SIEMENS

SINUMERIK 802D
SINUMERIK 802D base line

Commissioning Manual

Valid for

Control system	*Software version*
SINUMERIK 802D	2
SINUMERIK 802D base line	1

08/2005 Edition

Safety information

This Manual contains information which you should carefully observe to ensure your own personal safety and the prevention of material damage. The notices are highlighted by a warning triangle and, depending on the degree of hazard, represented as shown below:

Danger

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

Warning

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

Caution

with a warning triangle indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a warning triangle means that material damage **can** occur if the appropriate precautions are not taken.

Attention

indicates that an undesired event or status **can** occur if the appropriate note is not observed.

If several hazards of different degrees occur, the hazard with the highest degree must always be given preference. If a warning note with a warning triangle warns of personal injury, the same warning note can also contain a warning of material damage.

Qualified personnel

Start−up and operation of the device/equipment/system in question must only be performed using this documentation. The start−up and operation of a device/system must only be performed by **qualified personnel**. Qualified personnel as referred to in the safety guidelines in this documentation are those who are authorized to start up, ground and label units, systems and circuits in accordance with the relevant safety standards.

Proper use

Please note the following:

Warning

The device must only be used for the applications described in the Catalog and only in combination with the equipment, components and devices of other manufacturers as far as this is recommended or permitted by Siemens. It is assumed that this product be transported, stored and installed as intended and maintained and operated with care to ensure that the product functions correctly and properly.

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Disclaimer of liability

Although we have checked the contents of this publication for agreement with the hardware and software described, since differences cannot be totally ruled out. Nonetheless, differences might exist and therefore we cannot guarantee that they are completely identical. The information given in this publication is reviewed at regular intervals and any corrections that might be necessary are made in the subsequent editions.

Siemens AG
Automation and Drives
Postfach 4848
90437 NÜRNBERG
GERMANY

6FC5697−2AA00−1BP5

Preface

SINUMERIK Documentation

The SINUMERIK Documentation is organized in 3 levels:

- General Documentation:
- User Documentation
- Manufacturer/Service Documentation:

For detailed information regarding further publications about SINUMERIK 802D, as well as for publications that apply for all SINUMERIK control systems (e.g. Universal Interface, Measuring Cycles...), please contact your Siemens branch office.

A monthly overview of publications with specification of the available languages can be found on the Internet at:
http://www.siemens.com/motioncontrol
Follow the menu items ”Support”/”Technical Documentation”/”Overview of Publications”.

The Internet edition of DOConCD – DOConWEB – can be found at:
http://www.automation.siemens.com/doconweb

Addressees of the documentation

The present documentation is aimed at the machine tool manufacturer. This publication provides detailed information required for the machine tool manufacturer to start up the SINUMERIK 802D control system.

Standard scope

The present Instruction Manual describes the functionality of the standard scope. Any amendments made by the machine manufacturer are documented by the machine manufacturer.

Other functions not described in this documentation can possibly also be performed on the control system. However, the customer is not entitled to demand these functions when the new equipment is supplied or servicing is carried out.

Hotline

If you have any questions, do not hesitate to call our hotline:

A&D Technical Support
Tel.: +49 (0) 180 / 5050 – 222
Fax: +49 (0) 180 / 5050 – 223
Internet: http://www.siemens.de/automation/support–request

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Fax form: see return fax form at the end of this publication

Internet address

http://www.siemens.com/motioncontrol

Contents

Platz für Notizen

The SINUMERIK 802D Control System

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1.1 Components of the SINUMERIK 802D

Hardware components

- PCU (Panel Control Unit): Component of the control system for max. 4 axes and one spindle, with graphical display, softkey menu and NC card slot
- KB (keyboard): horizontal or vertical design
- MCP: Machine control panel
- PP 72/48 (Profibus I/Os): 72 digital inputs, 48 digital outputs
- ADI4 (analog drive interface for 4 axes)
- Drive module
  - SIMODRIVE 611UE closed−loop control module
  - PROFIBUS DP option module

Software components

- System software on the permanent flash memory of the PCU
  - Boot software
    starts the system
  - Human Machine Interface (HMI)
    realizes all operator functions
  - NCK software (NC Kernel)
    realizes all NC functions. It controls one ”NC channel ” with up to 5 axes (2 of them can be configured as spindles).
  - Programmable Logic Control (PLC)
    executes the integrated PLC user program cyclically.
- Toolbox
  - Setup files for turning and milling
  - Configuration file for transformations with turning
  - Cycle package for turning and milling
  - WINPCIN transfer program for transferring user data and programs between PC and NC
  - Reloadable languages
  - Text manager
  - PLC user library

- SimoCom U Parameterization and Commissioning Tool for Drives
- SIMODRIVE 611 UE Firmware
- PLC 802 Programming Tool

Note

Please always observe the readme file supplied with the ”Toolbox”. It provides up−to−date information.

User data

The user data include:

- Machine data
- Setting data
- Tool data
- R parameters
- Work offsets
- Offset data
- Part programs
- Standard cycles
- PLC user program
- PLC alarms

Note

After turning off or in case of power failure, changed user data are stored for at least 50 h. Thereafter, they can be lost if they are not permanently stored by appropriate operator actions (see Section 6.2.1)

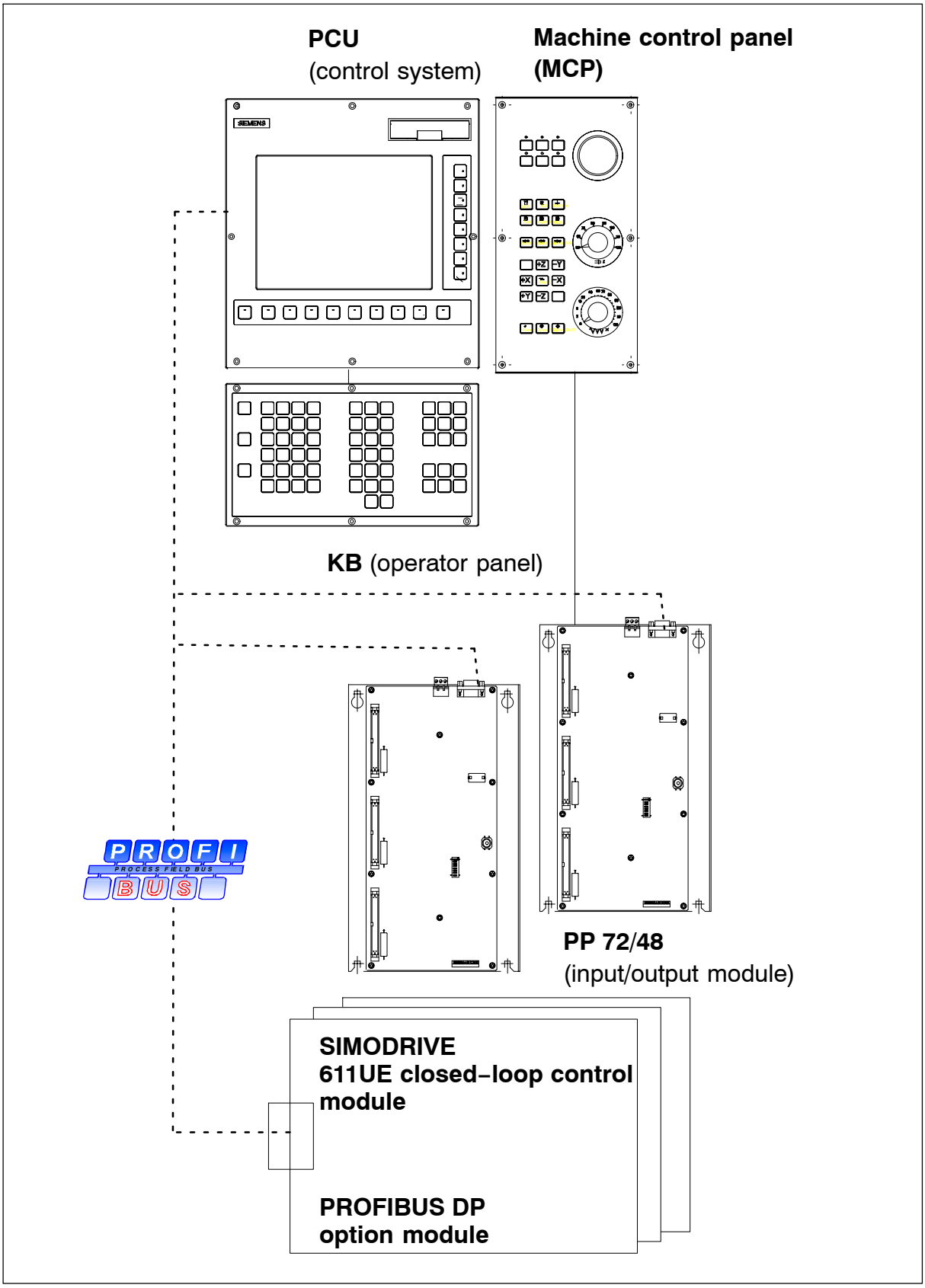


Fig. 1-1 Hardware components of the SINUMERIK 802D

1.2 Technical specifications

Connected loads

Table 1-1 Connected loads

Parameters	min.	typ.	max.	Unit	
Supply voltage	20.4		28.8	V	
Ripple			3.6	Vss	
24 V current consumption		1		A	*
Power dissipation of the PCU including KB Power dissipation of the MCP Power dissipation of the PP 72/48			50 <5 11	W W W	 **
Starting current, total			2.6	A	

* Basic configuration from PCU, KB, MCP and PP 72/48; all outputs open
** with nominal load

Weight

Table 1-2 Weight

Component	Weight
PCU	4.9 kg
KB	1.7 kg
MCP	1.5 kg
PP 72/48	1.2 kg

Dimensions

Table 1-3 Dimensions of the individual components

Component	Dimensions WxHxD [mm]
PCU	310 x 330 x 85
KB, horizontal design	310 x 175 x 32
KB, vertical design	172 x 330 x 32
MCP	170 x 330 x 128
PP 72/48	194 x 325 x 35

Ambient conditions during operation

Table 1-4 Ambient conditions during operation

Parameters	
Temperature range	0...50 °C
Permissible relative humidity	5...95 %, not condensing
Air pressure	700...1,060 hPa

The conditions during operation comply with IEC 1131-2.
The control system is to be intended for installation in a housing (e.g. cubicle).

Transport and storage conditions

Table 1-5 Transport and storage conditions

Parameter	
Temperature range	-20...60 °C
Permissible relative humidity	5...95 %, not condensing
Air pressure	700...1,060 hPa
Transport height	-1,000...3,000 m
Free fall in transport package	≤ 1,200 mm (PP 72/48 ≤ 1,000 mm)

Protective quality and degree of protection

Class of protection I to IEC 536.

No connection to protective−conductor terminal is required.

Protection from foreign matter and penetrating water to IEC 529.

- For the PCU : IP 65 (front)
  IP 00 (rear)
- For the keyboard : IP 65 (front)
  IP 00 (rear)
- For the MCP : IP 54 (front)
  IP 00 (rear)
- PP 72/48 IP 00

PP 72/48

Table 1-6 Digital inputs

Parameter	min	typ	max	Unit
U_H	15	24	30	V
I_{in} at U_H	2		15	mA
U_L	–30	0	+5	V
I_{in} at U_L	not defined		15	mA
Signal delay caused by the hardware	0.5		3	ms

A voltage of 24V for controlling the digital inputs is provided at pin 2 of the interfaces X111, X222 and X333.

Max. current on pin 2 I_{out} =0.5A

Table 1-7 Digital outputs (high–side driver)

Parameter	min	typ	max	Unit
U_H	V_{cc} – 3V		V_{cc}	V
I_{out} at U_H and 100% simultaneity factor			250	mA
U_L	Output open			
I_{out} at U_L (leakage current)		50	400	µA
Signal delay caused by the hardware			0.5	ms
Switching rate for the ohmic load			100	Hz
Switching rate for the inductive load (free–wheeling diode required)			2	Hz
Switching rate for the lamp load			11	Hz

The 24V voltage for the digital outputs must be connected to all 4 pins 47, 48, 49, 50.

Max. 1A may flow per supply pin.

Installing the Control System

2

2.1 Installing and removing the SINUMERIK 802D

Warning

Before installing the control system, make absolutely sure that the system is disconnected form the mains and deenergized!

The modules contain electrostatic sensitive devices.
When handling the modules, make sure that neither p.c.boards, nor components are touched by persons not grounded with ESD protection.

Procedure

1. Install the PCU, the keyboard (KB) and the machine control panel (MCP).

   Attention! The maximum permissible torque for tightening the fastening screws is 1.8 Nm and must not be exceeded.

2. Install the PP 72/48.
3. Installing the drive compound (see SIMODRIVE 611 UE Documentation)
4. Establish the connection between PCU and keyboard, as well as between MCP and PP 72/48.
5. Establish the PROFIBUS connection between PCU, PP 72/48 and SIMODRIVE 611 UE.

Removing the control system

To remove the control system, proceed in the reverse order.

Warning

Before removing the control system, make absolutely sure that the system is disconnected form the mains and deenergized!

Mounting dimensions

Note

When installing the control components, observe the dimensions specified in the diagrams below. These drilling patterns constitute the basis for preparing the mounting holes. The dimensions are binding.

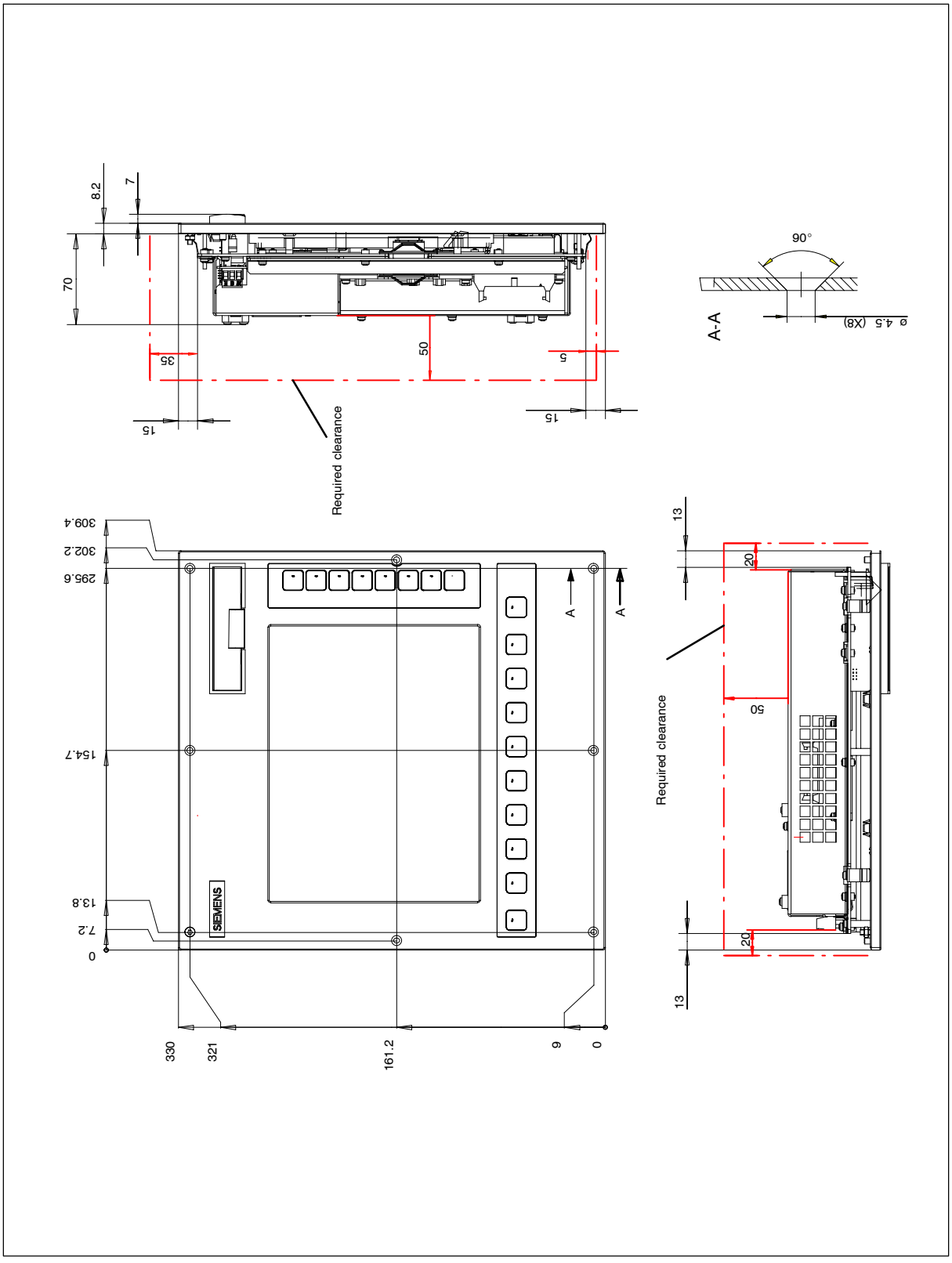


Fig. 2-1 PCU mounting dimensions

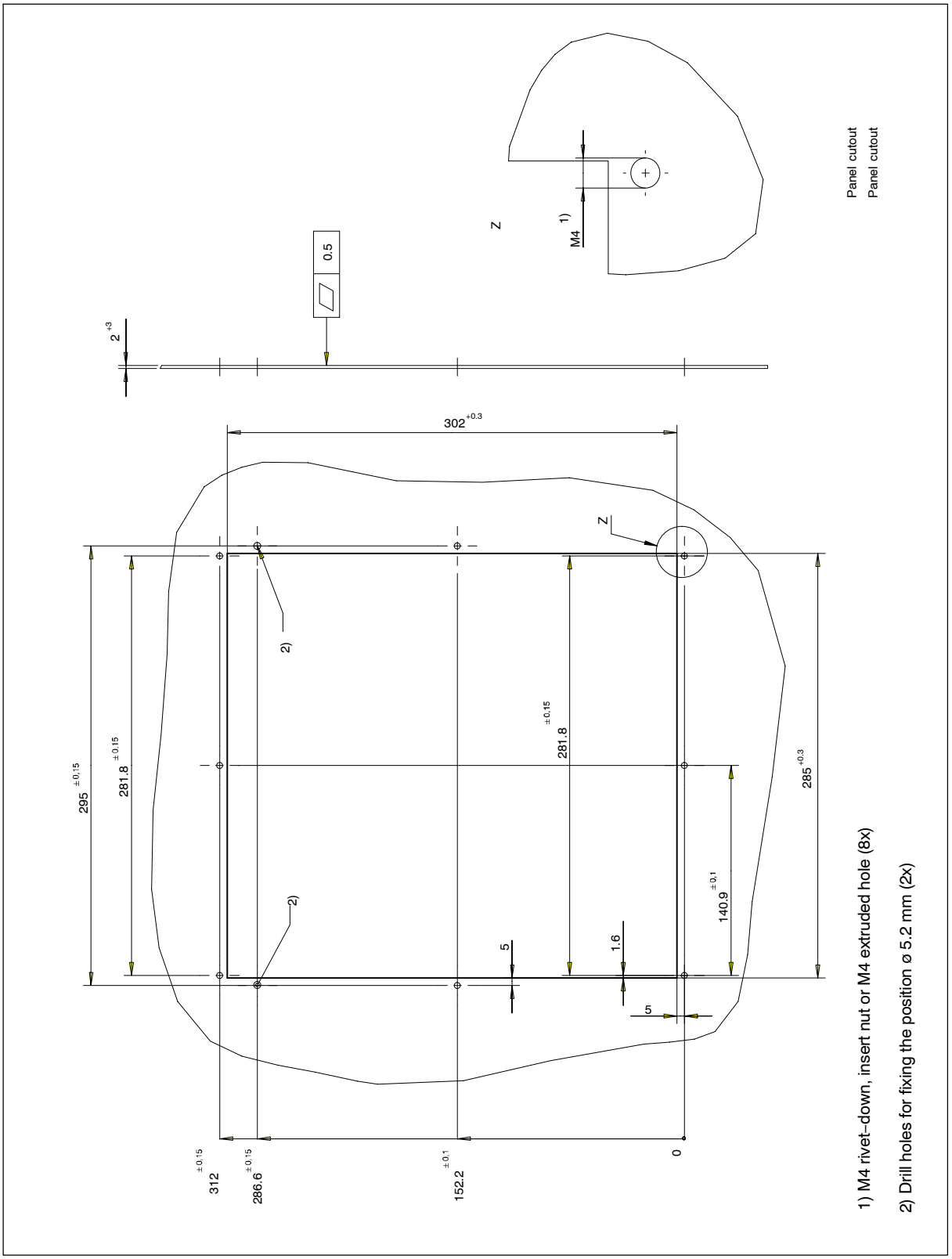


Fig. 2-2 Drilling pattern for the PCU

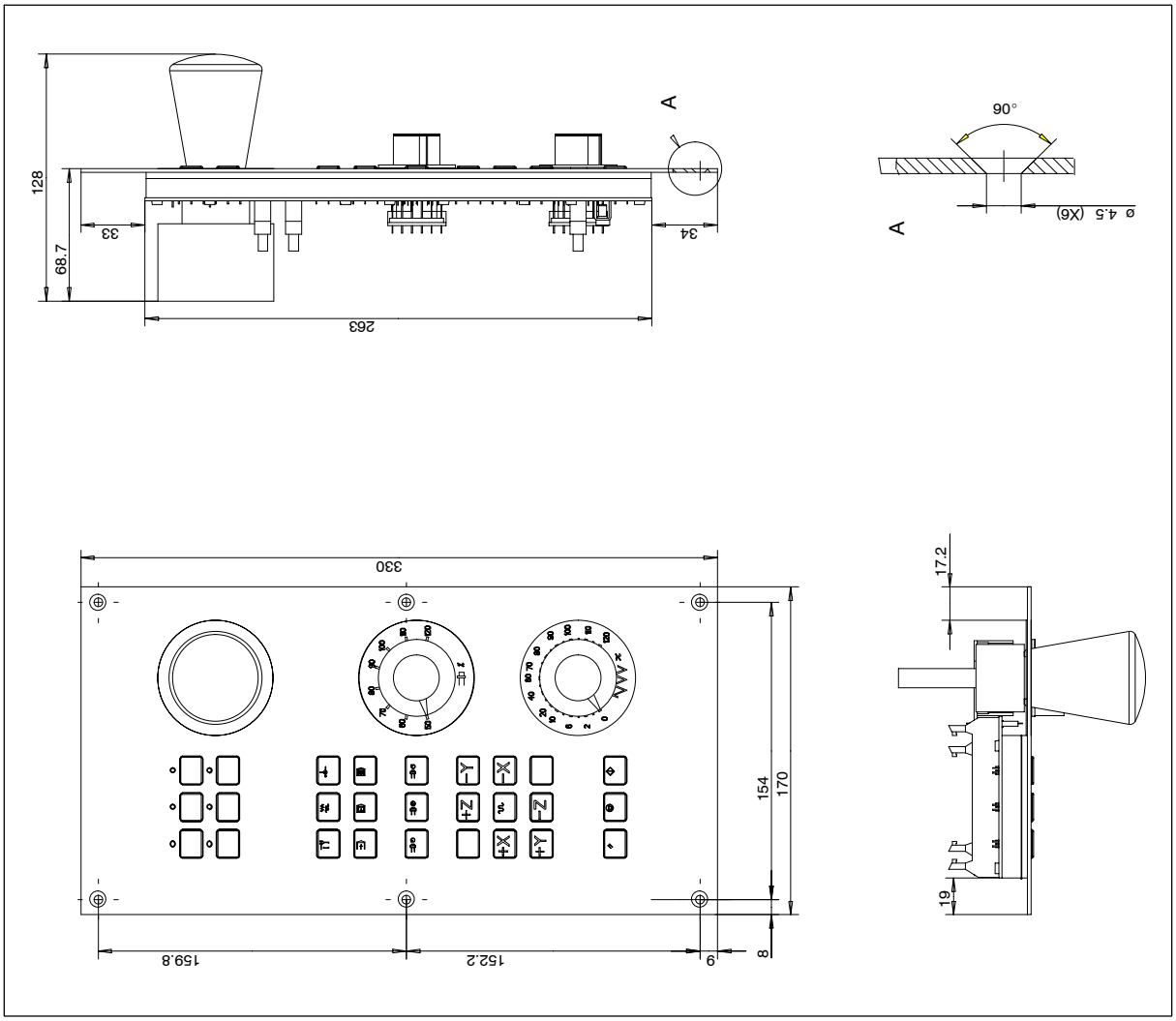


Fig. 2-3 Mounting dimensions for the machine control panel (MCP)

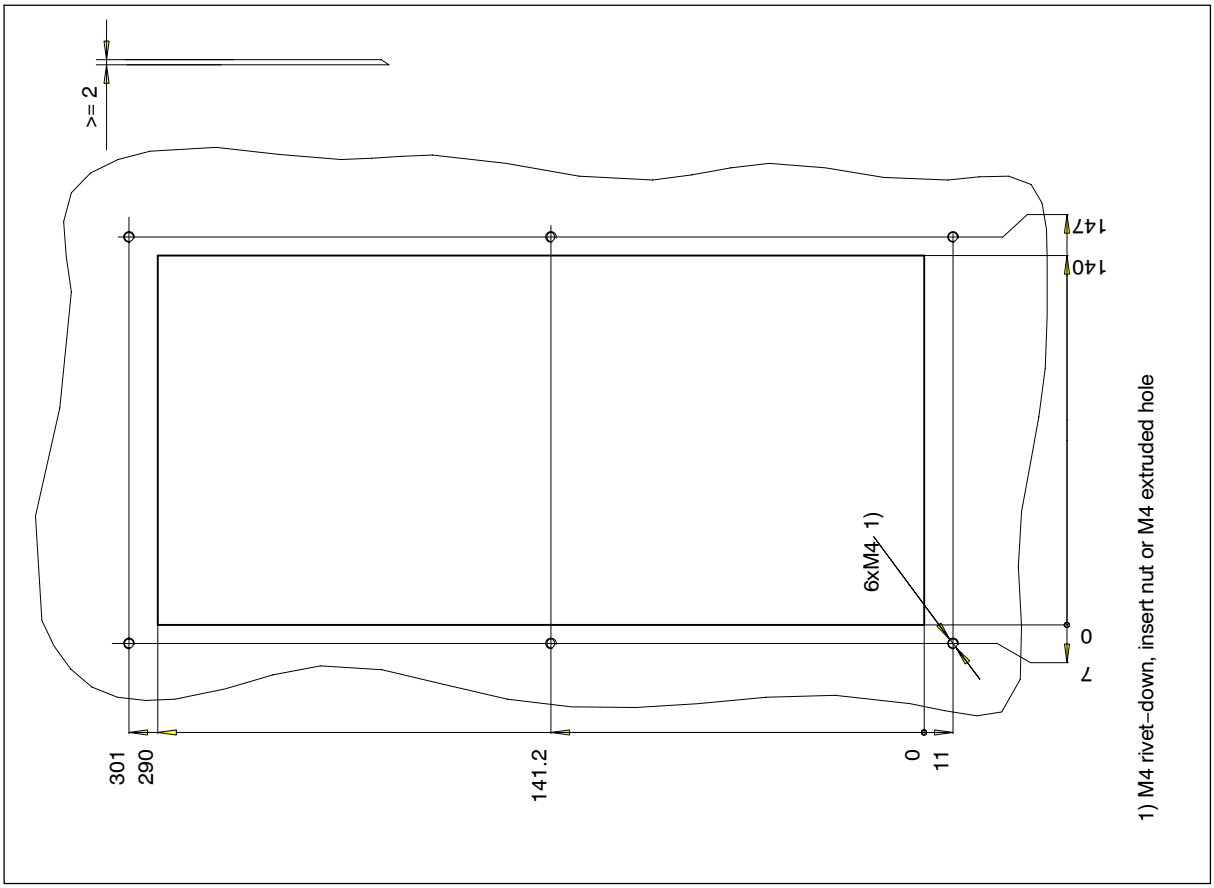


Fig. 2-4 Drilling pattern for the machine control panel (MCP)

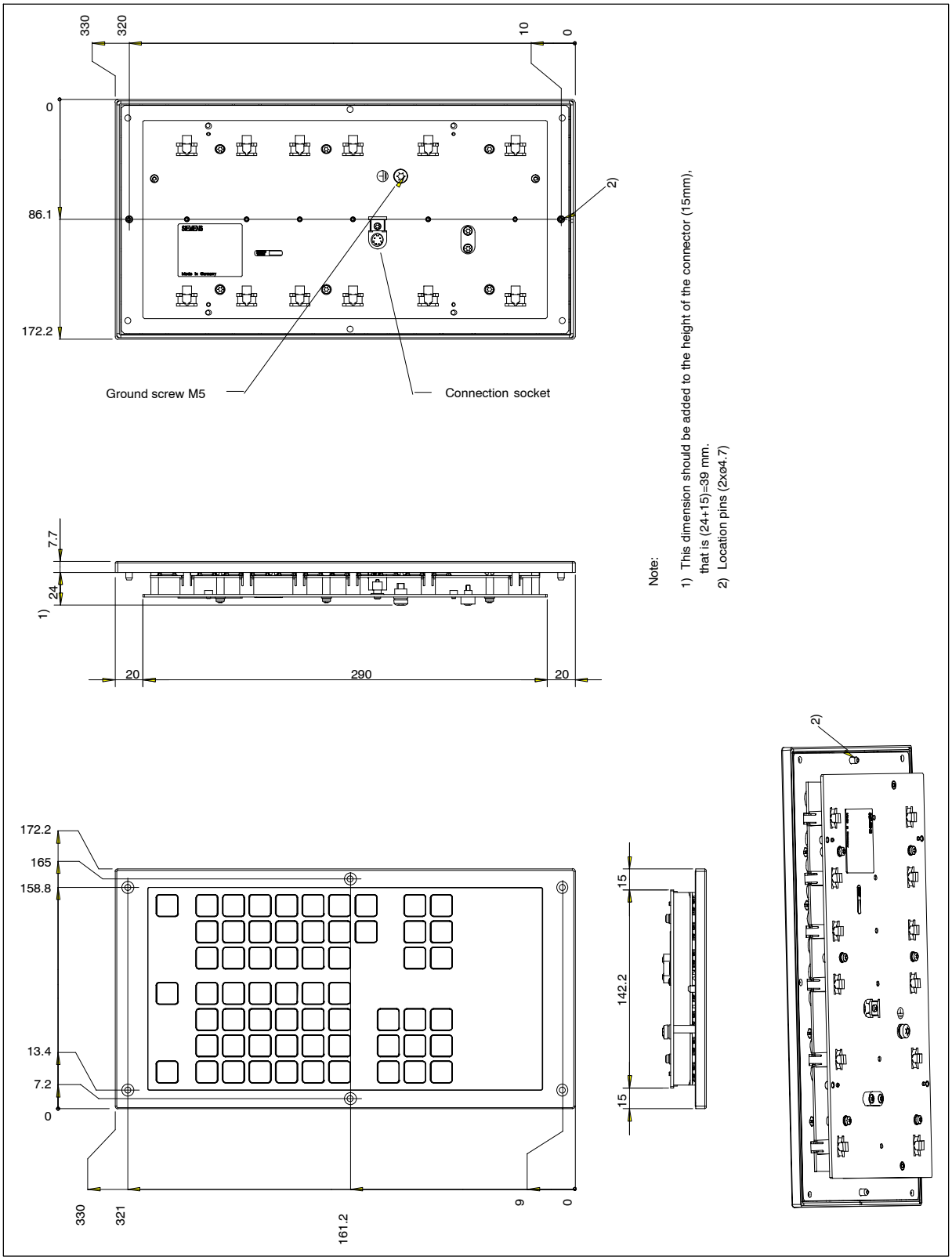


Fig. 2-5 Mounting dimensions for the keyboard (vertical layout for installation alongside the PCU)

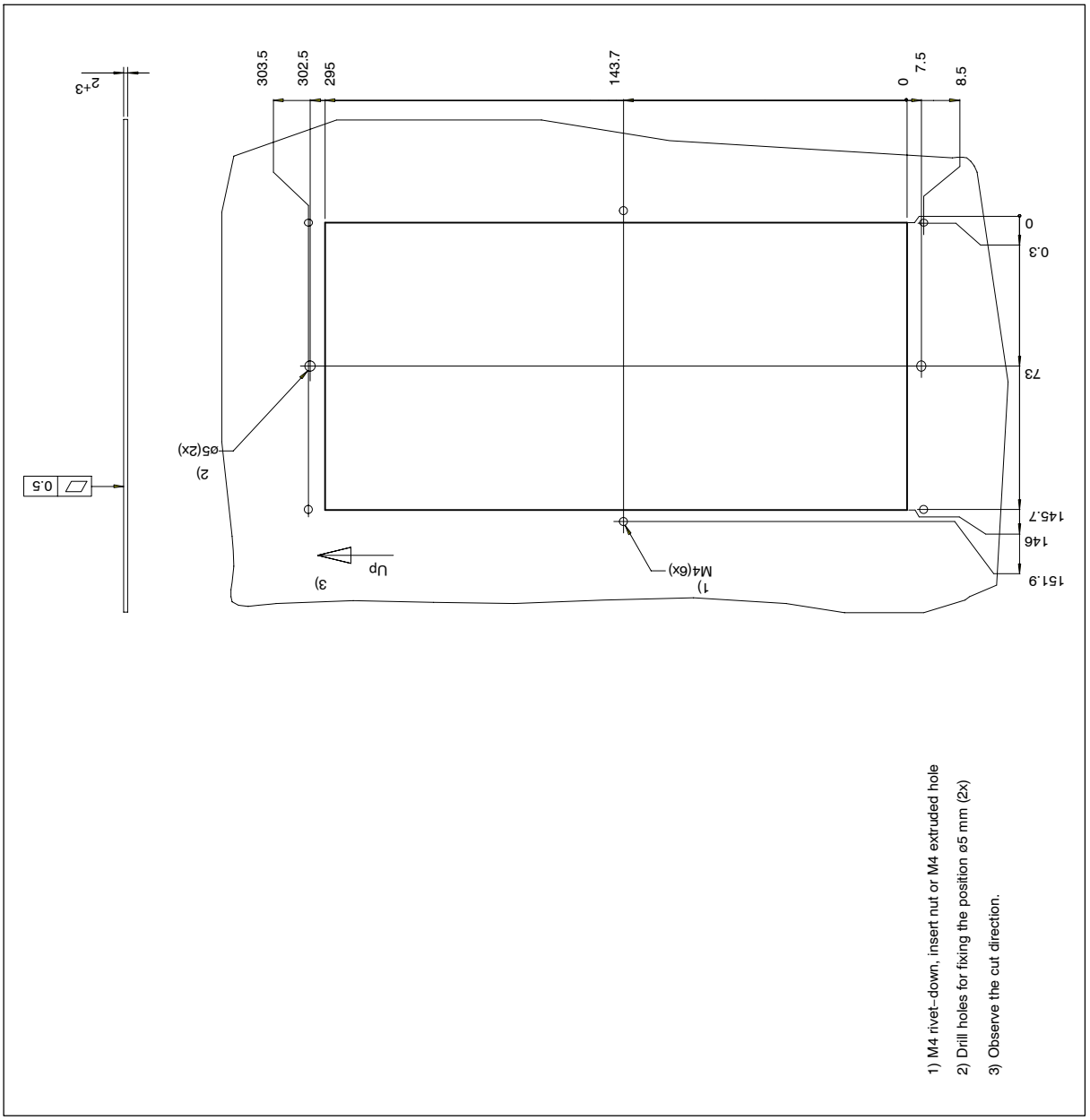


Fig. 2-6 Drilling pattern for the keyboard (vertical layout for installation alongside the PCU)

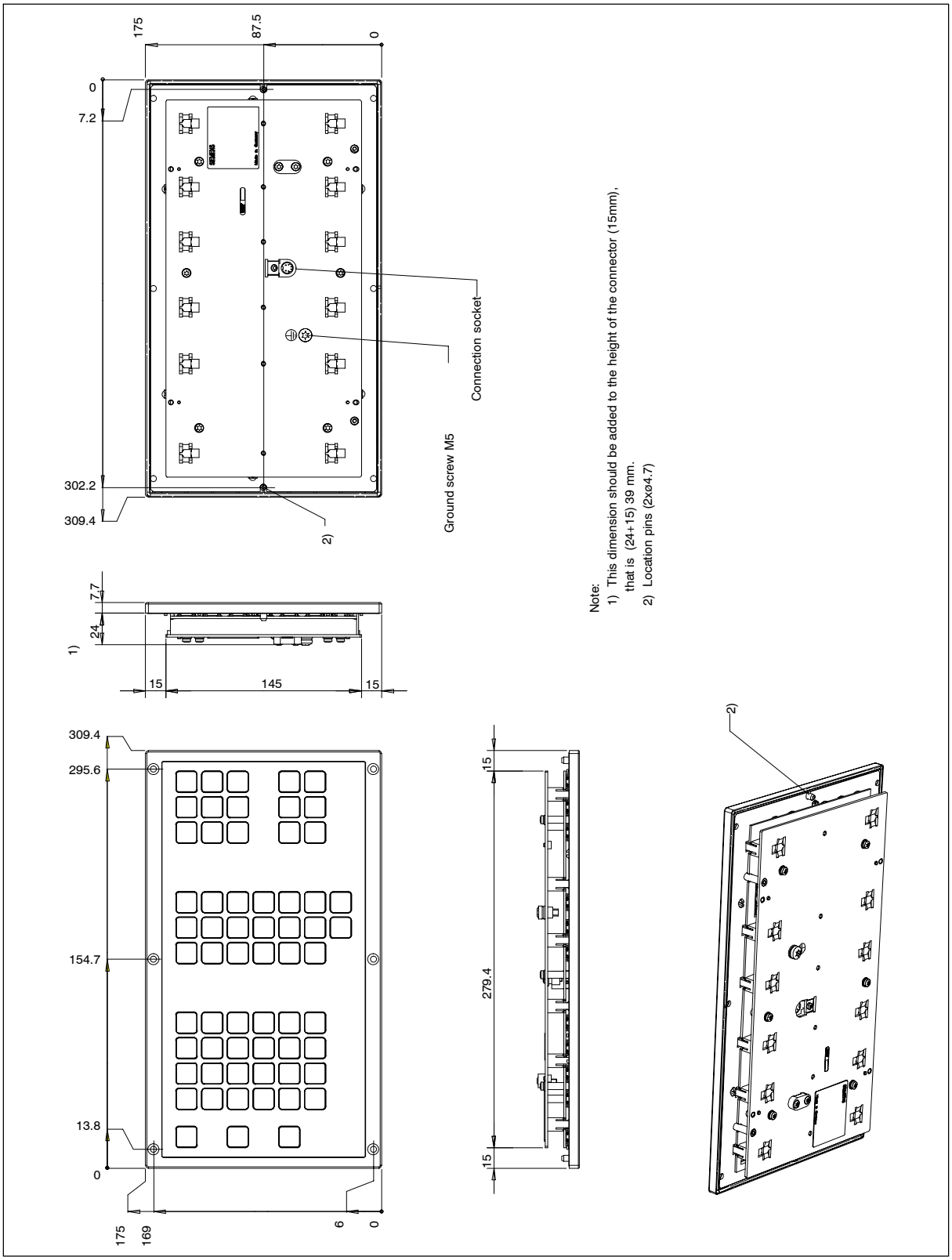


Fig. 2-7 Mounting dimensions for the keyboard (horizontal layout for installation beneath the PCU)

