Operating instructions

Video recorder
LINAX A325

Brief overview

For quick and easy commissioning:

1. Observe the safety instructions	Page 5
⇓	
2. Mount the unit	Page 8
⇓	
3. Wire the unit	Page 11
⇓	
4. Install the PC operating software	Page 28
⇓	
5. Connect the unit to the PC	Page 28
⇓	
6. Configure the unit (via PC)	Page 34
⇓	
7. Transfer the setup data to the unit	Page 34

Integrated Operating Instructions

The unit's simple control system enables you to perform commissioning for many applications without the need for hardcopy operating instructions. Your unit displays instructions at the push of a button directly on screen. These instructions are nevertheless delivered with the unit – they supplement the Operating Instructions in the unit. Anything that is not described directly at the unit by plain text or menus is explained here.

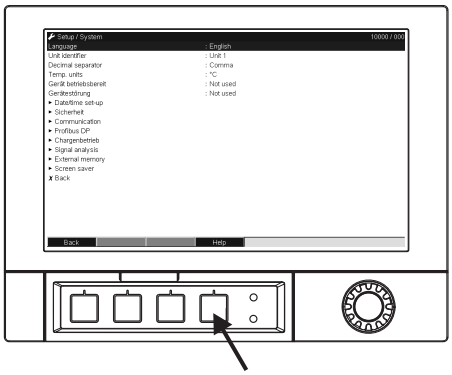


Fig. 1: Variable softkey (e.g. to call up the internal Help function in the Setup mode)

Index

A very extensive index can be found at the end of these Operating Instructions. It acts as a complement to the table of contents and helps you find special terms and functions.

Table of contents

1 Safety instructions 5
1.1 Designated use 5
1.2 Installation, commissioning and operation 5
1.3 Operational safety 5
1.4 Return 5
1.5 Notes on safety conventions and icons 6

2 Identification 7
2.1 Device designation 7
2.2 Scope of delivery 7

3 Installation 8
3.1 Incoming acceptance, transport, storage 8
3.2 Installation conditions 8
3.3 Installation instructions 8
3.4 Post-installation check 10

4 Wiring. 11
4.1 Quick wiring guide 11
4.2 Terminal assignment 14
4.3 Interface connection 19
4.4 Degree of protection 23
4.5 Post-connection check 23

5 Operation 24
5.1 Quick operating guide 24
5.2 Display and operating elements 24
5.3 Entering text and numbers 26
5.4 Overview of the symbols used 26
5.5 Confirming error messages 27
5.6 Communication; installing the PC software 28

6 Commissioning and use during operation 32
6.1 Installation check 32
6.2 Switching on the device 32
6.3 Setup 33
6.4 The Setup screen (in the main menu) 38
6.5 Use during operation – the "Extras" menu 84
6.6 Use during operation – the main menu 98
6.7 Meeting the requirements of 21 CFR 11 109
6.8 Measured value storage 110
6.9 Important functions of the PC software supplied 111

7 Maintenance. 113
7.1 Software update via the PC software supplied . . . 113
7.2 Instructions on Enabling a software option 113

8 Accessories. 114
8.1 Accessories 114

9 Troubleshooting. 115
9.1 Diagnose/simulation in the main menu 115
9.2 Troubleshooting instructions 115
9.3 System error messages 116
9.4 Errors and warnings 116
9.5 Spare parts 119
9.6 Return 121
9.7 Disposal 121

10 Technical data 122
10.1 Input 122
10.2 Output 124
10.3 Power supply / terminal diagram 125
10.4 Connection data interface, communication, operation . 126
10.5 Performance characteristics 128
10.6 Installation 128
10.7 Environment 129
10.8 Mechanical construction 130
10.9 Human interface 132
10.10 Certificates and approvals 136
10.11 Accessories 136
10.12 Documentation 137

Index 138

1 Safety instructions

1.1 Designated use

This unit is designed for the electronic acquisition, display, recording, analysis, remote transmission and archiving of analog and digital input signals in non-hazardous areas.

- The unit is designed for installation in a panel or a cabinet and may only be operated in an installed state.
- The manufacturer does not accept liability for damage caused by improper or non-designated use. The unit can cause danger if used improperly or other than intended.

1.2 Installation, commissioning and operation

- The unit may only be installed, connected, commissioned and serviced by qualified and authorized expert staff (e.g. electrical technicians) strictly adhering to the instructions contained in this manual, the applicable norms, legal regulations and certificates (depending on the application).
- These experts must have read and understood this manual and follow the instructions it contains.
- The unit may only be modified or repaired if expressly permitted in the Operating Instructions.
- Damaged units which could pose a source of danger may not be put into operation and must be marked as defective.
- Primarily observe local regulations regarding opening and repairing electrical units.

1.3 Operational safety

- The unit is safely built and tested according to state-of-the-art technology and has left the factory in perfect condition as regards technical safety. The applicable regulations and European standards have been taken into account.
- Please observe the technical data on the nameplate! The nameplate is on the left-hand side of the housing.

Repairs
Repairs that are not described in these Operating Instructions must only be carried out directly by the manufacturer or by the service department.

Electromagnetic compatibility
The measuring system meets the general safety requirements of IEC 61010 and the EMC requirements of IEC 61326.

Technical improvement
The manufacturer reserves the right to adapt technical data to the most up-to-date technical developments without any special announcement. Ask your supplier for information about activities and possible extensions to these Operating Instructions.

Desktop version

Warning!
- The mains plug should only be inserted into a socket with a ground contact.
- The protective effect may not be suspended by an extension cable without a protective ground.
- Relay outputs: U (max) = 30 V rms (AC) / 60 V (DC)

1.4 Return

The following measures must be taken before you return a measuring unit, e.g. for repair or calibration:
- The unit must be packed in protective packaging. The original packaging offers the best protection.

1.5 Notes on safety conventions and icons

Always refer to the safety instructions in these Operating Instructions labeled with the following symbols:

Warning!
This symbol draws attention to activities or procedures that can lead to injuries to persons, safety risks or the destruction of the unit if not carried out properly.

Caution!
This symbol draws attention to activities or procedures that can lead to defective operation or to destruction of the unit if not carried out properly.

Note!
This symbol draws attention to activities or procedures that have an indirect effect on operation, or can trigger an unforeseen unit reaction if not carried out properly.

ESD – Electrostatic discharge
Protect the terminals against electrostatic discharge. Failure to comply with this instruction can result in the destruction of parts of the electronics.

2 Identification

2.1 Device designation

2.1.1 Nameplate

Compare the nameplate on the left-hand side of the unit with the delivery note and with the following diagram:

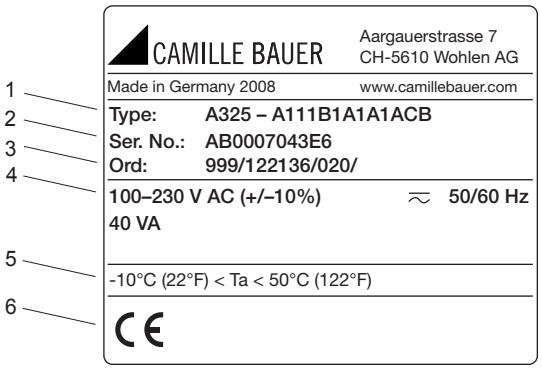


Fig. 2: *1. Order code*
2. Serial number
3. SAP order number
4. Fields for indicating the installed software updates
5. Supply voltage, power frequency, power consumption
6. Ambient temperature range
7. Unit approvals

2.2 Scope of delivery

- Unit (with terminals, as per your order)
- 2 fastening clips
- USB interface cable, length 1.5 m (4.9 ft)
- Optional secure digital (SD) card (card not in device but is supplied.)
- PC operating and configuration software on CD-ROM
- Delivery note
- Multilanguage Operating Instructions on CD-ROM

Anything missing? Then please inform your supplier.

3 Installation

3.1 Incoming acceptance, transport, storage

3.1.1 Incoming acceptance

After receiving the goods, check the following points:

- Is the packaging or the content damaged?
- Is the delivery complete? Compare the goods delivered with what you ordered.

3.1.2 Transport and storage

Observe the following points:

- The unit must be packed in shockproof packaging for storage (and transport). The original packaging offers the best protection for this.
- The permitted storage temperature is -20 to +60 °C (-4 to 140 °F)

3.2 Installation conditions

Working temperature range:
-10 to 50 °C (22 to 122 °F), max. 75% rel. humidity without condensation.

Caution!
- To avoid heat accumulation, please always ensure that the unit is sufficiently cooled.
- Maintain distance from strong magnetic fields (see Section 10 "Technical data", interference immunity)
- Permitted ambient conditions at front: in accordance with unit ingress protection of max. IP65 (with front flap closed)

3.3 Installation instructions

3.3.1 Mounting tool

To install in the control panel, all you need is a screwdriver.

3.3.2 Panel mounting, Installation dimensions

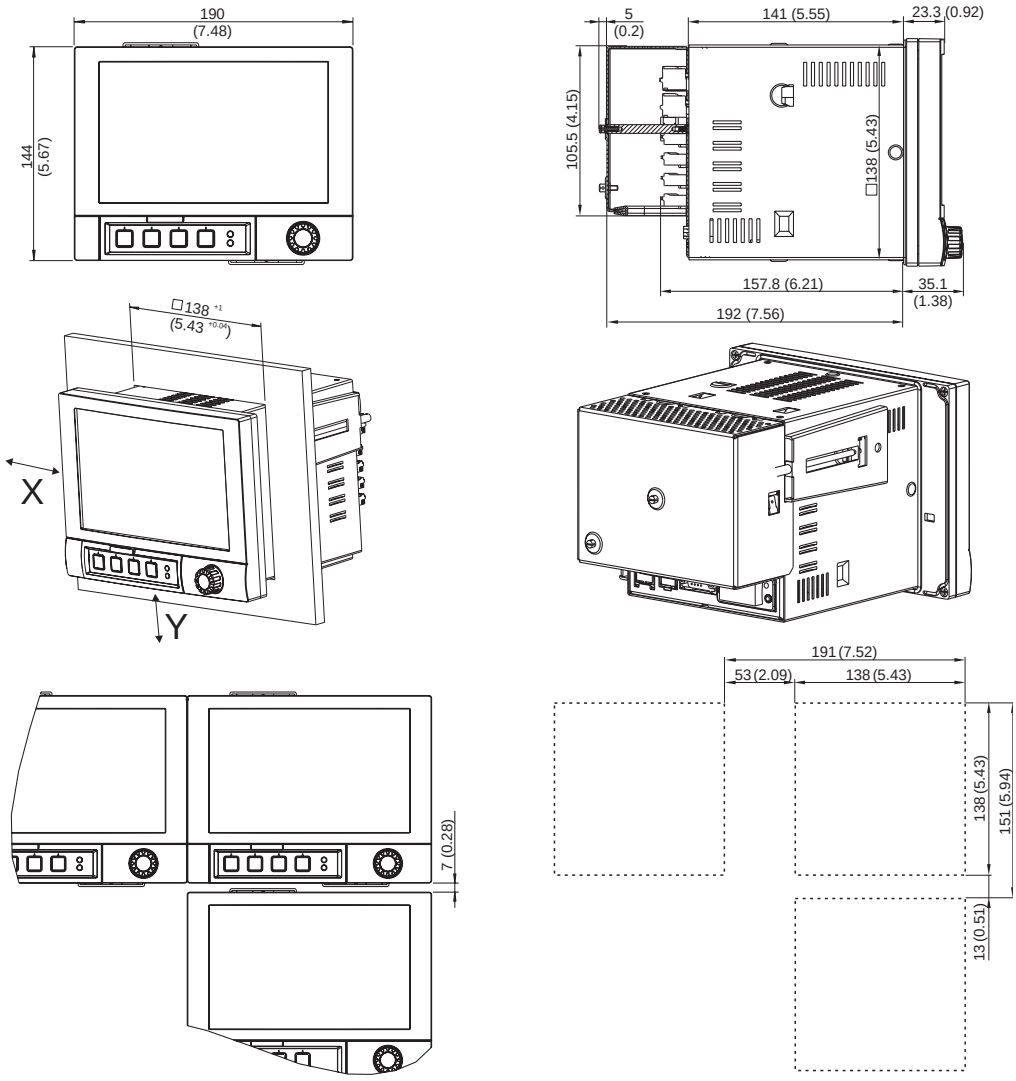


Fig. 3: Panel mounting and installation dimensions. All dimensions in mm or (inch)

- Installation depth without terminal cover: approx. 158 mm (6.22") (incl. terminals and fastening clips)
- Installation depth with terminal cover: approx. 197 mm (7,76")
- Panel cutout: 138^{+1} x 138^{+1} mm ($5.43^{+0.04}$ x $5.43^{+0.04}$")
- Panel thickness: 2 to 40 mm (0.08 to 1.58")
- Max. viewing angle range: from the display central axis 50° in all directions
- Securing to DIN 43 834

1. Push the unit through the panel cutout from the front. To avoid heat accumulation, we recommend keeping a distance of > 15 mm (>0.59 inch) from the walls and other units.
2. Hold the unit horizontally and then hang the two jack screws in the openings opposite (either on left or right housing side, or at top or bottom).
3. Tighten the screws on the jack screws equally with a screwdriver such that a secure seal to the control panel is guaranteed.

Note!
- A distance of min. 7 mm (0.28 inch) between the devices has to be observed if aligning the devices in the Y-direction (vertically above one another).

- The devices can be arranged horizontally beside one another in the X direction without any spacing between the devices.
- The grid dimension of the panel cutouts for multiple devices must be min. 191 mm (7.52") horizontally and min. 151 mm (5.94") vertically (tolerance not considered).

3.4 Post-installation check

After panel mounting, please check the following points:

- Is the unit fixed firmly in the center of the control panel cutout?

4 Wiring

4.1 Quick wiring guide

Warning!
Please note that the entire electrical connection may only take place when the unit is de-energized.

Caution!
- The ground connection must be made before all other connections. Any interruption in the ground can cause danger.
- Before commissioning, compare the supply voltage with the information specified on the nameplate (left-hand side of the housing).
- The mixed connection of safety extra-low voltage and dangerous contact voltage to the relay is not permitted.
- Provide a suitable switch or circuit breaker when installing in a building. This switch must be installed near the unit (easily accessible) and be labeled as a separator.
- An overcurrent protective unit (nominal current ≤ 10 A) is required for the power cable.

Note!
Please also refer to the terminal designation on the rear of the unit.

4.1.1 Color assignment of the channels

Colors are assigned to the channels in Setup "Application –> Signal groups". 8 predefined colors are available per group and can be assigned to the desired channels.

4.1.2 Circuit diagram

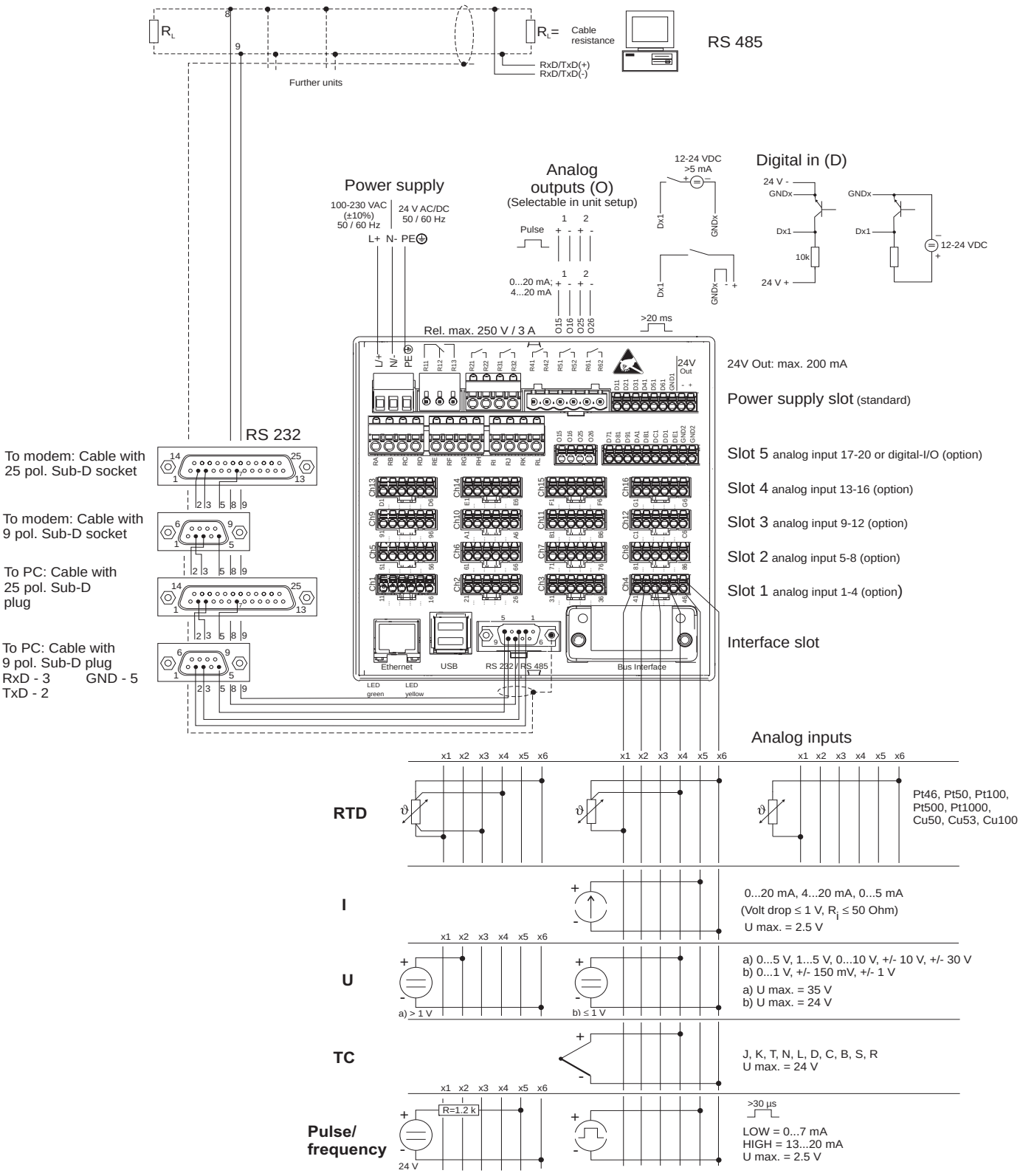


Fig. 4: Circuit diagram

Note!
Depending on the order, slot 5 can be assigned different cards (analog or digital inputs/outputs). When connecting, please take the corresponding terminal diagram into account.

4.1.3 Auxiliary voltage output as transmitter power supply for 2-wire sensors

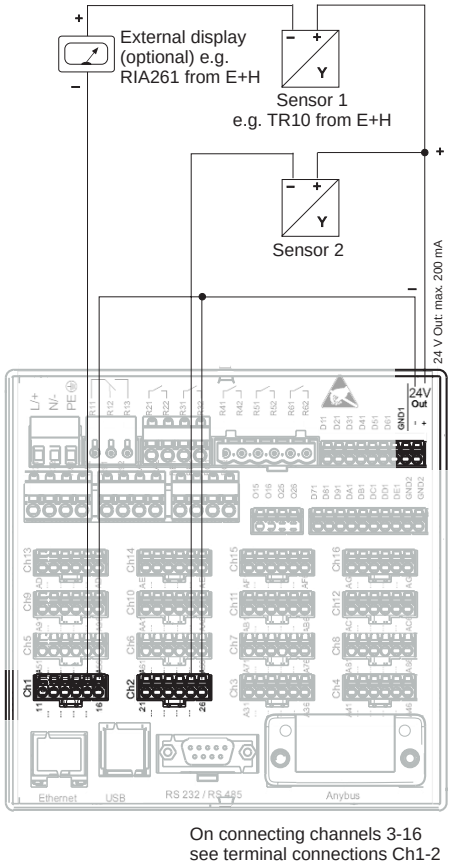


Fig. 5: Connecting the auxiliary voltage output when using as transmitter power supply for 2-wire sensors in the current measuring range

4.1.4 Auxiliary voltage output as transmitter power supply for 4-wire sensors

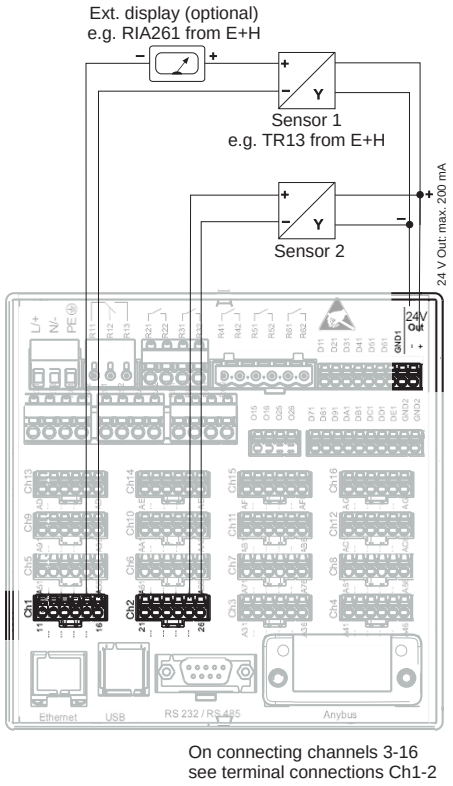


Fig. 6: Connecting the auxiliary voltage output when using as transmitter power supply for 4-wire sensors in the current measuring range

4.2 Terminal assignment

Caution!
If high-energy transients occur when using long signal cables, we recommend connecting a suitable overvoltage protection (e.g. E+H HAW560/562).
Use shielded signal lines for serial interfaces!

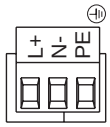
4.2.1 Cable specification, spring terminals

All connections on the rear of the unit are designed as screw or spring terminal blocks with reverse polarity protection. This makes the connection very quick and easy. The spring terminals are actuated with a slotted screwdriver (size 0).

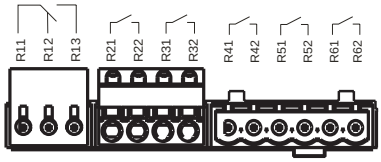
Please note the following when connecting:
- Wire cross-section, digital I/O, RS485 and analog inputs: max. 1.5 mm^2 (14 AWG) (spring terminals)
- Wire cross-section, power supply: max. 2.5 mm^2 (13 AWG) (screw terminals)
- Wire cross-section, relays: max. 2.5 mm^2 (13 AWG) (spring terminals)
- Stripped length: 10 mm (0.39 inch), 6 mm (0.24 inch) for power terminal

Note!
No ferrules have to be used when connecting flexible wires to spring terminals.

4.2.2 Supply voltage (power supply slot)

Power unit type	**Terminal** 		
100-230 V AC	**L+**	**N-**	**PE**
	Phase L	Zero conductor N	Ground
24 V AC/DC	**L+**	**N-**	**PE**
	Phase L or +	Zero conductor N or –	Ground

4.2.3 Relay (power supply slot)

Type	**Terminal** 				
	R11	**R12**	**R13**	**Rx1**	**Rx2**
Alarm relay 1	Changeover contact	Normally closed contact (NC)[1)]	Normally open contact (NO)[2)]		
Relay 2 - 6				Switching contact	Normally open contact (NO)[2)]

1) NC = normally closed

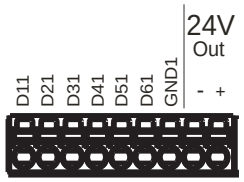
2) NO = normally open

Note!
The opening and closing function (= activation or deactivation of the relay coil) in the event of a limit value can be defined in the setup "Setup -> Outputs -> Relay -> Relay x".
If the power fails, the relay assumes its quiescent switching position regardless of the programming.

Note!
If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup -> Outputs -> Relay -> Relay x".

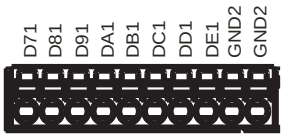
4.2.4 Digital inputs (power supply slot)

Note!
If the auxiliary voltage is to be used for the digital inputs, the "–" terminal of the 24 V auxiliary voltage has to be connected to the "GND1" terminal.

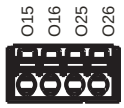
Type	Terminal								
									
	D11	**D21**	**D31**	**D41**	**D51**	**D61**	**GND1**	**(–)**	**(+)**
Digital input 1 - 6	Digital input 1 (+)	Digital input 2 (+)	Digital input 3 (+)	Digital input 4 (+)	Digital input 5 (+)	Digital input 6 (+)	Ground (-) for digital inputs 1-6		
Auxiliary voltage output, not stabilized, max. 200 mA								Ground	Approx. + 24 V

4.2.5 Digital inputs (optional: slot 5)

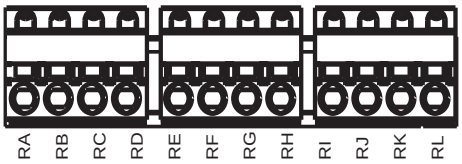
Note!
If the auxiliary voltage is to be used for the digital inputs, the "–" terminal of the 24 V auxiliary voltage has to be connected to the "GND2" terminal.

Type	Terminal									
										
	D71	**D81**	**D91**	**DA1**	**DB1**	**DC1**	**DD1**	**DE1**	**GND2**	**GND2**
Digital input 7-14	Digital input 7	Digital input 8	Digital input 9	Digital input 10	Digital input 11	Digital input 12	Digital input 13	Digital input 14	Ground for digital inputs 7-14	Ground for digital inputs 7-14

4.2.6 Analog outputs (optional: slot 5)

Type	Terminal			
				
	O15	**O16**	**O25**	**O26**
Analog output 1-2	Analog output 1 (+)	Ground analog output 1 (–)	Analog output 2 (+)	Ground analog output 2 (–)

4.2.7 Relay (optional: slot 5)

Type	Terminal											
												
	RA	**RB**	**RC**	**RD**	**RE**	**RF**	**RG**	**RH**	**RI**	**RJ**	**RK**	**RL**
Relay 7-12	Switching contact, relay 7	Normally open contact (NO)[1] relay 7	Switching contact, relay 8	Normally open contact (NO) [2] relay 8	Switching contact, relay 9	Normally open contact (NO) [2] relay 9	Switching contact, relay 10	Normally open contact (NO) [2] relay 10	Switching contact, relay 11	Normally open contact (NO) [2] relay 11	Switching contact, relay 12	Normally open contact (NO) [2] relay 12

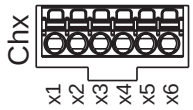
1) NO = normally open

Note!
The opening and closing function (= activation or deactivation of the relay coil) in the event of a limit value can be defined in the setup "Setup -> Outputs -> Relay -> Relay x".

Note!
If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup -> Outputs -> Relay -> Relay x".

4.2.8 Analog inputs (slot 1-5)

The first digit (x) of the two-digit terminal number corresponds to the related channel (e.g. Ch1: 11, 12, 13, 14, 15, 16):

Type	Terminal 					
	x1	**x2**	**x3**	**x4**	**x5**	**x6**
Current/pulse/ frequency input					(+)	(–)
Voltage > 1 V		(+)				(–)
Voltage ≤ 1 V				(+)		(–)
Resistance thermometer RTD (2-wire)	(A)					(B)
Resistance thermometer RTD (3-wire)	(A)			b (sense)		(B)
Resistance thermometer RTD (4-wire)	(A)		a (sense)	b (sense)		(B)
Thermocouples TC				(+)		(–)

4.3 Interface connection

4.3.1 USB at the front of the unit

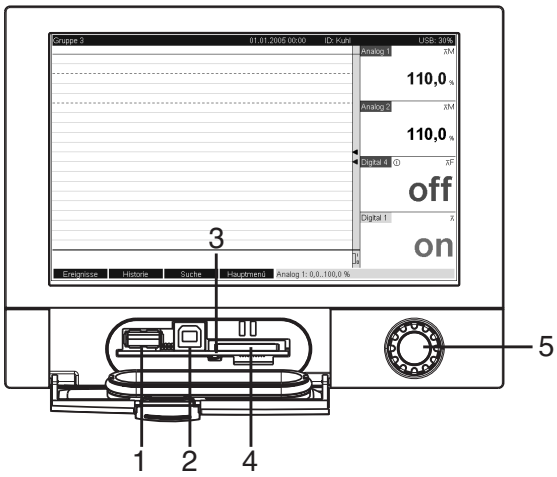


Fig. 7: Front of unit with open flap/keyboard

1: USB A socket "host" e.g. for USB memory stick, external keyboard, bar code reader or printer
2: USB B socket "function" e.g. to connect to PC or laptop
3: LED at SD slot. Yellow LED lit when the unit writes to the SD card or reads it.
4: Slot for SD card
5: Navigator

1 x USB connection, type A (host)
A USB 2.0 connection is available on a shielded USB A socket at the front of the unit. A USB stick as a memory medium, a keyboard, a USB hub, a bar code reader or a printer (PCL5c or higher) can be connected to this interface.

1 x USB connection, type B (function)
A USB 2.0 connection is available on a shielded USB B socket at the front of the unit. This can be used to connect the unit for communication with a laptop for example.

4.3.2 USB at the rear of the unit

2 x USB connection, type A (host) (interface slot)
Two USB 2.0 connections are available on shielded USB A sockets at the rear of the unit. A USB stick as a memory medium, a keyboard, a USB hub, a bar code reader or a printer (PCL5c or higher) can be connected to these interfaces.

Note!
- The USB 2.0 connections are compatible with USB 1.1, i.e. communication is possible.
- The assignment of the USB ports corresponds to the standard such that shielded standard cables with a maximum length of 3 meters (9.8 ft) can be used here.
- Multiple USB sticks cannot be operated simultaneously. The USB stick that was first connected has priority.

4.3.3 Points to note concerning USB units

Note!
The USB units are detected by the "plug-and-play" function. If several units of the same type (e.g. printer) are connected, only the first USB unit connected is available.
Settings for the USB units are made in the setup.
A maximum of 8 external USB units (incl. USB hub) can be connected if they do not exceed the maximum load of 500 mA. If overloaded, the corresponding USB units are automatically disabled.

Requirements with regard to an external USB hub

If USB units are deactivated due to the 500 mA unit limit, such units can be connected by means of a USB hub. Only active USB hubs (i.e. hubs with their own power supply) can be connected to the unit. Hubs with an "overcurrent protection" are recommended. A maximum of 1 hub can be connected to the unit.

Requirements with regard to the USB stick

USB sticks supported: 256 MB, 512 MB, 1 GB and 2 GB. It cannot be ensured that USB sticks from all manufacturers will work perfectly. For this reason, an "Industrial Grade" SD card is recommended for safe data recording (see Accessories).

Requirements with regard to an external USB keyboard

The system only supports keyboards which can be addressed using generic drivers (HID keyboard (human interface unit)). Special keys are not supported (e.g. Windows keys). Users can only enter characters that are available in the entry character set of the unit. All unsupported characters are rejected. It is not possible to connect a wireless keyboard.
The following keyboard assignments are supported: DE, CH, FR, USA, UK, IT.
See setting under "Setup -> System -> Keyboard".

Requirements with regard to an external USB bar code reader

The connected bar code reader has to act like a HID keyboard (human interface unit) (universal keyboard driver). The bar code reader must complete every bar code with a carriage return (0x0D) + line feed (0x0A).

Before connecting the bar code reader to the unit, it should be checked at a PC:

1. Connect the bar code reader and wait until Microsoft Windows® recognizes the unit as a HID keyboard and installs it (check with the Windows unit manager).
2. Configure the bar code reader as specified in the Operating Instructions of the bar code reader.
3. Start the Notepad (editor).
4. Using the bar code reader, read in a bar code (as it is used later) and check it.
5. Only connect the bar code reader to the unit once the bar code reader has been correctly configured and tested on the PC.
6. Select the character set at the unit under "Setup -> System -> Bar code reader -> Character set". The following character sets are supported: DE, CH, FR, USA, UK, IT.
   Note: This setting has to be identical to the configuration of the bar code reader!
   The system only reads characters that are available in the entry character set of the unit. All other characters are rejected.
7. The bar code reader should also be tested at the unit via "Main menu -> Diagnosis/simulation -> Simulation -> Test bar code reader".

If problems arise, please contact the manufacturer of the bar code reader.

Reference list: Datalogic Gryphon D230, Metrologic MS5100 Eclipse Series, Symbol LS2208

Requirements with regard to an external USB printer

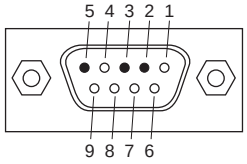
The printer must support PCL5c (or higher). Laser jet and ink jet printers are supported. The printouts are always color printouts (if supported by the printer). The printout has different shades of gray if you use a black/white printer.
Reference list: HP Color LaserJet CP1515n, Kyocera FS-C5015N

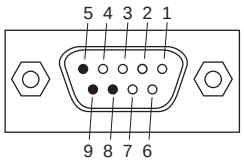
Note!
GDI printers are not supported!

4.3.4 RS232/RS485 interface

RS232/RS485 connection

A combined RS232/RS485 connection is available on a shielded SUB D9 socket at the rear of the unit. This can be used for data or program transfer and to connect a modem. For communication via modem, we recommend an industrial modem with a watchdog function.

<table>
<tr><td></td><td colspan="9">Pin of the SUB-D9 socket</td></tr>
<tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr>
<tr><td rowspan="2">RS232 assignment</td><td></td><td>TxD (data output)</td><td>RxD (data input)</td><td></td><td>GND</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="9">Fig. 8: RS232 assignment 

Caution!
Unoccupied connections should be left empty. The maximum cable length is 2 m (6.6 ft).</td></tr>
<tr><td rowspan="2">RS485 assignment</td><td colspan="3"></td><td colspan="2">GND</td><td></td><td></td><td>RxD/TxD –</td><td>RxD/TxD –</td></tr>
<tr><td colspan="9">Fig. 9: RS485 assignment 

Caution!
Unoccupied connections should be left empty. The maximum cable length is 1000 m (3280 ft).</td></tr>
</table>

Caution!
Only one interface can be used at any one time (RS232 or RS485). Choose the interface to be used under “Extras - Serial Interface”.

4.3.5 Ethernet

In principle, a unit equipped with an internal Ethernet interface can be integrated into a PC network (TCP/IP Ethernet). The unit(s) can be accessed by any of the PCs in the network using the PC operating and configuration software supplied.
Using DHCP,[1)] the fully automated integration of a new unit into an existing network is possible without any additional configuration. Normally, only automatic IP address acquisition has to be configured at the client. When the unit is started in the network, it can automatically get the IP address, subnetmask or gateway from a DHCP server. Without DHCP, these settings have to be made directly in the unit (depending on the network to which the unit should be connected).

Note!
- The IP address assigned by DHCP is required in the PC software supplied to be able to communicate with the unit. It can be viewed under "Setup –> System –> Communication –> Ethernet" or under "Diagnosis / Simulation –> Device information / ENP".
- If the unit has been switched off for an extended period, it is given a new "leasing time" IP address. Alternatively, the network administrator can also set up the system such that the unit is always given the same IP address.
- A maximum of 5 Ethernet connections can be established to the unit at the same time (e.g. 2 x PC software and 3x per Web server).

1) DHCP: In conjunction with an appropriate server, the Dynamic Host Configuration Protocol (DHCP) makes it possible to dynamically assign an IP address and additional configuration parameters of a unit in a network (e.g. Internet or LAN).

- If multiple PCs are to read out stored measured values (via different Ethernet connections or other communication interfaces such as a USB, for example), these PCs must receive different read-out IDs (configure in the PC software supplied under "Unit –> Display/change unit setup/add new unit –> Select unit –> Extras –> Unit readout").

Ethernet connection

An IEEE 802.3-compatible connection is available on a shielded RJ45 plug connector on the rear of the unit as the network connection. This can be used to connect the unit with a hub or switch to units in an office environment. For safe spacing distances, the office equipment standard EN 60950 must be observed. The assignment corresponds to a standards-compliant MDI port (AT&T258) such that a shielded 1:1 cable with a maximum length of 100 meters (328 ft) can be used here. The Ethernet port is designed as 10/100–BASE–T. Direct connection to a PC is possible with a crossover cable. Half-duplex and full-duplex data transfer is supported. Alternatively, a GPRS modem can also be connected to the Ethernet interface.

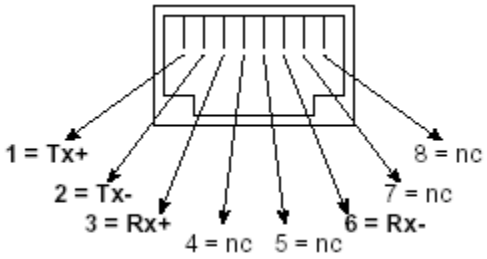


Fig. 10: RJ45 socket (AT&T256 assignment)

Meaning of the LEDs

Beneath the Ethernet connection (see rear of unit) there are two light emitting diodes which indicate the status of the Ethernet interface.

- Yellow LED: link signal; is on when the unit is connected to a network. If this LED is not illuminated then communication is impossible.
- Green LED: Tx/Rx; when the unit is receiving or sending data it flashes irregularly, otherwise is continuously on.

4.3.6 PROFIBUS or Modbus option

- PROFIBUS–DP slave:
  The unit can be integrated into a fieldbus system as per the PROFIBUS–DP standard by means of the PROFIBUS-DP interface. Up to 40 analog inputs and 14 digital inputs can be transmitted via PROFIBUS–DP and stored in the unit. For bidirectional communication in cyclic data transfer.
  Baudrate: maximum 12 Mbit/s
- Modbus RTU slave:
  Up to 40 analog inputs and 14 digital inputs can be transmitted via Modbus and stored in the unit.
- Ethernet Modbus TCP slave:
  Connection to SCADA systems (Modbus master). Up to 40 analog inputs and 14 digital inputs can be transmitted via Modbus and stored in the unit.

