Operating instructions

C9302-K0
Control computer for XC-Boards®
with Profibus DP interface

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:
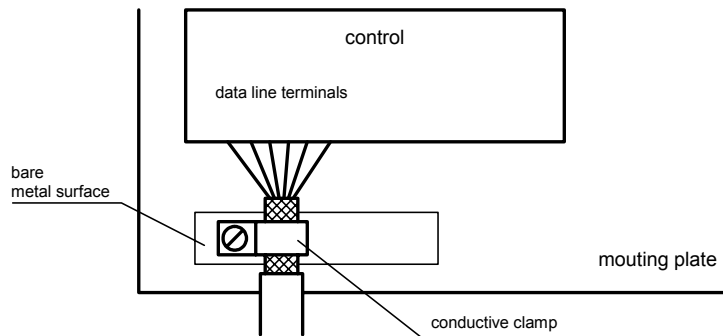
- The cable shielding is to be connected at both cable ends. If equipotential bonding currents are expected due to the cable arrangement, electrical isolation is to be performed on one side. In this case, capacitive connection (approx. 0.1µF/600 V AC) of the shielding on the isolated side must occur.

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-K0 serves for the activation of numeric or alphanumeric display fields in XC-Boards® via a Profibus-DP interface.

The following picture shows an example for an XC-Board® with four display fields:
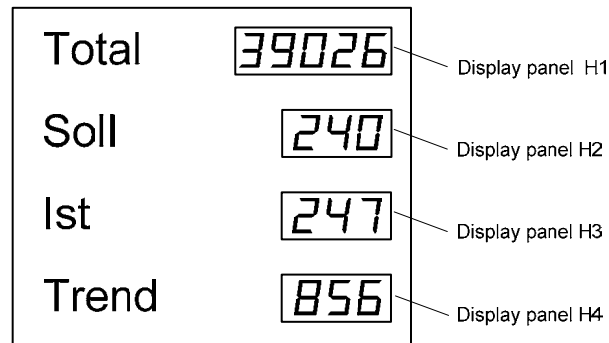
The electrical structure of the XC-Boards® is documented in the included logic diagram. The following picture shows the general structure of the XC-Boards®:
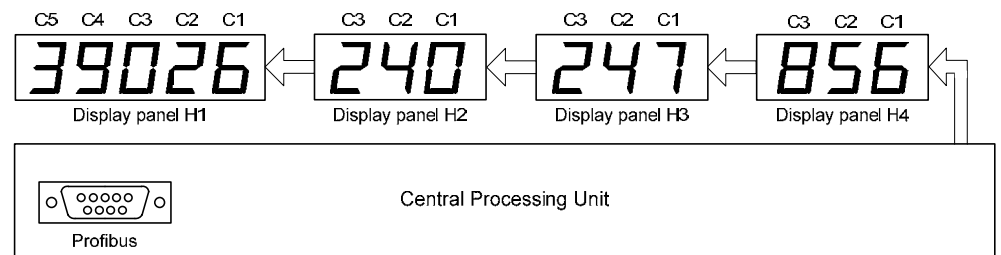
The control computer takes over the conversion from binary format to decimal format in all display fields.

In the master, each display field is defined as an individual module.

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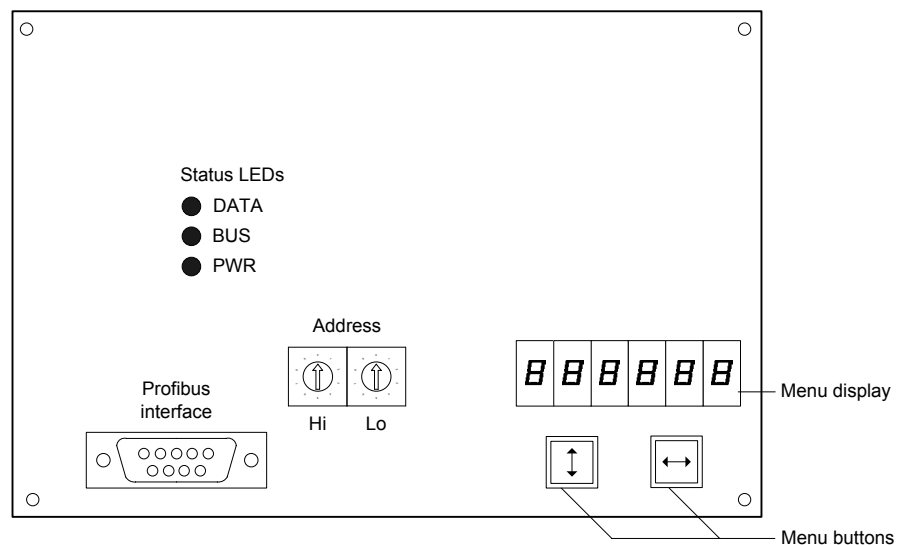
| Relay cards | Optionally, up to two relay cards with 8 relays each (type C9210) can be connected to the control computer, for example, for activating optical and acoustic signal transmitters. |