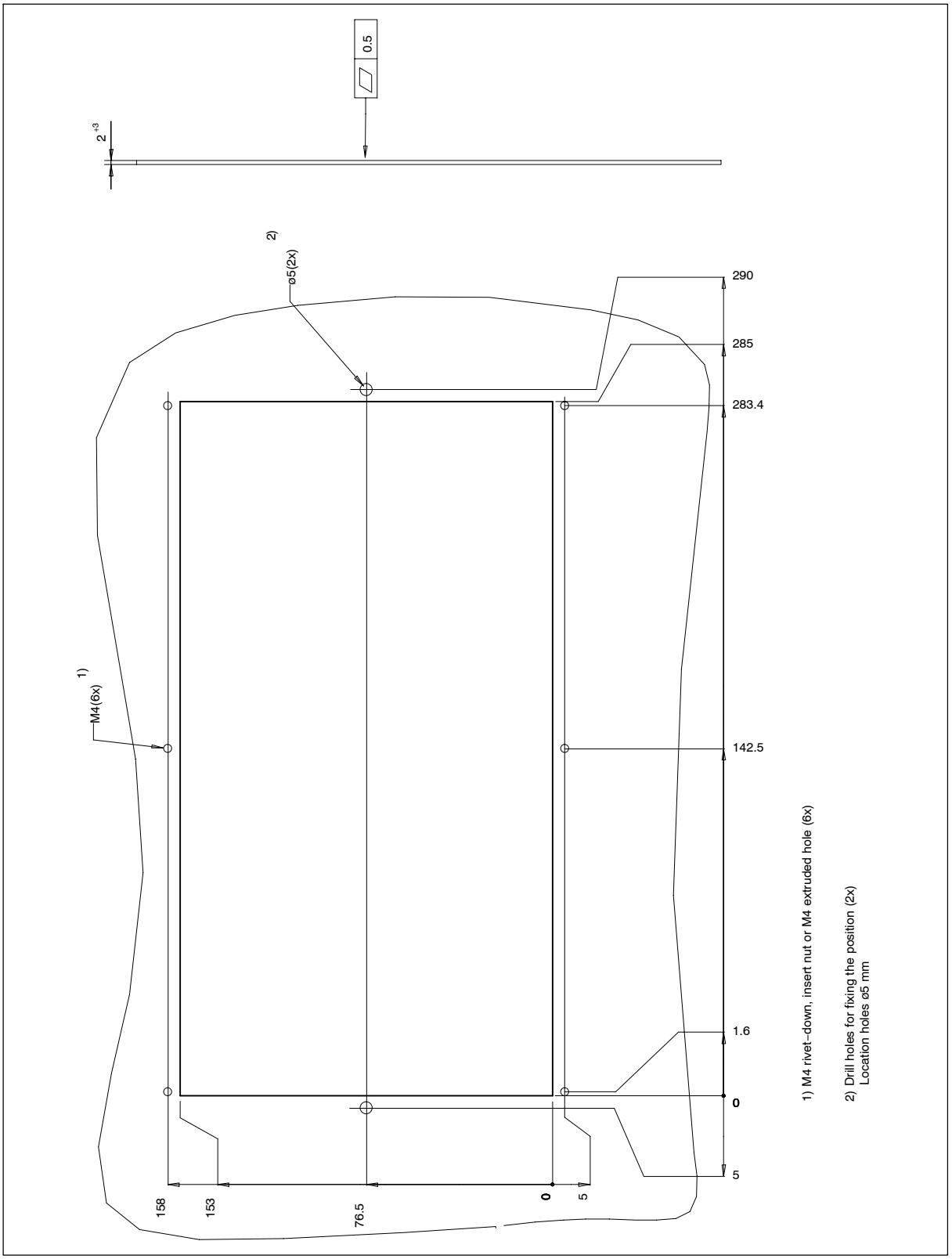


Fig. 2-8 Drilling pattern for the keyboard (horizontal layout for installation beneath the PCU)

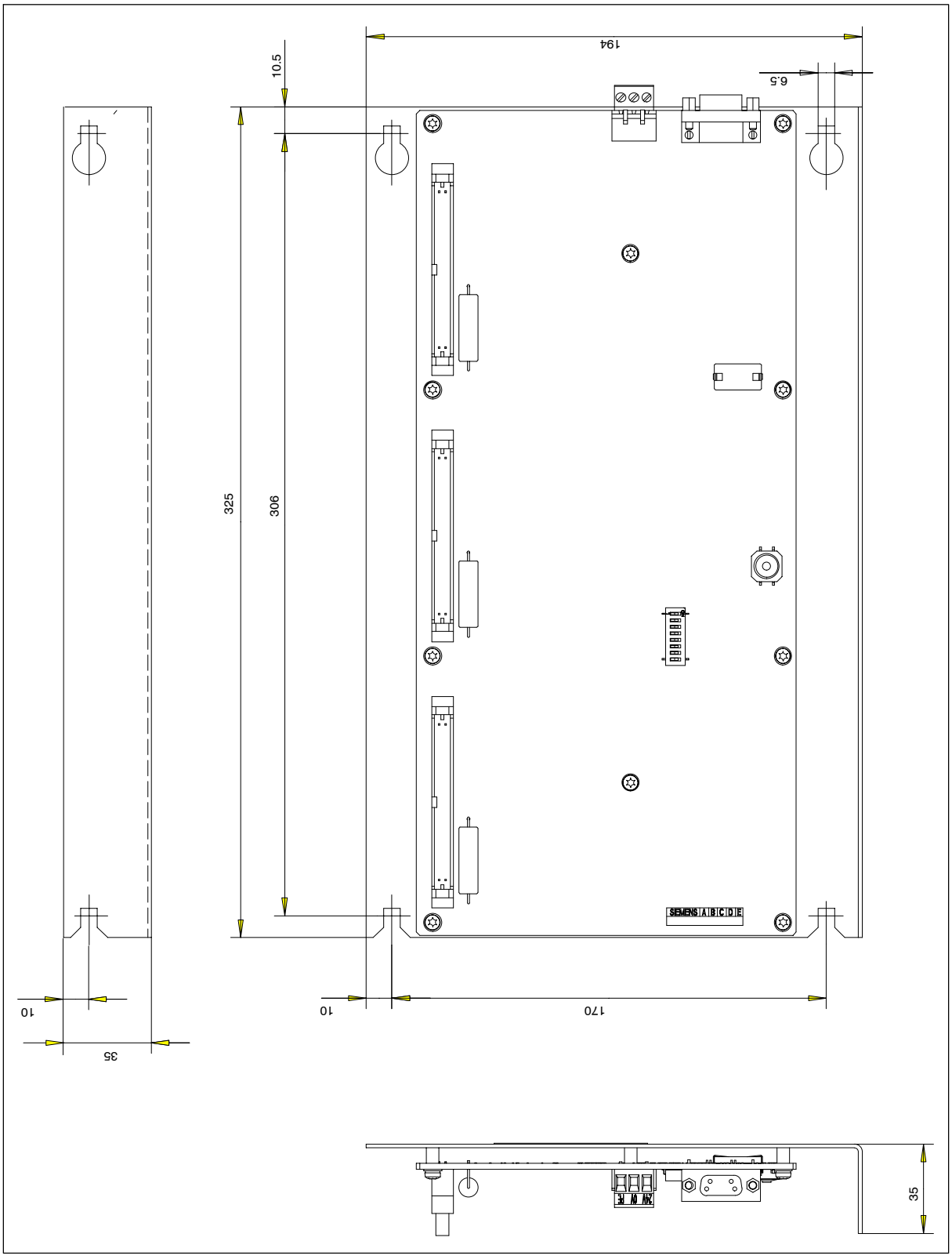


Fig. 2-9 Mounting dimensions for the PP 72/48

2.2 Interfaces and lines

Position of the interfaces, operator controls and displays on the PCU

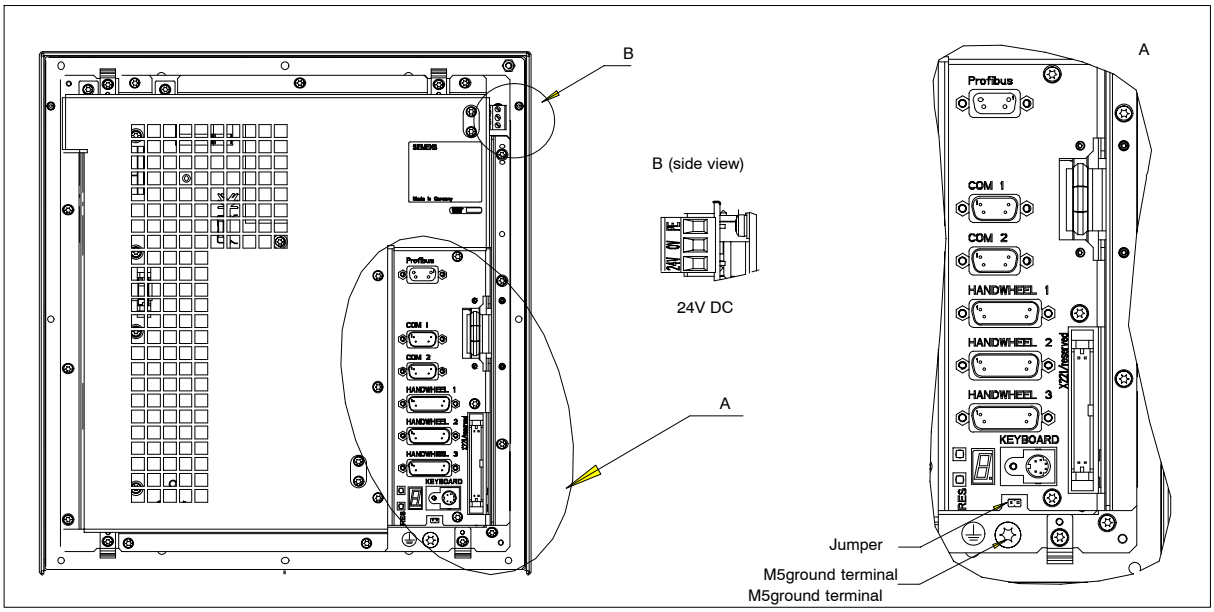


Fig. 2-10 User interface on the PCU

- **24V DC Power supply connection (X8)**

  3−pin screw terminal connection for connecting the 24 V load power supply
- **Profibus (X4)**

  9−pin D-Sub socket connector for connecting Profibus
- **COM1 RS232 interface (X6)**

  9−pin D-Sub connector
  The COM2 port does not have any function.
- **Handweels 1 to 3 (X14/X15/X16)**

  15−pin D-Sub connector for connecting the handwheels
- **Keyboard Keyboard connection (X10)**

  6−pin mini−DIN
- **Reset button**
- **Jumper X311**
- **4 LED**s for error and status displays (behind the front hatch)

Interface on the keyboard

- **Keyboard connection**

  6−pin mini−DIN

Position of the interfaces, displays and operator controls on the PP 72/48

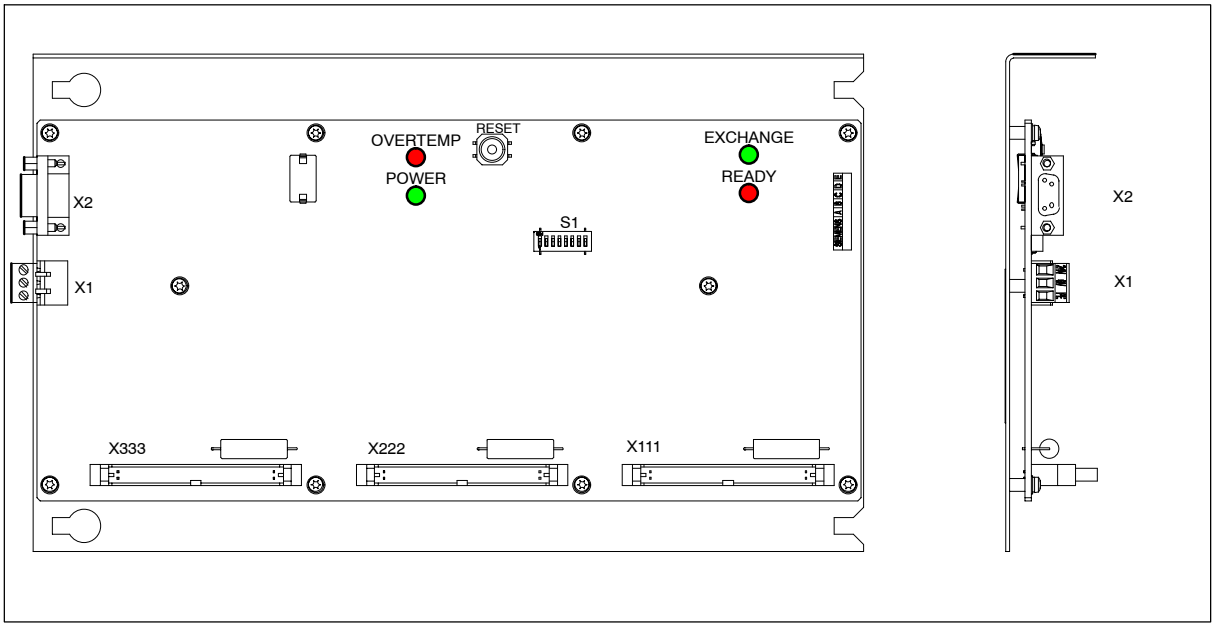


Fig. 2-11 User interfaces on the PP 72/48

- **X1 Power supply connection (24 V DC)**

  3−pin screw terminal connection for connecting the 24 V load power supply
- **X2 Profibus**

  9−pin D-Sub socket connector for connecting Profibus
- **X111, X222** and **X333**

  50−pin ribbon−cable connector for connecting the digital inputs/outputs
- **4 LED**s on the PP 72/48 for status displays
- **S1** DIL switches for setting the PROFIBUS address (see Section 3.6)

Interfaces on the MCP

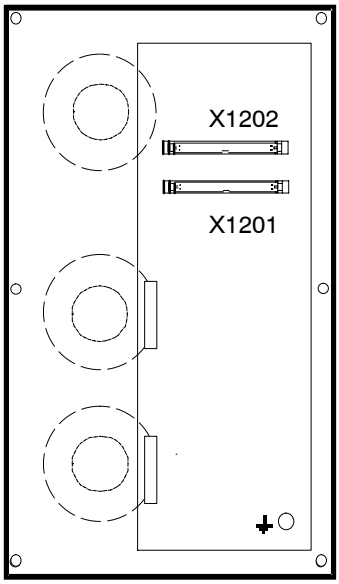


Fig. 2-12 User interfaces on the MCP

- **X1201** and **X1202**

  50−pin ribbon−cable connector for connection to PP 72/48

Interconnecting cables

The individual components are connected as shown in the Connection Diagram in Fig. 2-13. For the cable designations and connector types, please refer to the SINUMERIK 802D Catalog.

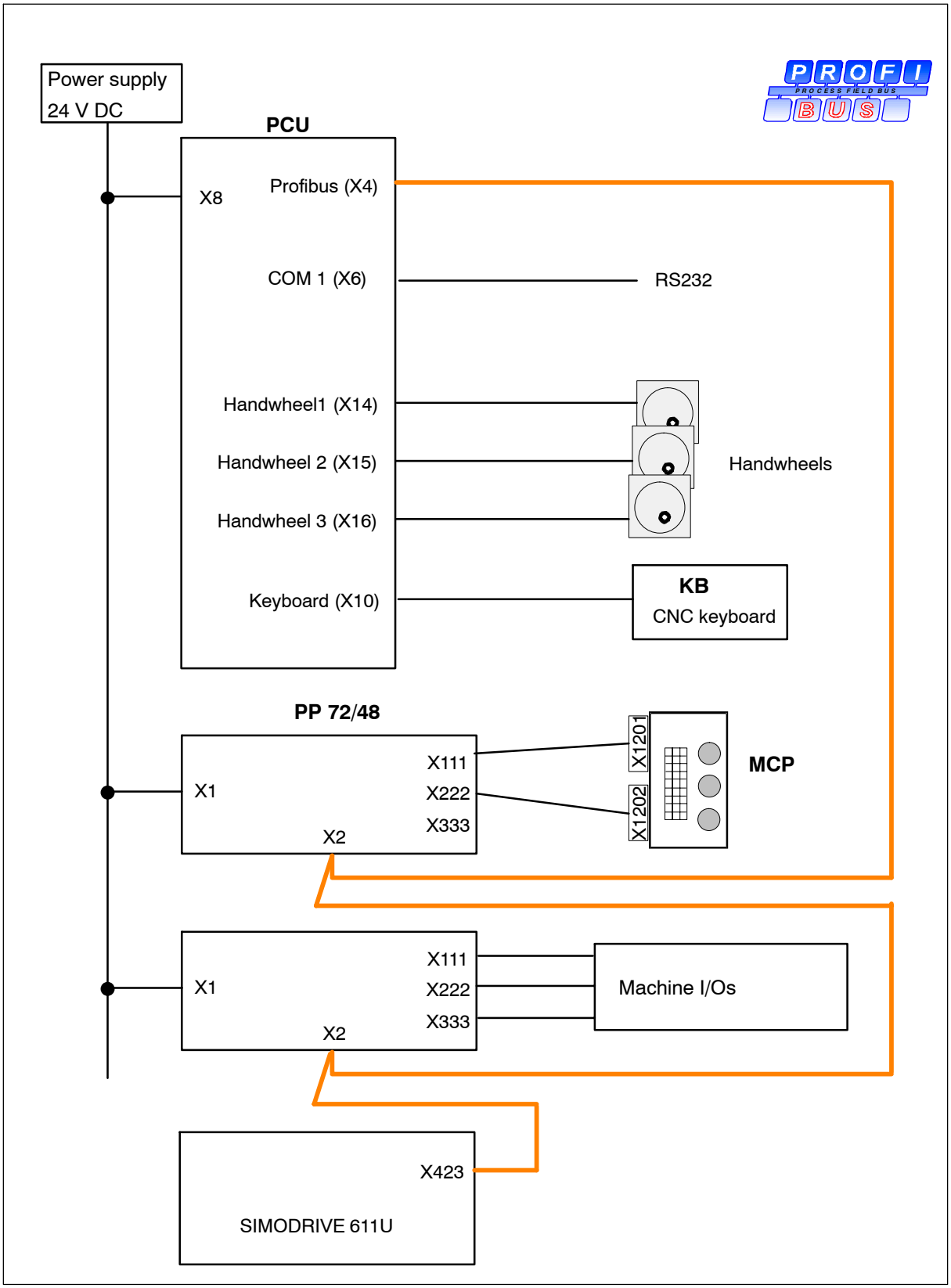


Fig. 2-13 Connection Diagram of the SINUMERIK 802D

2.3 Connecting the individual components

Note

Always use shielded lines only; make sure that the shield is connected to the metallic or metalized connector housing on the side of the control system.

1. Connect the lines to the components as shown in Fig. 2-13.
2. Lock the D-Sub connector using the fastening screws and install the strain reliefs.

The cable sets offered as accessories provide maximum interference immunity.

2.3.1 Connecting the keyboard

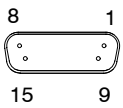
To connect the keyboard to the PCU, use the supplied cable. Insert the angular connector into the keyboard.

2.3.2 Connecting handwheels to the PCU

Connector designation:	**HANDWHEEL1 (X14)** **HANDWHEEL2 (X15)** **HANDWHEEL3 (X16)**
Connector type:	15−pin D−Sub socket connector
Max. cable length	3 m

Table 2-1 Pin assignment of the socket connectors X14, X15, X16

X14, X15, X16					
Pin	Signal	typ.	Pin	Signal	typ.
1	1P5	V	9	1P5	V
2	1 M	V	10	N.C.	
3	A		11	1 M	V
4	$\overline{A}$		12	N.C.	
5	N.C.		13	N.C.	
6	B		14	N.C.	
7	$\overline{B}$		15	N.C.	
8	N.C.				



Signal names

A	A pulse
$\overline{A}$	Inverted A pulse
B	B pulse
$\overline{B}$	Inverted B pulse
1P5	5V power supply
1M	Ground

Signal type

V Voltage output

Handwheels

Three electronic handwheels can be connected; these must meet the following requirements:

Transmission technique: 5 V square wave signals (TTL level or RS422)

Signals: Track A as true and negated signal (U_{a1}, $\overline{U_{a1}}$)
Track B as true and negated signal (U_{a2}, $\overline{U_{a2}}$)

Max. output frequency: 500 kHz

Phase shift
of the A tracks to B: 90° ±30°

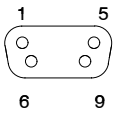
Power supply: 5 V, max. 250 mA

2.3.3 Terminal configuration of the RS232 interface (COM1) on the PCU

RS232 interface COM1

Connector designation: **COM1 (X6)**
Connector type: 9−pin D−Sub plug connector
Max. cable length 15 m

Table 2-2 Pin assignment of the COM1 socket connector (X6)

COM1 (X6)						
Pin	Name	typ.	Pin	Name	typ.	
1	DCD	I	6	DSR	I	
2	RXD	I	7	RTS	O	
3	TXD	O	8	CTS	I	
4	DTR	O	9	RI	I	
5	1 M	V				

Signal description:

DCD Data Carrier Detect
RxD Receive Data V24
TxD Transmit Data V24
RTS Request To Send
CTS Clear To Send
DTR Data Terminal Ready
DSR Data Send Ready
RI Ring Indicator
1M Signal Ground

Signal type

I	Input
O	Output
V	Voltage output

Cable assignment for the RS232 interface

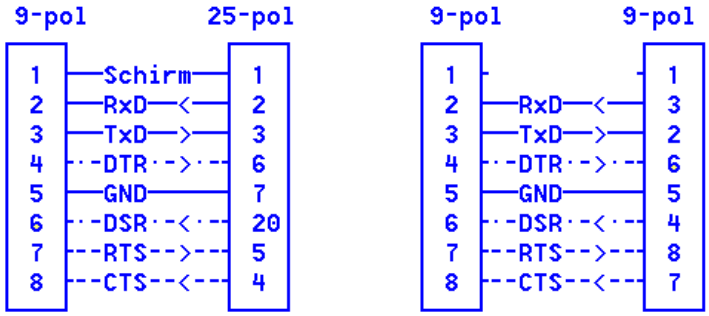


Fig. 2-14 Cable assignment: Pin assignment of the D–Sub female connectors

2.3.4 Connecting the I/Os to PP 72/48

To connect the **machine control panel** to the PP 72/48 (X111, X222), use ribbon cable (see Fig. 2-13).
Max. cable length: 15 m

Pin assignment of the connectors on the PP 72/48 side

Connector designation: **X111, X222, X333**
Connector type: 50–pin plug connector

Table 2-3 Pin assignment of the connectors X111, X222, X333

Pin	Signal	Type	Pin	Signal	Type
1	M	GND	2	+24 V	Output (output for I m+0.0 ... I m+2.7)
3	I m+0.0	Input	4	I m+0.1	Input
5	I m+0.2	Input	6	I m+0.3	Input
7	I m+0.4	Input	8	I m+0.5	Input
9	I m+0.6	Input	10	I m+0.7	Input
11	I m+1.0	Input	12	I m+1.1	Input
13	I m+1.2	Input	14	I m+1.3	Input
15	I m+1.4	Input	16	I m+1.5	Input
17	I m+1.6	Input	18	I m+1.7	Input
19	I m+2.0	Input	20	I m+2.1	Input
21	I m+2.2	Input	22	I m+2.3	Input
23	I m+2.4	Input	24	I m+2.5	Input

Table 2-3 Pin assignment of the connectors X111, X222, X333, cont'd

Pin	Signal	Type	Pin	Signal	Type
25	I m+2.6	Input	26	I m+2.7	Input
27		not connected	28		not connected
29		not connected	30		not connected
31	O n+0.0	Output	32	O n+0.1	Output
33	O n+0.2	Output	34	O n+0.3	Output
35	O n+0.4	Output	36	O n+0.5	Output
37	O n+0.6	Output	38	O n+0.7	Output
39	O n+1.0	Output	40	O n+1.1	Output
41	O n+1.2	Output	42	O n+1.3	Output
43	O n+1.4	Output	44	O n+1.5	Output
45	O n+1.6	Output	46	O n+1.7	Output
47	DO-COM1	VCC (input for O n+0.0 ... O n+1.7 supply)	48	DO-COM1	VCC (input for O n+0.0 ... O n+1.7 supply)
49	DO-COM1	VCC (input for O n+0.0 ... O n+1.7 supply)	50	DO-COM1	VCC (input for O n+0.0 ... O n+1.7 supply)

Danger

The 24V power supply for digital outputs (DOCOM1) must be designed as a functional extra−low voltage with safe isolation to EN 60204-1.

Note

The 24V voltage for the digital outputs must be connected to all 4 pins 47, 48, 49, 50. Make sure that the interconnecting cable between the power supply and the supply voltage inputs pins 47 - 50 does not exceed a permissible length of max. 10 m.

The connectors X111, X222 and X333 have the same assignment, but the I/O areas are offset by 3 bytes (inputs) or 2 bytes (outputs) (cf. Table 2-4).

Table 2-4

	PP 72/48 1 Profibus address 9			**PP 72/48 2 Profibus address 8**		
	X111	**X222**	**X333**	**X111**	**X222**	**X333**
IB	0	3	6	9	12	15
Input Byte	1	4	7	10	13	16
	2	5	8	11	14	17
OB	0	2	4	6	8	10
Output Byte	1	3	5	7	9	11
M	0	3	6	9	12	15
n	0	2	4	6	8	10

2.3.5 Connecting the ADI4 module

For the relevant data for connecting the ADI4 module, please refer to the documentation ”ADI4 – Analog Drive Interface for 4 Axes”, Product Manual.

For the configuration, please observe the specifications on the Toolbox.

Note

Make sure that your ADI4 module has firmware release 01.02.02.

2.4 Connecting the SIMODRIVE 611U drive unit

For the relevant information regarding the configuration of the interfaces and for connecting the components of the drive unit, please refer to the Documentation ”SIMODRIVE 611UE”.

2.5 Connecting the Profibus

All stations are connected to each other via Profibus. Master is the PCU, and slaves are the SIMODRIVE 611 UE and the PP 72/48.

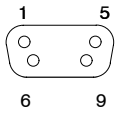
The baud rate of the clock−synchronous Profibus is fixed to 12 Mbaud and cannot be changed. Converters for optical fiber cable (OLMs, OLPs) or repeaters are not permitted.

Profibusinterface

Socket type: 9−pin D−Sub socket connector
Max. cable length: 100 m at 12 Mbaud

Table 2-5 Female connector pin assignment

Pin	Signal	Meaning	Pin	Signal	Meaning
1	Shield		6	VP	Supply voltage for the terminators − P, (P5V)
2	Reserved		7	Reserved	
3	RxD/TxD−P	Receive/send data − plus, B line (red)	8	RxD/TxD−N	Receive/send data − minus, A line (green)
4	CNTR−P	Control signal for the repeater (direction control)	9	CNTR−N	Repeater control signal (direction control)
5	DGND	Data transfer potential (ground to 5V)			



Note

Use the recommended Profibus connectors only. They are designed such that the ongoing P branch is disconnected when the terminator is connected.

The PB master = PCU should be connected at the start of the PB line.

Make sure that the terminating resistors are only connected at the first and at the last stations.

Line A green Line B red

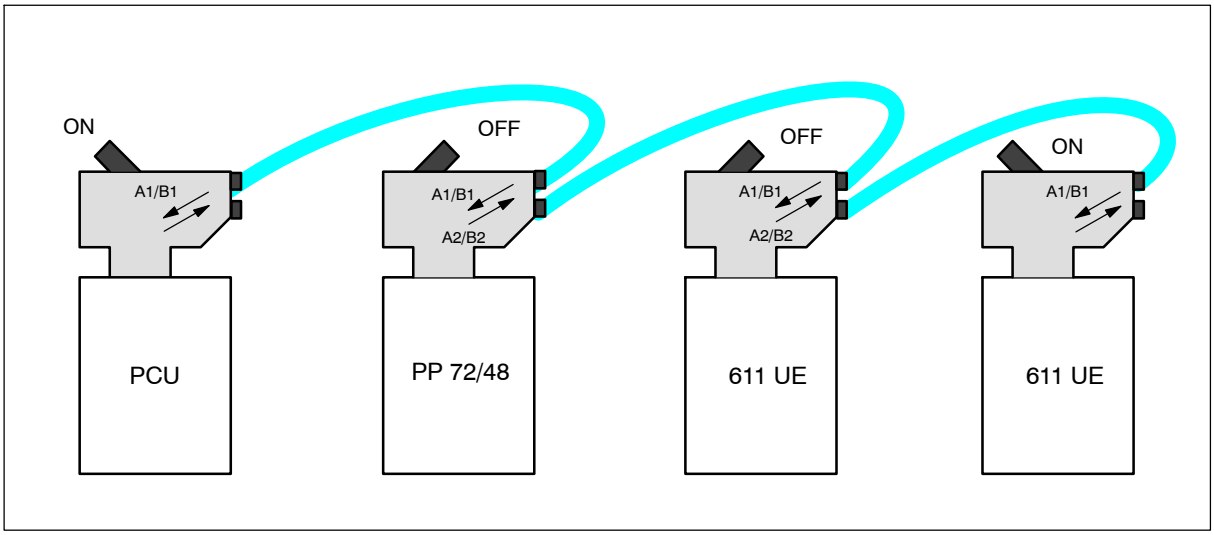


Fig. 2-15 General design of a Profibus line

2.6 Grounding

Ground connections

The following ground connections must be provided:

- PCU
- Machine control panel (MCP)
- Keyboard (KB)

When establishing the ground connections for PCU, MCP and KB, connect the grounding points to the grounding rail (Fig. 2-16).

Grounding the PP 72/48

Install the PP 72/48 in accordance with EN 60204. If a large−area, permanent metallic connection to the central grounding point is not possible via the backplane, connect the mounting plate to the grounding rail using a line >10 mm^2.

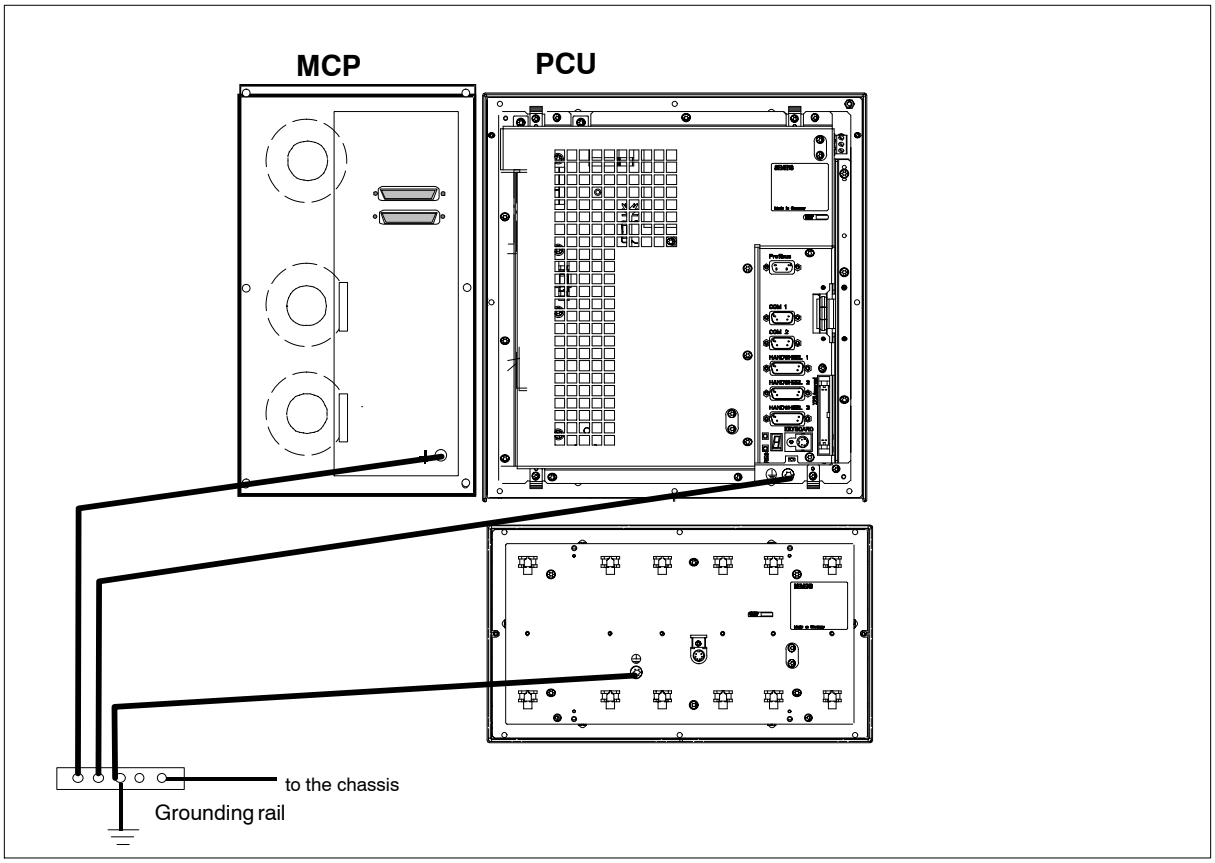


Fig. 2-16 Grounding diagram for installing PCU and MCP

2.7 Power supply of PCU (X8) and PP 72/48 (X1)

Screw−terminal block

Connect the 24 V DC load power supply required for the power supply to the screw terminal block X8 or X1.

Features of the load power distribution

Danger

The 24 V DC must be generated as a functional extra−low voltage with safe electrical isolation (to IEC 204-1, Section 6.4, PELV) and be grounded by the user (make a connection from the PELV signal M to the central grounding point of the system).

Table 2-6 Electrical parameters of the load power supply

Parameter	min.	max.	Unit	Conditions
Voltage range mean value	20.4	28.8	V	
Ripple		3.6	Vss	
Non−periodic overvoltage		35	V	Duration: 500 ms 50 s recovery time
Rated current consumption		1	A	
Starting current		2.6	A	

Table 2-7 Pin assignment of the screw terminal block X8/X1

Terminal	Signal	Description
1	P24	24 V DC
2	M	Ground (GND)
3	PE	

Note

Make sure that the interconnecting cable between the power supply and the supply voltage connection (screw−terminal block X1) does not exceed a permissible length of max. 10 m.

2.8 Displays on the PCU

Fours LEDs are installed on the front side of the PCU.

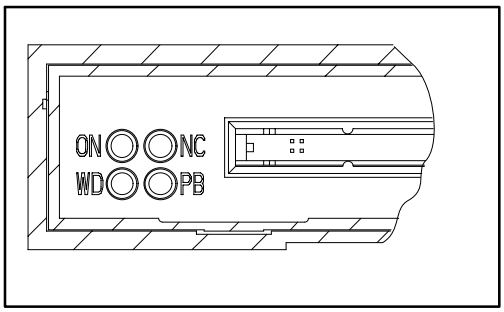


Fig. 2-17 Displays on the PCU alongside the PC card slot

ON (green)	Power On
NC (yellow)	Sign−of−life of the NC (flashing)
WD (red)	Process monitoring
PB (yellow)	Profibus

2.9 Displays on the PP 72/48

The status display is realized via 4 LEDs.

POWER (green)	Power On
READY (red)	PP 72/48 is ready; no cyclic data exchange
EXCHANGE (green)	PP 72/48 is ready; cyclic data exchange is performed
OVTEMP (red)	Overtemperature display

This sheet has been left empty for your notes.

Commissioning

3

3.1 General

Start–up prerequisites

- You will need the following:
  - SINUMERIK 802D User Documentation
  - SINUMERIK 802D Description of Functions
  - A PC for commissioning and data backup
  - Tools installed from the Toolbox CD:
    WinPCIN
    PLC802 Programming Tool
    SimoCom U
    Text Manager (is installed using the ”802D Toolbox” menu item)
- The mechanical and electrical installation of the system must be completed.
- Starting up the SIMODRIVE 611 UE drive (with the Profibus option module inserted)

Start–up sequence

To commission the SINUMERIK 802D, proceed as follows:

1. Check that the PCU boots.
2. Set the language.
3. Set the required technology.
4. Set the general machine data.
5. Start up the PLC.
6. Set the axis/spindle–specific machine data.
   - Match the encoder to the axis / spindle.
   - Match the setpoint to the axis / spindle.
7. Perform a dry run for the axes and for the spindle.
8. Optimize the drive.
9. Complete the commissioning; perform a data backup.

