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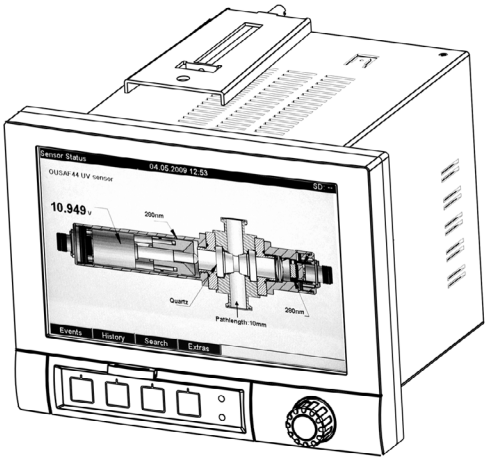
Brief Operating Instructions
Memograph CVM40

Graphic transmitter for inline photometers and data manager



These instructions are Brief Operating Instructions. For detailed information please read the Operating Instructions.

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1 About this document

1.1 Warnings

The structure, signal words and safety colors of the signs comply with the specifications of ANSI Z535.6 ("Product safety information in product manuals, instructions and other collateral materials").

Safety message structure	Meaning
⚠ DANGER **Cause (/consequences)** Consequences if safety message is not heeded ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation will result in a fatal or serious injury.
⚠ WARNING **Cause (/consequences)** Consequences if safety message is not heeded ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation can result in a fatal or serious injury.
⚠ CAUTION **Cause (/consequences)** Consequences if safety message is not heeded ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE **Cause/situation** Consequences if safety message is not heeded ▶ Action/note	This symbol alerts you to situations that can result in damage to property and equipment.

1.2 Document symbols

Additional information, tips

Permitted or recommended

Forbidden or not recommended

2 Basic safety instructions

2.1 Requirements for the personnel

- ▶ Installation, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel.
- ▶ The technical personnel must be authorized to perform the tasks by the owner-operator.
- ▶ The electrical connection may only be established by an electrical technician.
- ▶ The technical personnel must have read and understood these Operating Instructions and must follow the instructions they contain.
- ▶ Faults at the measuring point may only be rectified by authorized and properly trained personnel.

Repairs not described in the enclosed Operating Instructions may only be carried out directly at the manufacturer's or by the Service Organization.

2.2 Designated use

This unit is designed for operating inline photometers for UV, color, NIR, turbidity and cell growth. Furthermore it can be used for the electronic acquisition, display, recording, analysis, remote transmission and archiving of analog and digital input signals in non-hazardous areas. The unit is suitable for installation in a panel or a cabinet and may only be operated in an installed state.

Any other use than the one described here compromises the safety of persons and the entire measuring system and is not permitted.
The manufacturer is not liable for damage caused by improper or non-designated use.

2.3 Workplace safety

The measuring system has been designed and tested to the highest standards and left the factory in perfect functioning order.
Relevant regulations and European standards have been met.

As the user, you are responsible for complying with the following safety conditions:
- Installation instructions
- Local prevailing standards and regulations.

Immunity to interference
This instrument has been tested for electromagnetic compatibility in industrial use according to applicable European standards.
Protection against interference as specified above is valid only for an instrument connected according to the instructions in these Operating Instructions.

2.4 Operational safety

- ▶ Prior to commissioning the entire measuring point, check that all connections are correct. Make sure that electric cables and hose connections are not damaged.
- ▶ Do not commission damaged products. Protect them against unintentional startup. Label and identify the damaged product as defective.
- ▶ If the faults cannot be eliminated, take the products out of service and protect them against unintentional startup.

2.5 Product safety

The transmitter is designed 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.
The applicable regulations and European standards have been taken into account.

3 Identification

3.1 Scope of delivery

The scope of delivery comprises:
- Device (with terminals, as per your order)
- 2 fastening clips
- USB interface cable, length 1.5 m (4.9 ft)
- Optional secure digital (SD) card (card not in device but is supplied)
- PC operating and configuration software on CD-ROM
- Lamp voltage sense tool
- Brief Operating Instructions as hard copy
- Operating Instructions on CD-ROM

If you have any questions, please contact your supplier or your local sales center.

