 100 degrees; both these axis traverse at 0.7071 x programmed feedrate in [inch/min] or, respectively, [degrees/min].

Example with G71: The linear axis traverses by 100 mm, the rotary axis traverses by 100 degrees; both these axes traverse at 0.7071 x programmed feedrate in [mm/min] or, respectively, [degrees/min].

 **The following setting does not make any sense physically:**

[1]: 1
[2]: 2

Functions relating to channel parameters

4.9.5 Function-specific parameters; tolerances (group 7050)

7050 00010

Radius accuracy for center-point programming

Specifies

- the minimum radius difference above which the internal center-point compensation of the NC is activated.

With circular interpolation (G2/G3) in combination with center-point programming, inaccurate entries of the center-point coordinates lead to two different radii (center point – starting point and center point – end point). The NC can compensate this effect by shifting the center point.

If radius differences occur that are bigger than the threshold value entered here, (up to the limit entered in 7050 00020), the NC corrects the center-point coordinates automatically.

Radius differences that are smaller than the threshold value are ignored. This has the effect that in the range below the threshold value the programmed data takes effect without any compensation.

 Takes effect in combination with 7050 00020.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...10000	1	0.1 µm or 0.0001 inch	1	real	4 bytes	6	0	float	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 10

7050 00020

Radius tolerance for center-point programming

Specifies

- the maximum radius difference above which the NC-internal center-point compensation is deactivated.

Maximum permitted difference between the center point – starting point radius and the center point – end point radius.

If radius differences occur that are bigger than the threshold value entered here, 7050 00010 takes effect. Radius differences bigger than the threshold value will cause a runtime error (323).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...99999	1	0.1 µm or 0.0001 inch	1	real	4 bytes	5	0	float	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 10000

Functions relating to channel parameters

7050 00030

Radius tolerance with radius programming

Specifies

- up to which deviation inaccurate radius entries are compensated with circular interpolation without causing a runtime error.

This allows to compensate inaccurate computations in data preprocessing, e.g.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...99999	1	0.1 µm or 0.0001 inch	1	real	4 bytes	5	0	float	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 100

7050 00110

Corner rounding function: maximum deviation from programmed contour

Specifies

- the maximum deviation permitted from the programmed contour, i.e. the permitted range between the programmed and the rounded contour.

The corner rounding function rounds contour corner transitions between two successive linear blocks with the NC automatically inserting a circular transition block.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1...1000	1	1 µm	1	real	4 bytes	4	0	float	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 100

Functions relating to channel parameters

7050 00120

Corner rounding function: minimum block length for corner rounding function

Specifies

- the minimum block length from which up a circular transition block is generated.

If machining paths are generated with CAD systems, path segments of very short travel distance frequently occur, which are due to numeric insufficiencies. For these blocks, the corner rounding functions would not really make sense.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
2...90	1	1 µm	1	real	4 bytes	2	0	float	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1]	10									

7050 00130

Corner rounding function: Minimum angle for corner rounding function

Specifies

- the maximum angle from which on up block transitions are not to be interpreted as being continuous any more. No transition circles are computed for block transitions involving angles that are smaller than the angle entered here.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...45	1	degrees	1	real	4 bytes	2	0	float	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1]	1									

7050 00210

Tangential tool guidance: tool axis number

Specifies

- the number of the rotary or endless axis that is to be used as the axis of rotation for the "Tangential tool guidance" function after startup.

The "Tangential tool guidance" function moves a tool axis at the programmed offset angle (see 7050 00240) with the programmed path on the active plane.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
01...64	1	-	1	integer	1 byte	2	0	unsigned	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1]	04									

 **The axis number can be modified by programming (G131 TAX=3)**

Functions relating to channel parameters

7050 00220**Tangential tool guidance: tool symmetry**

Specifies

- wieviele Schneiden mit gleichem Abstand untereinander das verwendete Werkzeug hat.

Die Steuerung kann dadurch die erforderliche Ansteldrehung des Werkzeuges optimieren.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-2147483647 ... 2147483647 without 0!	1	–	1	integer	4 bytes	10	0	signed	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 1

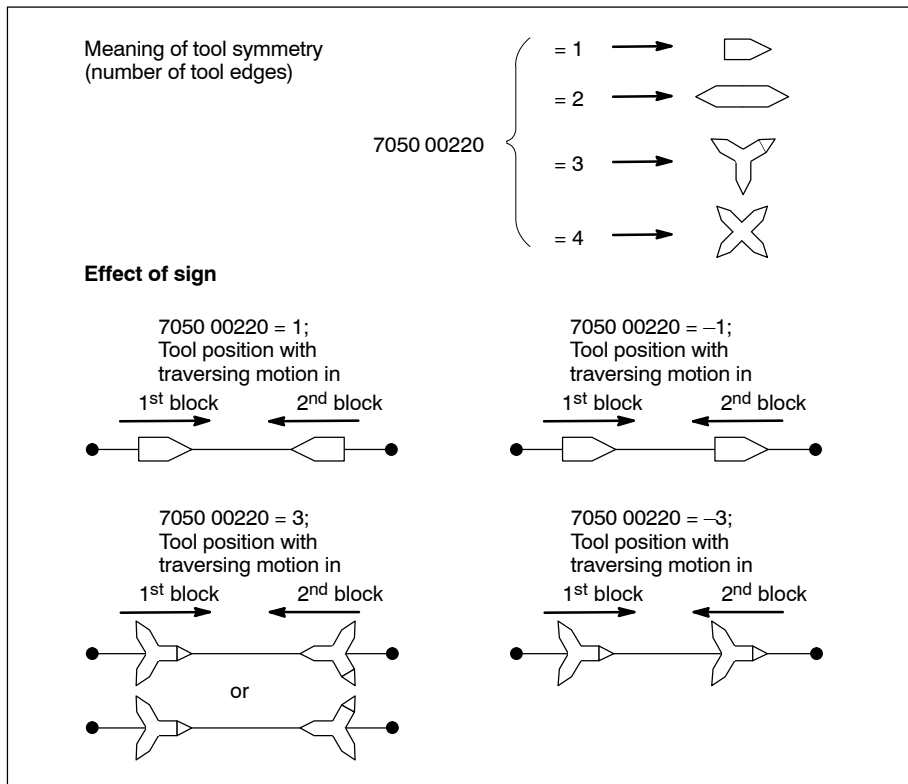
Meaning of parameter values:

- 1 The tool is asymmetric having only one tool edge. This edge is run along the contour with the offset angle taken into account.
- >0 The tool is symmetric having the stated number of equally spaced edges. If there is a knee in the contour, the tool is rotated just enough for the nearest tool edge to be positioned at the offset angle with the contour.
If, with rotary axes, this rotation would lead to a violation of the limit range, the NC will try to use another tool edge.
- <0 Has the effect that, irrespective of the offset angle, the tool is not rotated if a reversal of direction of motion (180° knee) occurs. In every other respect tool operation is the same as with the corresponding positive parameter values.

 **The symmetry value can be modified by programming (G131 SYM=<value>)**

Functions relating to channel parameters

Examples of operation: (offset angle in this example: 0°)



7050 00230

Tangential tool guidance: adaptation angle

Specifies

- from how many degrees upwards of a contour knee angle an intermediate block is inserted between 2 contour elements (NC blocks).

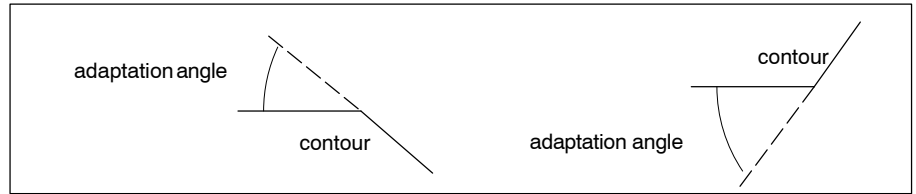
In the execution of this intermediate block, the NC rotates the tool axis till the offset angle required by the next block is reached. If no intermediate block is inserted, the tool axis jumps directly to its new position at the beginning of the next block.

☞ See also 7050 00260.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...180.000	0.001	degrees	1	real	8 bytes	12	3	float	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 0.000

Functions relating to channel parameters



☞ **The adaptation (intermediate) angle can be modified by programming (G131 IA=<value>)**

7050 00240

Tangential tool guidance: offset angle

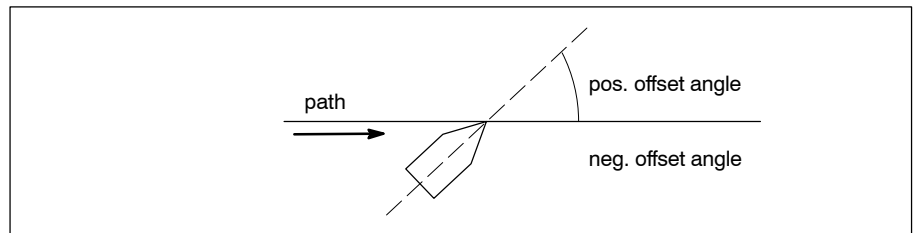
Specifies

- the angle between the symmetry axis of the tool and the path tangent.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-180.000 ... 180.000	0.001	degrees	1	real	8 bytes	12	3	float	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 0.000



☞ **The offset angle can be modified by programming (G131 ANG=<value>)**

Functions relating to channel parameters

7050 00250

Tangential tool guidance: init mode of the offset angle

Specifies

- the value to which the offset angle is to be set upon activation of the "Tangential tool guidance" function.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	1	integer	1 byte	1	0	unsigned	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 0 |

Meaning of parameter values:

- 0 Offset angle in accordance with 7050 00240.
- 1 Offset angle in accordance with the current position of the axis of rotation.

7050 00260

Tangential tool guidance: NC-PLC communication in respect of intermediate blocks

Specifies

- whether or not the NC and the PLC are to communicate with each other when an intermediate block is to be executed (see also DIN Programming Manual).

This allows the PLC take the necessary steps before the NC rotates the tool into the required position.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	1	–	1	integer	1 byte	1	0	unsigned	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 0 |

Meaning of parameter values:

- 0 No NC-PLC communication. Intermediate block is executed unconditionally.
- 1 NC-PLC communication takes place.

7050 00310

Is not evaluated anymore: replaced by MP 7060 00110 ff.

Functions relating to channel parameters

7050 00320**Default order for SHAPE**

Specifies for active G108

- into how many interpolation cycles a path acceleration jump is split up if G108 has been programmed without SHAPE parameter.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0 ... 100	1	–	1	integer	1 byte	3	–	unsigned	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 000

Meaning of parameter values:

0 ... 100 Number of interpolation steps

7050 00410**External tool compensation: activated compensation groups**

Specifies

- the groups of tool compensations that are to be released for the machining process.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	2	integer	1 byte	1	0	unsigned	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 1 | [2] 0

Meaning of the individual parameters:

- [1] compensation group 1:
tool length compensation (H compensation) and external tool compensation (G145...G845, G146)
- [2] compensation group 2:
general tool compensation (G147...G847, G148)

Meaning of parameter values:

- 0 The group is inhibited.
- 1 The group is released.

Functions relating to channel parameters

7050 00420

External tool compensation: assignment compensation - logical axis

Specifies

- which coordinates are assigned to the respective directions of compensation of the two compensation groups. The compensations may be based either on the coordinates of the workpiece coordinate system (WCS) or the coordinates of the tool coordinate system (TCS). Compensation values are taken into account in the tool coordinates only if the axis transformation function with the corresponding inclusion of tool compensation values is active.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-103..-101 -8...-1 0 1...8 101..103	1	–	6	integer	1 byte	1	0	unsigned	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1]	0	[2]	0	[3]	3	[4]	0	[5]	0	[6]	0
-----	---	-----	---	-----	---	-----	---	-----	---	-----	---

Meaning of the individual parameters:

- [1] reserved
- [2] reserved
- [3] $L_{(1)3}$ length compensation of compensation group 1 (H compens.)
- [4] $L_{(2)1}$ length compensation of compensation group 2
- [5] $L_{(2)2}$ length compensation of compensation group 2
- [6] $L_{(2)3}$ length compensation of compensation group 2 (H compens.)

Meaning of parameter values:

- Sign: specifies whether the compensation is taken into account with positive or negative direction
- Amount of 1 – 8: number of the logical axis, compensation based on WCS
- 101 – 103: compensation based on TCS
(101: x_t , 102: y_t , 103: z_t)
- 0: number of the logical axis

Functions relating to channel parameters

7050 00430**External tool compensation: compensation type of compensation group**

Specifies

- the type of tool (= compensation type) for which each compensation group is to be configured.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1...5	1	–	2	integer	1 byte	1	0	unsigned	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1]	2	[2]	2							


Meaning of the individual parameters:


- [1] type of tool for compensation group 1
 [2] type of tool for compensation group 2

Meaning of parameter values:

- 1 drilling tool with L3 length compensation
 2 milling tool with L3 length compensation, radius compensation
 3 turning tool with L1 length compensation, L3 length compensation, radius compensation, tool edge position (tool orientation)
 4 anglehead tool with L1 length compensation, L2 length compensation, L3 length compensation, radius compensation, tool edge position (tool orientation)
 5 Universal tool with L1 length compensation, L2 length compensation, L3 length compensation, Eulerian angle φ , Eulerian angle ϑ , Eulerian angle ψ , radius value, tool edge position (tool orientation)

If one compensation group is to cover different types of tools, the biggest tool type (in terms of its defined parameter values) must be entered.

 **With compensation values specified via the PLC, the NC checks whether the types of compensation values thus specified match the type of tool specified here.**

 **Compensation type 5 can be used only if a corresponding axis transformation is active that supports a directional compensation with a Eulerian angle. Compensation type 5 is suitable for gripping tools with their gripper coordinates either show a three-dimensional offset, or rotated in any position, or both.**

Functions relating to channel parameters

7050 00510

Delete G92 offset upon control reset

Specifies

- whether or not a zero point offset programmed with G92 is to be deleted upon control reset.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	1	integer	1 byte	1	0	unsigned	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 1

Meaning of parameter values:

- 0 G92 will not be deleted.
Zero points set with G92 will be deleted only if G92
 - has been programmed in the part program / by manual data input or
 - has been entered in 7060 00020 and the control is reset.
- 1 G92 will be deleted. Entry of G92 in 7060 00020 is not required.

