Operating Instructions
Ecograph T, RSG35

Universal Data Manager
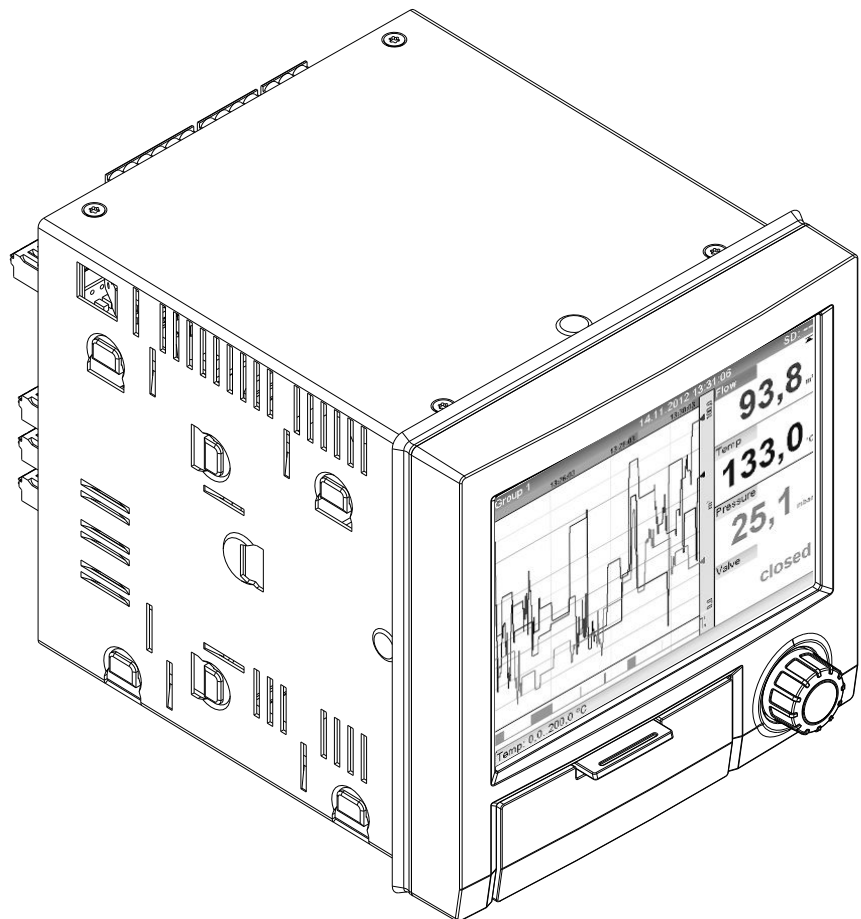
Endress+Hauser [EH]

People for Process Automation

Table of contents

# 1	Document information

## 1.1	Document function

These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

Integrated Operating Instructions

At the push of a button, the device displays operating instructions directly on the screen. This manual complements the operating instructions in the device and explains what is not directly described in the operating instructions.

## 1.2	Symbols used

### 1.2.1	Safety symbols

Symbol	Meaning
⚠ DANGER	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
⚠ WARNING	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
⚠ CAUTION	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE	**NOTE!** This symbol contains information on procedures and other facts which do not result in personal injury.

### 1.2.2	Electrical symbols

Symbol	Meaning
⎓	Direct current
∼	Alternating current
⏦	Direct current and alternating current
⏚	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
⏚	**Protective Earth (PE)** A terminal which must be connected to ground prior to establishing any other connections. The ground terminals are situated inside and outside the device: • Inner ground terminal: Connects the protectiv earth to the mains supply. • Outer ground terminal: Connects the device to the plant grounding system.

1.2.3 Symbols for certain types of information

Symbol	Meaning
☑	**Permitted** Procedures, processes or actions that are permitted.
☑ ☑	**Preferred** Procedures, processes or actions that are preferred.
☒	**Forbidden** Procedures, processes or actions that are forbidden.
🛈	**Tip** Indicates additional information.
📖	Reference to documentation.
📄	Reference to page.
🖼	Reference to graphic.
▶	Notice or individual step to be observed.
1., 2., 3....	Series of steps.
↳	Result of a step.
?	Help in the event of a problem.
👁	Visual inspection.

1.2.4 Symbols in graphics

Symbol	Meaning
1, 2, 3,...	Item numbers
1., 2., 3....	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections
≈➡ A0013441	Flow direction
EX A0011187	**Hazardous area** Indicates a hazardous area.
EX A0011188	**Safe area (non-hazardous area)** Indicates a non-hazardous area.

1.3 Terminology

To improve clarity, abbreviations or synonyms are used in these instructions for the following terms:

- Endress+Hauser:
  Term used in these instructions: "Manufacturer" or "Supplier"
- Ecograph T RSG35:
  Term used in these instructions: "Device" or "Measuring device"

1.4 Registered trademarks

Modbus®
Registered trademark of SCHNEIDER AUTOMATION, INC.

Internet Explorer®, Excel™
Registered trademarks of the Microsoft Corporation

Mozilla Firefox®
Registered trademark of the Mozilla Foundation

Opera®
Registered trademark of Opera Software ASA.

Google Chrome™
Registered trademark of Google INC.

2 Basic safety instructions

Reliable and safe operation of the device is guaranteed only if the user reads these Operating Instructions and complies with the safety instructions they contain.

2.1 Requirements concerning the staff

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
▸ Trained, qualified specialists: must have a relevant qualification for this specific function and task
▸ Are authorized by the plant owner/operator
▸ Are familiar with federal/national regulations
▸ Before beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
▸ Following instructions and basic conditions

The operating personnel must fulfill the following requirements:
▸ Being instructed and authorized according to the requirements of the task by the facility's owner-operator
▸ Following the instructions in these Operating Instructions

2.2 Designated use

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

- The manufacturer accepts no liability for damages resulting from incorrect use or use other than that designated. It is not permitted to convert or modify the device in any way.
- The device is designed for installation in a panel and must only be operated in an installed state.

2.3 Workplace safety

For work on and with the device:
▸ Wear the required personal protective equipment according to federal/national regulations.

2.4   Operational safety

Risk of injury.
▸   Operate the device in proper technical condition and fail-safe condition only.
▸   The operator is responsible for interference-free operation of the device.

Conversions to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers.
▸   If, despite this, modifications are required, consult with the manufacturer.

Repair

To ensure continued operational safety and reliability,
▸   Carry out repairs on the device only if they are expressly permitted.
▸   Observe federal/national regulations pertaining to repair of an electrical device.
▸   Use original spare parts and accessories from the manufacturer only.

Hazardous area

To eliminate a danger for persons or for the facility when the device is used in the hazardous area (e.g. explosion protection, pressure vessel safety):
▸   Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area.
▸   Observe the specifications in the separate supplementary documentation that is an integral part of these Instructions.

2.5   Product safety

This measuring device is designed in accordance with good engineering practice to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate.

It meets general safety standards and legal requirements. It also complies with the EC directives listed in the device-specific EC Declaration of Conformity. The manufacturer confirms this by affixing the CE mark to the device.

2.6   Safety information for table version (option)

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

2.7   IT security

The manufacturer only provides a warranty if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the device settings.

IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

3   Product description

3.1   Product design

This device is best suited for the electronic acquisition, display, recording, analysis, remote transmission and archiving of analog and digital input signals.

The device is intended for installation in a panel or cabinet. Operation in a desktop or field housing is possible as an option.

4   Incoming acceptance and product identification

4.1   Incoming acceptance

On receipt of the goods, check the following points:
- Is the packaging or the content damaged?
- Is the delivery complete? Compare the scope of delivery against the information on your order form.

4.2   Scope of delivery

The scope of delivery of the device comprises:
- Device (with terminals, as per order)
- Panel-mounted device: 2 screw fastening clips
- USB cable
- Optional: industrial grade SD card (card is located in the SD slot behind the flap on the front of the device)
- "Field Data Manager (FDM)" analysis software on DVD (Essential, Demo or Professional version, depending on order)
- Delivery note
- Multilanguage Brief Operating Instructions, hard copy

4.3   Product identification

4.3.1   Nameplate

Compare the nameplate with the following diagram:
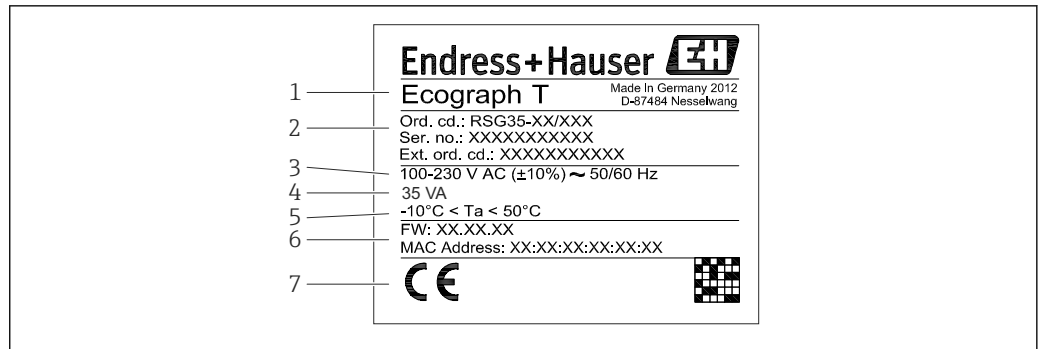
1 *Device nameplate (example)*

1 *Device tag*
2 *Order code, serial number, extended order code*
3 *Power supply, mains frequency*
4 *Maximum power consumption*
5 *Temperature range*
6 *Software version; MAC address*
7 *Device approvals*

4.4 Storage and transport

Compliance with the permitted environmental and storage conditions is mandatory. For precise specifications, see the "Technical data" section of the Operating Instructions.→ 🖺 71

Please note the following:
- Pack the device so that is protected against impact for storage and transport. The original packaging provides optimum protection.
- The permitted storage temperature is −20 to +60 ℃ (−4 to +140 ℉).

5 Installation

5.1 Installation conditions

NOTICE

Overheating due to buildup of heat in the device
▶ To avoid heat buildup, always ensure that the device is sufficiently cooled.

The device is designed for use in a panel in non-hazardous areas.

- Ambient temperature range: −10 to +50 ℃ (14 to 122 ℉)
- Climate class as per IEC 60654-1: Class B2
- Degree of protection: IP65, NEMA 4 at front / IP20 rear of housing

5.1.1 Installation dimensions

- Installation depth: approx. 158 mm (6.22 in) for device incl. terminals and fastening clips
- Panel cutout: 138 to 139 mm (5.43 to 5.47 in) x 138 to 139 mm (5.43 to 5.47 in)
- Panel thickness: 2 to 40 mm (0.08 to 1.58 in)

- Angle of vision: from the midpoint axis of the display, 75° to the left and right, 65° above and below
- A minimum distance of 15 mm (0.59 in) between the devices must be observed if aligning the devices in the Y direction (vertically above one another). A minimum distance of 10 mm (0.39 in) between the devices must be observed if aligning the devices in the X direction (horizontally beside one another).
- Securing to DIN 43 834

5.2   Mounting the measuring device

Mounting tool: For installation in the panel, all you need is a screwdriver.
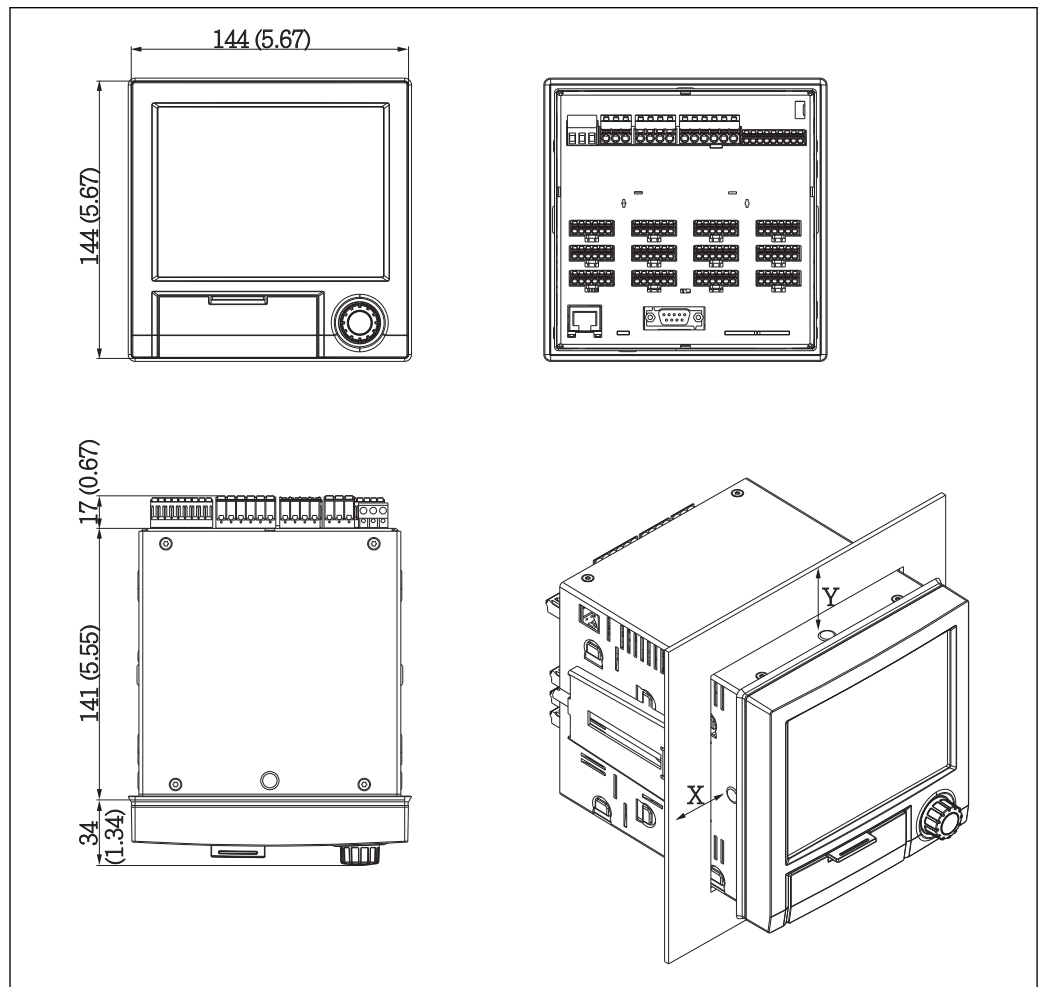
A0019301

🖻 *2*   *Panel mounting and dimensions in mm (inch)*

1. Push the device through the panel cutout from the front. To avoid heat buildup, maintain a distance of > 15 mm (>0.59 in) from walls and other devices.

2. Hold the device level and hook the fastening clips into the openings (1 x left, 1 x right).

3. Evenly tighten the screws on the fasting clip using a screwdriver to guarantee a secure seal to the panel (torque 100 Ncm).

5.3   Post-installation check

• Is the sealing ring undamaged?
• Does the seal run all around the housing collar?
• Are the threaded rods properly tightened?
• Is the device fixed firmly in the center of the panel cutout?

6   Electrical connection

6.1   Connection conditions

⚠ WARNING

Danger! Electric voltage!
▶ The entire connection of the device must take place while the device is de-energized.
▶ The mixed connection of safety extra-low voltage and dangerous contact voltage to the relay is **not** permitted.
▶ Apart from the relays and the supply voltage, only energy-limited circuits according to IEC/EN 61010-1 may be connected.

Danger if protective ground is disconnected
▶ The ground connection must be made before all other connections.

NOTICE

Cable heat load
▶ Use suitable cables for temperatures of 5 ℃ (9 ℉) above ambient temperature.

Incorrect supply voltage can damage the device or cause malfunctions
▶ Before commissioning the device, make sure that the supply voltage matches the voltage specifications on the nameplate.

Check emergency shutdown for device
▶ Provide suitable switch or circuit breaker in building installation. This switch must be provided close to the device (within easy reach) and marked as a circuit breaker.

Protect the device from overload
▶ Provide overload protection (nominal current = 10 A) for power cable.

Incorrect wiring may result in the device being destroyed
▶ Note terminal designation on the rear of the device.

Energy-rich transients in the case of long signal lines
▶ Install suitable overvoltage protection (e.g. E+H HAW562) upstream.

6.2   Connection instructions

6.2.1   Cable specification

Cable specification, spring terminals

All connections on the rear of the device are designed as pluggable 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:
- Wire cross-section, auxiliary voltage output, digital I/O and analog I/O: max. 1.5 mm^2 (14 AWG) (spring terminals)
- Wire cross-section, mains: max. 2.5 mm^2 (13 AWG) (screw terminals)
- Wire cross-section, relays: max. 2.5 mm^2 (13 AWG) (spring terminals)
- Stripping length: 10 mm (0.39 in)

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

Shielding and grounding

Optimum electromagnetic compatibility (EMC) can only be guaranteed if the system components and, in particular, the lines - both sensor lines and communication lines - are shielded and the shield forms as complete a cover as possible. A shielded line must be used for sensor lines that are longer than 30 m. A shield coverage of 90% is ideal. In addition, make sure not to cross sensor lines and communication lines when routing them. Connect the shield as often as possible to the reference ground to ensure optimum EMC protection for the different communication protocols and the connected sensors.

To comply with requirements, three different types of shielding are possible:
- Shielding at both ends
- Shielding at one end on the supply side with capacitance termination at the device
- Shielding at one end on the supply side

Experience shows that the best results with regard to EMC are achieved in most cases in installations with one-sided shielding on the supply side (without capacitance termination at the device). Appropriate internal device wiring measures must be taken to allow unrestricted operation when EMC interference is present. These measures have been taken into account for this device. Operation in the event of disturbance variables as per NAMUR NE21 is thus guaranteed.

Where applicable, national installation regulations and guidelines must be observed during the installation! Where there are large differences in potential between the individual grounding points, only one point of the shielding is connected directly with the reference ground.

ℹ If the shielding of the cable is grounded at more than one point in systems without potential matching, mains frequency equalizing currents can occur. These can damage the signal cable or significantly impact signal transmission. In such cases the shielding of the signal cable is to be grounded on one side only, i.e. it may not be connected to the ground terminal of the housing. The shield that is not connected should be insulated!

6.3   Connecting the measuring device

6.3.1   Terminal assignment on the rear of the device
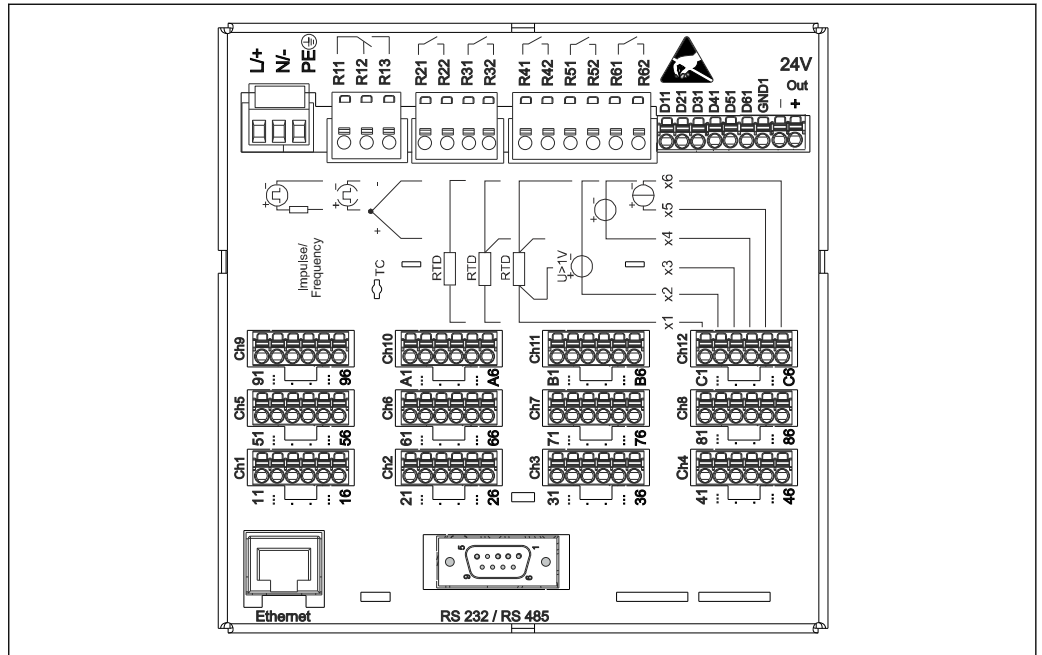
A0019304

🔲 *3   Terminals on the rear of the device*

6.3.2   Supply voltage

Power unit type	Terminal		
	A0019103		
100-230 VAC	L+	N-	PE
	Phase L	Zero conductor N	Ground
24 V AC/DC	L+	N-	PE
	Phase L or +	Zero conductor N or -	Ground

6.3.3   Relays

Type	Terminal (max. 250 V, 3 A)				
	A0019103				
Alarm relay 1	R11	R12	R13		
	Changeover contact	Normally closed contact (NC) [1]	Normally open contact (NO) [2]		

Type	Terminal (max. 250 V, 3 A)				
Relay 2 to 6				Rx1	Rx2
				Switching contact	Normally open contact (NO [2])

1) NC = normally closed (breaker)
2) NO = normally open (maker)
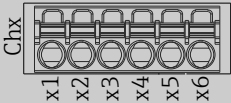
6.3.4 Digital inputs; auxiliary voltage output

Type	Terminal			
Digital input 1 to 6	D11 to D61	GND1		
	Digital input 1 to 6 (+)	Ground (-) for digital inputs 1 to 6		
Auxiliary voltage output, not stabilized, max. 250 mA			24V Out -	24V Out +
			- Ground	+ 24V (±15%)

6.3.5 Analog inputs

The first digit (x) of the two-digit terminal number corresponds to the associated channel:

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

Type	Terminal					
	Chx x1 x2 x3 x4 x5 x6 A0019303					
Resistance thermometer RTD (4-wire)	(A)		a (sense)	b (sense)		(B)
Thermocouples TC				(+)		(-)

1)   If a universal input is used as a frequency or pulse input and the voltage is >2.5 V, a series resistor must be used in series connection with the voltage source. Example: 1.2 kΩ series resistor at 24 V

6.3.6   Connection example: Auxiliary voltage output as transmitter power supply for 2-wire sensors
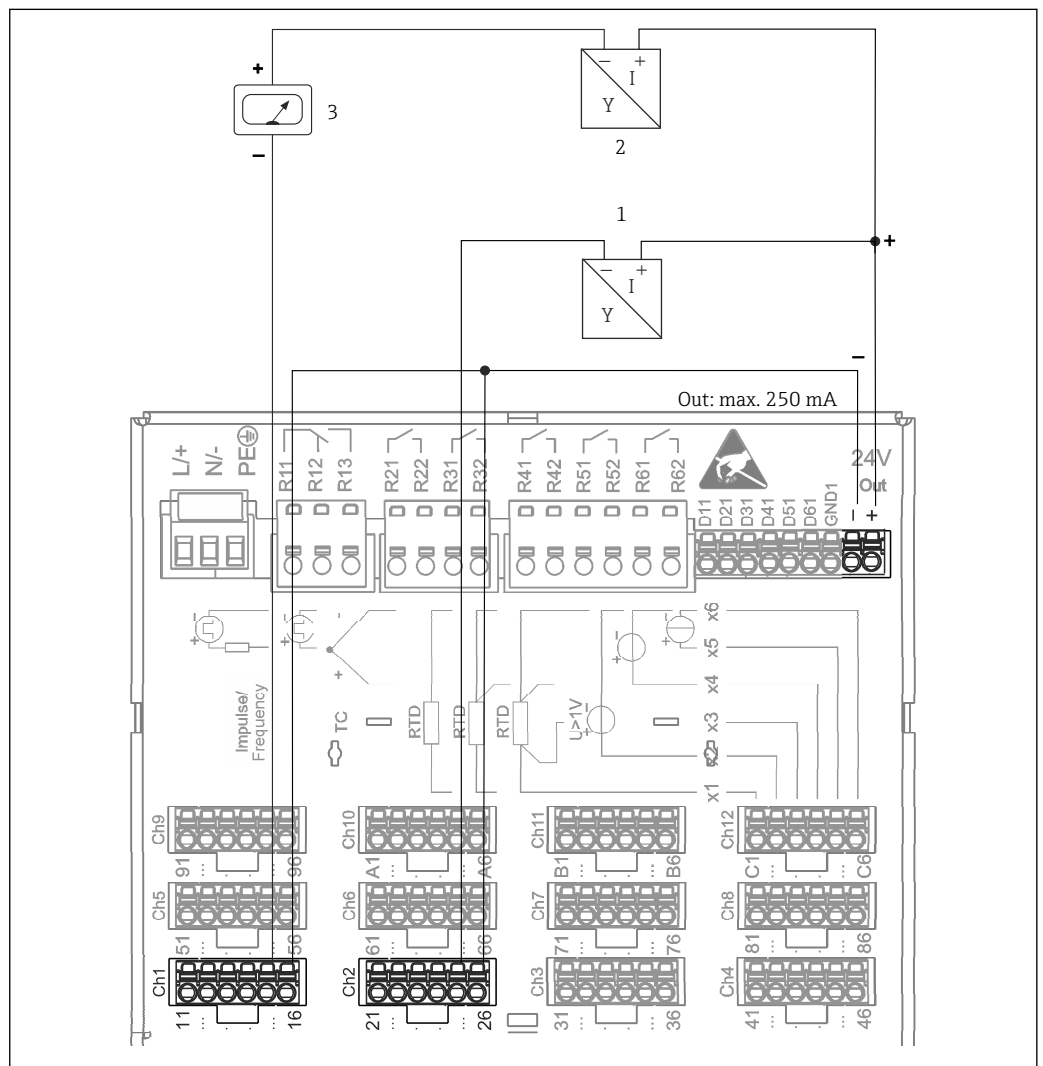
⊠ 4   Connecting auxiliary voltage output when using as a transmitter power supply for 2-wire sensors in the current measuring range. (When connecting channel CH3-12, see pin assignment CH1-2.)

1   Sensor 1 (e.g. Cerabar from Endress+Hauser)
2   Sensor 2
3   External indicator (optional) (e.g. RIA16 from Endress+Hauser)

6.3.7 Connection example: Auxiliary voltage output as transmitter power supply for 4-wire sensors

A0020260
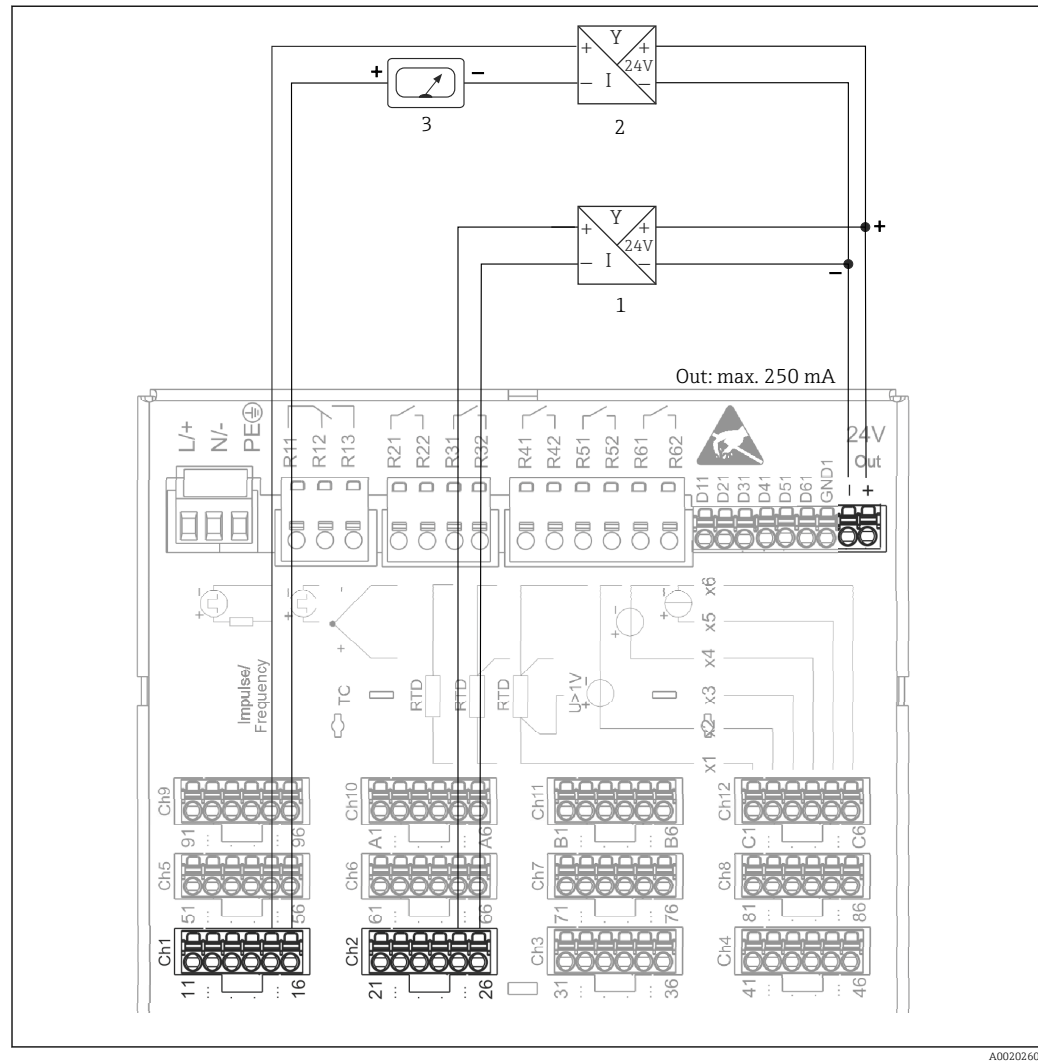
 5   *Connecting auxiliary voltage output when using as a transmitter power supply for 4-wire sensors in the current measuring range. (When connecting channel CH3-12, see pin assignment CH1-2.)*

1   Sensor 1 (e.g. temperature switch TTR31 from Endress+Hauser)
2   Sensor 2
3   External indicator (optional) (e.g. RIA16 from Endress+Hauser)

6.3.8 Option: RS232/RS485 interface (rear of device)

 Use shielded signal lines for serial interfaces!

A combined RS232/RS485 connection is available on a shielded SUB D9 socket at the rear of the device. This can be used for data transfer and to connect a modem. For communication via modem, we recommend an industrial modem with a watchdog function.
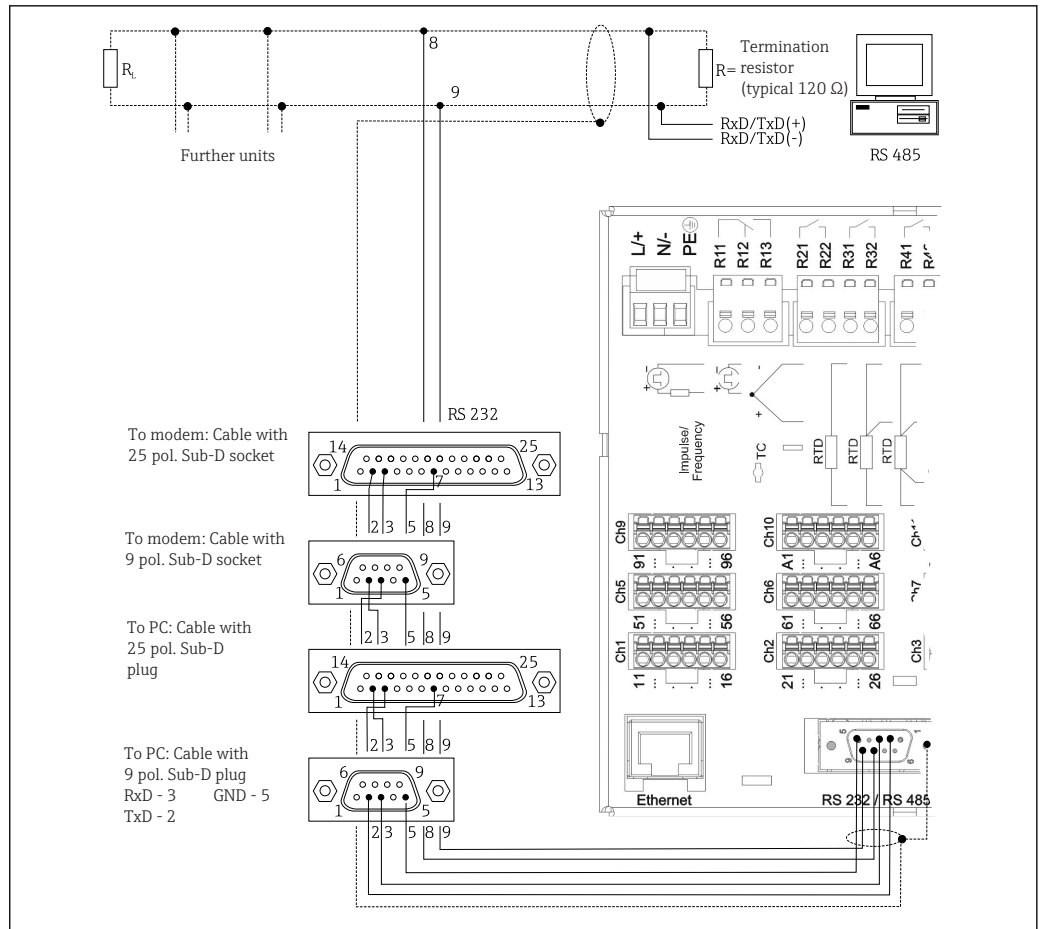
A0019305-EN

Type	Pin of the SUB-D9 socket								
	1	2	3	4	5	6	7	8	9
RS232 assignment		TxD (data output)	RxD (data input)		GND				
RS485 assignment					GND			RxD/TxD −	RxD/TxD +
Unoccupied connections should be left empty. Maximum cable length: RS232: 2 m (6.6 ft) RS485: 1000 m (3280 ft)									

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

6.3.9 Ethernet connection (rear of device)

The Ethernet interface can be used to integrate the device via a hub or switch into a PC network (TCP/ IP Ethernet). A standard patch cable (e.g. CAT5E) can be used for the connection. Using DHCP, the device can be fully integrated into an existing network without the need for additional configuration. The device can be accessed from every PC in the network.

- Standard: 10/100 Base T/TX (IEEE 802.3)
- Socket: RJ-45
- Max. cable length: 100 m
- Galvanic isolation; testing voltage: 500 V

Meaning of the LEDs

Beneath the Ethernet connection (see rear of device) there are two light emitting diodes which indicate the status of the Ethernet interface.
- Yellow LED: link signal; is lit when the device is connected to a network. If this LED is not illuminated then communication is impossible.
- Green LED: Tx/Rx; flashes irregularly if the device is transmitting or receiving data.

6.3.10 Option: Ethernet Modbus TCP slave

The Modbus TCP interface is used to connect to higher-ranking SCADA systems (Modbus master) to transmit all measured values and process values. Up to 12 analog inputs and 6 digital inputs can be transmitted via Modbus and stored in the device. Form a physical point of view, the Modbus TCP interface is identical to the Ethernet interface.

6.3.11 Option: Modbus RTU slave

The Modbus RTU (RS485) interface is galvanically isolated (testing voltage: 500 V) and is used to connect to higher-ranking systems to transmit all measured values and process values. Up to 12 analog inputs and 6 digital inputs can be transmitted via Modbus and stored in the device. Connection is via the combined RS232/RS485 interface.

🛈 Modbus TCP and Modbus RTU cannot be used at the same time.