4.4 Degree of protection

At the front, the unit meets the requirements of ingress protection IP65.

4.5 Post-connection check

After connecting the unit, carry out the following checks:

Device condition and specifications	**Notes**
Is the unit or cable damaged (visual inspection)?	–
Electrical connection	**Notes**
Does the supply voltage match the information on the nameplate?	Compare nameplate on the unit
Are the mounted cables relieved of tension?	–
Are all the terminals firmly seated at the contacts?	–

5 Operation

5.1 Quick operating guide

The unit's simple control system enables you to perform commissioning for many applications without the need for hardcopy operating instructions. Your unit displays instructions at the push of a button directly on screen. These instructions are nevertheless delivered with the unit – they supplement the Operating Instructions in the unit. Anything that is not described directly at the unit by plain text or menus is explained here.

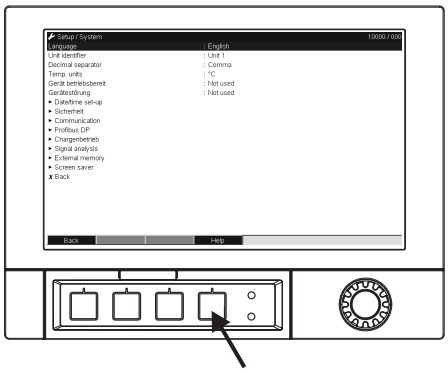


Fig. 11: Variable "softkey" (e.g. to launch the internal Help function in the Setup mode

5.2 Display and operating elements

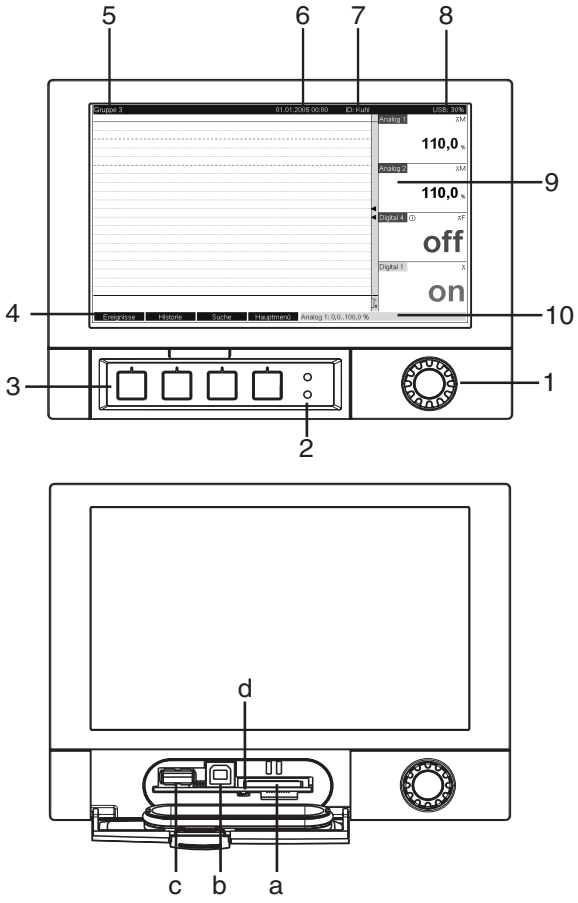


Fig. 12: Device display/operating units

Operating element (Item No.)	Operating function (Display mode = measured value display) (Setup mode = operating in the Setup menu)
1 ⊙	"Navigator" jog/shuttle dial for operating with additional press function. In the Display mode: turn the dial to switch between the various signal groups. Press the dial to display the main menu. In the Setup mode or in a selection menu: turn the dial anticlockwise to move the bar or the cursor upwards or counterclockwise, changes the parameter. Turning clockwise moves the bar or cursor down or clockwise, changes parameter. Press = selects the highlighted function, starts parameter change (ENTER).
2	Functions of the LED display (as per NAMUR NE44:) ■ Green LED (top) lights up: power supply OK, unit working without faults ■ Red LED (bottom) flashes: need for maintenance if unit-external problem occurs (e.g. cable open circuit etc.) or a message / note to be acknowledged is pending, calibration in progress.
3 ❑	Variable softkeys 1 to 4 (from left to right)
4	Function indicator of the softkey
5	In the Display mode: current group name, type of evaluation In the Setup mode: name of the current operating item (dialog title)
6	In the Display mode: displays current date/time In the Setup mode: —
7	In the Display mode: user ID (if the function is enabled) In the Setup mode: —
8	In the Display mode: alternating display indicating what percentage of the SD card or USB stick has already been written to. Status symbols are displayed for the following functions (alternate with the memory information): simulation mode, data storage active, operating lock, batch active [1)] In the Setup mode: the current "direct access" operating code is displayed
9	In the Display mode: screen for measured value display Displays the current measured values, and the status in a fault/alarm condition, depending on the signal display selected. In the case of counters, the type of counter is displayed as a symbol [1)]. ✎ Note! If a measuring point has limit value status, the corresponding channel identifier is highlighted in red (quick detection of limit values). When you are operating the unit, measured value acquisition continues to run without interruption.
10	In the Display mode: alternating status display (e.g. set zoom range) of the analog or digital inputs in the appropriate color of the channel. In the Setup mode: different information can be displayed here depending on the display type.
a	Slot for SD card ☝ Caution! Do not remove the SD card if the yellow LED (d) is lit! Risk of data loss!
b	USB B socket type "function" e.g. for laptop
c	USB A socket type "host" e.g. for USB stick
d	LED at SD slot Yellow LED lit when the unit writes to the SD card or reads it. ☝ Caution! Do not remove the SD card if the yellow LED is lit! Risk of data loss!

1) Overview of symbols, see → Kap. 5.4

5.3 Entering text and numbers

A virtual keyboard is available for entering text and numbers. This is opened automatically if needed. Here, turn the navigator to select the corresponding character and press the navigator to accept it.

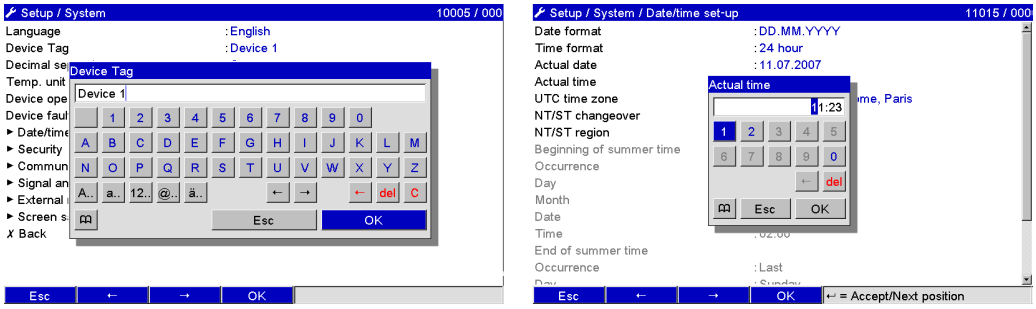


Fig. 13: Virtual keyboard

5.3.1 Operation via the external USB keyboard

Keys F1 to F4 correspond to softkeys 1 to 4 of the unit. Keys F5 to F12 are assigned as follows (only if the unit is in the measured value display mode. Otherwise no function is assigned to the keys):

- F5: Event log/audit trail
- F6: Safe SD card removal
- F7: Safe USB stick removal
- F8: Screenshot (only if an SD card or USB stick is connected)
- F9: Not assigned
- F10: Not assigned
- F11: Login (only if user administration is activated)
- F12: Logout (only if user administration is activated)

The context menu can be launched with the "Shift+Enter" key combination.

5.4 Overview of the symbols used

Symbol	Explanation	Symbol	Explanation
	Comment/subsequent reporting	Σ1	Analysis 1
	Help	Σ2	Analysis 2
	Telealarm (option): alarm active!	Σ3	Analysis 3
	Warning	Σ4	Analysis 4

Symbol	Explanation	Symbol	Explanation
	Information		Intermediate statistics
	Confirmation		Daily analysis
	Unit locked/operating lock		Weekly analysis
	External communication		Monthly analysis
	Sequence active (bar code reader waiting for input)		Annual analysis
	Lower limit value		Total analysis
	Upper limit value		Save to SD card/USB stick
	Limit value gradient increasing		Measured value simulation
	Limit value gradient decreasing		Power off

5.5 Confirming error messages

The process for confirming error messages depends on whether user administration as per FDA 21 CFR Part 11 is enabled or not.

1. User administration not enabled:
   Error messages on the display are acknowledged by pressing the navigator.
2. User administration enabled:
   The confirmation of messages can be configured in different ways. See "Main menu —> User administration —> General —> Acknowledging messages"
   a) Messages do not have to be confirmed with a password. Select "No".
   b) Messages have to be confirmed with an ID and password. The user logged onto the unit beforehand remains logged on. Select "Yes, same user".
   c) Messages have to be confirmed with an ID and password. This user is logged onto the unit from this point onwards.

5.6 Communication; installing the PC software

Note!
Version V1.22.0.0 (or higher) of the PC software supplied must be installed to be able to establish communication between the unit and the PC. To be on the safe side, you should install the current PC software package (CD–ROM supplied).

5.6.1 Installing the PC software supplied

Note!
The "Arial Unicode MS™" font must be installed on your PC to operate the PC software supplied. Otherwise certain characters might be displayed incorrectly or not at all. Check this on your PC under "Control Panel – Fonts". If this font is not installed, please refer to your Microsoft Office® or Microsoft Windows® manual.

Note!
Administrator authorization is needed to install the software.

1. Install the supplied PC software on your computer. The program's Operating Instructions can be printed out after installation, if required.
2. Once the PC software has been installed successfully, you can launch the software under "Start –> All programs".

5.6.2 Communication via USB/USB driver installation

Once the PC software supplied has been installed successfully, the unit can be connected to the PC with a USB cable. The operating system automatically recognizes the new USB unit.

Note!
Proceed as follows to then install the USB driver (depends on operating system):

1. The Windows prompt "Should a connection be established with Windows Update to look for software?" appears. Click "No, not this time" and then "Next".
2. The "What do you want the wizard to do?" window appears. Select "Install the software automatically (Recommended)" and then click "Next".

You can now start the PC software supplied to establish communication with the unit.

Caution!
Wait at least 15 seconds before plugging in and out the USB connection from the PC to the unit!

5.6.3 Communication via serial interfaces RS232/RS485

The RS232/RS485 serial interface can be accessed from the rear (9-pin Sub-D socket).

Note!
It is not possible to use the RS232 and RS485 interface simultaneously. The desired interface type must be selected in the setup under "System – Communication - Serial Interface".

Caution!
When using an RS232/RS485 converter, ensure that it supports automatic changeover between "sending" and "receiving" (e.g. W+T type 86000).

5.6.4 Communication via modem

In principle, any modem with a complete AT command set can be used for data transfer between your unit with RS232 interface and the supplied PC software.

Note!
An industrial modem with a watchdog function is recommended (e.g. WESTERMO or Devolo).

Connecting the modem to the unit:
The modem's original cable cannot be used for this because the unit and the modem have the same pin assignments at the interface plug. For this reason, if possible use the modem cable "RXU10-A1"

which is available as an accessory. Alternatively, an appropriate modem cable can be made following the drawing below. Only three cables are required (TxD, RxD, GND) and 2 bridges are required on the modem side:

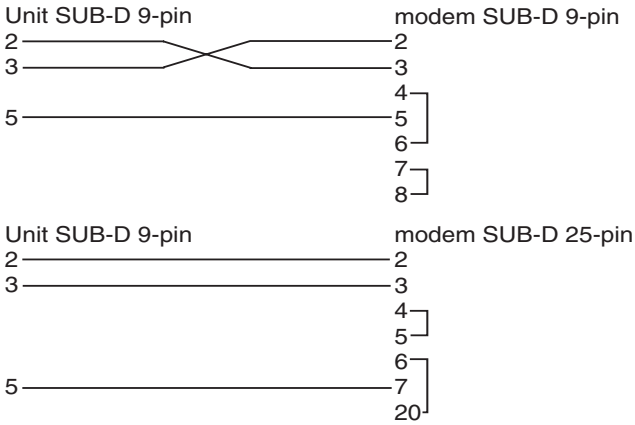


Fig. 14: Modem cable assignment at the unit via RS232

Initializing the modem at the unit:
The modem connected to the unit first has to be initialized:

1. Under "Setup -> System -> Communication -> Serial interface", set the baud rate the modem supports.
2. In the main menu, select "Diagnosis/Simulation -> Initialize modem".
3. A message appears on the display stating that the modem has been initialized.

Connecting the modem with the PC:
The modem, which works from the PC, does not have to be initialized. Connection to the PC is made with the original modem cable (normally included with the modem).
The first connection to the receiver is made as follows:

- In the PC software supplied, select "Display/change unit setup - Add new unit".
- Select unit, set interface parameters manually (COM, baudrate, number of data bits, parity)
- Activate modem operation - set up modem
- Enter receiver's telephone number.
- Now enter the telephone number under which the unit connected by modem can be reached and start the connection with "OK".

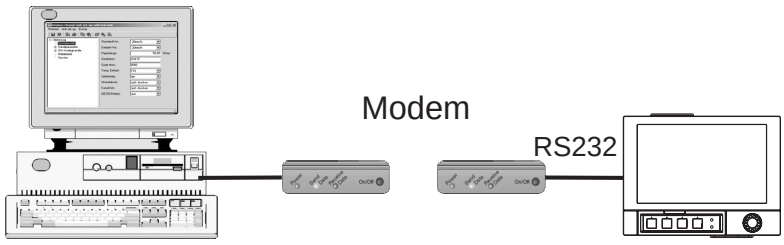


Fig. 15: Modem connection at unit and PC

5.6.5 Communication via Ethernet (TCP/IP)

In principle, all units equipped with an internal Ethernet interface can be integrated into a PC network (TCP/IP Ethernet).
The unit(s) can be accessed by any of the PCs in the network using PC software supplied. There is no need to install driver software ("COM redirection") on the PC because the PC software supplied has direct access to the Ethernet.
The system parameters "IP address", "Subnetmask" and "Gateway" are input directly at the unit.

Changes to the system parameters are not activated until the SETUP menu is closed and the settings accepted. Only then will the unit work with the new settings.

Ethernet commissioning
Before a connection can be established via the PC network, the system parameters in the unit must be set via "Setup – System – Communication – Ethernet". Alternatively, DHCP can be used to allow the fully automated integration of a new unit into an existing network without the need for additional configuration settings (see Section 4.3.4 "Ethernet").

Note!
You can obtain the system parameters from your relevant network administrator.

The following system parameters must be set:

1. IP address
2. Subnetmask
3. Gateway

Note!
This menu does not appear unless the unit is equipped with an internal Ethernet interface.

5.6.6 Communication in the network using the PC software supplied

After the unit has been configured and connected to the PC network, a connection to one of the PCs in the network can be established.
The following steps are required for this:

1. Install the supplied PC software on the PC via which communication is to take place. (s. Kap. 5.6.1)
2. A new unit now has to be created in the database. After the unit identifier has been input, select how the unit settings are to be transferred. In this case, select Ethernet (TCP/IP).

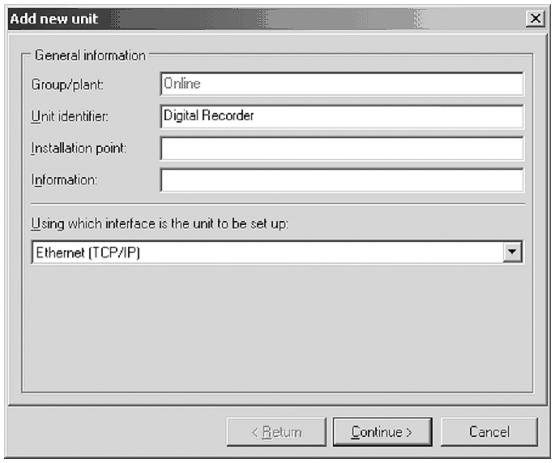


Fig. 16: Creating a new unit in the PC database

Now enter the IP address. The port address is 8000.
The unit address set at the unit and the release code must also be set correctly here.

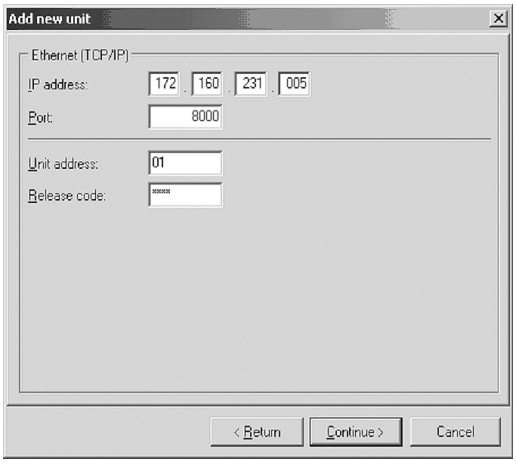


Fig. 17: Entering the IP address of the new unit (example)

Confirm the entry with "Continue" and start the transfer with OK.
The connection is now established and the unit is saved in the unit database.

6 Commissioning and use during operation

6.1 Installation check

Make sure that all post-connection checks have been carried out before you put your unit into operation:

- See Section 3.4 'Post-installation check'
- Checklist in Section 4.5 'Post-connection check'

6.2 Switching on the device

Once the operating voltage is applied, the display lights up and the unit is ready for operation.

- When you first commission the unit, program the setup in accordance with the description in the Operating Instructions.
- If you are commissioning a unit that is already configured, measuring is immediately started in accordance with the settings. The values of the display group currently configured appear on the display.

6.2.1 Configuring the operating language

The default setting for the operating language is English. A different operating language can be configured in the main menu.
Press the Navigator ⊙ -> Language

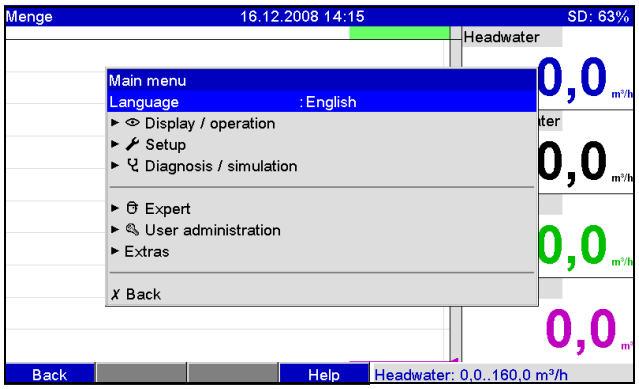


Fig. 18: Changing the operating language in the main menu

6.3 Setup

6.3.1 General information

You can also put your unit into service and/or configure it via PC and the PC software supplied. The following are available for this:

1. Front USB B system interface (→ Page 34)
2. SD card slot for reading in the parameters stored on the SD card (→ Page 35)
3. USB A socket on the front or rear of the device to read in parameters stored on a USB stick (→ Page 36)
4. Rear system interfaces RS232/RS485/Ethernet (→ Page 34)

Advantages of configuring by PC

- The unit data are saved in a database and can be accessed again at any time.
- Text entries can be carried out more quickly and efficiently by keyboard.
- Measured values can also be read out, archived and displayed on the PC with the same program.

Note!
The interfaces **cannot** be used simultaneously for configuration. Select the interface used under "Main menu –> Setup –> System –> Communication".

Note!
After commissioning (unit setup), the SD card and the internal memory should be cleared to delete the temporary setup data!
Deleting the SD card: Extras -> SD card -> Delete
Deleting the internal memory: Main menu -> Diagnosis/Simulation -> Delete internal memory

6.3.2 Notes on the setup access protection

Access to the setup is released when the unit leaves the factory and can be locked in various ways:
- By entering a 4-digit release code (factory setting: "0000", → Chap. 6.4.1)
- Via user administration with a unique password/ID combination for the administrator and users (→ Chap. 6.6.6)
- By activating a digital input as a control input with a setup block (→ Page 60)

Access protection via user administration: If user administration is enabled, unit settings can only be checked. Depending on the configuration, users cannot make any changes in the setup. On the other hand, an administrator can make the following changes:
- Add new users or delete users already created (e.g. new employees or employees that have left the company)
- Add, change or delete texts/comments. Comments already saved are not affected by this.

Note!
If operating parameters that affect measured value storage are changed (e.g. channel identifier, switching channels on/off), users cannot access the data prior to the setup changes at the device (i.e. measured value curves start again and it is no longer possible to search for data before this time). The data are NOT deleted however, i.e. they can still be read out/displayed using the PC software supplied or saved to the external SD card or a USB stick.

6.3.3 Setup via interface and PC software supplied

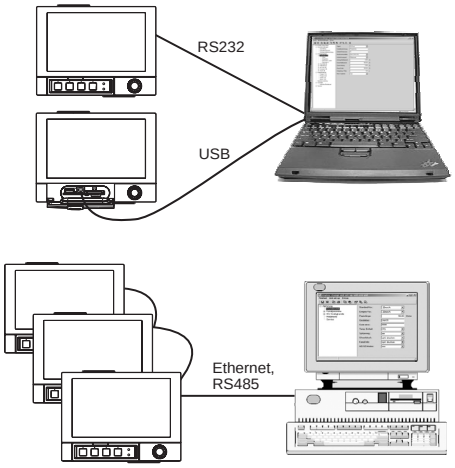


Fig. 19: Example: Setup via PC software supplied

Procedure for setup via interface and PC software supplied:

Start

⇩

Install the PC software supplied on the PC or laptop (see Section 5.6)

⇩

Connect the unit interface (RS232 / RS485, USB or Ethernet) to the PC

⇩

Check selected communication settings in the device (→ Chap. 6.4.4 communication)

⇩

Create the new device in the PC software supplied and make the interface settings

⇩

The current unit settings are displayed if the PC software supplied recognizes the unit. Now, all the parameters can be configured (see the following sections)

⇩

Save the settings in the unit database and send them to the unit

⇩

End

Procedure for setup via interface and PC software supplied:

Note!
In order to be able to use this function, the unit must already be created in the PC database or has to be created beforehand.

1. Connect the unit interface (RS232 / RS485, USB or Ethernet) to the PC.
2. Start the PC software and create a new unit in the PC database:
   – Select "Unit –> Display/change unit setup/Add new unit"
   – Select "Unit –> Add new unit"
   – Enter unit identifier. To transmit the unit setup select the corresponding unit interface. Confirm with "Next". Select the corresponding interface parameters (must match the settings for communicating at the device). Confirm with "Next". A summary of the information on the new unit is displayed. When you click "OK", a connection is established to the unit and the new unit is created in the PC database.
3. Adjust the unit settings and select "Finished –> Send setup to unit". The new setup parameters are automatically transferred to the unit.
4. Finally, the unit settings should be saved in the unit database. Select "Finished –> Save setup in unit database".

6.3.4 Setup via SD card

Save the unit settings on the PC onto the SD card using the PC software supplied. This setup file can then be imported into the unit.

Note!
In order to be able to use this function, the unit must already be created in the PC database or has to be created beforehand. In addition, there has to be an SD card slot on the PC.

Caution!
Never remove the SD card from the unit without previously launching the function "Extras –> SD card –> Remove safely" as data could be lost otherwise.

Procedure for setup using an SD card:

1. Copy setup to SD card:
   - Insert a formatted SD card into the unit.
   - In the Extras menu, select "SD card -> Save setup".
   – In the Extras menu, select "SD card –> Remove safely".
   – Remove the SD card from the unit and insert it into the SD card slot at the PC.
2. Start the PC software and create a new unit in the PC database:
   – Select "Unit –> Display/change unit setup/Add new unit"
   – Select "Unit –> Add new unit"
   – Enter unit identifier. Select "Parameter file from a data source (e.g. diskette, ATA Flash, CF, SD)" to transmit the unit setup. Confirm with "Next". Select the corresponding unit parameter file (*.rpd) from the SD card. Confirm with "Next". A summary of the information on the new unit is displayed. When you click "OK", the new unit is created in the PC database.
3. Adjust setup in the PC program and save in the associated database:
   - Adjust the unit settings.
   – Select "Finished –> Save setup in unit database". The new setup parameters are saved in the PC database. Transfer the new SETUP file to the SD card in your PC: select "Finished –> Create setup data carrier (diskette/ATA flash/CF/SD)" and select the suitable drive.
   – Remove the SD card from the slot in the PC and insert it into the unit.
4. Read in new setup directly at the unit:
   – In the Extras menu, select "SD card –> Load setup". To remove the SD card, select "SD card –> Safe removal" in the Extras menu. Repeat these steps to configure additional units with this setup.

Caution!
If the setup SD card is not removed, the measurement data will begin to be saved after approx. 5 minutes. The setup data are still kept. Please change the SD card if the measurement data are not meant to be saved onto this card.

Caution!
Correct and safe functioning is only guaranteed with genuine SD cards of the manufacturer (see "Accessories", Section 8).

6.3.5 Setup via USB stick

Save the unit settings on the PC onto a USB stick using the PC software supplied. This setup file can then be imported into the unit.

Note!
In order to be able to use this function, the unit must already be created in the PC database or has to be created beforehand. In addition, there has to be a free USB socket on the PC.

Caution!
Never remove the USB stick from the unit without previously launching the function "Extras –> USB stick –> Remove safely" as data could be lost otherwise.

Procedure for setup using a USB stick:

1. Copy the setup to the USB stick:
   – Insert the USB stick into the USB A socket on the unit front or rear.
   – In the Extras menu, select "USB stick –> Save setup".
   – In the Extras menu, select "USB stick –> Remove safely".
   – Remove the USB stick from the unit and insert it into the USB socket on the PC.
2. Start the PC software and create a new unit in the PC database:
   – Select "Unit –> Display/change unit setup/Add new unit"
   – Select "Unit –> Add new unit"
   – Enter unit identifier. Select "Parameter file from a data source (e.g. diskette, ATA Flash, CF, SD)" to transmit the unit setup. Confirm with "Next". Select the corresponding unit parameter file (*.rpd) from the USB stick. Confirm with "Next". A summary of the information on the new unit is displayed. When you click "OK", the new unit is created in the PC database.
3. Adjust setup in the PC program and save in the associated database:
   - Adjust the unit settings.
   – Select "Finished –> Save setup in unit database". The new setup parameters are saved in the PC database. Transfer the new SETUP file to the USB stick in your PC: select "Finished –> Create setup data carrier (diskette/ATA flash/CF/SD)" and select the suitable drive.
   – Remove the USB stick from the PC and insert it into the USB A socket on the unit.
4. Read in new setup directly at the unit:
   – In the Extras menu, select "USB stick –> Load setup". To remove the USB stick, select "USB stick –> Safe removal" in the Extras menu. Repeat these steps to configure additional units with this setup.

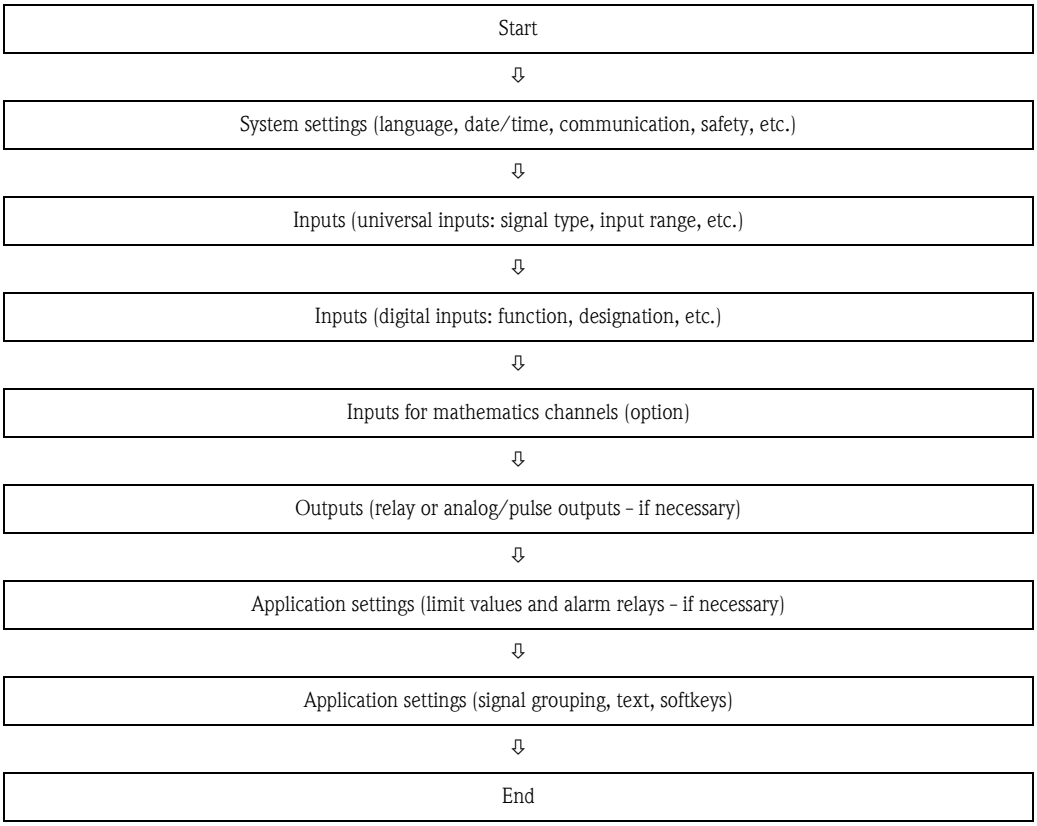
6.3.6 Setup directly at the unit (using keys/navigator)

Key functions in the setup
The function of the operating keys is described in the fields directly above the corresponding keys on the screen. Free fields mean that no function is currently assigned to the keys in question.

- Press the navigator; the main menu is displayed
- Using the navigator, select the "Setup" menu
- Press the navigator again to confirm your entry
- Use the softkey "Help" to call up the Help on the entry selected.
- The "Cancel" or "Back" softkey cancels entries or returns to the previous screen.

Note!
- Every parameter is modified via a dialog box.
- The modified settings do not take effect until you return to the normal operating mode by pressing "Back" repeatedly (confirm setup is accepted with "Yes"). Until this time, the unit still works with the previous data.

Procedure for unit configuration/setup:



6.4 The Setup screen (in the main menu)

Two Setup modes are available: the Standard setup and the Expert setup. All the settings that are needed to operate the unit can be made in the Standard setup. Additional settings are made in the Expert setup (e.g. Direct Access, Service).

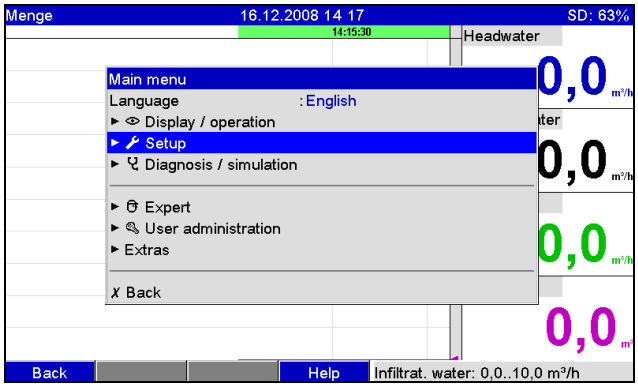


Fig. 20: Standard setup in the main menu

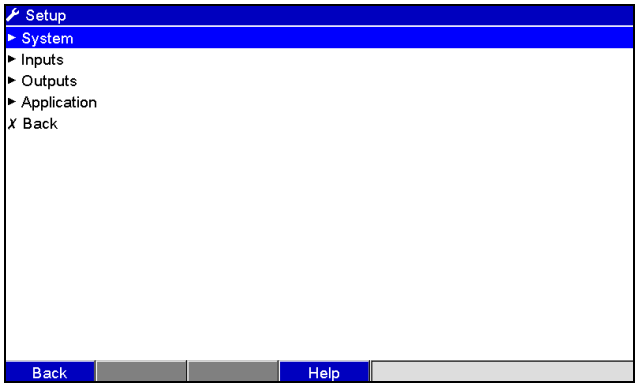


Fig. 21: The Setup screen (standard)

Launching the Expert setup:
The Expert setup is reserved for experienced users or service technicians. A 4-digit release code always has to be entered after calling up the Expert setup.

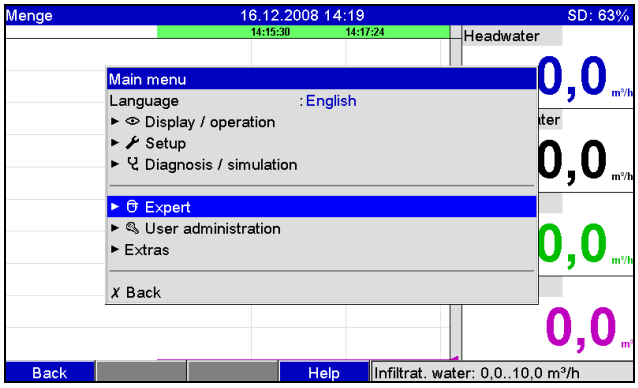


Fig. 22: Expert setup in the main menu

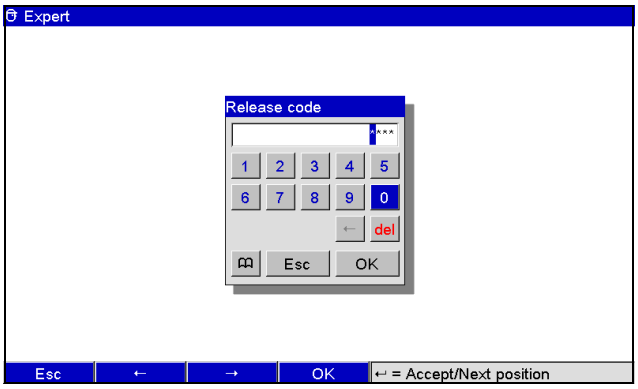


Fig. 23: Release code for Expert setup (factory setting: 0000)

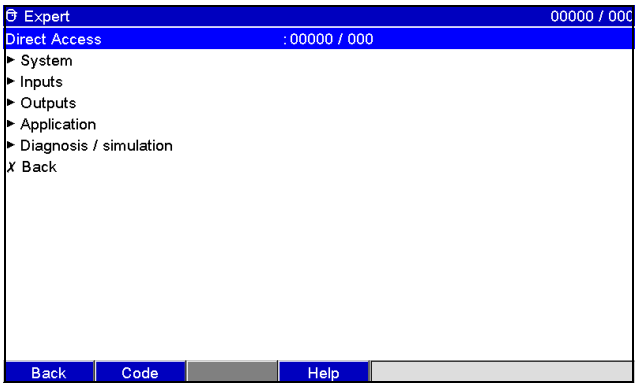


Fig. 24: The Expert setup

The individual parameters are summarized in the Setup menu in the following sections:

Direct access	Expert setup	Direct access to active operating items (rapid access). Entering the direct access code takes you directly to the desired operating parameter. The direct access code is displayed in the Setup menu on the top right of the display (e.g. 00000/000).
System → Chap. 6.4.1	Standard setup / Expert setup	Basic settings that are needed to operate the unit, (e.g. date, time, communication settings, etc.)
Inputs → Chap. 6.4.2	Standard setup / Expert setup	Settings for the analog and digital inputs, mathematics channels (option) and linearization.
Outputs → Chap. 6.4.3	Standard setup / Expert setup	Settings only required if outputs (e.g. relays or analog outputs) are to be used.
Application → Chap. 6.4.4	Standard setup / Expert setup	Specify the various application-specific settings (e.g. limit values, signal grouping, text, softkeys, Web server, telealarm (option)).
Diagnosis/Simulation → Chap. 6.4.5	Expert setup	Unit information and service information for a swift unit check.

Entry principle:

1. Begin changing parameters each time by pressing the navigator.
2. Turn the navigator to scroll through the values, characters and picklists.
3. If the parameter is set correctly, press the navigator again to confirm.

Note!

- Any settings that are displayed in gray cannot be selected/cannot be changed (only notes, or option not available/not activated).
- With the factory setting "0000" for the release code (delivery status), configuration is possible at any time. It can be protected against unauthorized manipulation by entering a 4-digit release code (see: Main menu –> Setup –> System –> Security –> Protected by: Release code). This has to be entered when the settings are later changed, if the unit settings are to be changed by keyboard.
  Tip: Make a note of your release code. Store it somewhere where unauthorized persons do not have access to it.
- The modified settings do not take effect until you return to the normal operating mode by pressing "Back" repeatedly and confirming the "Accept setup" prompt with "Yes". Until this time, the unit still works with the previous data.

6.4.1 Setup - System

Settings that are not channel specific, this means date, time, communication etc.

Procedure for basic settings in the "System" menu:

Start

⇩

Select an operating language from the list

⇩

Assign a device designation

⇩

Select a decimal separator (comma or point)

⇩

Select the temperature unit (°C, °F, K)

⇩

Make date/time settings (e.g. select region for summertime changeover)

⇩

Security: choose whether the setup should be protected and how

⇩

Select communication

⇩

Signal analysis: activate the desired signal analysis here (e.g. daily, weekly or annual analysis)

⇩

External memory: make settings for the external memory (SD card)

⇩

Screen saver: activating the screen saver increases the operating life of the rear illumination

⇩

Keyboard (only relevant if an external USB keyboard is connected)

⇩

Bar code reader (only relevant if a USB bar code reader is connected)

⇩

End

Note!
Depending on the selected function, the unit's user interface adapts itself, so that each time only parameters that are required for safe unit functioning have to be checked/set.

