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Operating Manual

XCx 700

Operating Manual XCx 700 Version 07/05
Article No. R4.322.2220.0 (322 385 31)



Target Group

These operating manual have been written for trained personnel with specialised knowledge. There are special demands on the selection and training of the personnel who work on the automation system. Suitable personnel are, for example, electricians and electrical engineers who have had the relevant training (see also Safety-related information, "Selection and Qualification of Personnel").

Applicability of these operating manual

Version Hardware XX / Software XX

Previous versions of these operating manual

09/03 06/04 04/05 06/05

Where can I obtain manuals?

You can download all our programming and operating manuals free of charge from our web site at <http://www.schleicher-electronic.com> or order them by writing to the following address (please quote order no.):

SCHLEICHER Electronic GmbH & Co. KG
Pichelswerderstraße 3-5
D-13597 Berlin
Germany

Additional manuals

Designation	Article No.
XCx Compact Controllers English	322 383 83
MULTIPROG Programming System acc. IEC 61131-3 English	322 158 44
Getting Started MULTIPROG English	322 380 15
Commissioning Field Bus Systems English	322 152 49
CNC Programming XCx and ProNumeric English	322 381 62
EMC Guidelines English	322 134 66

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Errors and omissions excepted. Subject to modifications.

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Document conventions

This manual uses the following signs to indicate a safety-related warning:



Possible injuries or damage to the equipment if relevant safety precautions were not to be taken.



Important information on the handling of the automation system or the respective part in the operating manual.

Object	Example
File names	MANUAL.DOC
Menus / Menu Items	<i>Einfügen / Graphik / Aus Datei [Insert / Graphic / From file]</i>
Paths / Directories	<i>C:\Windows\System</i>
Hyperlinks	<u>http://www.schleicher-de.com</u>
Program listings	MaxTsdr_9.6 = 60 MaxTsdr_93.75 = 60
Keys	<Esc> <Enter> (press first key, let go and press next key) <Ctrl+Alt+Del> (press all keys at the same time)



1 Introduction

The XCx 700 is a member of the XCx controller family with common concept of software and hardware.

For this reason use following operating manuals additionally.

For:

- Installing programming software MULTIPROG
- PLC error messages
- Field Bus CANopen
- The XCx Multi-Tasking System
- The PLC
- The CNC

Designation	Article No.
XCx Kompaktsteuerungen German	322 383 82
XCx Compact Controllers English	322 383 83

For electrically installing:

EMC Guidelines English	322 134 66
Commissioning Field Bus Systems English	322 152 49

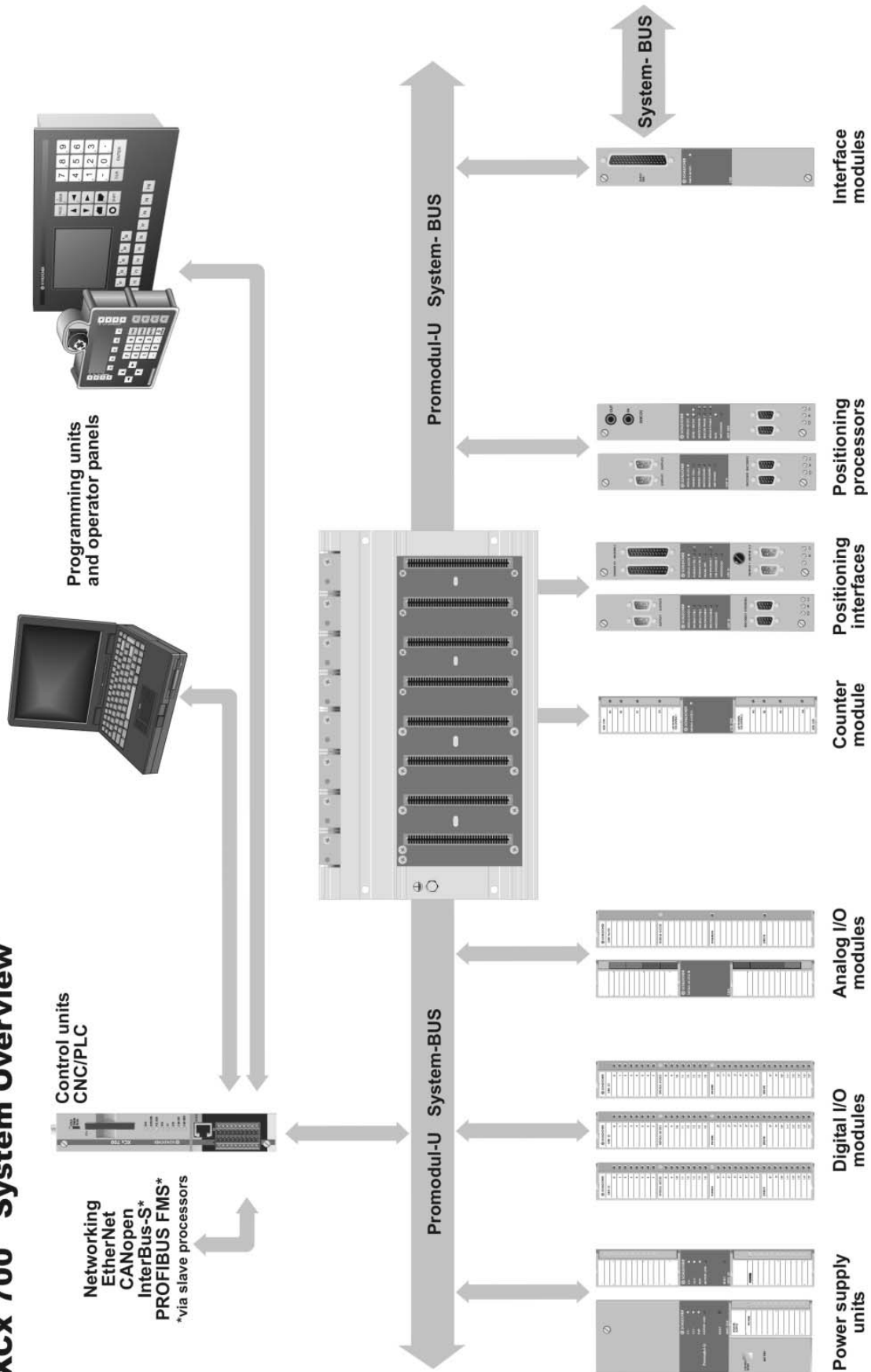
For programming:

MULTIPROG Programming System acc. IEC 61131-3 English	322 158 44
Getting Started MULTIPROG English	322 380 15
CNC Programming XCx and ProNumeric English	322 381 62

The description of Shared RAM is included in Online Help System of the XCx.

Manuals are on the XCx CDROM available also it is possible to load all manuals from the website: <http://www.schleicher-electronic.com>

XCx 700 System Overview



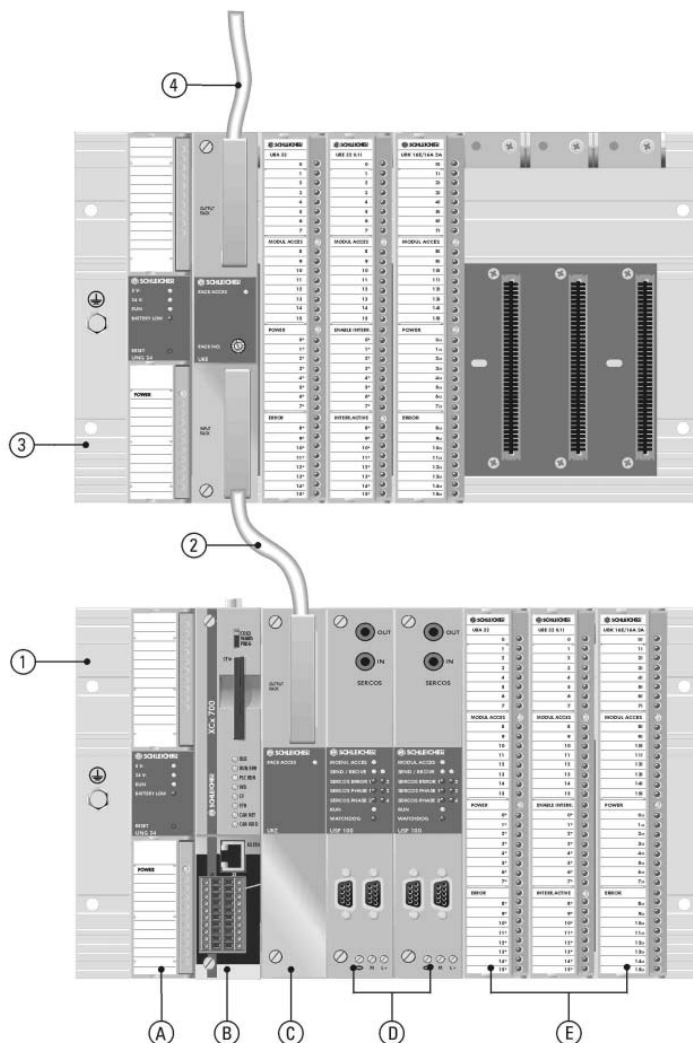
2 Controller Structure

XCx 700 is a modular automation system where up to 256 modules can be arranged on racks. Up to 4 control units can operate in parallel in multimaster mode on the first rack.



Install the automation system only inside of grounded metallic enclosures (e.g. control cabinet).
Note the "EMC Guidelines" manual part no. 322 134 66.

Connecting racks and arranging modules



- 1 Basic rack**
- 2 Interface cable* and interface modules
- 3 Extension rack**
- 4 Interface cable* to next extension rack

**All racks can be used as basic or extension racks.

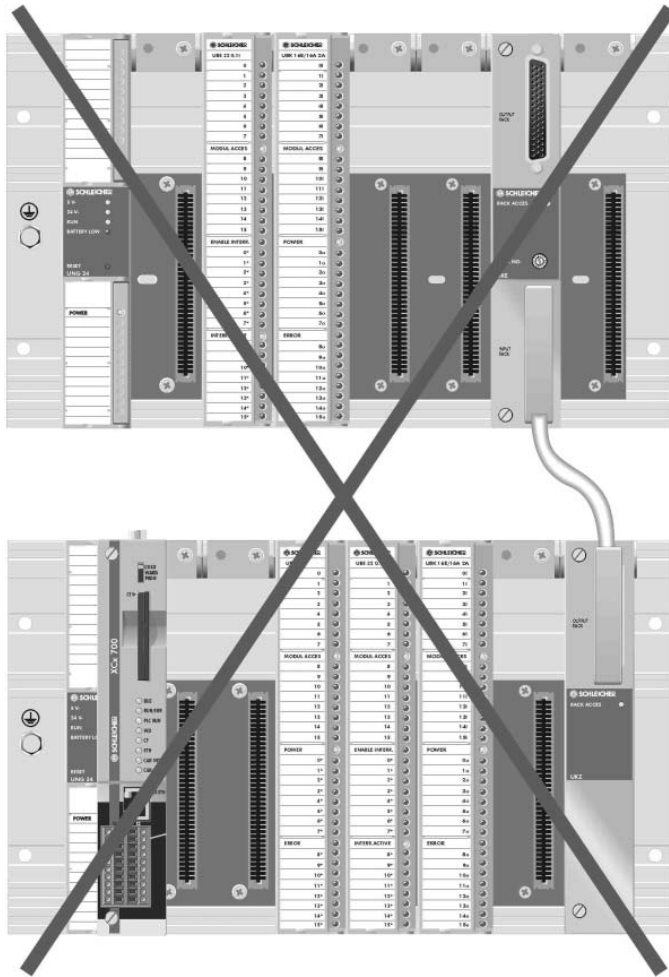
*You can use different length interface cables (see interface modules, accessories)

Interface cables which also carry power supply can only be used if:

- the rated output of the power supply unit is sufficient
- no power supply unit is fitted on the rack (power supply units must not be operated in parallel)

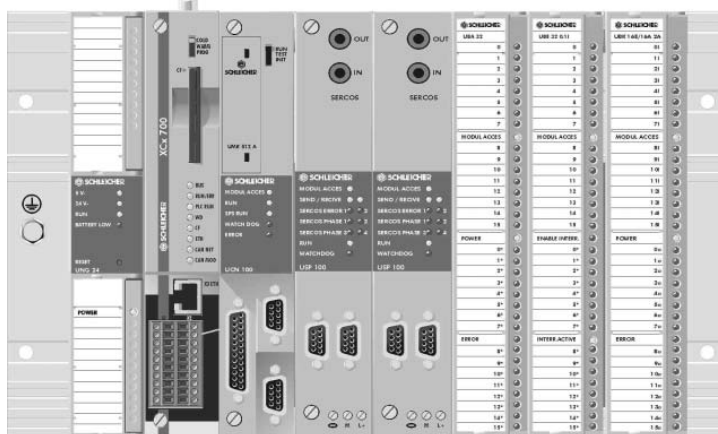
We recommend the following module arrangement for safe controller operation.

- A Power supply unit
- B Control units
Up to 4 control units can be operated in parallel. If more than one control unit is used you will also need a UKS interface module (with shared RAM) even if no extension racks are used.
- C Interface module
- D Intelligent modules
- E Digital input/output modules



The modules must be arranged without gaps on the racks.

Number of modules on the rack



The number of modules per rack depends on their power consumption (power loss).

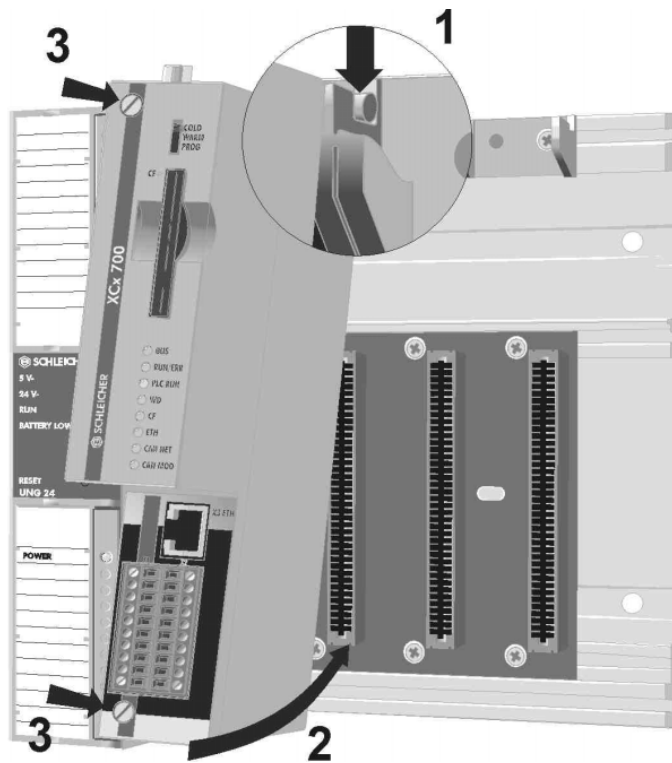
The power consumption of all modules must be less than the power supply unit output.

Power consumption on DC 24 V and DC 5 V power supplies must be added separately. The overall output of the power supply unit for both voltages must also be considered.

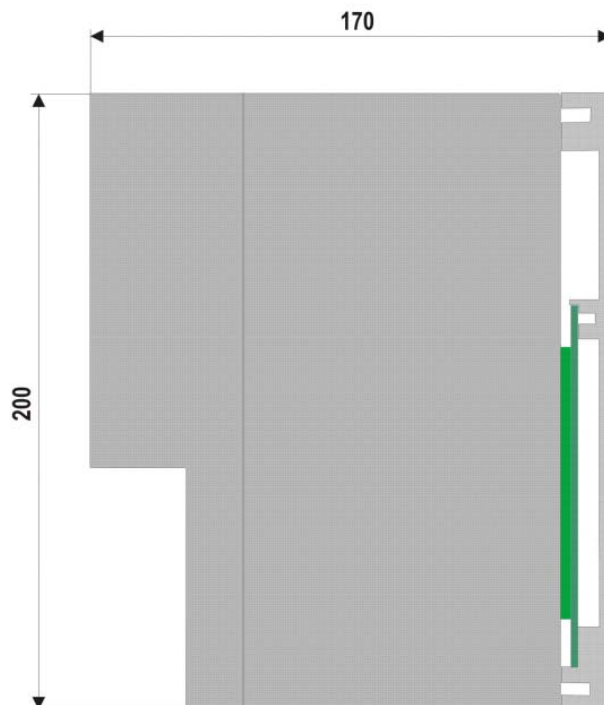
The power consumption of the modules and the output of the power supply unit is listed in the respective "Technical Data" for each module.



Installing modules on the rack



1. Hook module onto rack
2. Clip module onto contact strip
3. Tighten fixing screws



more dimensions see racks

3 UBT 4 to UBT 16 Racks

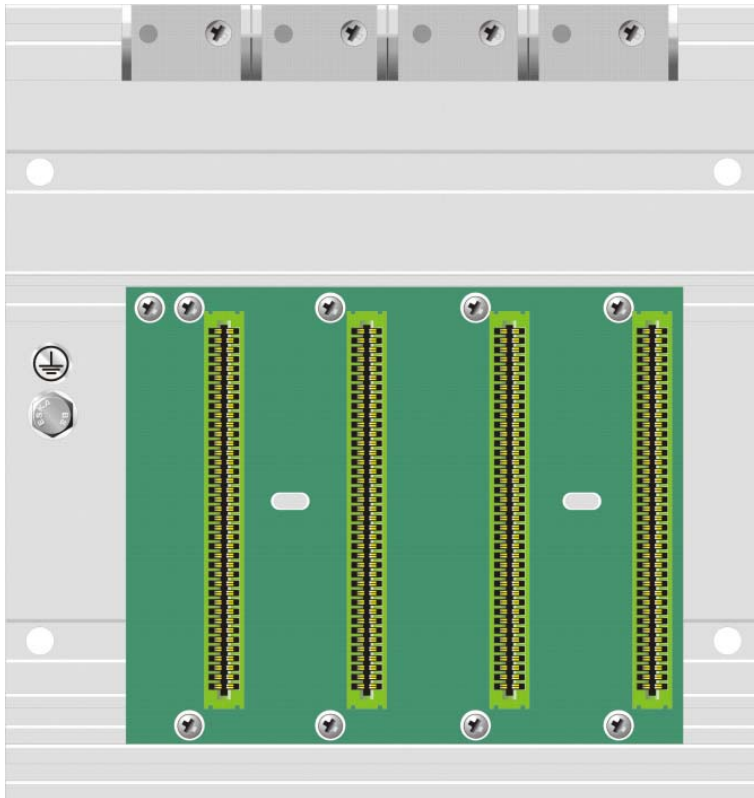


Figure: UBT 4

- Racks with different numbers of slots
UBT 4 4 slots
UBT 8 8 slots
UBT 12 12 slots
UBT 16 16 slots
- Designed for wall mounting
- Plug-in modules
- Screw fixing for modules
- Connecting screw for protective ground
- All racks can be used as basic or extension racks.

Numbering of slots on the rack starts at left with 0 (0-3, 0-7, etc.)

The spring contact strips of unused slots should be closed with the supplied empty slot covers during operation.