6.3.12 Connections at front of device

A0019501
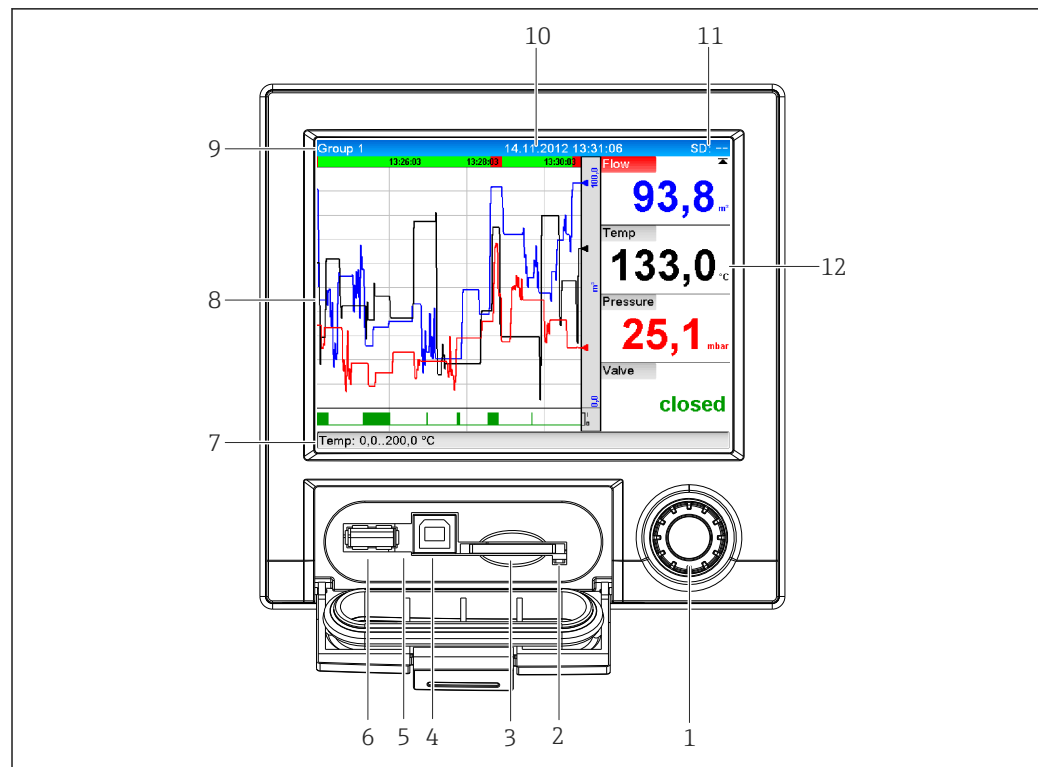
🖻 6   *Front of device with open flap*

1   Navigator
2   LED at SD slot. Orange LED lights up or flashes when the device writes to or reads from the SD card.
3   Slot for SD card
4   USB B socket "Function" e.g. to connect to PC or laptop
5   Green LED lit: power supply present
6   USB A socket "Host" e.g. for USB memory stick or external keyboard
7-12 For a description of the displays, see the "Operability" section

USB connection type A (host)

A USB 2.0 port is available on a shielded USB A socket at the front of the device. A USB stick, for example, can be connected to this interface as a storage medium. An external keyboard or USB hub may also be connected.

USB connection type B (function)

A USB 2.0 port is available on a shielded USB B socket at the front of the device. This can be used to connect the device for communication with a laptop, for example.→ 🖺 32

> 🛈 USB 2.0 is compatible with USB 1.1 or USB 3.0, i.e. communication is possible.

Information on USB devices

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

Requirements with regard to an external USB hub

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

Requirements with regard to the USB stick

There is no guarantee that all manufacturers' USB sticks will function faultlessly. That is why an industrial grade SD card is recommended to ensure the reliable recording of data.
→ 🖺 69

> 🛈 The USB stick must be formatted to FAT or FAT32. NTFS format is not readable. The system supports only USB sticks with max. 32 GB.

> 🛈 The USB stick must not be connected to the device via a USB hub. Interference from other USB devices may result in data loss.

Requirements with regard to an external USB keyboard

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

Requirements for the SD card

Industrial grade SD-HC cards with max. 32 GB are supported.

> 🛈 Use only the industrial grade SD cards described in the "Accessories" section of the Operating Instructions. These have been tested by the manufacturer and guaranteed to function faultlessly in the device. → 🖺 69

> 🛈 The SD card must be formatted to FAT or FAT32. NTFS format is not readable.

6.4   Post-connection check

Device condition and specifications	Notes
Are cables or the device damaged?	Visual inspection
Electrical connection	**Notes**
Does the supply voltage match the specifications on the nameplate?	-
Are all terminals firmly engaged in their correct slot?	-
Are the mounted cables strain-relieved?	-
Are the power supply and signal cables correctly connected?	See connection diagram and rear of device.

7   Operation options

7.1   Overview of operation options

The device can be operated directly onsite with the navigator and USB keyboard/mouse or via interfaces (serial, USB, Ethernet) and operating tools (Web server); FieldCare/ DeviceCare configuration software).

7.2   Structure and function of the operating menu

The layout and structure of the operating menu can differ slightly in parts on the Web server.

7.2.1   Operating menu for operators and maintenance personnel
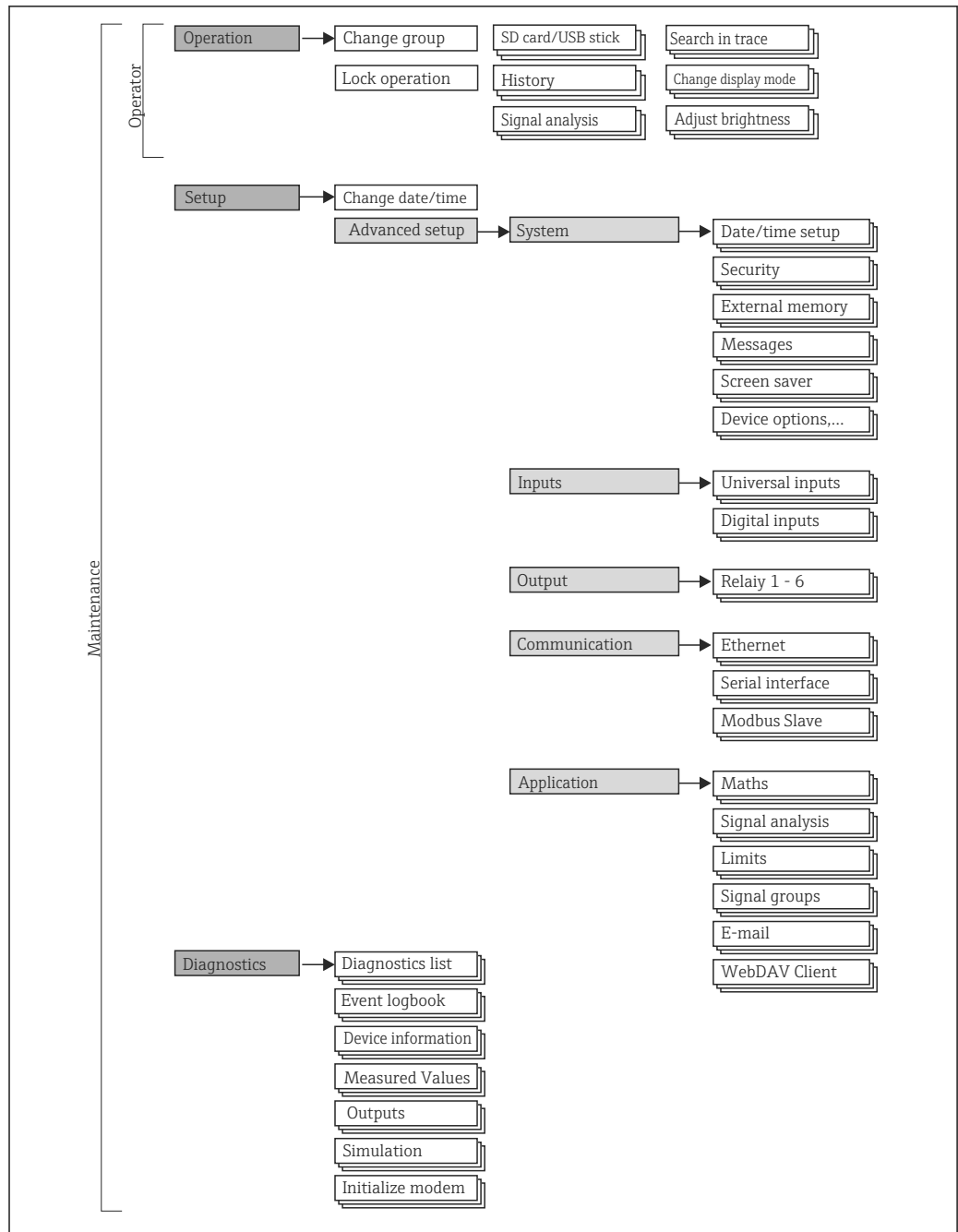
A0019594-EN

7.2.2 Operating menu for experts
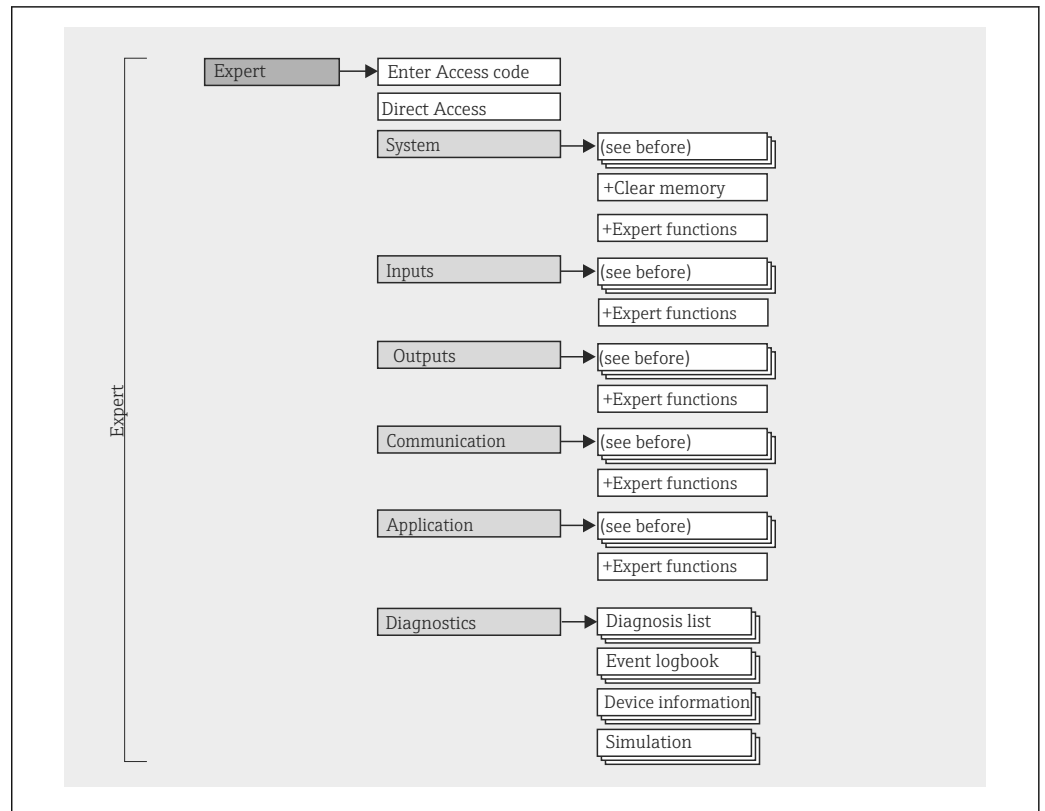
A0019596-EN

7.2.3 Submenus and users

Certain parts of the menu are assigned to certain user roles. Each user role corresponds to typical tasks within the lifecycle of the device.

User role	Typical tasks	Menu	Content/meaning
Operator	Tasks during operation: • Configuration of the display. • Reading measured values.	"Operation"	Contains all the parameters that are required in ongoing operation: configuration of the measured value display (displayed values, display format, etc.).

Maintenance	Commissioning:
	• Configuration of the measurement.
	• Configuration of data processing.
		"Setup"	Contains all parameters for commissioning:
			• **Change date/time**
			• **"Advanced setup" submenu**
			  Contains additional submenus and parameters:
			  – **System**: Basic settings required for operating the device.
			  – **Inputs:** Settings for analog and digital inputs.
			  – **Outputs:** Setup required only if outputs (e.g. relays) are to be used.
			  – **Communication:** Settings required if the USB, RS232, RS485 or Ethernet interface of the device is used (PC operation, serial data read-out, modem operation, etc.).
			  – **Application:** Various application-specific settings (e.g. group settings, limit values, etc.).
			
			Once values have been set for these parameters, the measurement should generally be completely configured.

User role	Typical tasks	Menu	Content/meaning
	Fault elimination: • Diagnosing and eliminating process errors. • Interpretation of device error messages and correcting associated errors.	"Diagnostics"	Contains all parameters for detecting and analyzing errors: • **Diagnosis list** All diagnosis messages are listed in chronological order. • **Event logbook** Events such as limit value violations and power failures are listed in chronological order. • **Device information** Displays important device information (e.g. serial number, firmware version, device options for hardware and software, memory information, etc.). • **Measured values** Display of current measured values of device. • **Outputs** Displays the current status of the outputs e.g. switch status of relay outputs. • **Simulation** Various functions/signals can be simulated for test purposes here. **Note:** In Simulation mode, normal recording of the measured values is interrupted and the intervention is logged in the event log. • **Initialize modem** Initializes the modem connected to the serial interface (for automatic call answering).
Expert	Tasks that require detailed knowledge of the function of the device: • Commissioning measurements under difficult conditions. • Optimal adaptation of the measurement to difficult conditions. • Detailed configuration of the communication interface. • Error diagnostics in difficult cases.	"Expert"	Contains all parameters of the device (including those that are already in one of the other menus). The expert menu is protected by a code. Factory setting: 0000. This menu is structured according to the function blocks of the device: • **"System" submenu** Contains all higher-order device parameters that do not concern the measurement or measured value communication. • **"Inputs" submenu** Contains all parameters for configuring the analog and digital inputs. • **"Output" submenu** Contains all parameters for configuring the outputs (e.g. relays). • **"Communication" submenu** Contains all parameters for configuring the communication interfaces. • **"Application" submenu** Contains all parameters for configuring application-specific settings (e.g. group settings, limit values etc.). • **"Diagnostics" submenu** Contains all parameters needed to detect and analyze operational errors.

7.3   Display and operating elements

⚐ 7   Front of device with open flap

Item No.	Operating function (display mode = display of measured values) (Setup mode = operation in the Setup menu)
1	"Navigator": jog/shuttle dial for operating with additional press/hold function. In display mode: turn the dial to switch between the various signal groups. Press the dial to display the main menu. In setup mode or in a selection menu: turn the dial anticlockwise to move the bar or the cursor upwards or to the left, changes the parameter. Turning clockwise moves the bar or cursor down or to the right, changes the parameter. Press briefly (<2 sec.) = Select highlighted function, parameter change starts (ENTER key). ⓘ Access online help: Press and hold navigator (>3 sec.) to show information on the selected function. To quit the menu immediately, press and hold "Back" (>3 sec.) in the navigator. The devices switches to display mode.
2	LED at SD slot. Orange LED lit when the device writes to the SD card or reads it. **Do not remove the SD card if the LED is lit! Risk of data loss!**
3	Slot for SD card
4	USB B socket "Function" e.g. to connect to PC or laptop
5	Green LED lit: power supply present
6	USB A socket "Host" e.g. for USB memory stick or external keyboard
7	In display mode: alternating status display (e.g. set zoom range) of the analog or digital inputs in the appropriate color of the channel. In setup mode: different information can be displayed here depending on the display type.
8	In display mode: window for measured value display (e.g. curve display). In setup mode: display of operating menu

Item No.	Operating function (display mode = display of measured values) (Setup mode = operation in the Setup menu)
9	In display mode: current group name, type of analysis In setup mode: name of the current operating item (dialog title)
10	In display mode: displays current date/time In setup mode: --
11	In display mode: alternating display indicating the percentage space on the SD card or USB stick that has already been used. Status symbols are also displayed in alternation with the memory information (see the following table). In setup mode: the current "direct access" operating code is displayed
12	In display mode: display of current measured values and the status in the event of an error/alarm condition. In the case of counters, the type of counter is displayed as a symbol (see the following table). ℹ️ If a measuring point has limit value status, the corresponding channel identifier is highlighted in red (quick detection of limit value violations). During a limit value violation and device operation, the acquisition of measured values continues uninterrupted.

7.4   Display representation of symbols used in operation

Item No.	Function	Description
8,12	**Symbols for counters:**	
	$\Sigma 1$	Interim analysis/ external analysis
	ΣD	Daily analysis
	ΣM	Monthly analysis
	ΣY	Annual analysis
	Σ	Totalizer
8, 12	**Channel-related symbols:**	
	⊻	Violation of lower limit value
	⊼	Violation of upper limit value or limit value on counter
	⧧	Violation of upper and lower limit values at the same time
	S	**"Out of specification"** e.g. input signal too high/low
	F	**Error message "Failure detected"** An operating error has occurred. The measured value is no longer valid (e.g. a channel not displayed in the current group is defective).
	M	**"Maintenance required"** Maintenance is required. The measured value is still valid.
	- - - - -	**Error, measured value not displayed.** Possible causes: Sensor / input error, line break, invalid value, input signal too high/low
11	**Symbol for status signals:**	
	🔒	**"Device locked"** Setup is locked via a control input. Disable setup lock via a control input.
	S	**"Out of specification"** The device is being operated outside its technical specifications (e.g. during startup or cleaning).
	C	**"Function check"** The device is in Service mode.

Item No.	Function	Description
	M	**"Maintenance required"** Maintenance is required. The measured value is still valid.
	F	**Error message "Failure detected"** An operating error has occurred. The measured value is no longer valid (e.g. a channel not displayed in the current group is defective).
	⇄	**"External communication"** The device is communicating externally (e.g. via Modbus).
	SIM	**"Simulation"** Simulation is active.
7	⌁	**"Historical data"** Historical data are currently shown on screen.

7.4.1   Symbols in operating menus

⚒	Symbol for setup
⚑	Symbol for diagnostics
⊟	Symbol for expert setup
✗	Back The function "Back" appears at the end of each menu/submenu. Press "Back" briefly to go up one level in the menu structure.

> ℹ️ Press and hold "Back" (>3 sec.) to quit the menu immediately. The devices switches to display mode.

7.4.2   Symbols in the event logbook

⚒	Setup changes
⏻	Power on
⏻	Power off
⊠	Limit value on
☐	Limit value off
1	Digital on (on/off message)
0	Digital off (on/off message)
⚑	Service
ⓐⓑⓒ	Texts saved / comments added
OK	Acknowledging message
✗	Back
▶	Continue searching

7.5   Entering text and numbers (virtual keyboard)

A virtual keyboard is available for entering text and numbers. This is opened automatically if needed. The appropriate character is selected by turning and pressing the navigator.

The following characters are available for entering free text:

0-9 a-z A-Z = + - * / \ ² ³ ¼ ½ ¾ ( ) [ ] < > { } I ? ! ` "' ^ % ° . , : _ µ & # $ € @ § £ ¥ ~

←	Jump one position to the left.	
	If this symbol is selected, the cursor jumps one position to the left.	
→	Jump one position to the right.	
	If this symbol is selected, the cursor jumps one position to the right.	
←x	Delete backwards.	
	If this symbol is selected, the character to the left of the cursor position is deleted.	
x→	Delete forwards.	
	If this symbol is selected, the character to the right of the cursor position is deleted.	
C	Delete all.	
	if this symbol is selected, the entire entry is deleted.	
✗	Reject entry.	
	If this symbol is selected, the entry is rejected and you quit editing mode. The previously set text remains.	
✔	Accept entry.	
	If this symbol is selected, the entry is applied at the position specified by the user, and you quit editing mode.	

7.6   Channel color assignment

Channel color assignment is performed in the main menu under **"Setup -> Advanced setup -> Application -> Signal groups -> Group x"**. 8 predefined colors are available per group and can be assigned to the desired channels.

7.7   Access to the operating menu via the local display

Using the "navigator" (jog/shuttle dial with additional press function), all settings can be made directly onsite at the device.

7.8   Device access via operating tools

7.8.1   Field Data Manager (FDM) analysis software (SQL database support)

The PC analysis software offers external, centralized data management with visualization for recorded data. The analysis software enables the complete archiving of all measuring point data e.g. measured values, diagnostic events and protocols. The analysis software stores data in an SQL database. The database can be operated locally or in a network (client/server). Access is via RS232/RS485, USB or Ethernet interface (network).

Function scope:
• Export of saved data (measured values, analyses, event log)
• Visualization and processing of saved data (measured values, analyses, event log)
• Safe archiving of exported data in a SQL database

The following versions of the software are available:
• Essential version (free, with limited functionalities)
• Professional version (see Accessories → 🗎 69)
• Demo version (time-limited Professional version)

🛈   An "Essential" version of the analysis software is supplied with the device.

📖   For details, see the Operating Instructions on the analysis software DVD provided.

7.8.2 Web server

A Web server is integrated into the device. This makes the current measured values of the device available in real time. Access is via an Ethernet interface from a PC in the network via the standard browser. The installation of additional software is not required. Alternatively, the Web server can be operated via the USB-B interface in a point-to-point connection (Ethernet via USB) using a standard USB cable. → 🖹 32

The Web server offers the following range of functions:
- Display of current and historical data and measured value curves via a standard Web browser → 🖹 41
- Easy configuration without additional installed software → 🖹 35
- Remote access to device and diagnostic information

7.8.3 OPC server (optional)

The OPC server makes it possible to access data on the device. These data are made available to OPC clients in real time. The OPC server meets the requirements of the OPC specifications regarding the supply of data to an OPC client. Access is via RS232/RS485, USB or Ethernet interface (network). Communication takes place using automatic device detection; the operator does not need to make any additional settings. The OPC server enables the flexible and powerful exchange of data and is easy and convenient to use.

The following momentary values can be provided:
- Analog channels
- Digital channels
- Mathematics
- Totalizer

📖   For details, see Operating Instructions BA00223R/09/xx

7.8.4 FieldCare/DeviceCare configuration software

Function scope

The configuration software is an FDT/DTM-based system asset management tool. It can configure all smart field devices in a system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition. Access is via USB or Ethernet interface (network).

Typical functions:
- Device configuration
- Loading and saving device data (upload/download)
- Documentation of the measuring point

ℹ️   Download at: www.endress.com/download

Overview of device description files (DTM)

Information and files are available free of charge at:

ℹ️   See online at: www.de.endress.com/fieldcare

8 System integration

8.1 Integrating the measuring device in the system

8.1.1 General notes

The device has (optional) fieldbus interfaces for exporting process values. Measured values and statuses can also be transmitted to the device via fieldbus.

Note: Counters cannot be transferred.

Alarms or errors in the context of data transmission are displayed depending on the bus system (e.g. status byte).

The process values are transferred in the same units that are used for display at the device.

8.1.2 Ethernet

Setup → **Advanced setup** → **Communication** → **Ethernet**

The IP address can be entered manually (fixed IP address) or assigned automatically using DHCP.

The port for data communication is preset to 8000. The port can be changed in the **Expert** → **Communication** → **Ethernet** menu.

The following functions are implemented:
• Data communication with PC software (analysis software, configuration software, OPC server)
• Web server

The following connections are possible at the same time:
• 1x Port 8000 (configuration software, OPC server or analysis software)
• 1x Port 8002 (OPC server only)
• 4x Modbus slave TCP
• 5x Web server

ℹ️ Ports can be changed!

As soon as the maximum number of connections has been reached, new connection attempts are blocked until an existing connection has been terminated.

8.1.3 Web server with "Ethernet via USB" function

To provide easy and efficient access via Web server for operation, setup and commissioning, the USB-B interface can be switched to the "Ethernet via USB" mode. Ethernet communication is established here via the USB interface. This has the advantage that the Ethernet interface in the case of commissioning laptops, for example, does not need to be reconfigured (IP address, ports, etc.). Instead, a standard USB cable can be used

to establish a point-to-point connection. The Web server itself retains its complete range of functionality.

Important information:
- Do not connect several devices via USB to a laptop/PC at the same time
- The PC should not be connected to "Ethernet via USB" (USB-B connector on front panel of device) and a standard Ethernet network (RJ45 connector on rear panel of device) simultaneously if both connections use the same address parameters.
- Driver software (EH ECM device) must be installed on the PC.
- The "Ethernet via USB" mode is not a gateway, i.e. the Ethernet/RJ45 and USB networks are separate from each other (no two-way access).
- The USB cable should be disconnected from the device for at least 10 s before being reconnected (prevention of errors due to response time of system)
- It takes at least 10 s before the USB driver is activated by Windows and communication with the device is possible.
- Initialization of the USB interface takes place when the PC and device are connected via a USB cable.

Supported services/functions
The following services/functions are provided via the USB interface:
- Web server
- CDI TCP (port 8000)
- WebDAV server

All other services/functions are available only by Ethernet via RJ45!

Driver installation at PC end

To use the Web server via USB, a driver must be installed once at the PC end.

1. The driver can be found under "..\Drivers\USB_ECM" on the Field Data Manager (FDM) software DVD supplied.

2. Alternatively: Download "USB_ECM.zip" from www.endress.com/downloads.

3. Execute the "setup.exe" and follow the instructions.

The necessary drivers are installed.

From version V1.04.01 of the Field Data Manager (FDM) software provided, the driver is automatically installed with the PC software.

The driver can be installed directly from the DVD without first having to copy the files to the PC.

Changing the USB-B mode to "Ethernet via USB" (panel version)

Communication can be established only if the device has been configured accordingly.

1. Supply power to the device, restart and wait for start screen.

2. Open dropdown menu under **"Setup → Advanced setup → Communication → Function USB-B"**.

3. "Always USB" option: USB-B is always set to Standard USB.

4. "Always Ethernet via USB" option: Ethernet via USB is always set.

5. "As per user entry" option: A prompt for the mode (option) appears once a USB cable is plugged in.

The device is now ready to establish a connection.

Establishing communication

1. Using a standard USB cable, connect the device at the USB-B interface to any of the PC's USB interfaces.

2. With "Always Ethernet via USB" function: The Web server can be started immediately.

3. With "As per user prompt" function: Once the USB cable has been plugged into the device, the "Select USB function" dropdown menu appears. Then select "Ethernet via USB" on the device. The device returns the IP address.

4. Open browser, enter http://192.168.1.212 and follow the instructions from Section → 🖺 42.

The device is now ready to communicate with the Web server.

ℹ The IP address of the Web server via USB is permanently set to http://192.168.1.212.

ℹ If the USB cable is already connected to a PC when the device starts up, there is no prompt even if the "As per user entry" option is selected. Instead, the previously selected functionality is used.

8.1.4 Modbus RTU/TCP slave

The device can be connected to a Modbus system via RS485 or Ethernet interface. The general settings for the Ethernet connection are made in the **Setup** → **Advanced setup** → **Communication** → **Ethernet** menu. Configuration for Modbus communication is done in the **Setup** → **Advanced setup** → **Communication** → **Modbus slave** menu. Up to 12 analog inputs and 6 digital inputs can be transmitted via Modbus and stored in the device.

Menu position	RTU (RS485)	Ethernet
Device address:	**1** to 247	IP address manual or automatic
Baud rate:	9600/**19200**/38400/57600/115200	-
Parity:	Even/Odd/**None**	-
Stop bits:	**1**/2	-
Port:	-	502

Transfer of values

The actual Modbus TCP protocol is located between layer 5 to 6 in the ISO/OSI model.

To transfer a value, 3 registers of 2 bytes each (2-byte status + 4-byte float) or 5 registers of 2 bytes each (2-byte status + 8-byte double) are used.

ℹ For more information about Modbus, see the supplementary documentation.

9 Commissioning

9.1 Function check

Perform the following checks prior to commissioning:
- "Post-installation check" checklist→ 🖺 13.
- "Post-connection check" checklist → 🖺 22.

9.2 Switching on the measuring device

After the operating voltage is applied, the green LED lights up and the device is ready for operation.

If you are commissioning the device for the first time, program the setup as described in the following sections of the Operating Instructions.

If you are commissioning a device that is already configured or preset, the device starts measuring immediately as defined in the settings. The values of the channels currently activated are shown on the display.

ℹ️ Remove the protective film from the display as this would otherwise affect the readability of the display.

9.3 Setting the operating language

Factory setting: English or ordered local language

Calling the main menu, configuring the operating language:

1. Press the navigator

2. The main menu appears on the display with the "Sprache/Language" option

3. Change the default language setting: press the navigator, turn it to select the preferred language and press the navigator again to accept the setting.

4. Use "Back" or "ESC" to quit the main menu

The operating language has been changed.

ℹ️ The function ✘ "Back" appears at the end of each menu/submenu.

Press "Back" briefly to go up one level in the menu structure.

To quit the menu immediately and return to the measured value display, press and hold "Back" (>3 sec.). The changes made are accepted and saved.

9.4 Configuring the measuring device (Setup menu)

Access to the setup is enabled when the device leaves the factory and can be locked in various ways e.g. by entering a 4-digit access code or via role-based password protection.

When locked, basic settings can be checked but not changed. The device can also be put into operation and configured via the PC.

Device configuration options:
- Setup directly at the device (panel-mounted device only)
- Setup via SD card or USB stick by transferring the parameters stored on it
- Setup via Web server using Ethernet or Ethernet via USB
- Setup via FieldCare/DeviceCare configuration software

9.4.1 Step-by-step: to the first measured value

Procedure and necessary settings:

1. Check the date/time in the main menu under **"Setup"** and set it if necessary

2. Make settings for the interfaces and communication in the main menu under **"Setup -> Advanced setup -> Communication"**

3. Create universal or digital inputs in the main menu under **"Setup -> Advanced setup -> Inputs -> Universal inputs/Digital inputs"**: Add input: select **"Universal input x"** or **"Digital input x"** with which the input signal should be detected. Then select the newly created input and configure it.

4. Activate relays or analog outputs (optional) in the main menu under **"Setup -> Advanced setup -> Outputs"**

5. Assign activated inputs to a group in the main menu under **"Setup -> Advanced setup -> Application -> Signal groups -> Group x"**

6. Use "Back" or "ESC" to quit the main menu. The changes made are accepted and saved.

The device is in the measured value display mode and displays the measured values.

9.4.2   Step-by-step: set or delete the limit values

Procedure for setting limit values:

1. Open the limit values in the main menu under **"Setup -> Advanced setup -> Application -> Limits"**

2. Add a limit value: select **"Yes"**

3. Select and configure **"Limit value x"**

4. Use "Back" or "ESC" to quit the main menu. The changes made are accepted and saved.

The device is in the measured value display mode and displays the measured values.

Procedure for deleting limit values:

1. Open the limit values in the main menu under **"Setup -> Advanced setup -> Application -> Limits"**

2. Delete a limit value: select **"Yes"**

3. Select the limit value to be deleted from the list

4. Use "Back" or "ESC" to quit the main menu. The changes made are accepted and saved.

The device is in the measured value display mode and displays the measured values.

9.4.3   Device setup

You can access the main menu by pressing the navigator during operation. Turn the navigator to navigate through the available menus. When the desired menu is displayed, press the navigator to open the menu.

In the **"Setup"** menu and in the **"Advanced setup"** submenu, you will find the **most important** settings for the device:

Parameter		Possible settings	Description
Change date/time		UTC time zone dd.mm.yyyy hh:mm:ss	Change the date and time.
Advanced setup			Advanced settings for the device e.g. system settings, inputs, outputs, communication, application etc.
	System		Basic settings that are needed to operate the device, (e.g. date/ time, security, memory management, messages, etc.)
	Inputs		Settings for analog and digital inputs.
	Outputs		Settings only required if outputs (e.g. relays or analog outputs) are to be used.
	Communication		Settings required if the USB, RS232/RS485 or Ethernet interface of the device is to be used (PC operation, serial data export, modem operation, etc.). The different interfaces (USB, RS232/RS485, Ethernet) can be operated in parallel. However, simultaneous use of the RS232 and RS485 interface is not possible.
	Application		Various application-specific settings (e.g. group settings, limit values, etc.).

For a detailed overview of all operating parameters, see the Appendix to the Operating Instructions. → 🖹 87

9.4.4 Setup via SD card or USB stick

An existing device configuration ("Setup data" *.DEH) from another Ecograph T RSG35 or from FieldCare/DeviceCare can be uploaded directly to the device.

Import new setup directly at the device: The function used to load the setup data can be found in the main menu under **"Operation -> SD card (or USB stick) -> Load setup -> Select directory -> Next"**.

9.4.5 Setup via Web server

To configure the device via the Web server, connect the device to a PC via Ethernet (or Ethernet via USB).

Observe instructions and communication settings for Ethernet (or Ethernet via USB) and Web server at → 🖺 32.

> ℹ️ To configure the device via a Web server, you must have Administrator or Service access. ID and password administration is performed in the main menu under **"Setup -> Advanced setup -> Communication -> Ethernet -> Configuration Web server -> Authentication"**.
>
> Default value for ID: admin; Password: admin
>
> Note: The password should be changed during commissioning!

Establishing a connection and setup

Procedure for setting up a connection:

1. Connect the device to the PC via Ethernet (or Ethernet via USB).

2. Start the browser at the PC; open the Web server for the device by entering the IP address: http://<ip-address> Note: Leading zeros in IP addresses must not be entered (e.g. enter 192.168.1.11 instead of 192.168.001.011).

3. Enter ID and password, and confirm each by clicking "OK" (see also the "Web server" section of the Operating Instructions → 🖺 42)

4. The Web server shows the instantaneous value display of the device. Click **"Menu -> Setup -> Advanced setup"** in the Web server function bar.

5. Starting configuration

Continue with device configuration in accordance with the Operating Instructions for the device. The complete Setup menu i.e. all of the parameters listed in the Operating Instructions, can also be found on the Web server. After configuration, accept the setup with **"Save settings"**.

> ℹ️ Procedure to establish a direct connection via Ethernet (point-to-point connection): → 🖺 41

NOTICE

Undefined switching of outputs and relays

▶ During configuration using a Web server, the device may assume undefined statuses! This may result in the undefined switching of outputs and relays.

> ℹ️ An existing device configuration ("Setup data" *.DEH) from another Ecograph T RSG35 or from FieldCare/DeviceCare can be uploaded directly to the device via the Web server.

Procedure for uploading a new setup via the Web server:

1. Make the connection to the device with the Web server → 🖺 37

2. Click **"Data management -> Import device settings"** in the Web server function bar

3. Select the setup file and press **"OK"** to confirm

4. The file is transferred, checked and accepted

5. Once the device settings have been accepted, information to this effect is displayed in the Web server.

9.4.6　Setup via FieldCare/DeviceCare configuration software

To configure the device using the configuration software, connect the device to your PC via USB or Ethernet.

ℹ️ Download at: www.endress.com/download

Establishing a connection and setup

Continue with device configuration in accordance with the Operating Instructions for the device.

The complete Setup menu, i.e. all the parameters listed in the Operating Instructions, can also be found in the configuration software.

NOTICE

Undefined switching of outputs and relays

▸ During configuration using the configuration software, the device may assume undefined statuses! This may result in the undefined switching of outputs and relays.

9.5　Advanced settings (Expert menu)

You can access the main menu by pressing the navigator during operation. Turn the navigator to navigate to the **"Expert"** menu. Press the navigator to open the menu.

ℹ️ The Expert menu is protected by the code **"0000"**. If an access code is set up under **"Setup -> Advanced setup -> System -> Security -> Protected by -> Access code"**, this must be entered here.

The **"Expert"** menu contains **all** of the device settings:

Parameter	Possible settings	Description
Direct access	000000-000	Direct access to parameters (fast access)
System		Basic settings that are needed to operate the device, (e.g. date/ time, security, memory management, messages, etc.)
Inputs		Settings for analog and digital inputs.
Outputs		Settings only required if outputs (e.g. relays or analog outputs) are to be used.
Communication		Settings required if the USB, RS232/RS485 or Ethernet interface of the device is to be used (PC operation, serial data export, modem operation, etc.). ℹ️ The different interfaces (USB, RS232/RS485, Ethernet) can be operated in parallel. However, simultaneous use of the RS232 and RS485 interface is not possible.
Application		Configure various application-specific settings (e.g. group settings, limit values, etc.).
Diagnosis		Device information and service functions for a swift device check.

ℹ️ A detailed overview of all the operating parameters is provided in the appendix at the end of the Operating Instructions. → 🔖 87

9.6   Configuration management

ℹ️ You can save the setup data ("Configuration") to an SD card or a USB stick, to a PC
drive via the Web server, or store them in a database using the configuration
software. This allows additional devices to be configured very easily using the same
settings.

Save setup: The function used to save the setup files can be found in the main menu under
"Operation -> SD card (or USB stick) -> Save setup".

⚠️ **CAUTION**

If the SD card or USB stick are removed directly:
Risk of data loss on SD card or USB stick
▸ To remove the SD card or the USB stick, always select **"Operation -> SD card (or USB
stick) -> Remove safely"** in the main menu!