7050 00600

Threading: Position controlled spindle, Programming type

Specifies

- the type of programming to be used for the execution of threading.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	1	–	3	integer	1 byte	1	–	unsigned	w,r,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 0 | [2] 0 | [3] 1

Meaning of the individual parameters:

- [1] **controlled spindle**
Parameter values:
0: cutting edge axes follow the actual spindle position
1: cutting edge axes follow the setpoint spindle position
master spindle must have been switched to position-controlled spindle operation with G533 SPC1
- [2] **G33 syntax** can be adjusted to CC220/Typ1 osa (compatibility)
Parameter values:
0: programming in accordance with PNC syntax
1: programming in accordance with CC220/Typ1 osa syntax
- [3] **G533 SPC1 action** (at [1] = 1)
0: G533 SPC1 activates the position mode at full spindle speed
1: G533 SPC1 stops the spindle and activates position mode at spindle halt. Subsequently, the spindle is accelerated to its previous speed.

 **During spindle run time, parameters 1 and 2 can be overridden by G33 TPMxx.**

Functions relating to channel parameters

7050 00610**Threading: dynamics, step velocity**

Specifies

- the intermittent feed of the cutting edge axes.

This parameter takes effect in combination with MACODA parameters 7050 00615 and 7050 00620.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 99999.999	0.001	mm/ min	1	real	8 bytes	8	3	float	w,r,r	ch.-spec.

Presettings [x] = element index

[1] 1000.000

Meaning of the individual parameters:

[1] intermittent cutting edge axis feed in mm/min.

 **During spindle run time, this parameter can be overridden by G533 DYN(x , ,).**

7050 00615**Threading: dynamics, acceleration**

Specifies

- the acceleration of the cutting edge axes

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000, 0.001 ... 99.999	0.001	m/s ²	1	real	8 bytes	5	3	float	w,r,r	ch.-spec.

Presettings [x] = element index

[1] 0.000

Meaning of the individual parameters:


[1] cutting edge axis acceleration in m/s²

Meaning of parameter values:

0.000: Velocity jump.

Feedrate of threading motion (speed * pitch) specified as an **intermittent feed** at the beginning of a threading block.

≥ 0.001: At the beginning of a threading block, the feedrate jumps to the value set in MACODA parameter 7050 00610 and then rises at the acceleration set here.

 **During spindle run time, this parameter can be overridden by G533 DYN(, y ,).**

Functions relating to channel parameters

7050 00620

Threading: dynamics, deceleration

Specifies

- the deceleration at which the cutting edge axes are to be fed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000, 0.001 ... 99.999	0.001	m/s ²	1	real	8 bytes	5	3	float	w,r,r	ch.-spec.
Presettings [x] = element index										

[1] 0.000

Meaning of the individual parameters:

[1] deceleration of cutting edge axes in m/s².

Meaning of parameter values:

0.000: Velocity jump.

At the end of a threading block, the feedrate of the threading motion jumps to 0.

≥ 0.001: At the end of a threading block, the feedrate is reduced at the deceleration value set in MACODA parameter 7050 00610.

 **During spindle run time, this parameter can be overridden by G533 DYN(, , z).**

7050 00640

Threading: fast retract, activated

Specifies

- whether "Fast retract" for threading is to be activated or deactivated. The data defining the retracting motion are specified in MACODA parameters 7006 00645 and 7070 00650.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	1	–	1	integer	1 byte	1	–	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										

[1] 0

Meaning of the individual parameters:

[1] activation/deactivation of fast retraction function for threading.

Meaning of parameter values:

0: "Fast retract" OFF.

1: "Fast retract" ON.

The data defining the retracting motion are specified in MACODA parameters 7006 00645 and 7070 00650.

 **During run time, this parameter can be overridden by G533 RON1 or G533 RON0.**

Functions relating to channel parameters

7050 00645**Threading: fast retract, system axis numbers**

Specifies

- the system axes selected for “Fast retract”.

 **The retraction axes must represent a plane on the respective channel.**

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1...64	–	–	2	integer	1 byte	2	–	unsigned	w,r,r	ch.- spec.

Presettings: basic setup. [x]=element index

[1] 0 | [2] 0 |

Meaning of the individual parameters:

[1] Axis number of the main (principal) axis

[2] Axis number of the secondary axis

Meaning of parameter values:

0: Fast retract“ inactive”.

1...64 System axis number.

Different system axis numbers must be assigned to the main (principal) and to the secondary axis.

 **During run time, this parameter and MACODA parameter 7050 00650 can be overridden by G533 RD(,).**

7050 00650**Threading: fast retract, distance and direction**

Specifies

- the retraction path (incl. sign) the axes specified in MACODA parameter 7050 00645 are to take.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–999.999 .. 999.999	0.001	mm	2	real	4 bytes	6	3	float	w,r,r	ch.- spec.

Presettings: basic setup. [x]=element index

[1] 0.000 | [2] 0.000 |

Meaning of the individual parameters:

[1] retraction path and direction of the main (principal) axis

[2] retraction path and direction of the secondary axis

 **During run time, this parameter and MACODA parameter 7050 00645 can be overridden by G533 RD(,).**

Functions relating to channel parameters

7050 00700

Axis distance control available

Specifies for every channel

- whether the axis distance control is available on this channel.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	1	–	1	integer	1 byte	1	0	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										

[1] 0

Meaning of parameter values:

0: No axis distance control

1: Axis distance control available

7050 00702

Axis distance control: number of the channel axis and compensation direction

Specifies for every channel

- which channel axis is compensated by the axis distance control.
- which direction the compensation of this channel axis is to have effect in.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–8 ... –1, 0, 1 ... 8	1	–	1	integer	1 byte	1	0	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										


[1] 0

Meaning of parameter values:

–8 through –1: Number of the channel axis on which axis distance control has effect. The negative sign leads to a negative compensation direction.

0: No channel axis selected

1 through 8: Number of the channel axis on which axis distance control with positive sign has effect.

 **In the part program, this parameter can be suppressed using DistCtrlOn DCAXIS(<Axis no.>,<Direction>).**

Functions relating to channel parameters

7050 00708

Axis distance control: freely selected interface signal

Specifies

- the channel interface signal which reports an activated axis distance control.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-1, 0 ... 7	1	–	1	integer	1 byte	1	0	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										
[1]	-1									

Meaning of parameter values:

- 1: No feedback active
- 0 through 7: Selected interface signal in the range 22.0 through 22.7:
 - 0: 22.0
 - 1: 22.1
 - ...
 - 7: 22.7

7050 00710

Axis distance control: sensor selection, device group

Specifies

- which device group provides the sensor values.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1, 2	1	–	1	integer	1 byte	1	0	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										
[1]	1									

Meaning of parameter values:

- 1: Drive
- 2: CPL
For special applications or for testing, in connection with permanent CPL variables.

7050 00712

Axis distance control: sensor selection, device number

Specifies

- the number of the drive if the device group “Drive” has been selected.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1 ...64	1	–	1	integer	1 byte	1	0	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										
[1]	0									

Meaning of parameter values:

- 0: No drive selected.
- 1 through 64: Drive number

Functions relating to channel parameters

7050 00714

Axis distance control: sensor selection, special identification

Specifies

- the SERCOS parameter (**S-0-xxxx** or **P-0-xxxx**) of the drive telegram (drive according to MP 7050 00712) used to provide the sensor value when the device group “Drive” has been selected.
- the permanent CPL variable (**@xxxxxx**) used to provide the sensor value if the device group “CPL” has been selected.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	2	string	8 bytes	8	0	–	w,r,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] P-0-0553 | [2] |

Meaning of the individual parameters:

- [1] SERCOS parameters from the drive telegram
- [2] Name of the permanent CPL variable

Meaning of parameter values:

P-0-0553: SERCOS parameters for Servodyn

7050 00720

Axis distance control: sensor increments, factor

Specifies

- a conversion factor for the sensor value in conjunction with MP 7050 00721:

$$\text{Sensor value} * \frac{\text{MP 7050 00720 (factor)}}{\text{MP 7050 00721 (divisor)}}$$

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–9999999.999 through 9999999.999	0.001	–	1	real	8 bytes	10	3	float	w,r,r	ch.-spec.

Presettings [x] = element index

[1] 1.000 |

Functions relating to channel parameters

7050 00721**Axis distance control: sensor increments, divisor**

Specifies

- a conversion factor for the sensor value in conjunction with MP 7050 00721:

$$\text{Sensor value} * \frac{\text{MP 7050 00720 (factor)}}{\text{MP 7050 00721 (divisor)}}$$

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1.000 up to 9999999.999	0.001	–	1	real	8 bytes	10	3	float	w,r,r	ch.-spec.
Presettings [x] = element index										

[1] 10000.000

7050 00730**Axis distance control: filter, smoothing time**

Specifies

- a filter for smoothing of the sensor values.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.0 through 40.0	0.1	msec	1	real	4 bytes	3	1	float	w,r,r	ch.-spec.
Presettings [x] = element index										

[1] 0.0


Meaning of the individual parameters:

[1] Square filter with adjustable smoothing

Meaning of parameter values:

0: No smoothing

0.1 through 40: Smoothing time in msec

 **In the part program, this parameter can be suppressed using DistCtrlOn DCFILTER(<Time>).**

Functions relating to channel parameters

7050 00740**Axis distance control: limiter, speed**

Specifies

- a maximum change speed of the compensation value.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.001 up to 999999.999	0.001	mm/min	1	real	8 bytes	9	3	float	w,r,r	ch.-spec.

Presettings [x] = element index

[1] 999999.999

Meaning of parameter values:

Speed in mm/min

 In the part program, this parameter can be suppressed using DistCtrlOn DCLIMIT (<Accel.>,<Speed>).

7050 00741**Axis distance control: limiter, acceleration**

Specifies

- a maximum steepness (acceleration) of the compensation value.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.001 through 99.999	0.001	m/sec ²	1	real	8 bytes	5	3	float	w,r,r	ch.-spec.

Presettings [x] = element index

[1] 99.999

 In the part program, this parameter can be suppressed using DistCtrlOn DCLIMIT (<Accel.>,<Speed>).

Functions relating to channel parameters

7050 00750**Axis distance control: monitoring collision detection**

Specifies

- a tolerance range for the collision detection.
When the tolerance range is exceeded, a warning will be generated and the part program will be stopped using Feed hold.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 through 999.999	0.001	mm	1	real	4 bytes	6	3	float	w,r,r	ch.-spec.

Presettings [x] = element index

[1] 0.000

Meaning of parameter values:

0.000: No collision detection

> 0.000: Size of the tolerance range for collision detection in mm

 **In the part program, this parameter can be suppressed using DistCtrlOn DCMON (<Collision>,<"Hole">).**

7050 00752**Axis distance control: monitoring hole detection**

Specifies

- a tolerance range for the hole detection.
When the tolerance range is exceeded, it is assumed that there is a hole and the axis distance control is interrupted for the time needed to travel over it.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 up to 999.999	0.001	mm	1	real	4 bytes	6	3	float	w,r,r	ch.-spec.

Presettings [x] = element index

[1] 0.000

Meaning of parameter values:

0.000: No hole detection

> 0.000: Size of the tolerance range for hole detection in mm

 **In the part program, this parameter can be suppressed using DistCtrlOn DCMON (<Collision>,<"Hole">).**

Functions relating to channel parameters

7050 00810

Laser power control: power limit values

Specifies

- the power limit values of the laser power control effective in conjunction with the speed limit values (MP 7050 00815).
Between the limit values, the laser power is adjusted in dependence on the path speed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.0 ... 100.0	0.1	%	2	real	4 bytes	4	1	float	w,r,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 0.0 | [2] 100.0 |

Meaning of the individual parameters:

- [1] Lower limit value
- [2] Upper limit value

Meaning of parameter values:

0.0 ... 100.0 Power limit value in %
100% corresponds to a voltage of 10 V at the analog output

7050 00815

Laser power control: speed limit values

Specifies

- the speed limit values for the laser power control.

 **This parameter is only effective together with MP 7050 00810.**

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.0 .. 99999.9	0.001	mm/min	2	real	4 bytes	6	1	float	w,r,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 0.0 | [2] 1000.0 |

Meaning of the individual parameters:

- [1] Lower limit value:
For speeds below this value, the lower power limit value is output at the analog output.
- [2] Upper limit value:
For speeds exceeding this value, the upper power limit value is output at the analog output.

Meaning of parameter values:

0.0 .. 99999.9: Speed limit values in mm/min

Functions relating to channel parameters

7050 00820**Laser power control: coordinate selection**

Specifies

- whether the movements in the selected plane or in the selected space are taken into account for calculation of the actual speed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 2, 3	–	–	1	integer	1 byte	1	0	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										
[1]	2									

Meaning of parameter values:

- 0 No coordinate selection
- 2 Active plane (main (principal) and secondary axis)
- 3 Active space (main (principal), secondary and normal axis)

7050 00900**Online correction in workpiece coordinates (WCS) available**

Specifies

- whether online correction in workpiece coordinates has been applied.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	1	–	1	integer	1 byte	1	–	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										
[1]	0									

Meaning of parameter values:

- 0 No online correction
- 1 Online correction in workpiece coordinates available

Functions relating to channel parameters

7050 00910

Online correction WCS: sensor selection, device group


Specifies

- the device group providing the data of the online correction in the WCS.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1, 2, 3	1	–	1	integer	1 byte	1	–	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										
[1]	3									

Meaning of parameter values:

- 1 From the drive
- 2 Via the permanent CPL variable
- 3 From the connected handwheel

 **In special cases, the data of the online correction can be fed in via a drive (e.g. P-0-0553) or via a permanent CPL variable. In this case, MP 7050 00912 and 7050 00914 have to be observed.**

7050 00912

Online correction WCS: sensor selection, device number

Specifies

- the number of the drive or the number of the handwheel from which the data of the online correction originate.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1 .. 64	1	–	1	integer	1 byte	2	–	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										
[1]	1									

Meaning of parameter values:

- 0 Online correction via CPL variable (MP 7050 00910 = 2)
- 1, 2 Handwheel number (MP 7050 00910 = 3)
- 1 ... 64 Drive number (MP 7050 00910 = 1)

7050 00914

Online correction WCS: sensor selection, identification

Specifies

- the SERCOS parameter (**S-0-xxxx** or **P-0-xxxx**) of the drive telegram (drive according to MP 7050 00912) used to provide the online correction value when the device group “Drive” has been selected.

