



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



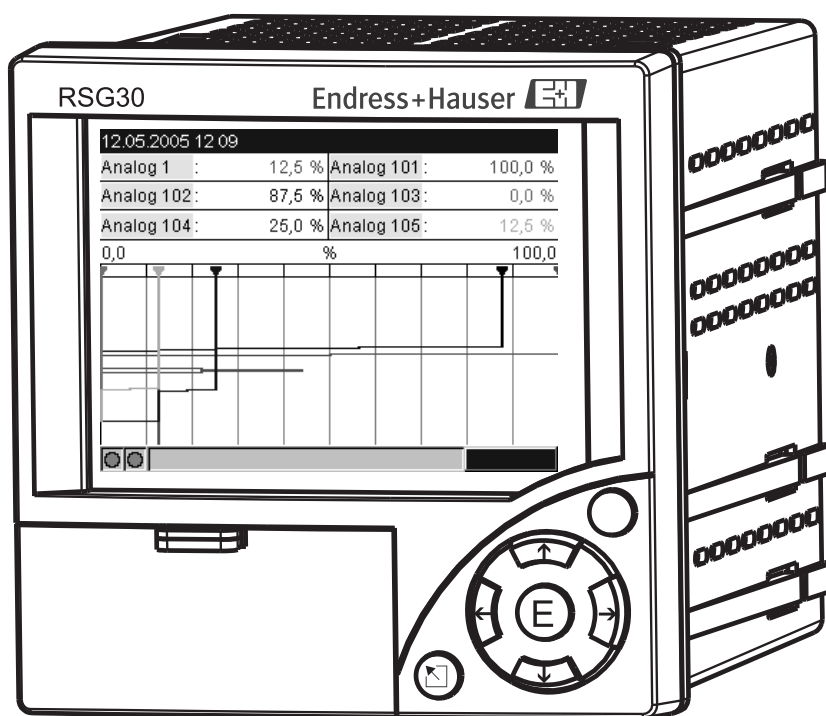
Services



Solutions

## Operating Instructions

# Multi Channel Recorder RSG30 Ecograph T



BA194R/09/en/13.10  
No.: 51009564

Software  
ETU00xA, V2.02.xx

**Endress+Hauser**

People for Process Automation

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## Brief overview

For quick and easy commissioning:

1. Consider the safety instructions	Page 5
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2. Install the unit	Page 8
↓	
3. Wire up the unit	Page 11
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4. Install the provided PC software	Page 22
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7. Transmit the set up files to the unit	Page 27

## Brief Operating Instructions

Your new unit has the Operating Instructions built-in. The unit's simple control system enables you to commission for many applications, practically without any paper. Your unit displays instructions at the push of a button directly on screen. This description is nevertheless delivered with the unit – it is a supplement to the Operating Instructions built into the unit. Anything that is not described directly at the unit by plain text or menus is explained here.

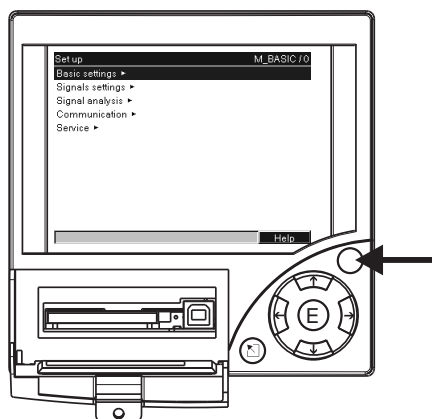


Fig. 1: Variable softkey (e.g. calling up internal Help function in the Setup menu)

## 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.

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# 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.

### Desk top version



#### Warning!

- The mains plug must only be inserted into a socket with grounding contact.
- The protective effect must not be removed by an extension lead without ground wire.
- Relay outputs:  $U(\text{max}) = 30 \text{ V eff (AC)} / 60 \text{ V (DC)}$

### 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.

## 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:

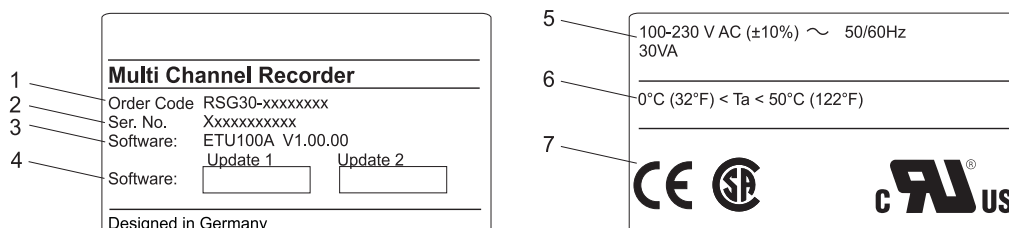


Fig. 2:

1. Order code
2. Serial number
3. Software version
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)
- 4 fastening clips
- USB cable
- Optional CompactFlash CF card (CF card is enclosed separately.)
- PC operating and configuration software on CD-ROM
- Delivery note
- Multilanguage Brief Operating Instructions as hard copy
- Operating Instructions on CD-ROM
- locking plate

Anything missing? Then please inform your supplier.

### 2.3 Certificates and approvals

An overview of all certificates and approvals can be found in the Technical Data, Section 10.

## 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 contents 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:

0 to 50 °C (32 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 )
- Environment at front in accordance with unit ingress protection IP 54

### 3.3 Installation instructions

#### 3.3.1 Mounting tool

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



### 3.3.2 Panel mounting, installation dimensions

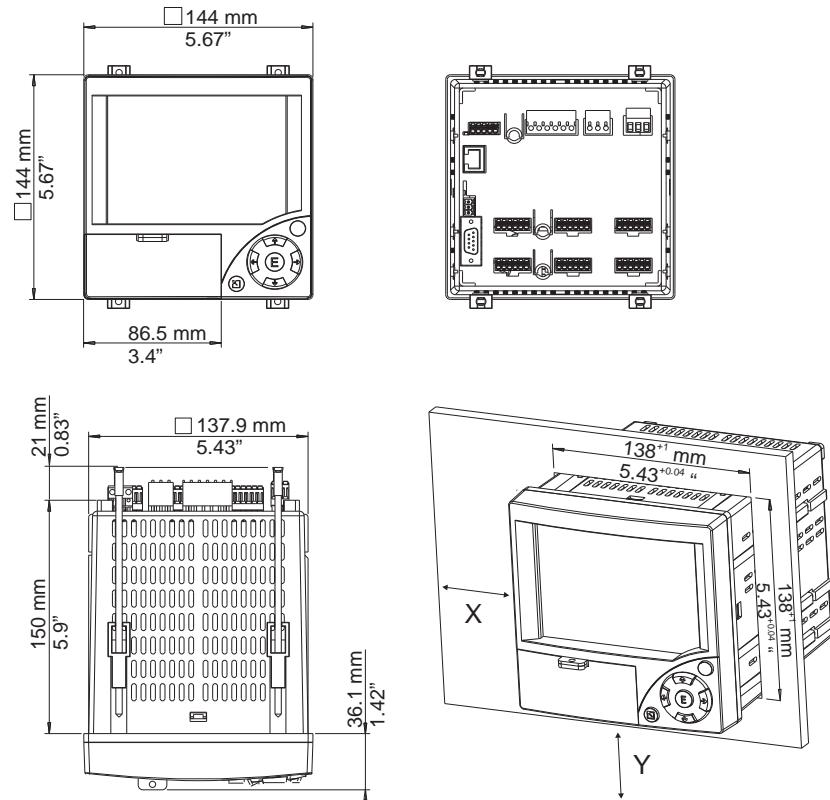


Fig. 3: Panel mounting and installation dimensions

- Installation depth: approx. 171 mm (6.73 inch) (incl. terminals and fastening clips)
  - Panel cutout:  $138^{+1} \times 138^{+1}$  mm ( $5.43^{+0.04} \times 5.43^{+0.04}$  inch)
  - Panel thickness: 2 to 40 mm (0.08 to 1.57 inch)
  - Maximum point of view range: From the display center 50° to the left and right, 20° upward, 30° downward.
  - 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 in) from the walls and other units.
  2. Hold the unit level and then hang jack screws in the openings (2 x top, 2 x bottom).
  3. Tighten the screws on the jack screws equally with a screwdriver, such that a secure seal to the control panel is guaranteed.



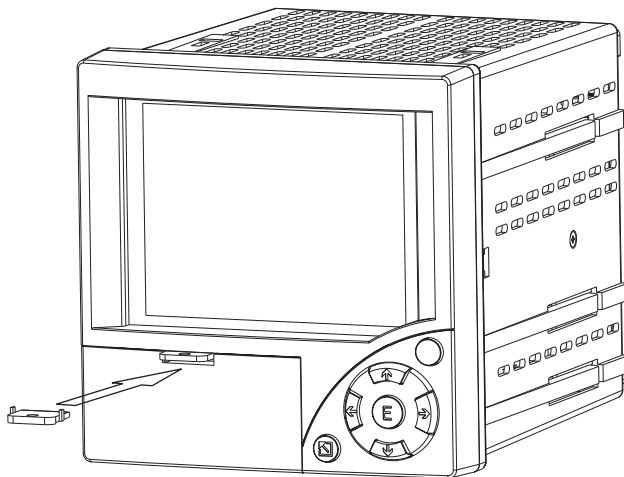
**Note!**

A distance of min. 15 mm (0.59 in) between the units has to be observed if aligning the units in the Y-direction (vertically above one another).

The units can be arranged horizontally beside one another in the X direction without any spacing between the units.

### 3.4 Mechanical locking

The CompactFlash card can be secured against unauthorized removal using the locking plate supplied. For this purpose, insert the locking plate into the slit below the handle of the cover plate (see Fig. 4). Now you can lead-seal or seal the cover plate with a suitable lock.



*Fig. 4: Inserting the locking plate*

### 3.5 Post-installation check

After installing the control panel, please check the following points:

- Is the unit fixed firmly in the center of the control panel cutout?
- Does the seal run all around the housing collar?

## 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 to the unit (easily accessible) and be labeled as a separator.
- An overcurrent protective unit (nominal current  $\leq 10$  A) is required for the power cable.



**Note!**

Please also refer to the terminal diagram on the rear of the unit.

#### 4.1.1 Channel color table

When wiring the analog channels, please ensure that the color display on the display for the individual channels is specified as follows:

3-channel version			
<b>Analog 1:</b>	Blue	<b>Analog 2:</b>	Red
<b>Analog 3:</b>	Green	<b>Digital 1:</b>	Cyan
<b>Digital 2:</b>	Red	<b>Digital 3:</b>	Green

6-channel version			
<b>Analog 1:</b>	Magenta	<b>Analog 2:</b>	Red
<b>Analog 3:</b>	Black	<b>Analog 4:</b>	Green
<b>Analog 5:</b>	Blue	<b>Analog 6:</b>	Brown
<b>Digital 1:</b>	Cyan	<b>Digital 3:</b>	Red
<b>Digital 2:</b>	Green		

## 4.1.2 Wiring diagram

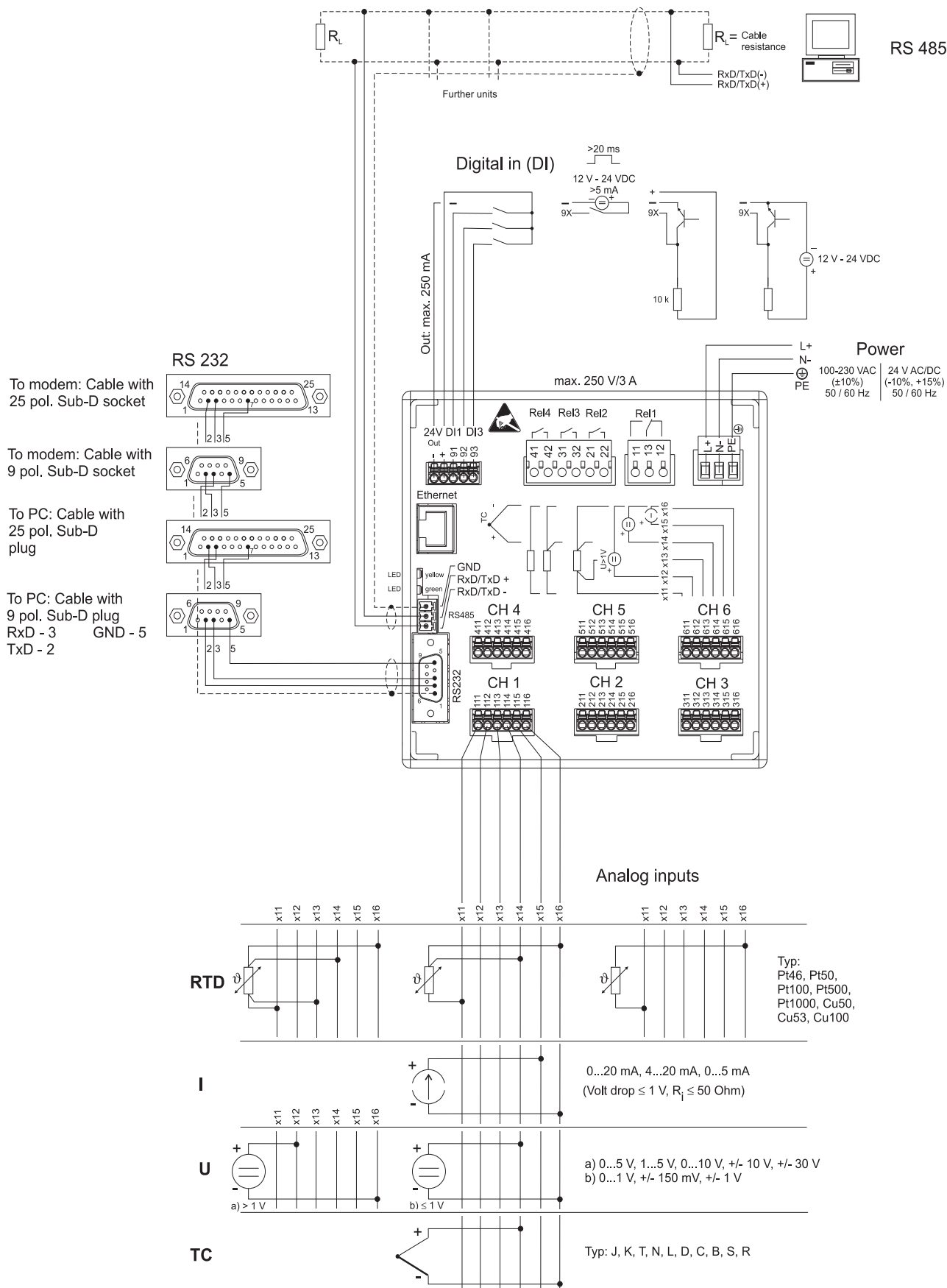


Fig. 5: Circuit diagram

### 4.1.3 Auxiliary voltage output for 2-wire sensors

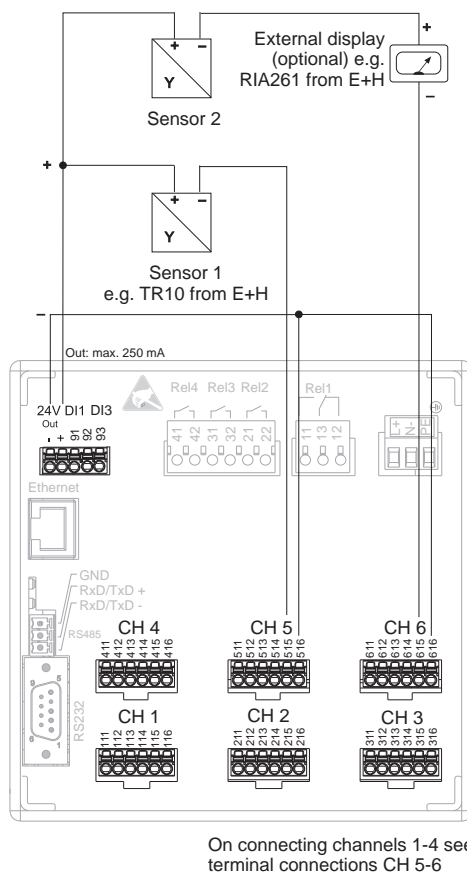


Fig. 6: Using the auxiliary voltage output as power supply for 2-wire sensors (at current measurement range)

### 4.1.4 Auxiliary voltage output for 4-wire sensors

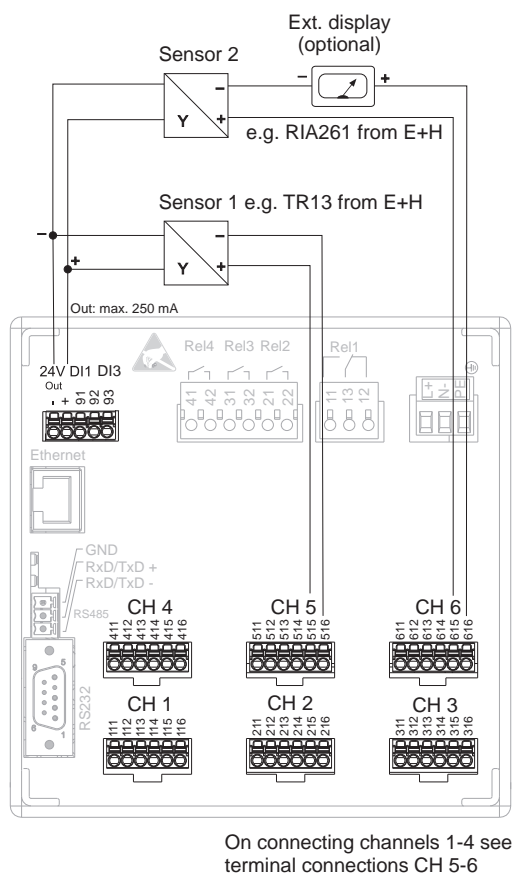


Fig. 7: Using the auxiliary voltage output as power supply for 4-wire sensors (at current measurement range)

## 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 unlocked with a slotted screwdriver (size 0).

Please note the following when connecting:

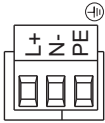
- Digital I/O wire cross-section, RS485 and analog inputs: max. 1.5 mm<sup>2</sup> (14 AWG) (spring terminals)
- Power wire cross-section: max. 2.5 mm<sup>2</sup> (13 AWG) (screw terminals)
- Relay wire cross-section: max. 2.5 mm<sup>2</sup> (13 AWG) (spring terminals)
- Stripping length: 10 mm (0.39 in)



### Note!

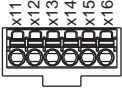
No ferrules have to be used when connecting flexible wires to spring terminals.

## 4.2.2 Supply voltage


Power supply type	Terminal		
			
100-230 VAC	L+	N-	GND
	Phase L	Zero conductor N	Ground
24 V AC/DC	L+	N-	GND
	Phase L or +	Zero conductor N or -	Ground

## 4.2.3 Analog inputs

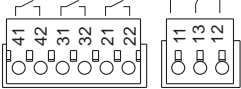
The first digit (x) of the three-digit terminal number corresponds to the associated channel (1.. to 6...: channels 1 to 6):

Type	Terminal					
	CH x 					
	x11	x12	x13	x14	x15	x16
Current					(+)	(-)
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				(+)		(-)

4.2.4 Digital I/O

Type	<b>Terminal</b> 24V DI1 DI3 Out + 91 92 93 				
	(-)	(+)	91	92	93
Digital input			Digital input 1	Digital input 2	Digital input 3
Auxiliary voltage output, not stabilized, max. 250 mA	Ground	Approx. + 24 V			

4.2.5 Relay

Type	<b>Terminal</b> Rel4 Rel3 Rel2 Rel1 								
	41	42	31	32	21	22	11	13	12
Alarm relay 1							Normally open contact (NO) <sup>2)</sup>	Changeover contact	Normally closed contact (NC) <sup>1)</sup>
Relay 2					Switching contact	Normally open contact (NO) <sup>2)</sup>			
Relay 3			Switching contact	Normally open contact (NO) <sup>2)</sup>					
Relay 4	Switching contact	Normally open contact (NO) <sup>2)</sup>							

1) NC = normally closed (breaker)  
2) NO = normally open (maker)



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



## 4.2.6 "Ethernet" option

### Ethernet connection

An IEEE 802.3 compatible connector on a shielded RJ45 plug on the rear side of the unit is available as a network connection. Through this connection, the unit can be connected 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 pin assignment corresponds to a standard MDI interface (AT&T258), so that a shielded 1:1 cable with a maximum length of 100 meters (328 ft) can be used here. The Ethernet interface is designed as 10BASE-T. Direct connection to a PC is possible with a crossover cable. Half duplex and full-duplex data communication is supported.

