Hardware CNC 61.00
Series 61.50

SIEB & MEYER AG

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1 Used Symbols and Abbreviations

1.1 Units of Measurement

Apart from the commonly used units for dimensions, SIEB & MEYER uses the units HU and WU, which are explained in the following:

Abbreviation	Meaning			
HU	technical unit for the height	1HU	≙	44.45 mm / 1.75 inches
WU	technical unit for the width	1WU	≙	5.08 mm / 0.2 inches

1.2 Symbols

The following table explains the symbols used in this manual for describing purposes. Technical symbols and signs are supposed to be known and therefore not explained.

Symbol	Meaning	
*	Points to further information concerning the subject.	
	Warning: indicates dangers which may cause damages to the product or personal injuries.	
	Indicates dangerous contacts.	
	Indicates currents and voltages.	
	Indicates general notes, to which special attention should be paid to.	
	Indicates measures or steps to be taken by the user.	
	LEDs indicating the module status	LED on
		LED off
		LED flashes
	Protective earth conductor	
	Neutral / common	

1.3 Abbreviations

General abbreviations

BGV	Regulations of the German professional association concerning the prevention of accidents (*German* Berufsgenossenschaftliche Verordnung)
CE	CE-labelling (Communauté Européenne = European Community); confirms the conformity of products with the relevant EU standards and guidelines
CC	SIEB & MEYER communication controller
DIN	Deutsches Institut für Normung = German Institute for Standards
DZ	differential measuring system for Z axis
EC	European Community
EEC	European Economic Community
EMC	Electromagnetic compatibility
EN	European standard
EnDat	Encoder Data
FC	SIEB & MEYER frequency converter
GB	Gigabyte
GHz	Gigahertz
HDLC	high level data link control
HSSB	high-speed serial bus
Hz	Hertz
IEC	International Electrotechnical Commission
IPC	industrial PC
KB	Kilobyte
LCD	liquid crystal display
LED	light emitting diode
LSB	lowest significant bit
MB	Megabyte
MC	SIEB & MEYER motion controller
MD	SIEB & MEYER motion drive
MHz	Megahertz
MSB	most significant bit
NMI	not maskable interrupt
NTC	NTC-resistor (negative temperature coefficient)
PDS	Power Drive Systems (product standard EN 61 800-3)
POF	plastic optic fiber
PS	SIEB & MEYER power supply
PTC	PTC-resistor (positive temperature coefficient)
SFU	static frequency converter (*German* statischer Frequenzumrichter)
TFT	thin flat tube
UL	Underwriters Laboratories; international conformity assessment provider for products
USB	universal serial bus
V_{AC}	alternating current voltage
VCO	voltage controlled oscillator
V_{DC}	direct current voltage
VDE	Association of German Electricians (*German* Verband Deutscher Elektrotechniker)

Physical connections

Physical connections are designed according to the type of wiring with the following abbreviations:

I	input
O	output
n.c.	not connected
n/o	normally open contact
n/c	normally closed contact

1.4 Product Designations

Product names mentioned in this documentation are trademarks or registered trademarks of their respective companies.

The appropriate name of the company is characterized by CAPITAL LETTERS.

Examples:

- SIEB & MEYER frequency converters of series FCXX
  SIEB & MEYER CNC 84.00
- PHOENIX terminal
- measuring system by HEIDENHAIN

2 About This Manual

The manual describes the automation system CNC 61.50. Information can be found about:

- Safety and Application Advice, page 17
- Unit Assembly Complying EMC, page 23
- Mounting (back plane fixing, module replacement), page 31
- General Information Regarding Wiring (cables and conductor cross-sections), page 33
- Wiring Examples, page 39
- Front Panels (indications, connectors), page 43
- Back Planes and their pin assignment, page 57
- Accessory Modules, page 167
- External I/O Modules, page 201
- Logic Cards, page 233
- Cables, page 237
- Technical Data, page 243
- Dimensioned Drawings, page 251
- Accessories, page 257

The manual is available in German and in English as printed documentation and as PDF file in the internet. The PDF files can be downloaded and printed on customary printers.

The manual makes the following demands on the expert personnel of the machine manufacturer:

Transport	**➜ Only by personnel with knowledge in handling electrostatically sensitive components**
Installation	**➜ Only by experts with qualified in electro-technics**
Initial Operation	**➜ Only by experts with extensive knowledge in the fields of electro-technics / drive technology**

3 Safety Instruction and Application Advice

According to **Low-Voltage Guideline 73/23/EEC**
Machine Guideline 98/37/EC
Electromagnetic Compatibility 89/336/EEC

3.1 General Information

Trained staff
In principle, the complete installation, the initial operation and the maintenance must only be carried out by trained staff.
Trained staff, according to this fundamental safety instruction, are persons, familiar with the installation, mounting, initial and permanent operation of the product and, are qualified appropriately for the work. The standards *DIN VDE 0100* and *DIN VDE 0110* and also the legal *national rules for prevention of accidents* must be paid attention to.

Energized and hot surfaces
During the operation the units can have *energized* and *hot surfaces* according to their protection system.

Damages / Injuries
Subjects can be damaged and persons be injured

- when covers are removed illegally,
- during any improper use,
- when either the installation or the operation is incorrect.

Modifications
Consult SIEB & MEYER **before** carrying out any modifications within the unit.

3.2 Appropriate Use

Definition of the concepts acc. to *IEC / EN 61800-3*

3.2.1 First Environment

Environment with residential districts; this environment contains also establishments which are directly connected without intermediate transformer to the low-voltage power supply network, which supplies buildings used for domestic purposes (households).

Annotation: Examples for establishments within the first environment are houses, apartments, stores or offices in residential buildings.

3.2.2 Second Environment

Environment with all remaining establishments (e.g. industrial establishments) which are not directly connected to a low-voltage power supply network, which supplies buildings used for domestic purposes.

Annotation: Examples for establishments within the second environment are indu-

strial areas and technical areas of buildings which are supplied by a transformer.

3.2.3 PDS (Power Drive System) of Category C1

PDS with a rated voltage lower than 1,000 V, which is to be used within the first environment.

3.2.4 PDS of Category C2

PDS with a rated voltage lower than 1,000 V, which is neither a device with connector nor a movable device and which must be installed and operated for the first time by an expert, if it is used within the first environment.

Annotation: An expert is a person or an organisation which has the necessary experience for the installation and/or initial operation of drive systems including its EMC aspects.

3.2.5 PDS of Category C3

PDS with a rated voltage lower than 1,000 V, which is to be used within the second environment and not within the first environment.

According to *EN 61800-3*, the electronic power drive systems (PDS) developed by SIEB & MEYER must be used in industrial establishments which are **not** directly connected to a low-voltage power supply network, which supplies buildings in residential districts (also called **second environment**, category C3). Products of this kind are only partly available.
Since all products by SIEB & MEYER are electronic equipment used for the operation of motors, electric loads and provided for the installation into machines or parts of a stationary installation, the safety-relevant aspects of the *Machine Guidelines* (98/37/EWG) must be taken into account.

If the mechanics or the electronics of the device is modified, the conformity with the EC/EEC guidelines and thus the CE label will expire.

Before initial operation, make sure that the machine will not expose danger (e.g. runaway moves). The conformity according to the *safety standard EN 60204-1 and EN 61800-5-1* must have been proven.

The manufacturer of the system or the machine has to meet the requirements of the legal values regarding the *Electromagnetic Compatibility (EMC)*. SIEB & MEYER´s units can be operated in industrial areas, provided the attached EMC information has been taken into consideration.

SIEB & MEYER takes care in its own EMC laboratory over their products to meet the respective standards, when they are installed properly.

Deviations of the construction and the installation, described in the documentation and in the manual “Unit Assembly Complying EMC” require new measurements of the system or machine by the machine manufacturer to meet the statutory requirements.
Appropriate proceedings according to the *EMC Product Standard (PDS) DIN/EN 61 800-3* ensure the use in industrial areas.

- Products, not equipped with an *AC supply line filter* must be operated with a series connected *mains filter*! Detailed information can be found in the chapter ''Unit Assembly Complying EMC''.

If using the drive systems in residential areas, in business and commercial areas as well as in small trade, the user has to take additional and larger filter measurements.

SIEB & MEYER products meet the requirements of the *Low-Voltage Guideline 73/23/EEC*. The coordinated standards of the series *IEC / EN 50178* and *IEC / EN 60 204-1* in combination with *IEC / EN 60 947* and *IEC / EN 61800-5-1* are strictly used for the products.

Technical data and the connection specification can be found in the respective product documents.

3.3 Transport and Storage

Make sure, that the unit is correctly used. The following points must especially be taken into consideration:

- Protection against mechanical damage (transport, handling, etc.)!
- Protection against dirt and humidity!
- Dry and well-ventilated storage area!
- No storage in the open!
- Storage temperature between –25°C to +55°C (–13°F to +131°F)! Shortly it may be +70°C (+158°F).
- Protection against contact with electronic components (electrostatic discharge)!
- No modification of insulating distances!

3.4 Installation

The drive components are designed for fulfilling the degree of pollution 2 according to IEC 61800-1 / DIN EN 50178.

- The units can be loaded to their maximum up to a height of 1,000 m M.S.L (3,281 ft M.S.L.)
- For an operation in areas higher than 1,000 m M.S.L. (3,281 ft M.S.L.) the capacity must be reduced by 15 % per 1,000 m (3,281 ft.)
- The ambient air must not contain aggressive, electrically conductive or flammable substances and must not contain any amount of dust.
- The maximum relative humidity is approx. 95 % (no condensation).
- The admissible ambient temperature during the operation is between +5°C and +40°C (+41°F and +104°F).
- Make sure that the fans installed in the units have sufficient space to take in and exhaust the cooling air!
- Do not touch electronic components.

SIEB & MEYER products contain electrostatically sensitive components that may easily be damaged by improper handling.

3.5 Electrical Connection

The valid rules for prevention of accidents (e.g. *VBG 1* and *VBG 4*) should be paid attention to, when working at current-carrying units.

The electrical installation must be carried out according to the relevant electrical codes (e.g. appropriate wire gauges, fuse protection and connections of ground conductors must be considered).

Recommendations for the installation according to the EMC (e.g. shields, connection to earth and line installations) can be found in the technical documents of the unit (only for machine manufacturers). The manufacturer of the system or machine has to meet the requirements of the legislation regarding the EMC.

- All work at and within the units must only be carried out, when they are turned off and when the AC line is cut!
- The mains supply must be protected via an overload release with restricted guidance for each mains phase.
- The mains line should only be connected, when the work is completed!
- Before turning on the unit the first time, make sure that the connected machine will not have runaway axes!
- After turning off the unit hazardous voltages may still exist for up to **3 minutes** in the power supply (due to capacitors).
- Capacitive loads must not be connected to the output phases of the servo amplifiers and frequency converters.
- Prevent cable loops. Therefore, the units must **only** be connected to earth at the provided PE connection for the mains supply line and the racks **only** at the provided earth screw.

Basically, the operation can be made with residual current operated devices. Nevertheless, like all clocked units of the power electronics, also SIEB & MEYER´s products can lead leakage currents via the earth system. Depending on the sensitivity of the residual current operated device and the installation type, the operation along with the device may arise problems. The following points should be taken into consideration:

- Use shortest motor leads possible.
- Do not connect additional consumers to the same residual current operated device.
- Use a residual current operated device with high response threshold.

3.6 Operation

Systems, into which servo amplifiers and frequency converters are mounted, possibly must be equipped with additional protective devices according to the valid safety instructions (e.g. law about technical material, rules for prevention of accidents, etc.).

All doors and covers must be closed during the operation.

In order to ensure a trouble-free operation of the installation, the screws must always be tightened!

3.7 Maintenance

The unit, especially the fan, must be checked regularly for cleanness and function depending on the ambient pollution.

3.8 Guarantee

The guarantee is only granted when the points 3.1 to 3.7 are taken into consideration.

This Safety Instruction and Application Advice does not assure any features.

A first programming carried out by SIEB & MEYER does not release the user from his duty to check programmed values for their correctness!

SIEB & MEYER AG
April 12, 2006

Save these Safety Instructions!

4 Unit Assembly Complying EMC

The EC guidelines for the electromagnetic compatibility (EMC) must be taken into consideration for the initial operation of all SIEB & MEYER units!

The manual "Unit Assembly Complying EMC" is available in German and English and comprises

- the EMC guidelines
- Information regarding the professional earth and wiring
- Safety-relevant aspects
- Extracts from the EMC product standard

Availability:
- Hard copy version directly from SIEB & MEYER
- PDF file in the Internet under *www.sieb-meyer.de*

5 Automation System CNC 61.00

The CNC 61.00 is a digital controller for high-dynamic servo drives. Synchronous and asynchronous AC servo motors can be driven.

The power and the control components of the CNC 61.00 form a compact unit. The fields of applications are, among others,
- Positioning applications
- Variable speed applications
- Torque control
- Press functions
- Nut setting functions
- Electronic shafts
- Electronic gearbox
- Disk cam functions

Along with the drive functions the CNC 61.00 provides PLC functions and the possibility to control dialogs via a control terminal.

The CNC 61.00 can be used independently or may be connected with higher-ranking or subordinated controllers (e.g. PLC, industrial PC, etc.). If several CNC 61.00 modules are networked, they can be communicate with each other. Thus, the CNC 61.00 can be used for applications dependent on others (e.g. electronic shafts, “flying shears”).

Complex control applications can be executed with the CNC 61.00. The large program memory enables the programming and execution of extensive processes.

The CNC 61.00 can be supplied as compact unit or rack module.

5.1 Hardware Design

The CNC 61.00 combines servo and control functions in one module.

The hardware comprises the following components:
- Digital speed and position controllers with a sample rate of 500 µs
- Powerful output stages for various motor types and performance ranges
- Evaluation of either resolver, Hall effect sensors or optical length measuring systems
- Standard interface with a level according to RS232/485
- Eight galvanically separated inputs and outputs
- Analog input and output
- Additional second measuring system
- SIEB & MEYER IO interface

The CNC 61.00 can be expanded by supplementary plug-in modules:
- Max. 80 digital inputs and outputs
- 10 bit analog/digital converter
- 12 bit digital/analog converter
- SIEB & MEYER token ring interface
- CAN bus interface
- INTERBUS interface
- PROFIBUS interface
- MODLINK interface
- Ethernet interface

All components of the hardware can be accessed due to the digitization.

Possible arising errors are indicated as error code via LEDs at the front panel. Evaluated errors are, among others, overvoltage, undervoltage, tracking error, limit switch and emergency stop.

5.2 Programming

Executable programs are created with the CNC 61.00 system software on a PC.

Machine functions are programmed in sequential programs, consisting of command sequences that specify, for example, movement, PLC functions or reaction on user inputs. The CNC 61.00 executes the programmed commands during the run of the sequential program.

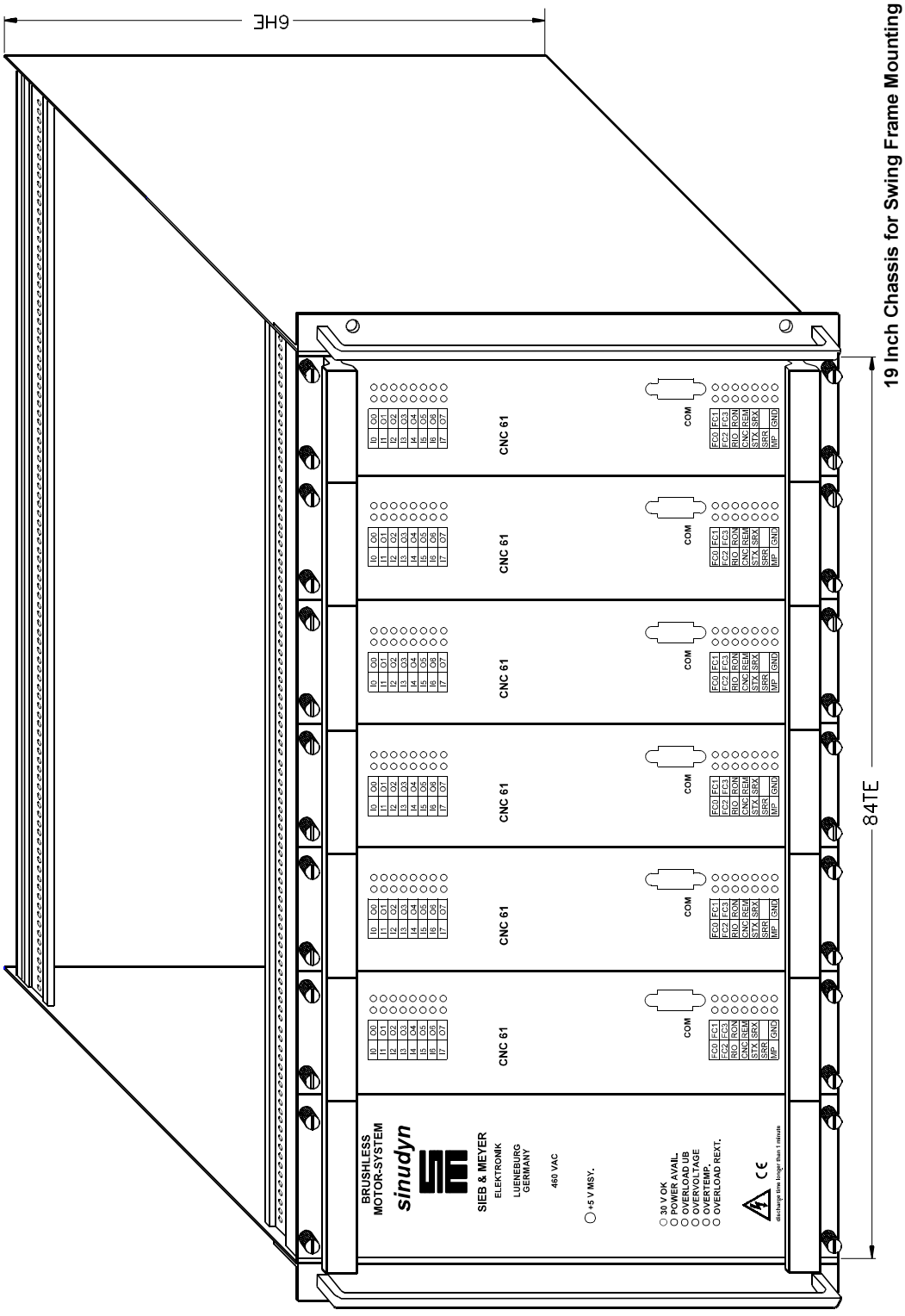
The commands have a uniform structure and permit compact programming. The user will need only some commands due to the sophisticated command repertoire.

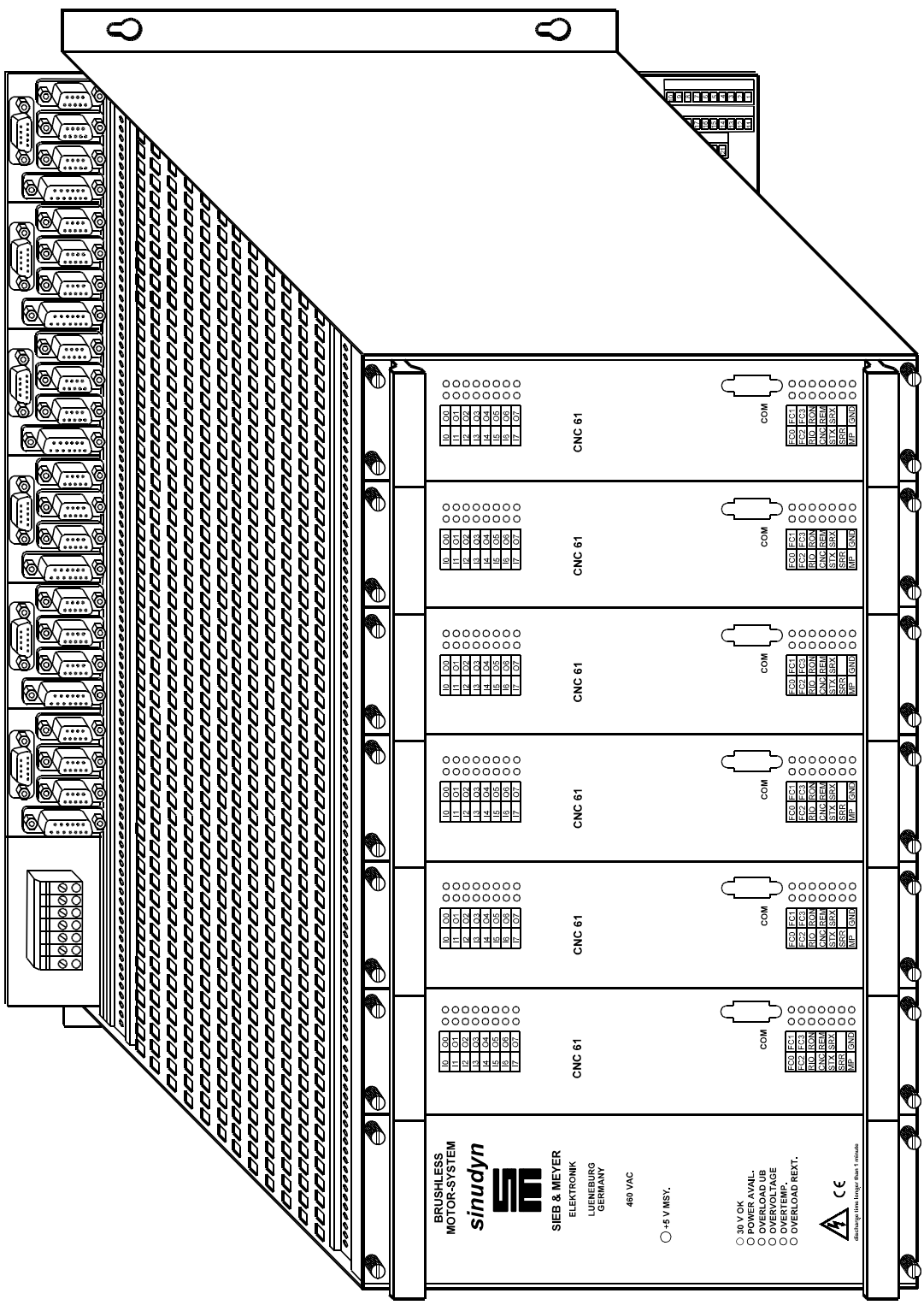
5.3 Performance Features

The following features are worth mentioning for the SIEB & MEYER automation system CNC 61.00:

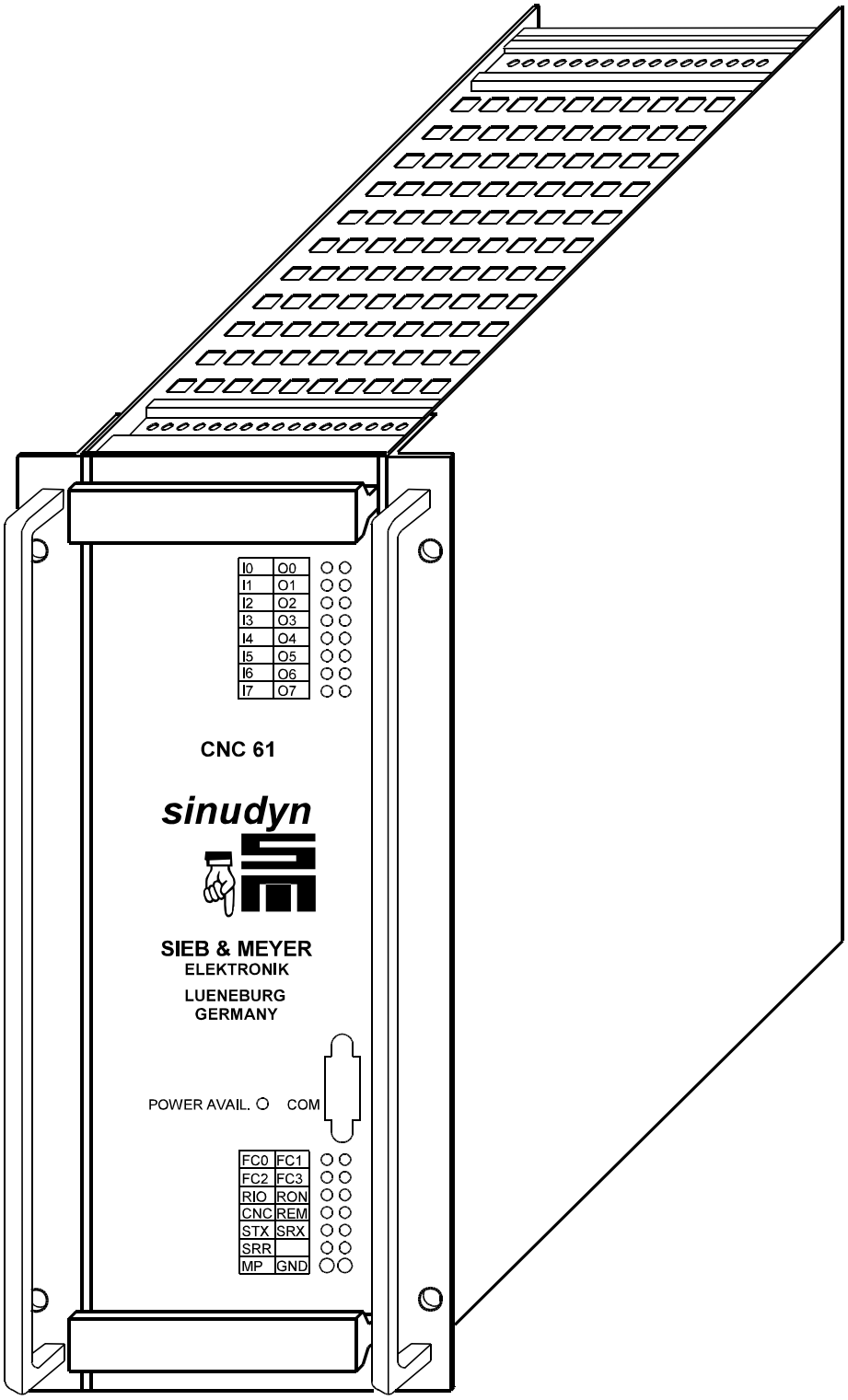
- ✘ **Direct supply up to 480 V_{AC} +10 %**
- ✘ **Single-phase voltage supply for lower motor powers in the version of 325 V_{DC}**
- ✘ **Galvanic separation between control and power components**
- ✘ **Extensive protective functions for motor and CNC module (e.g. evaluation of the thermal contact, I^2t, etc.)**
- ✘ **Output for collective fault messages**
- ✘ **Short-circuit proof (phase to phase, phase to earth)**
- ✘ **Optimal evaluation of the encoder signals**
- ✘ **Constant running, even at lowest speeds**
- ✘ **High dynamics**
- ✘ **Self-controlled resolver adaptation and adjustment of up to 1,024 angle pulses (version with resolver evaluation)**
- ✘ **Phase shifting for an increased drive performance**
- ✘ **Filter for eliminating possibly arising mechanical resonances (e.g. oscillation of coupling)**
- ✘ **Full operation with cables of up to 100 m length between CNC module and motor**
- ✘ **LEDs for diagnostic purposes**
- ✘ **Space and cost-saving solutions with the compact system**

5.4 Views

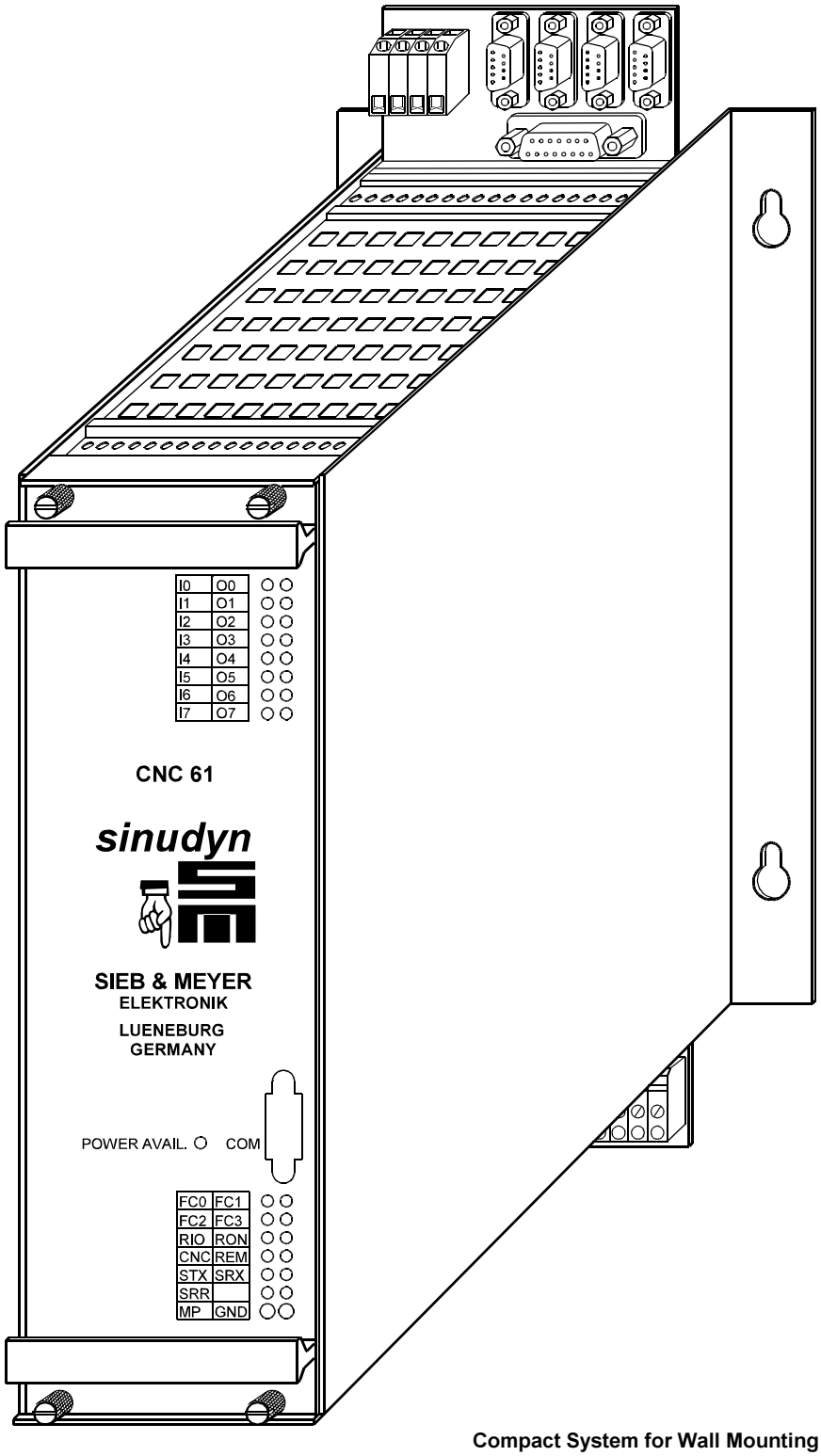

6HE
19 Inch Chassis for Swing Frame Mounting
84TE
CNC 61
COM
BRUSHLESS
MOTOR-SYSTEM
sinudyn
SIEB & MEYER
ELEKTRONIK
LUENEBURG
GERMANY
460 VAC
+5 V MSY.
30 V OK
POWER AVAIL.
OVERLOAD UB
OVERVOLTAGE
OVERTEMP.
OVERLOAD REXT.



19 Inch Chassis for Wall Mounting



Compact System for Swing Frame Mounting



Compact System for Wall Mounting

6 Mechanical Mounting

The power and CNC 61.00 modules for the multi-axis system are mounted into a 19" chassis facilitating the user to easy replace the modules by unscrewing the stop screws.

The chassis has to be mounted vertically. Customary hinged frames or frames for wall-mounting are valuable for the mounting of the chassis into a switch cabinet.

The modules of the compact system are integrated in a shortened chassis for wall-mounting. They can also easily be replaced by unscrewing the stop screws.

- **Above and below the chassis at least a space of 10 cm must be provided to ensure sufficient cooling.**
- **The modules have a very compact design. We recommend using external fans for the CNC 61.00 modules to achieve a high life expectancy and an efficiency of 100 % at an ambient temperature of up to 60°C.**
- **If the modules are pushed in, it is indispensable to fasten firmly the stop screws. Otherwise, the secure contact of the plug-in connectors is not given.**
  An insecure contact to the back plane can cause damage of the plug-in connectors.
- **The modules must only be replaced, when the lines are dead!**

Make sure that the M2.5 fixing screws ensure best connection between back plane and the brass rails in the chassis to form a closed, shielded housing. The leakage currents for the interference suppression flow via the fixing screws.

6.1 Replacement of Modules

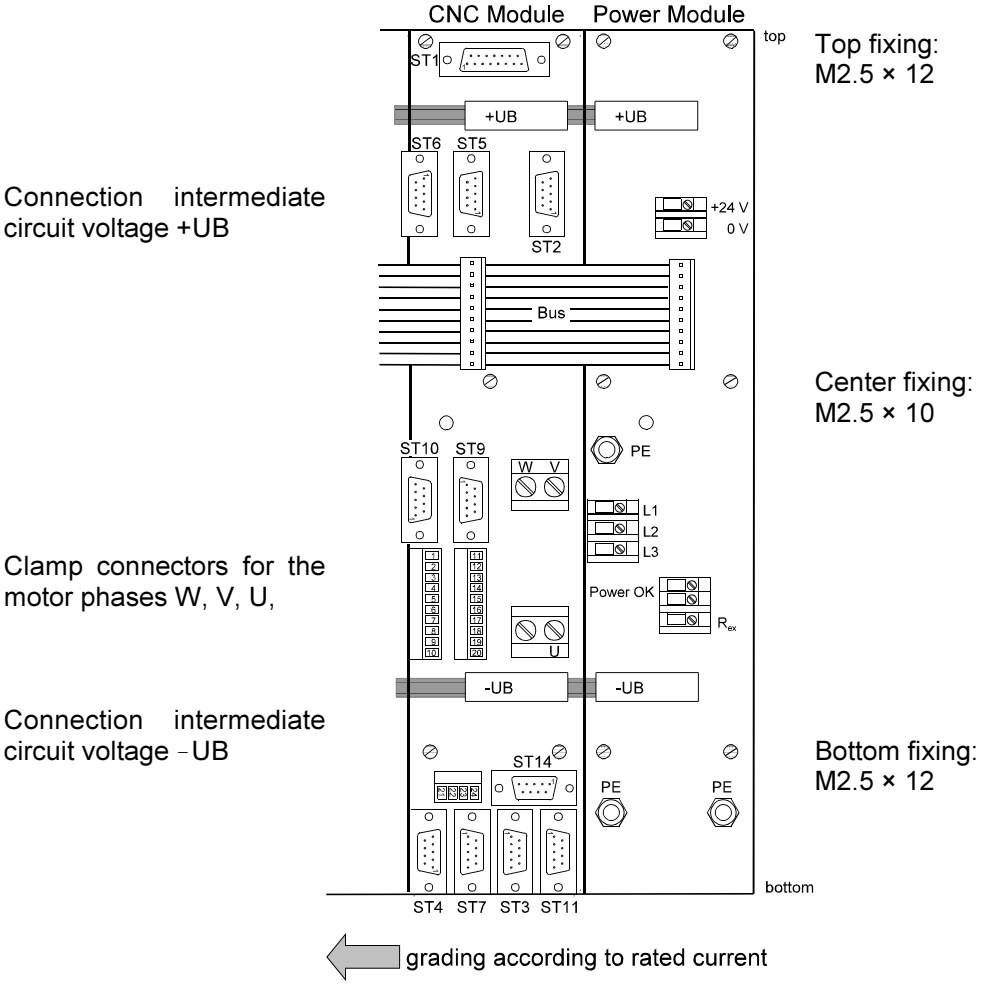
The modular design of the SIEB & MEYER CNC 61.00 modules facilitates the replacement of a complete rack.

When replacing a CNC 61.00 module, pay attention, that the substitute module is adjusted to the same motor (see labeling at the grips). Furthermore, the respective firmware (operating system) and application software has to be loaded into the module (axis). Also pay attention to the correct adjustment for the 24 V supply.

Do not forget to adjust the axis address correctly!

6.2 Mounting of the Back Planes

The back planes have to be fastened with six screws to ensure a good connection between back plane and CNC 61.00 module. Make sure that a reliable connection between back plane and module is given when pushing in the module. An improper connection can cause a burning of the contacts and, thus, destroy the module.



The grading is made according to the respective rated currents of the CNC 61.00 modules, so that the servo module with the lowest rated current is built in farthest to the power module.

7 General Information Regarding the Wiring

The 24 V supply voltages of the connectors X2 to X7 must only be used to feed encoders, or similar.
Never connect the 24 V lines of the separate axes!

7.1 General Information

The cables, described in this section correspond to the requirements, SIEB & MEYER AG demands for a correct function of the cable connections.

If cables are exposed to mechanical strain within the machine, for example in trailing chains or similar, the machine manufacturer must take care for only using appropriate cables.

In principle, the following points apply for the cables (see also “Unit Assembly Complying EMC”, page 23):

- Motor and signal cables must not be wired in the same armored tube!
- Motor cables must have a wire-woven shield. They must be wired segregated from signal lines.
- Signal lines must have a wire-woven shield. Difference signals should only be transmitted in pairwise twisted lines. They must be wired segregated from motor cables.
- The cable shields must be connected to the shell in the connectors. In the switch cabinet they should be connected to an earth bus.
- Cable shields, not ending in a connector within the switch cabinet, such as motor cables, must be connected on the respective bar.
- Both ends of shields are generally to be connected to the shell.

The conductor cross sections should be selected carefully to prevent an exceeding of the maximum admissible current at maximum ambient temperature (the max. ambient temperature of the CNC 61.00 module is 60°C). **DIN 60204-1** defines the admissible values for the separate cross sections, which must absolutely be considered.

The following table shows the current carrying capacity in combination with the conductor cross-section of copper leads, isolated with polyvinyl chloride or cables according to DIN/EN 60204-1 for wiring type B2 and an ambient temperature of +40°C:

Conductor Cross-Section A [mm²]	Admissible Current I [A]
0.75	7.60
1.00	9.60
1.50	12.20
2.50	16.50
4.00	23.00
6.00	29.00
10.00	40.00
16.00	53.00
25.00	67.00
35.00	83.00

The following correction factors are provided for deviating ambient temperatures:

Ambient Temperature T [°C]	Correction Factor
30	1.15
35	1.08
40	1.00
45	0.91
50	0.82
55	0.71
60	0.58

The following table shows the current carrying capacity in combination with the conductor cross-section of copper leads, isolated with polyvinyl chloride or cables according to DIN/EN 60204-1 for wiring type B2 and an ambient temperature of +40°C:

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1.50	12.20
2.50	16.50
4.00	23.00
6.00	29.00
10.00	40.00
16.00	53.00
25.00	67.00
35.00	83.00

The following correction factors are provided for deviating ambient temperatures:

Ambient Temperature T [°C]	Correction Factor
30	1.15
35	1.08
40	1.00
45	0.91
50	0.82
55	0.71
60	0.58

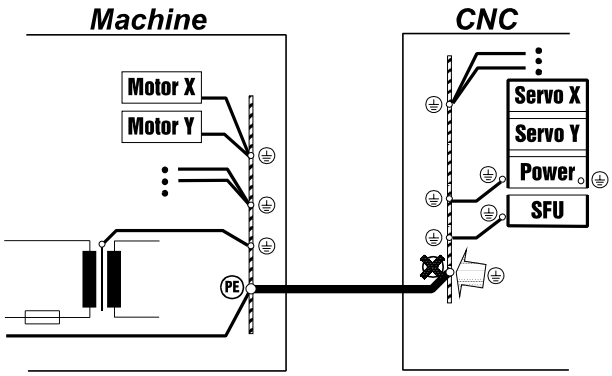
7.2 Difficulties of Ground Loops

Even if all ground points seem to have an identical potential, the potentials in the ground system may result from r.f. capacitances in a particular area of the machine (e.g. r.f. clocked motor lines). The resulting magnetic fields may cause malfunctions in the machine or controller (e.g. initiation of count pulses).

Connection Information

The main requirements for an efficient grounding according to DIN/EN 60 204-1 (electrical equipment of machines) are:

The complete system must have only one PE point!
All earth connections are connected tree-shaped to the PE point.



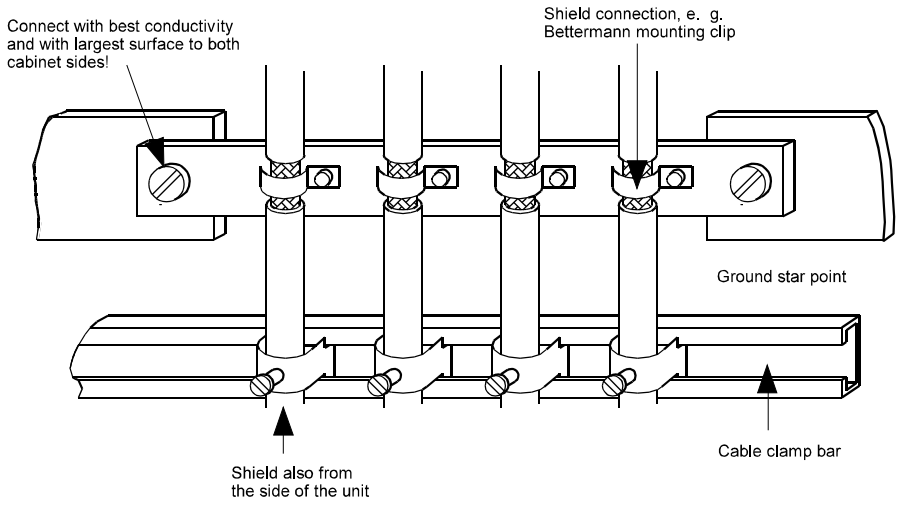
Connecting example of a machine and the connected CNC with connection to earth according to the EMC guidance

Particular notes:

- The PE point usually is the connecting point of the PE conductor of the voltage supply or the earth connection of a separate earth arrangement of the complete system.
- If several points within the system are marked with PE, all marks should be provided with the earth character ⏚, except for one.
- Motors must be connected with least impedance to the earth points ⏚. Earth connections to the outputs of the servo amplifiers must not be made!
- Motors, mounted on an insulated machine part (e.g. linear motors, handheld nut setting unit, etc.) must be connected to earth with largest surface.
- Earth connections must always be made with largest surface. Earth straps, consisting of many thin wires offer a larger surface than only one fixed core with thick cross-section. Earth connectors should be shortest possible.

7.3 Motor Cables

Use shielded conductors for the motor to ensure as low as possible interferences (conductor cross section according to table). The shield must be put with both ends to the PE.



7.4 Cables for the First Measuring System

Use shielded conductors and shielded Submin D shells for the wiring of the different measuring systems. At the side of the CNC 61.00 module the shield must be put with one end to the Submin D shell and at the side of the measuring system on its housing.

Examples for the usage of conductors:

- Motors with resolver
  LIYCY 3 × 2 × 0.14 or 4 × 2 × 0.14 for motors with integrated thermal contact. Shielded, pairwise twisted conductors. Twist mode: sine/sine, cosine/cosine, rotor/rotor and, if necessary, thermal contact/thermal contact.
  We recommend to additionally shield the separate pairs for delicate applications.
- Motors with incremental encoder
  LIYCY 5 × 0.14 or 7 × 0.14 for motors with integrated thermal contact.
- Motors with Hall effect sensors and tacho generator
  LIYCY 9 × 0.14 or 12 × 0.14 for motors with integrated thermal contact.

7.5 Cables for the Second Measuring System

Use shielded conductors with a shielded Submin D shell, like for example LIYCY 4 × 0.14, for the wiring of the Second Measuring System. At the side of the CNC 61.00 module the shield must be put with one end to the Submin D shell and at the side of the second measuring system on its housing.

We recommend using pairwise twisted conductors, possibly with an additional shield of the separate pairs for delicate applications. Twist mode: A+/A–; B+/B–.

As at all fast-clocked devices of the power electronics also the CNC 61.00 module can deliver high-frequency perturbing radiation into the feeding mains and leakage current can occur.
Specific measures in the circuitry of the devices already provide an effective protection against possible interferences (high frequency screening unit). However, due to the integration of the modules into plants with their resulting physical operating parameters the admissible values according to VDE 0875 can be exceeded. Therefore, the user should take additional steps, if necessary. Interferences can considerably be reduced with specific transformers or filter sections and by appropriate wiring.

7.6 Cables for the Connection of the I/O Expansion Modules

Use a shielded conductor with shielded Submin D shell, like for example LIYCY 4 × 2 × 0.14, for the wiring of the I/O Expansion Modules. Put the shield on the Submin D shell at the side of the CNC 61.00 module.

We recommend using pairwise twisted conductors, possibly with an additional shield of the separate pairs for delicate applications.

7.7 Cables for the Terminal Connections

Use a shielded conductor with shielded Submin D shell, like for example LIYCY 4 × 0.14, for the wiring of the Terminal Connections. Put the shields on the Submin D shell at the sides of the CNC 61.00 module and the PC.

7.8 Cables for the INTERBUS

If malfunctions arise during the bus operation, conducting the shield of the INTERBUS with one side via a 47 nF capacitor to earth can be useful.

Otherwise the points, described in the section “General Information”, see page 33, apply for the INTERBUS.

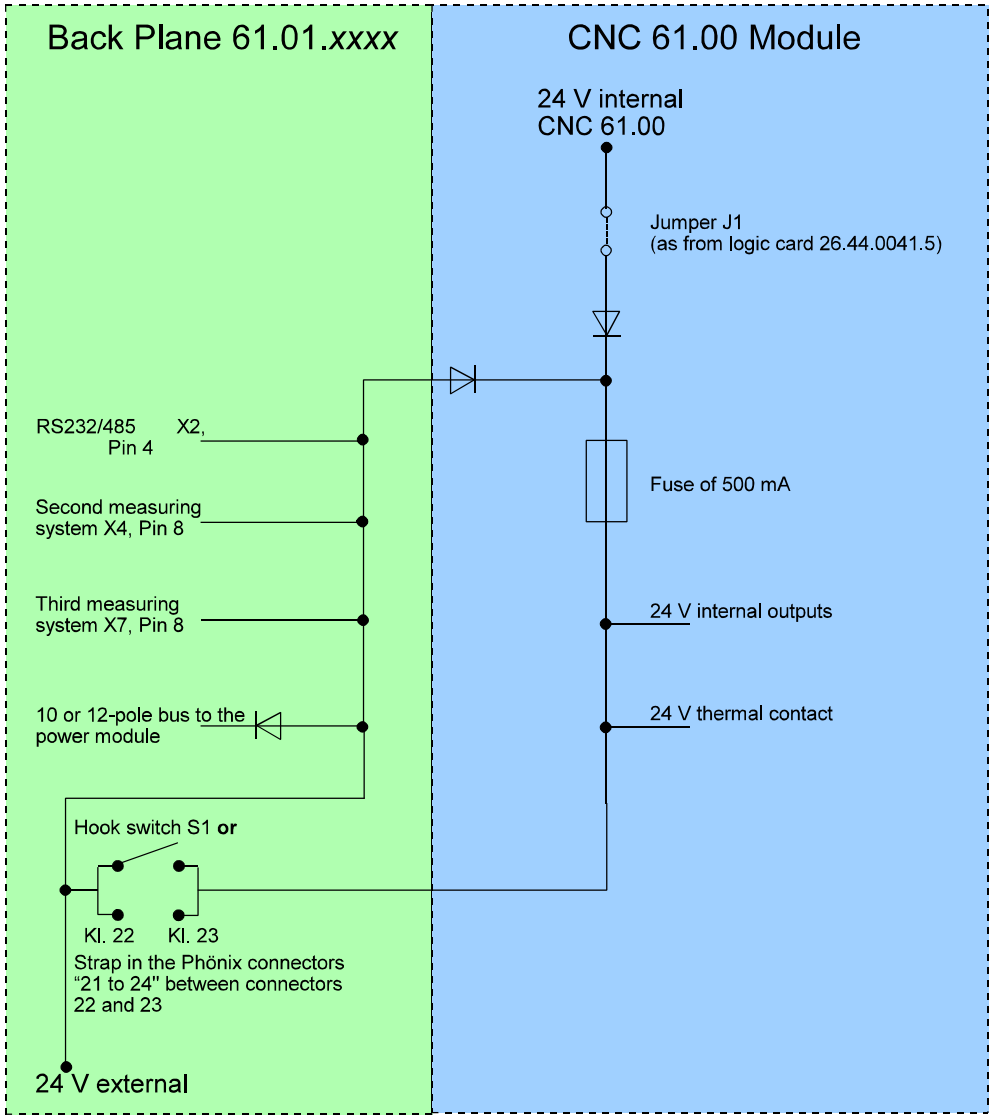
7.9 Cables for the External Ballast Resistor

The lines to the external ballast resistor from R_{EX} and +UB should be twisted. A shielded cable must be used, if the lines is longer than 20 cm.

7.10 Wiring of the 24 V (Internal/External)

For the back planes of the multi-axis system applies:
Supply of 24 V to connector 23: external 24 V
Strap between connectors 22 and 23: internal 24 V

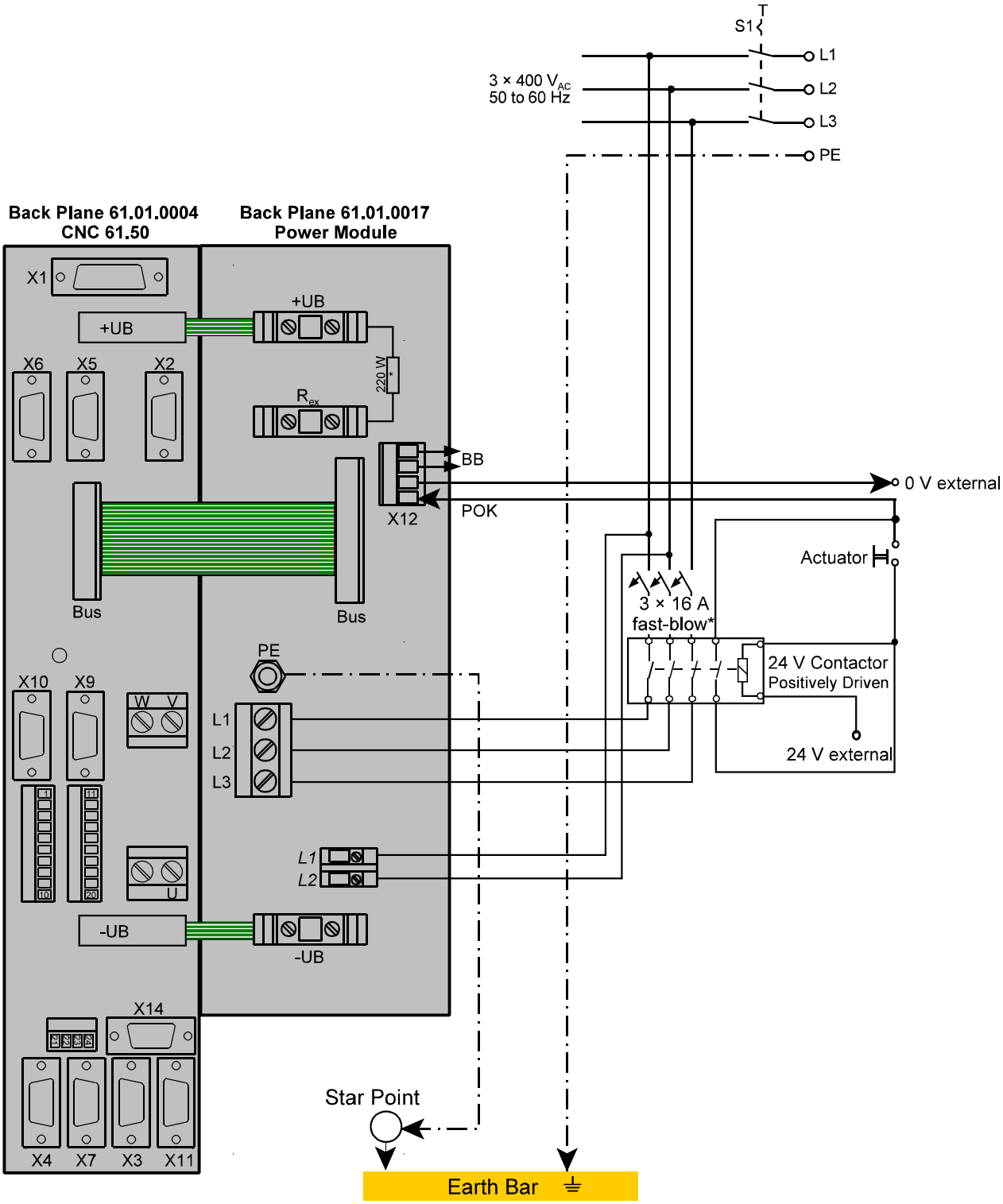
For the back planes of the compact system applies:
Open hook switch S1: external 24 V
Closed hook switch S1: internal 24 V



The total load of all outputs must not exceed 350 mA. Each output can be loaded with max. 100 mA..