Functions relating to channel parameters

7050 00926**Online correction WCS: incremental step, system axis number**

Specifies

- a system axis with the axis interface NC-I 1.0 through NC-I 1.3 (manual feed/incremental step), used to derive the size of the increment.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1 .. 64	1	–	1	integer	1 byte	2	–	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										

[1] 0

Meaning of parameter values:

0 Increment size is not derived from the axis interface

1 ... 64 Number of the system axis

7050 00940**Online correction WCS: max. speed**

Limits

- the speed for online corrections.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.1 ... 99999.9	0.1	mm/min	1	real	4 bytes	6	1	float	w,r,r	ch.-spec.
Presettings [x] = element index										

[1] 99999.9

Meaning of parameter values:

0.1 ... 99999.9: maximum speed in mm/min

7050 00941**Online correction WCS: max. acceleration**

Limits

- the acceleration for online corrections.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.001 ... 99.999	0.001	m/sec ²	1	real	4 bytes	5	3	float	w,r,r	ch.-spec.
Presettings [x] = element index										

[1] 99.999

Meaning of parameter values:

0.001 ... 99.999: maximum acceleration in m/sec²

Functions relating to channel parameters

7050 01000**Jogging WCS: manual feed**

Specifies

- the jogging speed in workpiece coordinates (WCS).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.000 ... 36000000.000	0.001	mm/min or degrees/min	6	real	8 bytes	11	3	float	w,r,r	ch.- spec.
Presettings: basic setup. [x]=element index										
[1] 100.000	[2] 500.000	[3] 1000.000	[4] 2000.000	[5] 100.000	[6] 500.000					

Meaning of the individual parameters:

One traversing step for each individual parameter:

- [1] Slow
- [2] Medium
- [3] Fast
- [4] Rapid traverse
- [5] Defined steps (incremental jogging)
- [6] Variable steps (incremental jogging)

Meaning of parameter values:

Jogging speed in mm/min or degrees/min

7050 01010**Jogging WCS: feed and incremental step, system axis number**

Specifies

- a system axis with the axis interface NC-I 1.0 through NC-I 1.3 (manual feed/incremental step), used to derive the selection of the feed (slow, medium, fast, rapid traverse) or the number of increments (1, 10, 100, 1000, x) (see MP 7050 01000).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1 ... 64	1	–	1	integer	1 byte	2	–	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										
[1] 0										

Meaning of parameter values:

0 Feed or number of increments is not derived from the axis interface.

In this case, a feedrate value has to be specified at the same time a “coordinate” is selected, and an incremental dimension when incremental jogging is performed.

1 ... 64: Number of the system axis

Functions relating to channel parameters

7050 01020**Jogging WCS: resolution of an increment**

Specifies

- the dimension of an increment.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.001..100.000	0.001	μm	1	real	4 bytes	6	3	float	w,r,r	ch.-spec.
Presettings [x] = element index										

[1] 1.000

Meaning of parameter values:

Increment size in μm or 0.001 degrees.

-  **In the channel-specific "inch" state, the set parameter is multiplied by the factor 2.54 for a linear coordinate.**

7050 01030**Jogging WCS: variable increment step**

Specifies

- by how many increments the axis is to traverse in traversing step "variable steps" when the jog key is pressed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1 ... 1000000	1	increments	1	integer	4 bytes	7	–	unsigned	w,r,r	ch.-spec.
Presettings [x] = element index										

[1] 2000

Functions relating to channel parameters

7050 01100

Jogging WCS: program name for the standard configuration

Specifies

- the name of the part program which is to be executed in workpiece coordinates during jogging.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	4	string	8 bytes	8	–	unsigned	w,r,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1]	[2]	[3]	[4]							

Meaning of the individual parameters:

[1] through [4]: name of a part program

Example:

The part program "InitstringForJogWCS" activates an axis transformation and/or a coordinate transformation:

[1] Initstri
[2] ngForJog
[3] WCS
[4]

 **The program "InitstringForJogWCS" has to be in the search path to be executed with the first jogging movement.**

Functions relating to channel parameters

4.9.6 Programming and configuration (group 7060)

7060 00010

Power-up condition after NC start-up

Specifies

- the NC functions to be active upon switching on or resetting the NC.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	30	string	8 bytes	8	–	–	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[17]	[18]	[19]	[20]	[21]	[22]	[23]	[24]	[25]	[26]	[27]
[25]	[26]	[27]	[28]	[29]	[30]					

 The ”|” character represents a blank. See also ”Chaining the individual parameters” under 7060 00020.

7060 00020

Power-up condition after control reset

Specifies

- the NC functions to be active after M30, channel reset, or system reset.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	30	string	8 bytes	8	–	–	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[17]	[18]	[19]	[20]	[21]	[22]	[23]	[24]	[25]	[26]	[27]
[25]	[26]	[27]	[28]	[29]	[30]					
Presettings: channel 1 and channel 2. [x]=element index										
[1] G1	[2] G9	[3] G17	[4] G22	[5] G39	[6] G53	[7] G62	[8] G66	[9] G67	[10] G90	[11] G94
[17] D0H0	[18] G68	[19] G65	[20] G543	[21] G115	[22] G79	[23] G40	[24]	[15] V1	[16] K4	
[25] #Reset:	[26]	[27] #SysRes:	[28] G513	[29]	[30]					

The following functions will be active after

- M30: all functions before the entry ”#Reset:”
- channel reset: all functions before the entry ”#SysRes:”
- system reset: all functions

 The ”|” character represents a blank.

Functions relating to channel parameters

Chaining the individual parameters:

The activation string results from chaining the individual parameters. The following is an example of a permitted chained string:

[1] G1G9G17G [2] 22G39 (= "G1G9G17G22G39").

Thus, when strings are entered, they must be followed by a blank, e.g.:

[3] G22K4|F0 (= "G22K4 F0")

7060 00110**Total number of blocks for look-ahead, including interpolation**

Specifies for every channel

- the total number of NC blocks available for look-ahead **and** interpolation.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
003...999	1	–	1	integer	4 bytes	3	0	unsigned	w,r,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1] 003										
Presettings: channel 1 and channel 2. [x]=element index										
[1] 030										

Meaning of parameter values:

3...999: Maximum number of NC blocks.

The blocks are needed for block preparation and for interpolation.

The interpolator requires at most the number of blocks set or programmed as SHAPE order. This maximum occurs when all NC blocks are so short that they are completely executed within one interpolation cycle. Advance and subsequent interpolation are then apart from each other by precisely the number of SHAPE order blocks. If the interpolation NC blocks are longer, the block demand of the interpolator is reduced accordingly.

All NC blocks which are not needed by the interpolation are available to the block preparation NC functions for the look-ahead.

Functions relating to channel parameters

7060 00120

Maximum number of blocks for look-ahead

Specifies

- for different NC functions what the maximum number of NC blocks for the look-ahead is.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0 ... 1000	1	–	4	integer	4 bytes	4	–	unsigned	w,w,w	ch-spec.

Presettings: basic setup. [x]=element index

[1]	0000	[2]	0000	[3]	0000	[4]	0003
-----	------	-----	------	-----	------	-----	------

Presettings: channel 1 and channel 2. [x]=element index


[1]	0001	[2]	0000	[3]	0010	[4]	0005
-----	------	-----	------	-----	------	-----	------

Meaning of the individual parameters:

- [1] G108 jerk-limited velocity profile generation
- [2] Buffering of prepared NC blocks to reduce the drops in speed due to the block cycle time (not implemented yet)
- [3] Spline functions, e.g. for the online calculation of the spline coefficients
- [4] Other functions:
Parameter [4] is just a marker and is not evaluated explicitly:
 - It is configured for all functions with small and medium look-ahead range such as chamfers + radiuses, tangential tool guidance, 2.5D path compensation.
 - It also contains the number of blocks which can be in preparation simultaneously within the interpolation. For an active path SHAPE, up to 100 blocks might lie between the advance and subsequent interpolation if the NC blocks are very short.

Meaning of parameter values:

- 0 No look-ahead
- 1 ... 1000: Max. number of NC blocks with regard to the corresponding individual parameter

 **The set maximum values can only be complied with if the total number is configured sufficiently large in MP 7060 00110 and additionally a sufficient share of the function has been assigned in the corresponding individual parameter of MP 7060 00130.**

Functions relating to channel parameters

7060 00130

Percentage number of blocks for look-ahead

Specifies

- for different NC functions which percentage share is used for weighting of the total number of blocks for look-ahead (7060 00110).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0 ... 100	1	%	4	integer	4 bytes	4	–	unsigned	w,w,w	ch.-spec.
Presettings: basic setup. [x]=element index										
[1] 000	[2] 000	[3] 000	[4] 000							
Presettings: channel 1 and channel 2. [x]=element index										
[1] 030	[2] 010	[3] 040	[4] 020							

Meaning of the individual parameters:

[1] G108 jerk-limited velocity profile generation

[2] Buffered blocks

[3] Spline functions

[4] Other functions

(identical with MP 7060 00120).

Meaning of parameter values:

0 ... 100: Number of blocks in %

If the total of the values of the individual parameters is greater than 100%, a standardization within the total to 100% is performed internally.

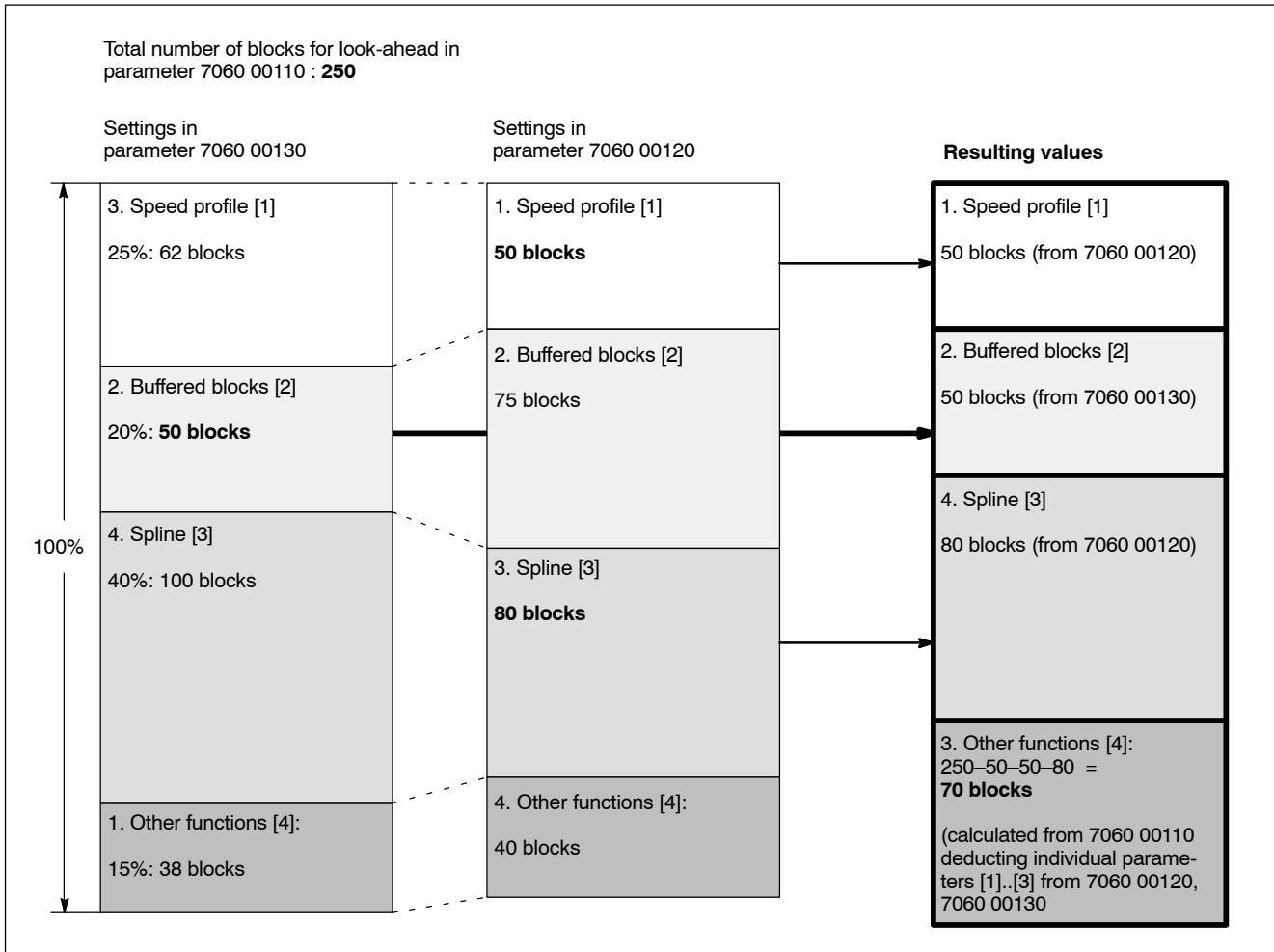
The maximum number of blocks $N_{\max[i]}$ actually taken into account is limited by the respective maximum value from MP 7060 00120, if required (see figure below).