The following picture shows the control computer with two relay cards:
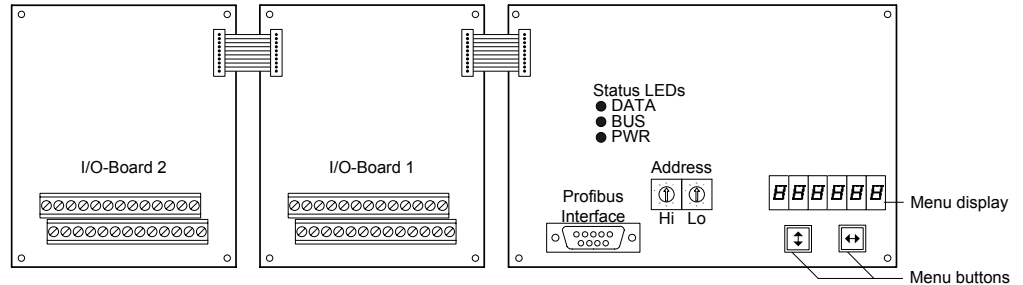
| Parameterization | The parameterization of the unit is done by means of a menu in the menu display (see chapter 3). |

⚠ Bus errors may result in personal injury or material damage. Therefore it is to observe that activating the menu may cause a bus error.

| Profibus interface | The Profibus interface is located on the SUB-D socket of the control computer. It has the following assignment: |

Pin	1	2	3	4	5	6	7	8	9
Signal	–	–	B	–	GND	+ 5V	–	A	–

The units are Profibus-DP slaves according EN 50 170.

The baud rate is automatically recognized. It can reach up to 12 Mbaud.

The GSD file "SIEB0B4C.GSD" on disc is included in the delivery.

The control unit is defined as 'C9330 Control unit for XC-Boards' in the hardware configuration.

The address is set by means of the rotary code switches of the control computers (00...99).

In the case of a bus error, minus signs appear in the display.

| Menu display | The menu display represents a menu for unit parameterization (see chapter 3). |

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 3). |

| Status indicators | The status indicators (LED) of the central processing unit have the following function: |

PWR   The Profibus interface is supplied with power.
BUS   The unit is parameterized and identified as a Profibus user.
DATA   The information to be represented is updated (short light-up).

⚠️ Bus errors may result in personal injury or material damage. Therefore it is to observe that activating the menu may cause a bus error.

Configuration in the master

During the hardware configuration, a module must be defined for each display field and for the optionally available relay cards in accordance with the desired operating mode.

The control unit is defined as 'C9330 Control unit for XC-Boards' in the hardware configuration.

For the data format ASCII, the respective module has to be selected according to the number of digits of the display field:

Display field with one digit	Modul ASC_1
Display field with 2 digits	Modul ASC_2
Display field with 3 digits	Modul ASC_3
↓	↓
Display field with 8 digits	Modul ASC_8

The number of digits in the INTEGER data format has no significance.

The modules are defined in the same order as in the logic diagram of the XC-Boards®. The control computer links the first module to the first display field (H1), the second module to the second display field (H2) etc..

The optionally available relay cards are defined as last module RELAIS_OUT.