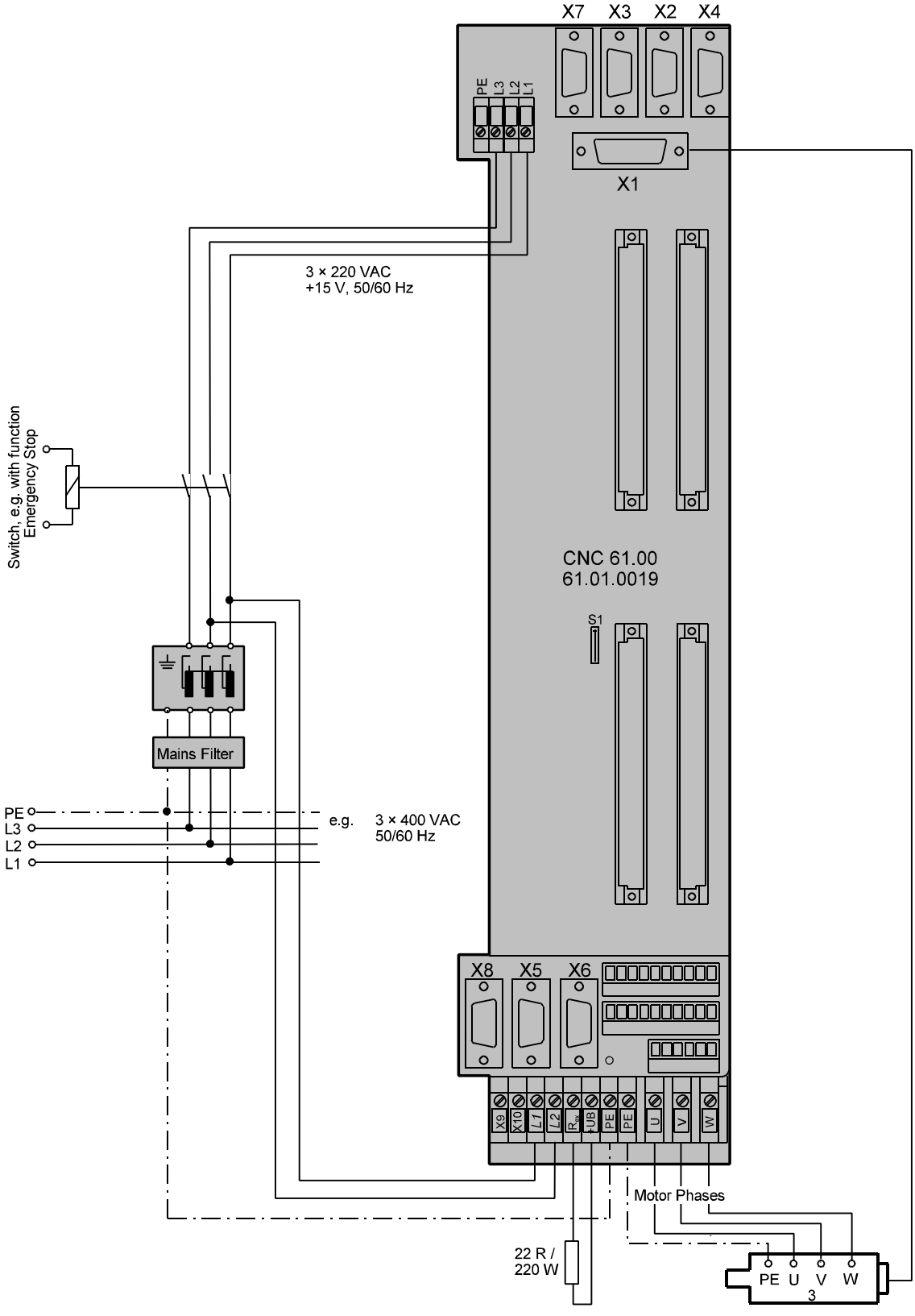
8 Connection Diagrams

8.1 Example: Operation of the CNC 61.50 Directly at the 3-Phase Mains

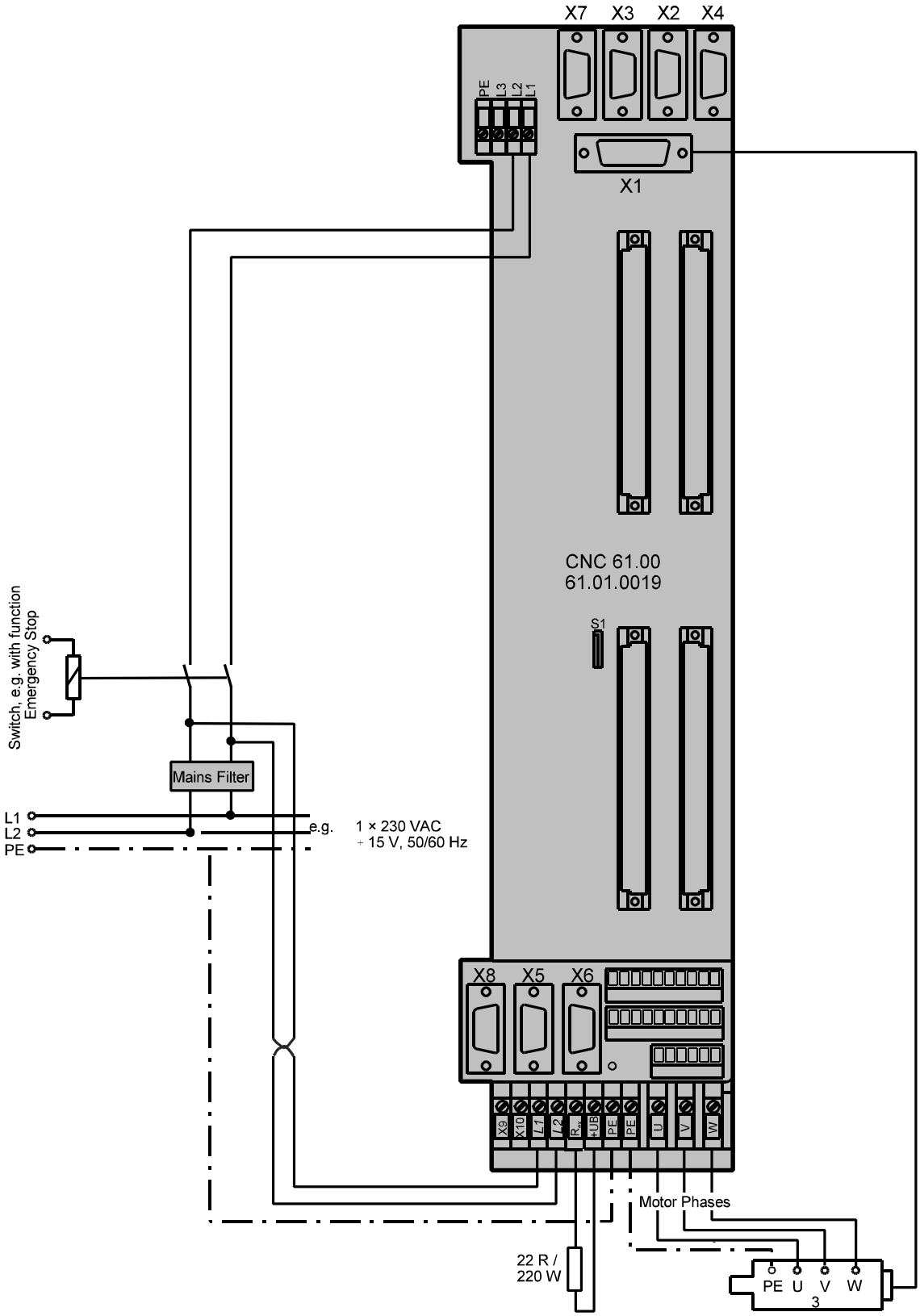


*e. g. Siemens Silized 16 A/5SD420

8.2 Example: Compact System 3-Phase Supply with Auto-transformer

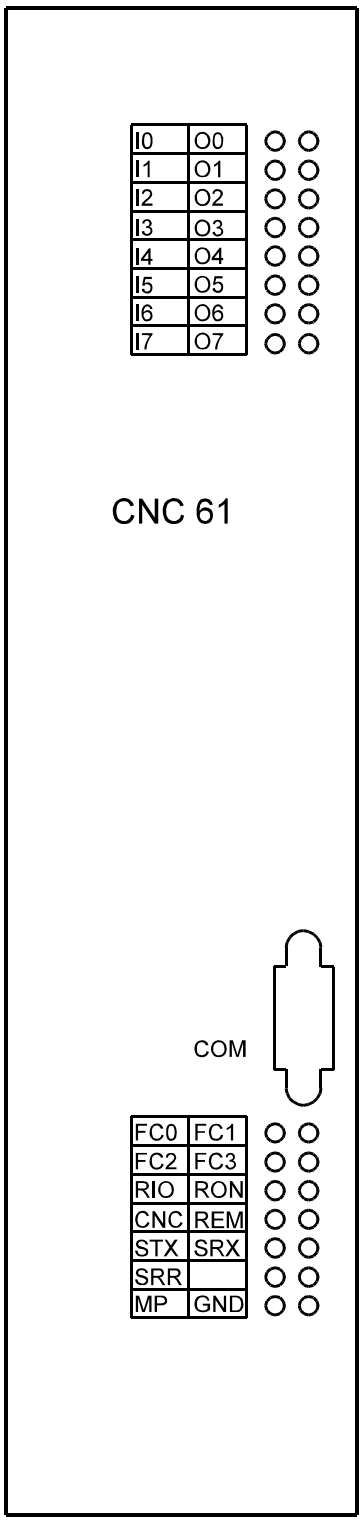


8.3 Example: Compact System With 1-Phase Supply



9 Front Panels

9.1 Front Panel of the Multi-Axis System



I0	O0
I1	O1
I2	O2
I3	O3
I4	O4
I5	O5
I6	O6
I7	O7

Status indication of the inputs/outputs of the connector "1 to 20 - Logic Signals" (page 63)

COM Connection of the terminal/programming unit (page 55)

FC0	FC1
FC2	FC3

Status indication/error messages (starting on page 46)

RIO	RON

Indication of malfunctions / of the controller (page 53)

CNC	REM

Indication of operation / "remote control" (page 53)

STX	SRX
SRR	

Status indication/error messages of bus systems (1 LED without designation, page 54)

MP	GND

Test pin

9.2 Front Panel of the Power Module 26.50.65

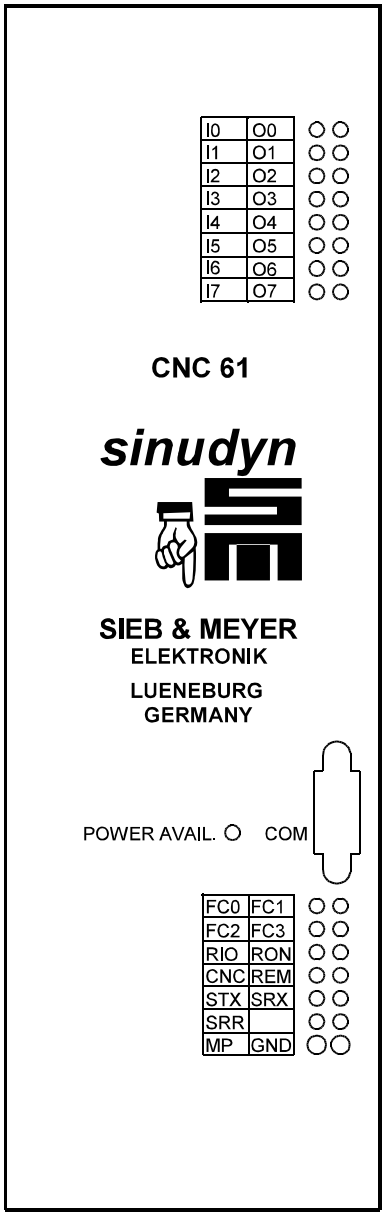
The power module 26.50.65 replaces the power module 26.50.42 and is fully downward compatible. It may be used in existing systems.

The power module 26.50.42, however, is not generally upward compatible, since the compatibility depends on the wiring of the system. If necessary, contact SIEB & MEYER.

+5 V MSY Potentiometer for the precise adjustment of the external 5 V

LEDs Visual indication of the operational statuses and possible arisen errors of the power module (page 55)

9.3 Front Panel of the Compact System



I0	O0
I1	O1
I2	O2
I3	O3
I4	O4
I5	O5
I6	O6
I7	O7

Status indication of the inputs/outputs of connector “1 to 20 - Logic Signals” (page 63)

POWER AVAIL. Status of the integrated power module

COM Connection of terminal/programming unit (page 55)

FC0	FC1
FC2	FC3

Status indication/error messages (starting on page 46)

RIO	RON

Indication of malfunctions / of the controller (page 53)

CNC	REM

Indication of operation / “remote control” (page 53)

STX	SRX
SRR	

Status indication/error messages of bus systems (1 LED without designation, page 54)

MP	GND

Test pin

9.4 Indications / Connections of the CNC 61.50 Front Panels

9.4.1 Status Indication FC0 to FC3 (Red Flashing)

FC0	FC1
FC2	FC3

LED is continuously on (red): permanent error, e. g. emergency stop
LED is flashing red: error occurred and must be reset with the software

LEDs	Code*	Error	Reaction	Possible Cause	LEDs**
○ ○ ○ ○	0	no error	no		○ ○ ○ ○
○ ○ ○ ●	129	active monitoring of travel area	ref. position = actual position ref. speed = zero		● ○ ○ ○
○ ○ ● ○	130	14 V not provided	ref. speed = zero **and** regulator off[1]		○ ● ○ ○
○ ○ ● ●	131	-14 V not provided	ref. speed = zero **and** regulator off[1]		● ● ○ ○
○ ● ○ ○	132	short circuit	ref. speed = zero **and** regulator off[1]	double peak current flows via the measuring shunt into the output stage	○ ○ ● ○
○ ● ○ ●	133	reserved	no		● ○ ● ○
○ ● ● ○	134	overvoltage/ undervoltage	ref. speed = zero **and** regulator off[1,2]	Overvoltage: 325 V_{DC} method = switch-off threshold 385 V 560 V_{DC} method = switch-off threshold 810 V Undervoltage: Voltage < 42 V 24 V not provided 24 V internal: fuse has responded 24 V external: 24 V not provided	○ ● ● ○
○ ● ● ●	135	error of first measuring system	ref. speed = zero **and** regulator off[1]		● ● ● ○
● ○ ○ ○	136	motor temperature	ref. speed = zero **and** regulator off[1]	ETC/PTC- characteristic adjustable. Check the adjustment.	○ ○ ○ ●
● ○ ○ ●	137	heat sink temperature	ref. speed = zero **and** regulator off[1]	heat sink is too hot	● ○ ○ ●
● ○ ● ○	138	I²t-computer	ref. speed = zero **and** regulator off[1]	The rated current has been exceeded, or the motor became to hot.	○ ● ○ ●
● ● ○ ○	140	emergency stop	Deceleration with the parameter “Quick Delay”		○ ○ ● ●
● ● ○ ●	141	positive limit switch	ref. position = actual position ref. speed = zero		● ○ ● ●
● ● ● ○	142	negative limit switch	ref. position = actual position ref. speed = zero		○ ● ● ●

●● ●●	143	power fail	Deceleration with the parameter “Quick Delay” and then ref. speed = zero **and** regulator off[1]	main supply is not provided	●● ●●
●○ ●●	144	tracking error	Deceleration with the parameter “Quick Delay” and then ref. speed = zero **or** regulator off[1] (acc. to the settings in the parameter file)		●● ○●

* error variable in the software
**only for series 61.50.71 / 73 / 75, the modules are turned around 180°; for this reason, here, the status indication is indicated correctly.
[1] The output stage is released and the motor coasts.
[2] This message is also generated, if

a) the CNC61 module is operated with internal 24 V and the fuse (on the processor card of the CNC 61.00) has responded, or

b) the CNC61 module is to be supplied with external 24 V, but this voltage is not applied. Reason: The internal or external 24 V are used for the generation of the message/signal lines of the power module. This means, that if this voltage is not supplied, 0 V are applied to the signal lines and the CNC61 interprets this fact as overvoltage/undervoltage!

9.4.2 Possible Error Causes

Error 129

LEDs	Code	Error
○○ ○●	129	active monitoring of travel area

This error will arise, if the software limit switches in the parameter file are activated.
Possible error cause:
- The parameterization of the software limit switches in the parameter file is wrong.

Error 130

LEDs	Code	Error
○○ ●○	130	+14 V not provided

Possible error cause:
- The option module on the processor board might be hidden.

Error 131

LEDs	Code	Error
○○ ●●	131	-14 V not provided

Possible error cause:

- The option module on the processor board might be hidden.

Error 132

LEDs	Code	Error
○ ● ○ ○	132	short circuit

Possible error cause:
- error in the wiring of the motor cable
- broken or squeezed motor cable (especially trailing chain)
- if the motor cables have been pulled off the back plane, the output stage of the CNC61 will be defective

Error 134

LEDs	Code	Error
○ ● ● ○	134	overvoltage/undervoltage

Possible error cause, if undervoltage:
- external 24 V supply is faulty
- 24 V fuse on the CNC61 (processor card) is defective
- the main voltage supply of the power module is faulty (too low)

Possible error cause, if overvoltage:
- external 24 V supply is faulty
- 24 V fuse on the CNC61 (processor card) is defective
- the main voltage supply of the power module is faulty (too low)
- wrong connection of the ballast resistor
- the braking power of the power module has been exceeded

Error 135

LEDs	Code	Error
○ ● ● ●	135	error of the first measuring system

Possible error cause:
- broken or squeezed cable of the measuring system(especially trailing chain)
- the connector of the first measuring system (X1) is not connected or wrongly connected
- error in the wiring of connector X1 at the back plane or in the wiring of the resolver connector at the motor

Error 136

LEDs	Code	Error
● ○ ○ ○	136	motor temperature

Possible error cause:

- the motor became too hot due to overload
- wrong connection of the PTC (NTC)
- the connection between the CNC61 and the PTC has been interrupted

Error 137

LEDs	Code	Error
	137	heat sink temperature

Possible error cause:
- the ambient temperature of the CNC61 is too hot (in the switch cabinet)

Error 138

LEDs	Code	Error
	138	I²t-load

Possible error cause:
- the machine became mechanically sluggish
- the parameter values of the traveling speed/acceleration are too high
- error in the wiring of the motor phases

Error 140

LEDs	Code	Error
	140	emergency stop

Possible error cause:
- emergency stop is initiated
- wrong wiring of input 0 of the CNC61

Error 141

LEDs	Code	Error
	141	positive limit switch

Possible error cause:
- the machine is on the limit switch
- the limit switch or the wiring is defective
- wrong wiring of input 1 of the CNC61

Error 142

LEDs	Code	Error
	142	negative limit switch

Possible error cause:

- the machine is on the limit switch
- the limit switch or the wiring is defective
- wrong wiring of input 2 of the CNC61

Error 143

LEDs	Code	Error
	143	power fail

a) The LED "Power Avail." of the power module is on.

Possible error cause:
- the 24 V fuse of the CNC61 (processor card) is defective
- the external 24 V supply is faulty

b) The LED "Power Avail." of the power module is off.

Possible error cause:
- emergency stop has been initiated
- the main voltage supply of the power module is not provided

Error 144

LEDs	Code	Error
	144	tracking error

Possible error cause:
- the machine became mechanically sluggish
- error in the wiring of the motor phases
- the acceleration or the delay of the motor is too high

Error: The LEDs of all CNCs are off.

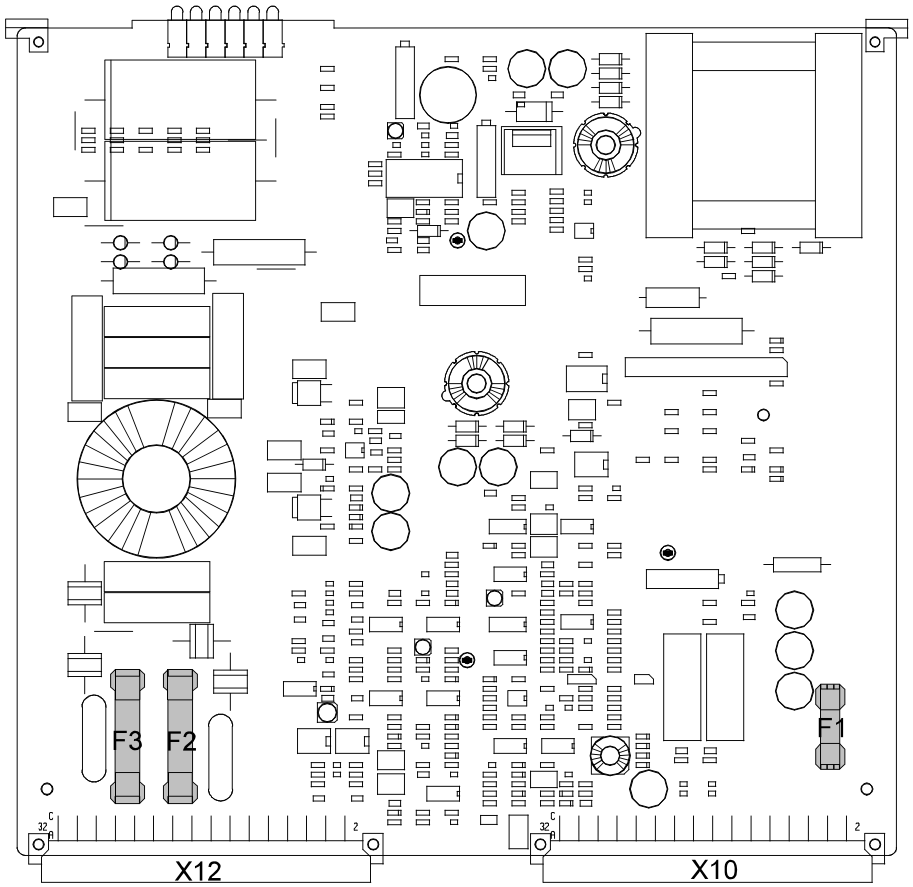
a) The LED "30V OK" of the power module is on.

Possible error cause:
- fuse F1 of the power module is defective

b) The LED "30V OK" of the power module is off.

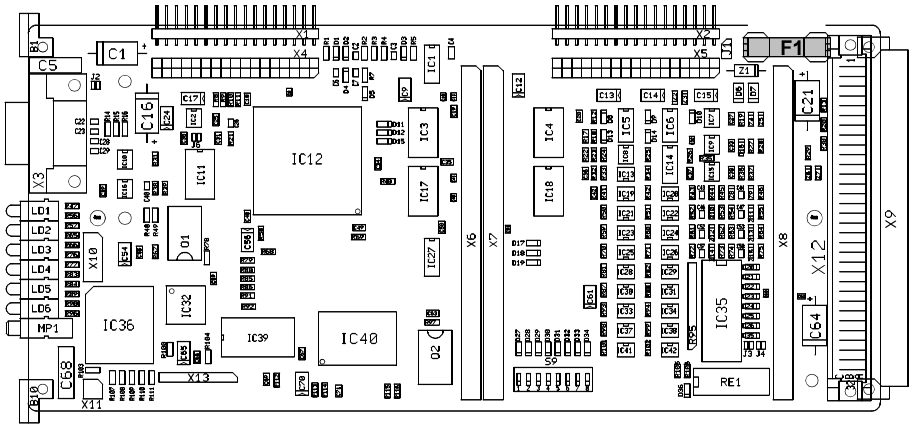
Possible error cause:
- the logic voltage supply of the power module is faulty
- fuses F2 and F3 of the power module are defective

Card of the Power Module 26.50.0038.xx/26.50.0073.xx



	C / K	H / I	
F1	6.3 A	6.3 A	5 x 20 mm semi time-lag
F2	3.15 A	2 A	6.3 x 32 mm fast-blow (500 V)
F3	3.15 A	2 A	6.3 x 32 mm fast-blow (500 V)

Processor Card 26.44.0041.xx



F1	5x20 500mA semi time-lag

9.4.3 Status Indication FC0 to FC3 (Green and Red)

FC0	FC1
FC2	FC3

LEDs	Status	Cause
● ○ ○ ○	FC0 lights green	PI LIMIT and Regulator ON are active
● ● ● ● ○ ○ ○ ○	FC0 to FC3 alternately light red and green	no operating system (firmware) is provided

9.4.4 RIO - Malfunction Indication

RIO	Meaning
●	no error of regulator
○	error of regulator

9.4.5 RON- Status of Regulator

RON	Meaning
●	regulator ON
○	regulator OFF

9.4.6 CNC - Operation Indication

CNC	Meaning
●	CNC operation
○	REMOTE operation

9.4.7 REM - Indication “Remote Control”

REM	Meaning
○	CNC operation
●	REMOTE operation

9.4.8 STX / SRX / SRR - Status Indication/ Error Messages of Bus Systems

Bus System MODLINK (Accessory Module F1)

LED			Meaning
STX	green	●	transmission signal is provided
		○	no transmission signal
SRX	green	●	receive signal is provided
		○	no receive signal
SRR	red/orange	●	transmission failure
		○	no fault
*	red/orange	●	without meaning
		○	

* LED has no designation

Bus System INTERBUS-S (Accessory Module A1)

LED			Meaning
STX	green	●	bus connection is completed
		○	no bus connection
SRX	green	●	monitoring of the input remote bus cable
		○	no monitoring
SRR	red/orange	●	no meaning
		○	
*	red/orange	●	module fault/inactive master
		○	no fault

* LED has no designation

Bus System INTERBUS (A1) and MODLINK (F1)

LED			Meaning
STX	green	●	transmission signal is provided
		○	no transmission signal
SRX	green	●	receive signal is provided
		○	no receive signal
SRR	red/orange	●	transmission failure
		○	no fault
*	red/orange	●	module fault / no active master in the INTERBUS
		○	

* LED has no designation

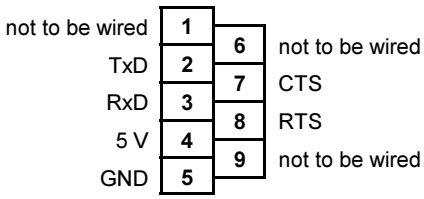
Bus System Profibus-DP (Accessory Modules AB, AE and AF)

LED			Meaning
STX	green	●	no meaning
		○	
SRX	green	●	
		○	
SRR	red/orange	●	
		○	
*	red/orange	●	communication is OK
		○	faulty communication

* LED has no designation

9.4.9 COM - Connection of Terminal/Programming Unit

9-pole female Submin D connector, corresponding with its levels to the RS 232 characteristics.



9.5 LEDs of the Power Module 26.50.65x

LED			Meaning
30 V OK	green	●	logic supply *L1* and *L2* is OK
POWER AVAIL.	green	●	generation of the intermediate circuit voltage *L1*, *L2* and *L3* is OK
OVERLOAD UB	red	●	short within the intermediate circuit
OVERVOLTAGE	red	●	overvoltage in the intermediate circuit
		☼	the I^2t monitoring of the ballast circuit has responded
OVERTEMP.	red	●	the monitoring of excess temperature has responded
OVERLOAD	red	●	short circuit at the external ballast resistor

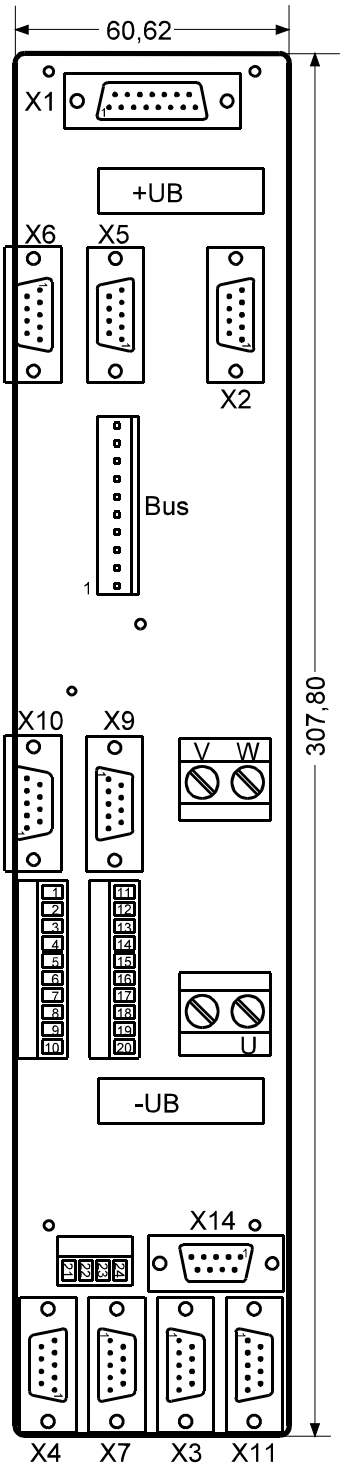
● LED is on
☼ LED flashes

10 Back Planes and Pin Assignment

10.1 Back Planes for the Multi-Axis System

10.1.1 Back Plane 61.01.0004 for INTERBUS, MODLINK and CAN Bus

Mounting into a 19” rack as hinged-frame unit and protection against touching

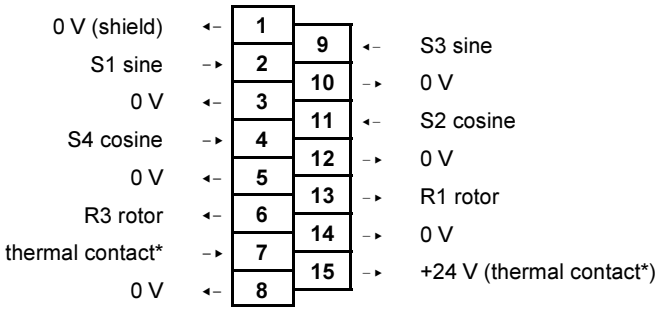


X1	Connection of the first measuring system, page 58
+UB	Intermediate circuit voltage
X6	INTERBUS connection (outputs), page 61
X5	INTERBUS connection (inputs), page 60
X2	Terminal connection, page 59
Bus	Internal connection, page 64
X10	MODLINK connection (inputs), page 62
X9	MODLINK connection (outputs), page 61
V W	Motor connection, page 64
1 to 20	Logic signals, page 63
U	Motor connection, page 64
-UB	Intermediate circuit voltage
21 to 24	Thermal contact/ 24 V external, page 63
X14	Transducer/analog input, page 62
X4	Angle pulse connection, page 60
X7	Angle pulse connection, page 61
X3	I/O expansion, page 59
X11	CAN bus connection, page 62

X1 - Connection of First Measuring System (Feedback)

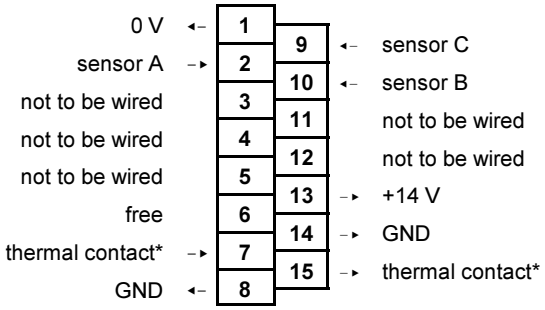
15-pole female Submin D connector

Resolver Evaluation



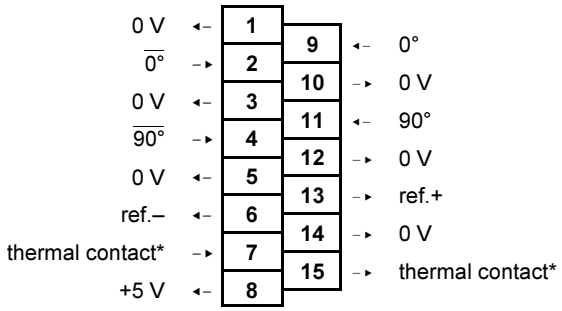
- If the thermal contact (*) is not evaluated, the Pins 15 and 7 must be strapped.
- Use a shielded cable with three pairs of wires, each of which being twisted (e. g. LIYCY 3 × 2 × 0.14). Twist mode: sine/sine; cosine/cosine; rotor/rotor.
- The shield must be connected with both ends: At the CNC on the connector shell and at the resolver, as described in the chapter “Wiring”, “General Information”, page 33.

Hall Effect Sensor Evaluation



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable. Connect the shield with largest surface to the connector shell.

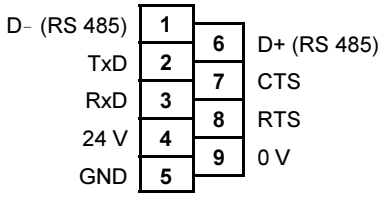
Optical Length Measuring System



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable with four pairs of wires, each of which being twisted. Twist mode: $\overline{0°}$/0°, $\overline{90°}$/90°, ref.+/ref.– and +5 V/0 V. If the thermal contact is evaluated, a shielded twisted pair cable with five pairs of wires must be used.
- For incremental encoders without difference voltage signal the Pins 9 and 11 must be supplied with 5 V (Pin 8).
- Connect the shield with largest surface to the connector shell.

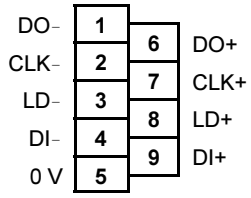
X2 - Terminal Connection

9-pole female Submin D connector with levels corresponding to the RS232 and RS485 specifications.



X3 - I/O Expansion

9-pole female Submin D connector

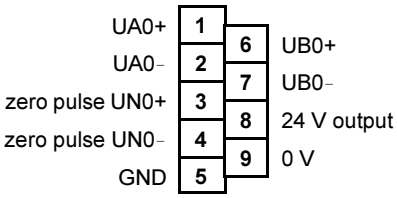


X4 - Angle Pulses

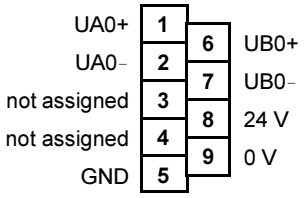
9-pole female Submin D connector

The connectors are either inputs or outputs.
Inputs: 5 V or 24 V
Outputs: 5 V

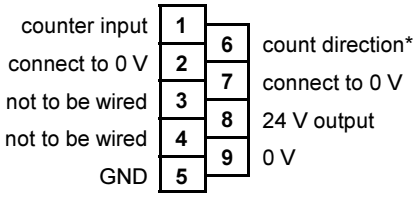
Accessory Modules AG, AH BA, B1/B2, B4, B5, B9 and C2/C3 Angle Pulse Input



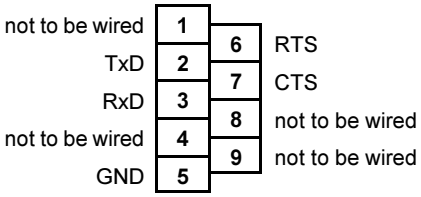
Accessory Modules B3 and C4 Angle Pulse Output



Accessory Module B7/B8 Counter Input



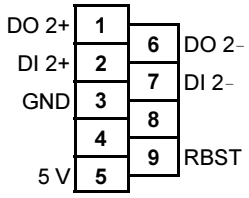
Accessory Modules A5 and A6 Serial Interface 2



* not wired: positive count direction
5 V/24 V: negative count direction

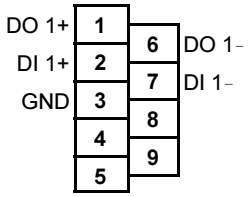
X5 - INTERBUS-S Connection

9-pole female Submin D connector



X6 - INTERBUS-S Connection

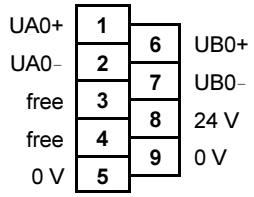
9-pole male Submin D connector



X7 - Angle Pulses

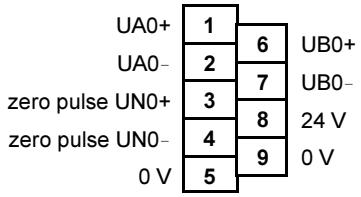
9-pole female Submin D connector

Accessory Modules BA, B4, B7/B8 Angle Pulse Output

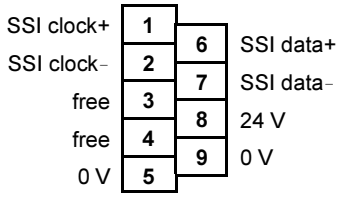


Accessory Modules B5 and B9

Angle Pulse Input

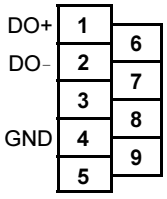


Accessory Modules C2/C3 and C4 SSI Interface



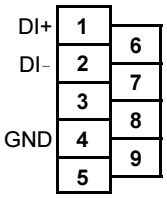
X9 - MODLINK Connection

9-pole female Submin D connector



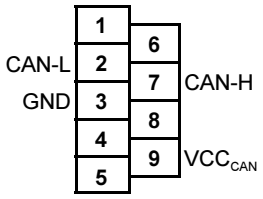
X10 - MODLINK Connection

9-pole male Submin D connector



X11 - CAN Bus Connection

9-pole female Submin D connector

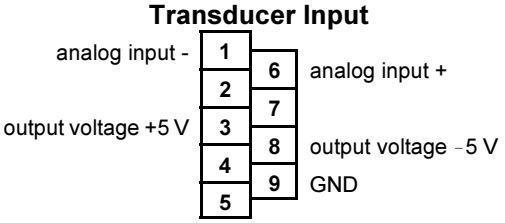


VCC_{CAN}: 8 V to 15 V

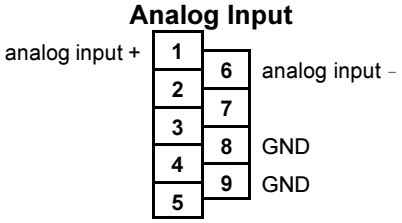
X14 - Transducer/Analog Input

9-pole female Submin D connector

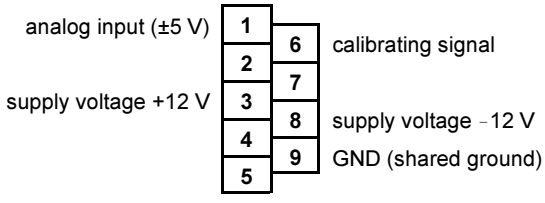
Accessory Modules A3, A5, AA and AE
Transducer Input



Accessory Modules A4 and A6
Analog Input



Accessory Module AF
Active Transducer



1 to 20 - Logic Signals

PHOENIX Mini CombiCon

All inputs and outputs work with a level of 24 V. The total load of all outputs must not exceed 350 mA.

Please take into consideration that some inputs and outputs have alternating meaning. If, for example, the function “Motor Brake” has been activated in the parameter editor (IP_E_BRAKE=ON), the output o1 will automatically be identical with the function “Motor Brake”.

1	regulator OK+	(voltage-free contacts)
2	regulator OK	
3	output o0 (always regulator OK)	
4	output o2	
5	output o1 (= motor brake, if IP_E_BRAKE = ON)	
6	output o7	
7	output o6	
8	output o5	
9	output o4	
10	output o3	

11	input i2 (= limit switch–, if IP_E_END = ON)
12	input i1 (= limit switch+, if IP_E_END = ON)
13	input i3
14	input i0 (always emergency stop)
15	input i7
16	input i6
17	input i5
18	input i4
19	0 V*
20	24 V*

* see also the section “Wiring of the 24 V (Internal/External) in the chapter “Wiring”, page 38.

‣ Additional inputs and outputs can be connected to X3 via the I/O modules 44.20.xxx. See also the chapter “External I/O Modules”, starting on page 201.

21 to 24 - Thermal Contact/24 V External

PHOENIX Mini CombiCon

21	thermal contact
22	24 V internal
23	24 V external
24	0 V

Wiring of the 24 V (Internal/External), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

U / V / W - Motor Connections

- WEIDMÜLLER screw connectors
  The maximum conductor cross-section for the terminals is 10 mm².

Bus - Internal Connection

The 10-pole bus line connects the power module and up to six CNC rack modules. The bus supplies the CNC modules with the voltage of +30 V (bus voltage). Additionally, statuses of the power module (readiness for operation, malfunctions) are signaled to the CNC 61.00 modules. At the power module the bus pins are outputs, whereas at the CNC module the bus pins are inputs.

Pin	Assignment	
1 + 2	ground potential	
3	mains OK = +24 V	
4	overvoltage message: 0 V in case of an error 24 V without error	
5	+24 V	
6	not assigned	
7 + 8	+30 V	mains potential
9 + 10	0 V for the 30 V	mains potential

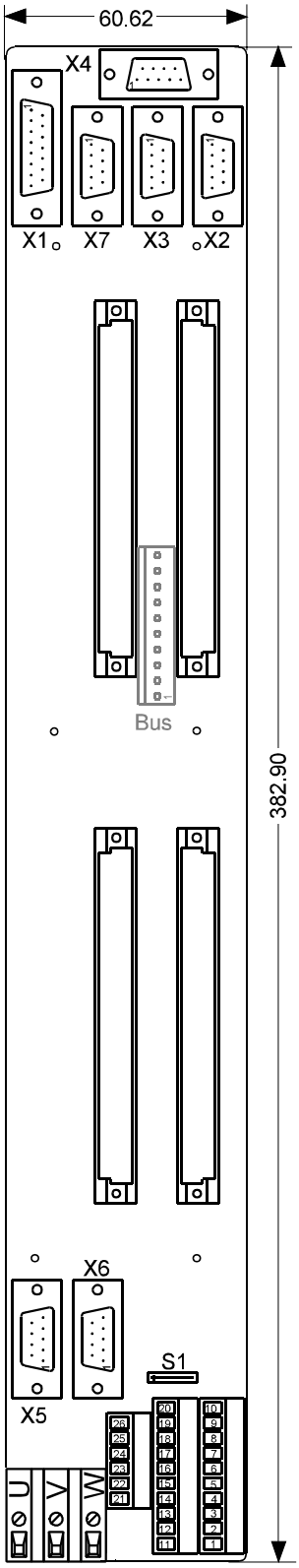
Do not use the +30 V for any other purposes!

Mains OK
This output intra-system activates and deactivates, inter alia, the CNC modules. If the main supply is not provided, the signal “mains OK” will be LOW and the CNC modules cannot be activated. The user may use this signal via the contacts *BB*.

Overvoltage Message
If an overvoltage comes up, the level of 24 V bounces to 0 V. Then the regulator in the CNC module is deactivated (*POK* and the main contactor open). Error messages, however, are kept.

10.1.2 Back Plane 61.01.0018 for Profibus

Mounting into 19” rack as wall-mounting unit

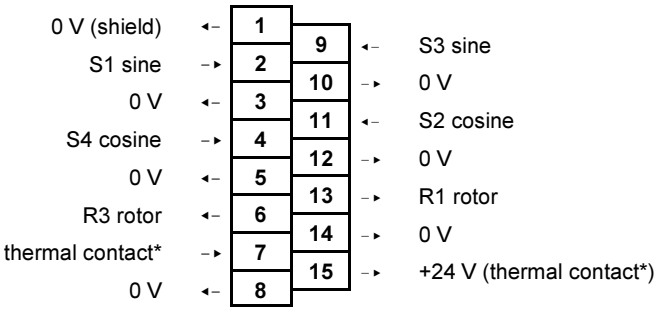


X4	Angle pulse connection, page 68
X1	Connection of first measuring system, page 66
X7	Angle pulse connection, page 69
X3	I/O expansion, page 67
X2	Terminal connection, page 67
Bus	Internal connection (rear side of the back plane), page 71
X5	Profibus connection, page 68
X6	Profibus connection, page 69
S1	Hook switch, page 69
21 to 24	Transducer / analog input, page 71
25 and 26	Thermal contact / 24 V, page 71
1 to 20	Logic signals, page 70

X1 - Connection of First Measuring System (Feedback)

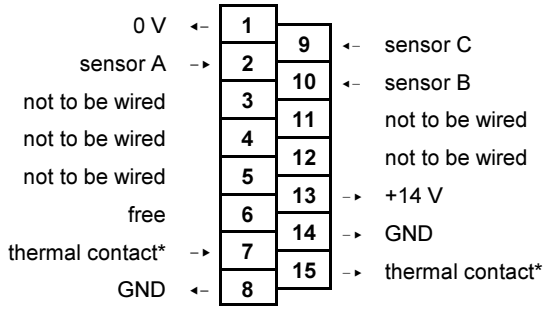
15-pole female Submin D connector

Resolver Evaluation



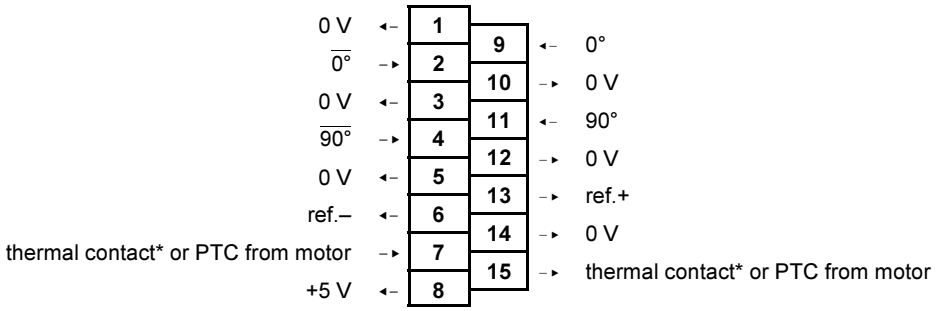
- If the thermal contact (*) is not evaluated, the Pins 15 and 7 must be strapped.
- Use a shielded cable with three pairs of wires, each of which being twisted (e.g. LIYCY 3 × 2 × 0.14). Twist mode: sine/sine; cosine/cosine; rotor/rotor
- The shield must be connected with both ends: At the CNC on the connector shell and at the resolver, as described in the chapter “Wiring”, “General Information”, page 33.

Hall Effect Sensor Evaluation



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable. Connect the shield with largest surface to the connector shell.

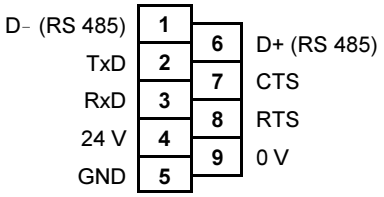
Optical Length Measuring System



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable with four pairs of wires, each of which being twisted. Twist mode: 0°/0°, 90°/90°, ref.+/ref.– and +5 V/0 V. If the thermal contact is evaluated, a shielded twisted pair cable with five pairs of wires must be used.
- For incremental encoders without difference voltage signal the Pins 9 and 11 must be supplied with 5 V (Pin 8).
- Connect the shield with largest surface to the connector shell.

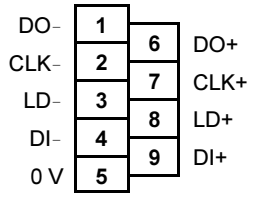
X2 - Terminal Connection

9-pole female Submin D connector with levels corresponding to the RS232 and RS485 specifications.



X3 - I/O Expansion

9-pole female Submin D connector

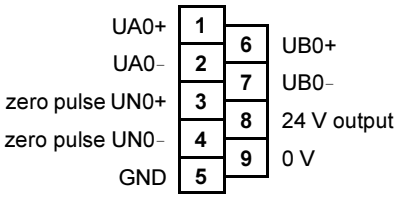


X4 - Angle Pulses

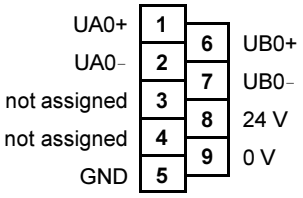
9-pole female Submin D connector

The connectors are either inputs or outputs.
Inputs: 5 V or 24 V
Outputs: 5 V

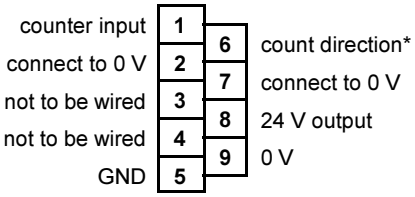
Accessory Modules AG, AH
BA, B1/B2, B4, B5, B9 and C2/C3
Angle Pulse Input



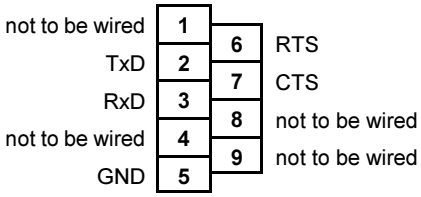
Accessory Modules B3 and C4
Angle Pulse Output



Accessory Module B7/B8
Counter Input



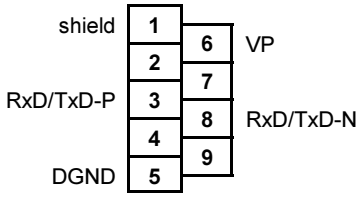
Accessory Modules A5 and A6
Serial Interface 2



* not wired: positive count direction
5 V/24 V: negative count direction

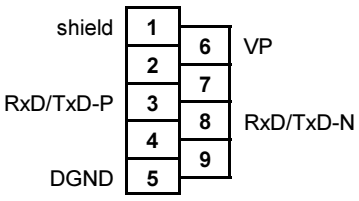
X5 - Profibus-DP Connection

9-pole female Submin D connector



X6 - Profibus-DP Connection

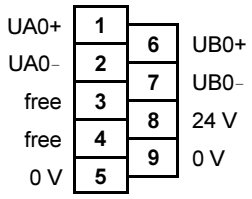
9-pole male Submin D connector



X7 - Angle Pulses

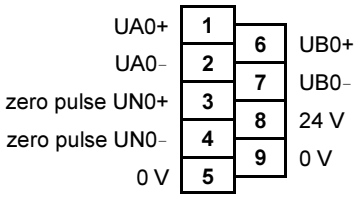
9-pole female Submin D connector

Accessory Modules BA, B4, B7/B8 Angle Pulse Output

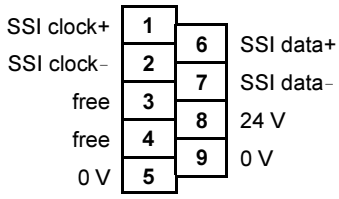


Accessory Modules B5 and B9

Angle Pulse Input



Accessory Modules C2/C3 and C4 SSI Interface



S1 - Hook Switch

Depending on the position of the hook switch S1 the CNC module provides the supply voltage of 24 V.

S1 closed: The CNC supplies the voltage at Pins 19 and 20 (default).
S1 open: The supply voltage is externally connected to Pins 19 and 20.

An incorrect hooking of the switches can cause damage at the CNC or the external power supply.

Wiring of the 24 V (internal/external), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

1 to 20 - Logic Signals

PHOENIX Mini CombiCon

All inputs and outputs work with a level of 24 V. The total load of all outputs must not exceed 350 mA.

Please take into consideration that some inputs and outputs have alternating meaning. If, for example, the function “Motor Brake” has been activated in the parameter editor (IP_E_BRAKE=ON), the output o1 will automatically be identical with the function “Motor Brake”.

1	regulator OK+	(voltage-free contacts)
2	regulator OK	
3	output o0 (always regulator OK)	
4	output o2	
5	output o1 (= motor brake, if IP_E_BRAKE = ON)	
6	output o7	
7	output o6	
8	output o5	
9	output o4	
10	output o3	
11	input i2 (= limit switch–, if IP_E_END = ON)	
12	input i1 (= limit switch+, if IP_E_END = ON)	
13	input i3	
14	input i0 (always emergency stop)	
15	input i7	
16	input i6	
17	input i5	
18	input i4	
19	0 V*	
20	24 V*	

* see also the section “Wiring of the 24 V (Internal/External) in the chapter “Wiring”, page 38.

▸ Additional inputs and outputs can be connected to X3 via the I/O modules 44.20.xxx. See also the chapter “External I/O Modules”, starting on page 201.

21 to 24 - Transducer/Analog Input

PHOENIX Mini CombiCon as inputs

Accessory Module A3
Transducer Interface

21	analog input –
22	analog input +
23	output voltage +5 V
24	output voltage –5 V

Accessory Module A4
Analog Input Module

21	analog input +
22	analog input –
23	
24	GND

25 and 26 - Thermal Contact/24 V External

PHOENIX Mini CombiCon

25	24 V
26	thermal contact

Wiring of the 24 V (Internal/External), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

U / V / W - Motor Connections

- WEIDMÜLLER screw connectors
  The maximum conductor cross-section for the terminals is 4 mm².

Bus - Internal Connection

The 10-pole bus line connects the power module and up to six CNC rack modules. The bus supplies the CNC modules with the voltage of +30 V (bus voltage). Additionally, statuses of the power module (readiness for operation, malfunctions) are signaled to the CNC 61.00 modules. At the power module the bus pins are outputs, whereas at the CNC module the bus pins are inputs.

Pin	Assignment	
1 + 2	ground potential	
3	mains OK = +24 V	
4	overvoltage message: 0 V in case of an error 24 V without error	
5	+24 V	
6	not assigned	
7 + 8	+30 V	⚠ mains potential
9 + 10	0 V for the 30 V	⚠ mains potential

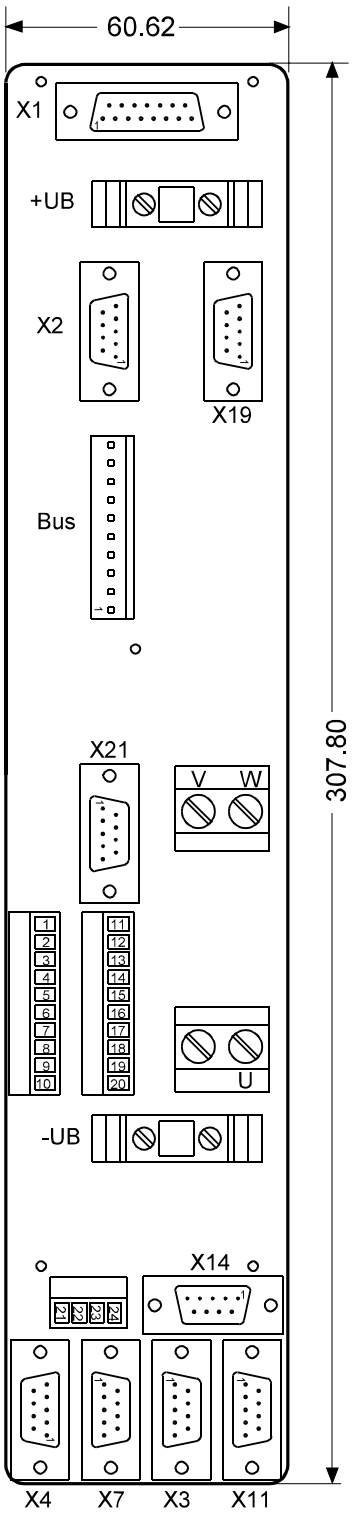
Do not use the +30 V for any other purposes!

Mains OK
This output intra-system activates and deactivates, inter alia, the CNC modules. If the main supply is not provided, the signal “mains OK” will be LOW and the CNC modules cannot be activated. The user may use this signal via the contacts *BB*.

Overvoltage Message
If an overvoltage comes up, the level of 24 V bounces to 0 V. Then the regulator in the CNC module is deactivated (*POK* and the main contactor open). Error messages, however, are kept.

10.1.3 Back Plane 61.01.0037 for Profibus and CAN Bus

Mounting into a 19” rack as hinged-frame unit and protection against touching

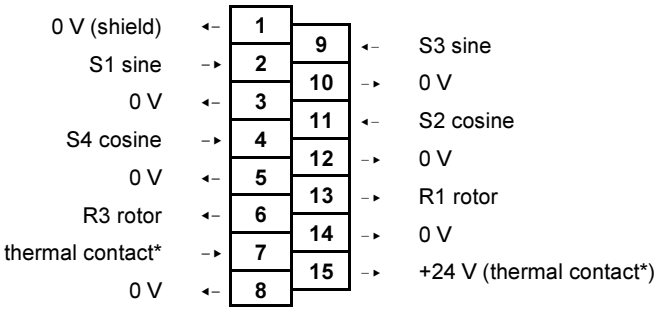


X1	Connection of first measuring system, page 74
+UB	Intermediate circuit voltage
X2	Terminal connection, page 75
X19	Profibus connection, page 77
Bus	Interne connection, page 79
X21	Serial interfaces 2 and 3, page 78
V W	Motor connection, page 79
1 to 20	Logic signals, page 78
U	Motor connection, page 79
-UB	Intermediate circuit voltage
21 to 24	Thermal contact / 24 V external, page 79
X14	Transducer / analog input, page 77
X4	Angle pulse connection, page 76
X7	Angle pulse connection, page 76
X3	I/O expansion, page 75
X11	CAN bus connection, page 77

X1 - Connection of First Measuring System (Feedback)

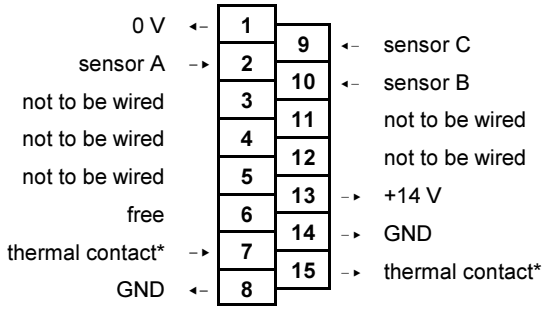
15-pole female Submin D connector

Resolver Evaluation



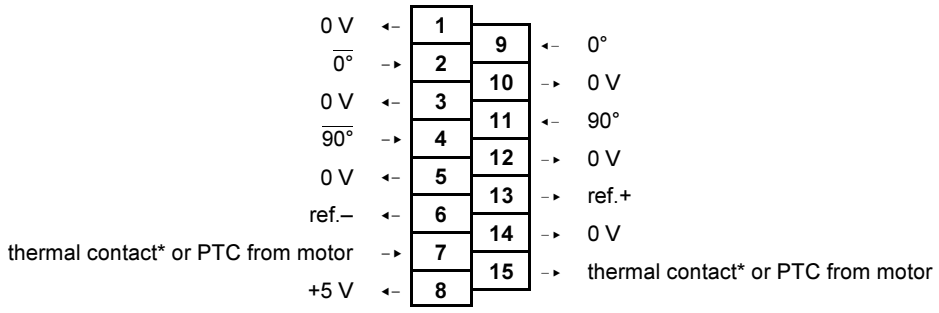
- If the thermal contact (*) is not evaluated, the Pins 15 and 7 must be strapped.
- Use a shielded cable with three pairs of wires, each of which being twisted (e. g. LIYCY 3 × 2 × 0.14). Twist mode: sine/sine; cosine/cosine; rotor/rotor
- The shield must be connected with both ends: At the CNC on the connector shell and at the resolver, as described in the chapter “Wiring”, “General Information”, page 33.

Hall Effect Sensor Evaluation



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable. Connect the shield with largest surface to the connector shell.

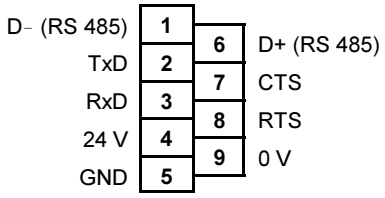
Optical Length Measuring System



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable with four pairs of wires, each of which being twisted. Twist mode: $\overline{0°}$/0°, $\overline{90°}$/90°, ref.+/ref.– and +5 V/0 V. If the thermal contact is evaluated, a shielded twisted pair cable with five pairs of wires must be used.
- For incremental encoders without difference voltage signal the Pins 9 and 11 must be supplied with 5 V (Pin 8).
- Connect the shield with largest surface to the connector shell.