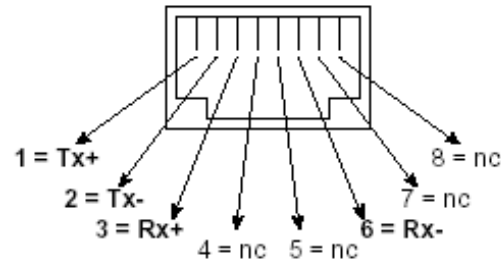


Fig. 8: RJ45 socket (assignment AT&T258)

### LED description

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.

## 4.2.7 USB connection

### USB connection

A compatible USB connection (V1.1, lowspeed 1.5 Mbit/s) is available on a shielded USB-B socket at the front of the unit. The unit can be connected to a laptop via this connection. The pin assignment corresponds to a standard USB interface, so that a shielded standard cable with a maximum length of 3 meters (9.8 ft) can be used here.



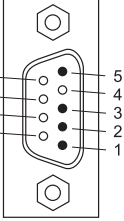
Note!

USB2.0 is compatible to USB1.1, i.e. communication is possible.

4.2.8 Option "RS232/RS485 interface"

RS232 connection

A compatible RS232 connection is available on a shielded SUB-D9 socket at the rear of the unit. This can be used to transmit data or programs or as a modem connection. The pin assignment corresponds to a standard RS232 interface, so that a shielded 1:1 cable can be used here.

	Pin of the SUB-D9 socket								
	1	2	3	4	5	6	7	8	9
RS232 assignment	Shield	TxD (data output)	RxD (data input)		GND				
	<div><div><div>Fig. 9: RS232 assignment</div></div><div><div>Caution!</div><div>Unoccupied connections should be left empty. The RS232/RS485 interfaces cannot be used simultaneously. Choose the interface to be used under “Extras – Serial Interface”.</div></div></div>								

RS485 connection

A compatible RS485 connection is available on the rear of the unit. This can be used to transmit data or programs or as a modem connection. Use a shielded cable.



Caution!  
Only one interface can be used at any one time (RS232 or RS485).

Terminal	RS485 assignment:
GND RxD/TxD + RxD/TxD -	GND RxD/TxD + RxD/TxD -

4.3 Degree of protection

At the front, the unit meets all the requirements of ingress protection IP54.

4.4 Post-connection check

After completing the unit's electrical connections, carry out the following checks:

Unit status 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

Your new unit has the Operating Instructions built-in. The unit's simple control system enables you to commission for many applications, practically without any operating instructions. Your unit displays instructions at the push of a button directly on screen. This description is a supplement to the Operating Instructions built into the unit. Anything that is not described directly in plain text or menus is explained here. We reserve the right to make alterations that contribute to technical progress.

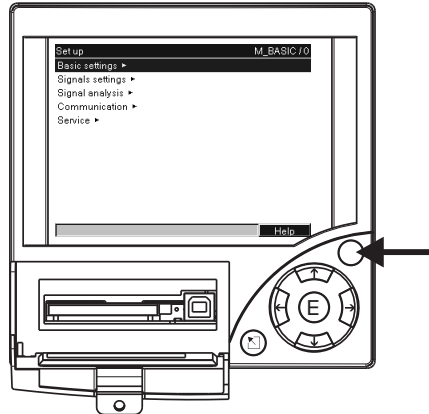


Fig. 10: Variable softkey (e.g. calling up internal Help function in the Setup menu)

## 5.2 Display and operating elements

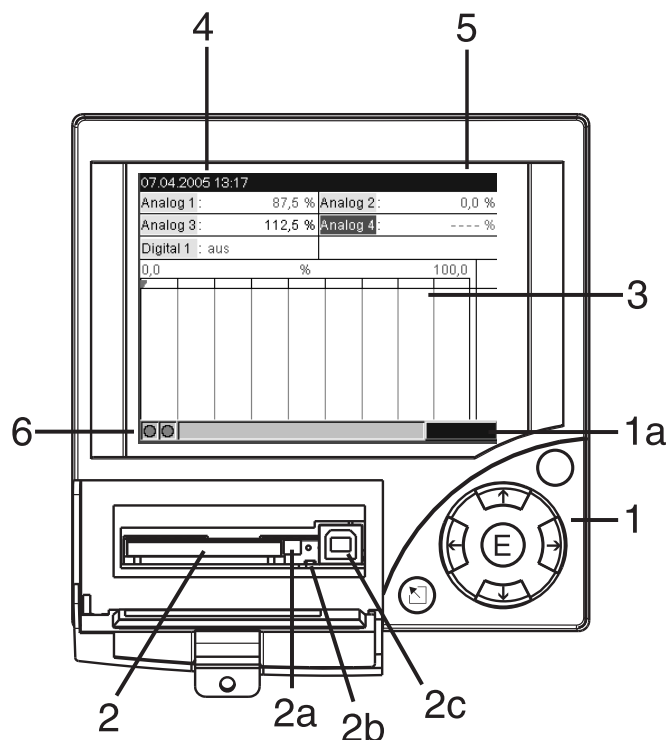



Fig. 11: Unit display / control units

Operating element (Item No.)		Operating function (Display mode = Signal display) (Setup menu = Operation in the Setup menu)
1		At display mode: Quick return to current time At Setup menu: ESC key to abort the input and/or quick return to the preceding display.
		At display mode: Changes between the various display modes (e.g. bargraph,...) At Setup menu: Moves the cursor to left or right
		At display mode: Rewinds recording (history display - "remove paper") At Setup menu: Moves the cursor bar upwards, changes parameter / signs
		At display mode: Forwards recording to current time ("wind on paper") At Setup menu: Moves the cursor bar downwards, changes parameter / signs
		At display mode: Displays main menu At Setup menu: ENTER key = Selection of the marked function, start the parameter change
		Variable softkey (e.g. calling up internal Help function in the Setup menu)
1a		Function indicator of the softkey
2		Slot for CF card
2a		Key to eject the CF card Caution! Do not actuate if LED (2b) is lit! Risk of data loss!
2b		LED at CF slot LED lights up if the unit is reading or writing to the CF card.
2c		USB socket

Operating element (Item No.)	Operating function (Display mode = Signal display) (Setup menu = Operation in the Setup menu)
3	At display mode: Window for measured value display Displays the current measured values depending on the signal display selected.   <b>Note!</b> If a measuring point has limit value status, the corresponding channel identifier is displayed in red (quick detection of limit values). When you are operating the unit, measured value acquisition continues to run without interruption.
4	At display mode: Displays the current date/time At Setup menu: Displays the operating item
5	At display mode: Indicates what portion of the CF card is already written to (in %) At Setup menu: Displays the operating code
6	At display mode: Functions of the LED displays on the display (as per NAMUR NE44:) <ul style="list-style-type: none"> <li>Green LED lights up: power supply OK, unit working without faults</li> <li>Red LED 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.</li> </ul>

### 5.3 Entering text and numbers

A virtual keyboard is available for entering text and numbers. This is opened automatically if needed. Here, use the arrow keys to select the letters you need and confirm with the "E" key.

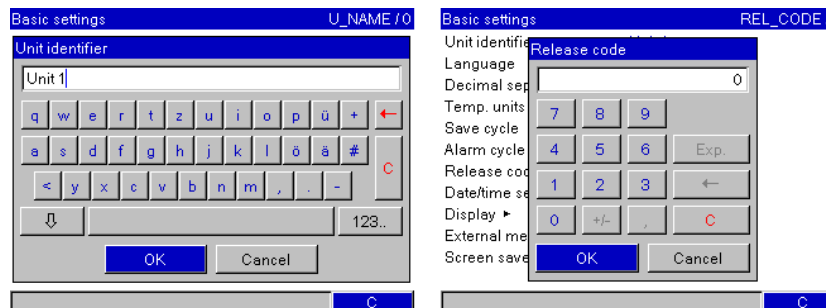




Fig. 12: Virtual keyboard

### 5.4 Overview of the symbols used

Symbol	Explanation
$\Sigma o$	Intermediate statistics
$\Sigma D$	Daily analysis
$\Sigma M$	Monthly analysis
$\Sigma Y$	Annual analysis

Symbol	Explanation
	Total analysis
	Measured value

## 5.5 Confirming error messages

Error messages on the display are acknowledged by pressing the "E" key.

## 5.6 Communication; PC software installation



Note!

The current PC operating software (CD-ROM supplied) must be installed to be able to establish communication between the unit and the PC (minimum V1.23.0.0).

### 5.6.1 Installing the provided PC software



Note!

The "Arial Unicode MS™" font must be installed on your PC to operate the provided PC software. 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!

The provided PC software is only supported by Windows® 2000 and Windows® XP. Administrator rights are required!

1. Install the supplied PC software on your computer. The program's Operating Instructions can be printed out after installation, if required.
2. After the successful installation you can call up the program under "Start - Programs".

### 5.6.2 Communication via USB / USB driver installation

Once the provided PC operating software 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 provided PC software to establish communication with the unit.



Note!

In the provided PC software, the USB interface is addressed like a COM port (serial interface). In the Windows device manager, you can determine the COM port via which the unit can be addressed. The unit is displayed in the device manager under "Connections (COM and LPT)" as "ETU00xA (Com x)". The provided PC software supports the COM-ports 1 to 20 (from version V1.21.2.0), if necessary reduce the allocation accordingly in the Windows equipment manager.

### 5.6.3 Communication via serial interfaces RS232 / RS485

The RS232 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 "Communication - Serial Interface".

Alternatively to the RS232 interface, the RS485 interface can be accessed from the rear of the unit.



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 watch dog is recommended (e.g. WESTERMO).

#### Modem at unit

The modem, which is later connected to the unit, must be initialized once with the provided PC software (Extras - Preparing modem for unit). The modem is, therefore, connected to the PC with its original cable (1:1 modem cable - normally enclosed with every modem).

Initialization must be carried out with the same data format (baudrate, data bits, parity) with which the measuring unit works.

After successful initialization, the modem is connected to the unit with a special modem cable. Only three cables (TxD, RxD, GND), and 2 bridges on modem side are required.

#### Cable assignment:



Note!

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.

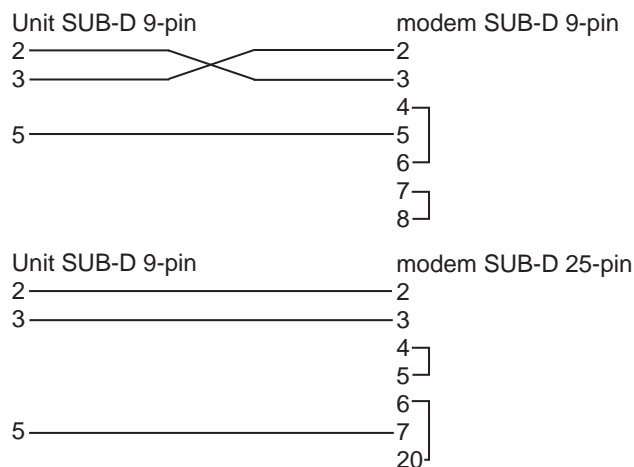


Fig. 13: Modem cable assignment

#### Modem at 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 provided PC software, select "Display/change unit setup - Add new device"
- Select unit, set interface parameters manually (COM, baudrate, number of data bits, parity)
- Activate modem operation - set up modem

- Enter receiver's telephone number.
- OK
- Now enter the telephone number under which the unit connected by modem can be reached and start the connection with "OK".

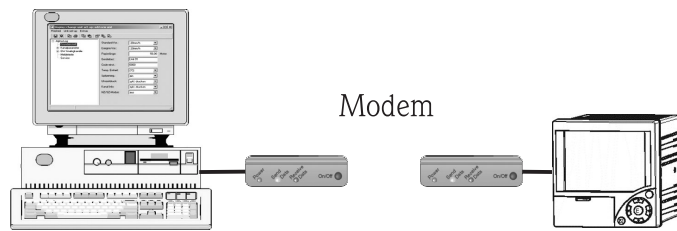


Fig. 14: Modem connection at unit and PC

### 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 the provided PC software. There is no need to install driver software ("COM redirection") on the PC because the provided PC software 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.



Note!

It is not possible for several clients (PC) to communicate with a server (unit) at the same time. If a second client (PC) tries to establish a connection, he receives an error message.

#### **Ethernet commissioning**

Before a connection can be established via the PC network, the system parameters in the unit must be set via "Setup - Communication - 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.

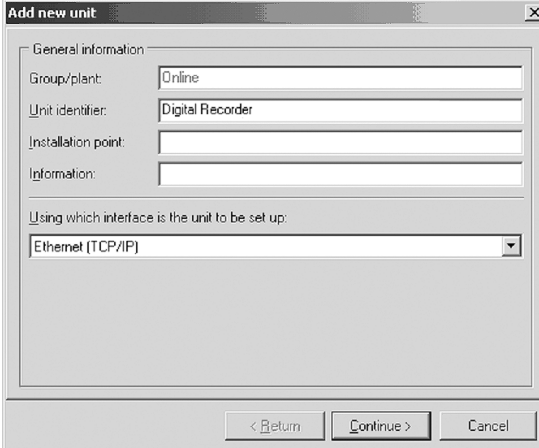


### 5.6.6 Communication in the network via the provided PC software

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. (see Section 5.6.1)
2. A new unit now has to be registered in the database. After the unit description has been input, select how the unit settings are to be transferred. In this case, select Ethernet (TCP/IP).



The screenshot shows the 'Add new unit' dialog box with the 'General information' tab selected. The fields are as follows:

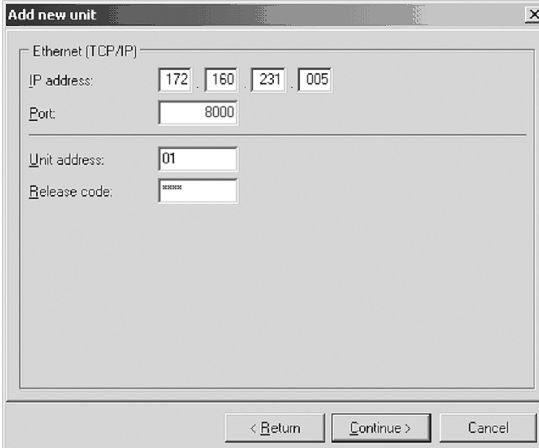
Field	Value
Group/plant:	Online
Unit identifier:	Digital Recorder
Installation point:	
Information:	
Using which interface is the unit to be set up:	Ethernet (TCP/IP)

At the bottom, there are three buttons: '< Return', 'Continue >', and 'Cancel'.

Fig. 15: Registering 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.



The screenshot shows the 'Add new unit' dialog box with the 'Ethernet (TCP/IP)' tab selected. The fields are as follows:

Field	Value
IP address:	172 . 160 . 231 . 005
Port:	8000
Unit address:	01
Release code:	000000

At the bottom, there are three buttons: '< Return', 'Continue >', and 'Cancel'.

Fig. 16: Entering the IP address of the new unit

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

### 6.1 Function check

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

- See Section 3.5 'Post-installation check'
- Checklist in Section 4.4 'Post-connection check'

### 6.2 Switching on the unit

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 set up 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 Setting the operating language

The default setting for the operating language is English (GB). A different operating language can be configured in the set up (see Section 6.4.1).

**E** -> Set up -> Basic settings -> Language

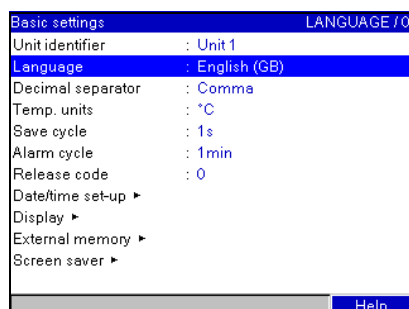


Fig. 17: Change the operating language

### 6.3 Unit Set up

#### 6.3.1 General

Access to the set up is released when the unit leaves the factory and can be locked in various ways, e.g. entering a 4-digit release code (→ Chap. 6.4.1 "Basic settings").

When locked, basic settings can be checked but not changed.

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

1. CompactFlash card slot for reading in parameters saved on CompactFlash card.
2. Rear RS232/RS485/Ethernet system interface
3. Front-panel USB system port

#### Advantages of configuration via PC

- The unit data is 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 at the same time for configuration. Select the interface used under "Set up - Communication".



Note!

To delete the temporary set up files you should delete the CompactFlash CF card and the internal memory after the commissioning (unit set up).

**Delete CF:** [E] Main menu -> CompactFlash (CF) functions -> Delete CF

**Delete internal memory:** [E] Main menu -> Diagnostic/unit information -> Delete internal memory

### 6.3.2 Set up via interface and provided PC software

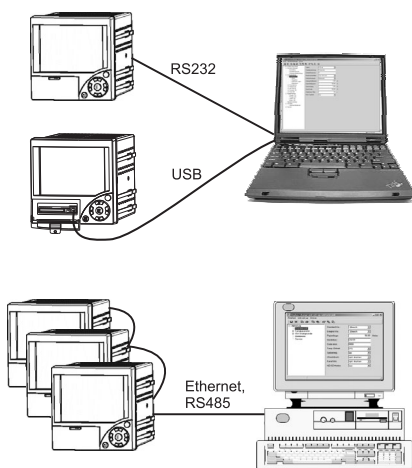
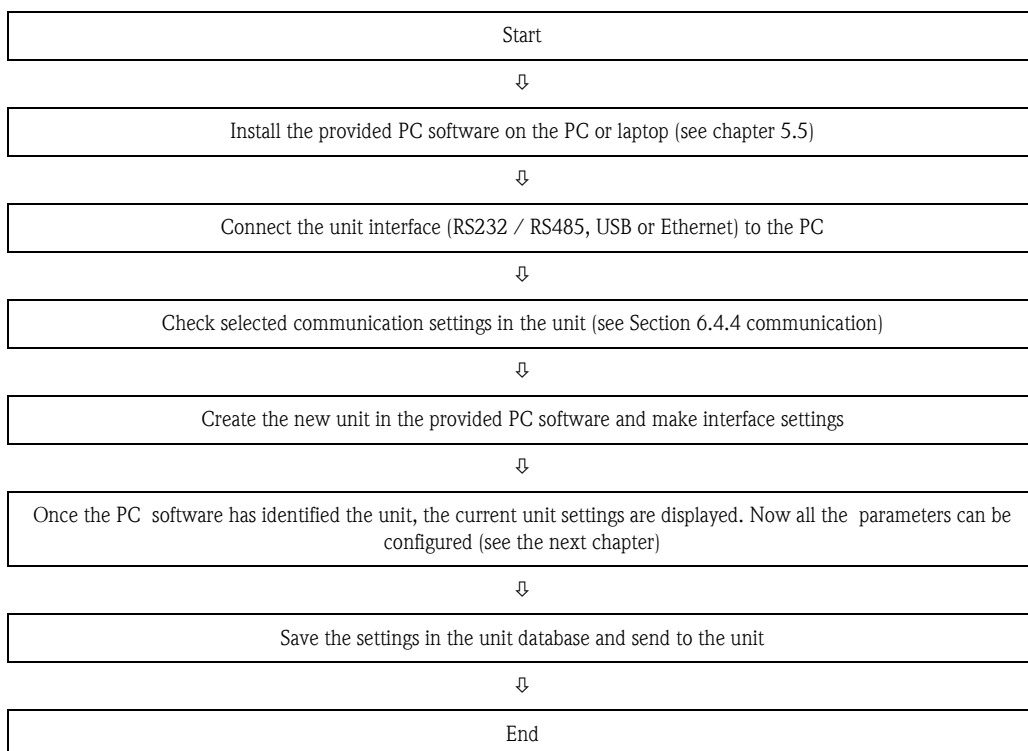


Fig. 18: Example: Set up via the provided PC software

#### Procedure for set up via interface and the provided PC software:



**Procedure set up via interface and the provided PC software:**

Note!

