Operating instructions

C9302-E0

Control computer for XC-Boards® with Ethernet interface

MAC address: ☐☐ : ☐☐ : ☐☐ : ☐☐ : ☐☐ : ☐☐

Site of the unit: _____

Table of contents

Important information

Read these operating instructions before starting the unit. They provide you with important information on the use, safety and maintenance of the units. This helps you to protect yourself and prevent damage to the unit.

⚠️ Information intended to help you to avoid death, bodily harm or considerable damage to property are highlighted by the warning triangle shown here; it is imperative that this information be properly heeded.

The operating instructions are intended for trained professional electricians familiar with the safety standards of electrical technology and industrial electronics.

Store these operating instructions in an appropriate place.

The manufacturer is not liable if the information in these operating instructions are not complied with.

Safety

⚠️ Components inside the units are energized with electricity during operation. For this reason, mounting and maintenance work may only be performed by professionally-trained personnel while observing the corresponding safety regulations.

The repair and replacement of components and modules may only be carried out by the manufacturer for safety reasons and due to the required compliance with the documented unit properties.

The units do not have a power switch. They are operative as soon as the operating voltage is applied.

Intended use

The units are intended for use in industrial environments. They may only be operated within the limit values stipulated by the technical data.

When configuring, installing, maintaining and testing the units, the safety and accident-prevention regulations relevant to use in each individual case must be complied with.

Trouble-free, safe operation of the units requires proper transport, storage, installation, mounting and careful operation and maintenance of the units.

Mounting and installation

The attachment options for the units were conceived in such a way as to ensure safe, reliable mounting.

⚠️ The user must ensure that the attachment hardware, the unit carrier and the anchoring at the unit carrier are sufficient to securely support the unit under the given surrounding conditions.

The units are to be mounted in such a way that they can be opened up while mounted. Sufficient space for the cables must be available in the unit near the cable infeed.

Sufficient space is to be kept clear around the units to ensure air circulation and to prevent the build-up of heat resulting from use. The relevant information must be heeded in the case of units ventilated by other means.

⚠️ When the housing fasteners are opened, the front frame of the housing hinges out upward or downward (depending on the unit version) automatically.

Grounding	All devices are equipped with a metal housing. They comply with safety class I and require a protective earth connection. The connecting cable for the operating voltage must contain a protective earth wire of a sufficient cross section (DIN VDE 0106 part 1, DIN VDE 0411 part 1).

EMC measures

The devices comply with the EU Directive 89/336/EEC (EMC Directive) and provide the required interference immunity. Observe the following when connecting the operating voltage and data cables:

- Use shielded data cables.

- The data and operating voltage cables must be laid separately. They may not be laid together with heavy-current cables or other interference-producing cables.

- The cable thickness must be properly assessed (DIN VDE 0100 Part 540).

- The cable lengths inside the units are to be kept as short as possible to prevent interference. This applies especially to unshielded operating voltage cables. Shielded cables are also to be kept short due to any interference which might be emitted by the shielding.

- Neither excessively long cables nor cable loops may be placed inside the units.

- The connection of the cable shielding to the functional ground (PE) must be as short and low-impedance as possible. It should be made directly to the mounting plate over a large area with a conductive clip:
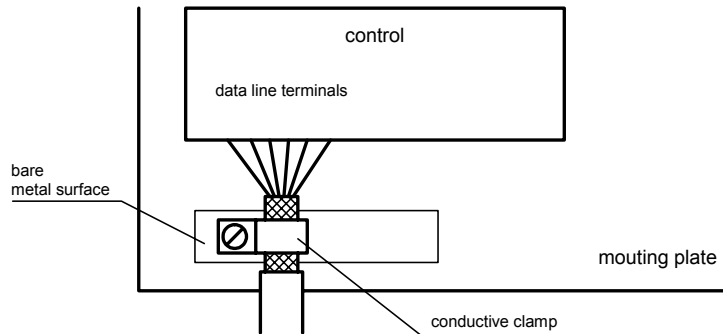
- The cable shielding is to be connected at both cable ends. If equipotential bonding currents are expected due to the cable arrangement, electrical isolation is to be performed on one side. In this case, capacitive connection (approx. 0.1μF/600 V AC) of the shielding on the isolated side must occur.

Disposal

Units or unit parts which are no longer needed are to be disposed of in accordance with the regulations in effect in your country.