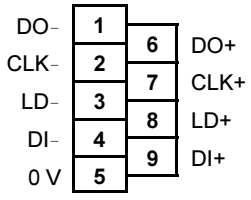
X2 - Terminal Connection

9-pole female Submin D connector with levels corresponding to the RS232 and RS485 specifications.



X3 - I/O Expansion

9-pole female Submin D connector

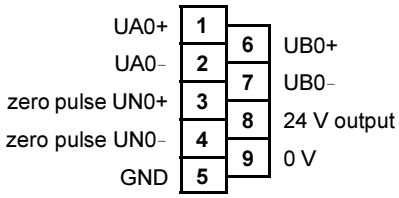


X4 - Angle Pulses

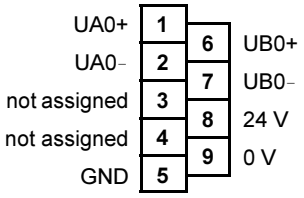
9-pole female Submin D connector

The connectors are either inputs or outputs.
Inputs: 5 V or 24 V
Outputs: 5 V

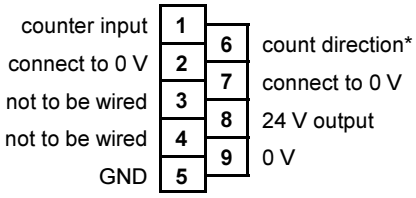
Accessory Modules AG, AH
BA, B1/B2, B4, B5, B9 and C2/C3
Angle Pulse Input



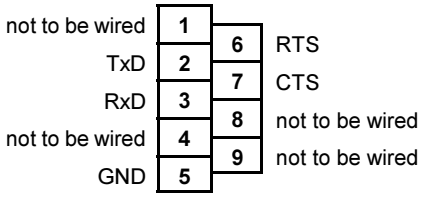
Accessory Modules B3 and C4
Angle Pulse Output



Accessory Module B7/B8
Counter Input



Accessory Modules A5 and A6
Serial Interface 2

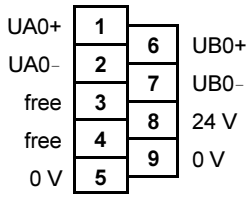


* not wired: positive count direction
5 V/24 V: negative count direction

X7 - Angle Pulses

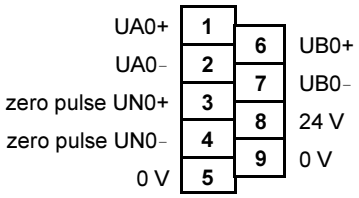
9-pole female Submin D connector

Accessory Modules
BA, B4, B7/B8
Angle Pulse Output

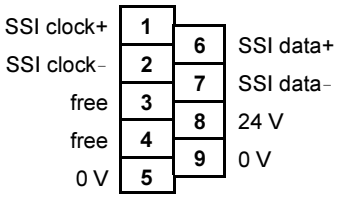


Accessory Modules B5 and B9

Angle Pulse Input

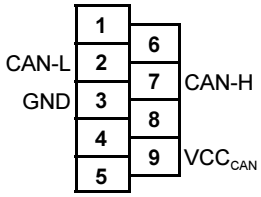


Accessory Modules
C2/C3 and C4
SSI Interface



X11 - CAN Bus Connection

9-pole female Submin D connector

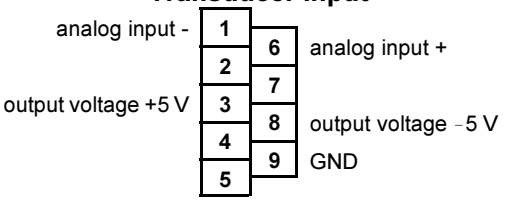


VCC_{CAN}: 8 V to 15 V

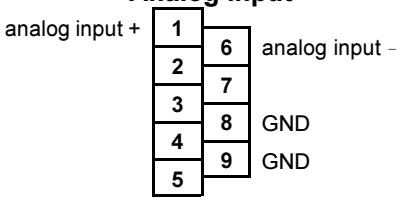
X14 - Transducer/Analog Input

9-pole female Submin D connector

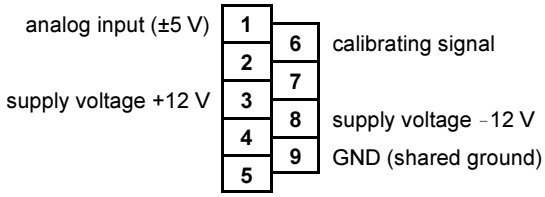
Accessory Modules A3, A5, AA and AE
Transducer Input



Accessory Modules A4 and A6
Analog Input

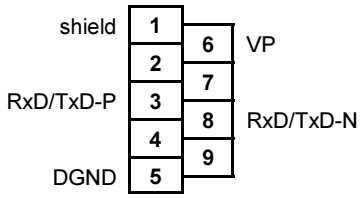


Accessory Module AF
Active Transducer



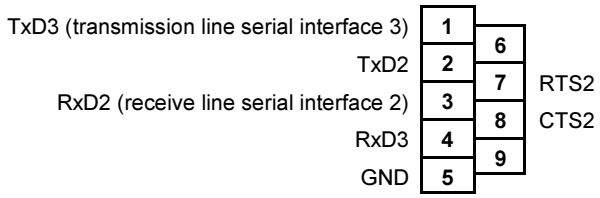
X19 - Profibus-DP Connection

9-pole female Submin D connector



X21 - Serial Interfaces 2 and 3

9-pole female Submin D connector



1 to 20 - Logic Signals

PHOENIX Mini CombiCon

All inputs and outputs work with a level of 24 V. The total load of all outputs must not exceed 350 mA.

Please take into consideration that some inputs and outputs have alternating meaning. If, for example, the function “Motor Brake” has been activated in the parameter editor (IP_E_BRAKE=ON), the output o1 will automatically be identical with the function “Motor Brake”.

1	regulator OK+ (voltage-free contacts)
2	regulator OK
3	output o0 (always regulator OK)
4	output o2
5	output o1 (= motor brake, if IP_E_BRAKE = ON)
6	output o7
7	output o6
8	output o5
9	output o4
10	output o3

11	input i2 (= limit switch–, if IP_E_END = ON)
12	input i1 (= limit switch+, if IP_E_END = ON)
13	input i3
14	input i0 (always emergency stop)
15	input i7
16	input i6
17	input i5
18	input i4
19	0 V*
20	24 V*

* see also the section “Wiring of the 24 V (Internal/External) in the chapter “Wiring”, page 38.

▸ Additional inputs and outputs can be connected to X3 via the I/O modules 44.20.xxx. See also the chapter “External I/O Modules”, starting on page 201.

21 to 24 - Thermal Contact/24 V External

PHOENIX Mini CombiCon

21	thermal contact
22	24 V internal
23	24 V external
24	0 V

Wiring of the 24 V (Internal/External), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

U / V / W - Motor Connections

- WEIDMÜLLER screw connectors
  The maximum conductor cross-section for the terminals is 10 mm².

Bus - Internal Connection

The 10-pole bus line connects the power module and up to six CNC rack modules. The bus supplies the CNC modules with the voltage of +30 V (bus voltage). Additionally, statuses of the power module (readiness for operation, malfunctions) are signaled to the CNC 61.00 modules. At the power module the bus pins are outputs, whereas at the CNC module the bus pins are inputs.

Pin	Assignment	
1 + 2	ground potential	
3	mains OK = +24 V	
4	overvoltage message: 0 V in case of an error 24 V without error	
5	+24 V	
6	not assigned	
7 + 8	+30 V	mains potential
9 + 10	0 V for the 30 V	mains potential

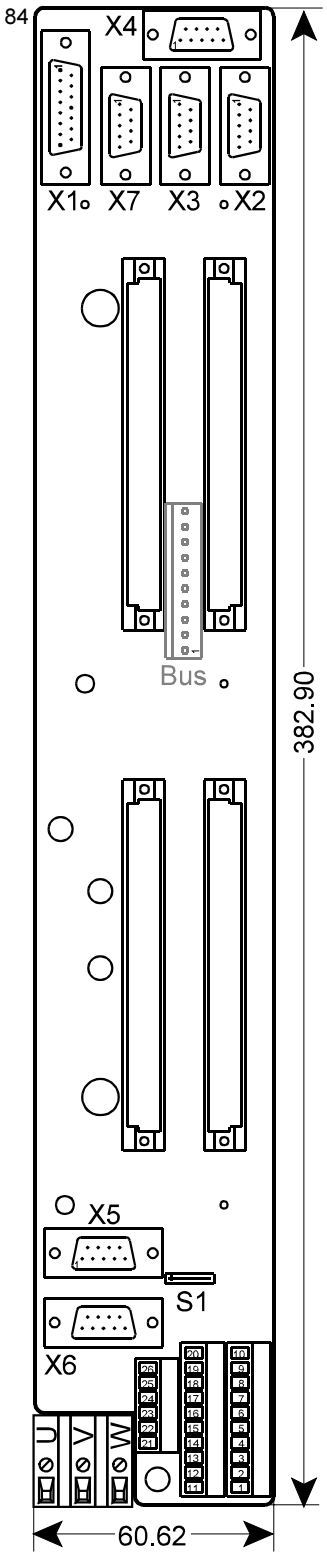
Do not use the +30 V for any other purposes!

Mains OK
This output intra-system activates and deactivates, inter alia, the CNC modules. If the main supply is not provided, the signal “mains OK” will be LOW and the CNC modules cannot be activated. The user may use this signal via the contacts *BB*.

Overvoltage Message
If an overvoltage comes up, the level of 24 V bounces to 0 V. Then the regulator in the CNC module is deactivated (*POK* and the main contactor open). Error messages, however, are kept.

10.1.4 Back Plane 61.01.0038

Wall-mounting into a 19” rack

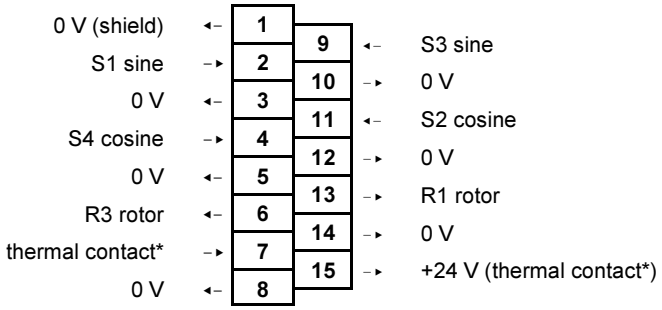


X4	Angle pulse connection, page 83
X1	Connection of first measuring system, page 81
X7	Angle pulse connection, page 84
X3	I/O expansion, page 82
X2	Terminal connection, page 82
Bus	Internal connection (rear side of back plane)
X5	Bus connection (depends on the used bus system), page 83
S1	Hook switch, page 84
X6	Bus connection (depends on the used bus system), page 84
21 to 24	Transducer / analog input, page 86
25 and 26	Thermal contact / 24 V, page 86
1 to 20	Logic signals, page 85
U V W	Motor connection, page 86

X1 - Connection of First Measuring System (Feedback)

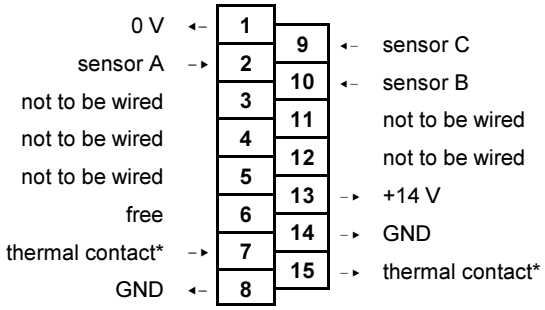
15-pole female Submin D connector

Resolver Evaluation



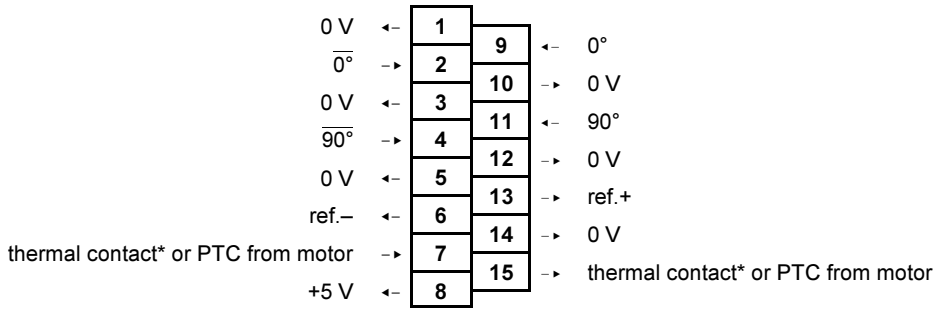
- If the thermal contact (*) is not evaluated, the Pins 15 and 7 must be strapped.
- Use a shielded cable with three pairs of wires, each of which being twisted (e. g. LIYCY 3 × 2 × 0.14). Twist mode: sine/sine; cosine/cosine; rotor/rotor
- The shield must be connected with both ends: At the CNC on the connector shell and at the resolver, as described in the chapter “Wiring”, “General Information”, page 33.

Hall Effect Sensor Evaluation



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable. Connect the shield with largest surface to the connector shell.

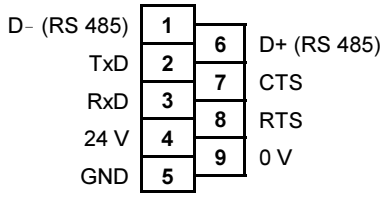
Optical Length Measuring System



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable with four pairs of wires, each of which being twisted. Twist mode: 0°/0°, 90°/90°, ref.+/ref.– and +5 V/0 V. If the thermal contact is evaluated, a shielded twisted pair cable with five pairs of wires must be used.
- For incremental encoders without difference voltage signal the Pins 9 and 11 must be supplied with 5 V (Pin 8).
- Connect the shield with largest surface to the connector shell.

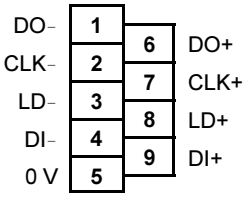
X2 - Terminal Connection

9-pole female Submin D connector with levels corresponding to the RS232 and RS485 specifications.



X3 - I/O Expansion

9-pole female Submin D connector

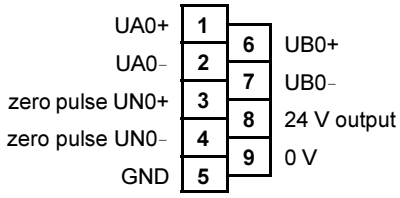


X4 - Angle Pulses

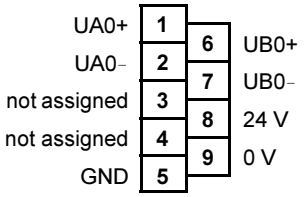
9-pole female Submin D connector

The connectors are either inputs or outputs.
Inputs: 5 V or 24 V
Outputs: 5 V

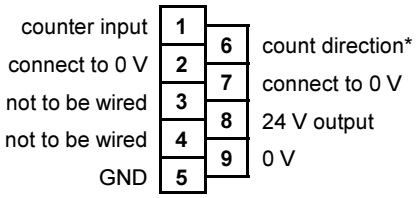
Accessory Modules AG, AH
BA, B1/B2, B4, B5, B9 and C2/C3
Angle Pulse Input



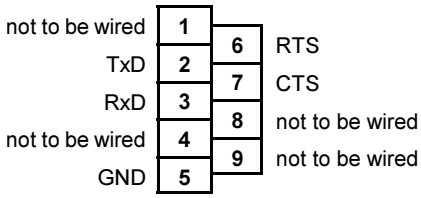
Accessory Modules B3 and C4
Angle Pulse Output



Accessory Module B7/B8
Counter Input



Accessory Modules A5 and A6
Serial Interface 2

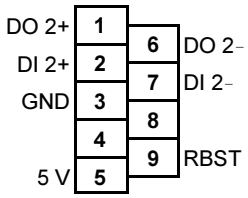


* not wired: positive count direction
5 V/24 V: negative count direction

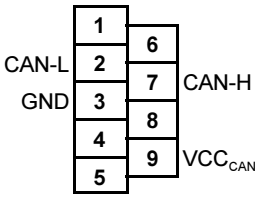
X5 - Bus Connection

9-pole female Submin D connector

Accessory Module A1
INTERBUS-S

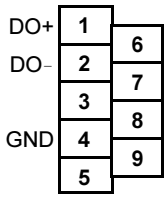


Accessory Module D1
CAN Bus



VCC_{CAN}: 8 V to 15 V

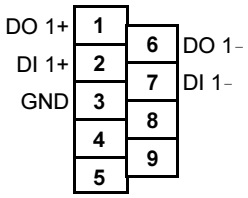
Accessory Module F1
MODLINK



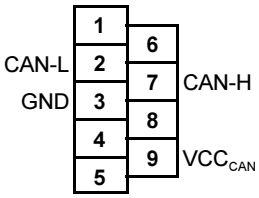
X6 - Bus Connection

9-pole male Submin D connector

Accessory Module A1
INTERBUS-S

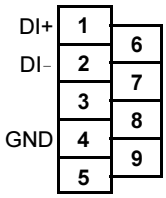


Accessory Module D1
CAN Bus



VCC_{CAN}: 8 V to 15 V

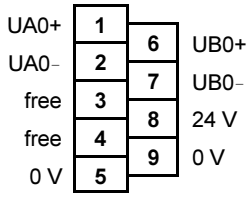
Accessory Module F1
MODLINK



X7 - Angle Pulses

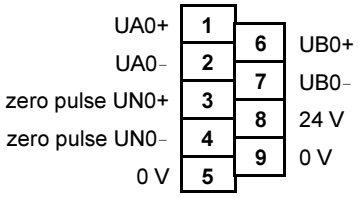
9-pole female Submin D connector

Accessory Modules
BA, B4, B7/B8
Angle Pulse Output

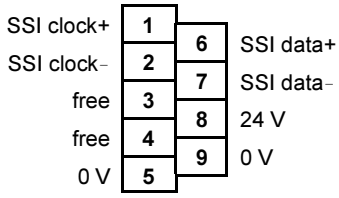


Accessory Modules B5 and B9

Angle Pulse Input



Accessory Modules
C2/C3 and C4
SSI Interface



S1 - Hook Switch

Depending on the position of the hook switch S1 the CNC module provides the supply voltage of 24 V.

S1 closed: The CNC supplies the voltage at Pins 19 and 20 (default).
S1 open: The supply voltage is externally connected to Pins 19 and 20.

An incorrect hooking of the switches can cause damage at the CNC or the external power supply.

Wiring of the 24 V (internal/external), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

1 to 20 - Logic Signals

PHOENIX Mini CombiCon

All inputs and outputs work with a level of 24 V. The total load of all outputs must not exceed 350 mA.

Please take into consideration that some inputs and outputs have alternating meaning. If, for example, the function “Motor Brake” has been activated in the parameter editor (IP_E_BRAKE=ON), the output o1 will automatically be identical with the function “Motor Brake”.

1	regulator OK+	(voltage-free contacts)
2	regulator OK	
3	output o0 (always regulator OK)	
4	output o2	
5	output o1 (= motor brake, if IP_E_BRAKE = ON)	
6	output o7	
7	output o6	
8	output o5	
9	output o4	
10	output o3	
11	input i2 (= limit switch–, if IP_E_END = ON)	
12	input i1 (= limit switch+, if IP_E_END = ON)	
13	input i3	
14	input i0 (always emergency stop)	
15	input i7	
16	input i6	
17	input i5	
18	input i4	
19	0 V*	
20	24 V*	

* see also the section “Wiring of the 24 V (Internal/External) in the chapter “Wiring”, page 38.

▸ Additional inputs and outputs can be connected to X3 via the I/O modules 44.20.xxx. See also the chapter “External I/O Modules”, starting on page 201.

21 to 24 - Transducer/Analog Input

PHOENIX Mini CombiCon as inputs

Accessory Module A3
Transducer Interface

21	analog input –
22	analog input +
23	output voltage +5 V
24	output voltage –5 V

Accessory Module A4
Analog Input Module

21	analog input +
22	analog input –
23	
24	GND

25 and 26 - Thermal Contact/24 V External

PHOENIX Mini CombiCon

25	24 V
26	thermal contact

Wiring of the 24 V (Internal/External), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

U / V / W - Motor Connections

- WEIDMÜLLER screw connectors
  The maximum conductor cross-section for the terminals is 4 mm².

Bus - Internal Connection

The 10-pole bus line connects the power module and up to six CNC rack modules. The bus supplies the CNC modules with the voltage of +30 V (bus voltage). Additionally, statuses of the power module (readiness for operation, malfunctions) are signaled to the CNC 61.00 modules. At the power module the bus pins are outputs, whereas at the CNC module the bus pins are inputs.

Pin	Assignment		
1 + 2	ground potential		
3	mains OK = +24 V		
4	overvoltage message: 0 V in case of an error 24 V without error		
5	+24 V		
6	not assigned		
7 + 8	+30 V	⚠	mains potential
9 + 10	0 V for the 30 V	⚠	mains potential

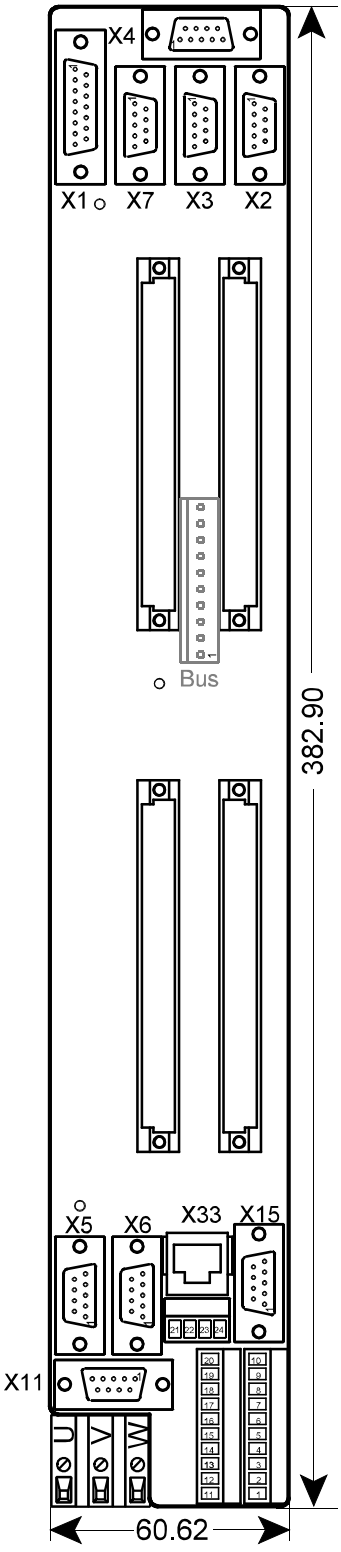
Do not use the +30 V for any other purposes!

Mains OK
This output intra-system activates and deactivates, inter alia, the CNC modules. If the main supply is not provided, the signal “mains OK” will be LOW and the CNC modules cannot be activated. The user may use this signal via the contacts *BB*.

Overvoltage Message
If an overvoltage comes up, the level of 24 V bounces to 0 V. Then the regulator in the CNC module is deactivated (*POK* and the main contactor open). Error messages, however, are kept.

10.1.5 Back Plane 61.01.0053 for Profibus, CAN Bus and Ethernet

Wall-mounting into a 19” rack

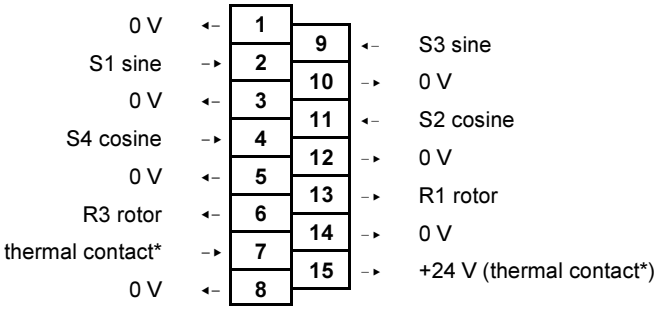


X4	Angle pulse connection, page 91
X1	Connection of first measuring system, page 89
X7	Angle pulse connection, page 92
X3	I/O expansion, page 90
X2	Terminal connection, page 90
Bus	Internal connection (rear side of back plane)
X5	Profibus connection, page 91
X6	Profibus connection, page 92
X33	Ethernet connection, page 93
X15	Active/passive transducer, page 93
21 to 24	Thermal contact / 24 V external, page 94
X11	CAN bus connection, page 92
U V W	Motor connection, page 112
1 to 20	Logic signals, page 94

X1 - Connection of First Measuring System (Feedback)

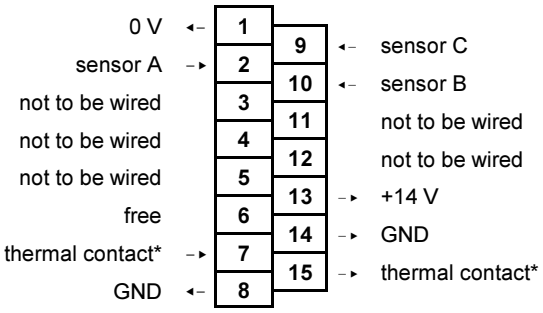
15-pole female Submin D connector

Resolver Evaluation



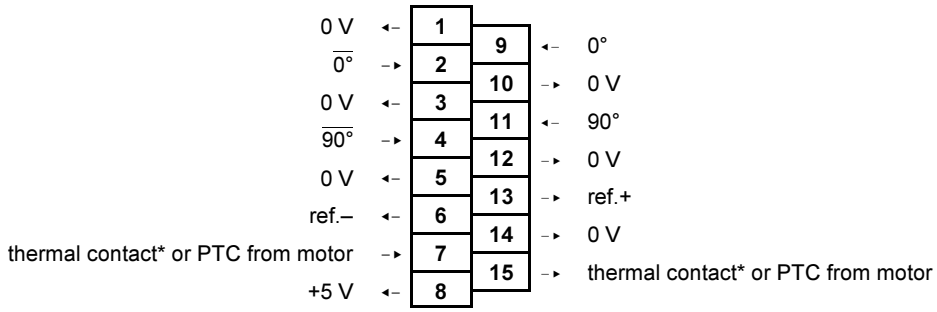
- If the thermal contact (*) is not evaluated, the Pins 15 and 7 must be strapped.
- Use a shielded cable with three pairs of wires, each of which being twisted (e. g. LIYCY 3 × 2 × 0.14). Twist mode: sine/sine; cosine/cosine; rotor/rotor
- The shield must be connected with both ends: At the CNC on the connector shell and at the resolver, as described in the chapter “Wiring”, “General Information”, page 33.

Hall Effect Sensor Evaluation



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable. Connect the shield with largest surface to the connector shell.

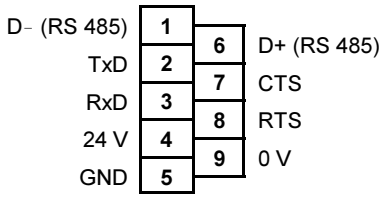
Optical Length Measuring System



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable with four pairs of wires, each of which being twisted.Twist mode: 0°/0°, 90°/90°, ref.+/ref.– and +5 V/0 V. If the thermal contact is evaluated, a shielded twisted pair cable with five pairs of wires must be used.
- For incremental encoders without difference voltage signal the Pins 9 and 11 must be supplied with 5 V (Pin 8).
- Connect the shield with largest surface to the connector shell.

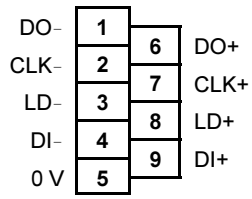
X2 - Terminal Connection

9-pole female Submin D connector with levels corresponding to the RS232 and RS485 specifications.



X3 - I/O Expansion

9-pole female Submin D connector

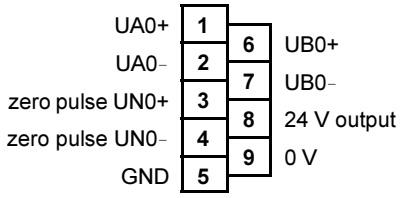


X4 - Angle Pulses

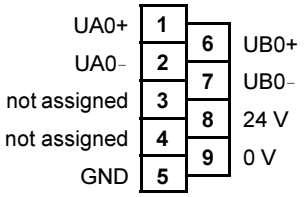
9-pole female Submin D connector

The connectors are either inputs or outputs.
Inputs: 5 V or 24 V
Outputs: 5 V

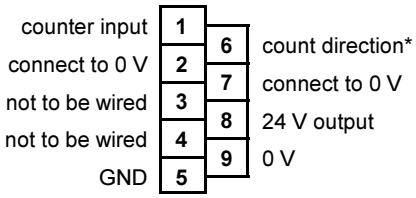
Accessory Modules AG, AH
BA, B1/B2, B4, B5, B9 and C2/C3
Angle Pulse Input



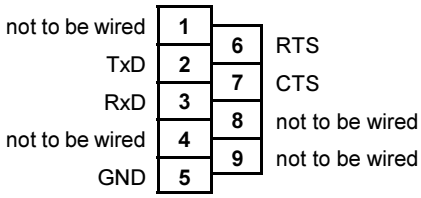
Accessory Modules B3 and C4
Angle Pulse Output



Accessory Module B7/B8
Counter Input



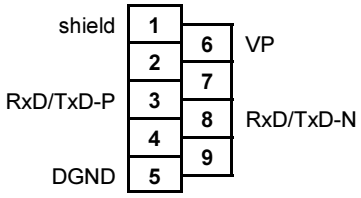
Accessory Modules A5 and A6
Serial Interface 2



* not wired: positive count direction
5 V/24 V: negative count direction

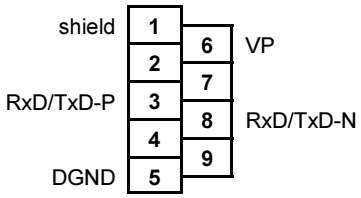
X5 - Profibus Connection

9-pole female Submin D connector



X6 - Profibus Connection

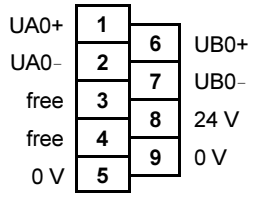
9-pole male Submin D connector



X7 - Angle Pulses

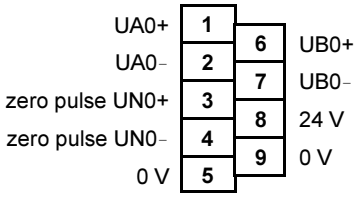
9-pole female Submin D connector

Accessory Modules BA, B4, B7/B8
Angle Pulse Output

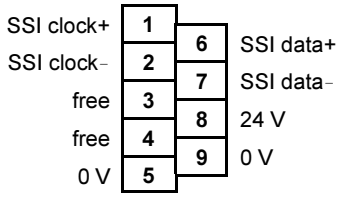


Accessory Modules B5 and B9

Angle Pulse Input

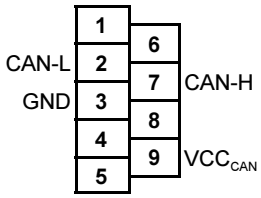


Accessory Modules C2/C3 and C4
SSI Interface



X11 - CAN Bus Connection

9-pole female Submin D connector

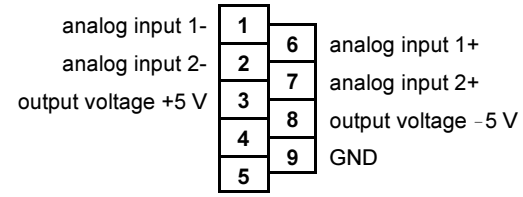


VCC$_{CAN}$: 8 V to 15 V

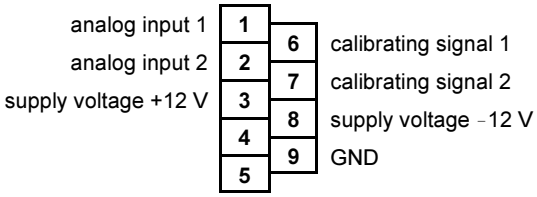
X15 - Active/Passive Transducer

9-pole female Submin D connector

Accessory Module AG



Accessory Module AH



X33 - Ethernet Connection

RJ45 female connector (Western)

Pin	Designation
1	TX+
2	TX-
3	RX+
4	not connected
5	not connected
6	RX-
7	not connected
8	not connected

1 to 20 - Logic Signals

PHOENIX Mini CombiCon

All inputs and outputs work with a level of 24 V. The total load of all outputs must not exceed 350 mA.

Please take into consideration that some inputs and outputs have alternating meaning. If, for example, the function “Motor Brake” has been activated in the parameter editor (IP_E_BRAKE=ON), the output o1 will automatically be identical with the function “Motor Brake”.

1	regulator OK+	(voltage-free contacts)
2	regulator OK	
3	output o0 (always regulator OK)	
4	output o2	
5	output o1 (= motor brake, if IP_E_BRAKE = ON)	
6	output o7	
7	output o6	
8	output o5	
9	output o4	
10	output o3	

11	input i2 (= limit switch–, if IP_E_END = ON)
12	input i1 (= limit switch+, if IP_E_END = ON)
13	input i3
14	input i0 (always emergency stop)
15	input i7
16	input i6
17	input i5
18	input i4
19	0 V*
20	24 V*

* see also the section “Wiring of the 24 V (Internal/External) in the chapter “Wiring”, page 38.

Additional inputs and outputs can be connected to X3 via the I/O modules 44.20.xxx. See also the chapter “External I/O Modules”, starting on page 201.

21 to 24 - Thermal Contact/24 V External

PHOENIX Mini CombiCon

21	thermal contact
22	24 V internal
23	24 V external
24	0 V

Wiring of the 24 V (Internal/External), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

U / V / W - Motor Connections

- WEIDMÜLLER screw connectors
  The maximum conductor cross-section for the terminals is 4 mm².

Bus - Internal Connection

The 10-pole bus line connects the power module and up to six CNC rack modules. The bus supplies the CNC modules with the voltage of +30 V (bus voltage). Additionally, statuses of the power module (readiness for operation, malfunctions) are signaled to the CNC 61.00 modules. At the power module the bus pins are outputs, whereas at the CNC module the bus pins are inputs.

Pin	Assignment		
1 + 2	ground potential		
3	mains OK = +24 V		
4	overvoltage message: 0 V in case of an error 24 V without error		
5	+24 V		
6	not assigned		
7 + 8	+30 V	⚠	mains potential
9 + 10	0 V for the 30 V	⚠	mains potential

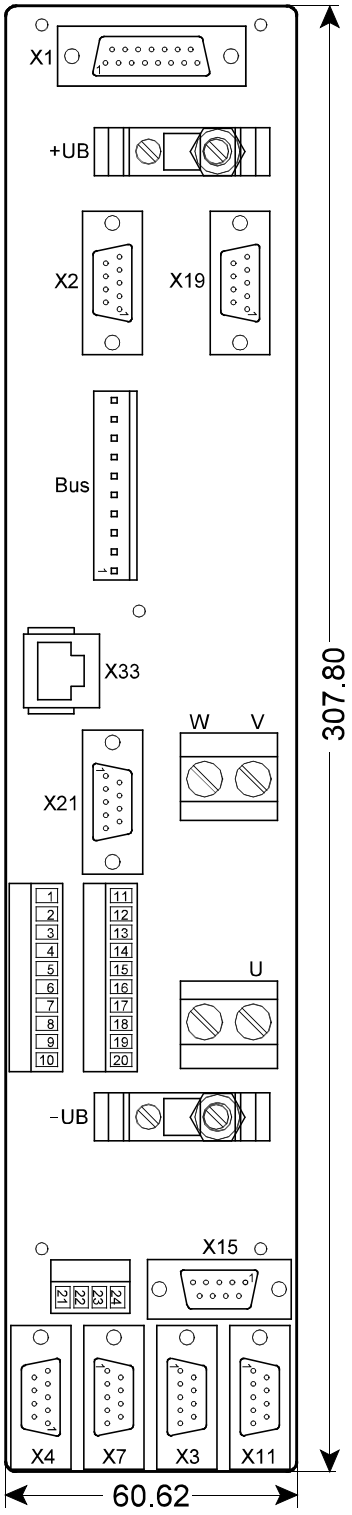
Do not use the +30 V for any other purposes!

Mains OK
This output intra-system activates and deactivates, inter alia, the CNC modules. If the main supply is not provided, the signal “mains OK” will be LOW and the CNC modules cannot be activated. The user may use this signal via the contacts *BB*.

Overvoltage Message
If an overvoltage comes up, the level of 24 V bounces to 0 V. Then the regulator in the CNC module is deactivated (*POK* and the main contactor open). Error messages, however, are kept.

10.1.6 Back Plane 61.01.0058 for Profibus, CAN Bus and Ethernet

Hinged-frame mounting into a 19” rack

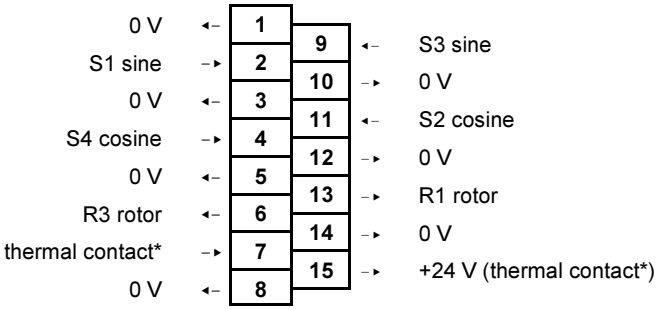


X1	Connection of first measuring system, page 97
+UB	Intermediate circuit voltage
X2	Terminal connection, page 98
X19	Profibus connection, page 100
Bus	Internal connection, page 103
X33	Ethernet connection, page 101
X21	Serial interfaces 2 and 3, page 101
W V	Motor connection
1 to 20	Logic signals, page 102
U	Motor connection
-UB	Intermediate circuit voltage
21 to 24	Thermal contact / 24 V external, page 102
X15	Active/passive transducer, page 100
X4	Angle pulse connection, page 99
X7	Angle pulse connection, page 99
X3	I/O expansion, page 98
X11	CAN bus connection, page 100

X1 - Connection of First Measuring System (Feedback)

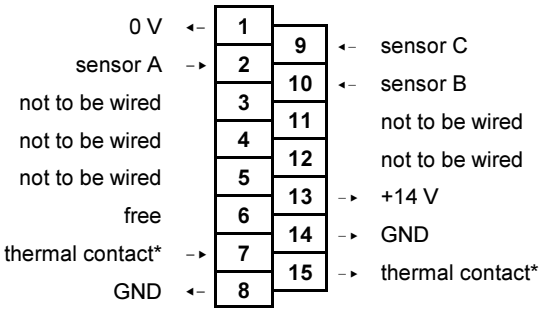
15-pole female Submin D connector

Resolver Evaluation



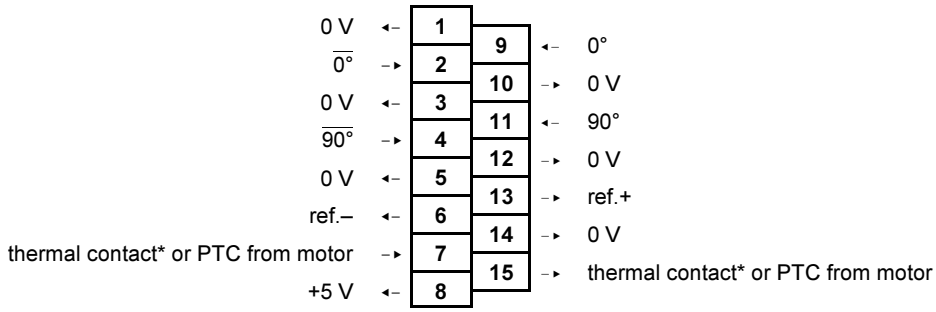
- If the thermal contact (*) is not evaluated, the Pins 15 and 7 must be strapped.
- Use a shielded cable with three pairs of wires, each of which being twisted (e. g. LIYCY 3 × 2 × 0.14). Twist mode: sine/sine; cosine/cosine; rotor/rotor
- The shield must be connected with both ends: At the CNC on the connector shell and at the resolver, as described in the chapter “Wiring”, “General Information”, page 33.

Hall Effect Sensor Evaluation



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable. Connect the shield with largest surface to the connector shell.

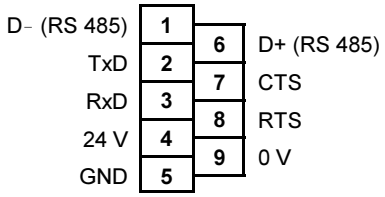
Optical Length Measuring System



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable with four pairs of wires, each of which being twisted.Twist mode: 0°/0°, 90°/90°, ref.+/ref.– and +5 V/0 V. If the thermal contact is evaluated, a shielded twisted pair cable with five pairs of wires must be used.
- For incremental encoders without difference voltage signal the Pins 9 and 11 must be supplied with 5 V (Pin 8).
- Connect the shield with largest surface to the connector shell.

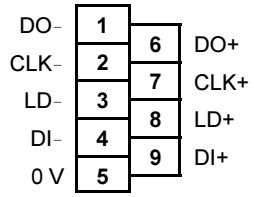
X2 - Terminal Connection

9-pole female Submin D connector with levels corresponding to the RS232 and RS485 specifications.



X3 - I/O Expansion

9-pole female Submin D connector

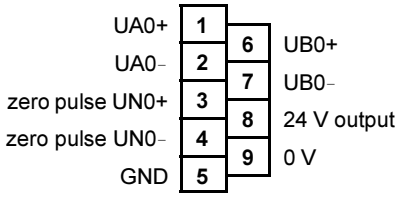


X4 - Angle Pulses

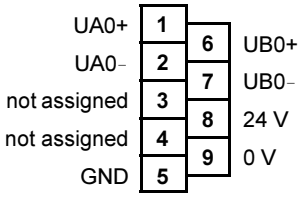
9-pole female Submin D connector

The connectors are either inputs or outputs.
Inputs: 5 V or 24 V
Outputs: 5 V

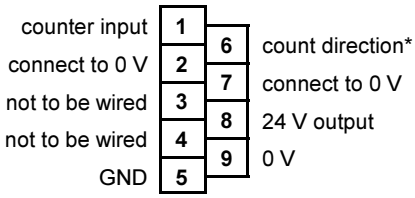
Accessory Modules AG, AH
BA, B1/B2, B4, B5, B9 and C2/C3
Angle Pulse Input



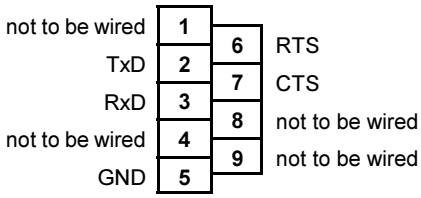
Accessory Modules B3 and C4
Angle Pulse Output



Accessory Module B7/B8
Counter Input



Accessory Modules A5 and A6
Serial Interface 2

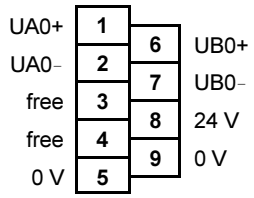


* not wired: positive count direction
5 V/24 V: negative count direction

X7 - Angle Pulses

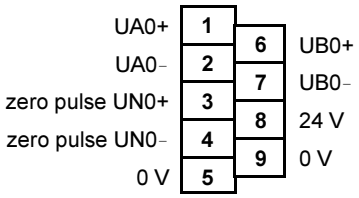
9-pole female Submin D connector

Accessory Modules
BA, B4, B7/B8
Angle Pulse Output

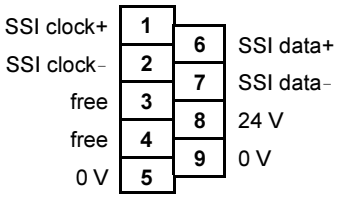


Accessory Modules B5 and B9

Angle Pulse Input

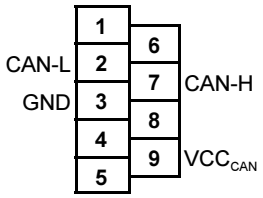


Accessory Modules
C2/C3 and C4
SSI Interface



X11 - CAN Bus Connection

9-pole female Submin D connector

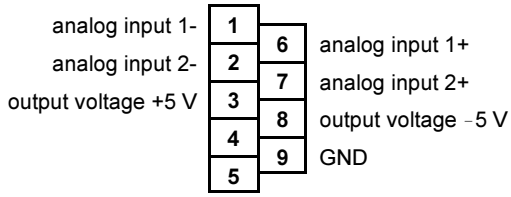


VCC$_{CAN}$: 8 V to 15 V

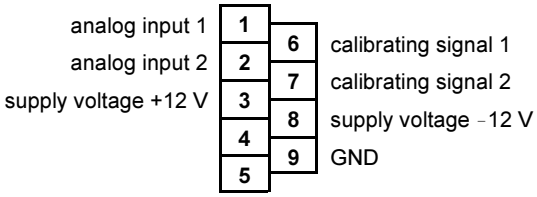
X15 - Active/Passive Transducer

9-pole female Submin D connector

Accessory Module AG

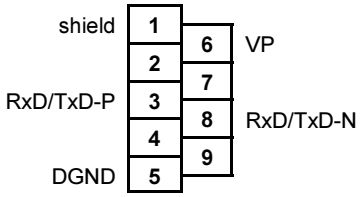


Accessory Module AH



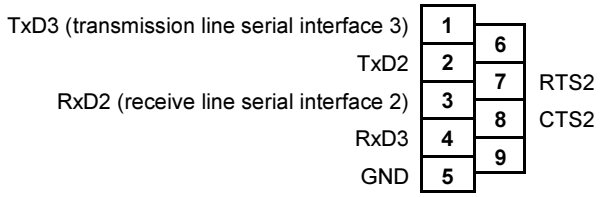
X19 - Profibus Connection

9-pole female Submin D connector



X21 - Serial Interfaces 2 and 3

9-pole female Submin D connector



X33 - Ethernet Connection

RJ45 female connector (Western)

Pin	Designation
1	TX+
2	TX-
3	RX+
4	not connected
5	not connected
6	RX-
7	not connected
8	not connected

1 to 20 - Logic Signals

PHOENIX Mini CombiCon

All inputs and outputs work with a level of 24 V. The total load of all outputs must not exceed 350 mA.

Please take into consideration that some inputs and outputs have alternating meaning. If, for example, the function “Motor Brake” has been activated in the parameter editor (IP_E_BRAKE=ON), the output o1 will automatically be identical with the function “Motor Brake”.

1	regulator OK+	(voltage-free contacts)
2	regulator OK	
3	output o0 (always regulator OK)	
4	output o2	
5	output o1 (= motor brake, if IP_E_BRAKE = ON)	
6	output o7	
7	output o6	
8	output o5	
9	output o4	
10	output o3	

11	input i2 (= limit switch–, if IP_E_END = ON)
12	input i1 (= limit switch+, if IP_E_END = ON)
13	input i3
14	input i0 (always emergency stop)
15	input i7
16	input i6
17	input i5
18	input i4
19	0 V*
20	24 V*

* see also the section “Wiring of the 24 V (Internal/External) in the chapter “Wiring”, page 38.

Additional inputs and outputs can be connected to X3 via the I/O modules 44.20.xxx. See also the chapter “External I/O Modules”, starting on page 201.

21 to 24 - Thermal Contact/24 V External

PHOENIX Mini CombiCon

21	thermal contact
22	24 V internal
23	24 V external
24	0 V

Wiring of the 24 V (Internal/External), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

U / V / W - Motor Connection

- WEIDMÜLLER screw connectors
  The maximum conductor cross-section for the terminals is 10 mm².

Bus - Internal Connection

The 10-pole bus line connects the power module and up to six CNC rack modules. The bus supplies the CNC modules with the voltage of +30 V (bus voltage). Additionally, statuses of the power module (readiness for operation, malfunctions) are signaled to the CNC 61.00 modules. At the power module the bus pins are outputs, whereas at the CNC module the bus pins are inputs.

Pin	Assignment	
1 + 2	ground potential	
3	mains OK = +24 V	
4	overvoltage message: 0 V in case of an error 24 V without error	
5	+24 V	
6	not assigned	
7 + 8	+30 V	⚠ mains potential
9 + 10	0 V for the 30 V	⚠ mains potential

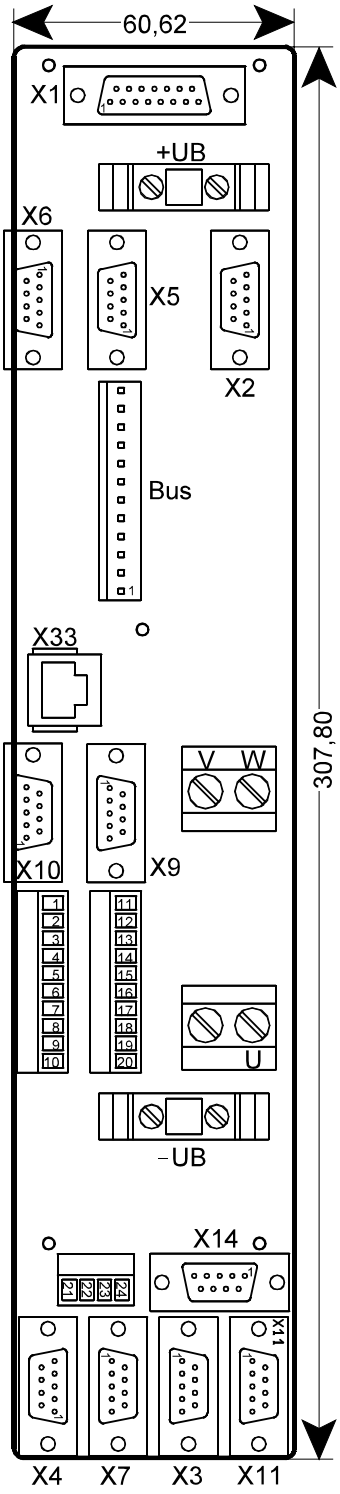
Do not use the +30 V for any other purposes!

Mains OK
This output intra-system activates and deactivates, inter alia, the CNC modules. If the main supply is not provided, the signal “mains OK” will be LOW and the CNC modules cannot be activated. The user may use this signal via the contacts *BB*.

Overvoltage Message
If an overvoltage comes up, the level of 24 V bounces to 0 V. Then the regulator in the CNC module is deactivated (*POK* and the main contactor open). Error messages, however, are kept.

10.1.7 Back Plane 61.01.0060 for INTERBUS, MODLINK and CAN Bus

Mounting as swing frame into 19” rack

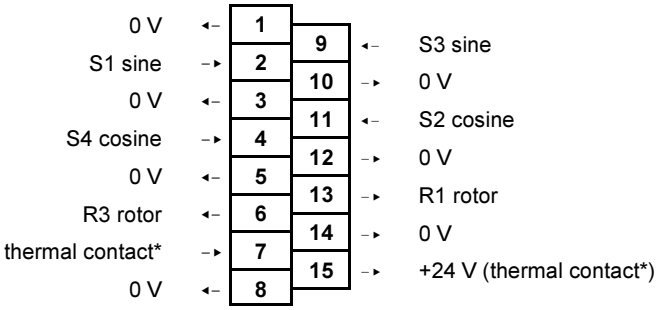


X1	Connection of first measuring system, page 105
+UB	Intermediate circuit voltage
X6	INTERBUS connection, page 108
X5	INTERBUS connection, page 107
X2	Terminal connection, page 106
Bus	Internal connection, page 112
X33	Ethernet connection, page 110
V W	Motor connection
X10	MODLINK connection, page 109
X9	MODLINK connection, page 108
1 to 20	Logic signals, page 110
U	Motor connection
-UB	Intermediate circuit voltage
21 to 24	Thermal contact/24 V external, page 112
X14	Transducer/analog input, page 109
X4	Angle pulse connection, page 107
X7	Angle pulse connection, page 108
X3	I/O expansion, page 106
X11	CAN bus connection, page 109

X1 - Connection of First Measuring System (Feedback)

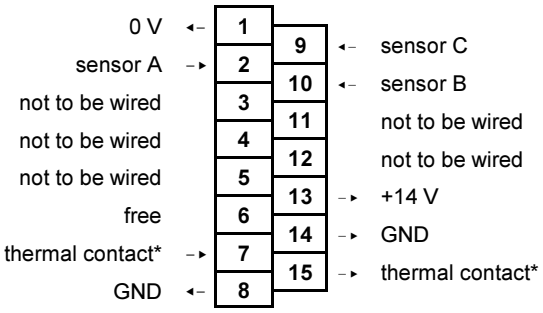
15-pole female Submin D connector

Resolver Evaluation



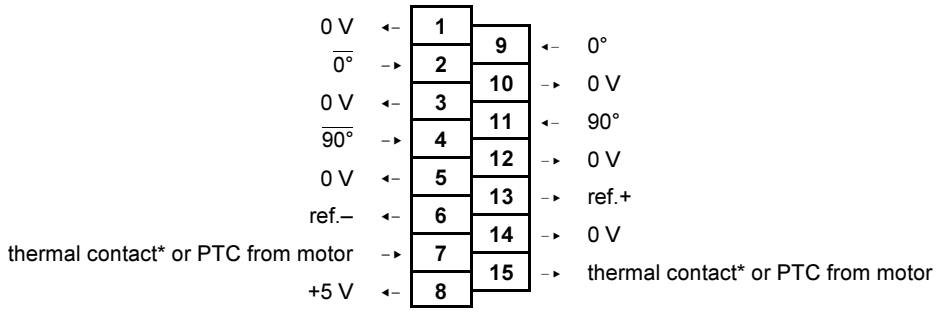
- If the thermal contact (*) is not evaluated, the Pins 15 and 7 must be strapped.
- Use a shielded cable with three pairs of wires, each of which being twisted (e. g. LIYCY 3 × 2 × 0.14). Twist mode: sine/sine; cosine/cosine; rotor/rotor
- The shield must be connected with both ends: At the CNC on the connector shell and at the resolver, as described in the chapter “Wiring”, “General Information”, page 33.

Hall Effect Sensor Evaluation



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable. Connect the shield with largest surface to the connector shell.

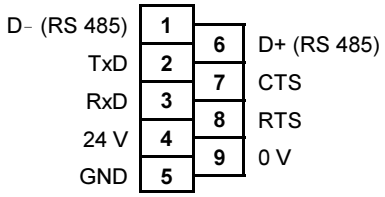
Optical Length Measuring System



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable with four pairs of wires, each of which being twisted.Twist mode: 0°/0°, 90°/90°, ref.+/ref.– and +5 V/0 V. If the thermal contact is evaluated, a shielded twisted pair cable with five pairs of wires must be used.
- For incremental encoders without difference voltage signal the Pins 9 and 11 must be supplied with 5 V (Pin 8).
- Connect the shield with largest surface to the connector shell.

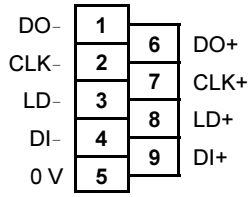
X2 - Terminal Connection

9-pole female Submin D connector with levels corresponding to the RS232 and RS485 specifications.