In the menu, the data format has to be selected for each display field. For display fields which are defined in the master as modules ASC_1...ASC_8, the setting ASC must be selected in the menu item d1...d8. For display fields which are defined in the master as INTEGER module, the data format UI16, SI16, UI24 or SI24 must be selected.

The control computer only accepts the configuration by the master if the hardware definition in the master, the number of display fields indicated in the logic diagram of the XC-Board® and the menu settings for all display fields as well as the existing relay cards are correct.

Configuration example

In the XC-Board® (see chapter 1) shown as an example, the display field H1 should be operated with the data format ASCII and the display fields H2, H3 and H4 with the INTEGER data format. The configuration in the master is the following:

ASC_5
INTEGER
INTEGER
INTEGER
RELAIS_OUT   (if relay cards are projected)

The following settings have to be done in the menu:

d1 ASC
d2 UI 16
d3 UI 16
d4 UI 16

The relay cards have been parameterized before delivery and must not be set.

INTEGER data format

Data transmission is carried out with 4 bytes per display field.

Byte 0 contains the formatting of the device. The following bytes are displayed in INTEGER data format.

	Byte 0	Byte 1	Byte 2	Byte 3
UI16/SI16	7 6 5 4 3 2 1 0	7 6 5 4 3 2 1 0	7 6 5 4 3 2 1 0	7 6 5 4 3 2 1 0
	Formatting	reserved	MSB	LSB

	Byte 0	Byte 1	Byte 2	Byte 3
UI24/SI24	7 6 5 4 3 2 1 0	7 6 5 4 3 2 1 0	7 6 5 4 3 2 1 0	7 6 5 4 3 2 1 0
	Formatting	MSB		LSB

```
: : : : : : : :
: : : : : 0 0 0   No decimal point              MSB:  Most Significant Byte
: : : : : 0 0 1   Decimal point digit C2               (highest value byte)
: : : : : 0 1 0   Decimal point digit C3        LSB:  Least Significant Byte
: : : : : 0 1 1   Decimal point digit C4               (lowest value byte)
: : : : : 1 0 0   Decimal point digit C5
: : : : : 1 0 1   Decimal point digit C6
: : : : : 1 1 0   Decimal point digit C7
: : : : : 1 1 1   Decimal point digit C8
: : : : :
: : : : 0   Flashing of the display field off
: : : : 1   Flashing of the display field on (only devices with LED display)
: : : :
: : : 0   Normal brightness of all display fields
: : : 1   Reduced brightness of all display fields (only devices with LED display)
: : :
: : 0   Flashing of all display fields off
: : 1   Flashing of all display fields on (only devices with LED display)
: :
0 0   Retrace blanking of all display fields off
0 1   Retrace blanking of all display fields on    For devices with single colored LED displays or
1 0   reserved                                     LRD® displays
: :
0 0   Red character color
0 1   Green character color                        For devices with selectable LED colors
1 0   Orange character color
: :
1 1   Display test of all display fields
```

The formatting for the brightness, flashing of all display fields, retrace blanking and display test can be set in byte 0 of the display field H1. The bits in the other display fields should be set to 0 in byte 0.

Depending on the data format, the maximum value ranges are the following:

UI16	0…65535
SI16	-32768...32767
UI24	0…16777215
SI24	-8388608…8388607

If the transferred value exceeds the value range, then the following with appear on the display: ⌐ (upper range) or ⌊ (lower range).

ASCII data format

For the data transmission, the number of bytes depends on the number of digits of the display field.

Byte 0 contains the formatting of the device. The following bytes are displayed in ASCII data format (C8…C1).

Display field with one digit

Byte 0	Byte 1
Format.	C1

Display field with 2 digits

Byte 0	Byte 1	Byte 2
Format.	C2	C1

Display field with 3 digits

Byte 0	Byte 1	Byte 2	Byte 3
Format.	C3	C2	C1

Display field with 4 digits

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Format.	C4	C3	C2	C1

Display field with 5 digits

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Format.	C5	C4	C3	C2	C1

Display field with 6 digits

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
Format.	C6	C5	C4	C3	C2	C1

Display field with 7 digits

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Format.	C7	C6	C5	C4	C3	C2	C1

Display field with 8 digits

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Format.	C8	C7	C6	C5	C4	C3	C2	C1