XC-Board®

The control computer C9302-E0 serves for the activation of numeric or alphanumeric display fields in XC-Boards® via an Ethernet interface.

The following picture shows an example for an XC-Board® with four display fields:
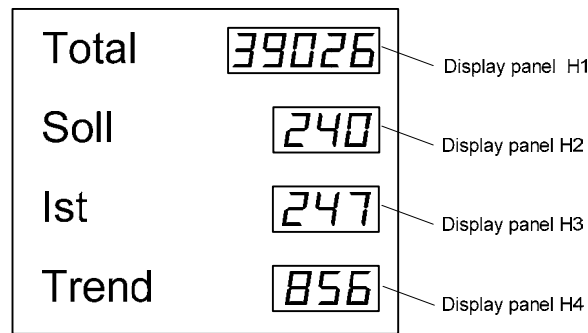
The electrical structure of the XC-Boards® is documented in the included logic diagram. The following picture shows the general structure of the XC-Boards®:
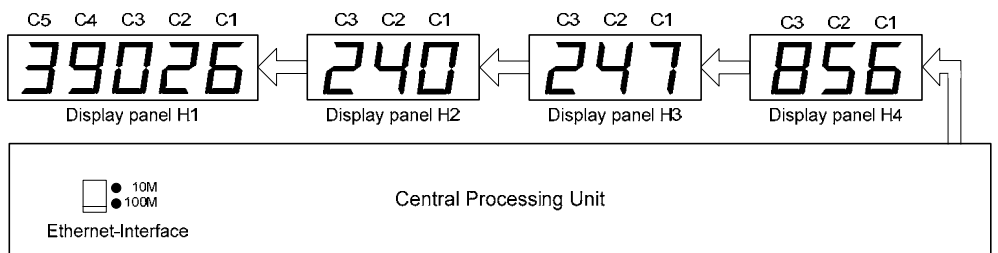
Central Processing Unit
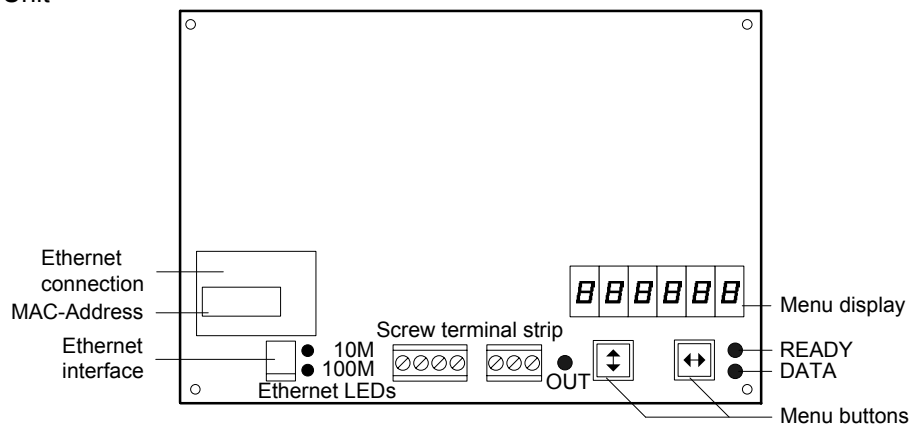
Principle circuit
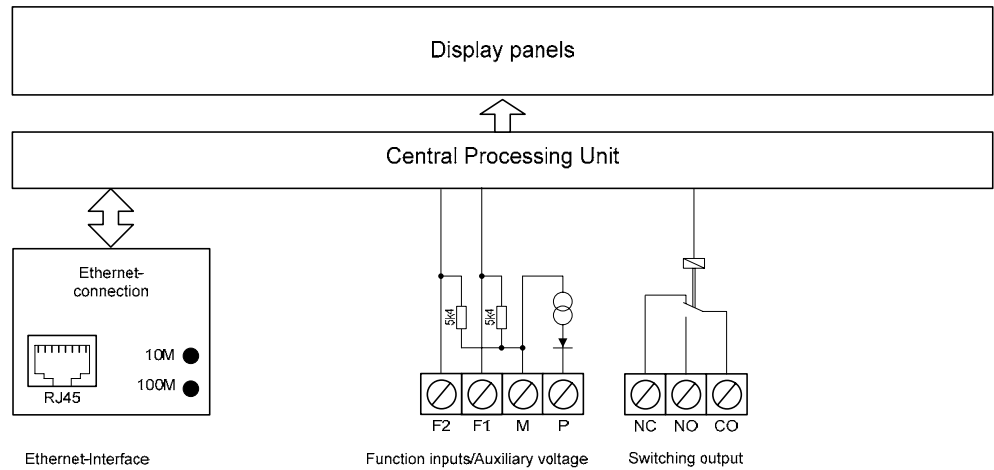
Relay cards

Optionally, up to two relay cards with 8 relays each (type C9210) can be connected to the control computer, for example, for activating optical and acoustic signal transmitters.