3.1 Racks - Technical Data

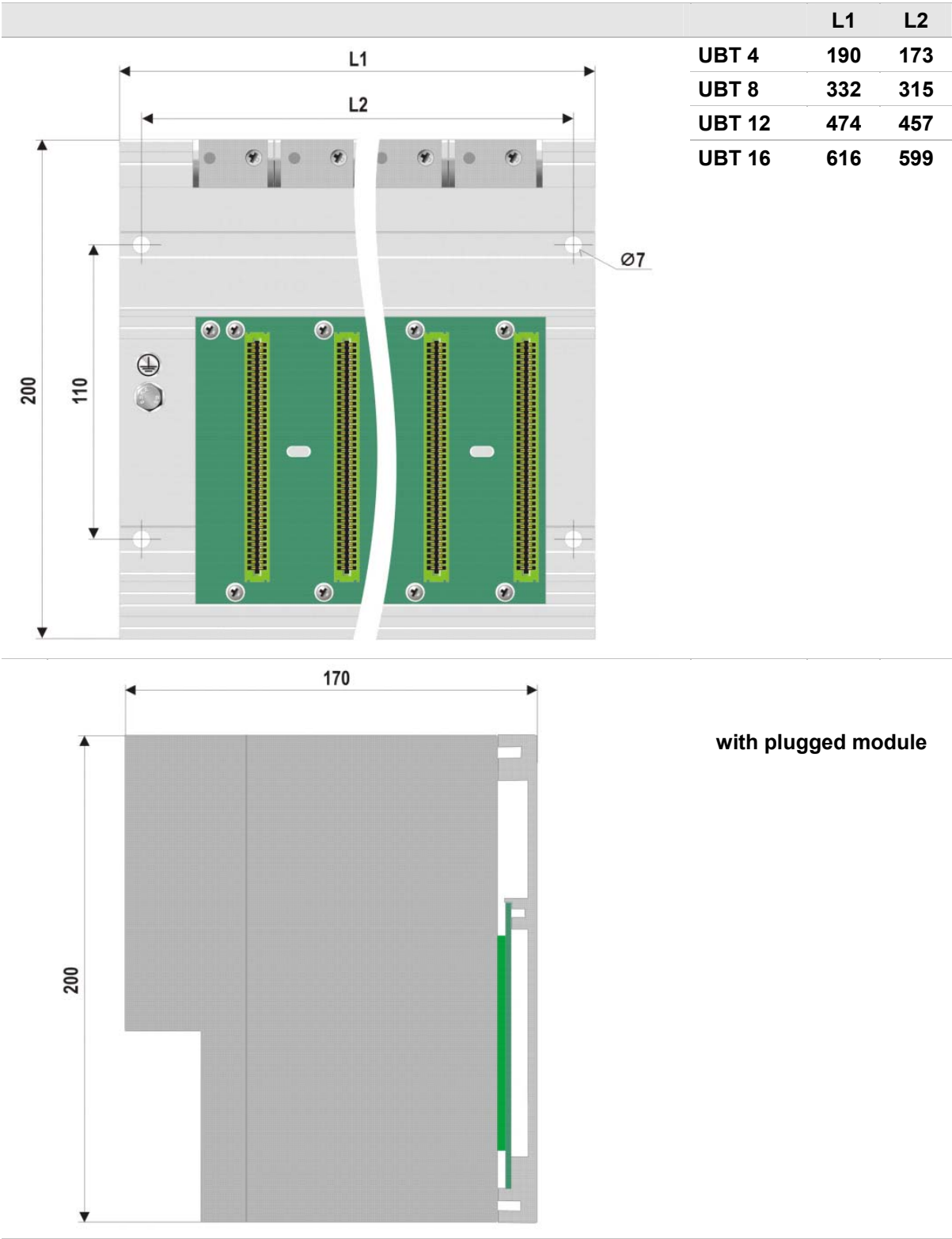
Basic data	
Number of slots	
UBT 4	4
UBT 8	8
UBT 12	12
UBT 16	16
Protective ground connection	M6 hex screw on base plate
Protection type when full	IP 20 to EN 60529
Protection type for partial configuration	IP 00 to EN 60529
Dimensions / weight	
Dimensions (W x H x D) in mm	
UBT 4	190 x 200 x 18
UBT 8	332 x 200 x 18
UBT 12	474 x 200 x 18
UBT 16	616 x 200 x 18
Weight in kg	
UBT 4	0.75
UBT 8	1.30
UBT 12	1.90
UBT 16	2.50

The information in the "Technical Data for all Modules " section also applies.

3.2 Ordering Information

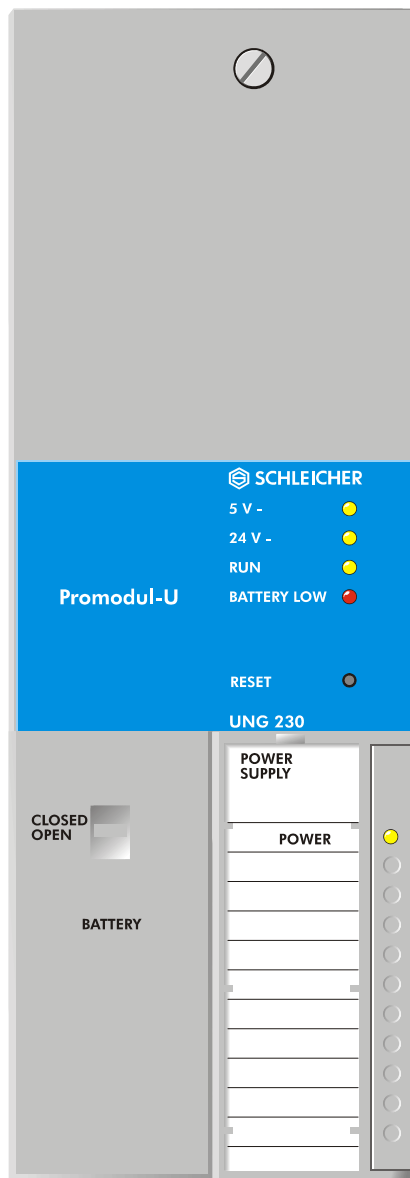
Racks	
Ordering designation	Article number
UBT 4	311 067 73
UBT 8	311 067 74
UBT 12	311 067 75
UBT 16	311 067 77

3.3 Dimensions UBT 4 to UBT 16





4 UNG 230A Power Supply Unit



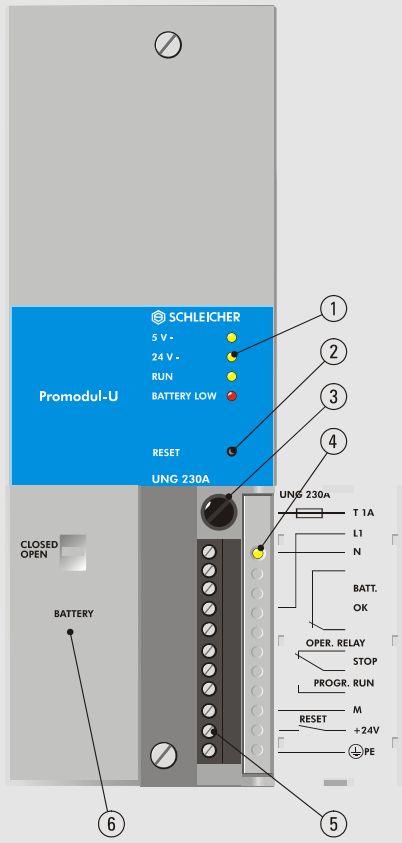
- Input voltage 230 V DC
- Integrated buffer batteries for control unit RAM
- Monitors charge in buffer battery
- Status LEDs
- Ready-for-operation relay

Attention

Power supply units must not be connected in parallel.

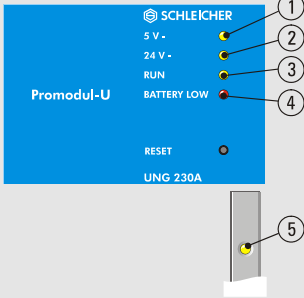
4.1 Displays and Connections - UNG 230A

Displays and connections - UNG 24



Designation	
1	Status LEDs
2	RESET button Same effect as switching input voltage off and on
3	1 A fuse
4	Power LED
5	11-pin plug-in terminal
6	Lithium battery on 11-pin plug-in terminal for buffering control unit RAM Replacement batteries can be ordered individually, see ordering information.

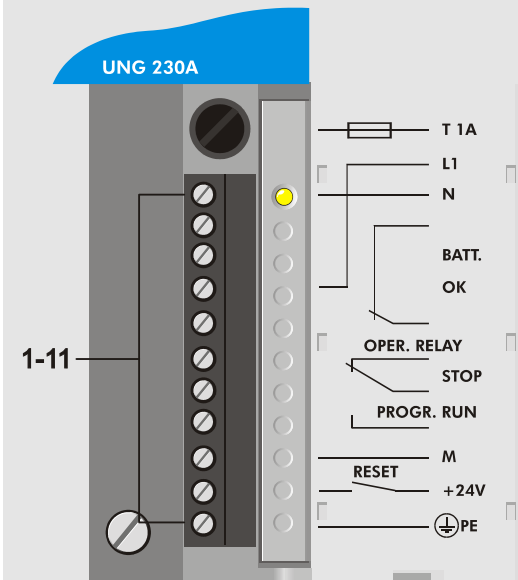
UNG 230A - LED displays

	LED	Colour	ON	OFF	
	1	5V / RESET	yellow	Output voltage 5 V DC OK RESET input not active	5 V DC error Operation relay off Controller switches to STOP
	2	24V	yellow	Output voltage 24 V DC OK	24 V DC error Operation relay off Controller switches to STOP
	3	RUN	yellow	Operation OK Operation relay on	Error in power supply unit or control unit Operation relay off Controller switches to STOP
	4	BATTER Y LOW	red	Buffer battery empty Battery relay on	Buffer battery OK Battery relay off
	5	POWER	yellow	Input voltage available	Input voltage not available



4.2 Klemmenbelegung UNG 230A

UNG 230A - terminal assignment



Terminal	Designation
1	Input voltage N
2	Battery relay contact OK
3	Not used
4	Input voltage L1
5	Battery relay contact OK
6	Operating mode relay contact STOP
7	Operating mode relay contact root
8	Operating mode relay contact RUN program
9	Ground DC 24 V
10	RESET Input DC 24 V
11	Protection Earth PE

4.3 UNG 230A - Technical Data

Electrical data	
Input voltage	AC 230 V $\pm 15\%$ 50 to 60 Hz
Power consumption	60 W (AC 230 V, 50 Hz)
Input fuse	T1A/250E fuse
Output voltage / current	DC 24 V / 2 A DC 5 V / 5 A (Total power is automatically limited to 50 W)
Short-circuit shutdown	Yes (short-circuit-proof permanently)
Output voltage monitoring	Yes, overvoltage and undervoltage
Thermal overload	Yes
Isolation	No

Connection system	
Input voltage, input and output signals	11-pin screw plug-in terminal
Conductor sizes	Up to 2.5 mm ² (stranded with wire-end ferrules)

RESET input	
Input voltage	24 V DC max. 5% residual ripple L level -30 to +6 V, H level +13 to +30 V
Input current	Typical 10 mA at 24 V
Isolation	No

Operation relay	
Contact type	Changeover contact
Contact load	230 V AC / 4 A 24 V DC / 2 A
Operating state	Activated when operation OK (PROGR. RUN)

Battery state relay	
Contact type	Changeover contact
Contact load	230 V AC / 4 A 24 V DC / 2 A
Operating state	Activated when battery discharged (LOW)

Buffer battery	
Type	Lithium battery 3.6 V / 2,5 Ah
Buffer time	Min 1 year (at +25°C and uninterrupted buffering of 4 control units)

Dimensions / weight	
Dimensions (W x H x D)	71 mm x 200 mm x 150 mm
Modular spacing	2
Weight	1,25 kg

The information in the "Technical Data for all Modules" section also applies.



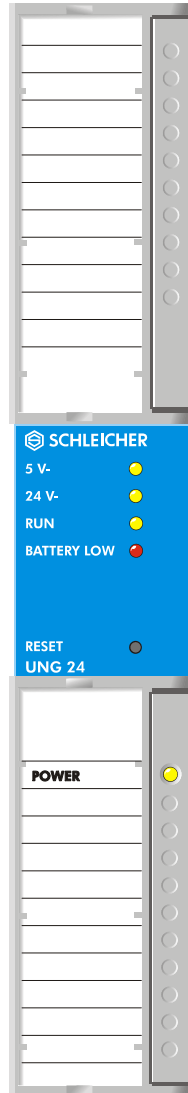
4.4 UNG 230A Ordering Information

Module	
Ordering designation	Article number
UNG 230A	312 108 49

Accessories	
Ordering designation	Article number
UNB 115/230 replacement buffer battery	318 074 96

5 UNG 24 Power Supply Unit

The power supply unit provides the controller's internal 24 V DC and 5 V DC voltages.



- Input voltage 24 V DC
- Integrated buffer batteries for control unit RAM
- Monitors charge in buffer battery
- Status LEDs
- Ready-for-operation relay

Attention

Power supply units must not be connected in parallel.

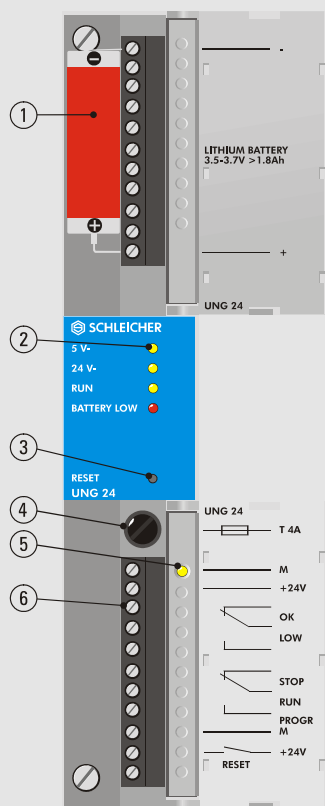
The following old modules must not be operated with the UNG 24.

Output modules	UBA R*, UBA RC*
Control units	UCL*, UCL 2*, UCH*, UCH 2*, UCN*, UCN 2*
Temperature processor	UST*

*These modules cannot be included in new configurations

5.1 Displays and Connections - UNG 24

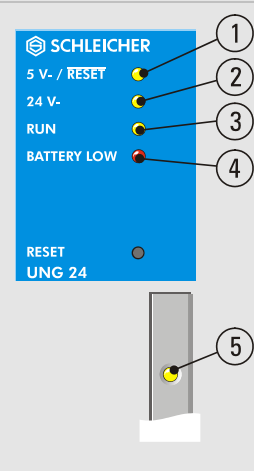
Displays and connections - UNG 24



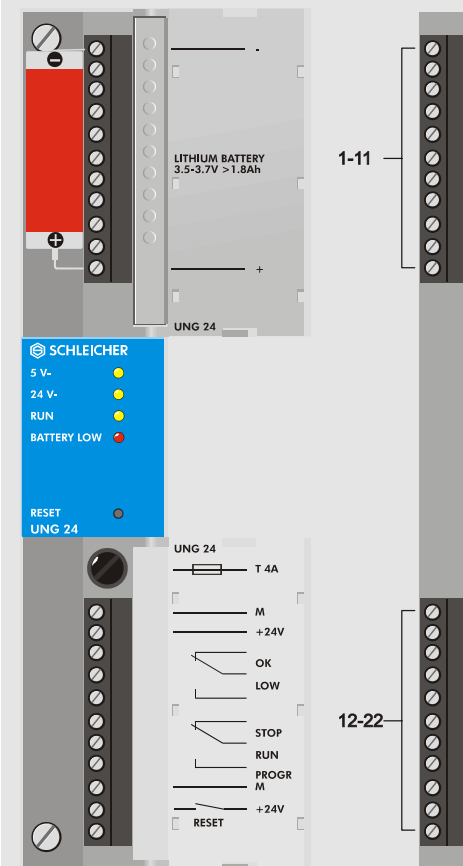
Designation

1	Lithium battery on 11-pin plug-in terminal for buffering control unit RAM Replacement batteries can be ordered individually, see ordering information.
2	Status LEDs
3	RESET button Same effect as switching input voltage off and on
4	4 A fuse
5	Power LED
6	11-pin plug-in terminal

UNG 24 - LED displays

	LED	Colour	ON	OFF
	1 5V / RESET	yellow	Output voltage 5 V DC OK RESET input not active	5 V DC error Operation relay off Controller switches to STOP
	2 24V	yellow	Output voltage 24 V DC OK	24 V DC error Operation relay off Controller switches to STOP
	3 RUN	yellow	Operation OK Operation relay on	Error in power supply unit or control unit Operation relay off Controller switches to STOP
	4 BATTERY LOW	red	Buffer battery empty Battery relay on	Buffer battery OK Battery relay off
	5 POWER	yellow	Input voltage available	Input voltage not available

UNG 24 - terminal assignment



Terminal	Designation
1	Buffer battery -
2-10	Not used
11	Buffer battery +
12	Input voltage M
13	Input voltage 24 V DC
14	Battery relay contact OK
15	Battery relay contact root
16	Battery relay contact LOW
17	Operating mode relay contact STOP
18	Operating mode relay contact root
19	Operating mode relay contact RUN program
20	M shared ground 24 V DC / 5 V DC
21	RESET input 24 V DC
22	Not used



5.2 UNG 24 - Technical Data

Electrical data		
Input voltage		24 V DC $\pm 20\%$ max. 5% residual ripple
Power consumption		60 W
Input fuse		T4A/250E fuse
Output voltage / current		DC 24V / 2A DC 5V / 5A
Output power	DC 24 V	48 W
	DC 5 V	25 W
		Attention! Total power is automatically limited to 50 W
Short-circuit shutdown		Yes (5 V DC short-circuit-proof)
Output voltage monitoring		Yes, overvoltage and undervoltage
Thermal overload		Yes
Isolation		No

Connection system	
Input voltage, input and output signals	11-pin screw plug-in terminal
Conductor sizes	Up to 2.5 mm ² (stranded with wire-end ferrules)

RESET input	
Input voltage	24 V DC max. 5% residual ripple L level -30 to +6 V, H level +13 to +30 V
Input current	Typical 10 mA at 24 V
Isolation	No

Operation relay	
Contact type	Changeover contact
Contact load	230 V AC / 4 A 24 V DC / 2 A
Operating state	Activated when operation OK (PROGR. RUN)

Battery state relay	
Contact type	Changeover contact
Contact load	230 V AC / 4 A 24 V DC / 2 A
Operating state	Activated when battery discharged (LOW)

Buffer battery	
Type	Lithium battery 3.6V / 1.9Ah
Buffer time	Min ½ year (at +25°C and uninterrupted buffering of 4 control units)

**Dimensions / weight**

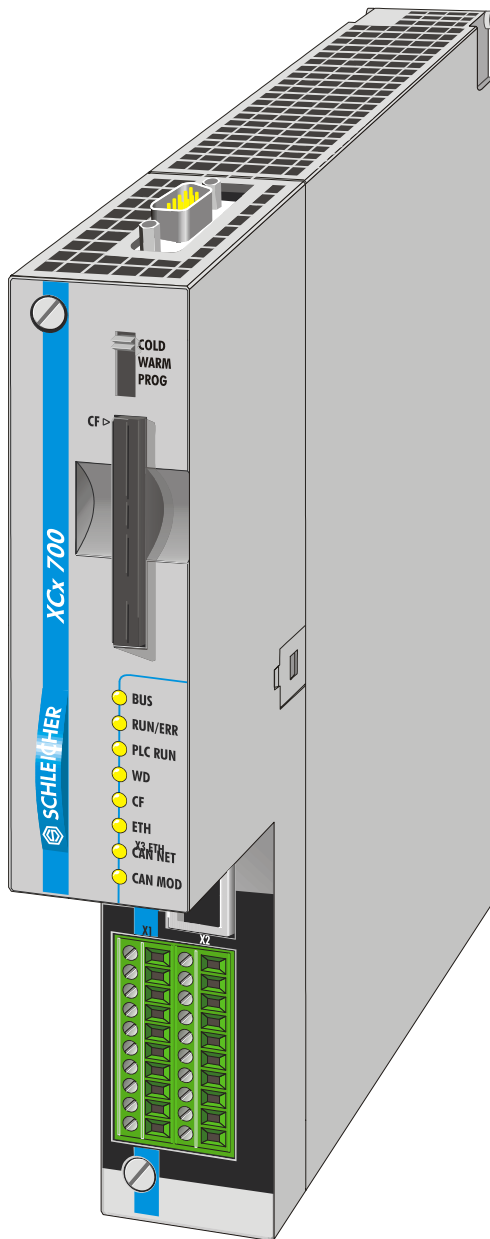
Dimensions (W x H x D)	35.5 mm x 200 mm x 150 mm
Modular spacing	1
Weight	1.2 kg

The information in the "Technical Data for all Modules" section also applies.