3.1.1 Access levels

Protection levels

The SINUMERIK 802D provides a concept of protection levels for enabling data areas. There are the protection levels 0 to 7 whereby **0** is the highest and **7** the lowest level.

The protection levels can be set for certain function areas (e.g. program editor) using the display machine data (USER_CLASS...).

When the control system is delivered, certain default passwords are already set for the protection levels 1 to 3. If necessary, the appropriate authorized person can change these passwords.

Table 3-1 Protection level concept

Protection level	Locked by	Area
0		Siemens, reserved
1	Password: SUNRISE (default)	Expert mode
2	Password: EVENING (default)	Machine manufacturer
3	Password: CUSTOMER (default)	Authorized operator, setter
4 to 7	No password and user interface from PLC →NCK	Authorized operator, setter or appropriate graduations as desired

Protection levels 1 ... 3

The protection levels 1 to 3 require a password. The passwords can be changed after activation. For example, if the passwords are no longer known, the control system must be reinitialized (booting with default machine data). This will reset all passwords to their defaults according to the software release you have acquired.

The password remains set until it is reset by selecting the **Delete password** softkey. **POWER ON** will **not** reset the password.

Protection levels 4 ... 7

Protection level 7 is set automatically if no password is set and no protection level interface signal is set. The protection levels 4 to 7 can be set from the PLC user program even without a password by setting the bits in the user interface.

Note for the reader

How to set the access levels is described in the User Manual: ”Operation and Programming”.

3.1.2 Structure of machine data (MD) and setting data (SD)

Number and identifier

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

Activation

The activation stages are listed according to their priority. If any data is changed, it comes into effect after:

- POWER ON (po) Turning off / turning on the SINUMERIK 802D
- NEW_CONF (cf)
  With **RESET** at the PLC interface (V3000 0000.7)
- RESET (re) With **RESET** at the PLC interface (V3000 0000.7) or at the end of the program M2/M30
- IMMEDIATELY (im) After input of the value

Protection level

For start−up or machine data input, usually, protection level 2 is required.

Unit/system of units

Depending on MD 10240 SCALING_SYSTEM_IS_METRIC, the physical units of the machine data (MD) differ as follows:

MD 10240 = 1	MD 10240 = 0
mm	inch
mm/min	inch/min
m/s^2	$inch/s^2$
m/s^3	$inch/s^3$
mm/rev.	inch/rev.

If there are machine data with no physical unit assigned, the relevant field remains empty.

Note
The default setting is MD 10240 SCALING_SYSTEM IS METRIC = 1 (metric).

3.2 Turning on and booting the control system

Procedure

- Check the system visually for:
  - correct mechanical design and check that all electrical connections are performed correctly.
  - connected voltages
  - connection of shielding and grounding.
- Connect the control system (booting in the normal mode)

Booting the control system in the normal mode

When the control system is turned on, the boot sequence is displayed on the control system with all its individual phases. Once the start screen of the user interface has appeared, the booting sequence is completed.

Booting the control system in the start−up mode

After Power ON and prompting via an appropriate message on the screen, press the **SELECT** key.

Once the DRAM test is completed, the **START UP MENU** appears on the display. Use the cursor to select an appropriate power−up/start−up mode and press **INPUT** to confirm.

The modes specified in the START−UP MENU have the following meanings:

- **normal mode**

  If this option is chosen, the control system will boot with the last machine data setand the previously loaded programs.

- **default data** (is only displayed if protection level 1 or 2 is set)

  If this option is chosen, the control system will boot with default machine data.

- **software update**

  In this case, the control system will not boot at all. The software can only be updated if an NC card with a software update is provided.

- **reload saved user data**

  If this option is chosen, the user data (machine data, programs, etc.) backed up to the flash memory of the control system are accepted as the current data and used for power−up.

- **PLC stop**

  Select PLC Stop while the control system is booting if PLC Stop can not be triggered via the user interface any more.

3.3 Language setting

English is set for both the foreground and background languages. You can change the languages by loading new language files from the toolbox using the Text Manager.

The functions provided by the Text Manager are described in its help file.

Sequence

- Establish a V24 connection between the PC and the PCU (COM1).
- Turn on the control system and wait until the control system has completed its booting sequence without errors.
- In the ”System” operating area, set the password for protection level 2.
- Preselect the > **BIN format** from the ”RS232 settings” operating area.
- In the ”System” operating area, **Data I/O > menu item,** position the cursor on the line ”Start−up data PC”.
- Select the **Read in** softkey.
- Start the Text Manager on your PC.
- Use the Text Manager to select the relevant language file for your foreground or background language and transfer it to the control system.
- Restart the NC.
- The desired language is now set.

Note

Make sure that the settings for the interface parameters of the PCU and of the PC are the same.

3.4 Setting the technology

Note

The SINUMERIK 802D is delivered with default machine data. Load the relevant setup file from the toolbox into the control system, depending on the technology turning or milling.

The following setup files are offered to choose from:

- setup_T.cnf Turning machine with complete cycle package
- setup_M.cnf Milling machine with complete cycle pack
- setTra_T.cnf Turning machine with complete cycle package and the functions Transmit, Tracyl, Spindle1, C axis and 2nd spindle technology 'turning'
- trafo_T.ini Machine data with the functions Transmit, Tracyl, Spindle1, C axis and 2nd spindle technology 'turning'
- trafo_M.ini Machine data for the Tracyl function – "Milling" technology
- adi4.ini Machine data for setting up the analog setpoint output via ADI4

The setup file must be loaded during the commissioning after booting of the control system, but prior to the general configuration.

Note

The SINUMERIK 802D base line is supplied with default machine data. To set the turning technology, load the following setup file from the toolbox into the control system:

- setup_T.cnf Turning machine with complete cycle package

If you wish to use the analog setpoint output in conjunction with the I/O module ADI4, reload the following ini file:

- adi4.ini Machine data for setting up the analog setpoint output via ADI4

The setup file must be loaded during the commissioning after booting of the control system, but prior to the general configuration.

Note

Please always observe the readme file supplied with the "Toolbox". It provides up–to–date information.

Sequence

- Establish an RS232 connection between the PC and the PCU (COM1).
- Turn on the control system and wait until the control system has completed its booting sequence without errors.
- In the "System" operating area, set the password for protection level 2.
- Set the binary format.

- In the ”System” operating area, \ **Data I/O** \ **menu item,** position the cursor on the line ”Start−up data PC”.
- Select the **Read in** softkey.
- Start your PC with WINPCIN.
- Select the **Binary format** softkey, press **RS232 config** and set, save and activate the relevant COM interface of your PC/PG (**Save&activate** softkey, **Back** softkey).
- Select the **Send data** softkey.
- Select the setup file (from the toolbox) for turning or milling in the Siemens or ISO mode (see Readme file in the Toolbox) and transfer it from your PC to the control system via WINPCIN.
- The control system boots automatically during the transmission several times.
- The SINUMERIK 802D is now preset to the required technology.

3.5 Entering the machine data

Overview

The most important machine data of the individual subareas are listed here to assist you. For a detailed description of the machine data and interface signals, please refer to the Descriptions of Functions (cf. cross−references in the tables of Chapter 7 ”Machine Data and Setting Data”).

Note

The default values of the machine data have been chosen such that usually no change is required.

Entering the machine data (MD)

Before you can enter the machine data, the password for protection level 2 must be set.

Use the relevant softkey to select the following machine data areas and to change the machine data if necessary:

- General machine data MD 10000 ... 19999
- Channel machine data MD 20000 ... 29999
- Axis machine data MD 30000 ... 39999
- Display machine data MD 1 ... 999
- Drive machine data Parameters 599 ... 1999

The data you have entered are written to the data memory immediately. An exception is the drive machine data. To save the drive machine data permanently, use either the **Save axis** softkey, which can be found in the area of the drive machine data with the drives turned on, or the SimoCom U tool. If you forget to save the data, the old data is effective again after the next drive reset. To refresh the display of the drive machine data on the screen after changing, use the **Refresh** softkey.

The machine data is activated depending on the machine data property ”Activated”, Section 3.1.2.

3.6 Setting the Profibus address

Certain bus configurations have already been prepared for SINUMERIK 802D. The required configuration can be set via MD 11240: PROFIBUS_SDB_NUMBER. In all cases, the configuration constitutes the maximum configuration. It is not necessary to connect all stations.

Table 3-2

MD 11240	PB DP station (slave)	PB address	Drive number
3	PP module 1	9	–
	PP module 2	8	–
	Single–axis power section	10	5
	Single–axis power section	11	6
	Twin–axis power section Drive A Drive B	12	1 2
4	PP module 1	9	–
	PP module 2	8	–
	Single–axis power section	10	5
	Twin–axis power section Drive A Drive B	12	1 2
	Twin–axis power section Drive A Drive B	13	3 4
5	PP module 1	9	–
	PP module 2	8	–
	Single–axis power section	20	1
	Single–axis power section	21	2
	Twin–axis power section Drive A Drive B	13	3 4
	Single–axis power section	10	5
6	PP module 1	9	–
	PP module 2	8	–
	Single–axis power section	20	1
	Single–axis power section	21	2
	Single–axis power section	22	3
	Single–axis power section	10	5
0	PP module 1	9	–
	PP module 2	8	–

Note

The assignment between PB address and drive number is fixed and cannot be changed.

Set now the MD 11240: PROFIBUS_SDB_NUMBER according to your particular bus configuration.

Parameterize the PB addresses of the PB stations (SIMODRIVE 611 UE and PP module) as specified in the table above.

To parameterize the drive, use the SimoCom U Parameterization and Commissioning Tool.

You will need the following documentation: SIMODRIVE 611 UE Description of Functions.

Example 1:

Turning machine with one PP module, one twin−axis power section (X and Z axes) and the spindle as the single−axis power section.

Table 3-3

MD 11240	PB station (slave)	PB address	Drive number
3	PP module 1	9	–
	Single−axis power section	10	5
	Twin−axis power section Drive A Drive B	12	1 2

Example 2:

Milling machine with two PP modules, two single−axis power sections (X, Z axes), one twin−axis power section (Y, C axis) and one spindle as a single−axis power section.

Table 3-4

MD 11240	PB station (slave)	PB address	Drive number
5	PP module 1	9	–
	PP module 2	8	–
	Single−axis power section	20	1
	Single−axis power section	21	2
	Twin−axis power section Drive A Drive B	13	3 4
	Single−axis power section	10	5

Slave 12 from example 1 has been fully replaced by slaves 20 and 21.

PCU

Is master at PROFIBUS; address cannot be changed

PP 72/48

Is slave at PROFIBUS; max. two PP modules can be connected. The addresses are set using DIL switch S1 on the PP module.

PB address	DIL switch S1 (PP module)
9 (default setting) (PP module 1)	1 + 4 = ON 2 + 3 + 5 + 6 + 7 + 8 = OFF
8 (PP module 2)	4 = ON 1 + 2 + 3 + 5 + 6 + 7 + 8 = OFF

Note

The newly set PB station address is only active after POWER ON.

611 UE

Is slave at PROFIBUS; the bus address is only set during commissioning using the Simo-Com U commissioning tool or directly via the display and the operator terminal.

Note for the reader

SIMODRIVE 611U Description of Functions

3.7 Starting up the PLC

After starting up the Profibus, the prepared PLC user program is ready to run and can be used for further start−up. To load the PLC user program, use the Programming Tool.

For a description, please refer to Section 5.

3.8 Starting up the axes/spindle

3.8.1 Setpoint/actual value assignment

The axis machine data MD 30130: CTRLOUT_TYPE can be used to switch the setpoint output, and MD 30240: ENC_TYPE can be used to switch the actual−value input between simulation and PROFIBUS drive.

Table 3-5

Machine data	**Simulation**	**Normal mode**
MD 30130	Value = 0 Simulation	Value = 1 In this case, the setpoint signals are output via Profibus.
MD 30240	Value = 0 Simulation	Value = 1 (INCR) or 4 (EnDat) In this case, the actual values are read in via Profibus.

Note

For simulation, MD 31130 **and** MD 30240 must be parameterized with ”0”.

To enable the relevant NC axis to assign its setpoint to the appropriate PROFIBUS drive, ensuring that the actual values are returned from this PROFIBUS drive, it is imperative to parameterize the machine data MD 30110: CTRLOUT_MODULE_NR and MD 30220: ENC_MODULE_NR.

Note

With 2−axis power sections, both drives (A and B) each must be assigned to one axis. Otherwise, an error message is issued during power−up (drive alarm 832 ”Profibus not clock−synchronized to master), and the entire power section is not ready for operation.

A meaningful default setting for these machine data have already been implemented in the default data record for turning and milling.

The following applies for the default data record for turning:

Axis	**Drive number MD 30110 MD 30220**	**PROFIBUS address**	**Power section**
X1	1	12	Twin−axis: Drive A
Z1	2	12	Twin−axis: Drive B
SP	5	10	Single−axis

The following applies for the default data record for milling:

Axis	Drive number MD 30110 MD 30220	PROFIBUS address	Power section
X1	1	12	Twin−axis: Drive A
Y1	2	12	Twin−axis: Drive B
Z1	3	13	Twin−axis: Drive A
SP	5	10	Single−axis
A1	4	13	Twin−axis: Drive B

If this default setting does not match your machine configuration, the data must be adapted accordingly.

Note

The machine data MD 31110: CTRLOUT_MODULE_NR and MD 30220: ENC_MODULE_NR must be set such that they have the same drive number because there is a fixed assignment between measuring system and motor.

Example:

The machine you want to start up is a milling machine. The milling machine possesses three axes and one spindle. The X1 and the Y1 axes are controlled by a twin−axis power section, the Z1 axis and the spindle by one single−axis power section each.

- The default data record for a milling machine (setup_m) has been loaded.
- The bus configuration has been selected with MD 11240= 3.
- Now, adapt the axis machine data MD 30110: CTRLOUT_MODULE_NR and MD 30220: ENC_MODULE_NR will be adapted as follows (MD 30110 and MD 30240 must only be changed for the Z1 axis).

Axis	Drive number MD 30110 MD 30220	PROFIBUS address	Power section
X1	1	12	Twin−axis: Drive A
Y1	2	12	Twin−axis: Drive B
Z1	**6**	11	Single−axis
SP	5	10	Single−axis

- Set the PB addresses of the drives as specified in the table above (SimoCom U). Due to the fact that the 5th axis (A1) is not used, MD 20070: AXCONF_MACHAX_USED[4]=0 must be parameterized. This will remove the axis from the configuration of the NC.

3.8.2 Default settings for the axis machine data for the feed axes

The following machine data list summarizes all default data or their recommended settings with SIMODRIVE 611 UE PROFIBUS drives connected.611

Once they have been set, the axes are ready to traverse, and only a fine adjustment (reference point approach, software limit switches, position controller optimization, speed feedforward control, lead error compensation,...) must be performed. See: /FB/ SINUMERIK 802D "Description of Functions"

Note

For feed axes, only parameter set 1 = index [0] is used. Index [1] ... [5] must only be parameterized when using the parameter switching function (see /FB/ Chapter 3), with G331 "Rigid tapping" or for G33 (see /FB/ Chapter 11).

MD	Name	Default value	Unit	Remark
31030	LEADSCREW_PITCH	10	mm	Leadscrew of the ballscrew
				Load gear transmission ratio
31050	DRIVE_AX_RATIO_DENOM	1		Revolutions of the ballscrew
31060	DRIVE_AX_RATIO_NUMERA	1		Motor revolutions
32000	MAX_AX_VELO	10000	mm/min	Maximum axis velocity
32300	MAX_AX_ACCEL	1	m/s^2	Maximum axis acceleration
34200	ENC_REFP_MODE	1		1: Incremental encoder Motor order no: 1Fx6xxx–xxxxx–x**A**xx 0: EnDat encoder Motor order no: 1Fx6xxx–xxxxx–x**E**xx
36200	AX_VELO_LIMIT	11500	mm/min	Threshold value for velocity monitoring; setting rule: MD 36200 = 1.15 x MD 32000

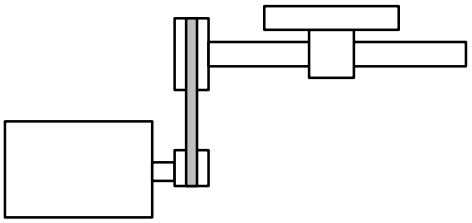
Example:

Motor with incremental encoder

Gear transmission ratio:	1:2
Spindle lead	5 mm
Max. axis velocity	12 m/min
Max. axis acceleration	1.5 m/s^2

Machine data settings:

MD 31030 = 5
MD 31050 = 1
MD 31060 = 2
MD 32000 = 12000
MD 32300 = 1,5
MD 36200 = 13800



The axis can now be traversed. The direction of movement can be reversed using MD 32100: AX_MOTION_DIR = 1 or –1 (without influencing the control direction of the position control).

3.8.3 Connecting a direct measuring system

Prerequisite:

Both rotary and linear measuring systems can be connected to the SINUMERIK 802D. These measuring systems must be signal generators with 1Vss sin/cos track (A, $\overline{A}$, B, $\overline{B}$). You can connect either a measuring system with a zero mark (R, $\overline{R}$) or a measuring system with an EnDat interface. Measuring systems with distance−coded zero marks must not be used!

If a direct measuring system is connected, the 611UE closed−loop control module can only be operated with one axis. The PB address with the appropriate drive number for a single−axis power section must be selected based on Table 3-2. The direct measuring system must be connected to the second encoder interface (X412). switching between the direct measuring system and the motor measuring system via the PLC is not possible.

Realization:

Connect a direct measuring system with Siemens standard cable

- 6FX8002−2CG00−xxxx (incremental encoder)
- 6FX8002−2CH00−xxxx (EnDat encoder)

to the encoder interface X412 of the 611UE closed−loop control module and parameterize the drive for the direct measuring system using SimoCom U.

Special feature:

If a probe is connected when using a direct measuring system, the probe must be connected on the SIMODRIVE 611UE to the −X454 interface, terminal I0.B and parameterized via drive parameter P672 with signal number 80.

672	Funktion Eingangsklemme I0.B	80		sofort

Fig. 3-1 Settings for P672

Parameterization using the Drive Configuration Wizard in case of identical number of increments

The number of increments of the motor encoder is identical to the number of increments of the direct rotary measuring system.

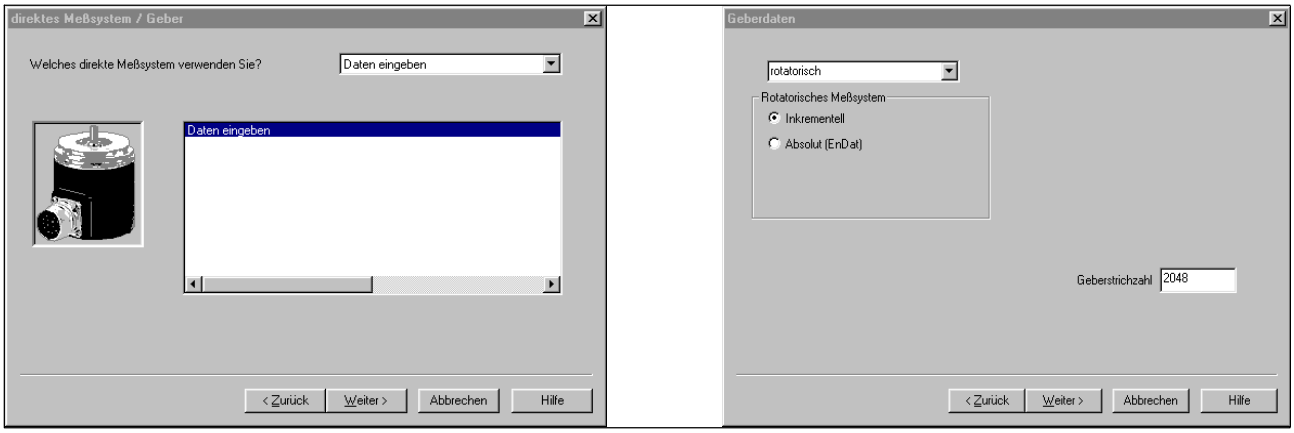


Fig. 3-2 Display

Adaptations in the Expert list

Nummer	Text	Wert	Einheit	**Wirksam**
879	Konfiguration PROFIBUS	1001h	Bits->F4	Power On
879.12	Direktes Meßsystem aktivieren	1		Power On
1036	DM Gebercodenummer	99		Power On
1037	DM Konfiguration Geber	0000h	Bits->F4	Power On
1037.3	Absolutgeber (EnDat-Schnittstelle)	0		Power On
1037.4	Lineares Meßsystem	0		Power On
1030	DM Konfiguration Istwerterfassung	0000h	Bits->F4	Power On
1031	DM Multiturn-Auflösung Absolutwertgeber	0		Power On
1032	DM Singleturn-Auflösung Absolutwertgeber	0		Power On
1033	DM Diagnose	0000h	Bits->F4	nur lesbar
1034	DM Gitterteilung	0	nm	Power On
1038	DM Seriennummer Lowteil	0000h		Power On
1039	DM Seriennummer Highteil	0000h		Power On
1007	DM Geberstrichzahl	2048		Power On

Fig. 3-3 Values to be entered in the Expert list

Change the process data parameterization from encoder 1 to encoder 2.

922	Telegramm-Auswahl PROFIBUS	102		Power On
915:6	PZD-Sollwertzuordnung PROFIBUS	50009		sofort
916:6	PZD-Istwertzuordnung PROFIBUS	50010		sofort
916:7	PZD-Istwertzuordnung PROFIBUS	50011		sofort
916:8	PZD-Istwertzuordnung PROFIBUS	50011		sofort
916:9	PZD-Istwertzuordnung PROFIBUS	50012		sofort
916:10	PZD-Istwertzuordnung PROFIBUS	50012		sofort

Fig. 3-4 Process data of encoder 1

Procedure:

- First, set P922 to zero; thereafter, save and press Reset.
- Change now P915:6, P916:6 ... P916:10.

922	Telegramm-Auswahl PROFIBUS	0		Power On
915:6	PZD-Sollwertzuordnung PROFIBUS	50013		sofort
916:6	PZD-Istwertzuordnung PROFIBUS	50014		sofort
916:7	PZD-Istwertzuordnung PROFIBUS	50015		sofort
916:8	PZD-Istwertzuordnung PROFIBUS	50015		sofort
916:9	PZD-Istwertzuordnung PROFIBUS	50016		sofort
916:10	PZD-Istwertzuordnung PROFIBUS	50016		sofort

Fig. 3-5 Process data of encoder 2

Adapting the machine data in the control system

Table 3-6

Machine Data	Designation	Remark
30240	ENC_TYPE[0]	1 := Incr. encoder 4 := EnDat
31020	ENC_RESOL[0]	Increments for rot. encoder
34200	ENC_REFP_MODE[0]	1 := Incr. encoder 0 := EnDat
31000	ENC_IS_LINEAR[0]	0 := Rot. encoder 1 := Linear scale
31010	ENC_GRID_POINT_DIST[0]	Graduations on linear scale
31040	ENC_IS_DIRECT[0]	0 := Encoder mounted directly on the motor 1 := Encoder mounted on the load
32110	ENC_FEEDBACK_POL[0]	1 := default −1:= Reverse direction of rotation
13070	DRIVE_FUNKTION_MASK[X]	8000 (only applies with SW >2.1) [X] ...drive number −1

Parameterization using the Drive Configuration Wizard with different number of increments

With software version 2.1 and higher, the number of increments of the motor encoder and of the direct measuring system can be different when connecting an external rotary measuring system.

Prerequisite:

NC SW 2.1, 611U SW 05.02.04
Only possible when using a single−axis power section with PB address 20 or 10

Parameterization using the Drive Configuration Wizard

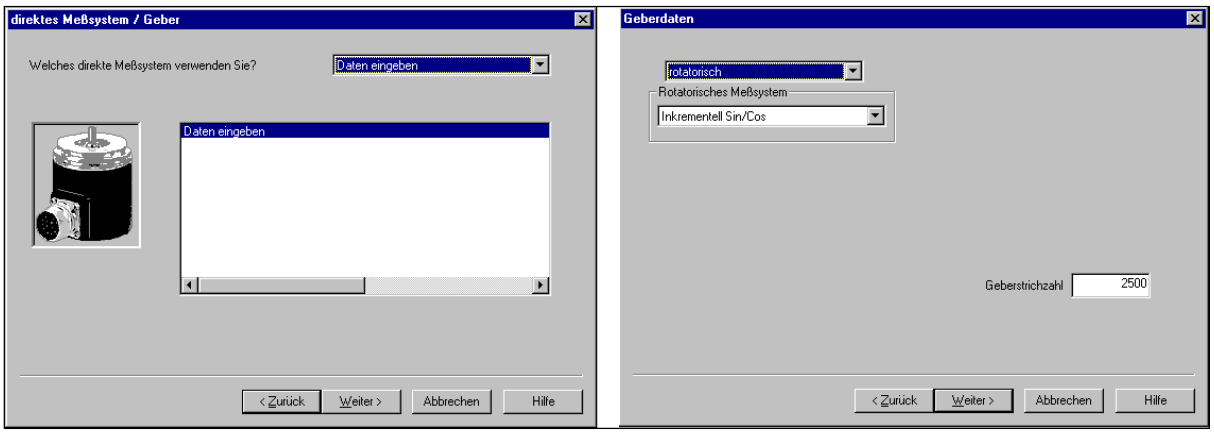


Fig. 3-6 Display

Message frame selection via PROFIBUS parameterization

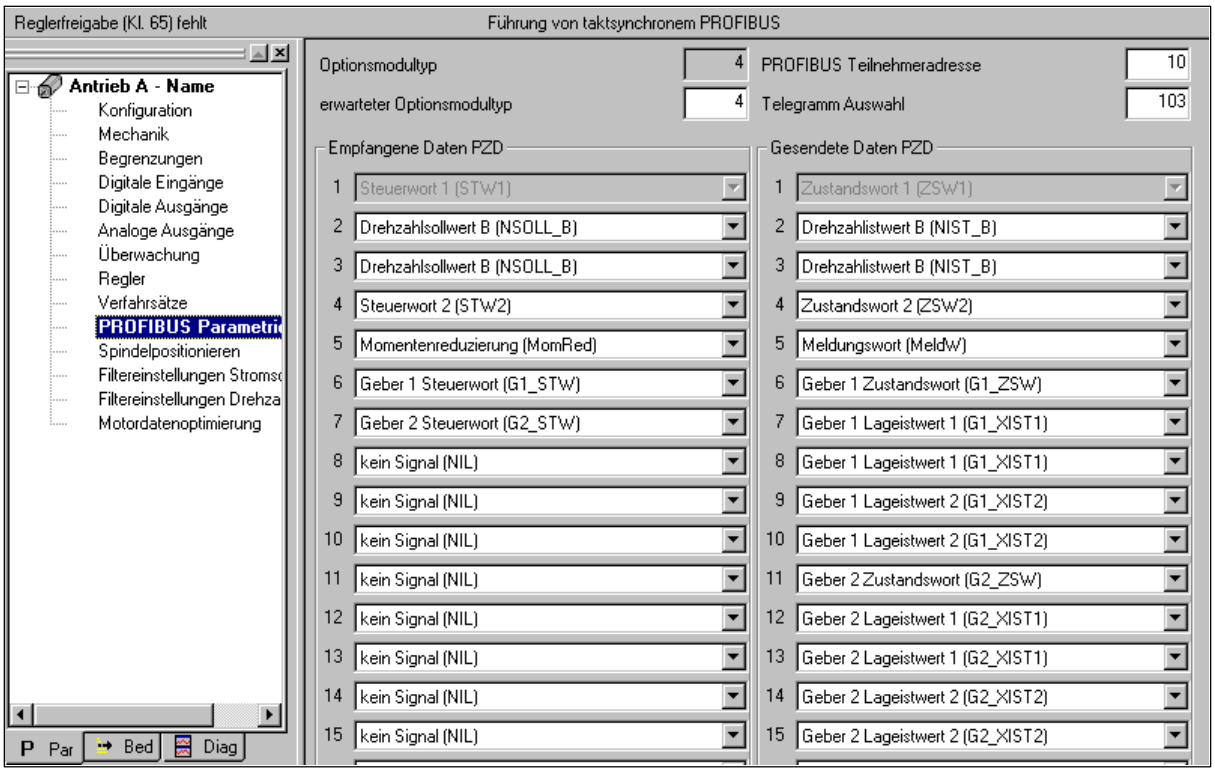


Fig. 3-7

Subsequently, save and press Reset.

Adapting the machine data in the control system

Table 3-7

Machine Data	Designation	Remark
13060	DRIVE_TELEGRAM_TYP[X] [X=drive number −1]	103: n_set interface with encoder 1 and encoder 2
30230	ENC_INPUT[0]	2: Encoder 2 actual value (X412)
31020	ENC_RESOL[0]	Number of increments for rot. encoder
31040	ENC_IS_DIRECT[0]	0:= Encoder 2 is mounted directly on the motor 1 := Encoder 2 is mounted on the load
32110	ENC_FEEDBACK_POL[0]	1:= default −1:= Reverse direction of rotation
34200	ENC_REF_MODE[0]	1:= Incr. encoder 0:= EnDat
13070	DRIVE_FUNKTION_MASK[X]	8000 (only applies with SW >2.1) [X] ...drive number −1

3.8.4 Default settings for the axis machine data for the spindle

With SINUMERIK 802D, the spindle is a subfunction of the entire axis functionality. The machine data of the spindle are therefore to be found amongst the axis machine data (MD 35xxx).

A description of the basic setting for the spindle can be found in Chapter 4.

3.9 Completing the start−up

After the start−up by the machine manufacturer has been completed, it is recommended to carry out a data backup prior to delivery to the end customer:

1. Performing an internal data backup (at least protection level 3 required):
   - Select the **Save data** softkey.
2. Resetting the access level:
   - Select the **Delete passw.** softkey.

3.10 Service display for the axis drive behavior

Servo Trace

For axis service, the **Servo trace** function has been implemented in the ”Diagnostic” menu to represent axis signals graphically.

The trace function is selected in the operating area **System\Service display\Servo Trace**.

Note for the reader

/BH/ SINUMERIK 802D ”Operation and Programming”, Chapter 7

Starting up the Spindle

4

With SINUMERIK 802D, the spindle is a subfunction of the entire axis functionality. The machine data of the spindle are therefore to be found amongst the axis machine data (MD 35xxx).

For this reason, data must also be entered for a spindle; this data has already been described in conjunction with the start−up of feed axes.

The following variants are offered for the spindle drive:

- Digital spindle drive with spindle actual−value encoder integrated into the motor
- Digital spindle drive with directly mounted spindle actual−value encoder
- Digital spindle drive with spindle actual−value encoder integrated into the motor, gearbox and external zero mark (BERO)
- Digital spindle drive without encoder and without external spindle actual−value encoder
- Digital spindle drive without encoder and with external TTL encoder
- Analog spindle (via 611 U(E)) with spindle actual−value encodermounted directly on the motor

Note

For spindles without gear stage switching, only gear stage 1 = index [1] will be used.
Index [2] ... [5] must only be parameterized when using the gear stage switching function (see /FB/ Chapter 5).

Table 4-1

MD	Name	Default value	Unit	Remark
30200	NUM_ENCS	1		0: Dig. spindle without speed actual−value encoder (AM mode = operation without encoder) 1: Dig. spindle with speed actual−value encoder integrated into the motor (1PH7 motor)
				Load gear transmission ratio
31050	DRIVE_AX_RATIO_DENOM[1]	1		Load revolutions
31060	DRIVE_AX_RATIO_NUMERA[1]	1		Motor revolutions
35100	SPIND_VELO_LIMIT	10000	r.p.m.	Maximum spindle speed
35130	GEAR_STEP_MAX_VELO_LIMIT[1]	500	r.p.m.	Max. speed in gear stage 1

35200	GEAR_STEP_SPEEDCTRL_ACCEL[1]	30	rev./s^2	Acceleration in the speed controlled mode
36200	AX_VELO_LIMIT[1]	11000	r.p.m.	Threshold value for velocity monitoring; setting rule: MD 36200 = 1.1 x MD 35100

4.1 Digital spindle drive with spindle actual−value encoder integrated into the motor

For a digital spindle drive (PROFIBUS) with spindle actual−value encoder integrated into the motor, the machine data parameterized in Table 4-1 must be parameterized.

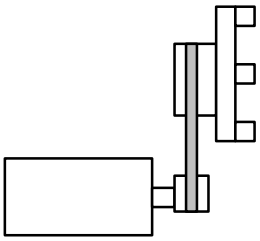
Example

Motor with incremental encoder

Gear transmission ratio:	1:2
Max. spindle speed	9,000 r.p.m.
Max. spindle acceleration	60 rev./s^2

Machine data settings:

MD 31050 = 1
MD 31060 = 2
MD 35100 = 9000
MD 35130 = 9000
MD 35200 = 60
MD 36200 = 9900



For the spindle, it can be necessary to adapt the following additional machine data.

Table 4-2 Additional machine data

MD	Name	Default value	Unit	Recommendation/remark
34000	REFP_CAM_IS_ACTIVE	1		0: without reference point cam
34060	REFP_MAX_MARKER_DIST	20	degrees	720° = two spindle revolutions
34110	REFP_CYCLE_NR	1 ... 5		0: The spindle is not involved in channel−specific referencing.
35300	SPIND_POSCTRL_VELO	500	r.p.m.	
36000	STOP_LIMIT_COARSE	0.04	degrees	0.4
36010	STOP_LIMIT_FINE	0.01	degrees	0.1
36030	STANDSTILL_POS_TOL	0.2	degrees	1
36060	STANDSTILL_VELO_TOL	0.0139	r.p.m.	1 (interface signal "Axis/spindle stopped" V390x 0001.4)
36400	CONTOUR_TOL	1	degrees	3

4.2 Digital spindle drive with spindle actual−value encoder (TTL) mounted directly on the motor

Procedure

- Parameterize the spindle as specified in Table 4-1.
- Connect the TTL encoder to −X472 on the SIMODRIVE 611 UE closed−loop control module for the spindle.
- Change the message frame type of the spindle to type 104 −>
  MD 13060: DRIVE_TELEGRAM_TYPE[4]=104.
- Switch the encoder input of the spindle to the second encoder −>
  MD 30230: ENC_INPUT_NR=2.
- Adapt the number of increments of the spindle encoder −>
  MD 31020: ENC_RESOL = xxxx.
- Parameterize the resolver gearbox:

  MD 31070: DRIVE_RATIO_DENOM (encoder revolutions)

  MD 31080: DRIVE_ENC_RATIO_NUMERA (load revolutions)

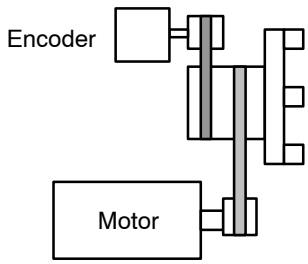
  MD 31040: ENC_IS_DIRECT
  0: The spindle encoder is mounted on the motor side.
  1: The spindle encoder is mounted on the load side.
- In some cases, the actual value of the position encoder must be inverted (depending on the mounting direction) −> MD 32110: ENC_FEEDBACK_POL = −1.
- Set the drive parameters (SimoCom U).
  P890 − activate the angular encoder/encoder interface= 4
  P922 − select the message frame PROFIBUS = 104
  Save + PowerOn

Example

Spindle with incremental encoder mounted on the chuck

TTL encoder with 2,500 pulses/revolution

Resolver gearbox transmission ratio: 1:3



Machine data settings:

MD 13060[4] = 104
MD 30230 = 2
MD 31020 = 2500
MD 31040 = 1
MD 31070 = 3
MD 31080 = 1
MD 32110 = 1

P890 = 4
P922 = 104

Note

If a resolver gearbox with a transmission ratio other than 1:1 is installed, positioning of the spindle can only be realized using a BERO.

4.3 Digital spindle drive with the encoder integrated into the motor, gearbox and external zero mark via BERO

Prerequisites

An inductive proximity switch, type Siemens 3RG4050−0AG05, is used.

With the approximation, a positive +24V edge is switched.

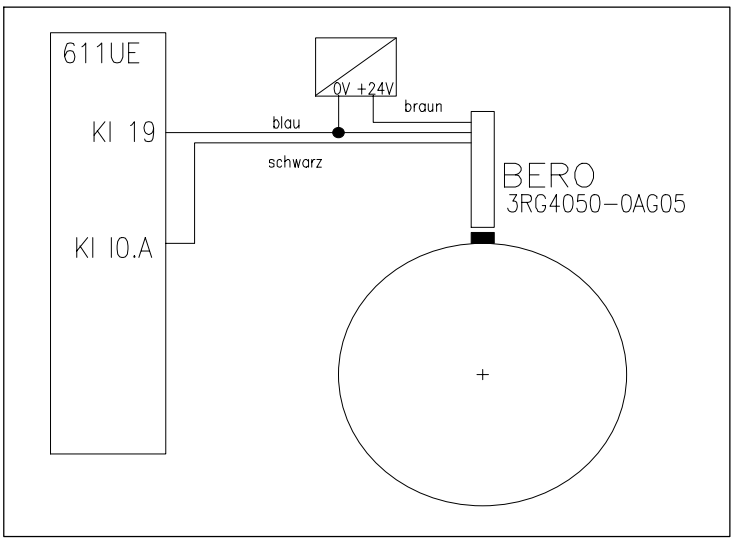


Fig. 4-1

Parameterization

611 UE (firmware release ≥ 03.01.06): Parameter P660 = 79
611 UE (firmware release ≥ 03.01.06): Parameter P879.13 = 1
Thus, instead of the internal zero mark, the BERO signal connected to terminal I0.A is evaluated.