The following picture shows the control computer with two relay cards:
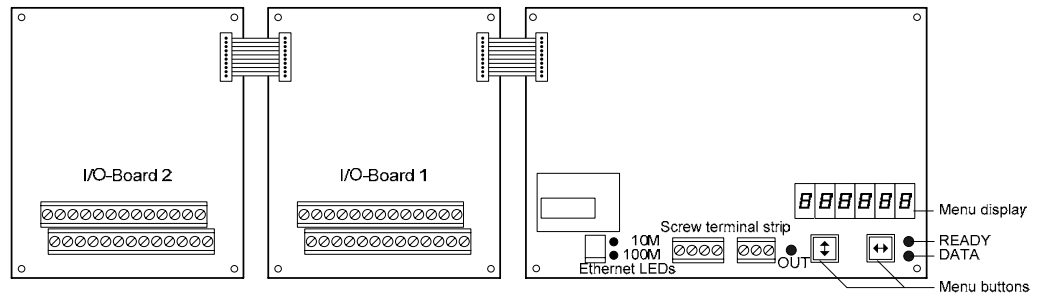
Parameterization

The parameterization of the unit is done by means of a menu in the menu display (see chapter 3).

Ethernet interface

The Ethernet interface is located on a standard RJ45 socket of the central processing unit. It has the following specifications:

Data speed	10/100 Mb/s, auto recognition
Galvanic isolation	1,5 kV
Protocol	TCP/IP, UDP/IP
Operating mode	TCP Server (TCP Client and UDP are configurable via the network, see chapter 2)
Configuration	The basic configuration can be set up without external aids via the menu (see chapter 2).

Function inputs

The function inputs allow, independently of commands via the Ethernet interface, a reduction the brightness and the flashing of the display (see chapter 3). It is located on the screw type terminal of the control computer.

The function inputs are PLC-compatible and are designed for the following signal voltages:

Signal voltage: L = -3.5...+5 V (open input = L)
H = +18...30 V (active H), M = reference potential

Auxiliary voltage	The units supply terminal P with an auxiliary voltage galvanically isolated from the operating voltage (24 V ± 25%, max. 50 mA, M = reference potential). It can be used as H signal.
Menu display	The menu display represents a menu for unit parameterization (see chapter 4). In normal operation, $OnlinE$ is shown in the menu display.
Menu buttons	The menu can be operated by means of the menu buttons (see chapter 4).
Switching output	The devices dispose of a switching output (relay) with potential-free change-over contact (NC, NO, CO).
Status displays	The status displays (LED) of the control computer and the Ethernet coupling have the following meaning:

10M   data speed 10 Mb/s (flashing = data traffic)
100M   data speed 100 Mb/s (flashing = data traffic)

READY on: ready for data transfer
           off (statistical IP-Address): Address conflict on the Ethernet
           off (DHCP): No DHCP server found

DATA   Data reception

OUT   Switching output is active

Chapter 3	Configuration

MAC address	The MAC address of the unit is to be found on the Ethernet coupling of the control processor (see label). It is possibly needed for commissioning and should be written down on page 2 of this operating manual before the unit is mounted on a hardly accessible location.
Basic Configuration	The basic configuration can be set up without external aids via the menu (see chapter 4). In the IP menu item, static IP-address or DHCP must be selected. In menu item P the port number can be set between 2000 and 9999 (factory setting 8000).
Statistical IP address	The statistical IP address is assigned by the system administrator. She must be set in the following menu items:

I.1…I.4   IP address   factory setting 192.168.127.254
S.1…S.4   Subnet Mask   factory setting 255.255.255.0
G.1…G.4   Gateway   factory setting 192.168.127.1

Configuration over network	For information, please refer to the documentation of the Ethernet coupling (Typ Moxa NE-4100T). For further information, please go to *www.moxa.com*. In menu item U you can restore the factory settings. The factory settings for the Ethernet coupling can also be restored here.