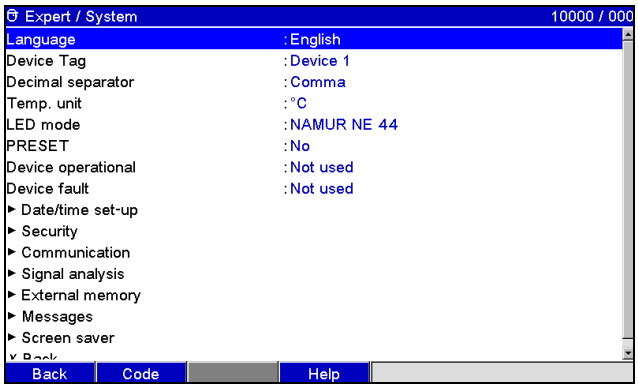
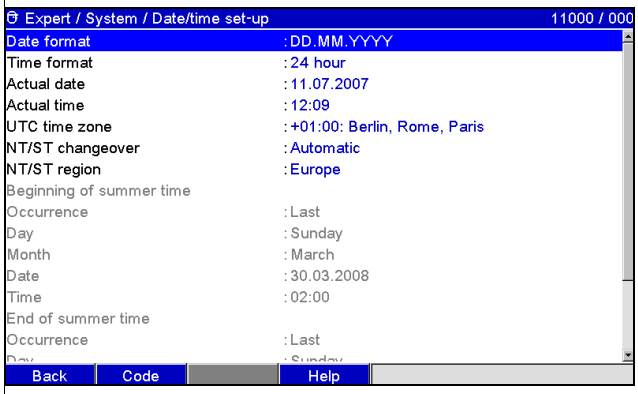
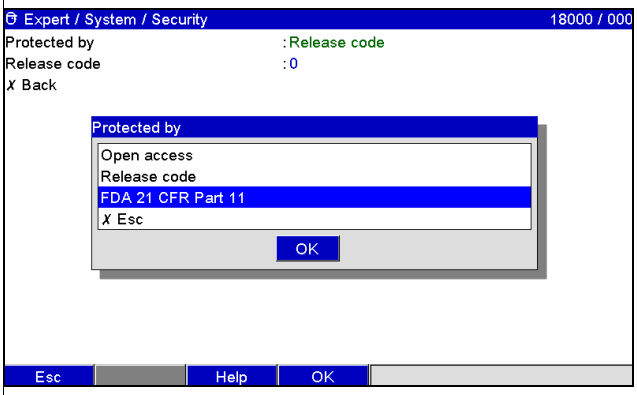
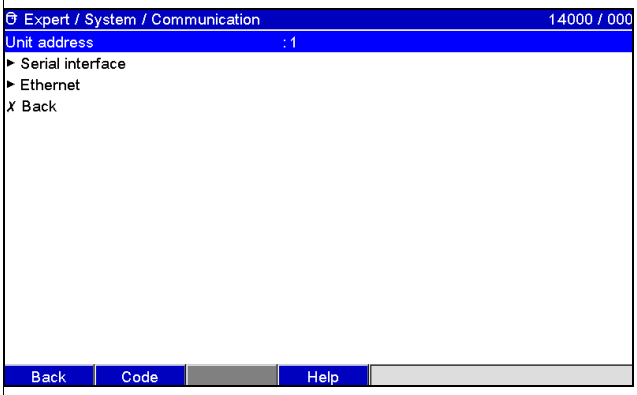
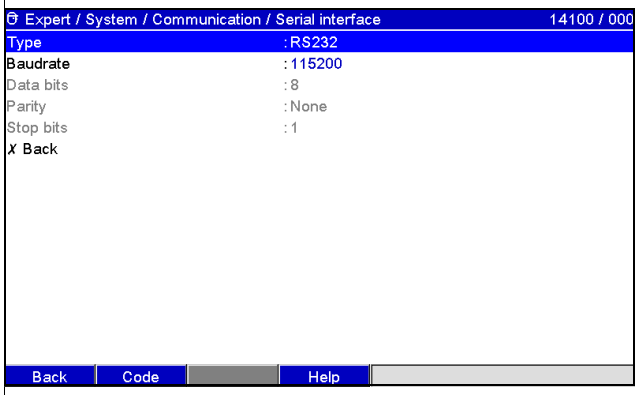


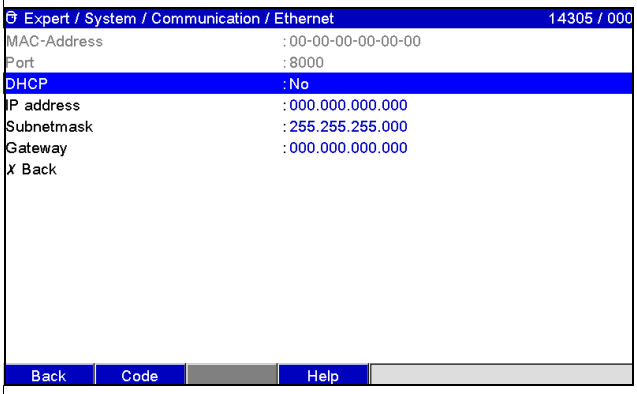
Fig. 25: Setup - System

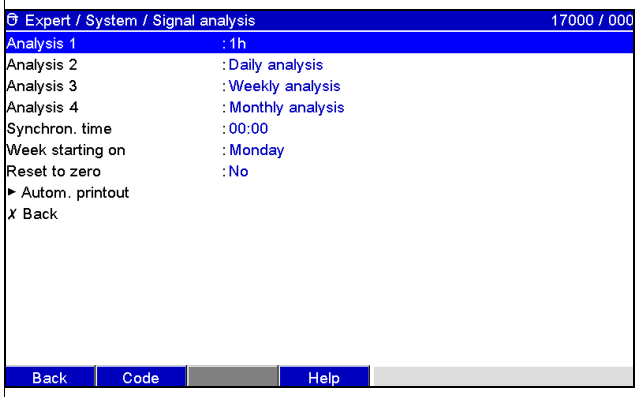
"System" menu items	Configurable parameters (factory settings are highlighted in bold)	Direct access code
Language	Select unit operating language. Factory setting: **English**	10000/000
Device tag	Individual unit identifier (max. 22 characters). Factory setting: **Device 1** ✎ Note! Is also saved on the SD card.	10005/000
Decimal separator	Select in which form the decimal separator character is to be displayed. Picklist: **comma**, point	10010/000
Temp. unit	Selection of temperature units. All directly connected thermocouples or resistance thermometers (RTD) are displayed in the preset engineering units. Picklist: **°C**, °F, K	10015/000
LED mode (only in the Expert mode)	**"Namur NE44"**: Green LED -> power supply OK. Red LED –> Measuring signal failure. Red LED flashing –> Maintenance required. "Namur NE44+": see above, + red LED in event of limit violation	10020/000
PRESET (only in the Expert mode)	☝ Caution! Returns all parameters to the factory default setup! ✎ Note! Only appears once the service code has been entered!	10025/000
Device operational	This relay is switched as soon as the device is fully operational. Picklist: **not used**, relay x (xx-xx) ✎ Note! If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup -> Outputs -> Relay -> Relay x".	10030/000
Device fault	The relay switches if the unit detects a system error (e.g. hardware defect). Picklist: **not used**, relay x (xx-xx) ✎ Note! If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup -> Outputs -> Relay -> Relay x".	10035/000

"System" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu "Date/time setup"	Here you can find various date and time settings.  *Fig. 26: Setup - System, submenu "Date/time setup"*		
	Date format	Select in which format the date is to be set and displayed. **(DD.MM.YYYY)**	11000/000
	Time format	Select in which format the time is to be set and displayed. Picklist: 12 hours AM/PM or **24 hours**	11005/000
	Actual date	Set up the actual date for the unit.	11010/000
	Actual time	Set up the actual time for the unit.	11015/000
	UTC time zone	Set your UTC time zone (UTC = Coordinated Universal Time). This setting is only needed for the Web server.	11020/000
	NT/ST changeover	Function for summer time/normal time changeover. **"Automatic":** changes as per local regional regulations; "Manual": changeover times can be set in the subsequent line items; "Off": no changeover times required	11025/000
	NT/ST region Only for "Automatic summer time changeover"	Selects the regional settings for summer/normal time changeover. Picklist: **Europe**, USA	11030/000
	Beginning of summer time: Occurrence Only for "Manual summer time changeover"	Day, when in the spring a change from normal to summer time occurs. Picklist: 1., 2., 3., 4., **last**	11035/000
	Day Only for "Manual summer time changeover"	Day, when in the spring a change from normal to summer time occurs. Picklist: **Sunday**, Monday to Saturday	11040/000
	Month Only for "Manual summer time changeover"	Month, when in the spring a change from normal to summer time occurs. Picklist: January, February, **March** to December Day, when in the autumn a change from summer to normal time occurs.	11045/000
	Date Only for "Manual summer time changeover"	Displays the calculated changeover date.	
	Time Only for "Manual summer time changeover"	Time when the time is moved forward by 1 hour on the day of the changeover from normal time to summer time. (Format: hh:mm) Time when the time is moved back by -1 hour on the day of the changeover from summer time to normal time. (Format: hh:mm)	11055/000

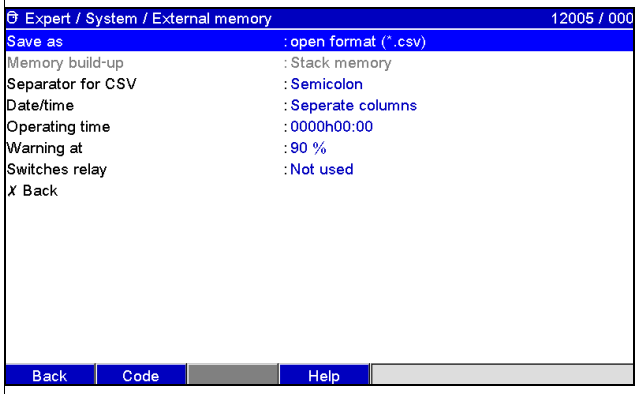
"System" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	End of summer time: Occurrence Only for "Manual summer time changeover"	Day, when in the autumn a change from summer to normal time occurs. Picklist: 1., 2., 3., 4., **last**	11060/000
	Day Only for "Manual summer time changeover"	Day, when in the autumn a change from summer to normal time occurs. Picklist: **Sunday**, Monday to Saturday	11065/000
	Month Only for "Manual summer time changeover"	Month, when in the autumn a change from summer to normal time occurs. Picklist: January to **October**, November, December	11070/000
	Date Only for "Manual summer time changeover"	Displays the calculated changeover date.	
	Time Only for "Manual summer time changeover"	Time when the time is moved back by 1 hour on the day of the changeover from summer time to normal time. (Format: hh:mm)	11080/000
Submenu "Security"	Settings that protect the unit against unauthorized operation and configuration.  *Fig. 27: Setup - System, submenu "Security"*		
	Protected by	Specify how the unit should be protected: **"Open access"**: the unit can be operated and configured without any restrictions. "Release code": the unit configuration is protected by a code. There is free access to all the other functions. "FDA 21 CFR Part 11": The unit is protected by a user administration system. Actions have to be authenticated using an ID and password. Note: user administration is managed outside the setup. → Page 101	18000/000
	Release code	Using this code setup access can be protected from unauthorized persons. In order to change any parameter the correct code must be entered. Factory setting: **"0000"**, i.e. changes are possible any time. **Tip:** make a note of the code and store in a safe place out of the reach of unauthorized persons. ✎ Note! This release code also has to be entered in the PC software supplied.	18005/000

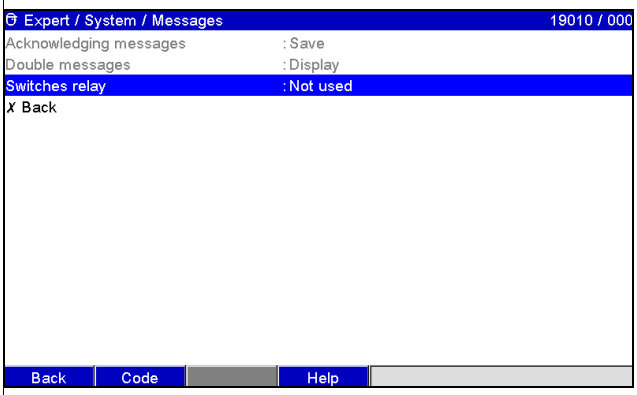
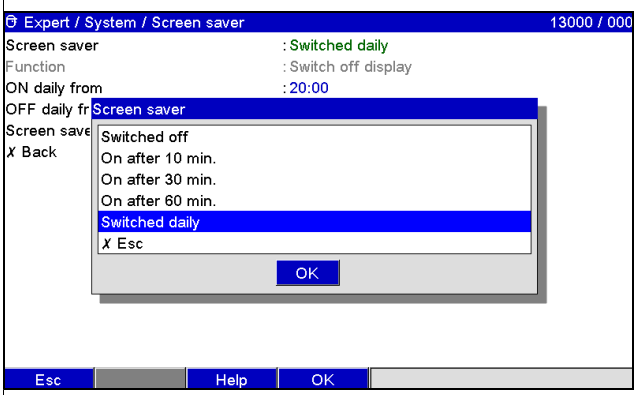
"System" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Set point code Only if the release code is enabled	The unit is protected by a release code. If a set point code has been set up then the user can change the alarm set points after entering this code or the unit release code (all other operating positions cannot be changed). Factory setting: **"0000"**, i.e. the alarm set points can only be changed by entering the release code. Note: the set point code and release code should not be identical!	18010/000
Submenu "Communication"	Setup required if you are using the USB, RS232/RS485 or Ethernet interface of the unit (PC operation, serial data read-out, modem operation, etc.). Note: the various interfaces can be operated in parallel.  *Fig. 28: Setup - System, submenu "Communication"*		
	Unit address	Each unit used by the USB, RS232, RS485 or Ethernet interfaces must have its own individual address (0-99). This is needed for PC software identification. Factory setting: **1**.	14000/000
	Submenu "Communication - Serial interface"	Setup required if you are using the RS232 or RS485 unit interface.  *Fig. 29: Setup - System - Communication, submenu "Serial interface"*	
		"Type": specify how the serial interface is used. Pay attention to the terminal assignment. Picklist: **RS232**, RS485	14100/000
		"Baudrate": transmission rate ("baudrate") - must match the settings of the PC software supplied.	14105/000
		"Data bits": make sure the setting matches that of the PC software supplied! Fixed settings - cannot be changed. Default value **"8"**.	14110/000

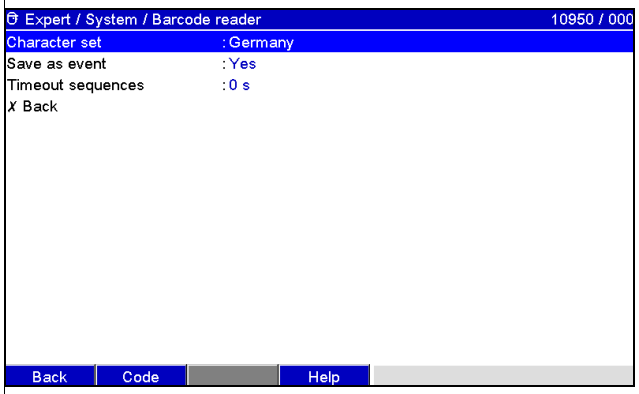
"System" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
		"Parity": make sure the setting matches that of the PC software supplied! Fixed settings – cannot be changed. Default value **"none"**.	14115/000
		"Stop bits": make sure the setting matches that of the PC software supplied! Fixed settings – cannot be changed. Default value **"1"**.	14120/000
	Submenu "Communication – Ethernet"	Setup required if you are using the Ethernet interface of the unit. Note! A maximum of 5 connections can be established to the unit at the same time (e.g. via Web server or the PC software supplied).  *Fig. 30: Setup – System – Communication, submenu "Ethernet"*	
		MAC address MAC address (preset at the factory – cannot be modified). The MAC (media access control) address is the hardware address that is used to uniquely identify the unit in the network.	14300/000
		Port Please check that settings are compatible with the settings of the PC software supplied! Fixed settings – cannot be changed. Port preset at the factory to **"8000"**. Note! The port "8000" must be released at the firewall of the accessing PC. The port "80" has to be released with the Web server function. Please contact your system administrator!	14325/000
		DHCP The unit can use the DHCP to get its Ethernet settings. Caution: the settings determined are not displayed until the setup has been accepted! Picklist: **no**, yes Note! The unit always gets the same IP address if the leasing time is set long enough on the DHCP server. The PC software needs the IP address to establish a connection!	14305/000

"System" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
		IP address Enter the IP address for the unit here. This IP address is assigned by your network administrator. Please talk to your network administrator about this. The unit is delivered with a preset IP address which must, however, be changed in the setup procedure. Before you can make the input in the unit, an IP address valid for your network must be defined. ✎ Note! Entry only needed if the IP address is not acquired automatically via DHCP. The IP address must be unique within the network! Please be aware that this number is not arbitrary, rather it must be defined dependent on the network address of the TCP/IP network. The input form corresponds to syntax (e.g. 192.168.100.002).	14310/000
		Subnetmask Please input the subnetmask (given by your network administrator). The subnetmask must be input if the unit is to establish connections in another sub-network. Specify the subnetmask of the sub-network in which the unit is located (e.g. 255.255.255.000). Please note: the IP address determines the network class. The result of this is a default subnetmask (e.g. 255.255.000.000 for a Class B network).	14315/000
		Gateway Please input the Gateway (given by your network administrator). Enter the IP address of the gateway here if connections are to be established in other networks. Factory setting: **000.000.000.000** ✎ Note! Changes to the system parameters are not activated until the System menu is closed and the settings accepted. Only then will the unit work with the new settings.	14320/000
Submenu "Signal analysis"	Setup in order to get signal analysis for a preset time range/cycle as well as the function to manually reset the signal analysis. Up to 4 analyses can be performed in parallel. The analyses can be displayed in the Extras menu.  *Fig. 31: Setup - System, submenu "Signal analysis"*		
	Analysis 1	Determines the minimum, maximum and average values, as well as the volumes and operating times, for the set time range. "Externally controlled": the analysis is started or stopped by means of a digital input (set the digital input to "Control input" and the action to "Analysis x"). Picklist: **no**, externally controlled, 1 min to 12 h	17000/000

"System" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Analysis 2 **Analysis 3** **Analysis 4**	Here, choose whether a daily, weekly, monthly or annual analysis should be performed. "No": no analysis "Externally controlled": the analysis is started or stopped by means of a digital input (set the digital input to "Control input" and the action to "Analysis x"). "Daily analysis": determines the daily minimum, maximum and average values, and the volumes for the day, when the day changes. "Weekly analysis": determines the weekly minimum, maximum and average values, and the volumes for the week, when the week changes. "Monthly analysis": determines the monthly minimum, maximum and average values, and the volumes for the month, when the month changes. "Annual analysis": determines the annual minimum, maximum and average values, and the volumes for the year, when the year changes.	17005/000 17010/000 17015/000
	Synchron. time	Time for ending the signal analysis. Example for daily analysis: starting at the set time, e.g. 7 a.m., the daily analysis continues until 7 a.m. the following day. It contains the analysis for the measured values over the last 24 hours. Factory setting: **"00:00"**	17020/000
	Week starting on Only if "Weekly analysis" is activated	Specify what day the weekly analysis should start. Factory setting: **"Monday"**	17025/000
	Reset to zero	The analyzed values can be reset to zero. Example: reset after commissioning a plant. All commissioning signals are discarded. The graphics or memory storage are not influenced (traceability)! Picklist: **no**, analysis 1-4, totalizer, all counters. ✎ Note! All previous (commissioning) signals are discarded. The graphics/storage are, however, not affected if you leave the setup and answer the "Accept setup?" question with "No" (traceability). If you answer the question with "Yes", the contents of the memory and thereby the graphic display is also deleted/reset. If the previous signals are still required, save them onto an external storage medium (USB stick or SD card) before resetting. The reset takes effect immediately if you confirm acceptance here.	17035/000
	Submenu "Autom. printout"	Specify whether the analysis should be printed out automatically at the end of an analysis. ✎ Note! The information is only printed out if a USB printer is connected to the device! With the Batch option, the printout process is configured in the Batch mode/printout menu.	
		Analysis 1: picklist: **no**, yes **Analysis 2**: picklist: **no**, yes **Analysis 3**: picklist: **no**, yes **Analysis 4**: picklist: **no**, yes	17100/000 17105/000 17110/000 17115/000

"System" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu "External memory"	Settings for the external data carrier, amongst other things which data are to be stored in which format on the external data carrier.  *Fig. 32: Setup - System, submenu "External memory"*		
	Save as	**"Protected format"**: all the data are stored in a way that protects them from data manipulation. They can only be interpreted using the PC software supplied. "Open format": the data are stored in CSV format. This can be opened by a number of different programs (caution: no manipulation protection). MS Excel restricts the open format to a maximum of 65535 rows.	12005/000
	Memory buildup	**"Stack memory"**: no more data can be stored once the data carrier is full. "Ring memory (FIFO)": once the data carrier is full the oldest data are deleted so that new data can be stored (first in first out (FIFO)). Option only possible for "Protected format".	12000/000
	Separator for CSV Can only be configured for "Open format (*.csv)"	Specify which separator is used by your application (e.g. in Excel = semicolon). Picklist: comma, **semicolon**	12010/000
	Date/time Can only be configured for "Open format (*.csv)"	Specify whether the date and the time should be saved in a joint column or in two separate columns when saving the data in CSV format.	12011/000
	Operating time Can only be configured for "Open format (*.csv)"	Specify the format for which operating times should be saved/displayed. Factory setting: **0000h00:00**	12015/000
	Warning at Can only be configured for "Stack memory"	Gives a warning before the data carrier is x% full. A warning is indicated on the unit and this is also stored in the event list. A relay can also be switched. Note: only with the external SD card (does not apply for USB stick)! Factory setting: **90 %**	12020/000
	Switches relay Can only be configured for "Stack memory"	When the warning "Data carrier full" is displayed a relay can also be switched. Picklist: **not used**, relay x (xx-xx) ✎ Note! If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup -> Outputs -> Relay -> Relay x".	12025/000

"System" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu "Messages" (only available in the Expert setup)	Settings for displaying/confirming messages. For example, messages can be: – Messages triggered by set points – Messages triggered by a digital input – Error messages, etc.  *Fig. 33: Expert setup - System, submenu "Messages"*		
	Acknowledging messages	The time the message is acknowledged can be saved in the events list. Note: this setting cannot be changed if the user administration function is activated (FDA 21 CFR Part 11). Picklist: do not save, **save**	19005/000
	Double messages Can only be configured if "Do not save" is selected for "Acknowledging messages"	The unit can merge the same messages into one single message (with the time stamp of the last message). Note: this setting cannot be changed if the user administration function is activated (FDA 21 CFR Part 11). Picklist: combine, **display**	19000/000
	Switches relay	A relay can be switched as soon as a message that has to be acknowledged (e.g. on/off messages, device errors, etc.) is displayed. Picklist: **not used**, relay x (xx-xx) ✎ Note! If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup -> Outputs -> Relay -> Relay x".	19010/000
Submenu "Screensaver"	✎ Note! To increase the life span of the LCD the rear illumination can be switched off (= screen saver). If the unit is in an alarm condition (e.g. open circuit or alarm point violation), the screen saver is not switched on or is automatically switched off. In this way, alarms can be read even if the screen saver is activated.  *Fig. 34: Setup - System, submenu "Screensaver"*		

"System" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Screensaver	**"Switched off":** LCD is always switched on "On after x min": display turns dark after 10, 30 or 60 minutes. All other functions remain in operation. Press an operating key: illumination is switched back on. "Switched daily": specify time. With this setting, the display turns dark 1 minute after the last key was pressed.	13000/000
	Function	**"Switch off display"**: the unit switches off the display when the screensaver is activated.	13005/000
	ON daily from Only for "Switched daily"	Set time (hh:mm) from which the rear illumination is to be switched off (e.g. shift end time). **Factory setting: 20:00**	13010/000
	OFF daily from Only for "Switched daily"	Set time (hh:mm) from which the rear illumination is to be switched on (e.g. shift start time). **Factory setting: 07:00**	13020/000
	Screensaver	**"Off on alarm"**: the screensaver is automatically deactivated in an alarm condition (e.g. limit value, cable open circuit, etc.). "Always on": the screensaver remains switched on even in the event of an alarm. Note: active messages that have to be acknowledged always deactivate the screensaver.	13025/000
Submenu "Keyboard"	Keyboard settings (only relevant if a USB keyboard is connected to the unit)		
	Keyboard layout	Please select the keyboard layout. Picklist: **Germany**, Switzerland, France, USA, USA International, UK, Italy	10900/000
Submenu "Bar code reader"	Instructions for operating a bar code reader: ■ It has to act like a HID keyboard ■ Texts must be terminated with a carriage return.  *Fig. 35: Setup - System, submenu "Bar code reader"*		
	Character set	Please select the character set. Picklist: **Germany**, Switzerland, France, USA, USA International, UK, Italy	10950/000
	Save as event	The unit can save texts read in using the bar code reader in the event log. Picklist: **yes**, no ✎ Note! Texts are NOT saved in the following situations: ■ An order sequence was read in ("Batch" option) ■ The dialog for entering batch information is active ("Batch" option) ■ The dialog for testing the bar code reader is active ■ The "Save text" function is already being executed	10955/000

"System" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Timeout sequences	Specify after how many seconds an order sequence is aborted if the necessary data are not read in. User input: 10 to 180 seconds; factory setting: **30 s**	10960/000

6.4.2 Setup - Inputs

Settings for the analog and digital inputs, mathematics channels (option) and linearization.

Note!
Depending on the selected function, the unit's user interface adapts itself, so that each time only parameters that are required for safe unit functioning have to be checked/set.

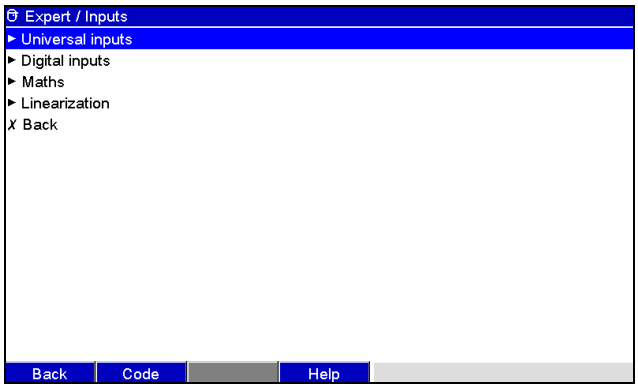


Fig. 36: Setup - Inputs

Setup - Inputs, submenu: Universal inputs

Procedure for the signal settings of the universal inputs:

Start

⇩

Set the signal for the universal input (current, voltage, resistance thermometer, thermocouple, pulse, frequency)

⇩

Set the range for the universal input (e.g. 0-20 mA for current; not necessary for pulse/frequency)

⇩

Enter the channel name

⇩

Select the plot type

⇩

Enter the unit/dimension

⇩

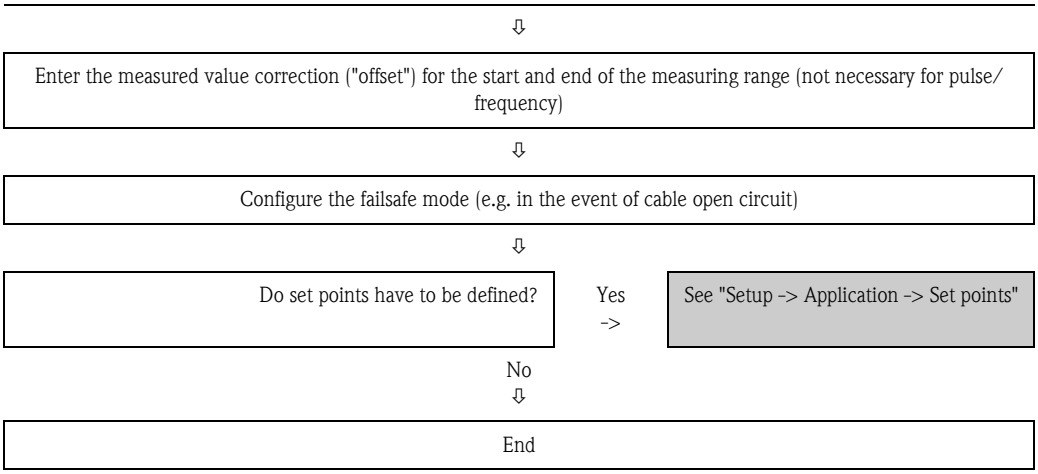
Enter the number of decimal places

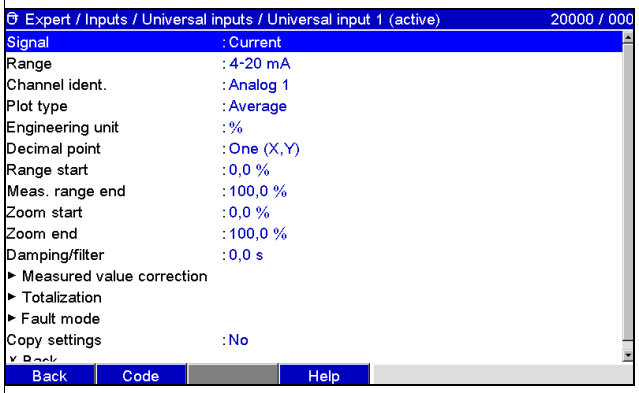
⇩

Enter the measuring range and zoom range (not necessary for pulse)

⇩

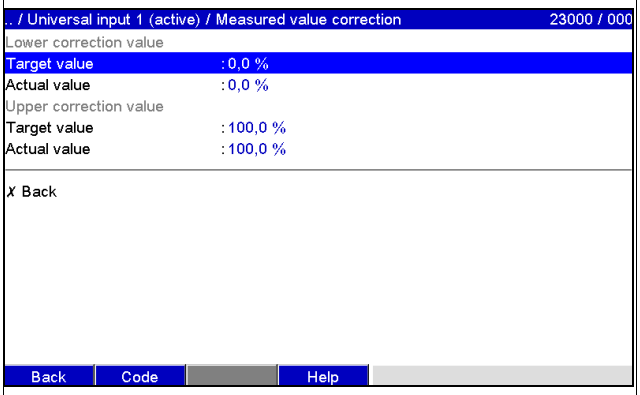
Enter the damping/filter (not necessary for pulse/frequency)

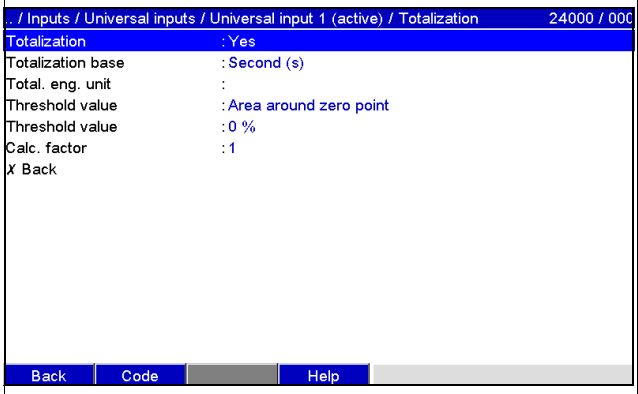


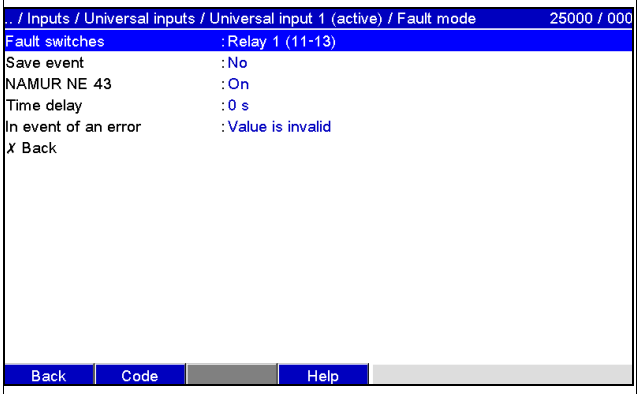
"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Universal inputs, universal input x	View or change settings of the connected measuring points for the selected channel. The unit can be equipped with a maximum of 20 internal signals and a further 20 external signals.  *Fig. 37: Setup - Inputs, submenu: Universal inputs, Universal input*		
	Signal	Select the type of signal connected (current, voltage, etc.). The channel is switched off if no signal type is selected (factory default). Picklist: **switched off**, current, voltage, resistance therm. RTD, thermocouple, pulse counter, frequency input, Profibus DP	20000/000 to 20000/039
	Range	Select the input range or which resistance thermometer/thermocouple is connected. The terminal assignment is provided in Section 4.	20005/000 to 20005/039
	Connection Only for "Resistance thermometer"	Specify whether RTDs are connected as 2-, 3- or 4-wire systems. Factory setting: **3-wire**	20010/000 to 20010/039
	Channel ident.	Identifier for the measurement point connected to this input (e.g. "Pressure", "Temperature", "Heater", ...). 16-character entry. **Factory setting: analog x**	20015/000 to 20015/039

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Plot type	The universal inputs are scanned at 100ms cycles. Depending on the save cycle, the selected data are determined from the scanned values and saved (e.g. with a save cycle of 1 min., the average of 600 values (10x60) is calculated and saved). **"Instantaneous value":** the value pending for the save cycle is saved. "Average": the average value during the save cycle is calculated and saved. "Minimum value": the minimum value is calculated and saved. "Maximum value": the maximum value is calculated and saved. "Minimum + Maximum": both minimum and maximum values are saved (requires higher memory capacity) "Counter": the counter is recorded and saved. "Current value + counter": a current value can also be determined from the pulses recorded.	20025/000 to 20025/039
	Pulse counter Only with "Pulse counter"	Specify whether the pulse counter is a fast or slow (up to max. 25Hz) counter. If you are recording the number of switching routines of the relays, you should definitely set "up to 25Hz". Picklist: **up to 13kHz**, up to 25Hz ✎ Note! This operating item does not affect analog cards whose software version <= 1.00.05. These cards always work in the "up to 13kHz" mode.	20039/000 to 20039/039
	1 pulse = Only with "Pulse counter"	Impulse factor = factor which, when multiplied by the input signal, results in the required physical value. Example: 1 impulse equals 5 m –> enter "5".	20040/000 to 20040/039
	Time base Only for the "Current value + counter" plot mode	With the aid of the time base, a current value can be determined from the counter reading e.g. input liters, time base = second –> current value = liters/second.	20045/000 to 20045/039
	Engineering unit	Input of the engineering (physical) unit for the measuring point connected to this input (e.g. %, bar, °C, m/h, etc.). 6-character entry. ✎ Note! Cannot be changed for resistance thermometers and thermocouples!	20050/000 to 20050/039
	Unit/dimension counter Only with "Pulse counter"	Technical unit of the counter input, e.g. liter m3 etc. 6-character entry.	20055/000 to 20055/039
	Decimal point	Number of places after decimal point for the display. Picklist: 0 to 5 number of places after the decimal point. This information is only used to better display the measured value. Factory setting: **one (X,Y)** e.g. measured value: 20.12348 l/s The display shows: None: 20 l/s One: 20.1 l/s Two: 20.12 l/s Three: 20.123 l/s Four: 20.1235 l/s Five: 20.12348 l/s ✎ Note! The value is rounded off where necessary.	20060/000 to 20060/039
	Lower frequency Only for "Frequency input"	Specify the lower frequency that corresponds to the start of the measuring range. A maximum frequency of 12.5 kHz can be configured here. Factory setting: **5 Hz**	20065/000 to 20065/039

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Range start	Transmitters convert the physical measurement into a standard signal. Example: 0–14 pH from the sensor is converted to 4–20 mA. Enter the starting point of the measurement range. A "0" for 0–14 pH. ✎ Note! Cannot be changed for resistance thermometers and thermocouples!	20070/000 to 20070/039
	Upper frequency Only for "Frequency input"	Specify the upper frequency that corresponds to the end of the measuring range. A maximum frequency of 12.5 kHz can be configured here. Factory setting: **1000 Hz**	20075/000 to 20075/039
	Meas. range end	The same as "Range start". Enter the end value for the measurement range here, e.g. "14" for a 0–14 pH transmitter. ✎ Note! Cannot be changed for resistance thermometers and thermocouples!	20080/000 to 20080/039
	Zoom start	If the total transmitter range is not being used then the lower value of the required range can be entered here (higher resolution). Example: transmitter 0–14 pH, required range: 5–9 pH. Set up "5" here. The zoom has no influence on the storage.	20085/000 to 20085/039
	Zoom end	As in "Zoom start". Enter the upper value of the required range here. Example: transmitter 0–14 pH, required range: 5–9 pH. Enter "9" here.	20090/000 to 20090/039
	Damping/filter	The more unwanted interference there is on the measurement signal the higher the value that should be entered here. Result: fast changes will be damped/suppressed. Factory setting: **0.0 s**	20095/000 to 20095/039
	Comparison point Only for "Thermocouples"	Only used when directly connecting thermocouples. **"Internal":** compensation of the voltage error by measuring the terminal temperature. "External": compensation of error voltage by using thermostated comparison points.	20100/000 to 20100/039
	Comparison temp. Only for "Comparison point – external"	Settings for the external comparison temperature (only when connecting thermocouples directly).	20105/000 to 20105/039

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Submenu: Measured value correction	For determining the correction values to offset measurement section tolerances. Follow these instructions: 1. Measure the current value at the lower measurement range. 2. Measure the current value at the upper measurement range. 3. Enter the lower and upper target and actual value.  *Fig. 38: Setup - Inputs - Universal inputs, Universal input x, "Measured value correction" submenu*	
		Lower correction value: **Target value:** enter the lower target value here (e.g. measuring range 0°C to 100°C: 0°C).	23000/000 to 23000/039
		Actual value: enter the lower value that is actually measured here (e.g. measuring range 0°C to 100°C: 0.5°C measured).	23005/000 to 23005/039
		Upper correction value: **Target value:** enter the upper target value here (e.g. measuring range 0°C to 100°C: 100°C).	23010/000 to 23010/039
		Actual value: enter the upper value that is actually measured here (e.g. measuring range 0°C to 100°C: 100.5°C measured).	23015/000 to 23015/039
		Correction RPT: Rear panel temperature correction value for this universal input (only required for thermocouples). ✎ Note! Only appears once the service code has been entered!	23500/000 to 23500/039

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Submenu: Totalization	Settings only required if this analog measuring point is to be integrated for calculating the volume for example. For analysis periods, see "Signal analysis".  *Fig. 39: Setup - Inputs - Universal inputs, Universal input x, submenu "Totalization"*	
		Totalization: using the totalization function, the volume (in m^3) can be calculated from an analog signal (e.g. flow in m^3/h). Picklist: **no**, yes	24000/000 to 24000/039
		Totalization base: select the corresponding time base here. Example: ml/s -> time base **seconds (s)**; m^3/h -> time base hours (h). Picklist: **second (s)**, minutes (min), hour (h), day (d)	24005/000 to 24005/039
		Total. eng. unit: here, enter the unit for the volume determined by totalization (e.g. "m^3").	24010/000 to 24010/039
		Threshold value: specify how the device should execute low flow cut off. Picklist: **area around zero point**, absolute value	24015/000 to 24015/039
		Threshold value: analog values that are lower than the set threshold value (absolute value) are not integrated ("low flow cut off"). User input: 6-digit; factory setting: **0**	24020/000 to 24020/039
		Calc. factor: factor for converting the integrated value (e.g. the transmitter returns l/s -> integration base = second -> desired unit is m^3 -> select 0.001 as the factor). Picklist: 0.00001 to 10000, free configuration; factory setting: **1**	24025/000 to 24025/039
	Only if "Free configuration" is selected for "Calc. factor":	**Calc. factor:** user-defined entry of the factor for converting the integrated value. Factory setting: **1.000**	24030/000 to 24030/039

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Submenu: Fault mode (only available in the Expert setup!)	Settings that lay down how this channel is to react under fault conditions (e.g. cable open circuit, over range).  *Fig. 40: Setup - Inputs - Universal inputs, Universal input x, submenu "Fault mode"*	
		Fault switches: switches the selected relay under fault conditions. The terminal numbers are shown in brackets. Picklist: **not used**, relay x (xx-xx) ✎ Note! If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup -> Outputs -> Relay -> Relay x".	25000/000 to 25000/039
		Save event: stores a message in the event memory when a fault condition occurs. Picklist: **no**, yes	25005/000 to 25005/039
	Only for "Current" as the signal and "4-20 mA" as the range	**NAMUR NE43:** Switch monitoring of the 4 to 20 mA range as per NAMUR Recommendation NE43 on and off. The following error ranges apply when NAMUR NE43 is switched on: ≤ 3.8 mA: under range (display shows: vvvvvv) ≥ 20.5 mA: overrange (displays shows: ^^^^^^) ≤ 3.6 mA or ≥ 21.0 mA: cable open circuit (display shows: ----) Picklist: **on**, off	25015/000 to 25015/039
	Only for "4-20 mA" or "1-5 V" as the range and if "NAMUR NE43" is "on"	**Time delay** The system only reacts to a cable open circuit/under range/overrange (e.g. relay is switched) if this condition is present for the set duration at least. Factory setting: **0 s**	25045/000 to 25045/039
	Only for "Voltage" as the signal and "1-5 V" as the range	**Cable open circuit:** Switch cable open circuit detection of the 1-5 V range on or off. If the cable open circuit detection function is switched on, all values < 0.8 V or > 5.2 V are regarded as a cable open circuit (display shows: ----) Picklist: **on**, off	25015/000 to 25015/039
	Not available if "Pulse counter" is the signal!	**In the event of an error** Specify the value the unit should continue to use (for calculations) if the measured value is not valid (e.g. cable open circuit). Picklist: last valid value, range start, meas. range end, zero[1)], LOW[1)], HIGH[1)], **value is invalid**, free configuration	25035/000 to 25035/039
	Only if "Free configuration" is selected for "In event of an error"	**Error value** The unit continues calculating with this value if a fault occurs. See table → Page 59	25040/000 to 25040/039
	Copy settings	Copies settings from actual channel to selected channel. Picklist: **no**, in universal input x	20115/000 to 20115/039

1) Only visible for mathematics (option)

Fault mode

Failsafe mode if an input signal/variable is invalid (e.g. cable open circuit, invalid result of mathematics calculation; e.g. dividing by zero).