Procedure for saving a setup via the Web server:

1. Make the connection to the device with the Web server → 📖 37

2. Click **"Data management -> Save device settings"** in the Web server function bar

3. Select the setup file

4. Transfer the file

5. Verify and accept

6. Once the device settings have been accepted, information to this effect is displayed in
   the Web server.

ℹ️ The function for saving the setup data must be enabled at the device for the Web
server under **"Setup -> Advanced setup -> Communication-> Ethernet -> Web
server settings; Setup -> Yes"**.

9.7   Simulation

Various functions/signals can be simulated for test purposes here.

NOTICE

**Selecting simulation: Simulation of the relays and the WebDAV client can be found in
the main menu under "Diagnostics -> Simulation". The simulation of the measured
values can be found in the main menu under "Expert -> Diagnostics -> Simulation".**
Only the simulated values are recorded during simulation. The simulation is recorded in
the event logbook.
▸ Do not start simulation if measured value recording must not be interrupted!

9.8   Access protection and security concept

To protect the setup from unauthorized access following commissioning, there are many
options to ensure access protection to the setup settings and the user entries. Access and
authorizations can be configured and assigned passwords.

ℹ️ The user of the device is responsible for access protection and the security concept. In
addition to the device functions listed, user policies and procedures, in particular,
must also be applied (e.g. password allocation, password sharing, physical access
barriers, etc.).

The following protection options and functionalities are available:
• Protection per control input
• Protection via access code
• Protection via user roles

Overview of access protection and security concept

Access protection	User	Setup changes	Description
Open access	-	Allowed	No protection, not recommended, all setup and system settings are accessible.
Control input	-	Allowed	Access protection via digital input (e.g. via key switch), all setup and system settings are accessible if input actuated.
Access code	-	Allowed	Access protection via access code, access authorization (distribution of access code) must be defined via (in-house) regulations and securely controlled. All setup and system settings can be accessed after entering the access code.
Password-protected user roles			Protection levels and access authorization can be defined via 3 levels of access (user roles). Access authorization (distribution of passwords) must be defined via (in-house) regulations and securely controlled.
	Administrator	Allowed	Access protection via administrator password, all setup and system settings can be accessed after entering the password.
	Service	Allowed	Access protection via service password, all setup and system settings can be accessed after entering the password, advanced functions (e.g. preset) are possible in the service mode.
	Operator	Locked	All setup and system settings are locked, access to device information and display values after entering the password.

In order to change any parameter, the correct code must first be entered or the device must be unlocked using the control input.

Setup lock via control input: The settings for the control input can be found in the main menu under **"Setup -> Advanced setup -> Inputs -> Digital inputs -> Digital input X -> Function: Control input; Action: Lock setup"**.

It is preferable to lock the setup using a control input.

Setting up an access code: The settings for the access code can be found in the main menu under **"Setup -> Advanced setup -> System -> Security -> Protected by -> Access code"**. Factory setting: "open access", i.e. modifications can always be made.

Make a note of the code and store in a safe place.

Setting up user roles: The settings for the user roles (operator, admin and service) are provided in the main menu under **"Setup -> Advanced setup -> System -> Security -> Protected by -> User roles"**. Factory setting: "open access", i.e. modifications can always be made.

The passwords should be changed during commissioning.

Make a note of the code and store in a safe place.

10   Operation

The "Operation" menu is geared towards the tasks and activities of the operator. It contains all the parameters that are needed in ongoing operation. Historical values and analyses, for example, can be displayed in the "Operation" menu and display settings can be made. Any settings made for the local display have no effect on the measurement section or the configured device parameters.

The device's simple operating concept and the integrated help function enables you to perform operation for many applications without the need for hard copy operating instructions.

10.1   Displaying and modifying current Ethernet settings

To establish communication with the device via Ethernet, the following settings must be known or modified where necessary:

Display IP/MAC address (only if DHCP is enabled): For the device's IP or MAC address, see the main menu under **"Diagnostics -> Device information -> Ethernet"**.

Display/change Ethernet settings: For the device's Ethernet settings, see the main menu under **"Setup -> Advanced setup -> Communication -> Ethernet"**.

Procedure to establish a direct connection via Ethernet (point-to-point connection):

1. Configure the PC (depends on operating system): e.g. IP address: 192.168.1.1; subnet mask: 255.255.255.0; gateway: 192.168.1.1

2. Disable DHCP on the device

3. Make communication settings on the device: e.g. IP address: 192.168.1.2; subnet mask: 255.255.255.0; gateway: 192.168.1.1

A crossover cable is not required.

10.2   Reading the device locking status

If setup is locked via a control input, a padlock symbol 🔒 appears on the top right of the screen. The setup must first be unlocked via the control input before device parameters can be edited.

Setup lock via control input: For the settings for the control input, see the main menu under **"Setup -> Advanced setup -> Inputs -> Digital inputs -> Digital input X -> Function: Control input; Action: Lock setup"**.

If setup is locked via the access code, all the operating parameters can be displayed, and can also be edited as soon as the access code is entered.

10.3   Reading measured values (display devices)
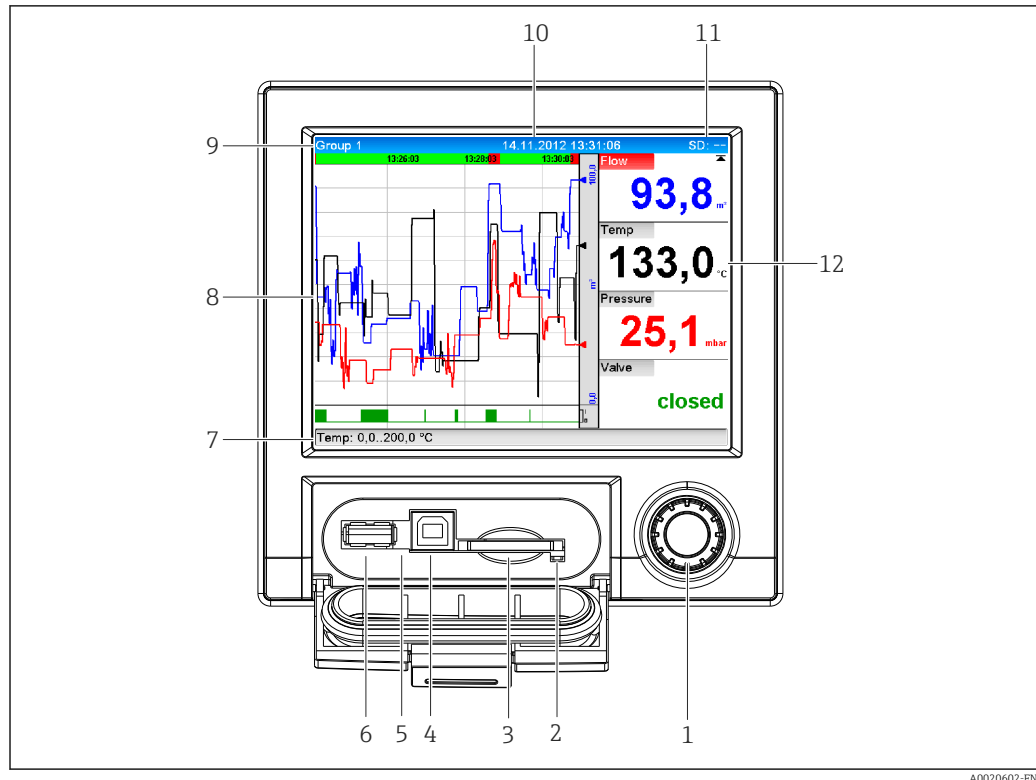
⊞ *8   Front of device with open flap*

*1   Navigator: press briefly to open the main menu and confirm messages (=Enter); press for longer to open the
      online help*
2   Orange LED for read/write access to the SD card
3   Slot for SD card
4   USB B socket "Function"
5   Green LED lit: power supply present
6   USB A socket "Host"
7   Status bar
8   Area for measured value display (e.g. curve display)
9   Header: group name, analysis type
10   Header: current date/time
*11   Header: alternating display indicating the percentage space on the SD card or USB stick that has already been
      used. Status symbols are also displayed in alternation with the memory information.*
*12   Display of current measured values and the status in the event of an error/alarm condition. In the case of
      counters, the type of counter is displayed as a symbol.*

An overview of all the symbols and icons is provided in the "Operating options" section.
→ 🕮 28

If a measuring point has limit value status, the corresponding channel identifier is
highlighted in red (quick detection of limit value violations). During a limit value
violation and device operation, the acquisition of measured values continues
uninterrupted.

Information on how to rectify a problem in the event of an error is provided in the
"Troubleshooting" section. → 🕮 57

10.4   Web server

The device features an integrated Web server, which enables access via Ethernet (or
Ethernet via USB). The Web server is used for convenient device commissioning and
configuration and to visualize measured values. Access is possible from any access point
when the device is connected to an Ethernet network. An appropriate IT infrastructure,

security measures etc. must be implemented in accordance with the requirements of the plant. Point-to-point access via Web server and Ethernet via USB is particularly well-suited for service purposes.

Activation of Web server in the menu **Setup → Advanced setup → Communication → Ethernet → Web server → Yes** or the menu **Expert → Communication → Ethernet → Web server → Yes**

The Web server port is preset to 80. The port can be changed in the **Expert → Communication → Ethernet** menu.

ⓘ If the network is protected by a firewall, the port may need to be activated.

The following web browsers are supported:
- MS Internet Explorer 11 and higher
- MS Edge
- Mozilla Firefox 52.1.0 and higher
- Opera 12.x and higher
- Google Chrome 66 and higher

ⓘ A minimum resolution of 1920x1080 (full HD) is recommended.

In order to use the full functionality of the Web server, it is recommended that the latest version of the browser is used. Administrator, Service or Operator authentication is required to access the device via a Web server → 🕮 39

When delivered, the following default values are set for the user roles in the device and Web server:
- ID: admin; password: admin
- ID: service; password: service
- ID: operator; password: operator

ⓘ Note: Passwords should be changed during commissioning!

The ID and password can be changed in the main menu under **"Setup -> Advanced setup -> Communication -> Ethernet -> Configuration Web server -> Authentication"**.

10.4.1   Access to the Web server via HTTP (HTML)

When using an Internet browser, you just need to enter the address **http://<ip-address>** to have the HTML view displayed in the browser.

ⓘ Note: Leading zeros in IP addresses must not be entered (e.g. enter 192.168.1.11 instead of 192.168.001.011).

As on the display, you can alternate between the display groups in the Web server. The measured values are automatically updated. In addition to the measured values, status and limit value flags are displayed.

10.4.2   Access to the Web server via XML

XML format is available in addition to HTML format and contains all measured values of a group. This can be integrated into additional systems as the user wishes.

The XML file is available in ISO-8859-1 (Latin-1) coding at **http://<ip-address>/values.xml** (alternative: **http://<ip-address>/xml**). However, some special characters, such as the Euro symbol, cannot be displayed in this file. Texts such as digital statuses are not transmitted.

ⓘ Note: Leading zeros in IP addresses must not be entered (e.g. enter 192.168.1.11 instead of 192.168.001.011).

ⓘ The decimal separator is always displayed as a point in the XML file. Also, all times are given in UTC. The time difference in minutes is noted in the following entry.

The structure of the channel values for the XML file is explained as follows:

```
<device        id="AI01IV" tag="Channel 1" type="INTRN">
               <v1>50.0</v1>
               <u1>%</u1>
               <vtime>20130506-140903</vtime>
               <vstslvl1>0</vstslvl1>
               <hlsts1>L</hlsts1>
               <param><min>0.0</min><max>100.0</max><hh></hh><hi></hi><lo></lo><ll></ll></
               param>
               <tag>Channel 1</tag>
               <man>Manufacturer</man>

</device>
```

Day	Description
device id	Unique ID of measuring point
tag	Channel ident.
type	Data type (INTRN, MODBUS)
v1	Measured value of channel as a decimal value
u1	Unit of measured value
vtime	Date and time
vstslvl1	Error level 0 = OK, 1 = warning, 2 = error
hlsts1	Limit value status H = upper limit value, L = lower limit value, LH = upper and lower limit value violation
param min max hh hi lo ll	Parameter (optional) Lower zoom Upper zoom Upper alarm limit Upper warning limit Lower warning limit Lower alarm limit
MAN	Manufacturer

10.4.3   Setup, operation and service via the Web server

Establish a connection to the Web server:

1. Connect the PC to the device via Ethernet (or Ethernet via USB)

2. Start the browser on the PC

3. Enter the device's IP address in the browser **http://<ip address>**

4. Log in with the ID and password

The startup screen of the Web server appears.
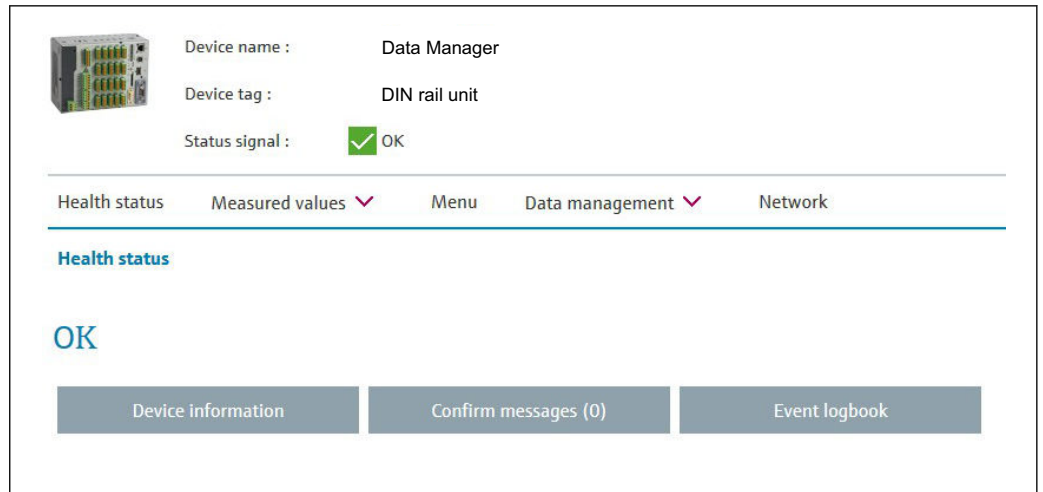
A0037114

General information regarding the **Device name**, **Device tag** and **Status signal** is displayed in the top section of the Web server. The following functions can be accessed in the middle of the screen:

Health status – Measured values – Menu – Data management - Network.

Clicking the functions calls up the following submenus. The submenus are closed by selecting "Cancel" or by clicking "Back" several times.

Health status (advanced device status)

Function	Description
Device information	Advanced device status, Ethernet settings, hardware configuration, device options, memory information, SSL certificate
Confirm messages	Submenu to confirm system messages
Event logbook	Submenu for the event logbook

Measured values (choice of measured value display)

Function	Description
Instantaneous values	Measured values are displayed as numerical instantaneous values, the signal groups can be selected as tabs here
Instantaneous values as curves	The measured values are displayed as curves
History	Displays a history of the measured values

Menu

The menu structure displayed in the Web server largely corresponds to the menu structure in the device

Data management

Update functions and parameters relating to the firmware, load/save setup, save setup as RTF, import SSL certificates

Network

Displays the Ethernet parameters (IP address, subnet mask, gateway, domain)

Displays the current measured values and history data

Under **Measured values** a selection window appears for **Instantaneous values – Instantaneous values as curves – History**. Click to display the corresponding display function.

It is also possible to retrieve current measured values via the Web server without logging in with the address **http://<ip address>**. Device configuration is **not** possible in this case, however.

Note: The browser must support HTML5.

Optional command parameters:
- Syntax: http://<ip address>/iv?group=<x>&refresh=<y>
- group=<x> where x = 1 to 4
- refresh=<y> where y = 3 to 3600 in seconds

Note: Pay attention to lower and upper case if using an optional parameter.

This function can be disabled in the setup. If this function is disabled, the option to export instantaneous values to XML is also disabled for security reasons.

Instantaneous values

The current measured values are displayed in numerical format. Clicking the tabs displays the signal groups defined in the setup.
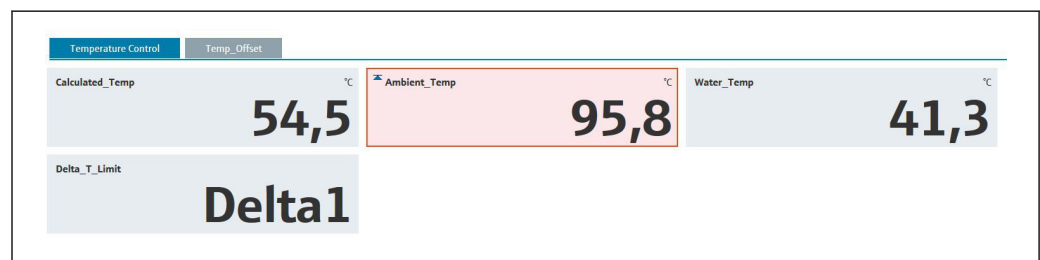
A0037118

Instantaneous values as curves

The current measured values are displayed as a curve and numerically over the time axis. The refresh rate can be set in a selection window. The display mode can be set to full screen. Clicking the tabs displays the signal groups defined in the setup.
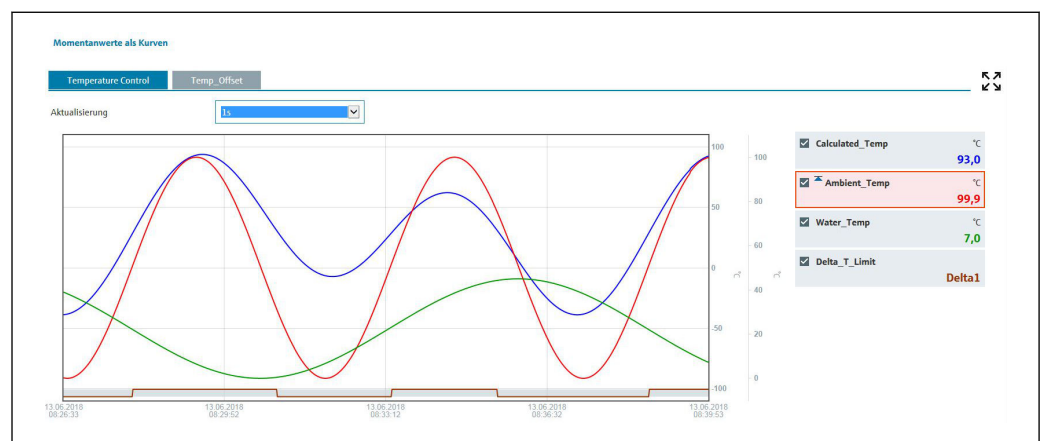
A0037117

Display functions

If the cursor is moved over one of the curves, the instantaneous value of the current point in the curve is displayed with the time stamp and unit. Channels can be displayed and hidden using the channel checkboxes in the legend.

History (logged measured values)

Clicking the **History** button loads the data previously logged. This can take a number of seconds depending on the data connection (USB, Ethernet, WLAN) and the number of measuring channels. The data for each channel is loaded to display the content of one screen. The logged (history) values are displayed as a curve and numerically over the time axis. The display mode can be set to full screen. Clicking the tabs displays the signal groups defined in the setup.
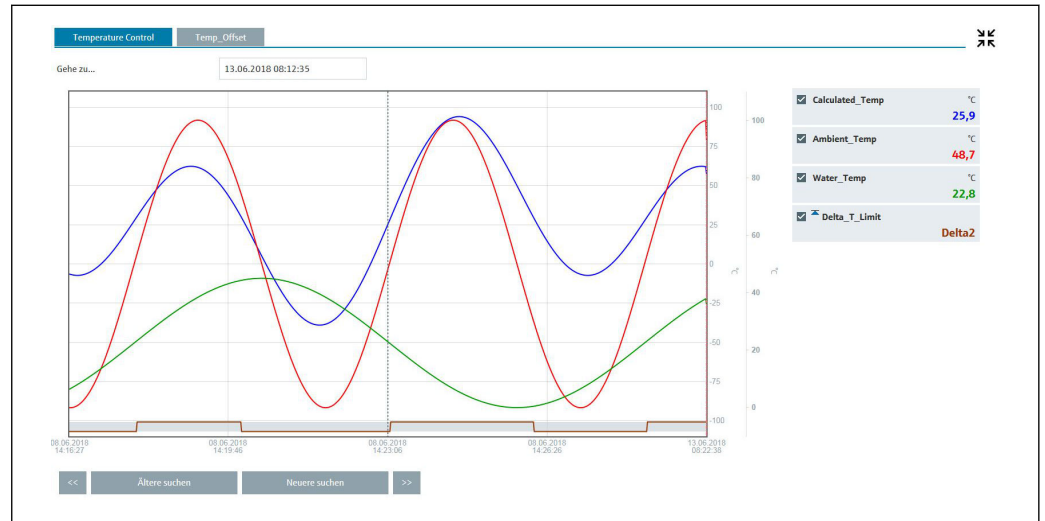
A0037115

Display functions

If the cursor is moved over one of the curves, the instantaneous value of the current point in the curve is displayed with the time stamp and unit. Channels can be displayed and hidden using the channel checkboxes in the legend.

Moving the dashed cursor line along the time axis updates the numerical display of the measured values accordingly (on right).

Go to ...: Enter a point in time. The history is reloaded. If you enter a time for which no measured values are available, the next possible time where measured values are available is displayed.

Search older: The information displayed moves half a screen to the left (displays older measured values). Press the **<<** button to move the information one entire screen to the left (older measured values).

Search newer: The information displayed moves half a screen to the right (displays more recent measured values). Press the **>>** button to shift the information one entire screen to the right (more recent measured values).

Note: If no measured values were recorded for a certain range of time (e.g. as there was no power supply), this is indicated by a symbol at the top of the window. The curves jump accordingly.

A0037116
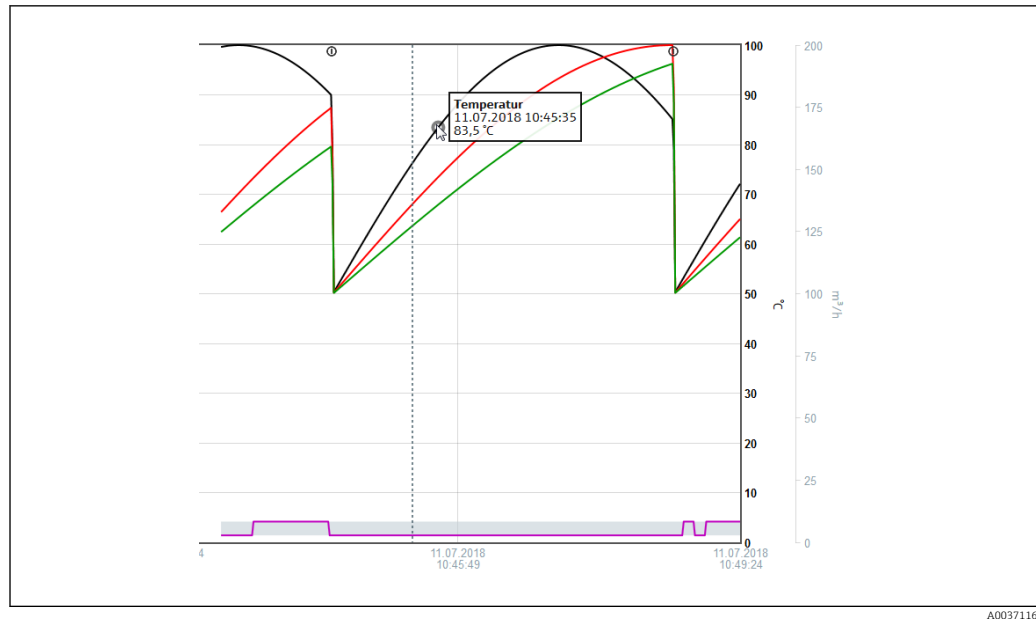
10.4.4 Remote control via the Web server

The device can be controlled remotely via the Web server. In the Web server, this remote control function can be found under **"Measured values -> Remote control"**. Here the display shown corresponds directly to the device display. The device is operated using buttons below this display. The interval for refreshing the display can be set in the **"Refresh"** menu.

Enabling remote control on the device:

1. In the menu **Setup -> Advanced setup -> Communication -> Ethernet -> Configuration Web server -> Remote control**, select **"Yes"** or under
2. **Expert -> Communication -> Ethernet -> Configuration Web server -> Remote control**, select **"Yes"**.

10.5 Change group

The group to be displayed can be changed in the main menu under **"Operation -> Change group"**. Alternatively, the group can also be changed by turning the navigator.

Only the **active** groups are displayed here. The settings for this can be made in the main menu under **"Setup -> Advanced setup -> Application -> Signal groups -> Group x"**.

10.6 Block keyboard/navigator

Local operation can be blocked in the main menu under **"Operation -> Lock operation"** to prevent unintended or incorrect operation (e.g. when cleaning the device).

The device is unlocked by pressing the navigator or the OK operating key for 3 s. When using an external keyboard, the device is unlocked with the key combination "Ctrl-Alt-Del".

10.7   Log on/log out

Log onto the device or log off the user currently logged on.

ℹ️   Only in the case of role-based access protection → 🕮 39

10.8   SD card/USB stick

10.8.1   Function of SD card or USB stick

Without affecting the internal memory, data packets are copied block by block (min. 1 x daily, midnight) to the SD card. Tests are also made to determine whether the data have been written without any errors. Once a new SD card is inserted, the device starts saving the data automatically after 5 minutes. The use of a USB stick is only recommended if certain data ranges should be copied.

The USB stick is **not** used for storing the measured values continuously, i.e. it is **not** automatically updated.

Data are saved in two different folders on the storage media depending on the storage method:
- All data are copied cyclically to the **rec_data_<Device name>** folder if a data packet is complete or the function **"Update"** is activated under **"Operation -> SD card/USB stick -> Update"**.
- The data for the time range selected under **"Operation -> SD card/USB stick -> Save measured value"** are copied to the **rng_data_<Device name>** folder. The copying of these data does not affect the saving of data in the **rec_data_<Device name>** folder.

ℹ️   • Only use new, formatted SD cards recommended by the manufacturer (see "Accessories" → 🕮 69).
   • During normal operation, the used memory space on the SD card or USB stick is displayed on the top right of the display ("SD: xx%" or "USB: xx%").
     Dashes "–" on this display mean that no SD card is inserted.
   • The SD card must not be write-protected.
   • Prior to removing the external data carrier, select **"Operation -> SD card/USB stick -> Update"**. The current data block is closed and saved to the external data carrier. This ensures that all the current data (up until the last save) is included on the data carrier.
   • Depending on the device configuration (see **"Setup –> Advanced setup –> System –> Ext. memory –> Warning at"**), an acknowledgeable message on the display notifies the user that the external data carrier has to be changed before the data carrier is 100 % full.
   • The device keeps track of which data have already been copied onto the SD card or USB stick. If the data carrier is not changed in time or if no SD card is inserted, the new external data carrier is filled with the missing data from the internal memory - insofar as the data are still in the memory. As measured value acquisition/recording is assigned the highest priority, it may take several minutes in this case for the data to be copied from the internal memory to the SD card or USB stick.

10.8.2   Functions relating to the SD card or USB stick

For functions to save measured data and device settings on a removable medium, see the main menu under **"Operation -> SD card / USB stick"** (only if an SD card or USB stick is provided).

Remove safely:
All internal access is terminated to ensure safe removal of the storage medium from the device. A message is displayed when the storage media can be removed. If the SD card is

not removed, the device automatically starts to save data to the storage medium again after 5 minutes.

ℹ️ Only remove the data storage medium using this function; otherwise data may be lost!

Update:
Measurement data not yet saved on the storage medium are now saved. This may take a moment. Measured value acquisition is running in parallel and has top priority.

ℹ️ Data from several devices can be saved onto one storage medium.

- **Save measured values:**
  A user-definable time range can be saved on the data storage medium.
- **Load setup:**
  Loads device settings (setup) from the storage medium onto the device.
- **Save setup:**
  All device settings (setup) are saved onto the storage medium. They can be archived or used for other devices.
- **Save setup as RTF:**
  Saves the setup on the storage medium in a readable format as an RTF file (rich text format).
  The RTF file can be opened and formatted using suitable word processing software (e.g. MS Word), allowing printouts to be easily made.
- **Screenshot:**
  Save the current measured value display as a bitmap on the SD card or USB stick.
- **Update firmware:**
  Loads new firmware onto the device. Only visible if a firmware file is provided on the SD card or USB stick.

ℹ️ Caution: The device will restart. Save the setup and measured values beforehand on the SD card or USB stick.

Import SSL certificate:
Uploads an SSL certificate (X.509) to the device. Certificates are needed to establish an SSL connection in order to send e-mails in an encrypted manner for example. Certificates are available from your network administrator or provider. The following are supported: DER, CER and CRT (binary or Base64-encoded).
Only visible if there is an SSL certificate on the SD card or USB stick.

10.8.3   Notes on e-mail encryption

In addition to sending unencrypted e-mails, it is also possible to send encrypted e-mails via SSL (TLS). To do so, you can choose either of two ways:
- By **SMTPS**: fully encrypted via port 465.
  The complete connection runs over TLS. The port is 465 by default but this value can be changed in the Setup.
- Via port 25 or 587 using **STARTTLS**.
  With this method the device first establishes a plain SMTP connection via port 25 and continues this connection following agreement and switchover to encryption.

The required process can be selected as follows: **"Setup -> Advanced setup -> Application -> E-mail -> Server requires SSL"** or under **"Expert -> Application -> E-mail -> Server requires SSL"**.

Only TLS V1.0 (= SSL 3.1) or TLS V1.1 is supported. Older standards are not supported. The encryption method is automatically agreed with the counterparty.

A certificate must be installed in order to be able to send encrypted e-mails. These certificates can be obtained from your e-mail service provider. The following file formats are supported:
• *.CER: DER- or Base64-encoded certificate
• *.CRT: DER- or Base64-encoded certificate
• *.DER: DER-encoded certificate

> The file name of the certificate may only contain the following characters: a..z, A..Z, 0..9, +, -, _, #, (,), !

To establish an SSL connection, the device automatically selects the certificate that best suits the counterparty from all the installed certificates. An error message is displayed if the device does not have any of the required certificates.

> When e-mail encryption is enabled, no e-mails can be sent if a valid certificate is not available or if the certificate has expired.

10.8.4 Notes on WebDAV encryption

In addition to sending unencrypted data to the WebDAV server, it is also possible to send encrypted data via SSL (TLS). All data are sent in encrypted format via the SSL port of the external WebDAV server.

The complete connection runs over TLS. The port is 80 by default but this value can be changed in the Setup. The procedure to be used can be selected as follows: **"Setup -> Advanced setup -> Application -> WebDAV Client -> Enable -> Yes (SSL)"** or under **"Expert -> Application -> WebDAV Client -> Enable -> Yes (SSL)"**.

Only TLS V1.0 (= SSL 3.1) or TLS V1.1 is supported. Older standards are not supported. The encryption method is automatically agreed with the counterparty.

A certificate must be installed in order to be able to send encrypted data. These certificates can be obtained from your WebDAV server service provider. The following file formats are supported:
• *.CER: DER- or Base64-encoded certificate
• *.CRT: DER- or Base64-encoded certificate
• *.DER: DER-encoded certificate

> The file name of the certificate may only contain the following characters: a..z, A..Z, 0..9, +, -, _, #, (,), !

To establish an SSL connection, the device automatically selects the certificate that best suits the counterparty from all the installed certificates. An error message is displayed if the device does not have any of the required certificates.

> When WebDAV client encryption is enabled, no data can be sent if a valid certificate is not available or if the certificate has expired.

10.8.5 SSL certificates

Importing an SSL certificate

Installing a certificate via SD card or USB stick:

1. Copy a certificate on a PC to an SD card or USB stick

2. Insert the SD card or USB stick into the device

3. In the main menu, select **"Operation -> SD card (or USB stick) -> Import SSL certificate"**

4. Select the required certificate from the list and follow the dialog on the display.

Installing a certificate via the Web server:

1. On the Web server, select **"Data management --> Import SSL certificate"**

2. Select the file

3. Start the process by clicking **OK**

ℹ️ Up to 3 certificates can be installed simultaneously.

Verifying the installed SSL certificates

The installed certificates can be verified in the main menu under **"Diagnostics -> Device information -> SSL certificates"**. The most important certificate information, e.g. subject key ID, organization and validity period, are displayed in the parameter list.

ℹ️ Not all fields are completed on all the certificates. This is because the parties issuing the certificates do not make all the information available.

Deleting an SSL certificate

In the main menu select the certificate to be deleted under **"Diagnostics -> Device information -> SSL certificate -> Certificate"** and select **"Yes"** under **"Delete certificate"**.

Period of validity of certificates

Certificates are valid for a defined period (valid from … to …). The device checks the certificate validity once a day or each time the device is rebooted. 14 days before the certificate expires the device notifies the user daily (by e-mail, screen display, entry in event log) that the certificate will expire shortly.

If the certificate has expired the alarm relay switches (if activated) and a message is displayed on the screen. An entry is also made in the event log. If a certificate is deleted all errors related to this certificate are reset.

10.9 Showing measured values history

You can scroll through the saved measured values in the main menu under **"Operation -> History"**. Turn the navigator clockwise or counterclockwise to scroll back and forth between the measured value curves. Press the navigator to make other settings for the historical data display (e.g. scroll speed, time scaling or change display mode) or to quit the historical data function.

ℹ️ The gray header on the display and the 〰️ symbol in the status bar indicate that historical values are being displayed. In the instantaneous value display the color of the header is blue.

10.9.1 Historical data: Change group

It is possible to change the group to be displayed in the historical data under **"Operation -> Change group"** in the data history.

10.9.2 Historical data: Scroll speed

Specify how fast the display should scroll when the navigator is turned.

It is possible to change the scroll speed in the historical data under **"Operation -> Scroll speed"** in the data history.

The scroll speed can also be set via the soft key with the arrow symbol < or >. The speed can be changed from < (slow) to <<<< (fast) by pressing the soft key repeatedly.

10.9.3 Historical data: Time scaling

It is possible to scale the displayed time range in the historical data under **"Operation -> Time scaling"** in the data history.

Notes:
- "1:1" option: Every measured value is displayed.
- "1:n" option: Only every nth measured value is displayed (increases the displayed time range).
- No interpolation is performed, nor is the mean value determined.
- If the value for "n" is large, this can result in extended loading times.
- Time scaling does not affect the process for storing the measured value.
- The time range displayed per screen for the currently set time scaling is also displayed in the menu.

10.9.4 Historical data: Time range displayed

The displayed time range is shown in the historical data under **"Operation -> Time range displayed"** in the data history. This tells the user which time range is displayed per screen in the standard memory cycle.

If the alarm cycle differs from the standard memory cycle, this is not taken into consideration.

10.9.5 Historical data: Screenshot

The current measured value display can be saved as a bitmap to an SD card or USB stick in the historical data under **"Operation -> Screenshot"**.

10.9.6 Historical data: Change the display mode

It is possible to change the display mode of the active group in the historical data under **"Operation -> Change display mode"** in the data history.

The following display modes are possible: Curve, Curve in ranges, Waterfall, Waterfall in ranges.

The various display modes have no influence on the signal recording.

10.10 Signal analysis

The analyses saved in the device are displayed in the main menu under **"Operation -> Signal analysis"**.

- **Actual intermediate analysis:**
  The current (i.e. not yet completed) intermediate analysis can be displayed here.
- **Actual day:**
  The current (i.e. not yet completed) daily analysis can be displayed here.
- **Actual month:**
  The current (i.e. not yet completed) monthly analysis can be displayed here.
- **Actual year:**
  The current (i.e. not yet completed) annual analysis can be displayed here.
- **Search:**
  Search and display of analyses. Select which analyses the system should search for/ display: Intermediate analysis, Daily analysis, Monthly analysis, Annual analysis.

10.11   Search in trace

In the main menu, the internal memory can be searched for events or times under **"Operation -> Search in trace"**.

Search for events: The event logbook forms the basis for searches for events. To search more easily for certain events (e.g. setup changes), the search filter can be used to select and search for the desired events. In the standard all events are shown. In the event list displayed, it is possible to select an event and go directly to this point in the history (if still in the memory).

Search for time: When searching for a time in the past, the user can enter a date and a time to specify when the system should start displaying historical data. Once the date/time have been entered and confirmed, the display goes to the selected time in the active group.

10.12   Changing the display mode

The display mode of the active group can be changed in the main menu under **"Operation -> Change display mode"**.

The following display modes are possible: Curve, Curve in ranges, Waterfall, Waterfall in ranges, Bargraph and Digital display.

The various display modes have no influence on the signal recording.