5.3 UNG 24 Ordering Information

Module	
Ordering designation	Article number
UNG 24	312 100 48

Accessories	
Ordering designation	Article number
UNB 24 replacement buffer battery	318 098 35



The control unit is equipped with a PLC operating system (XCS 700) or additional with a powerful CNC operating system (XCN 700). The control unit is equipped with CANopen field bus interface alternatively.

PLC

- Operating system: ProConOS
- Programming: ProdocPlus acc. IEC 61131-3

CNC

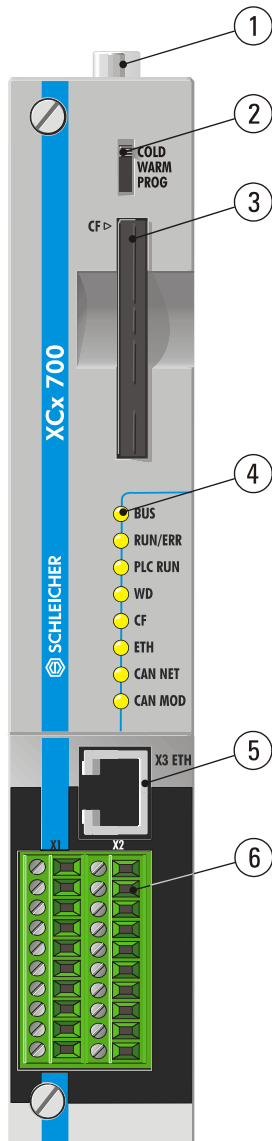
- Programming: acc. DIN 66025
- Special functions and machine specific transformations.
- Communication between PLC and CNC with dual port RAM.

Furthermore features:

- Compact Flash
- EtherNet interface
- Web-Server

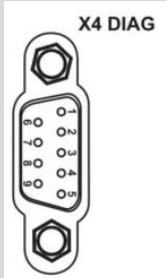
6.1 Display, Interfaces and Controls

Overview




- | | |
|---|---|
| 1 | X4 RS232 Interface for Diagnosis |
| 2 | Mode Switch |
| 3 | CF Compact Flash |
| 4 | LEDs |
| 5 | X3 ETH RJ 45 Ethernet-Interface |
| 6 | X1 CAN Interfaces
X2 RS 232 / RS 422 / RS 485 Interfaces for operating terminals |

6.1.1 X4 RS232 Interface for Diagnosis

X4 Subminiature, 9-pin, plug connector				
	Pin	Designation		Explanation
	1	(DCD)	(Data Carrier detect)	not used
	2	RD	Receive Data	Input
	3	SD	Send Data	Output
	4	DTR	Data Terminal ready	Bridge to pin 6
	5	GND	Logic Ground	Not for shield
	6	DSR	Data set ready	Bridge to pin 4
	7	RTS	Request to send	Bridge to pin 8
	8	CTS	Clear to send	Bridge to pin 7
	9	(Ri)	(Ring Indicator)	not used

6.1.2 Mode Switch

The mode switch is a three-position slider switch. These three positions determine the startup behaviour of the controller.

Mode switch		
	Position	Explanation
	WARM	PLC warm start (default setting)
	PROG	Programming mode (PLC stop)
	COLD	PLC cold start (reinitialisation retain variables)

6.1.3 CF Compact Flash

The operation system, important configuration files, the PLC program (boot project and PLC source) and the CNC files are stored on the CF card.

CF card access is indicated by the LED CF.

The CF card is hot pluggable. Of course pay attention to the following definitions:



Unplug the CF card only if:

- no CF card access (LED CF must be dark)
- the controller stand in the STOP operation mode

Plug the CF card only if:

- the controller stand in the STOP operation mode

Lost of data or watch dog events can occur, when not pay attention to this definitions.

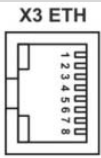
6.1.4 LEDs

LED designation	Color	Status	Meaning
BUS			Bus access
		OFF	No bus access (PLC Stop)
	green	ON	Bus access
	red	Flashing	Bus access error / Controller hardware configuration error
RUN/ERROR			CPU status
		OFF	CPU defect
	yellow	ON	CPU is booting
	green	ON	Operating voltage OK, no error
	red	Flashing	Fatal error: CPU can not booting
PLC RUN			PLC status
		OFF	PLC stop
	green	ON	PLC running
	yellow	Flashing	PLC running, but outputs shut down (ready-for-operation relay released)
WD			Watchdog
		OFF	Watchdog not activated
	red	ON	Fatal error, operating system stopped
CF			Compact Flash
	green		Memory access
	red		Access error
ETH			EtherNet network
	green		Network access
	red		Network error
CAN NET			CAN network status
		OFF	CAN state prepared
	green	ON	CAN state operational
		Flashing	CAN state pre-operational
	red	ON	Bus Off
CAN MOD		Flashing	CAN error
			CAN module status
	green	ON	CAN stack initialized
		Flashing	Invalid CAN configuration
	red	ON	Control unit not ready, or serious error
		Flashing	Error in controller

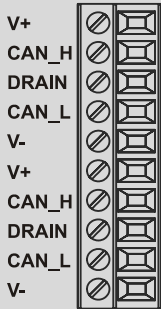
Error messages are stored in the active error buffer and in the error logbook. Error messages include error numbers and additional information.

Use the <Ctrl+?> keys in the SCHLEICHER-Dialog software to read the active error buffer and the log book.


6.1.5 X3 ETH RJ 45 Ethernet-Interface

X3 Ethernet			
	Pin	Designation	Explanation
	1	TX+	Transmitted data plus
	2	TX-	Transmitted data minus
	3	RX+	Received data plus
	4	nc	Not connected
	5	nc	Not connected
	6	RX-	Received data minus
	7	nc	Not connected
	8	nc	Not connected

6.1.6 X1 CAN Interfaces

X1 Removable screw terminal 10 pin		
	Designation	Description
	V+	Power supply
	CAN_H	
	DRAIN	Shield (optional)
	CAN_L	
	V-	Ground
	V+	Power supply
	CAN_H	
	DRAIN	Shield (optional)
	CAN_L	
	V-	Ground

6.1.7 X2 RS 232 / RS 422 / RS 485 Interfaces for operating terminals

X2 Removable screw terminals 10 pins		
	Designation	Description
	SHLD	Shield RS 232
	TxD	RS 232 Transmit data
	RxD	RS 232 Receive data
	M _{ext}	Ground for RS 232
	M _{ext}	Ground for RS 422 / 485
	TD-	Transmit data / Transmit and Receive data
	TD+	Transmit data / Transmit and Receive data
	RD-	Receive data / Bus termination resistors
	RD+	Receive data / Bus termination resistors
	SHLD	Shield RS 422 / 485

If the RS 485 interface is used connect RD+ with TD+ and RD- with TD- to activate the bus termination resistors.

The two ground pins for RS 232 and RS 485 have the same potential.

6.2 Technical Data Control Unit XCx 700

Electrical Data		
Power supply internal		DC 24 V
Power consumption internal	DC 24V	max. 6 W
	DC 5V	-
Isolation (to internal electronic)	X1 ETH (Ethernet)	yes
	X2 CAN	yes
	X3 (RS422)	yes
	X3 (RS232)	yes
	X4 PRG (RS232)	no

Serial Interfaces	
RS 232	for serial Devices
RS 232	Programming and Diagnosis
RS 422	Operating Panels
More Interfaces	
Ethernet	Programming and Diagnosis
CAN	CANopen Field Bus Interface

More Data		
CPU		Intel PXA 255, 400 MHz, 32 Bit Core
Memory	SDRAM	32 MB
	SRAM	1 MB
	FLASH (intern)	4 MB
	Compact FLASH (intern)	>= 32 MB
Real-Time Clock		Resolution 1s, battery-backed, calendar and leap-year
Buffer unit		Supercap min. 3 h, battery-backed with Power Supply Unit UNG
Processing time pro 1000 commands	Bit	0,4 ms
	Byte / Word / DWord	0,2 ms
Memory	Data	max.16384 kB
	Program	4096 kB
PLC Flags	residual	256 kB
	not residual	2048 kB

Electromagnetic compatibility (EMC)	
Surge	acc. EN 61000-4-5: 1 kV CM and 0,5 kV DM DC power supply lines 0,5 kV CM and 0,5 kV DM on DC I/O signal lines
Emitted interference (EMB)	acc. EN 55011: limiting value class A, group 1

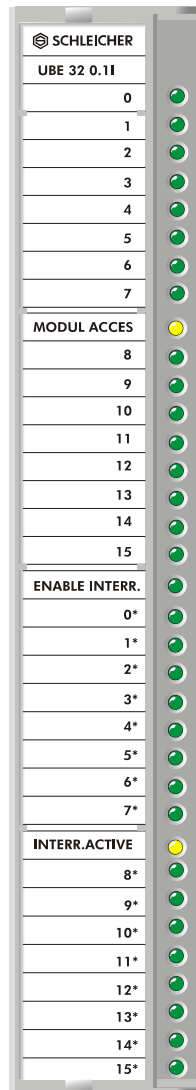
The information in the section "Technical Data for all Modules" also applies.

Dimension / Weight	
Dimension (W x H x D)	35,5 mm x 200 mm x 150 mm
Modular space	1
Weight	0,45 kg



7 UBE 32 Digital Input Module

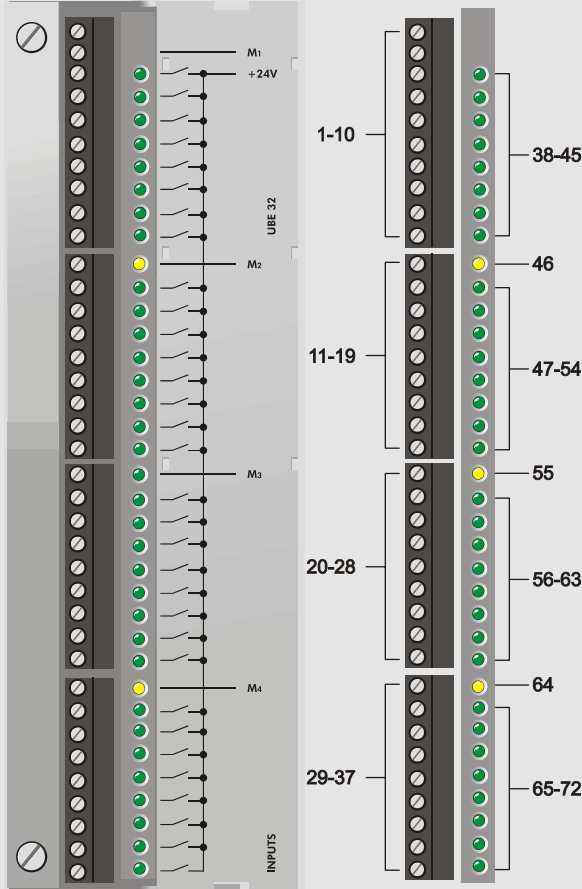
UBE 32 0,1I	32 inputs, of which 4 usable as interrupt inputs, 0.1 ms input delay
UBE 32 1D	32 inputs, 1 ms input delay
UBE 32 10D	32 inputs, 10 ms input delay



- 32 24 V DC semiconductor inputs
- Isolation with optocouplers (in groups)
- Connections on front
- Status LEDs for each input

7.1 Displays and Connections

UBE 32 - LED displays and terminal assignment

		Group and no.	Terminal	No.	LED
	1	1			
	2	Gnd (In0..In7)			
	3	In0	38	LED In0	
	4	In1	39	LED In1	
	5	In2	40	LED In2	
	6	In3	41	LED In3	
	7	In4	42	LED In4	
	8	In5	43	LED In5	
	9	In6	44	LED In6	
	10	In7	45	LED In7	
	2	11	Gnd (In8..In15)	46	LED Module access
		12	In8	47	LED In8
		13	In9	48	LED In9
		14	In10	49	LED In10
		15	In11	50	LED In11
		16	In12	51	LED In12
		17	In13	52	LED In13
		18	In14	53	LED In14
		19	In15	54	LED In15
	3	20	Gnd (In0*..In7*)	55	LED Enable Interr.**
		21	In0*	56	LED In0*
		22	In1*	57	LED In1*
		23	In2*	58	LED In2*
		24	In3*	59	LED In3*
		25	In4*	60	LED In4*
		26	In5*	61	LED In5*
		27	In6*	62	LED In6*
		28	In7*	63	LED In7*
	4	29	Gnd (In8*..In15*)	64	LED Interr. active**
		30	In8*	65	LED In8*
		31	In9*	66	LED In9*
		32	In10*	67	LED In10*
		33	In11*	68	LED In11*
		34	In12*	69	LED In12*
		35	In13*	70	LED In13*
		36	In14*	71	LED In14*
		37	In15*	72	LED In15*

** only UBE 32 0,11

** only UBE 32 0,1I

UBE 32 - LED displays

LED	Designation	Colour	ON	OFF
46	MOD.ACCESS	yellow	Access OK LED may also flash or flicker regularly or irregularly. Each flash indicates one CPU access	Module defective Control unit in STOP mode Not programmed
55	ENAB. INTERR.	green	Interrupt enabled	Interrupt disabled
64	INTERR. ACT.	yellow	Interrupt active	Interrupt not active

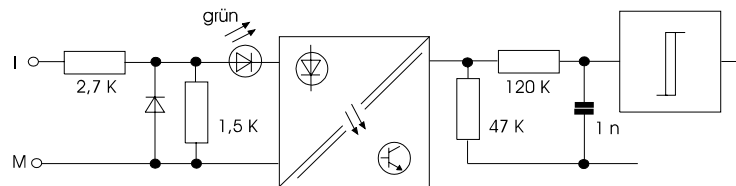


7.2 UBE 32 - Technical Data

Basic data	
Number of inputs	32, in 4 groups of 8 inputs

Electrical data	
Input voltage	24 V DC max. 5% residual ripple L level -30 to +6 V, H level +13 (+10*) to +30 V
Input current	Typical 8 (10*) mA at 24 V input voltage
Input signal delay	0.1 ms UBE 32 0,1I 1 ms UBE 32 1D 10 ms UBE 32 10D
Internal power consumption	DC 24 V -
	DC 5 V 0.1 W
Isolation	Yes, by optocouplers (in groups)

Input circuit



** Values for UBE 32 0,1I
Legend: grün: green

Connection system	
Input signals	One 10-pin and three 9-pin plug-in terminals
Conductor sizes	Up to 2.5 mm ² (stranded with wire-end ferrules)

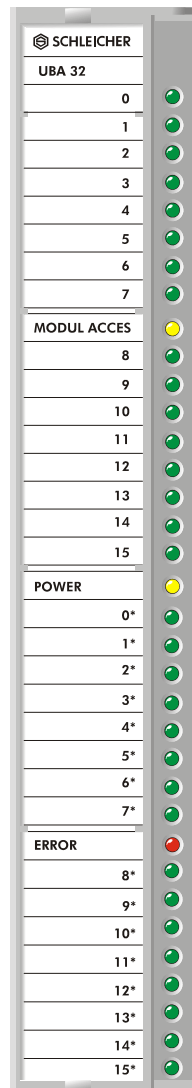
Dimensions / weight	
Dimensions (W x H x D)	35.5 mm x 200 mm x 150 mm
Modular spacing	1
Weight	0.47 kg

The information in the "Technical Data for all Modules" section also applies.

7.3 Ordering Information

Module	
Ordering designation	Article number
UBE 32 0,1I	314 098 49
UBE 32 1D	314 100 62
UBE 32 10D	314 092 46

8 UBA 32 Digital Output Module



- 32 24 V DC / 2 A semiconductor outputs
- Short-circuit-proof
- Total current monitoring by group
- Isolation in groups with optocouplers
- Reverse voltage protection
- Protection against inductive peaks on circuit interruption
- Connections on front
- Status LEDs for each output

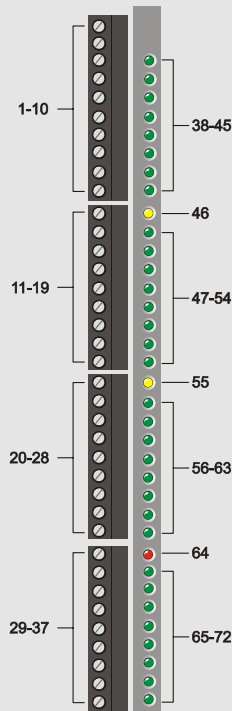
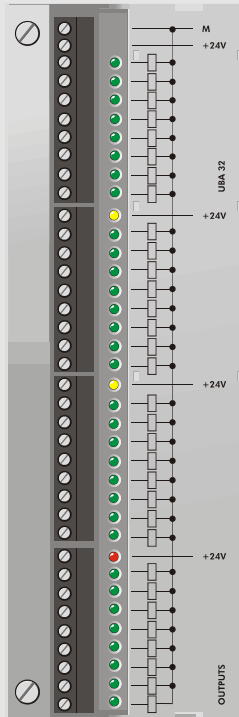


Note supply voltage when connecting the power supply.



8.1 Displays and Connections

UBA 32 - LED displays and terminal assignment



Group and no.	Terminal	No.	LED
1	1		Gnd
	2		+24V (Out0..Out7)
	3	38	LED Out1
	4	39	LED Out2
	5	40	LED Out3
	6	41	LED Out4
	7	42	LED Out5
	8	43	LED Out6
	9	44	LED Out7
	10	45	LED Out8
2	11	46	LED Module access
	12	47	LED Out9
	13	48	LED Out10
	14	49	LED Out11
	15	50	LED Out12
	16	51	LED Out13
	17	52	LED Out14
	18	53	LED Out15
	19	54	LED Out16
3	20	55	LED Power
	21	56	LED Out17
	22	57	LED Out18
	23	58	LED Out19
	24	59	LED Out20
	25	60	LED Out21
	26	61	LED Out22
	27	62	LED Out23
	28	63	LED Out24
4	29	64	LED Error
	30	65	LED Out25
	31	66	LED Out26
	32	67	LED Out27
	33	68	LED Out28
	34	69	LED Out29
	35	70	LED Out30
	36	71	LED Out31
	37	72	LED Out32

UBA 32 - LED displays

LED	Designation	ON	OFF
46	Module access	Access OK LED may also flash or flicker regularly or irregularly. Each flash indicates one CPU access	Module defective Control unit in STOP mode Not programmed
55	Power	24 V supply available on all 4 groups	24 V supply missing on at least one group, or no bonding to frame
64	Error	Group total current >8A	No overcurrent
38-72	OUT1..Out32	Output is switched to +24 V	Output is switched to 0 V

8.2 Important Notes on Connecting the Power Supply

The **UBA 32** module has 32 digital outputs in 4 groups of 8 outputs. You have to connect an external +24 V power supply to the corresponding connections on each output group.

Please observe the following safety instructions when switching external supply voltages on and off.

UBA 32 design version (B) and earlier:

To avoid errors in output activation all the external 24 V power supplies must be connected to the modules.

If it is necessary to switch off the 24 V power supply for reasons of safety, all supply voltages must be switched off together.

UBA 32 design version (C) and later:

On design (C) and later the four 24 V power supplies can be switched on and off separately in 2 groups of 16 outputs. The two groups with shared power supply are the two upper groups (i.e. the upper 16 outputs) and the two lower groups (i.e. the lower 16 outputs) on the module.

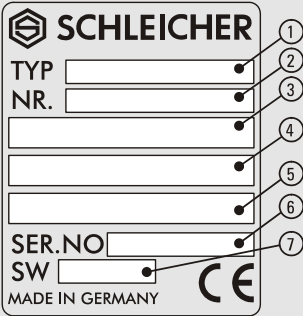


.In case of EMERGENCY STOP always switch off the power supply to all groups.