4 Installation

4.1 Measuring system

A complete measuring system comprises:
- Memograph M CVM40
- An optical sensor, e.g. OUSAF44
- Flow assembly, e.g. OUA260
- Cable set, e.g. OUK40

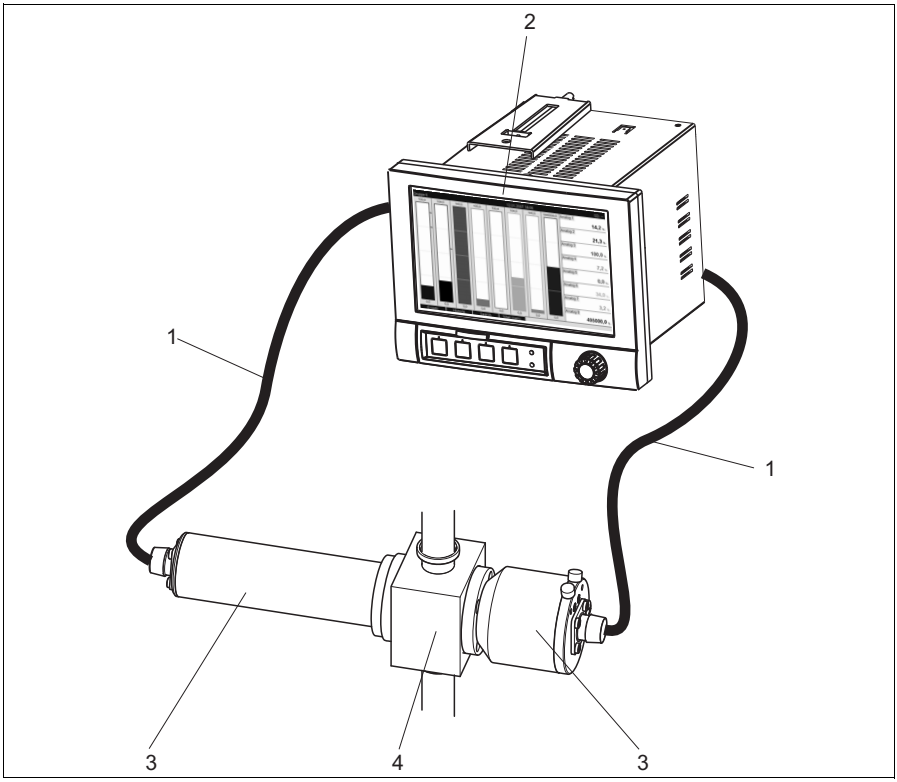

Fig. 1: Example of a measuring system

1 Cable set OUK40
2 Memograph M CVM40 photometer
3 OUSAF44 sensor
4 OUA260 flow assembly

4.2 Installation conditions

Working temperature range:
-10 to 50 °C (14 to 122 °F), max. 75% rel. humidity without condensation.