10.13   Adjusting the brightness of the display

You can adjust the brightness of the display in the main menu under **"Operation -> Adjust brightness"**:

Parameter	Possible settings	Description
Adjust brightness	0-100 Default: **80**	Sets the brightness of the display

10.14   Limit values

It is possible to change the limit values during operation in the main menu under **"Operation -> Limits"**.

This function must be enabled beforehand in the main menu under **"Expert -> Application -> Limits-> Change limits: Outside of setup also"**.

Detailed description of the limit values: → 🖹 157

10.15   WebDAV client

The function of the WebDAV client is to transmit recorded data automatically to a connected WebDAV server (e.g. NAS drive). The recorded data are sent to the connected WebDAV server cyclically every 15 minutes. The generated files correspond to the files that are automatically saved to the SD card.

The client is configured via **"Setup -> Advanced setup -> Application -> WebDAV Client"**. The settings under **"Setup -> Advanced setup -> System -> External memory"** are also used for this, with the exception of the SD card settings (memory structure, warning, and relay). The memory is regarded as a stack memory.

Detailed description of the parameters: → 🖹 174

Note: With the WebDAV client, the data are transmitted to the WebDAV server in accordance with the selection made in the .CSV or "protected format".

10.15.1 Access to the WebDAV server via HTTP (HTML)

Address entry in browser: **http://<ip-address>/webdav**

The data are updated cyclically every 15 minutes. The data are automatically updated each time a user logs in.

Note: Leading zeros in IP addresses must not be entered (e.g. enter 192.168.1.11 instead of 192.168.001.011).

Administrator or service authentication is required. ID and password administration is performed in the main menu under **"Setup -> Advanced setup -> Communication -> Ethernet -> Configuration Web server -> Authentication"**.

Default value for ID: admin; Password: admin

Note: The password should be changed during commissioning!

Note: For devices with a stainless steel front and touchscreen, the data are always made available in "protected format" via the WebDAV server.

10.16 Data analysis and visualization with the Field Data Manager software (FDM) provided

The analysis software offers centralized data management with visualization for recorded data.

This enables all measuring point data to be completely archived, e.g.:
- Measured values
- Diagnostic events
- Protocols

The analysis software stores data in an SQL database. The database can be operated locally or in a network (client/server). The free Postgre^{TM}SQL database supplied on the DVD can be installed and used.

For details, see the Operating Instructions on the analysis software DVD provided.

10.16.1 Structure/layout of a CSV file

The CSV files are comprised as follows:

File name (=serial number + file number + configuration number + date and start time + data type)	Description	Coding
H4000504428 0000000279 0000000185 2013-11-07 11-18-00 GROUP01.csv	Contains all the measured values of the group from the starting time indicated in the file name. An individual CSV file is created for each group.	ANSI
H4000504428 0000000279 0000000185 2013-11-07 11-30-00 ANALYSIS01.csv	Contains the signal analyses of the active channels from the starting time indicated in the file name. An individual CSV file is created for every analysis (01 - 04).	ANSI
H4000504428 0000000279 2013-11-07 11-18-34 EVENTS.csv	Contains the event log from the starting time indicated in the file name.	Unicode UTF-8 (see the notes in the following section)

Meaning of the values under "Status" and "Limit" when analyzing a group:

Status of the channel:
0: OK
1: Cable break

Status of the channel:

2: Input signal too high

3: Input signal too low

4: Invalid measured value

6: Error value, i.e. not the calculated value (for mathematics if an input variable is invalid)

7: Sensor/input error

Bit 8: Not assigned

Bit 9: Alarm storage

Bit 10..13: Not assigned

Bit 14: Use error value

Bit 15: Not assigned

General status:

1: High speed storage is active
2: Additional hour for summer/normal time changeover

Note: A combination of 1 and 2 is also possible.

Status of the limit value ("Limit"):

0: OK, no limit value has been violated

Bit 0: Lower limit value
Bit 1: Upper limit value
Bit 2: Increasing gradient
Bit 4: Decreasing gradient

Note: A combination is also possible.

10.16.2 Importing UTF-8-encoded CSV files into spreadsheets

You might encounter problems displaying information if importing UTF-8-encoded CSV files directly into more recent versions of MS Excel™ (2007 and higher).

Importing CSV data from the event logbook ("Events") into MS Excel™ (version 2007 and higher):

1. Select the menu **"Data -> Get external data - From text"**

2. MS Office 365 and higher: In the menu select **"Data -> From text/CSV"**

3. Select the CSV file

4. Follow the instructions in the wizard

5. Select file origin **"Unicode UTF-8"**

11 Diagnostics and troubleshooting

The following section contains an overview of possible causes of errors to provide initial assistance during troubleshooting.

11.1 General troubleshooting

⚠ WARNING

Danger! Electric voltage!

▸ Do not operate the device in an open condition for error diagnosis!

User interface	Cause	Solution
No measured value display; no LED lit	No supply voltage connected	Check the device supply voltage.
	Supply voltage is applied; device or power unit is defective	Replace the power unit or device.
Diagnostic message is displayed	For a list of diagnostic messages, see the next section.	

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

11.2 Troubleshooting

The Diagnostics menu is used for the analysis of the device functions and offers comprehensive assistance during troubleshooting. Always proceed as follows to locate the cause of device errors or alarms.

General troubleshooting procedure

1. Open diagnosis list: lists the 30 most recent diagnostic messages. This can be used to determine which errors are currently present and whether an error has repeatedly occurred.

2. Diagnosis of current measured values: Verify the input signals by displaying the current or scaled measuring ranges. To verify calculations, call up calculated auxiliary variables if necessary.

3. Most errors can be rectified by performing steps 1 and 2. If the error persists follow the troubleshooting instructions in the following sections.

4. If this does not rectify the problem, contact the Service Department. Any time you contact the Service Department please always have the error number and the information in the main menu under **"Diagnostics -> Device information"** (program name, serial number etc.) ready.

The contact details of Endress+Hauser representatives can be found on the Internet at www.endress.com/worldwide.

11.2.1 Device error/alarm relay

One relay can be used as an alarm relay. If the device detects a system error (e.g. hardware defect) or a malfunction (e.g. cable break), the selected output/relay switches. The alarm relay is assigned in the main menu under **"Setup -> Advanced setup -> System -> Fault switching -> Relay x"**. **Factory setting: Relay 1**.

This "alarm relay" switches if "F"-type or "S"-type errors occur, i.e. "M"-type or "C"-type errors do not switch the alarm relay.

11.3 Diagnostic information on the local display

The diagnostic message consists of a diagnostic code and a message text.

The diagnostic code consists of the error category as per Namur NE 107 and the message number.

Error category (letter in front of the message number)
- **F = Failure**. A malfunction has been detected.
  The measured value of the affected channel is no longer reliable. The cause of the malfunction is to be found in the measuring point. If a controller is connected, it should be switched to manual mode. An alarm relay can be assigned to this error category in the Advanced setup.
- **M = Maintenance required.** Action must be taken as soon as possible.
  The device still measures correctly. Immediate measures are not necessary. Proper maintenance efforts may prevent a possible malfunction in the future.
- **S = Out of specification**. The measuring point is being operated outside specifications. Operation is still possible. There is the risk of increased wear, a shorter operating life or less accurate measurements. The cause of the problem is to be found outside the measuring point.
- **C = Function check**. The device is in Service mode.

Diagnostic code	Message text	Description	Remedy
F100	Sensor/input error!	Sensor/input error!	Check connections and parameters
F101	Cable break	Cable break	Check connections
F105	Invalid value!	Measured value is invalid (when calculating --> NAN)	Check connections and process variables
F201	Device fault	Device error	Contact the Service Department
F261	Error: RAM	No access to RAM	Contact the Service Department
F261	Error: Flash	No access to flash	Contact the Service Department
F261	Error: SRAM	No access to SRAM	Contact the Service Department
F261	Analog card x out of order!	Hardware defect detected	Contact the Service Department, replace card
F261	Power supply out of order!	Hardware defect detected	Contact the Service Department, replace power unit
M284	Firmware update	Firmware has been updated	No action required. Message can be acknowledged.
M290	Internal flash reaches the end of its lifetime. Please replace device.	The internal flash memory is defective.	Replace device
F301	Error: Cannot load setup	Setup defective	Switch the device off and then on again, re-configure, contact the Service Department if necessary
M302	Setup restored from backup	Setup has been loaded from backup	Check setup
F303	Error: Device data	Device data defective	Contact the Service Department
M304	Backup: Device data	Device data defective. However it was possible to continue working with the backup data	Check settings (e.g. serial number)
F307	Error: Customer preset value defective	Customer preset value defective	
F309	Error: Date/time is not set	Invalid date/time (e.g. internal battery is empty)	Device was switched off too long. The date/time must be set again. Battery might need to be replaced (contact the Service Department)
F310	Error: Cannot save setup	The setup could not be saved	Contact the Service Department
F311	Error: Device data	The device data could not be saved	Contact the Service Department
F312	Error: Calibration data defective	The calibration data could not be saved	Contact the Service Department

Diagnostic code	Message text	Description	Remedy
F312	Analog card x is not calibrated!	Analog card x is not calibrated! The device works with default values, i.e. the measured values could possibly be inaccurate under certain circumstances.	Contact the Service Department
M313	SRAM has been defragmented	SRAM was defragmented after firmware update	No action required. Message can be acknowledged.
F314	Error: Option code	Activation code is no longer correct (incorrect serial number/program name). Option has been switched off and setup preset has been performed.	Enter new code
M315	No IP address could be obtained from the DHCP server!	No IP address could be obtained from the DHCP server!	Check the network cable
M316	Invalid MAC address!	No or incorrect MAC address	Contact the Service Department
M317	Battery voltage < 2.5 V. Please replace battery!		Battery needs to be replaced (contact the Service Department)
F348	Firmware cannot be updated: • Checksum incorrect • Firmware incompatible!	Firmware update has been aborted because the firmware file is damaged or is not compatible with this device	Contact the Service Department
M350	Measured value acquisition interrupted for calibration/ service work. Measured value acquisition restarted.	Measured value acquisition was interrupted/ reactivated for service/maintenance purposes. Causes include: • Calibration of inputs/outputs • Firmware update	No action required. Message can be acknowledged.
M351	The device will restart.	The device is rebooting. Causes include: • Following a firmware update • Change of device options	No action required. Message can be acknowledged.
F431	Error:Calibration	Calibration data missing	Contact the Service Department
M502	Device is locked!	Device is locked! The message appears when an attempt is made to update the firmware, for example	Check lock per digital channel
F510	Setup was corrected.	The device detected that the configuration was no longer correct. All the parameters affected have been reset to the factory default settings. Possible causes: • Input cards have been removed or replaced by another type • An input card is no longer working correctly A firmware update has caused compatibility problems. Note: This error message appears each time the device is restarted until at least one change has been made to the configuration.	Check the configuration of the device. If hardware has been replaced, no other action is needed (recommendation: change the operating language so that the error message no longer appears after the next restart).
M520	SMTP: Name could not be resolved (DNS)! SNTP: Name could not be resolved (DNS)!	Problem with name resolution (DNS). SMTP: e-mail SNTP: time synchronization	Check the corresponding settings
M528	Setup is not compatible with this firmware	An attempt was made to load a setup which is not compatible with this firmware (e.g. another device type)	Check whether the correct file has been selected.
M530	Cannot copy setup.	An error occurred when a setup was loaded from an SD card or USB stick An error occurred when a setup was saved to an SD card or USB stick	Replace the SD card or USB stick Setup file defective?

Diagnostic code	Message text	Description	Remedy
S901	Input signal too low	Input signal too low	Check Connections and parameters. Check connected sensor/transmitter.
S902	Input signal too high	Input signal too high	Check Connections and parameters. Check connected sensor/transmitter.
M905	Limit x	Limit x has been violated	Note: Error number only occurs if e-mails are sent
M906	End limit x	Limit x no longer violated	Note: Error number only occurs if e-mails are sent
F910	This software is not enabled for this device.	The current firmware is not enabled for this hardware	Contact the Service Department
M920	Too many messages that need to be acknowledged!	There are too many messages that need to be acknowledged. Another message could not be added.	Acknowledge messages
M921	SD card x% full.	External memory is full	Replace SD card
M922	No cyclic measurement transfer	The instantaneous values were not read out for a set time	
M922	No cyclic transfer	The device was not read out via fieldbus for a configurable time	Check the communication of the fieldbus. Check PLC.
M924	Error accessing SD card! Error accessing USB stick! SD card is not or wrong formatted! USB stick is not or wrong formatted!	Impossible to access the removable data medium. Causes include: Memory is larger than 32 GB Invalid format (only FAT or FAT32 are permitted)	Check/replace removable data medium
M925	SD card is write-protected!	SD card is write-protected!	Remove write protection
M927	Insufficient space free on data storage medium!	An attempt was made to save to the SD card or USB stick (setup, screenshot, etc.), but not enough free memory space is available.	Use other SD card/USB stick. Delete files that are no longer needed from the SD card/USB stick
M927	Insufficient space free on data storage medium!	An attempt was made to save the data onto the WebDAV server, but there was not sufficient memory available.	Use other WebDAV server. Delete files no longer required from the WebDAV server.
F929	File is damaged!	The file that should be loaded is damaged/ invalid (e.g. wrong checksum). This message can occur in connection with the following actions, for instance: Loading setup from SD card/USB stick Firmware update Loading process pictures	Create file again, use other storage medium.
M940	E-mail could not be sent! (x)	E-mail could not be sent! Optional: Error code (x) from server: e.g.: • 451: Requested action aborted: local processing error • 554: Transaction failed. Possible reason: e-mail was not sent as suspected of being SPAM • 1: No free buffer • 2: No receiver specified	Check settings/network connection • 451: Try again • 554: Use other e-mail provider
M941	No connection to the e-mail server!	A connection to the e-mail server could not be established because: • The entered connection data are incorrect • The connection is interrupted	Check settings/network connection

Diagnostic code	Message text	Description	Remedy
M942	SMTP: fault occurred (x).	An error occurred when sending an e-mail. x= error code: 0: SMTP was switched off when the mail was being sent 3: TCP/IP connection was denied 4: TCP/IP connection error 5: SMTP server denied 6: Error during authentication 7: Connection unexpectedly lost 8: Server responded with error code 9: Timeout 10: Internal protocol error	Check settings/network connection
M944	SMTP: authentication failed!		Check settings/network connection
M945	SNTP: Time was not synchronized!	Time could not be synchronized via SNTP. Possible reasons: • SNTP server temporarily unavailable • Settings not correct	• Check settings • Check whether the error occurs often. If it does, choose another time server.
M945	SNTP server 1 not responding. Try server 2.	Time could not be synchronized via SNTP. Possible reasons: • SNTP server temporarily unavailable • Settings not correct	• Check settings • Check whether the error occurs often. If it does, choose another time server.
M946	Screenshot could not be saved (x)!	Screenshot could not be created. Possible causes (x): 0: Error when writing 1: Insufficient free space 2: Bitmap could not be created 3: SD card/USB stick not available or not yet ready	Check/replace the SD card or USB stick
M947	Modem could not be initialized! Check the cable and modem.	The connected modem could not be initialized by the device.	Check the cable and modem.
M950	Unable to load SSL certificate.	Unable to load SSL certificate. Cause: • Invalid file format • File is damaged	• Use a certificate with a valid file format • Import certificate to device again
F951	SSL certificate '...' has expired!	Certificates have an expiry date, i.e. they must be renewed from time to time.	Install a new certificate
M952	SSL certificate '...' expires on ...!	The device warns the user shortly before the certificate expires.	Install a new certificate
M953	x certificates have already been installed. Delete certificates that are no longer required.	The device can manage max. 3 X.509 certificates.	Delete a certificate that is already installed and no longer required
M954	SSL certificate not found: key ID = ...	Unable to establish SSL connection as a suitable certificate is not installed.	Install a suitable certificate
M955	SSL connection denied!		
M980	No connection to the WebDAV server	A connection to the WebDAV server could not be established because the entered connection data are incorrect or the connection has been interrupted.	Check settings/network connection
M981	WebDAV: Authentication failed!		Check settings
M982	WebDAV: Directory or file could not be created!	Set directory path does not exist.	Create a directory manually in the WebDAV server
M983	WebDAV: Fault	An unassigned error has occurred. The error is displayed in English.	

Diagnostic code	Message text	Description	Remedy
M984	No Ethernet connection.	The device is not connected by an Ethernet cable.	Establish cable connection
M985	The test cannot be carried out because data are currently being copied by WebDAV.		Repeat later

11.4   Pending, current diagnostic messages

The diagnostic message that is currently pending, the last diagnostic message and the last device restart are displayed in the main menu under **"Diagnostics -> Actual diagnostics"**, **"Diagnostics -> Last diagnostics"** or under **"Diagnostics -> Last restart"**.

11.5   Diagnosis list

The last 30 diagnostic messages are displayed in the main menu under **"Diagnostics -> Diagnosis list"** (messages with Fxxx, Sxxx or Mxxx-type error numbers).

The diagnosis list is designed as a ring memory, i.e. when the memory is full the oldest messages are automatically overwritten (no message).

The following information is saved:
• Error number
• Error text
• Date/time

11.6   Event logbook

Events such as limit value violations and power failures are displayed in chronological order in the event logbook. It can be found in the main menu under **"Diagnostics -> Event logbook"**. Individual events can be selected and details displayed.

11.7   Device information

Important device information, e.g. serial number, firmware version, device name, device options, memory information, SSL certificates etc. are displayed in the main menu under **"Diagnostics -> Device information"** .

ℹ️ For further information open the online help on the device.

11.8   Diagnostics of measured values

Displays the current measured values in the main menu under **"Diagnostics -> Measured values"**. The input signals can be verified here by displaying the scaled and calculated values. To verify calculations, call up calculated auxiliary variables if necessary.

11.9   Diagnostics of outputs

Displays the current states of the outputs (relays 1-6) in the main menu under **"Diagnostics -> Outputs"**.

11.10   Simulation

Various functions/signals can be simulated for test purposes here.

> **NOTICE**
>
> **Invoke simulation: for the simulation of the relays, see the main menu under "Diagnostics -> Simulation". For the simulation of the measured values, see the main menu under "Expert -> Diagnostics -> Simulation".**
> Only the simulated values are recorded during simulation. The simulation is recorded in the event logbook.
> ▶ Do not start simulation if measured value recording must not be interrupted!

11.10.1 E-mail test

A test mail can be sent to the selected recipient in the main menu under **"Diagnostics -> Simulation -> E-mail"**.

ℹ️ At least one e-mail address must be set beforehand.

11.10.2 Test WebDAV client

A test file can be sent to the selected WebDAV server in the main menu under **"Diagnostics -> Simulation -> WebDAV Client"**.

ℹ️ The settings for the WebDAV server to be addressed must be set beforehand under **"Setup -> Advanced setup -> Application -> WebDAV Client"**.

11.10.3 Test time synchronization/SNTP

Time synchronization (SNTP setting) can be tested in the main menu under **"Diagnostics -> Simulation -> SNTP"**.

ℹ️ SNTP must be enabled beforehand in the main menu under **"Setup -> Advanced setup -> System -> Date/time set-up -> SNTP"**.

Note: The test can take some time.

11.10.4 Relay test

The relay selected under **"Diagnostics -> Simulation -> Relay x"** can be switched manually in the main menu.

11.11   Initialize modem

Initializes the modem connected (to automatically answer calls). The modem must support the complete AT command syntax.

ℹ️ • Set the baud rate in the main menu under **"Setup -> Advanced setup -> Communication -> Serial interface"** and select **"RS232"** as the interface type.
   • Connect the modem to the RS232 interface of the device. For this purpose only use the modem cable, which is available as an accessory.

ℹ️ A GSM modem can only be initialized if a SIM card is inserted and the PIN is entered or the prompt to enter the PIN has been disabled.

11.12   Resetting the measuring device

The device can be reset to the as-delivered state with a PRESET. This function should only be performed by a service technician.

The function can be found in the main menu under **"Expert -> System -> PRESET"**.

ℹ️ PRESET is only visible under "Expert" once the service code has been entered.

Procedure for resetting the measuring device

The PRESET returns all parameters to the factory default setup! The internal memory content is deleted!

▶ Save the setup and measured values on the USB stick or SD card. Then perform a PRESET.

  ↳ The device is reset to the factory default settings.

11.13 Clear memory

ℹ️ The internal memory should be cleared after commissioning so that the analysis software does not contain any unnecessary data.

11.14 Reset analysis

ℹ️ The analyses should be reset after commissioning so that the analysis software does not contain any unnecessary data.

11.15 Firmware history

Overview of unit software history:

Unit software version/date	Software modification	FDM analysis software version	Version of OPC server	Operating Instructions
V01.00.00 / 07.2013	Original software	V01.01.02.10 and higher	V5.00.02.04 and higher	BA01146R/ 09/01.13
V01.01.00 / 02.2014	E-mail via SSL; added functionality	V01.02.00.08 and higher	V5.00.02.04 and higher	BA01146R/ 09/02.14
V02.00.00 / 08.2015	Added functionality	V01.03.00.00 and higher	V5.00.03.00 and higher	BA01146R/ 09/03.15
V2.01.00 / 04.2016	Extended functionality/bug fixes	V01.03.01.00 and higher	V5.00.03.00 and higher	BA01146R/ 09/04.16
V2.01.05 / 11.2016	Extended functionality/bug fixes	V01.03.01.01 and higher	V5.00.03.00 and higher	BA01146R/ 09/05.16
V2.02.00 / 11.2017	Ethernet function via USB	V1.04.00 and higher	V5.00.04.00 and higher	BA01146R/ 09/06.17
V2.04.00 / 09.2018	Web server extension	V1.04.02 and higher	V5.00.04.01 and higher	BA01146R/ 09/07.18

12   Maintenance

No special maintenance work is required for the device.

12.1   Updating the device software ("firmware")

Updating the device software ("firmware") via USB stick, SD card or Web server.

This function can be accessed in the main menu under **"Operation -> SD card or USB stick -> Update firmware"**.

This function can be found in the Web server under **"Data management -> Firmware update"**.

It is advisable to save the setup and measured values beforehand on the SD card or USB stick.

The device software ("firmware") should only be updated by a service technician.

The device will restart following the firmware update.

If an older firmware version (< V2.04.00) is installed on the device, the internal memory must then be cleared under **"Expert -> System"**.

12.2   Instructions for enabling a software option

Various device options can be enabled via an activation code. Available device options can be ordered as an accessory → 🖺 69. Once you place your order, you will receive instructions on how to activate the option and a code which must be entered under **"Main menu -> Expert -> System -> Device options -> Activation code"**.

12.3   Cleaning

The front of the housing can be cleaned with a clean dry or damp cloth.

13   Repair

13.1   General notes

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

ℹ️ Always quote the serial number of the device when ordering spare parts! Installation instructions are included with the spare part.

13.2   Spare parts

ℹ️ Accessories and spare parts currently available for your product can be found online at: **www.endress.com/spareparts_consumables → access to specific device information →** enter serial number.
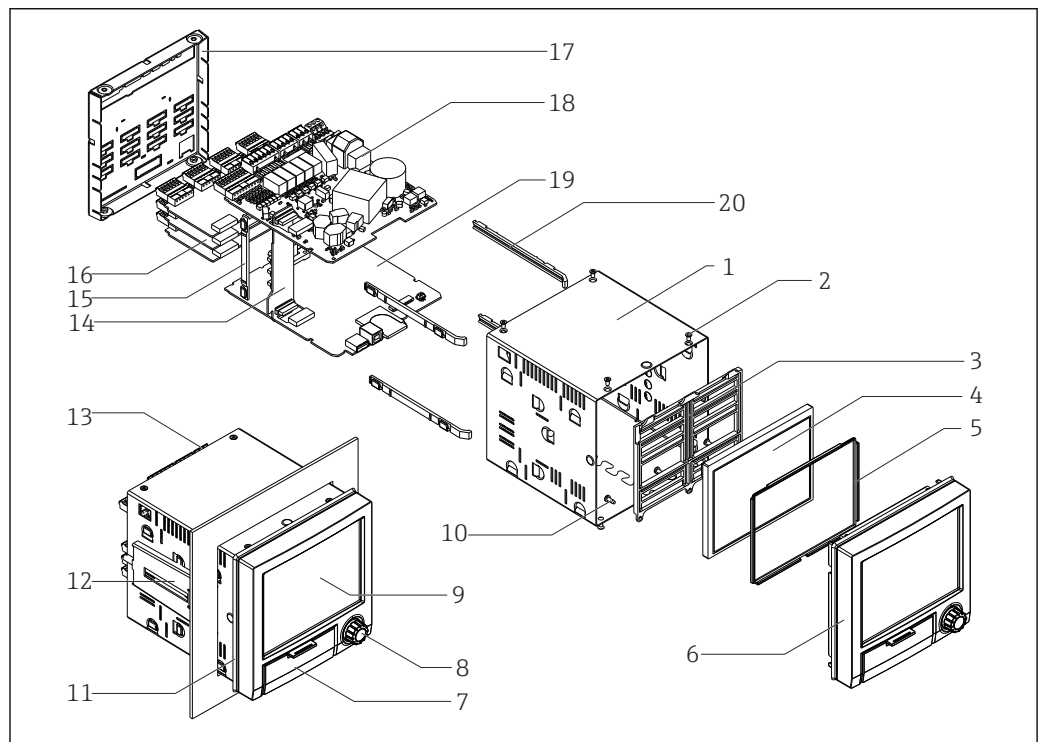
A0019863

🔲 9   *Spare parts diagram*

Spare parts list:

Item No.	Description	Order No.
1	Casing	71155332
12	Jack screw short (1 piece)	71035184
11	Seal housing	71155329
16	Analog card (4 channels)	XPR0007-A1
4	Display TFT 5.7" VGA + flat ribbon connector	XPR0007-A2
3, 5, 10	Spare parts kit, display	XPR0007-A3
6, 7, 8	Front + navigator + flat ribbon connector	XPR0007-A4
6, 7, 8	Front neutral + Navigator + flat ribbon connector	XPR0007-A5
15, 20	Spare parts kit, card holder	XPR0007-A6

Item No.	Description	Order No.
14	Motherboard	XPR0007-B1
18	Power supply 24 V AC/DC	XPR0007-B2
18	Power supply 100-230 V AC (+/-10%)	XPR0007-B3
17	Rear panel analog inputs	71165643
13	**Terminals:**	
	Terminal plug-in 3-pole for mains connection "N L PE" RM5.08 – orange color	71123475
	Terminal plug-in 3-pole FKC2.5/3-ST-5.08 for relay 1 (changeover)	71037408
	Terminal plug-in 4-pole FKC2.5/4-ST-5.08 for relay 2+3	71037410
	Terminal plug-in 6-pole FKC2.5/6-ST-5.08 for relay 4+5+6	71037411
	Terminal plug-in 9-pole FMC1.5/9-ST-3.5 for digital inputs	71037363
	Terminal plug-in 6-pole FMC1.5/6-ST-3.5 for analog input	51009211

Product structure for CPU with software

Item No.	Description	Order code
19	**CPU + software**	XPR0008-_ _ _ _
	Operating language: Universal	XPR0008-A1
	Software: Standard Mathematics	XPR0008-A1A XPR0008-A1B
	Communication Ethernet RJ45 + USB RS232/485 + Ethernet RJ45 + USB Modbus TCP slave + Ethernet RJ45 + USB Modbus RTU/TCP slave + RS232/485 + Ethernet RJ45 + USB	XPR0008-A1_ A XPR0008-A1_ B XPR0008-A1_ C XPR0008-A1_ D
	Option: Standard Neutral	XPR0008-A1_ _ A XPR0008-

Product structure for option retrofit

Item No.	Description	Order code
	Option retrofit (please enter the serial number)	XPR0009-_ _
	Software: Standard Mathematics	XPR0009-A XPR0009-B
	Option: Standard Neutral	XPR0009-_ A XPR0009-_ B
	Standard Modbus TCP slave (Modbus RTU only with RS485) ℹ An RS485 interface is required for Modbus RTU. If there is no RS485 in the device, a new CPU board must be ordered.	XPR0009-_ _ A XPR0009-_ _ C

ℹ The software option can be enabled directly on the device. After ordering you will receive instructions and a code that you must enter.

13.3   Return

The measuring device must be returned if it is need of repair or a factory calibration, or if the wrong measuring device has been delivered or ordered. Legal specifications require Endress+Hauser, as an ISO-certified company, to follow certain procedures when handling products that are in contact with the medium.

To ensure safe, swift and professional device returns, please refer to the procedure and conditions for returning devices provided on the Endress+Hauser website at http://www.endress.com/support/return-material

13.4   Disposal

13.4.1   IT security

Observe the following instructions before disposal:

1. Delete data

2. Reset the device

3. Delete/change passwords

4. Delete users

5. Carry out alternative or complementary measures to destroy the storage medium

13.4.2   Disassembling the measuring device

1. Switch off the device

2. Carry out the mounting and connection steps from the "Mounting the measuring device" and "Connecting the measuring device" sections in reverse order. Observe the safety instructions.

13.4.3   Disposing of the measuring device

Observe the following notes during disposal:
- Observe valid federal/national regulations.
- Ensure proper separation and reuse of the device components.

14   Accessories

ℹ️ Always quote the serial number of the device when ordering accessories! Installation instructions are provided with the accessory!
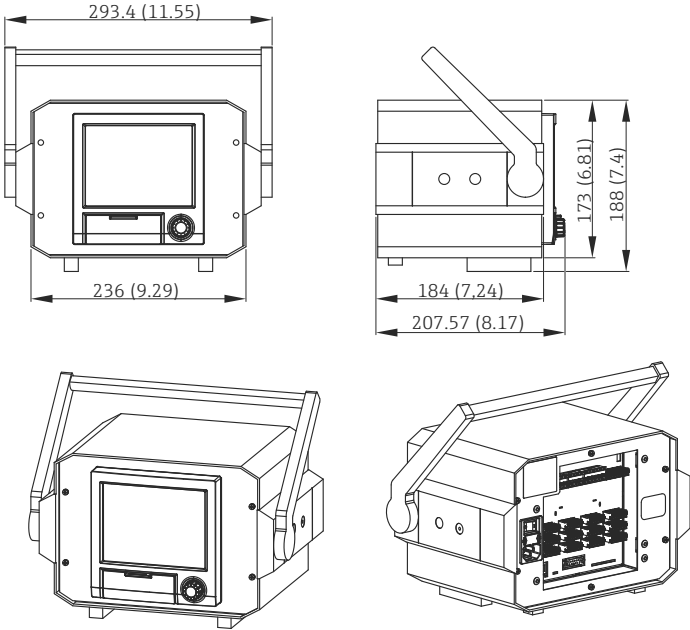
Various accessories, which can be ordered with the device or subsequently from Endress +Hauser, are available for the device. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

14.1   Device-specific accessories

Description	Order No.
"Industrial Grade" SD card, industry standard, 1GB	71213190
Field Data Manager analysis software with SQL database support (1 x workstation license, Professional version)	MS20-A1
OPC server software (full version on CD)	RXO20-11

Description	Order No.
Accessories for RXU10 data manager	RXU10- _ _
Designation: Cable set RS232 for connection to PC or modem USB - RS232 converter Cable USB-A - USB-B, 1.8 m (5.9 ft) Configuration software "FieldCare Device Setup" + USB cable	RXU10-B _ RXU10-E _ RXU10-F _ RXU10-G _

Description	Order No.
Field housing IP65 (for panel-mounted device) 🖻 *10 Dimensions in mm (in)*	RXU10-H _

Description	Order No.
Desktop housing (for panel-mounted device), cable with Schuko plug Desktop housing (for panel-mounted device), cable with US plug Desktop housing (for panel-mounted device), cable with Swiss plug	RXU10-I _ RXU10-J _ RXU10-K _
293.4 (11.55) 236 (9.29) 173 (6.81) 188 (7.4) 184 (7,24) 207.57 (8.17) A0021772 ⊡ *11 Dimensions in mm (in)*	
Version: Standard Neutral	RXU10- _ 1 RXU10- _ 2

15   Technical data

15.1   Function and system design

Measuring principle	Electronic acquisition, display, recording, analysis, remote transmission and archiving of analog and digital input signals.

The device is intended for installation in a panel or cabinet. There is also the option of operating it in a desktop housing or field housing.

Measuring system	Multichannel data recording system with multicolored TFT display (145 mm / 5.7" screen size), galvanically isolated universal inputs (U, I, TC, RTD, pulse, frequency), digital inputs, transmitter power supply, limit relay, communication interfaces (USB, Ethernet, optional RS232/485), optionally available with Modbus protocol, 128 MB internal memory, external SD card and USB stick. An Essential Version of the reporting software is included for SQL-supported data analysis at the PC.

The number of inputs available in the basic device can be individually increased using a maximum of 3 plug-in cards. The device supplies power directly to connected two-wire transmitters. The device is configured and operated via the navigator (jog/shuttle dial), via the integrated web server and a PC, or via an external keyboard. Online help facilitates local operation.

Reliability	**Dependability**

Depending on the device version, the MTBF is between 52 years and 24 years (calculated based on SN29500 standard at 40℃)

Serviceability

Battery-backed time and data memory. It is advisable to have the backup battery replaced by a service technician after 10 years.

Real time clock (RTC)

- Configurable summer/normal time changeover
- Battery buffer. It is advisable to have the backup battery replaced by a service technician after 10 years.
- Drift: <10 min./year
- Time synchronization possible via SNTP or via digital input.

Standard diagnostic functions as per Namur NE 107

The diagnostic code is made up of the error category as per Namur NE 107 and the message number.

- Cable open circuit, short-circuit
- Incorrect wiring
- Internal device errors
- Overrange/underrange detection
- Ambient temperature out-of-range detection

Device error/alarm relay

One relay can be used as an alarm relay. If the device detects a system error (e.g. hardware defect) or a malfunction (e.g. cable open circuit), the selected output/relay switches.

This "alarm relay" switches if "F"-type errors occur (F = failure), i.e. "M"-type errors (M= Maintenance required) do not switch the alarm relay.

Safety

The tamper-proof recorded data are saved and can be transferred to an external SQL database for archiving in a way that prevents subsequent manipulation.

15.2   Input

Measured values	**Number of analog universal inputs**

Standard version without universal inputs. Optional input cards (slot 1-3) with 4 universal inputs (4/8/12) each.

Number of digital inputs

6 digital inputs

Number of mathematics channels

4 mathematics channels (optional). Mathematics functions can be freely edited via a formula editor.

Integration of calculated values e.g. for totalization.

Number of limit values

30 limit values (individual channel assignment)

Function of analog universal inputs

You are free to choose between the following measured variables for each universal input: U, I, RTD, TC, pulse input or frequency input.

Integration of input variable for totalization e.g. flow rate (m^3/h) in quantity (m^3).

Calculated values

The values of the universal inputs can be used to perform calculations in the mathematics channels.

Measuring range of analog universal inputs	According to IEC 60873-1: An additional display error of ±1 digit is permitted for every measured value.