Otherwise invalid switching states will occur, i.e. if just one group is switched off it will still carry output potential if activated by the PLC and will switch anyway.

The design version is indicated on the type plate, line 1, after the type designation.

Example for UBA 32 with design version (C): UBA 32 (C)

Type plate		Explanation	
	1	Type designation and design version	
	2	Article number, warehouse number, date of manufacture	
	3	3-4 May contain other information	
	4		
	5		
	6	Serial number	
	7	Software version (if required)	

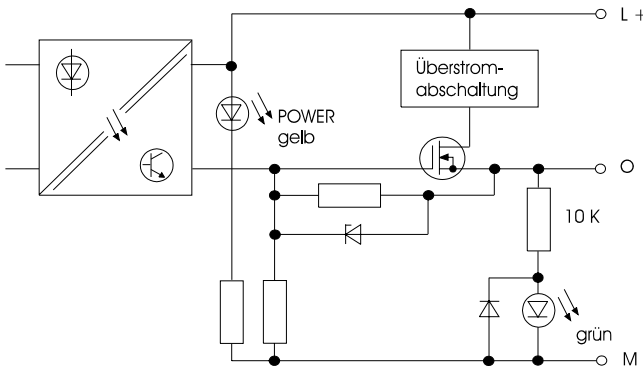


8.3 UBA 32 - Technical Data

Basic data		
Number of outputs	32, in 4 groups of 8 outputs	

Electrical data		
Supply voltage	I+ = 24 V DC ± 20% max. 5% residual ripple	
Output voltage	L level ≤ 3V , H level = L+ - xU (xU ≤ 0.3V)	
Output current	Max. 2A continuous operation, max. 5 W ohmic load	
Output current per group	Max. 8 A continuous operation	
Protection	Electronic total current monitoring by group, trigger current 9..11 A	
Short-circuit monitoring	Yes, electronic	
Parallel connection of outputs	No	
Switching frequency	With ohmic load: Max. 10 Hz With inductive load: Max. 0.5 Hz at 2 A Max. 10 Hz at 0.5 A	
Isolation	Yes, by optocouplers	

Internal power consumption	DC 24 V	-
	DC 5 V	0.9 W

Output circuit	
----------------	---

Legend:
gelb: yellow
Überstromabschaltung: Overcurrent cut-off
grün: green

Connection system	
Output signals	One 10-pin and three 9-pin plug-in terminals
Conductor sizes	Up to 2.5 mm ² (stranded with wire-end ferrules)

The information in the "Technical Data for all Modules " section also applies.

Dimensions / weight	
Dimensions (W x H x D)	35.5 mm x 200 mm x 150 mm
Modular spacing	1
Weight	0.55 kg

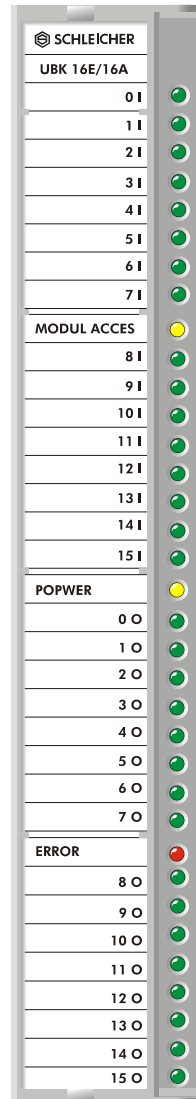
8.4 Ordering Information

Module	
Ordering designation	Article number
UBA 32	314 092 45



9 UBK 16E/16A Digital Input/Output Modules

UBK 16E 1D / 16A	16 inputs, 1 ms input delay / 16 outputs
UBK 16E 10D / 16A	16 inputs, 10 ms input delay / 16 outputs

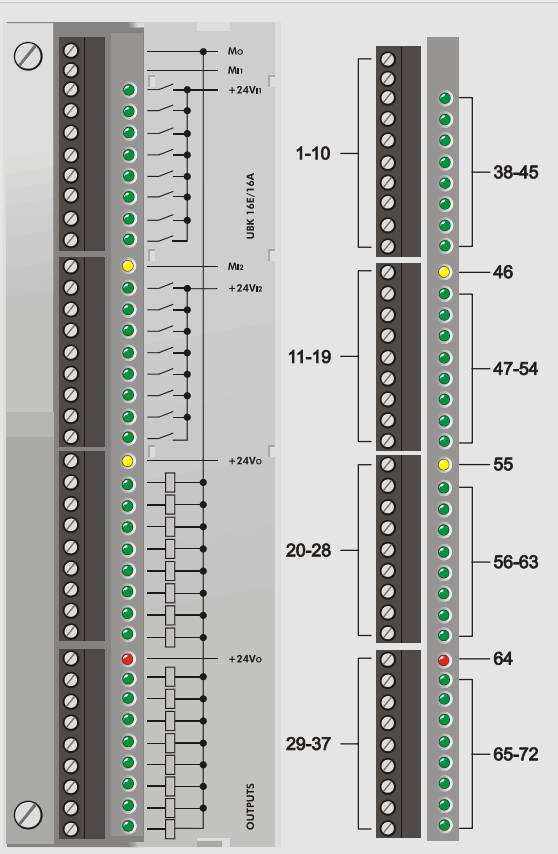


- 16 24 V DC semiconductor inputs
- 16 24 V DC / 2 A semiconductor outputs
- Outputs short-circuit-proof
- Total current monitoring by group
- Isolation with optocouplers
- Protection against inductive peaks on circuit interruption on outputs
- Connections on front
- Status LEDs for each input and output



Note supply voltage when connecting the power supply.

9.1 Displays and Connections

UBK 16E/16A - LED displays and terminal assignment				
	Group and no.	Terminal	No	LED
	1	1 M (Out)		
	2	2 M (In0..In7)		
	3	3 In0	38	LED In0
	4	4 In1	39	LED In1
	5	5 In2	40	LED In2
	6	6 In3	41	LED In3
	7	7 In4	42	LED In4
	8	8 In5	43	LED In5
	9	9 In6	44	LED In6
	10	10 In7	45	LED In7
	2	11 M (In8..In15)	46	LED Module access
	12	12 In8	47	LED In8
	13	13 In9	48	LED In9
	14	14 In10	49	LED In10
	15	15 In11	50	LED In11
	16	16 In12	51	LED In12
	17	17 In13	52	LED In13
	18	18 In14	53	LED In14
	19	19 In15	54	LED In15
	3	20 +24V (Out0...Out7)	55	LED POWER
	21	21 Out0	56	LED Out0
	22	22 Out1	57	LED Out1
	23	23 Out2	58	LED Out2
	24	24 Out3	59	LED Out3
	25	25 Out4	60	LED Out4
	26	26 Out5	61	LED Out5
	27	27 Out6	62	LED Out6
	28	28 Out7	63	LED Out7
	4	29 +24V (Out8...Out15)	64	LED ERROR
	30	30 Out8	65	LED Out8
	31	31 Out9	66	LED Out9
	32	32 Out10	67	LED Out10
	33	33 Out11	68	LED Out11
	34	34 Out12	69	LED Out12
	35	35 Out13	70	LED Out13
	36	36 Out14	71	LED Out14
	37	37 Out15	72	LED Out15

LED displays				
LED	Designation	Colour	ON	OFF
46	MOD.ACCESS	yellow	Access OK LED may also flash or flicker regularly or irregularly. Each flash indicates one CPU access	Module defective Control unit in STOP mode Not programmed
55	Power	yellow	24 V supply available on all 4 groups	24 V supply missing on at least one group, or no bonding to frame
64	Error	red	Group total current >8 A	No overcurrent



Important notes on connecting the power supply

The module has 16 digital outputs in 2 groups of 8 outputs. You have to connect an external +24 V power supply to the corresponding connections on each group. Please observe the following safety instructions when switching external supply voltages on and off.

To avoid errors in output activation all the external 24 V power supplies must be connected to the modules.

If it is necessary to switch off the 24 V power supply for reasons of safety, all supply voltages must be switched off together.

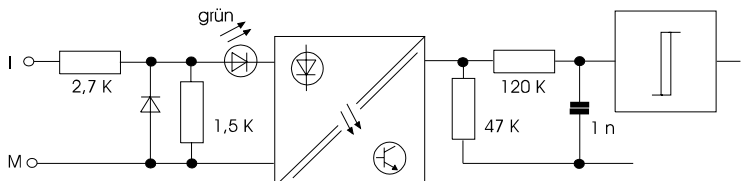
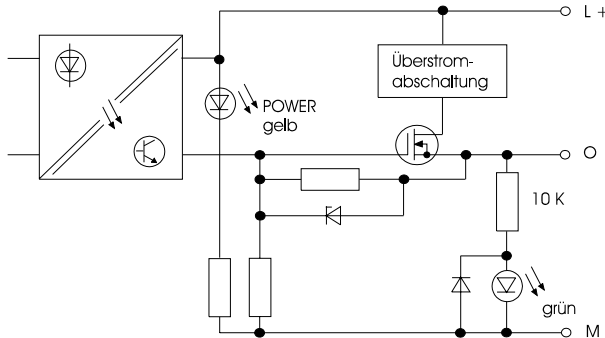


Danger

In case of EMERGENCY STOP always switch off the power supply to all groups.

Otherwise invalid switching states will occur, i.e. if just one group is switched off it will still carry output potential if activated by the PLC and will switch anyway.

9.2 UBK 16E/16A - Technical Data

Basic data		
Number of inputs	16, in 2 groups of 8 inputs	
Number of outputs	16, in 2 groups of 8 outputs	
Electrical data		
Internal power consumption	DC 24 V	-
	DC 5 V	0.6 W
Electrical data - inputs		
Input voltage	24 V DC max. 5% residual ripple L level -30 to +6 V, H level +13 to +30 V	
Input current	Typical 8 mA at 24 V input voltage	
Input signal delay	1 ms UBK 16E 1D / 16A 10 ms UBK 16E 10D / 16A	
Isolation	Yes, by optocouplers (in groups)	
Input circuit		
Legend	Grün: green	
Electrical data - outputs		
Supply voltage	L+ = 24 V DC \pm 20% max. 5% residual ripple	
Output voltage	L level \leq 3 V, H level = L+ - xU (xU \leq 0.3V)	
Output current	Max. 2A continuous operation, max. 5 W ohmic load	
Output current per group	Max. 8 A continuous operation	
Protection	Electronic total current monitoring by group, trigger current 9..11 A	
Short-circuit monitoring	Yes, electronic	
Parallel connection of outputs	No	
Switching frequency	With ohmic load: Max. 10 Hz With inductive load: Max. 0.5 Hz at 2 A Max. 10 Hz at 0.5 A	
Isolation	Yes, by optocouplers	
Output circuit		
Legend	gelb: yellow Überstromabschaltung: Overcurrent cut-off grün: green	



Connection system	
Signal lines and voltage supply	One 10-pin and three 9-pin plug-in terminals
Conductor sizes	Up to 2.5 mm ² (stranded with wire-end ferrules)

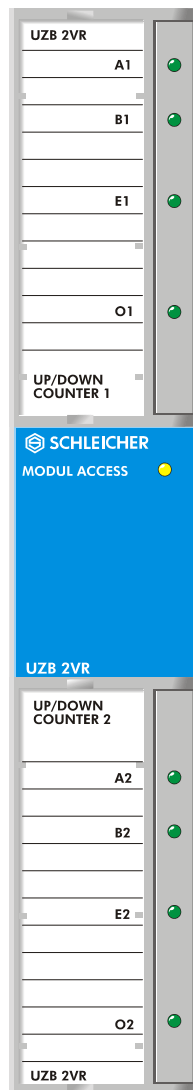
Dimensions / weight	
Dimensions (W x H x D)	35.5 mm x 200 mm x 150 mm
Modular spacing	1
Weight	0.5 kg

The information in the "Technical Data for all Modules" section also applies.

9.3 Ordering Information

Modules	
Ordering designation	Article number
UBK 16E 1D / 16A	314 103 94
UBK 16E 10D / 16A	314 098 50

10 UZH 2VR Counter Module

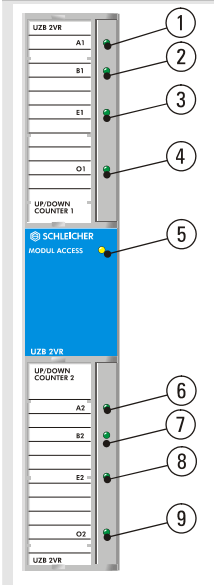


- 2 up/down counters
- Counting ranges 0 to 65535
- Counting frequencies up to 100 kHz
- Counter signals
DC 24V UZH 2VR
DC 5V UZH 2VR / 5V
- Enabling input
- Set counter setpoints
- Signal output (setpoint equal to actual value)
- Interrupt when setpoint equal to actual value



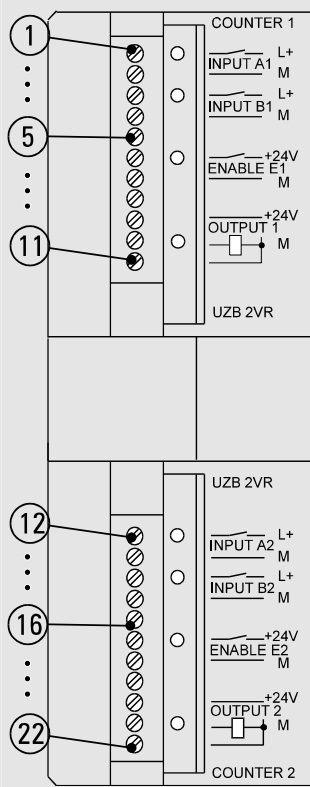
10.1 Displays and Connections

LED displays UZH 2VR



	Colour	Designation	Function
1	green	A1	Pulse input A counter 1
2	green	B1	Pulse input B counter 1
3	green	E1	Enable counter 1
4	green	O1	Output counter 1
5	yellow	Module access	Access OK LED may also flash or flicker Each flash indicates one CPU access
6	green	A2	Pulse input A counter 2
7	green	B2	Pulse input B counter 2
8	green	E2	Enable counter 2
9	green	O2	Output counter 2

UZR 2VR connection assignment

	Designation	Explanation
	1 L+	Input signal channel A 1
	2 M	Reference point M channel A 1
	3 L+	Input signal channel B 1
	4 M	Reference point M channel B 1
	5	
	6 +24V	Enabling input counter 1
	7 M	Reference point M enabling input counter 1
	8	
	9 +24V	Supply voltage, output counter 1
	10	Output signal counter 1
	11 M	Reference point M counter 1
	12 L+	Input signal channel A 2
	13 M	Reference point M, channel A 2
	14 L+	Input signal channel B 2
	15 M	Reference point M channel B
	16	
	17 +24	Enabling input counter 2
	18 M	Reference point M enabling input counter
	19	
	20 +24V	Supply voltage, output counter 2
	21	Output signal counter 2
	22 M	Reference point M, output counter 2



10.2 UZH 2VR - Technical Data

Basic data	
Number of counters	2
Counter direction	Up/down
Counting frequency	Max. 100 kHz

Electrical data		
Input signal voltage	UZH 2VR	DC 24 V \pm 10%
	UZH 2VR / 5V	DC 5 V \pm 10%
Input signal current	UZH 2VR	Typical 7.2 mA at 24 V
	UZH 2VR / 5V	Typical 6.5 mA at 5 V
Isolation		Yes
Internal power consumption	DC 24 V	-
	DC 5 V	0.6 W

Connection system	
Signal lines	Plug-in terminals
Conductor sizes	Up to 2.5 mm ² (stranded with wire-end ferrules)

Dimensions / weight	
Dimensions (W x H x D)	35.5 mm x 200 mm x 150 mm
Modular spacing	1
Weight	0,51 kg

The information in the "Technical Data for all Modules" section also applies.

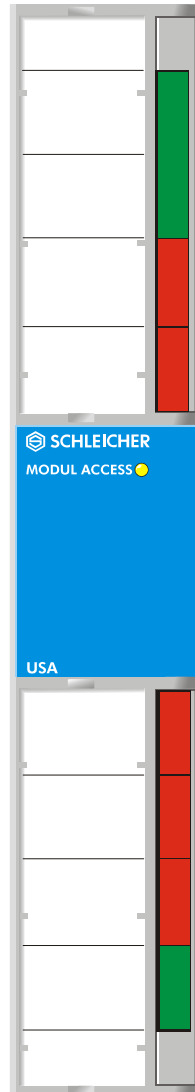
10.3 Ordering Information

Module	
Ordering designation	Article number
UZH 2VR	315 068 06
UZH 2VR / 5V	315 081 79

Operating manuals	
Ordering designation	Article number
UZH 2VR Counter Module German	322 153 78

11 USA 8/1 Analog Processor

The analog processor has 8 channels which are freely configurable using interface modules. It has its own microprocessor, which converts the analog values without involving the control unit.

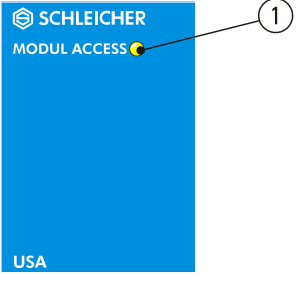


- 8 channels
- Each channel can be freely configured as input or output using plug-in interface modules
- ± 10 V, 20 mA, or Pt100
- 11-resolution (4095)
- Automatic conversion in data exchange
- Data exchange through simple write/read of shared RAM.

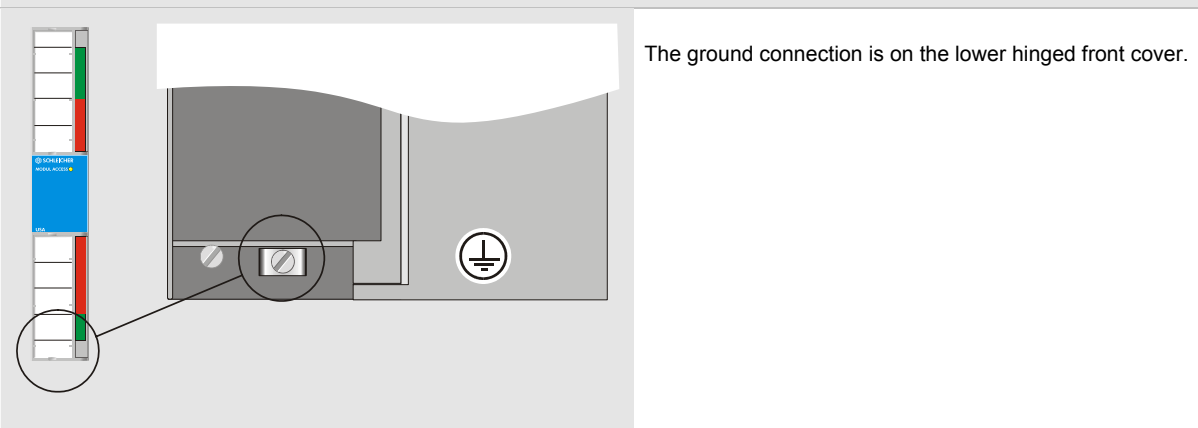


11.1 Displays and Connections

USA 8/1 - LED displays

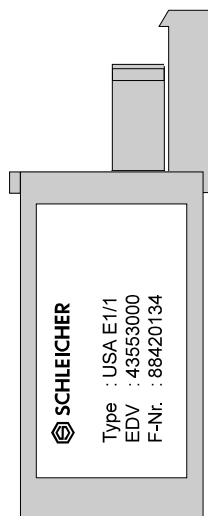
		LED	Colour	ON	OFF
	1	Module access	yellow	Access OK LED may also flash or flicker Each flash indicates one CPU access	Module defective Control unit in STOP mode Not programmed

USA 8/1 - ground connection





11.2 Interface Modules

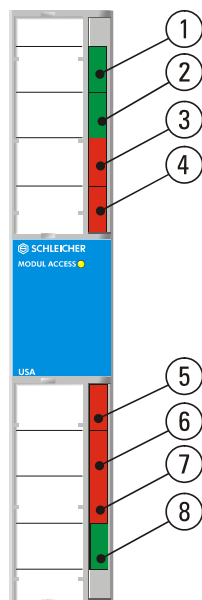


You can realize various input/output configurations using the interface modules. You can distinguish the interface modules by the colour of the housing.