X3 - I/O Expansion

9-pole female Submin D connector

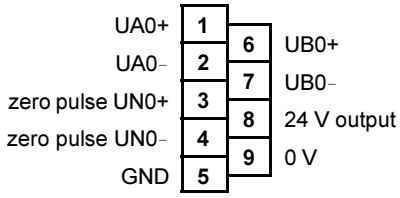


X4 - Angle Pulses

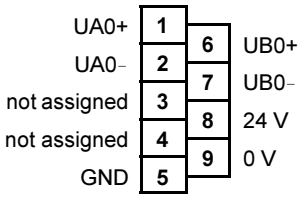
9-pole female Submin D connector

The connectors are either inputs or outputs.
Inputs: 5 V or 24 V
Outputs: 5 V

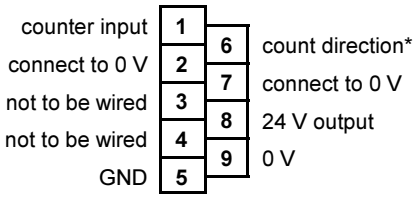
Accessory Modules AG, AH
BA, B1/B2, B4, B5, B9 and C2/C3
Angle Pulse Input



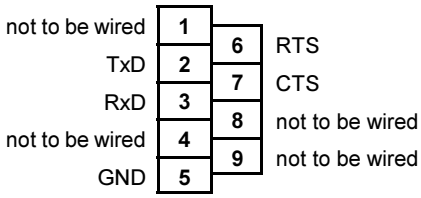
Accessory Modules B3 and C4
Angle Pulse Output



Accessory Module B7/B8
Counter Input



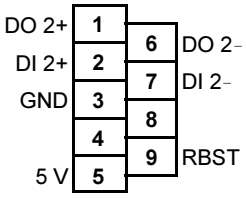
Accessory Modules A5 and A6
Serial Interface 2



* not wired: positive count direction
5 V/24 V: negative count direction

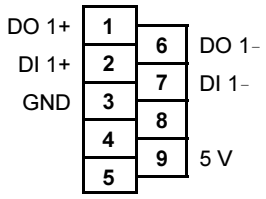
X5 - INTERBUS Connection

9-pole female Submin D connector



X6 - INTERBUS Connection

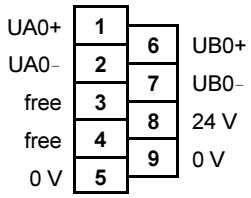
9-pole male Submin D connector



X7 - Angle Pulses

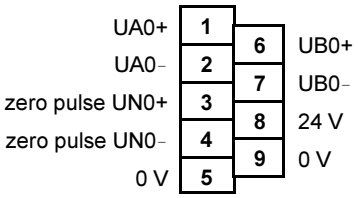
9-pole female Submin D connector

Accessory Modules BA, B4, B7/B8
Angle Pulse Output

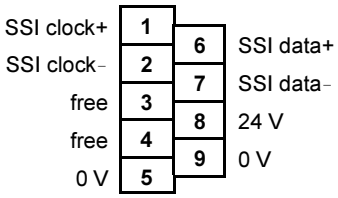


Accessory Modules B5 and B9

Angle Pulse Input

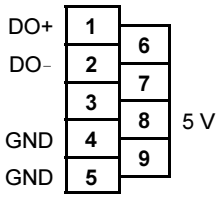


Accessory Modules C2/C3 and C4
SSI Interface



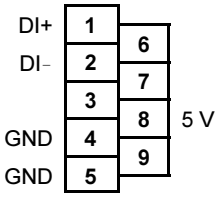
X9 - MODLINK Connection

9-pole female Submin D connector



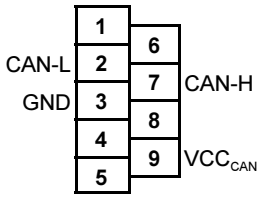
X10 - MODLINK Connection

9-pole male Submin D connector



X11 - CAN Bus Connection

9-pole female Submin D connector

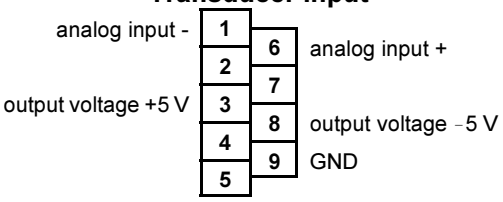


VCC_{CAN}: 8 V to 15 V

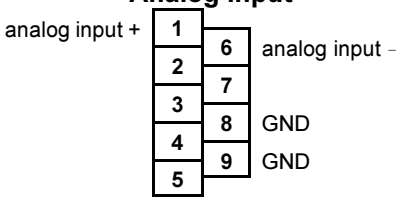
X14 - Transducer/Analog Input

9-pole female Submin D connector

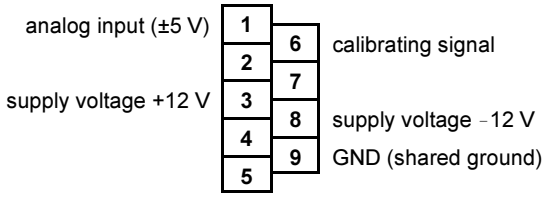
Accessory Modules A3, A5, AA and AE
Transducer Input



Accessory Modules A4 and A6
Analog Input



Accessory Module AF
Active Transducer



X33 - Ethernet Connection

RJ45 female connector (Western)

Pin	Designation
1	TX+
2	TX-
3	RX+
4	not connected
5	not connected
6	RX-
7	not connected
8	not connected

1 to 20 - Logic Signals

PHOENIX Mini CombiCon

All inputs and outputs work with a level of 24 V. The total load of all outputs must not exceed 350 mA.

Please take into consideration that some inputs and outputs have alternating meaning. If, for example, the function “Motor Brake” has been activated in the parameter editor (IP_E_BRAKE=ON), the output o1 will automatically be identical with the function “Motor Brake”.

1	regulator OK+	(voltage-free contacts)
2	regulator OK	
3	output o0 (always regulator OK)	
4	output o2	
5	output o1 (= motor brake, if IP_E_BRAKE = ON)	
6	output o7	
7	output o6	
8	output o5	
9	output o4	
10	output o3	

11	input i2 (= limit switch–, if IP_E_END = ON)
12	input i1 (= limit switch+, if IP_E_END = ON)
13	input i3
14	input i0 (always emergency stop)
15	input i7
16	input i6
17	input i5
18	input i4
19	0 V*
20	24 V*

* see also section “Wiring of the 24 V (Internal/External) in chapter “Wiring”.

Additional inputs and outputs can be connected to X3 via the I/O modules 44.20.xxx.

See also the chapter “External I/O Modules”, starting on page 201.

21 to 24 - Thermal Contact/24 V External

PHOENIX Mini CombiCon

21	thermal contact
22	24 V internal
23	24 V external
24	0 V

Wiring of the 24 V (Internal/External), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

U / V / W - Motor Connection

- WEIDMÜLLER screw connectors
  The maximum conductor cross-section for the terminals is 10 mm².

Bus - Internal Connection

The 12-pole bus line connects the power module and up to six CNC rack modules. The bus supplies the CNC modules with the voltage of +30 V (bus voltage). Additionally, statuses of the power module (readiness for operation, malfunctions) are signaled to the CNC 61.00 modules. At the power module the bus pins are outputs, whereas at the CNC module the bus pins are inputs.

The bus moreover provides the volt-free +5 V/GND that can be loaded with up to 1.8 A. The potentiometer **+5 V MSY** at the front panel enables the precise adjustment of the 5 V.

Pin	Assignment	
1	+5 V	
2	GND	
3 + 4	earth potential	
5	mains OK = +24 V	
6	overvoltage message	
7	+24 V	
8	not assigned	
9 + 10	+30 V	mains potential
11 + 12	0 V for the 30 V	mains potential

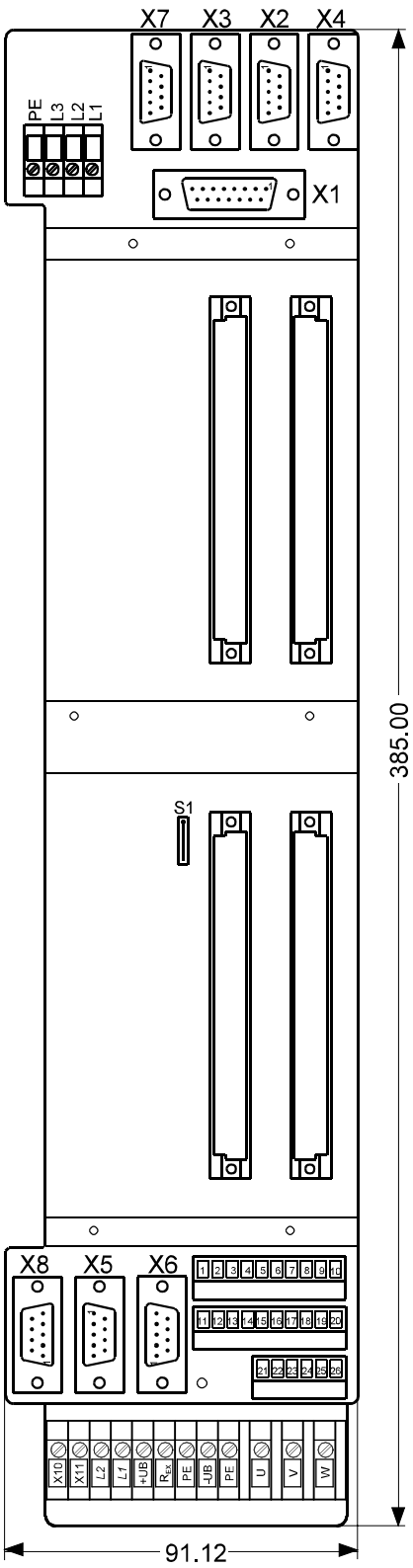
Do not use the +30 V for any other purposes!

Mains OK
This output intra-system activates and deactivates, inter alia, the CNC modules. If the main supply is not provided, the signal “mains OK” will be LOW and the CNC modules cannot be activated. The user may use this signal via the contacts *BB*.

Overvoltage Message
If an overvoltage comes up, the level of 24 V bounces to 0 V. Then the regulator in the CNC module is deactivated (*POK* and the main contactor open). Error messages, however, are kept.

10.2 Back Planes for the Compact System
10.2.1 Back Plane 61.01.0019

Mounting into a compact housing for wall mounting

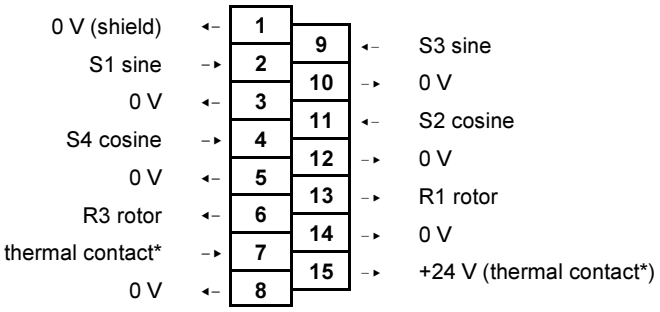


X7	Angle pulse connection, page 120
X4	Angle pulse connection, page 118
X3	I/O expansion, page 117
X2	Terminal connection, page 117
PE	Earth conductor
L1 L2 L3	Mains input for generating the intermediate circuit voltage
X1	Connection of first measuring system, page 116
S1	Hook switch, page 120
X8	Profibus connection, page 120
X5	Bus connection, depends on the used bus system, page 119
X6	Bus connection, depends on the used bus system, page 119
1 to 20	Logic signals, page 121
21 to 24	Transducer /analog input, page 122
25 and 26	24 V / thermal contact, page 122
X10 / X11	Fan connection
L1 L2	Mains input for the logic supply
R_{ex}	External ballast resistor
+UB	Intermediate circuit voltage
PE	Earth conductor
U V W	Motor connection

X1 - Connection of First Measuring System (Feedback)

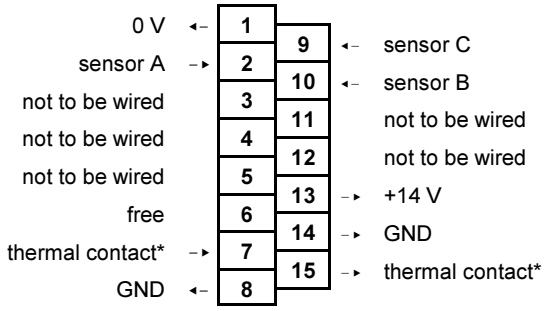
15-pole female Submin D connector

Resolver Evaluation



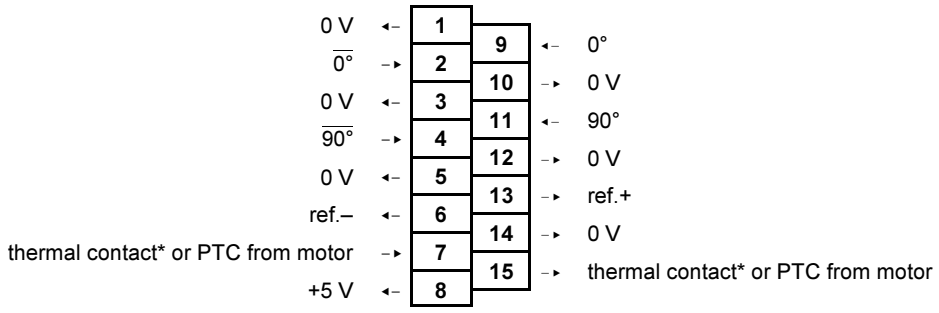
- If the thermal contact (*) is not evaluated, the Pins 15 and 7 must be strapped.
- Use a shielded cable with three pairs of wires, each of which being twisted (e. g. LIYCY 3 × 2 × 0.14). Twist mode: sine/sine; cosine/cosine; rotor/rotor
- The shield must be connected with both ends: At the CNC on the connector shell and at the resolver, as described in the chapter “Wiring”, “General Information”, page 33.

Hall Effect Sensor Evaluation



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable. Connect the shield with largest surface to the connector shell.

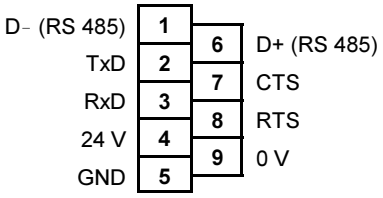
Optical Length Measuring System



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable with four pairs of wires, each of which being twisted. Twist mode: $\overline{0°}$/0°, $\overline{90°}$/90°, ref.+/ref.– and +5 V/0 V. If the thermal contact is evaluated, a shielded twisted pair cable with five pairs of wires must be used.
- For incremental encoders without difference voltage signal the Pins 9 and 11 must be supplied with 5 V (Pin 8).
- Connect the shield with largest surface to the connector shell.

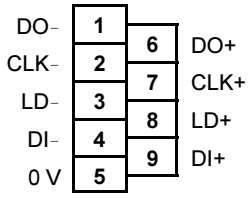
X2 - Terminal Connection

9-pole female Submin D connector with levels corresponding to the RS232 and RS485 specifications.



X3 - I/O Expansion

9-pole female Submin D connector

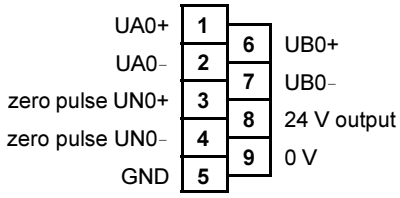


X4 - Angle Pulses

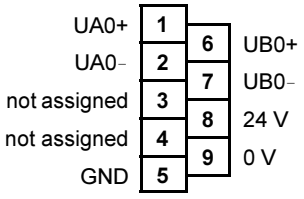
9-pole female Submin D connector

The connectors are either inputs or outputs.
Inputs: 5 V or 24 V
Outputs: 5 V

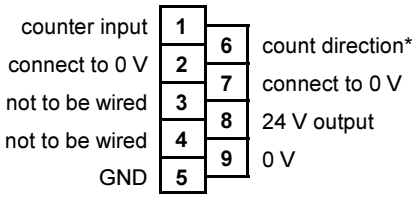
Accessory Modules AG, AH
BA, B1/B2, B4, B5, B9 and C2/C3
Angle Pulse Input



Accessory Modules B3 and C4
Angle Pulse Output

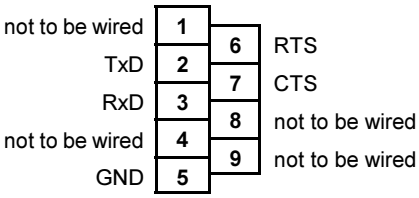


Accessory Module B7/B8
Counter Input



* not wired: positive count direction
5 V/24 V: negative count direction

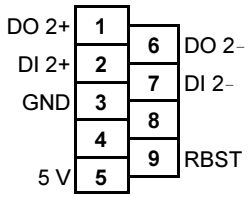
Accessory Modules A5 and A6
Serial Interface 2



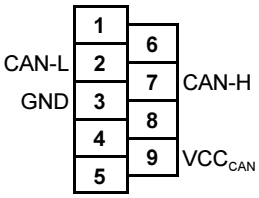
X5 - Bus Connection

9-pole female Submin D connector

Accessory Module A1
INTERBUS-S

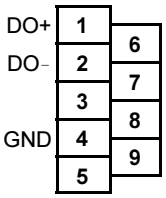


Accessory Module D1
CAN Bus



VCC_{CAN}: 8 V to 15 V

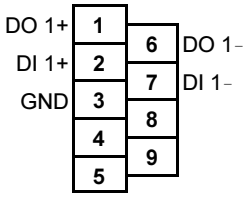
Accessory Module F1
MODLINK



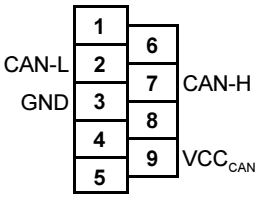
X6 - Bus Connection

9-pole male Submin D connector

Accessory Module A1
INTERBUS-S

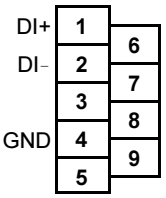


Accessory Module D1
CAN Bus



VCC_{CAN}: 8 V to 15 V

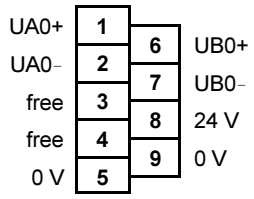
Accessory Module F1
MODLINK



X7 - Angle Pulses

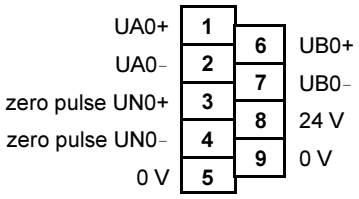
9-pole female Submin D connector

Accessory Modules BA, B4, B7/B8 Angle Pulse Output

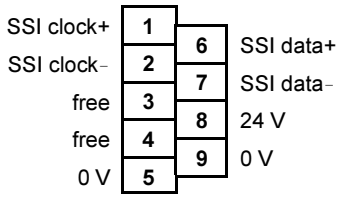


Accessory Modules B5 and B9

Angle Pulse Input

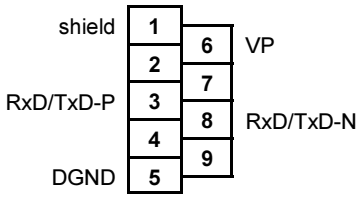


Accessory Modules C2/C3 and C4 SSI Interface



X8 - Profibus-DP Connection

9-pole male Submin D connector



S1 - Hook Switch

Depending on the position of the hook switch S1 the CNC module provides the supply voltage of 24 V.

S1 closed: The CNC supplies the voltage at Pins 19 and 20 (default).
S1 open: The supply voltage is externally connected to Pins 19 and 20.

An incorrect hooking of the switches can cause damage at the CNC or the external power supply.

Wiring of the 24 V (internal/external), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

U / V / W / PE - Motor Connections

- PHOENIX screw connectors
  The maximum conductor cross-section for the terminals is 2.5 mm².

1 to 20 - Logic Signals

PHOENIX Mini CombiCon

All inputs and outputs work with a level of 24 V. The total load of all outputs must not exceed 350 mA.

Please take into consideration that some inputs and outputs have alternating meaning. If, for example, the function “Motor Brake” has been activated in the parameter editor (IP_E_BRAKE=ON), the output o1 will automatically be identical with the function “Motor Brake”.

1	regulator OK+	(voltage-free contacts)
2	regulator OK	
3	output o0 (always regulator OK)	
4	output o2	
5	output o1 (= motor brake, if IP_E_BRAKE = ON)	
6	output o7	
7	output o6	
8	output o5	
9	output o4	
10	output o3	

11	input i2 (= limit switch–, if IP_E_END = ON)
12	input i1 (= limit switch+, if IP_E_END = ON)
13	input i3
14	input i0 (always emergency stop)
15	input i7
16	input i6
17	input i5
18	input i4
19	0 V*
20	24 V*

* see also the section “Wiring of the 24 V (Internal/External) in the chapter “Wiring”, page 38.

- Additional inputs and outputs can be connected to X3 via the I/O modules 44.20.xxx. See also the chapter “External I/O Modules”, starting on page 201.

21 to 24 - Transducer/Analog Input

PHOENIX Mini CombiCon as inputs

Accessory Module A3
Transducer Interface

21	analog input –
22	analog input +
23	output voltage +5 V
24	output voltage –5 V

Accessory Module A4
Analog Input Module

21	analog input +
22	analog input -
23	
24	GND

25 and 26 - Thermal Contact/24 V External

PHOENIX Mini CombiCon

25	24 V
26	thermal contact

Wiring of the 24 V (Internal/External), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

L1 / L2 / L3 - Main Supply

PHOENIX connectors

The intermediate circuit voltage of the power module is generated via the main supply **L1, L2, L3**.

The potential of the input phases of the logic supply *L1, L2* and the connection phases of the main supply L1, L2, L3 must be identical.

Pin Assignment L1, L2, L3		
Termi-nal	**C**	**D**
L1	3 × 110 V_{AC} to 3 × 230 V_{AC} +10 %	3 × 34 V_{AC} to 3 × 56 V_{AC}
L2		
L3		

L1 / *L2* - Mains Input for the Logic Supply

PHOENIX connectors or screw connectors

The logic supply generates a non mains-separated 30 V voltage supply independently of the main supply. Therefore, the intra-system logic is ready for operation before turning on the main supply **L1**, **L2**, **L3** and, the user has all signals and messages provided instantly.

Due to the respective wiring of ***L1***, ***L2*** the main supply (L1, L2, L3) must only be turned on, if the CNC module is to be activated (active regulator). See also the “Connection Diagrams“, starting on page 39.

The wiring must be made in order to have the logic supply turned on before the main supply.

Pin Assignment *L1, L2*		
Terminal	**C**	**D**
L1	2 × 110 V_{AC} +10 % to 2 × 230 V_{AC} +10 %	2 × 34 V_{AC} to 2 × 56 V_{AC}
L2		

The mains input *L1, L2* must always be connected. The angle pulses and error messages are kept in case of EMERGENCY STOP situations. If the main supply is turned off, make sure that all three mains phases are turned off consequently! That is why a main conductor with positively driven contacts must be used.

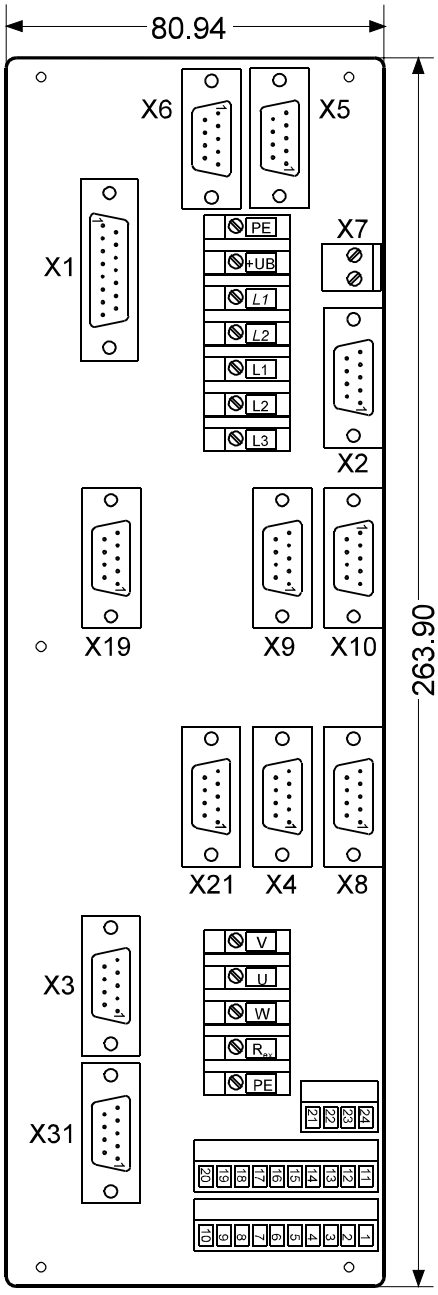
R_{ex} - External Ballast Resistor

PHOENIX connector or screw connector

A ballast resistor (75 Ω / 5 W) is already provided on the back plane. If too much energy is to be changed into heat during the deceleration, an additional ballast resistor of 22 Ω / 220 W can be connected between the connectors *+UB* and R_{EX}. The internal ballast resistor must **not** be removed.

10.2.2 Back Plane 61.01.0028

Mounting as swing frame in a compact housing

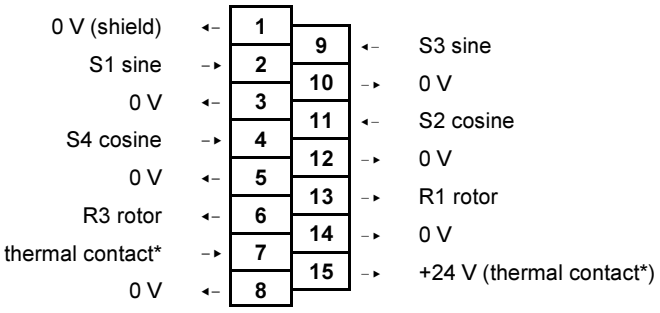


X6	INTERBUS connection, page 128
X5	INTERBUS connection, page 127
X1	Connection of first measuring system, page 125
X7	Fan connection
PE	Earth conductor
+UB	Intermediate circuit voltage
L1 L2	Mains input for the logic supply
L1 L2 L3	Mains input for generating the intermediate circuit voltage
X2	Terminal connection, page 126
X19	Profibus connection, page 129
X9	MODLINK connection, page 128
X10	MODLINK connection, page 129
X21	Serial interfaces 2 and 3, page 129
X4	Angle pulse connection, page 127
X8	Transducer connection, page 128
X3	I/O expansion, page 126
V U W	Motor connection
R_{ex}	External ballast resistor
PE	Earth conductor
21 to 24	Thermal contact / 24 V external, page 131
X31	CAN bus connection, page 129
1 to 20	Logic signals, page 130

X1 - Connection of First Measuring System (Feedback)

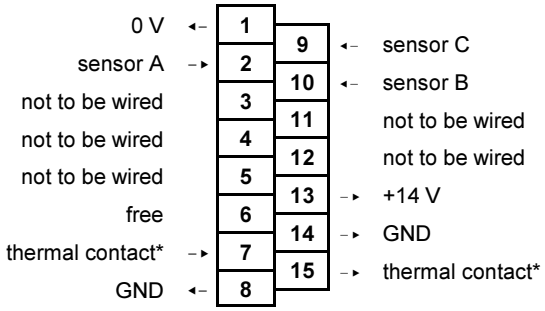
15-pole female Submin D connector

Resolver Evaluation



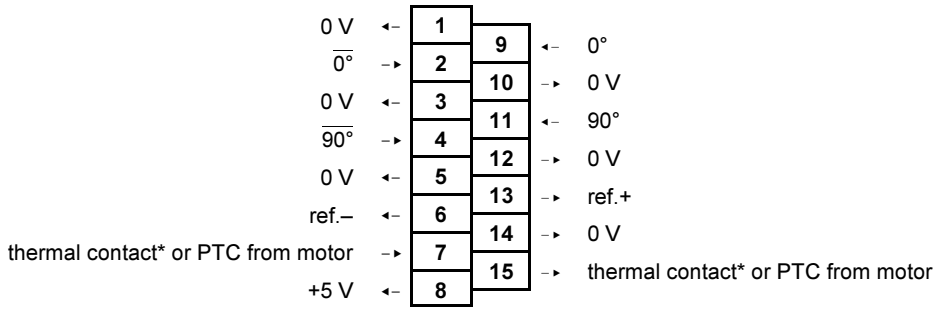
- If the thermal contact (*) is not evaluated, the Pins 15 and 7 must be strapped.
- Use a shielded cable with three pairs of wires, each of which being twisted (e. g. LIYCY 3 × 2 × 0.14). Twist mode: sine/sine; cosine/cosine; rotor/rotor
- The shield must be connected with both ends: At the CNC on the connector shell and at the resolver, as described in the chapter “Wiring”, “General Information”, page 33.

Hall Effect Sensor Evaluation



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable. Connect the shield with largest surface to the connector shell.

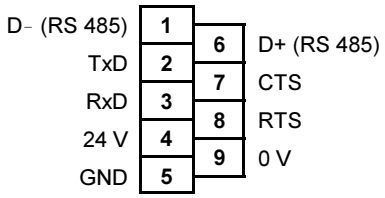
Optical Length Measuring System



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable with four pairs of wires, each of which being twisted. Twist mode: $\overline{0°}$/0°, $\overline{90°}$/90°, ref.+/ref.– and +5 V/0 V. If the thermal contact is evaluated, a shielded twisted pair cable with five pairs of wires must be used.
- For incremental encoders without difference voltage signal the Pins 9 and 11 must be supplied with 5 V (Pin 8).
- Connect the shield with largest surface to the connector shell.

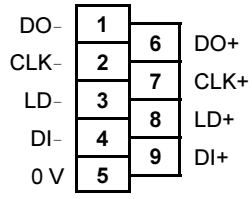
X2 - Terminal Connection

9-pole female Submin D connector with levels corresponding to the RS232 and RS485 specifications.



X3 - I/O Expansion

9-pole female Submin D connector

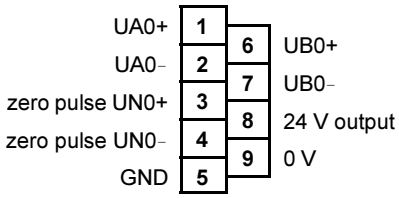


X4 - Angle Pulses

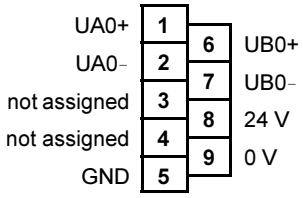
9-pole female Submin D connector

The connectors are either inputs or outputs.
Inputs: 5 V or 24 V
Outputs: 5 V

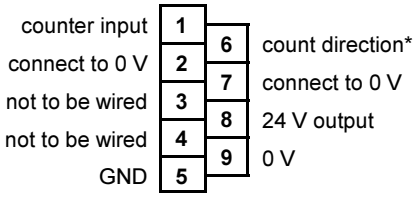
Accessory Modules AG, AH
BA, B1/B2, B4, B5, B9 and C2/C3
Angle Pulse Input



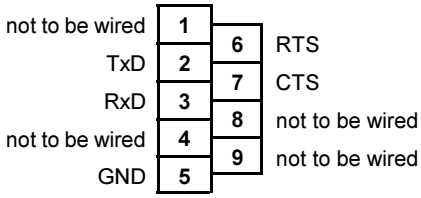
Accessory Modules B3 and C4
Angle Pulse Output



Accessory Module B7/B8
Counter Input



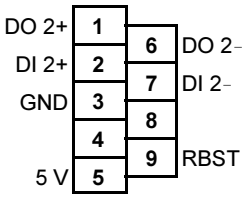
Accessory Modules A5 and A6
Serial Interface 2



* not wired: positive count direction
5 V/24 V: negative count direction

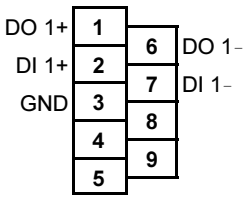
X5 - INTERBUS-S Connection

9-pole female Submin D connector



X6 - INTERBUS-S Connection

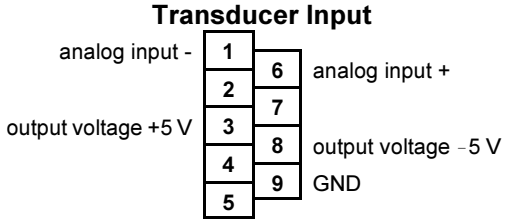
9-pole male Submin D connector



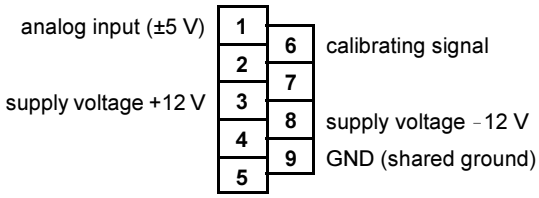
X8 - Transducer Connection

9-pole female Submin D connector

Accessory Modules A3, A5, AA and AE
Transducer Input

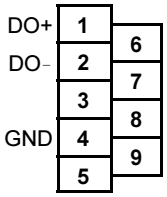


Accessory Module AF
Active Transducer



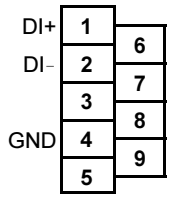
X9 - MODLINK Connection

9-pole female Submin D connector



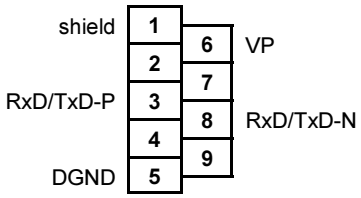
X10 - MODLINK Connection

9-pole male Submin D connector



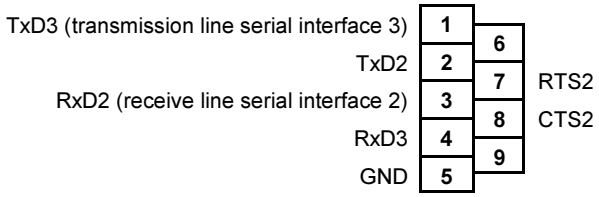
X19 - Profibus-DP Connection

9-pole female Submin D connector



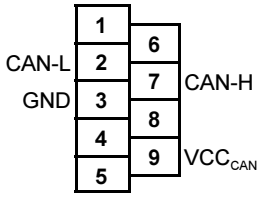
X21 - Serial Interfaces 2 and 3

9-pole female Submin D connector



X31 - CAN Bus Connection

9-pole female Submin D connector



VCC_{CAN}: 8 V to 15 V

U / V / W / PE - Motor Connections

- PHOENIX screw connectors
  The maximum conductor cross-section for the terminals is 2.5 mm².

1 to 20 - Logic Signals

PHOENIX Mini CombiCon

All inputs and outputs work with a level of 24 V. The total load of all outputs must not exceed 350 mA.

Please take into consideration that some inputs and outputs have alternating meaning. If, for example, the function “Motor Brake” has been activated in the parameter editor (IP_E_BRAKE=ON), the output o1 will automatically be identical with the function “Motor Brake”.

1	regulator OK+	(voltage-free contacts)
2	regulator OK	
3	output o0 (always regulator OK)	
4	output o2	
5	output o1 (= motor brake, if IP_E_BRAKE = ON)	
6	output o7	
7	output o6	
8	output o5	
9	output o4	
10	output o3	

11	input i2 (= limit switch–, if IP_E_END = ON)
12	input i1 (= limit switch+, if IP_E_END = ON)
13	input i3
14	input i0 (always emergency stop)
15	input i7
16	input i6
17	input i5
18	input i4
19	0 V*
20	24 V*

* see also the section “Wiring of the 24 V (Internal/External) in the chapter “Wiring”, page 38.

- Additional inputs and outputs can be connected to X3 via the I/O modules 44.20.xxx. See also the chapter “External I/O Modules”, starting on page 201.

21 to 24 - Thermal Contact/24 V External

PHOENIX Mini CombiCon

21	thermal contact
22	24 V internal
23	24 V external
24	0 V

Wiring of the 24 V (Internal/External), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

L1 / L2 / L3 - Main Supply

PHOENIX connectors
The intermediate circuit voltage of the power module is generated via the main supply **L1, L2, L3**.

The potential of the input phases of the logic supply *L1, L2* and the connection phases of the main supply L1, L2, L3 must be identical.

Pin Assignment L1, L2, L3		
Termi-nal	**C**	**D**
L1	3 × 110 V_{AC} to 3 × 230 V_{AC} +10 %	3 × 34 V_{AC} to 3 × 56 V_{AC}
L2		
L3		

L1 / *L2* - Mains Input for the Logic Supply

PHOENIX connectors or screw connectors

The logic supply generates a non mains-separated 30 V voltage supply independently of the main supply. Therefore, the intra-system logic is ready for operation before turning on the main supply **L1**, **L2**, **L3** and, the user has all signals and messages provided instantly.

Due to the respective wiring of ***L1***, ***L2*** the main supply (L1, L2, L3) must only be turned on, if the CNC module is to be activated (active regulator). See also the “Connection Diagrams“, starting on page 39.

The wiring must be made in order to have the logic supply turned on before the main supply.

Pin Assignment *L1, L2*		
Terminal	**C**	**D**
L1	2 × 110 V_{AC} +10 % to 2 × 230 V_{AC} +10 %	2 × 34 V_{AC} to 2 × 56 V_{AC}
L2		

The mains input *L1, L2* must always be connected. The angle pulses and error messages are kept in case of EMERGENCY STOP situations. If the main supply is turned off, make sure that all three mains phases are turned off consequently! That is why a main conductor with positively driven contacts must be used.

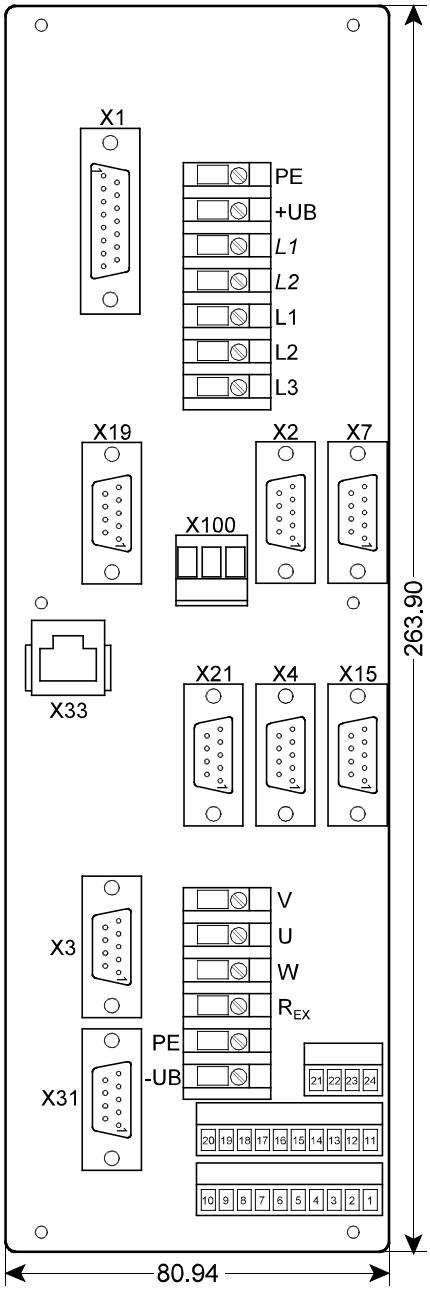
R_{ex} - External Ballast Resistor

PHOENIX connector or screw connector

A ballast resistor (75 Ω / 5 W) is already provided on the back plane. If too much energy is to be changed into heat during the deceleration, an additional ballast resistor of 22 Ω / 220 W can be connected between the connectors *+UB* and R_{EX}. The internal ballast resistor must **not** be removed.

10.2.3 Back Plane 61.01.0051

Mounting as swing frame into a compact housing

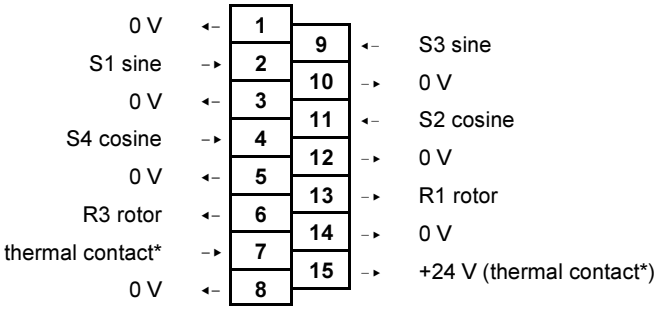


X1	Connection of first measuring system, page 134
PE **+UB**	Earth conductor Intermediate circuit voltage
L1 L2	Mains input for the logic supply
L1 L2 L3	Mains input for generating the intermediate circuit voltage
X19	Profibus connection, page 137
X2	Terminal connection, page 135
X7	Angle pulse connection, page 136
X100	Fan connection
X33	Ethernet connection, page 138
X21	Serial interfaces 2 and 3, page 137
X4	Angle pulse connection, page 136
X15	Transducer connection, page 137
X3	I/O expansion, page 135
V U W	Motor connection
R_{ex} **PE** **-UB**	External ballast resistor Earth conductor Intermediate circuit voltage
X31	CAN bus connection, page 138
21 to 24	Thermal contact / 24 V external, page 139
1 to 20	Logic signals, page 139

X1 - Connection of First Measuring System (Feedback)

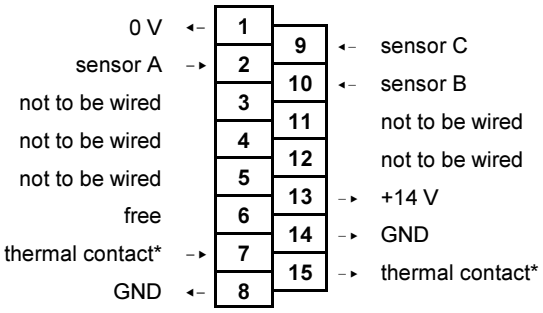
15-pole female Submin D connector

Resolver Evaluation



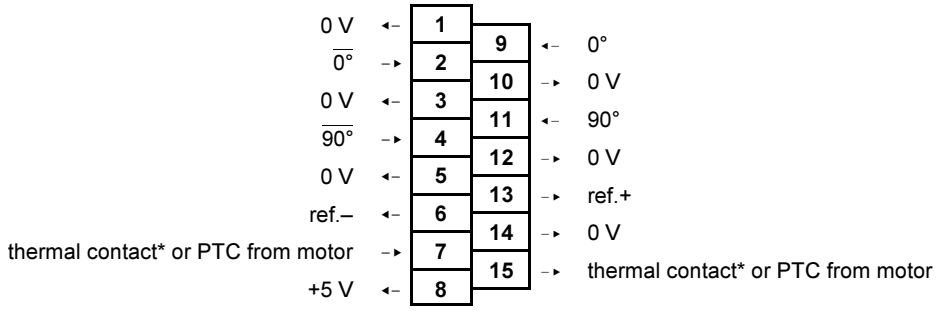
- If the thermal contact (*) is not evaluated, the Pins 15 and 7 must be strapped.
- Use a shielded cable with three pairs of wires, each of which being twisted (e. g. LIYCY 3 × 2 × 0.14). Twist mode: sine/sine; cosine/cosine; rotor/rotor
- The shield must be connected with both ends: At the CNC on the connector shell and at the resolver, as described in the chapter “Wiring”, “General Information”, page 33.

Hall Effect Sensor Evaluation



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable. Connect the shield with largest surface to the connector shell.

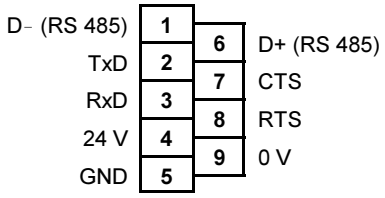
Optical Length Measuring System



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable with four pairs of wires, each of which being twisted.Twist mode: $\overline{0°}$/0°, $\overline{90°}$/90°, ref.+/ref.– and +5 V/0 V. If the thermal contact is evaluated, a shielded twisted pair cable with five pairs of wires must be used.
- For incremental encoders without difference voltage signal the Pins 9 and 11 must be supplied with 5 V (Pin 8).
- Connect the shield with largest surface to the connector shell.

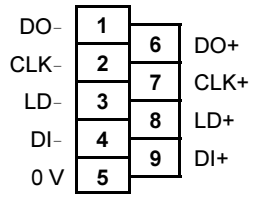
X2 - Terminal Connection

9-pole female Submin D connector with levels corresponding to the RS232 and RS485 specifications.



X3 - I/O Expansion

9-pole female Submin D connector

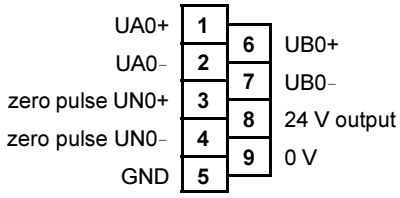


X4 - Angle Pulses

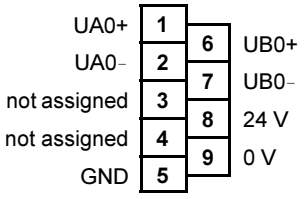
9-pole female Submin D connector

The connectors are either inputs or outputs.
Inputs: 5 V or 24 V
Outputs: 5 V

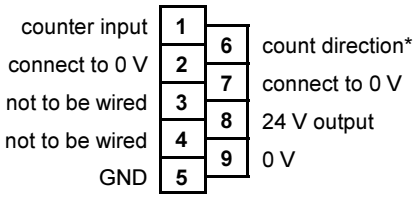
Accessory Modules AG, AH
BA, B1/B2, B4, B5, B9 and C2/C3
Angle Pulse Input



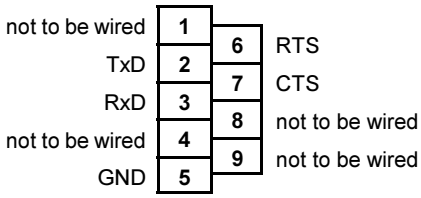
Accessory Modules B3 and C4
Angle Pulse Output



Accessory Module B7/B8
Counter Input



Accessory Modules A5 and A6
Serial Interface 2

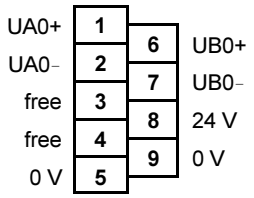


* not wired: positive count direction
5 V/24 V: negative count direction

X7 - Angle Pulses

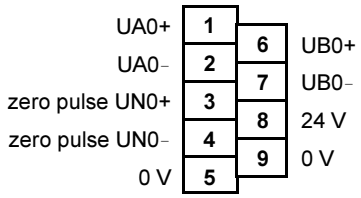
9-pole female Submin D connector

Accessory Modules
BA, B4, B7/B8
Angle Pulse Output

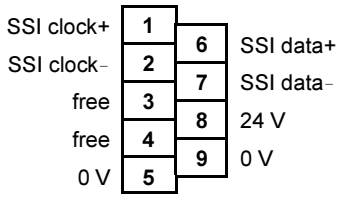


Accessory Modules B5 and B9

Angle Pulse Input



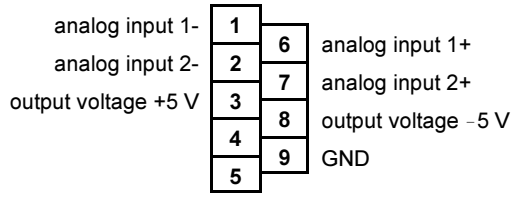
Accessory Modules
C2/C3 and C4
SSI Interface



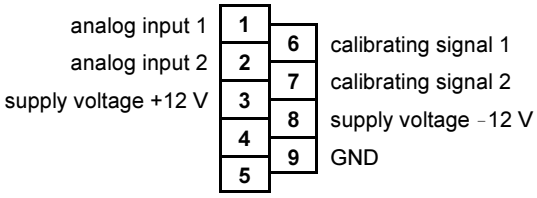
X15 - Active/Passive Transducer

9-pole female Submin D connector

Accessory Module AG

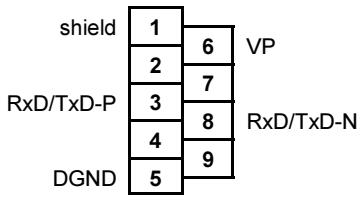


Accessory Module AH



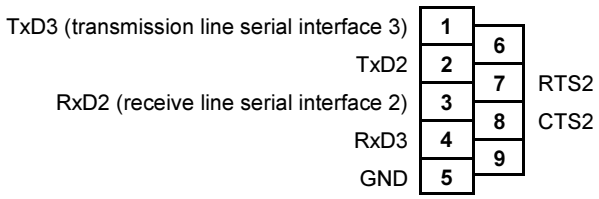
X19 - Profibus Connection

9-pole female Submin D connector



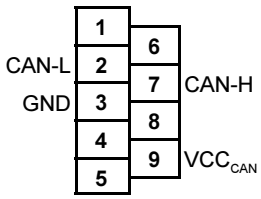
X21 - Serial Interfaces 2 and 3

9-pole female Submin D connector



X31 - CAN Bus Connection

9-pole female Submin D connector



VCC_{CAN}: 8 V to 15 V

X33 - Ethernet Connection

RJ45 female connector (Western)

Pin	Designation
1	TX+
2	TX-
3	RX+
4	not connected
5	not connected
6	RX-
7	not connected
8	not connected

U / V / W - Motor Connections

- PHOENIX screw connectors
  The maximum conductor cross-section for the terminals is 2.5 mm².

1 to 20 - Logic Signals

PHOENIX Mini CombiCon

All inputs and outputs work with a level of 24 V. The total load of all outputs must not exceed 350 mA.

Please take into consideration that some inputs and outputs have alternating meaning. If, for example, the function “Motor Brake” has been activated in the parameter editor (IP_E_BRAKE=ON), the output o1 will automatically be identical with the function “Motor Brake”.

1	regulator OK+	(voltage-free contacts)
2	regulator OK	
3	output o0 (always regulator OK)	
4	output o2	
5	output o1 (= motor brake, if IP_E_BRAKE = ON)	
6	output o7	
7	output o6	
8	output o5	
9	output o4	
10	output o3	

11	input i2 (= limit switch–, if IP_E_END = ON)
12	input i1 (= limit switch+, if IP_E_END = ON)
13	input i3
14	input i0 (always emergency stop)
15	input i7
16	input i6
17	input i5
18	input i4
19	0 V*
20	24 V*

* see also the section “Wiring of the 24 V (Internal/External) in the chapter “Wiring”, page 38.

Additional inputs and outputs can be connected to X3 via the I/O modules 44.20.xxx. See also the chapter “External I/O Modules”, starting on page 201.

21 to 24 - Thermal Contact/24 V External

PHOENIX Mini CombiCon

21	thermal contact
22	24 V internal
23	24 V external
24	0 V

Wiring of the 24 V (Internal/External), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

L1 / L2 / L3 - Main Supply

PHOENIX connectors

The intermediate circuit voltage of the power module is generated via the main supply **L1, L2, L3**.

The potential of the input phases of the logic supply *L1, L2* and the connection phases of the main supply L1, L2, L3 must be identical.

Pin Assignment L1, L2, L3		
Terminal	**C**	**D**
L1	3 × 110 V_{AC} to 3 × 230 V_{AC} +10 %	3 × 34 V_{AC} to 3 × 56 V_{AC}
L2		
L3		

L1 / *L2* - Mains Input for the Logic Supply

PHOENIX connectors or screw connectors

The logic supply generates a non mains-separated 30 V voltage supply independently of the main supply. Therefore, the intra-system logic is ready for operation before turning on the main supply **L1**, **L2**, **L3** and, the user has all signals and messages provided instantly.

Due to the respective wiring of ***L1***, ***L2*** the main supply (L1, L2, L3) must only be turned on, if the CNC module is to be activated (active regulator). See also the "Connection Diagrams", starting on page 39.

The wiring must be carried out that way that the logic supply is turned on before the main supply.

Pin Assignment *L1, L2*		
Terminal	**C**	**D**
L1	2 × 110 V_{AC} +10 % to 2 × 230 V_{AC} +10 %	2 × 34 V_{AC} to 2 × 56 V_{AC}
L2		

The mains input *L1, L2* must always be connected. The angle pulses and error messages are kept in case of EMERGENCY STOP situations. If the main supply is turned off, make sure that all three mains phases are turned off consequently! That is why a main conductor with positively driven contacts must be used.

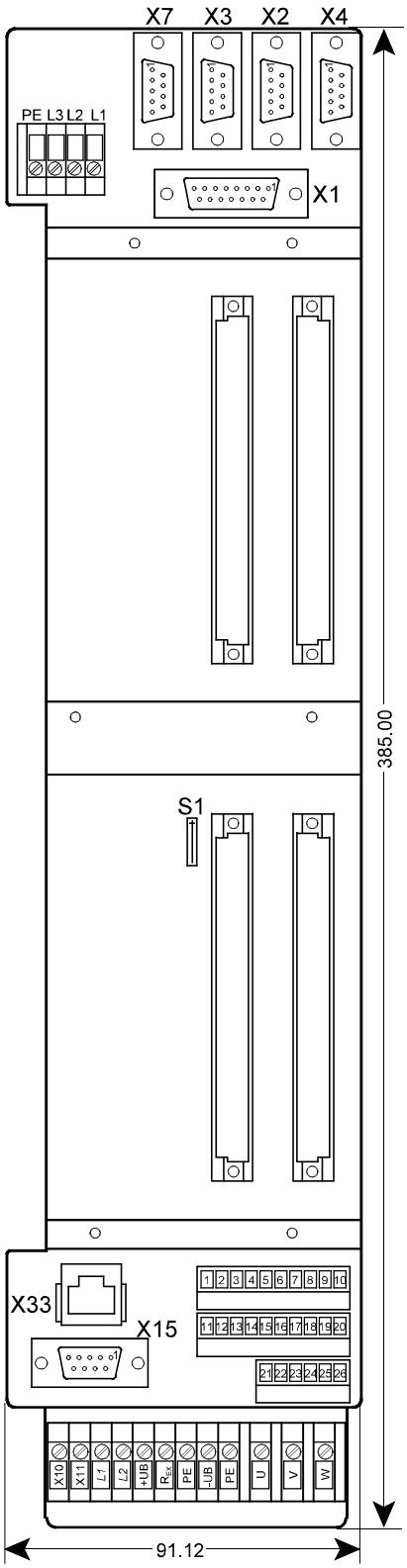
R_{EX} - External Ballast Resistor

PHOENIX connector or screw connector

A ballast resistor (75 Ω / 5 W) is already provided on the back plane. If too much energy is to be changed into heat during the deceleration, an additional ballast resistor of 22 Ω / 220 W can be connected between the connectors *+UB* and R_{EX}. The internal ballast resistor must **not** be removed.

10.2.4 Back Plane 61.01.0057

Wall mounting into a compact housing

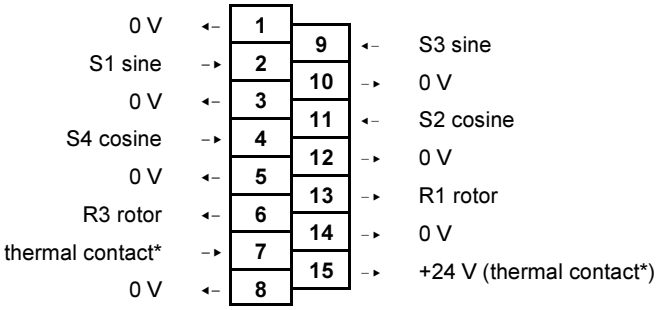


X7	Angle pulse connection, page 146
X3	I/O expansion, page 145
X2	Terminal connection, page 145
X4	Angle pulse connection, page 146
PE	Earth conductor
L1 L2 L3	Mains input for generating the intermediate circuit voltage
X1	Connection of first measuring system, page 144
S1	Hook switch, page 147
X33	Ethernet connection, page 147
1 to 20	Logic signals, page 148
21 to 24	Transducer/analog input, page 149
25 and 26	24 V / thermal contact, page 149
X15	Transducer connection, page 147
X10	**X 1** Fan connection
	1
L1 L2	Mains input for the logic supply
+UB	Intermediate circuit voltage
R_{EX}	External ballast resistor
PE	Earth conductor
-UB	Intermediate circuit voltage
U V W	Motor connection

X1 - Connection of First Measuring System (Feedback)

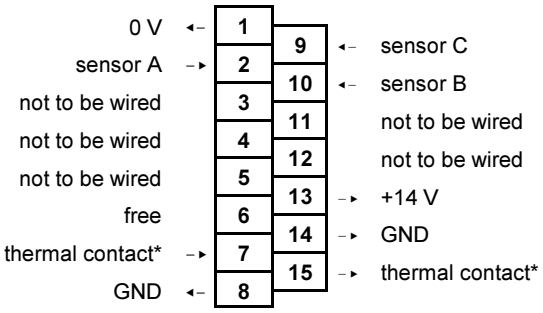
15-pole female Submin D connector

Resolver Evaluation



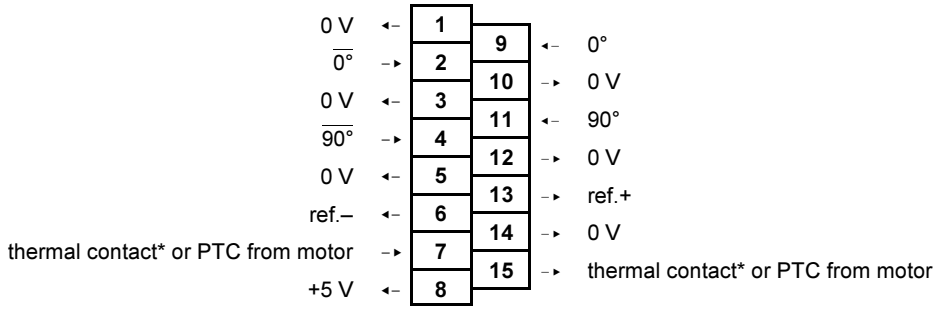
- If the thermal contact (*) is not evaluated, the Pins 15 and 7 must be strapped.
- Use a shielded cable with three pairs of wires, each of which being twisted (e. g. LIYCY 3 × 2 × 0.14). Twist mode: sine/sine; cosine/cosine; rotor/rotor
- The shield must be connected with both ends: At the CNC on the connector shell and at the resolver, as described in the chapter “Wiring”, “General Information”, page 33.