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

4.3 Installation instructions

4.3.1 Mounting the device

Panel cutout and installation / design, dimensions

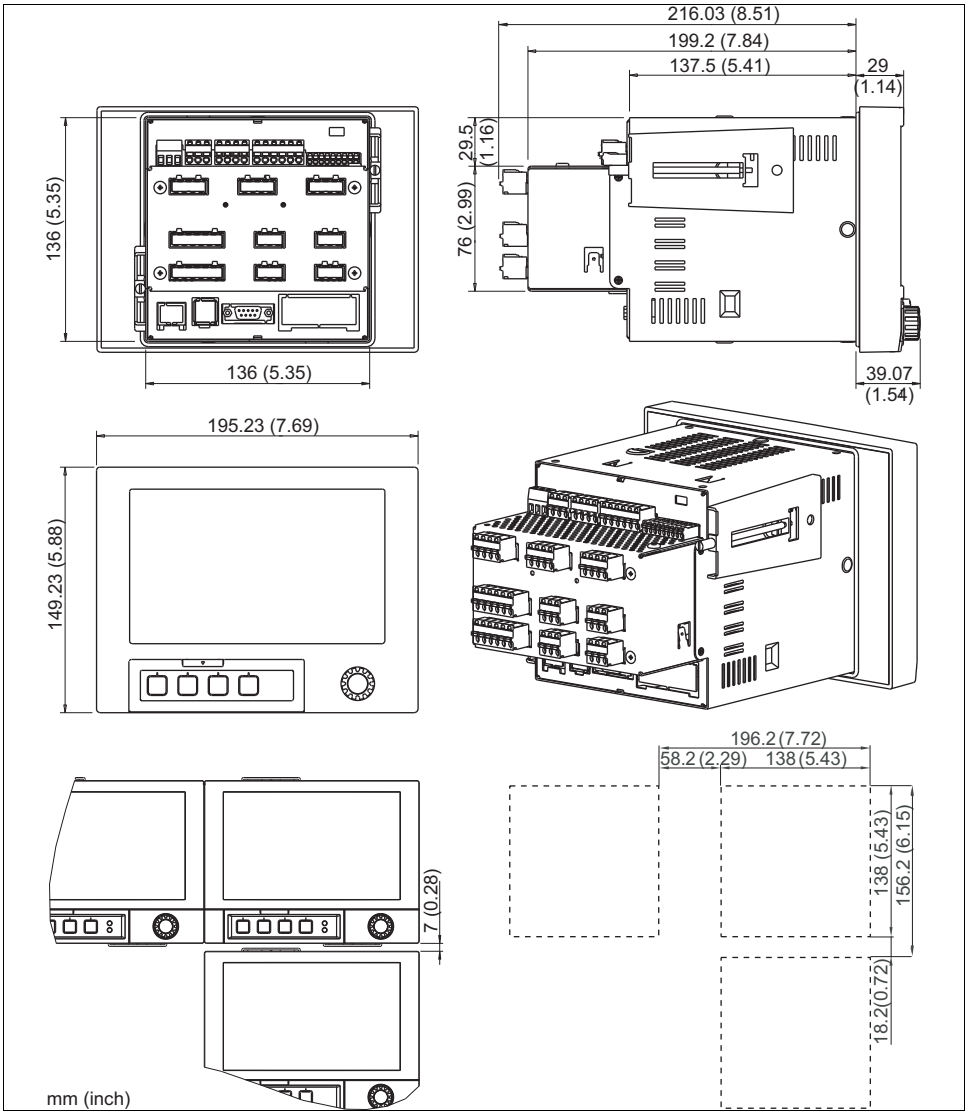

Fig. 2: Dimensions / panel cutout

Mounting dimensions:
- Installation depth: approx. 216 mm (8.51") (incl. terminals)
- Panel cutout: 138^{+1} x 138^{+1} mm ($5.43^{+0.04}$ x $5.43^{+0.04}$")
- Panel thickness: 2 to 40 mm (0.08 to 1.58")
- Max. viewing angle range: from the central display axis 50° in all directions
- Securing according to DIN 43 834

Make sure to leave an additional clearance of min. 35 mm (1.4") for cable connection.

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

Note the following points for installation:

- A distance of min. 7 mm (0.28") has to be observed if aligning the devices in the Y direction (vertically above on another).
- The devices can be arranged horizontally beside on another in the X direction without any spacing between the devices.
- The grid dimension of the panel cutouts for multiple devices must be min. 196.2 mm (7.72") horizontally and min. 156.2 mm (6.15") vertically (tolerance not considered).

5 Wiring

5.1 Electrical connection

⚠ WARNING

Device is energized

Incorrect wiring can result in injury or fatality

- The electrical connection may only be established by an electrical technician.
- The electrical technician must have read and understood these Operating Instructions and must follow the instructions they contain.
- **Prior to beginning** any wiring work, make sure voltage is not applied to any of the cables.
- The ground connection must be made before all other connections. Any interruption in the ground can cause danger.

NOTICE

The device does not have a power switch

- You must provide a protected circuit breaker in the vicinity of the device.
- This must be a switch or a power-circuit breaker and you must label it as the circuit breaker for the device.
- The mixed connection of safe extra-low voltage and dangerous contact voltage to the relay is not permitted.

Before commissioning, compare the supply voltage with the information specified on the nameplate (left-hand side of the housing).
Provide a suitable switch or circuit breaker when installing in a building. This switch must be installed near the unit (easily accessible) and must be properly labeled.
An overcurrent protective unit (nominal current ≤10 A) is required for the power cable.

5.2 Wiring diagram

Memograph CVM40 sensor terminal chart				
Parameter	**Sensor**	**1 optical channel**	**2 optical channels**	**4 optical channels**
Absorption Color and NIR	OUSAF11	S1	S1 / S2[1)]	S1 / S3[2)]
	OUSAF12	S1	S1 / S2[1)]	S1 / S3[2)]
	OUSAF21	n/a	S1 & S2	S1 & S2
	OUSAF22	n/a	S1 & S2	S1 & S2
UV absorption	OUSAF44	n/a	S1 & S2	S1 & S2
	OUSAF45	n/a	S1 & S2	S1 & S2
	OUSAF46	n/a	n/a	S1 & S2 S3 & S4
Turbidity	OUSTF10	n/a	S1 & S2	S1 & S2
Cell growth	OUSBT66	S1	S1 / S2[1)]	S1 / S3[2)]