In order to be able to use this function, the unit must already be registered in the PC database, and/or register in the PC database at first.

1. Connect the unit interface (RS232 / RS485, USB or Ethernet) to the PC.
2. Start the provided PC software and add new unit in the PC database:
  - Select "Unit -> Display/change unit set-up/add new unit"
  - Select "Unit -> Add new unit" in the new window.
  - Assign general informations for the new unit. Select the interface for the unit set up. Select "Continue". Select the appropriate interface parameters (must agree with the attitudes to communication on the unit). Select "Continue". A summary of the data to the new unit is indicated. With "OK" a connection to the unit is made and the new unit will be registered in the PC data base.
3. Adjust the unit settings and select "Finished -> Transmit set-up to unit". The new set up parameters are automatically transferred to the unit.
4. Finally, the unit settings should be saved in the unit database. Select "Finished -> Store set-up into unit database".

**6.3.3 Set up via CompactFlash card**

Save the unit settings on the PC onto the CompactFlash card using the provided PC software. This set up file can be adopted into the unit if released under "Main menu -> CompactFlash (CF) functions -> Load set-up from CF".



Note!

In order to be able to use this function, the unit must already be registered in the PC database, and/or register in the PC database at first. In addition a CompactFlash card slot must be present at the PC.

**Procedure set up via CompactFlash card:**

1. Copy set up to CompactFlash card:
  - Insert a formatted CompactFlash card into the unit.
  - In the main menu, select "CompactFlash (CF) functions -> Copy set-up to CF".
  - In the main menu, select "CompactFlash (CF) functions -> Safely remove CF".
  - Remove the CompactFlash card from the unit and insert it into the CompactFlash card slot in the PC.
2. Start the provided PC software and add new unit in the PC database:
  - Select "Unit -> Display/change unit set-up/add new unit"
  - Select "Unit -> Add new unit" in the new window.
  - Assign general informations for the new unit. Select "Parameter file from a data source (e.g. diskette, ATA flash card)". Select "Continue". Select the appropriate parameter file (\*.rpd) from the CompactFlash card. Select "Continue". A summary of the data to the new unit is indicated. With "OK" the new unit will be registered in the PC data base.
3. Adjust set up in the provided PC software and save in the associated database:
  - Adjust the unit settings.
  - Select "Finished -> Store set-up into unit data base". The new set up parameters are saved in the PC database. Transfer the new set up file to the CompactFlash card in your PC: select "Finished -> Create set-up data carrier (diskette/ATA flash card)" and select the suitable CompactFlash card slot.
  - Remove the CompactFlash card from the slot in the PC and insert it into the unit.
4. Read the new set up into one (or more) unit(s):
  - In the main menu, select "CompactFlash (CF) functions -> Load set-up from CF". Repeat this procedure, to set up further units with this parametrization.



**Caution!**

If the set up CompactFlash card is not removed, the measurement data will begin to be saved after approx. 5 minutes. The set up data is still kept. Please change the CompactFlash card if the measurement data is not meant to be saved onto this card.



**Caution!**

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

### 6.3.4 Set up direct at the unit (via unit keyboard)

- Press **[E]**. The main menu appears.
- With **[↑]** or **[↓]** select the desired chapter
- Confirm with **[E]**
- Use the softkey **○** to call up the Help on the entry selected.

**Key function in set up**

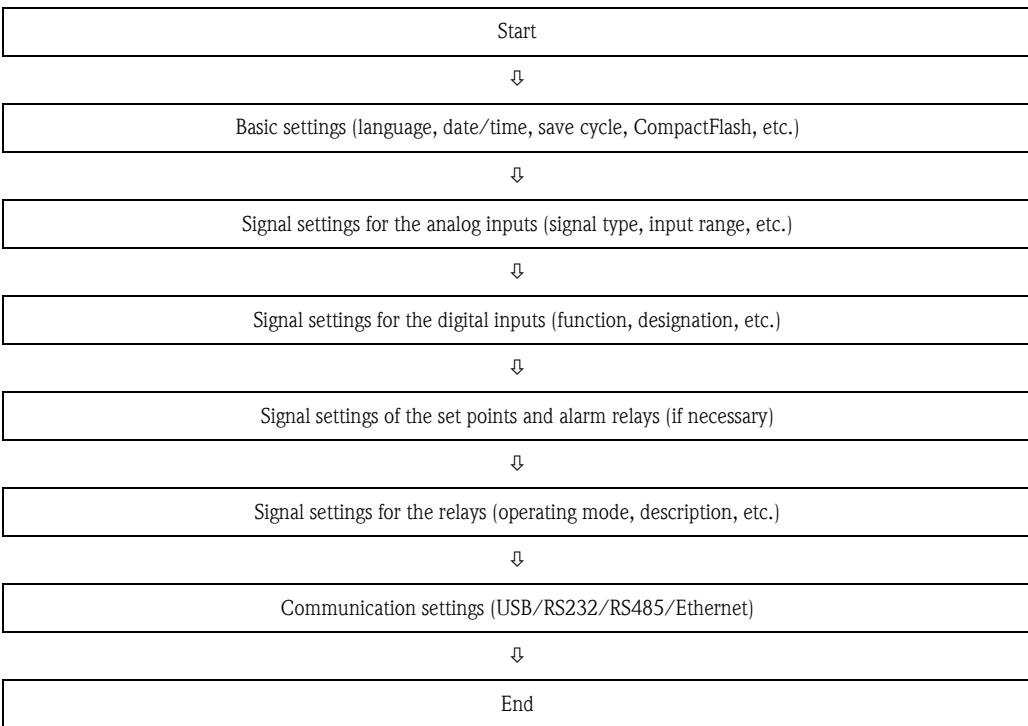
- [X]** Cancel entries or return to previous screen.
- [←]** **[→]** Moves cursor left or right.
- [↑]** **[↓]** Moves bar up or down, changes parameter/sign.
- [E]**: Enter key = selects the highlighted function, starts parameter change.



**Note!**

- Every parameter is modified via a dialog box.
- The altered settings only take effect once you return to normal operation by pressing **[X]** several times (confirm you accept changes with **[E]**). Until this time, the unit still works with the previous data.

**Procedure for unit configuration/set up:**



## 6.4 The set up window (at main menu)

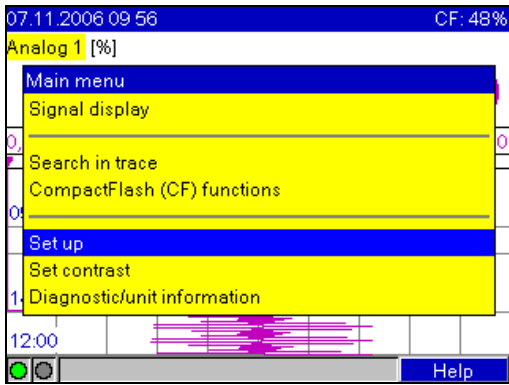


Fig. 19: The main menu

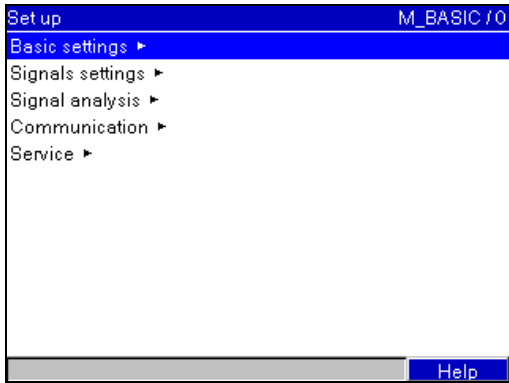







Fig. 20: The set up window



The individual parameters are summarized in the set up menu in the following sections:

<b>Basic settings</b> see Section 6.4.1	Settings that are not channel specific, this means date, time etc.
<b>Signal settings</b> see Section 6.4.2	Settings of the connected analog inputs (incl. set point settings), relays and the digital input.
<b>Signal analysis</b> see Section 6.4.3	Set up, in order to obtain signal analysis for presettable time ranges/cycles as well as a manual reset of the signal analysis. Function only visible if a digital input has been activated as a counter!
<b>Communication</b> see Section 6.4.4	Set up only required if you are using the USB, RS232, RS485 or Ethernet interface of the unit (PC operation, serial data read-out, modem operation, etc.).
<b>Service</b> see Section 6.4.5	Settings such as calibration etc.  <b>Caution!</b> Changes must only be made by skilled personnel. The unit will operate incorrectly if incorrect settings are made!

### Input principle:

1. Begin changing parameters each time with .
2. Use  or  to scroll through the values, symbols and picklists.
3. If the parameter is set correctly, press .

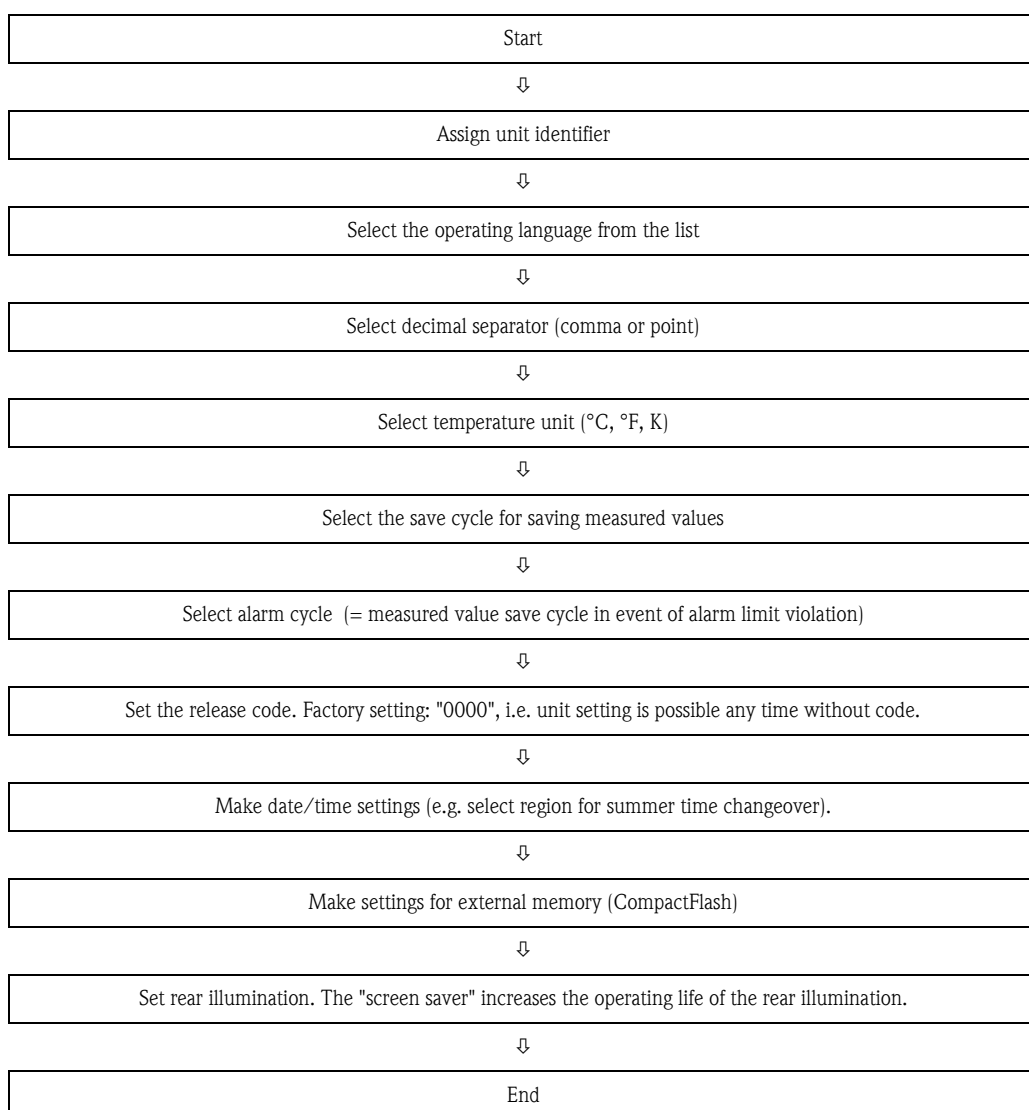
**Note!**

- 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" (delivery status), configuration is possible at any time. It can be protected against unauthorized manipulation by entering a 4-digit 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 altered settings only take effect once you return to normal operation by pressing  several times and confirming with . Until this time, the unit still works with the previous data.

### 6.4.1 Set up - Basic settings

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

**Procedure for basic settings:**



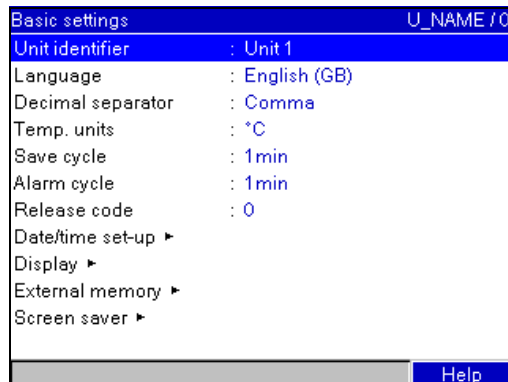
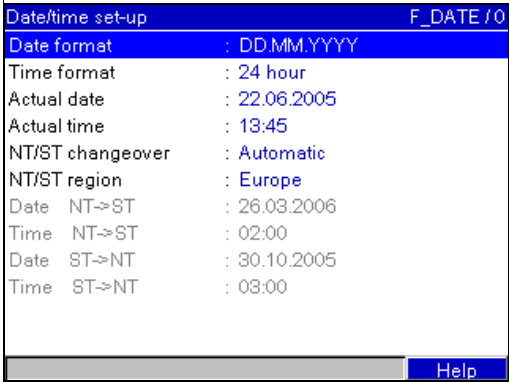


Fig. 21: Set up, Basic settings


"Basic settings" menu items	Configurable parameters (Factory settings bold marked)
<b>Unit identifier</b>	Individual unit identifier (max. 22 characters). Note! Is also saved on the CompactFlash card.
<b>Language</b>	Select unit operating language. Factory setting: <b>English (GB)</b>
<b>Decimal separator</b>	Select in which form the decimal separator character is to be displayed. Picklist: comma, point
<b>Temp. units</b>	Selection of temperature units. All directly connected thermocouples or resistance thermometers (RTD) are displayed in the preset engineering units. Picklist: °C, °F, K
<b>Save cycle</b>	Selects the cycle for normal operation (= no set point alarm) in which data is stored and displayed Picklist: off, 1s to 1h, <b>(1min)</b> Note! Depending upon adjusted save cycle the available recording length changes. Tables to the typical recording length you will find in the technical data, chapter 10.8.3.
<b>Alarm cycle</b>	Selects the cycle for alarm condition (e.g. alarm set point violation) in which data is stored and displayed. Picklist: off, 1s to 1h, <b>(1min)</b>
<b>Release code</b>	Using this code set up access can be protected from unauthorized persons. In order to change any parameter the correct code must be entered. Factory setting: <b>"0"</b> , i.e. changes are possible any time. <b>Tip:</b> Make a note of the code and store in a safe place. Note! This release code must be also entered in the provided PC software.
<b>Set point code</b>	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 default: <b>"0"</b> means that alarm set points can only be changed by entering the release code. Note! Alarm set point code and release code should not be identical!



"Basic settings" menu items	Configurable parameters (Factory settings bold marked)	
<b>Submenu:</b> <b>Date/time set-up</b>	<p>Here you can find various date and time settings.</p>  <p><i>Fig. 22: Set up, Basic settings, "Date/time set-up" submenu</i></p>	
	<b>Date format</b>	Select in which format the date is to be set and displayed. <b>(DD.MM.YYY)</b>
	<b>Time format</b>	Select in which format the time is to be set and displayed. Picklist: 12 hours AM/PM or <b>24 hours</b>
	<b>Actual date</b>	Set up the actual date for the unit.
	<b>Actual time</b>	Set up the actual time for the unit.
	<b>NT/ST changeover</b>	Function for summer time/normal time changeover. <b>"Automatic"</b> : changes as per the local regional regulations "Manual": changeover times can be set in the following addresses "Off": no changeover times required
	<b>NT/ST region</b> only at "NT/ST changeover automatic"	Selects the regional settings for summer/normal time changeover. Picklist: <b>Europe</b> , USA
	<b>Date NT -&gt; ST</b> only at "NT/ST changeover manual"	Day, when in the spring a change from normal to summer time occurs.
	<b>Time NT -&gt; ST</b> only at "NT/ST changeover manual"	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)
	<b>Date ST -&gt; NT</b> only at "NT/ST changeover manual"	Day, when in the autumn a change from summer to normal time occurs.
	<b>Time ST -&gt; NT</b> only at "NT/ST changeover manual"	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)