Hall Effect Sensor Evaluation



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable. Connect the shield with largest surface to the connector shell.

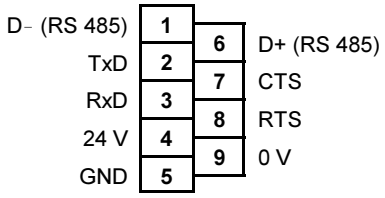
Optical Length Measuring System



- If no thermal contact (*) is connected, Pin 7 and Pin 15 must be strapped.
- Use a shielded cable with four pairs of wires, each of which being twisted. Twist mode: $\overline{0°}$/0°, $\overline{90°}$/90°, ref.+/ref.– and +5 V/0 V. If the thermal contact is evaluated, a shielded twisted pair cable with five pairs of wires must be used.
- For incremental encoders without difference voltage signal the Pins 9 and 11 must be supplied with 5 V (Pin 8).
- Connect the shield with largest surface to the connector shell.

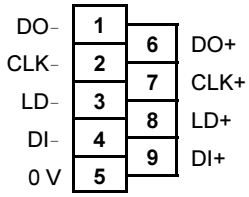
X2 - Terminal Connection

9-pole female Submin D connector with levels corresponding to the RS232 and RS485 specifications.



X3 - I/O Expansion

9-pole female Submin D connector

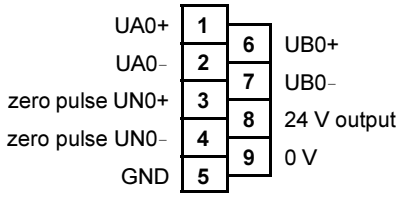


X4 - Angle Pulses

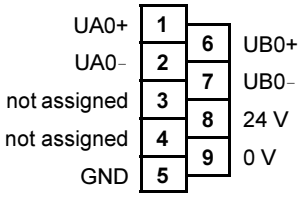
9-pole female Submin D connector

The connectors are either inputs or outputs.
Inputs: 5 V or 24 V
Outputs: 5 V

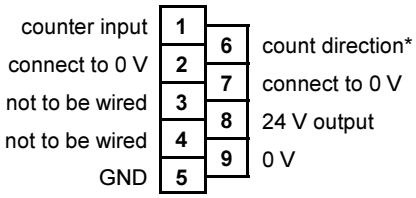
Accessory Modules AG, AH
BA, B1/B2, B4, B5, B9 and C2/C3
Angle Pulse Input



Accessory Modules B3 and C4
Angle Pulse Output

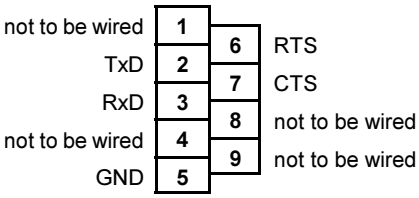


Accessory Module B7/B8
Counter Input



* not wired: positive count direction
5 V/24 V: negative count direction

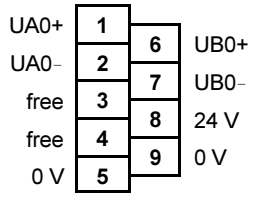
Accessory Modules A5 and A6
Serial Interface 2



X7 - Angle Pulses

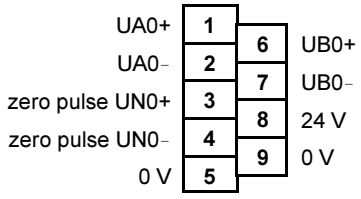
9-pole female Submin D connector

Accessory Modules
BA, B4, B7/B8
Angle Pulse Output

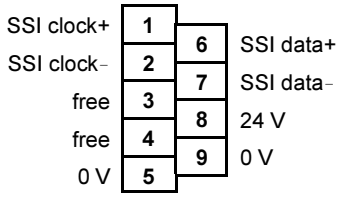


Accessory Modules B5 and B9

Angle Pulse Input



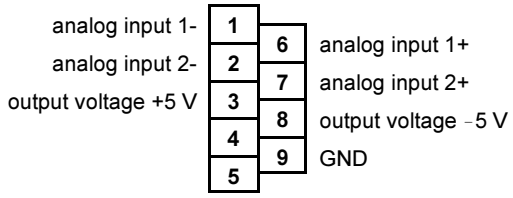
Accessory Modules
C2/C3 and C4
SSI Interface



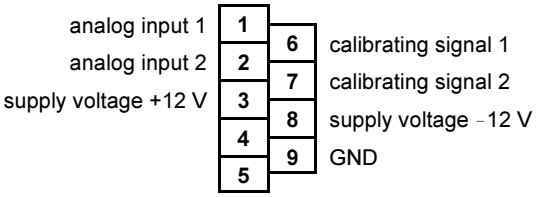
X15 - Active/Passive Transducer

9-pole female Submin D connector

Accessory Module AG



Accessory Module AH



X33 - Ethernet Connection

RJ45 female connector (Western)

Pin	Designation
1	TX+
2	TX-
3	RX+
4	not connected
5	not connected
6	RX-
7	not connected
8	not connected

S1 - Hook Switch

Depending on the position of the hook switch S1 the CNC module provides the supply voltage of 24 V.

S1 closed The CNC supplies the voltage at Pins 19 and 20 (default).
S1 open The supply voltage is externally connected to Pins 19 and 20.

An incorrect hooking of the switches can cause damage at the CNC or the external power supply.

Wiring of the 24 V (internal/external), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

U / V / W - Motor Connection

- PHOENIX screw connectors
  The maximum conductor cross-section for the terminals is 2.5 mm².

1 to 20 - Logic Signals

PHOENIX Mini CombiCon

All inputs and outputs work with a level of 24 V. The total load of all outputs must not exceed 350 mA.

Please take into consideration that some inputs and outputs have alternating meaning. If, for example, the function “Motor Brake” has been activated in the parameter editor (IP_E_BRAKE=ON), the output o1 will automatically be identical with the function “Motor Brake”.

1	regulator OK+	(voltage-free contacts)
2	regulator OK	
3	output o0 (always regulator OK)	
4	output o2	
5	output o1 (= motor brake, if IP_E_BRAKE = ON)	
6	output o7	
7	output o6	
8	output o5	
9	output o4	
10	output o3	

11	input i2 (= limit switch–, if IP_E_END = ON)
12	input i1 (= limit switch+, if IP_E_END = ON)
13	input i3
14	input i0 (always emergency stop)
15	input i7
16	input i6
17	input i5
18	input i4
19	0 V*
20	24 V*

* see also the section “Wiring of the 24 V (Internal/External) in the chapter “Wiring”, page 38.

Additional inputs and outputs can be connected to X3 via the I/O modules 44.20.xxx. See also the chapter “External I/O Modules”, starting on page 201.

21 to 24 - Transducer/Analog Input

PHOENIX Mini CombiCon as inputs

Accessory Module A3 and A5
Transducer Interface

21	analog input -
22	analog input +
23	output voltage +5 V
24	output voltage -5 V

Accessory Module A4
Analog Input Module

21	analog input +
22	analog input -
23	
24	GND

25 and 26 - Thermal Contact/24 V External

PHOENIX Mini CombiCon

25	24 V
26	thermal contact

Wiring of the 24 V (Internal/External), see chapter “Wiring”, section “Wiring of 24 V (internal/external)”, page 38.

L1 / L2 / L3 - Main Supply

PHOENIX connectors

The intermediate circuit voltage of the power module is generated via the main supply **L1, L2, L3**.

The potential of the input phases of the logic supply *L1, L2* and the connection phases of the main supply L1, L2, L3 must be identical.

Pin Assignment L1, L2, L3		
Termi-nal	**C**	**D**
L1	3 × 110 V_{AC} to 3 × 230 V_{AC} +10 %	3 × 34 V_{AC} to 3 × 56 V_{AC}
L2		
L3		

L1 / *L2* - Mains Input for the Logic Supply

PHOENIX connectors or screw connectors

The logic supply generates a non mains-separated 30 V voltage supply independently of the main supply. Therefore, the intra-system logic is ready for operation before turning on the main supply **L1**, **L2**, **L3** and, the user has all signals and messages provided instantly.

Due to the respective wiring of ***L1***, ***L2*** the main supply (L1, L2, L3) must only be turned on, if the CNC module is to be activated (active regulator). See also the "Connection Diagrams", starting on page 39.

The wiring must be carried out that way that the logic supply is turned on before the main supply.

Pin Assignment *L1, L2*		
Terminal	**C**	**D**
L1	2 × 110 V_{AC} +10 % to 2 × 230 V_{AC} +10 %	2 × 34 V_{AC} to 2 × 56 V_{AC}
L2		

The mains input *L1, L2* must always be connected. The angle pulses and error messages are kept in case of EMERGENCY STOP situations. If the main supply is turned off, make sure that all three mains phases are turned off consequently! That is why a main conductor with positively driven contacts must be used.

R_{EX} - External Ballast Resistor

PHOENIX connector or screw connector

A ballast resistor (75 Ω / 5 W) is already provided on the back plane. If too much energy is to be changed into heat during the deceleration, an additional ballast resistor of 22 Ω / 220 W can be connected between the connectors *+UB* and R_{EX}. The internal ballast resistor must **not** be removed.

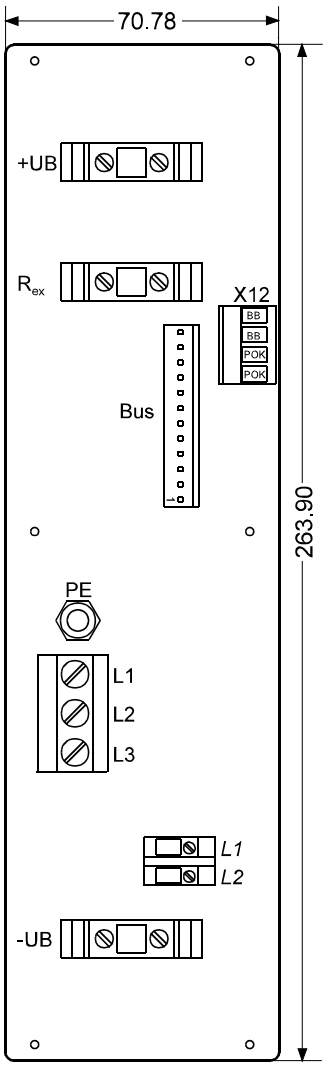
10.3 Back Planes of the Power Module 26.50.65

The power module 26.50.65 replaces the power module 26.50.42 and is fully downward compatible. It may be used in existing systems.

The power module 26.50.42, however, is not generally upward compatible, since the compatibility depends on the wiring of the system. If necessary, contact SIEB & MEYER.

10.3.1 Back Plane 61.01.0017

Mounting into a 19” rack as hinged-frame unit and protection against touching



+UB Intermediate circuit voltage

R_{ex} External ballast resistor, page 154

X12 BB - volt-free contact “ready for operation”, page 153
POK - volt-free contact “power OK”, page 153

Bus Internal connection, page 154

PE Earth conductor

L1 L2 L3 Mains input for generating the intermediate circuit voltage, page 152

L1 L2 Mains input for the logic supply, page 152

-UB Intermediate circuit voltage

L1 / L2 / L3 - Main Supply

PHOENIX connectors

The intermediate circuit voltage of the power module is generated via the main supply **L1, L2, L3**.

Connecting the main supply with three phases is indispensable!
The potential of the input phases of the logic supply *L1, L2* and the connection phases of the main supply L1, L2, L3 must be identical.

Screw Terminal	Voltage Range				
	B	C / CZ*	H	I	K
L1	3 × 70 V_{AC} +10 % –20 %	3 × 230 V_{AC} +10 % –20 %	3 × 380 V_{AC} –5 % to 3 × 480 V_{AC} +10 %	3 × 280 V_{AC} +10 % –20 %	3 × 250 V_{AC} +10 % –20 %
L2					
L3					

* CZ: Power module without overvoltage protection

The power module should be protected with 16 A fuses with fast blow behavior (e.g. Siemens Silized 16 A/5SD420)!

The time of discharging the intermediate circuit may be up to 5 minutes after turning off the mains inputs, when the power module is faulty (worst case). Usually, the intermediate circuit is discharged after approx. 2 s.
The contactor for the mains supply must not step back with time lag in case of a fault. It must be considered that the main contactor will not execute the time lag for deactivating the CNC module in an EMERGENCY STOP situation.

L1 / *L2* - Mains Input for the Logic Supply

PHOENIX connectors or screw connectors

Independently of the main supply, the logic supply generates a **non mains-separated 30 V voltage supply** that may be loaded up to 150 W (power modules with the code letter B: 100 W). Therefore, the intra-system logic is ready for operation before turning on the main supply **L1**, **L2**, **L3** and, the user has all signals and messages provided instantly.

Due to the respective wiring of ***L1, L2*** the main supply (L1, L2, L3) must only be turned on, if the CNC module is to be activated (active regulator). See also the "Connection Diagrams", starting on page 39.

The wiring must be carried out that way that the logic supply is turned on before the main supply.

Screw Terminal	Voltage Range B	C / CZ*	H	I	K
I1	2 × 70 V_{AC} +10 % –20 %	2 × 230 V_{AC} +10 % –20 %	2 × 380 V_{AC} –5 % to 2 × 480 V_{AC} +10 %	2 × 280 V_{AC} +10 % –20 %	2 × 250 V_{AC} +10 % –20 %
I2					

* CZ: Power module without overvoltage protection

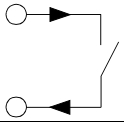
The mains input *L1, L2* must always be connected. The angle pulses and error messages are kept in case of EMERGENCY STOP situations. If the main supply is turned off, make sure that all three mains phases are turned off consequently! That is why a main conductor with positively driven contacts must be used.

X12 - POK and BB

PHOENIX Mini CombiCon or screw connectors

The volt-free contact *POK* closes, when the logic supply is provided at *I1, I2* and, the power module cannot detect any fault during an internal check. The contactor for enabling the main supply should be switched via these contacts.

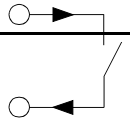
Pins Assignment of *POK*	
Screw Terminal	**Assignment**
POK	24 V, 2 A
POK	



The volt-free contact *BB* closes, when the power module is completely ready for operation. Condition:

- The logic supply at *L1, L2* **and**
- the main supply at L1, L2, L3 are provided.
- No error message of the power module.

Pin Assignment *BB*	
Screw Terminal	**Assignment**
B	24 V, 2 A

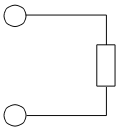


R_{ex} - External Ballast Resistor

PHOENIX connector or screw terminal

An external ballast resistor can be connected between this connector and the connector *+UB*.

During the generator operation the motor feeds energy back into the intermediate circuit. If the intermediate circuit voltage has reached a specific potential, the ballast resistor will be switched into the intermediate circuit via a transistor to dissipate the surplus energy.

Screw Terminal	Assignment				
	B	C / CZ*	H	I	K
R_{ext}  +UB	5 Ω	5 Ω	10 Ω	10 Ω	5.6 Ω

* CZ: Power module without overvoltage protection

The values of the ballast resistors listed in the table are minimum values. The value of the resistor to be used must not fall below the minimum value.

Bus - Internal Connection

The 12-pole bus line connects the power module and up to six CNC rack modules. The bus supplies the CNC modules with the voltage of +30 V (bus voltage). Additionally, statuses of the power module (readiness for operation, malfunctions) are signaled to the CNC 61.00 modules. At the power module the bus pins are outputs, whereas at the CNC module the bus pins are inputs.

The bus moreover provides the volt-free +5 V/GND that can be loaded with up to 1.8 A. The potentiometer **+5 V MSY** at the front panel enables the precise adjustment of the 5 V.

Pin	Assignment	
1	+5 V	
2	GND	
3 + 4	earth potential	
5	mains OK = +24 V	
6	overvoltage message	
7	+24 V	
8	not assigned	
9 + 10	+30 V	⚠ mains potential
11 + 12	0 V for the 30 V	⚠ mains potential

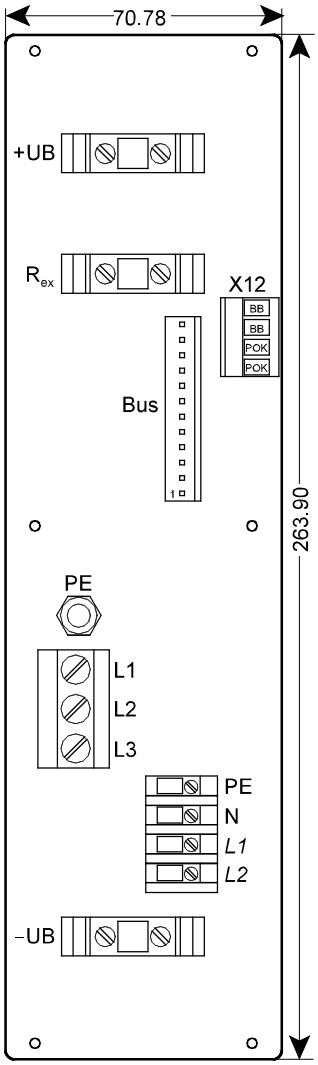
Do not use the +30 V for any other purposes!

Mains OK
This output intra-system activates and deactivates, inter alia, the CNC modules. If the main supply is not provided, the signal “mains OK” will be LOW and the CNC modules cannot be activated. The user may use this signal via the contacts *BB*.

Overvoltage Message
If an overvoltage comes up, the level of 24 V bounces to 0 V. Then the regulator in the CNC module is deactivated (*POK* and the main contactor open). Error messages, however, are kept.

10.3.2 Back Plane 61.01.0061

Mounting into a 19” rack as hinged-frame unit



+UB Intermediate circuit voltage

R_{ex} External ballast resistor, page 159

X12 BB - volt-free contact “ready for operation”, page 158
POK - volt-free contact “Power OK”, page 158

Bus Interne connection, page 159

PE Earth conductor

L1 L2 L3 Mains input for generating the intermediate circuit voltage, page 157

PE Earth conductor
N Neutral conductor*, page 159

L1 L2 Mains input for the logic supply, page 157

-UB Intermediate circuit voltage

* If a residual current operating device is used, the screw connectors **PE** and **N** must be wired separately. If no residual current operating device is used, both connectors can be wired to earth together.

L1 / L2 / L3 - Main Supply

PHOENIX connectors

The intermediate circuit voltage of the power module is generated via the main supply **L1, L2, L3**.

Connecting the main supply with three phases is indispensable!
The potential of the input phases of the logic supply *L1, L2* and the connection phases of the main supply L1, L2, L3 must be identical.

Screw Terminal	Voltage Range B	C / CZ*	H	I	K
L1	3 × 70 V_{AC} +10 % –20 %	3 × 230 V_{AC} +10 % –20 %	3 × 380 V_{AC} –5 % to 3 × 480 V_{AC} +10 %	3 × 280 V_{AC} +10 % –20 %	3 × 250 V_{AC} +10 % –20 %
L2					
L3					

* CZ: Power module without overvoltage protection

The power module should be protected with 16 A fuses with fast blow behavior (e.g. Siemens Silized 16 A/5SD420)!

The time of discharging the intermediate circuit may be up to 5 minutes after turning off the mains inputs, when the power module is faulty (worst case). Usually, the intermediate circuit is discharged after approx. 2 s.
The contactor for the mains supply must not step back with time lag in case of a fault. Pay attention of the main contactor not to execute the time lag for deactivating the CNC module in an EMERGENCY STOP situation.

L1 / *L2* - Mains Input for the Logic Supply

PHOENIX connectors or screw connectors

Independently of the main supply, the logic supply generates a **non mains-separated 30 V voltage supply** that may be loaded up to 150 W (power modules with the code letter B: 100 W). Therefore, the intra-system logic is ready for operation before turning on the main supply **L1**, **L2**, **L3** and, the user has all signals and messages provided instantly.

Due to the respective wiring of ***L1***, ***L2*** the main supply (L1, L2, L3) must only be turned on, if the CNC module is to be activated (active regulator). See also the “Connection Diagrams“, starting on page 39.

The wiring must be carried out that way that the logic supply is turned on before the main supply.

Screw Terminal	Voltage Range				
	B	C / CZ*	H	I	K
I1	2 × 70 V_{AC} +10 % –20 %	2 × 230 V_{AC} +10 % –20 %	2 × 380 V_{AC} –5 % to 2 × 480 V_{AC} +10 %	2 × 280 V_{AC} +10 % –20 %	2 × 250 V_{AC} +10 % –20 %
I2					

* CZ: Power module without overvoltage protection

The mains input *L1, L2* must always be connected. The angle pulses and error messages are kept in case of EMERGENCY STOP situations. If the main supply is turned off, make sure that all three mains phases are turned off consequently! That is why a main conductor with positively driven contacts must be used.

X12 - POK and BB

PHOENIX Mini CombiCon or screw connectors

The volt-free contact *POK* closes, when the logic supply is provided at *I1, I2* and, the power module cannot detect any fault during an internal check. The contactor for enabling the main supply should be switched via these contacts.

Pins Assignment of *POK*	
Screw Terminal	**Assignment**
POK	24 V, 2 A
POK	

The volt-free contact *BB* closes, when the power module is completely ready for operation. Condition:

- The logic supply at *L1, L2* **and**
- the main supply at L1, L2, L3 are provided.
- No error message of the power module.

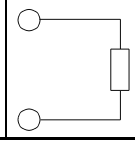
Pin Assignment *BB*	
Screw Terminal	**Assignment**
B	24 V, 2 A
B	

R_{EX} - External Ballast Resistor

PHOENIX connector or screw connector

An external ballast resistor can be connected between this connector and the connector *+UB*.

During the generator operation the motor feeds energy back into the intermediate circuit. If the intermediate circuit voltage has reached a specific potential, the ballast resistor will be switched into the intermediate circuit via a transistor to dissipate the surplus energy.

Screw Terminal	Assignment				
	B	C / CZ*	H	I	K
R_{ext}  +UB	5 Ω	5 Ω	10 Ω	10 Ω	5.6 Ω

* CZ: Power module without overvoltage protection

The values of the ballast resistors listed in the table are minimum values. The value of the resistor to be used must not fall below the minimum value.

N

If a residual current operating device is used in the system, the zero conductor must be connected to the screw connector ***N***.

Bus - Internal Connection

The 12-pole bus line connects the power module and up to six CNC rack modules. The bus supplies the CNC modules with the voltage of +30 V (bus voltage). Additionally, statuses of the power module (readiness for operation, malfunctions) are signaled to the CNC 61.00 modules. At the power module the bus pins are outputs, whereas at the CNC module the bus pins are inputs.

The bus moreover provides the volt-free +5 V/GND that can be loaded with up to 1.8 A. The potentiometer **+5 V MSY** at the front panel enables the precise adjustment of the 5 V.

Pin	Assignment	
1	+5 V	
2	GND	
3 + 4	earth potential	
5	mains OK = +24 V	
6	overvoltage message	
7	+24 V	
8	not assigned	
9 + 10	+30 V	⚠ mains potential
11 + 12	0 V for the 30 V	⚠ mains potential

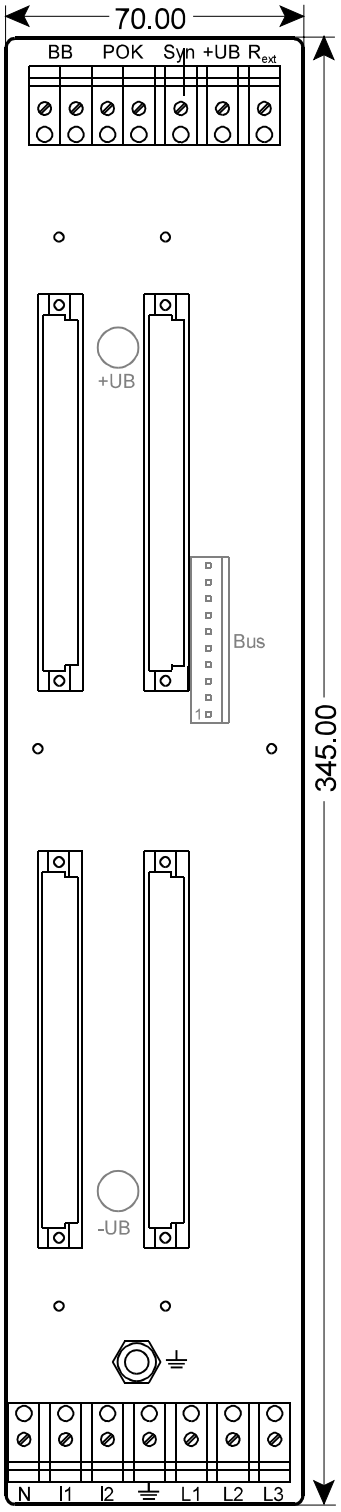
Do not use the +30 V for any other purposes!

Mains OK
This output intra-system activates and deactivates, inter alia, the CNC modules. If the main supply is not provided, the signal “mains OK” will be LOW and the CNC modules cannot be activated. The user may use this signal via the contacts *BB*.

Overvoltage Message
If an overvoltage comes up, the level of 24 V bounces to 0 V. Then the regulator in the CNC module is deactivated (*POK* and the main contactor open). Error messages, however, are kept.

10.3.3 Back Plane 26.50.0078

Mounting into a 19” rack as wall-mounting unit



8-pole screw terminal strip (the max. conductor cross-section for the terminals is 4 mm²):

BB	Volt-free contact “ready for operation”, page 163
POK	Volt-free contact “Power OK”, page 163
+UB	Intermediate circuit voltage (+)
R_{ext}	Connection for an external ballast resistor, page 164
+UB	Intermediate circuit voltage (rear side of back plane)
Bus	Internal connection (rear side of back plane), page 164
-UB	Intermediate circuit voltage (rear side of back plane)
⏚	Earth conductor*

7-pole screw terminal strip (the max. conductor cross-section for the terminals is 4mm²):

N	Neutral conductor*, page 164
⏚	Earth conductor
L1 L2	Mains inputs for the logic supply, page 162
L1 L2 L3	Mains input for the main voltage supply, page 162

* If a residual current operating device is used, the screw connectors ⏚ and **N** must be wired separately. If no residual current operating device is used, both connectors can be wired to earth together.

L1 / L2 / L3 - Main Supply

PHOENIX connectors

The intermediate circuit voltage of the power module is generated via the main supply **L1, L2, L3**.

Connecting the main supply with three phases is indispensable!
The potential of the input phases of the logic supply *L1, L2* and the connection phases of the main supply L1, L2, L3 must be identical.

Screw Terminal	Voltage Range				
	B	C / CZ*	H	I	K
L1	3 × 70 V_{AC} +10 % –20 %	3 × 230 V_{AC} +10 % –20 %	3 × 380 V_{AC} –5 % to 3 × 480 V_{AC} +10 %	3 × 280 V_{AC} +10 % –20 %	3 × 250 V_{AC} +10 % –20 %
L2					
L3					

* CZ: Power module without overvoltage protection

The power module should be protected with 16 A fuses with fast blow behavior (e.g. Siemens Silized 16 A/5SD420)!

The time of discharging the intermediate circuit may be up to 5 minutes after turning off the mains inputs, when the power module is faulty (worst case). Usually, the intermediate circuit is discharged after approx. 2 s.
The contactor for the mains supply must not step back with time lag in case of a fault. Pay attention of the main contactor not to execute the time lag for deactivating the CNC module in an EMERGENCY STOP situation.

L1 / *L2* - Mains Input for the Logic Supply

PHOENIX connectors or screw connectors

Independently of the main supply, the logic supply generates a **non mains-separated 30 V voltage supply** that may be loaded up to 150 W (power modules with the code letter B: 100 W). Therefore, the intra-system logic is ready for operation before turning on the main supply **L1**, **L2**, **L3** and, the user has all signals and messages provided instantly.

Due to the respective wiring of ***L1, L2*** the main supply (L1, L2, L3) must only be turned on, if the CNC module is to be activated (active regulator). See also the "Connection Diagrams", starting on page 39.

The wiring must be carried out that way that the logic supply is turned on before the main supply.

Screw Terminal	Voltage Range B	C / CZ*	H	I	K
I1	2 × 70 V_{AC} +10 % –20 %	2 × 230 V_{AC} +10 % –20 %	2 × 380 V_{AC} –5 % to 2 × 480 V_{AC} +10 %	2 × 280 V_{AC} +10 % –20 %	2 × 250 V_{AC} +10 % –20 %
I2					

* CZ: Power module without overvoltage protection

The mains input *L1, L2* must always be connected. The angle pulses and error messages are kept in case of EMERGENCY STOP situations. If the main supply is turned off, make sure that all three mains phases are turned off consequently! That is why a main conductor with positively driven contacts must be used.

POK and BB

PHOENIX Mini CombiCon or screw connectors

The volt-free contact *POK* closes, when the logic supply is provided at *I1, I2* and, the power module cannot detect any fault during an internal check. The contactor for enabling the main supply should be switched via these contacts.

Pins Assignment of *POK*	
Screw Terminal	**Assignment**
POK	24 V, 2 A
POK	

The volt-free contact *BB* closes, when the power module is completely ready for operation. Condition:

- The logic supply at *L1, L2* **and**
- the main supply at L1, L2, L3 are provided.
- No error message of the power module.

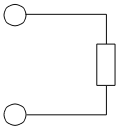
Pin Assignment *BB*	
Screw Terminal	**Assignment**
B	24 V, 2 A

R_{EX} - External Ballast Resistor

PHOENIX connector or screw connector

An external ballast resistor can be connected between this connector and the connector *+UB*.

During the generator operation the motor feeds energy back into the intermediate circuit. If the intermediate circuit voltage has reached a specific potential, the ballast resistor will be switched into the intermediate circuit via a transistor to dissipate the surplus energy.

Screw Terminal	Assignment				
	B	C / CZ*	H	I	K
R_{ext}  +UB	5 Ω	5 Ω	10 Ω	10 Ω	5.6 Ω

* CZ: Power module without overvoltage protection

The values of the ballast resistors listed in the table are minimum values. The value of the resistor to be used must not fall below the minimum value.

N

If a residual current operating device is used in the system, the zero conductor must be connected to the screw connector ***N***.

Bus - Internal Connection

The 10-pole bus line connects the power module and up to six CNC rack modules. The bus supplies the CNC modules with the voltage of +30 V (bus voltage). Additionally, statuses of the power module (readiness for operation, malfunctions) are signaled to the CNC 61.00 modules. At the power module the bus pins are outputs, whereas at the CNC module the bus pins are inputs.

Pin	Assignment		
1 + 2	ground potential		
3	mains OK = +24 V		
4	overvoltage message: 0 V in case of an error 24 V without error		
5	+24 V		
6	not assigned		
7 + 8	+30 V	⚠	mains potential
9 + 10	0 V for the 30 V	⚠	mains potential

Do not use the +30 V for any other purposes!

Mains OK
This output intra-system activates and deactivates, inter alia, the CNC modules. If the main supply is not provided, the signal “mains OK” will be LOW and the CNC modules cannot be activated. The user may use this signal via the contacts *BB*.

Overvoltage Message
If an overvoltage comes up, the level of 24 V bounces to 0 V. Then the regulator in the CNC module is deactivated (*POK* and the main contactor open). Error messages, however, are kept.

11 Accessory Modules

The CNC 61.00 provides several sockets to expand the functions. The sockets are marked with the letters A to E and G and can be equipped with an accessory module of the respective code.

Code	Accessory Module	Order Number	Socket
A1	INTERBUS interface	026.44.0056	A
A2	Second serial interface	026.44.0073	
A3	Transducer interface	026.44.0053A	
A4	Analog input module	026.44.0053B	
A5	Transducer and second serial interface	026.44.0067A	AB[1]
A6	Analog input module and second serial interface	026.44.0067B	
AA	Transducer and two serial interfaces	061.01.009	A
AB	Profibus-DP interface	061.01.0012	
AE	Transducer and Profibus-DP interface	061.01.0033	
AF	Active transducer and Profibus-DP interface	061.01.0033A	
AG	Passive twin transducer, 2 serial interfaces, Profibus interface and angle pulse input 5 V	061.01.0043/.0049	AB[1]
AH	Active twin transducer, 2 serial interfaces, Profibus interface and angle pulse input 5 V	061.01.0043/.0044	
B1	Interface for incremental encoder 5 V	061.01.0020B1	B
B2	Interface for incremental encoder 24 V	061.01.0020B2	
B3	Angle pulse output module 5 V	061.01.0020B3	
B4	Angle pulse output and input 5 V	061.01.0020B4	
B5	Angle pulse input module, 2-fold, with 5 V level	061.01.0020B5	
B7	Counter input and angle pulse output 5 V	061.01.0020B7	
B8	Counter input and angle pulse output 5 V	061.01.0020B8	
B9	Angle pulse input module, 2-fold, with 5 V/24 V levels	061.01.0020B9	
BA	Angle pulse input 24 V/angle pulse output 5 V	061.01.0020BA	
C1	I/O expansion interface	026.44.0054	C
C2	SSI interface, comprising the I/O expansion interface, an input for an incremental encoder with 5 V level and an input for an absolute value encoder	026.44.0079A	BC[2]
C3	SSI interface, comprising the I/O expansion interface, an input for an incremental encoder with 24 V level and an input for an absolute value encoder	026.44.0079B	
C4	SSI interface, I/O expansion and angle pulse output 5 V	061.01.0035	

Code	Accessory Module	Order Number	Socket
D1	CAN Bus interface	026.44.0055	D
E1	battery-buffered RAM and real time clock	026.44.0065	E
F1	MODLINK interface		F[3]
G1	ETHERNET interface	061.01.0042	G[3]

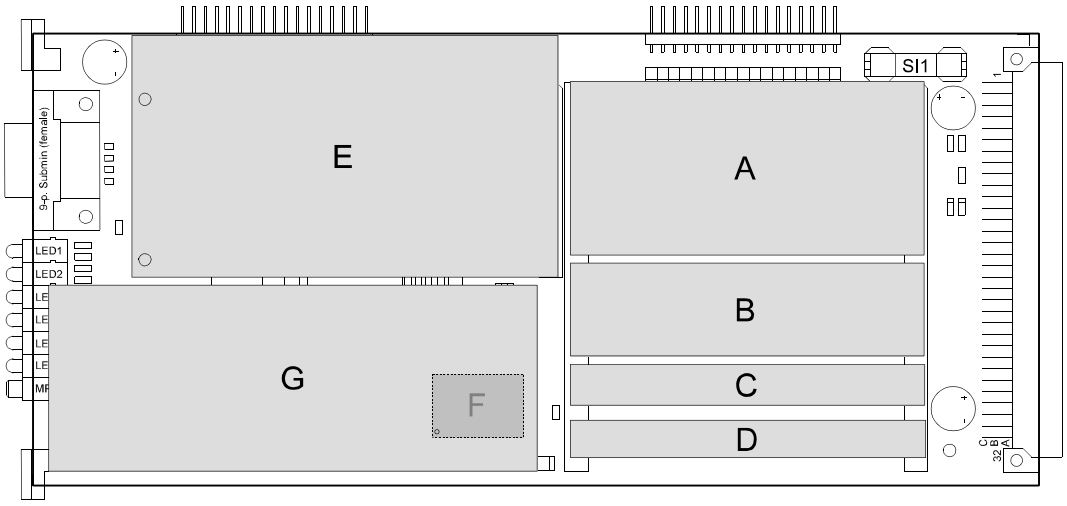
[1] The accessory modules occupy the sockets A and B and therefore cannot be combined with modules of code B.

[2] The accessory modules occupy the sockets B and C and therefore cannot be combined with modules of code B.

[3] The accessory modules F1 and G1 cannot be used simultaneously.

11.1 Mounting of the Accessory Modules

The mother board 026.44.0041 of the CNC 61.00 provides two 64-pole female connectors for expansions. The position of the modules can be found from the labeled letters. All accessory modules are mounted with the yellow marked side to the front panel (exception: accessory module F1).

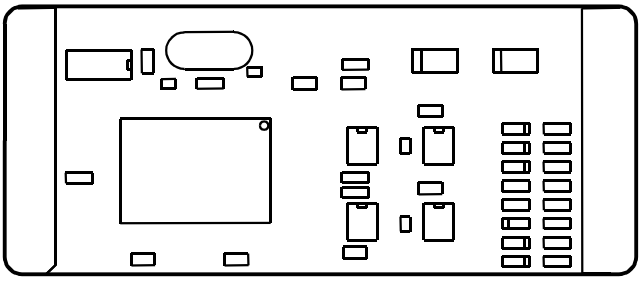


Mother Board 026.44.0041 with Sockets for the Accessory Modules A to G (Accessory Module F is located below accessory module G)

11.2 A1 - INTERBUS Interface

The interface expands the CNC 61.00 as remote bus participant in the INTERBUS. The interface occupies 4 words (64 bit) in the address range and is set to ID=3 (identification). The status of the bus is displayed with three LEDs at the front panel and at the rear side of the module.

LED			Designation	Meaning
ResReg	green	✹	remote bus check	monitoring of the input remote bus cable
BA	green	✹	active bus	bus connection is completed
RBDA	red/orange	✹	error	error of module / no active master



INTERBUS Interface 026.44.0056

Socket: A

Connection

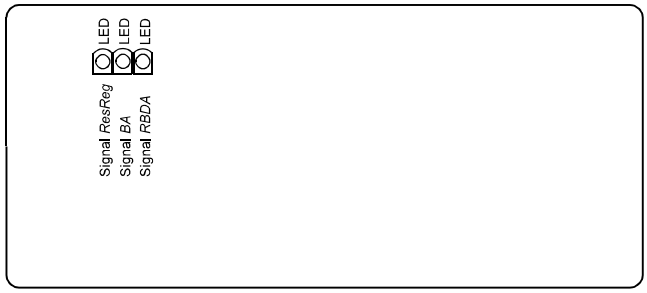
The INTERBUS interface is connected to the periphery via two Submin D connectors (X5 and X6 of the back planes). Pin assignment of the connectors:

- Back planes for the multi-axis system
  - 61.01.0004, X5, page 60 and X6, page 61
  - 61.01.0038, X5, page 83 and X6, page 84
  - 61.01.0060, X5, page 107 and X6, page 108
- Back planes for the compact system
  - 61.01.0019, X5, page 119 and X6, page 119
  - 61.01.0028, X5, page 127 and X6, page 128

Via the female connector X5 and the male connector X6 the Interbus (remote bus) is connected. If the module CNC61 is the last module within the Interbus, X6 is not connected. Furthermore the following applies:

- Pin 5 only serves for the supply of Pin 9 of X5; identification, whether further modules are connected. Further modules will be identified, if Pin 5 provides 5 V.
- Pin 5 and Pin 9 are not connected = no further modules
  Pin 5 and Pin 9 are connected = further modules

The connection between the separate INTERBUS modules can be made with the cable of order number K61.08.*xxx* (xxx = length in decimeter).



Solder Side of the Interface

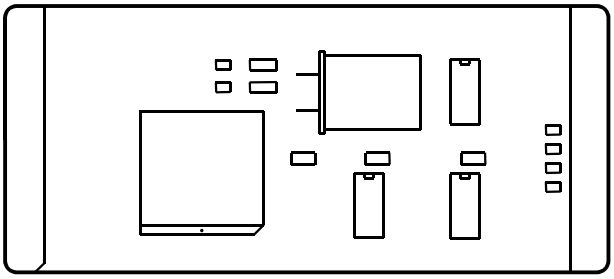
The ID code 3 (digital input/output module) is set as a standard for the interface.

Software (Example)
The 4 words of the INTERBUS (64 bit) are inserted like an I/O expansion into the input/output range. They assign the inputs or outputs 168 to 231.

```
SET  1, 0168; set the first bit in the Interbus
```

11.3 A2 - Second Serial Interface

The module provides an additional serial interface with a level corresponding to RS232. The interface may, for example, be used for connecting a serial printer.



Second Serial Interface 026.44.0073

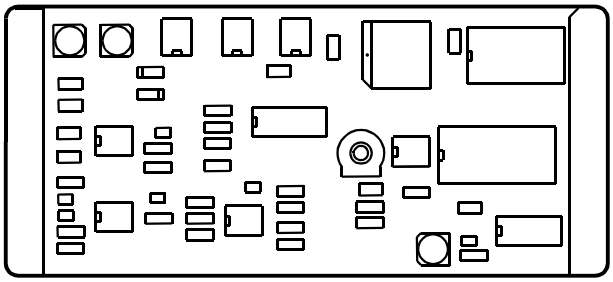
Socket: A

Connection
Connection of the module with the periphery via the 9-pole female Submin D connector X21

- of the back plane 61.01.0028, page 129
- of the back plane 61.01.0037, page 78
- of the back plane 61.01.0051, page 137
- of the back plane 61.01.0058, page 101

11.4 A3 - Transducer Interface

A transducer serves for measuring torques (e. g. for nut running applications) by means of resistance bridges. The impressing of a voltage at the transducer permits to convert a torque into an equivalent voltage. The voltage is amplified and smoothed in the module and converted with an analog/digital converter.



Transducer Interface 026.44.0053A

Socket: A

The four soldering jumpers at the rear side of the modules (when mounted the visible side) serve for the adaptation of the used transducers.

J2	closed soldering jumper	≙ 1 mV/V ≙ gain	1,000
J2 and J3	closed soldering jumpers	≙ 2 mV/V ≙ gain	500
J2 to J4	closed soldering jumpers	≙ 3 mV/V ≙ gain	250
J2 to J5	closed soldering jumpers	≙ 4 mV/V ≙ gain	125

The jumpers are usually set by SIEB & MEYER according to the user's requirement, so that later modifications are not necessary.

Connection

Connection with the periphery:

- Back planes of the multi-axis system
  - via the female Submin D connector X14 of back plane 61.01.0004, page 62
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0018, page 71
  - via the female Submin D connector X14 of back plane 61.01.0037, page 77
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0038, page 85
  - via the female Submin D connector X14 of back plane 61.01.0060, page 109
- Back planes of the compact system
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0019, page 122
  - via the female Submin D connector X8 of back plane 61.01.0028, page 128
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0057, page 149

Software (Example)
The module can be addressed by the software with three system variables.

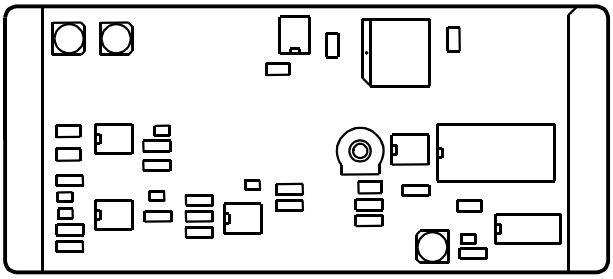
`T_ACT [-2048..2047]`
The actual converter value of the torque transducer is provided.

`T_Offset [-2048..2047]`
This parameter defines the offset for the torque transducer. A deviation to the zero point of the transducer can be compensated by entering the actual converter value (unloaded bridge) into this parameter.

`T_ADJ [0..15]`
To switch different calibrating resistances on the measuring bridge (detuning), values between 0 and 15 may be entered with this parameter.
1 lowest load of the bridge
15 highest load of the bridge
0 no detuning

11.5 A4 - Analog Input Module

The module provides an analog input with a resolution of 12 bits to the CNC 61.00. The input voltage is between –10 V and +10 V.



Analog Input Module 026.44.0053B

Socket: A
At the rear side of the modules (when mounted the visible side) many “soldering jumpers” can be seen. The jumpers control internal functions of the module and must only be modified after consulting SIEB & MEYER.

Connection
Connection with the periphery:
- Back planes of the multi-axis system
  - via the female Submin D connector X14 of back plane 61.01.0004, page 62
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0018, page 71
  - via the female Submin D connector X14 of back plane 61.01.0037, page 77
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0038, page 149
  - via the female Submin D connector X14 of back plane 61.01.0060, page 109
- Back planes of the compact system
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0019, page 122
  - via the female Submin D connector X8 of back plane 61.01.0028, page 128
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0057, page 149

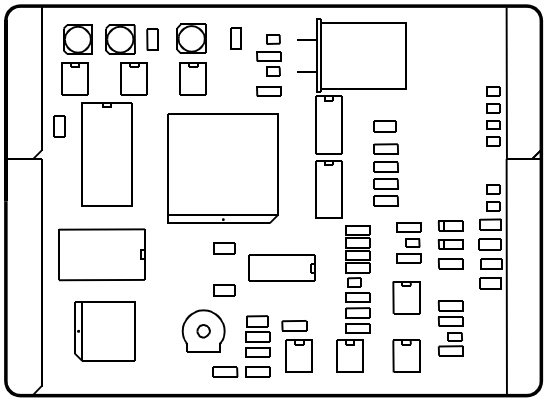
Input resistance: $R_{In} \approx 22\ k\Omega$

Software (Example)
The system variable T_ACT provides the actual converter value:
Input voltage −10 V = converter value -2048
Input voltage 0 V = converter value 0
Input voltage 10 V = converter value 2047

The values are achieved, when the negative analog input is connected to ground and the voltage to be measured is connected between the positive analog input and the ground.

11.6 A5 - Transducer Interface and Second Serial Interface

This module combines the Transducer Interface (A3) and the module of the Second Serial Interface (A2).



Transducer and Second Serial Interface 026.44.0067A

Socket: AB
The four soldering jumpers at the rear side of the modules (when mounted the visible side) serve for the adaptation of the used transducers.

J2	closed soldering jumper	≙ 1 mV/V ≙ gain	1,000
J2 and J3	closed soldering jumpers	≙ 2 mV/V ≙ gain	500
J2 to J4	closed soldering jumpers	≙ 3 mV/V ≙ gain	250
J2 to J5	closed soldering jumpers	≙ 4 mV/V ≙ gain	125

The jumpers are usually set by SIEB & MEYER according to the user's requirement, so that later modifications are not necessary.

Connections
The **second serial interface** is connected to the periphery via the 9-pole female Submin D connector

- Back planes for the multi-axis system
  - X4 of back plane 61.01.0004, page 62
  - X4 of back plane 61.01.0018, page 68
  - X4 of back plane 61.01.0037, page 77
  - X4 of back plane 61.01.0038, page 83
  - X4 of back plane 61.01.0060, page 109
- Back planes for the compact system
  - X4 of back plane 61.01.0019, page 118
  - X4 of back plane 61.01.0028, page 128
  - X4 of back plane 61.01.0057, page 149

The **transducer interface** is connected to the periphery:

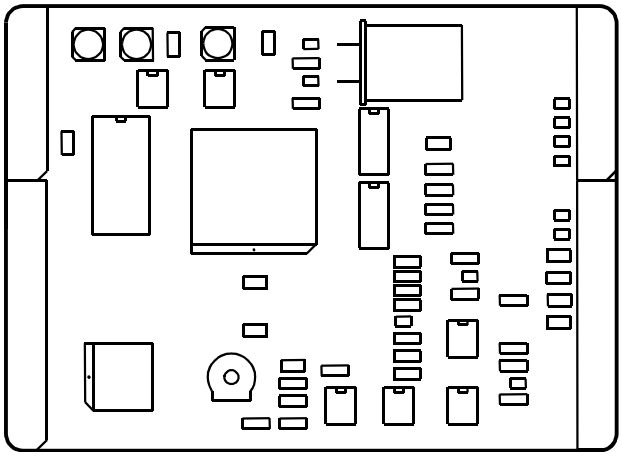
- Back planes of the multi-axis system
  - via the female Submin D connector X14 of back plane 61.01.0004, page 62
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0018, page 71
  - via the female Submin D connector X14 of back plane 61.01.0037, page 77
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0038, page 86
  - via the female Submin D connector X14 of back plane 61.01.0060, page 109
- Back planes of the compact system
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0019, page 122
  - via the female Submin D connector X8 of back plane 61.01.0028, page 128
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0057, page 149

Software (Example)

See under “A3 - Transducer Interface”, page 170.

11.7 A6 - Analog Input Module and Second Serial Interface

This module combines the Analog Input Module (A4) and the module of the Second Serial Interface (A2).



Analog Input Module and Second Serial Interface 026.44.0067B

Socket: AB
At the rear side of the modules (when mounted the visible side) many "soldering jumpers" can be seen. The jumpers control internal functions of the module and must only be modified after consulting SIEB & MEYER.

Connection
The **second serial interface** is connected to the periphery via the 9-pole female Submin D connector

- Back planes for the multi-axis system
  - X4 of back plane 61.01.0004, page 62
  - X4 of back plane 61.01.0018, page 68
  - X4 of back plane 61.01.0037, page 76
  - X4 of back plane 61.01.0038, page 83
  - X4 of back plane 61.01.0060, page 107
- Back planes for the compact system
  - X4 of back plane 61.01.0019, page 118
  - X4 of back plane 61.01.0028, page 127
  - X4 of back plane 61.01.0057, page 146

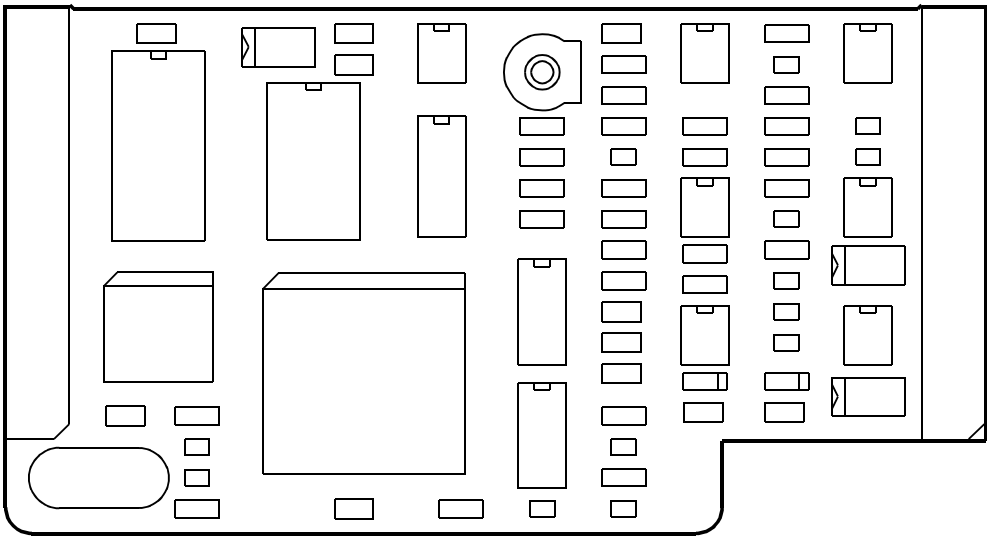
The **analog input module** is connected to the periphery:

- Back planes of the multi-axis system
  - via the female Submin D connector X14 of back plane 61.01.0004, page 62
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0018, page 71
  - via the female Submin D connector X14 of back plane 61.01.0037, page 77
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0038, page 86
  - via the female Submin D connector X14 of back plane 61.01.0060, page 109
- Back planes of the compact system
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0019, page 122
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0057, page 149

Software (Example)
See under "A4 - Analog Input Module", page 172.

11.8 AA - Transducer and Two Serial Interfaces

The interface is an upgrading of the accessory module A5 (transducer and second serial interface). It has an additional serial interface.



Transducer and Two Serial Interfaces 061.01.0009

Socket: A

The four soldering jumpers at the rear side of the module (when mounted the visible side) serve for the adaptation of the used transducers.

J2	closed soldering jumper	≙ 1 mV/V ≙ gain	1,000
J2 and J3	closed soldering jumpers	≙ 2 mV/V ≙ gain	500
J2 to J4	closed soldering jumpers	≙ 3 mV/V ≙ gain	250
J2 to J5	closed soldering jumpers	≙ 4 mV/V ≙ gain	125

The jumpers are usually set by SIEB & MEYER according to the user's requirement, so that later modifications are not necessary.

Connection

The **serial interfaces** are connected to the periphery via the 9-pole female Sub-min D connector X21

- of back plane 61.01.0028 for compact systems, page 129
- of back plane 61.01.0037 for multi-axis systems, page 78

The **transducer interface** is connected to the periphery:

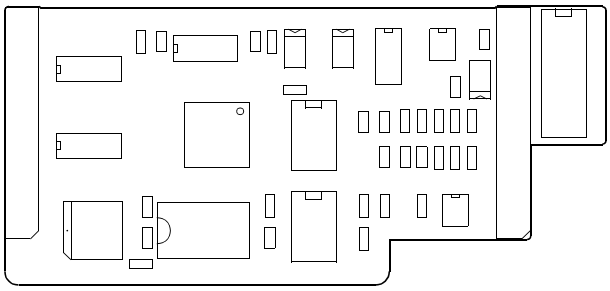
- via the Submin D connector X8 of back plane 61.01.0028 for compact systems, page 128
- via the Submin D connector X14 of back plane 61.01.0037 for multi-axis systems, page 109

Software (Example)

See under "A3 - Transducer-Interface", page 170.

11.9 AB - Profibus Interface

The accessory module enables the connection of the Profibus. The module is galvanically separated from the bus and can be operated with max. 12 MBaud. The firmware operates the software connection. The functions can be used independently of the used bus system in application programs. Detailed information can be found in chapter “Firmware Functions” and in the description “Communication Protocol DNC 61.00”.



Profibus Interface 061.01.0012

Socket: A

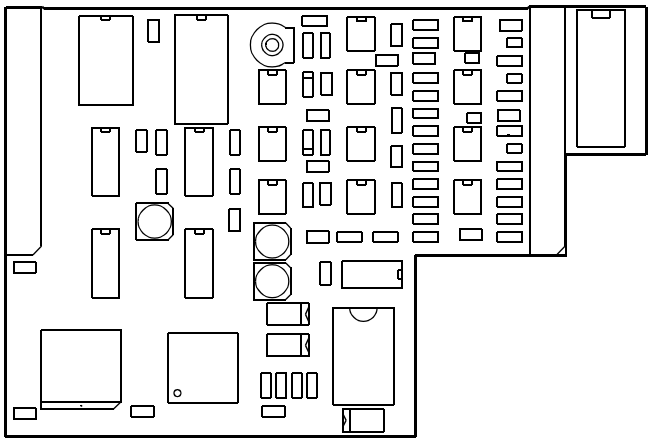
Connection

The Profibus interface is connected to the periphery via the connectors

- multi-axis system
  - X5 and X6 of back plane 61.01.0018, pages 91 and 92
  - X19 of back plane 61.01.0037, page 77
  - X5 and X6 of back plane 61.01.0053, pages 91 and 92
  - X19 of back plane 61.01.0058, page 100, 137
- compact system
  - X8 of back plane 61.01.0019, page 128
  - X19 of back plane 61.01.0028, page 129
  - X19 of back plane 61.01.0051, page 137

11.10 AE - Transducer and Profibus Interface

The interface combines the transducer interface (A3) and the Profibus interface (AB).

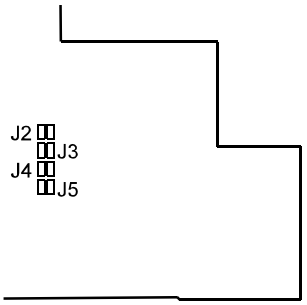


Transducer and Profibus Interface 061.01.0033

Socket: A

The four soldering jumpers at the rear side serve for the adaptation of the used transducers.

J2	closed soldering jumper	≙ 1 mV/V ≙ gain	1,000
J2 and J3	closed soldering jumpers	≙ 2 mV/V ≙ gain	500
J2 to J4	closed soldering jumpers	≙ 3 mV/V ≙ gain	250
J2 to J5	closed soldering jumpers	≙ 4 mV/V ≙ gain	125



The jumpers are usually set by SIEB & MEYER according to the user's requirement, so that later modifications are not necessary.