Commands	Commands and data telegrams require a telegram ending (↵) with the characters CR, LF or CR/LF.
Addressing	Commands which apply to all display fields are transmitted to the basic address of the control computer. Commands for a single display field are transmitted to its field address.
	The address precedes the data to be displayed in a 2-digit ASCII format. The base address of the controlling computer is 00.
	The field address is composed of the basic address and an offset. Display field H1 has the offset 1, display field H2 the offset 2 etc.
	Example 1. The field address of display panel H2 is 00 + 2 = 02.
	Example 2: The brightness of all display fields shall be reduced. The command is `00$L1`↵.
	Example 3: The display field H2 shall display the value 123. The command is `02123`↵.
Display data	The display data are transmitted in ASCII format. The representation in numeric display fields is right-aligned. The representation in alphanumeric display fields is left-aligned.
Flashing	The flashing of the display fields can be activated by means of the following commands to the basic address of the control computer:

`00$F1`↵   Flashing on
`00$F0`↵   Flashing off

If `$F1` is sent in the data telegram to a field address, the succeeding digits will flash until the end of the data telegram or until `$F0` is sent in the data telegram.

Flashing can also be activated by application of the H signal to functional input F1 (priority compared to the commands).

For units provided with an LRD® display flashing is not possible.

Brightness	You can reduce the brightness of the display panels with the following commands to the base address of the controlling computer.

`00$L1`↵   Reduced brightness
`00$L0`↵   Normal brightness

The brightness can also be reduced with an H signal applied to functional input F2 (priority compared to the commands).

For units provided with an LRD® display brightness reduction is not possible.

Blanking	The display can be blanked with the following command (priority compared to flashing):

`00$B1`↵   Blanking on
`00$B0`↵   Blanking off

Decimal point	In the menu items A1...A8, the decimal point can be set for each display (for numeric display fields only).
	The decimal points may also be activated via the Ethernet interface. You must select setting 0 (no fixed decimal point) in the respective menu item (A1...A8).
	Units with a LRD® display have no decimal points.
Leading zero suppression	In menu item C1...C8 you can set if leading zeros are to be displayed or suppressed (for numeric display fields only). If leading zeros shoud be suppressed for units with LRD® display and fixed decimal point (e.g. self-adhesive foil), the corresponding position must be set in menu item A1...A8.
Display test	In menu item F, you can set whether a short-time display test is automatically carried out in all display fields after power-on.
LED color	Devices with switchable LED color display the digits in red by default. If the command $A… is sent in the data telegram, the subsequent digits are displayed in the corresponding LED color:
	$A0 = red, $A1 = green, $A2 = orange
	Example: The display field H3 shall display the value 123 in green. The command is 03$A1123.
Switching output	The devices dispose of a switching output (relay) with potential-free change-over contact (NC, NO, CO).
	When setting OFF in menu item r, the switching output can be activated with the following command:
	00$Q@1↵ activate switching contact 00$Q@0↵ deactivate switching contact
	The relay does not switch before the end of the telegram.
	When setting 1, 2 or 4 in menu item r, the command 00$Q@1↵ causes a wiping pulse at the switching output with a duration of 1, 2 or 4 seconds.
	When setting A1, A2 or A4 in menu item r, each telegram to the basic address or a field address causes automatically a wiping pulse at the switching output with a duration of 1, 2 or 4 seconds.
	The wiping function is suitable, for example, for activating optical and acoustic signal transmitters.
	The status indicator OUT of the control computer is lighted with active switching output.
Power-on reset	After switching the operating voltage on, minus signs are displayed in all display fields to signalize that the unit is ready for operation. If a display test has been preselected in menu item F, it will run beforehand.
Time-out	In menu item t, it is possible to set whether a time-out occurs, and if so, after what time. Time-out means that a minus sign appears in all display fields if the control computer has not received a data telegram to the basic address or a field address after a defined time.
Exceeding amount of signs that can be displayed	If more signs are transmitted than can be displayed in a display field, ▫ (overflow) is displayed in all digits of the display field.