The maximum number of blocks for each individual parameter is:

$$N_{\max[i]} = \min(7060\ 00120[i], 7060\ 00110 * 7060\ 00130[i]).$$

Functions relating to channel parameters

Example: determination of the number of blocks for look-ahead



7060 00210

Number of open files per channel

Specifies

- the number of files that may be open simultaneously.

This includes


- all CPL files opened with the OPEN command and
- all NC programs that are open at the same time (incl. all nested sub-programs).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
005...060	1	—	1	integer	2 bytes	3	0	signed	w,r,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 010

Functions relating to channel parameters

 **This parameter should be modified only for working with programs of substantial nesting depth or with a large number of CPL files open at the same time because a higher parameter value means that more system resources are tied up.**

7060 00310

Mode: Return to path

Specifies for the "Return to contour" mode

- the strategy used for returning to the contour.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1, 2, 3	–	–	1	integer	4 bytes	1	0	signed	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 1 |

Meaning of parameter values:

1 Automatic

If the input signal "Return to contour" is set on the channel interface, the traversing motion back to the contour is started upon "Cycle start" and the "Re-entry active" output signal is sent.

The traversing motion then stops at the touch-down point. The touch-down point is the position reached upon completion of the first traversing motion back to the contour.

Subsequently, the condition of the NC changes to "Ready" and the "Ready for re-entry" signal is set.

With the next "Cycle start", machining is resumed. Machining can be resumed without automatic return to path by using "Cycle start" and resetting the "Return to contour" signal.

2 Single step

If the input signal "Return to contour" is set on the channel interface, a traversing motion back to the contour is started upon the next "Cycle start" and the "Re-entry active" output signal is sent.

At the end of each traversing motion, the condition of the NC changes to "Ready" and the "Ready for re-entry" interface output signal is set.

The touch-down point can be freely determined by pressing "Cycle start" repeatedly.

If you press "Cycle start" without setting the "Return to contour" signal, machining will be resumed.

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The touch-down point is approached by jogging motions.

Upon completion of each motion, the condition of the NC changes to "Ready" and the "Ready for re-entry" interface output signal is set. Machining is resumed with the next "Cycle start".

Functions relating to channel parameters

7060 00320

Traverse point Return to path

Specifies for the "Return to contour" mode

- the return point.

If the tool is on the touch-down point, a traversing motion to the return point is started with the next "Cycle start". Modified compensations, if any, will be activated.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1, 2, 3	–	–	1	integer	4 bytes	1	0	signed	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 1 |

Meaning of parameter values:

- 1 start point
- 2 end point
- 3 break point

7060 00330

Maximum records Return to path in blocks

Specifies for the "Return to contour" mode

- the number of jogging motions that are to be recorded when removing from the contour.

There is a softkey available for canceling the recording process.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
000...999	1	–	1	integer	4 bytes	3	0	signed	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 020 |

Functions relating to channel parameters

7060 00410**Automatic program reselection**

Specifies

- whether or not the function "Automatic program reselection" is to be activated.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	1	integer	4 bytes	1	0	unsigned	w,r,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 0

Meaning of parameter values:

- 0 No automatic program reselection.
- 1 Reselection of the last program selected after
 - activation of an automatic mode, or
 - channel reset while automatic mode is active.

7060 00510**Size of buffer for NC block selection**

Specifies

- the buffer size to be reserved for a retentive NC block selection if NC blocks are stored temporarily in a buffer.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0..1048576	1	Byte	1	integer	4 bytes	10	–	signed	w,r,r	–
Presettings [x] = element index										

[1] 1024

Meaning of the individual parameters:

- [1] buffer size

Functions relating to channel parameters

4.9.7 CPL parameters (group 7070)

7070 00010

Data areas for CPL programs

Reserves

- storage space for stack and link table.

During their execution, CPL programs need stack for subprogram calls, local variables, etc.

A link table is required for editing a CPL program. This link table is created automatically when a CPL program is selected. The link table contains, e.g., a subprogram table, tables of variables, and jump tables.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
001024 ... 524288	1	Byte	2	integer	4 bytes	6	0	unsigned	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 02048 | [2] 010240 |

Meaning of the individual parameters:

- [1] storage space for the CPL stack
- [2] storage space for the CPL link table

7070 00020

Customer PLC interface. By control reset resettable signals

Specifies

- the range of CPL customer outputs among the channel-specific interface signals (NC-O24.0 through NC-O25.7) to be reset upon a channel reset.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00, 80 ..95	1	–	2	integer	4 bytes	2	0	signed	w,w,r	ch.-spec.

Presettings: basic setup. [x]=element index

[1] 00 | [2] 00 |

Meaning of the individual parameters:

- [1] beginning of range
- [2] end of range

Meaning of parameter values:

- 00 No resetting of CPL customer outputs.
(Set this value for both individual parameters!)
- 80 CPL customer output 1 (NC-O24.0)
- 81 CPL customer output 2 (NC-O24.1)
- :
- 95 CPL customer output 16 (NC-O25.7)

Functions relating to channel parameters

4.9.8 Coordinates (group 7080)

7080 00010

Coordinate designation

Specifies

- the programmable names used to designate the coordinates of a channel with an axis transformation activated.
The axis transformation activated in the NC program specifies the subset to be programmed of the 6 coordinates available.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	6	string	8 bytes	8	–	–	w,w,r	ch.-spec.
Presettings: basic setup. [x]=element index										
[1] x	[2] y	[3] z	[4] phi	[5] theta	[6] psi					

Meaning of the individual parameters:

[1]..[3] designation of linear-motion coordinates

[4]..[6] designation of orientation coordinates

Functions relating to NC function parameters

4.10 Functions relating to NC function parameters

4.10.1 Parameters for punching (group 8001)

8001 00010

Activation of punching and nibbling

Specifies

- whether or not the "Punching" function is to be released.


If this function is released, punching can be activated via G661 or G662 (see 8001 00021) (provided G408 or G608, path shape, has been activated) and deactivated via G660.

Generally, a punching stroke is triggered at the end of every path segment when the punching function is active. Only when this stroke is completed will the subsequent traversing motion be started.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	1	integer	1 byte	1	–	signed	w,w,r	–
Presettings [x] = element index										
[1]	0									

Meaning of parameter values:

- 0 punching function inhibited
- 1 punching function released

 **An additional digital input and an additional digital output must be reserved on the DCIO if the punching function is released (see page 4–129: Group 4075).**

8001 00020

Axis-specific stroke release times

Specifies for every **axis**

- the time by which the stroke is released earlier or later than the time referenced point entered in 8001 00021.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
	1	ms	64	integer	4 bytes	10	–	signed	w,w,r	–					
Presettings [x] = element index															
[1]	0	[2]	0	[3]	0	[4]	0	[5]	0	[6]	0	[7]	0	[8]	0
[9]	0	[10]	0	[11]	0	[12]	0	[13]	0	[14]	0	[15]	0	[16]	0
[17]	0	[18]	0	[19]	0	[20]	0	[21]	0	[22]	0	[23]	0	[24]	0
[25]	0	[26]	0	[27]	0	[28]	0	[29]	0	[30]	0	[31]	0	[32]	0
[33]	0	[34]	0	[35]	0	[36]	0	[37]	0	[38]	0	[39]	0	[40]	0
[41]	0	[42]	0	[43]	0	[44]	0	[45]	0	[46]	0	[47]	0	[48]	0
[49]	0	[50]	0	[51]	0	[52]	0	[53]	0	[54]	0	[55]	0	[56]	0
[57]	0	[58]	0	[59]	0	[60]	0	[61]	0	[62]	0	[63]	0	[64]	0

Functions relating to NC function parameters

Meaning of parameter values:

- <0 early stroke release
This is possible only if "0" is entered in 8001 00021.
Earliest time of stroke release: the beginning of the stroke release block.
- 0 no time offset
- >0 late stroke release.

8001 00021**Reference of stroke release times**

Specifies for every axis

- the zero point in time (time referenced point) for stroke release. The time when the stroke is actually triggered depends on the value entered in 8001 00020.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes					
0, 1	–	–	64	integer	4 bytes	1	–	unsigned	w,w,r	–					
Presettings [x] = element index															
[1]	1	[2]	1	[3]	1	[4]	1	[5]	1	[6]	1	[7]	1	[8]	1
[9]	1	[10]	1	[11]	1	[12]	1	[13]	1	[14]	1	[15]	1	[16]	1
[17]	1	[18]	1	[19]	1	[20]	1	[21]	1	[22]	1	[23]	1	[24]	1
[25]	1	[26]	1	[27]	1	[28]	1	[29]	1	[30]	1	[31]	1	[32]	1
[33]	1	[34]	1	[35]	1	[36]	1	[37]	1	[38]	1	[39]	1	[40]	1
[41]	1	[42]	1	[43]	1	[44]	1	[45]	1	[46]	1	[47]	1	[48]	1
[49]	1	[50]	1	[51]	1	[52]	1	[53]	1	[54]	1	[55]	1	[56]	1
[57]	1	[58]	1	[59]	1	[60]	1	[61]	1	[62]	1	[63]	1	[64]	1

Meaning of parameter values:

- 0 The zero point in time (time referenced point) is defined as the end point of interpolation of the stroke release block. The time of stroke release can be pulled in or pushed out by programming G611.
- 1 The zero point in time (time referenced point) is defined as the time when the axis has reached its inpos window, or, if more than one axis is involved in the traversing motion, when the last axis involved has reached its inpos window. The time of stroke release can be pulled in or pushed out by programming G612.

Functions relating to NC function parameters

8001 00030

Stroke check time

Specifies

- whether or not, and if so, after what period of time (T_{stroke}) an error message will be displayed if a stroke cannot be released or completed.

One digital input and one digital output on the DCIO is used for communication with the punching control (see page 4-129).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0000...9999	1	ms	1	integer	4 bytes	4	–	unsigned	w,w,r	–
Presettings [x] = element index										

[1] 1000

Meaning of parameter values:

0000 Stroke checking off.

>0000 Stroke checking on. The time entered here will be rounded off internally to match the time grid of the SERCOS cycle time (see 9030 00001, page 4-230).

Errors that may occur when stroke check time is active:

After the T_{stroke} interval has elapsed, the following error messages may be displayed:

- "Stroke cannot be initiated". This means that the NC cannot request the stroke because it is running (the signal on the digital input of the DCIO is set to low). T_{stroke} starts to run in this case at the stroke release time.
- "Stroke was not initiated". This means that the NC requested the stroke via the digital output, however, the punching control did not initiate the stroke (digital input not changed to low). T_{stroke} starts to run in this case when the signal on the digital output is set.
- "Stroke was not completed". This means that the punching control initiated the stroke but the stroke was not completed within the T_{stroke} interval (digital input signal remains being set to low).

Functions relating to NC function parameters

4.10.2 Control areas (group 8002)

The PNC admits up to 10 two-dimensional control areas to be defined system-wide, either as dead or working ranges. Inputs of positions running into a dead range or out of a working range are not accepted provided the respective control area is active.

8002 00001

Control area: system axis number of 1st dimension of area

Specifies for each of the up to 10 control areas

- the number of the 1st system axis defining the respective control area.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
01...64	1	–	10	integer	1 byte	2	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1] 00	[2] 00	[3] 00	[4] 00	[5] 00	[6] 00	[7] 00	[8] 00	[9] 00	[10] 00	

If you enter "00" here, the respective control area will not be used.

8002 00002

Control area: system axis number of 2nd dimension of area

Specifies for each of the up to 10 control areas

- the number of the 2nd system axis defining the respective control area.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
01...16	1	–	10	integer	1 byte	2	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1] 00	[2] 00	[3] 00	[4] 00	[5] 00	[6] 00	[7] 00	[8] 00	[9] 00	[10] 00	

8002 00011

Control area: center of area, 1st dimension

Specifies for each of the up to 10 control areas

- the desired control area center point coordinate on the 1st axis involved (1st dimension).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–100000.00 ... 100000.00	0.01	mm	10	integer	8 bytes	12	2	float	w,w,r	–
Presettings [x] = element index										
[1] 0.00	[2] 0.00	[3] 0.00	[4] 0.00	[5] 0.00	[6] 0.00	[7] 0.00	[8] 0.00	[9] 0.00	[10] 0.00	

Functions relating to NC function parameters

8002 00012**Control area: center of area, 2nd dimension**

Same as for 8002 00011, relating to the 2nd axis involved.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-100000.00 ... 100000.00	0.01	mm	10	integer	8 bytes	12	2	float	w,w,r	–
Presettings [x] = element index										
[1] 0.00	[2] 0.00	[3] 0.00	[4] 0.00	[5] 0.00	[6] 0.00	[7] 0.00	[8] 0.00	[9] 0.00	[10] 0.00	

8002 00021**Control area: enlargement of area, 1st dimension**

Specifies for each of the up to 10 control areas

- its relative length on the 1st axis involved (1st dimension) in positive or negative direction of the control area.

For the reference point, see 8002 00011.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-100000.00 ... 100000.00	0.01	mm	10	integer	8 bytes	12	2	float	w,w,r	–
Presettings [x] = element index										
[1] 0.00	[2] 0.00	[3] 0.00	[4] 0.00	[5] 0.00	[6] 0.00	[7] 0.00	[8] 0.00	[9] 0.00	[10] 0.00	

8002 00022**Control area: enlargement of area, 2nd dimension**

Same as for 8002 00021, relating to the 2nd axis involved.