Connection

The **transducer interface** is connected to the periphery:

- back planes of the multi-axis system
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0018, page 71
  - via the female Submin D connector X14 of back plane 61.01.0037, page 62
- back planes of the compact system
  - via the terminals 21 to 24 "Transducer/Analog input" of back plane 61.01.0019, page 122
  - via the female Submin D connector X8 of back plane 61.01.0028, page 128

The **Profibus interface** is connected to the periphery via the connectors

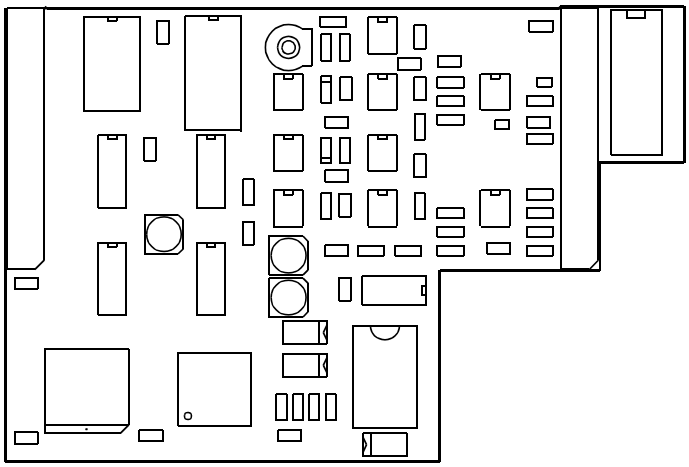
- of the multi-axis system
  - X5 and X6 of back plane 61.01.0018, pages 91 and 92
  - X19 of back plane 61.01.0037, page 77
- of the compact system
  - X8 of back plane 61.01.0019, page 120
  - X19 of back plane 61.01.0028, page 129

Software (Example)

See under "A3 - Transducer Interface", page 170. Detailed information can be found in chapter "Firmware Functions" and in the description "Communication Protocol DNC 61.00".

11.11 AF - Active Transducer and Profibus Interface

The interface is a combination of the Profibus interface (AB) and an active transducer.



Active Transducer and Profibus Interface 061.01.0033A

Socket: A

Connection

The **Profibus interface** is connected to the periphery via the connectors

- of the multi-axis system
  - X5 and X6 of back plane 61.01.0018, pages 91 and 92
  - X19 of back plane 61.01.0037, page 77
  - X5 and X6 of back plane 61.01.0053, pages 91 and 92
  - X19 of back plane 61.01.0058, page 100
- of the compact system
  - X8 of back plane 61.01.0019, page 120
  - X19 of back plane 61.01.0028, page 129
  - X19 of back plane 61.01.0051, page 137

The **active transducer** is connected to the periphery:

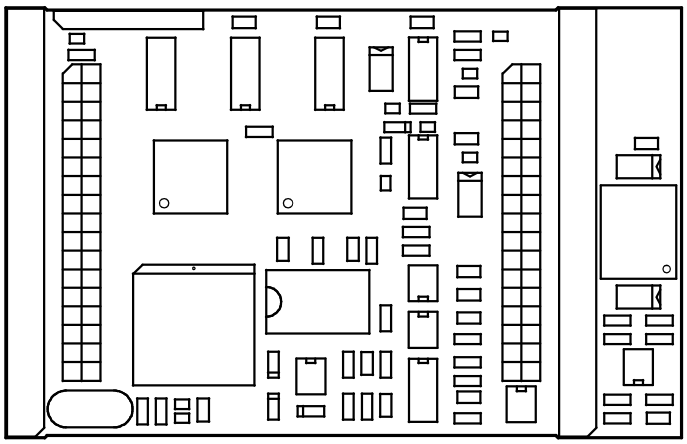
- back planes of the multi-axis system
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0018, page 71
  - via the female Submin D connector X14 of back plane 61.01.0037, page 62
  - via the female Submin D connector X15 of back plane 61.01.0053, page 93
  - via the female Submin D connector X15 of back plane 61.01.0058, page 100
- back planes of the compact system
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0019, page 122
  - via the female Submin D connector X8 of back plane 61.01.0028, page 128
  - via the female Submin D connector X15 of back plane 61.01.0051, page 137

11.12 AG – Passive Twin Transducer

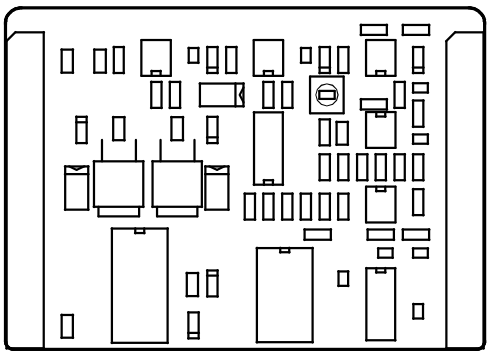
2 Serial Interfaces, Profibus Interface and Angle Pulse Input 5 V

The accessory module AG consists of two cards:

- 61.01.0043 base card with the functions Profibus and two serial interfaces
- 61.01.0049 plug-in module with passive twin transducer and angle pulse input



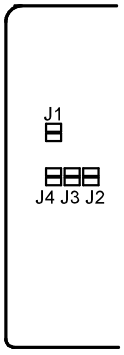
Profibus and 2 serial interfaces 061.01.0043



Twin transducer and angle pulse input 061.01.0049

The functions in detail:

- **Profibus**
  Physical interface to the Profibus. The bus is galvanically separated from the CNC 61.00 and can be operated up to 12 MBaud. The link to the software is made in the firmware and is provided for the user in the application program, independently of the used bus system. Detailed information can be found in the manual “Firmware Functions“ and in the manual “Communication Protocol DNC 61.00“.
- **Serial Interfaces**
  Two additional serial interfaces as RS232 are provided for the connection of, for example, printers, bar code scanners, etc., addressable by the application program.
- **Twin Transducers**
  Two independent passive transducer inputs (measuring bridges for accepting torques/forces). The module provides the supply voltage for the measuring bridge (±5 V, max. 400 mA for both transducers) and comprises a measuring amplifier, adjustable via soldering jumpers for the arriving analog signals and a 12 bit AD converter for the data transmission.
- **Angle Pulse Input**
  The input enables the connection of an additional rotary encoder on the basis of 5 V, permitting, for example, the synchronization with another drive.



Socket: AB

The four soldering jumpers on the rear side of module 61.01.0049 serve for the adaptation of the used transducer.

J1	closed soldering jumper	≙ 1 mV/V ≙ gain	1,000
J1 and J2	closed soldering jumpers	≙ 2 mV/V ≙ gain	500
J1 to J3	closed soldering jumpers	≙ 3 mV/V ≙ gain	250
J1 to J4	closed soldering jumpers	≙ 4 mV/V ≙ gain	125

Usually, the jumpers are preset by SIEB & MEYER according to the user’s requirements, so that later modifications can be omitted.

Connections

Connection of the **twin transducer**

- back planes of the multi-axis system
  - via the female Submin D connector X15 of back plane 61.01.0053, page 93
  - via the female Submin D connector X15 of back plane 61.01.0058, page 100
- back planes of the compact system
  - via the female Submin D connector X15 of back plane 61.01.0051, page 100, 147

Connection of the **Profibus interface**

- back planes of the multi-axis system
  - via the female Submin D connector X5 and the male Submin D connector X6 of back plane 61.01.0053, pages 91 and 92
  - via the female Submin D connector X19 of back plane 61.01.0058, page 100
- back planes of the compact system
  - via the female Submin D connector X19 of back plane 61.01.0051, page 137

Connection of the **two serial interfaces**

- back planes of the multi-axis system
  - via the female Submin D connector X21 of back plane 61.01.0058, page 101
- back planes of the compact system
  - via the female Submin D connector X21 of back plane 61.01.0051, page 101, 137

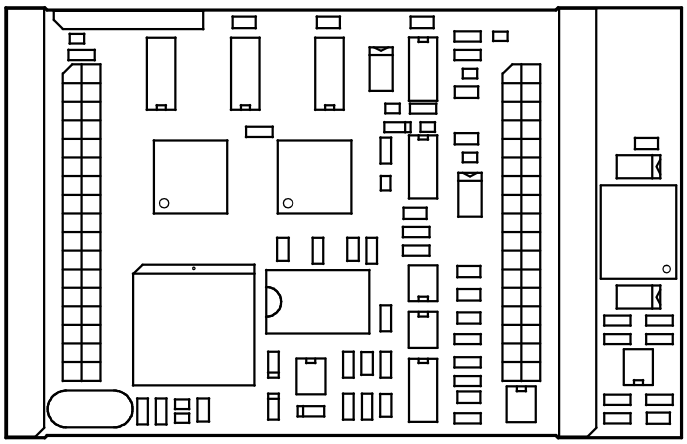
Connection of the **angle pulse input**

- back planes of the multi-axis system
  - via the female Submin D connector X4 of back plane 61.01.0053, page 91
  - via the female Submin D connector X4 of back plane 61.01.0058, page 99
- back planes of the compact system
  - via the female Submin D connector X4 of back plane 61.01.0051, page 136

The two serial interfaces are not provided when using the back plane 61.01.0053.
If only one transducer input is required, also other back planes can be used. See accessory modules AE and AF, pages 178 and 181

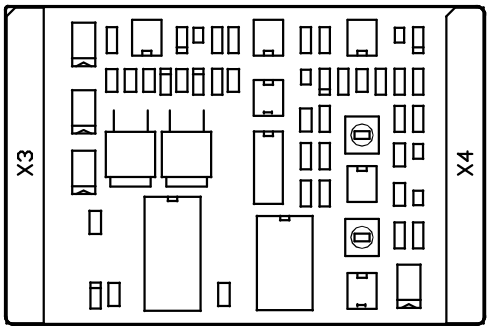
11.13 AH - Active Twin Transducer
2 Serial Interfaces, Profibus Interface and Angle Pulse Input 5 V

The accessory module AH consists of two cards:
- 61.01.0043 base card with the functions Profibus and two serial interfaces
- 61.01.0044 plug-in module with active twin transducer and angle pulse input



Profibus and 2 serial interfaces 061.01.0043

The functions in detail:



Twin transducer and angle pulse input 061.01.0044

- **Profibus**
  Physical interface to the Profibus. The bus is galvanically separated from the CNC 61.00 and can be operated up to 12 MBaud. The link to the software is made in the firmware and is provided for the user in the application program, independently of the used bus system. Detailed information can be found in the manual “Firmware Functions“ and in the manual “Communication Protocol DNC 61.00“.
- **Serial Interfaces**
  Two additional serial interfaces as RS232 are provided for the connection of, for example, printers, bar code scanners, etc., addressable by the application program.
- **Twin Transducers**
  Two independent active transducer inputs (measuring bridges for accepting torques/forces). The module provides the supply voltage for the measuring bridge (±12 V, max. 200 mA for both transducers) and converts the arriving analog signals (±5 V) with a 12 bit AD converter.
- **Angle Pulse Input**
  The input enables the connection of an additional rotary encoder on the basis of 5 V, permitting, for example, the synchronization with another drive.

Socket: AB
The soldering jumper on the rear side of the module 61.01.0044 has no relevant function for the user and must not be altered.

Connections
Connection of the **twin transducer**
- back planes of the multi-axis system
  - via the female Submin D connector X15 of back plane 61.01.0053, page 93
  - via the female Submin D connector X15 of back plane 61.01.0058, page 100
- back planes of the compact system
  - via the female Submin D connector X15 of back plane 61.01.0051, page 100, 147

Connection of the **Profibus interface**

- back planes of the multi-axis system
  - via the female Submin D connector X5 and the male Submin D connector X6 of back plane 61.01.0053, pages 91 and 92
  - via the female Submin D connector X19 of back plane 61.01.0058, page 100, 137
- back planes of the compact system
  - via the female Submin D connector X19 of back plane 61.01.0051, page 100, 137

Connection of the **two serial interfaces**

- back planes of the multi-axis system
  - via the female Submin D connector X21 of back plane 61.01.0058, page 101
- back planes of the compact system
  - via the female Submin D connector X21 of back plane 61.01.0051, page 101, 137

Connection of the **angle pulse input**

- back planes of the multi-axis system
  - via the female Submin D connector X4 of back plane 61.01.0053, page 91
  - via the female Submin D connector X4 of back plane 61.01.0058, page 99
- back planes of the compact system
  - via the female Submin D connector X4 of back plane 61.01.0051, page 136

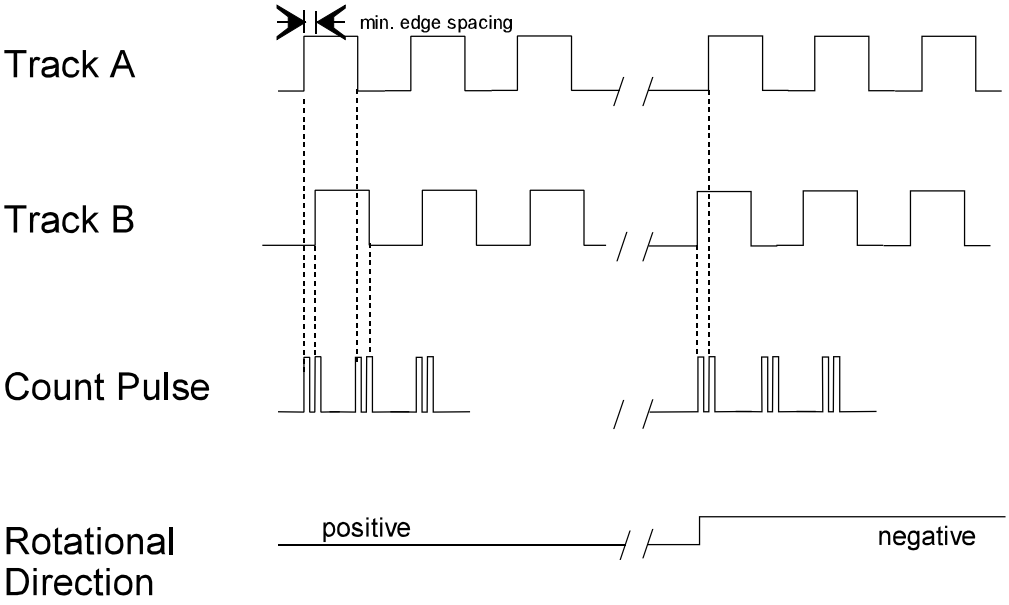
The two serial interfaces are not provided when using the back plane 61.01.0053.
If only one transduce input is required, also other back planes can be used. See accessory modules AE and AF, pages 178 and 181

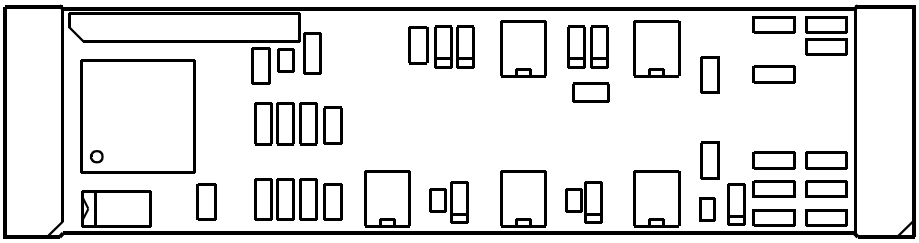
11.14 B - Universal Angle Pulse Module

This module is an upgrading of all previously available accessory modules of the code B and replaces them. In addition, it can process measuring systems with doubled input frequency (previously 150 kHz, now 300 kHz).

All accessory modules providing one or two angle pulses show the following basic behavior:

- Two square-wave signals dephased to each other (track A and track B) are evaluated to detect the rotational direction of the encoder.
- The input signals of both tracks are galvanically isolated from the evaluation system via optocouplers. They have to be wired as differential voltage input.
- With each edge change (see figure below) the evaluation electronics generates a count pulse towards the micro controller (CNC61 controller).
- The maximum count frequency (f_{max}) of the micro controller is 1 MHz. This means that the minimum spacing between two edges of track A and B is $1/f_{max}$ = 1 µs (if this value falls below 1 µs, pulse losses will occur!)
- This maximum frequency applies for all modules of the series *61.01.0020xx*. For all other module series (e. g. *26.44.0059* etc.) the maximum frequency is 500 kHz, and thus the minimum edge spacing is 2 µs.
- For the evaluation of a zero pulse an additional differential voltage input can be used.
- When wiring the angle pulse encoder it is recommended to use a twisted-pair cable (1. pair: track A, 2. pair: track B and 3. pair: zero pulse).





Universal Angle Pulse Module 061.01.0020

The universal module in detail:

Variant	Function	Replaced Card	New Card	Page
BA	angle pulse input (24 V) and angle pulse output (5 V)	026.44.0074C	061.01.0020BA	192
B1	angle pulse input 5 V	026.44.0059A	061.01.0020B1	189
B2	angle pulse input (24 V)	026.44.0059B	061.01.0020B2	189
B3	angle pulse output (5 V)	026.44.0060	061.01.0020B3	190
B4	angle pulse input (5 V) and angle pulse output (5 V)	026.44.0074	061.01.0020B4	190
B5	angle pulse input (5V) and angle pulse input (5V)	026.44.0080	061.01.0020B5	190
B7	counter input (5 V) and angle pulse output (5 V)	026.44.0074A	061.01.0020B7	191
B8	counter input (24 V) and angle pulse output (5 V)	026.44.0074B	061.01.0020B8	191
B9	angle pulse input (24 V) and angle pulse input (5 V)	026.44.0080A	061.01.0020B9	192

Socket: B

Connection
The connection facilities of the universal angle pulse module can be found in the descriptions of the separate accessory modules of the codes B.

Software (Example)
Examples can be found in the descriptions of the separate accessory modules of the code B.

11.15 B1/B2 - Incremental Encoder Interface

The module permits to connect an incremental encoder (second measuring system) to the CNC 61.00. Incremental encoders with 5 V/24 V output level can be used. An external encoder can be supplied via the 9-pole Submin D female connector X4 of the back planes, but only 24 V incremental encoders.

Socket: B

Difference Between the Modules
The “soldering jumpers” at the rear side of the module (visible when mounted) serve for the distinction of the incremental encoder used.

All soldering jumpers closed (soldering point): 5 V incremental encoder module (code B1)
All soldering jumpers open: 24 V incremental encoder module (code B2)

Connection
The module is connected to the periphery via the 9-pole Submin D connector X4 of all back planes (example of pin assignment, see page 68).
The max. count frequency is 150 kHz at the input.

Software (Example)
The system variables S_ACT_2, V_ACT_2 and S_LATCH_2 permit to access to the data of the second measuring system.

S_ACT_2
Definition of the position of the measuring system in increments. The variable may be read and set.

V_ACT_2
Actual speed of the measuring system. This value can only be read. Unit: $\frac{\text{Increments}}{\text{Sample}}$

S_LATCH_2
Contains the position of the measuring systems along with the condition of input i4 (internal input of the CNC 61.00; Pin 18)

```
SET   0,        ; set sec. measuring system to Zero
S_ACT_2
FCT   1, F22    ; edge change at input i4 writes to S_Latch_2
                ; further modes, see function calls
GET   S_LATCH_2 ; read the saved value
```

11.16 B3 - Angle Pulse Output Module 5 V Level

The module externally provides the angle pulses of the first measuring system. It is useful, if, for example, two axes shall be synchronized (electronic gear). Axis 1 as master then is equipped with the Angle Pulse Output Module, the axis 2 as slave is equipped with the Incremental Encoder Interface of code B1.

Socket: B

Connection
The module is connected to the periphery via the 9-pole female Submin D connector X4 of all back planes (Example of the pin assignment, see page 68).

Driver capacity max. 3 × incremental encoder interface B1/B2 (page 189).

11.17 B4 - Angle Pulse Input and Output Module

The module combines the module B1/B2 (Incremental Encoder Interface) with module B3 (Angle Pulse Output Module), permitting the operator to use the second measuring system (rotary encoder/CNC 61.00) along with the output of the angle pulses of the first measuring system of the respective axis simultaneously.

Socket: B

Connection
The module is connected to the periphery via the 9-pole female Submin D connectors X4 and X7 of all back planes, except for the back plane 61.01.0028. Example for the pin assignment, see pages 60 and 61.

Count frequency at the input: max. 150 kHz

Software (Example)
See under “B1/B2 - Incremental Encoder Interface”, page 189.

11.18 B5 - Angle Pulse Input Module, 2-Fold, 5 V Level

The module enables the connection of two incremental encoders (second and third measuring system) to the CNC 61.00. Encoders with 5 V output level can be connected.

Socket: B

Connections
The module is connected to the periphery via the 9-pole female Submin D connectors X4 and X7 of all back planes, except for the back plane 61.01.0028. Example for the pin assignment, see pages 60 and 61

Software
See under “B1/B2 - Incremental Encoder Interface”, page 189.

11.19 B7/B8 - Counter Input and Angle Pulse Output

The module provides a fast counter input and an angle pulse output. The counter input permits to measure pulses up to 300 kHz. The count direction can be controlled via the external output UB0+ of the 9-pole female Submin D connector X4 of the back planes.

Socket: B
The “soldering jumpers” at the rear side of the module (visible when mounted) serve for the setting of the counter input:

- All soldering jumpers closed (soldering point): 5 V input (variant B7)
- All soldering jumpers opened: 24 V input (variant B8)

Connections
The module is connected to the periphery via the 9-pole female Submin D connectors X4 and X7 of all back planes, except for the back plane 61.01.0028. Example for the pin assignment, see pages 60 and 61.

Software (Example)
See under “B1/B2 - Incremental Encoder Interface”, page 189.

11.20 B9 - Angle Pulse Input Module, 2-Fold, 5 V/24 V Levels

The module enables the connection of two incremental encoders (second and third measuring system) to the CNC 61.00. An encoder with an output level of 5 V and an encoder with an output level of 24 V can be connected.

Socket: B

Connections
The module is connected to the periphery via the 9-pole female Submin D connectors X4 and X7 of all back planes, except for the back plane 61.01.0028. Example for the pin assignment, see pages 60 and 61.

Software
See under “B1/B2 - Incremental Encoder Interface”, page 189.

11.21 BA - Angle Pulse Input 24 V / Angle Pulse Output 5 V

The module combines the accessory modules B2 (angle pulse input with 24 V level) and B3 (angle pulse output with 5 V level).

Socket: B

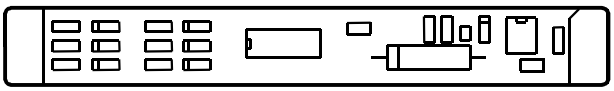
Connection
The module is connected to the periphery via the 9-pole female Submin D connectors X4 and X7 of all back planes, except for the back plane 61.01.0028. Example for the pin assignment, see pages 60 and 61.

Counter frequency at the input: max. 150 kHz

Software (Example)
See under “B1/B2 - Incremental Encoder Interface”, page 189.

11.22 C1 - I/O Expansion Interface

The module expands the I/O range by farther 128 inputs and outputs. However, the I/O Expansion Interface only connects the CNC to the following Basic Module 44.20.012 (page 203) or to the I/O system 50.06, to which input modules 44.20.014 and output modules 44.20.013 can be connected in any order. The latter modules each provide 16 inputs or outputs.



I/O Expansion Interface 026.44.0054

Socket: C

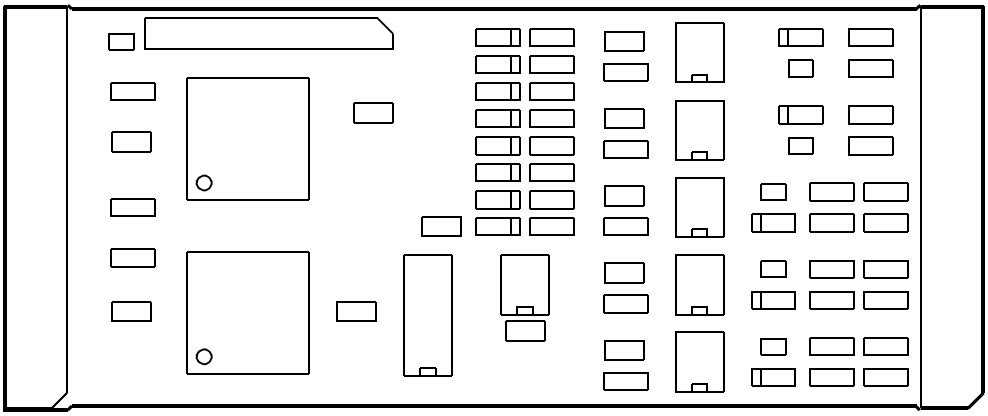
Connection
The module is connected to the periphery via the 9-pole female Submin D connector X3 of all back planes. Example for the pin assignment, page 59.

Software (Example)

```
SET   1,   ; set output 8 to 1 (set; 24 V at the output)
O8         ; 8 is the first output in the external IO area,
           ; since the outputs 0 to 7 are already provided by
           ; the CNC 61.00
```

11.23 C2/C3 - SSI Interface, Angle Pulse Input and IO Expansion

This module combines the modules B1/B2 (incremental encoder) and C1 (IO expansion) with an interface for an absolute value encoder (SSI). SSI encoder systems are used for applications, during which the positions must be recorded. The interface processes all systems, running with max. 25 bits resolution.



SSI Interface, Angle Pulse Input and IO Expansion 026.44.0079A/B

Socket: BC

Difference Between the Modules
The “soldering jumpers” at the rear side of the module (visible when mounted) serve for changing over the input voltage for the angle pulse input.

All soldering jumpers closed (soldering point): 5 V input (code C2)
All soldering jumpers open: 24 V input (code C3)

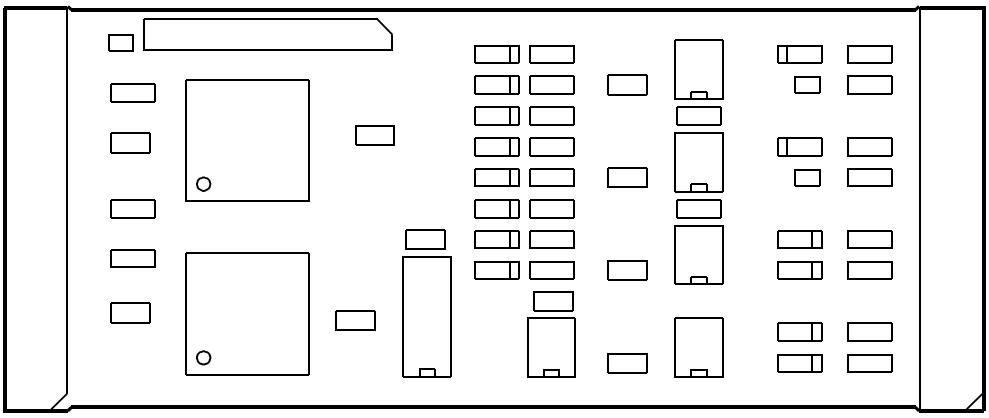
Connection
The module is connected to the periphery via the three 9-pole female Submin D connectors X3, X4 and X7 of all back planes, except for the back plane 61.01.0028. Examples for the pin assignment, pages 59, 60 and 61.

Software (Example)
The subfunction 38 of function 10 permits to read the connected absolute value encoder (SSI encoder). After calling the function the actual encoder value is provided in the numerical accumulator. The value is in the range of -8388608 to 8388607, corresponding to a resolution of max. 2^{24} bits.

```
GET   38
FCT   F10
SET   NA, N_Position_SSI
```

11.24 C4 - SSI Interface, I/O Expansion and Angle Pulse Output 5 V

The module is a variant of the accessory module C2, but with the distinction that an angle pulse output with 5 V level is provided instead of the angle pulse input.



SSI Interface, I/O Expansion and Angle Pulse Output 5 V, 061.01.0035

Socket: BC

Connection
The module is connected to the periphery via the three 9-pole female Submin D connectors X3, X4 and X7 of all back planes, except for the back plane 61.01.0028. Examples for the pin assignment, pages 59, 60 and 61.

Software (Example)
See under “C2/C3 - SSI Interface, Angle Pulse Input and IO Expansion”, page 194.

11.25 D1 - CAN Bus Interface

The CAN Bus Interface cannot be retrofit. That means: It must be ordered along with the CNC 61.00.

The module provides the physical connection to the CAN Bus.

CAN Bus Interface 026.44.0055

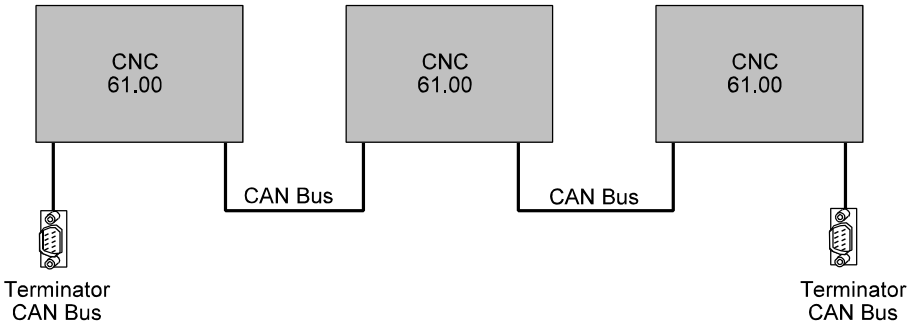
Socket: D
At the rear side of the module (when mounted the visible side) two “soldering jumpers” can be seen. The jumpers whether the module is supplied from the CAN Bus (external supply) or from the CNC 61.00 (internal supply).

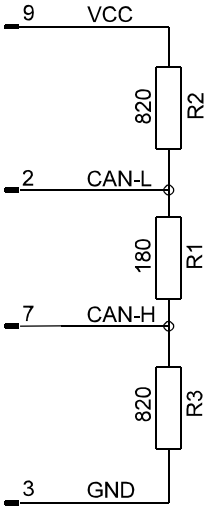
Internal supply:	Both soldering jumpers are closed. The CNC 61.00 supplies the CAN Bus module. No connection to the external CAN Bus supply.
External supply:	Both soldering jumpers are open. The voltage supply for the CAN Bus module must be made externally.

Connection

Connection of the CAN bus interface to the periphery:

- Multi-axis system
  - via the 9-pole female Submin D connector X11 of the back plane 61.01.0004, page 62, the back plane 61.01.0037, page 77, the back plane 61.01.0053, page 92, the back plane 61.01.0058, page 100 and the back plane 61.01.0060, page 109
  - via the 9-pole Submin D connectors X5 and X6 of the back plane 61.01.0038, pages 83
- Compact system
  - via the 9-pole female Submin D connector X31 of the back plane 61.01.0028, page 129 and the back plane 61.01.0051, page 138
  - via the 9-pole Submin D connectors X5 and X6 of the back plane 61.01.0019, pages 119





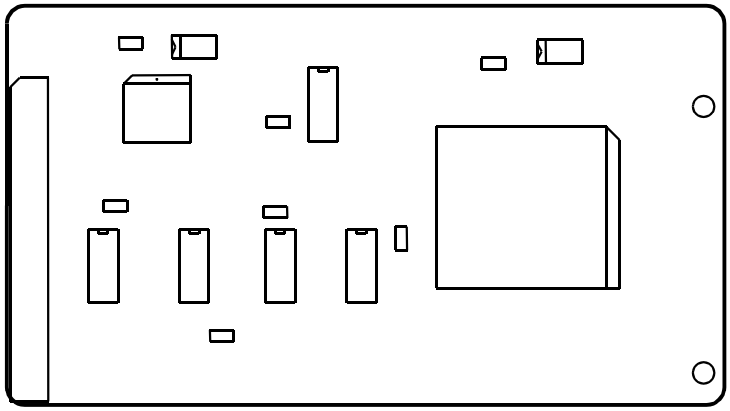
9-pole female/male Submin D connection

The CAN Bus must be closed electrically at both ends. Therefore, a terminator must be put on the connector X5 or X6. The terminator has the design, shown at the left side:

The connection between the separate CAN Bus modules can be made with the cable of order number K51.10.xxx (xxx = length in decimeter).

11.26 E1 - Battery-Buffered RAM and Real Time Clock

The module provides the user with a RAM of 128 kbyte that may be used for the user-specific management. This area is battery-buffered, which means that data are not lost after turning off the supply voltage. Additionally, a real time clock is included that of course also runs after turning off the supply voltage.



Battery-Buffered RAM and Real Time Clock 026.44.0065

Socket: E

Software (Example)

- Access to time/date:
  The two system variables TIME/DATE are provided for the user, permitting to read the actual time or date.

  ```
  SET   TIME, NA   ;transmits the actual time into the accumulator
  ```
  Format: (hour × 65536) + (minute × 256) + seconds = numerical accumulator

  ```
  SET   DATE, NA   ;transmit the actual date into the accumulator
  ```
  Format: (year × 65536) + (month × 256) + day = numerical accumulator

- Access to the battery-buffered RAM:
  TBL4: access byte by byte (8 bits)
  TBL5: access word by word (16 bits)
  TBL6: access to long word (32 bits)
  TBL7: access to true value (64 bits)

```
SET   NA,        ;write the contents of the numerical accu-
TBL5[0]          ;mulator into the field with index 0 of the
                 ;word-oriented table 5(16 bits)
```

11.27 F1 - MODLINK Interface

The CAN Bus Interface cannot be retrofit. That means: It must be ordered along with the CNC 61.00.

This interface is no pluggable card. Alterations are carried out on the mother board 26.44.0041.

The MODLINK bus system serves to build up a network with the CNC 61.00 modules. The structure of the bus is a master/slave system, which means that up to 16 slaves (CNC 61.00) may be connected to the master (e. g. PC). Physically, the MODLINK is a fast serial bus (4 MBits/s) permitting to provide data of the master at all axes synchronously.

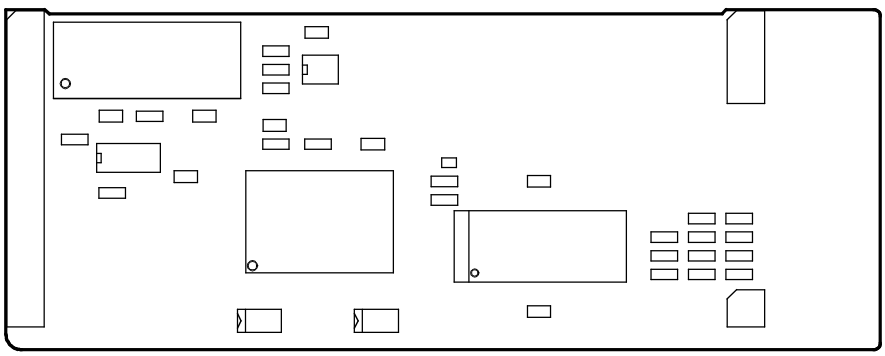
Connections
Connection of the MODLINK interface to the periphery:

- Multi-axis system
  - via the 9-pole Submin D connectors X9 and X10 of the back plane 61.01.0004, pages 61 and 62
  - via the 9-pole Submin D connectors X9 and X10 of the back plane 61.01.0060, pages 108 and 109
  - via the 9-pole Submin D connectors X5 and X6 of the back plane 61.01.0038, pages 83 and 84
- Compact system
  - via the 9-pole Submin D connectors X9 and X10 of the back plane 61.01.0028, pages 128 and 129
  - via the 9-pole Submin D connectors X5 and X6 of the back plane 61.01.0019, pages 119

11.28 G1 - Ethernet Interface

The Ethernet interface cannot be used along with the MODLINK interface (F1), since both modules assign identical hardware resources.

The accessory module G1 provides the Ethernet functions (10BaseT) for the CNC 61.00. The real coupling to the Ethernet then is made with an 8-pole “Western” connector on a prepared back plane.



Ethernet interface 61.01.0042

Socket: G

The soldering jumpers on the module are for test purposes and must not be modified!

Connections

Connection of the Ethernet interface with the periphery:

- Multi-axis system
  - via the 8-pole female Western connector X33 of the back plane 61.01.0053, page 93, the back plane 61.01.0058, page 101 and the back plane 61.01.0060, page 110
- Compact system
  - via the 8-pole female Western connector X33 of the back plane 61.01.0051, page 138 and the back plane 61.01.0057, page 147

Software

The firmware of the CNC 61.00 provides the TCP/IP protocol, see the manual “Software Option Ethernet”.

12 External I/O Modules

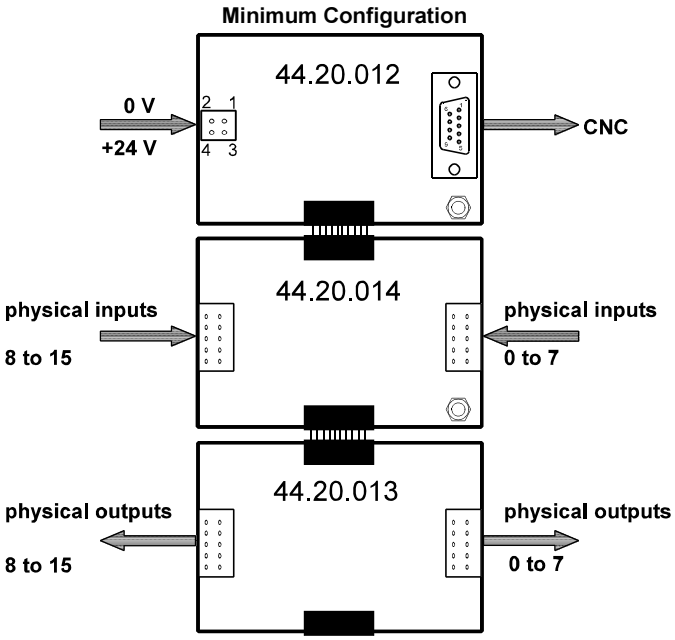
The CNC 61.00 can be delivered with two input/output systems:
- I/O modules 44.20.*xx*, starting on page 202
- I/O modules 50.06.*xx*, starting on page 213

Connection of the I/O Modules
- The I/O system 44.20.*xx* is connected to the CNC 61.00 with the cable K61.1*3.xxx* (page 241). It comprises the basic module 44.20.012 and different input and output modules, to be mounted in PHOENIX UMK housings on standard DIN EN rails. The connection between the basic module and the CNC 61.00 is made between the basic module 44.20.012 and the connector X3 of the back plane. The I/O modules can be varied and cascaded with simple plug-in connections.
  For applications, just requiring 8 additional inputs or outputs, the I/O Multi-Purpose Module 44.20.008 can be used.
- The most significant characteristic of the I/O System 50.06 is its compact construction, which in the most cases allows to reduce the size of the switch cabinet. The snap-on mounting and plug-in connection permits the easy and safe connection of the components of the system and of I/O Expansion Modules.
  The system provides 64 physical connections, which can either be defined as in- or outputs or as bidirectional in-/outputs. Since the system can be adapted to different automation purposes via the definition of the number of in- and outputs, it has a high degree of flexibility.

The accessory module "I/O - Expansion Interface" (C1, page 193) is required for the CNC 61.00. Otherwise, I/O modules cannot be used.

12.1 I/O Modules 44.20.*xx*

12.1.1 Connection Example



Serial I/O Modules:

44.20.012	=	basic module (transmitter/receiver)	
44.02.013	=	16 outputs +24 V	100 mA each
44.20.014	=	16 inputs +24 V	
44.20.028	=	8 outputs	1 A each
44.20.051	=	8 outputs	1 A (relay) each
44.20.053	=	2 × 4 outputs	1 A each

The input/outputs modules can be arranged in any order, but the following order is recommended: Transmitter/receiver → inputs → outputs. Example: Basic module → inputs → inputs → inputs → outputs → outputs, etc.

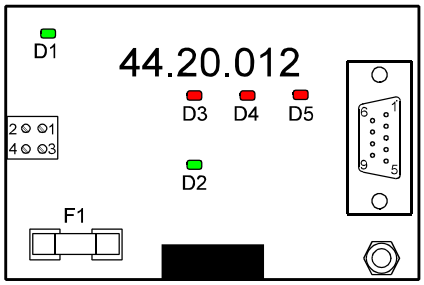
When defining the inputs and outputs in the software, pay attention that the I/O modules, closest to the basic module are assigned with the lowest-order inputs or outputs.

The M6 earth bolts must be connected at the machine side with the central earth point.

12.1.2 I/O Basic Module 44.20.012

The basic module serves as link between the CNC module and the input/output modules 44.20.013, 44.20.014, 44.20.028, 44.20.051 and 44.20.053. Up to 8 input/output modules can be connected to the basic module.

Basic Module (Transmitter/Receiver)



The voltage supply must be connected to the connector K10 of the basic module.

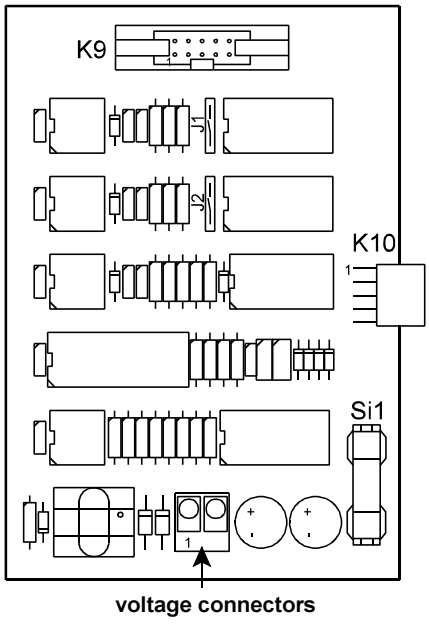
Pin	Designation
1	0 V
2	24 V

In order to connect the CNC 61.00 to the basic module the cable K61.13.*xxx* can be used.

Diodes

D1 +5 V operating voltage
D2 I/O OK
D3 load signal
D4 clock signal
D5 data signal

9-Pole Submin D Connection		
Pin	**Designation**	**Description**
1	DO-	data out
2	CLK-	clock
3	LD-	load
4	DI-	data in
5	0 V	
6	DO+	data out
7	CLK+	clock
8	LD+	load
9	DI+	data in



K9:Connection to the CNC module, connector X3

The figure on the left side shows an earlier module. Today the module shown above is used.

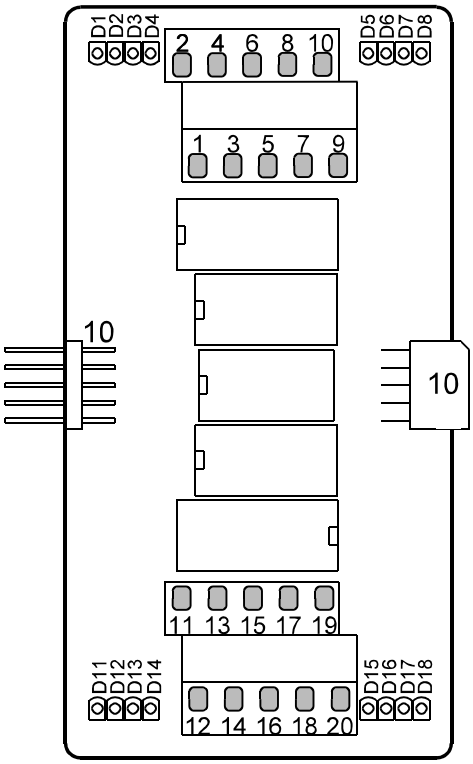
Current consumption: approx. 30 mA at 24 V

In order to connect the CNC 61.00 to the basic module the cable K61.02.*xxx* can be used.

12.1.3 Output Module 44.20.013

The output module 44.20.013 provides 16 outputs. The CNC module can address up to 128 outputs. The terminal 10 must be connected to 0 V and, terminal 20 to 24 V as turn-on voltage for the outputs. The total load of the output module is max. 350 mA.

One "Enable" input is provided for a group of 8 outputs. Only if the "Enable" input is connected to 24 V, the outputs can be activated. When the CNC module is turned on, the outputs are immediately switched to 0 V.



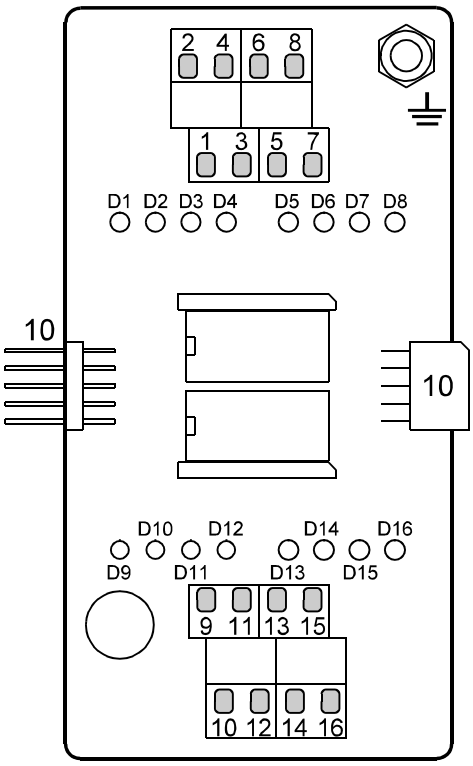
Terminal	Designation
1	output 0
2	output 1
3	output 2
4	output 3
5	output 4
6	output 5
7	output 6
8	output 7
9	enable for 0 to 7
10	0 V
11	output 8
12	output 9
13	output 10
14	output 11
15	output 12
16	output 13
17	output 14
18	output 15
19	enable for 8 to 15
20	24 V

The LEDs D1 to D8 and D11 to D18 indicate the status of the outputs 0 to 15 (LED is on, if the output is active).

The "Enable" inputs, pins 9 and 19, must be connected to 24 V to use all outputs. The deactivation of an "Enable" input permits to deactivate output groups (operating program, switch, etc.).

12.1.4 Input Module 44.20.014

The input module 44.20.014 provides 16 inputs. The CNC module can address up to 128 inputs. Inputs not wired are internally switched to 0 V.



Terminal	Designation
1	input 0
2	input 1
3	input 2
4	input 3
5	input 4
6	input 5
7	input 6
8	input 7
9	input 8
10	input 9
11	input 10
12	input 11
13	input 12
14	input 13
15	input 14
16	input 15

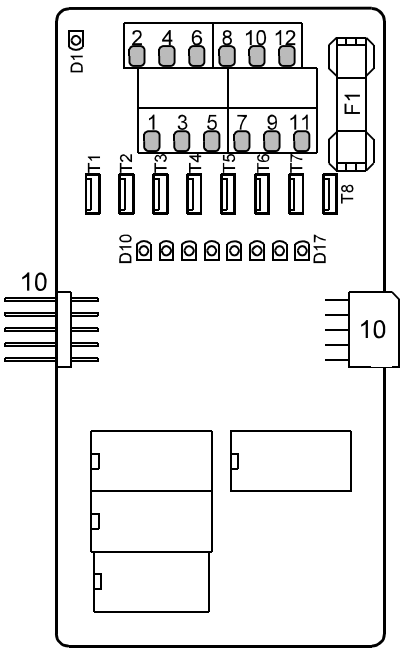
⏚ The interface must be connected to earth via an earth strap in the machine.

The LEDs D1 to D16 indicate the status of the respective input (LED is on, if the input is active).

12.1.5 Output Interface 44.20.028

The Output Interface 44.20.028 provides 8 outputs with an increased output current of 1 A each.

One “Enable” output is provided for the 8 outputs. Only if the “Enable” output is connected to 24 V, the outputs can be activated. After turning on the CNC module, all outputs are immediately switched to 0 V.



Terminal	Designation
1	output 0
2	output 1
3	output 2
4	output 3
5	output 4
6	output 5
7	output 6
8	output 7
9	enable for 0 to 7 +24 V ≙ all outputs can be activated
10	0 V
11	+24 V voltage supply
12	

Recovery diodes **must** be provided for inductive loads (relays, valves, etc.).

The mircofuse F1 (10 A) protects the +24 V voltage supply. The LED D1 will go on, if the fuse is faulty.

The transistors T1 to T8 switch the outputs.

The LEDs D10 to D17 indicate the status of the outputs (LED is on, if the output is active).

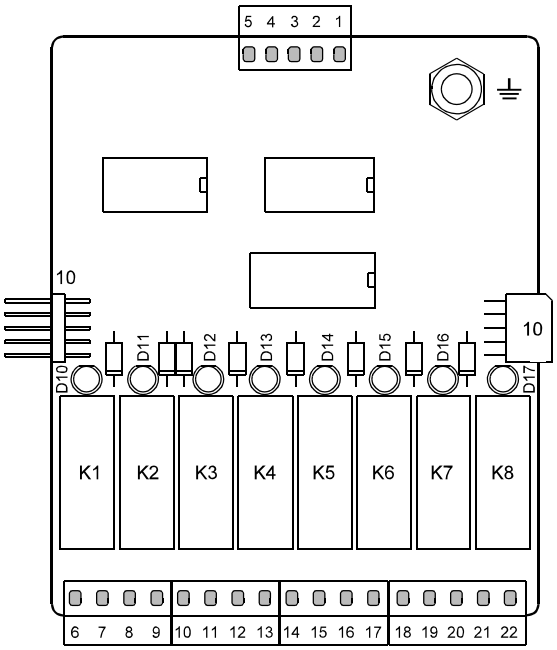
To use all outputs, the “Enable” input, Pin 9, must be connected to 24 V. The deactivation of an "Enable" input permits to deactivate output groups (operating program, switch, etc.).

12.1.6 Output Interface 44.20.051

Up to 8 outputs can be activated with the output module 44.20.051. The all-or-nothing relays are divided into 2 groups to 4 relays each and can be activated by providing the supply voltages. The outputs are additionally linked with enable signals, permitting to activate outputs in groups, but also to store them. Every output of the CNC can be used as enable signal. Unused enable inputs must be connected to +24 V.

Every module must be supplied with +24 V and 0 V.

Active outputs are switched to +24 V. Every output can be loaded with max. 1 A.



Terminal	Designation
1	supply voltage of the relay outputs 0 to 3
2	supply voltage of the relay outputs 4 to 7
3	0 V
4	enable for all outputs
5	
6	relay contact output 7
7	
8	relay contact output 6
9	
10	relay contact output 5
11	
12	relay contact output 4
13	
14	relay contact output 3
15	
16	relay contact output 2
17	
18	relay contact output 1
19	
20	switch-over contact output 0
21	n/c contact
22	n/o contact

⏚ The interface must be connected to earth with an earth strap in the machine.

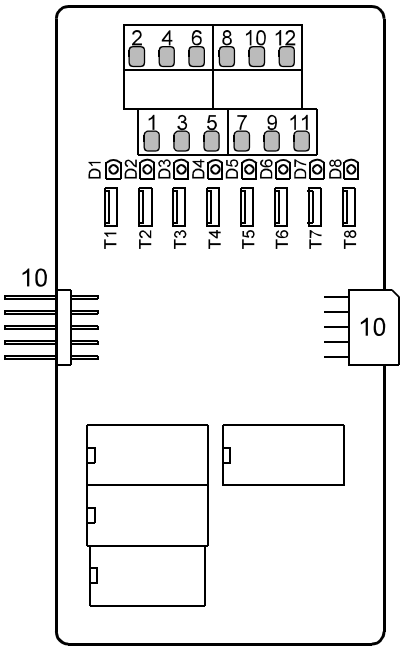
The LEDs D10 to D17 indicate the status of the outputs (LED is on, if the output is active).

The relays K1 to K8 switch the outputs.

12.1.7 Output Interface 44.20.053

The Output Interface 44.20.053 provides 2 × 4 outputs with an increased output current of 1 A each.

One “Enable” output is provided for the 8 outputs. Only if the “Enable” output is connected to 24 V, the outputs can be activated. After turning on the CNC module, all outputs are immediately switched to 0 V.



Terminal	Designation
1	output 0
2	output 1
3	output 2
4	output 3
5	output 4
6	output 5
7	output 6
8	output 7
9	enable for 0 to 7 +24 V ≙ all outputs can be activated
10	0 V
11	+24 V voltage supply for outputs 0 to 3
12	+24 V voltage supply for outputs 4 to 7

The LEDs D1 to D8 indicate the status of the outputs (LED is on, if the output is active).

The transistors T1 to T8 switch the outputs.

To use all outputs, the “Enable” input, Pin 9, must be connected to 24 V. The deactivation of an "Enable" input permits to deactivate output groups (operating program, switch, etc.).

12.1.8 I/O Multi-Purpose Module 44.20.008

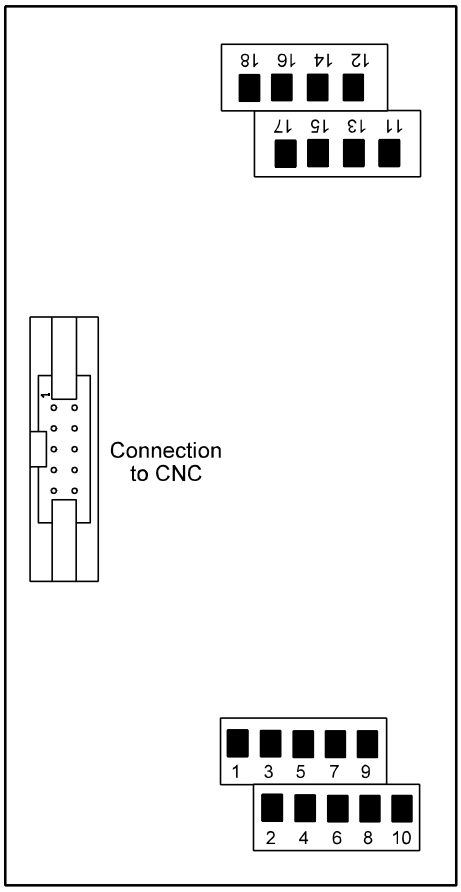
If not more than 8 additional inputs and 8 additional outputs are to be connected to the CNC 61.00, the I/O Multi-Purpose Module 44.20.008 can be used. ***In this case it is not necessary to connect the basic module 44.20.012.***

The voltage supply must be connected to the connectors, Pins 1 and 2, of the I/O Multi-Purpose Module.

The I/O Multi-Purpose Module 44.20.008 provides 8 outputs. The CNC module then can address up to 16 outputs in total (including the eight internal outputs). The total load of the I/O Multi-Purpose Module is 350 mA. All outputs are switched to 0 V immediately after turning on the CNC module.

The I/O Multi-Purpose Module 44.20.008 provides 8 inputs. The CNC module then can address up to 16 inputs in total (including the eight internal inputs). Inputs not wired are internally set to 0 V.

The supply voltage (Pin 1 = +24 V) must be available before turning on the CNC 61.00.



Terminal	Designation
1	+24 V
2	0 V
3	output 1
4	output 2
5	output 3
6	output 4
7	output 5
8	output 6
9	output 7
10	output 8
11	input 8
12	input 7
13	input 6
14	input 5
15	input 4
16	input 3
17	input 2
18	input 1

Current consumption: approx. 30 mA at 24 V
The cable K61.02.*xxx* can be used to connect the module with the CNC 61.00.

Pin Assignment of the 10-Pole Connector to the CNC

DO−: Data Out	**1**	**2**	DO+: Data Out
CLK−: Clock	**3**	**4**	CLK+: Clock
LD−: Load	**5**	**6**	LD+: Load
DI−: Data In	**7**	**8**	DI+: Data In
not assigned	**9**	**10**	not assigned

12.1.9 I/O Multi-Purpose Module 44.20.008B

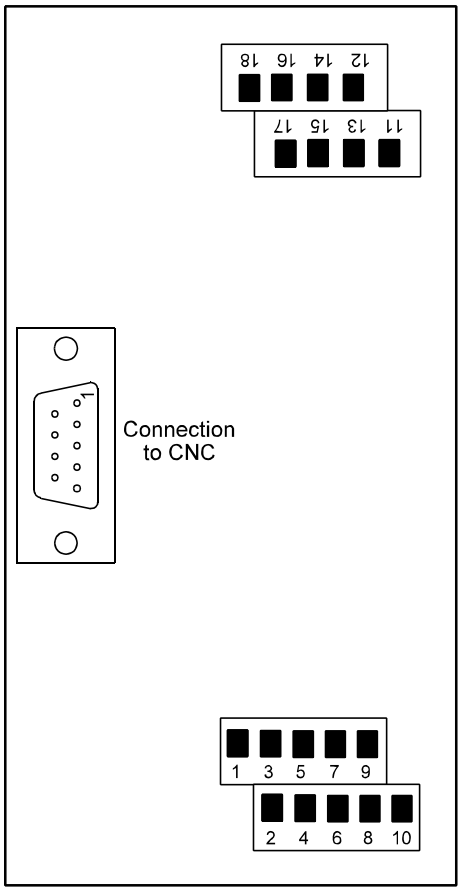
If not more than 8 additional inputs and 8 additional outputs are to be connected to the CNC 61.00, the I/O Multi-Purpose Module 44.20.008B can be used. ***In this case it is not necessary to connect the basic module 44.20.012.***

The voltage supply must be connected to the connectors, Pins 1 and 2, of the I/O Multi-Purpose Module.