1) One sensor: S1 or S2 / S3

2) Two sensors: S1 and S2 / S3

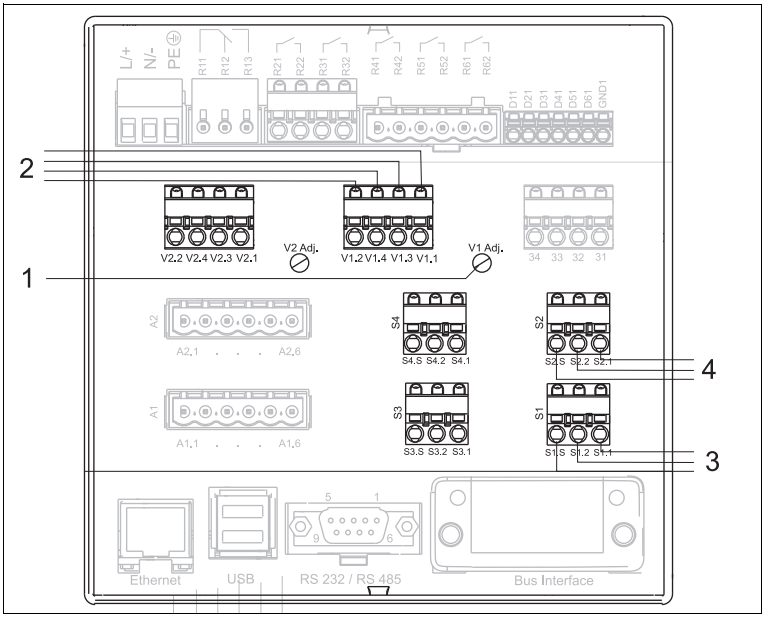

Fig. 3: Wiring diagram with terminals for lamps and sensors

1 Lamp voltage adjustment
Turn clockwise: voltage decrease
Turn counter-clockwise: voltage increase

2 V1.1: Lamp voltage + (Yellow bold)
V1.3: Lamp sense + (Yellow thin)
V1.4: Lamp sense - (Black thin)
V1.2: Lamp voltage - (Black bold)

3 S1.1: Photo diode anode (Red for measurement detector)
S1.2: Photo diode cathode (Black for measurement detector)
S1.S: Shield (Grey)

4 S2.1: Photo diode anode (White for reference detector)
S2.2: Photo diode cathode (Green for reference detector)
S2.S: Shield (Grey)

Lamp voltage adjustment (Vx Adj.):
- Turn clockwise to decrease voltage.
- Turn counter-clockwise to increase voltage.

Lamp voltage sense tool:
The lamp voltage sense tool allows to read the lamp voltage on the display of CVM40 without the cable and sensor connected.
This procedure is only necessary when changing the sensor type. E.g. when changing from an OUSAF44 sensor to an OUSTF10 sensor, the lamp voltage needs to be reduced from 12V to 5V. User has to do this change prior to connecting the sensor.

NOTICE
Changing the sensor type without using lamp voltage sense tool
Can damage the lamp
▶ Use this tool before connecting any new sensor type to the transmitter.

By using the lamp voltage sense tool the lamp voltage can be adjusted approximately to the rated value before connecting the sensor. Connect the power supply pin V1.1 and V1.2 to voltage sense pin V1.3 and V1.4.

The following steps are required for changing the sensor type:

1. Disconnect the cable set of the old sensor.
2. Connect the lamp voltage sense tool to the lamp power supply.
3. Adjust the voltage trimmer to the rated lamp voltage.
4. Take off the voltage sense tool.
5. Connect the cable set of the new sensor to the lamp power supply.
6. Observe the lamp voltage on the display and fine tune the lamp voltage to compensate the voltage drop on the cable.

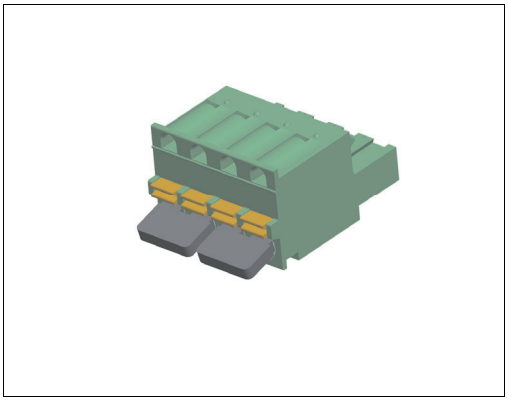

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Fig. 4: Lamp voltage sense tool