For the reference point, see 8002 00012.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
-100000.00 ... 100000.00	0.01	mm	10	integer	8 bytes	12	2	float	w,w,r	–
Presettings [x] = element index										
[1] 0.00	[2] 0.00	[3] 0.00	[4] 0.00	[5] 0.00	[6] 0.00	[7] 0.00	[8] 0.00	[9] 0.00	[10] 0.00	

Functions relating to NC function parameters

4.10.3 Precision programming (group 8003)

8003 00001

Contour deviation tolerance with G328, Precision programming

Specifies for G328

- the maximum permissible path deviation at contour transitions or the maximum permissible radius deviation for circular arcs.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.0001 ... 99.9999	0.0001	mm	1	real	8 bytes	6	4	float	w,w,r	–
Presettings [x] = element index										
[1]	0.0200									

 The value that is currently active can be modified temporarily by programming.

4.10.4 Time programming (group 8004)

8004 00001

Modal value for block cycle time programming

Specifies for active time programming

- whether the time programmed is to be active modally or, instead, the feedrate resulting from the programmed time and the length of path.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0, 1	–	–	1	integer	1 byte	1	–	unsigned	w,w,r	–
Presettings [x] = element index										
[1]	1									

Meaning of parameter values:

- 0 Feedrate acts modally.
- 1 Time acts modally.

Functions relating to NC function parameters

4.10.5 Polar coordinate programming (group 8005)

8005 00001

NC syntax of angle with polar coordinate programming

Specifies

- the NC syntax of the angle for polar coordinate programming.

Because a parameter for the name of the angle can be set here, conflicts between existing axis names and the name of the angle can be avoided.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	1	string	8 bytes	8	–	–	w,r,r	–
Presettings [x] = element index										

[1] A |

 **Changed settings in MACODA parameter 8005 00001 are not accepted before the next control start-up.**

Functions relating to NC function parameters

4.10.6 Digitizing (group 8006)

The parameters of this group are used to adjust the digitizing function to the respective application. Changed settings in these parameters are not accepted before the next control start-up, when the digitizing function is used for the first time.

 For further information on the digitizing function, see the "Description of Functions" manual.

8006 00001

Number of digitizing buffers (buffer size 512 bytes)

Specifies

- the number of digitizing buffers for temporary storage of real-time data.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0020...2000	1	–	1	integer	2 bytes	4	–	unsigned	w,r,r	–
Presettings [x] = element index										

[1] 0050 |

Meaning of parameter values:
0020..2000: number of digitizing buffers

8006 00002

Number of reserve buffers

Specifies

- the minimum number of free digitizing buffers.
If the number of free digitizing buffers drops below the number of reserve buffers, the control responds through the part program in accordance with the parameters set for the digitizing function. See the "RecordSet" command.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0005...0100	1	–	1	integer	2 bytes	4	–	unsigned	w,r,r	–
Presettings [x] = element index										

[1] 0010 |

Meaning of parameter values:
0005..0100: number of reserve buffers

Functions relating to NC function parameters

4.10.7 Splines (group 8007)

In comparison to linear interpolation, the spline function does not create straight lines between the points but curves.

Using MACODA parameters of this group, you parametrize:

- the start and end conditions for application-oriented spline machining in the NC program,
- path speed deviations and
- basic information on c^2 -continuous global cubic splines.

8007 00010

Maximum allowable starting/end point deviation.

Specifies

- the maximum allowable deviation between the **start point** of a spline block and the **end point** of the preceding block for spline coefficient programming.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.01 through 99.99	0.01	µm	1	real	8 bytes	–	–	float	w,r,r	–
Presettings [x] = element index										
[1]	0.1									

Meaning of parameter values:

0.01 ... 99.99: allowable deviation in µm between the programmed spline coefficient 0 of a coordinate and the end point of the preceding block. If the deviation is greater than this value, a runtime error is generated.

 **The parameter is only relevant for spline coefficient programming with the initialization SplineDef(1,...,5).**

Functions relating to NC function parameters

8007 00020

Maximum allowable relative path speed error.

Specifies

- a tolerance range for the deviation of the path speed on the spline curve.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.01 through 100.00	0.01	%	1	real	8 bytes	–	–	float	w,r,r	–

Presettings [x] = element index

[1] 1.0

Meaning of parameter values:

0.01 ... 100.00: allowable tolerance range in %, relative to the path speed. The smaller the parameter value, the higher the approximation quality of the inverse path length function $w(s)$.

If the parameter has the value 100 %, $w(s)$ is approximated by a straight line, i.e. the spline interpolation is performed directly via the spline parameter w .

 **With increasing precision, the computation time demand in the NC block preparation (block cycle time) rises.**

8007 00099

Spline configuration

Specifies

- basic configuration data for c^2 -continuous global cubic splines only (spline type 2).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	1	–	8	integer	4 bytes	8	–	–	r,r,r	–

Presettings [x] = element index

[1] 4 | [2] 4 | [3] 1 | [4] 0 | [5] 0 | [6] 0 | [7] 0 | [8] 0

Meaning of the parameter values of the individual parameters:

[1] Degree of the gap spline.
Because of the restricted look-ahead range, a gap spline is inserted between two neighboring partial sequences:

3: Third degree gap spline is inserted, it is c^1 -continuous to the preceding spline

4: Fourth degree gap spline is inserted, it is c^2 -continuous to the preceding spline

[2] Overlapping of two partial sequences:
Number of NC blocks which overlap.

Functions relating to NC function parameters

- [3] Spline variation for vector orientation:
1: Common spline for path and orientation movement
2: Independent splines for path and orientation movement

[4] ..[8] Not used

Functions relating to the system / management

4.11 Functions relating to the system / management

4.11.1 User (group 9010)

9010 00010

Password Rexroth System Management

Specifies

- the password for Rexroth System Management.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	1	string	8 bytes	8	–	–	–,–,–	–

Presettings [x] = element index

[1] *****

9010 00011

Password Rexroth Development

Specifies

- the password for Rexroth Development.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	1	string	8 bytes	8	–	–	–,–,–	–

Presettings [x] = element index

[1] *****

9010 00012

Password Machine Manufacturer

Specifies

- the password of the machine manufacturer.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	1	string	8 bytes	8	–	–	w,–,–	–

Presettings [x] = element index

[1] *****

9010 00013

Password Rexroth Service

Specifies

- the password for Rexroth Service.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	1	string	8 bytes	8	–	–	–,w,–	–

Presettings [x] = element index

[1] *****

Functions relating to the system / management

9010 00014

Password End User

Specifies

- the password of the end user.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	1	string	8 bytes	8	–	–	–,–,W	–
Presettings [x] = element index										

[1]Endkunde |

Functions relating to the system / management

4.11.2 Units of measurement and scaling (group 9020)

9020 00010

Dimensions of offsets and compensations (tables and external)

Specifies

- the unit of measurement in which compensation values are stated that are preset from the PLC for "External tool compensation" and "External zero offset". These values must be entered with four decimal positions in the unit of measurement specified here.

Example: 0 (=mm) entered here \Rightarrow values must be preset with 4 decimal positions (0.0001 mm).

- the unit of measurement for storing table values **internally**. This parameter is evaluated **when a table is created** and then stored in this table.

Irrespective of the unit of measure set here, entries of compensation values in interactive mode may be made in mm or inches.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0...4	1	–	1	integer	1 byte	1	–	unsigned	w,w,r	–
Presettings [x] = element index										

[1] 0 |

Meaning of parameter values:

0	Unit for external:	0.0001 mm
	Internal unit for tables:	mm
1	Unit for external:	0.0001 cm
	Internal unit for tables:	cm
2	Unit for external:	0.0001 inch
	Internal unit for tables:	inch
3	Unit for external:	0.0001 dm
	Internal unit for tables:	dm
4	Unit for external:	0.0001 m
	Internal unit for tables:	m

Functions relating to the system / management

9020 00110

Scale factor for PLC spindle speed values

Specifies

- the factor by which the spindle speed of an external spindle signaled by the PLC is multiplied for being displayed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0.0001 ... 999.9999	0.0001	rpm	1	real	8 bytes	7	4	float	w,r,r	–

Presettings [x] = element index

[1] 1.0000 |

Applies to all external spindles.

 **See also 1040 00003.**

Functions relating to the system / management

4.11.3 Interpolation parameters (group 9030)

9030 00001

NC cycle time

Specifies

- the interpolation cycle of the PNC.

The value entered here defines the timing of interpolator outputs of set-point values.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
00100 – 64000	1	µs	1	integer	2 bytes	5	–	unsigned	w,r,r	–

Presettings [x] = element index

[1] 4000 |

 **The SERCOS cycle time that is used is based on this value here. The following applies: SERCOS cycle time in µs = NC cycle time in µs.**

9030 00002

Updating actual machine coordinate values

Specifies

- whether or not, and if so, after how many interpolator cycles the NC computes actual machine coordinate values to be displayed when kinematic axis transformation is active.

When kinematic axis transformation is active, the PNC can generate on the basis of the current actual axis values the display of the actual values with reference to the machine coordinate system (Cartesian actual values).

The NC computes these actual values by an interrupt in the course of the interpolation process. Therefore, new values are available no earlier than when the time $\langle \text{value entered in } 9030\ 00001 \rangle * \langle \text{value entered in } 9030\ 00002 \rangle$ has elapsed.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
0000...1000	1	–	1	integer	4 bytes	4	–	signed	w,-,-	–

Presettings [x] = element index

[1] 0000 |

Meaning of parameter values:

0000 No computation.

>0000 Computation of actual values for display of machine coordinates.

The display can be called up via
 AUTOMATIC ► CHANGE DISPLAY ► CONFIGURE AXIS DISPLAY ► CONFIGURE LARGE AXIS DISPLAY.

 **This parameter has no impact on the OI (operator interface) display cycle time!**

Functions relating to the system / management

4.11.4 Block control parameters (group 9040)

9040 00001

Number of channels

Specifies

- the number of channels the PNC can activate simultaneously.

The value entered here includes both "regular" channels (with a group of machining axes combined on each channel for part program editing) and the "auxiliary" channel.

The PNC uses the auxiliary channel for internal control of machine functions, e.g.

Because 1 auxiliary channel and 1 machining channel are required as a minimum, the minimum value to be entered here is "02".

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
02...13	1	–	1	integer	1 byte	2	–	unsigned	w,r,r	–
Presettings [x] = element index										

[1] 03 |

Depending on the value entered here, the NC generates the required number of "channel interfaces" (see 2060 00003 and 2060 00007).

 **Machining channels can be configured to serve as "CPL channels" at the same time (see 3080 00005).**

9040 00010

CPU time for block control

Limits

- the portion of processor capacity made available by the PNC for block control (SAV).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
050...100	1	%	1	integer	4 bytes	3	–	signed	r,r,r	–
Presettings [x] = element index										

[1] 098 |


Thus, the system can be scaled so as to permit the execution of applications of less than top priority (operator interface, e.g.) while part programs are being executed, which tie up a lot of CPU capacity.

Functions relating to the system / management

4.11.5 System parameters (group 9050)

9050 00001

Time zone

 Upon start-up of the standard OI, the default values of the individual parameters are set if call parameter "-notimesync" is not used.

Specifies

- the difference between the "universal time coordinated", UTC (formerly GMT) and the local time of the place where the PNC is used (individual parameters that must be set: [1] through [3]) and
- optionally, the rules for changing from summer to winter time (individual parameters that must be set: [4] through [10]).

The internal time setting of the NC always conforms to the UTC. Local time is used for display purposes only (system time, time stamps of files).

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	10	string	8 bytes	8	–	–	w,w,r	–
Presettings [x] = element index										
[1] [9]	[2] [10]	[3]	[4]	[5]	[6]	[7]	[8]			

Meaning of the individual parameters:

- [1] Freely selected name of the time zone where the NC is located. Minimum: 3 characters, maximum: 8 characters. No digits, no "+" or "-" permitted.
- [2] Location of the NC:
east of 0 meridian (Greenwich): –
west of 0 meridian: +
on 0 meridian: + or –
no entry means: west of 0 meridian
- [3] Amount of time difference between UTC and local time. 8 digits maximum, format: hh:mm:ss. Entry of leading zeros, minutes and seconds is optional.
- [4] Freely selected name of the time zone for summer time at the location of the NC. The format permitted is the same as for [1]. No entry means: No change between winter and summer time.
- [5] Difference between local time and UTC
increases: –
decreases: +
when changing from winter to summer time.
No entry means: The difference increases.
- [6] Amount of time difference between UTC and local summer time. Same format as for [3].

Functions relating to the system / management

- [7] Date when the change from winter to summer time is to be made.
The syntax admits of the following inputs:

<nnn> date of change (excl. Feb. 29!).
Please note: $0 \leq \langle nnn \rangle \leq 364$
Example:
Input: 59 \Rightarrow change takes place on March 1

J<nnn> date of change (excl. Feb. 29!)
Please note: $1 \leq \langle nnn \rangle \leq 365$
Example:
Input: J60 \Rightarrow change takes place on March 1

M<mm>.<w>.<d> <mm> = month (1–12)
 <w> = week of the month (1–5)
 5 = last week of the month
 <d> = day of the week. 0 = Sunday
Example: Input: M3.5.0
 \Rightarrow change takes place on the last Sunday in March.

No entry means: Change to summertime as of the last Sunday in March.

- [8] Local time when the change from winter to summer time is to take place.
Same format as for [3]. No entry means: 02:00:00
- [9] Date of change from summer to winter time.
The syntax admits of the same inputs as for [7].
No entry means: Winter time as of the last Sunday in October.
- [10] Local time when the change from summer to winter time is to take place.
Same format as for [3]. No entry means: 03:00:00

If none of the individual parameters are set, the following applies:
The time displayed is UTC, no changes from summer to winter time or back are made.

If individual parameters [1] through [3] only are set, the following applies:
The time displayed is local time, no changes from summer to winter time or back are made.

If individual parameters [1] through [4] only are set, the following applies:
The time displayed is local time, changes from summer to winter time and back are displayed.

- Summer time as of the last Sunday in March. The clock is advanced by 1 hour at 02:00:00 a.m. local time to 03:00:00 a.m.
- Winter time as of the last Sunday in October. The clocks is set back by 1 hour at 03:00:00 a.m. local summer time to 02:00:00 a.m. local time.