"Basic settings" menu items	Configurable parameters (Factory settings bold marked)	
Submenu: Display	Various general settings for the measured value display, e.g. grid etc.	
	<div>DisplayCHNAMEMD / 0</div> <div>Channel ident. : Standard, 10 digit</div> <div>Group identifier : Group 1</div> <div>Grid divisions : 10</div> <div>Soft-key : Event list</div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> 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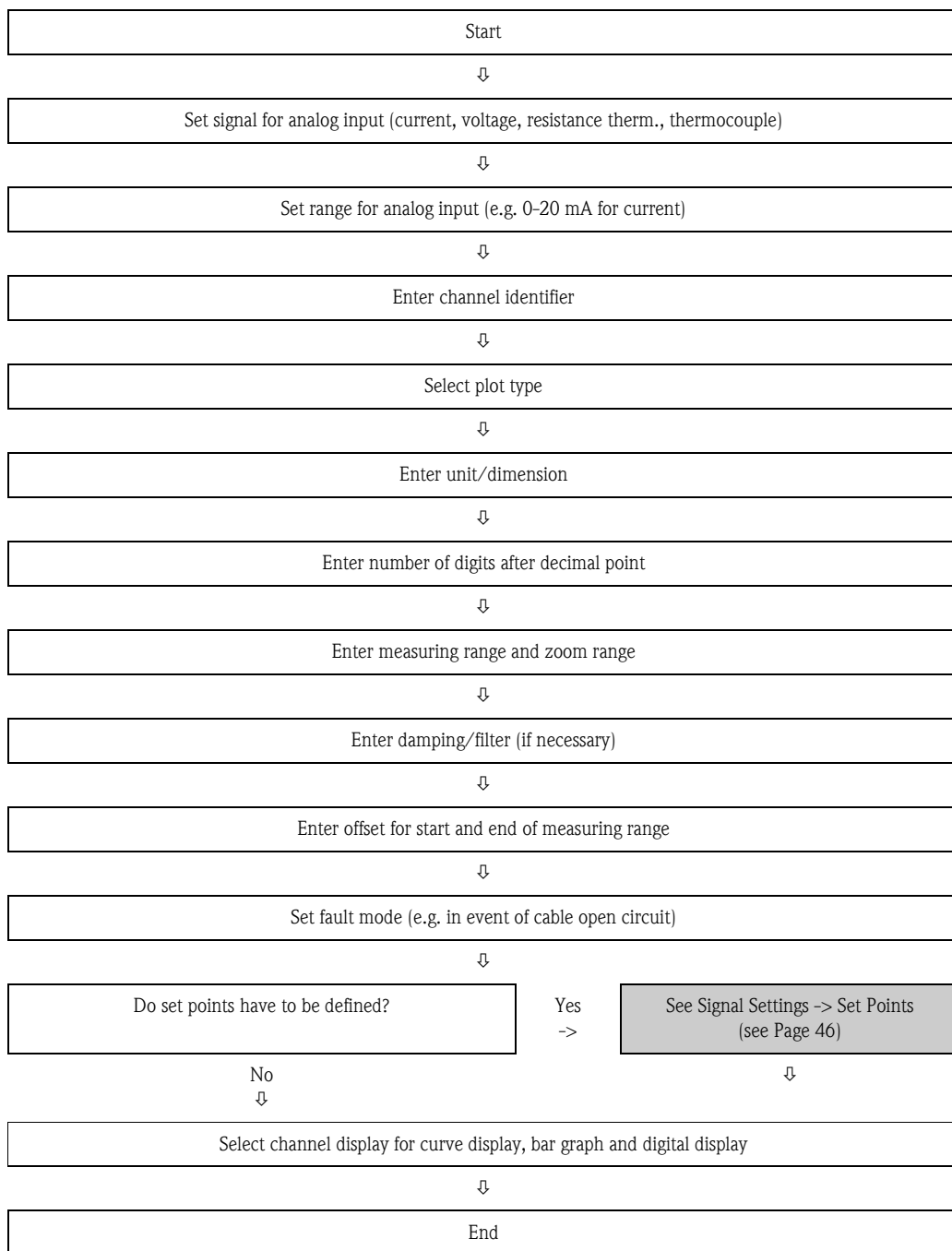
"Basic settings" menu items	Configurable parameters (Factory settings bold marked)	
<b>Submenu:</b> <b>External memory</b> <b>(CompactFlash CF)</b>	Settings for the external data carrier (CompactFlash CF), amongst other things which data is to be stored in which format on the external data carrier. <div data-bbox="400 394 911 775"> <p>External memory MEM_FMT / 0</p> <p>Save as : open format (*.csv)</p> <p>Memory build-up : Stack memory</p> <p>Separator for CSV : Semicolon</p> <p>Operating time : 0000:00:00</p> <p>Date/time : Seperate columns</p> <p>Warning at : 90 %</p> <p>Switches output : Not used</p> <p>Help</p> </div> <p><i>Fig. 26: Set up, Basic settings, "Ext. memory" submenu (CompactFlash CF)</i></p>	
	<b>Save as</b>	<b>"Protected format":</b> all data is stored in a manipulation protected encrypted format. This data can only be visualized by using our software package. <b>"Open format (*.csv)":</b> data is stored in a CSV format, this can be opened by a number of different programs (e.g. MS Excel). (Attention: no manipulation security). MS Excel limits the open format on max. 65535 lines.
	<b>Memory build-up</b>	<b>"Stack memory":</b> no more data can be stored once the data carrier is full. <b>"Ring memory (FIFO)":</b> once the data carrier is full the oldest data is deleted so that new data can be stored (first in first out (FIFO)). Option only possible for "Protected format".
	<b>Separator for CSV</b> only at "Open format (*.csv)"	Specify which separator is used by your application (e.g. in Excel = semicolon). Picklist: comma, <b>semicolon</b>
	<b>Operating time</b> only at "Open format (*.csv)"	Specify the format for which operating times should be saved/displayed. <b>(0000:00:00)</b>
	<b>Date/time</b> only at "Open format (*.csv)"	Specify whether the date and the time should be saved in a joint column or <b>in two separate columns</b> when saving the data in CSV format.
	<b>Warning at</b> only at "Stack memory"	Gives 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 on. <b>(90%)</b>
	<b>Switches output</b> only at "Stack memory"	When the warning "Data carrier full" is displayed a relay can also be switched on. Picklist: <b>not used</b> , relay 1 to 4 (Cl. xd-xd)

"Basic settings" menu items	Configurable parameters (Factory settings bold marked)	
Submenu: Screen saver	<div> Note! To increase the life span of the LCDs 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.</div> <div><div>Screen saverLCD_OFF / 0</div><div>Screen saver : Switched daily</div><div>ON daily from : 20:00</div><div>OFF daily from : 07:00</div><div>Help</div></div> <div>Fig. 27: Set up, Basic settings, "Screen saver" submenu</div>	
	Screen saver	<b>"Switched off"</b> : LCD is always switched on "Switch on for x min.": display goes dark after x minutes. All other functions remain in operation. Press an operating key: Illumination is switched back on. (x = 10, 30, 60 min.) "Switched daily": enter time span. With this setting, the display turns dark 1 minute after the last key was pressed.
	ON daily from only at "Switched daily"	Set time (hh:mm) from which the rear illumination is to be switched off (e.g. shift end time). <b>(20:00)</b>
	OFF daily from only at "Switched daily"	Set time (hh:mm) from which the rear illumination is to be switched on (e.g. shift start time). <b>(07:00)</b>

## 6.4.2 Setup - Signal Settings

Setup of the analog and digital inputs, mathematics function, set points, relays and display.

### Procedure for the signal settings of the analog inputs:



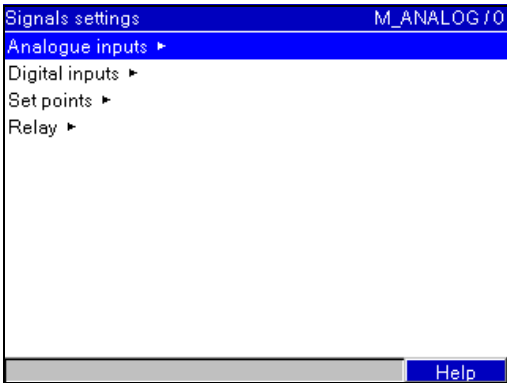








Fig. 28: Setup, Signal Settings

"Signal Settings" menu items	Configurable parameters (factory settings are highlighted in bold)	
Submenu: Analog Inputs, Analog Input x	Setup of the connected analog measurement point View or change settings for the selected channel.	
	Signal	Select the type of signal connected (current, voltage, etc.). The channel is switched off if no signal type is selected (factory default). Picklist: <b>Switched Off</b> , Current, Voltage, Resistance Therm., Thermocouple or Mathematics.  <b>Setting the mathematics functions:</b> Channels can be calculated with one another. The mathematics function can be selected here instead of an analog signal. Here, the user can specify whether an analog signal is attached or whether a calculation should be performed. Mathematics channels are treated like "real" analog inputs, e.g. set points, totalizing. If mathematics is selected, an analog signal can no longer be recorded there. If the device is a 3-channel device, analog input 4 – 6 can be used as a mathematics channel.   <b>Note!</b> Analog input 1 cannot be selected as a mathematics channel.
	Range	Select the input range or which resistance thermometer/thermocouple is connected. The respective terminal layout can be found in the operating manual or on the rear of the unit.
	Connection Only for "Resistance thermometer"	Specify whether RTDs are connected as 2-, 3- or 4-wire systems. <b>Factory setting: 3-wire</b>
	Channel Ident.	Identifier for the measurement point connected to this input (e.g. "Pressure", "Temperature", "Heater", ...). 10-character entry. <b>Factory setting: Analog x</b>

"Signal Settings" menu items	Configurable parameters (factory settings are highlighted in bold)	
	<b>Additional Info.</b>  Note! Only available if switched on in the basic settings.	Additional information on channel identifier, e.g. the respective measurement point tag number (example: tag numbers in power stations). In normal operation, the additional information can be listed along with the 10-digit channel identifier at "Main Menu -> Signal display -> Measurement point identifier". 13-character entry.
	<b>Plot Type</b>	The analog inputs are scanned in a 100ms cycle. 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). <b>"Instantaneous Value"</b> : the value pending for the save cycle is saved. <b>"Average"</b> : the average value during the save cycle is calculated and saved. <b>"Minimum Value"</b> : the minimum value is calculated and saved. <b>"Maximum Value"</b> : the maximum value is calculated and saved. <b>"Envelope Curve"</b> : both minimum and maximum values are saved (requires higher memory capacity)
	<b>Engineering Unit</b>	Input of the engineering (physical) unit for the measuring point connected to this input (e.g. %, bar, °C, m/h, etc.). 6-digit entry.  Note! Note: cannot be changed for resistance thermometers and thermocouples!
	<b>Decimal Point</b>	Number of places after decimal point for the display. Picklist: 0 to 5 number of places after the decimal point
	<b>Formula</b> Only for "Mathematics"	<b>f = (y1*a) ? (y2*b) +c</b> : linking two channels; <b>f = g(y1...y2) * b + c</b> : calculates the average or sum total of two or more channels. Mathematics channels are treated like "real" analog inputs, (set points etc.).
	<b>Function 'g'</b> Only for "Mathematics"	"Sum" or "Average" of channels 'y1' to 'y2'. Picklist: Not Used, <b>Sum</b> , Average
	<b>Signal 'y1'</b> Only for "Mathematics"	'y1' signal that should be linked to another signal. Picklist: Analog Input x  Note! Other mathematics channels can be used for the calculation if their channel number is smaller than the number of the mathematics channel that is computed.
	<b>Factor 'a'</b> Only for "Mathematics"	Factor 'a' by which the value of the 'y1' signal is multiplied. <b>Factory setting: 1.0</b>
	<b>Math Operator '?'</b> Only for "Mathematics"	Mathematical operator for combining the channels. To deactivate the second part of the formula (y2*b), select "Not Used" for the operator. Picklist: Not Used, - ( <b>Subtraction</b> ), + (Addition), * (Multiplication), / (Division)
	<b>Signal 'y2'</b> Only for "Mathematics"	Second signal, "y2", which is to be linked with the first one, "y1". Picklist: Analog Input x
	<b>Factor 'b'</b> Only for "Mathematics"	Factor 'b' by which the 'y2' signal or the function g(y1...y2) is multiplied. <b>Factory setting: 1.0</b>
	<b>Constant 'c'</b> Only for "Mathematics"	'c' constant is added to the result of linking the two signals y1 and y2. <b>Factory setting: 0.0</b> Entry in the (technical or physical) unit of the mathematics channel.
	<b>Range Start</b>	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! Note: cannot be changed for resistance thermometers and thermocouples!

<b>"Signal Settings" menu items</b>	<b>Configurable parameters</b> (factory settings are highlighted in bold)	
	<b>Meas. Range End</b>	<p>The same as "Range Start". Enter the end value for the measurement range, e.g. "14" for a 0-14 pH transmitter.</p> <p> <b>Note!</b> Note: cannot be changed for resistance thermometers and thermocouples!</p>
	<b>Zoom Start</b>	<p>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 "5" here. The zoom has no influence on the storage.</p>
	<b>Zoom End</b>	<p>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.</p>
	<b>Damping/ Filter</b>	<p>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.</p>
	<b>Comparison Point</b> Only for "Thermocouples"	<p>Only used when directly connecting thermocouples.  <b>"Internal"</b>: compensation of the voltage errors by measuring the terminal temperature.  <b>"External"</b>: compensation of error voltage by using thermostated comparison points.</p>
	<b>Comparison Temp.</b> Only for "Comparison Point – External"	<p>Settings for the external comparison temperature (only when connecting thermocouples directly).</p>
	<b>Submenu: Meas. Value Correct. (Offset)</b>	<p>Correction value, this can be entered before further evaluation takes place (e.g. in order to smooth out measurement chain tolerances). Follow these instructions:</p> <ol style="list-style-type: none"> <li>1. Measure the current value at the lower measurement range.</li> <li>2. Measure the current value at the upper measurement range.</li> <li>3. Enter the respective target and actual values in the submenu for the lower and upper correction values.</li> </ol>
		<p><b>Lower Correction Value:</b> Correction value for the lower measurement range. Example of measuring range 0°C to 100°C:  <b>Target Value:</b> enter the target value here (e.g.: 0°C).  <b>Actual Value:</b> enter the value actually measured here (e.g. 0.5°C).</p>
		<p><b>Upper Correction Value:</b> Correction value for the upper measurement range. Example of measuring range 0°C to 100°C:  <b>Target Value:</b> enter the target value here (e.g.: 100°C).  <b>Actual Value:</b> enter the value actually measured here (e.g. 100.5°C).</p>



"Signal Settings" menu items	Configurable parameters (factory settings are highlighted in bold)	
	Submenu: Totalization (option)	<p>Settings only required if this analog measuring point is to be totalized for calculating the volume for example. For analysis periods, see "Signal analysis".</p> <p><b>Totalization:</b> using the totalization function, the volume in m<sup>3</sup> can be calculated from an analog signal (e.g. flow in m<sup>3</sup>/h). Picklist: <b>no</b>, yes</p> <p><b>Totalization Base:</b> select the corresponding time base. Example: ml/s -&gt; time base <b>seconds (s)</b>; m<sup>3</sup>/h -&gt; time base hours (h).</p> <p><b>Total. Eng. Unit:</b> here, enter the unit for the volume determined by totalization (e.g. "m<sup>3</sup>").</p> <p><b>Scroll Display:</b> select the counter which should be displayed alternately with the instantaneous value. <b>Factory setting: No, Only Instant Value</b></p> <p><b>Low flow cut off:</b> specify how the device should perform low flow cut off:  <b>Area Around Zero Point:</b> all values in the zero point range that are smaller than the (absolute) "Low flow cut off" are not totalized (e.g. Low flow cut off = 0.1 m/h: all values &lt;= -0.1 m/h and &gt;= 0.1 m/h are totalized; all other values are discarded).  <b>Absolute Value:</b> all values that are smaller than the configured "Low flow cut off" are not totalized (e.g. Low flow cut off = 0.1 m/h: all values &lt; 0.1 m/h are not totalized).</p> <p><b>Low flow cut off:</b> specify the threshold value for the low flow cut off here. <b>Factory setting: 0 %</b></p> <p><b>Calc. Factor:</b> factor for calculating the totalized value (e.g. the transmitter returns l/s -&gt; totalization base = second -&gt; desired unit is m<sup>3</sup> -&gt; enter 0.001 as the factor). <b>Factory setting: 1</b></p>
	Submenu: Fault Mode	<p>Settings that lay down how this channel is to react under fault conditions (e.g. cable open circuit, over range).</p> <p><b>Fault Switches:</b> switches the selected relay under fault conditions. The terminal numbers are shown in brackets. Picklist: <b>Not Used</b>, Relay x (Term. xx-xx)</p> <p><b>Save Event:</b> stores an event in the event memory when a fault condition occurs. Picklist: <b>No</b>, Yes</p> <p><b>Cable Open Circ.:</b> The cable open circuit detection function can be switched on and off here.  In the case of thermocouples: When thermocouples are switched in parallel, enabled cable open circuit detection causes false alarms. Picklist: <b>no</b>, yes  In the 1 to 5 V range: Values &lt; 0.8 V or &gt; 5.2 V are assessed as cable open circuits. There is no underrange/overrange. Picklist: no, <b>yes</b></p> <p><b>NAMUR NE43:</b> Switch monitoring of the 4 to 20 mA range as per NAMUR Recommendation NE43 on and off. The following error ranges apply when NE43 is switched on:  ≤ 3.8 mA: underrange (display shows: vvvvvv)  ≥ 20.5 mA: overrange (display shows: ^^^^^^)  ≤ 3.6 mA or ≥ 21.0 mA: open circuit (display shows: ---)  Picklist: <b>On</b>, Off</p> <p><b>On Error:</b> 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, <b>Value is Invalid</b>, Free Configuration</p> <p><b>Error Value:</b> only if "Free Configuration" is selected for the error.  The unit continues calculating with this value if a fault occurs. <b>Factory setting: 0 %</b> (See the following table)</p>
	Copy Settings	Copies settings from actual channel to selected channel. Picklist: <b>No</b> , in Analog Input x

**Fault mode**

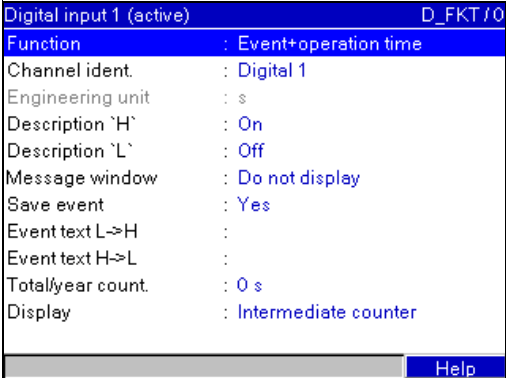


Failsafe mode if an input signal/variable is invalid (e.g. cable open circuit, invalid result of mathematics calculation; e.g. dividing by zero).

Set failsafe mode	"Invalid" channel	Dependent channels
<b>Value is Invalid</b>	<ul style="list-style-type: none"> <li>■ "-----" or "*****" are displayed</li> <li>■ Channel name is highlighted in red</li> <li>■ Status "F" is displayed</li> <li>■ Limit value monitoring is suspended</li> <li>■ Totalization is suspended</li> <li>■ A relay is switched if set.</li> <li>■ 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.</li> </ul>	<ul style="list-style-type: none"> <li>■ "-----" or "*****" are displayed</li> <li>■ Channel name is highlighted in red</li> <li>■ Status "F" is displayed</li> <li>■ Limit value monitoring/totalization: depends on the set failsafe mode of this channel</li> <li>■ A relay is switched if set.</li> <li>■ 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.</li> </ul>
<b>All other settings</b>	<ul style="list-style-type: none"> <li>■ "-----" or "*****" are displayed</li> <li>■ Channel name is highlighted in red</li> <li>■ Status "F" is displayed</li> <li>■ Value is totalized</li> <li>■ A relay is switched if set.</li> <li>■ 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.</li> </ul>	<ul style="list-style-type: none"> <li>■ Calculated value is displayed</li> <li>■ Channel name is highlighted in red</li> <li>■ Status "F" is displayed</li> </ul> <p>The channel is treated as "valid", i.e.:</p> <ul style="list-style-type: none"> <li>■ Value is totalized</li> <li>■ Limit value monitoring remains active</li> <li>■ If the result of the calculation for this channel is invalid, the set failsafe mode for this channel applies</li> <li>■ Analyses: the channel is analyzed as normal</li> </ul>

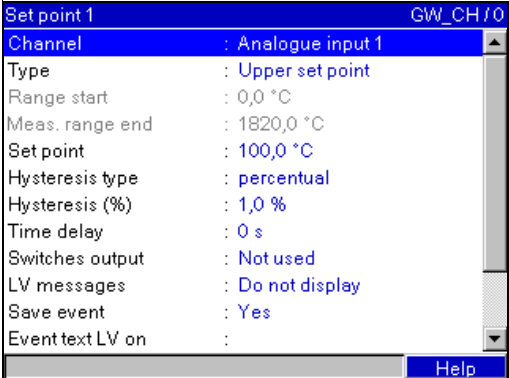
## Setup - Signal Settings, submenu: Digital Inputs