Green - input module
Red - output module

Interface module type		Designation	Colour
Voltage input	+/- 10 V	USA E 1/1	green
Current input	+/- 20 mA	USA E 1/2.1	green
Temperature input	Pt100 –127 to +882 degrees C	USA E 1/6	green
Voltage output	+/- 10 V	USA A 1/1	red
Current output	+/- 20 mA	USA A 1/2	red

Interface module slots



- 1 Channel 0
- 2 Channel 1
- 3 Channel 2
- 4 Channel 3
- 5 Channel 4
- 6 Channel 5
- 7 Channel 6
- 8 Channel 7



11.3 USA 8/1 - Technical Data

Basic data		
Number of interfaces		8 slots for interface modules
Electrical data		
Isolation		Yes
Internal power consumption	DC 24 V	2.5 W
	DC 5 V	1.2 W
Converter data		
Conversion principle		SAR
Resolution		11-bit with prefix (4095 steps)
Conversion rate		8 ms for all 8 channels
Linearization		For Pt 100
Connection system		
Signal lines		Plug-in terminals on the interface modules
Conductor sizes		Up to 2.5 mm ² (stranded with wire-end ferrules)
Dimensions / weight		
Dimensions (W x H x D)		35.5 mm x 200 mm x 150 mm
Modular spacing		1
Weight		0.52 kg

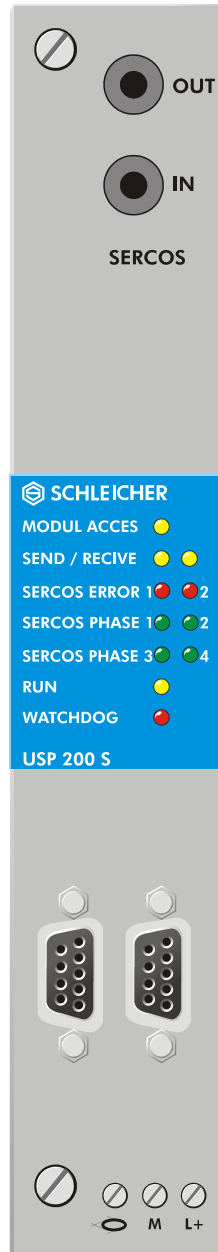
The information in the "Technical Data for all Modules" section also applies.

11.4 Ordering Information

Module		
Ordering designation		Article number
USA 8/1		315 111 34
Interface modules		
Type	Ordering designation	Article number
Voltage input +/- 10 V	USA E 1/1	315 111 35
Current input 20 mA	USA E 1/2.1	315 111 37
Temperature input Pt100	USA E 1/6	315 111 39
Voltage output +/- 10 V	USA A 1/1	315 111 36
Current output 20 mA	USA A 1/2	315 111 38
Operating manuals		
Ordering designation		Article number
Operating manual USA Analog Processor German		322 144 52
Operating manual Analog Value Processor USA English (in preparation)		322 144 53

12 USP 200 S Positioning Processor

The positioning processor can operate a SERCOS ring with up to 8 independent NC axes. The USP 200 S is designed for use with CNC control units.

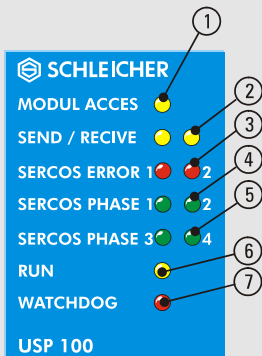


- SERCOS master acc. to IEC1491
- 1 to 8 axes
- F-SMA screw connections for optical fibre acc. to IEC 874-2
- 2 interfaces for additional incremental encoders (e.g. for handwheels)
- 45 MHz CPU (90 MHz internal) 32 Bit
- Comprehensive diagnosis functions



12.1 Displays and Connections

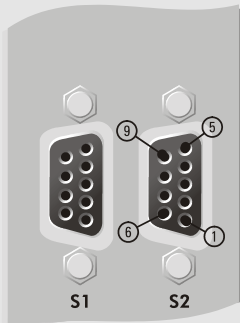
USP 200 S LED displays



	Designation	Colour	ON	OFF
1	MODUL ACCESS	yellow	Access OK LED may also flash or flicker Each flash indicates one CPU access	Module defective Control unit in STOP mode Not programmed
2	SEND / RECEIVE	yellow	Transmit / receive active	
3	SERCOS ERROR 1	red	Software error	
	SERCOS ERROR 2	red	Hardware error Indicates the distortion of the received optical signal. The brightness gives an indication of the degree of distortion. Causes: Optical fibre bent or broken, connection dirty.	
4	SERCOS PHASE 1/2	green	SERCOS run-up phase 1/2	
5	SERCOS PHASE 3/4	green	SERCOS run-up phase 3/4	
6	RUN	yellow	Module running	
7	WATCHDOG	red	Error Controller lock activated for axes 1 and 2, error message sent to control unit.	

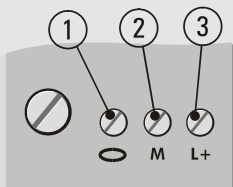
USP 200 S S1, S2 encoder connections

Subminiature, 9-pin, jack contact



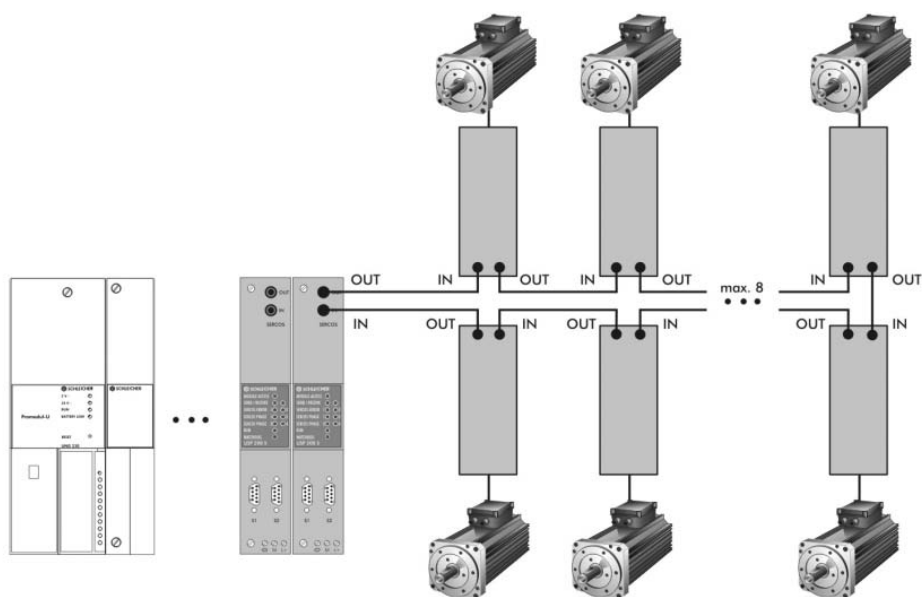
Pin	Explanation
1	Encoder supply voltage
2	Shield
3	A* Encoder signal inverted
4	B* Encoder signal inverted
5	Zero* Zero pulse inverted
6	Encoder supply voltage (0V):
7	A Encoder signal
8	B Encoder signal
9	Zero Zero pulse

USP 200 S screw terminals for shield and encoder power supply



Designation	Explanation
1 o	Shield connection for all cables
2 M	Encoder supply voltage (0V)
3 L+	Encoder supply voltage

12.2 Controller Structure





12.3 Compatibility



The USP 200 S can only be operated with CNC control units XCN 700.

The software version is indicated on the type plate, line 7.

Type plate	
 SCHLEICHER	1 Type designation and design version
TYP <input type="text"/>	2 Article number, warehouse number, date of manufacture
NR. <input type="text"/>	3 3-4 May contain other information
<input type="text"/>	4
<input type="text"/>	5
<input type="text"/>	6 Serial number
SER.NO <input type="text"/>	7 Software version (if required)
SW <input type="text"/>	
MADE IN GERMANY 	

**12.4 Technical Data USP 200 S**

Basic data		
Number of controlled axes		8
Electrical data		
Power supply		DC 5 V internal via UNG 230 or UNG 24
Internal power consumption	DC 24 V	-
	DC 5 V	4 W
Input signal voltage		typical 2.6 V ... 4.8 V (5...15 mA) worst case 3.2 V...4.6 V (6.3...15 mA)
Encoder voltage		DC 5 V external
Isolation		Between encoder interface and bus
Connection system		
Sercos ring optical fibre connection IN / OUT		F-SMA screw connections acc. to IEC 874-2
Encoder connection S1 / S2		9-pole subminiature, jack contact
Other data		
Processor		Motorola Cold Fire CF5307, 45 Mhz (internal 90 Mhz)
Memory		FLASH 2MByte (1M x 16Bit) SDRAM 32MByte, (16 MByte mirrored) 2 x 48LC8M16-75 (8M x 32Bit) SRAM 512KByte (1 x 4MBit , 256K x 16Bit)
Sercos chip		SERCON816
CPLD		1 x XC95144XL
Buffering		no
Dimensions / weight		
Dimensions (W x H x D)		35.5 mm x 200 mm x 150 mm
Modular spacing		1
Weight		0.5 kg

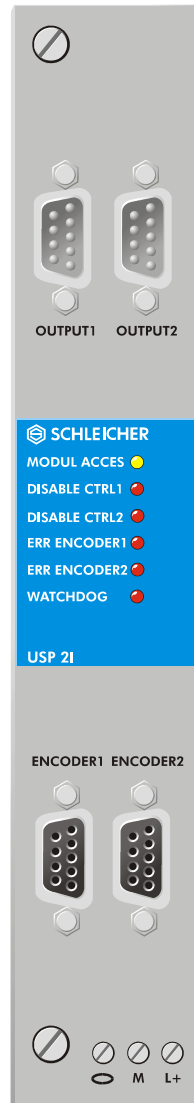
The information in the "Technical Data for all Modules" section also applies.

13 USP 2I / USP 2A Positioning Processors

Positioning processor for positioning and position control of 2 independent NC axes.

You can use incremental (USP 2I) or absolute (USP 2A) positioning transducers (encoders). Set value output is for analog servo amplifiers.

The positioning processor has its own microprocessor, separate from the control unit. It can be used on all CNC control units.



- 2 axes positioning and position control
- Incremental encoder (USP 2I)
- Absolute encoder SSI (USP 2A)
- 4-fold incremental encoder
- Set values ± 10 V
- Controller enable output (potential-free)

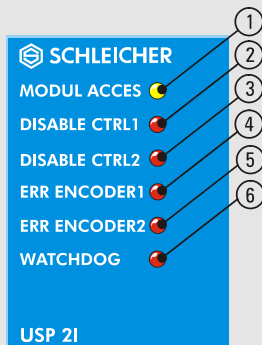


Important: if you use the USP 2I / USP 2A as spare parts for or from modules with design version A to H read the section on compatibility in the operating manual "Positioning Processors USP 2I / USP 2A", Order No. 322 153 82.



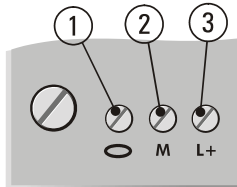
13.1 Displays and Connections

USP 2I/2A LED displays



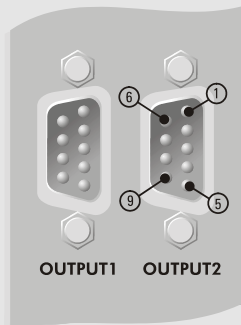
	Designation	Colour	ON	OFF
1	MODUL ACCESS	yellow	Access OK LED may also flash or flicker Each flash indicates one CPU access	Module defective Control unit in STOP mode Not programmed
2	DISABLE CTRL 1	red	Controller disable on setpoint = 0 V (axis 1)	Controller lock off (axis 1)
3	DISABLE CTRL 2	red	Controller lock on and setpoint = 0 V (axis 2)	Controller lock off (axis 2)
4	ERR ENCODER 1	red	Error encoder (axis 1)	
5	ERR ENCODER 2	red	Error encoder (axis 2)	
6	WATCHDOG	red	Error Controller lock activated for axes 1 and 2, error message sent to control unit.	

USP 2I/2A screw terminals for encoder supply voltage infeed



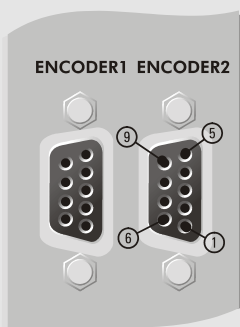
	Designation	Explanation
1	o	Shield connection for all cables
2	M	Encoder supply voltage (0V)
3	L+	Encoder supply voltage

USP 2I/2A connection assignment velocity setpoint axis 1, axis 2 Subminiature, 9-pin, pin contact



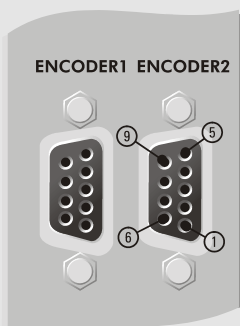
Pin	Explanation
1	Setpoint (+/- 10 V)
2	Shield
3	-
4	Controller enable NO contact
5	Controller enable NC contact
6	Setpoint (0V)
7	
8	
9	Controller enable root

USP 2I connection assignment axis 1, axis 2
Subminiature, 9-pin, pin contact



Pin	Explanation
1	Encoder supply voltage (DC 5 ... 24 V, depending on infeed)
2	Shield
3	A* Encoder signal inverted
4	B* Encoder signal inverted
5	Zero* Zero pulse inverted
6	Encoder supply voltage (0V):
7	A Encoder signal
8	B Encoder signal
9	Zero pulse

USP 2A connection assignment axis 1, axis 2
Subminiature, 9-pin, pin contact



Pin	Designation
1	Encoder supply voltage (DC 5 ... 24 V, depending on infeed)
2	Shield
3	Data+
4	-
5	Clock pulse-
6	Encoder supply voltage (0V):
7	Data-
8	-
9	Clock pulse+



13.2 USP 2I / USP 2A - Technical Data

Basic data	
Number of controllable NC axes	2 (max. 8 USP per control unit permissible)

Electrical data		
Velocity setpoint		±10 V / ±10 mA
Shunt		1 kΩ
Encoder voltage		5 V (external supply)
Input signal voltage		Typical 2.6 V ... 4.8 V (5...15 mA) Worst case 3.2 V...4.6 V (6.3...15 mA)
Isolation		Yes (OUTPUT 1 not isolated from OUTPUT 2)
Internal power consumption	DC 24 V	2.3 W
	DC 5 V	1.5 W

Connection system	
Signal lines	Subminiature, 9-pin

Position controller data	
Travel distance	$\pm 1\text{m}$ at 0,1 μm resolution $\pm 10\text{m}$ at 1 μm resolution $\pm 100\text{m}$ at 10 μm resolution $\pm 1.000\text{m}$ at 100 μm resolution
Position control cycle	2ms (4ms)
Velocity	1 mm/min to 300 m/min
Acceleration	1mm/s ² to 100m/s ²

Other data	
Block diagram	

Dimensions / weight	
Dimensions (W x H x D)	35.5 mm x 200 mm x 150 mm
Modular spacing	1
Weight	0.58 kg

The information in the "Technical Data for all Modules " section also applies.



13.3 Ordering Information

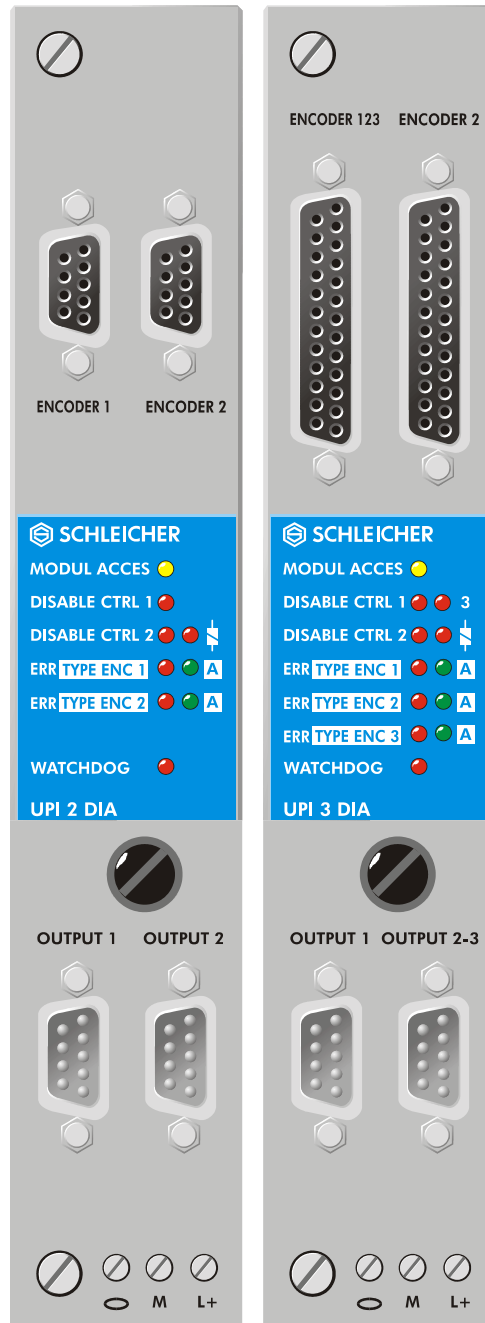
Modules	
Ordering designation	Article number
USP 2I	315 069 13
USP 2A	315 075 01

Operating manuals	
Ordering designation	Article number
Operating manual USP 2I / USP 2A Positioning Processors German	322 153 82



14 UPI 2DIA / UPI 3DIA Positioning Interface

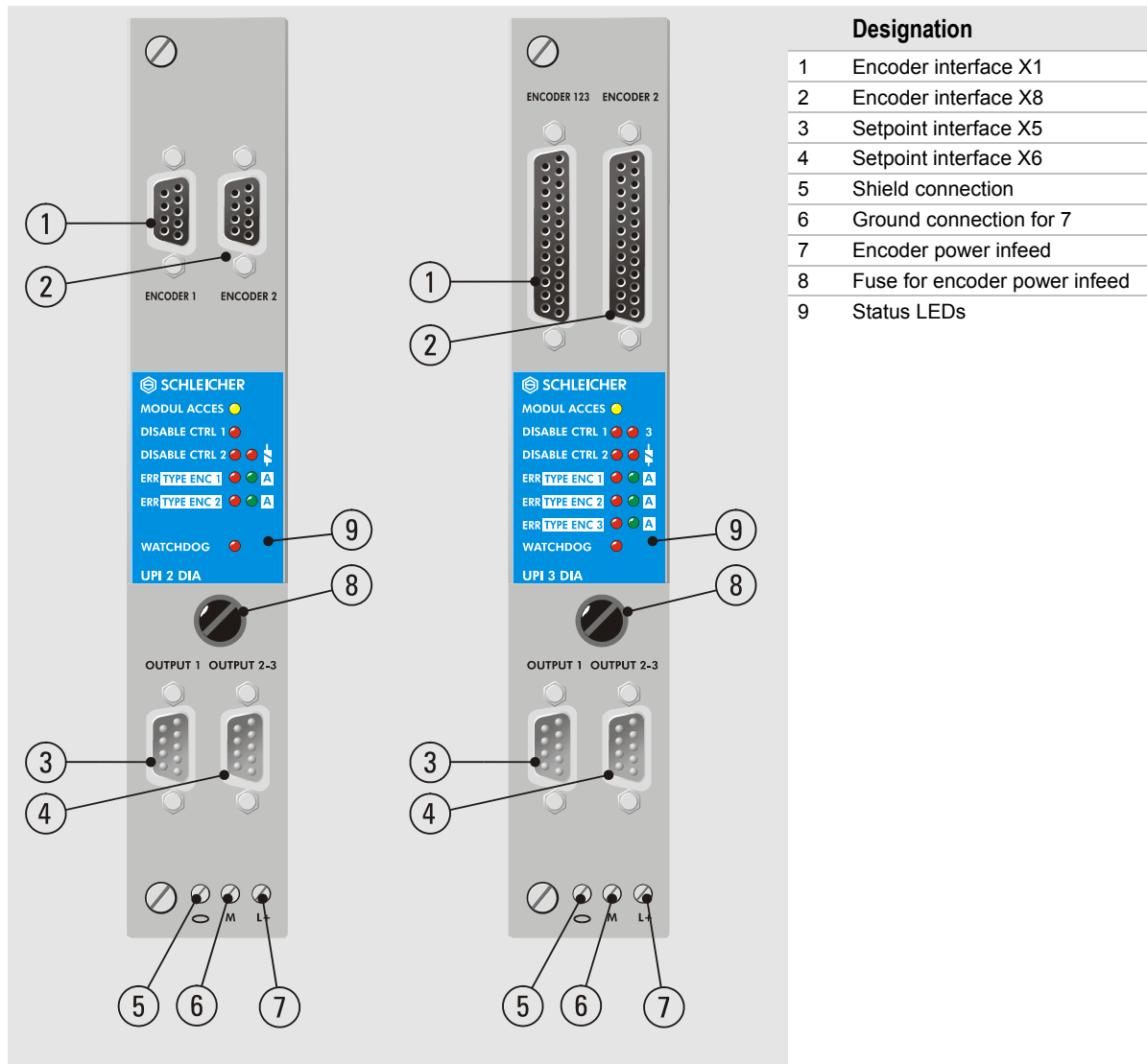
Positioning interface for position detection and set value output for 2 or 3 independent NC axes. You can use incremental or absolute positioning transducers (encoders). Set value output is for analog servo amplifiers. The positioning interface can be used on PLC and CNC control units.