User-definable measuring ranges per universal input of the multifunction card:

Measured variable	Measuring range	Maximum measured error of measuring range (oMR), temperature drift	Input resistance
Current (I)	0 to 20 mA; 0 to 20 mA quadratic 0 to 5 mA 4 to 20 mA; 4 to 20 mA quadratic ±20 mA Overrange: up to 22 mA or -22 mA	±0.1% oMR Temperature drift: ±0.01%/K oMR	Load: 50 Ω ±1 Ω
Voltage (U) >1 V	0 to 10 V; 0 to 10 V quadratic 0 to 5 V 1 to 5 V; 1 to 5 V quadratic ±10 V ±30 V	±0.1% oMR Temperature drift: ±0.01%/K oMR	≥1 MΩ
Voltage (U) ≤1 V	0 to 1 V; 0 to 1 V quadratic ±1 V ±150 mV	±0.1% oMR Temperature drift: ±0.01%/K oMR	≥2.5 MΩ

Measured variable	Measuring range	Maximum measured error of measuring range (oMR), temperature drift	Input resistance
Resistance thermometer (RTD)	Pt100: -200 to 850 ℃ (-328 to 1562 ℉) (IEC 60751:2008, α=0.00385) Pt100: -200 to 510 ℃ (-328 to 950 ℉) (JIS C 1604:1984, α=0.003916) Pt100: -200 to 850 ℃ (-328 to 1562 ℉) (GOST 6651-94, α=0.00391) Pt500: -200 to 850 ℃ (-328 to 1562 ℉) (IEC 60751:2008, α=0.00385) Pt500: -200 to 510 ℃ (-328 to 950 ℉) (JIS C 1604:1984, α=0.003916) Pt1000: -200 to 600 ℃ (-328 to 1112 ℉) (IEC 60751:2008, α=0.00385) Pt1000: -200 to 510 ℃ (-328 to 950 ℉) (JIS C 1604:1984, α=0.003916)	4-wire: ±0.1% oMR 3-wire: ±(0.1% oMR + 0.8 K) 2-wire: ±(0.1% oMR + 1.5 K) Temperature drift: ±0.01%/K oMR	
	Cu50: -50 to 200 ℃ (-58 to 392 ℉) (GOST 6651-94, α=4260) Cu50: -200 to 200 ℃ (-328 to 392 ℉) (GOST 6651-94, α=4280) Pt50: -200 to 1100 ℃ (-328 to 2012 ℉) (GOST 6651-94, α=0.00391) Cu100: -200 to 200 ℃ (-328 to 392 ℉) (GOST 6651-94, α=4280)	4-wire: ±0.2% oMR 3-wire: ±(0.2% oMR + 0.8 K) 2-wire: ±(0.2% oMR + 1.5 K) Temperature drift: ±0.02%/K oMR	
	Pt46: -200 to 1100 ℃ (-328 to 2012 ℉) (GOST 6651-94, α=0.00391) Cu53: -200 to 200 ℃ (-328 to 392 ℉) (GOST 6651-94, α=4280)	4-wire: ±0.3% oMR 3-wire: ±(0.3% oMR + 0.8 K) 2-wire: ±(0.3% oMR + 1.5 K) Temperature drift: ±0.02%/K oMR	
Thermocouples (TC)	Type J (Fe-CuNi): -210 to 1200 ℃ (-346 to 2192 ℉) (IEC 60584:2013) Type K (NiCr-Ni): -270 to 1300 ℃ (-454 to 2372 ℉) (IEC 60584:2013) Type L (NiCr-CuNi): -200 to 800 ℃ (-328 to 1472 ℉) (GOST R8.585:2001) Type L (Fe-CuNi): -200 to 900 ℃ (-328 to 1652 ℉) (DIN 43710-1985) Type N (NiCrSi-NiSi): -270 to 1300 ℃ (-454 to 2372 ℉) (IEC 60584:2013) Type T (Cu-CuNi): -270 to 400 ℃ (-454 to 752 ℉) (IEC 60584:2013)	±0.1% oMR from -100 ℃ (-148 ℉) ±0.1% oMR from -130 ℃ (-202 ℉) ±0.1% oMR from -100 ℃ (-148 ℉) ±0.1% oMR from -100 ℃ (-148 ℉) ±0.1% oMR from -100 ℃ (-148 ℉) ±0.1% oMR from -200 ℃ (-328 ℉) Temperature drift: ±0.01%/K oMR	≥1 MΩ
	Type A (W5Re-W20Re): 0 to 2500 ℃ (32 to 4532 ℉) (ASTME 988-96) Type B (Pt30Rh-Pt6Rh): 42 to 1820 ℃ (107.6 to 3308 ℉) (IEC 60584:2013) Type C (W5Re-W26Re): 0 to 2315 ℃ (32 to 4199 ℉) (ASTME 988-96) Type D (W3Re-W25Re): 0 to 2315 ℃ (32 to 4199 ℉) (ASTME 988-96) Type R (Pt13Rh-Pt): -50 to 1768 ℃ (-58 to 3214 ℉) (IEC 60584:2013) Type S (Pt10Rh-Pt): -50 to 1768 ℃ (-58 to 3214 ℉) (IEC 60584:2013)	±0.15% oMR from 500 ℃ (932 ℉) ±0.15% oMR from 600 ℃ (1112 ℉) ±0.15% oMR from 500 ℃ (932 ℉) ±0.15% oMR from 500 ℃ (932 ℉) ±0.15% oMR from 100 ℃ (212 ℉) ±0.15% oMR from 100 ℃ (212 ℉) Temperature drift: ±0.01%/K oMR	≥1 MΩ
Pulse input (I) [1]	Min. Pulse length 40 µs, max. 12.5 kHz; 0 to 7 mA = LOW; 13 to 20 mA = HIGH		Load: 50 Ω ±1 Ω
Frequency input (I) [1]	0 to 10 kHz, overrange: up to 12.5 kHz; 0 to 7 mA = LOW; 13 to 20 mA = HIGH	±0.02% @ f <100 Hz of reading ±0.01% @ f ≥100 Hz of reading Temperature drift: 0.01% of measured value over the entire temperature range	

1)   If a universal input is used as a frequency or pulse input, a series resistor must be used in series connection with the voltage source. Example: 1.2 kΩ series resistor at 24 V

Maximum load of inputs

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
Current (I)	Maximum permitted input voltage: 2.5 V Maximum permitted input current: 50 mA	4 to 20 mA range with disengageable cable open circuit monitoring to NAMUR NE43. The following error ranges apply when NE43 is switched on: ≤3.8 mA: underrange ≥20.5 mA: overrange ≤ 3.6 mA or ≥ 21.0 mA: open circuit (display shows: – – – –)
Pulse, frequency (I)	Maximum permitted input voltage: 2.5 V Maximum permitted input current: 50 mA	No cable open circuit monitoring
Voltage (U) >1 V	Maximum permitted input voltage: 35 V	1 to 5 V range with disengageable cable open circuit monitoring: <0.8 V or >5.2 V: cable open circuit (display shows: - - - -)
Voltage (U) ≤1 V	Maximum permitted input voltage: 24 V	

Measured variable	Limit values (steady-state, without destroying input)	Cable open circuit detection/line influence/temperature compensation
Resistance thermometer (RTD)	Measuring current: ≤1 mA	Maximum barrier resistance (or line resistance): 4-wire: max. 200 Ω; 3-wire: max. 40 Ω Maximum influence of barrier resistance (or line resistance) for Pt100, Pt500 and Pt1000: 4-wire: 2 ppm/Ω, 3-wire: 20 ppm/Ω Maximum influence of barrier resistance (or line resistance) for Pt46, Pt50, Cu50, Cu53, Cu100 and Cu500: 4-wire: 6 ppm/Ω, 3-wire: 60 ppm/Ω Cable open circuit monitoring if any connection is interrupted.
Thermocouples (TC)	Maximum permitted input voltage: 24 V	Influence of line resistance: <0.001%/Ω Error, internal temperature compensation: ≤ 2 K

Scan rate

Current/voltage/pulse/frequency input: 100 ms per channel

Thermocouples and resistance temperature detector: 1 s per channel

Data storage/save cycle

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

Typical recording duration

Prerequisites for following tables:
- No limit value violation / integration
- Digital input not used
- Signal analysis 1: off, 2: day, 3: month, 4: year
- No active mathematics channels

Frequent entries in the event log reduce the memory availability!

128 MB internal memory:

Analog inputs	Channels in groups	Storage cycle (weeks, days, hours)				
		5 min	1 min	30 s	10 s	1 s
1	1/0/0/0	668, 4, 14	135, 0, 5	67, 4, 4	22, 3, 20	2, 1, 18
4	4/0/0/0	491, 0, 10	99, 4, 17	49, 6, 12	16, 4, 15	1, 4, 16
8	4/4/0/0	246, 1, 14	49, 6, 1	24, 6, 19	8, 2, 7	0, 5, 20
12	4/4/4/0	164, 2, 4	33, 1, 18	16, 4, 13	5, 3, 21	0, 3, 21

External memory, 1 GB SD card:

Analog inputs	Channels in groups	Storage cycle (weeks, days, hours)				
		5 min	1 min	30 s	10 s	1 s
1	1/0/0/0	12825, 5, 20	2580, 4, 18	1291, 2, 5	430, 4, 14	43, 0, 12
4	4/0/0/0	8672, 5, 12	1749, 6, 13	875, 6, 13	292, 1, 8	29, 1, 14
8	4/4/0/0	4343, 1, 1	875, 1, 17	438, 0, 6	146, 0, 17	14, 4, 7
12	4/4/4/0	2896, 6, 13	583, 3, 21	292, 0, 6	97, 2, 20	9, 5, 4

The available storage capacity of the internal and external memory can be displayed in the main menu under **"Diagnostics → Device information → Memory information"**. The storage capacity depends on the specific device set-up.

Converter resolution

24 bit

Totalization

The interim, daily, monthly and yearly value and the total value can be determined (13-digit, 64 bit).

Analysis

Recording of quantity/operating time (standard function), also a min/max/median analysis within the set time frame.

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 (pulse counter)
Pulse length	Min. 100 ms (control input, messages, operating time)
Input current	max. 2 mA
Input voltage	Max. 30 V

Selectable functions

- Functions of the digital input: control input, ON/OFF message, pulse counter (13-digit, 64 bit), operating time, message+operating time, quantity from time, Modbus slave.
- Functions of the control input: start recording, screen saver on, lock setup, time synchronization, limit monitoring on/off, lock keyboard/navigator, start/stop analysis.

15.3   Output

Auxiliary voltage output

The auxiliary voltage output can be used for loop power supply or to control the digital inputs. The auxiliary voltage is short-circuit proof and galvanically isolated.

Output voltage	24 V_{DC} ±15%
Output current	Max. 250 mA

Galvanic isolation

All inputs and outputs are galvanically isolated from each other and designed for the following testing voltages:

	Relay	Digital in	Analog in	Ethernet	RS232/RS485	USB	Auxiliary voltage output
Relay	500 V_{DC}	2 kV_{DC}	2 kV_{DC}	2 kV_{DC}	2 kV_{DC}	2 kV_{DC}	2 kV_{DC}
Digital in	2 kV_{DC}	Galvanically connected	500 V_{DC}	500 V_{DC}	500 V_{DC}	500 V_{DC}	500 V_{DC}
Analog in	2 kV_{DC}	500 V_{DC}	500 V_{DC}	500 V_{DC}	500 V_{DC}	500 V_{DC}	500 V_{DC}
Ethernet	2 kV_{DC}	500 V_{DC}	500 V_{DC}	-	500 V_{DC}	500 V_{DC}	500 V_{DC}
RS232/RS485	2 kV_{DC}	500 V_{DC}	500 V_{DC}	500 V_{DC}	-	500 V_{DC}	500 V_{DC}

	Relay	Digital in	Analog in	Ethernet	RS232/RS485	USB	Auxiliary voltage output
USB	2 kV$_{DC}$	500 V$_{DC}$	500 V$_{DC}$	500 V$_{DC}$	500 V$_{DC}$	Galvanically connected	500 V$_{DC}$
Auxiliary voltage output	2 kV$_{DC}$	500 V$_{DC}$	500 V$_{DC}$	500 V$_{DC}$	500 V$_{DC}$	500 V$_{DC}$	-

Relay outputs	A mix of low voltage (230 V) and safety extra low voltage (SELV circuits) is not permitted at the connections of the relay contacts.

Alarm relay

1 alarm relay with changeover contact.

Standard relay

5 relays with NO contact, e.g. for limit value messages (can be configured as NC contact).

Relay switching capacity

- Max. switching capacity: 3 A @ 30 V DC
- Max. switching capacity: 3 A @ 250 V AC
- Min. switching load: 300 mW

Switching cycles

>10^5 |
| Cable specification | **Cable specification, spring terminals**

All connections on the rear of the device are designed as pluggable 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:
- Wire cross-section, auxiliary voltage output, digital I/O and analog I/O: max. 1.5 mm^2 (14 AWG) (spring terminals)
- Wire cross-section, mains: max. 2.5 mm^2 (13 AWG) (screw terminals)
- Wire cross-section, relays: max. 2.5 mm^2 (13 AWG) (spring terminals)
- Stripping length: 10 mm (0.39 in)

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

Shielding and grounding

Optimum electromagnetic compatibility (EMC) can only be guaranteed if the system components and, in particular, the lines - both sensor lines and communication lines - are shielded and the shield forms as complete a cover as possible. A shielded line must be used for sensor lines that are longer than 30 m. A shield coverage of 90% is ideal. In addition, make sure not to cross sensor lines and communication lines when routing them. Connect the shield as often as possible to the reference ground to ensure optimum EMC protection for the different communication protocols and the connected sensors.

To comply with requirements, three different types of shielding are possible:
- Shielding at both ends
- Shielding at one end on the supply side with capacitance termination at the device
- Shielding at one end on the supply side

Experience shows that the best results with regard to EMC are achieved in most cases in installations with one-sided shielding on the supply side (without capacitance termination |

at the device). Appropriate internal device wiring measures must be taken to allow unrestricted operation when EMC interference is present. These measures have been taken into account for this device. Operation in the event of disturbance variables as per NAMUR NE21 is thus guaranteed.

Where applicable, national installation regulations and guidelines must be observed during the installation! Where there are large differences in potential between the individual grounding points, only one point of the shielding is connected directly with the reference ground.

If the shielding of the cable is grounded at more than one point in systems without potential matching, mains frequency equalizing currents can occur. These can damage the signal cable or significantly impact signal transmission. In such cases the shielding of the signal cable is to be grounded on one side only, i.e. it may not be connected to the ground terminal of the housing. The shield that is not connected should be insulated!

15.4   Power supply

Terminal assignment	
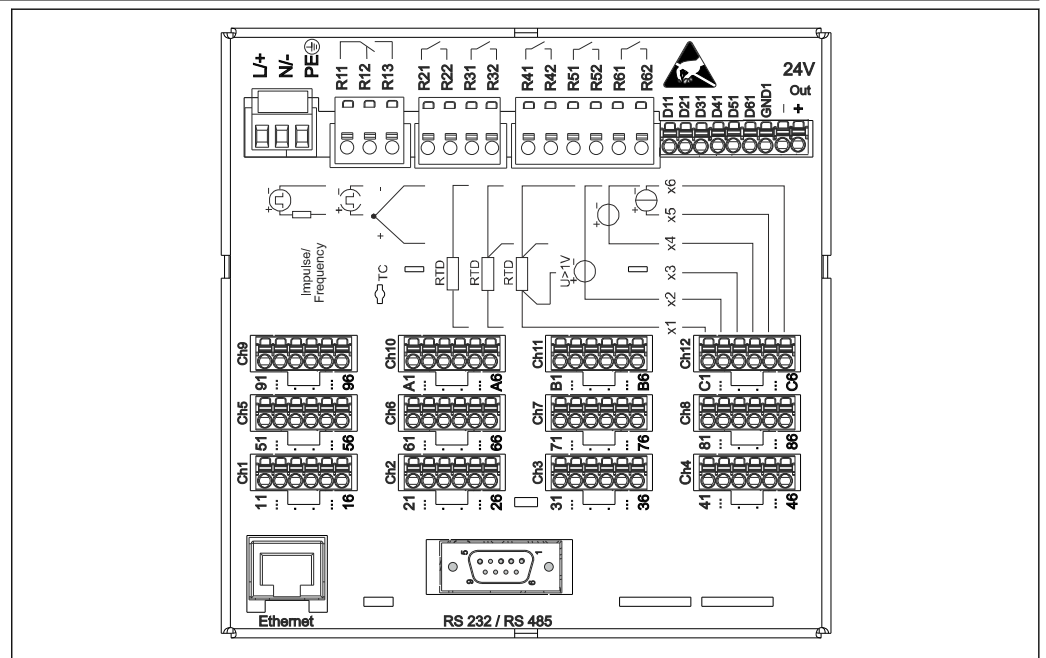
🖼 *12   Terminals on back of device*

Supply voltage	• Extra-low voltage power supply unit ±24 V AC/DC (-10% / +15%) 50/60Hz • Low voltage power supply unit 100 to 230 V AC (±10%) 50/60Hz An overload protection element (rated current ≤ 10 A) is required for the power cable.
Power consumption	• 100 to 230 V: max. 35 VA • 24 V: max. 24 VA The power actually consumed depends on the individual operating state and the device version (LPS, USB, brightness of screen, number of channels, etc). The active power here is approx. 3 W to 20 W.
Power supply failure	Battery-backed time and data memory. The device starts automatically following a power failure.

Electrical connection	Details about the electrical connection: → 🕮 13
Connector	• Panel-mounted device: connected to mains via plug-in screw terminals with reverse polarity protection • Desktop version (option): connected to mains via IEC connector
Overvoltage protection	To avoid high-energy transients on long signal cables, connect a suitable surge arrester upstream (e.g. E+H HAW562) in series upstream.
Connection data interface, communication	**USB ports (standard):** *1 x USB port type A (host)* A USB 2.0 port is available on a shielded USB A socket at the front of the device. A USB stick, for example, can be connected to this interface as a storage medium. An external keyboard or USB hub may also be connected. *1 x USB port type B (function)* A USB 2.0 port is available on a shielded USB B socket at the front of the device. This can be used to connect the device for communication with a laptop, for example. **Ethernet interface (standard):** Ethernet interface on back, 10/100 Base-T, plug type RJ45. The Ethernet interface can be used to integrate the device via a hub or switch into a PC network (TCP/ IP Ethernet). A standard patch cable (e.g. CAT5E) can be used for the connection. Using DHCP, the device can be fully integrated into an existing network without the need for additional configuration. The device can be accessed from every PC in the network. Normally only the automatic assignment of the IP address must be configured at the client. When the device is started, it can automatically retrieve the IP address, subnet mask and gateway from a DHCP server. If a DHCP is not used, these settings must be made directly in the device (depends on the network to which the device is to be connected). Two Ethernet function LEDs are located on the rear of the device. The following functions are implemented: • Data communication with PC software (analysis software, configuration software, OPC server) • Web server • WebDAV (Web-based Distributed Authoring and Versioning) is an open standard for the provisioning of files via the HTTP protocol. The data saved on the device's SD card can be read out using a PC. A web browser or dedicated WebDAV client can be selected as network drive on the PC for this purpose. **Serial RS232/RS485 interface (option):** A combined RS232/RS485 connection is available on a shielded SUB D9 socket at the rear of the device. This can be used for data transfer and to connect a modem. For communication via modem, we recommend an industrial modem with a watchdog function. • The following baud rates are supported: 9600, 19200, 38400, 57600, 115200 • Max. cable length with a shielded cable: 2 m (6.6 ft) (RS232), or 1000 m (3281 ft) (RS485) ℹ Only one interface can be used at any one time (RS232 or RS485).

15.5   Performance characteristics

Response time

Input	Output	Time [ms]
Current, voltage, pulse	Relay	≤ 550
RTD	Relay	≤ 1150
TC [1]	Relay	≤ 1550
Cable open circuit detection, current input	Relay	≤ 1150
Sensor error RTD, TC	Relay	≤ 5000
Digital input	Relay	≤ 350

1)   If internal measuring point temperature compensation is used, otherwise values as for voltage

Reference operating
conditions

Reference temperature	25 ℃ (77 ℉) ±5 K
Warm-up period	120 min.
Humidity	20 to 60 % rel. humidity

Hysteresis

Can be configured for limit values in the setup

Long-term drift

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

15.6   Installation

Mounting location and
installation dimensions

The device is designed for use in a panel in non-hazardous areas.
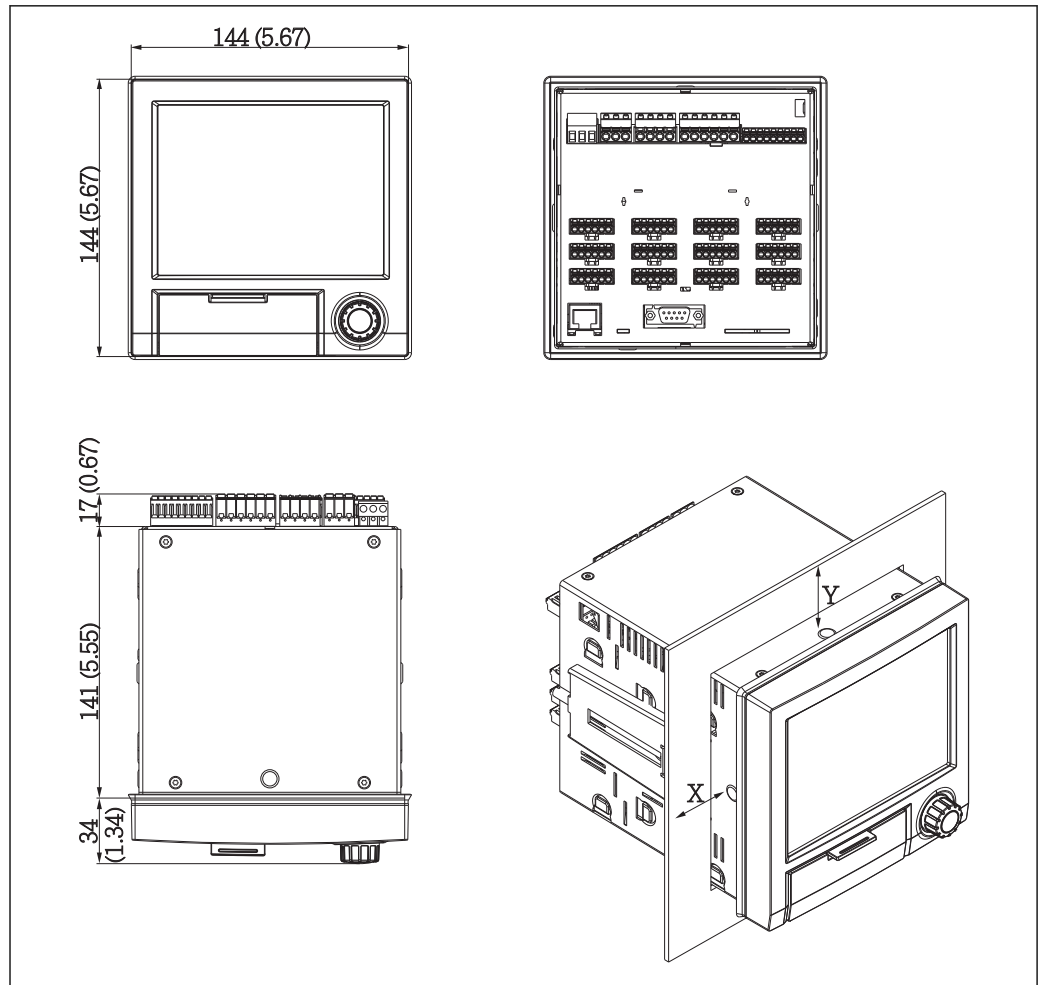
🔲 *13   Panel mounting and dimensions in mm (in)*

Please observe the installation depth of approx. 158 mm (6.22 in) for the device incl.
terminals and fastening clips.

- Panel cutout: 138 to 139 mm (5.43 to 5.47 in) x 138 to 139 mm (5.43 to 5.47 in)
- Panel strength: 2 to 40 mm (0.08 to 1.58 in)
- Angle of vision: from the midpoint axis of the display, 75° to the left and right, 65° above
  and below.
- A minimum distance of 15 mm (0.59 in) mm (inch) between the devices must be
  observed if aligning the devices in the Y-direction (vertically above one another). A
  minimum distance of 10 mm (0.39 in) mm (inch) between the devices must be observed
  if aligning the devices in the X-direction (horizontally beside one another).
- Securing to DIN 43 834

Field housing assembly and design (optional)	As an option, the device can be ordered ready-mounted in a field housing with IP65.
	Dimensions (B x H x D) approx.: 320 mm (12.6 in) x 320 mm (12.6 in) x 254 mm (10 in)
Desktop housing assembly and design (optional)	As an option, the device can be ordered ready-mounted in a desktop housing.
	Dimensions (B x H x D) approx.: 293 mm (11.5 in) x 188 mm (7.4 in) x 211 mm (8.3 in) (dimensions with bracket, feet and installed device)

15.7   Environment

Ambient temperature range	−10 to +50 °C (14 to 122 °F)
Storage temperature	−20 to +60 °C (−4 to +140 °F)
Humidity	5 to 85 %, non-condensing
Climate class	To IEC 60654-1: Class B2
Electrical safety	Class I equipment, overvoltage category II Pollution level 2
Altitude	< 2 000 m (6 561 ft) over MSL

Degree of protection

Front of panel-mounted device	IP65 / NEMA 4 (not assessed by UL)
Back of panel-mounted device (terminal side)	IP20

Electromagnetic compatibility

EMC in accordance with all relevant requirements of the IEC/EN 61326 series and NAMUR NE21. For details, refer to the Declaration of Conformity.

- Interference immunity: as per IEC/EN 61326 series (industrial environment) / NAMUR NE21
  Maximum measured error <1% of measuring range
- Interference emissions: as per IEC 61326-1 Class A

15.8   Mechanical construction

Design, dimensions	Information about design and dimensions → 🖹 79

Weight

- Panel-mounted device with maximum configuration: approx. 2.2 kg (4.85 lbs)
- Desktop housing (excluding device): approx. 2.3 kg (5 lbs)
- Field housing (excluding device): approx. 4 kg (8.8 lbs)

Materials

Front frame	Zinc die cast GD-Z410, powder-coated
Sight glass	Transparent Makrolon plastic (FR clear 099) UL94-V2
Flap; jog/shuttle dial	Plastic ABS UL94-V2
Mounting guide rail for PCBs; motherboard fixing unit; display retainer plate	Plastic PA6-GF15 UL94-V2

Seal to panel wall; seal to display; seal in flap; seal to navigator	Rubber EPDM 70 Shore A
Casing; rear panel	Galvanized sheet steel St 12 ZE

ℹ️ All materials are silicone-free.

Materials of desktop housing
- Housing half-panels: sheet steel, electrolytically plated (powder-coated)
- Side sections: aluminum extruded section (powder-coated)
- Section ends: colored polyamide

15.9   Display and operating elements

Operating concept

The device can be operated directly onsite, or via remote configuration with the PC via interfaces and operating tools (Web server, configuration software).

Web server
A Web server is integrated into the device. The Web server offers the following range of functions:
- Easy configuration without additional installed software
- Instantaneous value display and diagnostics information
- Display of current measured value curves via Web browser (remote control)
- Display of historical measured data in numerical format or as a curve
- Display of events and logbook entries
- Loading/saving of device configuration
- Device firmware update
- Printout of device configuration

Integrated operating instructions
The device's simple operating concept enables you to perform commissioning for many applications without the need for hard copy operating instructions. The device has an integrated help function and displays operating instructions directly on screen if the navigator (jog/shuttle dial) is pressed for longer than 3 seconds.

Local operation

Display elements

Type

TFT color display

Size (diagonal screen measurement)

145 mm (5.7")

Resolution

VGA 307,200 pixels (640 x 480 pixels)

Backlight

70,000 h half value time (= half brightness)

Number of colors

262,000 viewable colors, 256 colors used

Viewing angle

Viewing angle: 130° vertical, 150° horizontal

Screen display

- Background color white
- Active channels can be assigned to up to 4 groups. These groups can be given a name e.g. "Temp. boiler 1" or "Daily averages" so that they can be uniquely identified.
- Linear scaling
- Measured value history: quick retrieval of historical data with zoom function
- Preformatted screen displays such as horizontal or vertical curve presentation, bar graph display or digital display.

Operating elements

A0020602-EN

☒ *14   Front of device with open flap*

Item No.	Operating function (display mode = display of measured values) (Setup mode = operation in the Setup menu)
1	"Navigator": jog/shuttle dial for operating with additional press/hold function. In display mode: turn the dial to switch between the various signal groups. Press the dial to display the main menu. In setup mode or in a selection menu: turn the dial counterclockwise to move the bar or the cursor upwards or to the left, changes the parameter. Turning clockwise moves the bar or cursor down or clockwise, changes the parameter.
2	LED at SD slot. Orange LED lights up or flashes when the device writes to or reads from the SD card. **Do not remove the SD card if the LED is lit or flashing! Risk of data loss!**
3	Slot for SD card
4	USB B socket "Function" e.g. to connect to PC or laptop
5	Green LED lit: power supply present
6	USB A socket "Host" e.g. for USB memory stick or external keyboard
7	In display mode: alternating status display (e.g. set zoom range) of the analog or digital inputs in the appropriate color of the channel. In setup mode: different information can be displayed here depending on the display type.
8	In display mode: window for measured value display (e.g. curve display). In setup mode: display of operating menu

Item No.	Operating function (display mode = display of measured values) (Setup mode = operation in the Setup menu)
9	In display mode: current group name, type of evaluation In setup mode: name of the current operating item (dialog title)
10	In display mode: displays current date/time In setup mode: --
11	In display mode: alternating display indicating the percentage space on the SD card or USB stick that has already been used. Status symbols are also displayed in alternation with the memory information. In setup mode: the current "direct access" operating code is displayed
12	In display mode: display of current measured values and the status in the event of an error/alarm condition. In the case of counters, the type of counter is displayed as a symbol. ℹ️ If a measuring point has limit value status, the corresponding channel identifier is highlighted in red (quick detection of limit value violations). During a limit value violation and device operation, the acquisition of measured values continues uninterrupted.

Languages

The following languages can be selected in the operating menu: German, English, Spanish, French, Italian, Dutch, Swedish, Polish, Portuguese, Czech, Russian, Japanese, Chinese (Traditional), Chinese (Simplified)

Remote operation

Device access via operating tools

Device configuration and measured value retrieval can also be done via interfaces. The following operating tools are available for this purpose:

Operating tool	Functions	Access via
"Field Data Manager (FDM)" analysis software, SQL database support (included in the delivery)	• Export of saved data (measured values, analyses, event log) • Visualization and processing of saved data (measured values, analyses, event log) • Safe archiving of exported data in a SQL database	RS232/RS485, USB, Ethernet
Web server (integrated into the device; access via browser)	• Display of current and historical data and measured value curves via the Web browser • Easy configuration without additional installed software • Remote access to device and diagnostic information	Ethernet, or Ethernet via USB
OPC server (optional)	The following instantaneous values can be provided: • Analog channels • Digital channels • Mathematics • Totalizer	RS232/RS485, USB, Ethernet
"FieldCare / DeviceCare" configuration software	• Device configuration • Loading and saving device data (upload/download) • Documentation of the measuring point	USB, Ethernet

System integration

The device has (optional) fieldbus interfaces for exporting process values. Measured values and statuses can also be transmitted to the device via fieldbus. Alarms or errors in the context of data transmission are displayed depending on the bus system (e.g. status byte). The process values are transferred in the same units that are used for display at the device.

Ethernet

The following functions are implemented:
• Data communication with PC software (analysis software, configuration software, OPC server)
• Web server

Modbus RTU/TCP slave

The device can be connected to a Modbus system via RS485 or Ethernet interface. Up to 12 analog inputs and 6 digital inputs can be transmitted via Modbus and stored in the device.

15.10   Certificates and approvals

CE mark
The measuring system meets the legal requirements of the applicable EC guidelines. These are listed in the corresponding EC Declaration of Conformity together with the standards applied. The manufacturer confirms successful testing of the device by affixing to it the CE mark.

UL approval
UL recognized component (see www.ul.com/database, search for Keyword "E225237")

CSA
The product meets the requirements as per "CLASS 2252 05 - Process Control Equipment"

Other standards and guidelines
- IEC 60529:
  Degree of protection provided by housing (IP code)
- IEC/EN 61010-1:
  Safety requirements for electrical equipment for measurement, control and laboratory use
- IEC/EN 61326 Series:
  Electromagnetic compatibility (EMC requirements)

15.11   Ordering information

Ordering information
Detailed ordering information is available from the following sources:
- In the Product Configurator on the Endress+Hauser website: www.endress.com -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.
- From your Endress+Hauser Sales Center: www.addresses.endress.com

Product Configurator - the tool for individual product configuration
  - Up-to-the-minute configuration data
  - Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
  - Automatic verification of exclusion criteria
  - Automatic creation of the order code and its breakdown in PDF or Excel output format
  - Ability to order directly in the Endress+Hauser Online Shop

Scope of delivery
The scope of delivery of the device comprises:
- Device (with terminals, as per order)
- Panel-mounted device: 2 screw fastening clips
- USB cable
- Optional: industrial grade SD card (card is located in the SD slot behind the flap on the front of the device)
- "Field Data Manager (FDM)" analysis software on DVD (Essential, Demo or Professional version, depending on order)
- Delivery note
- Multilanguage Brief Operating Instructions, hard copy

15.12   Supplementary documentation

Standard documentation
- Technical Information for Ecograph T RSG35: TI01079R
- Operating Instructions for Ecograph T RSG35: BA01146R
- Brief Operating Instructions for Ecograph T RSG35: KA01132R
- System components and data manager - solutions to complete your measuring point: FA00016K

Supplementary device-dependent documentation
Operating Instructions for Ecograph T RSG35 with Modbus RTU / TCP slave: BA01258R

16 Appendix

16.1 Operating items in the "Expert" menu

The parameter groups for the Expert setup contain all the parameters of the operating menus: System, Input and Output Setup, Communication, Application, Diagnostics as well as other parameters that are reserved for experts only.

ℹ️ For most settings, the "Setup" or "Expert" menu must be quit before the settings are adopted. However settings such as the date/time are accepted immediately.

Direct access

Navigation	▣ Expert → Direct access
Description	Direct access to active operating items (rapid access). Entering the direct access code takes you directly to the desired operating parameter. The direct access code is displayed in the Setup menu on the top right of the display (e.g. 00000-000).
Text entry	(e.g. 00000-000)

16.1.1 "System" submenu

Basic settings that are needed to operate the device (e.g. date, time, etc.).

Language

Navigation	▣ Expert → System → Language Direct access code: 010000-000
Description	Select unit operating language.
Options	German, English, Spanish, French, Italian, Dutch, Polish, Portuguese, Russian, Swedish, Czech, Japanese, Chinese (Simplified), Chinese (Traditional)
Factory setting	English; or preset to customer's preferred language

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Device tag

Navigation	▣ Expert → System → Device tag Direct access code: 000031-000
Description	Individual device tag.
User entry	Text entry (max. 32 characters)
Factory setting	Unit 1

Temp. unit

Navigation	▣	Expert → System → Temp. unit Direct access code: 100001-000
Description		Selection of temperature unit. All directly connected thermocouples or resistance thermometers (RTD) are displayed in the preset engineering units.
Options		℃, ℉, K
Factory setting		℃

Decimal separator

Navigation	▣	Expert → System → Decimal separator Direct access code: 100003-000
Description		Select in which form the decimal separator character is to be displayed.
Options		Comma, Point
Factory setting		Comma

Fault switching

Navigation	▣	Expert → System → Fault switching Direct access code: 100002-000
Description		If the device detects a system error (e.g. hardware defect) or a fault (e.g. cable break), the selected output switches.
Options		Not used, Relay x All the available relays are displayed.
Factory setting		Relay 1

Keyboard layout

Navigation	▣	Expert → System → Keyboard layout Direct access code: 100020/000
Description		Please select the keyboard layout. Only relevant if external keyboard is used.

Options	Germany, Switzerland, France, USA, USA International, UK, Italy
Factory setting	Germany

Swap mouse buttons

Navigation	▤ Expert → System → Swap mouse buttons Direct access code: 100050/000
Description	Swap function of left and right mouse button.
Options	No, Yes
Factory setting	No

Paper size

Navigation	▤ Expert → System → Paper size Direct access code: 540004/000
Description	Please select the paper size of the printer connected to the PC.
Options	DIN A4, US Letter
Factory setting	DIN A4

Lock operation

Navigation	▤ Expert → System → Lock operation Direct access code: 100060/000
Description	Local operation is locked in cases of inactivity once the set time has elapsed to prevent inadvertent operation (e.g. when cleaning the device). The device is unlocked by pressing the navigator or the OK operating key for 3 s. When using an external keyboard, the device is unlocked with the key combination "Ctrl-Alt-Del".
Options	Never, After 2 (5, 10, 15) minutes
Factory setting	After 5 minutes

PRESET

Navigation	🖳	Expert → System → PRESET
		Direct access code: 000044-000

Description	Caution: Resets all the parameters to the factory settings!
	ℹ️ Only visible/editable if the service code has been entered.

Options	No, Factory reset, Customer setting

Clear memory

Navigation	🖳	Expert → System → Clear memory
		Direct access code: 059000-000

Description	Clear internal memory.

Options	No, Yes

Confirm delete

Navigation	🖳	Expert → System → Confirm delete
		Direct access code: 059001-000

Description	Please confirm that the memory should be cleared.

Options	No, Yes

Factory setting	No

"Date/time setup" submenu

Navigation	🖳	Expert → System → Date/time setup

Description	Contains settings for date/time.

Date format

Navigation	🖳	Expert → System → Date/time setup → Date format
		Direct access code: 110000-000

Description	Select in which format the date is to be set and displayed.