802D: MD 34200: ENC_REFP_MODE = 7
Thus, a synchronization is only performed if a speed has been defined (MD 34040) using the BERO signal. This is imperative, as a BERO always has certain signal runtimes. This is the only way to guarantee that the synchronization is always performed to the same position.

802D: MD 34040: REFP_VELO_SEARCH_MARKER = 200 r.p.m.
The BERO signal is synchronized at this speed.

802D: MD 34060: If necessary, adapt REFP_MAX_MARKER_DIST accordingly.
If SPOS is triggered from the standstill, the spindle is first accelerated to the speed entered in MD 34040, thereafter, the BERO edge is synchronized, and, finally, the spindle is positioned.
The direction of rotation depends on: MD 35350: SPIND_POSITIONING_DIR (3=CW / 4=CCW). In the CW direction of rotation, the synchronization is performed to the falling edge, and in the CCW direction − to the rising edge.

PLC

To ensure that a resynchronization is performed when switching from the speed−controlled mode to the positioning mode, the interface signal V380x2001.4 ”Resynchronize spindle when positioning” must be linked with V390x0001.5 ”Position controller active”.

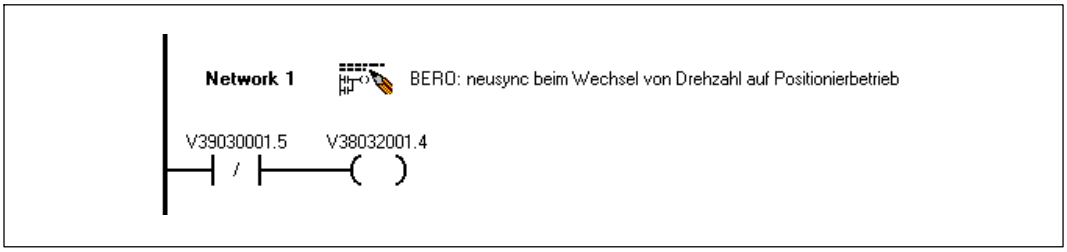


Fig. 4-2

Important

switching from the speed−controlled to the positioning mode must only be performed with the spindle rotating and from a defined direction. Otherwise, the spindle is mispositioned! Correct positioning can be guaranteed by programming ACP or ACN.

SPOS = ACP(0)

Thus, if first M4 Sxxx was programmed, the spindle will decelerate to the standstill, thereafter accelerate to the synchronization speed CW, then synchronize and position.

4.4 Digital spindle without external encoder

It is also possible to configure a motor without encoder (standard motor, non−Siemens motor) as the spindle motor. The KTY of the motor can be evaluated directly at the encoder interface X411 via pins 13 and 15.

4.4.1 Parameterization using the Drive Configuration Wizard

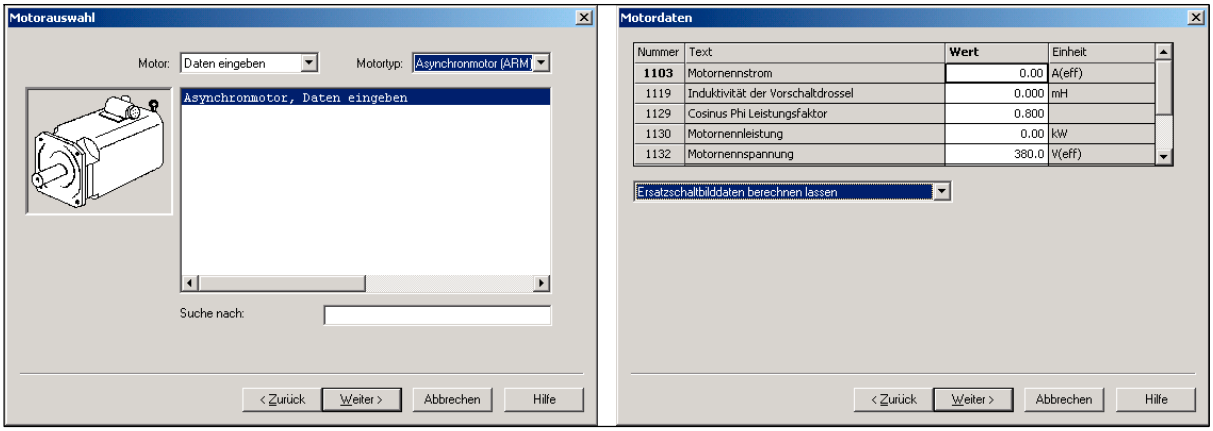


Fig. 4-3 Display

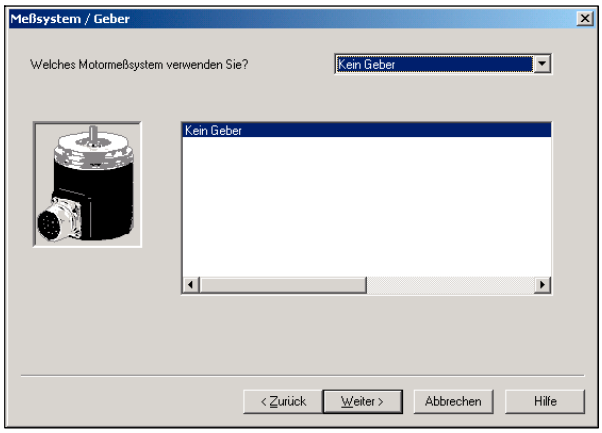


Fig. 4-4 Display

4.4.2 Parameterization using the Expert List

Table 4-3 Parameters to be entered in the Expert List

Parameters	Text	Value	Remark
922	PROFIBUSmessage frame selection	0	Save + Power On Reset
915:6	Process data setpoint assignment	0	

Table 4-3 Parameters to be entered in the Expert List, cont'd

Parameters	Text	Value	Remark
916:6	Process data actual value assignment	0	
916:7	Process data actual value assignment	0	
916:8	Process data actual value assignment	0	
916:9	Process data actual value assignment	0	
916:10	Process data actual value assignment	0	Save + Power On Reset
Optional			
1608	Fixed temperature	0	Save + Power On Reset
1602	Motor overtemperature warning threshold	120	
1607	Motor temperature shutdown limit	150	

The temperature evaluation of the KTY connected to terminal X411 is activated and can be used if P1608=0. The evaluation is provided via pins 13 and 25.

For example, if P1608=60 is set, the motor temperature is not evaluated; a temperature of 60°C is used for internal calculation.

Important

It is imperative to observe the order of the parameters listed above; in addition, "Save + Power On Reset" must be carried out whenever specified.

4.4.3 Adapting the machine data in the control system

Table 4-4

MD	Designation	Value	Remark
30130	CTRLOUT_TYPE[0]	1	
30240	ENC_TYPE[0]	0	

If the spindle does not possess an encoder, it will not be possible to display the actual speed. The display on the NC will therefore always remain zero.

With software versions higher than 2.01.05 or with SINUMERIK 802D−bl, the following machine data must be set for the expert password:

MD	Designation	Value	Remark
13070	DRIVE_FUNKTION_MASK[X]	8000	[X] corresponds to the drive number −1

4.5 Digital spindle without encoder with external TTL encoder

It is also possible to configure a motor without encoder (standard motor, non−Siemens motor) as the spindle motor. The external TTL encoder is used to acquire the spindle speed.

This configuration should not be used for positioning. Due to the lack of speed acquisition at the spindle motor, the spindle is always in the toque−controlled operation. This may result in thermal problems and inaccuracies.

Merely the TTL encoder is connected to the 611UE controller module via the angular encoder interface. The KTY of the motor can be evaluated at the encoder interface X411 via pins 13 and 25.

4.5.1 Parameterization using the Expert List

Table 4-5 Parameters to be entered in the Expert List

Parameters	Text	Value	Remark
890	Activating the angular encoder/encoder interface	4	Save + Power On Reset
922	PROFIBUSmessage frame selection	0	Save + Power On Reset
915:6	Process data setpoint assignment	50017	
916:6	Process data act. value assignment	50018	
916:7	Process data act. value assignment	50019	
916:8	Process data act. value assignment	50019	
916:9	Process data act. value assignment	50020	
916:10	Process data actual value assignment	50020	Save + Power On Reset
1006	Encoder interface mod. code number	99	Save + Power On Reset
1005	Encoder interface mod. code number	2500	Save + Power On Reset
Optional			
1608	Fixed temperature	0	Save + Power On Reset
1602	Motor overtemperature warning threshold	120	
1607	Motor temperature shutdown limit	150	

The temperature evaluation of the KTY connected to terminal X411 is activated and can be used if P1608=0. The evaluation is provided via pins 13 and 25.

For example, if P1608=60 is set, the motor temperature is not evaluated; a temperature of 60°C is used for internal calculation.

Important

It is imperative to observe the order of the parameters listed above; in addition, ”Save + Power On Reset” must be carried out whenever specified.

4.5.2 Adapting the machine data in the control system

Table 4-6

MD	Designation	Value	Remark
30130	CTRLOUT_TYPE[0]	1	
30240	ENC_TYPE[0]	1	
31020	ENC_RESOL[0]	2500	
32110	ENC_FEEDBACK_POL[0]	−1	1: = default −1:= Control direction inverted

With software versions higher than 2.01.05 or with SINUMERIK 802D−bl, the following machine data must be set for the expert password:

MD	Designation	Value	Remark
13070	DRIVE_FUNKTION_MASK[X]	8000	[X] corresponds to drive number ”−1”.

4.6 Analog spindle (via 611 U(E)) with with spindle actual−value encoder mounted directly on the motor

The analog spindle function uses the analog output of the SIMODRIVE 611 UE closed−loop control module as the setpoint output and die the encoder interface (−X472) as the actual−value input for a TTL encoder. A digital feed axis is used as the transport axis for the setpoint and actual values of the analog spindle.

The servo enable for the analog spindle is output via the digital outputs, and the analog setpoint via terminal 75.A / 15 of the transport axis.

There are three modes:

1. MD 30134: IS_UNIPOLAR_OUTPUT =0 Bipolar spindle ± 10V

   Digital output O0.A −> Servo enable

2. MD 30134: IS_UNIPOLAR_OUTPUT =1 Unipolar spindle 0...+10V (enable and direction signals)

   Digital output O0.A −> Servo enable
   Digital output O1.A −> Direction of rotation

3. MD 30134: IS_UNIPOLAR_OUTPUT =2 Unipolar spindle 0...+10V (CW enable, CCW enable)

   Digital output O0.A −> CW enable
   Digital output O1.A −> CCW enable

Important

In case of RESET, a setpoint is output at the analog output of the 611 UE closed−loop control module. It is therefore imperative to connect the servo enable for the analog spindle to terminal O0.A of the transport axis.

Important

Transport axis can only be drive A of the spindle−axis power section with PB address 10 and drive number 5 or drive A of the twin−axis module with PB address 12 and drive number 1 (see also Table 2-3).

When configuring the axes, first define the transfer axis, and then the analog spindle. Example: X, Z, SP, A
Only the X or Z axis may be configured as a transfer axis.

Example

The example below will use the first machine axis (X1) as the transport axis. X1 will be drive A on a 611 UE closed−loop control module with PROFIBUS address 12.

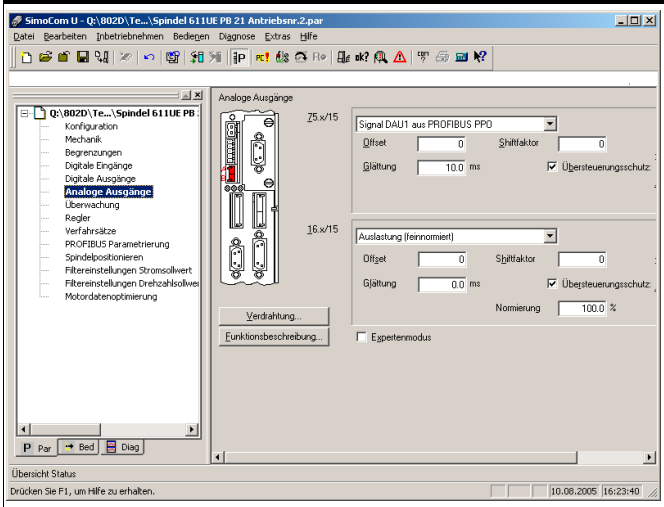
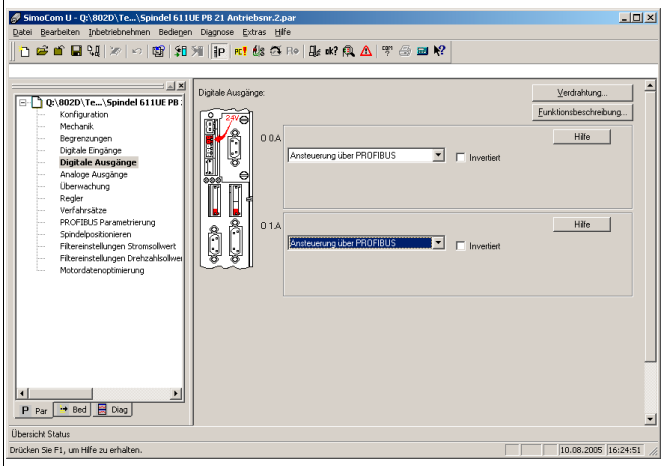
In the 802D, the spindle is parameterized as the third machine axis (SP) (standard data record for turning). This spindle is an analog spindle with +/− 10V interface. The maximum speed in 9,000 r.p.m. at 10 V in this example.

Only the additional machine data required for starting up an analog spindle will be dealt with in the following. The general machine data for configuring an analog spindle are listed in the table below.

Table 4-7 Settings for the example

Transport axis X1 (machine axis 1)	**Analog spindle SP (machine axis 3)**
Connections required between the transport axis X1 and the analog spindle SP	
Terminal 75.A to be connected to Terminal 15 to be connected to Terminal O0.A to be connected to −X472 to be connected to	e.g. terminal 56 (analog setpoint input) e.g. terminal 14 (analog setpoint input) e.g. terminal 65 (servo enable) TTL encoder 5V
NC machine data	
MD 13060: DRIVE_TELEGRAM_TYPE[0] = 0 ([0] corresponds to drive number − 1) MD 13070: DRIVE_FUNCTION_MASK[0] = 8000 (with the 802D, only valid from software release higher than 2.1.5) ([0] corresponds to drive number − 1)	**MD 30110: CTRLOUT_MODULE_NR[0,AX3]=1** (drive number of the transport axis) **MD 30120: CTRLOUT_NR[0,AX3]=2** MD 30130: CTRLOUT_TYPE[0,AX3]=1 **MD 30220: ENC_MODULE_NR[0,AX3]=1** (drive number of the transport axis) **MD 30230: ENC_INPUT_NR[0,AX3]=2** MD 30240: ENC_TYPE[0,AX3]=1 MD 31020: ENC_RESOL[0,AX3]=2500 (number of increments of the TTL encoder) MD 32110: ENC_FEEDBACK_POL[0,AX3]=−1 (if necessary, invert the actual value) **MD 32250: RATED_OUTVAL[0,AX3]=100** MD 32260: RATED_VELO[0,AX3]=9000 (adjust the analog interface) MD 34060: REFP_MAX_MARKER_DIST[0,AX3]=360 MD 35300: SPIND_POSCTRL_VELO=50 (speed at which the position controller becomes active with SPOS)
Drive data	***If necessary, adapt the monitoring data***
P890 Activate angular encoder/encoder interface= 4 P922 Message frame selection PROFIBUS = 104 **Save + RESET**	MD 36000: STOP_LIMIT_COARSE[AX3]=10 MD 36010: STOP_LIMIT_FINE[AX3]=10 MD 36030: STANDSTILL_POS_TOL[AX3]=10 MD 36400: CONTOUR_TOL[AX3]=40 Symmetrize analog output: MD 36720 DRIFT_VALUE=0,3891%
P915[8] Process data setpoint assignment PB = 50103 P915[9] Process data setpoint assignment PB = 50107 P922 Message frame selection PROFIBUS = 0 **Save + RESET**	
Parameterize analog output 75.A/15 to ”DAC1 signal from PROFIBUS PPO”	

Table 4-7 Settings for the example, cont'd

Transport axis X1 (machine axis 1)	Analog spindle SP (machine axis 3)
	
Parameterize digital outputs O0.A and O1.A to "Selection via PROFIBUS"	
	
Save + RESET	

4.7 Analog axis/spindle with TTL encoder via ADI4

Both rotary and linear 5V TTL square−wave encoders can be connected to SINUMERIK 802D. With this ADI4, up to 4 drives with analog setpoint interface can be connected.

Measuring systems that can be connected

- Incremental TTL encoder (for the number of increments, see Tables 4-9/4-10), difference transfer using 5 V square wave signals (RS422 standard).

Configuration

With 5 analog axes, 2 ADI4 modules must be used. Depending on the encoder pulse number selected from Table 4-9 or 4-10, either SDB 1_ADI4 or SDB 2_ADI4 must be loaded.

The ADI4 modules have the Profibus addresses 15 and 16 assigned as follows:

Table 4-8 Assignment of the PB addresses

MD 11240	PB (slave)		PB address	Drive number
0 (1_ADI4 or 2_ADI4 are loaded)	PP module 1		9	–
	PP module 2		8	–
	1st ADI4	drive 1 Drive 2 Drive 3 Drive 4	16	1 2 3 4
	2nd ADI4	drive 1 Drive 2 Drive 3 Drive 4	15	5 6 7 8

The following tables show the fixed assignment of the axes to the TTL encoders which can be connected.

Table 4-9 SDB: 1_ADI4

PROFIBUS address	16			
Axis	1st axis	2nd axis	3rd axis	4th axis
Increments	2500	2500	2500	1024
PROFIBUS address	**15**			
Axis	1st axis	2nd axis	3rd axis	4th axis
Increments	1024	18000	9000	2500

Table 4-10 SDB: 2_ADI4

PROFIBUS address	16			
Axis	1st axis	2nd axis	3rd axis	4th axis
Increments	2048	2048	2048	1024

Table 4-10 SDB: 2_ADI4, cont'd

PROFIBUS address	**15**			
Axis	1st axis	2nd axis	3rd axis	4th axis
Increments	1024	18000	9000	2048

Note for the reader

Toolbox, siemense.txt and ADI4_SDB.pdf

4.8 Digital axis/spindle with direct measuring system (TTL) via ADI4

Up to four direct 5V TTL square−wave encoders can be connected to SINUMERIK 802D via max. one ADI4.

Measuring systems that can be connected

- 5V incremental TTL encoder (increments: 4x2,500 or 4x5,000), differential transfer using 5 V square−wave signals (RS422 standard).

Configuration

You can use an ADI4 module with three 611 U modules in 2 different variants. Either of the SDBs DMS1_ADI4 or DMS2_ADI4 can be loaded.

The ADI4 module have the Profibus address 15 and is assigned as follows:

- Variant 1: SDB :DMS1_ADI4

  PP module 1 PB address 9

  PP module 2 PB address 8

  Single−axis power section PB address 10

  Twin−axis power section PB address 12

  Twin−axis power section PB address 13

  ADI4: 4 x 2,500 steps/rev. PB address 15

- Variant 2: SDB :DMS2_ADI4

  PP module 1 PB address 9

  PP module 2 PB address 8

  Single−axis power section PB address 10

  Twin−axis power section PB address 12

  Twin−axis power section PB address 13

  ADI4: 4 x 5,000 steps/rev. PB address 15

The table below shows an overview illustrating possible applications and the machine data assignment:

Table 4-11 SDB: DMS1_ADI4

PROFIBUS address	**15**			
Axis	1st axis	2nd axis	3rd axis	4th axis
Increments	2500	2500	2500	2500
Setpoint: Drive no. MD 30110	1	2	3	4
Actual value: Drive no. MD 30220	6	7	8	9

Table 4-12 SDB: DMS2_ADI4

PROFIBUS address	**15**			
Axis	1st axis	2nd axis	3rd axis	4th axis
Increments	5000	5000	5000	5000
Setpoint: Drive no. MD 30110	1	2	3	4
Actual value: Drive no. MD 30220	6	7	8	9

The axes are assigned correspondingly as per the particular application.

Note for the reader

Toolbox, siemense.txt and ADI4_SDB for DMS.pdf

This sheet has been left empty for your notes.

Starting up the PLC

5

General

The PLC is intended to control machine−related functional sequences. It is realized as a software PLC.

The user program − a PLC cycle − is always executed in the same order of sequence.

- Refresh of the process image (inputs, user interface, timers)
- Processing of communication requests (operator panel, PLC 802 programming tool, version 3.0 and higher)
- Editing of the user program
- Evaluation of alarms
- Output of the process image (outputs, user interface)

During the cycle, the PLC executes the user program from the first to the last operation. The user program accesses the hardware inputs/outputs only via the process image and not directly. The PLC refreshes the hardware I/Os at the beginning or end of program execution. Thus, these signals are stable over a whole PLC cycle.

The user program can only be created using the PLC 802 Programming Tool, version 3.1 and higher, with the S7−200 programming language using ladder diagram. Ladder diagram is a graphical programming language for representing electric circuit diagrams.

Important

PLC 802 Library with a description, which can be installed from the toolbox CD is offered as the basis for the PLC user program. The PLC 802 Library constitutes a subroutine library and contains one sample program each for a turning and for a milling machine.

Note

If the stop and reset buttons on the machine control panel are not realized as normally closed contacts, an open circuit cannot be detected.

Monitoring can be performed using software solutions, as shown in the example MCP_802D (SBR 34) from the subroutine library.

5.1 Commissioning the PLC

By default, the user program of the SINUMERIK 802D only consists of a NOP ("no operation") instruction and is stored in the permanent memory. The user program addressing the particular requirements of the machine is to be created by the user himself.

5.2 Start−up modes of the PLC

Table 5-1 Start−up modes

Selection			Reaction			
PCU Switch−on menu (802D)	**PCU Start−up menu (802D)**	**PT PLC 802 (PC)**	**PLC program preselection**	**Program status**	**Retentive data (battery bakked)**	**MD for the PLC in the user interface**
	NCK start−up *					
Normal booting	Normal booting		User program ***	Run	unchanged	Acceptance of the active PLC MD
Booting with default values	Booting with default values		User program ***	Run	deleted	Default PLC MD
Booting with saved data	Booting with saved data		User program ***	Run	saved data	Saved PLC MD
PLC stop after POWER ON		PLC stop possible either in Run or in Stop	unchanged	Stop	unchanged	Acceptance of the active PLC MD
	PLC start−up **					
	Cold restart	Run (after Stop)	User program ***	Run	unchanged	Acceptance of the active PLC MD
	Cold restart and debug mode		User program ***	Stop	unchanged	Acceptance of the active PLC MD
	Overall reset		User program ***	Run	deleted	Acceptance of the active PLC MD
	Overall reset and debug mode		User program ***	Stop	deleted	Acceptance of the active PLC MD

* Hardkey System / Softkey Start up switch / NCK
** Hardkey System / Softkey Start up switch / PLC
*** is loaded from the permanent memory into the RAM

Thanks to the debug mode (see ”Operation and Programming”, Chapter 7), the PLC remains in PLC Stop after booting of the control system. All start−up modes set via softkey only come into effect when the control system is booted the next time.

The ”Run” mode activates the cyclic operation.

The following actions are triggered in the ”Stop” mode:

- All hardware outputs are disabled.
- Profibus DP is inactive.
- No cyclic operation (the active user program is not executed).
- The process image is no longer refreshed (it is frozen).
- EMERGENCY STOP active.

Only in the ”Stop” mode can the user load a corrected or new project into the control system. The user program only becomes effective when the control system is booted the next time or if the ”Run” mode is selected.

5.3 PLC alarms

The control system displays max. 8 PLC alarms (system alarms or user alarms).

The PLC manages the alarm information per PLC cycle. It saves / cancels the alarms according to their times of occurrence. The first alarm in the list is always the alarm last occurred.

If more than 8 alarms have occurred, the first seven alarms and the newest alarm with the highest cancel priority are displayed.

Alarm response and cancel criteria

In addition, the alarm responses are managed by the PLC. The alarm responses always come into effect, irrespective of the number of active alarms. Depending on the type of the alarm response, the PLC will trigger the required action.

A cancel criterion must be defined for each alarm. The PLC uses the cancel criterion SELF−CLEARING by default (see ”Configuring user alarms”).

Cancel criteria are:

- POWERONCLEAR: The alarm is canceled by turning off / turning on the control system (POWER ON).
- CANCELCLEAR: The alarm is canceled by pressing the Cancel key or the Reset key (analogously to the NCK alarms).
- SELF−CLEARING: The alarm is canceled, since the alarm cause is no longer present.

The cancel conditions have the following priority:

- POWERON CLEAR − system alarms (highest priority)
- CANCEL CLEAR − system alarms
- SELF−CLEARING − system alarms
- POWERON CLEAR − user alarms
- CANCEL CLEAR − user alarms
- SELF−CLEARING − user alarm (lowest priority)

The responses to be triggered by the alarm in question in the PLC are defined for each alarm. The PLC uses the alarm response SHOWALARM by default.

Alarm responses are:

- PLC stop: The user program is not executed any more, Profibus DP is inactive, and the hardware outputs are disabled.
- EMERGENCY STOP: Once the user program is executed, the PLC transmits the EMERGENCY STOP signal to the NCK via the user interface.
- Feed disable: Once the user program is executed, the PLC transmits the feed disable signal to the NCK via the user interface.
- Read−in disable: Once the user program is executed, the PLC transmits the read−in disable signal to the NCK via the user interface.

- NC Start inhibited: Once the user program is executed, the PLC signals the ”NC start inhibited” signal to the NCK via the user interface.
- SHOWALARM : This alarm has no alarm response.

5.3.1 General PLC alarms

Note for the reader

SINUMERIK 802D Diagnostics Guide

5.3.2 User alarms

The user interface ‘’ 1600xxxx ‘’ provides the subareas (0, 1) for the user to define user alarms.

- Subarea 0: 8 x 8 bits to set the user alarms (0 –>1 edge)
  Byte 0 : Bit 0 => 1st user alarm ” 700000 ”
  Byte 1 : Bit 0 => 9th user alarm ” 700008 ”
  Byte 7 : Bit 7 => 64th user alarm ” 700063 “

  A new user alarm is activated with the relevant bit (subarea 0) via a 0/1 edge.
- Subarea 1: User alarm variables

  Subarea 1 is intended for additional user information; it can only be read / written as a double–word.
- Subarea 2: Alarm response
  Byte 0 : Bit 0 => NC start inhibited
  Bit 1 => Read–in disable
  Bit 2 => Feed disable for all axes
  Bit 3 => EMERGENCY STOP
  Bit 4 => PLC STOP

  By using subarea 2, the user can evaluate the active alarm responses; this subarea is read–only.

Self–clearing user alarms must be canceled by the user by resetting the appropriate bit in subarea 0 (1 –> 0 edge).

Other user alarms are canceled by the PLC after detecting the relevant cancel condition for the appropriate user alarms. If the bit of the user alarm, however, is still present, the alarm recurs.

Effect of a user alarm

User alarms have a higher priority than the appropriate signal in the user interface (e.g. NC start inhibited, read–in disable, feed disable and EMERGENCY STOP).

Configuring user alarms

A configuration byte is provided for each alarm. The user alarms can be configured by the user in the machine data **14516: USER_DATA_PLC_ALARM**.

Default setting of MD 14516[0...63]: 0 => SHOWALARM/SELF−CLEARING user alarm

Structure of a configuration byte:

- Bit0 − bit5 : Alarm responses
- Bit6 − bit7 : Cancel criteria

Alarm responses:		Bit0 − bit 5 = 0: Showalarm (default)
	Bit0 = 1:	NC start inhibited
	Bit1 = 1:	Read−in disable
	Bit2 = 1:	Feed disable for all axes
	Bit3 = 1:	EMERGENCY STOP
	Bit4 = 1:	PLC stop
	Bit5 =	reserved
Cancel criteria:	Bit6 + bit7 = 0:	SELF−CLEARING alarm (default)
	Bit6 = 1 :	CANCELCLEAR alarm
	Bit7 = 1 :	POWERONCLEAR alarm

The alarm response to PLC Stop always has the cancel condition POWER ON.

Alarm texts

The user are offered two options of defining his own alarm texts:

- via the **System** hardkey> **PLC softkey > Edit PLC txt** (cf. ”Operation and Programming”, Chapter 7)
- by using the toolbox: Editing and loading the alarm text file using the text manager

If no alarm text is assigned by the user, only the alarm number is displayed.

The % character in the alarm text denotes an additional variable. The variable type is the form of representation of the variable.

The following variable types are possible:

- %D integer decimal number
- %I integer decimal number
- %U decimal number without sign
- %O integer octal number
- %X integer hexadecimal number
- %B binary representation of a 32−bit value
- %F 4−byte floating point number

Examples of user alarm texts (Note: The text after the "//" is a comment and is not displayed.)

- 700000 '' '' // only the user alarm number
- 700001 '' Hardware limit switch + of the X axis''
- 700002 '' %D '' // only a variable as an integer decimal number
- 700003 '' Alarm number with a fixed alarm text and the variable %X ''
- 700004 '' %U Alarm number with variable and fixed alarm text ''
- 700005 ''Axis monitoring active : %U''

  Display: 700005 ''Axis monitoring active : 1
  or 700005 Axis monitoring active : 3

5.4 PLC programming

The PLC user program is created using the PLC 802 Programming Tool.

The handling of this tool for an S7−200 is described in the documentation "SIMATIC S7−200 Automation System Manual". The PLC 802 Programming Tool constitutes a subset of this documentation.

Compared to the S7− 200 MicroWin base system, the following is to be observed:

- The user program can only be programmed in ladder diagram.
- Only a subset of the S7−200 programming language is supported.
- The compilation of the user program is performed offline on a PG/PC or automatically when downloading into the control system.
- The project can be loaded into the control system (download).
- It is also possible to load the project from the control system (upload).
- Indirect data addressing is not possible. Thus, no programming errors will occur during the runtime.
- The user must manage the data and process information type−specifically.

  Example:

Information 1	T value	Memory size DWord	(32−bit)
Information 2	Override	Memory size Byte	(8−bit)

User data		
Byte 0	DWord	(information 1)
Byte 4	bytes	(information 2)

  The user must not access this data together; otherwise, he should have to observe the data access.
- Furthermore, the alignment of the data in the memory model and their types must be observed for all data.

Example:

Memory bits	MB0.1,MB3.5
Memory bytes	MB0,MB1,MB2
Memory word	MW0,MW2,MW4
	MW3, MW5 ... are not permissible
Memory double words	MD0,MD4,MD8
	MD1,MD2,MD3, MD5 ... are not permissible

Table 5-2 PLC data types permitted in the control system

Data type	Size	Address alignment	Range for logical operations	Range for arithmetical operations
BOOL	1 Bit	1	0.1	–
BYTE	1 byte	1	00 ... FF	0 ... +255
WORD	2 bytes	2	0000 ... FFFF	–32 768 ... + 32 767
DWORD (Double Word)	4 bytes	4	0000 0000 ... FFFF FFFF	–2 147 483 648 ... +2 147 483 647
REAL	4 bytes	4	–	$\pm 10^{-37}$... $\pm 10^{38}$

PLC project

The PLC 802 Programming Tool always manages one project (combinational logic, symbols and comments). All important information of a project can be stored in the control system via a download. The information is transmitted from the control to the PC via upload.

The control system can save max. 6,000 instructions and 1,500 symbols. The PLC memory required is influenced by the following components:

- number of instructions
- number and length of the symbol names
- number and length of the comments

S7–200 Ladder Diagram

The addresses and operations can be defined using the representation type ”International”. When using the ladder diagram, the user programs his program in networks. Each network corresponds to a certain logic reflecting a certain sequence. The basic elements of a ladder diagram are contacts, coils and boxes. The contacts, in turn, are divided into normally opened and normally closed contacts. Each coil corresponds to a relay. Boxes are used to represent a certain function. A box can be activated using an enable bit.

5.4.1 Command overview

Table 5-3 Operand identifier

Operand identifier	Description	Area
V	Data	V1000 0000.0 to V7999 9999.7
T	Timers	T0 to T15 (100 ms) T16 to T39 (10 ms)
C	Counter	C0 to C31
I	Image of digital inputs	I0.0 to I17.7
Q	Image of digital outputs	Q0.0 to Q11.7
M	Flags	M0.0 to M383.7
SM	Special bit memory	SM0.0 to SM 0.6 (see Table 5-6)
AC	ACCU	AC0 ... AC3
L	Local data	L0.0 to L51.7

Table 5-4 Forming the address in the V area (see ”User interface”)

Type identification (module no.)	Area no. (channel/ axis no.)	Subarea	Offset	Addressing
00 (10–79)	00 (00–99)	0 (0–9)	000 (000–999)	symbolic (8–digit)

Table 5-5 802D Operand Ranges

Access Method	Valid Operand Ranges for Programming 802D
Bit Access (Byte.Bit)	V(1000 0000.0–7900 9999.7) I(0.0–17.7) Q(0.0–11.7) M(0.0–255.7) SM(0.0–0.7) – T(0–39) C(0–31)
Byte Access	VB(1000 0000–7999 9999) IB(0–17) QB(0–11) MB(0–383) AC(0–3) SMB(0) – KB (Constant)

Table 5-5 802D Operand Ranges

Access Method	Valid Operand Ranges for Programming 802D
Word Access	VW(1000 0000–7999 9998) T(0–39) C(0–31) IW(0–16) QW(0–10) MW(0–382) AC(0–3) – – KW (Constant)
Double Word Access	VD(1000 0000–7999 9994) ID(0–14) QD(0–8) MD(0–380) AC(0–3) – – AC(0–3) KD (Constant)

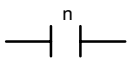
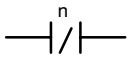
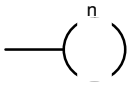
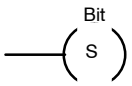
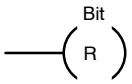
Table 5-6 Special bit memory SM Bit Definition

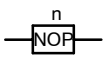
SM bits	Description
SM 0.0	Bit memory with defined ONE signal
SM 0.1	Initial position : first PLC cycle ‘1’, subsequent cycles ‘0’
SM 0.2	Buffered data lost – only valid in the first PLC cycle (‘0’ – data o.k., ‘1’ – data lost)
SM 0.3	POWER ON: first PLC cycle ‘1’, subsequent cycles ‘0’
SM 0.4	60 s clock (alternating ‘0’ for 30 s, then ‘1’ for 30 s)
SM 0.5	1 s clock (alternating ‘0’ for 0.5 s, then ‘1’ for 0.5 s)
SM 0.6	PLC cycle clock (alternating one cycle ‘0’, then one cycle’)

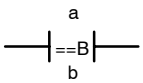
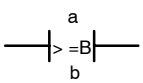
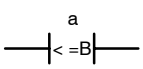
The user can only view the statement list (STL) in PT802 under ”View STL”. This type of representation (see Table : Mnemonic) shows the sequential processing.