The I/O Multi-Purpose Module 44.20.008B provides 8 outputs. The CNC module then can address up to 16 outputs in total (including the eight internal outputs). The total load of the I/O Multi-Purpose Module is 350 mA. All outputs are switched to 0 V immediately after turning on the CNC module.

The I/O Multi-Purpose Module 44.20.008B also provides 8 inputs. The CNC module then can address up to 16 inputs in total (including the eight internal inputs). Inputs not wired are internally set to 0 V.

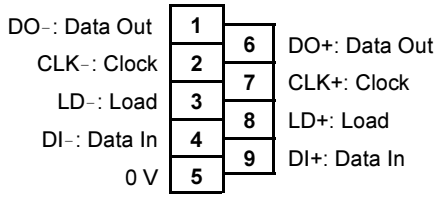
The supply voltage (Pin 1 = +24 V) must be available before turning on the CNC 61.00.



Terminal	Designation
1	+24 V
2	0 V
3	output 1
4	output 2
5	output 3
6	output 4
7	output 5
8	output 6
9	output 7
10	output 8
11	input 8
12	input 7
13	input 6
14	input 5
15	input 4
16	input 3
17	input 2
18	input 1

Current consumption: approx. 30 mA at 24 V
The cable K61.13.*xxx* can be used to connect the module with the CNC 61.00.

Pin Assignment of the 9-Pole Submin D Connector to the CNC



12.2 Components of the Standard I/O System 50.06

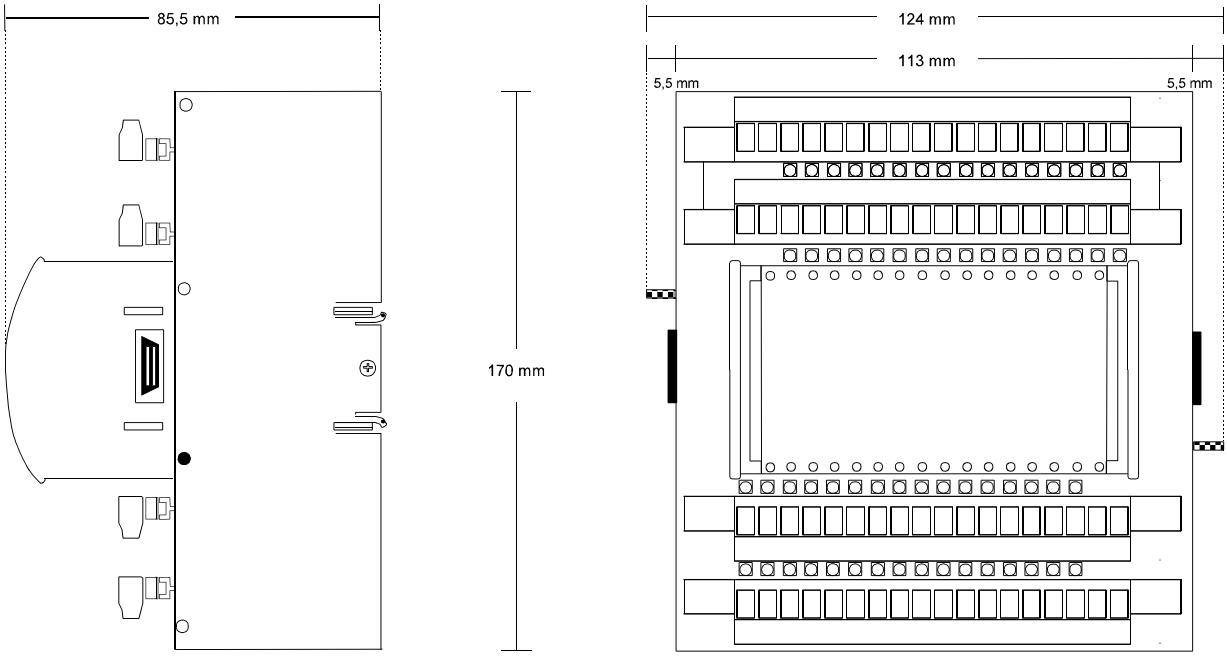
The Standard I/O System 50.06 consists of a Basic Module with up to 64 physical connections, which can be configured differently (see chapter 12.7). The connection of Expansion Modules allows any number of physical connection.

The **Basic Modules** contain the following elements:
- Standard
  - Mother board (50.06.0400.x or 50.06.0500.x) with up to 64 physical connections (page 214)
  - Basic plug-in PCB (50.06.0200.x, page 221)
- Option
  - customized PCB 50.06.01xx.x (page 222)

The **Expansion Modules** consist of the following components:
- Mother board (50.06.0400.x or 50.06.0500.x) with up to 64 physical connections (page 214)

12.3 Dimensions

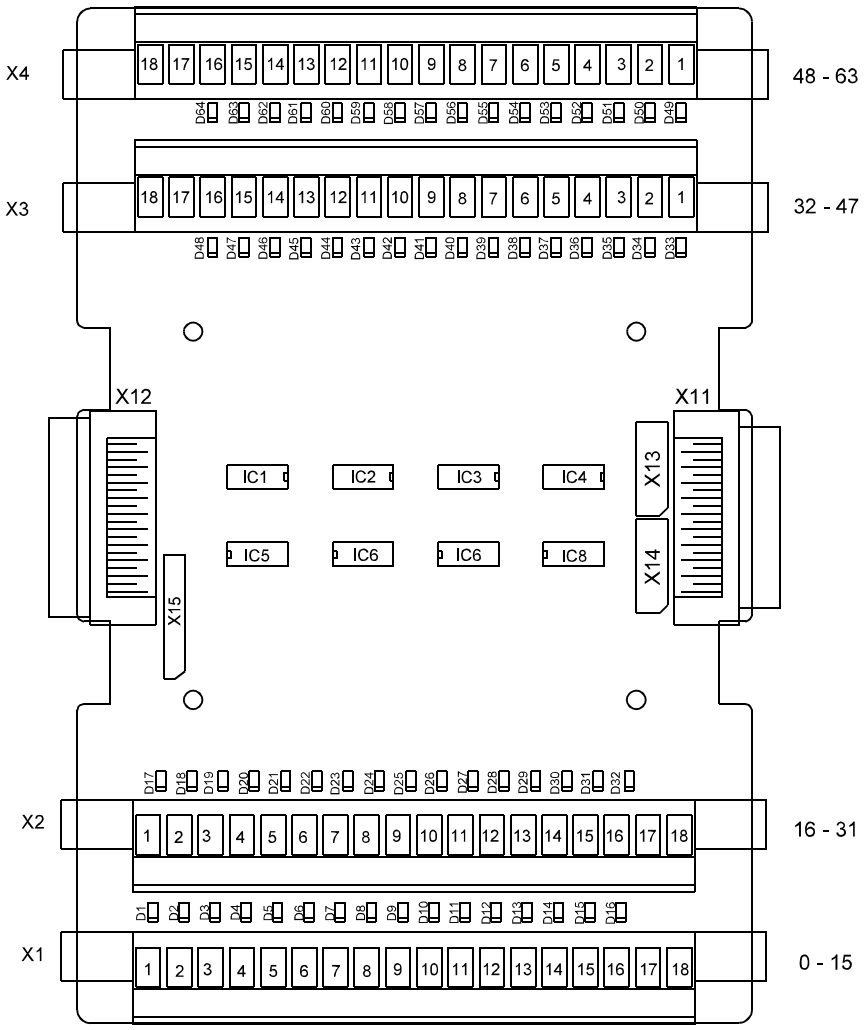
The I/O System 50.06 has the following standard dimensions:
B x T x H = 124 mm x 170 mm x 85.5 mm



The connector 9A and the LEDs shown in the figure are only equipped on the Basic Modules. Neither the connector nor the LEDs are provided on the Expansion Modules.

12.4 Mother Board

All Basic and Expansion Modules of the Standard I/O System 50.06 are equipped with the mother board. The mother board 50.06.0400.x is used in modules with low-side outputs (50.06.30 / 50.06.130) and the mother board 50.06.0500.x is used in Basic and Expansion Modules with high-side outputs (see chapter 12.7 "Modules").



X1 to X4

I/O plug-in connectors

Physical Connection	Assignment
1	logical input / output 0*
. . .	
16	logical input / output 15
17	+24 V
18	GND

D1 to D64

LEDs indicating the I/O status

LED	Color	Status	Meaning
LED for input	green	●	input active +24 V
LED for output	yellow	●	output active +24 V

X11 / X12

Connection of Expansion Modules

X13 / X14

Connection between the plug-in PCB 50.06.0200.x and the mother board 50.06.0400.x or 50.06.0500.x (page 214 et seq.)

X15

Connection of customized PCBs 50.06.01xx.x (page 222)

The different number of in- and outputs or bidirectional in- / outputs is achieved by the corresponding mounted components on the PCB 50.06.0500.x (cf. page 214).The coded variant designation of PCB 50.06.0500 determines the number of in- and outputs or bidirectional in- / outputs.

All in all, each module provides 64 physical connections at maximum (see table below, formula). Eight of these physical connections can be used on a customized PCB (50.06.01xx.x, see page 222) for specialized developments (e.g. AD/DA converters, counters).

Equipment Variant of Plug-In PCB 50.06.0500.x	Inputs (I)	Outputs (O)	Bidirectional Inputs/Outputs (I/O)	Equipment Variant of Customized PCB 50.06.01xx.x (S)		Variant	Sum
A	0	0	0	A	PCB not provided		
B	8	8	8	B	50.06.0100.x 2 x 11 bits ±10 V analog output 2 x 11 bits ±10 V analog input		
C	16	16	16	-[1]			
D	24	24	24	-[1]			
E	32	32	32	-[1]			
F	40	40	40	-[1]			
G	48	48	48	-[1]			
H	56	56	56	-[1]			
I	64	64	64	-[1]			
J	reserved						
Formula:	(I)	(O)	(I/O)	(S)			≤64
Examples: 50.06.0500 ➜	D	C	C	B		DCCB	64
	24 I	16 O	16 bidirectional inputs/outputs	8 customized physical connections			

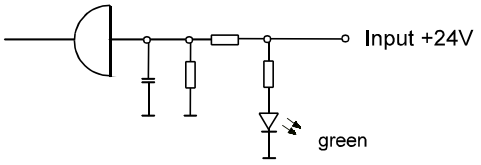
[1] Further variants of the customized PCB 50.06.01xx.x can be provided by different equipment (page 222).

The first letter in the coded variant designation generally determines the number of inputs mounted on the PCB 50.06.0500.x, the second letter of the number of mounted outputs etc.

12.4.1 Wiring of the In- and Outputs on the Mother Board

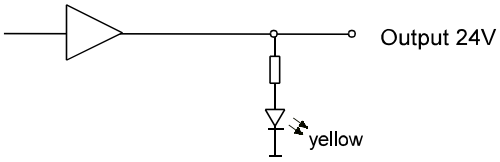
The type of physical connection is defined by the corresponding components mounted on the PCB.

Inputs



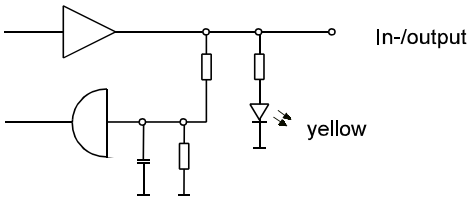
The LEDs for the inputs are green. If the LED is flashing, the input is active.

Outputs (Low-Side)

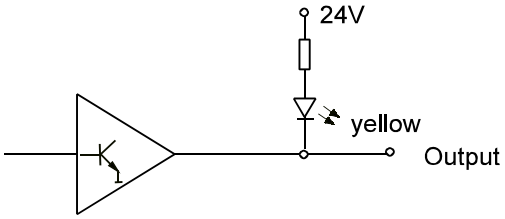


The LEDs for the inputs are yellow. If the LED is flashing, the input is active.

Bidirectional In- and Outputs (Low-Side)



Outputs (High-Side)



Maximum Permissible Load of the In- and Outputs

Concerning the maximum permissible load of the single in- and outputs the following must be observed:

- The inputs and high-side outputs are switched to +24 V_{DC} ±15 %.
- The low-side outputs are switched to 0 V.
- The input current for the inputs is 3.5 mA.
- Outputs which are not ventilated can be loaded with 0.5 A up to 5 min. The outputs are protected against short-circuit, overheating as well as under- and overvoltage.

Concerning the maximum permissible load of the entire module, the following time-current characteristic must be met:

- Outputs that are not ventilated can simultaneously be loaded with 0.5 A up to 5 min.
- If the high-side and low-side outputs are simultaneously loaded with 0.5 A longer than 5 min, the sum of all output currents must be half of the maximum current of the entire module. The maximum current for the module depends on the number of equipped outputs (à 0.5 A).
- The following formulas can be used to calculate the maximum permissible load:

$t \leq 5\ min \quad \Rightarrow \quad \sum I_{out} = 0{,}5\ A \quad \sum outputs$

$t > 5\ min \quad \Rightarrow \quad \sum I_{out} = 0{,}25\ A \quad \sum outputs$

s

If outputs are to be loaded with 0.5 A without time limit, ventilation measures must absolutely be assured.

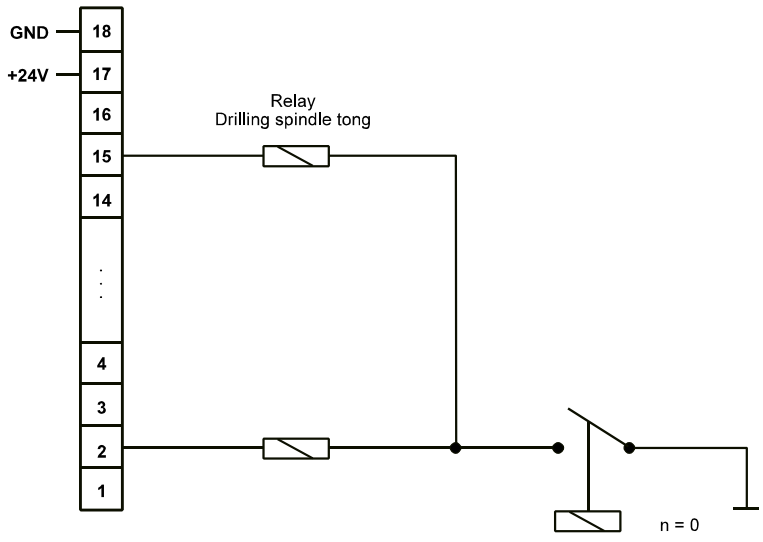
- In this case, the maximum permissible load is calculated as follows:

$t \infty \quad \Rightarrow \quad \sum I_{out} = 0{,}5\ A \quad \sum outputs$

Interlocking the Outputs

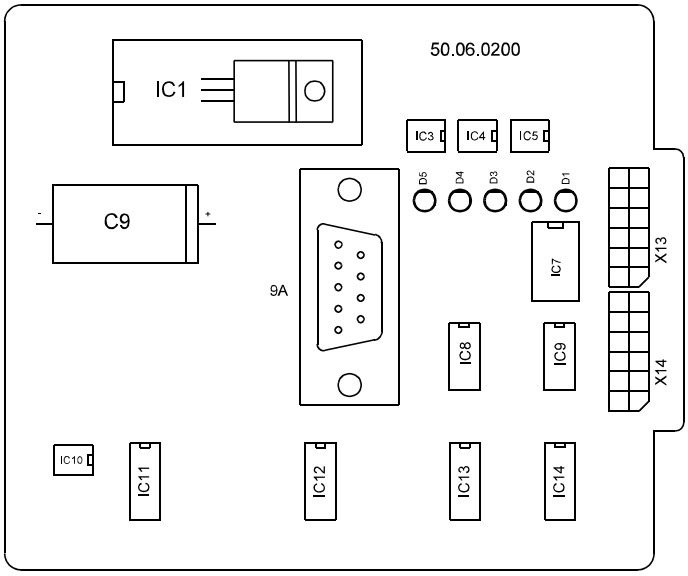
In applications which are critical with regard to safety, it is recommended to interlock application-specific outputs by additional relays.

The following figure shows exemplary the interlock of a drilling spindle tong via speed n = 0. This single interlock is carried out via switching the ground potential.



12.5 Basic Plug-In PCB 50.06.0200.x

The basic plug-in PCB 50.06.0200.x for the I/O Link reception is used in all Basic Module of the Standard I/O System 50.06 (see chapter 12.7).



D1 to D5

LEDs indicating the module status

LED	Designation	Color	Status	Meaning
D1	POWER	green	●	+24 V supply fo basic plug-in PCB provided
D2	DATA OK	green	●	data transmission OK (CRC)
D3	DATA IN	green	●	data signal of master OK
D4	CLOCK	green	●	clock signal of master OK
D5	LOAD	green	●	load signal of master OK

X13 / X14

Connection between the plug-in PCB 50.06.0200.x and the mother board 50.06.0400.x or 50.06.0500.x (page 214 et seq.)

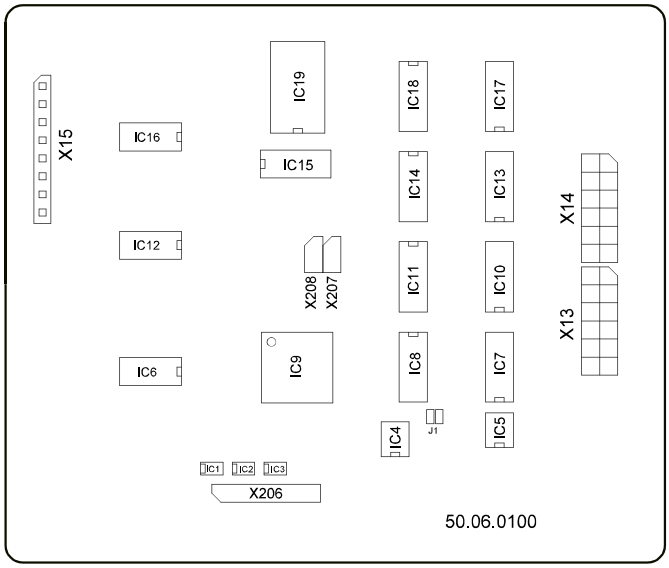
9A

I/O Link.

The cable K61.13.*xxx* can be used to connect the module with the back plane of the CNC 61.00 (connector X3).

12.6 Customized PCB 50.06.01xx.x
12.6.1 50.06.0100.x

Customized PCB for analog module



X 206 to X 208
Programming interfaces

X13 / X14
Connection between the mother board 50.06.0400.x or 50.06.0500.x (page 214) and the customized PCB 50.06.0100.x.

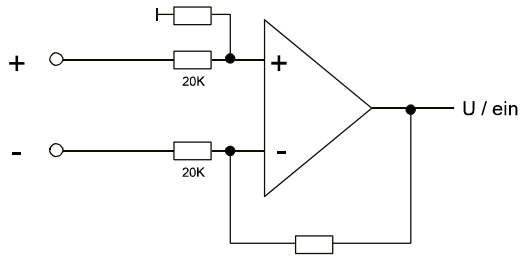
X15
Connection between the mother board 50.06.0400.x or 50.06.0500.x (page 214) and the customized PCB 50.06.0100.x.

Terminal	Meaning
1	Difference amplifier output (-) ±10V Ri = 20KΩ converter 1
2	Difference amplifier output (+) ±10V Ri = 20KΩ converter 1
3	Difference amplifier output (-) ±10V Ri = 20KΩ converter 2
4	Difference amplifier output (+) ±10V Ri = 20KΩ converter 2
5	Difference amplifier input (-) ±10V Ri = 20KΩ converter 1
6	Difference amplifier input (+) ±10V Ri = 20KΩ converter 1
7	Difference amplifier input (-) ±10V Ri = 20KΩ converter 2
8	Difference amplifier input (+) ±10V Ri = 20KΩ converter 2

Wiring of the In- and Outputs on the PCB 50.06.0100.x

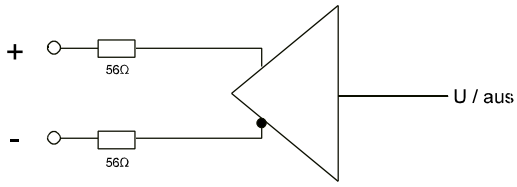
Inputs

Input lines ±10V, ±11 bits resolution



Outputs

Output lines ±10V, ±11 bits resolution



12.7 IO Modules

The Basic Modules of the Standard I/O System 50.06 are equipped with the plug-in PCB for the I/O Link reception 50.06.0200.x and the mother board 50.06.0400.x or 50.06.0500.x. Furthermore, the Basic Modules 50.06.2xx and 50.06.5xx are provided with the customized PCB 50.06.01xx.x (see chapter 12.4 and sections 12.8.1).

The number of in- and outputs can be increased by connecting the Expansion Modules. The Expansion Modules are not equipped with an additional mother board for the I/O Link reception (50.06.020x.x), but only with the mother board (50.06.0400.x or 50.06.0500.x). The number of in-and outputs is defined via the equipment variant of the plug-in PCB 50.06.0500.x.

12.8 Module Designations

The type and equipment variant of the module as well as the number of provided in- and outputs can be derived from the module designation.

The following code designations are used for the different modules:

Module Designation	Function	Components
50.06.1x	Basic module I/O	50.06.0200.x 50.06.0500.x with up to 64 physical connections
50.06.2x		
50.06.3x		
50.06.1xx	Expansion module I/O	50.06.0500.x with up to 64 physical connections
50.06.2xx	Basic module I/O with customized PCB	50.06.0200.x 50.06.0500.x with up to 56 physical connections 50.06.01xx.x with up to 8 physical connections
50.06.3xx	Basic module B (bidirectional)	50.06.0200.x 50.06.0500.x with up to 64 bidirectional physical connections
50.06.4xx	Expansion module B (bidirectional)	50.06.0500.x with up to 64 bidirectional physical connections
50.06.5xx	Basic module B (bidirectional) with customized PCB	50.06.0200.x 50.06.0500.x with up to 56 bidirectional physical connections 50.06.01xx.x with up to 8 physical connections
50.06.10xx	reserved	
50.06.12xx	reserved	
50.06.20xx	reserved	

12.8.1 Module 50.06.1x

Basic module I/O with up to 64 physical connections

In the Basic Modules of group 50.06.1x generally **all** of the 64 physical connections on the PCB 50.06.0500.x are mounted as in- or outputs.

Module Designation	Inputs	Outputs
50.06.10	64	0
50.06.11	56	8
50.06.12 (page 229)	48	16
50.06.13	40	24
50.06.14 (page 229)	32	32
50.06.15	24	40
50.06.16	16	48
50.06.17	8	56
50.06.18	0	64

12.8.2 Module 50.06.2x

Basic module I/O with up to 64 physical connections

Contrary to the Basic Modules of group 50.06.1x **not all** of the 64 physical connections are generally mounted as in- or outputs on the Basic Modules of group 50.06.2x.

Module Designation	Inputs	Outputs
50.06.20 (page 230)	16	16

12.8.3 Modul 50.06.3x

Basic module I/O with up to 64 physical connections for specialized developments

Module Designation	Inputs	Outputs
50.06.30	0	32 low-side

12.8.4 Module 50.06.1xx

Expansion module for Basic Module I/O

Module Designation	Inputs	Outputs
50.06.100	64	0
50.06.101	56	8
50.06.102	48	16
50.06.103	40	24
50.06.104 (page 230)	32	32
50.06.105	24	40
50.06.106	16	48
50.06.107	8	56
50.06.108	0	64
50.06.120	16	16
50.06.130	0	32 low-side

12.8.5 Module 50.06.2xx

Basic module I/O with customized PCB

Module Designation	Inputs	Outputs	Customized I/O (50.06.01xx.x)
50.06.200	56	0	8
50.06.201	48	8	8
50.06.202	40	16	8
50.06.203 (page 231)	32	24	8
50.06.204	24	32	8
50.06.205	16	40	8
50.06.206	8	48	8
50.06.207	0	56	8
50.06.220	16	16	8
50.06.230	0	32 low-side	8

12.8.6 Module 50.06.3xx

Basic module B with 64 bidirectional physical connections

Module Designation	Inputs	Outputs
50.06.300 (page 232)	64	64

12.8.7 Module 50.06.4xx

Expansion module B with up to 64 bidirectional in-/outputs

Module Designation	Inputs	Outputs
50.06.400	64	64

12.8.8 Module 50.06.5xx

Basic module B with up to 56 bidirectional physical connections and customized PCB

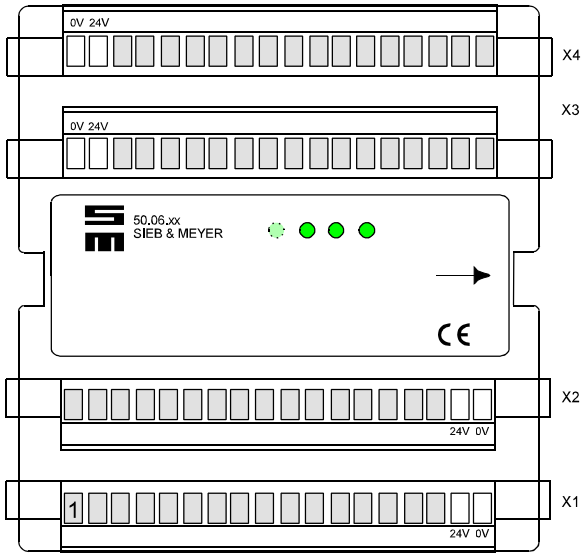
Module Designation	Inputs	Outputs	Customized I/O (50.06.01xx.x)
50.06.500	56	56	8

12.9 Assignment of the Physical Connections

When assigning the in- and outputs, bidirectional in- / outputs and customized in- / outputs to the physical connections, the following must be observed:

- Always observe the module's position shown in the figure below.
- The assignment of the in- / outputs, bidirectional in- / outputs and customized in- / outputs is carried out *in groups of eight physical connections*, beginning with the physical connection 1 at the terminal bar X1. During the assignment, the following order must be observed: customized I/O - inputs - outputs - bidirectional I/O.
  The following order must be observed:
  customized I/O - inputs - outputs - bidirectional I/O.
- Consider that the counter for each kind of in- and output begins with 0 in the software, i.e. for example that the input 0 is assigned to the physical connection 1.
- The appropriate assignment of the physical connections is printed on the modules. For this purpose, the following abbreviations are used:

IN	inputs
OUT	outputs
C-...	customized PCB-variant
BI	bidirectional in-/outputs



The connector 9A and the LEDs shown in the figure are only equipped on the Basic Modules. Neither the connector nor the LEDs are provided on the Expansion Modules.

The physical connections are divided into groups of eight and can be assigned as follows according to the order mentioned above:

Group	Physical Connection	Equipment Possibility
A	1 to 8	*customized PCB* or *inputs* or *outputs* or *bidirectional I/O*
B	9 to 16	*inputs* or *outputs* or *bidirectional I/O*
C	17 to 24	*inputs* or *outputs* or *bidirectional I/O*
D	25 to 32	*inputs* or *outputs* or *bidirectional I/O*
E	33 to 40	*inputs* or *outputs* or *bidirectional I/O*
F	41 to 48	*inputs* or *outputs* or *bidirectional I/O*
G	49 to 56	*inputs* or *outputs* or *bidirectional I/O*
H	57 to 64	*inputs* or *outputs* or *bidirectional I/O*

12.9.1 Examples

The assignment of some modules is shown in the following section. The different assignment of the physical connections is represented by the following symbols:

- Input E

- Output A

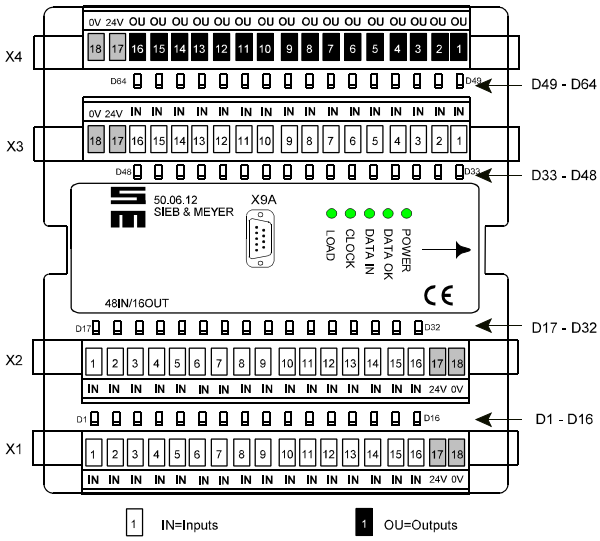
- Customized I/O K

- Bidirectional I/O B

- Firmly defined physical connection F

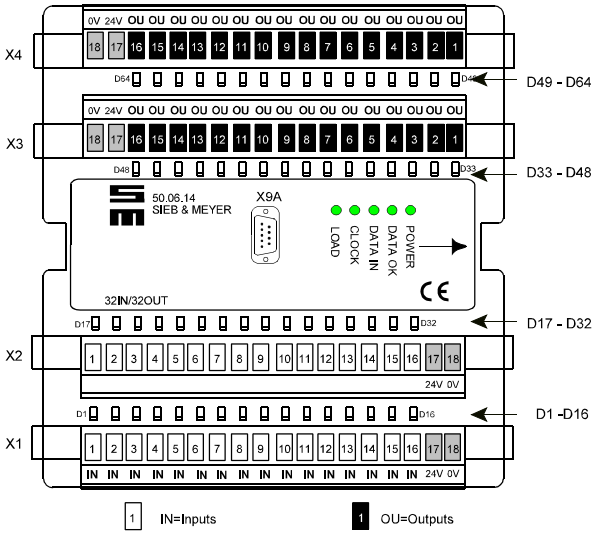
50.06.12

Basic module I/O with 48 inputs and 16 outputs



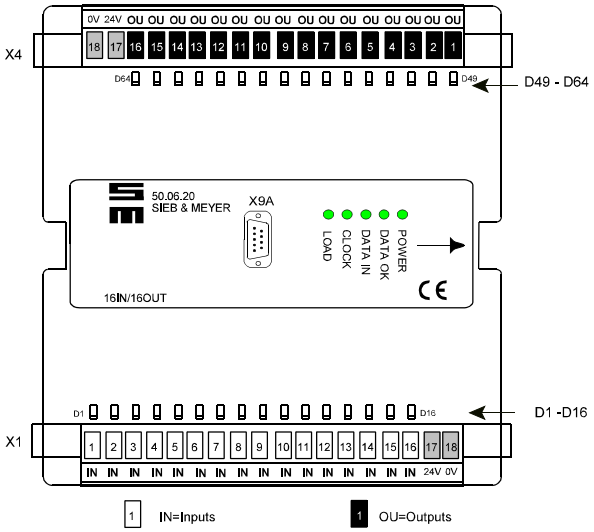
50.06.14

Basic module I/O with 32 inputs and 32 outputs



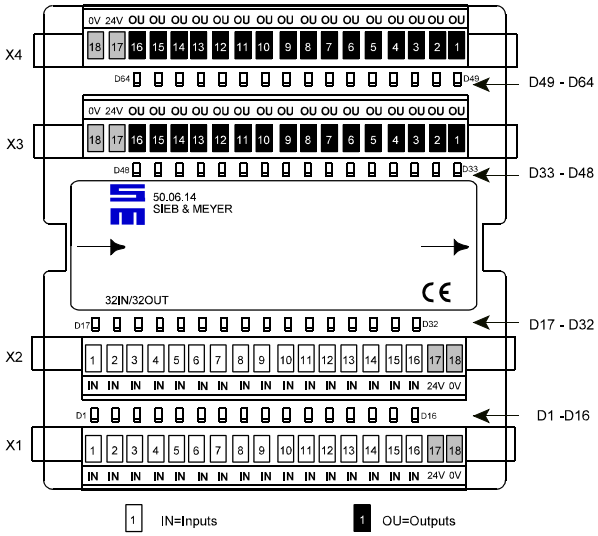
50.06.20

Basic module I/O with 16 inputs and 16 outputs



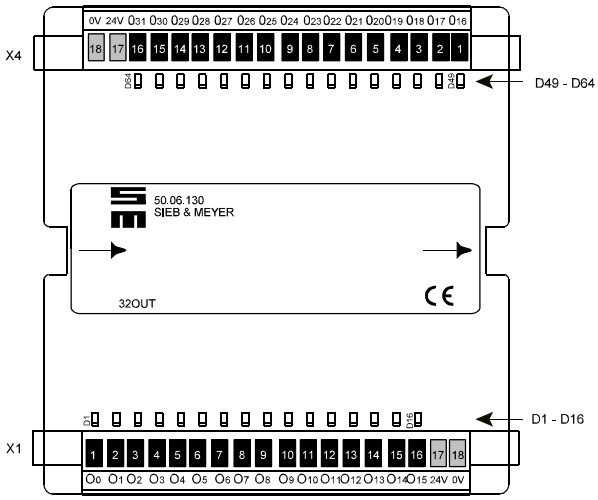
50.06.104

Expansion module I/O with 32 inputs and 32 outputs



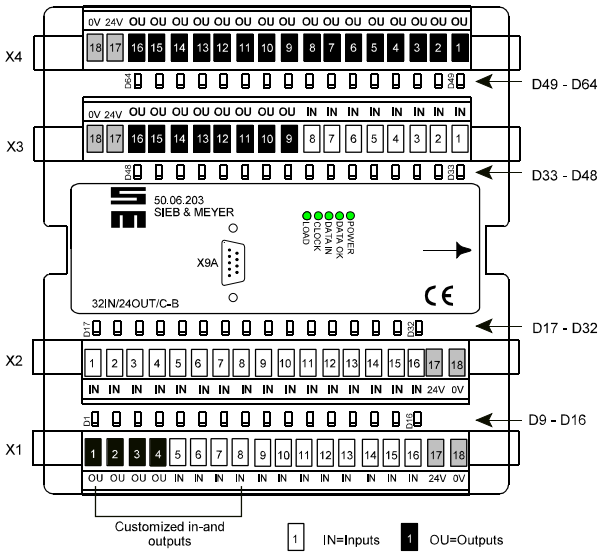
50.06.130

Expansion module I/O with 32 low-side outputs



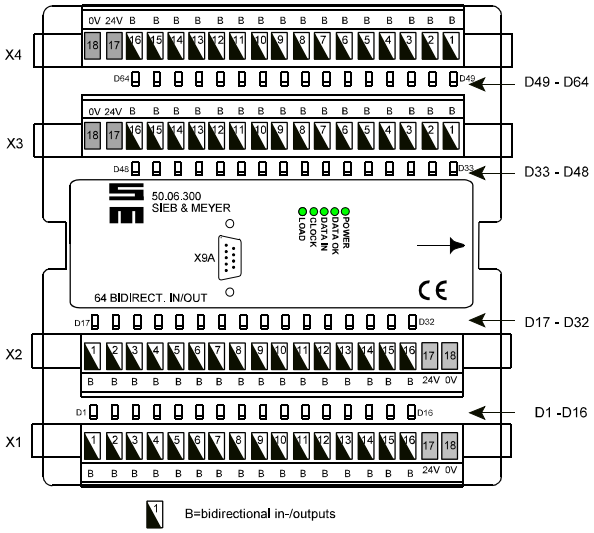
50.06.203

Basic Module I/O with 32 inputs, 24 outputs and customized PCB 50.06.0100.x



50.06.300

Basic module I/O with 64 bidirectional in-/outputs

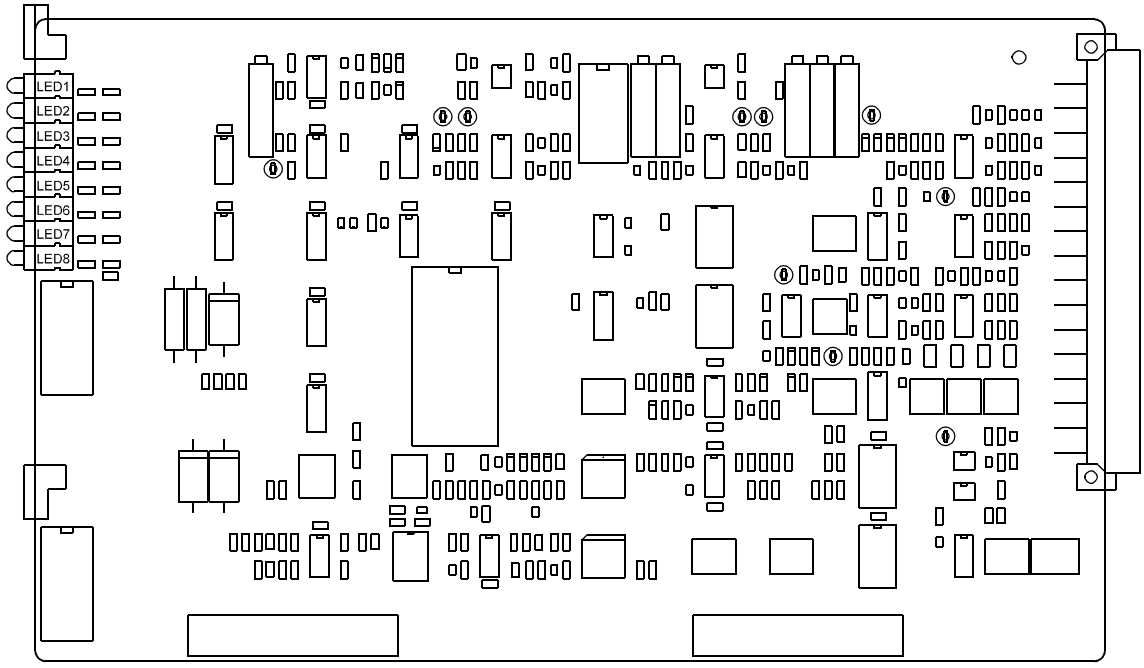


13 The Logic Cards

13.1 Logic Card 61.01.0003 (Resolver Evaluation, Trapezoidal Commutation)

The logic card has a hardware identification, permitting the CNC 61.00 to identify the hardware during the operation. For this logic card ID = 188 is generated.

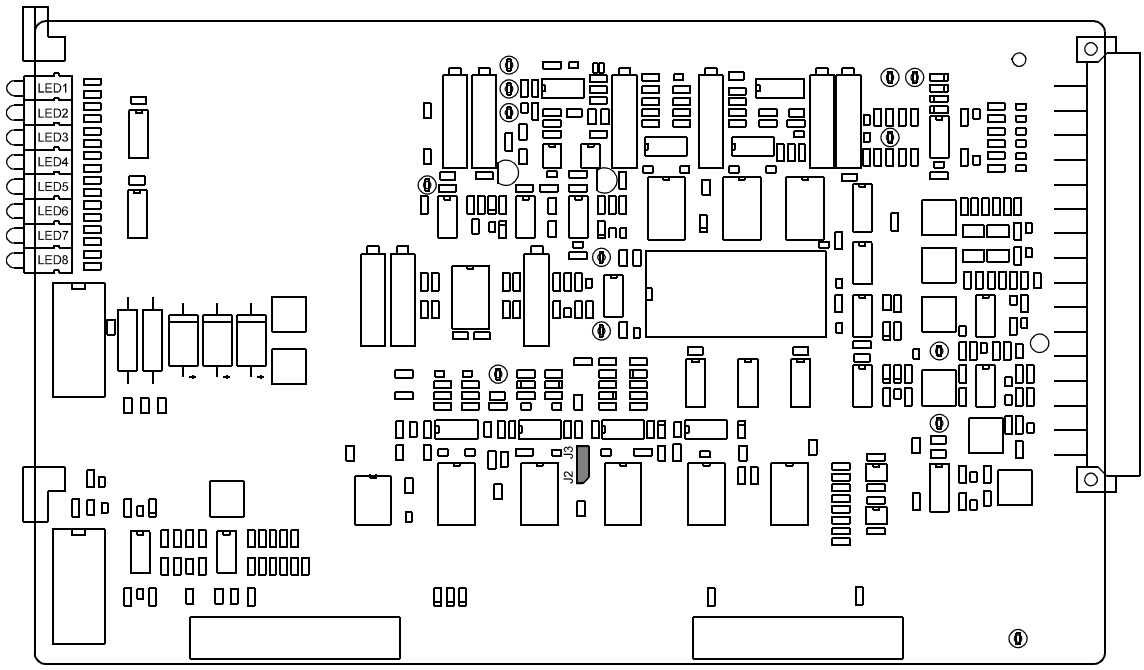
The logic card has 16 LEDs (2 × 8), reflecting the status of the 8 internal inputs or 8 internal outputs. When a LED is on, a 24 V signal is provided at the respective input or output.



13.2 Logic Card 61.01.0022 (Resolver Evaluation, Sinusoidal Commutation)

The logic card has a hardware identification, permitting the CNC 61.00 to identify the hardware during the operation. For this logic card ID = 174 is generated.

The logic card has 16 LEDs (2 × 8), reflecting the status of the 8 internal inputs or 8 internal outputs. When a LED is on, a 24 V signal is provided at the respective input or output.



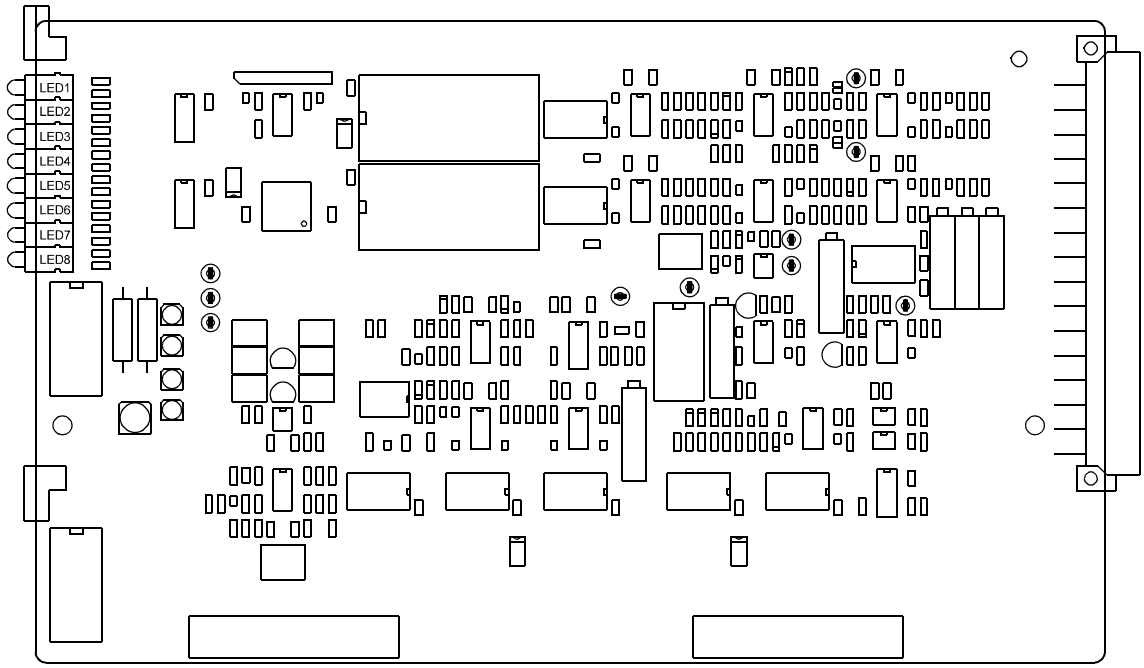
J2 Resolution of the current feed forward (plugged as a standard)
J3 Resolution of the current feed forward

Contacting SIEB & MEYER is indispensable before altering the jumper positions! A different firmware might be installed.

13.3 Logic Card 61.01.0023 (Synchronous Linear Motors, Sinusoidal Commutation)

The logic card has a hardware identification, permitting the CNC 61.00 to identify the hardware during the operation. For this logic card ID = 236 is generated.

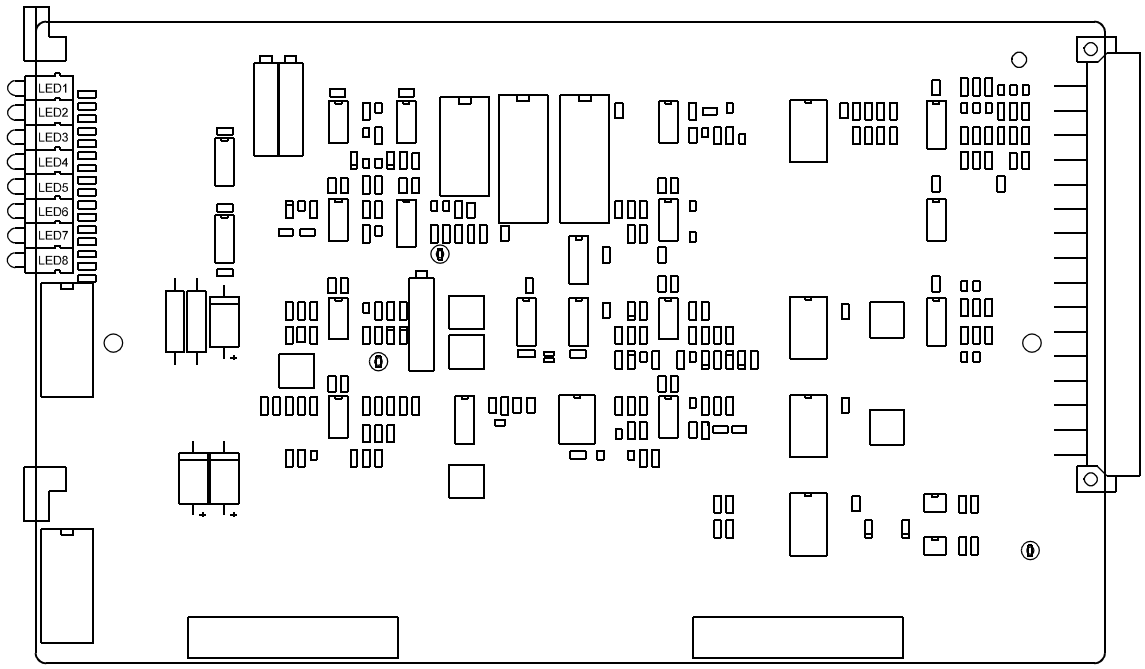
The logic card has 16 LEDs (2 × 8), reflecting the status of the 8 internal inputs or 8 internal outputs. When a LED is on, a 24 V signal is provided at the respective input or output.



13.4 Logic Card 61.01.0027 (Hall Effect Sensor Evaluation, Trapezoidal Commutation)

The logic card has a hardware identification, permitting the CNC 61.00 to identify the hardware during the operation. For this logic card ID = 189 is generated.

The logic card has 16 LEDs (2 × 8), reflecting the status of the 8 internal inputs or 8 internal outputs. When a LED is on, a 24 V signal is provided at the respective input or output.



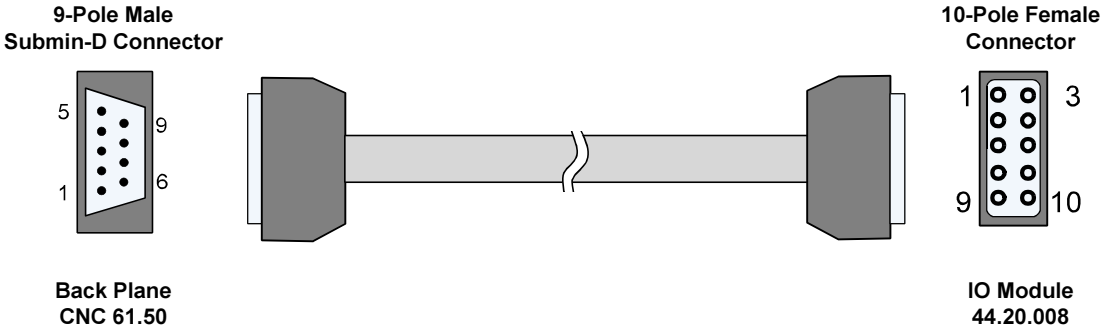
14 Cables

On the next pages the cables
K61.02.*xxx* - Connecting cable for the IO expansion
K61.04.*xxx* - Communication cable between PC and CNC 61.50
K61.08.*xxx* - INTERBUS-S remote bus cable
K61.11.*xxx* - MODLINK cable
▸ K61.13.*xxx* - Connecting cable for the IO expansion
are described.

xxx cable length in decimeters

14.1 Cable K61.02.*xxx* - Connection to the IO Expansion

Cable type: 4 × 2 × 0.14 mm²

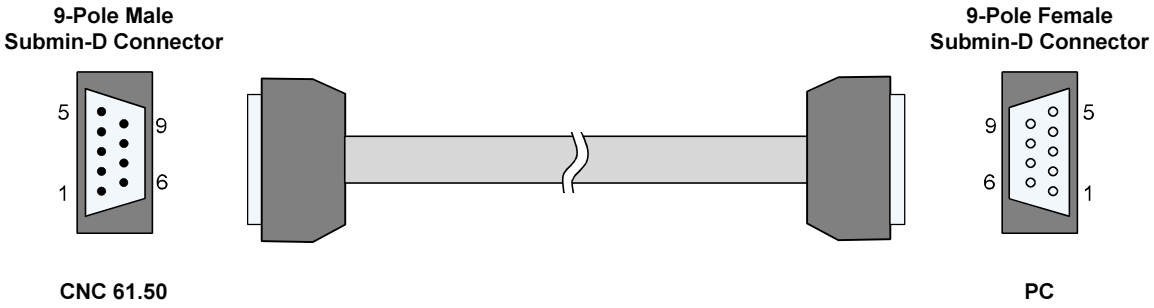


Pin Back Plane CNC 61.50	Designation	Pin IO Module 44.20.08
1	DO-	1
2	CLK-	3
3	LD-	5
4	DI-	7
5	0 V	
6	DO+	2
7	CLK+	4
8	LD+	6
9	DI+	8
Shell		

strap between Pin 5 and shell

14.2 Cable K61.04.*xxx* - Communication between PC and CNC 61.00

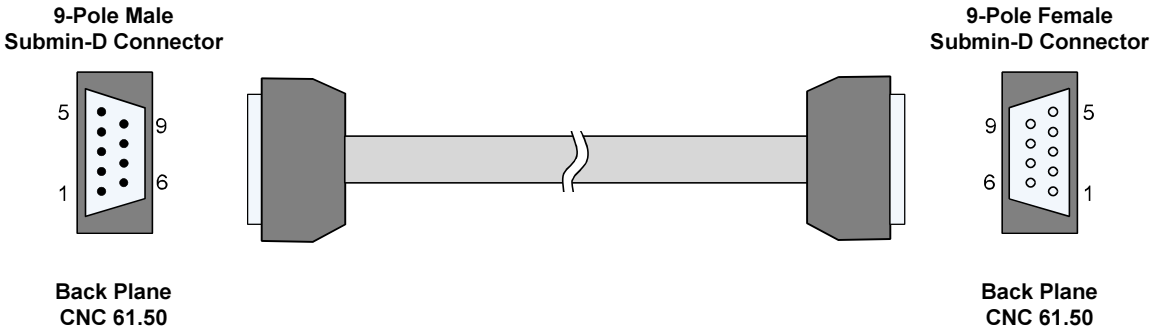
Cable type: 3 × 0.14 mm²



Pin CNC 61.50	Designation	Pin PC
1	---	1
2	TxD	2
3	RxD	3
4	---	4
5	GND	5
6	---	6
7	---	7
8	---	8
9	---	9

14.3 Cable K61.08.*xxx* - INTERBUS-S Remote Bus Cable

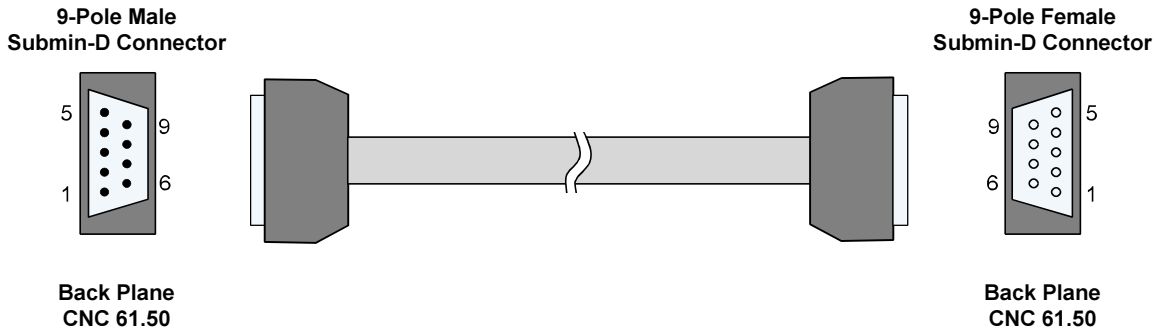
Cable type: 3 × 2 × 0.14 mm²



	Back Plane CNC 61.50 Male Submin D Connector		Back Plane CNC 61.50 Female Submin D Connector	
	Pin	Designation	Designation	Pin
	1	DO+	DO+	1
	2	DI+	DI+	2
	3	GND	GND	3
	4	---	---	4
strap to identify additionally connected participants of the remote bus	5	5 V	---	5
	6	DO-	DO-	6
	7	DI-	DI-	7
	8	---	---	8
	9	RBST	---	9

14.4 Cable K61.11.*xxx* - MODLINK Cable

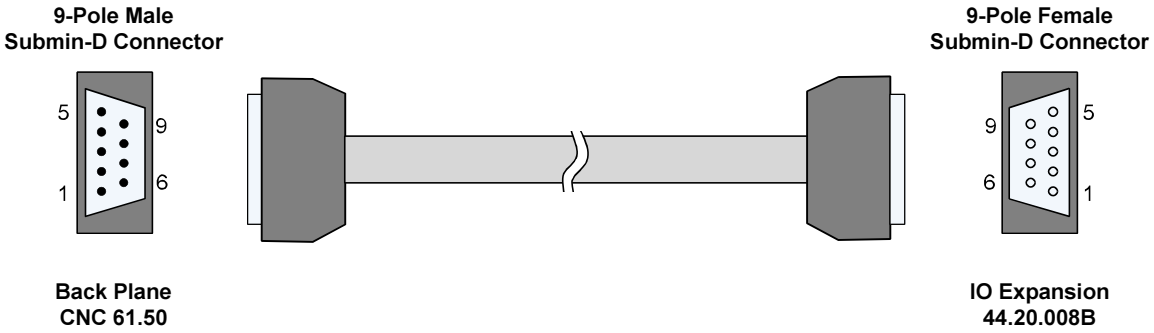
Cable type: 1 × 2 × 0.14 mm²



Back Plane CNC 61.50 Male Submin D Connector Pin	Designation	Back Plane CNC 61.50 Female Submin D Connector Pin
1	D+	1
2	D-	2
3	---	3
4	GND	4
5	---	5
6	---	6
7	---	7
8	---	8
9	---	9

14.5 Cable K61.13.*xxx* - Connecting Cable for IO Expansion

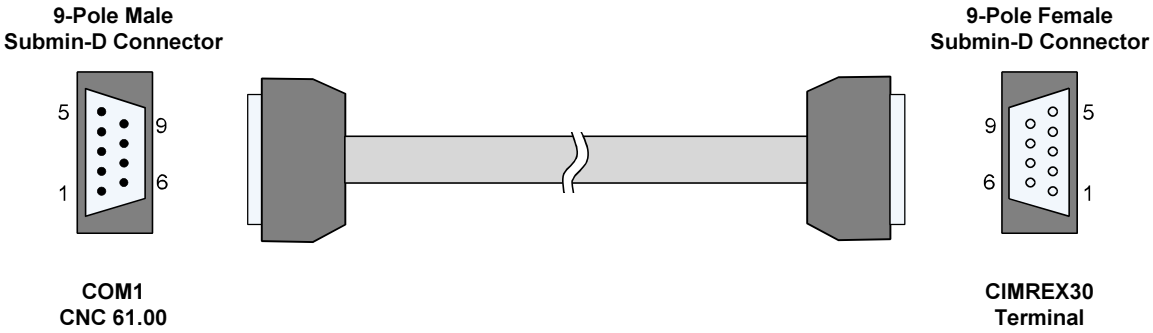
Cable type: 6 × 2 × 0,14 mm²



Back Plane CNC 61.50 Pin	Designation	IO Expansion Pin
1	DO-	1
2	CLK-	2
3	LD-	3
4	DI-	4
5	0 V	5
6	DO+	6
7	CLK+	7
8	LD+	8
9	DI+	9

14.6 Cable K61.14.*xxx* - Communication Between CNC 61.00 and CIMREX30 Terminal

Cable type: 3 × 0.14 mm²



Back Plane CNC 61.50 Male Submin D Connector		CIMREX30 Terminal Female Submin D Connector	
Pin	Designation	Designation	Pin
1	---	---	1
2	TxD	RxD	2
3	RxD	TxD	3
4	---	---	4
5	GND	GND	5
6	---	---	6
7	---	---	7
8	---	---	8
9	---	---	9

The cable shield is connected to the connector shells.