Options	DD.MM.YYYY, MM/DD/YYYY, YYYY-MM-DD

Factory setting	DD.MM.YYYY

Time format

Navigation	▤ Expert → System → Date/time setup → Time format Direct access code: 110001-000
Description	Select in which format the time is to be set and displayed.
Options	24 hour, 12 hour AM/PM
Factory setting	24 hour

"Date/time" submenu

Navigation	▤ Expert → System → Date/time setup → Date/time
Description	Contains parameters for setting the date/time.

UTC time zone

Navigation	▤ Expert → System → Date/time setup → Date/time → UTC time zone Direct access code: 120000-000
Description	Display of the current UTC time zone is on (UTC = universal time coordinated).

Current date/time

Navigation	▤ Expert → System → Date/time setup → Date/time → Current date/time Direct access code: 120003-000
Description	Displays the current date and the current time.

"Change date/time" submenu

Description	Contains parameters for changing the date/time.
Navigation	▤ Expert → System → Date/time setup → Change date/time

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UTC time zone

Navigation	▣	Expert → System → Date/time setup → Date/time → Change date/time → UTC time zone Direct access code: 120010-000
Description		Set your UTC time zone (UTC = universal time coordinated).
Options		-12:00, -11:00: Samoa, -10:00: Hawaii, -09:30: Marquesas, -09:00: Alaska, -08:00: LA, -07:00: Denver, -06:00: Chicago, -05:00: New York, -04:00: Caracas, -03:30: St.John's, -03:00: Brasilia, -02:00: Atlantic, -01:00: Azores, +00:00: London, +01:00: Berlin, +02:00: Cairo, +03:00: Moscow, +03:30: Tehran, +04:00: Abu Dhabi, +04:30: Kabul, +05:00: Islamabad, +05:30: New Delhi, +05:45: Kathmandu, +06:00: Dhaka, +06:30: Pyinmana, +07:00: Bangkok, +08:00: Peking, +08:45, +09:00: Tokyo, +09:30: Adelaide, +10:00: Canberra, +10:30: Lord-Howe, +11:00:Solom.Isl., +11:30: Norfolk, +12:00: Auckland, +12:45: Chatham, +13:00, +14:00

Date/time

Navigation	▣	Expert → System → Date/time setup → Date/time → Change date/time → Date/time Direct access code: 120013-000
Description		Set the current date and time for the unit here.
User entry		Date/time in set format

"NT/ST changeover" submenu

Navigation	▣	Expert → System → Date/time setup → NT/ST changeover
Description		Contains settings for normal time/summer time changeover.

NT/ST changeover

Navigation	▣	Expert → System → Date/time setup → NT/ST changeover → NT/ST changeover Direct access code: 110002-000
Description		Function for summer/normal time changeover. Automatic: Changeover according to applicable rules for the selected region; Manual: Set changeover times in the next items; Off: No time changeover.
Options		Off, Manual, Automatic
Factory setting		Automatic

NT/ST region

Navigation	▣	Expert → System → Date/time setup → NT/ST changeover → NT/ST region
		Direct access code: 110003-000

Description	Selects the regional settings for summer/normal time changeover.
	Only visible if NT/ST changeover = Automatic.

Options	Europe, USA

Factory setting	Europe

Begin summer time

Occurrence

Navigation	▣	Expert → System → Date/time setup → NT/ST changeover → Occurrence
		Direct access code: 110005-000

Description	Day, when in the spring a change from normal to summer time occurs.
	Visible for NT/ST changeover = Automatic or Manual. Only editable if NT/ST changeover = Manual.

Options	1st, 2nd, 3rd, 4th, Last

Factory setting	Last

Day

Navigation	▣	Expert → System → Date/time setup → NT/ST changeover → Day
		Direct access code: 110006-000

Description	Day, when in the spring a change from normal to summer time occurs.
	Visible for NT/ST changeover = Automatic or Manual. Only editable if NT/ST changeover = Manual.

Options	Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday

Factory setting	Sunday

Month

Navigation	▣	Expert → System → Date/time setup → NT/ST changeover → Month
		Direct access code: 110007-000

Description	Month, when in the spring a change from normal to summer time occurs. Visible for NT/ST changeover = Automatic or Manual. Only editable if NT/ST changeover = Manual.
Options	January, February, March, April, May, June, July, August, September, October, November, December
Factory setting	March

Date

Navigation	▤ Expert → System → Date/time setup → NT/ST changeover → Date Direct access code: 110008-000
Description	Date next spring when a change from normal to summer time occurs. Only visible if NT/ST changeover = Automatic or Manual. Cannot be edited.

Time

Navigation	▤ Expert → System →Date/time setup → NT/ST changeover → Time Direct access code: 110009-000
Description	Point of time when the time is moved forward by 1 hour on the day of the changeover from normal time to summer time (in the set time format). Visible for NT/ST changeover = Automatic or Manual. Only editable if NT/ST changeover = Manual.
User entry	Time in set time format
Factory setting	02:00

End summer time

Occurrence

Navigation	▤ Expert → System → Date/time setup → NT/ST changeover → Occurrence Direct access code: 110011-000
Description	Day, when in the autumn a change from summer to normal time occurs. Visible for NT/ST changeover = Automatic or Manual. Only editable if NT/ST changeover = Manual.
Options	1st, 2nd, 3rd, 4th, Last

Factory setting   Last

Day

Navigation   🖳   Expert → System → Date/time setup → NT/ST changeover → Day
                             Direct access code: 110012-000

Description   Day, when in the autumn a change from summer to normal time occurs.
                        Visible for NT/ST changeover = Automatic or Manual. Only editable if NT/ST changeover =
                        Manual.

Options   Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday

Factory setting   Sunday

Month

Navigation   🖳   Expert → System → Date/time setup → NT/ST changeover → Month
                             Direct access code: 110013-000

Description   Month, when in the autumn a change from summer to normal time occurs.
                        Visible for NT/ST changeover = Automatic or Manual. Only editable if NT/ST changeover =
                        Manual.

Options   January, February, March, April, May, June, July, August, September, October, November,
                        December

Factory setting   October

Date

Navigation   🖳   Expert → System → Date/time setup → NT/ST changeover → Date
                             Direct access code: 110014-000

Description   Date next autumn when summer time changes back to normal time.
                        Only visible if NT/ST changeover = Automatic or Manual. Cannot be edited.

Time

Navigation   🖳   Expert → System →Date/time setup → NT/ST changeover → Time
                             Direct access code: 110015-000

Description	Point of time when the time is moved back by 1 hour on the day of the changeover from summer time to normal time (in the set time format). Visible for NT/ST changeover = Automatic or Manual. Only editable if NT/ST changeover = Manual.
User entry	Time in set time format
Factory setting	02:00

"SNTP" submenu

Navigation	▣ Expert → System → Date/time setup → SNTP
Description	Contains settings for time synchronization using the Simple Network Time Protocol (SNTP).

SNTP

Navigation	▣ Expert → System → Date/time setup → SNTP Direct access code: 110020-000
Description	If switched on, time synchronization is carried out via SNTP once a day. Note: Only possible via Ethernet. Port 123 must be open in the firewall. The user/network administrator is responsible for the accuracy of the time server.
Options	No, Yes
Factory setting	No

SNTP server 1

Navigation	▣ Expert → System → Date/time setup → SNTP server → SNTP server 1 Direct access code: 110021-000
Description	Please specify the address of the time server (or the IP address). Note: The DNS server must be configured (see Communication/Ethernet). Your administrator can provide the address where necessary.
User entry	Text field

SNTP server 2

Navigation	▣ Expert → System → Date/time setup → SNTP Server → SNTP server 2 Direct access code: 110025-000

Description	Shows the IP address of the time server if it was automatically allocated via DHCP. Non-editable display text.

An attempt is always made to synchronize the time via SNTP server 1 first (provided it is configured).
DHCP must be switched on (see Communication/Ethernet).
DHCP server: Option 42.

"Security" submenu

Navigation	Expert → System → Security
Description	Contains settings that protect the unit against unauthorized operation and configuration.

Protected by

Navigation	Expert → System → Security → Protected by Direct access code: 100006-000
Description	Configure how the device should be protected.
Options	Open access, Access code, User roles
Factory setting	Open access

Access code

Navigation	Expert → System → Security → Access code Direct access code: 100000-000
Description	Using this code, setup access can be protected from unauthorized persons. In order to change any parameter the correct code must be entered. Factory setting: "0", i.e. changes can be made at any time. Hint: Make a note of the code and store in a safe place. Only visible if "Protected by" = "Access code".
User entry	4-digit number
Factory setting	0

Set point code

Navigation	Expert → System → Security → Set point code Direct access code: 100030-000

Description	If the unit is protected by an access code a set point code can also be defined. The user can change the set points once the set point code is entered. All other operating positions remain locked, however. Only visible if an access code has been defined. Factory default: "0" means that alarm set points can only be changed by entering the access code.

> ℹ Alarm set point code and access code should not be identical!

User entry	4-digit number

Factory setting	0

Lock hardware

Navigation	⌨ Expert → System → Security → Lock hardware Direct access code: 100099-000

Description	Device functions/interfaces that are not used can be switched off for security reasons.

> ℹ Fieldbuses may also be affected in the case of Ethernet or the serial interface. Please follow the operating instructions.

Options	**Panel version:** Ethernet (all ports/services), USB A socket front, USB A socket back, USB B socket front, serial interface, SD card

Factory setting	No lock

"Authentication" submenu

Navigation	⌨ Expert → System → Security → Authentication

Description	Define the passwords for the various user roles to allow device access. Only visible if "Protected by" = "User roles".

Operator
ID: operator
Password

Navigation	⌨ Expert → System → Security → Authentication → Password Direct access code: 470105/000

Description	Enter a password for this user account.

Options	Text entry max. 12 characters

Factory setting	operator

Administrator ID: admin Password	
Navigation	🖥 Expert → System → Security → Authentication → Password Direct access code: 470102/000
Description	Enter a password for this user account.
Options	Text entry max. 12 characters
Factory setting	admin

Service ID: service Password	
Navigation	🖥 Expert → System → Security → Authentication → Password Direct access code: 470101/000
Description	Enter a password for this user account.
Options	Text entry max. 12 characters
Factory setting	service

"External memory" submenu	
Navigation	🖥 Expert → System → External memory
Description	Contains settings for the external data carrier, amongst other things which data are to be stored in which format on the external data carrier.

Save as	
Navigation	🖥 Expert → System → External memory → Save as Direct access code: 140000-000
Description	"Protected format": All data are stored in a manipulation protected encrypted format. They can be interpreted only by the PC analysis software provided. "Open format": data are saved in CSV format, this can be opened by a number of different programs (e.g. MS Excel) (Caution: no tamper protection).
Options	Protected format, Open format (*.csv)
Factory setting	Protected format

SD card

Memory structure

Navigation		Expert → System → External memory → Memory structure Direct access code: 140001-000

Description   "Stack memory": no more data can be stored once the data carrier is full.
"Ring memory": once the data carrier is full the oldest data are deleted so that new data can be stored (First in first out (FIFO)).

The "Ring memory" setting refers only to the automatic storage of measured values. Manual save functions ("Operation -> SD card -> Update/Save measured values") are not affected.

Options   Stack memory, Ring memory (FIFO)

"Ring memory" can be selected only if "Save as" is set to "protected format" (and not "CSV").

Factory setting   Stack memory

Warning at

Navigation   Expert → System → External memory → Warning at
Direct access code: 140005-000

Description   Issues a warning before the data carrier is x% full.
A warning is indicated on the device and this is also stored in the event buffer.
A relay can also be switched.

Only for external SD card (does not apply to USB stick)!

User entry   0 to 99%

Factory setting   90

Switches relay

Navigation   Expert → System → External memory → Switches relay
Direct access code: 140006-000

Description   When the warning "Data carrier full" is displayed a relay can also be switched on.

Options	Not used, Relay x
	All the available relays are displayed.
Factory setting	Not used

CSV settings

ℹ️ Also configurable if "Protected format" is set.

Separator for CSV

Navigation	🖳	Expert → System → External memory → Separator for CSV
		Direct access code: 140002-000
Description		Configure which separator is used by your application (e.g. in Excel = semicolon).
Options		Comma, Semicolon
Factory setting		Semicolon

Date/time

Navigation	🖳	Expert → System → External memory → Date/time
		Direct access code: 140003-000
Description		Please select if the date and time should be stored in one column or separate columns when data are saved in CSV format files.
Options		One column, Separate columns
Factory setting		Separate columns

Operating time

Navigation	🖳	Expert → System → External memory → Operating time
		Direct access code: 140004-000
Description		Please select in which format operation times will be stored/displayed.
Options		0 seconds, 0.0000 hours, 0.00000 days, 0000h00:00
Factory setting		0000h00:00

"Messages" submenu

Navigation	▣	Expert → System → Messages

Description   Contains settings for displaying/acknowledging messages. Examples of messages include: messages triggered by set-points; messages triggered by a digital input; error messages; etc.

Acknowledging messages

Navigation	▣	Expert → System → Messages → Acknowledging messages Direct access code: 100040-000

Description   The time the message is acknowledged can be saved in the events list.

Options   Do not save, Save

Factory setting   Do not save

Switches relay

Navigation	▣	Expert → System → Messages → Switches relay Direct access code: 100042-000

Description   A relay can be switched as soon as a message that has to be confirmed is displayed (e.g. on/off message, device errors etc.).
The relay adopts the initial status as soon as all messages have been confirmed.

Options   Not used, Relay x
All the available relays are displayed.

Factory setting   Not used

"Screen saver" submenu

Navigation	▣	Expert → System → Screensaver

Description   To increase the life span of the LCDs the backlight can be switched off (= screen saver).

Screen saver

Navigation	▣	Expert → System → Screen saver → Screen saver Direct access code: 160000-000

Description	"Switched off": 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. "Switch daily": Enter time span.
Options	Switched off, On after 10 min, On after 30 min, On after 60 min, Switched daily, Control input
Factory setting	Switched off This setting has no effect if the screen saver is controlled by a digital input.

ON daily from

Navigation	⊟	Expert → System → Screen saver → ON daily from Direct access code: 160001-000

Description	Set time (hh:mm) as of when the screensaver should be switched on (e.g. shift end time). ℹ The screen saver is switched off as soon as the device is operated via onsite operation. After 1 min of inactivity it switches back on automatically. Only visible if screen saver = Switched daily.
User entry	Time (hh:mm)
Factory setting	20:00

OFF daily from

Navigation	⊟	Expert → System → Screen saver → OFF daily from Direct access code: 160002-000

Description	Set time (hh:mm) as of when the screensaver should be switched off (e.g. shift start time). Only visible if screen saver = Switched daily.
User entry	Time (hh:mm)
Factory setting	07:00

Alarm response

Navigation	⊟	Expert → System → Screen saver → Alarm response Direct access code: 160003-000

Description	"Off on alarm": If limit value violations occur or status signal "Maintenance required (*Mxxx*)" or "Check function (*Cxxx*)" is active, the screensaver will be automatically deactivated. "Always on": If limit value violations occur or status signal "Maintenance required (*Mxxx*)" or "Check function (*Cxxx*)" is active, the screensaver will not be deactivated.

Active messages that require acknowledgment or an active status signal "Failure (*Fxxx*)" or "Out of specification (*Sxxx*)" deactivate the screensaver always.

Options	Off on alarm, Always on

Factory setting	Off on alarm

"Device options" submenu

Navigation	Expert → System → Device options

Description	Hardware and software options of the device.

Activation code

Navigation	Expert → System → Device options → Activation code Direct access code: 000057-000

Description	Here, you can enter a code to enable the device options. Options that can be retrofitted can be found under "Spare parts" → 🖺 67. Note: When an activation code is entered, the device is restarted in order to enable the new option.

- The activation code entered is not displayed, i.e. this parameter is always empty following a restart.
- Pay attention to case-sensitivity.

User entry	Text

Slot 1

Navigation	Expert → System → Device options → Slot 1 Direct access code: 990000-000

Description	Shows hardware or software options. Cannot be edited.

The assignment can be specified in the PC operating software for offline configuration.

Options	Not assigned, Universal inputs

Slot 2

Navigation	▣ Expert → System → Device options → Slot 2
	Direct access code: 990001-000
Description	Shows hardware or software options.
	Cannot be edited.
	ℹ The assignment can be specified in the PC operating software for offline
	configuration.
Options	Not assigned, Universal inputs

Slot 3

Navigation	▣ Expert → System → Device options → Slot 3
	Direct access code: 990002-000
Description	Shows hardware or software options.
	Cannot be edited.
	ℹ The assignment can be specified in the PC operating software for offline
	configuration.
Options	Not assigned, Universal inputs

Communication

Navigation	▣ Expert → System → Device options → Communication
	Direct access code: 990006-000
Description	Shows hardware or software options.
	Cannot be edited.
Options	USB + Ethernet, USB + Ethernet + RS232/485

Fieldbus

Navigation	▣ Expert → System → Device options → Fieldbus
	Direct access code: 990005-000
Description	Shows hardware or software options.
	Cannot be edited.
Options	Not available, Modbus slave

Application	
Navigation	Expert → System → Device options → Application
	Direct access code: 990007-000
Description	Shows hardware or software options.
	Cannot be edited.
Options	Standard, Maths

16.1.2 "Inputs" submenu

Settings for analog and digital inputs.

"Universal inputs" submenu	
Navigation	Expert → System → Inputs → Universal inputs
Description	Settings for the connected measuring points.

Add input	
Navigation	Expert → System → Inputs → Universal inputs → Add input
	Direct access code: 222000/000
Description	Addition of an input that must be switched on and configured according to the input signal.
Options	No, Universal input x
Factory setting	No

Delete input	
Navigation	Expert → System → Inputs → Universal inputs → Delete input
	Direct access code: 222001/000
Description	Delete an input configuration.
Options	No, Universal input x
Factory setting	No

"Universal input x" submenu

Navigation	⊟ Expert → System → Inputs → Universal inputs→ Universal input x
Description	View or change settings for the selected channel.
	ⓘ x = place holder for selected universal input.

 Signal

Navigation	⊟ Expert → Inputs → Universal inputs → Universal input x → Signal Direct access code: 220000-0xx Examples: Universal input 1: 220000-000; Universal input 12: 220000-011
Description	Select the type of signal connected (current, voltage, etc.). The channel is switched off if no signal type is selected (factory default).
Options	Switched off, Current, Voltage, Resistance temperature detector, Thermocouple, Pulse counter, Frequency input, Modbus slave (option)
Factory setting	Switched off

 Range

Navigation	⊟ Expert → Inputs → Universal inputs → Universal input x → Range Direct access code: 220001-0xx Examples: Universal input 1: 220001-000; Universal input 12: 220001-011
Description	Select the input range or which resistance thermometer/thermocouple is connected. The respective terminal layout can be found in the Operating Instructions or on the rear of the unit. Only visible if signal ≠ Switched off.
Options	Switched off Current: 4-20 mA, 0-20 mA, 0-5 mA, 0-20 mA squared, 4-20 mA squared, ±20 mA Voltage: 0-1 V, 0-10 V, 0-5 V, 1-5 V, ±150 mV, ±1 V, ±10 V, ±30 V, 0-1 V squared, 0-10 V squared, 1-5 V squared Resistance thermometer: Pt100 (IEC), Pt100 (JIS), Pt100 (GOST), Pt500 (IEC), Pt500 (JIS), Pt1000 (IEC), Pt1000 (JIS), Pt46 (GOST), Pt50 (GOST), Cu50 (GOST, a=4260), Cu50 (GOST, a=4280), Cu53 (GOST, a=4280), Cu100 (GOST, a=4280) Thermocouple: Type A (W5Re-W20Re), type B (Pt30Rh-Pt6Rh), type C (W5Re-W26Re), type D (W3Re-W25Re), type J (Fe-CuNi), type K (NiCr-Ni), type L (Fe-CuNi), type L (NiCr-CuNi, GOST), type N (NiCrSi-NiSi), type R (Pt13Rh-Pt), type S (Pt10Rh-Pt), type T (Cu-CuNi) Pulse counter Frequency input Modbus (option)
Factory setting	Switched off

Connection

Navigation	▣ Expert → Inputs → Universal inputs → Universal input x → Connection Direct access code: 220002-0xx Examples: Universal input 1: 220002-000; Universal input 12: 220002-011
Description	Specify whether RTDs are connected as 2-, 3- or 4-wire systems. Only visible if signal = Resistance thermometer.
Options	2-wire, 3-wire, 4-wire
Factory setting	4-wire

Channel ident.

Navigation	▣ Expert → Inputs → Universal inputs → Universal input x → Channel ident. Direct access code: 220003-0xx Examples: Universal input 1: 220003-000; Universal input 12: 220003-011
Description	Name of the measuring point connected to this input. Only visible if signal ≠ Switched off.
User entry	Text (16 characters)
Factory setting	Channel x

Plot type

Navigation	▣ Expert → Inputs → Universal inputs → Universal input x → Plot type Direct access code: 220016-0xx Examples: Universal input 1: 220016-000; Universal input 12: 220016-011
Description	The analog inputs are scanned in a 100ms cycle. Depending on the memory cycle, the selected data are determined, saved, and displayed based on the scanned values.
Options	Instantaneous value, Average, Minimum value, Maximum value, Minimum + Maximum, Counter, Instantaneous value + Counter
Factory setting	Average

Time base

Navigation	▣	Expert → Inputs → Universal inputs → Universal input x → Time base
		Direct access code: 220025-0xx
		Examples: Universal input 1: 220025-000; Universal input 12: 220025-011

Description   An instantaneous value can be determined from the counter reading with the aid of the time base e.g. input liters, time base = second → instantaneous value = liters/second. Only visible if signal = "Pulse counter" and plot type = "Instantaneous value + counter".

Options   Second (s), Minute (min), Hour (h), Day (d)

Factory setting   Second (s)

Unit/dimension

Navigation	▣	Expert → Inputs → Universal inputs → Universal input x → Unit/dimension
		Direct access code: 220004-0xx
		Examples: Universal input 1: 220004-000; Universal input 12: 220004-011

Description   Specify the technical (physical) unit for the measuring point connected to this input. Only visible if signal ≠ Switched off.

User entry   Text (6 characters)

Unit/dimension counter

Navigation	▣	Expert → Inputs → Universal inputs → Universal input x → Unit/dimension counter
		Direct access code: 220024-00x
		Examples: Universal input 1: 220024-000; Universal input 12: 220024-011

Description   Technical units of the count input, e.g. gal, cf. Only visible if signal = "Pulse counter" and plot type = "Instantaneous value + counter".

User entry   Text (max. 6 characters)

Pulse counter

Navigation	▣	Expert → Inputs → Universal inputs → Universal input x → Pulse counter
		Direct access code: 220017-0xx
		Examples: Universal input 1: 220017-000; Universal input 12: 220017-011

Description   Please check if the pulse counter used is a fast or slow (up to a max. 25 Hz) counter. For example if the number of state changes from a relay are to be monitored then you must set up "up to 25Hz". Only visible if signal = Pulse counter.

Options   Up to 13kHz, Up to 25Hz

| Factory setting | Up to 13kHz |

Pulse value

| Navigation | ▤ | Expert → Inputs → Universal inputs → Universal input x → Pulse value
Direct access code: 220010-0xx
Examples: Universal input 1: 220010-000; Universal input 12: 220010-011 |

| Description | Factor, that when multiplied by the input signal results in the required physical value.
Example: 1 pulse equals 5 m^3-> enter "5".
Only visible if signal = Pulse counter. |

| User entry | Number, max. 8 digits |

| Factory setting | 1 |

Decimal point

| Navigation | ▤ | Expert → Inputs → Universal inputs → Universal input x → Decimal point
Direct access code: 220005-0xx
Examples: Universal input 1: 220005-000; Universal input 12: 220005-011 |

| Description | Number of places after decimal point for the display.
Only visible if signal ≠ Switched off. |

| Options | None, One (X.Y), Two (X.YY), Three (X.YYY), Four (X.YYYY), Five (X.YYYYY) |

| Factory setting | One (X.Y) |

Lower frequency

| Navigation | ▤ | Expert → Inputs → Universal inputs → Universal input x → Lower frequency
Direct access code: 220018-0xx
Examples: Universal input 1: 220018-000; Universal input 12: 220018-011 |

| Description | Configure the lower frequency that corresponds to the start of the measuring range.
Only visible if signal = Frequency input. |

| User entry | 0 to 12500 (Hz) |

| Factory setting | 5.0 (Hz) |

Range start

Navigation	▭	Expert → Inputs → Universal inputs → Universal input x → Range start Direct access code: 220006-0xx Examples: Universal input 1: 220006-000; Universal input 12: 220006-011

Description	Transmitters convert the physical measured variable to standardized signals. Enter the start of the measuring range here.

> • The start and end of the measuring range may not be identical.
> • The start of the measuring range can also be larger than the end (e.g. for deep wells).
> • The parameter can be defined independently of the number of decimal places configured for the measured value as these are only taken into consideration for the display.

User entry	Number (max. 8 digits)

Factory setting	0 (Depends on the input signal selected)

Upper frequency

Navigation	▭	Expert → Inputs → Universal inputs → Universal input x → Upper frequency Direct access code: 220019-0xx Examples: Universal input 1: 220019-000; Universal input 12: 220019-011

Description	Configure the upper frequency that corresponds to the end of the measuring range. Only visible if signal = Frequency input.

User entry	0 to 12500 (Hz)

Factory setting	1000.0 (Hz)

Upper range value

Navigation	▭	Expert → Inputs → Universal inputs → Universal input x → Meas. range end Direct access code: 220007-0xx Examples: Universal input 1: 220007-000; Universal input 12: 220007-011

Description	Transmitters convert the physical measured variable to standardized signals. Enter the end of the measuring range here.

> • The start and end of the measuring range may not be identical.
> • The end of the measuring range can also be smaller than the start (e.g. for deep wells).
> • The parameter can be defined independently of the number of decimal places configured for the measured value as these are only taken into consideration for the display.

User entry	Number (max. 8 digits)

Factory setting	100 (Depends on the input signal selected)

Zoom start	
Navigation	⬒ Expert → Inputs → Universal inputs → Universal input x → Zoom start Direct access code: 220011-0xx Examples: Universal input 1: 220011-000; Universal input 12: 220011-011
Description	If the whole value range is not used, you can configure the lower value of the required section here. Zooming does not affect the save function. ℹ • The zoom can also be set outside the measuring range. The only restriction is that the start and end of the zoom may not be identical. • If the signal or the range is changed, the zoom is corrected if it no longer fits the measuring range. • The zoom start can also be larger than the zoom end. The device will automatically rotate the values on the display.
User entry	Number (max. 8 digits)
Factory setting	0 (Depends on the input signal selected)

Zoom end	
Navigation	⬒ Expert → Inputs → Universal inputs → Universal input x → Zoom end Direct access code: 220012-0xx Examples: Universal input 1: 220012-000; Universal input 12: 220012-011
Description	Like "Zoom start". However, enter the upper value of the required range here. ℹ • The zoom can also be set outside the measuring range. The only restriction is that the start and end of the zoom may not be identical. • If the signal or the range is changed, the zoom is corrected if it no longer fits the measuring range. • The zoom end can also be smaller than the zoom start. The device will automatically rotate the values on the display.
User entry	Number (max. 8 digits)
Factory setting	100 (Depends on the input signal selected)

Damping	
Navigation	⬒ Expert → Inputs → Universal inputs → Universal input x → Damping Direct access code: 220008-0xx Examples: Universal input 1: 220008-000; Universal input 12: 220008-011
Description	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. Only visible if signal = Current, Voltage, Resistance thermometer or Thermocouple.

User entry	0 to 999.9 s
Factory setting	Current, voltage: 0.0 s Resistance thermometer, thermocouple: 0.2 s

Comparison point

Navigation	▣	Expert → Inputs → Universal inputs → Universal input x → Comparison point Direct access code: 220013-0xx Examples: Universal input 1: 220013-000; Universal input 12: 220013-011
Description		Internal: Compensation of the voltage error by measuring the terminal temperature. External: Compensation of the voltage error by using an external controlled comparison measurement point. Only visible if signal = Thermocouple.
Options		Internal, External
Factory setting		Internal

Comparison temp.

Navigation	▣	Expert → Inputs → Universal inputs → Universal input x → Comparison temp. Direct access code: 220014-0xx Examples: Universal input 1: 220014-000; Universal input 12: 220014-011
Description		Settings for the external comparison temperature (only when connecting thermocouples). Only visible if comparison point = External.
User entry		0 to 9999999 (Depends on the temperature unit selected)
Factory setting		0 (Depends on the temperature unit selected)

Totalizer

Navigation	▣	Expert → Inputs → Universal inputs → Universal input x → Totalizer Direct access code: 220015-0xx Examples: Universal input 1: 220015-000; Universal input 12: 220015-011
Description		Initial setting for the totalizer. Useful when continuing measurements recorded to date with an (electro)-mechanical counter. Only visible if signal = Pulse counter.
User entry		Number (max. 15 digits)
Factory setting		0

"Meas. val. corrct" submenu

Navigation	⌨ Expert → Inputs → Universal inputs → Universal input x → Meas. val. corrct
Description	Determining the correction values to balance measurement tolerances.
	Proceed as follows:
	• Measure the current value at the lower measurement range.
	• Measure the current value at the upper measurement range.
	• Enter the lower and upper target and actual value.

Offset

Navigation	⌨ Expert → Inputs → Universal inputs → Universal input x → Meas. val. corrct→ Offset
	Direct access code: 220050-0xx
	Examples: Universal input 1: 220050-000; Universal input 12: 220050-011
Description	This offset is only effective on the analog input signal (no maths/bus channels).
	Only visible if signal = Resistance thermometer or Thermocouple.
User entry	Number (max. 8 digits)
Factory setting	0

Correction RPT

Navigation	⌨ Expert → Inputs → Universal inputs → Universal input x → Meas. val. corrct → Correction RPT
	Direct access code: 220057-0xx
	Examples: Universal input 1: 220057-000; Universal input 12: 220057-011
Description	Rear panel temperature correction value for this analog input (only required for thermocouples).
	ℹ Only visible/editable if the service code has been entered.
User entry	Number (max. 8 digits)
Factory setting	-0.1

Range start

Target value

Navigation	▤ Expert → Inputs → Universal inputs → Universal input x → Meas. val. corrct → Target value Direct access code: 220052-0xx Examples: Universal input 1: 220052-000; Universal input 12: 220052-011
Description	Enter the lower set point here (e.g. measuring range 0℃ to 100℃: 0℃). Only visible if signal = Current or Voltage.
User entry	Number (max. 8 digits)
Factory setting	0

Actual value

Navigation	▤ Expert → Inputs → Universal inputs → Universal input x → Meas. val. corrct → Actual value Direct access code: 220053-0xx Examples: Universal input 1: 220053-000; Universal input 12: 220053-011
Description	Enter the lower value actually measured here (e.g. measuring range 0℃ to 100℃: measured value 0.5℃). Only visible if signal = Current or Voltage.
User entry	Number (max. 8 digits)
Factory setting	0

Upper range value

Target value

Navigation	▤ Expert → Inputs → Universal inputs → Universal input x → Meas. val. corrct → Target value Direct access code: 220055-0xx Examples: Universal input 1: 220055-000; Universal input 12: 220055-011
Description	Enter the upper set point here (e.g. measuring range 0℃ to 100℃: 100℃). Only visible if signal = Current or Voltage.
User entry	Number (max. 8 digits)
Factory setting	100

Actual value

Navigation	▣	Expert → Inputs → Universal inputs → Universal input x → Meas. val. corrct → Actual value Direct access code: 220056-0xx Examples: Universal input 1: 220056-000; Universal input 12: 220056-011
Description		Enter the upper value actually measured here (e.g. measuring range 0℃ to 100℃: measured value 100.5℃). Only visible if signal = Current or Voltage.
User entry		Number (max. 8 digits)
Factory setting		100

"Totalization" submenu

Navigation	▣	Expert → Inputs → Universal inputs → Universal input x → Totalization
Description		Set up only required for totalization of flow or power consumption.

Totalization

Navigation	▣	Expert → Inputs → Universal inputs → Universal input x → Totalization → Totalization Direct access code: 220030-0xx Examples: Universal input 1: 220030-000; Universal input 12: 220030-011
Description		By totalizing the analog signal (e.g. flow rate in m³/h) quantities (in m³) can be calculated.
Options		No, Yes
Factory setting		No

Totalization base

Navigation	▣	Expert → Inputs → Universal inputs → Universal input x → Totalization → Totalization base Direct access code: 220031-0xx Examples: Universal input 1: 220031-000; Universal input 12: 220031-011
Description		Select the required time base. Example: ml/s -> time base seconds (s); m³/h -> time base hours (h). Only visible if totalization = Yes.
Options		Second (s), Minute (min), Hour (h), Day (d)

Factory setting	Second (s)

Unit

Navigation	⊟	Expert → Inputs → Universal inputs → Universal input x → Totalization → Unit
		Direct access code: 220032-0xx
		Examples: Universal input 1: 220032-000; Universal input 12: 220032-011

Description	Enter the unit for the calculated quantity (e.g. "m³").
	Only visible if totalization = Yes.

User entry	Text (max. 6 characters)

Low flow cut off

Navigation	⊟	Expert → Inputs → Universal inputs → Universal input x → Totalization → Low flow cut off
		Direct access code: 220033-0xx
		Examples: Universal input 1: 220033-000; Universal input 12: 220033-011

Description	If the volume flow recorded is below the set value, these quantities are not added to the counter.
	If the input is scaled from 0 to y, or if the pulse input is used, all values that are smaller than the set value are not recorded.
	If the input is scaled from -x to +y, all values around the zero point (e.g. also negative values) are not recorded.
	Only visible if totalization = Yes.

User entry	Number (max. 8 digits)

Factory setting	0

Calc. factor

Navigation	⊟	Expert → Inputs → Universal inputs → Universal input x → Totalization → Calc. factor
		Direct access code: 220034-0xx
		Examples: Universal input 1: 220034-000; Universal input 12: 220034-011

Description	Factor for calculating the integrated value (e.g. the transmitter delivers l/s -> totalization base = second -> engineering unit required is m³ -> enter factor 0.001)
	Only visible if totalization = Yes.

User entry	Number (max. 8 digits)

Factory setting	1.0

Totalizer	
Navigation	▤ Expert → Inputs → Universal inputs → Universal input x → Totalization → Totalizer Direct access code: 220035-0xx Examples: Universal input 1: 220035-000; Universal input 12: 220035-011
Description	Initial setting for the totalizer. Useful when continuing measurements recorded to date with an (electro)-mechanical counter. Only visible if totalization = Yes.
User entry	Number (max. 15 digits)
Factory setting	0

"Fault mode" submenu	
	ℹ In the event of an error the alarm relay is switched if so configured → 🖹 88
Navigation	▤ Expert → Inputs → Universal inputs → Universal input x → Fault mode
Description	Contains settings that define how this channel is to react under fault conditions (e.g. cable break, over range).