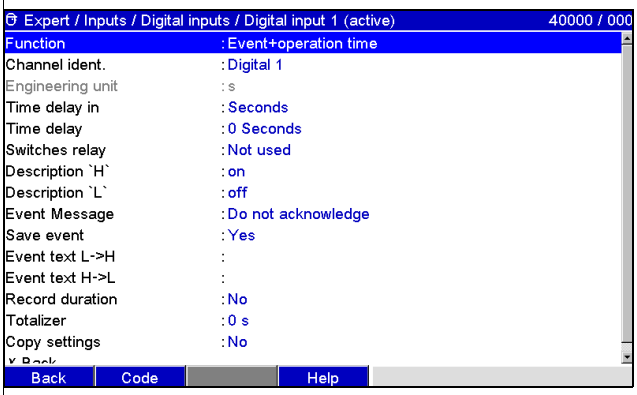
Set failsafe mode	"Invalid" channel	Dependent channels
Value is invalid	■ "– – – – –" or "******" are displayed ■ Channel name is highlighted in red ■ Status "F" is displayed ■ Limit value monitoring is suspended ■ Totalization is suspended ■ A relay is switched if set. ■ Analysis: if the error is pending during the entire analysis period, the value in the analysis is invalid. If there was at least 1 valid value, the result of the analysis is valid.	■ "– – – – –" or "******" are displayed ■ Channel name is highlighted in red ■ Status "F" is displayed ■ Limit value monitoring/totalization: depends on the set failsafe mode of this channel ■ A relay is switched if set. ■ Analysis: if the error is pending during the entire analysis period, the value in the analysis is invalid. If there was at least 1 valid value, the result of the analysis is valid.
All other settings	■ "– – – – –" or "******" are displayed ■ Channel name is highlighted in red ■ Status "F" is displayed ■ Value is totalized ■ A relay is switched if set. ■ Analysis: if the error is pending during the entire analysis period, the value in the analysis is invalid. If there was at least 1 valid value, the result of the analysis is valid.	■ Calculated value is displayed ■ Channel name is highlighted in red ■ Status "F" is displayed The channel is treated as "valid", i.e.: ■ Value is totalized ■ Limit value monitoring remains active ■ If the result of the calculation for this channel is invalid, the set failsafe mode for this channel applies ■ Analyses: the channel is analyzed as normal

Setup – Inputs, submenu: digital inputs

Procedure for setting the signals of the digital inputs:

1. Start					
⇩					
2. Select the function of the digital channel (also optionally possible via "Modbus" or "Profibus" fieldbus)					
⇩	⇩	⇩	⇩	⇩	⇩
3. Control input	3. On/off event	3. Pulse counter	3. Operational time	3. Event + operation time	3. Quantity from time
⇩	⇩	⇩	⇩	⇩	⇩
4. Enter channel identifier	4. Enter channel identifier	4. Enter channel identifier	4. Enter channel identifier	4. Enter channel identifier	4. Enter channel identifier
⇩	⇩	⇩	⇩	⇩	⇩
5. Select the action	5. Enter description for "HIGH" and "LOW" conditions	5. Enter the unit/ dimension	5. Where necessary, enter the current counter reading to continue a totalizer	5. Enter description for "HIGH" and "LOW" conditions	5. Enter the unit/ dimension
⇩	⇩	⇩	⇩	⇩	⇩
6. End	6. Select whether the event message has to be acknowledged	6. Select the number of decimal places	6. Select the display for the counter type (e.g. totalizer)	6. Select whether the event message has to be acknowledged	6. Select the number of decimal places
	⇩	⇩	⇩	⇩	⇩
	7. Choose whether the event should be saved in the event log	7. Enter the pulse factor	**7. End**	7. Choose whether the event should be saved in the event log	7. Select the factor
	Yes ⇩ / No ⇩	⇩		Yes ⇩ / No ⇩	⇩
	8. Enter event text for change in status from L->H and H->L / **8. End**	8. Where necessary, enter the current counter reading to continue a totalizer		8. Enter event text for change in status from L->H and H->L / ⇩	8. Where necessary, enter the current counter reading to continue a totalizer
	⇩	⇩		⇩ / ⇩	⇩
	9. Record duration?	9. Select the display for the counter type (e.g. totalizer)		9. Record duration? / ⇩	9. Select the display for the counter type (e.g. totalizer)
	⇩	⇩		⇩	⇩
	10. End	**10. End**		10. Where necessary, enter the current counter reading to continue a totalizer	**10. End**
				⇩	
				11. Select the display for the counter type (e.g. totalizer)	
				⇩	
				12. End	

Note!
The descriptions of the operating items for optional application packages can be found in the additional Operating Instructions on the CD-ROM or as hardcopy (part of the scope of delivery).

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Digital inputs, digital input x	Setting up only required if the digital inputs (e.g. events) are to be used. View or change the settings for the selected digital channel. ✎ Note! Digital input 7 – 14 can only be selected if the "Digital inputs" option card is available.  *Fig. 41: Setup Inputs - Digital inputs, submenu "Digital input 1"*		
	Function	Select the required function. Digital inputs are High active; this means the described effect is achieved by a high input. Low = -3 to +5 V, High = +12 to +30 V ✎ Note! Depending on the selected function, the unit's user interface adapts itself, so that each time only parameters that are required for safe unit functioning have to be checked/set. The following functions are available: **"Switched off"**: digital input is not active. "Control input": various control functions can be activated using the digital input. "On/off event": switch conditions of connected units (e.g. pump on/off) are displayed and stored. "Pulse counter": pulses are added up and saved as a numerical value (max. 25 Hz). "Operational time": running times of external units are recorded e.g. for maintenance purposes. **Example:** if the daily run time of a pump is to be saved, activate "Operating time" here and "Daily analysis" under "Signal analysis". "Event+operation time": both the on/off events and the operating time of an external unit are recorded and stored. "Quantity from time": a quantity is calculated from the time (e.g. for pumps with constant throughput). "Modbus" or "Profibus": the data are transmitted to the unit via the fieldbus (option).	40000/000 to 40000/013
	Function Only for the "Modbus" or "Profibus" function	Specifies how the data are interpreted/processed by the fieldbus. For a description, see "Function".	40005/000 to 40005/013
	Channel ident.	Measurement point name (e.g. "Pump") or description of the function of this input (e.g. "Fault message"). 16-character entry. **Factory setting: digital x**	40010/000 to 40010/013

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Engineering unit Only for the "Pulse counter" and "Quantity from time" functions	Technical units of the count input, e.g. gal, cf, ... 6-digit entry.	40030/000 to 40030/013
	Decimal point Only for the "Pulse counter" and "Quantity from time" functions	Number of places after decimal point for the display. Picklist: 0 to 5 number of places after the decimal point. This information is only used to better display the measured value. Factory setting: **one (X,Y)** e.g. measured value: 20.12348 l/s The display shows: None: 20 l/s One: 20.1 l/s Two: 20.12 l/s Three: 20.123 l/s Four: 20.1235 l/s Five: 20.12348 l/s ✎ Note! The value is rounded off where necessary.	40035/000 to 40035/013
	Input factor in Only for the "Quantity from time" function	Specifies whether the factor entered relates to 1 second or 1 hour. Picklist: **seconds**, hours	40040/000 to 40040/013
	1 pulse = Only for "Pulse counter" function	Impulse factor = factor which, when multiplied by the input signal, results in the required physical value. Example: 1 pulse corresponds to 5 m^3 -> enter "5" here. **Factory setting: 1.0**	40045/000 to 40045/013
	1 second/hour = Only for the "Quantity from time" function	Impulse factor = factor which, when multiplied by the operation time, results in the required physical value. Example: 1 second equals 8 liters –> enter "8" here. **Factory setting: 1.0**	40045/000 to 40045/013
	Time delay in Only for "On/off event" and "Event+operation time" functions.	Configure the engineering unit for entering the time delay. Picklist: **seconds**, minutes, hours	40115/000 to 40115/013
	Time delay Only for "On/off event" and "Event+operation time" functions.	The high signal must be present for the set time at least before the channel in the device is set from low to high. However, the transition from high to low takes place immediately. User input: **0** to 999	40120/000 to 40120/013
	Switches relay Only for "On/off event" and "Event+operation time" functions.	Switches the corresponding relay if the digital input is low or high. The terminal numbers are shown in brackets. Picklist: **not used**, relay x (xx-xx) ✎ Note! If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup -> Outputs -> Relay -> Relay x".	40130/000 to 40130/013
	Description ´H´ Only for "On/off event" and "Event+operation time" functions.	Description of the status if the digital input is activated. This text is both shown in the display and saved to memory. Factory setting: **On**	40050/000 to 40050/013
	Description ´L´ Only for "On/off event" and "Event+operation time" functions.	Description of the status if the digital input is not activated. This text is both shown in the display and saved to memory. Factory setting: **Off**	40055/000 to 40055/013
	Event message Only for "On/off event" and "Event+operation time" functions.	**"Do not acknowledge"**: no message is output if the digital input switches. "Acknowledge": an event message is displayed and has to be confirmed by pressing a button.	40060/000 to 40060/013

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Save event Only for "On/off event" and "Event+operation time" functions.	Determines whether the condition change from low to high or high to low is stored in the event log. Note: increased memory capacity needed. Picklist: **yes**, no	40065/000 to 40065/013
	Event text L->H Can only be saved for "Event message – acknowledge" or "Save event – yes"	Description of condition change from low to high. Event text is stored (e.g. start filling). 22-character entry.	40070/000 to 40070/013
	Event text H->L Can only be saved for "Event message – acknowledge" or "Save event – yes"	Description of condition change from high to low. Event text is stored (e.g. stop filling). 22-character entry.	40075/000 to 40075/013
	Record duration Can only be saved for "Event message – acknowledge" or "Save event – yes"	The duration between "On" and "Off" can be recorded. The duration is appended to the "Off" event text (format: <hhhh>h<mm>:<ss>). Times when the power has failed do not affect the duration. If the digital channel was "on" before the power failure and is still "on" when the power is restored, the duration continues to be counted. Picklist: **no**, yes	40080/000 to 40080/013
	Action Only for "Control input"	Set up the function of the control input. "Start recording": data are displayed/stored only if the input is active. "Screensaver on": display is switched off so long as the input is active. "Block setup": the setup can only be changed if a low signal is pending. "Block keyboard/navigator": the unit can only be operated if a low signal is pending. Otherwise all key activation and navigator actions are discarded. "Time synchronization": if the input is enabled (signal jump from low to high), the internal second counter is set to zero. The minute does not change if the second indicator is between 0 and 29. The minute is increased by one if the second indicator is between 30 and 59. ✎ Note! Use this function in conjunction with a master clock. All the units used in this way are synchronized. Signals measured on different units can thus be compared against one another on the same time basis. **"Change group":** you can either display a specific group or switch to the next active group. The system reacts to the Low —> High change. **"Set point monitoring on/off":** the complete set point monitoring function for the unit can be switched on (for High) or switched off (for Low) (e.g. during cleaning cycles). "Individual LV on/off": monitoring for a selected limit value can be switched on (for High) or switched off (for Low). "Start/stop analysis 1 – 4": all the active channels are analyzed as long as the control input is enabled, i.e. analysis based on the Min/Max/average values, amounts and totalization does not take place cyclically at fixed intervals. Analysis routines are controlled by this digital input. The analysis starts when the input is activated. The analysis is completed and saved when the input is deactivated. Measured value recording for the graphic display continues. Batches can also be started/finished via this function.	40085/000 to 40085/013
	Group Only for "Action - Change group"	Select the group which should be displayed in the event of a change from Low–>High. Alternatively, the next active group can be displayed. Picklist: **next group**, group x	40090/000 to 40090/013

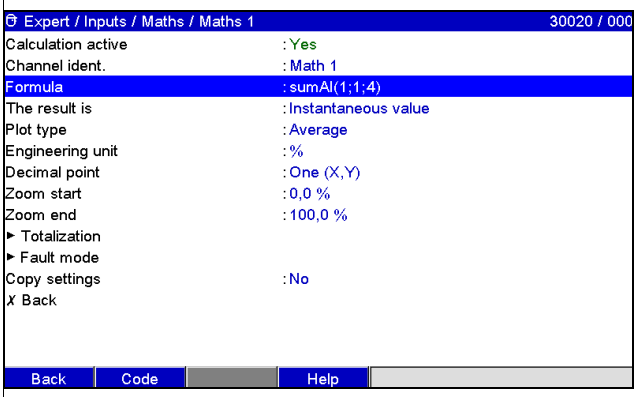
"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Set point Only for "Action – Individual LV on/off"	Select what limit value should be switched on and off by means of this control input. Picklist: **switched off**, set point x	40095/000 to 40095/013
	Totalizer Only for the "Pulse counter", "Operational time" and "Event + operation time" and "Quantity from time" functions.	Initial setting for the totalizer. Useful when continuing a measurement performed to date with an electromechanical counter. 12-character entry. **Factory setting: 0**	40100/000 to 40100/013
	Copy settings	Copies settings from actual channel to selected channel. The last two characters in the channel name of the target channel are replaced by the channel number. Note: makes unit setup easier if practically the same settings apply for several measuring points (e.g. several operation time counters).	40110/000 to 40110/013

Setup – Inputs, submenu: Mathematic (option)

Settings only required if measured values of the input signals are to be mathematically linked. Up to 8 mathematics channels can be used.

Note!
Depending on the selected function, the unit's user interface adapts itself, so that each time only parameters that are required for safe unit functioning have to be checked/set.

Note!
The descriptions of the operating items for optional application packages can be found in the additional Operating Instructions on the CD-ROM or as hardcopy (part of the scope of delivery).

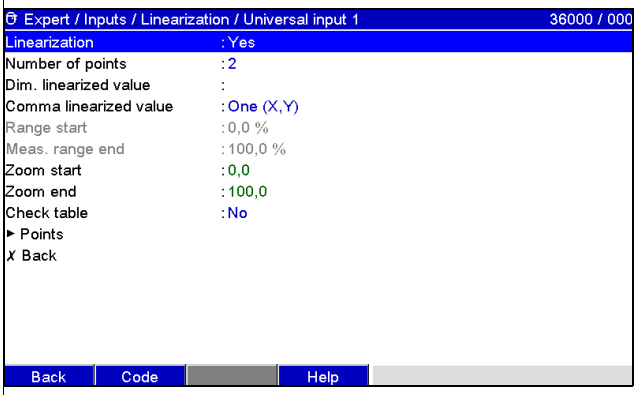
"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Maths, Maths 1 - 8	Configuration of the mathematics channels.		
			
	Fig. 42: Setup Inputs - Maths, "Maths 1" submenu		
	Calculation active	Switch the mathematics channel on or off. Picklist: yes, **no**	30000/000 to 30000/007
	Channel ident.	Name of the mathematics channel for identification purposes. 16-character entry. **Factory setting: maths x**	30005/000 to 30005/007
	Formula editor Is only displayed in the PC software supplied	The formula can be any combination of arithmetic calculations and logical operations. Analog and digital channels can be used, as can mathematics channels that are already active.	30015/000 to 30015/007
	Formula	Individual channels can be mathematically linked and calculated with functions. The mathematics channels calculated in this way are treated as "real" channels, regardless of whether they are connected conventionally of via fieldbus. Enter the desired formula for calculation. The formula can be any combination of arithmetic calculations and logical operations. Analog and digital channels can be used, as can mathematics channels that are already active. (See information in the Operating Instructions on the PC software supplied.)	30020/000 to 30020/007
	The result is	Specify what data type the calculation returns. This setting affects how the channel saves and is displayed. For example, if you add 2 analog channels, the result is an "instantaneous value". If, for example, you logically link 2 channels (Digital 1 AND Digital 2), the result is a "state" (on/off). Picklist: **instantaneous value**, state, counter, operating time, control input	30025/000 to 30025/007

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Action Only for "The result is – control input"	Set up the function of the control input. "Start recording": data are displayed/stored only if the input is active. **"Set point monitoring on/off":** the complete set point monitoring function for the unit can be switched on (for High) or switched off (for Low) (e.g. during cleaning cycles). "Individual LV on/off": monitoring for a selected limit value can be switched on (for High) or switched off (for Low). "Start/stop analysis 1 – 4": starts or stops external analysis (the analysis only runs if the signal is high). Measured value recording for the graphic display continues. ✎ Note! This function is not available for the "Batch" option!	30105/000 to 30105/007
	Set point Only for "Action – Individual LV on/off"	Select what limit value should be switched on and off by means of this control input. Picklist: **switched off**, set point x	30110/000 to 30110/007
	Plot type Only for "The result is – instantaneous value"	"Start/stop analysis 1 – 4": all the active channels are analyzed as long as the control input is enabled, i.e. analysis based on the Min/Max/average values, amounts and totalization does not take place cyclically at fixed intervals. Analysis routines are controlled by this digital input. The analysis starts when the input is activated. The analysis is completed and saved when the input is deactivated. Measured value recording for the graphic display continues. Batches can also be started/finished via this function.	30026/000 to 30026/007
	Engineering unit Only for "The result is – "Instantaneous value" or "Counter"	Unit of the calculated value, e.g. if several flow inputs are calculated together, the unit of the result can be entered here, e.g. m/h. 6–digit entry.	30045/000 to 30045/007
	Decimal point Only for "The result is – "Instantaneous value" or "Counter"	Number of places after decimal point for the display. Picklist: 0 to 5 number of places after the decimal point. This information is only used to better display the measured value. Factory setting: **one (X,Y)** e.g. measured value: 20.12348 l/s The display shows: None: 20 l/s One: 20.1 l/s Two: 20.12 l/s Three: 20.123 l/s Four: 20.1235 l/s Five: 20.12348 l/s ✎ Note! The value is rounded off where necessary.	30050/000 to 30050/007
	Zoom start Only for "The result is" – "Instantaneous value"	If the total value range is not being used then the lower value of the required range can be entered here. The zoom has no influence on the storage.	30055/000 to 30055/007
	Zoom end Only for "The result is" – "Instantaneous value"	As in "Zoom start". Enter the upper value of the required range here.	30060/000 to 30060/007
	Description ´H´ Only for "The result is – state"	Description of the status if the result is "HIGH". This text is both shown in the display and saved to memory. Factory setting: **on**	30065/000 to 30065/007
	Description ´L´ Only for "The result is – state"	Description of the status if the result is "LOW". This text is both shown in the display and saved to memory. Factory setting: **off**	30070/000 to 30070/007

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Event message Only for "The result is – state"	**"Do not acknowledge"**: no message is output if the status of the mathematics channel changes. "Acknowledge": an event message is displayed and has to be confirmed by pressing a button.	30075/000 to 30075/007
	Save event Only for "The result is – state"	Determines whether the condition change from low to high or high to low is stored in the event log. Note: increased memory capacity needed. Picklist: **yes**, no	30080/000 to 30080/007
	Event text L->H Can only be saved for "Event message – acknowledge" or "Save event – yes"	Description of condition change from low to high. Event text is stored (e.g. start filling). 22-character entry.	30085/000 to 30085/007
	Event text H->L Can only be saved for "Event message – acknowledge" or "Save event – yes"	Description of condition change from high to low. Event text is stored (e.g. stop filling). 22-character entry.	30090/000 to 30090/007
	Switches relay Only for "The result is – state"	Outputs the status of the mathematics channel on the selected relay. Picklist: **not used**, relay x (xx-xx) ✎ Note! If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup –> Outputs –> Relay –> Relay x".	30095/000 to 30095/007
	Submenu: Totalization Only for "The result is – instantaneous value"	Settings only required if the calculated value is to be integrated for calculating the volume for example. For analysis periods, see "Signal analysis".	
		Totalization Using the totalization function, the volume (in m) can be calculated from an analog signal (e.g. flow in m/h). Picklist: **no**, yes	34000/000 to 34000/007
		Totalization base Select the corresponding time base. Example: ml/s –> time base seconds (s); m/h –> time base hours (h). Picklist: **second (s)**, minutes (min), hour (h), day (d)	34005/000 to 34005/007
		Total. eng. unit Here, enter the unit for the volume determined by totalization (e.g. "m").	34010/000 to 34010/007
		Threshold value Specify how the device should execute low flow cut off. Picklist: **area around zero point**, absolute value	34015/000 to 34015/007
		Threshold value Analog values that are lower than the set threshold value (absolute value) are not integrated ("low flow cut off") User input: 6-digit; factory setting: **0**	34020/000 to 34020/007
		Calc. factor Factor for converting the integrated value (e.g. the transmitter returns l/s –> integration base = second –> desired unit is m –> enter 0.001 as the factor).	34025/000 to 34025/007
	Submenu: Fault mode Only in the Expert setup	Settings that specify how this channel behaves in the event of a fault (e.g. if an input channel has a cable open circuit or the system tries to divide by 0).	

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
		In the event of an error Specify the value/status the unit continues to work with if the result of the calculation is invalid. Picklist: last valid value, range start, meas. range end, zero, LOW, HIGH, free configuration, **value is invalid** ✎ Note! The picklist entries depend on the "The result is" option.	35000/000 to 35000/007
		Error value (Only if "In event of an error – free configuration" is selected.) The unit continues calculating with this value if a fault occurs. See table → Page 59	35005/000 to 35005/007
		Fault switches Switches the selected relay under fault conditions. The terminal numbers are shown in brackets. Picklist: **not used**, relay x (xx-xx) ✎ Note! If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup -> Outputs -> Relay -> Relay x".	35010/000 to 35010/007
	Copy settings	Copies settings from actual channel to selected channel.	30100/000 to 30100/007

Setup – Inputs, submenu: Linearization

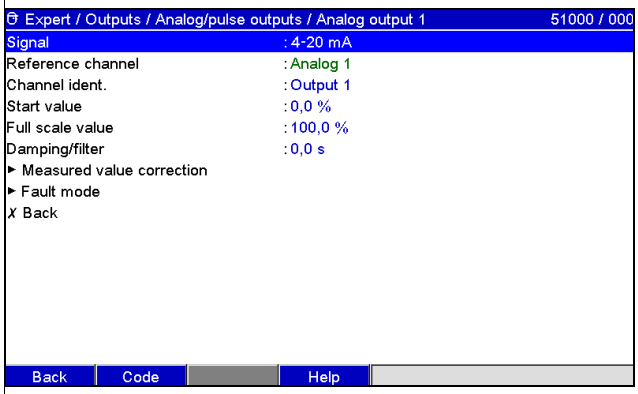
"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Linearization, universal input x	First select the analog input to be linearized. The "Linearization" menu item only appears for active analog inputs. ✎ Note! Only current and voltage inputs can be linearized.  *Fig. 43: Setup Inputs - Linearization, submenu "Universal input 1"*		
	Linearization	Specify whether this analog input should be linearized. Picklist: **no**, yes	36000/000 to 36000/015
	Number of points	Specify how many points your linearization table has. Note: the first and last points always have to be the start and end of the measuring range. Up to 32 points can be configured. Factory setting: **2 points**	36005/000 to 36005/015
	Dim. linearized value	Unit/dimension for the linearized value.	36010/000 to 36010/015
	Comma linearized value	Number of places after decimal point for the display. Picklist: 0 to 5 number of places after the decimal point. This information is only used to better display the measured value. Factory setting: **one (X,Y)** e.g. measured value: 20.12348 l/s The display shows: None: 20 l/s One: 20.1 l/s Two: 20.12 l/s Three: 20.123 l/s Four: 20.1235 l/s Five: 20.12348 l/s ✎ Note! The value is rounded off where necessary.	36015/000 to 36015/015
	Range start	The start of measuring range is displayed here. Fixed settings - cannot be changed.	36020/000 to 36020/015
	Meas. range end	The end of measuring range is displayed here. Fixed settings - cannot be changed.	36025/000 to 36025/015
	Zoom start	If the total transmitter range is not being used then the lower value of the required range can be entered here (higher resolution). Example: transmitter 0-14 pH, required range: 5-9 pH. Set up "5" here. The zoom has no influence on the storage.	36026/000 to 36026/015
	Zoom end	As in "Zoom start". Enter the upper value of the required range here. Example: transmitter 0-14 pH, required range: 5-9 pH. Enter "9" here.	36027/000 to 36027/015

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Edit table Only if operating via PC software	Edit the linearization table here.	36030/000 to 36030/015
	Check table	Here, you can check whether the linearization table has been entered correctly. Picklist: **no**, yes	36035/000 to 36035/015
	Submenu: Points x Number depends on the setting under "Number of points"	Enter the points for the linearization table here. Note: the first and last points always have to be the start and end of the measuring range. In the PC software, only the points can be viewed here. To change the points, use the "Edit table" function.	
		x-value x–value of the linearization (value that comes from the input of the unit). e.g. if 10 cm corresponds to 20 liters —> enter 10.	36100/000 to 36100/031
		y-value Here, enter the y–value the measured x–value corresponds to. e.g. if 10 cm corresponds to 20 liters —> enter 20.	36105/000 to 36105/031

6.4.3 Setup - Outputs

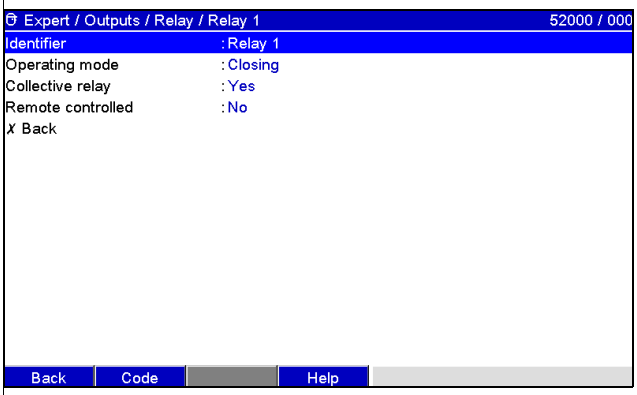
Settings only required if outputs (e.g. relays or analog outputs) are to be used.

Setup Outputs, submenu: Analog/pulse outputs, Analog output 1-2

"Outputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Analog/ pulse outputs, analog output x **Only for the "Digital card" option**	The unit optionally has 2 analog outputs. These work either as a current output or a pulse output. Settings only required if analog outputs are to be used. View or change the settings for the selected analog output channel.  *Fig. 44: Setup Outputs, submenu: Analog/pulse outputs, Analog output 1*		
	Signal	Select the output signal for this channel. Picklist: **switched off**, 4-20 mA, 0-20 mA, pulse output	51000/000 to 51000/001
	Reference channel	Select the input the analog output refers to. Picklist: **switched off**, analog x, digital x, maths x	51005/000 to 51005/001
	Channel ident.	User-definable name for this output. Factory setting: **Output x**	51010/000 to 51010/001
	Start value Only for signal "0/4-20 mA"	Specify what value corresponds to 0/4 mA. Factory setting: **0.0**	51025/000 to 51025/001
	Full scale value Only for signal "0/4-20 mA"	Specify what value corresponds to 20 mA. Factory setting: **100.0**	51030/000 to 51030/001
	Damping/filter Only for signal "0/4-20 mA"	Time constant of the first order low pass for the output signal. This is used to prevent large fluctuations in the output signal (can only be selected for the signal type 0/4 to 20 mA). Factory setting: **0.0 s**	51035/000 to 51035/001
	Pulse value Only for signal "Pulse output"	The pulse value is used to specify the volume an output pulse corresponds to (e.g. 1 pulse = 5 liters). Factory setting: **1 %**	51045/000 to 51045/001
	Pulse width Only for signal "Pulse output"	The pulse width limits the max. possible output frequency of the pulse output. Specify a fixed or dynamic pulse width. Picklist: **user-defined**, dynamic (max. 50 ms)	51050/000 to 51050/001
	Pulse width Only for signal "Pulse output"	Here, you can set the pulse width in the range from 0.5 to 1000 ms. Factory setting: **100 ms**	51055/000 to 51055/001

"Outputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Submenu: Measured value correction Only for signal "0/4-20 mA"	Here, you can correct the current value output (only required if the unit processing the values further cannot balance possible measurement section tolerances). Follow these instructions: 1. At the connected unit, read the value displayed in the lower and upper measuring range. 2. Enter the lower and upper target and actual value.	
		Lower correction value **Target value:** enter the target value here.	51200/000 to 51200/001
		Actual value: here, enter the lower actual value that is displayed at the connected unit.	51205/000 to 51205/001
		Upper correction value: **Target value:** enter the target value here.	51300/000 to 51300/001
		Actual value: here, enter the upper actual value that is displayed at the connected unit.	51305/000 to 51305/001
	Submenu: Fault mode Only for signal "0/4-20 mA"	Specify how the analog output should behave in the event of a fault (e.g. if the input channel has a cable open circuit).	
		Namur NE43 Switch outputting the 4 to 20 mA range as per NAMUR Recommendation NE 43 on and off. The following error ranges apply when NAMUR NE43 is switched on: ≤ 3.8 mA: under range ≥ 20.5 mA: overrange ≤ 3.6 mA or ≥ 21.0 mA: cable open circuit Picklist: off, **on**	51400/000 to 51400/001
		In the event of an error What value should the output assume in the event of an error (e.g. cable open circuit or calculated value invalid)? Picklist: last valid value, **range start**, meas. range end, 3.6 mA, 21 mA, free configuration	51405/000 to 51405/001
		Error value This value is output in the event of an error. Note: the value must be between 0 and 22 mA. See table → Page 59	51410/000 to 51410/001

Setup – Outputs, submenu: Relay

"Outputs" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Relay, relay x	Various relay settings (e.g. operating mode) The basic version of the unit has 6 relays. 6 additional relays are also available on the optional "Digital card". Setup for the selected relay:  *Fig. 45: Setup Outputs, submenu: Relay, relay 1*		
	Identifier	User-definable name for the relay. Factory setting: **relay x**	52000/000 to 52000/011
	Operating mode	Function of the relay: "Opening": the relay is closed in the quiescent state (maximum safety). **"Closing":** the relay is open in the quiescent state.	52005/000 to 52005/011
	Collective relay	"No": there can only be **one** reason for triggering the relay (if several trigger factors are assigned, the last trigger factor controls the relay) **"Yes":** the relay can be triggered by **several** factors (e.g. 2 different limit values) (OR logical operation).	52010/000 to 52010/011
	Remote controlled	Specify whether the relay can be controlled remotely (e.g. PC or SMS). Picklist: **no**, yes ✎ Note! Remote control by text message (SMS) is only possible for the "Telealarm" option. Remote-controlled relays may not be assigned to any other trigger factor (e.g. limit value alarm).	52015/000 to 52015/011

6.4.4 Setup - Application

Specify the various application-specific settings (e.g. limit values, signal grouping, text, softkeys, Web server, telealarm (option)).

Note!
Depending on the selected function, the unit's user interface adapts itself, so that each time only parameters that are required for safe unit functioning have to be checked/set.

Note!
The descriptions of the operating items for optional application packages can be found in the additional Operating Instructions on the CD-ROM or as hardcopy (part of the scope of delivery).

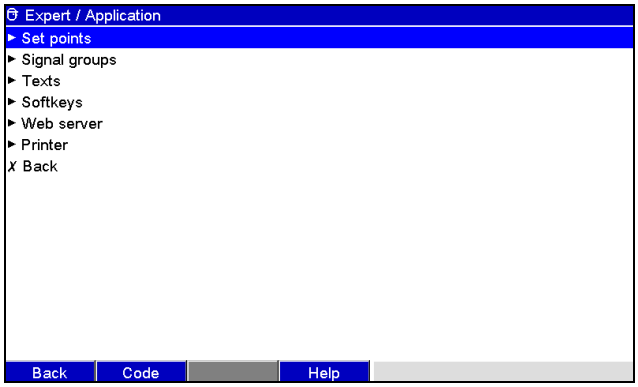


Fig. 46: Setup Application

"Application" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Set points	**Change set points**	Specify where the set points can be changed. If you select "Also in menu "Extras"", you can also change the set points in the Extras menu in addition to during the setup. Here, you can adapt your set points to suit the process even if the setup is locked. Note: this function can/should be protected by the set point code. Picklist: **only in the setup**, also in menu "Extras"	60000/000
Submenu: Set points, set point x	The measured values can be monitored for alarm set point violation. A relay can be switched or an event message displayed on violation. Channels can be individually assigned to the set points. View or change the setup for the selected alarm set point. Up to 100 set points can be monitored. Set points can also be changed outside the Setup menu, i.e. the user does not have to switch to the "Setup" menu. This increases the certainty that no other parameters are changed. Activate function: select "Main menu –> Setup –> Application –> Change set points: Also in menu "Extras"". If the user administration function is active, the user and the password also have to be entered with this setting before a set point can be changed.		