Functions relating to the system / management

4.11.6 Handwheel parameters (group 9060)

9060 00001

Number of increments per revolution

Specifies

- the number of increments of a connected handwheel.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
–	–	–	2	integer	4 bytes	–	–	–	w,r,r	ch.-spec.
Presettings: basic setup. [x]=element index										

[1] 100 | [2] 100 |

Meaning of the individual parameters:

[1] Handwheel 1

[2] Handwheel 2

Meaning of parameter values:

100: Number of increments per revolution

Example:

The machine operating panel “osa switch dp” with PROFIBUS-DP quadruples the number of increments of the connected handwheel. If a handwheel with 100 increments per revolution is used, the parameter has to be set to 400.

9060 00002

Field bus assignment (PNC-R only)

Specifies

- the field bus from which the handwheel values are taken over.

Input values	Increment	Unit	Elements	Type of data	Element length	TD	DP	Format	Access	Notes
1, 2	–	–	2	integer	4 bytes	–	–	–	w,r,r	ch.-spec.
Presettings [x] = element index										

[1] 1 | [2] 1 |

Meaning of the individual parameters:


[1] Handwheel 1

[2] Handwheel 2

Meaning of parameter values:

1: CAN-Bus

2: PROFIBUS-DP

 **In case of PNC-P, the data of the handwheels are always transmitted via PROFIBUS-DP.**

Functions relating to the system / management

Notes:

SERCOS initialization

5 SERCOS initialization

In addition to the “rudimentary” parameters belonging to the “1050 SERCOS” group, other parameters are stored in “SERCOS files”. SERCOS files can be recognized by the file extension “.scs”. The format of these files is ASCII and they are stored in the directory of the “EPROM” group as a default.

By editing these SERCOS files of the PNC, all connected drives can be parameterized.



DANGER

Unauthorized changes to parameters or files may lead to personal injury or damage to equipment!

Parameters or files may therefore only be changed by properly trained expert personnel!

This personnel must be familiar with the operator interface and the directory structure of the PNC and possess good knowledge of the SERCOS interface.

Also, this personnel must be able to recognize the risks involved in changing parameters and the inherent general risks of mechanical, electrical or electronic equipment.

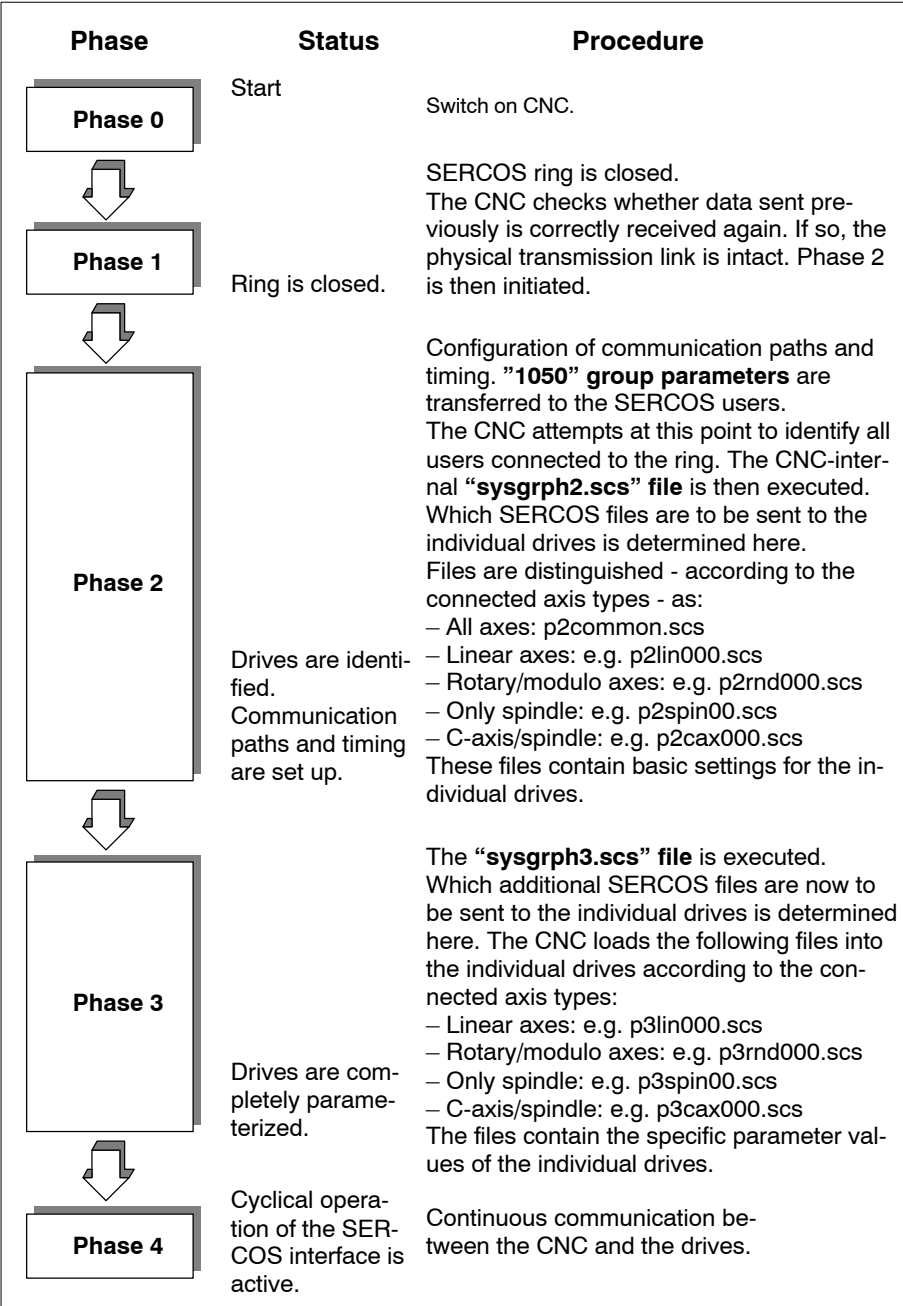
Rexroth accepts no liability for damage resulting from incorrectly programmed, calculated or optimized parameters, or due to failure to observe data limits!

SERCOS initialization

5.1 SERCOS initialization process

The configuration of the procedural steps in chronological order for establishing communication between the CNC and the connected drives is non-adjustable.

Basically, there are 5 distinct states (phases) in this continuous cycle:



SERCOS initialization

Logging SERCOS parameters transmitted during start-up

The SERCOS parameters transmitted by the NC during start-up can be logged for diagnostics purposes. For this purpose, you must delete the ";" mark at the beginning of a line in certain SERCOS files of the NC:

- To activate logging for phase 2: Delete ";" at the beginning of the line reading `dbg p2dbg.scs` in the `sysgrph2.scs` file (see sect. 5.2).
- To activate logging for phase 3: Delete ";" at the beginning of the line reading `dbg p3dbg.scs` in the `sysgrph3.scs` file (see sect. 5.8).

Upon completion of the start-up, the log results are stored in the files `p2dbg.scs` or `p3dbg.scs`, respectively.

To deactivate logging, simply re-insert the ";" marks at the beginning of the lines where they used to be.


Checking the SERCOS timing during start-up **Use this function for commissioning only!**

The SERCOS timing set in configuration parameter group 1050 and in the *.scs files of phase 2 can be checked in phase 3 of a system start-up.

For this purpose, delete the ";" mark at the beginning of the line reading `opt -m time.scs` in the SERCOS file `sysgrph3.scs` (see sect. 5.8).

Upon completion of the startup, the log results are stored in the file `time.scs`.

To deactivate logging, simply re-insert the ";" mark where it used to be in the file `sysgrph3.scs`.

 **The following sections show the contents of the various SERCOS files. For information on SERCOS parameters listed there, please see your drive parameter manual.**


SERCOS initialization

5.2 Control of the start-up in phase 2 (File: sysgrph2.scs)

```

; -----
; sysgrph2.scs Control of the Sercos start-up phase 2
; -----
; Start-up diagnostics phase 2
; Help with searching for initialization errors.
;dbg p2dbg.scs Switch on diagnostics of the start-up by removing the ";"
;          Sending of ident. nos. is logged
; -----
; Sample files for phase 2
; Axis-specific files can be created by copying and renaming
; the sample files (see example).
;Use p2common.scs for (*)          ; Parameter for all axes
;Use p2lin000.scs for (*)          ; Parameter for linear axis
;Use p2rnd000.scs for (*)          ; Parameter for rotary axis, modulo axis
;Use p2spin00.scs for (*)          ; Parameter for spindle
;Use p2cax000.scs for (*)          ; Parameter for spindle/C_axis
; -----
; Example for 6 axes + 2 spindles
;Use p2common.scs for (0,1,2,3,4,5,6,7) ; common parameters
;Use p2lin00x.scs for (0)           ; Parameter for linear axis x
;Use p2lin00y.scs for (1)           ; Parameter for linear axis y
;Use p2lin00z.scs for (2)           ; Parameter for linear axis z
;Use p2rnd00u.scs for (3)           ; Parameter for rotary axis u
;Use p2rnd00v.scs for (4)           ; Parameter for rotary axis v
;Use p2rnd00w.scs for (5)           ; Parameter for rotary axis w
;Use p2spin01.scs for (6)           ; Parameter for spindle 1
;Use p2spin02.scs for (7)           ; Parameter for spindle 2
; -----
; Default setting for ENC lab 7 axes + spindle
; Block should be suppressed or deleted during commissioning!
Use p2common.scs for (0,1,2,3,4,5,6,7) ; Common parameters
Use p2lin000.scs for (0,1,2,4,5) ; Parameter for linear axis
Use p2rnd000.scs for (3,6) ; Parameter for rotary axis, modulo axis
Use p2spin00.scs for (7) ; Parameter for spindle
; -----

```

 **If the Automatic SERCOS timing function (MP 1050 00010) is activated, the file "p2common.scs" (see page 5-5) must be deactivated in this example.**

SERCOS initialization

5.3 All axes phase 2 (File: p2common.scs)

```

; -----
; p2common.scs "all axes Phase 2"
; -----
S-0-0007 = 3880 ; T4 actual value valid [us]
S-0-0008 = 2000 ; T3 setpoint value valid [us]

```

5.4 Linear axes phase 2 (File: p2lin000.scs)

```

; -----
; p2lin000.scs "Linear axis phase 2"
; -----
; Use preferred telegram for Indramat drive
;S-0-0015 = 0b100 ; Telegram type parameter (preferred telegram 4)
; -----
; Telegram configuration
S-0-0015 = 0b111 ; Telegram type parameter (freely configured telegram)
S-0-0016 = (S-0-0051,S-0-0189) ; DT: position actual value 1, couplelag
S-0-0024 = S-0-0047 ; MDT: position setpoint value
;S-0-0026 = S-0-0403 ; Define status word : Status position actual value etc.
; -----
; Operating modes
S-0-0032 = 0b0011 ; Main operating mode (position control with position actual value 1)
S-0-0033 = 0b0011 ; Secondary operating mode 1 (position control with position actual value 1)
S-0-0034 = 0b0011 ; Secondary operating mode 2 (position control with position actual value 1)
S-0-0035 = 0b0011 ; Secondary operating mode 3 (position control with position actual value 1)
; |++
; 011 Position control position actual value 1
; 100 Position control position actual value 2
; | 1 Position control without couplelag
; -----
; Determine weightings
S-0-0076 = 0b1000001 ; Weighting type for position data (Transla. to load)
S-0-0044 = 0b1000001 ; Weighting type for speed. (Transla. to load)
S-0-0160 = 0b1000001 ; Weighting type of acceleration (Transla. to load)
; -----
; Set gear and feedrate spindle
S-0-0121 = 1 ; Input revolutions
S-0-0122 = 1 ; Output revolutions
S-0-0123 = 5 ; Feedrate constants mm/rev.
; -----
; Motor encoder initialization
S-0-0256 = 512 ; Multiplication of motor encoder max. 512
; -----
; Ext. encoder initialization
;S-0-0115 = 0b00000 ; Position encoder type parameter ext. encoder
; | Encoder type 0: Rotary encoder, 1: linear encoder
; | Distance-coded scale 0: No 1: Yes
; | Measuring system resolution 0: metric 1: Inch
; | Direction inverted 0: No, 1: Yes
; | Number of reference markers 0: one marker, 1: cycl. markers
; | encoder monitoring
;S-0-0117 = 1000 ; Rotary encoder resolution ext. encoder
;S-0-0118 = 250 ; Linear encoder resolution ext. encoder
;S-0-0257 = 4 ; Multiplication ext. encoder
; -----

```

SERCOS initialization

5.5 Rotary and modulo axes phase 2 (File: p2rnd000.scs)

```

; -----
; p2rnd000.scs "rotary axis, modulo axis Phase 2"
; -----
; Use preferred telegram for Indramat drive
;S-0-0015 = 0b100 ; Telegram type parameter (preferred telegram 4)
; -----
; Telegram configuration
S-0-0015 = 0b111 ; Telegram type parameter (freely configured telegram)
S-0-0016 = (S-0-0051,S-0-0189) ; DT: position actual value 1, couplelag
S-0-0024 = S-0-0047 ; MDT: position setpoint value
;S-0-0026 = S-0-0403 ; Define status word : Status position actual value etc.
; -----
; Operating modes
S-0-0032 = 0b0011 ; Main operating mode (position control with position actual value 1)
S-0-0033 = 0b0011 ; Secondary mode 1 (position control with position actual value 1)
S-0-0034 = 0b0011 ; Secondary mode 2 (position control with position actual value 1)
S-0-0035 = 0b0011 ; Secondary mode 3 (position control with position actual value 1)
; |++
; 011 Position control position actual value 1
; 100 Position control position actual value 2
; | 1 Position control without couplelag
; -----
; Determine weightings
;S-0-0076= 0b01000010 ; Weighting type for position data (Rot., to load)
S-0-0076 = 0b11000010 ; Weighting type for position data (Rot., to load, modulo format)
S-0-0044 = 0b01000010 ; Weighting type speed. (Rot., [rpm] to load)
S-0-0160 = 0b01000010 ; Weighting type acceleration (rotary to load)
; -----
; Setting gears and feedrate spindle
S-0-0121 = 1 ; Input revolutions
S-0-0122 = 1 ; Output revolutions
; -----
; Motor encoder initialization
S-0-0256 = 512 ; Multiplication of motor encoder max. 512
; -----
; Ext. motor encoder initialization
;S-0-0115 = 0b00000 ; Position encoder type parameter ext. encoder
; | encoder type 0: Rotary encoder, 1: linear encoder
; | Direction inverted 0: No, 1: Yes
; | Number of reference markers 0: one marker, 1: cycl. markers
; | encoder monitoring
;S-0-0117 = 1000 ; Rotary encoder resolution ext. encoder
;S-0-0257 = 4 ; Multiplication ext. encoder
; -----