- 2 or 3 axes position detection and set value output
- Incremental or absolute encoder
- Set values $\pm 10V$
- Encoder monitored for cable break and short-circuit
- Connections on front
- Status LEDs

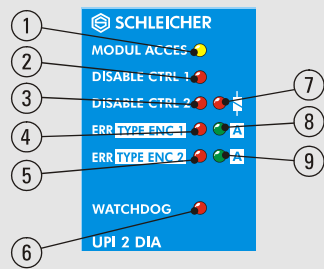
Communication with control unit via loadable function blocks. Function blocks must be ordered separately (see ordering information).

14.1 Displays and connections - UPI 2DIA / UPI 3DIA



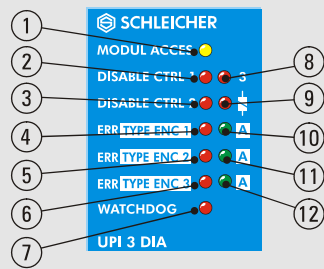


LED displays - UPI 2DIA



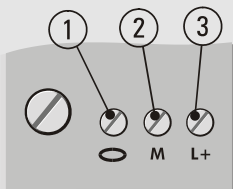
LED	Designation	Colour	Function
1	MODUL ACCESS	yellow	LED on means control unit access to positioning interface is OK. LED is off when control unit is in STOP mode, the positioning interface not programmed by the user program, or the module is defective.
2	DISABLE CTRL 1	red	LED off signals analog speed setpoint output and controller enable on axis 1. LED on signals 0 V speed setpoint output and controller disable on axis 1.
3	DISABLE CTRL 2	red	LED off signals analog speed setpoint output and controller enable on axis 2. LED on signals 0 V speed setpoint output and controller disable on axis 2.
4	ERR ENCODER 1	red	LED off signals correct processing of six encoder signals or those from absolute value encoder on axis 1. LED on signals interruption of one or more encoder signals for axis 1.
5	ERR ENCODER 2	red	LED off signals correct processing of six encoder signals or those from absolute value encoder on axis 2. LED on signals interruption of one or more encoder signals for axis 2.
6	WATCHDOG	red	LED off means control unit access to UPI 3DIA is OK within cycle time. LED goes on if control unit access to UPI 3DIA does not occur within cycle time (defective PLC user program for function block F 150, matching remotepages not created, remotepage numbers not entered in Q.091. Control unit outputs error message and controller disable is activated on axes 1, 2 and 3.
7	RELAY OFF	red	As LED DISABLE CTRL 1
8.. 9	A	green	LED off means "incremental encoder" mode for the axis in question. LED on means "absolute value encoder" or "digital servo" mode.

LED displays - UPI 3DIA



LED	Designation	Colour	Function
1	MODUL ACCESS	yellow	LED on means control unit access to positioning interface is OK. LED is off when control unit is in STOP mode, the positioning interface not programmed by the user program, or the module is defective.
2	DISABLE CTRL 1	red	LED off signals analog speed setpoint output and controller enable on axis 1. LED on signals 0 V speed setpoint output and controller disable on axis 1.
3	DISABLE CTRL 2	red	LED off signals analog speed setpoint output and controller enable on axis 2. LED on signals 0 V speed setpoint output and controller disable on axis 2.
4	ERR ENCODER 1	red	LED off signals correct processing of six encoder signals or those from absolute value encoder on axis 1. LED on signals interruption of one or more encoder signals for axis 1.
5	ERR ENCODER 2	red	LED off signals correct processing of six encoder signals or those from absolute value encoder on axis 2. LED on signals interruption of one or more encoder signals for axis 2.
6	ERR ENCODER 3	red	LED off signals correct processing of six encoder signals or those from absolute value encoder on axis 3. LED on signals interruption of one or more encoder signals for axis 3.
7	WATCHDOG	red	LED off means control unit access to UPI 3DIA is OK within cycle time. LED goes on if control unit access to UPI 3DIA does not occur within cycle time (defective PLC user program for function block F 150, matching remotepages not created, remotepage numbers not entered in Q.091. Control unit outputs error message and controller disable is activated on axes 1, 2 and 3.
8	DISABLE CTRL 3	red	LED off signals analog speed setpoint output and controller enable on axis 3. LED on signals 0 V speed setpoint output and controller disable on axis 3.
9	RELAY OFF	red	As LED DISABLE CTRL 1
10.. 12	A (three)	green	LED off means "incremental encoder" mode for the axis in question. LED on means "absolute value encoder" or "digital servo" mode.

Screw terminals for shield and encoder power supply



	Designation	Explanation
1	o	Shield connection for all cables
2	M	Encoder supply voltage (0V)
3	L+	Encoder supply voltage



Encoder interfaces X1 and X8 UPI 2DIA, subminiature, 9-pin, socket connector

Encoder interfaces X1 and X8 are assigned identically

Pin	Channel	Encoder type	
		Incremental encoder	Absolute value encoder
1	Encoder supply channel 1/2	+5.3..24 V (depends on encoder)	+5.3..24 V (depends on encoder)
2	Channel 1/2	Shield	Shield
3	Channel 1/2	/A	Data
4	Channel 1/2	/B	Do not connect!
5	Channel 1/2	/zero	Clock pulse
6	Encoder supply channel 1/2	Gnd	Gnd
7	Channel 1/2	A	/Data
8	Channel 1/2	B	Do not connect!
9	Channel 1/2	Zero	/clock pulse

Encoder interfaces X1 and X8 UPI 3DIA, subminiature, 25-pin, socket connector

Encoder interfaces X1 and X8 are connected in parallel

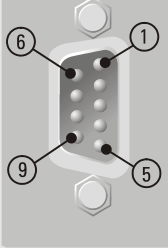
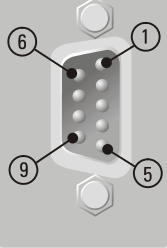
Pin	Channel	Encoder type	
		Incremental encoder	Absolute value encoder
1	Channel 2	A	/Data
2	Channel 2	B	Do not connect!
3	Channel 2	Zero	/clock pulse
4	Encoder supply Channel 2	+5.3..24 V (depends on encoder)	+5.3..24 V (depends on encoder)
5	Encoder supply Channel 3	+5.3..24 V (depends on encoder)	+5.3..24 V (depends on encoder)
6	Encoder supply Channel 1	+5.3..24 V (depends on encoder)	+5.3..24 V (depends on encoder)
7	Shield	Shield	Shield
8	Channel 1	/A	Data
9	Channel 1	/B	Do not connect!
10	Channel 1	/zero	Clock pulse
11	Channel 3	A	/Data
12	Channel 3	B	Do not connect!
13	Channel 3	Zero	/clock pulse
14	Channel 2	/A	Data
15	Channel 2	/B	Do not connect!
16	Channel 2	/zero	Clock pulse
17	Encoder supply channel 2	Gnd	Gnd
18	Encoder supply channel 3	Gnd	Gnd
19	Encoder supply channel 1	Gnd	Gnd
20	Channel 1	A	/Data
21	Channel 1	B	Do not connect!
22	Channel 1	Zero	/clock pulse
23	Channel 3	/A	Data
24	Channel 3	/B	Do not connect!
25	Channel 3	/zero	Clock pulse

/A = Negated signal A (applies to all values prefixed with slash)

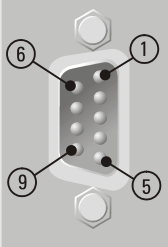
The encoder type (incremental or absolute) is adjustable by F151 for each axes individual.

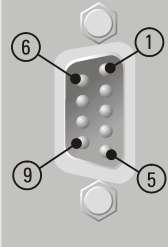
**Setpoint interfaces X5 and X6 UPI 2DIA
subminiature, 9-pin, socket connector**

Setpoint interfaces X5 and X6 are assigned identically.

		Pin	Channel	Meaning
OUTPUT 1		1	Channel 1/2	Setpoint
		2	Channel 1/2	Shield
OUTPUT 2		3		Free
		4	Channel 1/2	Controller enable NO contact
		5	Channel 1/2	Controller disable NC contact
		6	Channel 1/2	Gnd
		7	Channel 1/2	Close brake or controller enable
		8	Channel 1/2	Open brake or controller disable
		9	Channel 1/2	+ 24V for controller enable and brake

**Setpoint interfaces X5 and X6 UPI 3DIA
subminiature, 9-pin, socket connector**

		Pin	Channel	Meaning
OUTPUT 1		1	Channel 1	Setpoint
		2	Channel 1	Shield
		3		Free
		4	Channel 1	Controller enable NO contact
		5	Channel 1	Controller disable NC contact
		6	Channel 1	Gnd
		7	Channel 1	Close brake or controller enable
		8	Channel 1	Open brake or controller disable
		9	Channel 1	+ 24V for controller enable and brake

		Pin	Channel	Meaning
OUTPUT 2-3		1	Channel 2	Setpoint
		2	Channel 2 and 3	Shield
		3	Channel 3	Setpoint
		4	Channel 2	Close brake or controller enable
		5	Channel 2	Open brake or controller disable
		6	Channel 2 and 3	GND
		7	Channel 3	Close brake or controller enable
		8	Channel 3	Open brake or controller disable
		9	Channel 2 and 3	+24V



14.2 UPI 2DIA / UPI 3DIA - Technical Data

Basic data		
Number of controllable NC axes	UPI 2DIA	2
	UPI 3DIA	3

Electrical data		
Input signal voltage (incremental and analog encoder)		Typical 2.25 V ... 3.75V (5...15 mA) Worst case 2.75V...3.55V (6.3...15 mA)
Output voltage (setpoint outputs)		±10 V
Output current (setpoint outputs)		±10 mA
Internal power consumption	DC 24 V	5.5 W (when switched on max. 9.7 W for approx. 50 ms)
	DC 5 V	1 W
Encoder supply voltage		Depending on encoder 5.3... 24 V external supply
Fuse for encoder supply voltage		T1.6 A

Encoder inputs incremental	
Encoder inputs	A, /A, B, /B, zero, /zero
Max. encoder frequency	150 kHz
Max. counting frequency	600 kHz (after internal pulse quadrupling)
Max. travel velocity	36 m/min at 1 µm resolution 10ms positioning cycle

Encoder inputs absolute	
Encoder inputs	Measured value, /measured value
Output to encoder	Clock pulse, /clock pulse (similar to RS422)
Clock rate	Programmable: 156, 312 or 624 kHz
Encoder code	Programmable: Gray, binary
Data format	Programmable: 21 / 25 bit

Setpoint outputs	
Resolution	12-bit
Output protection	Permanently short-circuit-proof
Enabling outputs	Potential-free relay contacts Switching voltage 24 V DC / 100 mA

Isolation	
Encoder	Connected to each other, isolated from bus, enabling outputs, setpoint outputs
Setpoints	Connected to each other, isolated from bus, enabling outputs, encoders
Enabling outputs	Connected to each other, isolated from bus, encoders, setpoint outputs



Connection system		
Setpoints, enabling outputs		Subminiature, 9-pin, plug connector
Encoder	UPI 3DIA	Subminiature, 25-pin, socket connector
	UPI 2DIA	Subminiature, 9-pin, socket connector

Connecting lines	
Setpoints, enabling outputs	5-core, shielded, 0.25 mm ²
Encoder	Cable acc. to Haidenhain specification

Dimensions / weight	
Dimensions (W x H x D)	35.5 mm x 200 mm x 150 mm
Modular spacing	1
Weight	0.48 kg

The information in the "Technical Data for all Modules" section also applies.

14.3 Ordering Information

Modules	
Ordering designation	Article number
UPI 2DIA	318 134 85
UPI 3DIA	318 126 12

Loadable function blocks* on diskette	
Ordering designation	Article number
UDF POS German	320 101 16
UDF POS English	320 140 82

*The UPI cannot be operated without the loadable function blocks.

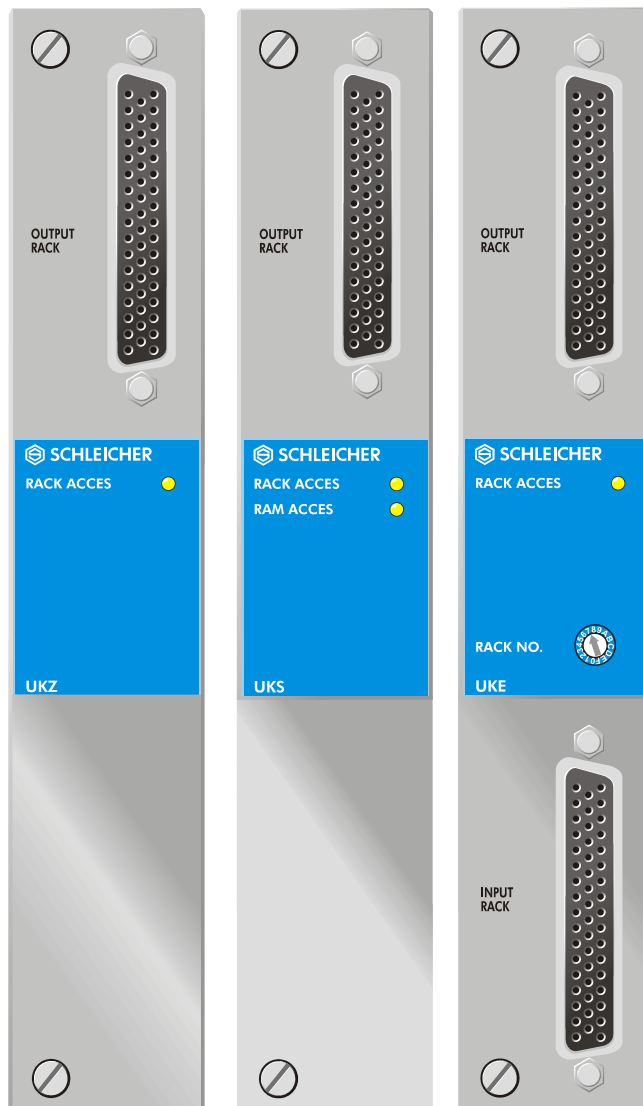
Operating manuals	
Ordering designation	Article number
USP 2I / USP 2A Positioning Interface manual German	322 138 92
Operation Manual Positioning Interface USP 2I / USP 2A English	322 138 93



15 UKZ / UKS / UKE Interface Modules

Application

- UKZ** • For interfacing a rack with an extension rack
- UKS** • For interfacing a rack with an extension rack. When several control units are fitted on one rack
- UKE** • For use on extension racks



- Status LEDs
- Front connection for interface cable



15.1 UKZ / UKS / UKE Displays and Connections

The diagram shows three vertical interface modules: UKZ, UKS, and UKE. Each module has a top section with two connector ports labeled 'OUTPUT RACK' (top) and 'INPUT RACK' (bottom). Below these is a blue section with two yellow LEDs labeled 'RACK ACCESS' and 'RAM ACCESS'. At the bottom of the blue section is a rotary switch labeled 'RACK NO.'. Callouts 1 through 5 point to specific components: 1 points to the top 'OUTPUT RACK' port, 2 points to the bottom 'INPUT RACK' port, 3 points to the 'RACK ACCESS' LED, 4 points to the 'RAM ACCESS' LED, and 5 points to the 'RACK NO.' rotary switch.

Connections			
Designation	Explanation		
1 OUTPUT RACK	Connection for interface cable to extension rack		
2 INPUT RACK (only UKE)	Connection for interface cable from previous rack		

LED display			
Designation	Colour	ON	OFF
3 RACK ACCESS	yellow	Access to extension rack is OK	No access to extension rack <ul style="list-style-type: none"> No interface cable Program cannot operate extension Controller in STOP mode
4 RAM ACCESS (only UKS)	yellow	Access to shared RAM is OK	No access to shared RAM <ul style="list-style-type: none"> Program cannot operate shared RAM Controller in STOP mode Interface module defective

Rotary switch	
Designation	Explanation
5 RACK NO. (only UKE)	Set hexadecimal number of rack



15.2 Interface Modules - Technical Data

Basic data		
Number of connectable interface modules	UKZ	1
	UKS	1
	UKE	2
Shared RAM (UKS only)		32 k x 16 bit

Electrical data		
Isolation		No
Internal power consumption	DC 24 V	-
	DC 5 V	0.5 W

Dimensions / weight	
Dimensions (W x H x D)	35.5 mm x 200 mm x 150 mm
Modular spacing	1
Weight	0.48 kg

The information in the "Technical Data for all Modules " section also applies.

15.3 Ordering Information

Modules	
Ordering designation	Article number
UKZ	318 069 80
UKS	318 069 16
UKE	318 069 81

Accessories		
Ordering designation	Description	Article number
UKK 24 interface cable	Length 24 cm	318 069 17
UKK 100 interface cable	Length 100 cm	318 095 99
UKK 24/V interface cable	Length 24 cm, also carries power supply. Use only if no power supply unit on rack.	318 075 00

16 Technical Data for all modules

Climatic conditions	
Ambient operating temperature	0 ... +55°C (category KV acc. DIN 40040), vertical installation, free air circulation
Storage temperature	-25 ... +70°C (category HS to DIN 40040)
Relative humidity	10 ... 95% (category F acc. DIN 40040), no condensation
Air pressure in operation	860 ... 1060 hPa
Mechanical strength	
Vibration	acc. DIN EN 60068-2-6 10 ... 57 Hz constant amplitude 0.075 mm 57 ... 150 Hz constant acceleration 1g
Shocks	acc. DIN EN 60068-2-27, sinus half wave 15 g / 11 ms
Free fall	acc. DIN EN 60068-2-32, height of fall 1 m (with original packing)
Electrical safety	
Protection class	Class I acc. EN 60536 (Basis isolation and protective earth connection)
Protection type	IP 00 to EN 60529
Clearance/creepage distance	acc. DIN EN 61131-2 between electrical circuits and objects as well as between decoupled electrical circuits corresponding to overload category II, contamination level 2
Test voltage	AC 350 V / 50 Hz for rated equipment voltage DC 24 V AC 1350 V / 50 Hz for rated equipment voltage AC 230 V
Electromagnetic compatibility	
Electrostatic discharge	acc. EN 61000-4-2: 4 kV contact discharge / 8 kV clearance in air discharge
Electromagnetic fields	acc. EN 61000-4-3: field intensity 10 V / m, 80 ... 1000 MHz
Burst	acc. EN 61000-4-4: 2 kV on AC/DC supply lines, 1 kV on I/O signal lines
Interference emissions	acc. EN 55011: Limit category A, Group 1



17 Quick Introduction

The XCx startup described in this section can be carried out without in-depth knowledge. In order to achieve success quickly, you have to follow the startup steps exactly, and keep to the specified conditions (e.g. I/O configuration).