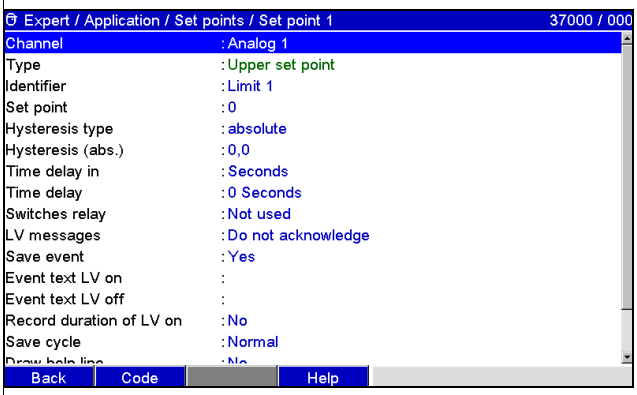
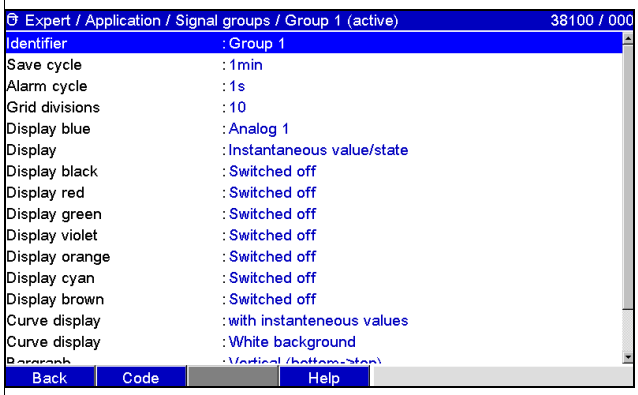


Fig. 47: Setup Application, submenu "Set points, Set point x"

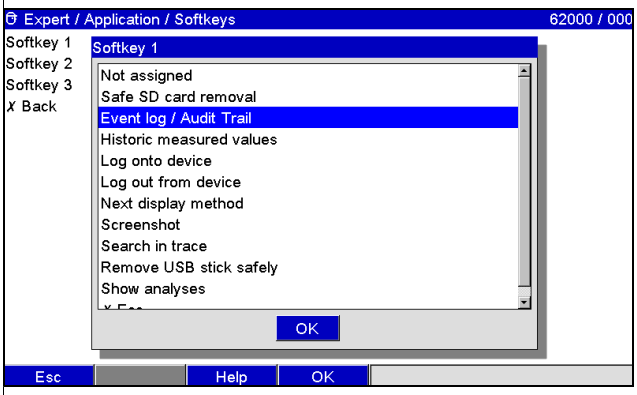
"Application" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Channel	Select the input the alarm set point refers to. Picklist: **switched off**, analog input x, digital input x, maths x	37000/000 to 37000/099
	Type	Type of alarm set point (dependent on the input signal): "Lower set point": analog signal drops below the set point. **"Upper set point"**: analog signal exceeds the set point. "Analysis 1-4": counter exceeds the set point. Note: the counters are reset cyclically to 0. "Gradient dy/dt": is used to monitor the change in the input signal over time. If the measured value changes too quickly, the alarm is triggered. The alarm stops when the gradient drops below the set value again. Note: pay attention to the settings in "Signal analysis"	37005/000 to 37005/099
	Identifier	Identifier of the set point. Factory setting: **Limit x**	37008/000 to 37008/099
	Range start Only for "Analog input x" with "Upper or lower set point"	The lower value of the set measuring range is displayed here.	37015/000 to 37015/099
	Meas. range end Only for "Analog input x" with "Upper or lower set point"	The upper value of the set measuring range is displayed here.	37020/000 to 37020/099
	Set point	Analog set point in the preset engineering unit, e.g. in °C, bar, etc.	37025/000 to 37025/099
	Signal change dy Only for the "Gradient dy/dt" type	Here, enter the value for the signal change to be detected as the set point.	37025/000 to 37025/099
	Time span dt Only for the "Gradient dy/dt" type	Time span within which the signal has to change by the specified value so it can be detected as a set point. Note: max. 60 seconds.	37030/000 to 37030/099
	Set point	Counter alarm set point in the engineering units set up, e.g. m, piece, ...	37035/000 to 37035/099
	Hysteresis type Only for the "Upper or lower set point" type	**"Percentual":** set hysteresis in %. "Absolute": enter hysteresis in the preset engineering unit (e.g. °C, bar, etc.)	37040/000 to 37040/099
	Hysteresis (%) Only for "Percentual" hysteresis type	The alarm condition is only canceled when the signal has changed into the normal operation range by the preset value. **Factory setting: 1.0%**	37045/000 to 37045/099
	Hysteresis (abs.) Only for "Absolute" hysteresis type	The alarm condition is only canceled when the signal has changed into the normal operation range by the preset value. **Factory setting: 0.0**	37050/000 to 37050/099
	Time delay in	Configure the engineering unit for entering the time delay. Picklist: **seconds**, minutes, hours	37054/000 to 37054/099
	Time delay	In order to be interpreted as an alarm the signal must exceed or undercut the preset value by at least the time set up. User input: **0** to 999	37055/000 to 37055/099

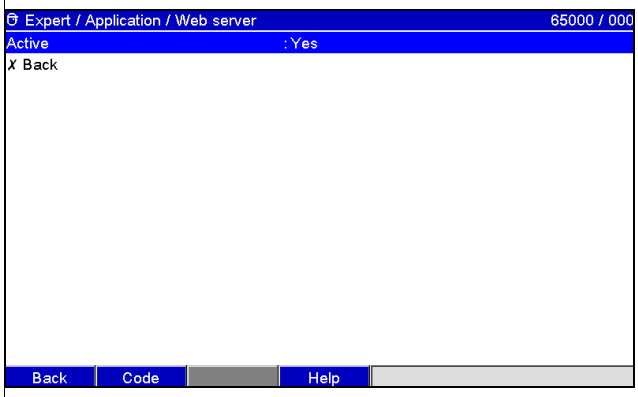
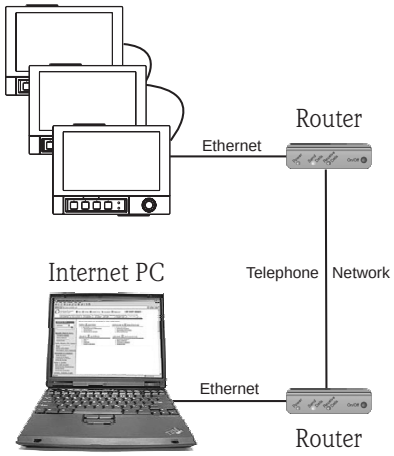
"Application" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Switches relay	Switches the respective relay in alarm condition. The terminal numbers are shown in brackets. Picklist: **not used**, relay x (xx-xx) ✎ Note! If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup -> Outputs -> Relay -> Relay x".	37060/000 to 37060/099
	LV messages	**"Do not acknowledge"**: the tag name is highlighted in red to signal an alarm condition (no message is output). "Acknowledge": in the event of an alarm, a message is also displayed and this message has to be acknowledged. ✎ Note! The screensaver is automatically disabled in the event of a limit value message!	37065/000 to 37065/099
	Save event	Stores a message in the event log on limit value violation. Picklist: no, **yes**	37070/000 to 37070/099
	Event text LV on	If the limit value is violated, this text (including date and time) is shown on the display and stored in the event log. Only available when "LV messages" is set to "Acknowledge" or "Save event" is set to "Yes". If no text is entered, the unit generates its own text (e.g. Analog 1 > 100%). 22-character entry.	37075/000 to 37075/099
	Event text LV off	The same as "Event text LV on", but on return from alarm to normal condition. 22-character entry.	37080/000 to 37080/099
	Record duration of LV on	The duration of the limit value violation can be recorded. The duration is appended to the limit value "Off" event text (format: <hhhh>h<mm>:<ss>). Times when the power has failed do not affect the duration. If the limit value was violated before the power failure and is still violated when the power is restored, the duration continues to be counted. Picklist: **no**, yes	37085/000 to 37085/099
	Reset relay	**"If LV no longer violated"**: the relay remains switched as long as the limit value is violated. "After acknowledging message": even if the limit value is no longer violated, the relay remains switched until the message has been acknowledged. If the limit value is still violated when the message is acknowledged, the relay remains switched until the limit value is no longer violated. "Until message is acknowledged": the relay remains switched until the message has been acknowledged or the limit value is no longer violated.	37090/000 to 37090/099
	Save cycle	**"Normal":** save in normal save cycle. "Alarm cycle": fast storage during an alarm violation, e.g. every second. Attention: requires higher memory capacity! The save cycles are set up in the menu "Signal groups".	37095/000 to 37095/099
	Draw help line	You can specify whether this limit value should be displayed in the graphic as a help line (in the color of the channel). Note: a maximum of 4 help lines can be displayed per group. Picklist: **no**, yes	37100/000 to 37100/099
	Copy settings	Copies the setup of the actual alarm set point into the selected alarm set points. Picklist: **no**, in set point x	37110/000 to 37110/099

"Application" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Signal groups, Group x	Various general settings for the measured value display of the unit, e.g. grid division, etc. Channels are only displayed and saved if they are assigned to a group. Group the analog, digital and/or mathematics channels in groups in such a way that you can call up all the important information during operation at the touch of a button (e.g. temperatures, signals in plant unit 1). Note! – Maximum 8 channels per group! – Channels can be assigned to several groups. – High-speed saving (100ms) is only available in Group 1. – A maximum of 10 groups can be formed.  *Fig. 48: Setup Application - Signal groups, "Group 1" submenu*		
	Identifier	Group identifier which is used by the PC software. Factory setting: **group x**	38100/000 to 38100/009
	Save cycle	Specify the save cycle for saving this group during normal operation (see also limit value / save cycle). Note: the save cycle is independent of the measured value display. Note! The recording length available changes depending on the save cycle set. Tables on the typical recording length are provided in the technical data. Picklist: off, 100ms, 1s, to **1min** to 1h	38105/000 to 38105/009
	Alarm cycle	Specify the save cycle for saving this group during an alarm condition (e.g. in the event of limit value violation). Picklist: off, 100ms, **1s**, to 1h	38110/000 to 38110/009
	Grid division	Indicates the number of lines ("amplitude grid") that should be displayed on the screen in the display mode "Curve". Example: display of 0 to 100%: select 10 divisions, display 0 to 14 pH: select 14 divisions. Picklist: logarithmic, 1, 2, to **10** to 20	38115/000 to 38115/009
	Min. decade Only if the grid division is "Logarithmic"	Set the decade as of which the display should be split. Picklist: **1**, 10, 100 to 10000000	38120/000 to 38120/009
	Max. decade Only if the grid division is "Logarithmic"	Set the decade up to which the display should be split. Picklist: 1, 10, 100, **10000** to 10000000	38125/000 to 38125/009
	Display blue	Color for displaying the assigned input. Note! Only the channels that were assigned to a group are saved. Channels can be assigned to several groups. However, these groups then have to have the same save cycle (except when the save and alarm cycle are set to "off"). Picklist: **switched off**, analog x, digital x, maths x	38130/000 to 38130/009

"Application" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Display	Please select what data from the selected channel should be displayed. Picklist: **instantaneous value/state**,... (depending on the channel settings)	38135/000 to 38135/009
	Display black	Color for displaying the assigned input. ✎ Note! Only the channels that were assigned to a group are saved. Channels can be assigned to several groups. However, these groups then have to have the same save cycle (except when the save and alarm cycle are set to "off"). Picklist: **switched off**, analog x, digital x, maths x	38140/000 to 38140/009
	Display	Please select what data from the selected channel should be displayed. Picklist: **instantaneous value/state**,... (depending on the channel settings)	38145/000 to 38145/009
	Display red	Color for displaying the assigned input. ✎ Note! Only the channels that were assigned to a group are saved. Channels can be assigned to several groups. However, these groups then have to have the same save cycle (except when the save and alarm cycle are set to "off"). Picklist: **switched off**, analog x, digital x, maths x	38150/000 to 38150/009
	Display	Please select what data from the selected channel should be displayed. Picklist: **instantaneous value/state**,... (depending on the channel settings)	38155/000 to 38155/009
	Display green	Color for displaying the assigned input. ✎ Note! Only the channels that were assigned to a group are saved. Channels can be assigned to several groups. However, these groups then have to have the same save cycle (except when the save and alarm cycle are set to "off"). Picklist: **switched off**, analog x, digital x, maths x	38160/000 to 38160/009
	Display	Please select what data from the selected channel should be displayed. Picklist: **instantaneous value/state**,... (depending on the channel settings)	38165/000 to 38165/009
	Display violet	Color for displaying the assigned input. ✎ Note! Only the channels that were assigned to a group are saved. Channels can be assigned to several groups. However, these groups then have to have the same save cycle (except when the save and alarm cycle are set to "off"). Picklist: **switched off**, analog x, digital x, maths x	38170/000 to 38170/009
	Display	Please select what data from the selected channel should be displayed. Picklist: **instantaneous value/state**,... (depending on the channel settings)	38175/000 to 38175/009
	Display orange	Color for displaying the assigned input. ✎ Note! Only the channels that were assigned to a group are saved. Channels can be assigned to several groups. However, these groups then have to have the same save cycle (except when the save and alarm cycle are set to "off"). Picklist: **switched off**, analog x, digital x, maths x	38180/000 to 38180/009

"Application" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Display	Please select what data from the selected channel should be displayed. Picklist: **instantaneous value/state**,... (depending on the channel settings)	38185/000 to 38185/009
	Display cyan	Color for displaying the assigned input. ✎ Note! Only the channels that were assigned to a group are saved. Channels can be assigned to several groups. However, these groups then have to have the same save cycle (except when the save and alarm cycle are set to "off"). Picklist: **switched off**, analog x, digital x, maths x	38190/000 to 38190/009
	Display	Please select what data from the selected channel should be displayed. Picklist: **instantaneous value/state**,... (depending on the channel settings)	38195/000 to 38195/009
	Display brown	Color for displaying the assigned input. ✎ Note! Only the channels that were assigned to a group are saved. Channels can be assigned to several groups. However, these groups then have to have the same save cycle (except when the save and alarm cycle are set to "off"). Picklist: **switched off**, analog x, digital x, maths x	38200/000 to 38200/009
	Display	Please select what data from the selected channel should be displayed. Picklist: **instantaneous value/state**,... (depending on the channel settings)	38205/000 to 38205/009
	Curve display	The current instantaneous values are displayed with the measured value curves as standard. Alternatively, this instantaneous value display can also be hidden. As a result, more data can be shown on the display. Picklist: no instantaneous values, **with instantaneous values**	38210/000 to 38210/009
	Curve display	Specify the background color for the curve display. Picklist: **white background**, black background	38215/000 to 38215/009
	Bar graph	Specify the direction in which the bar graphs should be drawn. Picklist: **vertical (bottom->top)**, vertical (top->bottom), horiz. (left->right), horiz. (right->left), centered/vertical, centered/horiz.	38220/000 to 38220/009
	Submenu: Circular chart	Setting for the circular chart.	
		1 revolution = Specify how long it takes for the circular chart to be completely written to once (one complete revolution). Note: the unit always only shows 1/4 of the chart. Picklist: **1 hour** to 8 hours, 1 day to 7 days	38500/000 to 38500/009
Submenu: Texts	Settings only required if you want to save text for subsequent reporting. Here, specify the text that can be saved in the event log during operation. Up to 30 different texts with a maximum of 22 characters each can be entered.		
	Text 1 - 30	Create or change the text here.	61001/000 to 61030/000

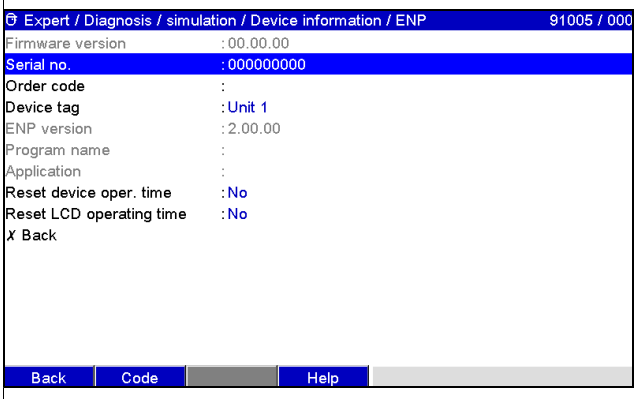
"Application" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Softkeys	You can specify the function assigned to softkeys 1 to 3 of the unit.		
			
	Fig. 49: Setup Application, Softkeys submenu		
	Softkey 1 **Softkey 2** **Softkey 3**	Specify what function should be assigned to this softkey. Picklist: – Not assigned – Safe SD card removal - Event log/audit trail – Historic measured values – Log onto device – Log out from device – Next display method – Screenshot – Search in trace – Remove USB stick safely – Show analyses	62000/000 62005/000 62010/000

"Application" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Web server	Setup for operation of the unit as a Web server. Instantaneous values can be read off using an Internet Browser, e.g. MS Internet Explorer. **Call: http://<IP address>** You can find the IP address of the device under "Setup -> System -> Communication -> Ethernet". A fixed IP address is required! Caution! Do not enter any leading zeros in the IP address! You can specify that the page should be automatically refreshed by calling up "http://<IP address>/ web?refresh=x". (Note: x refers to the refresh interval in seconds e.g. http://10.55.81.109/web?refresh=20)  *Fig. 50: Setup Application, submenu Webserver* **Using a Web server to remotely monitor process values** The unit is equipped with an integrated Web server. This makes it possible for the user to display the instantaneous values in a standard Web browser, such as Internet Explorer or Firefox, on a PC. A maximum of 4 users can access the unit simultaneously via the Web server. Note! The port "80" must be enabled at the firewall of the Internet PC. Please contact your system administrator! A physical Web link must be established via LAN or Internet to display the values on the Web browser of a PC:  *Fig. 51: Remote monitoring with Web browser*		
	Active	Switch the Web server function on or off (= factory default). The instantaneous values can only be displayed by means of an Internet browser when the Web server is active. Note! Only possible using the Ethernet interface! Picklist: **no** (off), yes (on)	65000/000

"Application" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Printer	Printer settings ✎ Note! Only relevant if a printer is directly connected to the device.		
	Color printer	Please set up if you´re using a black and white or a color printer. Picklist: **Yes (=color printer)**, No (=b/w printer)	67025/000
	Paper size	Please select the paper format of your printer. Picklist: **DIN A4**, US Letter	67000/000
	Fault switches	You can switch a relay if an error occurred when printing out. The relay remains switched until the printer is ready again or the device is restarted. Picklist: **not used**, relay x (xx-xx) ✎ Note! If there are several reasons for triggering a relay (e.g. 2 different limit values), this must be set to "Collective relay" under "Setup –> Outputs –> Relay –> Relay x".	67005/000

6.4.5 Expert - Diagnosis/Simulation

Unit information and service functions for a swift unit check.

"Expert" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
Submenu: Diagnosis/ Simulation, Device information/ENP	Displays important device information.  *Fig. 52: Expert, submenu: Diagnosis/Simulation, Device information/ENP*		
	Firmware version	Displays the firmware version of the unit. Cannot be changed. Please quote if you have any questions on the unit.	91000/000
	Serial No.	Displays the serial number of the unit. Please quote if you have any questions on the unit. ✎ Note! Only appears once the service code has been entered!	91005/000
	Order code	Displays the order code of the unit. Please quote if you have any questions on the unit. ✎ Note! Only appears once the service code has been entered!	91010/000

"Expert" menu items	Configurable parameters (factory settings are highlighted in bold)		Direct access code
	Device tag	Individual unit identifier (max. 22 characters).	91015/000
	ENP version	Displays the ENP (electronic name plate) version of the unit. Cannot be changed. Please quote if you have any questions on the unit.	91020/000
	Program name	Displays the program name of the unit. Cannot be changed. Please quote if you have any questions on the unit.	91025/000
	Application	Displays the installed application packages of the unit. Cannot be changed. Please quote if you have any questions on the unit.	91030/000
	Reset device oper. time	Resets the unit operating time to 0 hours. Picklist: **no**, yes ✎ Note! Only appears once the service code has been entered!	91035/000
	Reset LCD operating time	Resets the LCD operating time to 0 hours. Picklist: **no**, yes ✎ Note! Only appears once the service code has been entered!	91040/000
Submenu: Diagnosis / Simulation, Simulation	Settings for the simulation mode. ✎ Note! If required, use the "Signal analysis- Reset to zero" function, so that the values of the simulated signals do not corrupt your true minima/maxima/quantities after switching back to normal operation. If the previous signals are still needed, save them on the SD card beforehand.		
	"Normal operation": the unit records the connected measuring points. "Simulation": instead of operating with the real measurement points connected, the signals are simulated (using the actual settings).		92000/000

6.5 Use during operation - the "Extras" menu

Call up the "Extras" menu by pressing softkey 4:

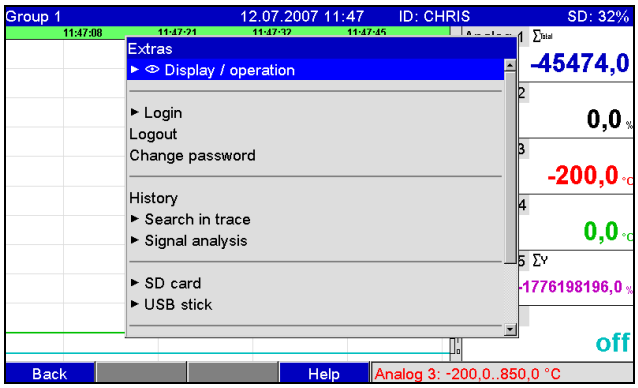


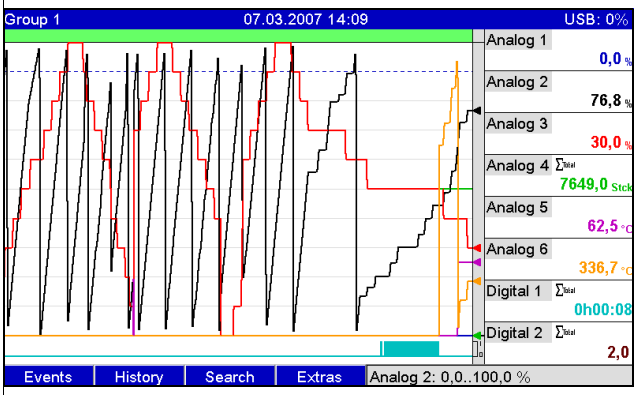
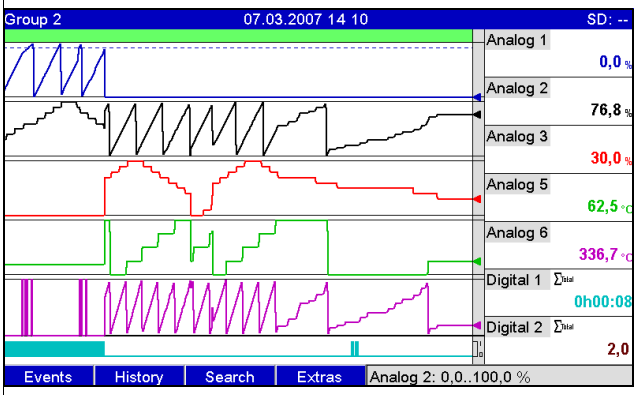
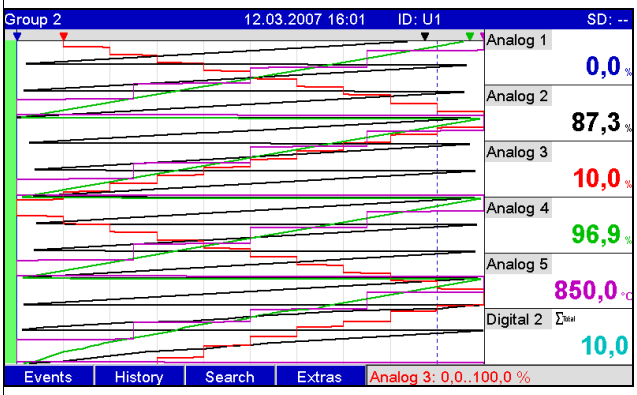
Fig. 53: "Extras" menu

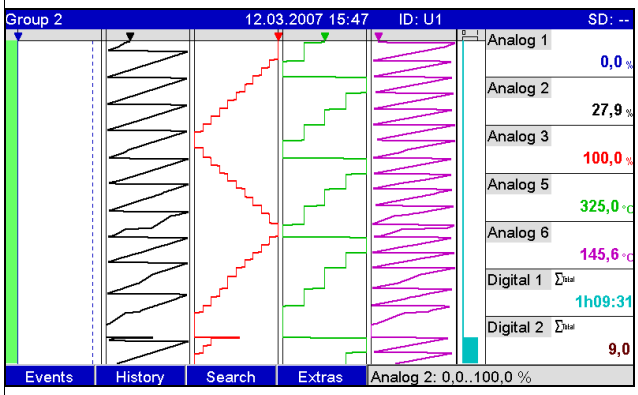
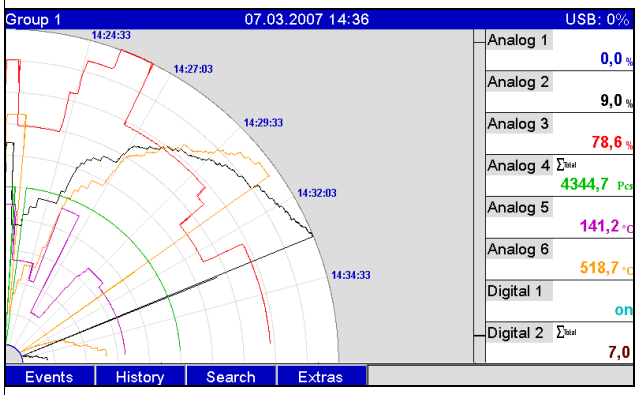
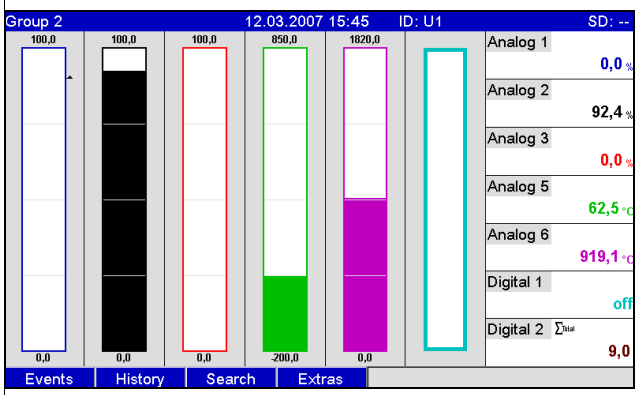
6.5.1 Extras - Display/operation

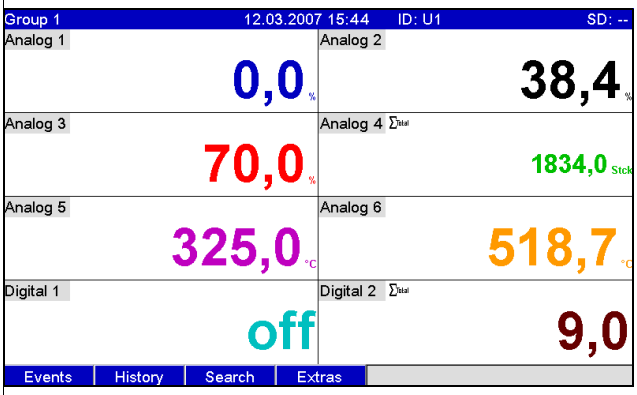
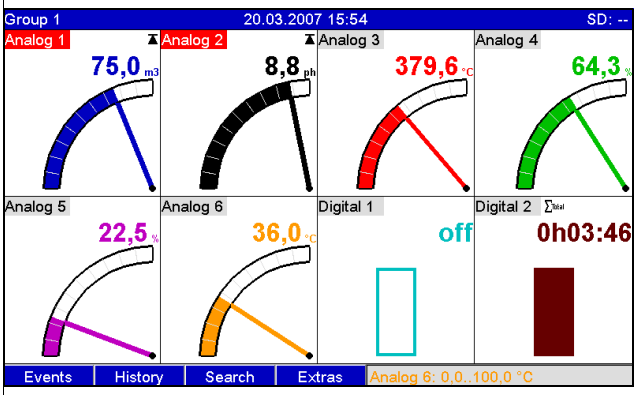
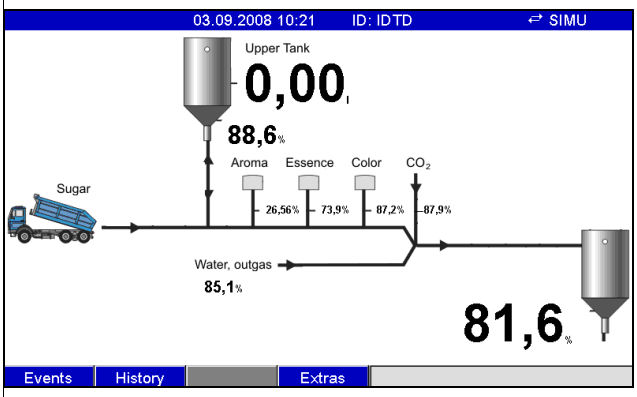
Changes the display mode, e.g. curve display, bar graph, digital display or event list. The various display modes have no influence on the signal recording. You can also call up the menu in the main menu. To do so, press the navigator.

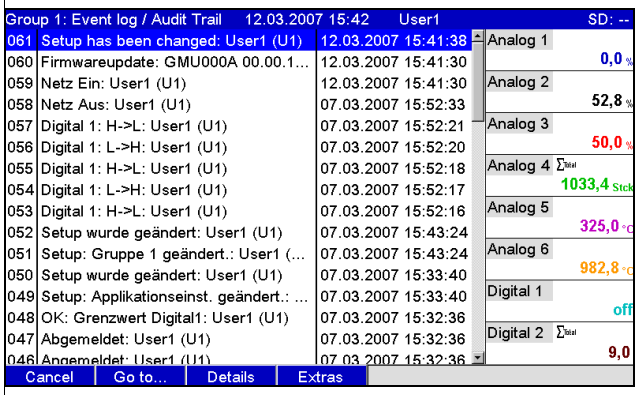
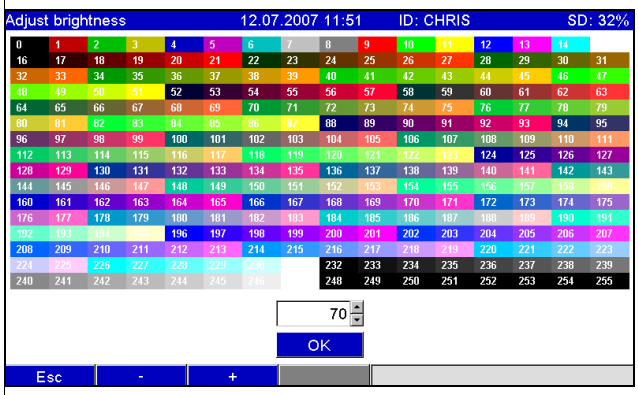
Note!
You can switch directly between the various active groups by turning the navigator "counterclockwise" or "clockwise".

Fig. 54: "Extras" menu, display/operation

"Extras" menu items, submenu: Display/operation	Description
Change group	Select the group which should be displayed. Note: only the active groups are displayed. Picklist: group 1 – x
Curve	All channels are displayed over the total width. Maximum resolution in upscale direction. All the channels in a group are displayed horizontally (from right to left).  *Fig. 55: Curve display*
Curve in ranges	All the channels in a group are displayed horizontally (from right to left). Each channel is displayed in its own chart zone. Accuracy of the plot is not influenced in this display mode.  *Fig. 56: Curve in ranges*
Waterfall	All the channels in a group are displayed vertically (from top to bottom).  *Fig. 57: Waterfall*

"Extras" menu items, submenu: Display/operation	Description
Waterfall in ranges	All the channels in a group are displayed vertically (from top to bottom). Each channel is displayed in its own chart zone. Accuracy of the plot is not influenced in this display mode.  *Fig. 58: Waterfall in ranges*
Circular chart	All the channels in a group are displayed as a 1/4-circular chart.  *Fig. 59: Circular chart*
Bar graph	Display of the active analog measured values as bar graphs including values. The digital input is displayed as a status or counter/operating time counter.  *Fig. 60: Bar graph*

"Extras" menu items, submenu: Display/operation	Description
Digital display	Display of the active analog measured values as digital values. The digital input is displayed as a status or counter/ operating time counter.  *Fig. 61: Digital display*
Instrument display	All the analog channels in a group are displayed as analog instruments. The digital input is displayed as a status or counter/operating time counter.  *Fig. 62: Instrument display*
Process-related graphic	A process-related graphic created by the user can be displayed at the device including the instantaneous values. This display method is only available if a process-related graphic is stored. The process-related graphic can be transferred to the device using an SD card or a USB stick (Extras -> SD card or USB stick -> Process-related graphic).  *Fig. 63: Example of process-related graphic*

"Extras" menu items, submenu: Display/operation	Description
Event log/audit trail	Events such as alarm set point infringement and power failure are listed in the correct time sequence.  *Fig. 64: Event log/audit trail*
Adjust brightness	Here, you can adjust the brightness of the display.  *Fig. 65: Adjust brightness*

6.5.2 Extras - Login

The user can log in here. A list with all the permitted users is displayed. Select your user ID to log on. Then you are asked to enter your password. Function only visible if the option "Protected by: FDA 21 CFR Part 11" is selected under "Main menu –> Setup –> System –> Security (direct access code: 18000/000).

6.5.3 Extras - Logoff

Log off the user currently logged on. Function only visible if the option "Protected by: FDA 21 CFR Part 11" is selected under "Main menu –> Setup –> System –> Security (direct access code: 18000/000), and a user is logged on.

6.5.4 Extras - Change password

The user password can be changed here. Pay attention to the rules for passwords. Function only visible if the option "Protected by: FDA 21 CFR Part 11" is selected under "Main menu –> Setup –> System –> Security (direct access code: 18000/000), and a user is logged on.

6.5.5 Extras - History (scrolling through saved measured values)

You can scroll through the saved measured values here. Turn the navigator clockwise or counterclockwise to scroll back and forth between the measured value curves. You can change the speed with softkey 3 (slow "<" to fast "<<<<"). This function can also be called up in the instantaneous value display mode during ongoing operation by pressing softkey 2 "History". To go back to the instantaneous value display mode, press softkey 1 "Esc".

Note!
The gray header indicates that historical values are being displayed (this header is blue during instantaneous value display):

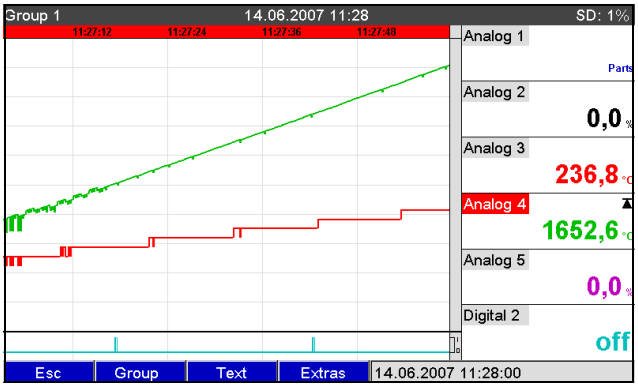


Fig. 66: Extras "History"

Note!
- If no key has been pressed for 5 minutes, the unit automatically returns to normal operation.
- With extreme configurations, loading and scrolling can take a very long time (e.g. if save cycle Group 1 "100ms", Groups 2 to 9 "1s" and Group 10 "1h"). The unit cannot be operated during the loading procedure.
- Only the data of the current configuration (after a setup change) can be accessed at the unit.

Subsequent reporting

Under "Store text", comments can be entered on the specific time selected by pressing softkey 4 "Extras". The date and time are automatically taken from the history value. A predefined text can be selected or a new text can be entered (see "Setup –> Application –> Text). These texts are stored in the event log/audit trail.

Note!
When user administration is activated ("Setup –> System –> Security –> Protected by: "FDA 21 CFR Part 11"), this function is only available if a user is logged on and this user has the necessary rights.

Zoom

In the history display, a larger time range can be configured by pressing softkey 4 "Extras" under "Zoom".
Picklist:
"1:1": Every measured value is displayed.
"1:n": Only every nth measured value is displayed.

Note!
- The zoom function is only available for the following display modes: Curves, Curve in ranges, Waterfall, Waterfall in ranges.
- The zoom value has to be configured separately for every group and display mode.
- No interpolation is performed, nor is the mean value determined.
- If the value for "n" is large, this can result in extended loading times.
- The zoom value does not affect the process for storing the measured value.

6.5.6 Extras - Search in trace

Search for events or times in the internal memory.

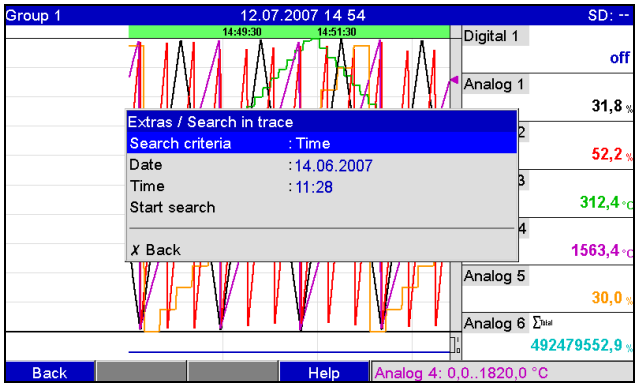


Fig. 67: Extras "Search in trace"

"Search in trace" menu items	Description (factory settings are highlighted in bold)
Search criterion	You can search for a specific time or event in the memory. When you are searching by **"Time"** this point is shown in the graphic. When you are searching by "Events", the ones found are displayed as a list.
Date **Only when searching by "Time"**	Enter the required date. **Default value: today's date**
Time **Only when searching by "Time"**	Enter the required time. **Default value: current time**
Search filter **Only when searching by "Events"**	For a better overview a search can be conducted looking for specific events (e.g. only setup changes). In the standard all events are shown. Picklist: **all events**, alarm limit violation, on/off events, setup change, power on/off, service, external memory, user administration, acknowledging messages, miscellaneous
Start search	Start search with setup parameters

Search result when "Searching by time":

The time you are searching for appears as a curve on the display shortly after the search is started. Turn the navigator clockwise or counterclockwise to scroll back and forth between the measured value curves. You can change the speed with softkey 3 (slow "<" to fast "<<<<"). This function can also be called up in the instantaneous value display mode during ongoing operation by pressing softkey 3 "Search". To go back to the instantaneous value display mode, press softkey 1 "Esc".