15 Technical Data

15.1 Multi-Axis Modules of Series 61.50

15.1.1 Up to 325 V_{DC} Intermediate Circuit Voltage

Order Number 61.50.*nn.xx*	CC	DC	EC	FC	GC	ZC	MC	KC	NC	LC	OC	HC	PC	IC
Adjusted rated current (sine crest value)	5 A	12 A	12 A	16 A	16 A	21 A	20 A	30 A	20 A	30 A	30 A	45 A	30 A	45 A
Adjusted peak current (sine crest value)	10 A	20 A	40 A	20 A	40 A	40 A	60 A	60 A	80 A	80 A	60 A	60 A	80 A	80 A
T_{max} for the peak current	3 s													
Code letter of output stage	C	D	E	F	G	Z	M	K	N	L	O	H	P	I
Code letter of intermediate circuit voltage	C = 325 V_{DC}													
Temperature range	0°C to 60°C													
Ambient temperature for 100 % performance	40°C													
Power reduction for T > 40°C	-1.5 % per 1°C													
Width	12 TE										16 TE			
Height	6 HE													

nn is replaced by the code for the evaluation according to the table below:

Code	Commutation	Motor Type	Evaluation	Logic Card	TE
30	sinusoidal	servo motor	resolver	61.01.0022	12
50	sinusoidal	servo motor	resolver	61.01.0022	16
34	trapezoidal	servo motor	Hall effect sensor	61.01.0027	12
54	trapezoidal	servo motor	Hall effect sensor	61.01.0027	16
40	sinusoidal	synchronous linear motor	optical length measuring system	61.01.0023	12
60	sinusoidal	synchronous linear motor	optical length measuring system	61.01.0023	16
42	sinusoidal	synchronous motor	incremental decoder	61.01.0023C	12
62	sinusoidal	synchronous motor	incremental decoder	61.01.0023C	16

xx is replaced by the code for the accessory module, page 257.

The order number for a CNC module
- for sinusoidal commutated servo motors with resolver evaluation
- rated current of 16 A
- peak current of 20 A and
- the accessory module “Profibus”

would be:
61.50.30.FC.AB

15.1.2 Up to 560 V_{DC} Intermediate Circuit Voltage

Order Number 61.50.*nn,xx*	CF	DF	EF	FF	GF	KF	LF	HF	IF
Adjusted rated current (sine crest value)	5 A	8 A	8 A	12 A	12 A	15 A	15 A	22 A	22 A
Adjusted peak current (sine crest value)	10 A	20 A	40 A	20 A	40 A	60 A	80 A	60 A	80 A
T_{max} for the peak current	3 s								
Code letter of output stage	C	D	E	F	G	K	L	H	I
Code letter of intermediate circuit voltage	F = 560 V_{DC}								
Temperature range	0°C to 60°C								
Ambient temperature for 100 % performance	40°C								
Power reduction for T > 40°C	-1.5 % per 1°C								
Width	12 TE							16 TE	
Height	6 HE								

nn is replaced by the code for the evaluation according to the table below:

Code	Commutation	Motor Type	Evaluation	Logic Card	TE
30	sinusoidal	servo motor	resolver	61.01.0022	12
50	sinusoidal	servo motor	resolver	61.01.0022	16
34	trapezoidal	servo motor	Hall effect sensor	61.01.0027	12
54	trapezoidal	servo motor	Hall effect sensor	61.01.0027	16
40	sinusoidal	synchronous linear motor	optical length measuring system	61.01.0023	12
60	sinusoidal	synchronous linear motor	optical length measuring system	61.01.0023	16
42	sinusoidal	synchronous motor	incremental decoder	61.01.0023C	12
62	sinusoidal	synchronous motor	incremental decoder	61.01.0023C	16

xx is replaced by the code for the accessory module, page 257.

The order number for a CNC module
- for sinusoidal commutated servo motors with resolver evaluation
- rated current of 12 A
- peak current of 20 A and
- the accessory module “Profibus”

would be:
61.50.30.FF.AB

15.1.3 Power Module 26.50.65*x*

The power module 26.50.65 replaces the power module 26.50.42 and is fully downward compatible. It may be mounted into existing systems.

The power module 26.50.42, however, is not completely upward compatible, since the compatibility depends on the system wiring. Contact SIEB & MEYER in this case.

Power Module 26.50.65		PS 16/50					
Main supply:	Voltage Range	B	C	CZ*	H	I	K
	3 × each	70 V_{AC} +10 % –20 %	230 V_{AC} +10 % –20 %		380 V_{AC} to 480 V_{AC} +10% –5 %	280 V_{AC} +10 % –20 %	250 V_{AC} +10% –20 %
Logic supply		same potential as main supply, but only two phases					
Rated direct current in the intermediate circuit, ventilated with fan EL 1.23.1		16 A					
Peak direct current in the intermediate circuit, provided max. 1 s		50 A					
Intermediate circuit voltage		100 V_{DC} +10 % –20 %	325 V_{DC} +10 % –20 %		540 V_{Dc} bis 680 V_{DC} +10 % –5 %	400 V_{Dc} +10 % –20 %	350 V_{Dc} +10 % –20 %
Minimum ballast resistor		5 Ω			10 Ω		5.6 Ω
Temperature range		5°C to 60°C 100 % rated current up to 40°C					
Reduction of the rated current at ambient temperatures > 40°C		-1,5 % per 1°C					
Width		14 TE = 71.1 mm					
Height		6 HE = 264 mm					

* power module without overvoltage protection

Power Ranges of the Power Module 26.50.65

Voltage range	B	C	CZ	H	I	K
Main supply	1.4 kW	7.0 kW		10.0 kW	5.5 kW	7.0 kW
Logic supply	100 W	180 W		150 W	150 W	150 W

When rating the drive it has to be considered that the rated currents and peak currents of the power module (intermediate circuit currents) are not comparable to the currents of the servo module (currents to the AC motor). See also "Electric Performance Dimensioning", page 265.

15.1.4 Back Planes
Multi-Axis Modules of Series 61.50

Order Number	Mounting As	Impossible Accessory Modules	TE
61.01.0004	swing frame	AA, AB, AE, AF, AG, AH, G1	12
61.01.0018	wall mounting	A1, AA, AG, AH, D1, F1, G1,	12
61.01.0037	swing frame	A1, F1, G1	12
61.01.0038	wall mounting	AG, AH, G1	12
61.01.0053	wall mounting	A1, F1	12
61.01.0058	swing frame	A1, F1	12
61.01.0060	swing frame	AA, AB, AE, AF, AG, AH	12

Power Module 26.50.65*x*

	Swing Frame 14 TE	Wall Mounting 14 TE
Order Number	61.01.0017 61.01.0061	26.50.0078

15.2 Compact Modules of Series 61.50

Order Number	061.50.*nn*.Ax.*XX*	061.50.*nn*Bx.*XX*	061.50.*nn*.Cx.*XX*
Adjusted rated current (sine crest value)	7 A	7 A	10 A
Adjusted peak current (sine crest value)	10 A	20 A	40 A
T_{max} for the peak current	3 s		
Code letter of output stage	A	B	C
Temperature range	0°C to 60°C		
Ambient temperature for 100 % performance	40°C		
Power reduction for T > 40°C	-1.5 % per 1°C		
Width	16 TE		
Height	6 HE		

nn is replaced by the code for the evaluation according to the table below:

Code	Commutation	Motor Type	Evaluation	Logic Card	TE
11	sinusoidal	servo motor	resolver	61.01.0022	16
15	trapezoidal	servo motor	Hall effect sensor	61.01.0027	16
21	sinusoidal	synchronous linear motor	optical lenght measuring system	61.01.0023	16
23	sinusoidal	synchronmotor	incremental decoder	61.01.0023C	16

x Code letter for the intermediate circuit voltage
C 150 V_{DC} to 325 V_{DC}; 1.80 kW; supply 3 × 110 V_{AC} to 3 × 230 V_{AC};+10 %
D 48 V_{DC} to 80 V_{DC}; 0.36 kW; supply 3 × 34 V_{AC} to 3 × 56 V_{AC}

XX is replaced by the code for the accessory module, page 257.

The order number for a CNC module
- for sinusoidal commutated servo motors with resolver evaluation
- rated current of 7 A
- peak current of 20 A
- an intermediate circuit voltage of 325 V_{DC} and
- the accessory module “Profibus”

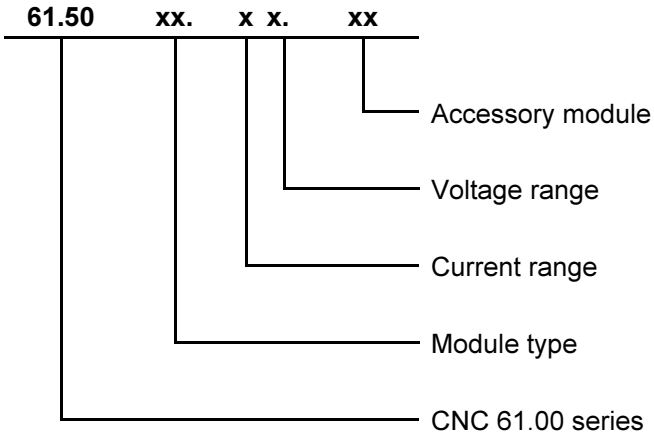
would be:
61.50.11.BC.AB

15.2.1 Back Planes

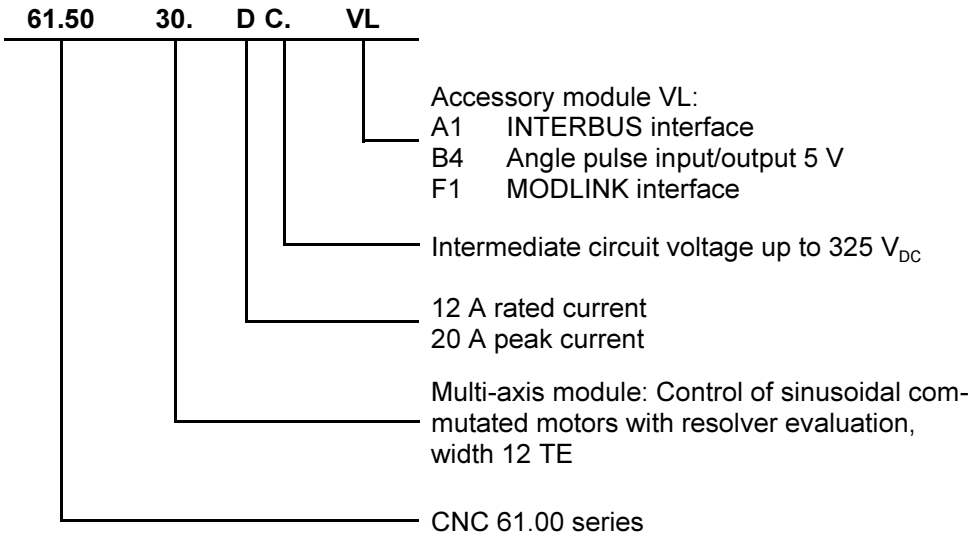
Order Number	Mounting As	Impossible Accessory Modules	TE
61.01.0019	wall mounting	AA, G1	16
61.01.0028	swing frame	G1	16
61.01.0051	swing frame	A1, F1	16

61.01.0057	wall mounting	A1, AA, AB, AE, AF, D1, F1	16

15.3 Module Identification

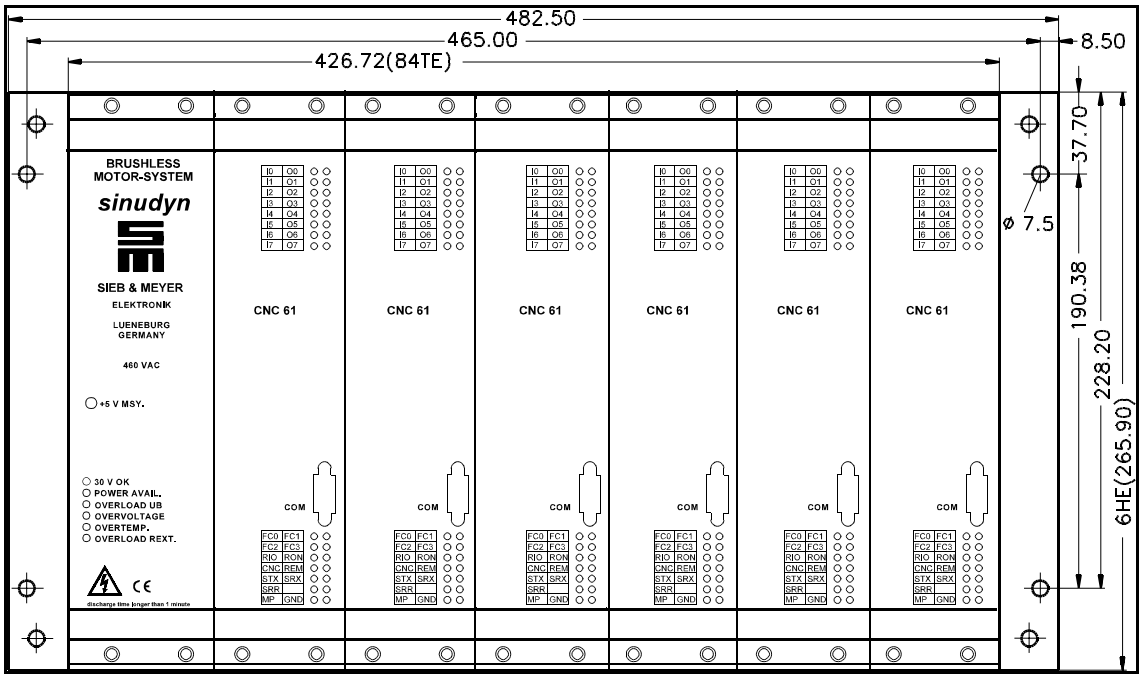


Example

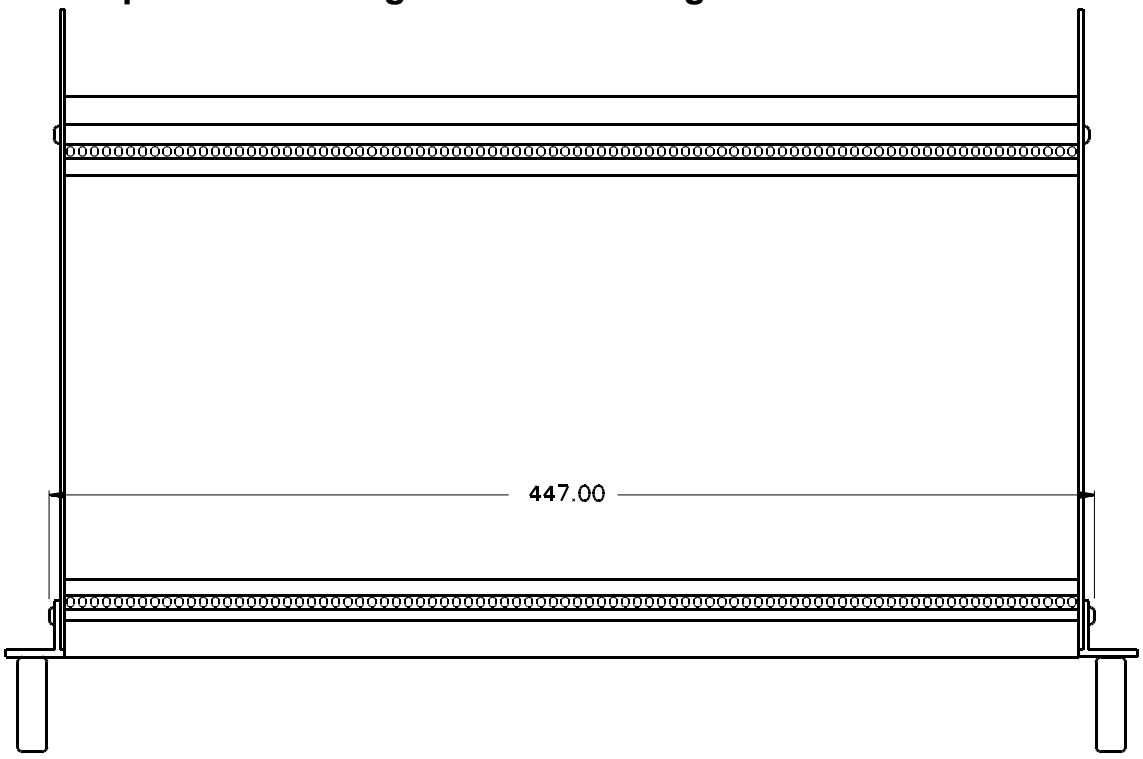


16 Dimensioned Drawings

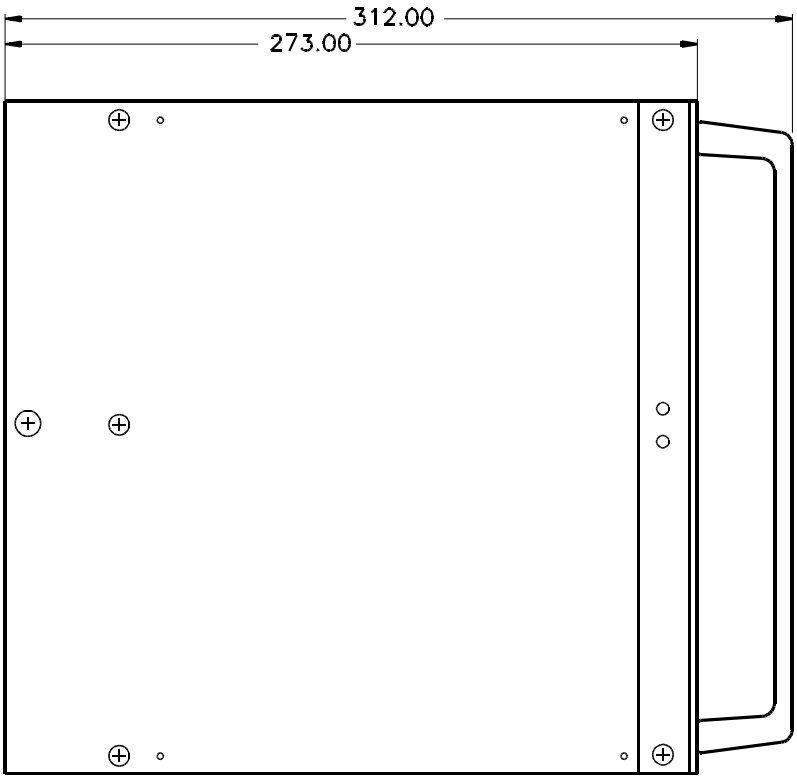
16.1 Front View of Swing Frame Mounting



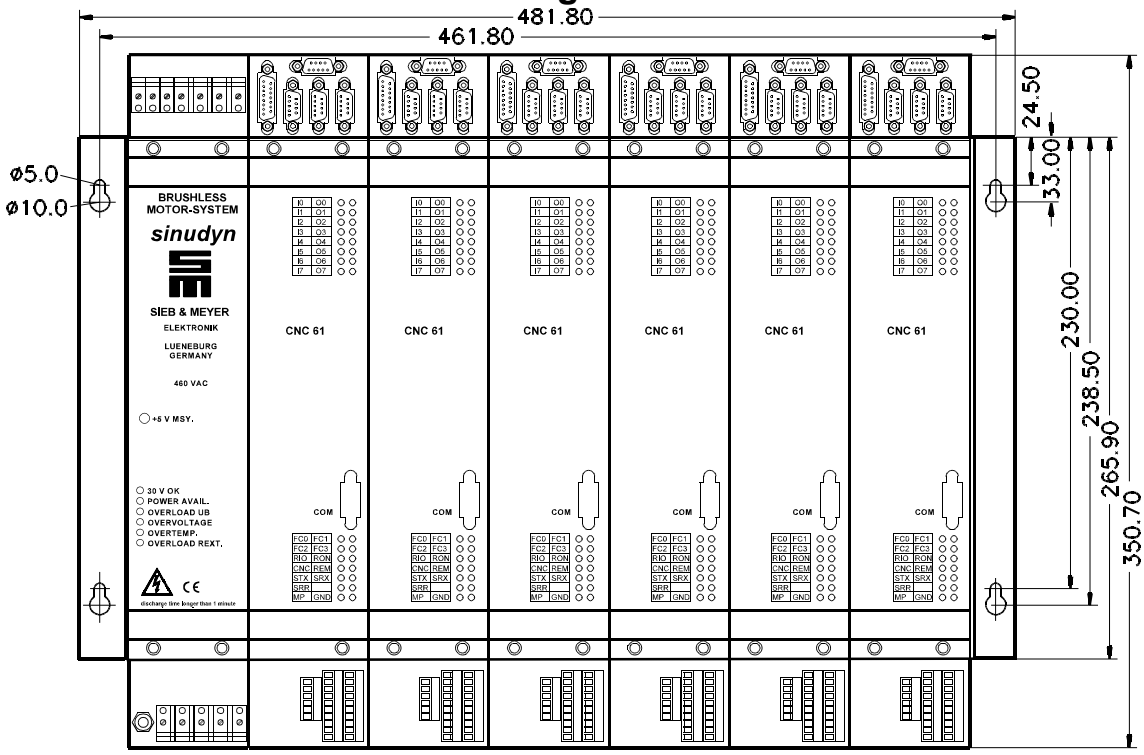
16.2 Top View of Swing Frame Mounting



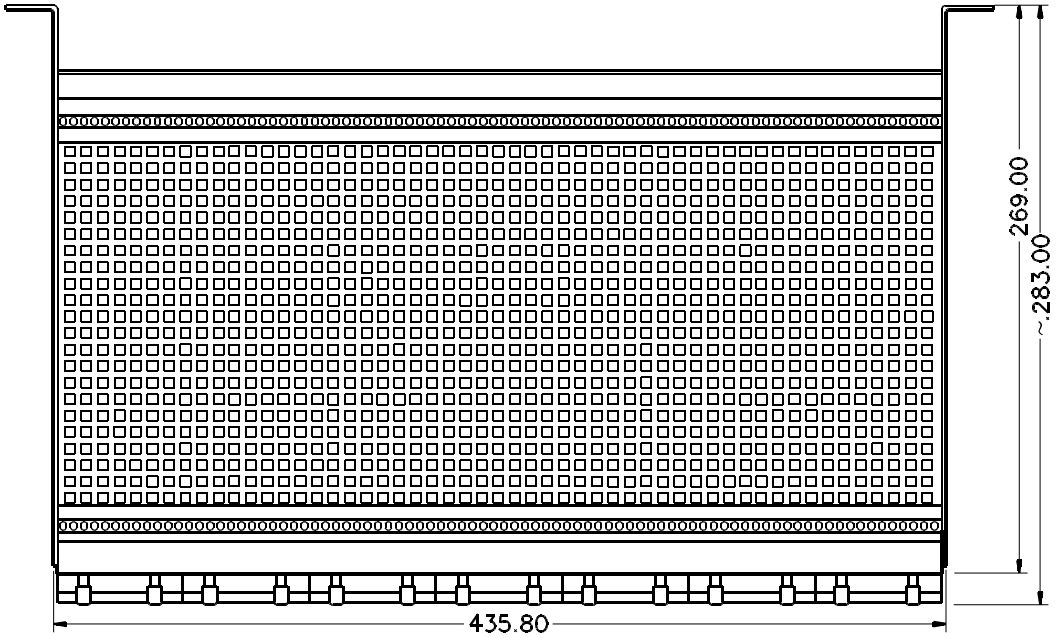
16.3 Side View of Swing Frame Mounting



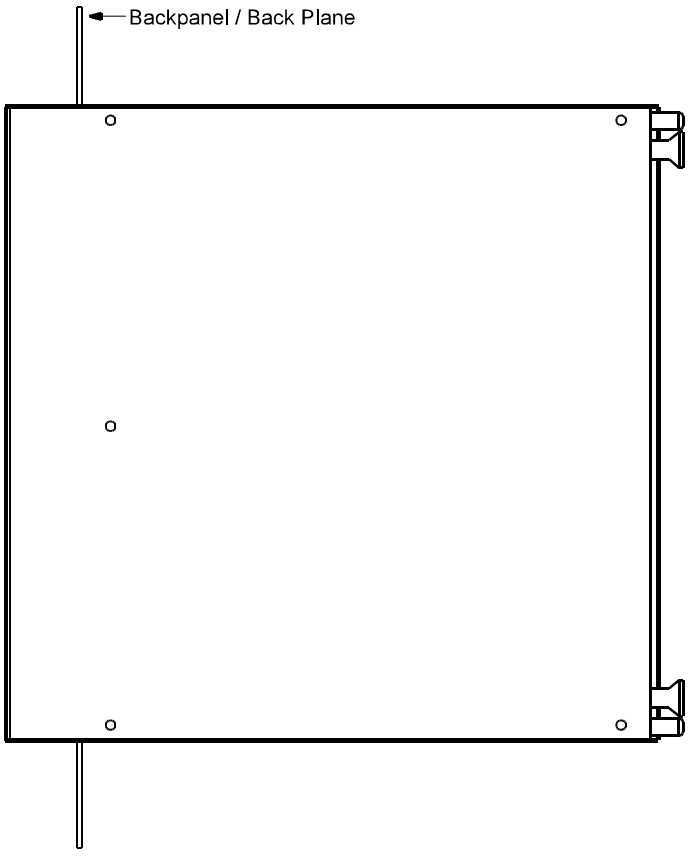
16.4 Front View of Wall Mounting



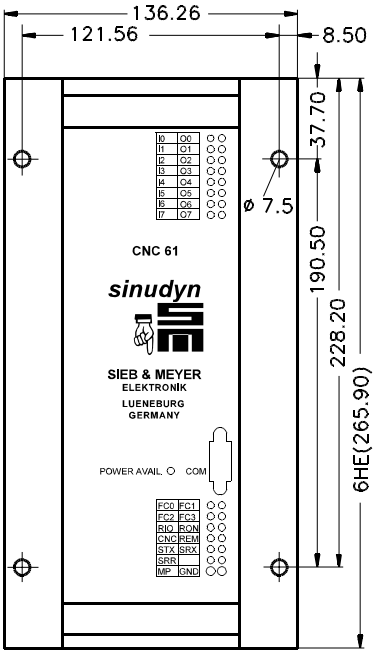
16.5 Top View of Wall Mounting



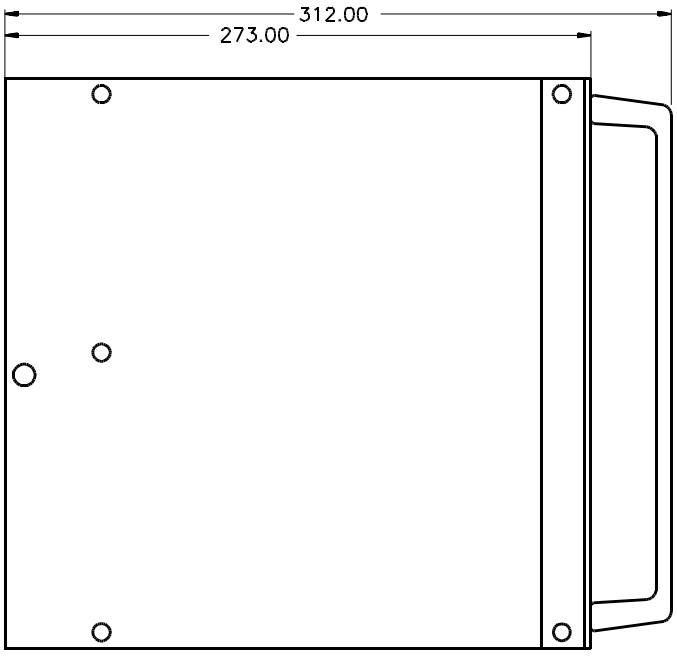
16.6 Side View of Wall Mounting



16.7 Swing Frame Mounting: Compact Module

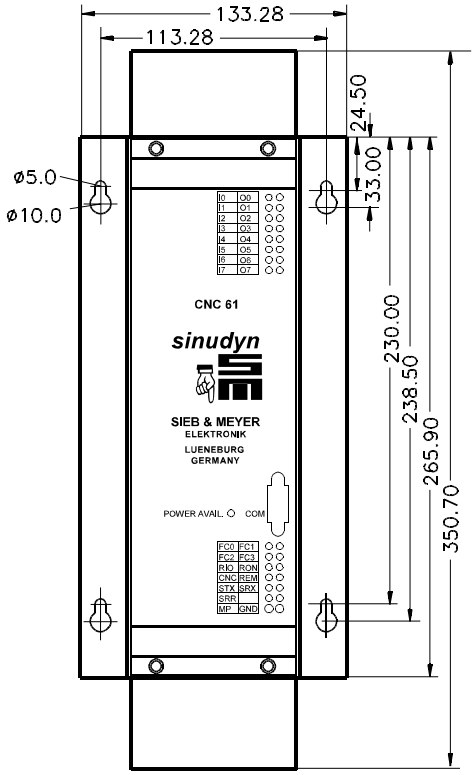


Front

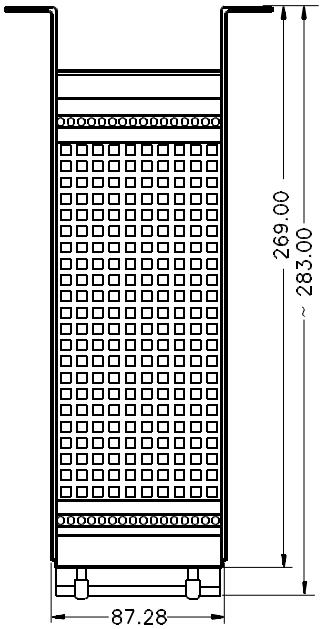


Seitenansicht / Side View

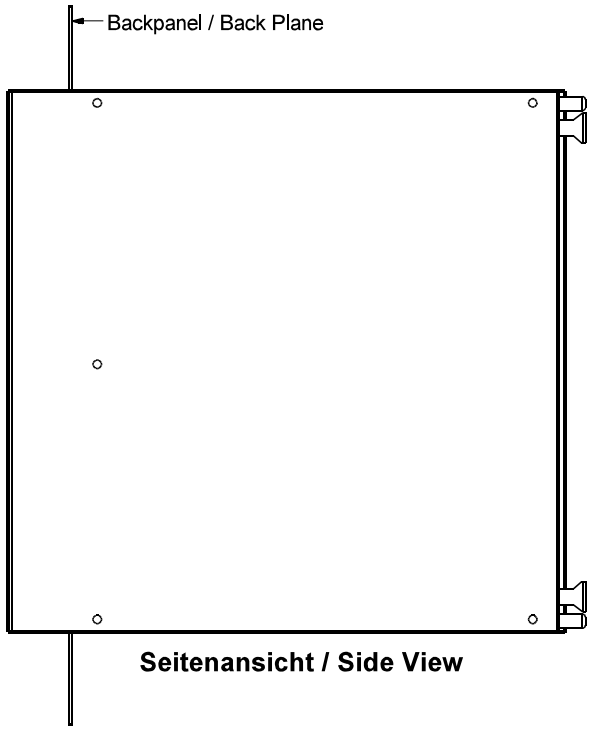
16.8 Wall Mounting: Compact Module



Front



Draufsicht /
Top View



Seitenansicht / Side View

17 Accessories

17.1 Accessory Modules

Code	Accessory Module	Order Number	Socket
A1	INTERBUS interface	026.44.0056	A
A2	Second serial interface	026.44.0073	
A3	Transducer interface	026.44.0053A	
A4	Analog input module	026.44.0053B	
A5	Transducer and second serial interface	026.44.0067A	AB[1]
A6	Analog input module and second serial interface	026.44.0067B	
AA	Transducer and two serial interfaces	061.01.009	A
AB	Profibus-DP interface	061.01.0012	
AE	Transducer and Profibus-DP interface	061.01.0033	
AF	Active transducer and Profibus-DP interface	061.01.0033A	
AG	Passive twin transducer, 2 serial interfaces, Profibus interface and angle pulse input 5 V	061.01.0043/.0049	AB[1]
AH	Active twin transducer, 2 serial interfaces, Profibus interface and angle pulse input 5 V	061.01.0043/.0044	
B1	Interface for incremental encoder 5 V	061.01.0020B1	B
B2	Interface for incremental encoder 24 V	061.01.0020B2	
B3	Angle pulse output module 5 V	061.01.0020B3	
B4	Angle pulse output and input 5 V	061.01.0020B4	
B5	Angle pulse input module, 2-fold, with 5 V level	061.01.0020B5	
B7	Counter input and angle pulse output 5 V	061.01.0020B7	
B8	Counter input and angle pulse output 5 V	061.01.0020B8	
B9	Angle pulse input module, 2-fold, with 5 V/24 V levels	061.01.0020B9	
BA	Angle pulse input 24 V/angle pulse output 5 V	061.01.0020BA	
C1	I/O expansion interface	026.44.0054	C
C2	SSI interface, comprising the I/O expansion interface, an input for an incremental encoder with 5 V level and an input for an absolute value encoder	026.44.0079A	BC[2]
C3	SSI interface, comprising the I/O expansion interface, an input for an incremental encoder with 24 V level and an input for an absolute value encoder	026.44.0079B	
C4	SSI interface, I/O expansion and angle pulse output 5 V	061.01.0035	
D1	CAN Bus interface	026.44.0055	D
E1	battery-buffered RAM and real time clock	026.44.0065	E
F1	MODLINK interface		F[3]
G1	ETHERNET interface	061.01.0042	G[3]

The modules A3, A4, B1, B2, B3 and C1 can be used for all back planes.

17.1.1 Combinations of Accessory Modules

Code	Description	Code	Description
V1	Modules A4, C1 and D1	VV	Modules A1 and B1
V2	Modules C1 and F1	VW	Modules AE and F1
V3	Modules B3 and C1	VX	Modules A4 and B1
V4	Modules A4 and C1	VY	Modules B8 and D1
V5	Modules B1 and C1	VZ	Modules AB and B4
V6	Modules V1 and B1	W1	Modules AA and E1
V7	Modules B4 and C1	W2	Modules B1, C1 and D1
V8	Modules A4, B4 and C1	W3	Modules B5, C1 and D1
V9	Modules A4, B3 and C1	W4	Modules A3 and G1
VA	Modules A5 and C1	W5	Modules A4, B4 and D1
VB	Modules A1 and B2	W6	Modules A4 and D1
VC	Modules A4, B1 and C1	W7	Modules AH and E1
VD	Modules A4 and B4	W8	Modules AH, E1 and G1
VE	Modules B1 and D1	W9	Modules AG, E1 and G1
VF	Modules B3 and D1	WA	Modules A2 and C1
VH	Modules B4 and D1	WB	Modules B5 and C1
VI	Modules A1, C2, and F1	WC	Modules C1 and G1
VJ	Modules A3, B1 and C1	WD	Modules AG and E1
VK	Modules A5 and E1	WE	Modules C1 and D1
VL	Modules A1, B4 and F1	WF	Modules AF, E1 and G1
VM	Modules A1, B5 and F1	WG	Modules AB and C2
VN	Modules A1 and F1	WH	Modules B5 and D1
VO	Modules A3, B1, C1 and E1	WI	Modules AB, B4 and D1
VP	Modules A4, B2 and C1	WJ	Modules A4 and G1
VR	Modules A3 and E1	WK	Modules C4 and AB
VS	Modules AA, B1, C1 and E1	WL	Modules A5, C1 and G1
		WM	Modules A3, B1, C1 and G1
		WN	A1, C4 and F1
		WO	AA, B1, C1 and G1

17.2 External I/O Expansion Modules

17.2.1 E/A Modules 44.20.*xx*

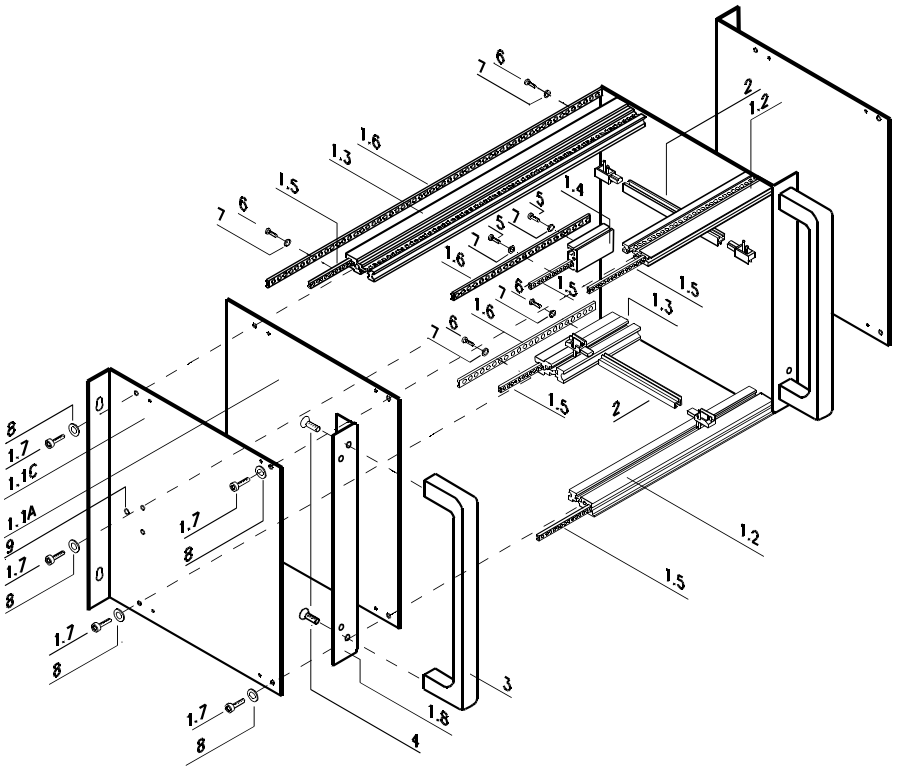
Order Number	Description
044.20.008	I/O module, 8 inputs and 8 outpus 24 V, cannot be cascaded, with flat connector
044.20.008B	I/O module, 8 inputs and 8 outputs 24 V, cannot be cascaded, with Submin D connector
044.20.012	I/O basic module for the I/O modules 044.20.014/.013/.053/.028
044.20.014	Input module, 16 inputs, 24 V
044.20.013	Output module, 16 outputs, 24 V
044.20.0028	Output module, 8 outputs, 24 V, 1 A each
044.20.0051	Output module, 8 outputs, 24 V
044.20.0053	Outputs module, 8 outputs, 24 V, 1 A each

17.2.2 I/O Modules 50.06

Module Designation	Function	Components
50.06.1x	Basic module I/O	50.06.0200.x 50.06.0500.x with up to 64 physical connections
50.06.2x		
50.06.3x		
50.06.1xx	Expansion module I/O	50.06.0500.x with up to 64 physical connections
50.06.2xx	Basic module I/O with customized PCB	50.06.0200.x 50.06.0500.x with up to 56 physical connections 50.06.01xx.x with up to 8 physical connections
50.06.3xx	Basic module B (bidirectional)	50.06.0200.x 50.06.0500.x with up to 64 bidirectional physical connections
50.06.4xx	Expansion module B (bidirectional)	50.06.0500.x with up to 64 bidirectional physical connections
50.06.5xx	Basic module B (bidirectional) with customized PCB	50.06.0200.x 50.06.0500.x with up to 56 bidirectional physical connections 50.06.01xx.x with up to 8 physical connections
50.06.10xx	reserved	
50.06.12xx	reserved	
50.06.20xx	reserved	

17.3 Chassis
17.3.1 Chassis for the Multi-Axis Modules

Order Number	Description
EG6.84.A00	Chassis, 19 inch, 84 TE, 6 HE, for swing frames, for 1 power and up to 5 CNC 61.00 modules
EG6.84.C00	Chassis, 19 inch, 84 TE, 6 HE, for wall mounting, for 1 power and up to 6 CNC 61.00 modules
Special chassis	
EG6.xx.A00	for swing frames, can be supplied in the sizes of up to 40 TE, up to 60 TE, up to 84 TE, up to 110 TE and up to 126 TE (xx = width in TE)
EG6.xxC00	for wall mounting, can be supplied in the sizes of up to 40 TE, up to 60 TE, up to 84 TE, up to 110 TE and up to 126 TE (xx = width in TE)

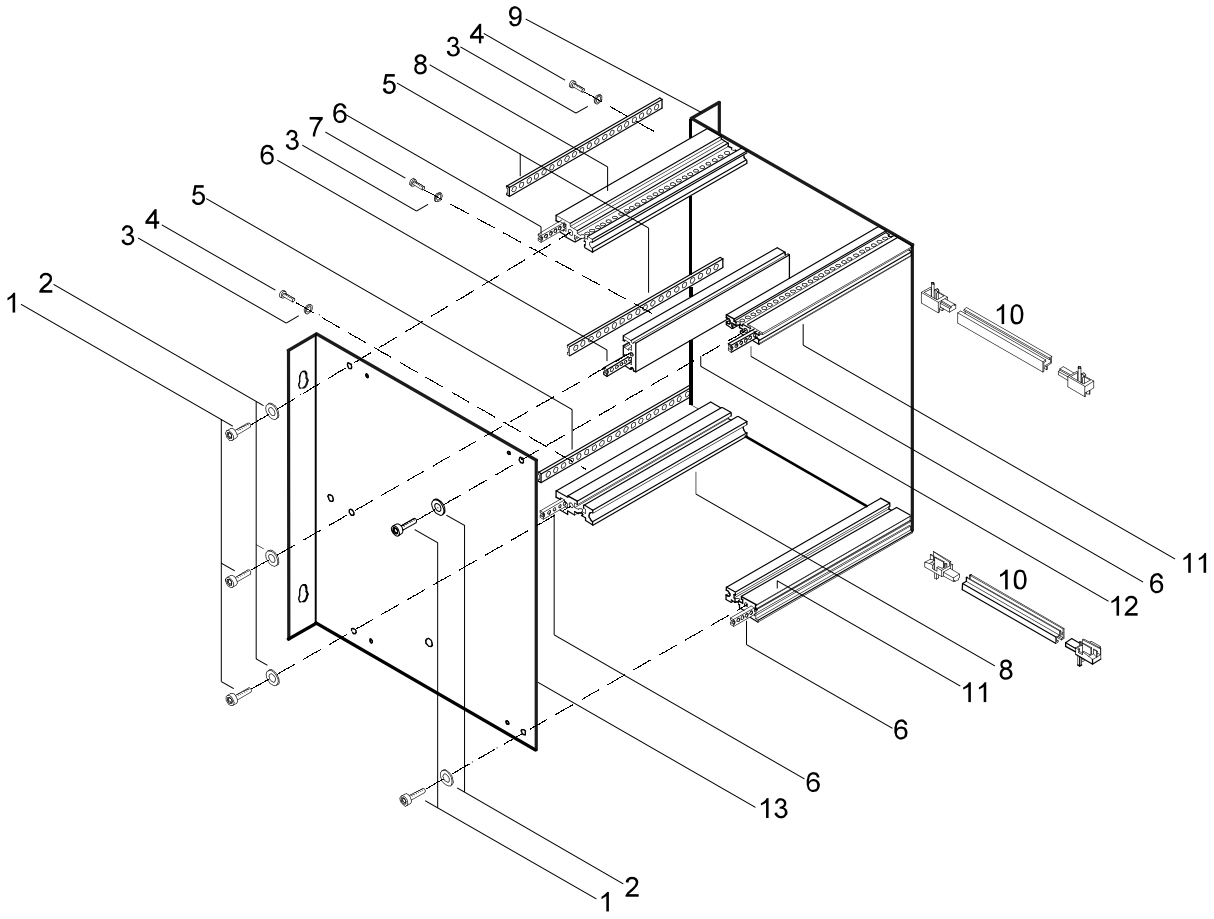


1.1A/C	Aluminum side panels BA 6/1 (right/left)
1.2	Aluminum front rail 84 TE
1.3	Aluminum rear rail 84 TE
1.4	Central aluminum rail 84 TE
1.5	Brass rail with tapped hole M2.5
1.6	Plastic rod with hole
1.7	Phillips screw M4×12
1.8	rack angle plate, anthracite, 6 HE
2	Aluminum card guide rails, 180 mm in total
3	Housing grips
4	Countersunk head screws M5×10
5	Pan head screws M2.5×10
6	Pan head screws M2.5×12
7	Crinkled spring washer M2.5
8	Crinkled spring washer M4

9 Fixing hole for the grounding

17.3.2 Chassis for the Compact Modules

Order Number	Description
EG6.16.5A	Chassis, 19 inch, 6 HE, for swing frames
EG6.15.5C	Chassis, 19 inch, TE, 6 HE, for wall mounting



1 4 × 12 raised fillister head screw, DIN 7985, zinc coated
2 4.3 mm spring washer, DIN 137, zinc coated
3 2.6 mm spring washer, DIN 137, zinc coated
4 2.5 × 12 raised fillister head screw, DIN 7985, zinc coated
5 Isolating rod 84 TE
6 Threaded rod M2.5, 147.32 mm web
7 2.5 × 10 raised fillister head screw, DIN 7985, zinc coated
8 Rear profile, 6 HE, 147.32 mm hole
9 BA 6/16 side element, wall-mounted mains filter, 266 mm
10 Card guide rail, 6 HE, 161.50 mm
11 Front profile, 147.32 mm hole
12 Central profile, 6 HE, 147.32 mm
13 BA 6/22 side element, 6 HE, left

17.4 Blind Front Panels

If not all spaces are equipped with CNC 61.00 modules in a 19 inch chassis, the gaps can be covered with blind front panels.

Width	Order Number
2 TE	F06.02.00.00
4 TE	F06.04.00.00
8 TE	F06.08.00.00
12 TE	F06.12.00.01
14 TE	F06.12.00.00

18 Electric Performance Dimensioning

Experience shows that questions arise during the dimensioning of a drive when selecting output stages and power supplies. This chapter shall make clear the physical background and shall help to correctly dimension the electronic components.

18.1 Components

18.1.1 Output Stage

The output stage of a servo amplifier is specified by the following details:

Voltage Range

The maximum intermediate circuit voltage is limited by the used transistors and capacitors and the minimum space between the circuit-board conductors.

Components have an electric strength of 600 V_{Dc} at output stages with a max. admissible intermediate circuit voltage of 325 V_{DC} (class C), that means: at an AC supply of 230 V_{AC}. The reserve is necessary to preclude damages at surge voltages and to protect the higher intermediate circuit voltages during the deceleration.

Current Range

The current range specifies the max. admissible currents. Distinction is made between peak and rated current:

- The **peak current** is only admissible for a short time (mostly 5 seconds) and depends on the used transistors and their number.
- The **rated current** can be provided continuously by the output stage. Its value depends on the cooling of the transistors, that means: the capacity of the used heatsink and its ventilation.

18.1.2 Power Supply

The power supply is specified by the following details:

Voltage Range

The maximum voltage supply is limited by the used transistors, diodes and capacitors and the minimum space between the circuit-board conductors.

Current Range

The current range specifies the max. admissible currents. Distinction is made between peak and rated current:

- The **peak current** is only admissible shortly (mostly 1 second) and depends on the used diodes and their number.
- The **rated current** can be provided continuously by the power supply. Its value depends on the cooling of the diodes, that means: the capacity of the used heatsink and its ventilation.

Capacity

In practice, a maximum permanent power is specified, since the supply voltage is assumed to be constant. Since the limitation in the power supply is determined by the load carrying capacity of the diodes, the maximum permanent power depends on the supply voltage and the type of supply.

Examples:

Supply 230 V_{AC}, 2 phases, max. permanent current of diodes 6 A

$230V_{AC} \times 2 \times 6\ A = 2.76\ kW$

Supply 400 V_{AC}, 3 phases, max. permanent current of diodes 6 A

$400V_{AC} \times 3 \times 6\ A = 7.20\ kW$

The maximum peak current depends on the diode type.

The **protection** is calculated as follows:

$$\frac{\text{Capacity}}{\text{Supply}} = \frac{2{,}76\text{kW}}{230V_{Ac}} = 12A_{r.m.s}$$

18.1.3 Motor

Among other things, the motor is specified by the following details:

Peak Current

The peak current defines the max. admissible motor current. The peak current is only admissible for short times (between 1 and 30 seconds) and depends on the used motor material and the thickness of the coil wires. The motor manufacturer normally specifies the peak current for standstill and the rotating field. Normally, the specifications are r.m.s. values.

Rated Current

The rated current can permanently impressed to the motor. Its value depends on the motor cooling, the coils and the max. admissible motor temperature. The motor manufacturer normally specifies the rated current for standstill and the rotating field. Normally, the specifications are r.m.s. values.

Voltage Constant

Due to the underlying inductance, the motor generates during the operation a negative field voltage, which is opposite to the provided voltage. This voltage is proportional to the speed and is specified in volt per 1,000 revolutions. The specifications are normally r.m.s. values and are measured between the connection terminals.

Example:
Intermediate circuit voltage: 325 V, e.m.f.: 100 V /1,000 revs.

Only 225 V are provided per 1000 RPM for controlling the motor. The motor has the theoretical max. speed of 3,250 RPM. At this speed no torque is provided, since a current cannot be impressed.

Torque Constant

The torque constant specifies the ratio between the motor current and the motor torque (Nm/A). The torque constant is the result of required the max. speed, the dynamics, the efficiency and the quality of the magnet material.

Inductive Coil Resistance

The inductive coil resistance (ωL) results from the number of windings of the coil. It is zero during the standstill. The resistance increases with the frequency.

Ohmic Coil Resistance

The ohmic coil resistance R results from the length and thickness of the wires. During the standstill only it specifies the coil resistance.

Electric Time Constant

The electric time constant results from the ohmic and the inductive resistance ($\tau = L/R$)

Nut Setting Motors

Nut setting motors usually are high dynamic, with high peak speed, high peak torque, low mass inertia and low rated torque. As a result, the voltage constant and inductance are low, the wires of the coil are thin and the rotor diameter is small. Due to the low inductance, nut setting motors are operated with a high pulse width modulation (PWM frequency 16 kHz) to keep the current ripple low.

18.2 Power Consumption of a Drive

If a constant torque is taken from the drive, the power consumption will depend on the actual speed.

Examples:

Preset torque:	30 Nm
Intermediate circuit voltage:	300 V
Voltage constant:	50 V / 1,000 RPM
Coil resistance:	1 Ω
Torque constant:	1 Nm / A

From this results a motor current of

$$I = \frac{30Nm}{1Nm / A} = 30A$$

The motor requires a voltage of U = 1 Ω × 30 A = 30 V

0 RPM, Standstill

From this results a power of P = 30 V × 30 A = 0.9 kW
At an intermediate circuit voltage of 300 V an input current results from the supply voltage of I = P / 300 V = 3 A
Thus, in the power supply considerably less current flows than in the motor. This reflection is very important especially for nut setting applications, since the high torques and currents are only required for low speeds.

2,000 RPM

At 2,000 RPM the motor requires a voltage of U = R × I + e.m.f. × n = 1 Ω × 30 A + 50 V / (1,000 RPM) × (2,000 RPM) = 130 V.
From this results a power of P = 130 V × 30 A = 3.9 kW.
At an intermediate circuit voltage of 300 V an input current results from the supply voltage of I = P / 300 V = 13 A.
In the power supply thus a considerable higher current flows at 2,000 RPM than at standstill.

5,400 U/min

At 5,400 RPM the motor requires a voltage of U = R × I + e.m.f × n = 1 Ω × 30 A + 50 V /(1,000 RPM) × (5,400 RPM) = 300 V.
From this results a power of P = 300 V × 30 A = 9 kW.
At an intermediate voltage of 300 V an input current results from the supply voltage of I = P / 300 V = 30A.
The identical current value thus flows in the power supply at 5,400 RPM than in the motor.

It must be considered, that the currents, flowing in the motor phases, are lower by factor $\sqrt{3}$ than the currents, calculated above.

The examples clearly show that the expected motion profile must be considered for the dimensioning of the power module. An exact dimensioning is only possible by integrating the motion profile.

This also applies for the dimensioning of the output stage and the motor.

19 Appendix: Revisions

The appendix describes alterations, made in comparison to the version with the identification number “061-cnc-tec61.50/r1-sm-en-hg/ca” of October 6, 1997.

Identification Number “061-cnc-tec61.50/r2-sm-en-hg/ca”
of March 31, 1999

This technical manual has totally been revised. Worth mentioning are:
- The insertion of new back planes
- The insertion of new accessory modules
- The omission of the technical data and order numbers as well as the dimensioned drawings. This information can now be found in a separate manual.

Identification Number “061-cnc-tec61.50/r3-sm-en-hg/ca”
of October 22, 1999

Chapter “Safety Instruction and Application Advice”
Section “Appropriate Use”: Supplement to the third paragraph.

Chapter “Wiring”
Section “General Information”: The table regarding the conductor cross-sections has been deleted. A general information referring to the DIN EN 60204-1 has been inserted.

Chapter “Back Planes” und “Pin Assignment”
Both chapters have been combined to “Back Planes and “Pin Assignment”. Other subdivision.
The back plane 61.01.0038 has been inserted.

☞ *The version r3 has never been published, since alterations came up in the meantime. The above mentioned alterations are also valid for version r4.*

Identification Number “061-cnc-tec61.50/r4-sm-en-hg/ca”
of March 3, 2000

Chapter “Wiring”
Section “Wiring of the 24 V (Internal/External)”: The drawing has been modified.

Chapter “Front Panels”
The section “Front Panel of the Power Module 26.50.42*xx*” has been changed for the upgraded power module 26.50.65.
The section “STX / SRX / SRR - ...” has been revised.

Chapter “Back Planes and Pin Assignment”
Section “X1 - Connection of First Measuring System (Feedback)”: The assignment for the evaluation with Hall sensors has been modified for all back planesl (exception: power module).
Additional assignment to the connection “X8 - Transducer Connection” for all back planes, providing this connector.
Additional assignment to the connection “X14 - Transducer/Analog Input” for all back planes, providing this connector.

Section “Back Planes of the Power Module ...” has been modified, since the power module 26.50.42 has been replaced by the power module 26.50.65.

Chapter “Accessory Modules”
The accessory module AF has been added.

The chapter “Cables” has been added to the end of this technical manual.

Identification Number “061-cnc-tec61.50/R005-sm-de-hg/ca/ac”
of July 18, 2002

The hardware description has been revised completely. Worth mentioning are the following alterations/additions:
Section 8.4.2 "Possible Causes for an Error" has been added.
Chapter 7 "Safeguard (Preventing Unintentional Start)": The figure has been revised.
Section 10.14 "B - Universal Angle Pulse Module" has been revised.

Identification Number “061-cnc-tec61.50/R006-sm-de-hg/ca/ac/she”
of March 31, 2004

The chapter "Safeguard" has been deleted.
The fuses in figure "Power Module Card 26.50.0038.xx/26.50.0073.xx" has been described.
The bus system "INTERBUS and MODLINK" has been added.
2 accessory modules of the bus connections X5 and X6 has been deleted.

Identification Number “061-cnc-tec61.50/R007-sm-de-hg/ca/ac/she”
of August 25, 2004

The table concerning the fuses on the card of the power module 26.50.0038.xx/ 26.50.0073.xx has been added.

Identification Number “061-cnc-tec61.50/R008-sm-de-hg/ca/ac/she/uh”
of April 04, 2013

Chapter 12.1.2: Cable pin assignment corrected.