Starting up of CANopen field bus and the web server functions of the XCx 700 are described in the chapter "Quick Introduction" of following operating manuals:

Designation	Article No.
XCx Kompaktsteuerungen German	322 383 82
XCx Compact Controllers English	322 383 83

17.1 Starting up Communication

17.1.1 Communication connections

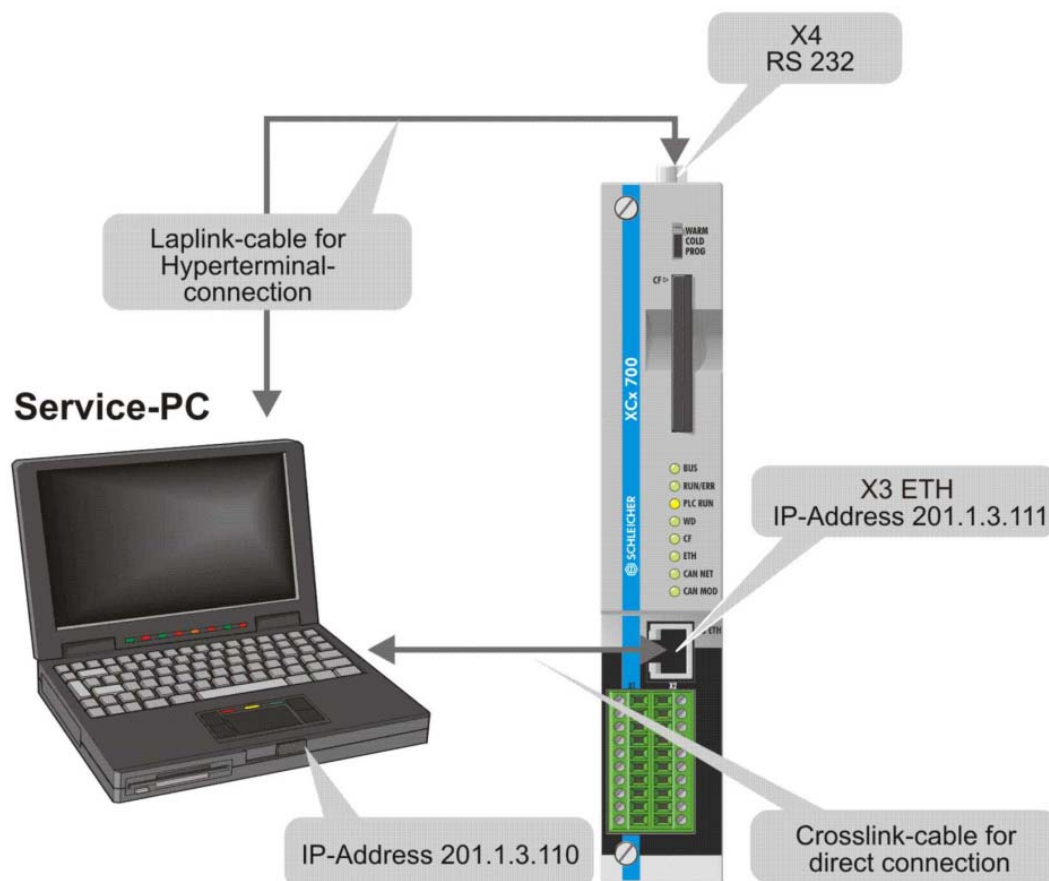
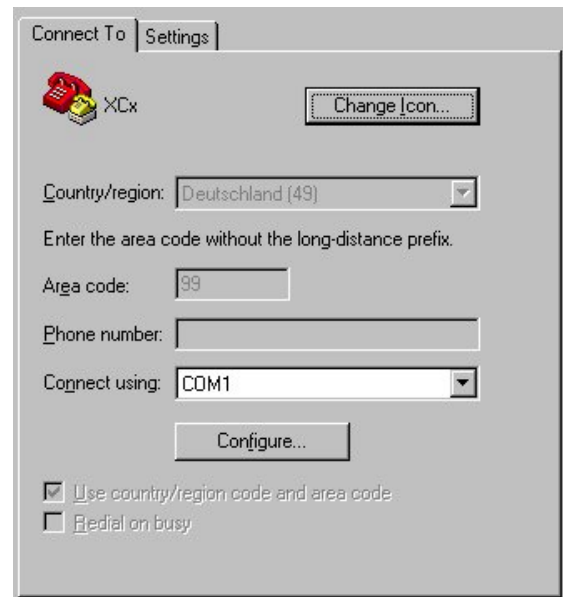


Figure 1: Connecting the service PC to the XCx

17.1.2 Starting up the serial connection via the RS232 interface

A connection via the serial interface is very useful when you first start up the XCx. It is easy to get it running, and it allows you to see the first reactions of the XCx.

- Connect the cable between COM1 or COM2 on the service PC and X4 on the XCx.
- Go to *Start/Programs/Accessories/Hyperterminal* on the PC and start *Hypertm.exe*. Enter a name, for example XCx, and select a symbol.
- In Properties of *.../Connect To* select direct connection via COM1 and then click the Configure button.



- Set the following parameters in *Properties of COM1*.



- Switch the XCx on or RESET.
The boot log appears in the hyperterminal dialog window while the controller is starting up.



17.2 Starting up the Ethernet Interface

We recommend using the Ethernet connection for programming with MULTIPROG, in order to gain maximum performance during configuring, programming and startup.

You will need a PC with a network card for Ethernet and a cross-link cable for direct connection to the XCx.

17.2.1 Output current IP address of XCx via the RS232 interface

Enter the instruction *version* in the *Hyperterminal* dialog window.

The version information is displayed.

```
-> version
VxWorks (for Intel XcpuSA - ARMSA1110) version
VxWorks5.4.2.
Kernel: WIND version 2.5.
Made on Jun  3 2002, 13:56:31.
Boot line:
ata=0,0(0,0):/ata0/OS/vxworks.xcn
e=192.168.1.2:ffffff00 u=target pw=target tn=X
Cx o=lnc f=0x08 s=/ata0/OS/Run.vxs
value = 126 = 0x7e = '~'
->
```

The IP address (192.168.1.2), subnet mask (255.255.255.00), username (u=target) and password (pw=target) are in the line:

```
e=192.168.1.1:ffffff00 u=target pw=target tn=X
```

17.2.2 Setting the IP address of the service PC

1. The IP address of the service PC is set via Start/Settings/Control Panel/Network/Configuration.
2. Select TCP/IP and click Properties.
Enter IP address: 192.168.1.1
Enter subnet mask: 255.255.255.0
3. Now the PC must be restarted.
4. Output the IP address to check the service PC

Windows® 9x *Start/Run/winipcfg*
At network card info select <Name of network card> instead of *PPP-Adapter*.

Windows® NT At *Start/Programs/MS-DOS Prompt*
enter *ipconfig* and start.

192.168.1.1 should now appear as the IP address of the network card.

255.255.255.0 should now be displayed at Subnet Mask.

Acknowledge with OK or close window.

17.2.3 Setting up and checking the Ethernet connection

1. Set the XCx lock switch to PROG and connect the Ethernet connection on the PC to the X6 ETH Ethernet interface on the XCx using a cross-link cable.
2. Select Start/Programs/MS-DOS Prompt on the PC.
3. Enter: doskey (Doskey installed appears. Use as help for another test).
4. Enter :ping 192.168.1.2 (this IP address is preset when the XCx is delivered).
5. Start with OK
6. If everything is OK the following appears:
pinging ...
Response from 192.168.1.2.....
Response ...
Response ...
Response ...

If the XCx is not recognized an error message will appear. Check the IP address and the cable connections.

17.3 Changing the IP Address of the XCx

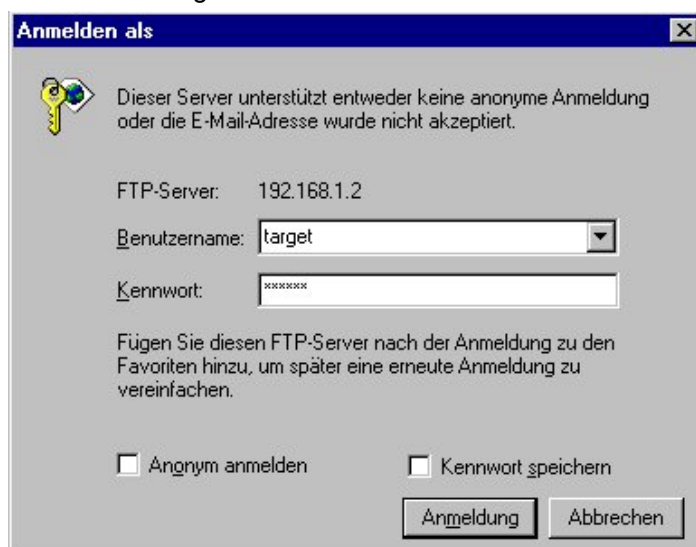
If the XCx is operated as described above via a *crosslink* cable you do not have to change the IP address.

- To change it, start a program for FTP access (File Transfer Protocol) on the PC (e.g. Windows® Internet Explorer 6).



For FTP access the TCP/IP connection to the XCx has to be active. (see "Checking the IP address with ping")

- Enter ftp://192.168.1.2 in the address line and start.
- To log on, enter the user name and the password for the XCx:
User name = target
Password = target





- Now the content of the compact flash should be in Windows® Internet Explorer.
- Copy the BootLine.txt file from the \OS directory to the hard disk.
- Edit the BootLine.txt file.
... e=192.168.1.1:fffff00 u=target pw=target
Meaning of entries:
e=192.168.1.1:fffff00 = IP address : Subnet mask
u= target = User name
pw=target = Password
- Enter the required address and if required, the user name and the password:
- Save the file and copy it back to the compact flash on the XCx.
If the file cannot be copied, you will have to cancel the read-only attribute in the BootLine.txt file on the compact flash. To do this enter and execute the instruction attrib *bootline.txt*,"-R" using the hyperterminal via the RS232 interface.
- Set the XCx lock switch to PROG and switch the XCx off and on again (or RESET).

17.4 Installing the MULTIPROG Programming Software, OPC-Driver, MwtAddOns



Installing MULTIPROG is necessary on this step.

Find the installing description in following operator manuals:

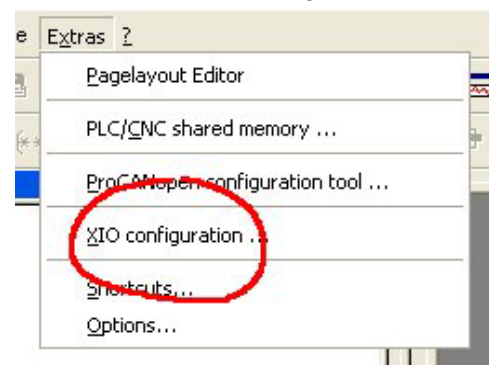
Designation	Article No.
XCx Kompaktsteuerungen German	322 383 82
XCx Compact Controllers English	322 383 83

17.5 Read in the Hardware Configuration and Accessing the I/O Level

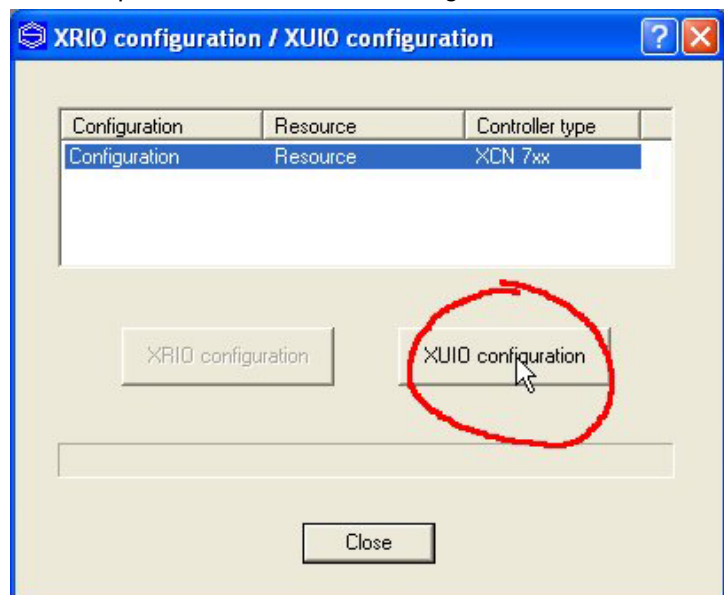
17.5.1 Inserting the I/O configuration

When you install *MwtAddOns* the XIO configurator is provided.
The configurator has the following features:

- Display and edit the hardware configuration (module slot list)
- Inserting the necessary variables in the PLC project to access the I/O modules.
- Inserting the necessary entries in the I/O configuration of the PLC project.
- You can start the configurator with *Extras/XIO configuration...*



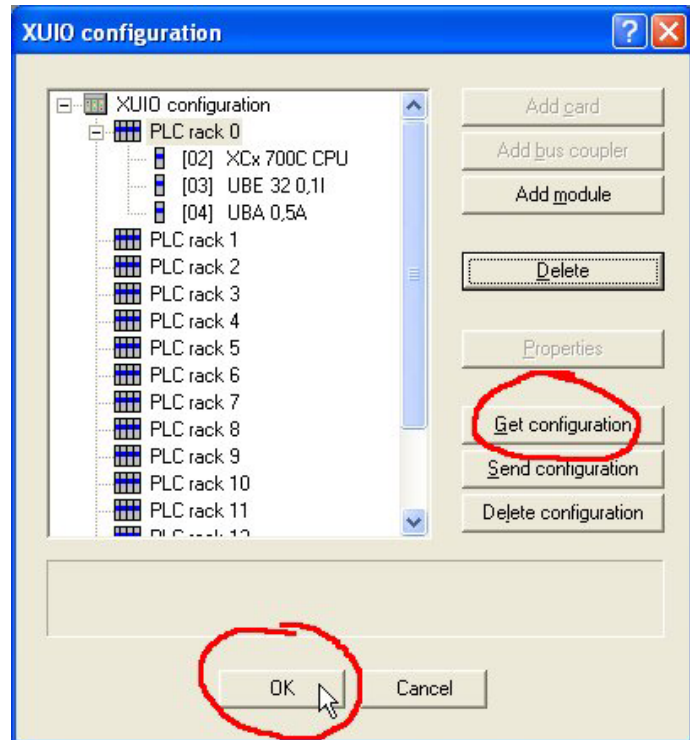
- Firstly in the dialog window choose the Resource, in this case XCN 700 and press the button *XUIO configuration*.



In case of communication errors, the correct EtherNet interface parameters must be checked.



- The actual XUIO configuration of the PLC project is displayed. If no configuration is displayed, the configuration must be loaded from the PLC (button *Get configuration*)
With button *OK* the configuration, variables and I/O configuration entries are saved.



Hardware Configuration Check during Controller Start Up

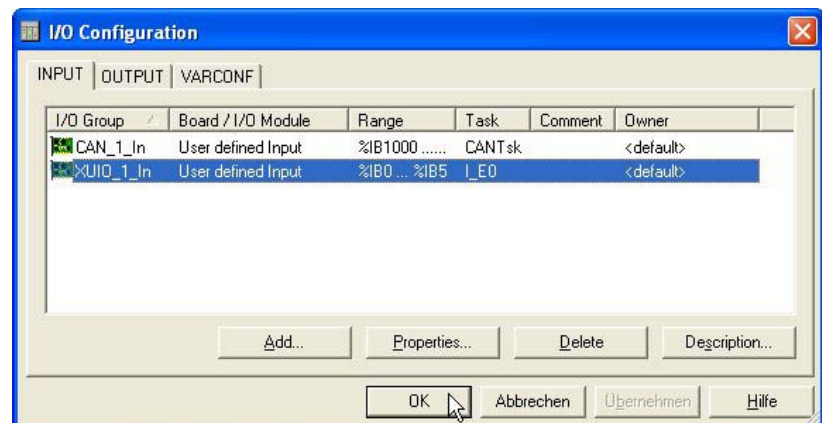
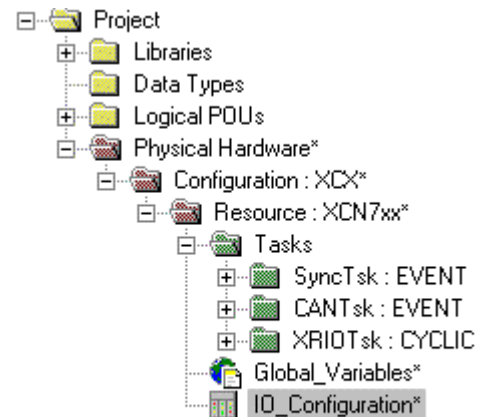
During every controller start up the stored hardware configuration will be compared with the real existing hardware configuration.

Is whereas any difference detected the start up will be interrupted. The LED BUS is blinking red and the following error message will be stored in the active error buffer:

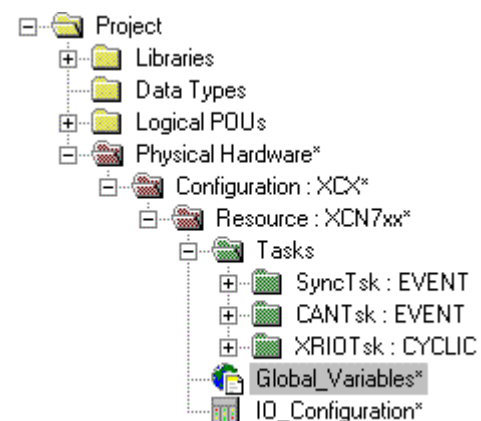
0x01100001	Incompatible hardware configuration
------------	-------------------------------------

Use the <Ctrl+?> keys in the SCHLEICHER-Dialog software to read the active error buffer and the log book.

The I/O configuration described above was entered under *IO_Configuration*. in the MULTIPROG project tree



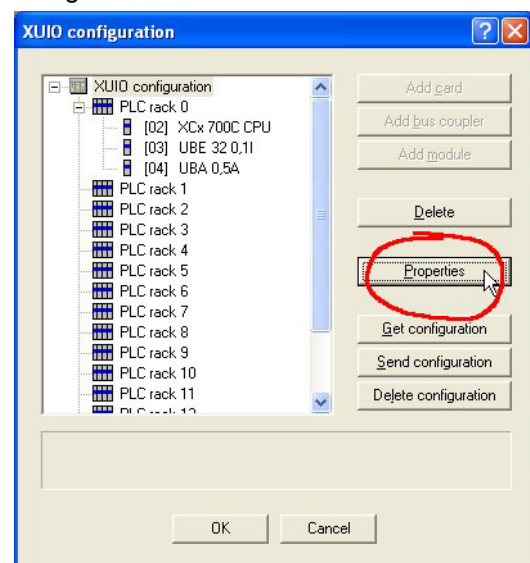
- The variable declaration for the configuration described above was entered under *Global_Variables*.