```

SERCOS initialization

5.6 Spindle phase 2 (File: p2spin00.scs)

```

; -----
; p2spin00.scs "spindle phase 2"
; -----
; Telegram configuration
S-0-0015 = 0b111      ; Telegram type parameter (freely configurable)
S-0-0024 = S-0-0036   ; MDT: speed setpoint value
S-0-0016 = (40,144)   ; DT: speed actual value, signal status
S-0-0026 = (330,331,0,333,0,335,336,337); Signal status like INDRAMAT
; -----
; Operating modes
S-0-0032 = 0b010     ; Main operating mode          (speed control)
S-0-0033 = 0b010     ; Secondary operating mode 1 (speed control)
S-0-0034 = 0b010     ; Secondary operating mode 2 (speed control)
S-0-0035 = 0b010     ; Secondary operating mode 3 (speed control)
; -----
; Determine weightings
S-0-0076 = 0b01000010 ; Weighting type position data (rotary to load)
S-0-0044 = 0b01000010 ; Weighting type speed (rot., [rpm] to load)
S-0-0160 = 0b01000010 ; Weighting type acceleration (rotary to load)
; -----
; Setting gears and feedrate spindle
S-0-0121 = 1          ; Input revolutions
S-0-0122 = 1          ; Output revolutions
; -----
; Motor encoder initialization
P-0-1026 = 512        ; Multiplication of motor encoder max. 512
; -----
; ext. encoder initialization
;S-0-0154 = 0b1000    ; Spindle positioning parameter
;                   | External encoder for position control spindle
;S-0-0115 = 0b000000  ; position encoder type parameters of ext. encoder
;                   | Encoder type 0: rotary encoder, 1: linear encoder
;                   | Direction inverted 0: No, 1: Yes
;                   | Number of reference markers 0: one marker, 1: cycl. markers
;                   | ! encoder monitoring
;S-0-0117 = 1000      ; Rotary encoder resolution ext. encoder
;S-0-0257 = 4         ; Multiplication ext. encoder
; -----

```

SERCOS initialization

5.7 C_axis/spindle phase 2 (File: p2cax000.scs)

```

; -----
; p2cax000.scs "C_axis/spindle phase 2"
; -----
; Telegram Configuration
S-0-0015 = 0b111      ; Telegram type parameter (freely configurable)
S-0-0024 = (47,36)   ; MDT: position setpoint value, speed setpoint value
S-0-0016 = (51,40,144); DT: position actual value mot., speed. actual value, signal status
S-0-0026 = (330,331,0,333,0,335,336,337,403); Signal status like INDRAMAT
                                           ; plus actual position value status
; -----
; Operating modes
S-0-0032 = 0b000000010 ; Main operating mode (speed control)
S-0-0033 = 0b000001011 ; Secondary mode 1 (position control with position actual value 1)
S-0-0034 = 0b000000011 ; Secondary mode 2 (position control with position actual value 1)
S-0-0035 = 0b000000010 ; Secondary mode 3 (speed control)
;           |++
;           010   Speed control
;           011   Position control position actual value 1
;           100   Position control position actual value 2
;           |     1 Position control without couplelag
;           |     1 Drive-controlled c_axis switching
; -----
; Determine weightings
S-0-0076 = 0b11000010 ; Weighting type position data (rotary to load), modulo weighting
S-0-0044 = 0b01000010 ; Weighting type speed. (rot., [rpm] to load)
S-0-0160 = 0b01000010 ; Weighting type acceleration (rotary to load)
; -----
; Setting gears and feedrate spindle
S-0-0121 = 1          ; Input revolutions
S-0-0122 = 1          ; Output revolutions
; -----
; Motor encoder initialization
S-0-0256 = 512        ; Multiplication of motor encoder max. 512
P-0-1026 = 512        ; Multiplication of motor encoder spindle max. 512
; -----
; Ext. encoder initialization
;S-0-0154 = 0b1000    ;Spindle positioning parameter
;           |         external encoder for spindle position control
;S-0-0115 = 0b000000 ; Position encoder type parameters of ext. encoder
;           |         encoder type 0: rotary encoder, 1: linear encoder
;           |         Direction inverted 0: No, 1: Yes
;           |         Number of reference markers 0: one marker, 1: cycl. markers
;                                     ! encoder monitoring
;S-0-0117 = 1000     ; Rotary encoder resolution ext. encoder
;S-0-0257 = 4        ; Multiplication ext. encoder
; -----

```

SERCOS initialization

5.8 Control of the start-up in phase 3 (File: sysgrph3.scs)

```

; -----
; sysgrph3.scs Control of the Sercos start-up phase 3
; -----
; Start-up diagnostic phase 3
; Help with searching for initialization errors
; dbg p3dbg.scs Switch on diagnostics of start-up by removing ";"
;           Sending of ident. nos. is logged
; -----
; Sample files for phase 3
; Axis-specific files can be created by copying and renaming
; the sample files (see example).
; Use p3lin000.scs for (*)           ; Parameter for linear axis
; Use p3rnd000.scs for (*)           ; Parameter for rotary axis, modulo axis
; Use p3spin00.scs for (*)          ; Parameter for spindle
; Use p3cax000.scs for (*)          ; Parameter for spindle/C_axis
; -----
; Example for 6 axes + 2 spindles
; Use p3lin00x.scs for (0)           ; Parameter for linear axis x
; Use p3lin00y.scs for (1)           ; Parameter for linear axis y
; Use p3lin00z.scs for (2)           ; Parameter for linear axis z
; Use p3rnd00u.scs for (3)           ; Parameter for rotary axis u
; Use p3rnd00v.scs for (3)           ; Parameter for rotary axis v
; Use p3rnd00w.scs for (3)           ; Parameter for rotary axis w
; Use p3spin01.scs for (6)           ; Parameter for spindle 1
; Use p3spin02.scs for (7)           ; Parameter for spindle 2
; -----
; Default setting for ENC lab 7 axes + spindle
; Block should be suppressed or deleted during commissioning!
Use p3lin000.scs for (0,1,2,4,5) ; Parameter for linear axis
Use p3rnd000.scs for (3,6)       ; Parameter for rotary axis, modulo axis
Use p3spin00.scs for (7)         ; Parameter for spindle
; -----
; opt -m time.scs ;Activate SERCOS Timing diagnostics by deleting ";"

```

SERCOS initialization

5.9 Linear axes phase 3 (File: p3lin000.scs)

```

; -----
; p3lin000.scs "linear axis phase 3"
; -----
; Limit values
S-0-0092 = 300 ; Torque limit value bipolar [%]
S-0-0138 = 1.0 ; Acceleration limit value [m/s2]
; -----
; Speed parameters
S-0-0091 = 15.0 ; Feedrate limit value [m/min]
S-0-0124 = 0.001 ; Standstill window [m/min]
S-0-0125 = 0.5 ; Feedrate threshold nx [m/min]
S-0-0157 = 0.001 ; Feedrate window [m/min]
P-0-0012 = 50 ; Start-up speed limit value [rpm]
S-0-0100 = 50 ; Speed controller proportional gain
S-0-0101 = 10 ; Speed controller reset time [ms]
; -----
; Position parameters
S-0-0049 = 1 ; Position limit value positive [m]
S-0-0050 = -1 ; Position limit value negative [m]
S-0-0159 = 120 ; Monitoring window [%]
S-0-0057 = 0.00001 ; Positioning window [m]
S-0-0261 = 0.0001 ; Positioning window rough [m]
S-0-0058 = 0 ; Backlash [m]
S-0-0104 = 1.00 ; Loop gain value [m/min/mm]
;S-0-0055 = 0b00000 ; Position polarities parameter
; | Polarity position setpoint value 0: positive, 1: negative
; | Polarity position actual value_1 0: positive, 1: negative
; | Polarity position actual value_2 0: positive, 1: negative
; | Position limit value 0: not active , 1: active
; -----
; Ipoparameter
S-0-0108 = 100 ; Feedrate override [%]
; -----
; Referencing parameters
S-0-0407 = 0b1 ; Referencing enable, must be set for Bosch drive
S-0-0041 = 0.5 ; Referencing speed [m/min]
S-0-0042 = 0.1 ; Referencing acceleration [m/s2]
S-0-0147 = 0b10000100 ;Referencing parameter
; | Referencing direction 0: positive, 1: negative
; | Reference edge selection 0: pos. edge, 1: neg. edge
; | Reference point switch 0: to NC, 1: to drive
; | Evaluation reference point switch 0: Yes, 1: No
; | Traverse to reference point after referencing 0: No, 1: Yes
; Motor encoder
S-0-0052 = 0 ; Reference measurement position actual value 1 [m]
S-0-0150 = 0 ; Reference measurement offset 1 [m]
;S-0-0177 = 0 ; Absolute measurement offset 1 [m] !only absolute encoder
; ext. encoder
;S-0-0054 = 0 ; Reference measurement position actual value 2 [m]
;S-0-0151 = 0 ; Reference measurement offset 2 [m]
;S-0-0178 = 0 ; Absolute measurement offset 2 [m] !only absolute encoders
; Distance coded scale
;S-0-0165 = 0 ; Distance coded reference measurement A [m]
; -----

```


SERCOS initialization

5.10 Rotary and modulo axes phase 3 (File: p3rnd000.scs)

```

; -----
; p3rnd000.scs "rotary axis, modulo axis phase 3"
; -----
; Limit values
S-0-0092 = 300 ; Torque limit value bipolar [%]
S-0-0138 = 1000 ; Acceleration limit value [rad/s2]
; -----
; Speed parameters
S-0-0091 = 3000 ; Feedrate limit value [rpm]
S-0-0124 = 1.0 ; Standstill window [rpm]
S-0-0125 = 10 ; Feedrate threshold nx [rpm]
S-0-0157 = 5.0 ; Feedrate window [rpm]
P-0-0012 = 50 ; Start-up speed limit value [rpm]
S-0-0100 = 50 ; Speed controller proportional gain
S-0-0101 = 10 ; Speed controller reset time [ms]
; -----
; Position parameters
S-0-0049 = 360 ; Position limit value positive [degrees]
S-0-0050 = -360 ; Position limit value negative [degrees]
S-0-0159 = 120 ; Monitoring window [%]
S-0-0057 = 0.5 ; Positioning window [degrees]
S-0-0261 = 2.0 ; Positioning window rough [degrees]
S-0-0058 = 0 ; Backlash [degrees]
S-0-0103 = 360 ; Modulo value [degrees]
S-0-0104 = 1.00 ; Loop gain value [1000 1/min]
;S-0-0055 = 0b00000 ; Position polarities parameter
; | Polarity position setpoint value 0: positive, 1: negative
; | Polarity position actual value_1 0: positive, 1: negative
; | Polarity position actual value_2 0: positive, 1: negative
; | Position limit value 0: not active , 1: active
; -----
; Ipoparameter
S-0-0108 = 100 ; Feedrate-Override [%]
; -----
; Referencing parameters
S-0-0407 = 0b1 ; Referencing enable, must be set for Bosch drive
S-0-0041 = 300 ; Referencing speed [rad/min]
S-0-0042 = 100 ; Referencing acceleration [rad/s2]
S-0-0147 = 0b10100100 ;Referencing parameter
; | Referencing direction 0: positive, 1: negative
; | Reference edge selection 0: pos. edge, 1: neg. edge
; | Reference point switch 0: to NC, 1: to drive
; | Evaluation reference point switch 0: Yes, 1: No
; | Traverse to reference point after referencing 0: No, 1: Yes
; Motor encoder
S-0-0052 = 0 ; Reference measurement position actual value 1 [degrees]
S-0-0150 = 0 ; Reference measurement offset 1 [degrees]
; ext. encoder
;S-0-0054 = 0 ; Reference measurement position actual value 2 [degrees]
;S-0-0151 = 0 ; Reference measurement Offset 2 [degrees]
; -----