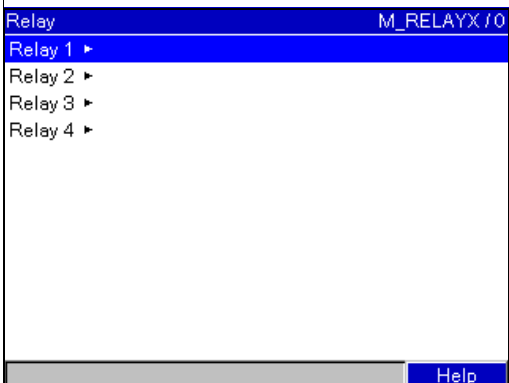

### Procedure for the signal settings of the digital inputs:


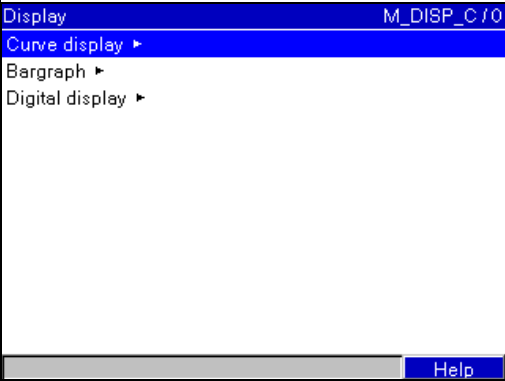
<b>1. Start</b>				
↓				
2. Select the function of the digital channel				
↓	↓	↓	↓	↓
3. Control input	3. On/off event	3. Pulse counter	3. Operational time	3. Event + operation time
↓	↓	↓	↓	↓
4. Enter channel identifier	4. Enter channel identifier	4. Enter channel identifier	4. Enter channel identifier	4. Enter channel identifier
↓	↓	↓	↓	↓
5. Select action	5. Enter event text for status change from L->H	5. Enter unit/dimension	5. Where necessary, enter current counter reading to continue a total/yearly counter	5. Enter event text for status change from L->H
↓	↓	↓	↓	↓
<b>6. End</b>	6. Enter event text for status change from H->L	6. Select the number of decimal places	6. Select display for counter type (e.g. daily counter)	6. Enter event text for status change from H->L
	↓	↓	↓	↓
	<b>7. End</b>	7. Enter pulse factor	<b>7. End</b>	7. Where necessary, enter current counter reading to continue a total/yearly counter
		↓		↓
		8. Where necessary, enter current counter reading to continue a total/yearly counter		8. Select display for counter type (e.g. daily counter)
		↓		↓
		9. Select display for counter type (e.g. daily counter)		<b>9. End</b>
		↓		
		<b>10. End</b>		

"Signal Settings" menu items	Configurable parameters (factory settings are highlighted in bold)	
<b>Submenu:</b> <b>Digital Inputs</b>	<p>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.</p> <div data-bbox="309 394 817 770">  <p>Digital input 1 (active) D_FKT / 0</p> <p>Function : Event+operation time</p> <p>Channel ident. : Digital 1</p> <p>Engineering unit : s</p> <p>Description 'H' : On</p> <p>Description 'L' : Off</p> <p>Message window : Do not display</p> <p>Save event : Yes</p> <p>Event text L-&gt;H :</p> <p>Event text H-&gt;L :</p> <p>Total/year count : 0 s</p> <p>Display : Intermediate counter</p> <p>Help</p> </div> <p><i>Fig. 30: Setup, Signal Settings, "Digital Input 1" submenu</i></p>	
	<b>Function</b>	<p>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</p> <p> <b>Note!</b> 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.</p> <p>The following functions are available:</p> <p><b>"Switched Off"</b>: digital input is not active.</p> <p>"Control Input": various control functions can be activated using the digital input.</p> <p>"On/Off Event": switch conditions of connected units (e.g. pump on/off) are displayed and stored.</p> <p>"Pulse Counter": pulses are added up and stored as numeric counter values.</p> <p>"Operational Time": running times of external units are recorded e.g. for maintenance purposes. <b>Example:</b> if the daily running time of a pump is to be saved, activate "Operational Time" here and "Daily Analysis" under "Signal Analysis".</p> <p>"Event+Operation Time": both the on/off events and the operating time of an external unit are recorded and stored.</p>
	<b>Channel Ident.</b>	<p>Measurement point name (e.g. "Pump") or description of the function of this input (e.g. "Fault message"). 10-character entry. <b>Factory setting: digital 1</b></p>
	<b>Additional Info.</b>  <b>Note!</b> Only available if switched on in the basic settings.	<p>Additional information on channel identifier, e.g. the respective measurement point tag number (example: tag numbers in power stations). In normal operation, the additional information can be listed along with the 10-digit channel identifier at "Main Menu -&gt; Signal display -&gt; Measurement point identifier". 13-character entry.</p>
	<b>Action</b> Only for "Control Input"	<p>Set up the function of the control input.</p> <p>"Start Recording": data are displayed/stored only if the input is active.</p> <p>"Screensaver On": display is switched off so long as the input is active.</p> <p>"Ext. Inter. Analysis": starts and ends the external intermediate analysis (the analysis progresses as long as the input is active).</p> <p><b>"Set Up Lock"</b>: setup cannot be changed as long as the input is active.</p> <p>"Time Synchronization": rounds off the current time to a full minute, rounding off to the higher minute if <math>\geq 30</math>s and to the lower minute if <math>&lt; 30</math>s.</p>

"Signal Settings" menu items	Configurable parameters (factory settings are highlighted in bold)	
	<b>Engineering Unit</b>	Technical unit of the count input, e.g. liters, m, etc. Only active for the functions "Pulse Counter", "Operational Time" and "Event+Operation Time". This value can only be changed for the "Pulse Counter" function. 6-character entry.
	<b>Decimal Point</b>	Number of places after decimal point for the display. Picklist: 0 to 5 number of places after the decimal point. Only active for "Impulse Counter" function. <b>Factory setting: one (XXXX.X)</b>
	<b>1 impulse =</b>	Pulse factor = factor which, when multiplied by the input pulse, results in the required physical value. Example: 1 pulse equals 5 m → enter "5". Only active for "Pulse Counter" function. <b>Factory setting: 1.0</b>
	<b>Description 'H'</b>	Description of the status if the digital input is activated. This text is both shown in the display and saved to memory. Only active for "On/Off Event" and "Event+Operation Time" functions. Factory setting: on
	<b>Description 'L'</b>	Description of the status if the digital input is not activated. This text is both shown in the display and saved to memory. Only active for "On/Off Event" and "Event+Operation Time" functions. Factory setting: off
	<b>Message Window</b>	<b>"Do Not Display"</b> : no message is output when the digital input switches. <b>"Display+Acknowledge"</b> : a message window is displayed that has to be acknowledged by pressing a key. Only active for "On/Off Event" and "Event+Operation Time" functions.
	<b>Save Event</b>	Determines whether the condition change from low to high or high to low is stored in the event list. Note: increased memory capacity needed. Only active for "On/Off Event" and "Event+Operation Time" functions. Picklist: <b>Yes</b> , No
	<b>Event Text L-&gt;H</b>	Description of condition change from low to high. Event text is stored (e.g. start filling). 22-character entry. Only active for "Event+Operation Time" and "On/Off Event" functions.
	<b>Event Text H-&gt;L</b>	Description of condition change from high to low. Event text is stored (e.g. stop filling). 22-character entry. Only active for "Event+Operation Time" and "On/Off Event" functions.
	<b>Total/Year Count.</b>	Preset for the totalizer/yearly counter. Useful when continuing a measurement performed to date with an electromechanical counter. 13-character entry. Only active for "Pulse Counter", "Operational Time" and "Event+Operation Time" functions. <b>Factory setting: 0</b>
	<b>Display</b>	Counter values are saved in specific time cycles (e.g. daily, monthly, ... - see "Signal analysis"). Here you can select the counter type that is to be constantly displayed. Picklist: <b>Intermediate Counter</b> ;, Daily Counter, Monthly Counter, Total/Yearly Counter. Only available for "Impulse Counter", "Operating Time" and "Events + Operating Time" functions.
	<b>Copy Settings</b>	Copies settings from actual channel to selected channel. Picklist: <b>No</b> , in Digital Input x

"Signal Settings" menu items	Configurable parameters (factory settings are highlighted in bold)	
<b>Submenu:</b> <b>Set Points,</b> <b>Set Point x</b>	<p>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.</p>  <p><i>Fig. 31: Setup, Signal Settings, "Set Point, Set Point x" submenu</i></p>	
	<b>Channel</b>	Select the input the alarm set point refers to. Picklist: <b>Switched Off</b> , Analog Input x, Digital Input x
	<b>Type</b>	Type of alarm set point (dependent on the input signal): "Lower Set Point": analog signal drops below the set point. " <b>Upper Set Point</b> ": analog signal exceeds the set point. " <b>Intermed. Analysis</b> ", "Daily Counter", "Monthly Counter", "Total/Yearly Counter": counter exceeds the set point. Note: the counters are regularly reset to zero. Always take note of the "Signal Analysis" setup.
	<b>Range Start</b> Only for "Analog Input x" with "Upper or Lower Set Point"	The lower value of the set measuring range is displayed here.
	<b>Meas. Range End</b> Only for "Analog Input x" with "Upper or Lower Set Point"	The upper value of the set measuring range is displayed here.
	<b>Set Point</b>	Analog set point in the preset engineering unit, e.g. in °C, bar, etc. Counter alarm set point in the engineering units set up, e.g. m, piece, ...
	<b>Hysteresis Type</b> Only for "Analog Input x" with "Upper or Lower Set Point"	"Percentual": set hysteresis in %. " <b>Absolute</b> ": enter hysteresis in the preset engineering units (e.g. in °C, bar, etc.)
	<b>Hysteresis (%)</b> 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. <b>Factory setting: 0 %</b>
	<b>Hysteresis (abs.)</b> 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. <b>Factory setting: 0</b>
	<b>Time Delay</b>	In order to be interpreted as an alarm the signal must exceed or undercut the preset value by at least the time set up. <b>Factory setting: 0 s</b>
	<b>Switches Output</b>	Switches the respective relay in alarm condition. The terminal numbers are shown in brackets. Please take note of the connection notes found in the operating manual. Picklist: <b>Not Used</b> , Relay x (Term. xd–xd)

"Signal Settings" menu items	Configurable parameters (factory settings are highlighted in bold)	
	<b>LV Messages</b>	<p>"Display+Acknowledge": message - with date, time, measurement point with alarm set point or event text LV on/off - must be acknowledged.</p> <p> <b>Note!</b> The screensaver is automatically disabled in the event of a limit value message!</p> <p><b>"Do Not Display"</b>: alarm condition is displayed by measurement point ident. with red background.</p>
	<b>Save Event</b>	Stores a message in the event memory on limit value violation. Picklist: No, <b>Yes</b>
	<b>Event Text LV On</b>	If the event of a limit value, this text (including date and time) is shown on the display or stored in the event list. Only available when "LV Messages" is set to "Display + Acknowledge" or "Save Event" is set to "Yes". 22-character entry.
	<b>Event Text LV Off</b> Only for "Analog Input x" with "Upper or Lower Set Point"	When returning from the limit value to normal operation, this text (including date and time) is shown on the display or stored in the event list. Only available when "LV Messages" is set to "Display + Acknowledge" or "Save Event" is set to "Yes". 22-character entry.
	<b>Save Cycle</b>	<p><b>Normal</b>: save in normal save cycle.</p> <p><b>"Alarm Cycle"</b>: fast storage during an alarm violation, e.g. every second. Attention: requires higher memory capacity!</p> <p>Save cycles are set up in the menu "Basic Settings".</p>
	<b>Copy Settings</b>	Copies the setup of the actual alarm set point into the selected alarm set points. Picklist: <b>No</b> , In Set Point x
<b>Submenu:</b> <b>Relay</b>	<p>Various relay settings (e.g. operation mode)</p>  <p><i>Fig. 32: Setup, Signal Settings, "Relay" submenu</i></p>	
	<b>Submenu:</b> <b>Relay x,</b>	<p>Setup for the selected relay:</p> <p><b>"Terminals"</b>: shows the relay terminal number</p> <p><b>"Operating Mode"</b>: relay function in alarm condition:</p> <p><b>"Opening"</b>: the relay is closed in the rest condition. In the event of a violation it opens.</p> <p><b>"Closing"</b>: the relay is open in the rest condition. In the event of a violation it closes.</p> <p> <b>Note!</b> Relay 1 has changeover contacts.</p>

"Signal Settings" menu items	Configurable parameters (factory settings are highlighted in bold)	
Submenu: Display	<p>Specify the channels which should be displayed as the instantaneous value (Tip: the fewer the channels assigned, the larger the device can display the channels). If no channels are assigned, the device assigns the channels automatically.</p> <p> <b>Note!</b> Note: these settings do not affect measured value storage.</p>  <p><i>Fig. 33: Setup, Signal Settings, "Display" submenu</i></p>	
	Submenu: Curve display	If no channels are assigned, the device assigns the channels automatically. Caution: All the channels are always displayed in the curve. Picklist: channel x: <b>Switched Off</b> , Analog Input x, Digital Input x
	Submenu: Bargraph	Specify the channels that should be displayed in the bar graph. If no channels are assigned, the device assigns the channels automatically. Picklist: channel x: <b>Switched Off</b> , Analog Input x, Digital Input x
	Submenu: Digital display	Specify the channels which should be displayed in the digital display. If no channels are assigned the device assigns the channels automatically. Picklist: channel x: <b>Switched Off</b> , Analog Input x, Digital Input x



### 6.4.3 Set up - Signal analysis

Function only visible if a digital input has been activated as a counter, or the option "Integration + Analysis + Mathematic" is activated!

Set up in order to get signal analysis for a preset time range/cycle as well as the function to manually reset the signal analysis.

The analyses can be displayed in normal operation at the touch of a button ("Main menu - Analysis").



Note!

Signal analysis means a quantity analysis or an operational time analysis (built-in function) and a min/max/average value analysis (with option "integration + analysis + mathematic") within the adjusted period.

This information is also saved (reduces the memory available for the graphics), transferred to a PC and can be used there for further analyses.

Signal analysis		INTERM / 0
Intermed analysis	:	No
Day	:	Yes
Month	:	No
Total/year count.	:	No(=Total)
Synchron. time	:	00:00
Reset to zero	:	No

Help

Fig. 34: Set up, Signal analysis

"Signal analysis" menu items	Configurable parameters (Factory settings bold marked)
<b>Intermed analysis</b>	Calculates quantities and operating times for the time cycles preset here. Picklist: <b>No</b> , External, 1min,...12h
<b>Day</b>	Calculates daily quantities and operation times. Picklist: <b>no</b> (off), yes (on)
<b>Month</b>	Calculates monthly quantities and operation times. Picklist: <b>no</b> (off), yes (on)
<b>Total/year count.</b>	Calculates quantities and operation times. "Yes": analysis time cycle is one year. " <b>No(=Total)</b> ": the analysis is continuous from the time of the last reset (useful as a totalizer).
<b>Synchron. time</b>	Time for ending the signal analysis. If, for example, 07:00 is set up then the daily analysis will run from 07:00 of the actual day until 07:00 of the following day. ( <b>00:00</b> )
<b>Reset to zero</b>	<p>The analyzed values can be reset to zero. Example: Reset after commissioning plant. All (installation) signals are deleted. The graphics or memory storage are not influenced (traceability)!</p> <p>Picklist: <b>no</b>, intermed analysis, daily counter, monthly counter, total/yearly counter, all counters.</p> <p> Note!</p> <ul style="list-style-type: none"> <li>■ All previous (commissioning) signals are discarded.</li> <li>■ If the previous signals are still required, save them on the CompactFlash card before resetting (see Section "Commissioning - Accessible functions - CompactFlash card").</li> <li>■ The reset takes effect immediately if you confirm here with "E= Accept".</li> </ul>

6.4.4 Set up - Communication

Information on the interface used

Set up required if you are using the USB, RS232, RS485 or Ethernet interface of the unit (PC operation, serial data read-out, modem operation, etc.).



Caution!  
The various interfaces can be operated in parallel.  
Only one of the RS232/RS485 interfaces can be used at any one time.

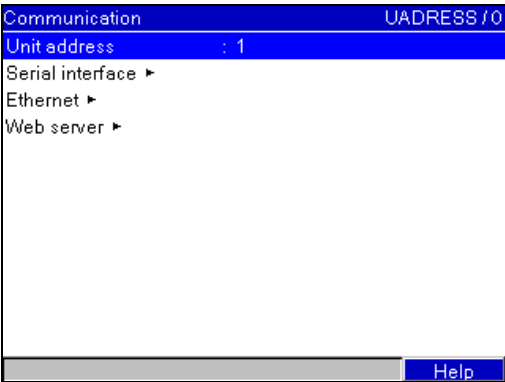

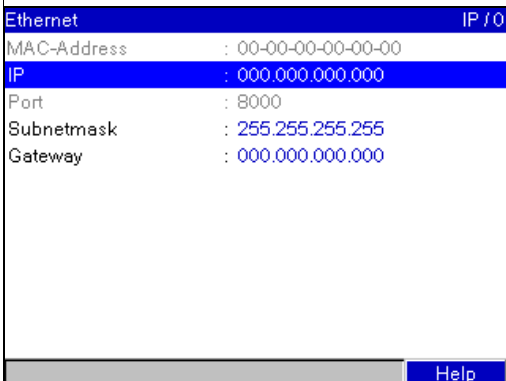




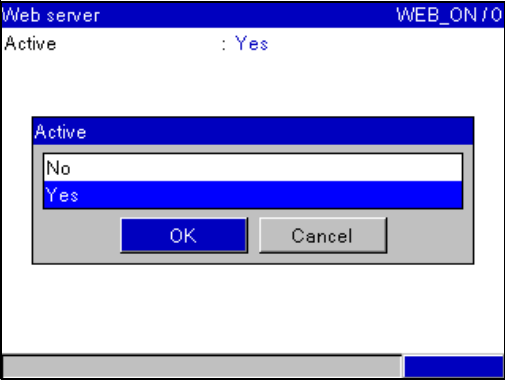

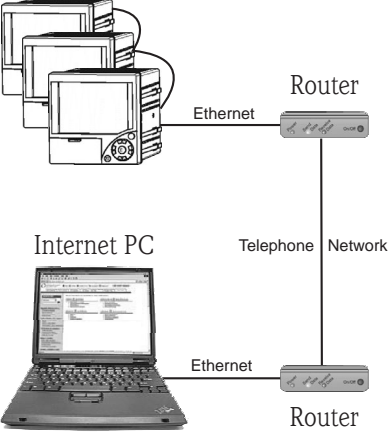





Fig. 35: Set up, Communication

"Communication" menu items	Configurable parameters (Factory settings bold marked)	
Unit address	Each unit using the USB, RS232, RS485 or Ethernet interfaces must have its individual address (0 - 99). <b>Factory setting: 1.</b>	
Submenu: Serial interface	Set up required if you are using the RS232 or RS485 unit interface.	
	Fig. 36: Set up, Communication, Serial interface	
	Type	Selection as to which interface is being used ( <b>RS232</b> or RS485).
	Baudrate	Transmission speed ("Baudrate") - must be the same as the settings for the provided PC software. Picklist: 1200 to <b>115200</b>
	Data bits	Please check that settings are compatible with the PC settings! Fixed settings - cannot be changed. <b>Default value "8"</b> .
	Parity	Please check that settings are compatible with the PC settings! Fixed settings - cannot be changed. <b>Default value "none"</b> .
	Stop bits	Please check that settings are compatible with the PC settings! Fixed settings - cannot be changed. <b>Default value "1"</b> .