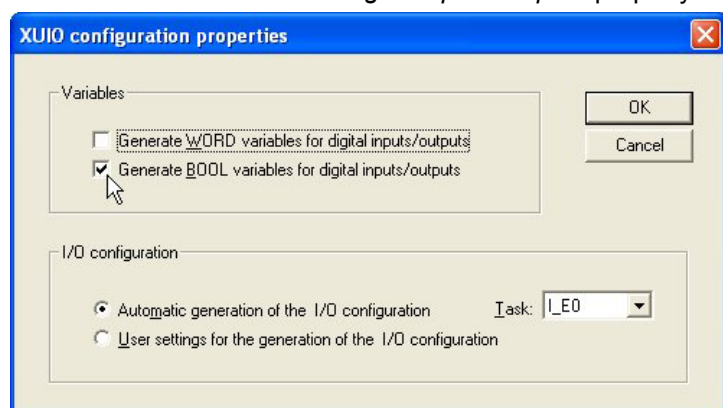
XUIO_Variables				
xuio03_MV0	WORD	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, bit inputs	%MV 0
xuio03_MV2	WORD	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, bit inputs	%MV 2
xuio03_MV4	WORD	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, bit inputs	%MV 4
xuio03_QV0	WORD	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, bit outputs	%QV 0
xuio03_MVQ0	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000000
xuio03_MVQ2	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000002
xuio03_MVQ4	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000004
xuio03_MVQ6	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000006
xuio03_MVQ8	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000008
xuio03_MVQ10	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000010
xuio03_MVQ12	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000012
xuio03_MVQ14	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000014
xuio03_MVQ16	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000016
xuio03_MVQ18	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000018
xuio03_MVQ20	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000020
xuio03_MVQ22	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000022
xuio03_MVQ24	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000024
xuio03_MVQ26	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000026
xuio03_MVQ28	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000028
xuio03_MVQ30	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,11, word output	%MV 3.4000030
xuio04_QV2	WORD	VAR_GLOBAL	XUIO slot 04, UBA 0,5A, bit outputs	%QV 2

In this case variables of the WORD type was created. Every of the 16 bit of the variable correspond with an digital input or output.

To generate variables of BOOL type, for every digital input or output, in the *XUIO configuration* dialog .



set the *Generate BOOL variables for digital inputs/outputs* property.



17.5.2 Use Options of Hardware Configuration



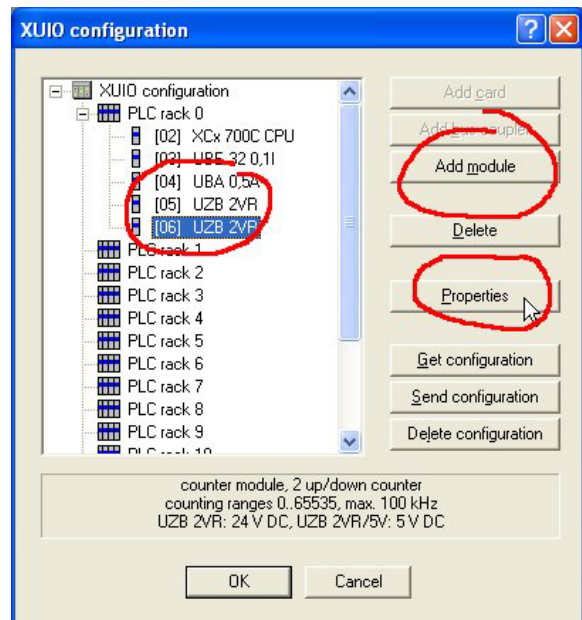
Important for experienced users only.

Options of hardware configuration (following named options) allow a effective PLC programming.

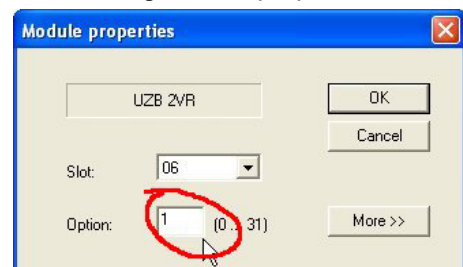
The PLC program detect options and adapt itself to different controller hardware.

Example

Two counter modules UZB 2VR added to the hardware configuration generated above (button *Add module*).



Use the button *Properties* to open the dialog *Module properties*.



Set the Option to 1 (0 to 31 is possible) for both UZB 2VR.
All other modules keeps the option 0 (default setting).



Now the both UZB 2VR are members of option 1 all other modules are members of option 0.

During controller start up the stored hardware configuration will be compared with the real exist hardware configuration.

All modules of a option must be present (the option is active) or all modules of a option must be not present (the option is not active). The address range of not active options are reserved.

Are the modules of a option only partial present, a configuration error is generated (LED BUS on controller is red blinking and a error message is stored in the active error buffer).

Active options are bit-wise stored in variable `slotOptions_0` and `slotOptions_1`. The option number is equal of the bit number.

In the shared memory a data structure exist:

```
TYPE
  XU_System_Global_Bit : STRUCT
    systemLock      : USINT;      (* CX 08,00..08,03 *)
    plcStop         : USINT;      (* CX 08,08..08,11 CPU 0..3 *)
    slotOptions_0   : UINT;       (* CX 09,00..09,15 options 0..15 *)
    slotOptions_1   : UINT;       (* CX 10,00..10,15 options 16..31 *)
    errorDetect     : UINT;       (* CX 11,00..11,01 error detection *)
  END_STRUCT
END_TYPE

VAR_GLOBAL
  cx      AT %MW3.5001520 : XU_System_Global_Bit;
END_VAR
```

The PLC can decide if a option active and react correspond to them.

17.6 Interrupt processing

The XCx 700 is able to process four interrupts, activated by digital inputs. The first four inputs of an UBE 32 0,1I can be used for.

17.6.1 Variables for Interrupt Processing

If a UBE 32 0,1I module added to the hardware configuration (see above), variables for physical inputs and interrupt processing are automatically created.

XUIO_Variables				
xuio03_IW0	WORD	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, bit inputs	%MW 0
xuio03_IW2	WORD	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, bit inputs	%MW 2
xuio03_IW4	WORD	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, bit inputs	%MW 4
xuio03_QW0	WORD	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, bit outputs	%QW 0
xuio03_MWQ0	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000000
xuio03_MWQ2	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000002
xuio03_MWQ4	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000004
xuio03_MWQ6	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000006
xuio03_MWQ8	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000008
xuio03_MWQ10	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000010
xuio03_MWQ12	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000012
xuio03_MWQ14	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000014
xuio03_MWQ16	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000016
xuio03_MWQ18	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000018
xuio03_MWQ20	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000020
xuio03_MWQ22	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000022
xuio03_MWQ24	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000024
xuio03_MWQ26	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000026
xuio03_MWQ28	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000028
xuio03_MWQ30	INT	VAR_GLOBAL	XUIO slot 03, UBE 32 0,1I, word output	%MW 3.4000030
xuio04_QW2	WORD	VAR_GLOBAL	XUIO slot 04, UBA 0,5A, bit outputs	%QW 2

Inputs	
xuio.._IW0	input bits 0 – 15 (input bits 0 – 3 with interrupt functionality)
xuio.._IW2	input bits 16 – 31
xuio.._IW4	Image of the input bits 0 – 3 if the interrupt functionality active This bits must be reset by xuio.._MWQ0-14 together see examples.
	bit 0 set by rising edge on input 0
	bit 1 set by rising edge on input 1
	bit 2 set by rising edge on input 2
	bit 3 set by rising edge on input 3
	bit 4 set by falling edge on input 0
	bit 5 set by falling edge on input 1
	bit 6 set by falling edge on input 2
	bit 7 set by falling edge on input 3



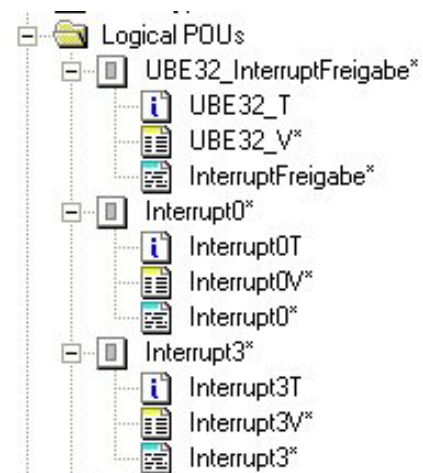
Outputs		
xuio.._QW0	Mask to enabling the interrupts	
	bit 0	input bit 0 rising edge
	bit 1	input bit 1 rising edge
	bit 2	input bit 2 rising edge
	bit 3	input bit 3 rising edge
	bit 4	input bit 0 falling edge
	bit 5	input bit 1 falling edge
	bit 6	input bit 2 falling edge
	bit 7	input bit 3 falling edge
xuio.._MWQ0 bis xuio.._MWQ14	Words to quit the interrupts	
	xuio.._MWQ0	input bit 0 rising edge
	xuio.._MWQ2	input bit 1 rising edge
	xuio.._MWQ4	input bit 2 rising edge
	xuio.._MWQ6	input bit 3 rising edge
	xuio.._MWQ8	input bit 0 falling edge
	xuio.._MWQ10	input bit 1 falling edge
	xuio.._MWQ12	input bit 2 falling edge
	xuio.._MWQ14	input bit 3 falling edge

.. two dots represents the slot number of the module

17.6.2 Interrupt Processing POU's

Three POU's must be created:

- enable the interrupts "UBE32_InterruptFreigabe"
- processing caliper "Interrupt 0"
- processing impulse for counting "Interrupt3"



Global variables for communication and counting must be created.

Interrupt0_Zaehler	INT	VAR_GLOBAL
Interrupt3_Zaehler	INT	VAR_GLOBAL
Interrupt0_RTrig_Freigabe	BOOL	VAR_GLOBAL

POU "UBE32_InterruptFreigabe" enabling interrupts

```
(* Example 1: POU interrupt0/ task I_E0 event 0
interrupt 0 (UBE32 0,1I input 0)
Evaluation of the first rising edge at input 0 (e.g. caliper).
Force the variable Interrupt0_RTrig_Freigabe to enable the interrupt.
The variable is set to 0 in the POU Interrupt0
----- *)
IF      Interrupt0_RTrig_Freigabe
THEN
      xui03_QW0  := S_BIT_IN_WORD(TRUE,xui03_QW0,SINT#0);
ELSE
      xui03_QW0  := R_BIT_IN_WORD(TRUE,xui03_QW0,SINT#0);
      xui03_MWQ0 := 0;
END_IF;

(* Example 2: POU interrupt3/ task I_E3 event 3
interrupt 3 (UBE32 0,1I input 3)
Evaluation of all falling edges at input 3 (e.g. count light barrier
impulses).
Force the variable Interrupt3_RTrig_Freigabe to enable or disable the
interrupt.
----- *)
IF      Interrupt3_FTrig_Freigabe
THEN
      xui03_QW0  := S_BIT_IN_WORD(TRUE,xui03_QW0,SINT#7);
ELSE
      xui03_QW0  := R_BIT_IN_WORD(TRUE,xui03_QW0,SINT#7);
      xui03_MWQ14 := 0;
END_IF;
```

POU "Interrupt0" process caliper

```
(* Example 1: POU interrupt0/ task I_E0 event 0
interrupt 0 (UBE32 0,1I input 0)
Evaluation of the first rising edge at input 0 (e.g. caliper).
----- *)
Interrupt0_Zaehler      := Interrupt0_Zaehler + 1;

Interrupt0_RTrig_Freigabe := FALSE;

RETURN;
```

POU "Interrupt3" counter

```
(* Example 2: POU interrupt3/ task I_E3 event 3
interrupt 3 (UBE32 0,1I input 3)
Evaluation of all falling edges at input 3 (e.g. count light barrier
impulses).
----- *)
Interrupt3_Zaehler := Interrupt3_Zaehler + 1;

xuio03_MWQ14      := 0;

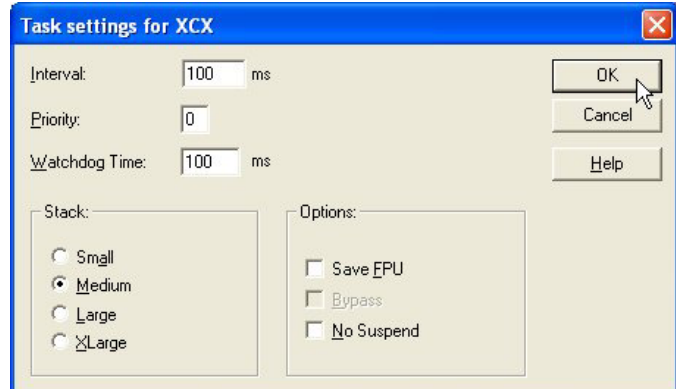
RETURN;
```

17.6.3 Interrupt Processing Task Structure

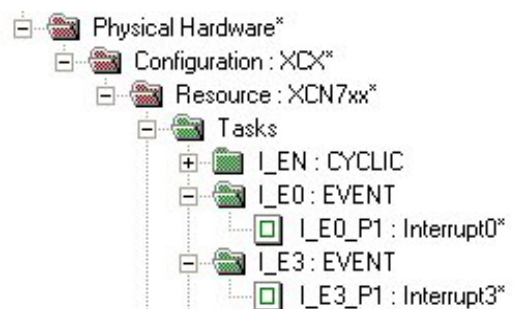
A cyclic task must be inserted for enabling the interrupt. The POU "UBE32_InterruptFreigabe" must be allocated.



Choose task settings:



At the finish must be inserted two event tasks. The tasks are running interrupt conditioned with the interrupt processing POU's.



I_E0:EVENT with POU "Interrupt0" process the interrupt input bit 0

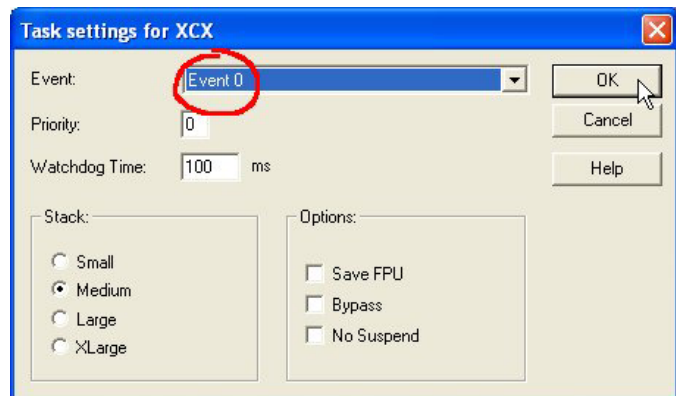
I_E3:EVENT with POU "Interrupt3" process the interrupt input bit 3

Allocate the events (input bits) to the tasks with the *Task settings* dialog

There are following rules:

input bit 0	correspond	event 0
input bit 1	correspond	event 1
input bit 2	correspond	event 2
input bit 3	correspond	event 3

Choose task settings





18 Appendix

18.1 Trademarks

- WINDOWS is a registered trademark of Microsoft Corporation.
- CANopen is a registered trademark of CAN in Automation e.V,
- ProCANopen is a registered trademark of Vector Informatik GmbH
- CANalyzer is a registered trademark of Vector Informatik GmbH
- Pentium is a registered trademark of Intel Corp.
- VxWorks is a registered trademark of Wind River Systems Inc.

All other trademarks or product names are registered trademarks of their respective owners.

19 Safety-related Information

The term automation system as used in this manual includes control units, their components (modules), other parts (such as racks, cables), operator panels, and the software used for programming, commissioning and operating the control units. This operating manual can only describe a fraction of the automation system (e.g. modules).

The technical design of SCHLEICHER automation systems is based on the EN 61131-2 (IEC 61131-2) product norm. The systems and devices have CE marking according to the EMC directive 89/336/EEC and, if applicable, the low-voltage directive 73/23/EEC.

The machinery directive 89/392/EEC is not applicable, because the safety objectives of the directive are covered by the low-voltage and EMC directives.

When SCHLEICHER automation systems are part of the electrical equipment of a machine, the manufacturer must include them in the conformity evaluation process. In this case the DIN EN 60204-1 norm must be observed (safety of machines, general requirements for electrical equipment of machines).

When an automation system is properly maintained and used for its intended purpose it will not normally cause damage to property or present health hazards. However, improper configuration, installation, maintenance or operation of the system or machine, ignoring the instructions in this manual, or intervention by insufficiently qualified personnel may result in connected actuators (such as motors, hydraulic units, etc.) becoming a source of danger.

19.1 Correct Use of the System

SCHLEICHER automation systems are state-of-the-art products and manufactured to recognised safety requirements. All the same, their use can cause danger to the health and safety of operators and others, or damage machines, systems or other property.

The automation system must only be used in perfect technical condition for its intended purpose, with attention given to safety and danger, and observing the operating manual. Correct transport, storage, installation, operation and maintenance of the system are all prerequisites for smooth and safe operation of the control system. Malfunctions, in particular those which may affect safety, must be immediately resolved.

Automation systems are designed exclusively to control machines and systems. Automation systems are not intended for any other use than the above. The manufacturer will therefore accept no liability for any damages resulting from the incorrect use of the systems.

When using automation systems, all instructions given in this manual regarding mechanical and electrical setup, commissioning and operation must be observed.

19.2 Selection and Qualification of Personnel



All configuring, programming, installation, commissioning, operation and maintenance work on the automation system must be carried out by trained personnel such as electricians or electrical engineers.

Personnel responsible for configuring and programming the system must be familiar with all safety-related issues in automation technology.

System operators must be instructed on the operation of the control system and be familiar with the relevant operating instructions.

All personnel responsible for installing, commissioning and maintaining the system must have had appropriate training qualifying them to work on automation systems.



19.3 Configuring, Programming, Installation, Commissioning and Operation

The automation system will in most cases be a part of a larger system in which machines are controlled. When configuring, installing and commissioning automation systems to control machines the machine manufacturer and the user must observe the safety regulations as defined in the machinery directive 89/392/EEG. For specific applications national accident prevention regulations such as VBG 4.0 will apply.

Safety-related components on the controlled machine must be designed such that they operate independently from the control system. Emergency stop components must be operational in all control modes. In an emergency stop the power supply to all switching elements controlled by the control system must be cut off.

Measures must be taken for restarting an interrupted control program following voltage dips or power failures. Operating conditions should never cause danger, not even for a short time. In the event of danger the emergency stop must be immediately triggered.

In order to prevent an open-circuit in the signal circuit causing non-controllable conditions in the control system, the relevant hardware and software safety precautions must be taken for I/O interfacing. Control elements and their assigned control panel elements must be installed in a place where they are sufficiently protected against inadvertent use.

19.4 Maintenance

Measuring and testing on active devices must be carried out in accordance with the regulations and instructions of the VBG 4.0 accident prevention regulation. The appropriate power tools must be used.

Repairs on control components must be carried out at repair shops authorised by SCHLEICHER. Opening the components and repairs by unauthorised personnel may lead to personal injury or damage to property.

Always be disconnected the device from the mains before opening it (either disconnect the mains plug or use the cut-out switch).

Control modules may only be replaced when the power is switched off. Disassembly and assembly must be carried out according to the directives for mechanical assembly.

Fuses may only be replaced with those types specified in Technical Data.

Batteries may only be replaced with those types specified in Technical Data. Batteries must always be disposed as hazardous waste.

19.5 High Voltages



When the cabinet is opened or casing is removed from system components certain parts of the automation system are exposed. These parts may be subject to dangerous high voltages.

The user must prevent any unauthorised and incorrect access to the system (for example, by ensuring that the cabinet is locked).

Personnel must be familiar with all sources of danger and measures for commissioning and maintaining the system in line with the instructions given in this manual.

19.6 Dealing With Used Batteries

When the batteries in the automation system are dead they must be disposed of in a battery return system or through public waste disposal facilities.

Batteries should be fully discharged before disposal. A battery is discharged when the function of the device is impaired due to insufficient battery capacity.

When batteries for disposal are not fully discharged precautions must be taken to prevent short circuits. For example by sticking tape over the poles of the battery.

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