NAMUR NE 43	
Navigation	▤ Expert → Inputs → Universal inputs → Universal input x → Fault mode → NAMUR NE 43 Direct access code: 220060-0xx Examples: Universal input 1: 220060-000; Universal input 12: 220060-011
Description	Activate/deactivate the 4-20mA loop monitoring as per NAMUR recommendation NE 43. The following error ranges apply when NAMUR NE43 is switched on: ≤ 3.8 mA: under range ≥ 20.5 mA: over range ≤ 3.6 mA or ≥ 21.0 mA: sensor error ≤ 2 mA: cable break Only visible if signal = "Current" and range = "4-20 mA" or "4-20 mA squared".
Options	Off, On
Factory setting	On

Cable break detection	

Navigation	Expert → Inputs → Universal inputs → Universal input x → Fault mode → Cable break detection Direct access code: 220060-0xx Examples: Universal input 1: 220060-000; Universal input 12: 220060-011
Description	Cable break detection Only visible if signal = "Voltage" and range = "1-5 V" or "1-5 V squared".
Options	Off, On
Factory setting	On

Lower error value

Navigation	Expert → Inputs → Universal inputs → Universal input x → Fault mode → Lower error value Direct access code: 220065-0xx Examples: Universal input 1: 220065-000; Universal input 12: 220065-011
Description	When NE43 is switched off, defines the value that must be undershot for the device to output an error. Only visible if signal = "Current", range = "4-20 mA", and NAMUR NE 43 = "Off".
User entry	Number (max. 8 digits); 0 to 4 mA
Factory setting	3.9mA

Upper error value

Navigation	Expert → Inputs → Universal inputs → Universal input x → Fault mode → Upper error value Direct access code: 220066-0xx Examples: Universal input 1: 220066-000; Universal input 12: 220066-011
Description	When NE43 is switched off, defines the value that must be exceeded for the device to output an error. Only visible if signal = "Current", range = "4-20 mA", and NAMUR NE 43 = "Off".
User entry	Number (max. 8 digits); 20 to 22mA
Factory setting	20.8mA

Time delay

| Navigation | | Expert → Inputs → Universal inputs → Universal input x → Fault mode → Time delay
 Direct access code: 220064-0xx
 Examples: Universal input 1: 220064-000; Universal input 12: 220064-011 |

| Description | The device only reacts (e.g. relay switches) to a cable break/under range/over range if this condition has existed at least for the preset time.
 Only visible if NAMUR NE 43 = On. |

| User entry | 0 to 99 s |

| Factory setting | 0s |

On error

| Navigation | | Expert → Inputs → Universal inputs → Universal input x → Fault mode → On error
 Direct access code: 220061-0xx
 Examples: Universal input 1: 220061-000; Universal input 12: 220061-011 |

| Description | Configure what value the device should continue working with (for calculations) if the measured value is not valid (e.g. cable break). |

> In the event of an error value, all the dependent calculations are flagged accordingly as "error value". Counters are not flagged, however!

| Options | Invalid calculation, Error value |

| Factory setting | Invalid calculation |

Error value

| Navigation | | Expert → Inputs → Universal inputs → Universal input x → Fault mode → Error value
 Direct access code: 220062-0xx
 Examples: Universal input 1: 220062-000; Universal input 12: 220062-011 |

| Description | The device continues calculating with this value in the event of an error.
 Only visible if On error = Error value. |

| User entry | Number (max. 8 digits) |

| Factory setting | 0 |

Save event

| Navigation | | Expert → Inputs → Universal inputs → Universal input x → Fault mode → Save event
 Direct access code: 220063-0xx
 Examples: Universal input 1: 220063-000; Universal input 12: 220063-011 |

Description	Stores a message in the event log when a fault occurs.
Options	No, Yes
Factory setting	No

Copy settings

Navigation	▤ Expert → Inputs → Universal inputs → Universal input x → → Copy settings Direct access code: 220200-0xx Examples: Universal input 1: 220200-000; Universal input 12: 220200-011
Description	Copies settings from actual channel to selected channel.
Options	Switched off, Universal input x Users can choose from all the available universal inputs.
Factory setting	Switched off

Submenu "Digital inputs -> Digital input x"

Navigation	▤ Expert → Inputs → Digital inputs → Digital input x
Description	Setting up only required if the digital inputs (e.g. events) are to be used.
	ℹ x = place holder for selected digital input.

Add input

Navigation	▤ Expert → System → Digital inputs → Add input Direct access code: 252000/000
Description	Addition of a digital input that must be configured according to the function.
Options	No, Digital input x
Factory setting	No

Delete input

Navigation	▤ Expert → System → Digital inputs → Delete input Direct access code: 252001/000
Description	Delete an input configuration.

Options	No, Digital input x
Factory setting	No

Function

Navigation	⊟	Expert → Inputs → Digital inputs → Digital input x → Function Direct access code: 250000-00x Examples: Digital input 1: 250000-000; Digital input 6: 250000-005
Description		Select the required function. Digital inputs are High active; this means the described effect is achieved by a high input. Low = -3 to +5V High = +12 to +30V
Options		Switched off, Control input, On/off event, Pulse counter, Operational time, Event +operation time, Quantity from time, Modbus slave (option)
Factory setting		Switched off

Function

Navigation	⊟	Expert → Inputs → Digital inputs → Digital input x → Function Direct access code: 250014-00x Examples: Digital input 1: 250014-000; Digital input 6: 250014-005
Description		Specifies how the data from the fieldbus is interpreted/processed. Only visible if function = Modbus slave
Options		Switched off, Control input, On/off event, Pulse counter, Operational time, Event + operation time, Quantity from time
Factory setting		Switched off

Channel ident.

Navigation	⊟	Expert → Inputs → Digital inputs → Digital input x → Channel ident. Direct access code: 250001-00x Examples: Digital input 1: 250001-000; Digital input 6: 250001-005
Description		Measurement point name (e.g. "Pump") or description of the function of this input (e.g. "Fault message"). Only visible if function ≠ Switched off.
User entry		Text (max. 16 characters)

Factory setting   Digital x

Unit/dimension

Navigation   Expert → Inputs → Digital inputs → Digital input x → Unit/dimension
                        Direct access code: 250002-00x
                        Examples: Digital input 1: 250002-000; Digital input 6: 250002-005

Description   Technical units of the count input, e.g. gal, cf.
                        Only visible if function = Pulse counter or Quantity from time.

User entry   Text (max. 6 characters)

Decimal point

Navigation   Expert → Inputs → Digital inputs → Digital input x → Decimal point
                        Direct access code: 250004-00x
                        Examples: Digital input 1: 250004-000; Digital input 6: 250004-005

Description   Number of places after decimal point for the display.
                        Only visible if function = Pulse counter or Quantity from time.

Options   None, One (X.Y), Two (X.YY), Three (X.YYY), Four (X.YYYY), Five (X.YYYYY)

Factory setting   One (X.Y)

Input factor in

Navigation   Expert → Inputs → Digital inputs → Digital input x → Input factor in
                        Direct access code: 250019-00x
                        Examples: Digital input 1: 250019-000; Digital input 6: 250019-005

Description   Defines if the set up factor is respective to 1 second or 1 hour.
                        Only visible if function = Quantity from time.

Options   Seconds, Hours

Factory setting   Seconds

Pulse value

Navigation	Expert → Inputs → Digital inputs → Digital input x → Pulse value Direct access code: 250005-00x Examples: Digital input 1: 250005-000; Digital input 6: 250005-005
Description	Factor, that when multiplied by the input signal results in the required physical value. Examples: 1 pulse equals 5 m^3 -> enter "5". Only visible if function = Pulse counter.
User entry	Number (max. 8 digits)
Factory setting	1

1 second=/1 hour= (depends on the setting in "Input factor in")

Navigation	Expert → Inputs → Digital inputs → Digital input x → 1 second=/1 hour= Direct access code: 250005-00x Examples: Digital input 1: 250005-000; Digital input 6: 250005-005
Description	Factor, that when multiplied by the operating time results in the required physical value. Examples: 1 second equals 8 l -> enter "8". Only visible if function = Quantity from time.
User entry	Number (max. 8 digits)
Factory setting	1

Time delay

Navigation	Expert → Inputs → Digital inputs → Digital input x → Time delay Direct access code: 250017-00x Examples: Digital input 1: 250017-000; Digital input 6: 250017-005
Description	The high signal must be active for at least the preset time before the device changes the channel from low to high. The change from high to low is always immediate. Only visible if function = Control input, On/off event, Event+operation time.
User entry	0 to 99 999 s
Factory setting	0

Action

| Navigation | ▯ | Expert → Inputs → Digital inputs → Digital input x → Action
Direct access code: 250003-00x
Examples: Digital input 1: 250003-000; Digital input 6: 250003-005 |

Description   Set up the function of the control input.
Only visible if function = Control input.

Action	Description
Start/stop recording	The device only saves data as long as a high signal is present.
Screensaver on	Switches backlight/display off, low = off, high = on.
Lock setup	The user can only change the setup if a low signal is present.
Time synchronization	If a high signal is applied, the device rounds the system time up or down (only for low→high change) to the nearest minute: 0 to 29 → Round down; 30 to 59 → round up.
Set point monitoring on/off	The entire set point monitoring function of the device can be switched on (for "high") or switched off (for "low").
Block keyboard/navigator	The device can only be operated if a low signal is present. Otherwise all key activation and navigator actions are discarded.
Start/stop analysis 1	Starts/ends the external analysis (the analysis only runs as long as the signal is high). Measured value acquisition for the graphic display continues.

Options   Switched off, Start/stop recording, Screensaver on, Lock setup, Time synchronization, Set point monitoring on/off, Block keyboard/navigator, Start/stop analysis 1

Factory setting   Switched off

Switches relay

| Navigation | ▯ | Expert → Inputs → Digital inputs → Digital input x → Switches relay
Direct access code: 250006-00x
Examples: Digital input 1: 250006-000; Digital input 6: 250006-005 |

Description   Switches the respective relay when the digital input is low or high. Please take note of the connection hints in the Operating Instructions!
Only visible if function = Control input, On/off event, Event+operation time.

Options   Not used, Relay x
All the available relays are displayed.

Factory setting   Not used

Description 'H'

| Navigation | ▯ | Expert → Inputs → Digital inputs → Digital input x → Description 'H'
Direct access code: 250007-00x
Examples: Digital input 1: 250007-000; Digital input 6: 250007-005 |

Description	Condition description when the digital input is active. This text is both shown on the display and saved to memory. Only visible if function = Control input, On/off event, Event+operation time.
User entry	Text (max. 6 characters)
Factory setting	On

Description 'L'

Navigation	Expert → Inputs → Digital inputs → Digital input x → Description 'L' Direct access code: 250008-00x Examples: Digital input 1: 250008-000; Digital input 6: 250008-005
Description	Condition description when the digital input is not active. This text is both shown on the display and saved to memory. Only visible if function = Control input, On/off event, Event+operation time.
User entry	Text (max. 6 characters)
Factory setting	Off

Save event

Navigation	Expert → Inputs → Digital inputs → Digital input x → Save event Direct access code: 250009-00x Examples: Digital input 1: 250009-000; Digital input 6: 250009-005
Description	Determines whether the condition change from low to high or high to low is stored in the event log. ℹ️ Requires higher memory capacity. Only visible if function = Control input, On/off event, Event+operation time.
Options	No, Yes, only "On" message
Factory setting	Yes

Event message

Navigation	Expert → Inputs → Digital inputs → Digital input x → Event message Direct access code: 250018-00x Examples: Digital input 1: 250018-000; Digital input 6: 250018-005

Description	"Do not acknowledge": No message is shown if the digital input switches. "Acknowledge": A message window is shown on the screen which has to be acknowledged by operating a push button. Only visible if function = Control input, On/off event, Event+operation time.
Options	Do not acknowledge, Acknowledge
Factory setting	Do not acknowledge

Event text L->H

Navigation	⊟ Expert → Inputs → Digital inputs → Digital input x → Event text L->H Direct access code: 250010-00x Examples: Digital input 1: 250010-000; Digital input 6: 250010-005
Description	Description of condition change from low to high. Event text is stored (e.g. Start filling). ℹ If no event text is set, the device generates an automatic event text (factory setting), e.g. digital 1 L->H. Only visible if function = Control input, On/off event, Event+operation time.
User entry	Text (max. 22 characters)

Event text H->L

Navigation	⊟ Expert → Inputs → Digital inputs → Digital input x → Event text H->L Direct access code: 250011-00x Examples: Digital input 1: 250011-000; Digital input 6: 250011-005
Description	Description of condition change from high to low. Event text is stored (e.g. Stop filling). ℹ If no event text is set, the device generates an automatic event text (factory setting), e.g. digital 1 H->L. Only visible if function = Control input, On/off event, Event+operation time.
User entry	Text (max. 22 characters)

Record duration

Navigation	⊟ Expert → Inputs → Digital inputs → Digital input x → Record duration Direct access code: 250012-00x Examples: Digital input 1: 250012-000; Digital input 6: 250012-005

Description		The duration between "On" and "Off" can be recorded. The duration is appended to the "Off" event text (<hhhh>h<mm>:<ss>). Power failure times do not affect the duration. If the digital channel was "on" before the power failure and is still "on" after the power failure, the duration continues. Only visible if function = Control input, On/off event, Event+operation time.
Options		No, Yes
Factory setting		No

Totalizer

Navigation	▯	Expert → Inputs → Digital inputs → Digital input x → Totalizer Direct access code: 250013-00x Examples: Digital input 1: 250013-000; Digital input 6: 250013-005
Description		Initial setting for the totalizer. Useful when continuing measurements recorded to date with an (electro)-mechanical counter. Only visible if function = Pulse counter, Operational time, Event+operation time or Quantity from time.
User entry		Number (max. 15 digits)
Factory setting		0

Copy settings

Navigation	▯	Expert → Inputs → Digital inputs → Digital input x → Copy settings Direct access code: 250200-00x Examples: Digital input 1: 250200-000; Digital input 6: 250200-005
Description		Copies settings from actual channel to selected channel.
Options		No, Digital input x Users can choose from all the available digital inputs.
Factory setting		No

16.1.3   "Outputs" submenu

Setting up only required if outputs (e.g. relays) are to be used.

"Relay x" submenu

Navigation	▯	Expert → Outputs → Relay x

Description	Contains setup for the selected relay.
	ℹ️ x = place holder for selected relay.

Operating mode

Navigation	▤ Expert → Outputs → Relay x → Operating mode Direct access code: 330000-00x Examples: Relay 1:330000-000; Relay 6: 330000-005
Description	Relay function: Opening: The relay is closed in its quiescent state (maximum safety). Closing: The relay is open in its quiescent state.
Options	Closing, Opening
Factory setting	Closing

Identifier

Navigation	▤ Expert → Outputs → Relay x → Identifier Direct access code: 330001-00x Examples: Relay 1:330001-000; Relay 6: 330001-005
Description	User-configurable relay identifier.
User entry	Text (max. 16 characters)
Factory setting	Relay x

16.1.4   "Communication" submenu

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.).

ℹ️ The various interfaces can be operated in parallel.

Timeout cycl. readout

Navigation	▤ Expert → Communication → Timeout Direct access code: 150200-000
Description	Monitors whether measured values are read out cyclically via OPC or Fieldbus. Timeout is modifiable between 1 and 99 seconds. 0 seconds means that the functionality is inactivated.
User entry	0 to 99s

Factory setting	0 s

Switches

Navigation	▣	Expert → Communication → Switches Direct access code: 150201-000
Description		After the given timeout the dedicated relay/OC is active while no readout of actual measured values are in process.
Options		Not used, Relay x All the available relays are displayed.
Factory setting		Not used

Timeout fieldbus

Navigation	▣	Expert → Communication → Timeout fieldbus Direct access code: 150210-000
Description		Time within which measured values must be received via fieldbus (otherwise an error will be set). Not relevant if only measured values are read out.
User entry		1 to 99s
Factory setting		10 s

Function USB-B

Navigation	▣	Expert → Communication → Function USB-B Direct access code: 012001-000
Description		Determines the operating mode of the USB interface if a cable is connected to the device.
Options		Always USB Always Ethernet over USB By user input
Factory setting		Always USB

"Ethernet" submenu

Navigation	▣	Expert → Communication → Ethernet

Description	Contains the set-up required if you are using the Ethernet interface of the unit.

MAC address

Navigation	▣ Expert → Communication → Ethernet → MAC-address Direct access code: 150000-000
Description	Displays the MAC address.

DHCP

Navigation	▣ Expert → Communication → Ethernet → DHCP Direct access code: 150002-000
Description	The device can get its Ethernet settings through DHCP. Caution: The settings determined are not displayed until after setup acceptance! ℹ Note: The unit always gets the same IP address if the leasing time is set long enough on the DHCP server. The PC software needs the IP address determined to establish a connection!
Options	No, Yes
Factory setting	Yes

IP address

Navigation	▣ Expert → Communication → Ethernet → IP address Direct access code: 150003-000
Description	Please enter the IP address (given from your network administrator). Please talk to your network administrator about this. Only editable if DHCP = no.
User entry	IP address
Factory setting	000.000.000.000

Subnet mask

Navigation	▣ Expert → Communication → Ethernet → Subnet mask Direct access code: 150004-000

Description	Please enter the subnet mask (given from your network administrator). Only editable if DHCP = no.
User entry	IP address
Factory setting	255.255.255.000

Gateway

Navigation	⊟	Expert → Communication → Ethernet → Gateway Direct access code: 150005-000
Description		Please enter the Gateway (given from your network administrator). Only editable if DHCP = no.
User entry		IP address
Factory setting		000.000.000.000

Domain Name System (DNS)

Navigation	⊟	Expert → Communication → Ethernet → Domain Name System (DNS) Direct access code: 150009-000
Description		Please enter the IP-address of the DNS server (you can get this from your network administrator). Is needed if you wish to send e-mails and want to use the e-mail server name instead of the IP address (e.g. smtp.example.org). Only editable if DHCP = no.
User entry		IP address
Factory setting		000.000.000.000

Disable port

Navigation	⊟	Expert → Communication → Ethernet → Disable port Direct access code: 150020-000
Description		You can disable unused ports for security reasons. CDI is the protocol that the configuration software or analysis software uses to communicate with the device.
		ⓘ All other ports (e.g. SNTP, SMTP, Web server) are automatically disabled if the function is switched off.
Options		CDI, OPC, Modbus slave

| Factory setting | ---- (no port disabled) |

Port

Navigation	⌨	Expert → Communication → Ethernet → Port Direct access code: 150001-000
Description		The system communicates with the PC software through this communication port. ℹ️ If your network is protected by a firewall, this port may have to be enabled. Please contact your network administrator if this is the case.
User entry		Number (max. 5 digits)
Factory setting		8000

OPC port

Navigation	⌨	Expert → Communication → Ethernet → OPC port Direct access code: 150010-000
Description		Values van be read via OPC server using this communication port. ℹ️ If your network is protected by a firewall, this port may have to be enabled. Please contact your network administrator if this is the case.
User entry		Number (max. 5 digits)
Factory setting		8002

Web server

Navigation	⌨	Expert → Communication → Ethernet → Web server Direct access code: 470000-000
Description		Switch the Web server functionality on/off. The instantaneous values can only be displayed using an Internet browser when the web browser is activated. ℹ️ A connection to the Web server can only be established via the Ethernet interface.
Options		No (Web server is off), Yes (Web server is active)
Factory setting		Yes

"Configuration Web server" submenu

Navigation	⊟ Expert → Communication → Ethernet → Configuration Web server
Description	Configure the Web server or specify which functionality should be possible via Web server. Only visible if Web server = Yes.
	ℹ️ Instantaneous value display is always possible once the Web server is switched on.

Port

Navigation	⊟ Expert → Communication → Ethernet → Configuration Web server → Port Direct access code: 470003-000
Description	The Web server communicates through this communication port.
	ℹ️ If your network is protected by a firewall, this port may have to be enabled. Please contact your network administrator if this is the case.
User entry	Number (max. 5 digits)
Factory setting	80

Setup

Navigation	⊟ Expert → Communication → Ethernet → Configuration Web server → Setup Direct access code: 470001-000
Description	The device can be configured via Web server. For security reasons it is advisable to switch off configuration via the Web server after commissioning. With regard to IT security please contact your network administrator if necessary.
Options	No, Yes
Factory setting	Yes

Firmware update

Navigation	⊟ Expert → Communication → Ethernet → Configuration Web server → Firmware update Direct access code: 470002-000
Description	Firmware can be updated via Web server.
Options	No, Yes
Factory setting	No

Remote control

Navigation	▣	Expert → Communication → Ethernet → Configuration Web server → Remote control
		Direct access code: 470004-000
Description		The device can be controlled remotely via the Web server.
Options		No, Yes
Factory setting		No

WebDAV server

Navigation	▣	Expert → Communication → Ethernet → Configuration Web server → WebDAV server
		Direct access code: 470006-000
Description		The SD card can be read via a WebDAV client.
Options		No, Yes
Factory setting		No

Instantaneous values without login

Navigation	▣	Expert → Communication → Ethernet → Configuration Web server →Instantaneous values without login
		Direct access code: 470009-000
Description		Allow access to current measured values without logging in.
		URL: http:\\<ip>\iv
Options		Yes, No
Factory setting		Yes

"Authentication" submenu

Navigation	▣	Expert → Communication → Ethernet → Configuration Web server → Authentication
Description		Set the passwords for the various users with which the device can be accessed via Web server.

	Operator	Admin	Service
Measured value display	Yes	Yes	Yes
Display instrument health status	Yes	Yes	Yes
Configuration	No	Yes	Yes
Configuration incl. service parameter	No	No	Yes
Update firmware	No	Yes	Yes
WebDAV	Yes	Yes	Yes

Note: The following passwords should be changed during commissioning.

Operator

ID

Navigation   Expert → Communication → Ethernet → Configuration Web server → Authentication
                        → ID
                        Direct access code: 470104-000

Description   ID required in order to access the device. Pay attention to case-sensitivity.
                        Cannot be edited.

Factory setting   operator

Password

Navigation   Expert → Communication → Ethernet → Configuration Web server → Authentication
                        → Password
                        Direct access code: 470105-000

Description   Enter a password for this user account.
                        Pay attention to case-sensitivity.

User entry   Text (max. 12 characters)

Factory setting   operator

Administrator

ID

Navigation	⌨	Expert → Communication → Ethernet → Configuration Web server → Authentication → ID
		Direct access code: 470101-000

Description	ID required in order to access the device. Pay attention to case-sensitivity.
	Cannot be edited.

Factory setting	admin

Password

Navigation	⌨	Expert → Communication → Ethernet → Configuration Web server → Authentication → Password
		Direct access code: 470102-000

Description	Enter a password for this user account.
	Pay attention to case-sensitivity.

User entry	Text (max. 12 characters)

Factory setting	admin

Service

ID

Navigation	⌨	Expert → Communication → Ethernet → Configuration Web server → Authentication → ID
		Direct access code: 470107-000

Description	ID required in order to access the device. Pay attention to case-sensitivity.
	Cannot be edited.

Factory setting	service

Password

Navigation	⌨	Expert → Communication → Ethernet → Configuration Web server → Authentication → Password
		Direct access code: 470108-000

Description	Enter a password for this user account.
	Pay attention to case-sensitivity.

User entry	Text (max. 12 characters)

Factory setting	service

"Timeouts" submenu

Navigation	▣ Expert → Communication → Ethernet → Configuration Web server → Timeouts

Description	Timeouts for the Web server. Settings should only be modified if slow network connections are causing transmission problems.

> **ℹ** The settings are only adopted if the browser has been restarted or a new tab opened. Caution: Settings should only be changed by experts.

Connection quality

Navigation	▣ Expert → Communication → Ethernet → Configuration Web server → Timeouts → Connection quality Direct access code: 470200-000

Description	Configuration of typical timeout values for the Web server connection.

> **ℹ** The default values can be changed if necessary.

Options	Please select, Local network (LAN/WLAN), Wireless/mobile (fast connect.), Wireless/mobile (slow connect)

Factory setting	Please select

Get timeout

Navigation	▣ Expert → Communication → Ethernet → Configuration Web server → Timeouts → Get timeout Direct access code: 470201-000

Description	Maximum time to load a new page before the browser ends the connection.

User entry	5 to 999 s

Factory setting	25

Set timeout

Navigation	▣	Expert → Communication → Ethernet → Configuration Web server → Timeouts → Set timeout Direct access code: 470202-000
Description		Maximum time to write a value or execute an action before the browser ends the connection.
User entry		5 to 999 s
Factory setting		5

Put timeout

Navigation	▣	Expert → Communication → Ethernet → Configuration Web server → Timeouts → Put timeout Direct access code: 470203-000
Description		Maximum time to transmit files to or from the device before the browser ends the connection.
User entry		5 to 9999 s
Factory setting		240

Ping interval

Navigation	▣	Expert → Communication → Ethernet → Configuration Web server → Timeouts → Ping interval Direct access code: 470204-000
Description		Interval in which the browser checks device reachability. ℹ The check is switched off if 0s is set. This is for diagnostic purposes only and should not be set!
User entry		0 to 999 s
Factory setting		10

Ping timeout

Navigation	▣	Expert → Communication → Ethernet → Configuration Web server → Timeouts → Ping timeout Direct access code: 470205-000
Description		Time in which the device must respond before the browser ends the connection.

User entry	5 to 999 s

Factory setting	15

Ping retry

Navigation	▭ Expert → Communication → Ethernet → Configuration Web server → Timeouts → Ping retry Direct access code: 470206-000

Description	Number of retries if the device does not respond.

User entry	0 to 5

Factory setting	0

Poll timeout

Navigation	▭ Expert → Communication → Ethernet → Configuration Web server → Timeouts → Poll timeout Direct access code: 470207-000

Description	Maximum permitted time to refresh the website.

User entry	5 to 999 s

Factory setting	5

"Serial interface" submenu

Navigation	▭ Expert → Communication → Serial interface

Description	Contains the set-up required if you are using the RS232 or RS485 unit interface.

Type

Navigation	▭ Expert → Communication → Serial interface → Type Direct access code: 150100-000

Description	Configure how the serial interface is used. Pay attention to the connections.

Options	RS232, RS485, Debug (only for service purposes)

Factory setting	RS232

Protocol	
Navigation	▣ Expert → Communication → Serial interface → Protocol Direct access code: 150105-000
Description	Define the serial interface protocol. Note: The device automatically disables incompatible settings.
Options	PC software, Modbus slave (only if type = RS485)
Factory setting	PC software

Baud rate	
Navigation	▣ Expert → Communication → Serial interface → Baud rate Direct access code: 150101-000
Description	Transmission speed ("Baud rate") - must be the same as the settings for the PC software.
Options	9600, 19200, 38400, 57600, 115200
Factory setting	19200

Parity	
Navigation	▣ Expert → Communication → Serial interface → Parity Direct access code: 150103-000
Description	Parity Only visible if protocol ≠ PC software.
Options	None, Even, Odd
Factory setting	None

Stop bits	
Navigation	▣ Expert → Communication → Serial interface → Stop bits Direct access code: 150104-000
Description	Stop bits Only visible if protocol ≠ PC software.

Options	1, 2
Factory setting	1

Unit address

Navigation	▣ Expert → Communication → Serial interface → Unit address Direct access code: 150102-000
Description	Every device operated using RS232/RS485 must have an individual address (00-30). Only visible if type = RS485.
User entry	0 to 30
Factory setting	0

"Modbus slave" submenu (option)

Navigation	▣ Expert → Communication → Modbus slave
Description	Configure the Modbus settings for the device.

> 🛈 Detailed descriptions of this device option can be found in the associated documentation.

Modbus

Navigation	▣ Expert → Communication → Modbus slave → Modbus Direct access code: 480000-000
Description	Specify the physical interface you wish to use.
Options	Not used, RS485, Ethernet
Factory setting	Not used

Unit address

Navigation	▣ Expert → Communication → Modbus slave → Unit address Direct access code: 480001-000
Description	Enter the device address where it should be possible to reach this device in the bus. Only visible if Modbus = RS485.
User entry	1 to 247

Factory setting	1

Port

Navigation	⊟ Expert → Communication → Modbus slave → Port Direct access code: 480004-000
Description	Port via which the Modbus protocol can be activated. Only visible if Modbus = Ethernet.
User entry	Number (max. 5 digits)
Factory setting	502

"Serial interface" submenu

Navigation	⊟ Expert → Communication → Modbus slave → Serial interface
Description	Contains settings for the serial interface. Only visible if Modbus = RS485.

Baud rate

Navigation	⊟ Expert → Communication → Modbus slave → Serial interface → Baud rate Direct access code: 150101-000
Description	Transmission speed ("Baud rate") - must be the same as the settings for the PC software. Only visible if Modbus = RS485.
Options	9600, 19200, 38400, 57600, 115200
Factory setting	19200

Parity

Navigation	⊟ Expert → Communication → Modbus slave → Serial interface → Parity Direct access code: 150103-000
Description	Parity Only visible if Modbus = RS485.
Options	None, Even, Odd
Factory setting	None

Stop bits	
Navigation	⊟ Expert → Communication → Modbus slave → Serial interface → Stop bits Direct access code: 150104-000
Description	Parity Only visible if Modbus = RS485 and parity = None.
Options	1, 2
Factory setting	1

16.1.5   "Application" submenu

Configure various application-specific settings (e.g. group settings, limit values, etc.).

Submenu "Maths - Maths x"	
Navigation	⊟ Expert → Application → Maths → Maths x
Description	Configuration of the mathematics channels. ℹ️ x = place holder for selected mathematics channel.

Function	
Navigation	⊟ Expert → Application → Maths → Maths x → Function Direct access code: 400000-000 Examples: Maths 1: 400000-000; Maths 4: 400000-003
Description	Switch the mathematics channel on or off.
Options	Switched off, Formula editor
Factory setting	Switched off

Channel ident.	
Navigation	⊟ Expert → Application → Maths → Maths x → Channel ident. Direct access code: 400001-000 Examples: Maths 1: 400001-000; Maths 4: 400001-003

Description	Measurement point name (e.g. "Pump") or description of the function of this input (e.g. "Fault message").
User entry	Text (max. 16 characters)
Factory setting	Maths x

Formula

Navigation	▢ Expert → Application → Maths → Maths x → Formula Direct access code: 400002-000 Examples: Maths 1: 400002-000; Maths 4: 400002-003
Description	Enter the desired calculation formula. Analog, digital or already active mathematics channels can be used. Description of formula editor → ▤ 150 Only visible if function = Formula editor.
User entry	Formula

The result is

Navigation	▢ Expert → Application → Maths → Maths x → The result is Direct access code: 400003-000 Examples: Maths 1: 400003-000; Maths 4: 400003-003
Description	Configure which data type the calculation returns. This setting affects how the channel saves and is displayed. If you add 2 analog channels, for example, the result is an "instantaneous value". Instantaneous value: If, for example, 2 analog channels are added (AI(1;1)+AI(1;2)), the result is an instantaneous value. State: The state/status of an individual analog input can be output as the result. A relay can also be actuated as a result. Counter: If, for example, 2 counters from digital inputs are added (DI(3;1)+DI(3;5)), the result is a counter. Operating time from status: The status (logical "1" or "0") of one or more digital inputs that are connected by addition can be analyzed. If the result of the calculation is not equal to 0, the counter for the operating time starts. The time is increased by 0.1 s every 100 ms. Operating time from total: If several digital inputs that are configured as "operational time" are added together, the result is the total of all the individual operating times. Control input: The function corresponds to a digital input that has been configured as a control input.
Options	Instantaneous value, State, Counter, Operating time from status, Operating time from total, Control input
Factory setting	Instantaneous value

Plot type

Navigation	▣ Expert → Application → Maths → Maths x → Plot type Direct access code: 400015-000 Examples: Maths 1: 400015-000; Maths 4: 400015-003
Description	The mathematics channels are recalculated every 100 ms. Depending on the save cycle, the selected data are determined/saved from the calculated values.
Options	Instantaneous value, Average, Minimum value, Maximum value, Minimum + Maximum, Counter, Instantaneous value + Counter
Factory setting	Average

Unit/dimension

Navigation	▣ Expert → Application → Maths → Maths x → Unit/dimension Direct access code: 400004-000 Examples: Maths 1: 400004-000; Maths 4: 400004-003
Description	Unit of the calculated value. Only visible if the result is = Instantaneous value or Counter
User entry	Text (max. 6 characters)

Decimal point

Navigation	▣ Expert → Application → Maths → Maths x → Decimal point Direct access code: 400005-000 Examples: Maths 1: 400005-000; Maths 4: 400005-003
Description	Number of places after decimal point for the display. Only visible if function = Formula editor and the result is = Instantaneous value or Counter.
Options	None, One (X.Y), Two (X.YY), Three (X.YYY), Four (X.YYYY), Five (X.YYYYY)
Factory setting	One (X.Y)

Action

Navigation	▣ Expert → Application → Maths → Maths x → Action Direct access code: 400006-000 Examples: Maths 1: 400006-000; Maths 4: 400006-003

Description	Set up the function of the control input. Only visible if the result is = Control input.

Action	Description
Start/stop recording	The device only saves data as long as a high signal is present.
Screensaver on	Switches backlight/display off, low = off, high = on.
Lock setup	The user can only change the setup if a low signal is present.
Time synchronization	If a high signal is applied, the device rounds the system time up or down (only for low→high change) to the nearest minute: 0 to 29 → Round down; 30 to 59 → round up.
Set point monitoring on/off	The entire set point monitoring function of the device can be switched on (for "high") or switched off (for "low").
Block keyboard/navigator	The device can only be operated if a low signal is present. Otherwise all key activation and navigator actions are discarded.
Start/stop analysis 1	Starts/ends the external analysis (the analysis only runs as long as the signal is high). Measured value acquisition for the graphic display continues.

Options	Switched off, Start/stop recording, Screensaver on, Lock setup, Time synchronization, Set point monitoring on/off, Block keyboard/navigator, Start/stop analysis 1
Factory setting	Switched off

Switches relay

Navigation	⊟ Expert → Application → Maths → Maths x → Switches relay Direct access code: 400007-000 Examples: Maths 1: 400007-000; Maths 4: 400007-003
Description	Switches the respective relay when the digital input is low or high. Only visible if the result is = Control input or State.
Options	Not used, Relay x All the available relays are displayed.
Factory setting	Not used

Description 'H'

Navigation	⊟ Expert → Application → Maths → Maths x → Description 'H' Direct access code: 400008-00x Examples: Maths 1: 400008-000; Maths 4: 400008-003
Description	Condition description when the digital input is active. This text is both shown on the display and saved to memory. Only visible if the result is = Control input or State.
User entry	Text (max. 6 characters)

Factory setting	On

Description 'L'

Navigation	⌨	Expert → Application → Maths → Maths x → Description 'L' Direct access code: 400009-00x Examples: Maths 1: 400009-000; Maths 4: 400009-003
Description		Condition description when the digital input is not active. This text is both shown on the display and saved to memory. Only visible if the result is = Control input or State.
User entry		Text (max. 6 characters)
Factory setting		Off

Save event

Navigation	⌨	Expert → Application → Maths → Maths x → Save event Direct access code: 400010-00x Examples: Maths 1: 400010-000; Maths 4: 400010-003
Description		Determines whether the condition change from low to high or high to low is stored in the event log. ℹ Requires higher memory capacity. Only visible if the result is = Control input or State.
Options		No, Yes, only "On" message
Factory setting		Yes

Event message

Navigation	⌨	Expert → Application → Maths → Maths x → Event message Direct access code: 400018-00x Examples: Maths 1: 400018-000; Maths 4: 400018-003
Description		"Do not acknowledge": No message is shown if the state of the mathematics channel changes. "Acknowledge": A message window is shown on the screen which has to be acknowledged by operating a push button. Only visible if the result is = Control input or State.
Options		Do not acknowledge, Acknowledge

Factory setting	Do not acknowledge

Event text L->H

Navigation	⌨	Expert → Application → Maths → Maths x → Event text L->H Direct access code: 400011-00x Examples: Maths 1: 400011-000; Maths 4: 400011-003
Description		Description of condition change from low to high. Event text is stored (e.g. Start filling). Only visible if the result is = Control input or State.
User entry		Text (max. 22 characters)

Event text H->L

Navigation	⌨	Expert → Application → Maths → Maths x → Event text H->L Direct access code: 400012-00x Examples: Maths 1: 400012-000; Maths 4: 400012-003
Description		Description of condition change from high to low. Event text is stored (e.g. Stop filling). Only visible if the result is = Control input or State.
User entry		Text (max. 22 characters)

Record duration

Navigation	⌨	Expert → Application → Maths → Maths x → Record duration Direct access code: 400013-00x Examples: Maths 1: 400013-000; Maths 4: 400013-003
Description		The duration between "On" and "Off" can be recorded. The duration is appended to the "Off" event text (<hhhh>h<mm>:<ss>). Power failure times do not affect the duration. If the digital channel was "on" before the power failure and is still "on" after the power failure, the duration continues. Only visible if the result is = Control input or State.
Options		No, Yes
Factory setting		No

Zoom start

Navigation	▣	Expert → Application → Maths → Maths x → Zoom start Direct access code: 400016-00x Examples: Maths 1: 400016-000; Maths 4: 400016-003
Description		If the whole value range is not used, you can configure the lower value of the required section here. Zooming does not affect the save function. Only visible if the result is = Instantaneous value.
User entry		Number (max. 8 digits)
Factory setting		0

Zoom end

Navigation	▣	Expert → Application → Maths → Maths x → Zoom end Direct access code: 400017-00x Examples: Maths 1: 400017-000; Maths 4: 400017-003
Description		Like "Zoom start". However, enter the upper value of the required range here. Only visible if the result is = Instantaneous value.
User entry		Number (max. 8 digits)
Factory setting		100

Totalizer

Navigation	▣	Expert → Application → Maths → Maths x → Totalizer Direct access code: 400014-00x Examples: Maths 1: 400014-000; Maths 4: 400014-003
Description		Initial setting for the totalizer. Useful when continuing measurements recorded to date with an (electro)-mechanical counter. Only visible if the result is = Counter, Operating time from Status or Operating time from total.
User entry		Number (max. 15 digits)
Factory setting		0

Formula editor

Enter the desired calculation formula.