```

SERCOS initialization

5.11 Spindle phase 3 (File: p3spin00.scs)

```

; -----
; p3spin00.scs "spindle phase 3"
; -----
; Limit values
S-0-0092 = 300 ; Torque limit value bipolar [%]
S-0-0138 = 1000 ; Acceleration limit value [rad/s2]
; -----
; Speed parameters
S-0-0091 = 3000 ; Speed limit value bipolar [rpm]
S-0-0124 = 1.0 ; Standstill window [rpm]
S-0-0125 = 10 ; Speed threshold nx [rpm]
S-0-0157 = 5.0 ; Speed window [rpm]
P-0-0012 = 50 ; Start-up speed limit value [rpm]
P-0-1011 = 50 ; Speed controller proportional gain, spindle
P-0-1012 = 10 ; Speed controller reset time, spindle [ms]
; -----
; Spindle referencing
P-0-1004 = 0 ; Reference measurement offset-1 spindle [degrees] motor encoder
; P-0-1005 = 0 ; Reference measurement offset-2 spindle [degrees] ext. encoder
; -----
; Spindle orientation parameters
S-0-0108 = 100 ; Feedrate override [%]
S-0-0222 = 100 ; Spindle positioning speed [rpm]
P-0-1027 = 1000 ; Orientation acceleration [rad/s2]
P-0-1002 = 1 ; Position controller loop gain factor spindle [1000 * 1/min]
P-0-1024 = 1 ; Loop gain rise, spindle
P-0-1025 = 10 ; Speed, loop gain rise, spindle
P-0-1006 = 120 ; Monitoring window spindle [%]
P-0-1001 = 1 ; Positioning window spindle [degrees]
P-0-1023 = 5 ; Positioning window rough spindle [degrees]
P-0-1028 = 360 ; Modulo value spindle [degrees]
; P-0-1000 = 0b0000 ; Position polarity parameters spindle
; | Polarity position setpoint value 0: positive, 1: negative
; | Polarity position actual value_1 0: positive, 1: negative
; | Polarity position actual value_2 0: positive, 1: negative
; -----
; Parameters for the oscillating function
S-0-0213 = 10 ; Oscillating speed [rpm]
S-0-0214 = 50 ; Oscillating offset speed [rpm]
S-0-0215 = 3600 ; Oscillating cycle time [ms]
; -----

```

SERCOS initialization

5.12 C_axis/spindle phase 3 (File: p3cax000.scs)

```

; -----
; p3cax000.scs "C_axis/spindle phase 3"
; -----
; Spindle
; -----
; Limit values
S-0-0092 = 300          ; Torque limit value bipolar [%]
S-0-0138 = 1000        ; Acceleration limit value [rad/s2]
; -----
; Speed parameters
S-0-0091 = 3000        ; Speed limit value bipolar [rpm]
S-0-0124 = 1.0         ; Standstill window [rpm]
S-0-0125 = 10          ; Speed threshold nx [rpm]
S-0-0157 = 5.0         ; Speed window [rpm]
P-0-0012 = 50          ; Start-up speed limit value [rpm]
P-0-1011 = 50          ; Speed controller proportional gain, spindle
P-0-1012 = 10          ; Speed controller reset time, spindle [ms]
; -----
; Spindle referencng
P-0-1004 = 0           ; Reference measurement offset-1 spindle [degrees] motor encoder
;P-0-1005 = 0          ; Reference measurement offset-2 spindle [degrees] ext. encoder
; -----
; Spindle orientation parameters
S-0-0108 = 100         ; Feedrate override [%]
S-0-0222 = 100         ; Spindle positioning speed [rpm]
P-0-1027 = 1000        ; Orientation acceleration [rad/s2]
P-0-1002 = 1           ; Position controller loop gain factor spindle [1000 * 1/min]
P-0-1024 = 1           ; Loop gain rise, spindle
P-0-1025 = 10          ; Speed, loop gain rise, spindle
P-0-1006 = 120         ; Monitoring window spindle [%]
P-0-1001 = 1           ; Positioning window spindle [degrees]
P-0-1023 = 5           ; Positioning window rough spindle [degrees]
P-0-1028 = 360         ; Modulo value spindle [degrees]
;P-0-1000 = 0b0000     ; Position polarity parameters spindle
;                       | Polarity position setpoint value 0: positive, 1: negative
;                       | Polarity position actual value_1 0: positive, 1: negative
;                       | Polarity position actual value_2 0: positive, 1: negative
; -----
; Parameters for the oscillating function
S-0-0213 = 10          ; Oscillating speed [rpm]
S-0-0214 = 50          ; Oscillating offset speed [rpm]
S-0-0215 = 3600        ; Oscillating cycle time [ms]
; -----
; C_axis
; -----
; Speed parameters
S-0-0100 = 50          ; Speed controller proportional gain
S-0-0101 = 10          ; Speed controller reset time [ms]
; Position parameters
S-0-0049 = 360         ; Position limit value positive [degrees]
S-0-0050 = -360        ; Position limit value negative [degrees]
S-0-0159 = 120         ; Monitoring window [%]
S-0-0057 = 0.5         ; Positioning window [degrees]
S-0-0261 = 2.0         ; Positioning window rough [degrees]
S-0-0058 = 0           ; Backlash [degrees]
S-0-0103 = 360         ; Modulo value [degrees]
S-0-0104 = 1.00        ; Loop gain value [1000 1/min]
;S-0-0055 = 0b000000   ; Position polarity parameters
;                       | Polarity position setpoint value 0: positive, 1: negative
;                       | Polarity position actual value_1 0: positive, 1: negative
;                       | Polarity position actual value_2 0: positive, 1: negative

```

SERCOS initialization

```
;          |          Position limit value 0: not active , 1: active
; -----

; Ipoparameter
S-0-0108 = 100          ; Feedrate override [%]
; -----
; Referencing parameters
S-0-0407 = 0b1          ; Referencing enable, must be set for Bosch drive
S-0-0041 = 300          ; Referencing speed [rad/min]
S-0-0042 = 100          ; Referencing acceleration [rad/s2]
S-0-0147 = 0b10100100 ;Referencing parameter
;          | Referencing direction 0: positive, 1: negative
;          | Reference edge selection 0: pos. edge, 1: neg. edge
;          | Reference point switch 0: to NC, 1: to drive
;          | Evaluation reference point switch 0: Yes, 1: No
;          | Traverse to reference point after referencing 0: No, 1: Yes
; Motor encoder
S-0-0052 = 0          ; Reference measurement position actual value 1 [degrees]
S-0-0150 = 0          ; Reference measurement offset 1 [degrees]
; ext. encoder
;S-0-0054 = 0          ; Reference measurement position actual value 2 [degrees]
;S-0-0151 = 0          ; Reference measurement offset 2 [degrees]
;S-0-0307 = 336        ; InPos window 1 assignment --> real-time bit 2
; -----
```

Appendix

A Appendix

A.1 Abbreviations

Abbreviation	Description
APS	Application Software
CEST	Central European Summer Time
CET	Central European Time
ESD	Electro-Static Discharge Abbreviation for all terms relating to electro-static discharge, e.g. ESD protection, ESD hazards, etc.
Fx	Function key with number x
HP	Main Program ('Hauptprogramm')
LSEC	Lead Screw Error Compensation
MDI	"Manual Data Input" mode
MP	MACODA parameter
MSD	Machine-Status Display
MTB	Machine-Tool Builder
NC, CNC	Control Unit
OI	Operator Interface
OM	Operating Mode
PE	Protective Earth
PLC	Programmable Logic Controller
SK	Softkey
SP	Subprogram
UTC	Universal Time Coordinated (formerly GMT)

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7060 00410	Automatic program reselection	4-211
7060 00510	Size of buffer for NC block selection	4-211
7070 00010	Data areas for CPL programs	4-212
7070 00020	Customer PLC interface. By control reset resettable signals	4-212
7080 00010	Coordinate designation	4-213
8001 00010	Activation of punching and nibbling	4-214
8001 00020	Axis-specific stroke release times	4-214
8001 00021	Reference of stroke release times	4-215
8001 00030	Stroke check time	4-216
8002 00001	Control area: system axis number of 1st dimension of area	4-217
8002 00002	Control area: system axis number of 2nd dimension of area	4-217
8002 00011	Control area: center of area, 1st dimension	4-217
8002 00012	Control area: center of area, 2nd dimension	4-218
8002 00021	Control area: enlargement of area, 1st dimension	4-218
8002 00022	Control area: enlargement of area, 2nd dimension	4-218
8002 00031	Control area: type of control area	4-219
8002 00032	Control area: area is programmable	4-219
8002 00033	Control area: parameter (area-specific data)	4-219
8003 00001	Contour deviation tolerance with G328, Precision programming	4-220
8004 00001	Modal value for block cycle time programming	4-220
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8006 00001	Number of digitizing buffers (buffer size 512 bytes)	4-222
8006 00002	Number of reserve buffers	4-222
8007 00010	Maximum allowable starting/end point deviation.	4-223
8007 00020	Maximum allowable relative path speed error.	4-224
8007 00099	Spline configuration	4-224
9010 00010	Password Rexroth System Management	4-226
9010 00011	Password Rexroth Development	4-226
9010 00012	Password Machine Manufacturer	4-226
9010 00013	Password Rexroth Service	4-226
9010 00014	Password End User	4-227
9020 00010	Dimensions of offsets and compensations (tables and external)	4-228
9020 00110	Scale factor for PLC spindle speed values	4-229
9030 00001	NC cycle time	4-230
9030 00002	Updating actual machine coordinate values	4-230
9040 00001	Number of channels	4-231
9040 00010	CPU time for block control	4-231
9050 00001	Time zone	4-232
9060 00001	Number of increments per revolution	4-235
9060 00002	Field bus assignment (PNC-R only)	4-235

Appendix

A.4 Parameter number conversion table

old	new	old	new
1001 0000 1	1003 0000 1	1070 0000 9	1040 0001 5[1]
1001 0000 2	1003 0000 2	1070 0001 1	1040 0003 1[1]
1001 0000 3	1001 0000 1	1070 0001 8	1040 0004 1[1]
1001 0000 4	1003 0000 4	1070 0002 0	1040 0002 0[1]
1001 0000 5	1003 0000 5	1070 0002 1	1040 0002 1[1]
1001 0000 6	1050 0000 1	1070 0010 1	9020 0011 0
1001 0000 7	7010 0003 0	1070 0090 1	1040 0000 3
1001 0000 8	obs.	1070 0090 2	obs.
1001 0000 9	1003 0000 9	1080 0000 2	1040 0001 0[2]
1001 0001 0	1003 0001 0	1080 0000 3	1040 0001 1[2]
1001 0001 1	1003 0001 1	1080 0000 4	1040 0001 2[2]
1001 0001 2	1003 0001 2	1080 0000 9	1040 0001 5[2]
1001 0002 0	1003 0002 0	1080 0001 1	1040 0003 1[2]
1001 0005 0	1003 0005 0	1080 0001 8	1040 0004 1[2]
1001 0005 1	obs.	1080 0002 0	1040 0002 0[2]
1001 0005 5	1003 0005 5	1080 0002 0(V6)	8001 0002 0
1001 0005 6	1003 0005 6	1080 0002 1	1040 0002 1[2]
1001 0005 7	1003 0005 7	1080 0002 1(V6)	8001 0002 1
1001 0006 0	1003 0006 0	1080 0010 1	8002 0000 1
1001 0006 1	1003 0006 8	1080 0010 2	8002 0000 2
1001 0007 0	1003 0006 1	1080 0011 0	8002 0003 1
1001 0007 1	1003 0006 2	1080 0012 0	8002 0003 2
1001 0010 0	1003 0010 0	1080 0013 0	8002 0003 3
1001 0100 1	obs.	1080 0015 0	8002 0001 1
1001 0100 2	6020 0001 1	1080 0016 0	8002 0001 2
1001 0100 3	6020 0001 2	1080 0017 0	8002 0002 1
1010 0000 3	1010 0001 1	1080 0018 0	8002 0002 2
1010 0000 4	1010 0001 2	1090 0020 1	9020 0011 0
1010 0000 6	1010 0000 1	2060 0000 1	obs.
1010 0000 9	1010 0000 2	2060 0000 8	7070 0002 0
1015 0000 1	1015 0000 2	2060 0001 0	2060 0009 0
1015 0000 6	1015 0010 0	3030 0000 1	7060 0002 0
1015 0000 7	1015 0000 1	3030 0000 2	7060 0001 0
1030 0000 4	7030 0001 0	3080 0000 3	7070 0001 0
1030 0000 5	7030 0031 0	3080 0010 0	7060 0031 0
1030 0000 8	7030 0021 0	3080 0010 1	7060 0032 0
1030 0000 9	7030 0022 0	3080 0010 2	7060 0033 0
1030 0001 0	7030 0011 0	4075 0000 1	4075 0010 5
1030 0010 1	7040 0011 0	4075 0000 2	4075 0010 6
1030 0020 1	7020 0001 0	4075 0000 3	4075 0010 2
1030 0020 2	7010 0011 0	4075 0000 4	4075 0010 7
1030 0030 1	7050 0011 0	4075 0000 5	4075 0010 3
1030 0030 2	7050 0012 0	4075 0000 6	4075 0010 8
1030 0030 3	7050 0013 0	4075 0000 7	4075 0010 4
1040 0001 1	1050 0000 3	7060 0034 0	7060 0041 0
1040 0001 2	1050 0000 4	9020 0000 5	obs.
1050 0000 1	9030 0000 1	9020 0000 6	obs.
1050 0000 6	1050 0001 1	9098 0000 1	9050 0000 1
1050 0008 9	1050 0001 2	9098 0000 2	9040 0000 1
1050 0010 0	1050 0003 1	9098 0000 3	7060 0011 0
1050 0010 1	1050 0003 2	9098 0000 4	9040 0001 0
1050 0100 0	1050 0000 2	9098 0000 9	7060 0021 0
1050 0100 1	1050 0002 1	9098 0001 0	7050 0001 0
1061 0000 2	1020 0000 1	9098 0001 1	7050 0002 0
1061 0000 3	1020 0000 2	9098 0001 2	7050 0003 0
1061 0000 4	1020 0000 3	9098 0001 6	7040 0001 0
1061 0000 5	1020 0000 4	9098 0002 0	7040 0002 0
1070 0000 2	1040 0001 0[1]	9098 0002 4	8004 0000 1
1070 0000 3	1040 0001 1[1]	9098 0003 0	9020 0001 0
1070 0000 4	1040 0001 2[1]	9098 0004 0	7050 0031 0

(V6): These parameters have been newly implemented in MACODA release 6 following a shift of the old parameters under the same numbers.

Bosch Rexroth AG
Electric Drives and Controls
Bgm.-Dr.-Nebel-Str. 2
97816 Lohr a. Main, Germany
info@boschrexroth.de
www.boschrexroth.de