Note!
The gray header indicates that historical values are being displayed (this header is blue during instantaneous value display):

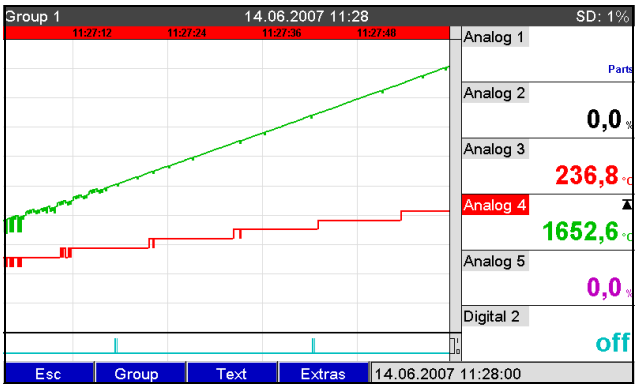


Fig. 68: Extras "Search in trace" - Search results

Subsequent reporting

Under "Store text", comments can be entered on the specific time selected by pressing softkey 4 "Extras". The date and time are automatically taken from the search result. A predefined text can be selected or a new text can be entered (see "Setup –> Application –> Text). These texts are stored in the event log/audit trail.

Note!
When user administration is activated ("Setup –> System –> Security –> Protected by: "FDA 21 CFR Part 11"), this function is only available if a user is logged on and this user has the necessary rights.

Zoom

In the history display, a larger time range can be configured by pressing softkey 4 "Extras" under "Zoom".
Picklist:
"1:1": Every measured value is displayed.
"1:n": Only every nth measured value is displayed.

Note!

- The zoom function is only available for the following display modes: Curves, Curve in ranges, Waterfall, Waterfall in ranges.
- The zoom value has to be configured separately for every group and display mode.
- No interpolation is performed, nor is the mean value determined.
- If the value for "n" is large, this can result in extended loading times.
- The zoom value does not affect the process for storing the measured value.

Search result when "Searching by results":

The search results appear in a list on the display shortly after the search is started:

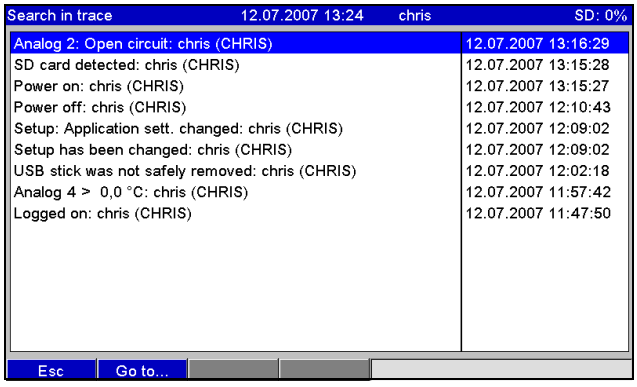


Fig. 69: Extras "Search by events" - events list

6.5.7 Extras - Signal analysis

Displays the analyses stored in the device.

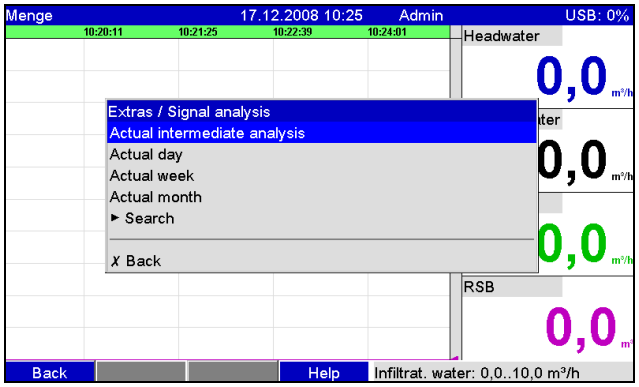


Fig. 70: Extras "Signal analysis"

"Signal analysis" menu items	Description (factory settings are highlighted in bold)	
Analysis 1-4	You can display the current analysis here (i.e. the analysis that is currently ongoing). Note! This option can only be selected if settings were made under "Setup -> System -> Signal analysis".	
Submenu "Search"	Searching and displaying analyses.	
	Kind	Select what analyses the system should search for/display. Picklist: analysis 1-4
	Start search	Start search with setup parameters

6.5.8 Extras - SD card or USB stick

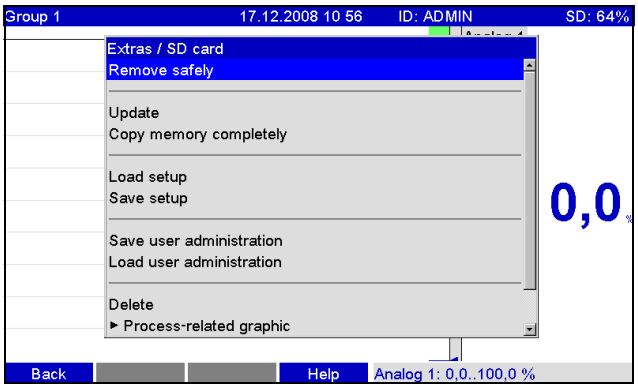


Fig. 71: Extras "SD card" or "USB stick"

Functions for measured data storage and unit setup on SD card or USB stick. The following functions are possible:

Menu items "SD card" or "USB stick"	Description	
Remove safely	In order to ensure safe removal of the data carrier from the unit, all internal access is ended. You will receive a message when the data carrier can be safely removed. ✎ Note! Remove the SD card within 5 minutes otherwise the unit will start to automatically store data onto the card again. Only remove the data carrier using this function as otherwise data can be lost!	
Update	Data that have not been transferred to the data carrier are now stored. Please be patient! Measured value recording continues in parallel and has the highest priority. Note: you can store data from multiple units onto one data carrier.	
Copy memory completely	The content of the internal memory is completely copied to the data carrier. Please be patient! Measured value recording continues in parallel and has the highest priority. Note: you can store data from multiple units onto one data carrier.	
Submenu "Copy time frame"	A time range you defined can be saved on the USB stick. ✎ Note! Function not available with SD card.	
	Date "from"	Enter the date as of which you want to copy data to the USB stick.
	Time "from"	Enter the time as of which you want to copy data to the USB stick.
	Date "until"	Enter the date up until which you want to copy data to the USB stick.
	Time "until"	Enter the time up until which you want to copy data to the USB stick.
	Save as	**"Protected format"**: all the data are stored in a way that protects them from data manipulation. They can only be interpreted by our PC program. "Open format": the data are stored in CSV format. This can be opened by a number of different programs (caution: no manipulation protection).
	Start copying process	Save the data of the selected time frame on the USB stick.
Load setup	Loads unit parameters (setup) from the data carrier into the internal nonvolatile memory of the unit. The file has the extension .rpd.	
Save setup	All unit parameters (setup) are copied to the data carrier. They can be archived and used for other units. The file has the extension .rpd.	
Save user administration	Saves all the settings and user accounts to the data carrier. The file has the extension .ids.	

Menu items "SD card" or "USB stick"	Description	
Load user administration	Loads all the settings and user accounts from the data carrier. The file has the extension .ids. Caution! All the existing settings/accounts are overwritten!	
Screenshot	Save the current measured value display as a bitmap on the SD card or on the USB stick.	
Submenu "Process-related graphic"	Load, export or delete process-related graphics. Note! Process-related graphics have to be created on a PC. Please pay attention to the information provided in → Chap. 6.6.7, Page 105.	
	Group	Select the group for which the action should be executed. Note! A process graphic can only be loaded if the corresponding group was configured beforehand.
	Load	Loads a process-related graphic from an external memory medium to the device memory. Note! Function is only possible if an appropriate bitmap (bmp) is on the data carrier. The process-related graphic can then be edited in the "Process-related graphic editor" context menu (→ Page 107).
	Export	Saves the process-related graphic available in the device to the external memory medium to transfer the graphic to another device.
	Delete	Deletes the selected process-related graphic from the memory.
Delete **Only with SD card**	Deletes all the data generated by the device that are on the SD card. Note! If a release code has been set up then the SD card can only be deleted after this code has been entered. When the user administration function is active, this action can only be performed by the administrator.	

Without affecting the internal memory, data packages are copied block-by-block to the data carrier. Tests are also made to determine whether the data have been written onto the data carrier without any errors. The same happens when storing the data on the PC with the associated PC software.

Note!

- Before removing the data carrier, select "Update". The current data block is closed and saved to the data carrier. This ensures that all current data (until the last save) are included on the data carrier.
- You are informed before the data carrier is 100 % full. This is achieved by an acknowledgeable message on the display, which indicates that the data carrier being written to needs changing (only for "Stack memory" ext. save mode, not for "Ring memory FIFO".) In addition, a relay can be switched.
- Your unit knows which data have already been copied onto the data carrier. Should you ever forget to change the data carrier in time (or if no data carrier has been inserted), the new data carrier is filled with the missing data from the internal memory – in as far as the data are still available there.
- Since measured value acquisition/registration has highest priority, it can take some minutes until the contents of the internal memory are copied onto the data carrier.
- If a user is accessing the SD card or the USB stick, the LED lights up. During this time, the data carrier should not be removed.

6.5.9 Extras – Store text

Save the text comments ("subsequent reporting") for a specific time. After entering the desired date and time, a predefined text can be selected or a new text can be entered (see "Setup –> Application –> Text). These texts are stored in the event log/audit trail.

Note!
When user administration is activated ("Setup –> System –> Security –> Protected by: "FDA 21 CFR Part 11"), this function is only available if a user is logged on and this user has the necessary rights.

6.5.10 Extras - Printout

If a printer is connected to the device, device settings, events and measured values can be printed out here.

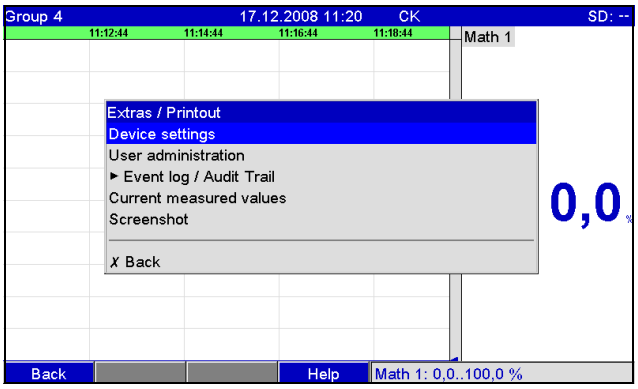


Fig. 72: Extras "Printout"

"Printout" menu items	Description (factory settings are highlighted in bold)	
Device settings	For printing out device settings (incl. date/time).	
User administration	All the user administration data are printed out. Note! Passwords are not visible. When user administration is activated ("Setup –> System –> Security –> Protected by: "FDA 21 CFR Part 11"), this function is only available if a user is logged on and this user has the necessary rights.	
Submenu "Event log/audit trail"	Print out event log/audit trail.	
	Search filter	For a better overview a search can be conducted looking for specific events (e.g. only setup changes). Picklist: **all events**, alarm limit violation, on/off events, setup change, power on/off, service, external memory, user administration, acknowledging messages, miscellaneous
	From	Enter the time as of which the events should be printed out. Entry: date
	From	Enter the time as of which the events should be printed out. Entry: time
	To	Enter the time up to which the events should be printed out. Entry: date
	To	Enter the time up to which the events should be printed out. Entry: time
	Print	Start printing.

"Printout" menu items	Description (factory settings are highlighted in bold)
Current measured values	Print out instantaneous measured values (all active channels).
Screenshot	Print out current measured value display (screenshot).

6.5.11 Extras - Screenshot

Save the current measured value display as a bitmap on the SD card or the USB stick.

Note!
This function is not available if no SD card or USB stick is plugged into the unit. If an SD card and a USB stick is plugged into the unit, the screenshot is only saved onto the USB stick.

6.5.12 Extras - Set points

Here, you can change set points during operation. In this way, the set points can be changed outside the actual setup. The advantage is that all the other parameters cannot be changed in this way. A list with all the set points currently set is displayed. To change a limit value, select the desired limit value from the list. Function is only visible if "Also in menu Extras" is selected under in "Main menu -> Setup -> Application -> Change set points.

Note!
When user administration is activated ("Setup –> System –> Security –> Protected by: "FDA 21 CFR Part 11"), this function is only available if a user is logged on and this user has the necessary rights.

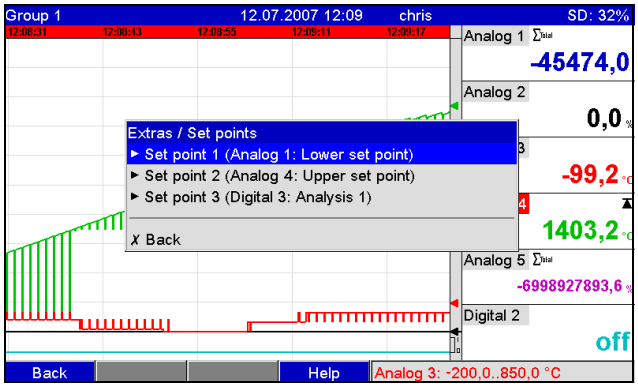


Fig. 73: Extras "Set points"

"Set points" menu items	Configurable parameters (factory settings are highlighted in bold)	
Submenu: Set point x	This is used to change the set point during operation.	
	Channel	Displays the channel assigned to the set point selected. Cannot be changed.
	Type	Displays the type assigned to the set point selected (e.g. upper set point). Cannot be changed.
	Range start Only with analog channels	Displays the start of measuring range for the selected channel. Cannot be changed.
	Meas. range end Only with analog channels	Displays the end of measuring range for the selected channel. Cannot be changed.
	Set point Only with analog channels	Enter the analog set point in the preset engineering unit, e.g. in °C, bar, etc.
	Time span dt Only for the "Gradient dy/dt" type	Time span within which the signal has to change by the specified value so it can be detected as a set point. Note: max. 60 seconds.
	Set point Only with digital channels	Enter the counter alarm set point in the engineering unit set up, e.g. m, piece, etc.

6.6 Use during operation - the main menu

Call up the main menu by pressing the navigator:

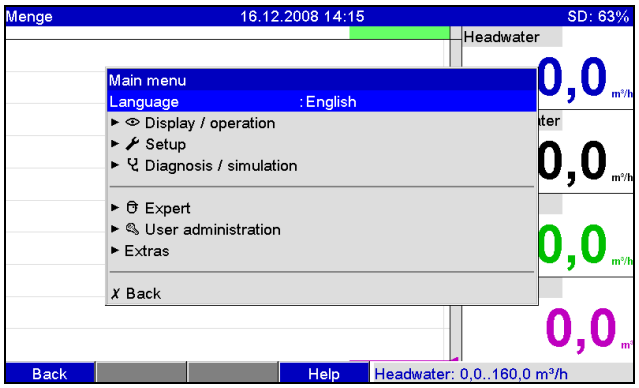


Fig. 74: Main menu

6.6.1 Main menu - Language

The default setting for the operating language is English. A different operating language can be configured here.

6.6.2 Main menu - Display/operation

Changes the display mode, e.g. curve display, bar graph, digital display or event list. The various display modes have no influence on the signal recording. You can also launch the menu under "Extras" (descriptions, → Page 84).

6.6.3 Main menu - Setup

Start the setup. Note: the most common/important operation items can be configured in this setup (quick setup). Special settings can also be made via "Expert". (→ Chap. 6.4).

6.6.4 Main menu - Diagnosis/simulation

Unit information and service functions for a swift unit check.

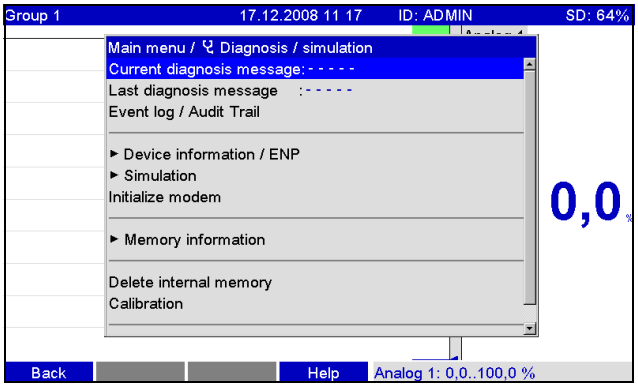


Fig. 75: Main menu, submenu: Diagnosis/simulation

"Diagnosis/ Simulation" menu items	Configurable parameters (factory settings are highlighted in bold)	
Current diagnosis message	Displays the current diagnosis message.	
Last diagnosis message	Displays the last diagnosis message.	
Diagnosis list	All the diagnosis messages pending are output. ✎ Note! Only visible if diagnosis messages are present.	
Event log/audit trail	Events such as alarm set point infringement and power failure are listed in the correct time sequence.	
Submenu: device information/ENP	Displays important device information.	
	Firmware version	Displays the firmware version of the unit. Cannot be changed. Please quote if you have any questions on the unit.
	Serial No.	Displays the serial number of the unit. Please quote if you have any questions on the unit.
	Order code	Displays the order code of the unit. Please quote if you have any questions on the unit.
	Device tag	Individual unit identifier (max. 22 characters).
	ENP version	Displays the ENP (electronic name plate) version of the unit. Cannot be changed. Please quote if you have any questions on the unit.
	Program name	Displays the program name of the unit. Cannot be changed. Please quote if you have any questions on the unit.
	Application	Displays the installed application packages of the unit. Cannot be changed. Please quote if you have any questions on the unit.
	IP	If the unit gets its Ethernet settings by DHCP, the current IP address is displayed here.
	Modbus TCP	If the unit gets its Ethernet settings by DHCP, the current IP address is displayed here.
	Device operating time	Indicates how long the unit was in operation.

"Diagnosis/ Simulation" menu items	Configurable parameters (factory settings are highlighted in bold)	
	LCD operating time	Indicates how long the display of the unit was in operation.
	Submenu: Hardware	Information on the hardware components, and what slots are assigned, with information on the software version.
		Submenu: USB devices Overview of the USB devices currently connected. **Device 1-8**: information on the USB device connected.
	Submenu: Protocols Internal unit logs.	
	Boot log	Logs the boot procedure of the unit (for diagnosis purposes). ✎ Note! Can only be accessed using the service code.
	Error log	Only for diagnosis purposes. ✎ Note! Can only be accessed using the service code.
Submenu: Simulation	Various functions/signals can be simulated for test purposes here. ✎ Note! During the simulation mode normal recording of the measured values is interrupted and the intervention is logged in the event log.	
	Outputs	Output simulation (analog/pulse output, relay). ✎ Note! Only possible if switched on/assigned.
	Display test	Test whether all pixels are being controlled or whether the colors can be easily identified from each other.
	Test bar code reader	Test the function of the bar code reader (e.g. to determine if the right character set is being used). ✎ Note! Only possible if a bar code reader is connected to the device.
Initialize modem	Initializes the modem connected (to automatically answer calls). ✎ Note! The modem has to be connected to the serial interface of the device. Only use the RXU10-A1 modem cable (see Accessories, Section 8). Beforehand, set the baud rate to be used to transmit the data under "Setup -> System -> Communication -> Serial interface".	
Submenu: Memory information	Information on the size of the memory and how long data can be saved.	
	Internal memory **SD card**	Indicates the size of the memory in MB (or GB) and how long data can be saved until the memory is full. ☝ Caution! ▪ Normal operation (i.e. standard save cycle) is presumed when calculating the memory duration. Higher save speeds, due to alarms or many event messages, can reduce the storage duration considerably! ▪ With regard to external storage media, third-party files, or the creation of screenshots, can also reduce the duration of the memory. For this reason, read out the memory on time or change the external storage medium. ✎ Note! Even if the (external) memory is not yet full, it is advisable to read out the data frequently or to back up the data on the PC. The storage information for a USB stick is not displayed.

"Diagnosis/ Simulation" menu items	Configurable parameters (factory settings are highlighted in bold)
Delete internal memory	Deletes the entire internal measured value memory. ✎ Note! The SD card or the USB stick is not cleared. If a release code has been set up then the memory can only be deleted after this code has been entered. When the user administration function is active, this action can only be performed by the administrator.
Calibration	Calibration must only be carried out by skilled and trained personnel. ☝ Caution! Malfunctions possible if not performed correctly! Normal recording of the measured values is interrupted while this function is being used and the intervention is logged in the event log. Can only be changed using the service code.

6.6.5 Main menu - Expert

Start the Expert setup. All the operating items of the device can be changed here (see → Chap. 6.4).

6.6.6 Main menu - User administration

Activate user administration

Activate the security system if you want to protect the unit against unauthorized operation. Only then is the user administration function active in the device (Main menu -> Setup -> System -> Security -> Protected by: "FDA 21 CFR Part 11" → Chap. 6.4.1).

User administration

The administrator then has to create the users in the unit (max. 50).
You can manage the user accounts here (e.g. create new users).

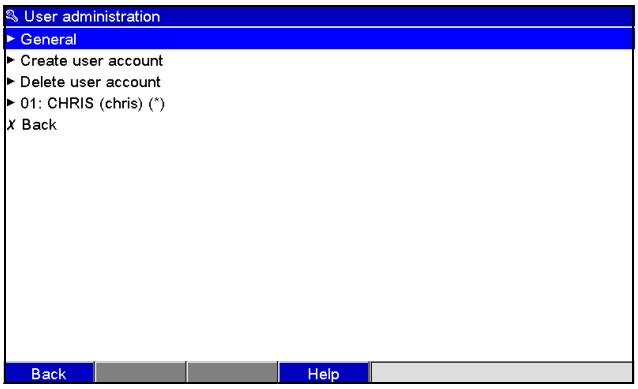


Fig. 76: Main menu, submenu: User administration

"User administration" menu items	Configurable parameters (factory settings are highlighted in bold)
Submenu: General	General settings for the user administration function.
	Submenu: Administrators General settings for administrator accounts. Note: at least one administrator account must be created. It is better, however, to define 2 or 3 administrators.

"User administration" menu items	Configurable parameters (factory settings are highlighted in bold)	
	Password length	Set the minimum number of characters passwords should contain. Note: this setting only affects new passwords entered. Picklist: 1, 2, 3, 4, **5**, 6, 7, 8, 9, 10 characters
	Password valid for	Specify how frequently the password has to be changed. The user has to change the password after this specified period at the very latest. The user receives appropriate notification a few days before the password expires. Picklist: **unlimited**, x days
	Block account temporarily	Specify after how many invalid logon attempts the administrator account is blocked for 10 minutes.
	Submenu: User General settings for user accounts.	
		Password length Set the minimum number of characters passwords should contain. Note: this setting only affects new passwords entered. Picklist: 0, 1, 2, 3, 4, **5**, 6, 7, 8, 9, 10 characters **Password valid** Specify how frequently the password has to be changed. The user has to change the password after this specified period at the very latest. The user receives appropriate notification a few days before the password expires. Picklist: **unlimited**, x days **Block account** Specify after how many invalid logon attempts a user account is blocked. If an account is blocked, the account can only be released by an administrator.
	Submenu: Password rules Specify how passwords should be structured. A secure password should contain upper and lower-case letters, numbers and special characters. Note: these settings only affect new passwords.	
		Changing a password Specify how many old passwords a user is not allowed use when changing his/her password. Picklist: **no check**, the last password, the last x passwords **Upper and lower-case letters** Specify whether passwords have to contain upper- and lower-case letters. Picklist: **no**, yes **Must contain numbers** Specify whether passwords have to contain numbers. Picklist: **no**, yes **Must contain spec. characters** Specify whether passwords have to contain special characters (e.g. %$@^!). Picklist: **no**, yes
	Submenu: Define authorization rights Define the rights of the various user groups here. Note: administrator rights cannot be changed.	
	Submenu: Main user, user level x	Specify the functions this user group can perform. 3 different user levels are available.

"User administration" menu items	Configurable parameters (factory settings are highlighted in bold)	
		Change setup The user is allowed change the setup. Picklist: **no**, yes **Change set points** The user is allowed change set points in the setup and in the Extras menu. The user cannot change any other operating items in the setup. Picklist: no, yes **Subsequent reporting** The user is allowed save individual texts. Picklist: no, yes **Confirm messages** The user is allowed confirm messages. Picklist: no, yes **Batch entry** (batch option) The user may enter batch information (name, number, etc.). Picklist: no, yes **Remote control** (telealarm option) The user can control the device remotely using a Web server (e.g. switching relays, confirming messages). Picklist: no, yes
	Automatic logout	A user is logged off automatically if a key is not pressed for a specific time. Note: the user is not logged off if he/she is in the Setup menu. If users are automatically logged off while they are in the Setup menu, the changes made to the settings are discarded. Picklist: **no**, after x minutes
	Acknowledging message	"No": messages do not have to be confirmed with a password. "Yes same user": messages have to be confirmed with an ID and password. The user logged onto the unit beforehand remains logged on. **"Yes, new user":** messages have to be confirmed with an ID and password. This user is logged onto the unit from this point onwards.
Submenu: Create user account	Create a new user.	
	Available IDs	Indicates how many users can still be created.
	New ID	Enter a unique ID for the user. This ID can only occur once in the system. The first ID entered automatically has administrator rights.
	Name	Enter the name of the new user.
	Access level	Assign the rights to the new user here. Picklist: **administrator**, main user, user level x
	Password	Enter the initialization password here. The first time the user logs on, he/she has to replace this password with his/her own password. Note: the password cannot start or finish with empty characters.
	Create	The new user is created when you confirm with "Yes". Picklist: **no**, yes
Submenu: Delete user account	Delete a user that already exists.	
	ID	Here, select the unique ID of the user that is to be deleted.
	Delete ID	The selected user is deleted when you confirm with "Yes".
Submenu: User account x	Edit this user account.	
	ID	Displays the user ID to be edited.

"User administration" menu items	Configurable parameters (factory settings are highlighted in bold)	
	Name	Change the name of the user.
	Access level	Change the authorization rights of the user. Note: administrator accounts cannot be changed. Picklist: **administrator**, main user, user level x
	Password	Assign a new initialization password for this user, e.g. if the user has forgotten his/her password. The first time the user logs on, he/she has to replace this password with his/her own password.
	User blocked	Blocking and releasing the user account. Picklist: **no**, yes

6.6.7 Creating process-related graphics on the PC

The process-related graphic always consists of two files:

1. The background graphic (*.bmp)
2. A configuration file (*.ini)

Note!
- Process-related graphics can only be created on the PC.
- The file names are prespecified:
  "PP_GROUP_<xx>.bmp" and "PP_GROUP_<xx>.ini"
  <xx> = 01..10 (Group 1..10, caution: always 2 digits).
- An individual process-related graphic can be created for every group (max. 10).
- To be able to load the process-related graphic at the device, the two files for the process-related graphic have to be in the root directory of the SD card or the USB stick.
- Templates for creating process-related graphics can be found in the "Templates" directory on the CD-ROM of the PC software provided.

Background graphic (*.bmp)

Prerequisites:

- Size: 800x480 pixels
- 256 colors (8-bit palette)
- You have to use the color palette of the device or the template.
- The bitmap should not be compressed.

Procedure for creating the background graphic:

1. Open one of the templates on the CD-ROM (e.g. with Adobe® Photoshop® or Corel® PHOTO-PAINT®).
2. Adapt the template to your needs.
3. Save the file on an SD card or a USB stick (observe the information on the filenames!).

Caution!
When inserting graphics into the template, make sure that the graphic program used adjusts the colors. Otherwise, the colors are not displayed correctly on the device. The Paint® program supplied with Windows®, for example, does not adjust colors. Programs like Adobe® Photoshop® or Corel® PHOTO-PAINT® perform color adjustment.

Configuration file (*.ini)

The configuration file can be edited with a text editor.
One row is entered for every channel and terminated with CR/LF:
<no>=<x>;<y>;<font>;<left-aligned/right-aligned>;<channel name>

Legend:

Abbreviation:	Description:
<no>	Channel 1 to 8 of the group in question
<x>	Select the x-position where the measured value should be displayed (in pixels). Note: with "left-aligned", the x-position is the upper left-hand corner of the measured value. With "right-aligned", the x-position is the upper right-hand corner of the measured value. Entry: 0 to 799 (pixels). The channel is switched off if x = -1.
<y>	Select the y-position where the measured value should be displayed (in pixels). Entry: 26 to 452 (pixels). The channel is switched off if x = -1. Note! No measured values can be displayed in the area of the header and the softkeys/status bar. Pay attention to the size of the font.

Abbreviation:	Description:
<font>	Select the font size to be used for displaying the measured value: 0 = small (16 pixels) 1 = medium (24 pixels) 2 = large (38 pixels) 3 = very large (78 pixels) Font 0 is used for all other values.
<Left/right-aligned>	Specify how the measured value should be aligned. 0 = left-aligned, 1 = right-aligned
<channel name>	Specify whether the channel name should also be displayed in addition to the measured value. The channel name is displayed above the measured value. 0 = hide channel name; 1 = display channel name

Procedure for creating the configuration file:

1. Open one of the templates on the CD-ROM in a text editor.
2. Adapt the template to your needs.
3. Save the file on an SD card or a USB stick (observe the information on the filenames!).
4. Load the process-related graphic (=background graphic + configuration file) in the device (see Page 94)

Note!
- To determine the x/y positions, where possible use the coordinates display function/grid of the graphic program (caution: configure "Pixel" for the dimension).
- The configuration (e.g. x/y position) can also be modified subsequently at the device (see Page 107).
- A short comment can be optionally added to the end of every line. A comment starts with "//" (see example). However, comments may not be inserted between the lines.
- The configuration file must always have one entry for all 8 channels (even if individual channels are not used, see the example below).
- The process-related graphic is not displayed if there are errors in the syntax.

Example of a configuration file:

```
1=182;75;3;1;0  // sugar
2=382;75;3;1;0  // citric acid
3=582;75;3;1;0  // base
4=782;75;3;1;0  // sparkling apple juice
5=90;310;0;0;0  // sugar valve
6=290;310;0;0;0 // acid valve
7=-1;-1;0;0;0   // not used
8=-1;-1;0;0;0   // not used
```

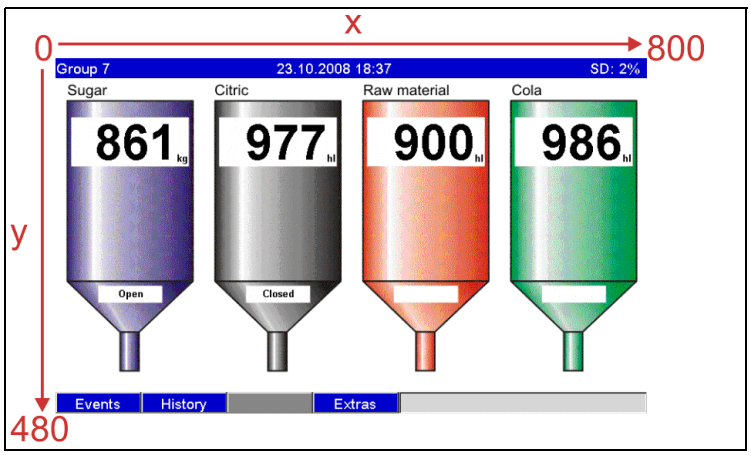


Fig. 77: Example: coordinate system on the process-related graphic

6.6.8 The context menu

The context menu is available for all the measured value displays (apart from the event log). Launch: press the navigator 3-4 seconds. If an external keyboard is connected, the context menu can also be called using Shift+Enter.

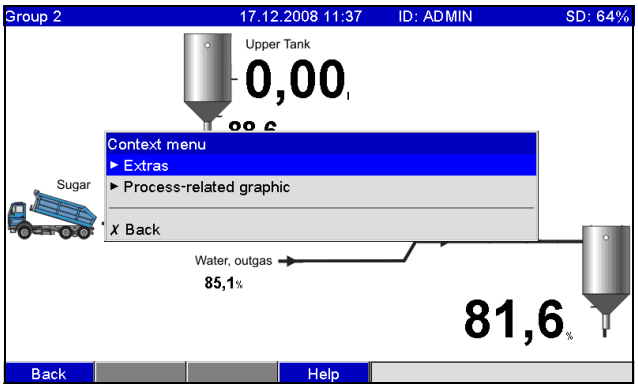


Fig. 78: Context menu

"Context menu" menu items	Configurable parameters (factory settings are highlighted in bold)	
Submenu: Extras	The "Extras" menu can be called here. Alternatively, softkey 4 "Extras" can be pressed in the measured value display.	
Submenu: Process-related graphic	You can make changes to the process-related graphic here.	
	Submenu: Edit	You can edit the process-related graphic currently displayed here (position, font size, etc.).
	Submenu: Edit, channel x	You can edit this channel of the process-related graphic here (activate, change position/ font size etc.).

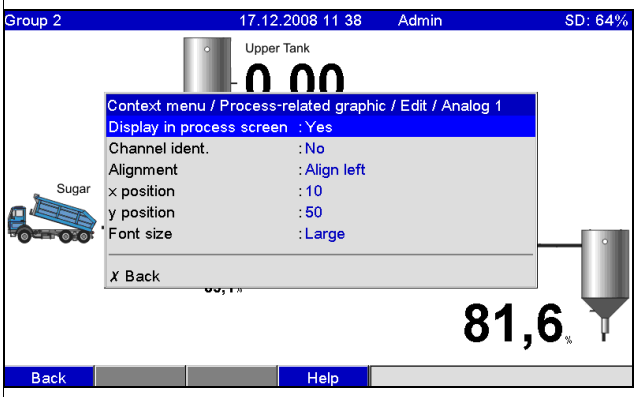


Fig. 79: Context menu, submenu: Edit process-related graphic

"Context menu" menu items	Configurable parameters (factory settings are highlighted in bold)	
		Display in process screen Switch the channel in the process-related graphic on or off. Note: This does not affect the process for storing the measured value or the configuration. Picklist: **no**, yes **Channel ident.** Specify whether the channel name should also be displayed in addition to the measured value. The channel name is displayed above the measured value. Picklist: **no**, yes **Alignment** Specify how the measured value should be aligned. Picklist: **left-aligned**, right-aligned **x position** Select the x-position where the measured value should be displayed. ✎ Note! With "left-aligned", the x-position is the upper left-hand corner of the measured value. With "right aligned", the x-position is the upper right-hand corner of the measured value. User input: 0 to 799 pixel **y position** Select the y-position where the measured value should be displayed. ✎ Note! No measured values can be displayed in the area of the header and the softkeys/status bar. Pay attention to the size of the font. User input: 26 to 452 pixel **Font size** Select the font size to be used for displaying the measured value. Picklist: **small**, medium, large, very large
	Submenu: Edit, Accept changes	Saves the changes to the process-related graphic in the device memory.
	Delete	Deletes the selected process-related graphic from the memory.

6.7 Meeting the requirements of 21 CFR 11

6.7.1 General notes

Prior to using electronic signatures, a hand-signed letter should be sent to the

Office of Regional Operations (HFC—100)
5600 Fishers Lane
Rockville, MD 20857
USA

informing it that the company intends to use electronic documents/signatures in the future. Administrators and users have to be trained on 21 CFR 11 or already have to be knowledgeable in this field. Commercial software that is used in electronic recording systems in accordance with 21 CFR 11 must be validated. The suitability of the unit and the related PC software (incl. operating system) for the required application has to be defined, validated and documented (e.g. with regard to data confidentiality, printing device parameters, backup copies of the set parameters, assigning access authorization in the PC software, suitability of the software commercially used – such as the operating system etc.).
Prior to assigning/specifying the electronic signature (or elements of this electronic signature such as a unique ID/initialization password), the identity of the person in question has to be verified. The administrator has to ensure that IDs are unique and assigned correctly to the appropriate parties and must document this information. Electronic signatures may only be used by the legitimate users. They may not be disclosed to third parties. The administrators and users must be committed to ensuring the user IDs and passwords (including the initialization passwords) are not abused. Procedural requirements stating that each individual will be held responsible for any action taken using his/her signature must be defined and observed to have a mechanism in place to act as a deterrent to document and signature forging. To meet the requirements of the FDA with regard to 21 CFR 11 compliance, please ensure that the correct settings for the unit and related PC software are made. Suitable controls have to put in place with regard to the system documentation (distribution, access and use of the documentation for operating and maintaining the system). Revision and change control processes have to be put in place for the system documentation (audit trail documenting the advancement of, and modifications to, the system documentation over time). The system is not designed for use in Internet applications/open systems.

6.7.2 Important PC software settings

Compliance with the requirements of 21 CFR 11 demands certain functions in the related PC software. In particular, settings have to be made that automatically record PC software access and operation in an audit trail.

Note!