Byte 0

7	6	5	4	3	2	1	0

			bit 2	bit 1	bit 0	
			0	0	0	No decimal point
			0	0	1	Decimal point digit C2
			0	1	0	Decimal point digit C3
			0	1	1	Decimal point digit C4
			1	0	0	Decimal point digit C5
			1	0	1	Decimal point digit C6
			1	1	0	Decimal point digit C7
			1	1	1	Decimal point digit C8

0 Flashing of the display field off
1 Flashing of the display field on (only devices with LED display)

0 Normal brightness of all display fields
1 Reduced brightness of all display fields (only devices with LED display)

0 Flashing of all display fields off
1 Flashing of all display fields on (only devices with LED display)

0 0 Retrace blanking of all display fields off
0 1 Retrace blanking of all display fields on
1 0 reserved
> For devices with single colored LED displays or LRD® displays

0 0 Red character color
0 1 Green character color
1 0 Orange character color
> For devices with selectable LED colors

1 1 Display test of all display fields

The formatting for the brightness, flashing of all display fields, retrace blanking and display test can be set in byte 0 of the display field H1. The bits in the other display fields should be set to 0 in byte 0.

If in byte 0 bit 3 is set, the respective display field flashes.

If in byte 0 of the display field H1 bit 5 is set, all display fields will flash. (priority over flashing of individual display fields).

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

LED color	The LED color can be set in byte 0 bit 7 and bit 6. (only for displays that have selectable LED colors).
Blanking	If in byte 0 of the display field H1 bit 6 is set, all display fields are blank (priority over flashing). This is not possible for displays with selectable LED colors.
Brightness	If in byte 0 of the display field H1 bit 4 is set, the brightness of all display fields will be reduced. (not possible for LRD® displays).
Decimal point	In the menu items A1...A8, the decimal point can be set for each display (for numeric display fields only).

The decimal point can also be activated by setting bits 2…0 in byte 0. Setting 0 (no decimal point) should be chosen in the appropriate menu point (A1…A8).

If a decimal point has been set in the menu points A1…A8, this decimal point will have priority.

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 should 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.

The display test can be activated by setting bits 7 and 6 in byte 0 of the display field.

The display test has priority over flashing and blanking.

Power-on reset	After power-on, minus signs are displayed to signalize that the unit is ready for operation. If a display test has been preselected in menu item F, it will run beforehand.