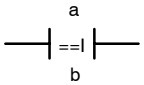
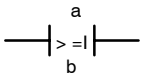
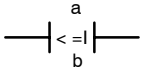
5.4.2 Explanation of the stack operations

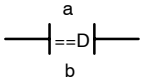
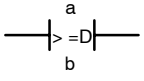
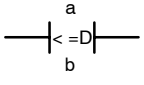
Table 5-7 INSTRUCTIONS Set

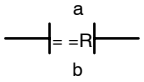
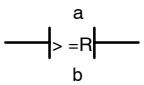
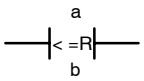
BASIC BOOLEAN INSTRUCTIONS			
Instruction		**Ladder Symbol**	**Valid Operands**
Load **And** **Or**	normal open n=1 close n=0 open		n: V, I, Q, M, SM, T, C, L
Load Not **And Not** **Or Not**	normal close n=0 close n=1 open		n: V, I, Q, M, SM, T, C, L
Output	prior 0, n=0 prior 1, n=1		n: V, I, Q, M,T, C, L
Set (1 Bit)	prior 0, not set prior 1 or ↗		S_Bit: V, I, Q, M,T, C, L n =1
Reset (1 Bit)	prior 0, no reset prior 1 or ↗		S_Bit: V, I, Q, M,T, C, L n =1

OTHER BOOLEAN INSTRUCTIONS			
Instruction		**Ladder Symbol**	**Valid Operands**
Edge Up	prior ↗ close (1 PLC cycle)		
Edge Down	prior ↘ close (1 PLC cycle)		
Logical Not	prior 0, later 1 prior 1, later 0		
No operation			n = 0 ... 255

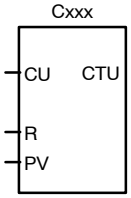
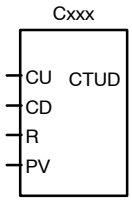
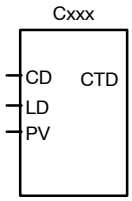
BYTE COMPARES (Unsigned)			
Instruction		**Ladder Symbol**	**Valid Operands**
Load Byte = **And Byte =** **Or Byte =**	a = b close a ≠ b open		a: VB, IB, QB, MB, SMB, AC, Constant, LB b: VB, IB, QB, MB, SMB, AC, Constant, LB
Load Byte ≥ **And Byte ≥** **Or Byte ≥**	a ≥ b close a < b open		
Load Byte ≤ **And Byte ≤** **Or Byte ≤**	a ≤ b close a > b open		

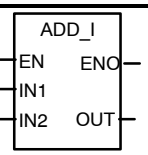
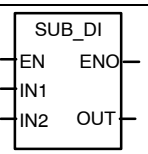
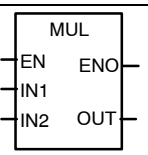
WORD COMPARES (Signed)		
Instruction	**Ladder Symbol**	**Valid Operands**
Load Word = a = b close **And Word =** a ≠ b open **Or Word =**		a: VW, T, C, IW, QW, MW, AC, Constant, LW b: VW, T, C, IW, QW, MW, AC, Constant, LW
Load Word ≥ a ≥ b close **And Word ≥** a < b open **Or Word ≥**		
Load Word ≤ a ≤ b close **And Word ≤** a > b open **Or Word ≤**		

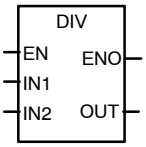
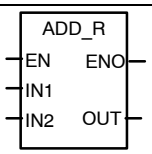
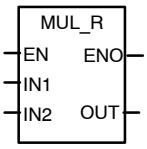
DOUBLE WORD COMPARES (Signed)		
Instruction	**Ladder Symbol**	**Valid Operands**
Load DWord = a = b close **And DWord =** a ≠ b open **Or DWord =**		a: VD, ID, QD, MD, AC, Constant, LB b: VD, ID, QD, MD, AC, Constant, LB
Load DWord ≥ a ≥ b close **And DWord ≥** a < b open **Or DWord ≥**		
Load DWord ≤ a ≤ b close **And DWord ≤** a > b open **Or DWord ≤**		

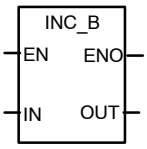
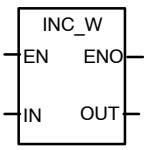
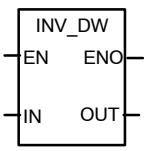
REAL WORD COMPARES (Signed)		
Instruction	**Ladder Symbol**	**Valid Operands**
Load RWord = a = b close **And RWord =** a ≠ b open **Or RWord =**		a: VD, ID, QD, MD, AC, Constant, LD b: VD, ID, QD, MD, AC, Constant, LD
Load RWord ≥ a ≥ b close **And RWord ≥** a < b open **Or RWord ≥**		
Load RWord ≤ a ≤ b close **And RWord ≤** a > b open **Or RWord ≤**		

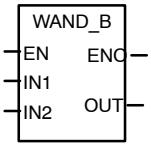
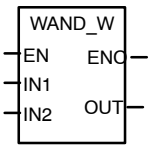
TIMER			
Instruction		**Ladder Symbol**	**Valid Operands**
Timer Retentive On Delay	EN=1, Start EN=0, Stop If $T_{Value} \geq PT$, $T_{bit}=1$	Txxx TONR IN PT	Enable: (IN) S0 Txxx: T0 – T31 Preset: (PT) VW, T, C, IW, QW, MW, AC, Constant 100 ms T0 – T15 10 ms T16 – T39
Timer On Delay	EN=1, Start EN=0, Stop If $T_{Value} \geq PT$, $T_{bit}=1$	Txxx TON IN PT	Enable: (IN) S0 Txxx: T0 – T31 Preset: (PT) VW, T, C, IW, QW, MW, AC, Constant 100 ms T0 – T15 10 ms T16 – T39
Timer Of Delay	If $T_{Value} <$ PT, $T_{bit}=1$	Txxx TOF IN PT	Enable: (IN) S0 Txxx: T0 – T31 Preset: (PT) VW, T, C, IW, QW, MW, AC, Constant 100 ms T0 – T15 10 ms T16 – T39

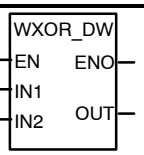
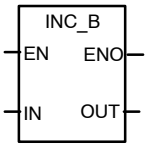
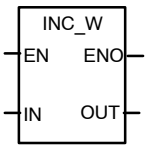
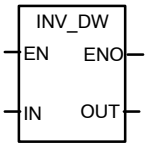
COUNTER			
Instruction		**Ladder Symbol**	**Valid Operands**
Count Up	CU ↗, Value+1 R=1, Reset If $C_{Value} \geq PV$, C_{bit}=1		Cnt Up: (CU) S1 Reset: (R) S0 Cxxx: C0 – 31 Preset: (PV) VW, T, C, IW, QW, MW, AC, Constant, LW
Count Up/Down	CU ↗, Value+1 CD ↗, Value−1 R=1, Reset If $C_{Value} \geq PV$, C_{bit}=1		Cnt Up: (CU) S2 Cnt Dn: (CD) S1 Reset: (R) S0 Cxxx: C0 – 31 Preset: (PV) VW, T, C, IW, QW, MW, AC, Constant, LW
Count Down	If C_{Value} = 0, C_{bit}=1		Cnt Down: (CD) S2 Reset: (R) S0 Cxxx: C0 – 31 Preset: (PV) VW, T, C, IW, QW, MW, AC, Constant, LW

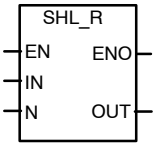
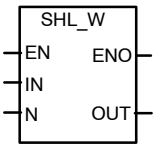
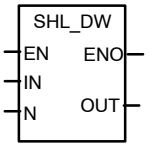
MATH OPERATIONS			
Instruction		**Ladder Symbol**	**Valid Operands**
Word Add **Word Subtract**	If EN = 1, b = a + b b = b – a		Enable: EN In: VW, T, C, IW, QW, MW, AC, Constant, LW Out: VW, T, C, IW, QW, MW, AC, LW
DWord Add **DWord Subtract**	If EN = 1, b = a + b b = b – a		Enable: EN In: VD, ID, QD, MD, AC, Constant, LD Out: VD, ID, QD, MD, AC, LD
Multiply	If EN = 1, b = a x b		Enable: EN In: VW, T, C, IW, QW, MW, AC, Constant, LW Out: VD, ID, QD, MD, AC, LD

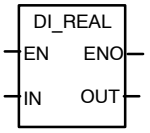
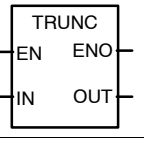
Instruction		Ladder Symbol	Valid Operands
Divide	If EN = 1, b = b ÷ a Out: 16 bit remainder Out+2: 16 bit quotient		Enable: EN In: VW, T, C, IW, QW, MW, AC, Constant, LW Out: VD, ID, QD, MD, LD
Add **Subtract** **Real Numbers**	If EN = 1, b = a + b b = b – a		Enable: EN In: VD, ID, QD, MD, AC, Constant, LD Out: VD, ID, QD, MD, AC, LD
Multiply **Divide** **Real Numbers**	If EN = 1, b = a x b b = b ÷ a		Enable: EN In: VD, ID, QD, MD, AC, Constant, LD Out: VD, ID, QD, MD, AC, LD

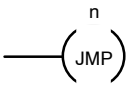
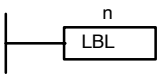
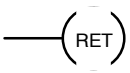
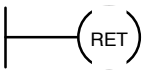
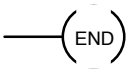
INCREMENT, DECREMENT			
Instruction		**Ladder Symbol**	**Valid Operands**
Increment **Decrement** **Byte**	If EN = 1, a = a + 1 a = a – 1		Enable: EN In: VB, IB, QB, MB, AC, Constant LB Out: VB, IB, QB, MB, AC, LB
Increment **Decrement** **Word**	If EN = 1, a = a + 1 a = a – 1 a = /a		Enable: EN In: VW, T, C, IW, QW, MW, AC, Constant, LW Out: VW, T, C, IW, QW, MW, AC, LW
Increment **Decrement.**	If EN = 1, a = a + 1 a = a – 1		Enable: EN In: VD, ID, QD, MD, AC, Constant, LD Out: VD, ID, QD, MD, AC, LD

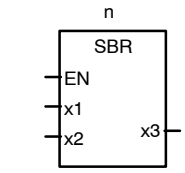
LOGIC OPERATIONS			
Instruction		**Ladder Symbol**	**Valid Operands**
Byte AND **Byte OR** **Byte XOR**	If EN = 1, b = a AND b b = a OR b b = a XOR b		Enable: EN In: VB, IB, QB, MB, AC, Constant, LB Out: VB, IB, QB, MB, AC, LB
Word AND **Word OR** **Word XOR**	If EN = 1, b = a AND b b = a OR b b = a XOR b		Enable: EN In: VW, T, C, IW, QW, MW, AC, Constant, LW Out: VW, T, C, IW, QW, MW, AC, LW

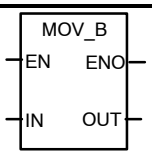
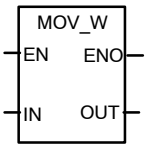
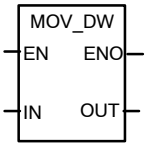
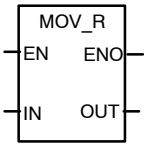
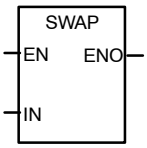
Instruction		Ladder Symbol	Valid Operands
DWord AND **DWord OR** **DWord XOR**	If EN = 1, b = a AND b b = a OR b b = a XOR b		Enable: EN In: VD, ID, QD, MD, AC, Constant, LD Out: VD, ID, QD, MD, AC, LD
Invert Byte	If EN = 1, a = /a		Enable: EN In: VB, IB, QB, MB, AC, Constant, LB Out: VB, IB, QB, MB, AC, LB
Invert Word	If EN = 1, a = /a		Enable: EN In: VW, T, C, IW, QW, MW, AC, Constant, LW Out: VW, T, C, IW, QW, MW, AC, LW
Invert DWord	If EN = 1, a = /a		Enable: EN In: VD, ID, QD, MD, AC, Constant, LD Out: VD, ID, QD, MD, AC, LD

SHIFT AND ROTATE OPERATIONS			
Instruction		**Ladder Symbol**	**Valid Operands**
Shift Right **Shift Left**	If EN = 1, a = a SR c bits a = a SL c bits		Enable: EN In: VB, IB, QB, MB, AC, Constant, LB Out: VB, IB, QB, MB, AC Count: VB, IB, QB, MB, AC, Constant, LB
Shift Right **Shift Left**	If EN = 1, a = a SR c bits a = a SL c bits		Enable: EN In: VW, T, C, IW, QW, MW, AC, Constant, LW Out: VW, T, C, IW, QW, MW, AC, LW Count: VB, IB, QB, MB, AC, Constant, LB
DWord Shift R **DWord Shift L**	If EN = 1, a = a SR c bits a = a SL c bits		Enable: EN In: VD, ID, QD, MD, AC, Constant, LD Out: VD, ID, QD, MD, AC, LD Count: VB, IB, QB, MB, AC, Constant, LB

CONVERSION OPERATIONS			
Instruction		**Ladder Symbol**	**Valid Operands**
Convert Double Word Integer to a Real	If EN = 1, convert the double word integer i to a real number o.		Enable: EN In: VD, ID, QD, MD, AC, Constant, LD Out: VD, ID, QD, MD, AC, LD
Convert a Real to a Double Word Integer	If EN = 1, convert the real number i to a double word integer o.		Enable: EN In: VD, ID, QD, MD, AC, Constant, LD Out: VD, ID, QD, MD, AC, LD

PROGRAM CONTROL FUNCTIONS			
Instruction		**Ladder Symbol**	**Valid Operands**
Jump to Label	If EN = 1, go to label n.		Enable: EN Label: WORD: 0–127
Label	Label marker for the jump.		Label: WORD: 0–127
Conditional Return from Subroutine	If EN = 1, exit the subroutine.		Enable: EN
Return from Subroutine	Exit subroutine.		
Conditional End	If EN = 1, END terminates the main scan.		Enable: EN

PROGRAM CONTROL FUNCTIONS			
Instruction		**Ladder Symbol**	**Valid Operands**
Subroutine	If EN ↗, go to subroutine n.	 (x... optional parameters)	Label: Constant : 0–63

MOVE, FILL AND FIND OPERATIONS			
Instruction		**Ladder Symbol**	**Valid Operands**
Move Byte	If EN = 1, copy i to o.		Enable: EN In: VB, IB, QB, MB, AC, Constant, LB Out: VB, IB, QB, MB, AC, LB
Move Word	If EN = 1, copy i to o.		Enable: EN In: VW, T, C, IW, QW, MW, AC, Constant, LW Out: VW, T, C, IW, QW, MW, AC, LW
Move DWord	If EN = 1, copy i to o.		Enable: EN In: VD, ID, QD, MD, AC, Constant, LD Out: VD, ID, QD, MD, AC, LD
Move Real	If EN = 1, copy i to o.		Enable: EN In: VD, ID, QD, MD, AC, Constant, LD Out: VD, ID, QD, MD, AC, LD
Swap Bytes	If EN = 1, exchange MSB and LSB of w.		Enable: EN In: VW, IW, QW, MW, T, C, AC, LW

5.4.3 Program organization

Every programmer should structure the user program divided into separate program sections (subroutines). The S7−200 programming language offers the user the possibility to create a structured user program. There are two program types − main program and subroutine. Eight program levels are possible.

A PLC cycle can be a multiple of the control−internal interpolation cycle (IPO cycle). The machine manufacturer must set the PLC cycle according to his particular conditions (see machine data ”PLC_IPO_TIME_RATIO”). An IPO/ PLC ratio of 1:1 has been proven to provide the fastest possible cyclic program execution.

Example: The programmer will write a sequence control in the main program using a cycle defined by himself. This sequence control will organize all cyclic signals in the subroutine (UP0); UP1/UP2 are called every two cycles, and UP3 controls all signals at an interval of three cycles.

5.4.4 Data organization

The data can be divided into three areas:

- non−retentive data
- retentive data
- machine data for the PLC (all these machine data are active after POWER ON).

Most of the machine data, such as process image, timer and counter are non−retentive data which are deleted each time when the control system is powered up.

The data area 1400 0000 −1400 0127 is reserved for the retentive data. The user can here store all data which are to remain valid after POWER ON.

The user can either load the data in his program with default data using the PLC machine data (see ”User interface”) or parameterize various program sections.

5.4.5 Interface to the control system

This interface can be selected via **SYSTEM**, softkeys **PLC > STEP7−connect**.

This V24 interface continues to be active even after cold restart or normal booting. The connection (STEP7 connect active) to the control system can be checked in the ”PLC/information” menu of the PLC 802 Programming Tool. If the interface is active, the active PLC mode, for example (Run/Stop) is displayed in this window.

5.4.6 Testing and monitoring your program

A check or error analysis of the user program is possible as follows:

- PLC status: Display and change of called operands
- Status list: Display and change of three freely selectable variable fields
- PLC program: Display and monitoring (status) of the entire user program including symbols and comments
- PT PLC 802: Connecting a PG/PC and activating the PT. Connection also possible via modem

5.5 PLC applications "Download/Upload/Copy/Compare"

The user can save, copy or overwrite the PLC project or the PLC applications in the control system.

This is possible using

- PLC 802 Programming Tool
- WINPCIN (binary file)
- NC card

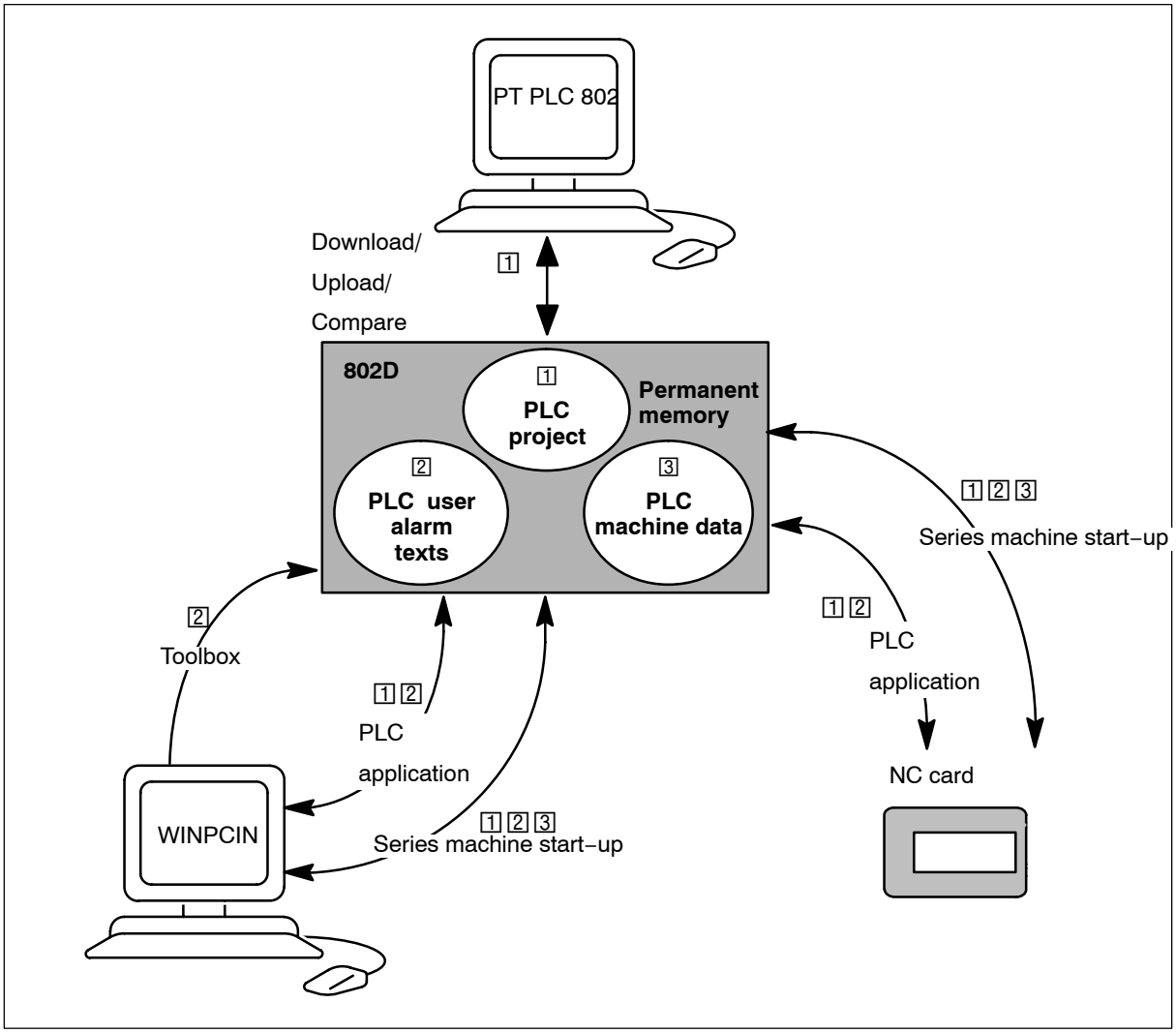


Fig. 5-1 PLC applications in the control system

Download

This function writes the transmitted data to the permanent memory (load memory) of the control system.

- Download from the PLC project using the PLC 802 Programming Tool (Step 7 connect on)
- Machine series start−up using the WINPCIN tool (PLC MD, PLC project and user alarm texts), DataIn or the NC card.
- Reading in PLC applications using the WINPCIN tool or theNC card (PLC project and user alarm texts) analogously to the series machine start−up DataIn

When the control system is powered up next time, the loaded PLC user program is transferred from the permanent memory to the user memory and is active in the control system from this moment.

Upload

The PLC applicationscan be saved from the permanent memory of the control system using the either PLC 802 Programming Tool, WINPCIN or the NC card.

- Upload from the PLC project using the PLC 802 Programming Tool (Step 7 connect on)

  Reading out the project from the control system and thus reconstructing the current project in the PLC 802 Programming Tool.
- Machine series start−up ”Start−up data” using the WINPCIN tool (PLC MD, PLC project and user alarm texts), DataIn or the NC card.
- Reading out PLC applications using the WINPCIN tool or theNC card (PLC project and user alarm texts) analogously to the series machine start−up DataOut

Compare

This function compares the project contained in the PLC 802 Programming Tool with the project loaded in the permanent memory (load memory) in the control system.

Version display

This function is called using the **SYSTEM** hardkey, **Service Display** / **Versionsoftkeys.**

- **Project**
  The transferred project including the user program which is active in the user memory of the PLC after booting of the control system.

  The programmer can use the start of the first comment line in the comment of OB1 in the PLC 802 Programming Tool for his own supplementary information in the version display (see ”View Properties”).

5.6 User interface

This interface comprises all signals exchanged between NCK/PLC and HMI/PLC. In addition, the PLC decodes all auxiliary function commands for processing in the user program.

Note for the reader

/FB/ Sinumerik 802D Description of Functions, Chapter 20

Series Machine Start−Upand Data Backup

6

6.1 Series machine start−up

Functionality

The objective of the machine start−up is:

- to bring another control system at a machine of the same type to the samecondition as after a commissioning

  or

- to bring a new control system to the initial state in case of servicing (after hardware replacement) with lowest possible expenditure.

Series start−up file

The series machine start−up file contains the following data:

- Machine data
- R parameters
- PLC user alarm texts
- Display machine data
- PLC user program
- Part programs
- Cycles
- Setting data
- Work offsets
- Tool offsets
- Leadscrew error compensation data
- SIMODRIVE 611UE drive machine data (This data is only transferred with the drive connected.)

Prerequisites

The prerequisite for the series start−up is a PC with V24 interface for data transfer from/to the control system, or an NC card.

In the PC, the **WINPCIN** tool must be used.

Sequence with PC

1. Create a series machine start−up archive in the PC (data transfer from the control system to the PC):
   - Establish a V24 cable connection between the PC (COM port) and the SINUMERIK 802D (COM1).
   - Use the WINPCIN tool to make the following settings in the **RS232 Config** menu (the settings not printed in bold correspond to the default setting when starting WINPCIN):

Com Port	Number of the PC COM to SINUMERIK 802D
Baud rate:	**19200**
Parity	none
Data bits:	8
Stop bit:	1
Software (XON/XOFF):	OFF
Hardware (RTS/CTS):	ON
Timeout:	0s
BIN format ON	

   - Call the **Receive Data** menu in the PC,
     enter the file name (any archive name) and star the transfer.
     The PC will switch to receive and is awaiting data from the control system.
   - The control system requires the password for protection level 2.
   - In the **System > Data I/O > RS232 settings** menu, make the same settings as in the WINPCIN tool and save them.
   - Select the **Start−up data PC" >**line from the **Data I/O** menu and use **Read out** to read out the series machine start−up file.
2. Reading in the series start−up file from the PC into the SINUMERIK 802D
   - Make the relevant settings for the V24 interface on the PC as specified under 1.
   - Select the **Start−up data PC" >** line from the **Data I/O** menu and use **Read in** to read in the series machine start−up file. The control system is now ready to receive.
   - Use WINPCIN on your PC to open the series machine start−up file from the **Send Data** menu, starting the data transfer.
   - Once reading−in has started, confirm the start of the series machine start−up in the control system.
   - The control system reboots several times both during and at the end of the data transfer. After an error−free data transfer, the control system is in a fully configured operating condition.

Sequence with NC card

Important

Make sure that a flash−file system (max. 2 MB possible) is formatted on the NC card. (see Section 6.3)

Never insert or remove the NC card when the PCU is connected to the mains. Do not insert or remove the NC card with the control system turned on; otherwise, the NC card can be damaged.

1. Creating a series machine start−up file on the NC card:
   - Before booting the control system, make sure that the NC card (flash card from Siemens) is inserted!
   - The control system requires the password for protection level 2.
   - **> Select the "Start−up data NC−Card"** line from the **Data I/O menu** and use the "Read out" softkey to read out the series machine start−up file.
2. Reading in the series start−up file from the NC card into the SINUMERIK 802D
   - Before booting the control system, make sure that the NC card (flash card from Siemens) is inserted!
   - The control system requires the password for protection level 2.
   - **> Select the "Start−up data NC−Card"** line from the **Data I/O menu** and use the "Read in" softkey to read in the series machine start−up file.

6.2 Data backup

6.2.1 Internal data backup

The data of the limited−buffered memory must be saved via a backup copy to the permanent memory of the control system. This backup is performed internally and required whenever the control system has been switched off for more than 50 hours (with control system ON min. 10 min/day).

Recommendation: After changing important data, it is recommended to carry out a data backup **immediately**.

Note

During the data backup, an image of the limited−buffered memory is produced and stored in the permanent memory. A backup of selected data (e.g. only machine data and no workpiece programs) is not possible.

Performing an internal data backup

In the **System** operating area or in the **Program Manager**, select the **Save data** softkey (at least protection level 3 required).

Loading internally backed−up data

- Boot the control system in the start−up mode ”Reload saved user data”.
- In case of data loss of the buffered memory, the data saved in the permanent memory are automatically reloaded into the memory with **POWER ON**.

Note

Message ”4062 Data backup copy has been loaded” is displayed on the screen.

6.2.2 External data backup via V24

Important

Never connect or disconnect the V24 cable when the PCU is connected to the mains.

In addition to an internal data backup, the user data of the control system can also be saved externally. To do so, a PC with V24 interface and the **WINPCIN** tool (included in the toolbox) are required.

An external data backup should be performed if major data changes have been made or always at the end of the start−up.

To create a complete data backup for a machine, it is sufficient to create the series machine start−up file.

Variants of external data backup:

1. Reading out the data completely: **Series machine start−up**
2. The files are read out / read in by areas. If the cursor is positioned on the ”Start−up data PC” line, all user data are transferred together.
   The following user data can be selected as **individual files**:

   Data
   - Machine data
   - Setting data
   - Tool data
   - R parameters
   - Work offset
   - Compensation data (leadscrew error compensation − LEC)

   Part programs

   Standard cycles

   User cycles

   PLC programs (binary file)

Performing the external data backup:

- In the **System >menu, Data I/O> RS232 settings**, select ”Text format”.
- In WINPCIN, select also ”Text format”.
- In the **System >menu, Data I/O> Data selection**, transfer the user data either area by area or as individual files via the V24 interface to an external PC.

Loading externally saved files into the control system:

In the **System >menu, Data I/O** , select the **Read in** softkey.

6.2.3 External data backup via NC card

Important

Make sure that a flash−file system (max. 2 MB possible) is formatted on the NC card. (see Section 6.3)

Never insert or remove the NC card when the PCU is connected to the mains. Do not insert or remove the NC card with the control system turned on; otherwise, the NC card can be damaged.

Variants of data backup on the NC card

- Start−up data
- Reading out the PLC application
- Display machine data
- PLC useralarm texts
- Part programs NC −> NC card (not with the 802D base line)
- Part programs NC card −> NC (not with the 802D base line)
- HMI start−up files (start−up data with the languages loaded)

Performing the external data backup

In the **Data I/O** menu, use the **Read−in** / **Read−out** softkeys to activate the process.

6.3 Formatting an NC card

An appropriate menu item for formatting the NC card has been implemented in the Start menu. By selecting ”Format NC card”, an inserted NC card can be deleted and, subsequently, a 1.5 MB file system can be formatted thereon.

Note

This menu item is only displayed if protection level 0 ... 3 is set.

Sequence

- NC card inserted; turn on the control system.
- After the DRAM check, press the ” Select” key.
- In the ”Start” menu (SWITCH ON MENUE), select the ”Format NC card” menu item.
- At completion of the initialization, answer the question ”Do you really want ... [N/Y]?”.
  “N” will cancel the process without formatting;
  ”Y” will start the formatting once **Input** is pressed.
- After completion of formatting, further PC cards can be formatted.
  ”Format another NC card [N/Y]?”
  ”Y” After changing the card, the process restarts from the beginning.
  “N” Quits the process.
- Perform a POWER ON for the control system (turn off and back on again the CNC).

Note

The 8 MB NC card from Siemens with system software for the update also contains a file system with a residual memory capacity of approx. 900 kB.

If the Sinucopy program from Siemens is installed on your PC, you can create a file system up to 2MB on an empty NC card. A larger area is not managed by the control system.

6.4 Data backup in case of backlight failure

In case of backlight failure, menu−assisted operation is no longer possible for the control system. If a backlight failure has occurred on the control system, an external data backup can be performed on PC using a special command.

To this end, activate the V24 connection to a PC as described in Section 6.1 (settings ”binary format, baud rate 19200”).

After turning on the control system, issue the command **CTRL S**. Thus, a series machine start−up with the last current data is output.

Software Update via NC card

7

General

A change in the system software can be necessary for either of the following reasons:

- A new system software is to be installed (new software release).
- After replacing the hardware, if a system software other than that delivered is to be installed.

Note

An external data backup of the user data must always be performed via V.24 (see Section 6.1) or NC card (see Section 6.2).

Sequence

Prerequisite: The control system is turned off.

1. Insert the supplied NC card with the system software and the flash−file system.

Caution

Never insert or remove the NC card when the PCU is connected to the mains. Do not insert or remove the NC card with the control system turned on; otherwise, the NC card can be damaged.

Attention: Software release 02.xx.xx can only be loaded on a hardware with 32MB user memory. This hardware configuration can be identified via the order number ("MLFB")6FC5610−0BA10−0BA1.

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2. Turning on the control system
3. as per display on the screen

   "DRAM CHECK"
   "You can press SELECT−Key to get START UP MENU after DRAM Check"

   Press the **SELECT** key.
4. Upon completion of the DRAM test, the selection menu appears.

   Use the cursor to select "Software update" and press **INPUT** to confirm.
5. The update is performed. The progress of the update is displayed via appropriate messages on the screen.

   If the update was successful, the following message is displayed on the screen:

”SINUMERIK 802D – UPDATE O. K.”
”VERSION 802D SW xx.xx.xx

6. Perform a POWER ON for the control system (turn off and back on again the CNC.
7. The update is completed, and the user data can be reloaded after setting the password.

Note

If necessary, load a language as described in Section 3.3.

Machine and Setting Data 802D

Data type

BOOLEAN	Boolean value: 1 (TRUE) or 0 (FALSE)
BYTE	8–bit value, as an INTEGER value: -128 ... 127, as a hexadecimal value: 00 ... FF as a character as per ASCII character set, e.g. ”a”
STRING	Sequence of characters (max. 16)
WORD	16–bit value, as an INTEGER value: -32768 ... 32767, as a hexadecimal value: 0000 ... FFFF
UNSIGNED WORD	16–bit value, as an INTEGER value: 0 ... 65535, as a hexadecimal value: 0000 ... FFFF
INTEGER	16–bit value (here defined locally), INTEGER value: -32768 ... 32767
DWORD	32–bit value, as an INTEGER value: –2147483648 ... 2147483647, as a hexadecimal value: 0000 0000 ... FFFF
UNSIGNED WORD	32–bit value, as an INTEGER value: 0 ... 4294967295, as a hexadecimal value: 0000 0000 ... FFFF FFFF
DOUBLE	64–bit value, floating point value: $\pm$ 4.19 · 10^{-307} ... $\pm$ 1.67 · 10^{308}

Range of values (minimum/maximum value)

If no range of values is specified, the data type will determine the input limits, and the filed will be marked with ”***”.

8.1 List of machine data

8.1.1 Display machine data

Number	MD identifier				Cross ref. to the relevant chapter in the Description of Functions
Schematic view	Name, miscellaneous			**Activation**	Read/write protection level
Unit	Default value	Minimum value	Maximum value	Data type	
202	**FIRST_LANGUAGE**				**19**
decimal	Foreground language			**POWER ON**	2/3
0	2	1	2	BYTE	
203	**DISPLAY_RESOLUTION**				**19**
decimal	Display resolution			**immediately**	2/3
0	3	0	5	BYTE	
204	**DISPLAY_RESOLUTION_INCH**				**19**
decimal	Display resolution			**immediately**	2/3
0	4	0	5	BYTE	
205	**DISPLAY_RESOLUTION_SPINDLE**				**19**
decimal	Display resolution			**immediately**	2/3
0	1	0	5	BYTE	
208	**USER_CLASS_WRITE_TOA_GEO**				
decimal	Protection level for "Write tool geometry"			**immediately**	3/3
0	3	0	7	BYTE	
209	**USER_CLASS_WRITE_TOA_WEAR**				
decimal	Protection level for "Write wear data"			**immediately**	3/3
0	3	0	7	BYTE	
210	**USER_CLASS_WRITE_ZOA**				
decimal	Protection level for "Write settable work offset"			**immediately**	3/3
0	3	0	7	BYTE	
212	**USER_CLASS_WRITE_SEA**				
decimal	Protection level for "Write setting data"			**immediately**	3/3
0	7	0	7	BYTE	
213	**USER_CLASS_READ_PROGRAM**				
decimal	Protection level for "Read part program"			**immediately**	3/3
0	7	0	7	BYTE	
214	**USER_CLASS_WRITE_PROGRAM**				
decimal	Protection level for "Enter part program"			**immediately**	3/3
0	3	0	7	BYTE	
215	**USER_CLASS_SELECT_PROGRAM**				
decimal	Protection level for program selection			**immediately**	3/3
0	3	0	7	BYTE	

217	USER_CLASS_WRITE_CYCLES				
decimal	Protection level for "Write cycles"			**immediately**	3/3
0	3	0	7	BYTE	

218	USER_CLASS_WRITE_RPA				
decimal	Protection level for "Write R parameters"			**immediately**	3/3
0	3	0	7	BYTE	

219	USER_CLASS_SET_V24				
decimal	Protection level for "Set V24"			**immediately**	3/3
0	3	0	7	BYTE	

221	USER_CLASS_DIR_ACCESS				
decimal	Protection level for directory access			**immediately**	3/3
0	3	0	7	BYTE	

222	USER_CLASS_PLC_ACCESS				
decimal	Protection level for PLC project			**immediately**	2/2
0	3	0	7	BYTE	

223	USER_CLASS_WRITE_PWA				
decimal	Protection level for protected working area			**immediately**	2/3
0	7	0	7	BYTE	

247	V24_PG_PC_BAUD				
Bit pattern	PG: Baud rate (300, 600, 1200, 2400, 4800, 9600, 19200, 38400)			**immediately**	3/3
0	7	0	7	BYTE	

280	V24_PPI_ADDR_PLC				
	PLCstation address			**POWER ON**	3/3
	2	0	126	BYTE	

281	V24_PPI_ADDR_NCK				
	NCKstation address			**POWER ON**	3/3
	3	0	126	BYTE	

289	CTM_SIMULATION_TIME_NEW_POS				10 (K1)
decimal	Simulation of actual–value refresh rate			**immediately**	3/4
0	100	0	4000	INTEGER	

290	CTM_POS_COORDINATE_SYSTEM				10 (K1)
decimal	Position of the coordinate system			**immediately**	3/4
0	2	0	7	BYTE	

291	CTM_CROSS_AX_DIAMETER_ON				10 (K1)
decimal	Diameter for "Transverse axis active"			**immediately**	3/4
0	1	0	1	BYTE	

292	CTM_G91_DIAMETER_ON				10 (K1)
decimal	Incremental feed			**immediately**	3/7
0	1	0	1	BYTE	

305	G_GROUP1				
decimal	User–oriented G group for position display			**immediately**	3/7
0	1	1	1000	INTEGER	

306	G_GROUP2				
decimal	User−oriented G group for position display			**immediately**	3/7
0	2	1	1000	INTEGER	

307	G_GROUP3				
decimal	User−oriented G group for position display			**immediately**	3/7
0	8	1	1000	INTEGER	

308	G_GROUP4				
decimal	User−oriented G group for position display			**immediately**	3/7
0	9	1	1000	INTEGER	

309	G_GROUP5				
decimal	User−oriented G group for position display			**immediately**	3/7
0	10	1	1000	INTEGER	

310	FG_GROUP1				
decimal	User−oriented G group for position display (external language)			**immediately**	3/7
0	1	1	1000	INTEGER	

311	FG_GROUP2				
decimal	User−oriented G group for position display (external language)			**immediately**	3/7
0	2	1	1000	INTEGER	

312	FG_GROUP3				
decimal	User−oriented G group for position display (external language)			**immediately**	3/7
0	8	1	1000	INTEGER	

313	FG_GROUP4				
decimal	User−oriented G group for position display (external language)			**immediately**	3/7
0	9	1	1000	INTEGER	

314	FG_GROUP5				
decimal	User−oriented G group for position display (external language)			**immediately**	3/7
0	10	1	1000	INTEGER	

330	CMM_POS_COORDINATE_SYSTEM				
decimal	Coordinate position of machine ***)**			**immediately**	3/7
0	0	0	7	BYTE	

***) Explanation:**

Both the position and the size of the representation are handed over during initialization. The position of the coordinate system can be influenced by the parameter "Axis direction" in the header of the file.

The following positions are possible:

	Position	X+	Z+
0	to the top	to the right	
1	to the top	to the left	
2	downwards	to the right	
3	downwards	to the left	
4	**to the right**	**upwards**	
5	to the left	upwards	
6	to the right	downwards	
7	to the left	downwards	

The positions of the elements must be specified in position 4 (mathematic coordinate system). The simulation will then automatically convert the representation to the relevant system.