"Communication" menu items	Configurable parameters (Factory settings bold marked)	
Submenu: Ethernet	<p>Set up required if you are using the Ethernet interface of the unit.</p> <p> Note! Several user cannot access at the same time via provided PC software and Ethernet to the unit.</p>  <p><i>Fig. 37: Set up, Communication, Ethernet</i></p>	
	<b>MAC-Address</b>	MAC address (Fixed settings - cannot be changed). The MAC address (Media Access Control) is the hardware address, which identifies the unit in the network.
	<b>IP</b>	<p>Please input the IP-address (given by your network administrator). This IP address is assigned by your network administrator. Please talk to your network administrator about this.</p> <p>The unit is delivered with a preset IP address which must, however, be changed in the set up procedure. Before you can make the input in the unit, an IP address valid for your network must be defined.</p> <p> Note! The IP address must be unique within the network!</p> <p>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).</p>
	<b>Port</b>	<p>Please check that settings are compatible with the PC settings! Fixed settings - cannot be changed. Port preset at the factory to <b>"8000"</b>.</p> <p> Note! The port "8000" must be opened on the Firewall of the accessing PC, with Web server function open the port "80" too. Call your system administrator!</p>
	<b>Subnetmask</b>	<p>Please input the subnetmask (given by your network administrator).</p> <p>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).</p>
	<b>Gateway</b>	<p>Please input the Gateway (given by your network administrator).</p> <p>Enter the IP address of the gateway here, if connections are to be established in other networks. <b>Factory setting: 000.000.000.000</b></p> <p> Note! Changes to the system parameters are not activated until the set up menu is closed and the settings accepted. Only then will the unit work with the new settings.</p>

"Communication" menu items	Configurable parameters (Factory settings bold marked)		
Submenu: Web server	<p>Set up for operation of the unit as a web server. Instantaneous values can be read off using an Internet Browser, e.g. MS Internet Explorer. <b>Call up: http://&lt;IP address&gt;/web (e.g. http://192.168.100.2/web)</b></p> <p> <b>Caution!</b> Do not enter any leading zeros in the IP address!</p> <p>With device software version V01.01.00 or higher, it is possible to call up the web server without the "web" parameter in the address (e.g. http://192.168.100.2). The "http://&lt;IP-Adresse&gt;/web?refresh=x" call-up can be used to specify automatic updating of the page. (Note: x is the update interval in seconds, e.g. http://10.55.81.109/web?refresh=20)</p> <div></div> <p><i>Fig. 38: Set up, Communication, Web server</i></p> <p><b>Using a web server to remotely monitor process values</b></p> <p>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. Maximally 4 user can have access to the unit via Web server at the same time.</p> <p> <b>Note!</b> The port "80" must be opened on the Firewall of the accessing PC. Call your system administrator!</p> <p>A physical web link must be established via LAN or Internet to display the values on the web browser of a PC:</p> <div></div> <p><i>Fig. 39: Remote monitoring with web browser</i></p> <p>The desired IP address of the unit must be entered in the address line of the web browser. You find the IP address of the unit under "Main menu -&gt; Set up -&gt; Communication -&gt; Ethernet". It is necessary to have a fixed IP address!</p> <p>This function makes it possible to remotely monitor process variables. Access is password-protected. The following parameters must be configured in the unit:</p> <table><tr><td><b>Active</b></td><td>Switch the web server function on or off (= factory default). The instantaneous values can be displayed by means of the web server using an Internet browser.   <b>Note!</b> Only possible using the Ethernet interface! Picklist: <b>no</b> (off), yes (on)</td></tr></table>	<b>Active</b>	Switch the web server function on or off (= factory default). The instantaneous values can be displayed by means of the web server using an Internet browser.   <b>Note!</b> Only possible using the Ethernet interface! Picklist: <b>no</b> (off), yes (on)
<b>Active</b>	Switch the web server function on or off (= factory default). The instantaneous values can be displayed by means of the web server using an Internet browser.   <b>Note!</b> Only possible using the Ethernet interface! Picklist: <b>no</b> (off), yes (on)		

### 6.4.5 Setup - Service

Service setup.



Caution!

Changes must only be made by skilled personnel. The unit will operate incorrectly if incorrect settings are made!

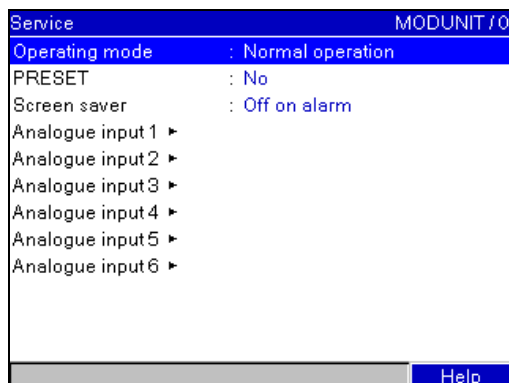


Fig. 40: Setup, Service, Preset

"Service" menu items	Configurable parameters (factory settings are highlighted in bold)	
Operating Mode	<p><b>"Normal Operation"</b>: unit plots the signals from the connected measuring points.  <b>"Simulation"</b>: instead of operating with the real measuring points connected, the signals are simulated (using the actual settings).  <b>Note!</b>            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 required, save them on the CompactFlash card beforehand (see Section 7 "Commissioning - Accessible functions - CompactFlash card functions").</p>	
PRESET	<p> <b>Caution!</b>            Returns all parameters to the factory default setup! The internal memory contents is deleted!            Picklist: <b>No</b>, Yes  <b>Note!</b>            Can only be changed using the service code.</p>	
Screen Saver	<p><b>"Off on Alarm"</b>: the screensaver is automatically deactivated in an alarm condition (e.g. limit value, cable open circuit, etc.).  <b>"Always On"</b>: the screensaver remains switched on even in the event of an alarm.  <b>Note!</b>            Active messages that have to be acknowledged always deactivate the screensaver.</p>	
Submenu: Reset to Zero	<p>Service setup.  <b>Caution!</b>            Changes must only be made by skilled personnel. The unit will operate incorrectly if incorrect settings are made!  <b>Note!</b>            Can only be changed using the service code.</p>	
	"Unit Running Time:"	Resets the unit operating time to 0 hours. Picklist: <b>No</b> , Yes
	"LCD Running Time:"	Resets the LCD operating time to 0 hours. Picklist: <b>No</b> , Yes
Submenu: Analog Input x	<p><b>"Correction RWT"</b>: rear wall temperature correction value for this analog input (only required for thermocouples).  <b>Factory setting: -1.0 °C</b>  <b>Note!</b>            Can only be changed using the service code.</p>	

## 6.5 The main menu

Press the  key to call up the main menu:

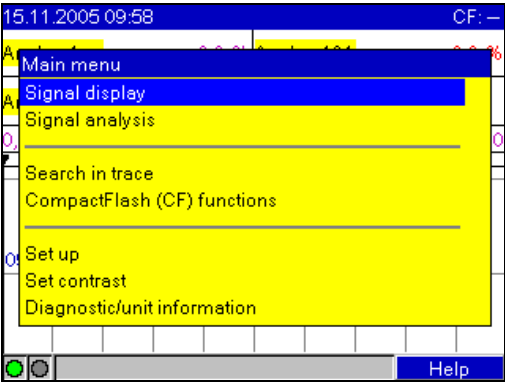




Abb. 41: Main menu

### 6.5.1 Main menu - Signal display

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.



Note!

You can change between the various display modes using  and .

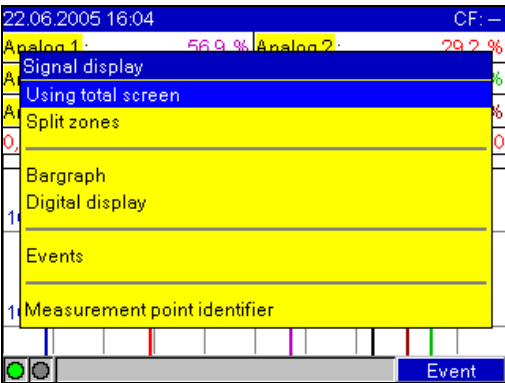
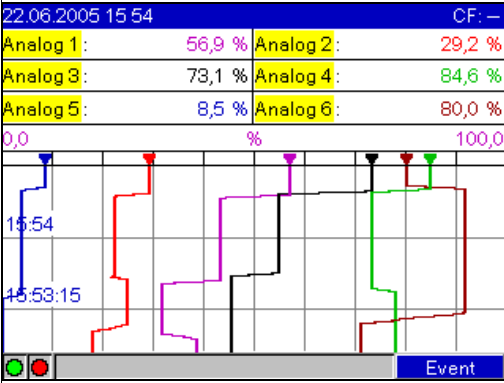
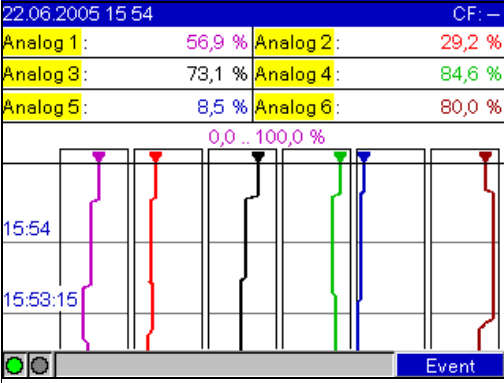
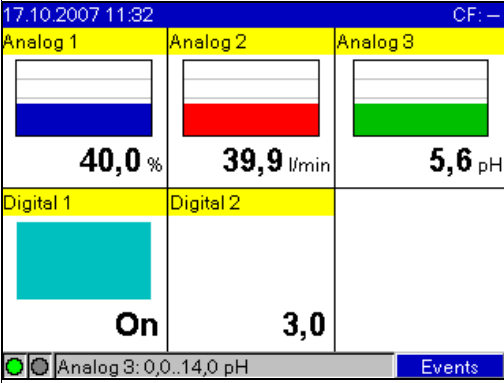
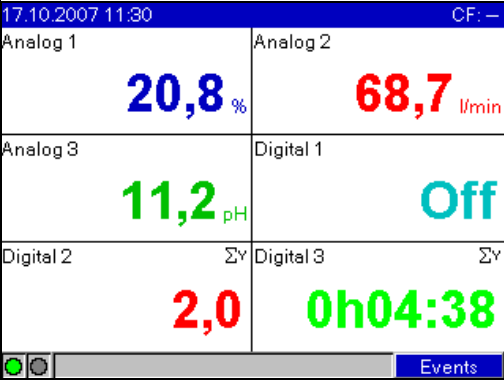


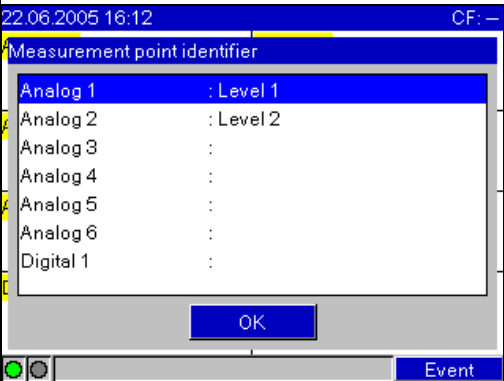


Fig. 42: Main menu, Signal display

"Signal display" menu items	Description
Using total screen	<p>All channels are displayed over the total width. Maximum resolution in upscale direction.</p>  <p>Fig. 43: "Using total screen" signal display</p>
Split zones	<p>Each channel is displayed in its own chart zone. Accuracy of the plot is not influenced in this display mode.</p>  <p>Fig. 44: "Split zones" signal display</p>
Bar graph	<p>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.</p>  <p>Fig. 45: "Bar graph" signal display</p>

"Signal display" menu items	Description
<b>Digital display</b>	<p>Display of the active analog measured values as digital values. The digital input is displayed as a status or counter/operating time counter.</p>  <p><i>Fig. 46: "Digital display" signal display</i></p>
<b>Events</b>	<p>Events such as alarm set point infringement and power failure are listed in the correct time sequence.</p>  <p><i>Fig. 47: "Events" signal display</i></p>
<b>Measurement point identifier</b>	<p>Listing of the 10-character channel identifier together with additional 13-character information text (e.g. additional measurement tag numbers, identification system in power stations etc.).</p> <p> <b>Note!</b> Only visible if "With add. channel info" is selected under "Set up - Basic settings - Display - Channel ident.".</p>  <p><i>Fig. 48: "Measurement point identifier" signal display</i></p>



### 6.5.2 Main menu - Signal analysis

Function only visible if a digital input was activated as a counter or the option "Integration + Analysis" is activated and signal analysis is activated in the set up!

As an option, it is also possible to perform signal analysis for analog inputs (option "Integration + Analysis" with activated integration for analog inputs).

Display of the last 7 intermediate, daily, monthly, yearly analyses (so long as they are available).

The digital input is displayed as the respective counter or operating time counter.

When using analog inputs, the min. value, max. value, average value and, if applicable, the integrated meter reading are output ("Integration + Analysis" option).

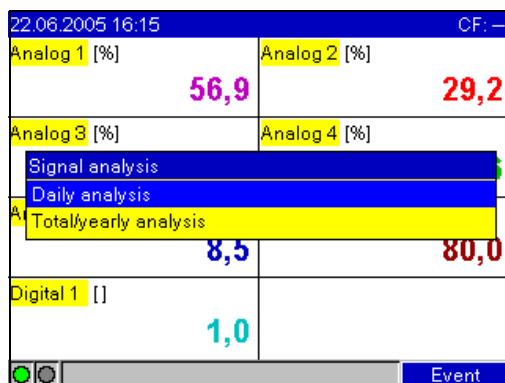


Fig. 49: Main menu, "Signal analysis"

Once an analysis is selected, it appears on the display.

### 6.5.3 Main menu - Search in trace

Search for events or times in the internal memory.

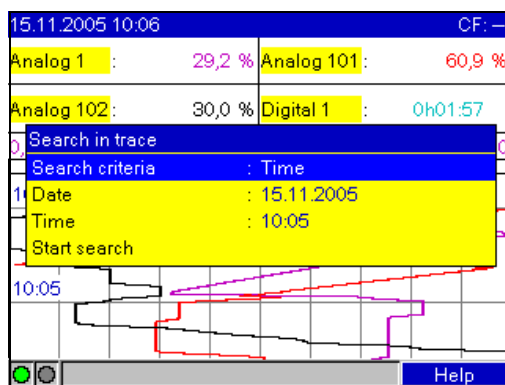





Fig. 50: Main menu, "Search in trace"

"Search in trace" menu items	Description (Factory setting bold marked)
Search criteria	You can search for a specific time or event in the memory. When searching for a <b>"time"</b> the graphic display shows from this time. When searching for an <b>"event"</b> the ones found are displayed as a list.
Date only at search criteria "time"	Enter the required date. <b>Factory setting: actual date</b>
Time only at search criteria "time"	Enter the required time. <b>Factory setting: actual time</b>

"Search in trace" menu items	Description (Factory setting bold marked)
Search filter	For a better overview a search can be conducted looking for specific events (e.g. only set up changes). In the standard all events are shown. Function only possible for search criterion "Search for events". Picklist: <b>All events</b> , Alarm limit violation, On/off events, Setup change, Power on/off, Service, CompactFlash card
Time span	Select the times where the events are to be searched for. Function only possible for search criterion "Search for events". Picklist: the last 12 hours, <b>the last 24 hours</b> , this week, this month, 3 month back, total memory
Start search	Start search with set up parameters

The search results appear on the display shortly after the search is started. You can use the arrow keys   to scroll through the search results. Press the ESC key to return to the current value display .

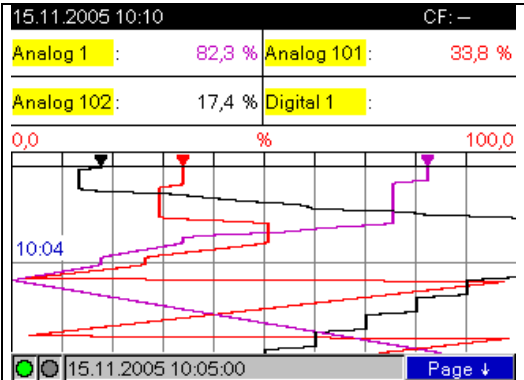


Fig. 51: Main menu, "Search in trace" – search results

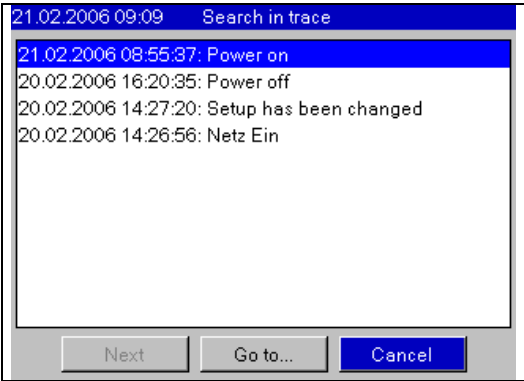




Fig. 52: Main menu, "Search in trace" – event list

6.5.4 Main menu – CompactFlash (CF) functions

Functions for measured data storage and unit set up onto the CompactFlash card. The following functions are possible:

"CompactFlash (CF) functions" menu items	Description
<b>Safely remove CF</b>	In order to ensure safe removal of the CompactFlash card all internal access is ended. You will receive a message when the card can be safely removed.  <b>Note!</b> Remove the card within 5 minutes otherwise the unit will start to automatically store data onto the card again. Only remove the card using this function otherwise data can be lost!
<b>Update CF</b>	Data that has not been transferred to the CompactFlash card is now stored.
<b>Complete memory to CF</b>	The content of the internal memory is completely copied to the CompactFlash card. Please be patient! Measured value recording continues in parallel and has the highest priority.
<b>Copy set up to CF</b>	All unit parameters (set up) are copied to the CompactFlash card. They can be archived and used for other units. The file has the extension .rpd.
<b>Load set up from CF</b>	Loads unit parameters (set up) from the Compact Flash card into the internal nonvolatile memory of the unit. The file has the extension .rpd.
<b>Delete CF</b>	Deletes all data on the CompactFlash card.  <b>Note!</b> If a release code has been set up then the CompactFlash card can only be deleted after this code has been entered.

Without affecting the internal memory, data packages are copied block-by-block to the CF card. Tests are also made to determine whether the data has 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 CompactFlash card, select "CompactFlash card functions/Update CF". The current data block is closed and saved to CompactFlash. This ensures that all current data (until the last save) is included on the CF card.
- You are informed before the CF card is 100 % full. This is achieved by an acknowledgeable message in the display, which indicates that the CF card described 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 has already been copied onto the CF card. Should you ever forget to change it in time (or if there is no CF card inserted), the new CF card is filled with the missing data from the internal memory – in as far as it is still available there.
- Since measured value acquisition/registration has highest priority, it can take some minutes until the contents of the internal memory is copied onto the CF card.
- If the CF card is being accessed, the LED lights up. During this process, the CF card must not be removed.

### 6.5.5 Main menu – Set up

Here you can trim your new unit to optimum operation, all possible operating parameters are accessible (see see Section 6.4).

### 6.5.6 Main menu – Set contrast

You can set the viewing angle upwards or downwards to an optimum contrast depending on the installation height.