Relay cards

The optionally available relay cards are defined in the last module RELAIS_OUT with 2 byte regardless of how many relays have been implemented.

```
                        Byte 0              Byte 1
RELAIS_OUT     7  6  5  4  3  2  1  0 | 7  6  5  4  3  2  1  0
               :  :  :  :  :  :  :  :   :  :  :  :  :  :  :  :
               :  :  :  :  :  :  :  :   :  :  :  :  :  :  :  0   Relay 1 on relay card 1 off
               :  :  :  :  :  :  :  :   :  :  :  :  :  :  :  1   Relay 1 on relay card 1 on
               :  :  :  :  :  :  :  :   :  :  :  :  :  :  :
               :  :  :  :  :  :  :  :   :  :  :  :  :  :  0      Relay 2 on relay card 1 off
               :  :  :  :  :  :  :  :   :  :  :  :  :  :  1      Relay 2 on relay card 1 on
               :  :  :  :  :  :  :  :   :  :  :  :  :  :
               :  :  :  :  :  :  :  :   :  :  :  :  :  0         Relay 3 on relay card 1 off
               :  :  :  :  :  :  :  :   :  :  :  :  :  1         Relay 3 on relay card 1 on
               :  :  :  :  :  :  :  :   :  :  :  :  :
               :  :  :  :  :  :  :  :   :  :  :  :  0            Relay 4 on relay card 1 off
               :  :  :  :  :  :  :  :   :  :  :  :  1            Relay 4 on relay card 1 on
               :  :  :  :  :  :  :  :   :  :  :  :
               :  :  :  :  :  :  :  :   :  :  :  0               Relay 5 on relay card 1 off
               :  :  :  :  :  :  :  :   :  :  :  1               Relay 5 on relay card 1 on
               :  :  :  :  :  :  :  :   :  :  :
               :  :  :  :  :  :  :  :   :  :  0                  Relay 6 on relay card 1 off
               :  :  :  :  :  :  :  :   :  :  1                  Relay 6 on relay card 1 on
               :  :  :  :  :  :  :  :   :  :
               :  :  :  :  :  :  :  :   :  0                     Relay 7 on relay card 1 off
               :  :  :  :  :  :  :  :   :  1                     Relay 7 on relay card 1 on
               :  :  :  :  :  :  :  :   :
               :  :  :  :  :  :  :  :   0                        Relay 8 on relay card 1 off
               :  :  :  :  :  :  :  :   1                        Relay 8 on relay card 1 on
               :  :  :  :  :  :  :  :
               :  :  :  :  :  :  :  :
               :  :  :  :  :  :  :  :
               :  :  :  :  :  :  :  0                            Relay 1 on relay card 2 off
               :  :  :  :  :  :  :  1                            Relay 1 on relay card 2 on
               :  :  :  :  :  :  :
               :  :  :  :  :  :  0                               Relay 2 on relay card 2 off
               :  :  :  :  :  :  1                               Relay 2 on relay card 2 on
               :  :  :  :  :  :
               :  :  :  :  :  0                                  Relay 3 on relay card 2 off
               :  :  :  :  :  1                                  Relay 3 on relay card 2 on
               :  :  :  :  :
               :  :  :  :  0                                     Relay 4 on relay card 2 off
               :  :  :  :  1                                     Relay 4 on relay card 2 on
               :  :  :  :
               :  :  :  0                                        Relay 5 on relay card 2 off
               :  :  :  1                                        Relay 5 on relay card 2 on
               :  :  :
               :  :  0                                           Relay 6 on relay card 2 off
               :  :  1                                           Relay 6 on relay card 2 on
               :  :
               :  0                                              Relay 7 on relay card 2 off
               :  1                                              Relay 7 on relay card 2 on
               :
               0                                                 Relay 8 on relay card 2 off
               1                                                 Relay 8 on relay card 2 on
```

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	i	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	€	Ü	é	ä	ä	à	å	ç	ê	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	■	

Error detection

If the unit detects an error, *Err…* will appear in the menu display.

Fault message	Cause	Elimination
Err 1	The data format that is projected in the master and the data format chosen in the menu do not conform with each other.	Choose the same data format in each display field menu that is projected in the master.
	The hardware does not comply with the projected modules.	The amount and type of module has to be adjusted to the equipment configuration (see function plan).

Chapter 4   **Parameterization**

Menu

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

⚠ Bus errors may result in personal injury or material damage. Therefore it is to observe that activating the menu may cause a bus error.

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 Ξ appears in all display fields. Control of the display is not possible in menu mode.

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
d1	Data format display field H1	Unsigned Integer 16 Bit*	d1 UI 16
		Signed Integer 16 Bit	d1 SI 16
		Unsigned Integer 24 Bit	d1 UI 24
		Signed Integer 24 Bit	d1 SI 24
		ASCII	d1 ASC
d2	Data format display field H2	Unsigned Integer 16 Bit*	d2 UI 16
		Signed Integer 16 Bit	d2 SI 16
		Unsigned Integer 24 Bit	d2 UI 24
		Signed Integer 24 Bit	d2 SI 24
		ASCII	d2 ASC
	⇩	⇩	⇩
d8	Data format display field H8	Unsigned Integer 16 Bit*	d8 UI 16
		Signed Integer 16 Bit	d8 SI 16
		Unsigned Integer 24 Bit	d8 UI 24
		Signed Integer 24 Bit	d8 SI 24
		ASCII	d8 ASC

Menu item		Settings	Menu display
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 00*
		Leading zeros displayed	*C1 0000*
C2	Leading zeros display field H2	Leading zeros not displayed*	*C2 00*
		Leading zeros displayed	*C2 0000*
⇩		⇩	⇩
C8	Leading zeros display field H8	Leading zeros not displayed*	*C8 00*
		Leading zeros displayed	*C8 0000*
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*

Chapter 5   **Technical data**

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