331	CONTOUR_MASK				
decimal	Activate the 802blueprint programming			**immediately**	3/7
0	1	0	1	BYTE	

332	TOOL_LIST_PLACE_NO				
decimal	Activate location number in tool list			**immediately**	3/3
0	0	0	1	INTEGER	

343	V24_PPI_ADDR_MMC				
decimal				**POWER ON**	3/3
0	4	0	126		

344	V24_PPI_MODEM_ACTIVE				
decimal				**immediately**	3/3
0	0	0	1	Byte	

345	V24_PPI_MODEM_BAUD				
decimal	Baud rate for modem connection			**immediately**	3/3
0	7	5	9	Byte	

346	V24_PPI_MODEM_PARITY				
decimal	Parity for modem connection			**immediately**	3/3
0	0	0	2	Byte	

347	V24_PPI_MODEM_STOPBIT				
decimal	Number of stop bits for connection to a modem			**immediately**	3/3
	0	0	1	Byte	

348	V24_PPI_MODEM_DATABITS				
decimal	Number of data bits for connection to a modem			**immediately**	3/3
	1	0	1	Byte	

356	HMI_COL_TITLE_FOCUS_FORE				
decimal	Color settings title bar focus window foreground			immediately	0/3
	15	0	15	Byte	

357	HMI_COL_TITLE_FOCUS_BACK				
decimal	Color settings title bar focus window background			**immediately**	0/3
	2	0	15	Byte	

358	HMI_COL_SK_FORE				
decimal	Color settings softkey foreground			**POWER ON**	3/3
	0	0	15	Byte	

359	HMI_COL_SK_BACK				
decimal	Color settings softkey background			**POWER ON**	3/3
	7	0	15	Byte	

360	SPINDLE_LOAD_DISPL1				
decimal	Activate utilization display for spindle 1			**immediately**	3/3
	0	0	1	INTEGER	

361	USER_MEAS_TOOL_CHANGE				
decimal	Input enable for T/D no. in the "Tool gauging" window			**immediately**	3/3
	0	0	1	Byte	

362	SPINDLE_LOAD_DISPL2				
decimal	Activate utilization display for spindle 2			**immediately**	3/3
	1	0	1	INTEGER	

363	SPINDLE_LOAD_BAR_LIM2				
decimal	Activate utilization display for the spindle, limit value 2			**immediately**	2/2
	100	0	9999999	INTEGER	

364	SPINDLE_LOAD_BAR_LIM3				
decimal	Activate utilization display for the spindle, limit value 3			**immediately**	2/2
	100	0	9999999	INTEGER	

365	SPINDLE_LOAD_BAR_MAX				
decimal	Utilization display for the spindle, maximum			**immediately**	2/2
	120	0	120	INTEGER	

366	SPINDLE_LOAD_BAR_COL1				
decimal	Utilization display color for the spindle, range 1			**immediately**	3/3
	10	0	15	Byte	

367	SPINDLE_LOAD_BAR_COL2				
decimal	Utilization display color for the spindle, range 2			**immediately**	3/3
	9	0	15	Byte	

368	SPINDLE_LOAD_BAR_COL3				
decimal	Utilization display color for the spindle, range 3			**immediately**	3/3
	9	0	15	Byte	

369	PROBE_MODE				
decimal	Measuring system type: 1: Probe, 2: Opt. measuring technique			**immediately**	3/3
	1	0	2	INTEGER	

370	TOOL_REF_PROBE_AXIS1				
decimal	Absolute position of probe X			**immediately**	2/2
	0	–999999.999	999999.999	DOUBLE	

371	TOOL_REF_PROBE_AXIS2				
decimal	Absolute position of probe Y			**immediately**	2/2
	0	–999999.999	999999.999	DOUBLE	

372	TOOL_REF_PROBE_AXIS3				
decimal	Absolute position of probe Z			**immediately**	2/2
	9	–999999.999	999999.999	DOUBLE	

373	MEAS_SAVE_POS_LENGTH2				
decimal	Activate tool gauging; select "Save Pos" softkey for all values			**immediately**	2/2
	0	0	1	Byte	

374	TOOL_WEAR_LIMIT_VALUE				
decimal	Limit value for wear control during input			**immediately**	2/2
	9.999	0	9.999	DOUBLE	

375	USER_CLASS_READ_CUS_DIR				
decimal	Protection level for "Read user cycles"			**immediately**	2/3
0	7	0	7	Byte	

376	USER_CLASS_WRITE_CUS_DIR				
decimal	Protection level for "Write user cycles"			**immediately**	2/2
0	2	0	7	Byte	

377	USER_CLASS_WRITE_TO_MON_DAT				
decimal	Protection level for "Tool monitoring"			**immediately**	2/3
0	3	0	7	Byte	

378	USER_CLASS_LADDER_VIEW				
decimal	Protection level for "Select user ladder view"			**immediately**	2/2
0	2	0	7	Byte	

379	SPINDLE_DISP_MODE				
decimal	0: Standard mode, display of spindle speed 1: Constant cutting rate, display with G96 set 2: Mixed display			**immediately**	3/3
0	0	0	2	Byte	

8.1.2 General machine data

Number	MD identifier				Cross ref. to the relevant chapter in the Description of Functions
Unit	Name, miscellaneous			**Activation**	Read/write protection level
Schematic view	Default value	Minimum value	Maximum value	Data type	

10000	AXCONF_MACHAX_NAME_TAB[0]...[4]				19
–	Machine axis name			**POWER ON**	2/2
always		–	–	STRING	
Turning	X1, Z1, SP, A1, B1	–	–	STRING	
Milling	X1, Y1, Z1, SP, A1	–	–	STRING	

10074	PLC_IPO_TIME_RATIO				19
–	Factor of the PLC task for main run			**POWER ON**	2/2
always	2	1	50	DWORD	

10136	DISPLAY_MODE_POSITION				21
–	Display mode for actual position in the WCS			**RESET**	2/2
always	0	0	1	DWORD	

10200	INT_INCR_PER_MM				3 (G2)
–	Computational resolution for linear positions			**POWER ON**	2/2
always	1000	1	1000000000	DOUBLE	

10210	INT_INCR_PER_DEG				3 (G2)
–	Computational resolution for angular positions			**POWER ON**	2/2
always	1000	1	1000000000	DOUBLE	

10240	SCALING_SYSTEM_IS_METRIC				3 (G2)
–	Metric basic system			**POWER ON**	2/2
always	1	***	***	BOOLEAN	

10713	**M_NO_FCT_STOPRE** [n]: 0 ... Max. permissible M function number –1				
–	M function with preprocessing stop			**POWER ON**	2/2
always	–1, –1, –1, –1, –1, –1, –1, –1, –1, ...	–	–	DWORD	

10714	M_NO_FCT_EOP				
–	M function active for spindle after reset			**POWER ON**	2/2
always	–1	–	–	DWORD	

10715	M_NO_FCT_CYCLE[0]				
–	M function to be replaced by a subroutine			**POWER ON**	2/2
always	–1	–1	999999	DWORD	

10716	M_NO_FCT_CYCLE_NAME				
–	Name of subroutine for the M function to be replaced			**POWER ON**	2/2
always	""	–	–	STRING	

10717	T_NO_FCT_CYCLE_NAME				
–	Name of subroutine for the T function to be replaced			**POWER ON**	2/2
always	""	–	–	STRING	

10718	M_NO_FCT_CYCLE_PAR				
–	M function replacement by parameters			**POWER ON**	2/2
always	–1	–	–	DWORD	

10719	T_NO_FCT_CYCLE_MODE				
–	Parameterization of the T function replacement			**POWER ON**	2/2
always	0	0	1	DWORD	

10760	G53_TOOLCORR				
–	Activation as with G53			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

10880	MM_EXTERN_CNC_SYSTEM				
–	Definition of the control system to be adapted			**POWER ON**	2/2
always		1	2	DWORD	
Turning	2	1	2	DWORD	
Milling	1	1	2	DWORD	

10881	MM_EXTERN_GCODE_SYSTEM				
–	ISO_3 Mode: GCodeSystem			**POWER ON**	2/2
External NC progr. language	0	0	2	DWORD	

10882	NC_USER_EXTERN_GCODES_TAB[0]...[59]				
–	List of user–specific G commands of an external NC language			**POWER ON**	2/2
always	""	***	***	STRING	

10884	EXTERN_FLOATINGPOINT_PROG				
–	Evaluation of values programmed without decimal points			**POWER ON**	2/2
always	1	***	***	BOOLEAN	

10886	EXTERN_INCREMENT_SYSTEM				
–	Increment system			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

10888	EXTERN_DIGITS_TOOL_NO				
–	Number of digits for T number			**POWER ON**	2/2
always	2	0	8	BYTE	

10890	**EXTERN_TOOLPROG_MODE**				
HEX	Programming of tool change when working with an external language			**POWER ON**	2/2
always	0x00000000	0x00000000	0xFFFFFFFF	DWORD	

11100	**AUXFU_MAXNUM_GROUP_ASSIGN**				**13 (H2)**
–	Number of auxiliary functions in AuxF groups			**POWER ON**	2/2
always	1	1	64	DWORD	

11210	**UPLOAD_MD_CHANGES_ONLY**				**19**
HEX	MD backup only for changed MD			**immediately**	2/2
–	0x0F	0x00	0x0FF	BYTE	

11240	**PROFIBUS_SDB_NUMBER**				**3 (G2)**
–	SDB1000 number			**POWER ON**	2/2
always	0	0	6	BYTE	

11250	**PROFIBUS_SHUTDOWN_TYPE**				
–	Profibus shutdown handling			**POWER ON**	2/2
always	0	0	2	BYTE	

11310	**HANDWH_REVERSE**				**9 (H1)**
–	Threshold for handwheel direction reversal			**POWER ON**	2/2
always	2	0	***	BYTE	

11320	**HANDWHL_IMP_PER_LATCH[0]...[5]**				**9 (H1)**
–	Handwheel pulses per locking position			**POWER ON**	2/2
always	1., 1., 1., ...	***	***	DOUBLE	

11346	**HANDWH_TRUE_DISTANCE**				**9 (H1)**
–	Handwheel travel or speed specification			**POWER ON**	2/2
always	0	0	3	BYTE	

13060	**DRIVE_TELEGRAM_TYPE[0]...[8]**				**3 (G2)**
–	Standard message frame type for Profibus DP			**POWER ON**	2/2
always	102, 102, 102, 102, 102	***	***	DWORD	

13070	**DRIVE_FUNCTION_MASK[0]...[8]**				
–	Used DP functions			**POWER ON**	2/2
Profibus adapter	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ...	–	–	DWORD	

13080	**DRIVE_TYPE_DP[0]...[8]**				
–	Drive type with Profibus			**POWER ON**	2/2
always	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ...	0	3	BYTE	

13200	**MEAS_PROBE_LOW_ACTIVE[0]**				**15 (M5)**
–	Polarity change of the probe			**POWER ON**	3/3
always	0	***	***	BOOLEAN	

13220	**MEAS_PROBE_DELAY_TIME** [n]: 0 ... 0				
s	Detection of probe deflection delay time			**POWER ON**	3/3
always	0.0, 0.0	0	0.1	DOUBLE	

14510	USER_DATA_INT[0]...[31]				19
–	User data (INT)			**POWER ON**	3/7
always	0	–32768	32767	DWORD	

14512	USER_DATA_HEX[0]...[31]				19
–	User data (HEX)			**POWER ON**	3/7
–	0	0	0x0FF	BYTE	

14514	USER_DATA_FLOAT[0]...[7]				19
–	User data (FLOAT)			**POWER ON**	3/7
–	0.0	$-3.40*10^{38}$	$3.40*10^{38}$	DOUBLE	

14516	USER_DATA_PLC_ALARM[0]...[31]				19
–	User data (HEX)			**POWER ON**	3/7
–	0, 0, 0, 0, ...	***	***	BYTE	

17530	TOOL_DATA_CHANGE_COUNTER				
–	Mark tool data change for HMI			**POWER ON**	2/2
always	0	0	0x3	DWORD	

18080	MM_TOOL_MANAGEMENT_MASK				14 (W1)
HEX	Memory reservation for tool management step by step (SRAM) Bit 1 =1: Monitoring data are loaded			**POWER ON**	2/2
always	0x0	0	0x2	DWORD	

18102	MM_TYPE_OF_CUTTING_EDGE				
–	Type of D number for programming			**POWER ON**	2/2
always	0	0	1	DWORD	

8.1.3 Channel–specific machine data

Number	MD identifier				Cross ref. to the relevant chapter in the Description of Functions
Unit	Name, miscellaneous			**Activation**	Read/write protection level
Schematic view	Default value	Minimum value	Maximum value	Data type	

20050	AXCONF_GEOAX_ASSIGN_TAB[0]...[2]				19
–	Assignment 'geometry/channel axis'			**POWER ON**	2/2
always		0	5	BYTE	
Turning	1, 0, 2	0	5	BYTE	
Milling	1, 2, 3	0	5	BYTE	

20070	AXCONF_MACHAX_USED[0]...[4]				19
–	Machine axis number valid in channel			**POWER ON**	2/2
always		0	5	BYTE	
Turning	1, 2, 3, 0, 0	0	5	BYTE	
Milling	1, 2, 3, 4, 5	0	5	BYTE	

20080	AXCONF_CHANAX_NAME_TAB[0]...[4]				19
–	Name of channel axis in the channel			**POWER ON**	2/2
always		–	–	STRING	
Turning	”X”, ”Z”, ”SP”, ” ”, ” ”	–	–	STRING	
Milling	”X”, ”Y”, ”Z”, ”SP “, ”A ”	–	–	STRING	

20090	SPIND_DEF_MASTER_SPIND				5 (S1)
–	Initial setting for master spindle in channel			**POWER ON**	2/2
always	1	1	2	BYTE	

20094	SPIND_RIGID_TAPPING_M_NR				5 (S1)
–	M function for switching to controlled axis mode (Siemens mode)			**POWER ON**	2/2
always	70	–	–	DWORD	

20095	EXTERN_RIGID_TAPPING_M_NR				
–	M function for switching to controlled axis mode (”External” mode)			**POWER ON**	2/2
always	29	–	–	DWORD	

20108	PROG_EVENT_MASK				
–	EEvent–controlled program calls			**POWER ON**	2/2
always	0x0	0	0xF	DWORD	

20140	TRAFO_RESET_VALUE				18 (M1)
–	Transformation data record selected during power–up (Reset/TP end)			**RESET**	2/2
Fct.: Trans-formations	0	0	8	BYTE	

20156	**EXTERN_GCODE_RESET_MODE** [n]: 0 ... 30				
–	Reset behavior of the external G groups			**RESET**	2/2
External NC progr. language	–	0	1	BYTE	

20204	WAB_CLEARANCE_TOLERANCE				
mm	Direction reversal with SAR			**POWER ON**	2/2
always	0.01	0.0	plus	DOUBLE	

20310	TOOL_MANAGEMENT_MASK				14 (W1)
HEX	Activation of the tool management in various configurations			**POWER ON**	2/2
always	0x0	0	0x2	DWORD	

20320	TOOL_TIME_MONITOR_MASK				
HEX	Activation of the tool time monitoring for the tool in spindle 1...x			**POWER ON**	2/2
always	0x1	–	–	DWORD	

20360	TOOL_PARAMETER_DEF_MASK				14 (W1)
HEX	Definition of the tool parameters			**POWER ON**	2/2
always	0x0	0	0x01	DWORD	

20380	TOOL_CORR_MODE_G43G44				
–	Handling of tool length compensation with G43 / G44			**RESET**	2/2
External NC progr. language	0	0	2	BYTE	

20384	TOOL_CORR_MULTIPLE_AXES				
–	Tool length compensation in several axes simultaneously			**RESET**	2/2
External NC progr. language	1	0	1	BOOLEAN	

20500	CONST_VELO_MIN_TIME				
s	Minimum time with constant velocity			**POWER ON**	2/2
always	0.0	0.0	0.1	DOUBLE	

20550	EXACT_POS_MODE				
–	Exact stop conditions with G00 and G01			**NEW CONF**	2/2
always	0	0	33	BYTE	

20552	EXACT_POS_MODE_G0_TO_G1				
–	Exact stop condition with the G00–>G01transition			**NEW CONF**	2/2
always	0	0	3	BYTE	

20700	REFP_NC_START_LOCK				**8 (R1)**
–	NC start disable without reference point			**RESET**	2/2
always	1	***	***	BOOLEAN	

20730	G0_LINEAR_MODE				
–	Interpolation behavior with G0			**POWER ON**	2/2
always	1	0	1	BOOLEAN	

20732	EXTERN_GO_LINEAR_MODE				
–	Interpolation behavior with G00			**POWER ON**	2/7
always	1	0	1	BOOLEAN	

20734	EXTERN_FUNCTION_MASK				
–	Function mask for external language			**RESET**	2/7
External NC progr. language	0	0	0xFFFF	DWORD	

21000	CIRCLE_ERROR_CONST				**10 (K1)**
mm	Constant for circle end point monitoring			**POWER ON**	2/2
always	0.01	***	***	DOUBLE	

21010	CIRCLE_ERROR_FACTOR				
Factor	Factor for circle end point monitoring			**POWER ON**	2/2
always	0.001	0.0	plus	DOUBLE	

21020	WORKAREA_WITH_TOOL_RADIUS				**2 (A3)**
–	Tool radius with working area limitation			**RESET**	2/2
always	0	***	***	BOOLEAN	

22000	AUXFU_ASSIGN_GROUP[0]...[63]				**13 (H2)**
–	Auxiliary function group			**POWER ON**	2/2
always	1, 1, 1, 1, 1, ...	1	64	BYTE	

22010	AUXFU_ASSIGN_TYPE[0]...[63]				**13 (H2)**
–	Auxiliary function type			**POWER ON**	2/2
always	"", "", "", ...	–	–	STRING	

22020	AUXFU_ASSIGN_EXTENSION[0]...[63]				13 (H2)
–	see MD 22010 AUXFU_ASSIGN_TYPE			**POWER ON**	2/2
always	0, 0, 0, ...	0	99	BYTE	

22030	AUXFU_ASSIGN_VALUE[0]...[63]				13 (H2)
–	Auxiliary function value			**POWER ON**	2/2
always	0, 0, 0, 0, ...	***	***	DWORD	

22040	AUXFU_PREDEF_GROUP				
–	Predefined auxiliary function groups			**POWER ON**	2/2
always	0	0	64	BYTE	

22050	AUXFU_PREDEF_TYPE				
–	Predefined auxiliary function type			**POWER ON**	2/2
always	–	–	–	STRING	

22060	AUXFU_PREDEF_EXTENSION				
–	Predefined auxiliary function extension			**POWER ON**	2/2
always	0	0	99	BYTE	

22070	AUXFU_PREDEF_VALUE[0]...[63]				
–	Predefined auxiliary function value			**POWER ON**	2/2
always	–	–	–	DWORD	

22254	AUXFU_ASSOC_M0_VALUE				
–	Additional M functions for program stop			**POWER ON**	2/2
always	–1	–	–	DWORD	

22256	AUXFU_ASSOC_M1_VALUE				
–	Additional M functions for conditional stop			**POWER ON**	2/2
always	–1	–	–	DWORD	

22400	S_VALUES_ACTIVE_AFTER_RESET				5 (S1)
–	S function active even after RESET			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

22534	TRAFO_CHANGE_M_CODE				18 (M1)
–	M code when switching the transformation type			**POWER ON**	2/2
Fct.: Trans-formations	0	0	99999999	DWORD	

22550	TOOL_CHANGE_MODE				14 (W1)
–	New tool compensation with T– or M function			**POWER ON**	2/2
always	0	0	1	BYTE	

22910	WEIGHTING_FACTOR_FOR_SCALE				
–	Input resolution for scaling factor			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

22914	AXES_SCALE_ENABLE				
–	Activation for axial scaling factor G51			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

22920	EXTERN_FIXED_FEEDRATE_F1_ON				
–	Activate fixed feedrate F1 – F9			**POWER ON**	2/2
External NC progr. language	0	0	1	BOOLEAN	

22930	**EXTERN_PARALLEL_GEOAX** [n]: 0 ... 2				
–	Assignment of parallel channel geometry axis			**POWER ON**	2/2
External NC progr. language	{ 0, 0, 0 }	0	10	BYTE	

24020	FRAME_SUPPRESS_MODE				
–	Positions with frame suppression			**POWER ON**	2/2
always	0x0	0	0x03	DWORD	

24100	TRAFO_TYPE_1				18 (M1)
–	Definition of transformation 1 in the channel			**NEW CONF**	2/2
Fct.: Trans-formations	0	–	–	DWORD	

24110	**TRAFO_AXES_IN_1** 0 ... max. number of axes per channel – 1				18 (M1)
–	Axis assignment for transformation			**NEW CONF**	2/2
Fct.: Trans-formations	{ 1, 2, 3, 4, 5}	0	5	BYTE	

24120	**TRAFO_GEOAX_ASSIGN_TAB_1** 0 ... 2				18 (M1)
–	Assignment of the geometry axis to the channel axis for transformation 1			**NEW CONF**	2/2
Fct.: Trans-formations	{ 0, 0, 0 }	0	5	BYTE	

24130	TRAFO_INCLUDES_TOOL_1				
–	Tool handling with active 1st transformation			**NEW CONF**	2/2
Fct.: Trans-formations	1	0	1	BOOLEAN	

24200	TRAFO_TYPE_2				18 (M1)
–	Definition of transformation 2 in the channel			**NEW CONF**	2/2
Fct.: Trans-formations	0	–	–	DWORD	

24210	**TRAFO_AXES_IN_2** 0 ... max. number of axes per channel – 1				18 (M1)
–	Axis assignment for transformation 2			**NEW CONF**	2/2
Fct.: Trans-formations	{ 1, 2, 3, 4, 5}	0	5	BYTE	

24220	**TRAFO_GEOAX_ASSIGN_TAB_2** [n]:0 ... 2				18 (M1)
–	Assignment of the geometryaxis to the channel axis for transformation 2			**NEW CONF**	2/2
Fct.: Trans-formations	{ 0, 0, 0 }	0	5	BYTE	

24230	TRAFO_INCLUDES_TOOL_2				
–	Tool handling with active 2nd transformation			**NEW CONF**	2/2
Fct.: Trans-formations	1	0	1	BOOLEAN	

24800	TRACYL_ROT_AX_OFFSET_1				18 (M1)
degrees	Offset of the rotary axis for the 1st TRACYL transformation			**NEW CONF**	2/2
Fct.: Peripheral surface transf.	0.0	–	–	DOUBLE	

24805	TRACYL_ROT_AX_FRAME_1				
degrees	Rotary axis offset TRACYL 1			**NEW CONF**	2/2
Fct.: Peripheral surface transf.	0	0	2	BYTE	

24810	TRACYL_ROT_SIGN_IS_PLUS_1				18 (M1)
–	Sign of the rotary axis for the 1st TRACYL transformation			**NEW CONF**	2/2
Fct.: Peripheral surface transf.	1	0	1	BOOLEAN	

24820	TRACYL_BASE_TOOL_1 0 ... 2				18 (M1)
mm	Vector of the base tool for the 1st TRACYL transformation			**NEW CONF**	2/2
Fct.: Peripheral surface transf.	{0.0, 0.0 , 0.0}	–	–	DOUBLE	

24850	TRACYL_ROT_AX_OFFSET_2				
degrees	Offset of the rotary axis for the 2ndTRACYL transformation			**NEW CONF**	2/2
Fct.: Peripheral surface transf.	0.0	–	–	DOUBLE	

24855	TRACYL_ROT_AX_FRAME_2				
degrees	Rotary axis offset TRACYL 2			**NEW CONF**	2/2
Fct.: Peripheral surface transf.	0	0	2	BYTE	

24860	TRACYL_ROT_SIGN_IS_PLUS_2				
–	Sign of the rotary axis for the 2ndTRACYL transformation			**NEW CONF**	2/2
Fct.: Peripheral surface transf.	1	0	1	BOOLEAN	

24870	TRACYL_BASE_TOOL_2 0 ... 2				
mm	Vector of the base tool for the 2nd TRACYL transformation			**NEW CONF**	2/2
Fct.: Peripheral surface transf.	{0.0, 0.0 , 0.0}	–	–	DOUBLE	

24900	TRANSMIT_ROT_AX_OFFSET_1				18 (M1)
degrees	Offset of the rotary axis for the 1st TRANSMIT transformation			**NEW CONF**	2/2
Fct.: Transmit transf.	0.0	–	–	DOUBLE	

24905	TRANSMIT_ROT_AX_FRAME_1				
degrees	Rotary axis offset TRANSMIT 1			**NEW CONF**	2/2
Fct.: Transmit transf.	0	0	2	BYTE	

24910	TRANSMIT_ROT_SIGN_IS_PLUS_1				18 (M1)
–	Sign of the rotary axis for the 1st TRANSMIT transformation			**NEW CONF**	2/2
Fct.: Transmit transf.	1	0	1	BOOLEAN	

24911	TRANSMIT_POLE_SIDE_FIX_1				18 (M1)
–	Limitation of the working area in front of/behind the pole, 1st TRANSMIT			**NEW CONF**	2/2
Fct.: Transmit transf.	0	0	2	BYTE	

24920	TRANSMIT_BASE_TOOL_1 0 ... 2				18 (M1)
mm	Vector of the base tool for the 1st TRANSMIT transformation			**NEW CONF**	2/2
Fct.: Transmit transf.	{0.0, 0.0 , 0.0}	–	–	DOUBLE	

24950	TRANSMIT_ROT_AX_OFFSET_2				
degrees	Offset of the rotary axis for the 2nd TRANSMIT transformation			**NEW CONF**	2/2
Fct.: Transmit transf.	0.0	–	–	DOUBLE	

24955	TRANSMIT_ROT_AX_FRAME_2				
degrees	Rotary axis offset TRANSMIT 2			**NEW CONF**	2/2
Fct.: Transmit transf.	0	0	2	BYTE	

24960	TRANSMIT_ROT_SIGN_IS_PLUS_2				
–	Sign of the rotary axis for the 2nd TRANSMIT transformation			**NEW CONF**	2/2
Fct.: Transmit transf.	1	0	1	BOOLEAN	

24961	TRANSMIT_POLE_SIDE_FIX_2				
–	Limitation of the working area in front of/behind the pole, 2ndTRANSMIT			**NEW CONF**	2/2
Fct.: Transmit transf.	0			BYTE	

24970	TRANSMIT_BASE_TOOL_2 0 ... 2				
mm	Vector of the base tool for the 2nd TRANSMIT transformation			**NEW CONF**	2/2
Fct.: Transmit transf.	{0.0, 0.0 , 0.0}	–	–	DOUBLE	

27100	ABSBLOCK_FUNKTION_MASK				
–	Parameterize block display with absolute values			**POWER ON**	2/2
always	0x0	0	0x1	DWORD	

27800	TECHNOLOGY_MODE				19
–	Technology in the channel			**NEW CONF**	2/2
always		0	1	BYTE	
Turning	1	0	1	BYTE	
Milling	0	0	1	BYTE	

27860	PROCESSTIMER_MODE				10 (K1)
HEX	Activate program runtime measurement			**RESET**	2/2
always	0x07	0	0x0FF	BYTE	

27880	PART_COUNTER				10 (K1)
HEX	Activate workpiece counter			**RESET**	2/2
always	0x0	0	0x0FFFF	DWORD	

27882	PART_COUNTER_MCODE[0]...[2]				10 (K1)
–	Workpiece counting with user–defined M commands			**POWER ON**	2/2
always	2, 2, 2	0	99	BYTE	

28400	MM_ABSBLOCK				
–	Block display with absolute values: 0: Deactivate 1: Activate			**POWER ON**	2/2
always	0			DWORD	

28402	MM_ABSBLOCK_BUFFER_CONF				
–	Dimension size of upload buffer			**POWER ON**	2/2
always	0, 0			DWORD	

8.1.4 Axis−specific machine data

Number	MD identifier				Cross ref. to the relevant chapter in the Description of Functions
Unit	Name, miscellaneous			**Activation**	Read/write protection level
Schematic view	Default value	Minimum value	Maximum value	Data type	
30110	**CTRLOUT_MODULE_NR[0]**				**3 (G2)**
–	Setpoint: Drive no./module no.			**POWER ON**	2/2
always	1	1	9	BYTE	
30120	**CTRLOUT_NR[0]**				**3 (G2)**
–	Setpoint: Output to module			**POWER ON**	2/2
always	1	1	2	BYTE	
30130	**CTRLOUT_TYPE[0]**				**3 (G2)**
–	Setpoint output type			**POWER ON**	2/2
always	0	0	1	BYTE	
30134	**IS_UNIPOLAR_OUTPUT[0]**				**5 (S1)**
–	Setpoint output is unipolar			**POWER ON**	2/2
always	0	0	2		
30200	**NUM_ENCS**				**3 (G2)**
–	Number of encoders			**POWER ON**	2/2
always	1	0	1	BYTE	
30220	**ENC_MODULE_NR[0]**				**3 (G2)**
–	Actual value: Drive type			**POWER ON**	2/7
always	1	1	9	BYTE	
30230	**ENC_INPUT_NR[0]**				**3 (G2)**
–	Act. value: No. of input on module/measuring−circuit board			**POWER ON**	2/2
always	1	1	3	BYTE	
30240	**ENC_TYPE[0]**				**3 (G2)**
–	Actual value: Encoder type			**POWER ON**	2/2
always	0	0	4	BYTE	
30270	**ENC_ABS_BUFFERING** [n]: 0 ... max. number of encoders −1				
–	Absolute encoder: Traversing range extension			**POWER ON**	2/2
always	0,0	0	1	BYTE	
30300	**IS_ROT_AX**				**6 (R2)**
–	Rotary axis / spindle			**POWER ON**	2/2
always	0	***	***	BOOLEAN	
30310	**ROT_IS_MODULO**				**6 (R2)**
–	Modulo conversion for rotary axis/spindle			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

30320	DISPLAY_IS_MODULO				6 (R2)
–	Display modulo 360 degrees for rotary axis			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

30350	SIMU_AX_VDI_OUTPUT				3 (G2)
–	Axis signals for simulation axis			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

30600	FIX_POINT_POS[0]				19
mm, degrees	Axis position with G75			**POWER ON**	2/2
always	0.0	***	***	DOUBLE	

31000	ENC_IS_LINEAR				3 (G2)
–	Direct measuring system (linear scale)			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

31010	ENC_GRID_POINT_DIST				3 (G2)
mm	Scale division with linear scales			**POWER ON**	2/2
always	0.01	0	***	DOUBLE	

31020	ENC_RESOL[0]				3 (G2)
–	Encoder lines per revolution			**POWER ON**	2/2
always	2048	***	***	DWORD	

31030	LEADSCREW_PITCH				3 (G2)
mm	Lead of the ballscrew			**POWER ON**	2/2
always	10.0	***	***	DOUBLE	

31040	ENC_IS_DIRECT[0]				3 (G2)
–	Encoder mounted directly on the machine			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

31044	ENC_IS_DIRECT2[0]				
–	Encoders installed at the attached gearbox			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

31050	DRIVE_AX_RATIO_DENOM[0]...[5]				3 (G2)
–	Load gearbox denominator			**POWER ON**	2/2
always	1	1	2147000000	DWORD	

31060	DRIVE_AX_RATIO_NUMERA[0]...[5]				3 (G2)
–	Load gearbox numerator			**POWER ON**	2/2
always	1	–2147000000	2147000000	DWORD	

31064	DRIVE_AX_RATIO2_DENOM				
–	Denominator of attached gearbox			**POWER ON**	2/2
always	1	1	2147000000	DWORD	

31066	DRIVE_AX_RATIO2_NOMERA				
–	Numerator of attached gearbox			**POWER ON**	2/2
always	1	–2147000000	2147000000	DWORD	

31070	DRIVE_ENC_RATIO_DENOM[0]				3 (G2)
–	Measuring gearbox denominator			**POWER ON**	2/2
always	1	1	2147000000	DWORD	

31080	DRIVE_ENC_RATIO_NUMERA[0]				3 (G2)
–	Measuring gearbox numerator			**POWER ON**	2/2
always	1	1	2147000000	DWORD	

31600	TRACE_VDI_AX				
–	Trace specification for die axial Vdi signals			**POWER ON**	2/2
Fct.: With TRACE files	0	0	1	BOOLEAN	

32000	MAX_AX_VELO				3 (G2)
mm/min, r.p.m.	Maximum axis velocity			**NEW CONF**	2/7
always	10000. (mm/min) 27.77 (r.p.m.)	***	***	DOUBLE	

32010	JOG_VELO_RAPID				9 (H1)
mm/min, r.p.m.	Rapid traverse in the JOG mode			**RESET**	2/7
always	10000. (mm/min) 27.77 (r.p.m.)	***	***	DOUBLE	

32020	JOG_VELO				9 (H1)
mm/min, r.p.m.	JOG axis velocity			**RESET**	2/7
always	2000. (mm/min) 5.55 (r.p.m.)	***	***	DOUBLE	

32100	AX_MOTION_DIR				3 (G2)
–	Traversing direction (not control direction)			**POWER ON**	2/2
always	1	–1	1	DWORD	

32110	ENC_FEEDBACK_POL[0]				3 (G2)
–	Sign of actual value (control direction)			**POWER ON**	2/2
always	1	–1	1	DWORD	

32200	POSCTRL_GAIN[0]...[5]				3 (G2)
(m/min)/mm	Servo gain factor			**NEW CONF**	2/7
always	1	0	2000.	DOUBLE	

32210	POSCTRL_INTEGR_TIME				
(m/min)/mm	Integral action time position control			**NEW CONF**	2/2
always	1	0,001	10000	DOUBLE	
32220	**POSCTRL_INTEGR_ENABLE**				
(m/min)/mm	Activation integral component position controller			**RESET**	2/2
always	1	–	–	BOOLEAN	

32300	MAX_AX_ACCEL				4 (B2)
mm/s^2, rev./s^2	Axis acceleration			**NEW CONF**	2/7
always	1 (mm/s^2) 2.77 (rev./s^2)	0.001	***	DOUBLE	

32420	JOG_AND_POS_JERK_ENABLE				4 (B2)
–	Enable axial jerk limitation			**RESET**	2/2
always	0	***	***	BOOLEAN	

32430	JOG_AND_POS_MAX_JERK				4 (B2)
mm/s^3, deg./s^3	Axial jerk			**RESET**	2/2
always	1,000 (mm/s^3) 2,777.77 (deg./s^3)	10^{-9}	***	DOUBLE	

32431	MAX_AX_JERK				4 (B2) 12 (B1)
mm/s^3, deg./s^3	Maximum axial jerk when traveling along the path			**NEW CONF**	3/3
always	1,000 (mm/s^3) 2,777.77 (deg./s^3)	10^{-9}	***	DOUBLE	

32432	PATH_TRANS_JERK_LIM				12 (B1)
mm/s^3, deg./s^3	Max. axial jerk in path motion [mm/ s*s*s, deg./ s*s*s]			**NEW CONF**	3/3
always	1,000 (mm/s^3) 2,777.77 (deg./s^3)	***	***	DOUBLE	

32450	BACKLASH[0]				16 (K3)
mm	Backlash on reversal			**NEW CONF**	2/2
always	0.0	***	***	DOUBLE	

32510	FRICT_COMP_ADAPT_ENABLE				
–	Friction compensation adaptation active			**NEW CONF**	2/2
always	0	0	1	BOOLEAN	

32520	FRICT_COMP_CONST_MAX				
mm/min, r.p.m.	Maximum friction compensation value			**NEW CONF**	2/2
always	0.0	0.0	plus	DOUBLE	

32530	FRICT_COMP_CONST_MIN				
mm/min, r.p.m.	Minimum friction compensation value			**NEW CONF**	2/2
always	0.0	0.0	plus	DOUBLE	

32540	FRICT_COMP_TIME				
s	Friction compensation time constant			**NEW CONF**	2/2
always	0.015	0.0	plus	DOUBLE	

32630	FFW_ACTIVATION_MODE				16 (K3)
–	Feedforward control can be activated from the program			**RESET**	2/2
always	1	***	***	BYTE	

32640	STIFFNESS_CONTROL_ENABLE				
–	Dynamicstiffness control			**NEW CONF**	2/2
not 810D, CCU1; Profib.	0	0	1	BOOLEAN	

32642	STIFFNESS_CONTROL_CONFIG				
–	Config. of dynamicstiffness control			**POWER ON**	2/2
Profibus adapter	0	0	1	BYTE	

32644	STIFFNESS_DELAY_TIME				
–	Dyn. stiffness control: Delay			**POWER ON**	2/2
Profibus adapter	–0.0015	–0.02	0.02	DOUBLE	

32700	ENC_COMP_ENABLE [0]				16 (K3)
–	Encoder/lead error compensation			**NEW CONF**	2/2
always	0	***	***	BOOLEAN	

32810	EQUIV_SPEEDCTRL_TIME[0]...[5]				16 (K3)
s	Equivalent time constant for the speed control loop			**NEW CONF**	2/2
always	0.003, 0.003, 0.003, 0.003, 0.003, 0.003,	***	***	DOUBLE	

33050	LUBRICATION_DIST				19
mm, degrees	Distance to be traversed f. lubrication pulse PLC signal			**NEW CONF**	3/3
always	100000000	***	***	DOUBLE	

34000	REFP_CAM_IS_ACTIVE				8 (R1)
–	Axis with reference point cam			**RESET**	2/2
always	1	***	***	BOOLEAN	

34010	REFP_CAM_DIR_IS_MINUS				8 (R1)
–	Reference point approach in the negative direction			**RESET**	2/2
always	0	***	***	BOOLEAN	

34020	REFP_VELO_SEARCH_CAM				8 (R1)
mm/min, r.p.m.	Cam travel velocity			**RESET**	2/2
always	5,000.0 (mm/min) 13.88 (r.p.m.)	***	***	DOUBLE	

34030	REFP_MAX_CAM_DIST				8 (R1)
mm, degrees	Max. distance to reference cam			**RESET**	2/2
always	10000.0	***	***	DOUBLE	

34040	REFP_VELO_SEARCH_MARKER[0]				8 (R1)
mm/min, r.p.m.	Velocity when searching for the reference mark			**RESET**	2/2
always	300.0 (mm/min) 0.833 (r.p.m.)	***	***	DOUBLE	

34050	REFP_SEARCH_MARKER_REVERSE[0]				8 (R1)
–	Direction reversal on reference cam			**RESET**	2/2
always	0	***	***	BOOLEAN	

34060	REFP_MAX_MARKER_DIST[0]				8 (R1)
mm, degrees	Max. distance to be traversed to reference mark			**RESET**	2/2
always	20.0	***	***	DOUBLE	

34070	REFP_VELO_POS				8 (R1)
mm/min, r.p.m.	Reference point approach velocity			**RESET**	2/2
always	1,000.0 (mm/min) 2.77 (r.p.m.)	***	***	DOUBLE	

34080	REFP_MOVE_DIST[0]				8 (R1)
mm, degrees	Reference point distance			**RESET**	2/2
always	-2.0	***	***	DOUBLE	

34090	REFP_MOVE_DIST_CORR[0]				8 (R1)
mm, degrees	Reference point offset			**RESET**	2/2
always	0.0	***	***	DOUBLE	

34092	REFP_CAM_SHIFT[0]				8 (R1)
mm, degrees	Electronic cam offset			**RESET**	2/2
always	0.0	***	***	DOUBLE	

34093	REFP_CAM_MARKER_DIST [0]				8 (R1)
mm, degrees	Distance 'Reference cam – reference mark'			**POWER ON**	2/2
always	0.0	–	–	DOUBLE	