- Only use operating systems with user administration (e.g. MS Windows® NT/2000/XP).
- Activate user administration, audit trail recording and password protection as per 21 CFR Part 11: "Extras –> Program options –> Setup" select "General", "Audit trail activate recording" switch to "Security", click "Protected by" and "Password protection per FDA 21 CFR Part 11".
- Assign the permitted rights to the users: click "User administration"; new users can be added here. Recommendation: password valid for 60 days to prevent the user getting used to the password.
- Where applicable, use the powerful automatic functions of the PC software (e.g. automatic readout, automatic backup function, automatic alarm by e-mail). Note: this requires a series connection to a PC that has to work in the automatic mode. Detailed instructions are provided on the CD-ROM of the PC software supplied.

6.8 Measured value storage

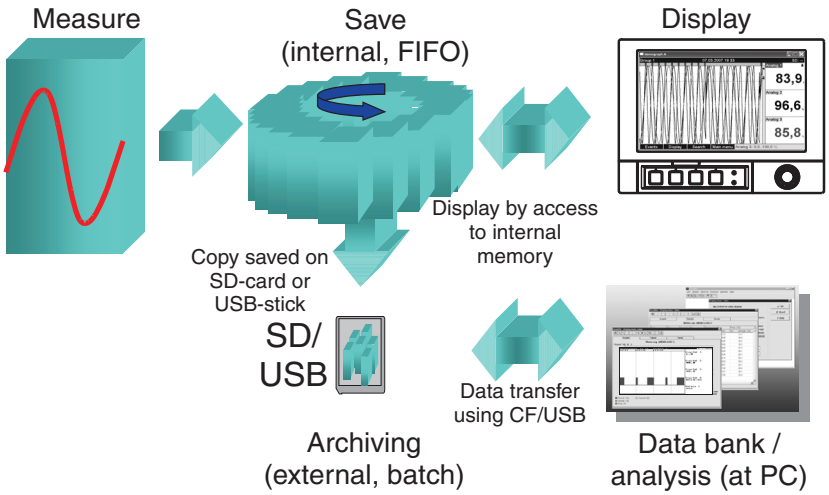


Fig. 80: Schematic illustration of the process for storing measured values

6.8.1 Internal memory

Measured value saving shows signal changes and provides access to processes which took place long ago. They are stored (nonvolatile) in a Flash memory which is secure on power failure. This large internal memory works as a ring memory. If it is full, the oldest data are overwritten (FIFO – first in/first out principle). As a result, the current data are always available.
In ongoing operation, the measured values saved can be called up in the instantaneous value display by pressing softkey 2 "History". This function can also be accessed via the "Extras" menu (see Page 89). Turn the navigator clockwise or counterclockwise to scroll back and forth between the measured value curves. You can change the speed with softkey 3 (slow "<" to fast "<<<<"). To go back to the instantaneous value display mode, press softkey 1 "Esc".

6.8.2 Operating mode of the SD card and USB stick

Without affecting the internal memory, data packages are copied block-by-block to the SD card. Tests are also made to determine whether the data have been written without any errors. The same happens when storing the data on the PC with the PC software contained in the scope of delivery. The data, monitored against manipulation, are available here. If you wish, you can export these data to other programs, such as MS Excel®, without losing the protected data basis.
The use of a USB stick is only recommended if certain data ranges should be copied. The USB stick is not designed for continuous measured value storage.

Note!
- Only use new, formatted SD cards recommended by the manufacturer (see "Accessories", Section 8). Any data on the SD card or USB stick are overwritten once the card/stick is inserted into the slot.
- The SD card or USB stick memory being written to is shown in normal operation at the top right of the display ("SD: xx%" or "USB: xx%")
- Dashes "–" on this display mean that no SD card is inserted.
- No information is output if no USB stick is connected.
- The SD card should not be write-protected.
- Prior to removing the external data carrier, select "Extras –> SD card (or USB stick)–> Update". The current data block is closed and saved to the external data carrier. This ensures that all current data (until the last save) is included on it.
- Depending on the configuration of your unit (see "Setup –> System –> Ext. memory –> Warning at"), an acknowledgeable message on the display informs you that the data carrier has to be changed before the external data carrier is 100 % full.
- Your unit knows which data have already been copied onto the SD card or USB stick. Should you ever forget to change the data carrier in time (or if no SD card has been inserted), the new external data carrier is filled with the missing data from the internal memory – in as far as the data are still available there. Since measured value acquisition/registration has highest priority, it can take several minutes until the data are copied from the internal memory to the SD card or USB stick.

6.9 Important functions of the PC software supplied

Note!
The current PC software must be installed on a PC (for installation instructions, see description on CD–ROM or Section 5.6 of these Operating Instructions).

6.9.1 Data transmission to the PC software supplied

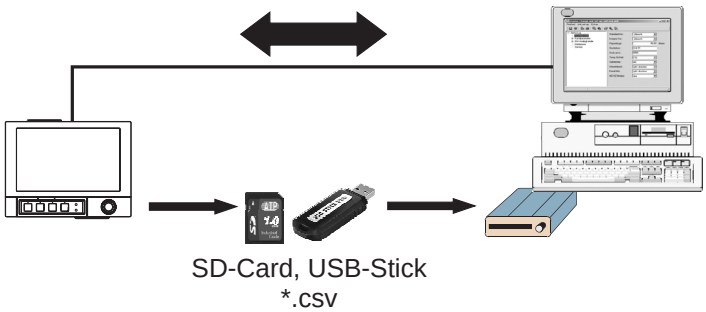


Fig. 81: Data transmission to the PC software supplied

Data can be transferred to the installed PC software in one of the following ways:
- Using USB, RS232/485 or Ethernet. Communication and download of data to PC using the function "Read out –> Read out measured values using interface/Modem".

- Saving the data on the SD card or USB stick in the device using the function "Extras -> SD card or USB stick -> Update". Remove the SD card or USB stick from the device with the function "Extras -> SD card or USB stick -> Remove safely".

Now insert the SD card or USB stick into the PC and read the data using the function "Read out –> Read out measured values from PC card drive".

- Using the PC software, read out the internal memory as a file: the data is read out via RS232/ RS485, Ethernet or USB. Start the PC software provided. Select "Read out –> Read out memory card by interface/modem". Select the relevant device from the PC database. Select "Unit -> Open unit(s) ". The connection is made. Select the relevant files in the internal memory and confirm with "OK". The measured values are read out. The measured values are kept in internal memory.

6.9.2 Offline data verification, analysis and printout

The data saved offline or downloaded to the PC (using one of the methods described above) can be viewed in the PC software supplied using the function "Display –> Display measured values from database".
All data received can be viewed as trend graphics and in tabular form and printed out (see corresponding print function in the main menu of the PC software supplied). A detailed description of the functions can be found on the CD–ROM of the PC software supplied.

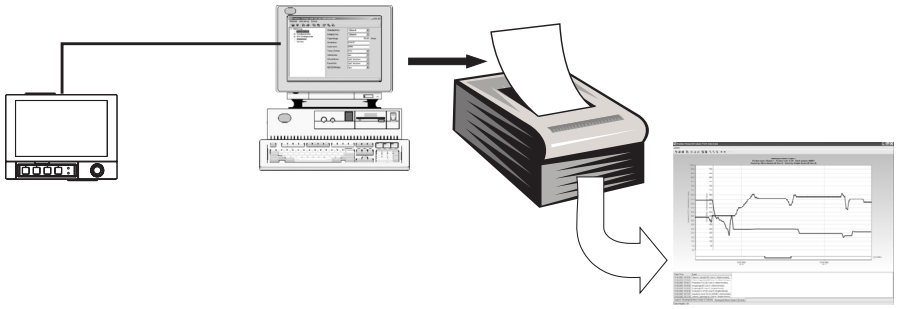


Fig. 82: Data analysis at the PC

6.9.3 Viewing data in a spreadsheet (e.g. MS-Excel®)

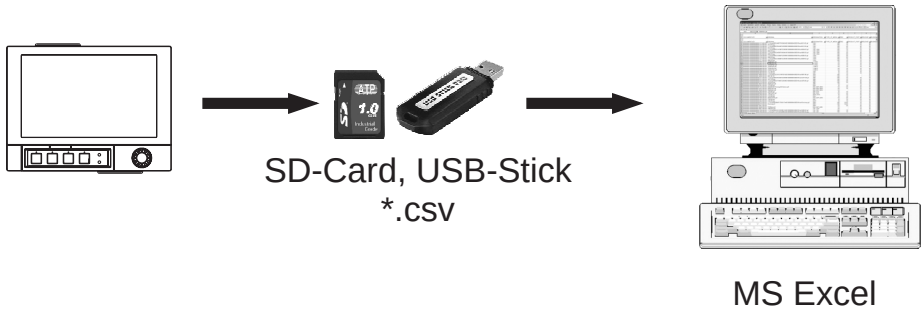


Fig. 83: Data analysis in spreadsheet

Select "Open format (*.csv)" (comma separated values) as the save mode in the unit under " Main menu –> Setup –> System –> Ext. memory –> Save as" to be able to open saved data directly in the spreadsheet for analysis and printout.

Note!
To open the data directly in MS-Excel®, select the semicolon ";" as the separator in the unit under "Main menu -> Setup -> System -> Ext. memory -> Separator for CSV". The open format (*.csv) is restricted to a maximum of 60000 lines.

The CSV files are comprised as follows:

File name (=name + consecutive number + date and start time of the first value)	Description
rec_analysis01 00000000000 0009 2008-08-07 14-00-00.csv	Contains the signal analyses of the active channels from the starting time indicated in the file name. An individual CSV file is created for every analysis (01 - 04).
rec_events 00000000000 0009 2008-08-07 13-40-13.csv	Contains the event log from the starting time indicated in the file name.
rec_group01 00000000000 0009 2008-08-07 13-44-19.csv	Contains all the measured values of the group from the starting time indicated in the file name. An individual CSV file is created for every group (01 - 10).

Alternatively, the data saved in a protected format can be exported to *.xls, *.csv or *.txt format in the PC software supplied under "Extras –> Export measured values".

7 Maintenance

The unit is maintenance-free.

7.1 Software update via the PC software supplied

Caution!
When the program is updated, all measurement data in the memory are deleted. If the measured values saved in the unit are still required, they should first be read out or the SD card should be updated and removed from the unit. After the program transfer, all unit settings are reset to the factory settings.
Function only possible via USB or RS232, not via Ethernet or modem!

Procedure:

1. Start the PC software supplied.
2. Connect the unit to the PC.
3. Open the "Extras -> Special device functions -> (Select unit) -> Transfer program" menu.
4. Select interface parameters (Com port or USB device)
5. Select desired program file (*.prg) and confirm with OK.

7.2 Instructions on Enabling a software option

Note!
- The PC software supplied (at least version 1.22.0 or higher) is needed to enable a software option.
- Be ready with the enable code you received from the manufacturer (see delivery note).
- The unit must be read out before starting the update. The unit must be in the database of the PC software supplied.
- Make sure that the unit is connected to the computer in the same way as it was read out (e.g. if the unit was read out using the USB port, connect the unit via the USB port).

Procedure:

1. Start the PC software supplied.
2. Open "Extras -> Service -> Release options"
3. From the unit database, select the unit where an option is to be enabled.
4. The enable code (see delivery note) has to be entered in the next dialog box. Click "OK" to start transmitting the release code to the unit.

5. Once the release code has been transmitted without any errors, an appropriate message appears in the PC software supplied. The unit is restarted. An entry is made in the event buffer of the unit.
6. Read out the unit again.
   The option that was enabled can now be used.

8 Accessories

Note!
If ordering accessories, please specify the serial number of the unit!

8.1 Accessories

The following accessories are available:

Order code	Accessory
163353	Cable USB-A - USB-B, 2 m (6.6 ft)

9 Troubleshooting

9.1 Diagnose/simulation in the main menu

Unit information and service functions for a swift unit check. For descriptions, see Section 6.6.4.

9.2 Troubleshooting instructions

Dead pixels:
Dead pixels refer to pixels on LCD and TFT displays that are defect due to the technology or manufacturing techniques used. The TFT display used can have up to 10 dead pixels (Class III as per ISO 13406-2). These dead pixels do **not** entitle the user to a warranty claim.

Problem:	Cause:	Remedy:
Display does not function	Screen saver is active	Press a key. Check settings for screen saver in the setup.
	No LED lights up beside the keys or on the rear of the unit (Ethernet) => no power supply	Check power supply and mains connection.
	No LED lights up beside the keys or on the rear of the unit (Ethernet) => power unit defective	Replace the power unit or call the service department of the supplier!
	An LED lights up beside the keys or on the rear of the unit (Ethernet) => display defective	Contact the supplier's service department!
SD card slot does not work	CPU defective	Contact the supplier's service department!
No data on the SD card	Setup changed	Save the data onto a data carrier before making any changes to the setup.
	Software update/upgrade	Save measured values onto a data carrier before making any changes to the software.
	SD card defective	Replace the SD card, use genuine cards from the manufacturer! (Accessories, see Section 8)
	CPU defective	Contact the supplier's service department!
Setup is locked	Setup lock active, i.e. the setup is only released with a digital signal	Create a digital signal to remove setup lock.
	Operation is locked by a user code	Enter the correct user code to disable the lock.
Relay does not function	Incorrect connection	Check the connection and circuit of the relay.
	Incorrect configuration	Check the configuration of the relay.
	Power supply defective	Replace the power unit card or call the service department of the supplier!
	Digital card (optional) defective	Replace the digital card or call the service department of the supplier!
No connection to the unit possible via the USB	Cable defective	Replace cable
	Driver for USB connection not installed on the PC	Install driver

Problem:	Cause:	Remedy:
RS232/RS485, Ethernet interface not working	Cable defective	Replace cable (Accessories, see Section 8)
	Incorrect connection assignment	Use original cables.
	Incorrect unit address	Check and set correctly.
	Incorrect interface parameters	Check and set correctly.
	CPU defective	Contact the supplier's service department!
Modem connection not working	Modem not initialized on unit	Initialize the modem again (see Section 5.6.4)
	Incorrect or faulty connecting cable	Replace cable (Accessories, see Section 8)
Digital input does not function	Incorrect connection	Check the connection and circuit of the digital input.
	Incorrect configuration	Check the digital input configuration.
	Power supply defective	Replace the power unit card or call the service department of the supplier!
	CPU defective	Contact the supplier's service department!
Analog input shows "– – – –" This means cable open circuit	The signal lines are incorrectly connected or not connected.	Check connections.
Analog input shows "*****" This means the measured value is invalid**	The input signal does not correspond to the configured signal.	Check the input signal and the configuration.
Analog input shows "^^^^^^^" This means overranging	The sensor is defective.	Check the input signal and replace the sensor.
Analog input shows "vvvvvv" This means underranging	The sensor is defective.	Check the input signal and replace the sensor.
Analog output does not function	Digital card (optional) defective	Replace the digital card or call the service department of the supplier!
Communication to fieldbus (Profibus DP or Modbus) not working	Wrong settings	Check communication settings.
	Anybus communicator module defective	Contact the supplier's service department!
	Incorrect terminal assignment	Check the wiring to the fieldbus.

9.3 System error messages

Your unit informs you of faults or incorrect entries using plain text on the screen.

9.4 Errors and warnings

If an error occurs in the unit, the red LED lights up. If warnings occur or if the unit needs to be serviced, the red LED starts flashing. The red LED can also start flashing for limit value alarms if this is configured in the setup (standard setting = off).

- M-code (maintenance required): warning or maintenance needed
- F-code: failure

Note!
All the error messages are displayed in the event log.

M-code error messages:

Code	Brief error description	Remedial action
M304	SD card is full!	Replace SD card
M305	USB stick is full!	Replace USB stick
M308	SD card is write-protected!	Disable write protection on SD card
M330	Not all USB units could be switched on since the max. current limiting level was reached.	Use active USB hub (hub with own power supply)
M331	SIM card is blocked	Unlock SIM card by entering the PUK number. Note: The PUK must be entered using a cellular phone (not possible to enter number using the unit)!
M432	Analog card x is not calibrated!	Calibrate the analog card (technical personnel only) or contact the service department of the supplier!

F-code error messages:

Code	Brief error description	Remedial action
F306	File not found or is corrupt!	
F307	Parameter file not found or is corrupt!	
F309	Analog card x is out of order!	Replace the analog card or contact the service department of the supplier! Switch the unit off and then on again if necessary.
F310	Digital card is out of order!	Replace the digital card or contact the service department of the supplier! Switch the unit off and then on again if necessary.
F311	Power unit is out of order!	Replace the power unit or contact the service department of the supplier! Switch the unit off and then on again if necessary.
F312	Fieldbus card is out of order!	Contact the supplier's service department! Switch the unit off and then on again if necessary.
F313	Screenshot could not be saved!	Change the SD card or USB stick and try again
F314	Error occurred when calibrating!	Repeat the calibration
F315	Cannot save run times!	Contact the supplier's service department!
F316	Cannot save setup to file!	Contact the supplier's service department!
F317	Cannot save unit data!	Contact the supplier's service department!
F318	Cannot save user administration!	Contact the supplier's service department!
F319	No IP address could be obtained from the DHCP server!	Check the connections and communication settings. Contact your network administrator.
F320	No connection to the e-mail server.	Check the connections and communication settings
F321	E-mail could not be sent!	Check the connections and communication settings
F322	SMS could not be sent!	Check the connections and communication settings
F323	Mathematics channel x: settings are invalid!	Check formula

Code	Brief error description	Remedial action
F324	Mathematics settings are invalid!	Check formula
F325	Incompatible hardware detected! Please update firmware.	Firmware update necessary. Contact the supplier's service department!
F326	x: The selected input signal is not supported by this hardware!	This hardware does not yet support the input ranges used. Contact the supplier's service department!
F327	No connection to the e-mail server (x).	See SMTP error codes, next table
F328	SMTP: authentication failed!	Check e-mail server access data (user name, password)
F329	SMTP: error occurred (x).	See SMTP error codes, next table
F332	DNS server not found! (x)	Check settings in the setup under "System - Communication - Ethernet - DNS"

SMTP error codes:

SMTP error code (x)	Description
-1	SMTP communication faulty
-2	SMTP routing faulty
-3	SMTP greetings faulty
-4	Authentication faulty
-5	Error in MAIL FROM
-6	Error in RCPT TO
-7	Error in DATA
-8	Server response: e-mail could not be sent!
-10	Internal access error
-11	Ethernet not connected
-12	Ping out of order
-13	Time limit exceeded when sending mail
-14	DNS: name server cannot be addressed
-15	DNS: domain name not found

SMTP error messages:

Error code	Error description	Remedial action
421 dns lookup failed for sender domain	Sender name has incorrect domain e.g. "unit@demo.unit" -> SMTP server checked "demo.unit" and found it did not exist.	Please enter your company's address as the domain (e.g. unit@company.com). Ask your system administrator.
501 bad address syntax: <DeviceXXX> 553 Complete address with domain	If no sender name was entered, the unit name is used as the sender name. Some SMTP servers do not accept this.	Please enter your company's address as the domain (e.g. unit@company.com). Ask your system administrator.
535 Error: authentication failed	The user name or password is not correct.	Please correct the user name or password. Ask your system administrator.
550 must be authenticated	The SMTP server demands authentication.	Please enter a user name and a password. Ask your system administrator.
550 Sender address does not belong to logged in user	The sender name must correspond to the user name.	Use the user name as the sender name.
530 Must issue a STARTTLS command	The server demands secure encryption.	Is not supported!

9.5 Spare parts

Note!
If ordering spare parts, please specify the serial number of the unit!

Installation instructions are included with the spare part.

9.5.1 Illustration of spare parts

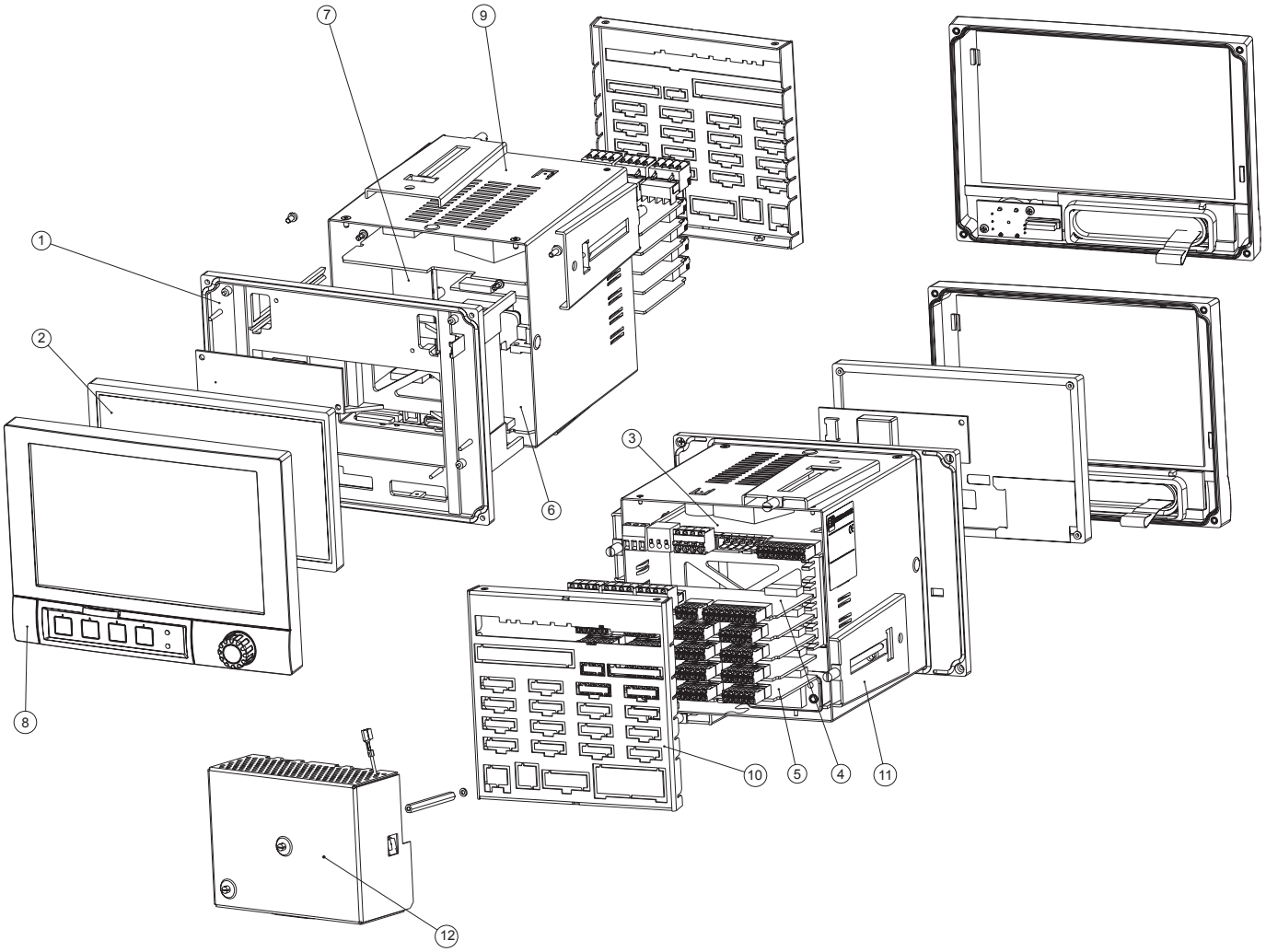


Fig. 84: Illustration of spare parts

9.5.2 List of spare parts, retrofit parts

Pos.	Order No.	Description
1	163444	Securing frame +DC-AC converter board
2	163452	LCD module + ribbon cable connector
-	163460	Ribbon cable set (cable for display - CPU card, cable for navigator - CPU card)
3	163436	Terminal, 3-pin, for power supply
3	163428	Terminal, pluggable, 3-pin for relay 1 (changeover)
3	163410	Terminal, pluggable, 6-pin for relay 4+5+6 on power unit card

Pos.	Order No.	Identifier
3	163478	Terminal, pluggable, 9-pin for digital inputs on power unit card
3	163486	Power supply 115/230 V AC
3	163494	Power supply 24 V AC/DC
4	163501	Terminal, pluggable, 4-pin for relay 2+3 and relay on digital I/O option card
4	163519	Terminal, pluggable, 10-pin for digital inputs on digital I/O option card
4	163527	Terminal, pluggable, 4-pin for analog outputs on digital I/O option card
4	163535	Digital card extension (8x digital input + 6x relay + 2x analog output) (for slot 5), with connector
5	163543	Analog card with 4 multifunction inputs (for slot 1-5), with connector
5	163387	Terminal, pluggable, 6-pin, for analog input
7	163551	Motherboard
8	163569	Front + navigator + ribbon cable connector
9	163577	Casing
10	163585	Rear wall, analog, stamped, for units in which only analog cards are integrated
10	163593	Rear wall, analog+digital, stamped, for units in which analog cards and the digital I/O card (optional card) are integrated
11	163600	Securing unit for casing, short, 1 piece
12	163618	Rear panel, terminal cover

9.5.3 Device software spare parts structure (upgrading options)

Order No.	Description
163634	Software Mathematics package
163642	Software Telealarm
163650	Software Batch
163668	Software Waste water + Rainwater overflow tank + Telealarm

Note!
The software option can be enabled at the unit using the PC software supplied. After ordering, you receive instructions and a special code that you have to enter in the PC software.

9.6 Return

The unit must be packed in protective packaging for later reuse or in case of repair. The original packaging offers the best protection. Repairs must only by carried out by your supplier's service organization or by skilled personnel.

Note!
When sending for repair, please enclose a note with a description of the error and the application.

9.7 Disposal

Please observe local regulations.

9.8 Software history

Overview of unit software history:

10 Technical data

10.1 Input

10.1.1 Analog multifunction inputs

Number	Standard version without universal inputs. Optional multifunction input cards (slot 1-5) each with 4 universal inputs (4/8/12/16/20).
Function	You can choose between the measured variables U, I, RTD, TC, pulse input or frequency input for each universal input.
Measured variable, measuring range	To IEC 60873-1: An additional display error of -/+ 1 digit is permitted for every measured value. Measuring ranges which can be selected per channel:

Measured variable	Measuring range	Maximum measured error of measuring range (oMR)	Input resistance
Current (I)	0 to 20 mA 0 to 5 mA 4 to 20 mA Overrange: up to 22 mA	± 0.10 % oMR	Load: ≤ 50 Ohm
Voltage (U) > 1 V	0 to 10 V 0 to 5 V 1 to 5 V ± 10 V ± 30 V	± 0.10 % oMR	≥ 1 MOhm
Voltage (U) ≤ 1 V	0 to 1 V ± 1 V ± 150 mV	± 0.10 % oMR	≥ 2.5 MOhm
Resistance thermometer (RTD)	Pt100: -200 to 850 °C (-328 to 1562 °F) (IEC751, GOST) Pt100: -200 to 649 °C (-328 to 1200.2 °F) (JIS1604) Pt500: -200 to 850 °C (-328 to 1562 °F) (IEC751) Pt500: -200 to 649 °C (-328 to 1200 °F) (JIS1604) Pt1000: -200 to 600 °C (-328 to 1112 °F) (IEC751, JIS1604)	4-wire: ± 0.10 % oMR 3-wire: ± (0.10 % oMR + 0.8 K) 2-wire: ± (0.10 % oMR + 1.5 K)	
	Cu100: -200 to 200 °C (-328 to 392 °F) (GOST) Cu50: -200 to 200 °C (-328 to 392 °F) (GOST) Pt50: -200 to 850 °C (-328 to 1562 °F) (GOST)	4-wire: ± 0.20 % oMR 3-wire: ± (0.20 % oMR + 0.8 K) 2-wire: ± (0.20 % oMR + 1.5 K)	
	Cu53: -50 to 180 °C (-58 to 356 °F) (GOST) Pt46: -200 to 650 °C (-328 to 1202 °F) (GOST)	4-wire: ± 0.30 % oMR 3-wire: ± (0.30 % oMR + 0.8 K) 2-wire: ± (0.30 % oMR + 1.5 K)	
Thermocouples (TC)	Type J (Fe-CuNi): -210 to 1200 °C (-346 to 2192 °F) (IEC581-1) Type K (NiCr-Ni): -270 to 1372 °C (-454 to 2501.6 °F) (IEC581-1) Type T (Cu-CuNi): -270 to 400 °C (-454 to 752 °F) (IEC581-1) Type N (NiCrSi-NiSi): -270 to 1300 °C (-454 to 2372 °F) (IEC581-1) Type L (Fe-CuNi): -200 to 900 °C (-328 to 1652 °F) (DIN43710) Type L (Fe-CuNi): -200 to 659 °C (-328 to 1218.2 °F) (GOST)	± 0.10 % oMR as of -100 °C (-148 °F) ± 0.10 % oMR as of -130 °C (-202 °F) ± 0.10 % oMR as of -200 °C (-328 °F) ± 0.10 % oMR as of -100 °C (-148 °F) ± 0.10 % oMR as of -100 °C (-148 °F) ± 0.10 % oMR as of -100 °C (-148 °F)	≥ 1 MOhm
	Type D (W3Re-W25Re): 0 to 2315 °C (32 to 4199 °F) (ASTME998) Type C (W5Re-W26Re): 0 to 2315 °C (32 to 4199 °F) (ASTME998) Type B (Pt30Rh-Pt6Rh): 0 to 1820 °C (32 to 3308 °F) (IEC581-1) Type S (Pt10Rh-Pt): -50 to 1768 °C (-58 to 3214.4 °F) (IEC581-1) Type R (Pt13Rh-Pt): -50 to 1768 °C (-58 to 3214.4 °F) (IEC581-1)	± 0.15 % oMR as of 500 °C (932 °F) ± 0.15 % oMR as of 500 °C (932 °F) ± 0.15 % oMR as of 600 °C (1112 °F) ± 0.15% oMR as of 100 °C (212 °F) ± 0.15% oMR as of 100 °C (212 °F)	≥ 1 MOhm

Measured variable	Measuring range	Maximum measured error of measuring range (oMR)	Input resistance
Pulse input (I)	Min. pulse length 30 µs, max. 13 kHz		
Frequency input (I)	0 to 10 kHz, overrange: to 12.5 kHz 0...7 mA = LOW 13...20 mA = HIGH	± 0.01 % oMR	Load: ≤ 50 Ohm

Maximum input load

Limit values for input voltage and input current as well as cable open circuit detection/line influence/temperature compensation:

Measured variable	Limit values (steady-state, without destroying input)	Cable open circuit detection/line influence/temperature compensation
Current (I)	Maximum permitted input voltage: 2.5 V Maximum permitted input current: 50 mA	4 to 20 mA range with disengageable cable open circuit detection as per NAMUR NE43. The following error ranges apply if NE43 is activated: ≤ 3.8 mA: underrange (display shows: vvvvvv) ≥ 20.5 mA: overrange (display shows: ^^^^^^) ≤ 3.6 mA or ≥ 21.0 mA: cable open circuit (display: - - - -)
Pulse, frequency (I)	Maximum permitted input voltage: 2.5 V Maximum permitted input current: 50 mA Minimum pulse length: 30 µs Maximum 13 kHz	No cable open circuit monitoring
Voltage (U) > 1 V	Maximum permitted input voltage: 35 V	1 to 5 V range with disengageable cable open circuit detection: < 0.8 V or > 5.2 V: cable open circuit (display: - - - -)
Voltage (U) ≤ 1 V	Maximum permitted input voltage: 24 V	
Resistance thermometer (RTD)	Measuring current: ≤ 1 mA	Maximum barrier resistance (or line resistance): Max. 200 Ohm (4-wire) Max. 40 Ohm (3-wire) Maximum influence of barrier resistance (or line resistance) for Pt100, Pt500 and Pt1000: 4-wire: ±0.0002%/Ohm, 3-wire: ±0.002%/Ohm Maximum influence of barrier resistance (or line resistance) for Pt46, Pt50, Cu50, Cu53 and Cu100: 4-wire: ±0.0006%/Ohm, 3-wire: ±0.006%/Ohm
Thermocouples (TC)	Maximum permitted input voltage: 24 V	Cable open circuit detection from 50 kOhm Influence of line resistance in event of break detection: < 0.001%/Ohm Error, internal temperature compensation: ≤ 2 K

Scan rate

All channels are scanned within 100 ms.

Converter resolution

24 bit

Totalization

The interim value, daily value, weekly value, monthly value, annual value and overall value can be determined (13-digit, 64 bit).

10.1.2 Digital inputs

Number

Standard version: 6 digital inputs
Optional digital card (slot 5): 8 additional digital inputs

Input level	To IEC 61131-2: Logical "0" (corresponds to -3 to +5 V), activation with logical "1" (corresponds to +12 to +30 V)
Input frequency	Max. 25 Hz
Pulse length	Min. 20 ms
Input current	Max. 2 mA
Input voltage	Max. 32 V (steady-state, without destroying input)
Selectable functions	Control input, ON/OFF message, pulse counter (13-digit, 64 bit), operating time, message+operating time, quantity from time. Functions of the control input: start recording, screensaver on, block setup, block keyboard/ navigator, time synchronization, change group, limit value monitoring on/off, individual LV on/off, start/stop evaluation.

10.2 Output

10.2.1 Auxiliary voltage output

The auxiliary voltage is provided to activate the digital input (or the sensors) with floating contacts and is galvanically isolated from the system and the inputs (testing voltage 500 V).

Output voltage:

Approx. 24 V DC, max. 28 V

Output current:

Maximum 200 mA, short-circuit proof, not stabilized

10.2.2 Relay outputs

Standard version (power supply slot): 1 alarm relay with changeover contact, 5 relays with NO contact e.g. for limit value alarms (can be configured as NC contact).

Optional digital card (slot 5): 6 additional relays with NO contact e.g. for limit value alarms (can be configured as an NC contact).

Note!
It is not permitted to mix low voltage and safety extra low voltage (do not mix SELV circuits and low voltage).

Response time:

max. 400 ms

Maximum DC contact load:

30 V / 3 A

Maximum AC contact load:

230 V / 3 A

10.2.3 Analog and pulse outputs

Number:

Optional digital card (slot 5): 2 analog outputs which can be operated as current or pulse outputs.

Analog output (current output):

Output current: 0/4 to 20 mA with 10 % overrange
Max. output voltage: approx. 16 V
Accuracy: ≤ 0.1 % of output range
Temperature drift: ≤ 0.015 %/K
Resolution: 13 bit
Load: 0 to 500 Ohm
Error signal to NAMUR NE43: 3.6 mA or 21 mA can be configured

Digital output (pulse output):

Output voltage as per IEC 61131-2:
≤ 5 V corresponds to LOW
≥ 12 V corresponds to HIGH
Short-circuit proof (maximum 25 mA)

Frequency: 0 to 2 kHz
Pulse width: 0.5 to 1000 ms
Accuracy: ≤ 0.1 % of output range
Temperature drift: ≤ 0.1 %
Load: ≥ 1 kOhm

10.2.4 Galvanic isolation

All the inputs and outputs are galvanically isolated from one another and tested with the following testing voltages:

	Relay	Digital in	Analog in	Analog out
Relay	2.3 kV	2.3 kV	2.3 kV	2.3 kV
Digital in	2.3 kV	500 V[1)]	500 V	500 V
Analog in	2.3 kV	500 V	500 V	500 V
Analog out	2.3 kV	500 V	500 V	500 V

1) Not galvanically isolated from one another. Galvanic isolation is only available for digital inputs between the power unit and the optional digital card.

10.3 Power supply / terminal diagram

10.3.1 Electrical connection (wiring diagram)

(Wiring diagram, see Section 4 "Wiring")

10.3.2 Supply voltage

Low voltage power unit: 100...230 V_{AC} (±10%)
Extra-low voltage power unit: 24 $V_{AC/DC}$

10.3.3 Frequency

Nominal frequency: 50 / 60 Hz

10.3.4 Cable specification

Screw or spring terminal blocks with reverse polarity protection:
Wire cross-section, digital I/O and analog inputs: max. 1.5 mm^2 (14 AWG) (spring terminals)
Wire cross-section, power supply: max. 2.5 mm^2 (13 AWG) (screw terminals)
Wire cross-section, relays: max. 2.5 mm^2 (13 AWG) (spring terminals)

10.3.5 Power consumption

100...230 V: max. 40 VA
24 V: max. 40 VA

10.4 Connection data interface, communication, operation

10.4.1 USB ports:

USB at the front of the unit

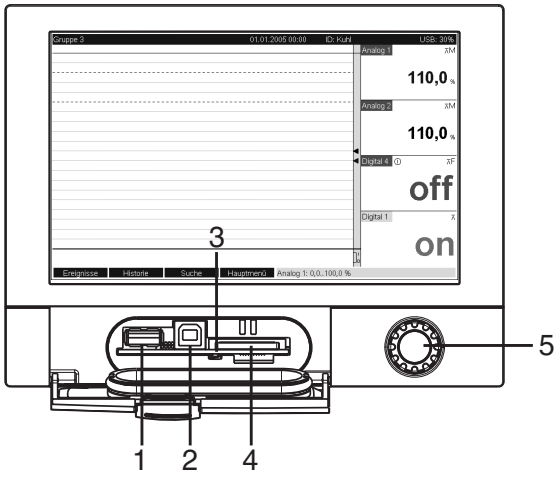


Fig. 85: Front of unit with open flap/keyboard

1: USB A socket "host" e.g. for USB memory stick, external keyboard, bar code reader or printer
2: USB B socket "Function" e.g. to connect to PC or laptop
3: LED at SD slot. Yellow LED lit when the unit writes to the SD card or reads it.
4: Slot for SD card
5: Navigator

1 x USB connection, type A (host)
A USB 2.0 connection is available on a shielded USB A socket at the front of the unit. A USB stick as a memory medium, a keyboard, a USB hub, a bar code reader or a printer (PCL5c or higher) can be connected to this interface.