Relay cards	The optional relay cards are interfaced with the following commands to the basic address of the control computer:

Relay card 1   Relay card 2

`00$QA1↵` Relay 1 on   `00$QI1↵` Relay 1 on
`00$QA0↵` Relay 1 off   `00$QI0↵` Relay 1 off

`00$QB1↵` Relay 2 on   `00$QJ1↵` Relay 2 on
`00$QB0↵` Relay 2 off   `00$QJ0↵` Relay 2 off

`00$QC1↵` Relay 3 on   `00$QK1↵` Relay 3 on
`00$QC0↵` Relay 3 off   `00$QK0↵` Relay 3 off

`00$QD1↵` Relay 4 on   `00$QL1↵` Relay 4 on
`00$QD0↵` Relay 4 off   `00$QL0↵` Relay 4 off

`00$QE1↵` Relay 5 on   `00$QM1↵` Relay 5 on
`00$QE0↵` Relay 5 off   `00$QM0↵` Relay 5 off

`00$QF1↵` Relay 6 on   `00$QN1↵` Relay 6 on
`00$QF0↵` Relay 6 off   `00$QN0↵` Relay 6 off

`00$QG1↵` Relay 7 on   `00$QO1↵` Relay 7 on
`00$QG0↵` Relay 7 off   `00$QO0↵` Relay 7 off

`00$QH1↵` Relay 8 on   `00$QP1↵` Relay 8 on
`00$QH0↵` Relay 8 off   `00$QP0↵` Relay 8 off

Example: On relay card 1 relay 5 shall be switched on. The command is: `00$QE1↵`.

Character set for numeric display fields

20/2B	2D	30	31	32	33	34	35	36	37	38	39	2C/2E
	-	0	1	2	3	4	5	6	7	8	9	.

41/61	42/62	43	44/64	45/65	46/66	47/67	48	49	4A/6A	4C/6C	50/70	55
A	b	C	d	E	F	G	H	I	J	L	P	U

59/79	5F	63	68	69	4E/6E	4F/6F	52/72	54/74	75	58/78	other
Y	_	c	h	ı	n	o	r	t	u	▫	≡

Character set for alphanumeric display fields

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2		!	"	#	$	%	&	'	(	)	*	+	,	─	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	△
8	€	Ö	é	ā	ä	à	å	ç	ē	ë	è	ï	î	ì	Ä	Å
9	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	¢	£	¥	₧	ƒ
A	á	í	ó	ú	ñ	Ñ	ª	º	¿	⌐	¬	½	¼	¡	«	»
B	▓	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	Ë
C	А	Б	В	Г	Д	Е	Ж	З	И	Й	К	Л	М	Н	О	П
D	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
E	α	ß	Γ	π	Σ	σ	µ	τ	Φ	θ	Ω	δ	∞	φ	ε	∩
F	≡	±	≥	≤	⌠	⌡	÷	≈	°	∙	·	√	ⁿ	²	■	

Menu

The parameterization of the devices is carried out in a menu of the menu display.

In normal operation, OnlinE is shown in the menu display.

Menu operation

To reach the menu, press both menu buttons simultaneously (approx. 1 sec.) until an audible signal is heard and menu item 01 appears in the menu display. Now, you can navigate in the menu as follows:

Next setting	Shortly press key [↕]
Page menu items forward	Press key [↕] long
Previous setting	Double click on key [↕]
Page menu items backward	Double click on [↕] and keep it pressed
Next setting	Shortly press key [↔]
Page settings forward	Press key [↔] long
Previous setting	Double click on key [↔]
Page settings backward	Double click on [↔] and keep it pressed

The menu ends in menu item U with the button [↕]. The settings made are either saved (set), not saved (escape) or the factory settings are reset, depending on the setting selected in menu item U.

Cancelling the menu without saving the settings made is possible by pressing both menu buttons longer (approx. 1 sec.) or will occur automatically if 60 seconds pass without a menu button being pressed.

Once the menu is closed, the unit behaves in the same manner as when the operating voltage was applied.

In the menu mode the character $\bar{\underline{=}}$ appears in all display fields. Control of the display is not possible in menu mode.

Menu item P

In menu item P, the decimal points of the port number flash one after the other. The digit with the decimal point flashing can be set to the value requested by means of the menu key [↔].

Menu table

The menu items are displayed in the following menu table. The factory settings are marked with an *. Individual menu items or settings can be suppressed in another menu item, depending on the unit version or setting.