### 6.5.7 Main menu – Diagnostic/unit information

Unit information and service functions for a swift unit check. The following functions are possible:

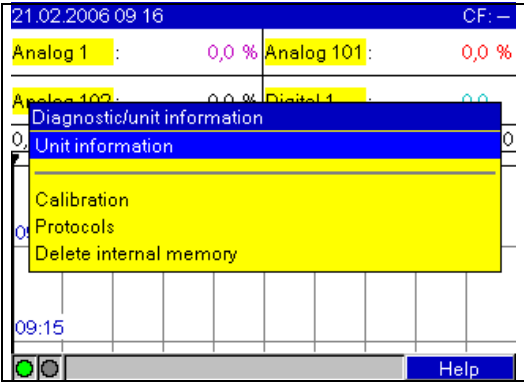
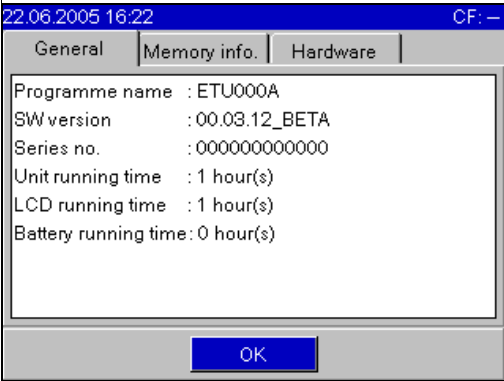







Fig. 53: Main menu, "Diagnostic/unit information"

"Diagnostic/unit information" menu items	Description
Unit information	<p>Display of important unit and memory information, such as program name and software version. In addition, the memory time available is also displayed. This time is reduced if</p> <ul style="list-style-type: none"><li>■ Limit values/events are saved or monitored</li><li>■ Signal analyses are activated</li><li>■ Digital inputs are active</li></ul>  <p>22.06.2005 16:22 CF: -</p> <p>General   Memory info.   Hardware</p> <p>Programme name : ETU000A SW version : 00.03.12_BETA Series no. : 000000000000 Unit running time : 1 hour(s) LCD running time : 1 hour(s) Battery running time : 0 hour(s)</p> <p>OK</p>
Calibration	<p>Calibration must only be carried out by skilled and trained personnel.</p> <p> Caution! Malfunctions possible if not performed correctly! Normal trending is interrupted for the complete time that this function is operational. This is also identified in the event list.</p> <p> Note! Protection via a service code to prevent unintentional release.</p>
Protocols	<p><b>Boot log:</b> Only for service purposes <b>Error log:</b> Only for service purposes</p> <p> Note! Protection via a service code to prevent unintentional release.</p>
Delete internal memory	<p> Caution! Completely deletes the measured values with all analyses recorded in the internal memory. The total counter remains.</p> <p> Note! The CompactFlash card is not deleted. When the release code (password) is set in the unit, then you will need to enter it.</p>

## 6.6 Saving measured values

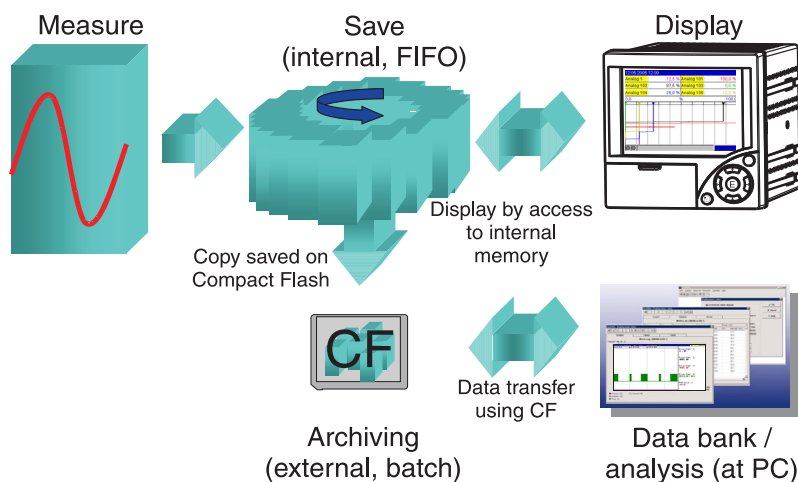


Fig. 55: Schematic display of measured value saving

### 6.6.1 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 is overwritten (FIFO – first in/first out principle). As a result, the current data is always available.

### 6.6.2 Scrolling through measured values

In running operation, you can scroll through the saved measured values in curve display. Use the arrow keys ( ) to move backwards or forwards. Press the ESC key to return to the current value display.

### 6.6.3 How the CompactFlash card works

Without affecting the internal memory, data packages are copied block-by-block to the CompactFlash card. Tests are also made to determine whether the data has been written onto the CompactFlash 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, is available here. If you wish, you can export this data into other programs, such as MS Excel®, without losing the protected data basis.



Note!

- Only use new, formatted CompactFlash cards recommended by the manufacturer (see "Accessories", Section 8). Any data on the CompactFlash card is overwritten once the card is inserted into the slot.
- The CompactFlash memory being written to is shown in normal operation at the top right of the display ("CF: xx %")
- Dashes "-" on this display mean that no CompactFlash is inserted.
- Before removing the CompactFlash card, select "CompactFlash card functions/Update CF". The current data block is closed and saved to CompactFlash. This ensures that all current data (until the last save) is included on it.

- Depending on the configuration of your unit (see "Set up/Basic settings/External memory/Warning at"), an acknowledgeable message on the display informs you that the CompactFlash being written to needs to be changed before the CompactFlash is 100 % full.
- Your unit knows which data has already been copied onto the CompactFlash. Should you ever forget to change the CompactFlash in time (or if there is no CompactFlash inserted), the new CompactFlash is filled with the missing data from the internal memory - in as far as it is still available there. Since measured value acquisition/registration has highest priority, it can take several minutes until the data is copied from the internal memory to CompactFlash.

## 6.7 Important functions of the provided PC software



Note!

The current PC software must be installed on a PC (for installation instructions, see description on CD-ROM or chapter 5.5 in this manual).

### 6.7.1 Data transfer to the provided PC software

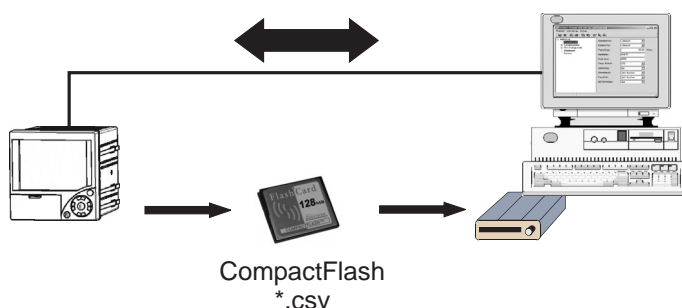


Fig. 56: Data transfer to the provided PC software

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 measured values using interface/Modem".
- Save the data to CompactFlash in the unit using the function "Main menu -> CompactFlash (CF) functions -> Update CF".  
Now insert the CF card into the PC and read the data using the function "Read out -> Read out measured values using PC card drive".
- Read out the CompactFlash CF card with the provided PC software:  
In principle the values can be read out directly from the CompactFlash CF card. The connection to the unit is made by RS232/RS485, Ethernet or USB. Start the provided PC software. Select "Read out -> Read out memory card by interface/modem". Select the appropriate unit from the PC data base. Select "Unit -> open unit(s)". The connection is developed. Select the appropriate file on the CompactFlash CF card and confirm with "OK". The measured values are read out. The measured values remain on the CompactFlash CF card.

### 6.7.2 Offline data check, analysis and printout

The data saved offline or downloaded to the PC (using one of the methods described above), can be viewed in the provided PC software using the function "Display -> Display measured values from data base".

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 provided PC software). A detailed description of the functions can be found on the CD-ROM of the provided PC software.

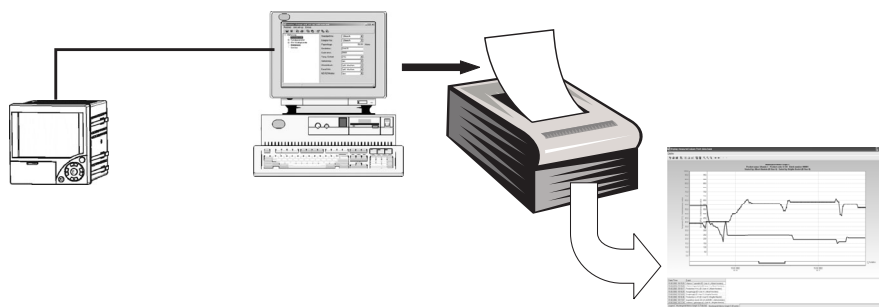


Fig. 57: Data analysis at PC

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

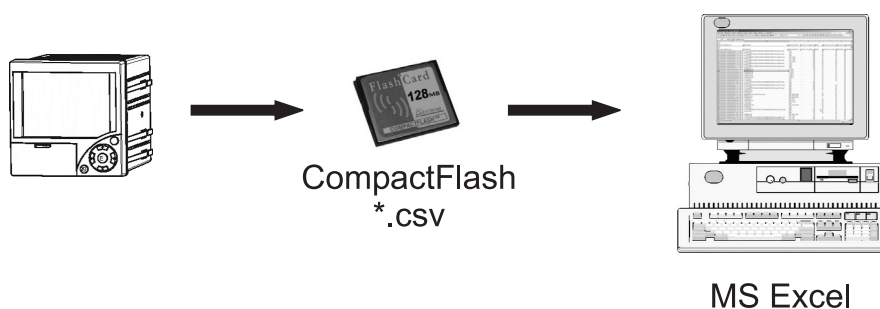


Fig. 58: Data analysis in spreadsheet

Select "open format (\*.csv)" (comma separated values) as the save mode in the unit under "Set up -> Basic settings -> External 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 "Set up -> Basic settings -> External memory -> Separator for CSV". MS-Excel limits the open format (\*.csv) to max. 65535 lines.

Alternatively, the data can be exported to \*.xls, \*.csv or \*.txt format in the provided PC software under "Extras -> Export measured values".

## 7 Maintenance

The unit is maintenance-free.

### 7.1 Software update via the provided PC software



Caution!

When the program is updated, all measurement data in the memory is deleted. If the measured values saved in the unit are still required, they should first be read out or the CompactFlash card should be updated and removed from the unit. After the program transfer, all unit settings are reset to the factory settings.

Procedure:

1. Start the supplied PC software
2. Connect the unit via USB to the PC (update only possible via USB connection!)
3. Select "Extras -> Special unit functions -> (select the unit) -> Transmit program"
4. Select interface parameters (Com-Port)
5. Select desired program file (\*.prg) and confirm with OK.

### 7.2 Instruction for releasing a software option e.g. "Integration + Analysis + Maths"



Note!

- You need the provided PC software (at least version 1.23.0 or higher) for releasing a software option.
- The firmware of the unit must be at least version 2.00.00 or higher. Is this not the case, please contact the manufacturer.
- Please hold the release code, which you have received from the manufacturer, ready (see delivery order).
- It is necessary to read out the unit parameters before beginning. The unit's settings must be stored in the PC software database.
- Please make sure, that the unit is connected with a communication cable. The communication port must be the same as used for the settings' readout before (e.g. USB).

Procedure:

1. Start the supplied PC software
2. Select menu item "Extras -> Service -> Release options"
3. You will see a list of units stored in the PC database. Select the relevant unit.
4. Please enter the release code, which you have received from the manufacturer (see delivery order), into the appearing pop-up window. Start the transmission of the release code with a click on the button "OK".
5. If the transmission was successful a message on the provided PC software will appear. The unit will reboot. A relevant message will be saved in the event list, indicating the successful option release.
6. A new read out of the unit parameters is necessary.  
**The released option is now useable.**



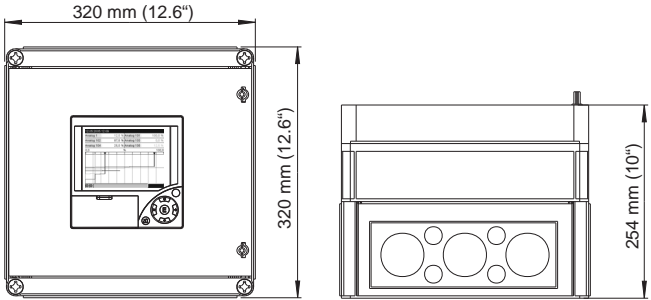
# 8 Accessories



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

## 8.1 Accessory parts

The following accessories are available:

Order code	Accessory
50078843	Terminal, pluggable, 3-pole, for power supply
51009211	Terminal, pluggable, 6-pole, for analog input
51009214	Terminal, pluggable, 3-pole, for relay
51009215	Terminal, pluggable, 6-pole, for relay
71062537	Terminal, pluggable, 5-pole, for digital I/O
71043991	CompactFlash (CF) memory card 128 MB
51009640	CompactFlash (CF) memory card 256 MB
71007465	Cable USB-A - USB-B, 2 m (6.56 ft)
RXU10-A1	Cable set for connection PC or modem
RSG30A-H1	Field housing IP65 

# 9 Troubleshooting

## 9.1 Diagnostic/unit information

Unit information and service functions for a swift unit check. The following functions are possible:

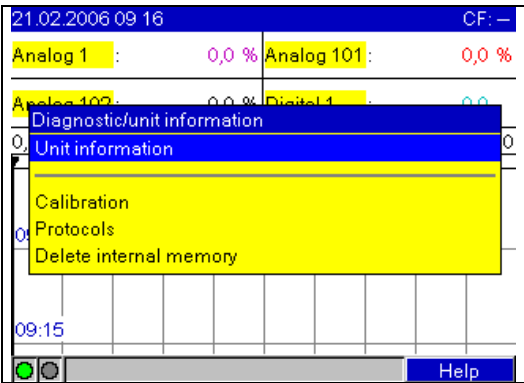
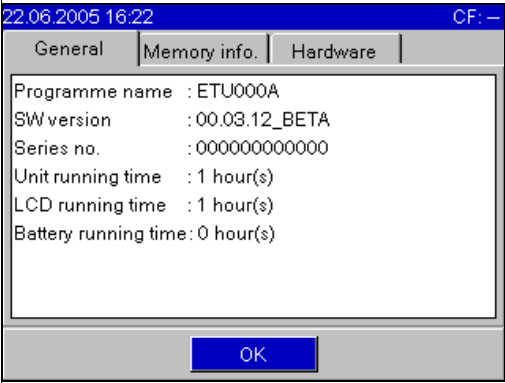




Fig. 59: Main menu, "Diagnostic/unit information"

"Diagnostic/unit information" menu items	Description
Unit information	<p>Display of important unit and memory information, such as program name and software version. In addition, the memory time available is also displayed. This time is reduced if</p> <ul style="list-style-type: none"><li>■ Limit values/events are saved or monitored</li><li>■ Signal analyses are activated</li><li>■ Digital inputs are active</li></ul>  <p>The screenshot shows the 'Unit information' screen with tabs for 'General', 'Memory info.', and 'Hardware'. The 'General' tab is selected, displaying the following information: Programme name : ETU000A, SW version : 00.03.12_BETA, Series no. : 000000000000, Unit running time : 1 hour(s), LCD running time : 1 hour(s), and Battery running time : 0 hour(s). An 'OK' button is at the bottom.</p> <p>Fig. 60: Diagnostic/unit information, "Unit information"</p>
Calibration	<p>Calibration must only be carried out by skilled and trained personnel.</p> <p>⚠ Caution! Malfunctions possible if not performed correctly! Normal trending is interrupted for the complete time that this function is operational. This is also identified in the event list.</p> <p>🔧 Note! Protection via a service code to prevent unintentional release.</p>
Protocols	<p><b>Boot log:</b> Only for service purposes <b>Error log:</b> Only for service purposes</p> <p>🔧 Note! Protection via a service code to prevent unintentional release.</p>

"Diagnostic/unit information" menu items	Description
Delete internal memory	<p> <b>Caution!</b> Completely deletes the measured values with all analyses recorded in the internal memory. The total counter remains.</p> <p> <b>Note!</b> The CompactFlash card is not deleted. When the release code (password) is set in the unit, then you will need to enter it.</p>

## 9.2 Troubleshooting instructions

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 on CF drive or rear of unit (Ethernet) => no power supply	Please check the power supply and the power supply.
	No LED lights up on CF drive or rear of unit (Ethernet) => power supply faulty	Please replace the power supply or call the service department of the supplier!
	LED lights up on CF drive or rear of unit (Ethernet) => display faulty	Please replace the display or call the service department of the supplier!
CompactFlash slot or LED not working	LED lights up on rear of unit (Ethernet) => CPU faulty	Please replace the CPU or call the service department of the supplier!
	CPU defective	Please replace the CPU or call the service department of the supplier!
	Setup change	Save the data onto a data carrier before any changes to the setup.
	Software update / upgrade	Save measured values onto a data carrier before any changes to the software.
No data on the CompactFlash card	CF card defective	Replace the CF card, use genuine cards from the manufacturer! (Accessories, see Section 8)
	CPU defective	Please replace the CPU or call the service department of the supplier!
	Setup lock active, i.e. the setup is only released with a digital signal	Create a digital signal to remove setup lock.
	Relay does not function	
RS232/RS485, Ethernet interface not working	Incorrect connection	Please check the connection and the relay circuit.
	Incorrect configuration	Please check the relay configuration.
	Power supply defective	Replace the power supply card or call the service department of the supplier!
	Cable defective	Replace cable (Accessories, see Section 8)
Modem connection not working	Incorrect connection assignment	Please use original cable
	Incorrect unit address	Check and set correctly.
	Incorrect interface parameters	Check and set correctly.
	Communication card defective	Replace communication card
Modem connection not working	Modem not installed on unit	Initialize modem via provided PC software
	Incorrect or faulty connecting cable	Replace cable (Accessories, see Section 8)

Problem:	Cause:	Remedy:
<b>Digital input does not function</b>	Incorrect connection Incorrect configuration Power supply defective	Please check the connection and the digital input circuit. Please check the digital input configuration. Replace the power supply card or call the service department of the supplier!
<b>Analog input shows "-- --"</b> <b>This means cable open circuit</b>	The signal lines are incorrectly connected or not connected.	Please check the connections.
<b>Analog input shows "*****"</b> <b>This means the measured value is invalid</b>	The input signal does not correspond to the configured signal.	Please check the input signal and the configuration.
<b>Analog input shows "^^^^^^"</b> <b>This means overranging</b>		
<b>Analog input shows "vvvvv"</b> <b>This means underranging</b>	The sensor is defective.	Please check the input signal and replace the sensor.

## 9.3 System error messages

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

## 9.4 Spare parts



Note!

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

Installation instructions are included with the spare part.

### 9.4.1 Spare parts diagram

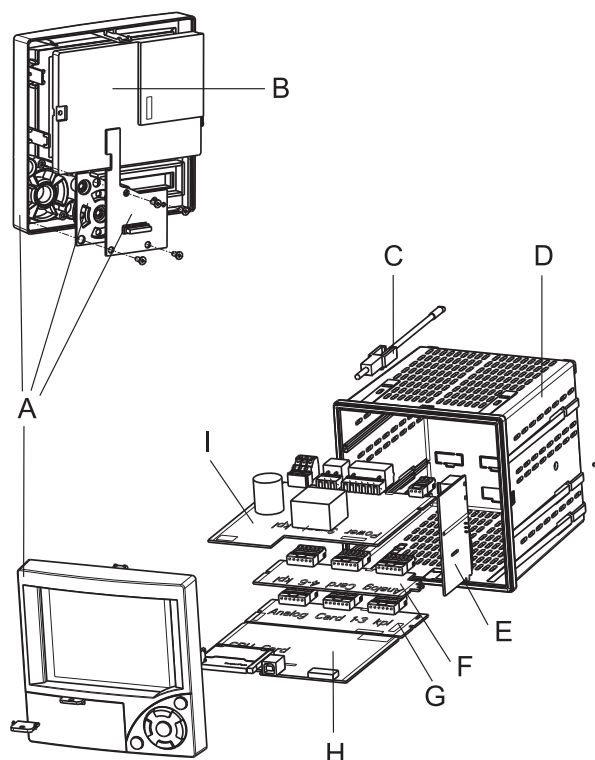


Fig. 61: Spare parts diagram

### 9.4.2 Spare parts list

Pos.	Order No.	Description
A	RSG30X-FA	Front incl. key pad + board
	RSG30X1-WA	Spare connection cable display -> key board
B	RSG30X-DA	LCD Module
C	50084623	Securing unit for casing, 1 piece
D	51009281	Complete casing
E	RSG30X-CA	Communication board + plug for RS485
F	RSG30X-A2	Analog board channel 4-6 with connector, board connector
G	RSG30X-A1	Analog board channel 1-3
I	RSG30X-NA	Power supply 100-230 V AC ( $\pm 10\%$ ); 1 x digital input up to device number 9B021C04267
I	RSG30X-NB	Power supply 100-230 V AC ( $\pm 10\%$ ); 3 x digital input as of device number 9B021C04268
I	RSG30X-NC	Power supply 24 V AC/DC; 1 x digital input up to device number 9B022E04267
I	RSG30X-ND	Power supply 24 V AC/DC; 3 x digital input as of device number 9B022E04268
	51009617	USB connecting cable (USB-A - USB-B, 1 m / 3.3 ft)

### 9.4.3 Spare parts structure for the CPU with software

Pos.	Order No.	Description
H	RSG30X1-...	<b>CPU board with software, USB interface and CompactFlash socket</b>
	A B C D E F G	<b>Operating language package</b> Standard (German, English) Central/western Europe (German, English, French, Spanish, Italian, Dutch) Northern Europe (German, English, Danish, Swedish) Eastern Europe (German, English, Polish, Russian, Czech, Slovak) America (German, English, French, Spanish, American, Portuguese) Japan (German, English, Japanese) China (German, English, Chinese)
	A	<b>Internal memory</b> 2 MB
	A C	<b>Software</b> Standard Integration (totalizer) + analysis + mathematic
	A B	<b>Model</b> Standard Standard North American Region

### 9.4.4 Spare parts structure for unit software options

Pos.	Order No.	Description
	RSG30A1-0CA	<b>Software options</b>
	0	<b>Release code on delivery note + PC operating software on CD-ROM</b>
	C	<b>Software</b> Option integration (totalizer) + analysis + mathematic; <b>needed information: serial number!</b> (Option possible from unit software version 2.00.00)
	A	<b>Operation language</b> All languages (possible for all languages)



Note!  
Installation instructions see chapter 7 "Maintenance".