34100	REFP_SET_POS[0]...[3]				8 (R1)
mm, degrees	Reference point position			**RESET**	2/2
always	0.	***	***	DOUBLE	

34110	REFP_CYCLE_NR				8 (R1)
–	Order of axes when referencing			**RESET**	2/2
always	1	–1	5	DWORD	

34200	ENC_REFP_MODE[0]				8 (R1)
–	Referencing mode			**POWER ON**	2/2
always	1	0	8	BYTE	

34210	ENC_REFP_STATE[0]				8 (R1)
–	Absolute encoder adjusting status			**immediately**	2/2
always	0	0	2	BYTE	

34220	ENC_ABS_TURNS_MODULO				6 (R2)
–	Modulo range of rot. absolute encoder			**POWER ON**	2/2
always	4096	1	4096	DWORD	

34990	ENC_ACTVAL_SMOOTH_TIME [0]				
s	Smooth time constant for actual values			**RESET**	2/7
always	0.0	0.0	0.5	DOUBLE	

35000	SPIND_ASSIGN_TO_MACHAX				5 (S1)
–	Assignment 'spindle – machine axis'			**POWER ON**	2/2
always	0	0	1	BYTE	

35010	GEAR_STEP_CHANGE_ENABLE				5 (S1)
–	Gear stage change possible			**POWER ON**	2/2
always	0	0	2	DWORD	

35012	GEAR_STEP_CHANGE_POSITION [0] ... [5]				5 (S1)
mm, degrees	Gear stage change position			**NEW CONF**	2/2
always	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	0.0	***	DOUBLE	

35020	SPIND_DEFAULT_MODE				5 (S1)
–	Spindle park position 0 1: Speed–controlled mode with/without position control, 2: Pos. mode, 3: Axis mode			**RESET**	2/2
always	0	0	3	BYTE	

35030	SPIND_DEFAULT_ACT_MASK				5 (S1)
HEX	Time of activation for spindle park position 0: POWER ON, 1: Progr. start, 2: Reset (M2/M30)			**RESET**	2/2
always	0x00	0	0x03	BYTE	

35040	SPIND_ACTIVE_AFTER_RESET				5 (S1)
–	Own spindle RESET			**POWER ON**	2/2
always	0	0	2	BYTE	

35100	SPIND_VELO_LIMIT				5 (S1)
r.p.m.	Maximum spindle speed			**POWER ON**	2/7
always	10000.0	***	***	DOUBLE	

35110	GEAR_STEP_MAX_VELO[0]...[5]				5 (S1)
r.p.m.	Maximum speed for gear stage change			**NEW CONF**	2/2
always	500., 500., 1,000., 2,000., 4,000., 8,000.	***	***	DOUBLE	

35120	GEAR_STEP_MIN_VELO[0]...[5]				5 (S1)
r.p.m.	Minimum speed for gear stage change			**NEW CONF**	2/2
always	50., 50., 400., 800., 1,500., 3,000.	***	***	DOUBLE	

35130	GEAR_STEP_MAX_VELO_LIMIT[0]...[5]				5 (S1)
r.p.m.	Maximum speed of gear stage			**NEW CONF**	2/2
always	500., 500., 1,000., 2,000., 4,000., 8,000.	***	***	DOUBLE	

35140	GEAR_STEP_MIN_VELO_LIMIT[0]...[5]				5 (S1)
r.p.m.	Minimum speed of gear stage			**NEW CONF**	2/2
always	5., 5., 10., 20., 40., 80.	***	***	DOUBLE	

35150	SPIND_DES_VELO_TOOL				5 (S1)
–	Spindle speed tolerance			**RESET**	2/2
always	0.1	0.0	1.0	DOUBLE	

35160	SPIND_EXTERN_VELO_LIMIT				5 (S1)
r.p.m.	Spindle speed limitation from PLC			**NEW CONF**	2/2
always	1000.0	***	***	DOUBLE	

35200	GEAR_STEP_SPEEDCTRL_ACCEL[0]...[5]				5 (S1)
rev./s^2	Acceleration in the control mode			**NEW CONF**	2/2
always	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	0.001	***	DOUBLE	

35210	GEAR_STEP_POSCTRL_ACCEL[0]...[5]				5 (S1)
rev./s^2	Acceleration in the position–controlled mode			**NEW CONF**	2/2
always	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	0.001	***	DOUBLE	

35300	SPIND_POSCTRL_VELO				5 (S1)
r.p.m.	Position controller starting speed			**NEW CONF**	2/2
always	500.0	***	***	DOUBLE	

35310	SPIND_POSIT_DELAY_TIME[0]...[5]				5 (S1)
s	Positioning delay time			NEW CONF	2/2
always	0.0, 0.05, 0.1, 0.2, 0.4, 0.8	0.0	***	DOUBLE	

35350	SPIND_POSITIONING_DIR				5 (S1)
–	Direction of rotation when positioning			RESET	2/2
always	3	3	4	BYTE	

35400	SPIND_OSCILL_DES_VELO				5 (S1)
r.p.m.	Reciprocating speed			NEW CONF	2/2
always	500.0	***	***	DOUBLE	

35410	SPIND_OSCILL_ACCEL				5 (S1)
rev./s^2	Acceleration when reciprocating			NEW CONF	2/2
always	16	0.001	***	DOUBLE	

35430	SPIND_OSCILL_START_DIR				5 (S1)
–	Starting direction when reciprocating			RESET	2/2
always	0	0	4	BYTE	

35440	SPIND_OSCILL_TIME_CW				5 (S1)
s	Reciprocation time for M3 direction			NEW CONF	2/2
always	1.0	***	***	DOUBLE	

35450	SPIND_OSCILL_TIME_CCW				5 (S1)
s	Reciprocation time for M4 direction			NEW CONF	2/2
always	0.5	***	***	DOUBLE	

35500	SPIND_ON_SPEED_AT_IPO_START				5 (S1)
–	Feed enable for spindle in setpoint range			RESET	2/2
always	1	0	2	BYTE	

35510	SPIND_STOPPED_AT_IPO_START				5 (S1)
–	Feed enable with the spindle stopped			RESET	2/2
always	0	***	***	BOOLEAN	

35550	DRILL_VELO_LIMIT [0] ... [5]				
mm/min, r.p.m.	Maximum speeds when tapping			NEW CONF	2/2
always	10000, 10000, 10000, 10000, 10000, 10000	***	***	DOUBLE	

36000	STOP_LIMIT_COARSE				2 (A3)
mm, degrees	Threshold for exact stop coarse			NEW CONF	2/2
always	0.04	***	***	DOUBLE	

36010	STOP_LIMIT_FINE				2 (A3)
mm, degrees	Exact stop fine			NEW CONF	2/2
always	0.01	***	***	DOUBLE	

36020	POSITIONING_TIME				2 (A3)
s	Exact stop fine delay time			NEW CONF	2/2
always	1.0	***	***	DOUBLE	

36030	STANDSTILL_POS_TOL				2 (A3)
mm, degrees	Standstill tolerance			**NEW CONF**	2/2
always	0.2	***	***	DOUBLE	

36040	STANDSTILL_DELAY_TIME				2 (A3)
s	Standstill monitoring delay time			**NEW CONF**	2/2
always	0.4	***	***	DOUBLE	

36050	CLAMP_POS_TOL				2 (A3)
mm, degrees	Clamping tolerance			**NEW CONF**	2/2
always	0.5	***	***	DOUBLE	

36060	STANDSTILL_VELO_TOL				2 (A3)
mm/min, r.p.m.	Threshold value for "Axis stopped"signal			**NEW CONF**	2/2
always	5.0 (mm/min) 0.01388 (r.p.m.)	***	***	DOUBLE	

36100	POS_LIMIT_MINUS				2 (A3)
mm, degrees	1st software limit switch minus			**NEW CONF**	2/2
always	-100000000	***	***	DOUBLE	

36110	POS_LIMIT_PLUS				2 (A3)
mm, degrees	1st software limit switch, plus			**NEW CONF**	2/2
always	100000000	***	***	DOUBLE	

36120	POS_LIMIT_MINUS2				2 (A3)
mm, degrees	2ndsoftware limit switch minus			**NEW CONF**	2/2
always	-100000000	***	***	DOUBLE	

36130	POS_LIMIT_PLUS2				2 (A3)
mm, degrees	2nd software limit switch, plus			**NEW CONF**	2/2
always	100000000	***	***	DOUBLE	

36200	AX_VELO_LIMIT[0]...[5]				2 (A3)
mm/min, r.p.m.	Velocity monitoring threshold value			**NEW CONF**	2/2
always	11500., 11500., 11500., ... (mm/min) 31,944; 31,944; 31,944; 31,944; ... (r.p.m.)	***	***	DOUBLE	

36210	CTRLOUT_LIMIT[0]				3 (G2)
%	Maximum speed setpoint			**NEW CONF**	2/7
always	110.0	0	200	DOUBLE	

36300	ENC_FREQ_LIMIT[0]				2 (A3)
Hz	Encoder limit frequency			**POWER ON**	2/2
always	300000	***	***	DOUBLE	

36302	ENC_FREQ_LIMIT_LOW[0]				8 (R1)
%	Encoder limit frequency resynchronization			**NEW CONF**	2/2
always	99.9	0	100	DOUBLE	

36310	ENC_ZERO_MONITORING[0]				2 (A3)
–	Zero mark monitoring			**NEW CONF**	2/2
always	0	***	***	DWORD	

36400	CONTOUR_TOL				2 (A3)
mm, degrees	Contour monitoring tolerance band			NEW CONF	2/2
always	1.0	***	***	DOUBLE	

36500	ENC_CHANGE_TOL				16 (K3)
mm, degrees	Position actual−value switching tolerance			NEW CONF	2/2
always	0.1	***	***	DOUBLE	

36600	BRAKE_MODE_CHOICE				2 (A3)
–	Brake behavior at hardware limit switch			POWER ON	2/2
always	0	0	1	BYTE	

36610	AX_EMERGENCY_STOP_TIME				2 (A3)
s	Time of braking ramp in case of errors			NEW CONF	2/2
always	0.05	0.02	1000	DOUBLE	

36620	SERVO_DISABLE_DELAY_TIME				1 (N2)
s	Cutout delay controller enable			NEW CONF	2/2
always	0.1	0.02	1000	DOUBLE	

36710	DRIFT_LIMIT				
%	Drift limit value for automatic drift compensation			NEW CONF	3/3
always	1.0	0.0	5.0	DOUBLE	

36720	DRIFT_VALUE[0]				5 (S1)
%	Drift basic value			NEW CONF	2/2
always	0.0	−5.0	5.0	DOUBLE	

37000	FIXED_STOP_MODE				17 (F1)
–	Mode ”Traversing to fixed stop”			POWER ON	
Fct.: Travel to fixed stop	0	0	1	BYTE	2/2

37002	FIXED_STOP_CONTROL				17 (F1)
–	Sequence control for travel to fixed stop			POWER ON	
Fct.: Travel to fixed stop	0	0	1	BYTE	2/2

37010	FIXED_STOP_TORQUE_DEF				17 (F1)
%	Fixed stop clamping torque default setting			POWER ON	
Fct.: Travel to fixed stop	5.0	0.0	100.0	DOUBLE	2/2

37012	FIXED_STOP_TORQUE_RAMP_TIME				17 (F1)
s	Time required to reach the changed torque limit			NEW CONF	
Fct.: Travel to fixed stop	0.0	0.0	***	DOUBLE	2/2

37020	FIXED_STOP_WINDOW_DEF				17 (F1)
mm, degrees	Fixed stop clamping torque monitoring window			POWER ON	
Fct.: Travel to fixed stop	1.0	0.0	***	DOUBLE	2/2

37030	FIXED_STOP_THRESHOLD				17 (F1)
mm, degrees	Threshold for fixed stop detection			NEW CONF	
Fct.: Travel to fixed stop	2.0	0.0	***	DOUBLE	2/2

37040	FIXED_STOP_BY_SENSOR				17 (F1)
–	Fixed stop detection via sensor			**POWER ON**	
Fct.: Travel to fixed stop	0	0	2	BYTE	2/2

37050	FIXED_STOP_ALARM_MASK				17 (F1)
–	Enabling of the fixed–stop alarms			**NEW CONF**	
Fct.: Travel to fixed stop	1	0	7	BYTE	2/2

37060	FIXED_STOP_ACKN_MASK				17 (F1)
–	Observing PLC acknowledgments for traversing to fixed stop 0. Do not wait, 1: Wait, 3: Analog drives			**POWER ON**	
Fct.: Travel to fixed stop	0	0	3	BYTE	2/2

37610	PROFIBUS_CTRL_CONFIG				
–	Profibus control bit configuration			**POWER ON**	2/2
Profibus adapter	0	0	2	BYTE	

37620	PROFIBUS_TORQUE_RED_RESOL				
%	Resolution of Profibus torque reduction			**NEW CONF**	2/2
always	1 .0	0.01	10.0	DOUBLE	

38000	MM_ENC_COMP_MAX_POINTS[0]				16 (K3)
–	Intermediate points for encoder/spindle compensation			**POWER ON**	0/7
always	125	0	125	DWORD	

8.2 Setting data

Number	SD identifier				Cross ref. to the relevant chapter in the Description of Functions
Unit	Name, miscellaneous			**Activation**	Read/write protection level
Schematic view	Default value	Minimum value	Maximum value	Data type	

41010	JOG_VAR_INCR_SIZE				9 (H1)
mm or degrees	Size of variable increment in JOG			**immediately**	7/7
always	0.	***	***	DOUBLE	

41110	JOG_SET_VELO				9 (H1)
mm/min	Axis velocity in the JOG mode			**immediately**	7/7
always	0.0	0.0	***	DOUBLE	

41130	JOG_ROT_AX_SET_VELO				9 (H1)
r.p.m.	Axis velocity of the rotary axis in the JOG mode			**immediately**	7/7
always	0.0	0.0	***	DOUBLE	

41200	JOG_SPIND_SET_VELO				9 (H1)
r.p.m.	Speed for spindle jog mode			**immediately**	7/7
always	0.0	***	***	DOUBLE	

42000	THREAD_START_ANGLE				10 (K1)
degrees	Starting angle for thread			**immediately**	3/3
always	0.	***	***	DOUBLE	

42010	THREAD_RAMP_DISP[0]...[1]				10 (K1)
mm	Acceleration behavior of axis when thread cutting			**immediately**	3/3
always	–1., –1.	–1.	999999.	DOUBLE	

42100	DRY_RUN_FEED				10 (K1)
mm/min	Dry run feed			**immediately**	7/7
always	5000.0	***	***	DOUBLE	

42101	DRY_RUN_FEED_MODE				
–	Mode for dry run velocity			**immediately**	7/7
always	0	0	12	BYTE	

42110	DEFAULT_FEED				11 (V1)
mm/min	Default value for path feedrate			**immediately**	7/7
always	0.	***	***	DOUBLE	

42120	APPROACH_FEED				
mm/min	Path feed in approach blocks			**immediately**	7/7
always	0.	***	***	DOUBLE	

42140	DEFAULT_SCALE_FACTOR_P				
–	Default scaling factor for address P			**immediately**	7/7
always	1	***	***	DWORD	

42150	DEFAULT_ROT_FACTOR_R				
–	Default rotation factor for address R			**immediately**	7/7
External NC progr. language	0.	–	–	DOUBLE	

42160	EXTERN_FIXED_FEEDRATE_F1_F9 0 ... 9				
–	Fixed feedrates F1 – F9			**immediately**	7/7
External NC progr. language	{ 0., 0., 0., 0., 0., 0., 0., ...	0.0	***	DOUBLE	

42162	EXTERN_DOUBLE_TURRET_DIST				
–	Tool distance of dual resolver head			**immediately**	7/7
External NC progr. language	0.	0.0	***	DOUBLE	

42200	SINGLEBLOCK2_STOPRE				
–	Activate debug mode for SBL2			**immediately**	7/7
always	0	***	***	BOOLEAN	

42440	FRAME_OFFSET_INCR_PROG				
–	Traversing of zero offsets with incr. programming			**immediately**	7/7
always	0	***	***	BOOLEAN	

42442	TOOL_OFFSET_INCR_PROG				
–	Traversing of tool offsets with incr. programming			**immediately**	7/7
always	0	***	***	BOOLEAN	

42444	TARGET_BLOCK_INCR_PROG				
–	Set–down mode after block search with calculation			**immediately**	7/7
always	1	***	***	BOOLEAN	

42480	STOP_CUTCOM_STOPRE				
–	Alarm response with TRC and preprocessing stop			**immediately**	3/3
always	1	***	***	BOOLEAN	

42490	CUTCOM_G40_STOPRE				
–	Retraction behavior of TRC with preprocessing stop			**immediately**	3/3
always	0	***	***	BOOLEAN	

42494	CUTCOM_ACT_DEACT_CTRL				
–	Approach and retraction behavior in tool radius compensation			**immediately**	7/7
always	2222	***	***	DWORD	

42750	ABSBLOCK_ENABLE				
–	Enable base block display			**immediately**	2/2
always	1	***	***	BOOLEAN	

42940	TOOL_LENGTH_CONST				**14 (W1)**
–	Change of tool length compensation when changing the plane			**immediately**	3/3
always	0	–	–	DWORD	

42950	TOOL_LENGTH_TYPE				**14 (W1)**
–	Assignment of the geom. length compensationcomponents independent of tool type			**immediately**	3/3
always	0	–	–	DWORD	

42990	MAX_BLOCKS_IN_IPOBUFFER				
–	Max. number of blocks in the IPO buffer			**immediately**	2/2
always	–1	–	–	DWORD	

43120	DEFAULT_SCALE_FACTOR_AXIS				
–	Axial default scaling factor with active G51			**immediately**	7/7
always	1	***	***	DWORD	

43200	SPIND_S				
r.p.m.	Spindle speed when starting the spindle via VDI interface signals			**immediately**	7/7
always	0.0	***	***	DOUBLE	

43202	SPIND_CONSTCUT_S				
r.p.m.	Specify constant cutting rate for master spindle			**immediately**	7/7
always	0.0	***	***	DOUBLE	

43210	SPIND_MIN_VELO_G25				**5 (S1)**
r.p.m.	Programmed spindle speed limitation G25			**immediately**	7/7
always	0.0	***	***	DOUBLE	

43220	SPIND_MAX_VELO_G26				**5 (S1)**
r.p.m.	Programmed spindle speed limitation G26			**immediately**	7/7
always	1000.0	***	***	DOUBLE	

43230	SPIND_MAX_VELO_LIMS				**5 (S1)**
r.p.m.	Spindle speed limitation with G96			**immediately**	7/7
always	100.0	***	***	DOUBLE	

43240r.p.m.	M19_SPOS				
r.p.m.	Spindle position for positioning spindle using M19			**immediately**	7/7
always	0.0	–10000000.0	10000000.0	DOUBLE	

43250	M19_SPOSMODE				
–	Spindle position approach mode for positioning spindle using M19			**immediately**	7/7
always	0	0	5	DOUBLE	

43340	EXTERN_REF_POSITION_G30_1				
–	Reference point position for G30.1			**immediately**	7/7
External NC progr. language	0.0	–	–	DOUBLE	

43400	WORKAREA_PLUS_ENABLE				2 (A3)
–	Working area limitation active in the positive direction			**immediately**	7/7
always	0	***	***	BOOLEAN	

43410	WORKAREA_MINUS_ENABLE				2 (A3)
–	Working area limitation active in the negative direction			**immediately**	7/7
always	0	***	***	BOOLEAN	

43420	WORKAREA_LIMIT_PLUS				2 (A3)
mm, degrees	Working area limitation plus			**immediately**	7/7
always	100000000	***	***	DOUBLE	

43430	WORKAREA_LIMIT_MINUS				2 (A3)
mm, degrees	Working area limitation minus			**immediately**	7/7
always	–100000000	***	***	DOUBLE	

43500	FIXED_STOP_SWITCH				17 (F1)
–	Selection "Traversing to fixed stop"			**immediately**	2/2
Fct.: Travel to fixed stop	0	0	1	BYTE	

43510	FIXED_STOP_TORQUE				17 (F1)
%	Fixed stop clamping torque			**immediately**	2/2
Fct.: Travel to fixed stop	5.0	0.0	800.0	DOUBLE	

Machine and Setting Data 802D base line

Data type

BOOLEAN	Boolean value: 1 (TRUE) or 0 (FALSE)
BYTE	8–bit value, as an INTEGER value: -128 ... 127, as a hexadecimal value: 00 ... FF as a character as per ASCII character set, e.g. “a”
STRING	Sequence of characters (max. 16)
WORD	16–bit value, as an INTEGER value: -32768 ... 32767, as a hexadecimal value: 0000 ... FFFF
UNSIGNED WORD	16–bit value, as an INTEGER value: 0 ... 65535, as a hexadecimal value: 0000 ... FFFF
INTEGER	16–bit value (here defined locally), INTEGER value: -32768 ... 32767
DWORD	32–bit value, as an INTEGER value: –2147483648 ... 2147483647, as a hexadecimal value: 0000 0000 ... FFFF
UNSIGNED WORD	32–bit value, as an INTEGER value: 0 ... 4294967295, as a hexadecimal value: 0000 0000 ... FFFF FFFF
DOUBLE	64–bit value, floating point value: $\pm$ 4.19 · 10^{-307} ... $\pm$ 1.67 · 10^{308}

Range of values (minimum/maximum value)

If no range of values is specified, the data type will determine the input limits, and the filed will be marked with ”***”.

9.1 List of machine data

9.1.1 Display machine data

Number	MD identifier				Cross reference to the relevant section / chapter in the Description of Functions
Schematic view	Name, miscellaneous			**Activation**	Read/write protection level
Unit	Default value	Minimum value	Maximum value	Data type	
202	**FIRST_LANGUAGE**				**19**
decimal	Foreground language			**POWER ON**	2/3
0	2	1	2	BYTE	
203	**DISPLAY_RESOLUTION**				**19**
decimal	Display resolution			**immediately**	2/3
0	3	0	5	BYTE	
204	**DISPLAY_RESOLUTION_INCH**				**19**
decimal	Display resolution			**immediately**	2/3
0	4	0	5	BYTE	
205	**DISPLAY_RESOLUTION_SPINDLE**				**19**
decimal	Display resolution			**immediately**	2/3
0	1	0	5	BYTE	
207	**USER_CLASS_READ_TOA**				
decimal	Protection level for reading tool offsets, general			**immediately**	3/3
0	3	0	7	BYTE	
208	**USER_CLASS_WRITE_TOA_GEO**				
decimal	Protection level for "Write tool geometry"			**immediately**	3/3
0	3	0	7	BYTE	
209	**USER_CLASS_WRITE_TOA_WEAR**				
decimal	Protection level for "Write wear data"			**immediately**	3/3
0	3	0	7	BYTE	
210	**USER_CLASS_WRITE_ZOA**				
decimal	Protection level for "Write settable work offset"			**immediately**	3/3
0	3	0	7	BYTE	
212	**USER_CLASS_WRITE_SEA**				
decimal	Protection level for "Write setting data"			**immediately**	3/3
0	7	0	7	BYTE	
213	**USER_CLASS_READ_PROGRAM**				
decimal	Protection level for "Read part program"			**immediately**	3/3
0	7	0	7	BYTE	

214	USER_CLASS_WRITE_PROGRAM				
decimal	Protection level for "Enter part program"			**immediately**	3/3
0	3	0	7	BYTE	

215	USER_CLASS_SELECT_PROGRAM				
decimal	Protection level for program selection			**immediately**	3/3
0	3	0	7	BYTE	

218	USER_CLASS_WRITE_RPA				
decimal	Protection level for "Write R parameters"			**immediately**	3/3
0	3	0	7	BYTE	

219	USER_CLASS_SET_V24				
decimal	Protection level for "Set V24"			**immediately**	3/3
0	3	0	7	BYTE	

221	USER_CLASS_DIR_ACCESS				
decimal	Protection level for directory access			**immediately**	3/3
0	3	0	7	BYTE	

222	USER_CLASS_PLC_ACCESS				
decimal	Protection level for PLC project			**immediately**	2/2
0	3	0	7	BYTE	

223	USER_CLASS_WRITE_PWA				
decimal	Protection level for protected working area			**immediately**	2/3
0	7	0	7	BYTE	

247	V24_PG_PC_BAUD				
Bit pattern	PG: Baud rate (300, 600, 1200, 2400, 4800, 9600, 19200, 38400)			**immediately**	3/3
0	7	0	7	BYTE	

280	V24_PPI_ADDR_PLC				
	PLCstation address			**POWER ON**	3/3
	2	0	126	BYTE	

281	V24_PPI_ADDR_NCK				
	NCKstation address			**POWER ON**	3/3
	3	0	126	BYTE	

289	CTM_SIMULATION_TIME_NEW_POS				**10 (K1)**
decimal	Simulation of actual–value refresh rate			**immediately**	3/7
0	100	0	4000	INTEGER	

290	CTM_POS_COORDINATE_SYSTEM				**10 (K1)**
decimal	Position of the coordinate system			**immediately**	3/7
0	2	0	7	BYTE	

291	CTM_CROSS_AX_DIAMETER_ON				**10 (K1)**
decimal	Diameter for "Transverse axis active"			**immediately**	3/7
0	1	0	1	BYTE	

292	CTM_G91_DIAMETER_ON				**10 (K1)**
decimal	Incremental feed			**immediately**	3/7
0	1	0	1	BYTE	

305	G_GROUP1				
decimal	User−oriented G group for position display			**immediately**	3/7
0	1	1	1000	INTEGER	

306	G_GROUP2				
decimal	User−oriented G group for position display			**immediately**	3/7
0	2	1	1000	INTEGER	

307	G_GROUP3				
decimal	User−oriented G group for position display			**immediately**	3/7
0	8	1	1000	INTEGER	

308	G_GROUP4				
decimal	User−oriented G group for position display			**immediately**	3/7
0	9	1	1000	INTEGER	

309	G_GROUP5				
decimal	User−oriented G group for position display			**immediately**	3/7
0	10	1	1000	INTEGER	

310	FG_GROUP1				
decimal	User−oriented G group for position display (external language)			**immediately**	3/7
0	1	1	1000	INTEGER	

311	FG_GROUP2				
decimal	User−oriented G group for position display (external language)			**immediately**	3/7
0	2	1	1000	INTEGER	

312	FG_GROUP3				
decimal	User−oriented G group for position display (external language)			**immediately**	3/7
0	8	1	1000	INTEGER	

313	FG_GROUP4				
decimal	User−oriented G group for position display (external language)			**immediately**	3/7
0	9	1	1000	INTEGER	

314	FG_GROUP5				
decimal	User−oriented G group for position display (external language)			**immediately**	3/7
0	10	1	1000	INTEGER	

330	CMM_POS_COORDINATE_SYSTEM				
decimal	Coordinate position of machine ***)**			**immediately**	3/7
0	0	0	7	BYTE	

***) Explanation:**

Both the position and the size of the representation are handed over during initialization. The position of the coordinate system can be influenced by the parameter "Axis direction" in the header of the file.

The following positions are possible:

	Position	X+	Z+
0	to the top	to the right	
1	to the top	to the left	
2	downwards	to the right	
3	downwards	to the left	
4	**to the right**	**upwards**	
5	to the left	upwards	
6	to the right	downwards	
7	to the left	downwards	

The positions of the elements must be specified in position 4 (mathematic coordinate system). The simulation will then automatically convert the representation to the relevant system.

331	CONTOUR_MASK				
decimal	Activate the 802blueprint programming			**immediately**	3/7
0	1	0	1	BYTE	

332	TOOL_LIST_PLACE_NO				
decimal	Activate location number in tool list			**immediately**	3/3
0	0	0	1	INTEGER	

343	V24_PPI_ADDR_MMC				
decimal				**POWER ON**	3/3
0	4	0	126		

344	V24_PPI_MODEM_ACTIVE				
decimal				**immediately**	3/3
0	0	0	1	Byte	

345	V24_PPI_MODEM_BAUD				
decimal	Baud rate for modem connection			**immediately**	3/3
0	7	5	9	Byte	

346	V24_PPI_MODEM_PARITY				
decimal	Parity for modem connection			**immediately**	3/3
0	0	0	2	Byte	

347	V24_PPI_MODEM_STOPBIT				
decimal	Number of stop bits for connection to a modem			**immediately**	3/3
	0	0	1	Byte	

348	V24_PPI_MODEM_DATABITS				
decimal	Number of data bits for connection to a modem			**immediately**	3/3
	1	0	1	Byte	

356	HMI_COL_TITLE_FOCUS_FORE				
decimal	Color settings title bar focus window foreground			immediately	2/3
	15	0	15	Byte	

357	HMI_COL_TITLE_FOCUS_BACK				
decimal	Color settings title bar focus window background			**immediately**	3/3
	2	0	15	Byte	

360	SPINDLE_LOAD_DISPL1				
decimal	Activate utilization display for spindle 1			**immediately**	3/3
	0	0	1	INTEGER	

361	MEAS_TOOL_CHANGE				
decimal	Input enable for T/D no. in the ”Tool gauging” window			**immediately**	3/3
	0	0	1	Byte	

362	SPINDLE_LOAD_DISPL2				
decimal	Activate utilization display for spindle 2			**immediately**	3/3
	1	0	1	INTEGER	

363	SPINDLE_LOAD_BAR_LIM2				
decimal	Activate utilization display for the spindle, limit value 2			**immediately**	2/2
	100	0	9999999	INTEGER	

364	SPINDLE_LOAD_BAR_LIM3				
decimal	Activate utilization display for the spindle, limit value 3			**immediately**	2/2
	100	0	9999999	INTEGER	

365	SPINDLE_LOAD_BAR_MAX				
decimal	Utilization display for the spindle, maximum			**immediately**	2/2
	120	0	120	INTEGER	

366	SPINDLE_LOAD_BAR_COL1				
decimal	Utilization display color for the spindle, range 1			**immediately**	3/3
	10	0	15	Byte	

367	SPINDLE_LOAD_BAR_COL2				
decimal	Utilization display color for the spindle, range 2			**immediately**	3/3
	9	0	15	Byte	

368	SPINDLE_LOAD_BAR_COL3				
decimal	Utilization display color for the spindle, range 3			**immediately**	3/3
	9	0	15	Byte	

369	PROBE_MODE				
decimal	Measuring system type: 1: Probe, 2: Opt. measuring technique			**immediately**	3/3
	1	0	2	INTEGER	

370	TOOL_REF_PROBE_AXIS1				
decimal	Absolute position of probe X			**immediately**	2/2
	0	–999999.999	999999.999	DOUBLE	

371	TOOL_REF_PROBE_AXIS2				
decimal	Absolute position of probe Y			**immediately**	2/2
	0	–999999.999	999999.999	DOUBLE	

372	TOOL_REF_PROBE_AXIS3				
decimal	Absolute position of probe Z			**immediately**	2/2
	9	–999999.999	999999.999	DOUBLE	

373	MEAS_SAVE_POS_LENGTH2				
decimal	Activate tool gauging; select "Save Pos" softkey for all values			**immediately**	2/2
	0	0	1	Byte	

374	TOOL_WEAR_LIMIT_VALUE				
decimal	Limit value for wear control during input			**immediately**	2/2
	9.999	0	9.999	DOUBLE	

375	USER_CLASS_READ_CUS_DIR				
decimal	Protection level for "Read user cycles"			**immediately**	2/3
0	7	0	7	Byte	

376	USER_CLASS_WRITE_CUS_DIR				
decimal	Protection level for "Write user cycles"			**immediately**	2/2
0	2	0	7	Byte	

377	USER_CLASS_WRITE_TO_MON_DAT				
decimal	Protection level for "Tool monitoring"			**immediately**	2/3
0	3	0	7	Byte	

9.1.2 General machine data

Number	MD identifier				Cross reference to the relevant section / chapter in the Description of Functions
Unit	Name, miscellaneous			**Activation**	Read/write protection level
Schematic view	Default value	Minimum value	Maximum value	Data type	
10000	**AXCONF_MACHAX_NAME_TAB[0]...[3]**				**19**
–	Machine axis name			**POWER ON**	2/2
	X1, Z1, SP	–	–	STRING	
10074	**PLC_IPO_TIME_RATIO**				**19**
–	Factor of the PLC task for main run			**POWER ON**	2/2
	2	1	50	DWORD	
10136	**DISPLAY_MODE_POSITION**				**21**
–	Display mode for actual position in the WCS			**RESET**	2/2
always	0	0	1	DWORD	
10240	**SCALING_SYSTEM_IS_METRIC**				**3 (G2)**
–	Metric basic system			**POWER ON**	2/2
	1	***	***	BOOLEAN	
11100	**AUXFU_MAXNUM_GROUP_ASSIGN**				**13 (H2)**
–	Number of auxiliary functions in AuxF groups			**POWER ON**	2/2
	1	1	64	DWORD	
11210	**UPLOAD_MD_CHANGES_ONLY**				**19**
HEX	MD backup only for changed MD			**immediately**	2/2
–	0x0F	0x00	0x0FF	BYTE	
11240	**PROFIBUS_SDB_NUMBER**				**3 (G2)**
–	SDB1000 number			**POWER ON**	2/2
	0	0	6	BYTE	
11250	**PROFIBUS_SHUTDOWN_TYPE**				
–	Profibus shutdown handling			**POWER ON**	2/2
always	0	0	2	BYTE	
11310	**HANDWH_REVERSE**				**9 (H1)**
–	Threshold for handwheel direction reversal			**POWER ON**	2/2
	2	0	***	BYTE	
11320	**HANDWHL_IMP_PER_LATCH[0]...[5]**				**9 (H1)**
–	Handwheel pulses per locking position			**POWER ON**	2/2
	1., 1., 1., ...	***	***	DOUBLE	
11346	**HANDWH_TRUE_DISTANCE**				**9 (H1)**
–	Handwheel travel or speed specification			**POWER ON**	2/2
	0	0	3	BYTE	

13060	DRIVE_TELEGRAM_TYPE[0]...[8]				3 (G2)
–	Standard message frame type for Profibus DP			**POWER ON**	2/2
	102, 102, 102, 102, 102	***	***	DWORD	

13070	DRIVE_FUNCTION_MASK [0] ... [8]				
–	Used DP functions			**POWER ON**	2/2
Profibus adapter	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ...	–	–	DWORD	

13080	DRIVE_TYPE_DP[0]...[8]				
–	Drive type with Profibus			**POWER ON**	2/2/2
	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ...	0	3	BYTE	

13200	MEAS_PROBE_LOW_ACTIVE[0]				15 (M5)
–	Polarity change of the probe			**POWER ON**	3/3
	0	***	***	BOOLEAN	

13220	**MEAS_PROBE_DELAY_TIME** [n]: 0 ... 0				
s	Detection of probe deflection delay time			**POWER ON**	3/3
	0.0, 0.0	0	0.1	DOUBLE	

14510	USER_DATA_INT[0]...[31]				19
–	User data (INT)			**POWER ON**	3/7
	0	–32768	32767	DWORD	

14512	USER_DATA_HEX[0]...[31]				19
–	User data (HEX)			**POWER ON**	3/7
–	0	0	0x0FF	BYTE	

14514	USER_DATA_FLOAT[0]...[7]				19
–	User data (FLOAT)			**POWER ON**	3/7
–	0.0	$-3.40*10^{38}$	$3.40*10^{38}$	DOUBLE	

14516	USER_DATA_PLC_ALARM[0]...[31]				19
–	User data (HEX)			**POWER ON**	3/7
–	0, 0, 0, 0, ...	***	***	BYTE	

9.1.3 Channel–specific machine data

Number	MD identifier				Cross reference to the relevant section / chapter in the Description of Functions
Unit	Name, miscellaneous			**Activation**	Read/write protection level
Schematic view	Default value	Minimum value	Maximum value	Data type	

20050	AXCONF_GEOAX_ASSIGN_TAB[0]...[2]				19
–	Assignment 'geometry/channel axis'			**POWER ON**	2/2
	1, 0, 2	0	5	BYTE	

20070	AXCONF_MACHAX_USED[0]...[3]				19
–	Machine axis number valid in channel			**POWER ON**	2/2
	1, 2, 3, 0	0	5	BYTE	

20080	AXCONF_CHANAX_NAME_TAB[0]...[3]				19
–	Name of channel axis in the channel			**POWER ON**	2/2
	"X", "Z", "SP", " "	–	–	STRING	

20090	SPIND_DEF_MASTER_SPIND				5 (S1)
–	Initial setting for master spindle in channel			**POWER ON**	2/2
always	1	1	2	BYTE	

20094	SPIND_RIGID_TAPPING_M_NR				5 (S1)
–	M function for switching to controlled axis mode (Siemens mode)			**POWER ON**	2/2
always	70	–1	0x7FFF	DWORD	

20108	PROG_EVENT_MASK				
–	Event–controlled program calls			**POWER ON**	2/2
always	0x0	0	0xF	DWORD	

20204	WAB_CLEARANCE_TOLERANCE				
mm	Direction reversal with SAR			**POWER ON**	2/2
always	0.01	0.0	plus	DOUBLE	

20360	TOOL_PARAMETER_DEF_MASK				14 (W1)
HEX	Definition of the tool parameters			**POWER ON**	2/2
always	0x0	0	0x01	DWORD	

20500	CONST_VELO_MIN_TIME				
s	Minimum time with constant velocity			**POWER ON**	2/2
always	0.0	0.0	0.1	DOUBLE	

20550	EXACT_POS_MODE				
–	Exact stop conditions with G00 and G01			**NEW CONF**	2/2
always	0	0	33	BYTE	

20552	EXACT_POS_MODE_G0_TO_G1				
–	Exact stop condition with the G00–>G01transition			**NEW CONF**	2/2
always	0	0	3	BYTE	

20700	REFP_NC_START_LOCK				8 (R1)
–	NC start disable without reference point			**RESET**	2/2
always	1	***	***	BOOLEAN	

20730	G0_LINEAR_MODE				
–	Interpolation behavior with G0			**POWER ON**	2/2
always	1	0	1	BOOLEAN	

21000	CIRCLE_ERROR_CONST				10 (K1)
mm	Constant for circle end point monitoring			**POWER ON**	2/2
always	0.01	***	***	DOUBLE	