1 x USB connection, type B (function)
A USB 2.0 connection is available on a shielded USB B socket at the front of the unit. This can be used to connect the unit for communication with a laptop for example.

USB at the rear of the unit

2 x USB connection, type A (host) (interface slot)
Two USB 2.0 connections are available on shielded USB A sockets at the rear of the unit. A USB stick as a memory medium, a keyboard, a USB hub, a bar code reader or a printer (PCL5c or higher) can be connected to these interfaces.

Note!
- The USB 2.0 connections are compatible with USB 1.1, i.e. communication is possible.
- The assignment of the USB ports corresponds to the standard such that shielded standard cables with a maximum length of 3 meters (9.8 ft) can be used here.
- Multiple USB sticks cannot be operated simultaneously. The USB stick that was first connected has priority.

USB printer reference list:

HP Color LaserJet CP1515n; Kyocera FS-C5015N

Note!
The printer must support PCL5c (or higher). GDI printers are not supported!

USB bar code reader reference list:

Datalogic Gryphon D230; Metrologic MS5100 Eclipse Series; Symbol LS2208

10.4.2 Ethernet interface (interface slot):

An IEEE 802.3-compatible connection is available on a shielded RJ45 plug connector on the rear of the unit as the network connection. This can be used to connect the unit with a hub or switch to units in an office environment. For safe spacing distances, the office equipment standard EN 60950 must be observed. The assignment corresponds to a standards-compliant MDI port (AT&T258) such that a shielded 1:1 cable with a maximum length of 100 meters (328 ft) can be used here. The Ethernet port is designed as 10/100–BASE–T. Direct connection to a PC is possible with a crossover cable. Half-duplex and full-duplex data transfer is supported. Alternatively, a GPRS modem can also be connected to the Ethernet interface.
The unit can be used in the network as a "Web server". Two Ethernet function LEDs on the rear of the unit.

10.4.3 Serial RS232/RS485 interface (interface slot):

A combined RS232/RS485 connection is available on a shielded SUB D9 socket at the rear of the unit. This can be used for data or program transfer and to connect a modem. For communication via modem, we recommend an industrial modem with a watchdog function.
The following baudrates are supported: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Max. line length with shielded cable: 2 m (6.6 ft) (RS232) or 1000 m (3281 ft) (RS485)
Both interfaces are galvanically isolated from the system.
The RS232/RS485 interfaces cannot be used simultaneously.

10.4.4 Remote interrogation with analog or GSM/GPRS wireless modem:

- Analog modem:
  An analog modem (e.g. Devolo or WESTERMO), which is connected to the RS232 interface with a special modem cable (see Accessories RXU10-A1), is recommended for industry.
- GSM/GPRS wireless modem:
  A GSM/GPRS wireless modem (e.g. Siemens, INSYS or WESTERMO, incl. antenna and power unit), which is connected to the RS232 interface with a special modem cable (RXU10-A1 accessory), is recommended for industry. Important: the wireless modem needs a SIM card and data transfer subscription. In addition, it must be possible to deactivate the PIN prompt.

10.4.5 Bus interface (interface slot, optional)

- PROFIBUS–DP slave:
  The unit can be integrated into a fieldbus system as per the PROFIBUS–DP standard by means of the PROFIBUS-DP interface. Up to 40 analog inputs and 14 digital inputs can be transmitted via PROFIBUS–DP and stored in the unit. For bidirectional communication in cyclic data transfer.
  Baudrate: maximum 12 Mbit/s
- Modbus RTU slave:
  Up to 40 analog inputs and 14 digital inputs can be transmitted via Modbus and stored in the unit.
- Ethernet Modbus TCP slave:
  Connection to SCADA systems (Modbus master). Up to 40 analog inputs and 14 digital inputs can be transmitted via Modbus and stored in the unit.

10.5 Performance characteristics

10.5.1 Reference operating conditions

Ambient temperature: 25 °C ± 5 K (77 °F ± 9 °F)
Air humidity: 55 % ± 10 % r.h.

10.5.2 Maximum measured error

See Input, see Section 10.1.1

10.5.3 Temperature drift

Cu50, Cu53, Cu100, Pt46 and Pt50: max. ± 0.02 %/K (of measuring range)
All other ranges: max. ± 0.01 %/K (of measuring range)

10.5.4 Long-term drift

To IEC 61298-2: max. ± 0.1 %/year (of measuring range)

10.6 Installation

10.6.1 Orientation

Operating position as per DIN 16 257, NL 90 ± 30°

10.6.2 Installation instructions

(Panel mounting, see Section 3)

- Installation depth without terminal cover: approx. 158 mm (6.22") (incl. terminals and fastening clips)
- Installation depth with terminal cover: approx. 197 mm (7,76")
- Panel cutout: 138^{+1} x 138^{+1} mm ($5.43^{+0.04}$ x $5.43^{+0.04}$")
- Panel thickness: 2 to 40 mm (0.08 to 1.58")
- Max. viewing angle range: from the display central axis 50° in all directions
- Securing to DIN 43 834

10.7 Environment

10.7.1 Ambient temperature range

-10 to 50 °C (14 to 122 °F)

10.7.2 Storage temperature

-20 to +60 °C (-4 to 140 °F)

10.7.3 Climate class

To IEC 60654-1: B1

10.7.4 Degree of protection

Front-panel IP65 (IEC 60529, Cat. 2) NEMA 4
Rear-panel IP20 (IEC 60529, Cat. 2)

10.7.5 Electrical safety

IEC 61010-1, protection class I
Low voltage: overvoltage category II
Environment < 3000 m (< 9843 ft) above MSL (mean sea level)

10.7.6 Electromagnetic compatibility (EMC)

Interference immunity:

To IEC 61326 (industrial environment) and NAMUR NE21:

- ESD (electrostatic discharge): IEC 61000-4-2 severity 3 (6/8 kV)
- HF field (electromagnetic interference fields): IEC 61000-4-3: severity 3 (10 V/m)
- Burst (quick transient disturbance variables): IEC 61000-4-4 severity 3 (1 kV signal, 2 kV power supply)
- Surge on power line: IEC 61000-4-5: 2 kV asymmetrical, 1 kV symmetrical
- Surge on signal line: IEC 61000-4-5: 1 kV asymmetrical (with external protection element)
- Conducted HF: IEC 61000-4-6: 150 kHz to 80 MHz, 10 V
- Power failure: IEC 61000-4-11 (> 20 ms/0%)
- Voltage variation: IEC 61000-4-11 (40% / 0%)

Emission:

To IEC 61326: Class A (operation in industrial environment)

Interference voltage:

Power cable: To CISPR 16-1/-2: Class A

Interference current:

Ethernet cable: To EN 50022: Class A

Interference field intensity:

Housing/all connections: To CISPR 16: Class A

Interference voltage suppression:

- Common mode interference voltage suppression: IEC 61298-3:
  Analog inputs: 80 dB at 60 V and 50 Hz / 60 Hz
- Push-pull interference voltage suppression: IEC 61298-3:
  Analog inputs: 40 dB at 50 Hz / 60 Hz, for measuring range/10

10.8 Mechanical construction

10.8.1 Design, dimensions

Panel-mounted instrument:

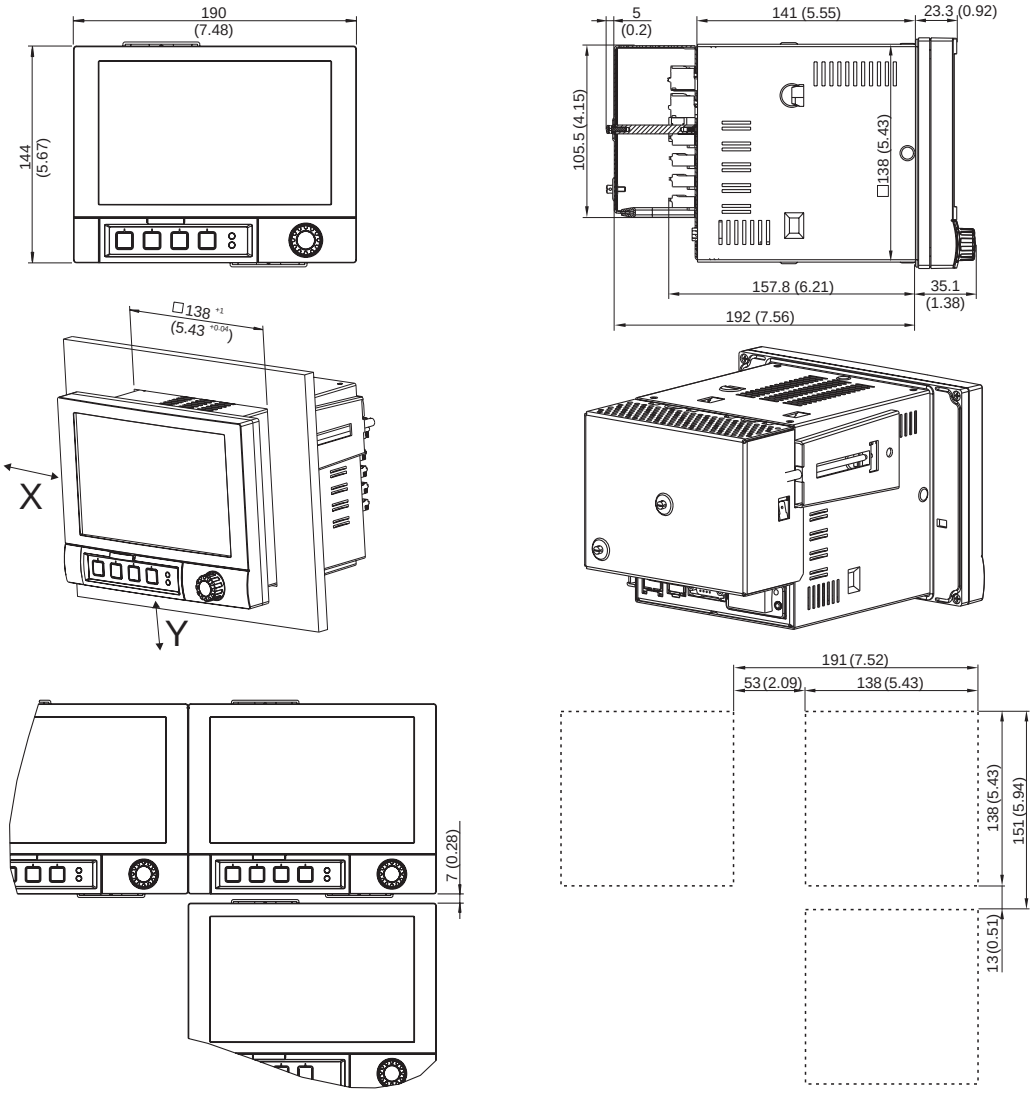


Fig. 86: All dimensions in mm or (inch)

Design, dimensions desk top housing:

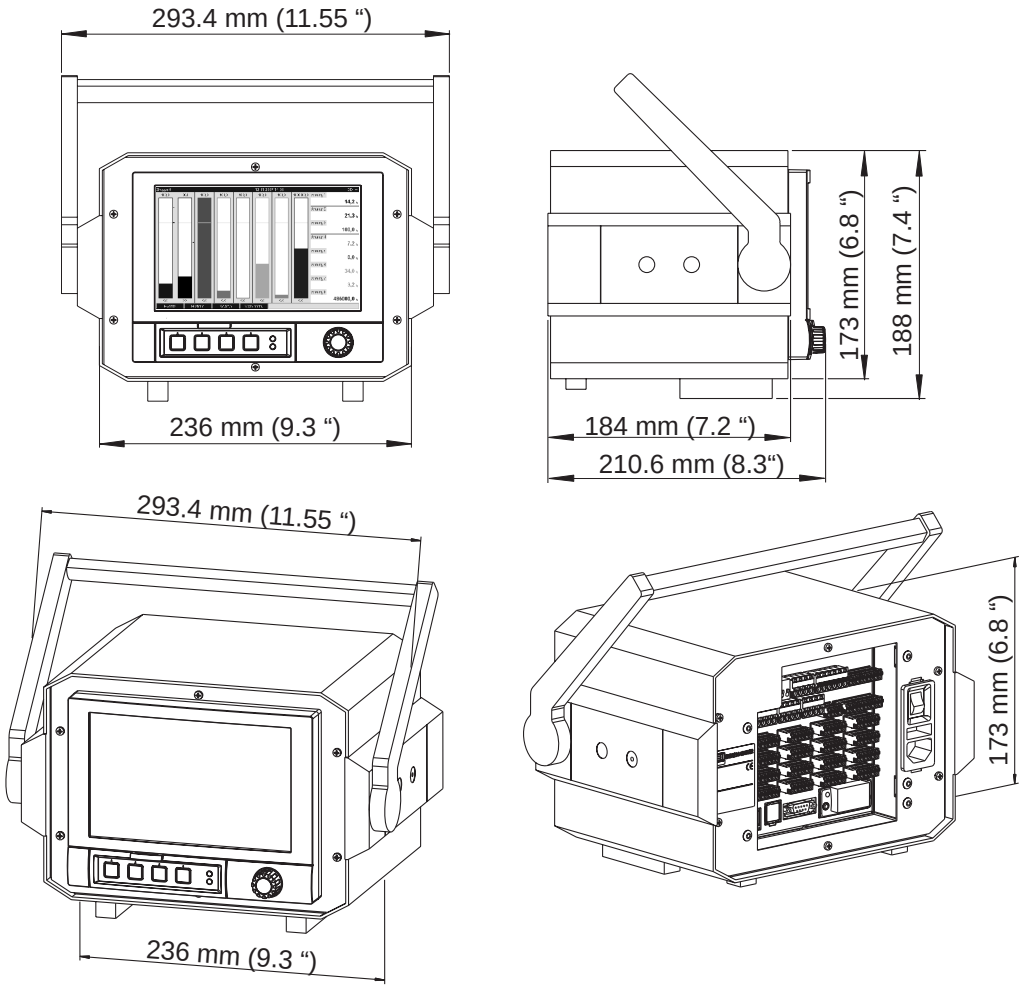


Fig. 87: All dimensions in mm or (inch)

10.8.2 Weight

- Panel-mounted instrument, maximum configuration: approx. 2 kg (4.4 lb)
- Desk top housing, maximum configuration: approx. 3.7 kg (8.2 lb)

10.8.3 Material

Front (front part incl. display panel): transparent plastic (PC UL94-V2) (border area painted)
Flap (front): plastic (ABS UL94-V2)
Membrane keypad: polyester (PC-ABS UL94-V2)
Jog/shuttle dial ("navigator"): plastic (ABS UL94-V2)
Intermediate frame (front to panel): plastic (PA6-GF15 UL94-V2)
Casing: St 12 ZE (galvanized sheet steel)
Rear panel: St 12 ZE (galvanized sheet steel)

Note!
All materials are free from silicone.

Desk top housing:
Half shell housing: Sheet steel, electrolytic galvanized (powder-coated)
Side profiles: extruded aluminum sheath (powder-coated)
Profile ending: pigmented Polyamide
Housing feet: pigmented Polyamide, glass fiber reinforced

10.9 Human interface

10.9.1 Display elements

Type:

Wide-screen TFT color graphic display

Size (Screen size):

178 mm (7")

Resolution:

Wide VGA 384,000 pixels (800 x 480 pixels)

Background illumination:

50,000 h half value time (= half brightness)

Number of colors:

262,000 viewable colors, 256 colors used

Viewing angle:

Max. viewing angle range: from the display central axis 50° in all directions

Screen display:

- Users can choose between black or white for the background color
- Active channels can be assigned to up to 10 groups. For the purposes of clear identification, these groups are given a name e.g. "Temperatures boiler 1" or "Daily average values of all boilers"
- Scales linear or logarithmic
- Replay function: rapid callup of history data with zoom function
- Preformatted screen display, such as horizontal or vertical curves, bar graphs, instrument display, circular chart or digital display, allow rapid and uncomplicated commissioning:

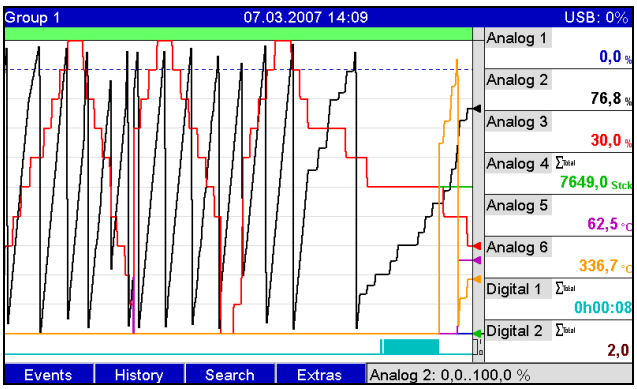


Fig. 88: Curve display

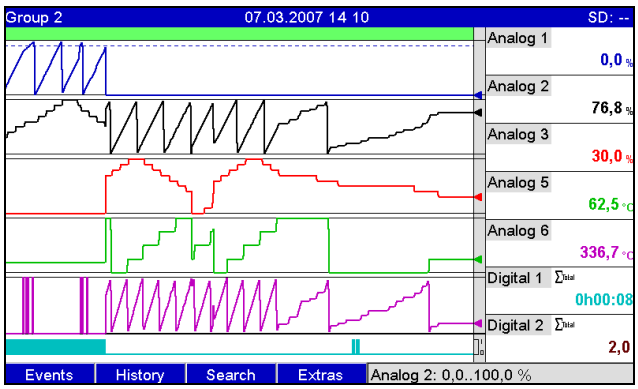


Fig. 89: Curve in ranges

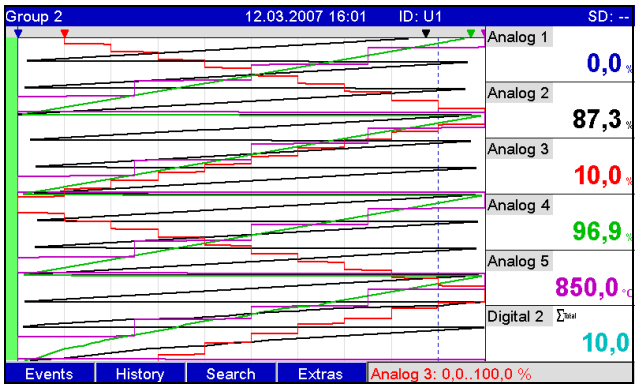


Fig. 90: Waterfall

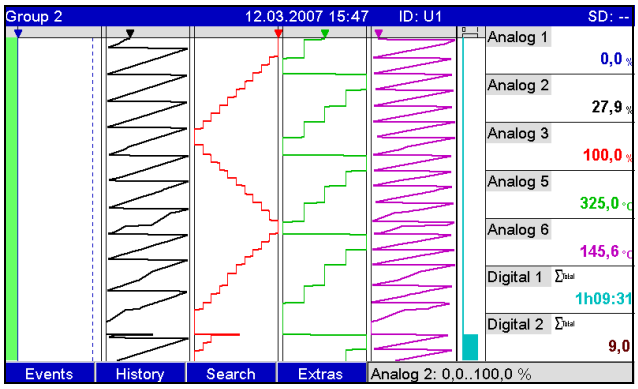


Fig. 91: Waterfall in ranges

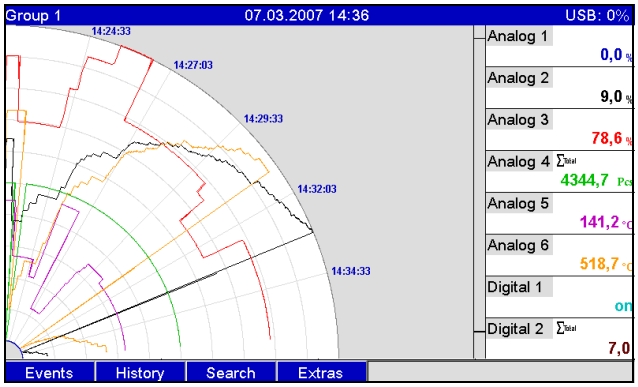


Fig. 92: Circular chart

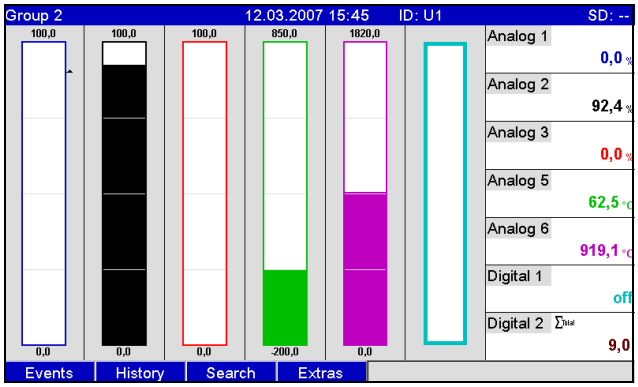


Fig. 93: Bar graph

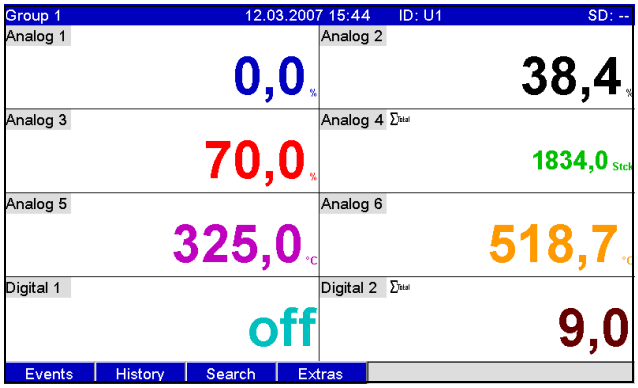


Fig. 94: Digital display

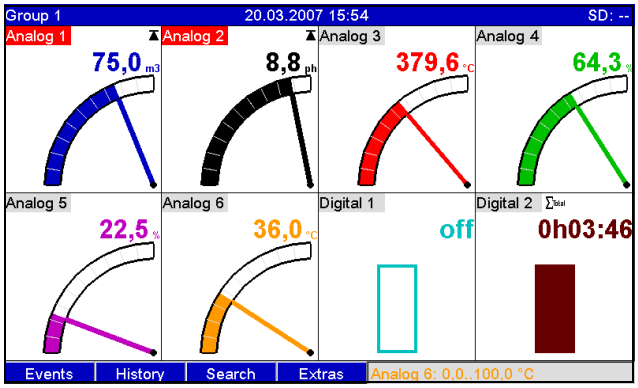


Fig. 95: Instrument display

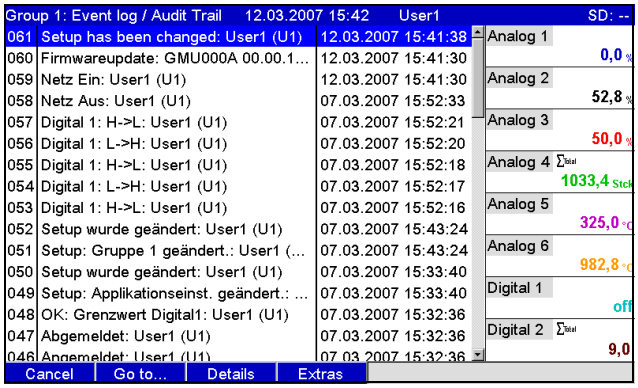


Fig. 96: Event log

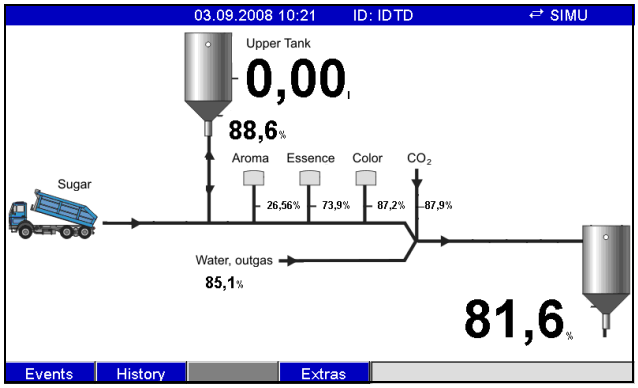


Fig. 97: Process display

10.9.2 Operating elements

Unit keyboard:

Option of operation and configuration via navigator (jog/shuttle dial) and 4 softkeys on the front side in interactive dialog with the screen, or using PC software supplied. Integrated online help displayed at the press of a button.

External keyboard:

Additionally an external keyboard for operation and configuration can be connected to the equipment (USB type A " Host"). Radio keyboards are not supported.

10.9.3 Saving data

Memory cycle:

- Selectable memory cycle: off, 100ms, 1s / 2s / 3s / 4s / 5s / 10s / 15s / 20s / 30s / 1min / 2min / 3min / 4min / 5min / 10min / 30min / 1h
- High-speed saving (100ms) can be configured for up to 8 channels of group 1

Measured data storage, internal memory:

- Setup data memory, measured data memory and program memory: permanent backup of setup data and measured data in internal Flash memory with power failure protection (256 MB, nonvolatile)
- Data buffering and RTC buffering with lithium cell (buffering for 6 years; replace after 10 years).
- Even after being exported to a USB stick or SD card, measured data remain in the unit for a long time and can be reexported. This is important if the external data storage unit is lost or for official audits.
- Plant monitoring functions with operated hours counter, calibration monitoring, monitoring of storage medium exchange and other functions for monitoring the unit status.

External memory:

- Cyclic copy of the measured data for archiving on SD card (secure digital memory card)
- SD cards supported: 256 MB and 512 MB. Only use "Industrial Grade" SD cards (see Accessories).
- USB sticks supported: 256 MB, 512 MB, 1 GB and 2 GB. It cannot be ensured that USB sticks from all manufacturers will work perfectly. For this reason, an "Industrial Grade" SD card is recommended for safe data recording (see Accessories).
- A yellow LED beside the SD slot indicates data access. The SD card may not be removed while this LED is lit. Risk of losing data!

Typical recording length:

Prerequisites for following tables:

- No limit value violation/event storage
- Digital input not used
- Signal analysis deactivated

✎ Note!
Frequent entries in the event log reduce the memory availability!

Internal memory 256 MB (weeks, days, hours):

Analog inputs	Memory cycle 5 min.	Memory cycle 1 min.	Memory cycle 30 s.	Memory cycle 10 s.	Memory cycle 1 s.
1	7211, 5, 16	1869, 5, 2	957, 4, 15	324, 3, 11	32, 3, 18
4	3169, 2, 5	718, 6, 20	363, 5, 5	121, 4, 1	12, 1, 9
12	1198, 3, 23	254, 6, 7	128, 2, 8	42, 6, 18	4, 2, 3
20	739, 0 ,4	155, 2, 22	78, 0, 5	26, 0, 18	2, 4, 7

External SD card 254 MB (weeks, days, hours):

Analog inputs	Memory cycle 5 min.	Memory cycle 1 min.	Memory cycle 30 s.	Memory cycle 10 s.	Memory cycle 1 s.
1	9703, 3, 19	2515, 5, 3	1288, 3, 19	436, 4, 7	43, 5, 11
4	4264, 2, 8	967, 2, 18	489, 2, 22	163, 4, 3	16, 2, 21
12	1612, 4, 19	342, 6, 19	172, 4, 14	57, 5, 17	5, 5, 13
20	994, 2, 13	209, 0, 20	104, 6, 22	35, 0, 22	3, 3, 15

Calculating the recording duration:

The recording duration is calculated using the "storage calculator" (can be found in the "Tools" directory on the PC software CD–ROM supplied).

Pixels available for measured value curves:

Display method	Pixel
Curve display with instantaneous value display	566
Curve display without instantaneous value display	786
Waterfall	409
Circular chart	Not available

Note!
1 pixel = 1 measuring date
With 100 ms storage cycle -> 1 s = 10 pixels

10.9.4 Real time clock (RTC)

Configurable summer time/normal time automated system
Power reserve: buffering via lithium battery (buffering 6 years; replace after 10 years)
Deviation: < 10 min./year
Time synchronization possible via PC software supplied or via control input.

10.9.5 Remote control, communication

- USB interface, series (front-panel), Ethernet interface and additional RS232/RS485 interface optional (rear)
- OPC server (3.0) for direct data exchange with databases or/and visualization systems
- Integrated Internet page (Web server) allows password-protected access to the device with every PC (e.g. for displaying the measured data)
- DHCP-enabled (dynamic allocation of an IP address)
- Device-internal summer time/winter time changeover
- Configuring and archiving the device settings with SD card, USB stick or with PC software supplied via rear-mounted serial interface RS232/RS485 (e.g. modem), Ethernet, or USB port.

Functions of the PC software supplied:
- Device configuration, measured data visualization, measured data administration and measured data export
- Export the measured data of individual channels to separate files or several channels to one file

10.10 Certificates and approvals

10.10.1 CE mark

The measuring system meets the legal requirements of the EC directives. The manufacturer confirms successful testing of the device by affixing the CE mark.

10.10.2 UL-listed for Canada and USA

The device has been examined by Underwriters Laboratories Inc. (UL) in compliance with the UL 61010-1 and CSA C22.2 No. 61010-1 standards and has been UL-listed under the number E225237.

10.10.3 Milk pasteurization approval

The device has been examined by the Technical University of Munich (TUM) in compliance with the test guidelines for measuring, control and safety devices for milk heating plants and has been listed under the number W-M1/07.

10.10.4 Other standards and guidelines

CSA approval
CAN/CSA-C22.2 No. 61010-1-04 Safety requirements for electrical equipment for measurement, control, and laboratory use - General requirements, Second Edition.

10.10.5 Electronic recording/electronic signature

FDA 21 CFR11
The device meets the requirements of the "Food and Drug Administration" for electronic recording/ electronic signature.

10.11 Accessories

Accessories available, see Section 8

Index

Numerics

1 pulse = ... 62
1 second/hour = ... 62

A

Access protection 33
Acknowledging messages 50
Action 63
Actual date 43
Actual time 43
Adjust brightness 88
Administrators 101
Alarm cycle 76–77
Ambient temperature range 129
Analog inputs 18, 53
Analog multifunction input channel 1-6 122
Analog outputs 17
Analog/pulse outputs 71
Analysis 47
Application 74
Audit trail 99
Auxiliary voltage output 124

B

Background graphic 105
Background illumination 132
Bar graph 79, 86
Basic settings 41
Baudrate 45
Beginning of summer time 43

C

Cable specification 14, 126
Calc. factor 57, 67
Calculating the recording duration 135
Calculation active 65
Calibration 101
CE mark 136
Change group 85
Change password 88
Channel 75
Channel ident 53, 61, 65
Check table 70
Circuit diagram 12
Circular chart 79, 86
Climate class 129
Collective relay 73
Color for displaying the assigned input 77
Communication 45
Communication in the network using the PC software . . . 30
Communication via Ethernet (TCP/IP) 29
Communication via modem 28
Communication via serial interfaces 28
Communication via USB 28
Comparison point 55
Comparison temp 55
Configuration file 105
Configuring by PC 33
Configuring the operating language 32, 98
Connection 53
Connection data interface, communication 126
Context menu 107
Control input 61
Copy memory completely 93
Copy time frame 93
Correction RPT 56
Correction value 56
Creating a user account 103
Creating process-related graphics on the PC 105
Curve 85
Curve display 79
Curve in ranges 85

D

Damping/filter 55, 71
Data analysis 112
Data bits 45
Data transmission to the PC software 111
Date format 43
Date/time setup 43
Decade 77
Decimal point 54, 62, 66
Decimal separator 42
Defining authorization rights 102
Degree of protection 129
Delete internal memory 101
Delete SD card 94
Deleting a user account 103
Description ´H´ 62, 66
Description ´L´ 62, 66
Design, dimensions 130
Device fault 42
Device information 82
Device operational 42
Device tag 42, 82
DHCP 46
Diagnosis message 99
Diagnosis/Simulation 82
Diagnosis/simulation 99
Digital display 87
Digital I/O 16
Digital inputs 61, 123
Dim. linearized value 69
Direct access 39
Display 77
Display elements 132
Display/operation 84
Double messages 50
Draw help line 76

E

Edit table 70
Electrical safety 129
Electromagnetic compatibility 5

Electromagnetic compatibility (EMC) 129
Emission 129
enabling a software option 113
End of summer time 44
Engineering unit 62, 66
ENP version 83
Error value 58
Ethernet 21, 46
Ethernet commissioning 30
Ethernet connection 22
Ethernet interface 127
Event + operation time 61
Event log 88, 99
Event message 62, 67
Event text 76
Event text H->L 63, 67
Event text L->H 63, 67
Expert 82
External memory 49, 134
Extras - Change password 88
Extras - Login 88
Extras - Logoff 88
Extras - Set points 97

F

Fault mode 58–59, 67, 72
FDA 21 CFR Part 11 44
Filter 55
Firmware version 82
Formula 65
Frequency 126
Full scale value 71

G

Gateway 47
GPRS modem 22, 127
Grid division 77

H

Hardware 100
History 89
Hysteresis (%) 75
Hysteresis (abs.) 75
Hysteresis type 75

I

Illustration of spare parts 119
Incoming acceptance 8
Initialize modem 100
Input factor in 62
Input frequency 124
Input level 124
Input principle 39
Input resistance 122
installation dimensions 9
Installation instructions 128
Installing the PC software 28
Instantaneous value 54
Instrument display 87
Interference current 129
Interference field intensity 129
Interference immunity 129
Interference voltage 129
Interference voltage suppression 130
Internal memory 110
IP address 30, 47

L

Language 42
LED mode 42
LEDs 22
Limit value 75
Limit values 123
Linearization 69
Linearized value 69
List of spare parts 119
Load setup 93
Load user administration 94
Login 88
Logoff 88
Long-term drift 128
Lower frequency 54
LV messages 76

M

MAC address 46
Main menu 38, 98
Material 131
Mathematics 65
Maximum contact load 124
Maximum measured error 122
Meas. range end 55, 75
Measured value correction 56, 72
Measured variable, measuring range 122
Memory buildup 49
Memory information 100
Messages 50
Modbus 23
Modem at the PC 29
Modem at the unit 29
Modem cable assignment 29
Mounting tool 8

N

Nameplate 7
NAMUR NE43 58
NT/ST changeover 43
NT/ST region 43
Number of colors 132

O

Offline data verification, analysis and printout 112
On/off event 61
Open format 49
Operating mode of the SD card and USB stick 111
Operating time 49, 61
Operation via the external USB keyboard 26
Order code 82
Orientation 128
Outputs 71

P

Panel mounting 9
Parity 46
Password rules 102
PC database 30
Plot type 54, 66
Point x 70
Points 69
Port 46
Port address 30
Power consumption 126
PRESET 42
Printout 95
Process-related graphic 87, 94
PROFIBUS 23
Program name 83
Protected by 44
Protected format 49
Protocols 100
Pulse counter 61
Pulse length 124
Pulse outputs 71
Pulse value 71
Pulse width 71

Q

Quantity from time 61

R

Range 53
Range start 55, 75
Real time clock (RTC) 135
Record duration 63
Recording length 134
Reference channel 71
Relay 15, 17, 73
Relay outputs 124
Release code 44
Remote control 136
Remote controlled 73
Remote monitoring of process values 81
Remove safely 93
Repairs 5
Reset device oper. time 83
Reset LCD operating time 83
Reset relay 76
Reset to zero 48
Resolution 123, 132
Response time 124
RS232/RS485 28
RS232/RS485 interface 21, 127

S

Save as 49
Save cycle 76–77
Save event 63, 67, 76
Save setup 93
Save user administration 93
Saving data 134
Scan rate 123
Screen size 132
Screensaver 50
Screenshot 94, 96
Scrolling through measured values 89
Scrolling through saved measured values 89
Search criterion 90, 92, 95
Search filter 90
Search in trace 90
Security 44
Separator for CSV 49
Serial number 82
Set point code 45
Set points 74
Setup - Application 74
Setup - Inputs 52
Setup - Outputs 71
Setup - System 41
Setup by SD card 35
Setup directly at the device (using keys/Navigator) 37
Setup screen 38
Setup using a USB stick 36
Setup via interface/PC software 34–35
Signal 53
Signal analysis 47, 92
Signal change dy 75
Signal group 77
Simulation 100
SMTP error code 118
Softkeys 80
Spare parts structure for the CPU with software 121
Spring terminals 14
Stack memory 49
Start search 90, 92, 95
Start value 71
Stop bits 46
Storage temperature 129
Subnetmask 47
Subsequent commenting, "Text" softkey 91
Subsequent reporting, "Text" softkey 89, 91
Supply voltage 15, 126
Switches relay 67, 76
Synchron. time 48

T

Technical improvement 5
Temp. unit 42
Temperature drift 128
Test bar code reader 100
Texts 79, 82
The result is 65
Threshold value 57, 67
Time delay 75
Time format 43
Time span dt 75
Totalization 57, 67
Totalization base 67
Totalizer 64
Transmitter power supply 13–14

Transport and storage 8
Type 75

U

UL-listed for Canada and USA 136
Unit address 45
Unit/dimension counter 54
Upper frequency 55
USB at the front of the unit 19, 126
USB at the rear of the unit 19, 127
USB devices 100
USB driver installation 28
USB port 126
USB units 19
User administration 101
Using auxiliary voltage output as the transmitter power supply 13–14
UTC time zone 43

V

Viewing angle 132
Viewing data in a spreadsheet (e.g. Excel) 112

W

Warning at 49
Waterfall 85
Waterfall in ranges 86
Web server 81
Week starting on 48
Weight 131
Working temperature range 8

X

x-value 70

Y

y-value 70

Z

Zoom 55, 66, 89, 91

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