## 9.5 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 be 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.

## 9.6 Disposal

Please observe local regulations.

## 9.7 Software history

Overview of unit software history:

Unit software version/date	Software changes	PC software version	Operating instructions
<b>01.00.00 / 06.2005</b>	Original software	V1.18.0.0 and higher	BA194R/09/06.05
<b>01.00.08 / 08.2005</b>	Software revision	V1.18.2.0 and higher	BA194R/09/08.05
<b>01.00.13 / 10.2005</b>	Software revision	V1.19.0.0 and higher	BA194R/09/10.05
<b>01.01.00 / 02.2006</b>	Software revision	V1.20.0.0 and higher	BA194R/09/02.06
<b>01.02.00 / 10.2006</b>	Software revision	V1.21.2.0 and higher	BA194R/09/11.06
<b>02.00.00 / 11.2007</b>	Software revision: Mathematic function included; 3 digital inputs	V1.23.0.0 and higher	BA194R/09/10.07
<b>02.01.00 / 03.2008</b>	Software revision: 1...5 V analog input	V1.23.2.0 and higher	BA194R/09/03.08
<b>02.02.01 / 05.2008</b>	New RTD inputs Pt46 and Cu53	V1.24.0.0 and higher	BA194R/09/06.08
<b>02.02.08 / 04.2010</b>	Texts modified; Bug fixing	V1.27.0.0 and higher	BA194R/09/13.10

## 10 Technical data

### 10.1 Input

#### 10.1.1 Analog multi-function input channel 1-6

Measured variable, measuring range To IEC 60873-1:  
An additional display error of  $\pm 1$  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 impedance
<b>Current</b>	0...20 mA 0...5 mA 4...20 mA Overrange: up to 22 mA	$\pm 0.10 \%$	Load: $\approx 50 \text{ Ohm}$
<b>Voltage &gt; 1 V</b>	0...10 V 0...5 V 1...5 V $\pm 10 \text{ V}$ $\pm 30 \text{ V}$	$\pm 0.10 \%$	$\approx 980 \text{ kOhm}$
<b>Voltage <math>\leq 1 \text{ V}</math></b>	0...1 V $\pm 1 \text{ V}$ $\pm 150 \text{ mV}$	$\pm 0.10 \%$	$\approx 2.7 \text{ MOhm}$
<b>Resistance thermometer (RTD)</b>	Pt100: -200 to 850 °C (-328 to 1562 °F) (IEC751, JIS1604, GOST) Pt500: -200 to 850 °C (-328 to 1562 °F) (IEC751, JIS1604) Pt1000: -200 to 600 °C (-328 to 1112 °F) (IEC751, JIS1604)	4-wire: $\pm 0.10 \%$ oMR 3-wire: $\pm (0.10 \%$ oMR + 0.8 K) 2-wire: $\pm (0.10 \%$ 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: $\pm 0.20 \%$ oMR 3-wire: $\pm (0.20 \%$ oMR + 0.8 K) 2-wire: $\pm (0.20 \%$ 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: $\pm 0.30 \%$ oMR 3-wire: $\pm (0.30 \%$ oMR + 0.8 K) 2-wire: $\pm (0.30 \%$ oMR + 1.5 K)	
<b>Thermocouples (TC)</b>	Type J (Fe-CuNi): -210 to 999.9 °C (-346 to 1832 °F) (IEC581-1) Type K (NiCr-Ni): -200 to 1372 °C (-328 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, GOST)	$\pm 0.10 \%$ oMR from -100 °C (-148 °F) $\pm 0.10 \%$ oMR from -130 °C (-202 °F) $\pm 0.10 \%$ oMR from -200 °C (-328 °F) $\pm 0.10 \%$ oMR from -100 °C (-148 °F) $\pm 0.10 \%$ oMR from -100 °C (-148 °F)	$\approx 2.7 \text{ MOhm}$
	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): 0 to 1768 °C (32 to 3214 °F) (IEC581-1) Type R (Pt13Rh-Pt): -50 to 1768 °C (-58 to 3214 °F) (IEC581-1)	$\pm 0.15 \%$ oMR from 500 °C (932 °F) $\pm 0.15 \%$ oMR from 500 °C (932 °F) $\pm 0.15 \%$ oMR from 600 °C (1112 °F) $\pm 0.15 \%$ oMR from 100 °C (212 °F) $\pm 0.15 \%$ oMR from 100 °C (212 °F)	$\approx 2.7 \text{ MOhm}$

Limit values

Limit values for input voltage and 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
<b>Current</b>	Maximum permitted input voltage: 2.5 V Maximum permitted input current: 50 mA	4...20 mA range with cable open circuit monitoring to NAMUR NE43. Activate/deactivate the 4...20 mA loop monitoring as per NAMUR recommendation NE43. On activation: ≤ 3.8 mA: Under range (indicate: vvvvvv) ≥ 20.5 mA: Over range (indicate: ^^^^^^) ≤ 3.6 mA or ≥ 21.0 mA: Open Circuit (indicate: ---)
<b>Voltage &gt; 1 V</b>	Maximum permitted input voltage: 35 V	1...5 V range with cable open circuit monitoring: < 0.8 V or > 5.2 V: Open Circuit (indicate: ---)
<b>Voltage ≤ 1 V</b>	Maximum permitted input voltage: 12 V	
<b>Resistance thermometer (RTD)</b>	Measuring current: ≤ 1 mA	Disengageable cable open circuit detection  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, Cu100, Cu50 and Cu53: 4-wire: ±0.0006%/Ohm, 3-wire: ±0.006%/Ohm
<b>Thermocouples (TC)</b>	Maximum permitted input voltage: 12 V	Disengageable cable open circuit detection from 50 kOhm Error, internal temperature compensation: ≤ 2 K

Channel isolation All analog inputs are galvanically isolated from one another. The testing voltage between the channels is 500 V (no safety isolation)

Scan rate All channels are scanned within 100 ms.

Resolution For all ranges: ≥ 18 bit

Integration, analysis, mathematic (option package) **Integration** (Quantity calculation of analog channels): It is possible to calculate an intermediate, daily, monthly, yearly or total value (13-digit, 64 bit).  
**Analysis:** Quantity-/operating time recording (standard function), additionally a min/max/average value evaluation within the preset period.  
**Mathematic:** Up to 5 mathematics channels. Mathematic calculation of analog channels using basic arithmetic operands (+, -, \*, /), constants. In addition either the sum or the average value of several channels can be calculated. If the mathematics channel is used then 1 analog channel is lost.

### 10.1.2 Digital inputs

Number 3 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. Functions of the control input: start recording, rear illumination OFF, setup lock, time synchronization.

## 10.2 Output

### 10.2.1 Auxiliary voltage output

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

**Output voltage:**

Approx. 24 V, max. 28 V

**Output current:**

Maximum 250 mA, short-circuit proof, not stabilised

### 10.2.2 Relay outputs

**Alarm relay:**

1 Alarm relay with changeover contact

**Standard relay:**

3 relays with NO contact for limit value messages (can be configured as 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:**

$\leq 1$  s

**Maximum DC contact load:**

50 V / 300 mA (steady-state, without destroying input)

**Maximum AC contact load:**

230 V / 3 A (steady-state, without destroying input)

## 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 supply: 100...230 V<sub>AC</sub> ( $\pm 10\%$ )

Extra-low voltage power supply: 24 V<sub>AC/DC</sub> (-10%, +15%)

### 10.3.3 Frequency

Nominal frequency: 50 / 60 Hz

### 10.3.4 Cable specification

Screw or spring terminal blocks with reverse polarity protection:

Digital I/O wire cross-section, RS485 and analog inputs: max. 1.5 mm<sup>2</sup> (14 AWG) (spring terminals)

Power wire cross-section: max. 2.5 mm<sup>2</sup> (13 AWG) (screw terminals)

Relay wire cross-section: max. 2.5 mm<sup>2</sup> (13 AWG) (spring terminals)

### 10.3.5 Power consumption

100...230 V: max. 30 VA

24 V: max. 24 VA

### 10.3.6 Connection data interface, communication

#### USB port (standard):

Front-mounted USB-B socket (V1.1) for connecting a laptop or computer using a shielded USB cable. The USB port can be used for program transmission and unit configuration (printers or modems cannot be connected here).

#### Ethernet interface (option):

Rear-mounted Ethernet interface 10BaseT, plug type RJ45, connection via shielded cable, allocation of IP address via setup menu in unit. The unit can be connected to units in an office environment with this interface. For safe spacing distances, observe the office equipment standard IEC 60950-1. Direct connection to a PC is possible with a "crossover" cable. The unit can be used in the network as a "Web server". Two Ethernet function LEDs on the rear of the unit.

#### Serial RS232/RS485 interface (option):

Rear-mounted RS232 SUB-D9 socket or RS485 interface (terminal connection) for data/program transmission or as modem connection.

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 Performance characteristics

### 10.4.1 Reference operating conditions

Ambient temperature:  $25\text{ °C} \pm 5\text{ K}$  ( $77\text{ °F} \pm 9\text{ °F}$ )

Air humidity:  $55\% \pm 10\% \text{ r.h.}$

### 10.4.2 Maximum measured error

See Inputsee Section 10.1.1

### 10.4.3 Temperature drift

Cu100, Cu50, Cu53, Pt46 and Pt50: max.  $\pm 0.02\text{ %/K}$  (of measuring range)

All other ranges: max.  $\pm 0.01\text{ %/K}$  (of measuring range)

### 10.4.4 Long-term drift

To IEC 61298-2: max.  $\pm 0.01\text{ %/month}$  (of measuring range)

## 10.5 Installation conditions

### 10.5.1 Orientation

Position of use as per DIN 16 257, NL  $90 \pm 30^\circ$

### 10.5.2 Installation instructions

(Panel mounting, see Section 3)

- Installation depth: approx. 171 mm (6.73 inch) (incl. terminals and fastening clips)
- Panel cutout:  $138^{+1} \times 138^{+1}$  mm ( $5.43^{+0.04} \times 5.43^{+0.04}$  inch)
- Panel thickness: 2 to 40 mm (0.08 to 1.57 inch)
- Maximum point of view range: From the display center  $50^\circ$  to the left and right,  $20^\circ$  upward,  $30^\circ$  downward.
- Securing to DIN 43 834

## 10.6 Environment

### 10.6.1 Ambient temperature range

0 to  $50\text{ °C}$  ( $32$  to  $122\text{ °F}$ )

### 10.6.2 Storage temperature

$-20$  to  $+60\text{ °C}$  ( $-4$  to  $140\text{ °F}$ )

### 10.6.3 Relative air humidity

0 to  $50\text{ °C}$  ( $32$  to  $122\text{ °F}$ ), max. 75% humidity without condensation.

### 10.6.4 Climate class

To IEC 60654-1: B1

### 10.6.5 Degree of protection

Front-panel IP 54 (IEC 60529, Cat. 2) NEMA 2

rear-panel IP 20 (IEC 60529, Cat. 2)

### 10.6.6 Electrical safety

IEC 61010-1, protection class I

Low voltage: overvoltage category II

Environment < 3000 m (< 9843 ft) above MSL (mean sea level)

### 10.6.7 Electromagnetic compatibility (EMC)

#### Interference immunity:

To IEC 61326: Class B (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 line: To CISPR 16-1/-2: Class A

#### Interference current:

Ethernet line: To EN 50022: Class A

#### Interference field intensity:

Housing/all connections: to CISPR 16: Class A

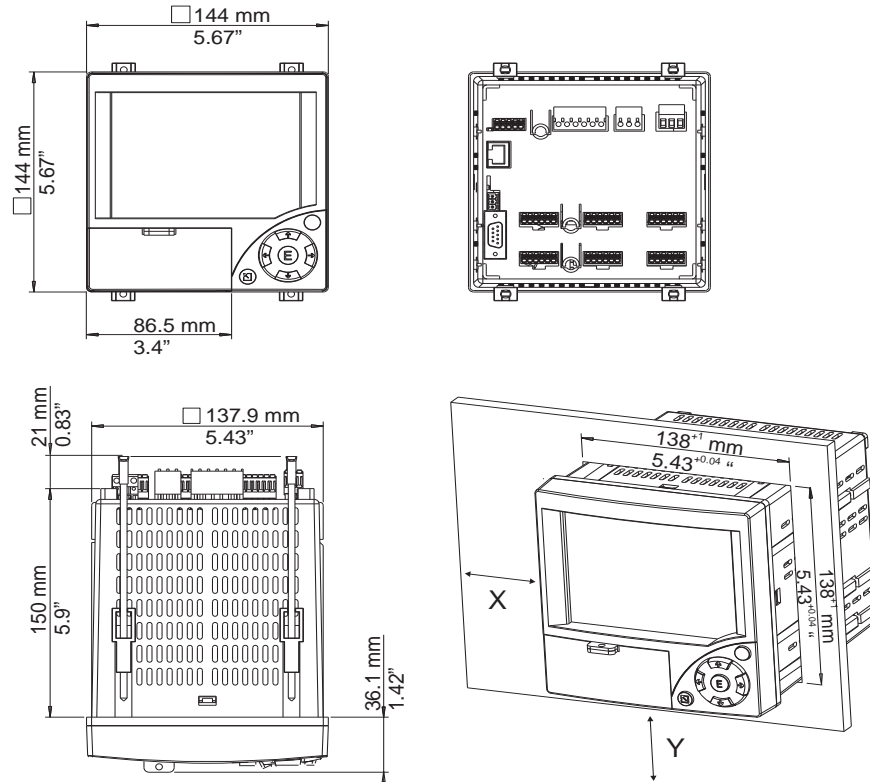
#### Interference voltage suppression:

- 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

## 10.7 Mechanical construction

### 10.7.1 Design, dimensions

Panel-mounted instrument:



### 10.7.2 Weight

- Panel-mounted instrument: approx. 700 g (1.54 lb)

### 10.7.3 Materials

Front frame/removable media door: plastic (ABS)

Housing: fiberglass reinforced plastic (PC)

Protective cover in front of display: plastic (PC)

## 10.8 Human interface

### 10.8.1 Display elements

**Type:**

LC color graphic display

**Size (screen size, measured diagonally):**

120 mm (4.7")

**Resolution:**

76,800 pixels (320 x 240 pixels)

**Rear illumination:**

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

**Number of colors:**

64 colors

**Point of view:**

Maximum point of view range: From the display center 50° to the left and right, 20° upward, 30° downward.

**Display modes:**

Curves/load curves, curves in ranges, digital display, bar graph, events list (set points/power failure), status display, history display in curve form with display of digital measured values, date and time

## 10.8.2 Operating elements

**Keyboard:**

Option of operation and configuration via 7 push buttons on the front side in interactive dialog with the screen or using the provided PC software. Display of integrated operating instructions at the push of a button.

## 10.8.3 Data storage

**Save cycle:**

- Selectable save cycle: 1s / 2s / 3s / 4s / 5s / 10s / 15s / 20s / 30s / 1min / 2min / 3min / 4min / 5min / 10min / 30min / 1h

Selected save cycle	Equal to a feed rate in mm/h	Equal to a feed rate in inch/h
1s	1000	40
2s	600	24
3s	300	12
4s	240	10
10s	120	4.8
20s	60	2.4
30s	30	1.2
1 min (60s)	20	0.8
2min (120s)	10	0.4
4min (240s)	5	0.2

### Internal memory:

- Program memory: 2 MB Flash (nonvolatile)
- Setup data memory, measured data memory: permanent back-up of setup data and measured data in internal Flash memory (nonvolatile)
- Main memory: 2 MB SRAM  
Data buffering and RTC buffering with lithium cell (replace after 10 years)

### External memory:

- Cyclic copying of the measured data for archiving on CompactFlash card (CompactFlash base: type I)
- Supported CF memory cards : 32 MB, 64 MB, 128 MB, 256 MB and 512 MB. Please use the CF memory cards recommended by the manufacturer (see "Accessories").
- A green LED beside the CF slot indicates data access. During this process, the CF card must not be removed. Risk of losing data!

### Typical recording lengths:

Requirements for the following tables:

- No alarm point violation/event storage
- Digital input not used
- Signal analysis deactivated

 Note!

Frequent entries in the events list reduce the memory availability!

*Internal memory (weeks = w, days = d, hours = h):*

Analog inputs	Save cycle 5 min.	Save cycle 1 min.	Save cycle 30 s.	Save cycle 10 s.	Save cycle 1 s.
1	68 w, 5 d, 0 h	15 w, 1 d, 23 h	7 w, 4 d, 11 h	2 w, 3 d, 19 h	1 d, 18 h
3	34 w, 2 d, 12 h	7 w, 1 d, 20 h	3 w, 4 d, 10 h	1 w, 1 d, 11 h	20 h
6	19 w, 4 d, 10 h	4 w, 0 d, 11 h	2 w, 0 d, 5 h	4 d, 17 h	11 h

*CompactFlash 128 MB (weeks = w, days = d, hours = h):*

Analog inputs	Save cycle 5 min.	Save cycle 1 min.	Save cycle 30 s.	Save cycle 10 s.	Save cycle 1 s.
1	5738 w, 6 d, 14 h	1276 w, 4 d, 7 h	638 w, 2 d, 3 h	212 w, 5 d, 9 h	21 w, 1 d, 22 h
3	2869 w, 4 d, 2 h	606 w, 4 d, 10 h	303 w, 2 d, 5 h	101 w, 0 d, 17 h	10 w, 0 d, 18 h
6	1639 w, 6 d, 0 h	339 w, 4 d, 18 h	169 w, 5 d, 21 h	56 w, 4 d, 7 h	5 w, 4 d, 15 h

*CompactFlash 256 MB (weeks = w, days = d, hours = h):*

Analog inputs	Save cycle 5 min.	Save cycle 1 min.	Save cycle 30 s.	Save cycle 10 s.	Save cycle 1 s.
1	11526 w 3 d, 0 h	2564 w, 0 d, 5 h	1282 w, 0 d, 2 h	427 w, 2 d, 8 h	42 w, 5 d, 3 h
3	5763 w, 3 d, 2 h	1218 w, 2 d, 20 h	609 w, 1 d, 10 h	203 w, 0 d, 11 h	20 w, 2 d, 3 h



Analog inputs	Save cycle 5 min.	Save cycle 1 min.	Save cycle 30 s.	Save cycle 10 s.	Save cycle 1 s.
6	3293 w, 4 d, 3 h	682 w, 1 d, 16 h	341 w, 0 d, 20 h	113 w, 4 d, 22 h	11 w, 2 d, 14 h

#### Calculation of recording duration:

Calculation of recording duration using "storage calculator" (can be found under "tools" on the CD-ROM of the PC software supplied).

### 10.8.4 Real time clock (RTC)

Switchable summer time/normal time automated system

Power reserve: buffering via lithium battery

Deviation: < 10 min./year

Time synchronization possible

### 10.8.5 Remote operation

Configuring and archiving the unit settings with CompactFlash or with supplied PC software via rear-mounted serial interface RS232/RS485 (e.g. modem), Ethernet, or front-mounted USB port.

## 10.9 Certificates and approvals

### 10.9.1 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.

### 10.9.2 UL listed for Canada and USA

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

### 10.9.3 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 Accessories

Accessories available, see Section 8

## 10.11 Documentation

☐ Brochure on recording technology (FA014R/09/en)

☐ Technical Information (TI115R/09/en)

☐ Brief Operating Instructions (KA199R/09/c5)

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