21010	CIRCLE_ERROR_FACTOR				
Factor	Factor for circle end point monitoring			**POWER ON**	2/2
always	0.001	0.0	plus	DOUBLE	

21020	WORKAREA_WITH_TOOL_RADIUS				2 (A3)
–	Tool radius with working area limitation			**RESET**	2/2
always	0	***	***	BOOLEAN	

22000	AUXFU_ASSIGN_GROUP[0]...[63]				13 (H2)
–	Auxiliary function group			**POWER ON**	2/2
always	1, 1, 1, 1, 1, ...	1	64	BYTE	

22010	AUXFU_ASSIGN_TYPE[0]...[63]				13 (H2)
–	Auxiliary function type			**POWER ON**	2/2
always	“”, “”, “”, ...	–	–	STRING	

22020	AUXFU_ASSIGN_EXTENSION[0]...[63]				13 (H2)
–	see MD 22010 AUXFU_ASSIGN_TYPE			**POWER ON**	2/2
always	0, 0, 0, ...	0	99	BYTE	

22030	AUXFU_ASSIGN_VALUE[0]...[63]				13 (H2)
–	Auxiliary function value			**POWER ON**	2/2
always	0, 0, 0, 0, ...	***	***	DWORD	

22254	AUXFU_ASSOC_M0_VALUE				
–	Additional M functions for program stop			**POWER ON**	2/2
always	–1	–	–	DWORD	

22256	AUXFU_ASSOC_M1_VALUE				
–	Additional M functions for conditional stop			**POWER ON**	2/2
always	–1	–	–	DWORD	

22400	S_VALUES_ACTIVE_AFTER_RESET				5 (S1)
–	S function active even after RESET			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

22550	TOOL_CHANGE_MODE				14 (W1)
–	New tool compensation with T– or M function			**POWER ON**	2/2
always	0	0	1	BYTE	

24020	FRAME_SUPPRESS_MODE				
–	Positions with frame suppression			**POWER ON**	2/2
always	0x0	0	0x03	DWORD	

27860	PROCESSTIMER_MODE				10 (K1)
HEX	Activate program runtime measurement			**RESET**	2/2
always	0x07	0	0x03F	BYTE	

27880	PART_COUNTER				10 (K1)
HEX	Activate workpiece counter			**RESET**	2/2
always	0x0	0	0x0FFFF	DWORD	

27882	PART_COUNTER_MCODE[0]...[2]				10 (K1)
–	Workpiece counting with user–defined M commands			**POWER ON**	2/2
always	2, 2, 2	0	99	BYTE	

9.1.4 Axis−specific machine data

Number	MD identifier				Cross reference to the relevant section / chapter in the Description of Functions
Unit	Name, miscellaneous			**Activation**	Read/write protection level
Schematic view	Default value	Minimum value	Maximum value	Data type	

30110	**CTRLOUT_MODULE_NR[0]**				**3 (G2)**
–	Setpoint: Drive no./module no.			**POWER ON**	2/2
always	1	1	9	BYTE	

30120	**CTRLOUT_NR[0]**				**3 (G2)**
–	Setpoint: Output to module			**POWER ON**	2/2
always	1	1	2	BYTE	

30130	**CTRLOUT_TYPE[0]**				**3 (G2)**
–	Setpoint output type			**POWER ON**	2/2
always	0	0	1	BYTE	

30134	**IS_UNIPOLAR_OUTPUT[0]**				**5 (S1)**
–	Setpoint output is unipolar			**POWER ON**	2/2
always	0	0	2		

30200	**NUM_ENCS**				**3 (G2)**
–	Number of encoders			**POWER ON**	2/2
always	1	0	1	BYTE	

30220	**ENC_MODULE_NR[0]**				**3 (G2)**
–	Actual value: Drive type			**POWER ON**	2/7
always	1	1	9	BYTE	

30230	**ENC_INPUT_NR[0]**				**3 (G2)**
–	Act. value: No. of input on module/measuring−circuit board			**POWER ON**	2/2
always	1	1	3	BYTE	

30240	**ENC_TYPE[0]**				**3 (G2)**
–	Actual value: Encoder type			**POWER ON**	2/2
always	0	0	4	BYTE	

30270	**ENC_ABS_BUFFERING** [n]: 0 ... max. number of encoders −1				
–	Absolute encoder: Traversing range extension			**POWER ON**	2/2
always	0,0	0	1	BYTE	

30300	**IS_ROT_AX**				**6 (R2)**
–	Rotary axis / spindle			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

30310	**ROT_IS_MODULO**				**6 (R2)**
–	Modulo conversion for rotary axis/spindle			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

30320	DISPLAY_IS_MODULO				6 (R2)
–	Display modulo 360 degrees for rotary axis			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

30350	SIMU_AX_VDI_OUTPUT				3 (G2)
–	Axis signals for simulation axis			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

30600	FIX_POINT_POS[0]				19
mm, degrees	Axis position with G75			**POWER ON**	2/2
always	0.0	***	***	DOUBLE	

31000	ENC_IS_LINEAR				3 (G2)
–	Direct measuring system (linear scale)			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

31010	ENC_GRID_POINT_DIST				3 (G2)
mm	Scale division with linear scales			**POWER ON**	2/2
always	0.01	0	***	DOUBLE	

31020	ENC_RESOL[0]				3 (G2)
–	Encoder lines per revolution			**POWER ON**	2/2
always	2048	***	***	DWORD	

31030	LEADSCREW_PITCH				3 (G2)
mm	Lead of the ballscrew			**POWER ON**	2/2
always	10.0	***	***	DOUBLE	

31040	ENC_IS_DIRECT[0]				3 (G2)
–	Encoder mounted directly on the machine			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

31044	ENC_IS_DIRECT2[0]				
–	Encoders installed at the attached gearbox			**POWER ON**	2/2
always	0	***	***	BOOLEAN	

31050	DRIVE_AX_RATIO_DENOM[0]...[5]				3 (G2)
–	Load gearbox denominator			**POWER ON**	2/2
always	1 1	1	2147000000	DWORD	

31060	DRIVE_AX_RATIO_NUMERA[0]...[5]				3 (G2)
–	Load gearbox numerator			**POWER ON**	2/2
always	1	–2147000000	2147000000	DWORD	

31064	DRIVE_AX_RATIO2_DENOM				
–	Denominator of attached gearbox			**POWER ON**	2/2
always	1	1	2147000000	DWORD	

31066	DRIVE_AX_RATIO2_NOMERA				
–	Numerator of attached gearbox			**POWER ON**	2/2
always	1	–2147000000	2147000000	DWORD	

31070	DRIVE_ENC_RATIO_DENOM[0]				3 (G2)
–	Measuring gearbox denominator			**POWER ON**	2/2
always	1	1	2147000000	DWORD	

31080	DRIVE_ENC_RATIO_NUMERA[0]				3 (G2)
–	Measuring gearbox numerator			**POWER ON**	2/2
always	1	1	2147000000	DWORD	

31600	TRACE_VDI_AX				
–	Trace specification for die axial Vdi signals			**POWER ON**	2/2
Fct.: With TRACE files	0	0	1	BOOLEAN	

32000	MAX_AX_VELO				3 (G2)
mm/min, r.p.m.	Maximum axis velocity			**NEW CONF**	2/7
always	10000. (mm/min) 27.77 (r.p.m.)	***	***	DOUBLE	

32010	JOG_VELO_RAPID				9 (H1)
mm/min, r.p.m.	Rapid traverse in the JOG mode			**RESET**	2/7
always	10000. (mm/min) 27.77 (r.p.m.)	***	***	DOUBLE	

32020	JOG_VELO				9 (H1)
mm/min, r.p.m.	JOG axis velocity			**RESET**	2/7
always	2000. (mm/min) 5.55 (r.p.m.)	***	***	DOUBLE	

32100	AX_MOTION_DIR				3 (G2)
–	Traversing direction (not control direction)			**POWER ON**	2/2
always	1	–1	1	DWORD	

32110	ENC_FEEDBACK_POL[0]				3 (G2)
–	Sign of actual value (control direction)			**POWER ON**	2/2
always	1	–1	1	DWORD	

32200	POSCTRL_GAIN[0]...[5]				3 (G2)
(m/min)/mm	Servo gain factor			**NEW CONF**	2/7
always	1, 1, 1, 1, 1, 1	0	2000.	DOUBLE	

32210	POSCTRL_INTEGR_TIME				
(m/min)/mm	Integral action time position control			**NEW CONF**	2/2
always	1	0,001	10000	DOUBLE	

32220	POSCTRL_INTEGR_ENABLE				
(m/min)/mm	Activation integral component position controller			**RESET**	2/2
always	1	–	–	BOOLEAN	

32300	MAX_AX_ACCEL				4 (B2)
mm/s^2, rev./s^2	Axis acceleration			**NEW CONF**	2/7
always	1 (mm/s^2) 2.77 (rev./s^2)	0.001	***	DOUBLE	

32420	JOG_AND_POS_JERK_ENABLE				4 (B2)
–	Enable axial jerk limitation			**RESET**	2/2
always	0	***	***	BOOLEAN	

32430	JOG_AND_POS_MAX_JERK				4 (B2)
mm/s^3, deg./s^3	Axial jerk			**RESET**	2/2
always	1,000 (mm/s^3) 2,777.77 (deg./s^3)	10^{-9}	***	DOUBLE	

32450	BACKLASH[0]				16 (K3)
mm	Backlash on reversal			**NEW CONF**	2/2
always	0.0	***	***	DOUBLE	

32630	FFW_ACTIVATION_MODE				16 (K3)
–	Feedforward control can be activated from the program			**RESET**	2/2
always	1	***	***	BYTE	

32640	STIFFNESS_CONTROL_ENABLE				
–	Dynamicstiffness control			**NEW CONF**	2/2
not 810D, CCU1; Profib.	0	0	1	BOOLEAN	

32642	STIFFNESS_CONTROL_CONFIG				
–	Config. of Dynamicstiffness control			**POWER ON**	2/2
Profibus adapter	0	0	1	BYTE	

32644	STIFFNESS_DELAY_TIME				
–	Dyn. stiffness control: Delay			**POWER ON**	2/2
Profibus adapter	–0.0015	–0.02	0.02	DOUBLE	

32700	ENC_COMP_ENABLE [0]				16 (K3)
–	Encoder/lead error compensation			**NEW CONF**	2/2
always	0	***	***	BOOLEAN	

32810	EQUIV_SPEEDCTRL_TIME[0]...[5]				16 (K3)
s	Equivalent time constant for the speed control loop			**NEW CONF**	2/2
always	0.003, 0.003, 0.003, 0.003, 0.003, 0.003,	***	***	DOUBLE	

33050	LUBRICATION_DIST				19
mm, degrees	Distance to be traversed f. lubrication pulse PLC signal			**NEW CONF**	3/3
always	100000000	***	***	DOUBLE	

34000	REFP_CAM_IS_ACTIVE				8 (R1)
–	Axis with reference point cam			**RESET**	2/2
always	1	***	***	BOOLEAN	

34010	REFP_CAM_DIR_IS_MINUS				8 (R1)
–	Reference point approach in the negative direction			**RESET**	2/2
always	0	***	***	BOOLEAN	

34020	REFP_VELO_SEARCH_CAM				8 (R1)
mm/min, r.p.m.	Cam travel velocity			**RESET**	2/2
always	5,000.0 (mm/min) 13.88 (r.p.m.)	***	***	DOUBLE	

34030	REFP_MAX_CAM_DIST				8 (R1)
mm, degrees	Max. distance to reference cam			**RESET**	2/2
always	10000.0	***	***	DOUBLE	

34040	REFP_VELO_SEARCH_MARKER[0]				8 (R1)
mm/min, r.p.m.	Velocity when searching for the reference mark			**RESET**	2/2
always	300.0 (mm/min) 0.833 (r.p.m.)	***	***	DOUBLE	

34050	REFP_SEARCH_MARKER_REVERSE[0]				8 (R1)
–	Direction reversal on reference cam			**RESET**	2/2
always	0	***	***	BOOLEAN	

34060	REFP_MAX_MARKER_DIST[0]				8 (R1)
mm, degrees	Max. distance to be traversed to reference mark			**RESET**	2/2
always	20.0	***	***	DOUBLE	

34070	REFP_VELO_POS				8 (R1)
mm/min, r.p.m.	Reference point approach velocity			**RESET**	2/2
always	1,000.0 (mm/min) 2.77 (r.p.m.)	***	***	DOUBLE	

34080	REFP_MOVE_DIST[0]				8 (R1)
mm, degrees	Reference point distance			**RESET**	2/2
always	-2.0	***	***	DOUBLE	

34090	REFP_MOVE_DIST_CORR[0]				8 (R1)
mm, degrees	Reference point offset			**RESET**	2/2
always	0.0	***	***	DOUBLE	

34092	REFP_CAM_SHIFT[0]				8 (R1)
mm, degrees	Electronic cam offset			**RESET**	2/2
always	0.0	***	***	DOUBLE	

34093	REFP_CAM_MARKER_DIST				8 (R1)
mm, degrees	Distance 'Reference cam – reference mark'			**POWER ON**	2/2
always	0.0, 0.0	–	–	DOUBLE	

34100	REFP_SET_POS[0]...[3]				8 (R1)
mm, degrees	Reference point position			**RESET**	2/2
always	0.	***	***	DOUBLE	

34110	REFP_CYCLE_NR				8 (R1)
–	Order of axes when referencing			**RESET**	2/2
always	1	–1	5	DWORD	

34200	ENC_REFP_MODE[0]				8 (R1)
–	Referencing mode			**POWER ON**	2/2
always	1	0	7	BYTE	

34210	ENC_REFP_STATE[0]				8 (R1)
–	Absolute encoder adjusting status			**immediately**	2/2
always	0	0	2	BYTE	

34220	ENC_ABS_TURNS_MODULO				6 (R2)
–	Modulo range of rot. absolute encoder			**POWER ON**	2/2
always	4096	1	4096	DWORD	

35000	SPIND_ASSIGN_TO_MACHAX				5 (S1)
–	Assignment 'spindle – machine axis'			**POWER ON**	2/2
always	0	0	1	BYTE	

35010	GEAR_STEP_CHANGE_ENABLE				5 (S1)
–	Gear stage change possible			**POWER ON**	2/2
always	0	0	2	DWORD	

35012	GEAR_STEP_CHANGE_POSITION [0] ...[5]				5 (S1)
mm, degrees	Gear stage change position			**NEW CONF**	2/2
always	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	0.0	***	DOUBLE	

35020	SPIND_DEFAULT_MODE				5 (S1)
–	Spindle park position 0 1: Speed–controlled mode with/without position control, 2: Pos. mode, 3: Axis mode			**RESET**	2/2
always	0	0	3	BYTE	

35030	SPIND_DEFAULT_ACT_MASK				5 (S1)
HEX	Time of activation for spindle park position 0: POWER ON, 1: Progr. start, 2: Reset (M2/M30)			**RESET**	2/2
always	0x00	0	0x03	BYTE	

35040	SPIND_ACTIVE_AFTER_RESET				5 (S1)
–	Own spindle RESET			**POWER ON**	2/2
always	0	0	2	BYTE	

35100	SPIND_VELO_LIMIT				5 (S1)
rev/min	Maximum spindle speed			**POWER ON**	2/7
always	10000.0	***	***	DOUBLE	

35110	GEAR_STEP_MAX_VELO[0]...[5]				5 (S1)
rev/min	Maximum speed for gear stage change			**NEW CONF**	2/7
always	500., 500., 1000., 2000., 4000., 8000.	***	***	DOUBLE	

35120	GEAR_STEP_MIN_VELO[0]...[5]				5 (S1)
rev/min	Minimum speed for gear stage change			**NEW CONF**	2/7
always	50., 50., 400., 800., 1500., 3000.	***	***	DOUBLE	

35130	GEAR_STEP_MAX_VELO_LIMIT[0]...[5]				5 (S1)
rev/min	Maximum speed of gear stage			**NEW CONF**	2/7
always	500., 500., 1000., 2000., 4000., 8000.	***	***	DOUBLE	

35140	GEAR_STEP_MIN_VELO_LIMIT[0]...[5]				5 (S1)
rev/min	Minimum speed of gear stage			**NEW CONF**	2/7
always	5., 5., 10., 20., 40., 80.	***	***	DOUBLE	

35150	SPIND_DES_VELO_TOOL				5 (S1)
–	Spindle speed tolerance			**RESET**	2/2
always	0.1	0.0	1.0	DOUBLE	

35160	SPIND_EXTERN_VELO_LIMIT				5 (S1)
rev/min	Spindle speed limitation from PLC			**NEW CONF**	2/2
always	1000.0	***	***	DOUBLE	

35200	GEAR_STEP_SPEEDCTRL_ACCEL[0]...[5]				5 (S1)
rev./s^2	Acceleration in the control mode			**NEW CONF**	2/2
always	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	0.001	***	DOUBLE	

35210	GEAR_STEP_POSCTRL_ACCEL[0]...[5]				5 (S1)
rev./s^2	Acceleration in the position−controlled mode			**NEW CONF**	2/2
always	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	0.001	***	DOUBLE	

35300	SPIND_POSCTRL_VELO				5 (S1)
rev/min	Position controller starting speed			**NEW CONF**	2/2
always	500.0	***	***	DOUBLE	

35310	SPIND_POSIT_DELAY_TIME[0]...[5]				5 (S1)
s	Positioning delay time			**NEW CONF**	2/2
always	0.0, 0.05, 0.1, 0.2, 0.4, 0.8	0.0	***	DOUBLE	

35350	SPIND_POSITIONING_DIR				5 (S1)
−	Direction of rotation when positioning			**RESET**	2/2
always	3	3	4	BYTE	

35400	SPIND_OSCILL_DES_VELO				5 (S1)
rev/min	Reciprocating speed			**NEW CONF**	2/2
always	500.0	***	***	DOUBLE	

35410	SPIND_OSCILL_ACCEL				5 (S1)
rev./s^2	Acceleration when reciprocating			**NEW CONF**	2/2
always	16	0.001	***	DOUBLE	

35430	SPIND_OSCILL_START_DIR				5 (S1)
−	Starting direction when reciprocating			**RESET**	2/2
always	0	0	4	BYTE	

35440	SPIND_OSCILL_TIME_CW				5 (S1)
s	Reciprocation time for M3 direction			**NEW CONF**	2/2
always	1.0	***	***	DOUBLE	

35450	SPIND_OSCILL_TIME_CCW				5 (S1)
s	Reciprocation time for M4 direction			**NEW CONF**	2/2
always	0.5	***	***	DOUBLE	

35500	SPIND_ON_SPEED_AT_IPO_START				5 (S1)
−	Feed enable for spindle in setpoint range			**RESET**	2/2
always	1	0	2	BYTE	

35510	SPIND_STOPPED_AT_IPO_START				5 (S1)
−	Feed enable with the spindle stopped			**RESET**	2/2
always	0	***	***	BOOLEAN	

35550	**DRILL_VELO_LIMIT** [0] ... [5]				
mm/min, r.p.m.	Maximum speeds when tapping			**NEW CONF**	2/2
always	10000, 10000, 10000, 10000, 10000, 10000	***	***	DOUBLE	

36000	**STOP_LIMIT_COARSE**				**2 (A3)**
mm, degrees	Threshold for exact stop coarse			**NEW CONF**	2/2
always	0.04	***	***	DOUBLE	

36010	**STOP_LIMIT_FINE**				**2 (A3)**
mm, degrees	Exact stop fine			**NEW CONF**	2/2
always	0.01	***	***	DOUBLE	

36020	**POSITIONING_TIME**				**2 (A3)**
s	Exact stop fine delay time			**NEW CONF**	2/2
always	1.0	***	***	DOUBLE	

36030	**STANDSTILL_POS_TOL**				**2 (A3)**
mm, degrees	Standstill tolerance			**NEW CONF**	2/2
always	0.2	***	***	DOUBLE	

36040	**STANDSTILL_DELAY_TIME**				**2 (A3)**
s	Standstill monitoring delay time			**NEW CONF**	2/2
always	0.4	***	***	DOUBLE	

36050	**CLAMP_POS_TOL**				**2 (A3)**
mm, degrees	Clamping tolerance			**NEW CONF**	2/2
always	0.5	***	***	DOUBLE	

36060	**STANDSTILL_VELO_TOL**				**2 (A3)**
mm/min, r.p.m.	Threshold value for ”Axis stopped”signal			**NEW CONF**	2/2
always	5.0 (mm/min) 0.01388 (r.p.m.)	***	***	DOUBLE	

36100	**POS_LIMIT_MINUS**				**2 (A3)**
mm, degrees	1st software limit switch minus			**NEW CONF**	2/2
always	-100000000	***	***	DOUBLE	

36110	**POS_LIMIT_PLUS**				**2 (A3)**
mm, degrees	1st software limit switch, plus			**NEW CONF**	2/2
always	100000000	***	***	DOUBLE	

36120	**POS_LIMIT_MINUS2**				**2 (A3)**
mm, degrees	2nd software limit switch minus			**NEW CONF**	2/2
always	-100000000	***	***	DOUBLE	

36130	**POS_LIMIT_PLUS2**				**2 (A3)**
mm, degrees	2nd software limit switch, plus			**NEW CONF**	2/2
always	100000000	***	***	DOUBLE	

36200	AX_VELO_LIMIT[0]...[5]				2 (A3)
mm/min, r.p.m.	Velocity monitoring threshold value			**NEW CONF**	2/2
always	11500., 11500., 11500., ... (mm/min) 31,944; 31,944; 31,944; 31,944; ... (r.p.m.)	***	***	DOUBLE	

36210	CTRLOUT_LIMIT[0]				3 (G2)
%	Maximum speed setpoint			**NEW CONF**	2/7
always	110.0	0	200	DOUBLE	

36300	ENC_FREQ_LIMIT[0]				2 (A3)
Hz	Encoder limit frequency			**POWER ON**	2/2
always	300000	***	***	DOUBLE	

36302	ENC_FREQ_LIMIT_LOW[0]				8 (R1)
%	Encoder limit frequency resynchronization			**NEW CONF**	2/2
always	99.9	0	100	DOUBLE	

36310	ENC_ZERO_MONITORING[0]				2 (A3)
–	Zero mark monitoring			**NEW CONF**	2/2
always	0	***	***	DWORD	

36400	CONTOUR_TOL				2 (A3)
mm, degrees	Contour monitoring tolerance band			**NEW CONF**	2/2
always	1.0	***	***	DOUBLE	

36500	ENC_CHANGE_TOL				16 (K3)
mm, deg	Position actual–value switching tolerance			**NEW CONF**	2/2
always	0.1	***	***	DOUBLE	

36600	BRAKE_MODE_CHOICE				2 (A3)
–	Brake behavior at hardware limit switch			**POWER ON**	2/2
always	0	0	1	BYTE	

36610	AX_EMERGENCY_STOP_TIME				2 (A3)
s	Time of braking ramp in case of errors			**NEW CONF**	2/2
always	0.05	0.02	1000	DOUBLE	

36620	SERVO_DISABLE_DELAY_TIME				1 (N2)
s	Cutout delay controller enable			**NEW CONF**	2/2
always	0.1	0.02	1000	DOUBLE	

36710	**DRIFT_LIMIT** [n]: 0 ... 0				
%	Drift limit value for automatic drift compensation			**NEW CONF**	3/3
always	1.0	0.0	5.0	DOUBLE	

36720	DRIFT_VALUE[0]				5 (S1)
%	Drift basic value			**NEW CONF**	2/2
always	0.0	–5.0	5.0	DOUBLE	

38000	MM_ENC_COMP_MAX_POINTS[0]				16 (K3)
–	Intermediate points for encoder/spindle compensation			**POWER ON**	0/7
always	125	0	125	DWORD	

9.2 Setting data

Number	SD identifier				Cross reference to the relevant section / chapter in the Description of Functions
Unit	Name, miscellaneous			**Activation**	Read/write protection level
Schematic view	Default value	Minimum value	Maximum value	Data type	
41010	**JOG_VAR_INCR_SIZE**				**9 (H1)**
mm or degrees	Size of variable increment in JOG			**immediately**	7/7
always	0.	***	***	DOUBLE	
41110	**JOG_SET_VELO**				**9 (H1)**
mm/min	Axis velocity in the JOG mode			**immediately**	7/7
always	0.0	0.0	***	DOUBLE	
41130	**JOG_ROT_AX_SET_VELO**				**9 (H1)**
rev/min	Axis velocity of the rotary axis in the JOG mode			**immediately**	7/7
always	0.0	0.0	***	DOUBLE	
41200	**JOG_SPIND_SET_VELO**				**9 (H1)**
rev/min	Speed for spindle jog mode			**immediately**	7/7
always	0.0	***	***	DOUBLE	
42000	**THREAD_START_ANGLE**				**10 (K1)**
degrees	Starting angle for thread			**immediately**	3/3
always	0.	***	***	DOUBLE	
42010	**THREAD_RAMP_DISP[0]...[1]**				**10 (K1)**
mm	Acceleration behavior of axis when thread cutting			**immediately**	3/3
always	–1., –1.	–1.	999999.	DOUBLE	
42100	**DRY_RUN_FEED**				**10 (K1)**
mm/min	Dry run feed			**immediately**	7/7
always	5000.0	***	***	DOUBLE	
42101	**DRY_RUN_FEED_MODE**				
–	Mode for dry run velocity			**immediately**	7/7
always	0	0	12	BYTE	
42110	**DEFAULT_FEED**				**11 (V1)**
mm/min	Default value for path feedrate			**immediately**	7/7
always	0.	***	***	DOUBLE	
42120	**APPROACH_FEED**				
mm/min	Path feed in approach blocks			**immediately**	7/7
always	0.	***	***	DOUBLE	
42140	**DEFAULT_SCALE_FACTOR_P**				
–	Default scaling factor for address P			**immediately**	7/7
always	1	***	***	DWORD	

42150	DEFAULT_ROT_FACTOR_R				
–	Default rotation factor for address R			**immediately**	7/7
External NC progr. language	0.	–	–	DOUBLE	

42200	SINGLEBLOCK2_STOPRE				
–	Activate debug mode for SBL2			**immediately**	7/7
always	0	***	***	BOOLEAN	

42440	FRAME_OFFSET_INCR_PROG				
–	Traversing of zero offsets with incr. Programming			**immediately**	7/7
always	1	***	***	BOOLEAN	

42442	TOOL_OFFSET_INCR_PROG				
–	Traversing of tool offsets with incr. Programming			**immediately**	7/7
always	1	***	***	BOOLEAN	

42480	STOP_CUTCOM_STOPRE				
–	Alarm response with TRC and preprocessing stop			**immediately**	7/7
always	1	***	***	BOOLEAN	

42490	CUTCOM_G40_STOPRE				
–	Retraction behavior of TRC with preprocessing stop			**immediately**	3/3
always	0	***	***	BOOLEAN	

42750	ABSBLOCK_ENABLE				
–	Base block display enabled			**immediately**	2/2
always	1	***	***	BOOLEAN	

42940	TOOL_LENGTH_CONST				**14 (W1)**
–	Change of tool length compensation when changing the plane			**immediately**	3/3
always	0	–	–	DWORD	

42950	TOOL_LENGTH_TYPE				**14 (W1)**
–	Assignment of the tool length compensation independently of the tool type			**immediately**	3/3
always	0	–	–	DWORD	

42990	MAX_BLOCKS_IN_IPOBUFFER				
–	Max. number of blocks in the IPO buffer			**immediately**	2/2
always	–1	–	–	DWORD	

43120	DEFAULT_SCALE_FACTOR_AXIS				
–	Axial default scaling factor with active G51			**immediately**	7/7
always	1	***	***	DWORD	

43200	SPIND_S				
rev/min	Spindle speed when starting the spindle via VDI interface signals			**immediately**	7/7
always	0.0	***	***	DOUBLE	

43202	SPIND_CONSTCUT_S				
rev/min	Specify constant cutting rate for master spindle			**immediately**	7/7
always	0.0	***	***	DOUBLE	

43210	SPIND_MIN_VELO_G25				**5 (S1)**
rev/min	Programmed spindle speed limitation G25			**immediately**	7/7
always	0.0	***	***	DOUBLE	

43220	SPIND_MAX_VELO_G26				5 (S1)
rev/min	Programmed spindle speed limitation G26			**immediately**	7/7
always	1000.0	***	***	DOUBLE	

43230	SPIND_MAX_VELO_LIMS				5 (S1)
rev/min	Spindle speed limitation with G96			**immediately**	7/7
always	100.0	***	***	DOUBLE	

43400	WORKAREA_PLUS_ENABLE				2 (A3)
–	Working area limitation active in the positive direction			**immediately**	7/7
always	0	***	***	BOOLEAN	

43410	WORKAREA_MINUS_ENABLE				2 (A3)
–	Working area limitation active in the negative direction			**immediately**	7/7
always	0	***	***	BOOLEAN	

43420	WORKAREA_LIMIT_PLUS				2 (A3)
mm, degrees	Working area limitation plus			**immediately**	7/7
always	100000000	***	***	DOUBLE	

43430	WORKAREA_LIMIT_MINUS				2 (A3)
mm, degrees	Working area limitation minus			**immediately**	7/7
always	–100000000	***	***	DOUBLE	

Start–Up ISO Mode (with 802D only) 10

10.1 1. Setup

To use the ISO 66025 programming, the SINUMERIK 802D Control Setup Files are offered for start–up as part of the Toolbox Software. These files which can be loaded into the control system are intended maker the start–up easier. The following variants are offered:

1. ISO_T Turning technology
2. ISO_M Milling technology

When commissioning a SINUMERIK 802D using the ISO 66025 Programming additional function, observe the following order and procedure:

1. Perform a ”Power–up with default data” in the Start–up mode.
2. After restarting the control system, set the password (EVENING).
3. Set the V24 interface and WINPCIN to the binary format.

Important

Depending on the technology, a difference must now be made between turning and milling variants.

10.1.1 Turning variant

4. Transfer the **setISO_T.CNF** file for the turning variant to the control system.

With loading the **setISO_T.CNF** file, the **System B** Programming System has been activated and defined as the default setting.

Remark: The ISO SYSTEM B is deemed to be the most widely used ISO programming dialect.

In addition to the ISO System B default setting, the system can be adapted individually to other variants of DIN 66025 programming using the following start–up aids.

By reloading the **ISO_A_T** file, the **ISO System A** programming language is activated.

By reloading the **ISO_C_T** file, the **ISO System C** programming language is activated.

10.1.2 Milling variant

4. Transfer the **setISO_M.CNF** file for the milling variant to the control system.

With loading the **setISO_M.CNF** file, the **ISO Milling** Programming System with the option of switching between ”inch” and ”metric” via G20/G21 has been activated and defined as a function.

In addition to this default setting, the inch/metric switching option with G70/G71 can be defined as a function by reloading the **ISOG70_M** file.

The technology and the type of ISO 66025 programming are now defined for the SINUMERIK 802D.

Important

The procedure described above is obligatory for start−up in the SINUMERIK 802D ISO mode.

10.2 Machine data

To adapt the SINUMERIK 802D to the ISO 66025 programming, the following machine data are provided.

10.2.1 Decimal point programming

Use the 10884 EXTERN_FLOATINGPOINT_PROGRAMMING machine data to select whether or not the axis programming is to be performed using decimal−point notation.

- Bit = 1 means notation without decimal point.
  Example: G0 G90 X10 The X axis is traversed absolutely to the position 10 millimeters/inch/degrees.
- Bit = 0 means notation with decimal point.
  Example: G0 G90 X10 The X axis is traversed absolutely to the position which is defined in the machine data $MN_INT_INCR_PER_MM or $MN_INT_INCR_PER_DEC as the incremental resolution.
  Value :1000 means axis position 0.1 millimeter/inch/degrees

10.2.2 Linear path control at rapid traverse rate G00

The 20732 EXTERN_G0_LINEAR_MODE machine data can be used to select whether the axes approach their programmed end position with interpolation or on the shortest path when using G00.

- Bit = 1 Continuous−path control
- Bit = 0 Linear path control

10.2.3 Spindle positioning M19

The spindle position for M19 is defined in the 43240 M19_SPOS setting data.

10.2.4 Blueprint programming (for the turning technology only)

With loading the SETISO_T.INI file, the names in the machine data have been fixed for the angle =A, for the radius =R and for the chamfer =C when working with blueprint programming.

Important

Do not assign the names for other purposes, e.g. axis name ”A”.

10.2.5 Tool compensation (for the turning technology only)

Use the 10880 EXTERN_DIGITS_TOOL_NO machine data to define the number of digits for the tool number. Keep or reenter the default value 2.

Value = 2 corresponds to the 2−decade tool number.

Use the 10900 EXTERN_TOOLPROGR−MODE machine data to define the type of tool and tool compensation programming. Keep the default value 0.

Thus, the following programming rule shall apply for the turning technology:

The tool and the tool call are divided into 2 X 2 decades.

The first 2 decades define the tool number. The values T01XX ... T32XX are permissible. Max. 32 tools can be defined.

The second 2 decades are used to activate or deselect the tool compensation. The values TXX00 and TXX01 are permissible.

Value TXX01 means ”Tool active”.

Value TXX00 means ”Tool not active”.

Example: T0201 Tool 2 with tool compensation selected.
Attention! Each tool is assigned offset memory 01 as a fixed memory.

T0200 Tool 2 without tool compensation selected.

The 20360 TOOL_PARAMETER_DEF_MASK machine data can be used to define whether the input of the tool wear data is to be taken into account in radius or diameter dimensions.

Bit = 0 Take into account the tool wear in radius dimension.

Bit = 1 Take into account the tool wear in diameter dimension.

10.3 Functions

ISO dialect for SINUMERIK 802D
Programmable functions to ISO 66025

Turning Variant (A/B/C)	Milling Variant	Function
G00	G00	Rapid traverse
G01	G01	Linear interpolation
G02	G02	Circular interpolation CW
G03	G03	Circular interpolation CCW
G04	G04	Dwell time
	G09	Non−modal exact stop
G10	G10	Load work offset/tool offset
	G11	Loading work offset/tool offsetcompleted
	G15	Programming of polar coordinates OFF
	G16	Programming of polar coordinates ON
G17	G17	Select machining plane X−Y
G18	G18	Select machining plane Z−X
G19	G19	Select machining plane Y−Z
G20/20/70	G20 (G70)	Inch input system
G21/21/71	G21 (G71)	Metric input system
G28	G28	Reference point approach
G30	G30	Reference point approach for 2nd, 3rd, 4th ref. point
G31	G31	Measuring with touch−trigger probe
G32/33/33		Thread cutting with constant lead
G40	G40	Tool radius compensation OFF
G41	G41	Tool radius compensation left of the contourON
G42	G42	Tool radius compensation right of the contourON
	G43	Positive tool length compensation ON
	G44	Negative tool length compensation ON
	G49	Tool length compensation OFF
	G50	Scaling OFF
	G51	Scaling ON
G52	G52	Select additive work offset
G53	G53	Approach position in machine coordinate system

Turning Variant (A/B/C)	**Milling Variant**	**Function**
G54	G54	Select 1st work offset
G55	G55	Select 2nd work offset
G56	G56	Select 3rd work offset
G57	G57	Select 4th work offset
G58	G58	Select 5th work offset
G59	G59	Select 6th work offset
	G61	Exact stop
	G63	Tapping
	G64	Continuous−path control mode
G70/70/72		Finishing cycle
G71/71/73		Rough turning cycle for the longitudinal axis
G72/72/74		Rough turning cycle for the transverse axis
	G73	Deep hole drilling cycle with chip breaking
G73/73/75		Contour repetition
	G74	Tapping cycle − LH tread
G74/74/76		Deep hole drilling and plunge−cutting in longitudinal axis
G75/75/77		Deep hole drilling and plunge−cutting in transverse axis (Z)
	G76	Fine drilling cycle
G76/76/76		Multiple−thread cutting cycle
G90/77/20		Outer/inner diameter − single longitudinal turning cycle
G92/78/21		Single thread−cutting cycle
G94/79/24		Single face turning cycle
G80	G80	Cycle OFF
	G81	Drilling cycle, counterboring
	G82	Drilling cycle, countersinking
	G83	Deep hole drilling cycle with stock removal
G83		End face deep hole drilling
	G84	Tapping cycle, RH thread
G84		Front face tapping
	G85	Drilling cycle
G85		Front face drilling
	G86	Drilling cycle, retraction with G0
G87		Side face deep hole drilling
	G87	Reverse countersinking
G88		Side face tapping
G89		Side face drilling
	G89	Drilling cycle, retraction with machining feedrate
G−−/90/90	G90	Absolute programming
G−−/91/91	G91	Incremental programming

G50/92/92	G92	PRESET (preset actual value memory)
G98/94/94	G94	Feedrate in mm/min, inch/min
Turning Variant (A/B/C)	**Milling Variant**	**Function**
G99/95/95	G95	Feedrate in mm/rev., inch/rev.
G96	G96	Constant cutting rateON
G97	G97	Constant cutting rateOFF
G−−/98/98	G98	Return to starting point with fixed cycles
G−−/99/99	G99	Return to point R with fixed cycles
G290	G290	Deselect ISO 66025 programming
G291	G291	Select ISO 66025 programming
M98	M98	Subroutine call
M99	M99	End of subroutine

Note for the reader

For further information, please refer to the Manufacturer/Service Documentation ”ISO Dialect for SINUMERIK” (order no. 6FC5297−6AE10−0BP0)

Note

However, only the functions described in the present documentation are supported.

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To:
SIEMENS AG
A&D MC BMS
Postfach 3180

D−91050 Erlangen

(Tel. +49 (0) 180 5050 − 222 [hotline]
Fax +49 (0) 9131 98 − 63315 [documentation]
E−mail: motioncontrol@siemens.com)

Suggestions

Corrections

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Suggestions for improvement are also welcome.

Suggestions and/or corrections

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