Menu item		Settings		Menu display
IP	IP-Address	Static IP-Address		*IP StAt*
		DHCP*		*IP dHCP*
I.1	IP-Address	0		*I.1 0*
	Byte 1 (xxx.- - -.- - -.- - -)	↓	192*	↓
		255		*I.1 255*
I.2	IP-Address	0		*I.2 0*
	Byte 2 (- - -.xxx.- - -.- - -)	↓	168*	↓
		255		*I.2 255*
I.3	IP-Address	0		*I.3 0*
	Byte 3 (- - -.- - -.xxx.- - -)	↓	127*	↓
		255		*I.3 255*
I.4	IP-Address	1		*I.4 1*
	Byte 4 (- - -.- - -.- - -.xxx)	↓	254*	↓
		254		*I.4 254*
S.1	Subnet Mask	0		*S.1 0*
	Byte 1 (xxx.- - -.- - -.- - -)	↓	255*	↓
		255		*S.1 255*
S.2	Subnet Mask	0		*S.2 0*
	Byte 2 (- - -.xxx.- - -.- - -)	↓	255*	↓
		255		*S.2 255*
S.3	Subnet Mask	0		*S.3 0*
	Byte 3 (- - -.- - -.xxx.- - -)	↓	255*	↓
		255		*S.3 255*
S.4	Subnet Mask	0		*S.4 0*
	Byte 4 (- - -.- - -.- - -.xxx)	↓	0*	↓
		255		*S.4 255*
G.1	Gateway	0		*G.1 0*
	Byte 1 (xxx.- - -.- - -.- - -)	↓	192*	↓
		255		*G.1 255*
G.2	Gateway	0		*G.2 0*
	Byte 2 (- - -.xxx.- - -.- - -)	↓	168*	↓
		255		*G.2 255*
G.3	Gateway	0		*G.3 0*
	Byte 3 (- - -.- - -.xxx.- - -)	↓	127*	↓
		255		*G.3 255*
G.4	Gateway	1		*G.4 1*
	Byte 4 (- - -.- - -.- - -.xxx)	↓	1*	↓
		254		*G.4 254*
P	Port	2000…8000*…9999		*P nnnn*

Menu item		Settings	Menu display
R	Switching output	No wiping pulse*	r OFF
		Wiping pulse 1 sec	r 1
		Wiping pulse 2 sec	r 2
		Wiping pulse 4 sec	r 4
		Automatic wiping pulse 1 sec	r A1
		Automatic wiping pulse 2 sec	r A2
		Automatic wiping pulse 4 sec	r A4
T	Time-out	No time-out *	t 0
		Time-out after 2 s	t 2
		Time-out after 4 s	t 4
		Time-out after 8 s	t 8
		Time-out after 16 s	t 16
		Time-out after 32 s	t 32
		Time-out after 64 s	t 64
		Time-out after 128 s	t 128
A1	Decimal point display field H1	No decimal point*	A1 0
		Decimal point digit C1	A1 1
		Decimal point digit C2	A1 2.
		↓	↓
		Decimal point digit C8	A1 8.
A2	Decimal point display field H2	No decimal point*	A2 0
		Decimal point digit C1	A2 1
		Decimal point digit C2	A2 2.
		↓	↓
		Decimal point digit C8	A2 8.
⇩		⇩	⇩
A8	Decimal point display field H8	No decimal point*	A8 0
		Decimal point digit C1	A8 1
		Decimal point digit C2	A8 2.
		↓	↓
		Decimal point digit C8	A8 8.
C1	Leading zeros display field H1	Leading zeros not displayed*	C1 0.0
		Leading zeros displayed	C1 000.0
C2	Leading zeros display field H2	Leading zeros not displayed*	C2 0.0
		Leading zeros displayed	C2 000.0
⇩		⇩	⇩
C8	Leading zeros display field H8	Leading zeros not displayed*	C8 0.0
		Leading zeros displayed	C8 000.0
F	Display test	No display test at power-on *	F ----
		Display test at power-on	F 8888
U	Saving	Saving parameters* (Set)	U SEt
		Not saving parameters (Escape)	U ESC
		Resetting to the default settings (Default)	U dEF

| Switching output | Maximum switching voltage | 30 V AC/DC |
| | Maximum switching current 500 mA (resistive load) | |

| Screw clips | Clamping range | 0,14…1,5 mm^2 |

Ambient conditions	Operating temperature	0…55 °C
	Storage temperature-30…85 °C	
	Relative humidity max. 95 % (non-condensing)	