Analog, digital or already active mathematics channels can be used.

Formula editor

Navigation   Expert → Application → Maths → Maths x → Formula
Direct access code: 400002-000

x = place holder for selected mathematics channel

A text field with the formula currently used appears. If the field is empty a formula has not yet been defined for the mathematics channel.

Description   Individual channels can be mathematically linked and calculated with functions. The mathematics channels calculated in this way are treated as "real" channels, regardless of whether they are connected conventionally or via fieldbus. Enter the desired calculation formula.
Analog and digital channels can be used, as can mathematics channels that are already active.
A formula with up to 200 characters can be created using this editor. If the formula is finished, click OK to close the editor and accept the formula entered. The common entry and arithmetic operators and inputs are described in detail in the following sections.

Inputs

Inputs are described in the formula using the following syntax:

Input type (signal type;channel number)

Type of input	Description
AI	Analog inputs
DI	Digital inputs
MI	Mathematics inputs

Signal type	Description
1	Instantaneous value (measured value)
2	State
3	Counter/operational time
5	Validity: The validity of an analog or maths channel is returned. The relayed value of the function is 0 in the event of: • Open circuit • Invalid measured value • Sensor error • Input signal too high/low • Error value The relayed value of the function is 1 in the event of: Measured value OK, even if the limit value is breached
6	Delta count
7...10	Analysis 1..4
11	Totalizer
12	Duration

Not all signal types are available for each input type. These depend on the respective device options.

Channel number:

Analog channel 1 = 1, analog channel 2 = 2, digital channel 1 = 1, ...

Examples:

DI(2;4)	State of digital channel 4
AI(1;1)	Instantaneous value of analog channel 1

Status of a limit value:

LMT (type, limit number)

Type	Description
1	"Instantaneous value": Currently set limit value
2	"State": The function returns the status of a limit value The result is 1 if the limit value is violated. The result is 0 if • The limit value is not violated • The limit value is not switched on • Limits monitoring is switched off (e.g. per control input)

Examples:

LMT (1;1)	Instantaneous value of limit value 1
LMT (2;3)	State of limit value 3

Priority of operators / functions

The formula is processed based on universally applicable mathematics rules:
• Parentheses first
• Exponents before multiplication or division
• Multiplication or division before addition or subtraction
• Calculate from left to right

Operators

Arithmetic operators:

Operator	Function
+	Addition
-	Subtraction / negative sign
*	Multiplication
/	Division

Decimal separator

Both the decimal point and the decimal comma can be used in the formula editor. Thousand separators are not supported.

Check whether formula is valid or malfunctions

A formula is invalid if:
• The channels used are not switched on or are in the wrong operating mode (is not verified during formula entry as the channel could be switched on subsequently)
• It contains invalid characters/formulas/functions/operators
• Syntax errors (e.g. wrong number of parameters) occur in the formulas

- There are incorrect parentheses in the formula (number of open parentheses unequal to number of closed parentheses)
- Division is by zero
- A channel refers to itself (infinite recursion)

Invalid formulas are deactivated when the setup is accepted or the device is started.

Undetectable errors: wherever possible, errors in the formula are reported immediately during input. However, given the possible complexity of the formula entered (e.g. nested formulas) it is not possible to detect every error.

"Totalization" submenu

Navigation	🖥	Expert → Application → Maths → Maths x → Totalization
Description		Settings only needed if the calculated value - e.g. for quantity calculation - should be integrated. Analysis time frames, see "Signal analysis".

 Totalization

Navigation	🖥	Expert → Application → Maths → Maths x → Totalization → Totalization Direct access code: 400050-00x Examples: Maths 1: 400050-000; Maths 4: 400050-003
Description		By totalizing the analog signal (e.g. flow rate in m³/h) quantities (in m³) can be calculated.
Options		No, Yes
Factory setting		No

 Totalization base

Navigation	🖥	Expert → Application → Maths → Maths x → Totalization → Totalization base Direct access code: 400051-00x Examples: Maths 1: 400051-000; Maths 4: 400051-003
Description		Select the required time base. Example: ml/s -> time base seconds (s); m³/h -> time base hours (h). Only visible if totalization = Yes.
Options		Second (s), Minute (min), Hour (h), Day (d)
Factory setting		Second (s)

 Unit

Navigation	⌨	Expert → Application → Maths → Maths x → Totalization → Unit Direct access code: 400052-00x Examples: Maths 1: 400052-000; Maths 4: 400052-003
Description		Enter the unit for the calculated quantity (e.g. "m³"). Only visible if totalization = Yes.
User entry		Text (max. 6 characters)

Low flow cut off

Navigation	⌨	Expert → Application → Maths → Maths x → Totalization → Low flow cut off Direct access code: 400053-00x Examples: Maths 1: 400053-000; Maths 4: 400053-003
Description		If the volume flow recorded is below the set value, these quantities are not added to the counter. If the input is scaled from 0 to y, or if the pulse input is used, all values that are smaller than the set value are not recorded. If the input is scaled from -x to +y, all values around the zero point (e.g. also negative values) are not recorded. Only visible if totalization = Yes.
User entry		Number (max. 8 digits)
Factory setting		0

Calc. factor

Navigation	⌨	Expert → Application → Maths → Maths x → Totalization → Calc. factor Direct access code: 400054-00x Examples: Maths 1: 400054-000; Maths 4: 400054-003
Description		Factor for calculating the integrated value (e.g. the transmitter delivers l/s -> totalization base = second -> engineering unit required is m³ -> enter factor 0.001) Only visible if totalization = Yes.
User entry		Number (max. 8 digits)
Factory setting		1.0

Totalizer

Navigation	⌨	Expert → Application → Maths → Maths x → Totalization → Totalizer Direct access code: 400055-00x Examples: Maths 1: 400055-000; Maths 4: 400055-003

Description	Initial setting for the totalizer. Useful when continuing measurements recorded to date with an (electro)-mechanical counter. Only visible if totalization = Yes.
User entry	Number (max. 15 digits)
Factory setting	0

"Fault mode" submenu

Navigation	▣ Expert → Application → Maths → Maths x → Fault mode
Description	Contains settings that specify how this channel is to behave in the event of an error (e.g. if there is a cable break in an input channel or there is division by 0).

On error

Navigation	▣ Expert → Application → Maths → Maths x→ Fault mode → On error Direct access code: 400060-00x Examples: Maths 1: 400060-000; Maths 4: 400060-003
Description	Configure what value the device should continue working with (for calculations) if the measured value is not valid (e.g. cable break).
Options	Invalid calculation, Error value
Factory setting	Invalid calculation

Error value

Navigation	▣ Expert → Application → Maths → Maths x→ Fault mode → Error value Direct access code: 400061-00x Examples: Maths 1: 400061-000; Maths 4: 400061-003
Description	The device continues calculating with this value in the event of an error. Only visible if On error = Error value.
User entry	Number (max. 8 digits)
Factory setting	0

Copy settings

Navigation		Expert → Application → Maths → Maths x → Copy settings Direct access code: 400200-00x Examples: Maths 1: 400200-000; Maths 4: 400200-003
Description		Copies settings from actual channel to selected channel.
Options		No, In maths. channel x Users can choose from all the available maths channels.
Factory setting		No

"Signal analysis" submenu

Navigation		Expert → Application → Signal analysis
Description		Contains settings for signal analysis (saving).

Analysis x

Navigation		Expert → Application → Signal analysis → Analysis x Direct access code: 44000x-000 Examples: Analysis 1: 440000-000; Analysis 4: 440003-000
Description		For the set time frame, determines the minimum, maximum and average value or quantities and operating times.
		If the "Externally controlled" option is to be used, a digital input or a maths channel must be set to "Function = Control input" and "Action = Start/stop analysis x". Only analysis 1 can be configured; analyses 2-4 are permanently set to daily analysis, monthly analysis and annual analysis
Options		Switched off, Externally controlled, 1min, 2min, 3min, 4min, 5min, 10min, 15min, 30min, 1h, 2h, 3h, 4h, 6h, 8h, 12h
Factory setting		Switched off

Synchron. time

Navigation		Expert → Application → Signal analysis → Synchron. time Direct access code: 440004-000
Description		Time for completing the signal analysis. If, for example, 07:00 is set up then the daily analysis will run from 07:00 on the current day until 07:00 on the following day.
User entry		Time
Factory setting		00:00

Enter reset code

Navigation	▣ Expert → Application → Signal analysis → Reset to zero
	Direct access code: 440007-000
Description	Reset analysis.
	Note: Should only be executed after the device has adopted the setup.
Options	Please select, Analysis x, Totalizer, All
Factory setting	Please select

Reset channel

Navigation	▣ Expert → Application → Signal analysis → Reset channel
	Direct access code: 440010-000
Description	Reset analysis of a single channel.
	Note: Should only be executed after the device has adopted the setup.
Options	Please select, Universal input x, Digital input x, Maths x, Limit x, Relay x
	All active inputs are available for selection.
Factory setting	Please select

"Limits" submenu

Navigation	▣ Expert → Application → Limits
Description	Limit values can monitor the measured values. A relay, for example, can be switched if a
	limit value is violated.

Add limit value

Navigation	▣ Expert → Application → Limits → Add limit value
	Direct access code: 450300-000
Description	Adding a new limit value.
User entry	No, Yes
Factory setting	No

Delete limit value

Navigation	Expert → Application → Limits → Delete limit value Direct access code: 450301-000
Description	Deleting a limit value from the list.
User entry	No, Limit x
Factory setting	No

"Limit x" submenu

Navigation	Expert → Application → Limits → Limit x
Description	View or change the setup for the selected alarm set point. x = place holder for selected limit value

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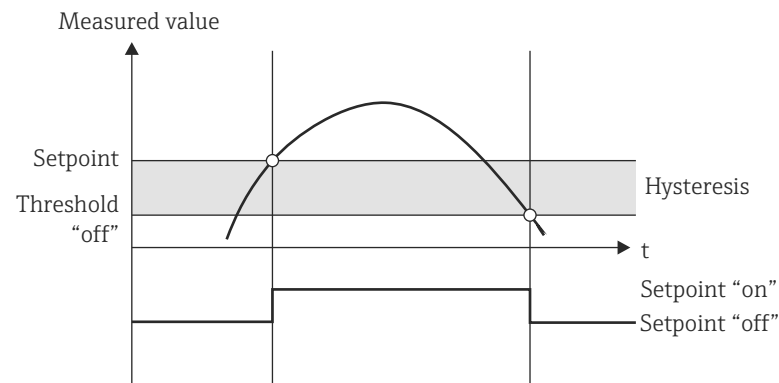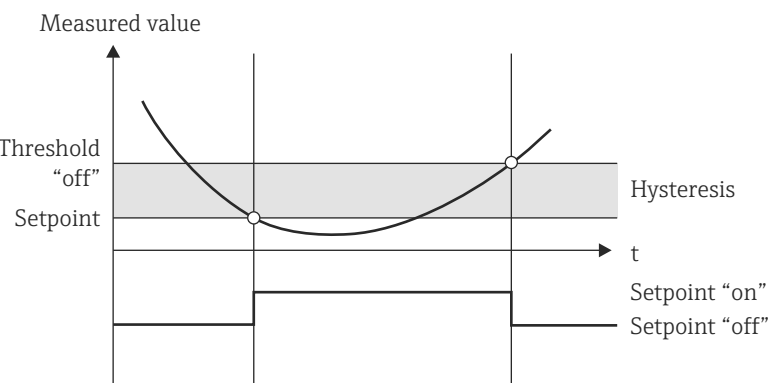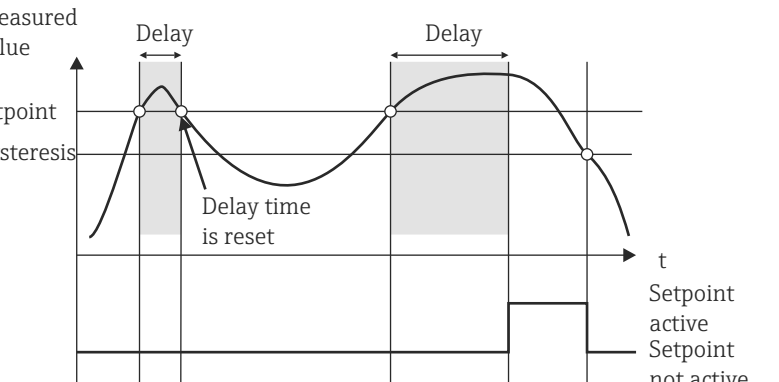
Channel/value

Navigation	Expert → Application → Limits → Limit x → Channel/value Direct access code: 450000-0xx Examples: Limit 1: 450000-000; Limit 30: 450000-029
Description	Select which input/calculated value the limit value refers to.
Options	Switched off, Universal input x, Digital input x, Maths x
Factory setting	Switched off

Type

Navigation	Expert → Application → Limits → Limit x → Type Direct access code: 450001-0xx Examples: Limit 1: 450001-000; Limit 30: 450001-029
Description	Type of limit value (depends on the input variable).
Options	Switched off, Upper set point, Lower set point, Analysis x

Description of the individual set point types

Set point type/function	Description
Hysteresis	For every set point, the switch point can be controlled via a hysteresis. The hysteresis is set as an absolute value (positive values only) in the unit of the respective channel (e.g. upper set point = 100 m, hysteresis = 1 m: Set point on = 100 m, set point off = 99 m).
Upper set point	The limit value is active if the value exceeds the configured value. The limit value is switched off if the limit value, including hysteresis, is undershot. A0010187-EN
Lower set point	The limit is active if the value drops below the configured value. The limit value is switched off if the limit value, including hysteresis, is exceeded. A0010186-EN
Special case: Hysteresis and delay for one limit value	In the special case that hysteresis and limit value delay are activated, a limit value is switched according to the following principle. If hysteresis and limit value delay are activated, the delay becomes active when a limit value is exceeded and measures the time from which the value is exceeded. If the measured value falls below the limit value, the delay is reset. This also occurs if the measured value falls below the limit value, but continues to be higher than the set hysteresis value. When the limit value is exceeded again, the time delay becomes active again and starts measuring from 0. A0010193-EN

Factory setting	Switched off

Identifier

Navigation	⊟	Expert → Application → Limits → Limit x → Identifier Direct access code: 450015-0xx Examples: Limit 1: 450015-000; Limit 30: 450015-029
Description		Name of the limit for identification purposes.
User entry		Text (max. 16 characters)
Factory setting		Limit x

Set point

Navigation	⊟	Expert → Application → Limits → Limit x → Set point Direct access code: 450003-0xx Examples: Limit 1: 450003-000; Limit 30: 450003-029
Description		Limit value in the set process unit, e.g. in ℃, m³/h.
User entry		Number (max. 10 digits)
Factory setting		0

Hysteresis (abs.)

Navigation	⊟	Expert → Application → Limits → Limit x → Hysteresis (abs.) Direct access code: 450004-0xx Examples: Limit 1: 450004-000; Limit 30: 450004-029
Description		The alarm condition is only canceled when the signal has changed into the normal operation range by the preset value.
User entry		Number (max. 8 digits)
Factory setting		0

Time delay

Navigation	▣	Expert → Application → Limits → Limit x → Time delay Direct access code: 450005-0xx Examples: Limit 1: 450005-000; Limit 30: 450005-029
Description		In order to be interpreted as an alarm the signal must exceed or undercut the preset value by at least the time set up.
User entry		0 to 99999 s
Factory setting		0 s

Switches

Navigation	▣	Expert → Application → Limits → Limit x → Switches Direct access code: 450006-0xx Examples: Limit 1: 450006-000; Limit 30: 450006-029
Description		Switches the appropriate output in the limit value state.
Options		Not used, Relay x
Factory setting		Not used

LV messages

Navigation	▣	Expert → Application → Limits → Limit x → LV messages Direct access code: 450007-0xx Examples: Limit 1: 450007-000; Limit 30: 450007-029
Description		"Do not acknowledge": Alarm condition is signaled by the tag name highlighted in red (no message is output). "Acknowledge": In the event of an alarm, a message is also displayed. This message then has to be acknowledged.
Options		Do not acknowledge, Acknowledge
Factory setting		Do not acknowledge

Save event

Navigation	▣	Expert → Application → Limits → Limit x → Save event Direct access code: 450008-0xx Examples: Limit 1: 450008-000; Limit 30: 450008-029
Description		Stores a message in the event log on limit value violation.

Options	No, Yes, only "On" message

Factory setting	Yes

Event text LV on

Navigation	⊟	Expert → Application → Limits → Limit x → Event text LV on Direct access code: 450009-0xx Examples: Limit 1: 450009-000; Limit 30: 450009-029

Description		This text (including date and time) is shown on the display and/or stored in the event log. Only available if "LV messages" is set to "Acknowledge" or "Save message" is set to "Yes". If no text is entered, the device generates its own text (e.g. Analog 1 > 100%).

User entry		Text (max. 22 characters)

Event text LV off

Navigation	⊟	Expert → Application → Limits → Limit x → Event text LV off Direct access code: 450010-0xx Examples: Limit 1: 450010-000; Limit 30: 450010-029

Description		The same as "Event text LV on", but on return from alarm to normal condition.

User entry		Text (max. 22 characters)

Record duration of LV on

Navigation	⊟	Expert → Application → Limits → Limit x → Record duration of LV on Direct access code: 450011-0xx Examples: Limit 1: 450011-000; Limit 30: 450011-029

Description		The duration of a limit value violation can be recorded. The duration is appended to the "limit value off" event text (format: <hhhh>h<mm>:<ss>). Power failure times do not affect the duration. If the set point was violated before the power failure and is still violated after the power failure, the duration continues.

Options	No, Yes

Factory setting	No

Save cycle

Navigation		Expert → Application → Limits → Limit x → Save cycle
		Direct access code: 450012-0xx
		Examples: Limit 1: 450012-000; Limit 30: 450012-029

Description	Normal: Save in normal store cycle.
	Alarm cycle: Fast storage during an alarm violation, e.g. every second. Caution: Requires higher memory capacity.
	▪ The save cycle is set under signal groups .
	▪ In the event of an alarm violation, all the groups are saved in the alarm cycle.

Options	Normal, Alarm cycle

Factory setting	Normal

Draw help line

Navigation		Expert → Application → Limits → Limit x → Draw help line
		Direct access code: 450013-0xx
		Examples: Limit 1: 450013-000; Limit 30: 450013-029

Description	The user can configure whether this set point should be displayed in the graphic as a help line (in the color of the channel).
	Note: 4 lines can be shown per channel in a single group.

Options	No, Yes

Factory setting	No

Copy settings

Navigation		Expert → Application → Limits → Limit x → Copy settings
		Direct access code: 450200-0xx
		Examples: Limit 1: 450200-000; Limit 30: 450200-029

Description	Copies settings from actual channel to selected channel.

Options	No, In limit x (all the limits are displayed)

Factory setting	No

"Signal groups" submenu

Navigation		Expert → Application → Signal groups

Description	Group the analog, digital and/or mathematics channels such that you can call up important information during operation (e.g. temperatures, signals in plant unit 1).

> **ℹ** Maximum 8 channels per group!

"Group x" submenu

Navigation	**▣** Expert → Application → Signal groups → Group x
Description	**ℹ** x = place holder for selected group.
	General settings for displaying the measured value and saving data.

Identifier

Navigation	**▣** Expert → Application → Signal groups → Group x → Identifier Direct access code: 460000-0xx Examples: Group 1: 460000-000; Group 4: 460000-003
Description	Enter a name for these groups.
User entry	Text (max. 20 characters)
Factory setting	Group x

Save cycle

Navigation	**▣** Expert → Application → Signal groups → Group x → Save cycle Direct access code: 460001-0xx Examples: Group 1: 460001-000; Group 4: 460001-003
Description	Configure the save cycle with which this group should be saved in normal conditions (see also set point/save cycle).

> **ℹ** The save cycle is independent of the measured value display (see Operating Instructions).

Options	Off, 1s, 2s, 3s, 4s, 5s, 10s, 15s, 20s, 30s, 1min, 2min, 3min, 4min, 5min, 10min, 15min, 30min, 1h
Factory setting	1min

Alarm cycle

| Navigation | 🖳 | Expert → Application → Signal groups → Group x → Alarm cycle
Direct access code: 460002-0xx
Examples: Group 1: 460002-000; Group 4: 460002-003 |

| Description | | Configure the save cycle with which this group should be saved in an alarm condition (limit value violation).
Caution: Requires higher memory capacity. |

| Options | | Off, 1s, 2s, 3s, 4s, 5s, 10s, 15s, 20s, 30s, 1min, 2min, 3min, 4min, 5min, 10min, 15min, 30min, 1h |

| Factory setting | | 1min |

Display blue

| Navigation | 🖳 | Expert → Application → Signal groups → Group x → Display blue
Direct access code: 460003-00x
Examples: Group 1: 460003-000; Group 4: 460003-003 |

| Description | | Choose which input/calculate variable should be displayed in this group. |

| Options | | Switched off, Universal input x, Digital input x, Maths x |

| Factory setting | | Switched off |

Display

| Navigation | 🖳 | Expert → Application → Signal groups → Group x → Display
Direct access code: 460004-00x
Examples: Group 1: 460004-000; Group 4: 460004-003 |

| Description | | Please select which data from the selected channel should be displayed. |

ℹ️ If the "Everything" option is selected, the device switches cyclically between the various values of the channel (instantaneous value, analysis 1 etc.)

| Options | | Instantaneous value/state, Analysis x, Totalizer, Everything |

| Factory setting | | Instantaneous value/state |

Display black

| Navigation | 🖳 | Expert → Application → Signal groups → Group x → Display black
Direct access code: 460005-00x
Examples: Group 1: 460005-000; Group 4: 460005-003 |

| Description | | Choose which input/calculate variable should be displayed in this group. |

Options	Switched off, Universal input x, Digital input x, Maths x
Factory setting	Switched off

Display

Navigation	▣ Expert → Application → Signal groups → Group x → Display Direct access code: 460006-0xx Examples: Group 1: 460006-000; Group 4: 460006-003
Description	Please select which data from the selected channel should be displayed.
Options	Instantaneous value/state, Analysis x, Totalizer, Everything
Factory setting	Instantaneous value/state

Display red

Navigation	▣ Expert → Application → Signal groups → Group x → Display red Direct access code: 460007-00x Examples: Group 1: 460007-000; Group 4: 460007-003
Description	Choose which input/calculate variable should be displayed in this group.
Options	Switched off, Universal input x, Digital input x, Maths x
Factory setting	Switched off

Display

Navigation	▣ Expert → Application → Signal groups → Group x → Display Direct access code: 460008-0xx Examples: Group 1: 460008-000; Group 4: 460008-003
Description	Please select which data from the selected channel should be displayed.
Options	Instantaneous value/state, Analysis x, Totalizer, Everything
Factory setting	Instantaneous value/state

Display green

Navigation	🖥	Expert → Application → Signal groups → Group x → Display green Direct access code: 460009-00x Examples: Group 1: 460009-000; Group 4: 460009-003

Description	Choose which input/calculate variable should be displayed in this group.

Options	Switched off, Universal input x, Digital input x, Maths x

Factory setting	Switched off

Display

Navigation	🖥	Expert → Application → Signal groups → Group x → Display Direct access code: 460010-0xx Examples: Group 1: 460010-000; Group 4: 460010-003

Description	Please select which data from the selected channel should be displayed.

Options	Instantaneous value/state, Analysis x, Totalizer, Everything

Factory setting	Instantaneous value/state

Display violet

Navigation	🖥	Expert → Application → Signal groups → Group x → Display violet Direct access code: 460011-00x Examples: Group 1: 460011-000; Group 4: 460011-003

Description	Choose which input/calculate variable should be displayed in this group.

Options	Switched off, Universal input x, Digital input x, Maths x

Factory setting	Switched off

Display

Navigation	🖥	Expert → Application → Signal groups → Group x → Display Direct access code: 460012-0xx Examples: Group 1: 460012-000; Group 4: 460012-003

Description	Please select which data from the selected channel should be displayed.

Options	Instantaneous value/state, Analysis x, Totalizer, Everything

Factory setting	Instantaneous value/state

Display orange

Navigation	▤	Expert → Application → Signal groups → Group x → Display orange Direct access code: 460013-00x Examples: Group 1: 460013-000; Group 4: 460013-003

Description   Choose which input/calculate variable should be displayed in this group.

Options   Switched off, Universal input x, Digital input x, Maths x

Factory setting   Switched off

Display

Navigation	▤	Expert → Application → Signal groups → Group x → Display Direct access code: 460014-0xx Examples: Group 1: 460014-000; Group 4: 460014-003

Description   Please select which data from the selected channel should be displayed.

Options   Instantaneous value/state, Analysis x, Totalizer, Everything

Factory setting   Instantaneous value/state

Display cyan

Navigation	▤	Expert → Application → Signal groups → Group x → Display cyan Direct access code: 460015-00x Examples: Group 1: 460015-000; Group 4: 460015-003

Description   Choose which input/calculate variable should be displayed in this group.

Options   Switched off, Universal input x, Digital input x, Maths x

Factory setting   Switched off

Display

Navigation	▤	Expert → Application → Signal groups → Group x → Display Direct access code: 460016-0xx Examples: Group 1: 460016-000; Group 4: 460016-003

Description   Please select which data from the selected channel should be displayed.

Options	Instantaneous value/state, Analysis x, Totalizer, Everything
Factory setting	Instantaneous value/state

Display brown

Navigation	▤	Expert → Application → Signal groups → Group x → Display brown Direct access code: 460017-00x Examples: Group 1: 460017-000; Group 4: 460017-003
Description		Choose which input/calculate variable should be displayed in this group.
Options		Switched off, Universal input x, Digital input x, Maths x
Factory setting		Switched off

Display

Navigation	▤	Expert → Application → Signal groups → Group x → Display Direct access code: 460018-0xx Examples: Group 1: 460018-000; Group 4: 460018-003
Description		Please select which data from the selected channel should be displayed.
Options		Instantaneous value/state, Analysis x, Totalizer, Everything
Factory setting		Instantaneous value/state

Grid divisions

Navigation	▤	Expert → Application → Signal groups → Group x → Grid divisions Direct access code: 460019-0xx Examples: Group 1: 460019-000; Group 4: 460019-003
Description		Indicates the number of lines ("amplitude grid") that should be displayed. Example: display of 0 to 100%: select 10 divisions, display 0 to 14pH: select 14 divisions.
Options		1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
Factory setting		10

Zoom

Navigation	Expert → Application → Signal groups → Group x → Zoom Direct access code: 460028-0xx Examples: Group 1: 460028-000; Group 4: 460028-003
Description	Defines the zoom that is shown in "Curves" or "Waterfall" display mode. This setting does not affect other display modes (e.g. Curves in range, Bar graph etc.).
Options	Do not display, Scroll display, Display blue, Display black, Display red, Display green, Display violet, Display orange, Display cyan, Display brown
Factory setting	Do not display

"E-mail" submenu

Navigation	Expert → Application → E-mail With Telealarm option under Expert → Application → Telealarm → General → E-mail setup
Description	Contains settings required if alarms are to be transmitted by e-mail. Test the e-mail settings under Diagnostics → Simulation → E-mail.

SMTP host

Navigation	Expert → Application → E-mail → SMTP host Direct access code: 510062-000
Description	Enter your SMTP host here. If necessary, contact your network administrator or e-mail provider.
User entry	Text (max. 40 characters)

Server requires SSL

Navigation	Expert → Application → E-mail → Server requires SSL Direct access code: 510061-000
Description	Specify whether the e-mail server requires a secure connection (SSL). STARTTLS: Runs on the same TCP port as unencrypted SMTP (port 25 or 587). SMTPS: Completely encrypted with own TCP port (465). If necessary, contact your network administrator or e-mail provider.
Options	No, Yes (SMTPS), Yes (STARTTLS)
Factory setting	No

Port	
Navigation	Expert → Application → E-mail → Port Direct access code: 510063-000
Description	Enter your SMTP port here. If necessary, contact your network administrator or e-mail provider.
User entry	Number (max. 4 digits)
Factory setting	25

Sender	
Navigation	Expert → Application → E-mail → Sender Direct access code: 510064-000
Description	Enter the e-mail address of the device here (this text appears as the sender of the e-mail). If necessary, contact your network administrator or e-mail provider. If a valid e-mail address is not configured this might cause e-mail transmission problems, depending on the particular provider.
User entry	Text (max. 60 characters)

User name	
Navigation	Expert → Application → E-mail → User name Direct access code: 510066-000
Description	Configure the user name of the e-mail account here. If necessary, contact your network administrator or e-mail provider.
User entry	Text (max. 60 characters)

Password	
Navigation	Expert → Application → E-mail → Password Direct access code: 510067-000
Description	Enter the password for authentication here. If necessary, contact your network administrator or e-mail provider.
User entry	Text (max. 22 characters)

"E-mail addresses" submenu

Navigation	⊟ Expert → Application → E-mail → E-mail addresses
Description	Here, enter all the e-mail addresses messages should be sent to in the event of an alarm.
	ℹ️ Assignment to the alarms is performed later on.

E-mail address x

Navigation	⊟ Expert → Application → E-mail → E-mail addresses → E-mail address x
	Direct access code:
	E-mail address 1: 510080-000
	...
	E-mail address 5: 510084-000
Description	Here, enter an e-mail address a message should be sent to.
	ℹ️ Assignment to the alarms is performed later on.
User entry	Text (max. 60 characters)

"Limit value violations" submenu

Navigation	⊟ Expert → Application → E-mail → Limit value violations
Description	Specify who should receive e-mails when limit value violations occur (both on and off messages).
	ℹ️ Only for limit values where "Save message" is set to "Yes".

Recipient x

Navigation	⊟ Expert → Application → E-mail → Limit value violations → Recipient x
	Direct access code:
	Recipient 1: 510110-000; Recipient 2: 510111-000
Description	Select who should receive the e-mail.
Options	Not used, E-mail address x
Factory setting	Not used

"On/off messages" submenu

Navigation   Expert → Application → E-mail → On/off messages

Description   Specify who should receive e-mails when "on"/"off" messages occur (for digital inputs or maths channels).

🛈 Only for inputs where "Save message" is set to "Yes".

Recipient x

Navigation   Expert → Application → E-mail → On/off messages → Recipient x
Direct access code:
Recipient 1: 510115-000; Recipient 2: 510116-000

Description   Select who should receive the e-mail.

Options   Not used, E-mail address x

Factory setting   Not used

"Errors (Fxxx/Sxxx)" submenu

Navigation   Expert → Application → E-mail → Errors (Fxxx/Sxxx)

Description   Specify who should receive e-mails when errors occur (Fxxx and Sxxx messages).

Recipient x

Navigation   Expert→ Application → E-mail → Errors→ Recipient x
Direct access code:
Recipient 1: 510120-000; Recipient 2: 510121-000

Description   Select who should receive the e-mail.

Options   Not used, E-mail address x

Factory setting   Not used

"Maintenance required" (submenu)

Navigation   Expert → Application → E-mail → Maintenance required

Description   Specify who should receive e-mails when maintenance is required (Mxxx messages).

Recipient x

Navigation	Expert → Application → E-mail → Maintenance required → Recipient x
	Direct access code:
	Recipient 1: 510130-000; Recipient 2: 510131-000
Description	Select who should receive the e-mail.
Options	Not used, E-mail address x
Factory setting	Not used

"WebDAV Client" submenu

Navigation	Expert → Application → WebDAV Client
Description	All recorded data are transmitted to an external WebDAV server (e.g. NAS). The format can be specified or selected via **"Setup → Advanced setup → System → External memory -> Save as"**.

Parameter	Description	Direct access code
Enable	Switch the WebDAV client functionality on/off. When active, the device copies the saved measured values automatically to the configured server. ℹ️ Only possible using the Ethernet interface! **Options:** No, Yes, Yes (SSL) **Factory setting:** No	472000-000
IP address	Enter the IP address of the WebDAV server here. ℹ️ A DNS name can also be used. **User entry:** IP address **Factory setting:** 0.0.0.0	472001-000
Port	This communication port is used to communicate with the WebDAV Server. ℹ️ If your network is protected by a firewall, this port may have to be enabled. Please contact your network administrator if this is the case. **User entry:** Numbers (max. 5 digits) **Factory setting:** 80	472002-000
User name	Input of the user name that can access the WebDAV server. **User entry:** Text (max. 20 characters)	472004-000
Password	Password for accessing the WebDAV server. **User entry:** Text (max. 20 characters)	472007-000
Directory	Enter the directory in which the data should be saved. **User entry:** Text (max. 120 characters)	472005-000
Save as	"Protected format": All data are stored in a manipulation protected encrypted format. They can be interpreted only by the PC analysis software provided. "Open format": data are saved in CSV format, this can be opened by a number of different programs (e.g. MS Excel) (Caution: no tamper protection). **Options:** Protected format, Open format (*.csv) **Factory setting:** Protected format	472010-000

ℹ️ Test of WebDAV client settings under **"Diagnostics → Simulation → WebDAV Client"**.

16.1.6   "Diagnostics" submenu

Device information and service functions for a swift device check.

Only some of the diagnostic functions are available under Expert → Diagnostics. For other functions, see Main menu → Diagnostics.

Actual diagnostics

Navigation	Expert → Diagnostics → Actual diagnostics Direct access code: 050000-000
Description	Displays the current diagnostic message.

Last diagnostics

Navigation	Expert → Diagnostics → Last diagnostics Direct access code: 050005-000
Description	Displays the last diagnostic message.

Last restart

Navigation	Expert → Diagnostics → Last restart Direct access code: 050010-000
Description	Information as to when the device was last restarted (e.g. due to a power failure).

"Event logbook" submenu

Navigation	Expert → Diagnostics → Event logbook
Description	Events such as limit value violations and power failure are listed in the chronological order in which they occurred.

"Device information" submenu

Navigation	Expert → Diagnostics → Device information
Description	Displays important device information.

Device tag

Navigation	Expert → Diagnostics → Device information → Device tag Direct access code: 000031-000
Description	Individual device tag name/unit identifier (max. 32 characters).

Serial number

Navigation	Expert → Diagnostics → Device information → Serial number Direct access code: 000027-000
Description	Individual serial number of the device. Please provide these details when ordering spare parts or asking any questions about the unit.

Order code

Navigation	Expert → Diagnostics → Device information → Order code Direct access code: 000029-000
Description	Displays the order code. The order code indicates the attribute of all the features of the product structure for the device and thus uniquely identifies the device. It can also be found on the nameplate. Uses of the order code • To order an identical spare device. • To check the ordered device features using the delivery note.

Firmware version

Navigation	Expert → Diagnostics → Device information → Firmware version Direct access code: 000026-000
Description	Displays the installed firmware version of the device. Please send these details with any questions about the unit.

ENP version

Navigation	Expert → Diagnostics → Device information → ENP version Direct access code: 000032-000
Description	Displays the version of the electronic nameplate. Please send these details with any questions about the unit.

ENP device name

Navigation   ▣   Expert → Diagnostics → Device information → ENP device name
                                    Direct access code: 000020-000

Description   Displays the ENP device name (electronic name plate). Please send these details with any
                               questions about the unit.

Device name

Navigation   ▣   Expert → Diagnostics → Device information → Device name
                                    Direct access code: 000021-000

Description   Displays the device name. Please send these details with any questions about the unit.

Manufacturer ID

Navigation   ▣   Expert → Diagnostics → Device information → Manufacturer ID
                                    Direct access code: 000022-000

Description   Displays the manufacturer ID. Please send these details with any questions about the unit.

Manufacturer name

Navigation   ▣   Expert → Diagnostics → Device information → Manufacturer name
                                    Direct access code: 000023-000

Description   Displays the manufacturer name. Please send these details with any questions about the
                               unit.

Firmware

Navigation   ▣   Expert → Diagnostics → Device information → Firmware
                                    Direct access code: 009998-000

Description   Displays the installed firmware of the device. Please send these details with any questions
                               about the unit.

"Simulation" submenu

Navigation   Expert → Diagnostics → Simulation

Description   Settings for simulation mode.

 Operating mode

Navigation   Expert → Diagnostics → Simulation → Operating mode
                              Direct access code: 010010-000

Description   Normal operation: Unit plots the signals from the connected measurement points.
                              Simulation: Instead of operating with the real measurement points the signals are
                              simulated (using the actual settings).

Options   Normal operation, Simulation

Factory setting   Normal operation

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