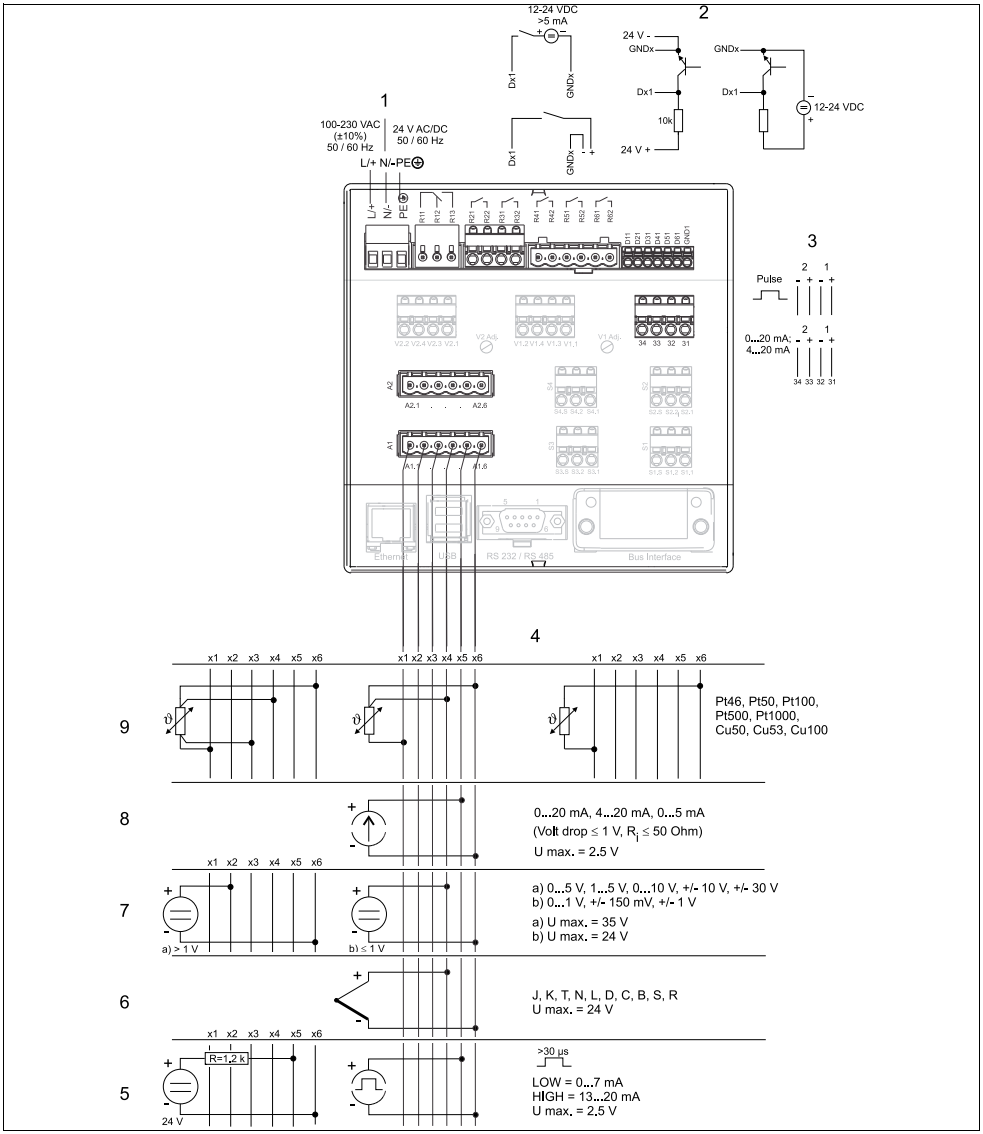

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Fig. 5: Wiring diagram

1 *Power supply*
2 *Binary inputs (D)*
3 *Analog outputs (O)*
4 *Analog inputs*
5 *Pulse / frequency*
6 *Thermocouples (TC)*
7 *Voltage (U)*
8 *Current (I)*
9 *Resistance thermometer (RTD)*

5.3 Terminal assignment

NOTICE

High-energy transients occur when using long signal cables

- Connect a suitable overvoltage protection (e.g. E+H HAW560/562).
- Use shielded signal lines for serial interfaces!

5.3.1 Cable specification, spring terminals

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

Wire cross-sections:

Digital I/O and analog inputs:	max. 1.5 mm^2 (14 AWG) (spring terminals)
Power supply:	max. 2.5 mm^2 (13 AWG) (screw terminals)
Relays:	max. 2.5 mm^2 (13 AWG) (spring terminals)
Stripped length:	10 mm (0.39 inch), 6 mm (0.24 inch) for power terminal

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

5.4 Interface connection

Ethernet, RS232/485 and USB connection

Details on connecting the interfaces can be found in the Operating Instructions on CD-ROM, Section 4.4 "Interface connection".

6 Commissioning and operation

When ordered as a complete measuring system the unit is factory-calibrated and preset with the related sensor and armature. Operation of measuring loop based on basic settings is guaranteed when switching on the device.

6.1 Display and operating elements

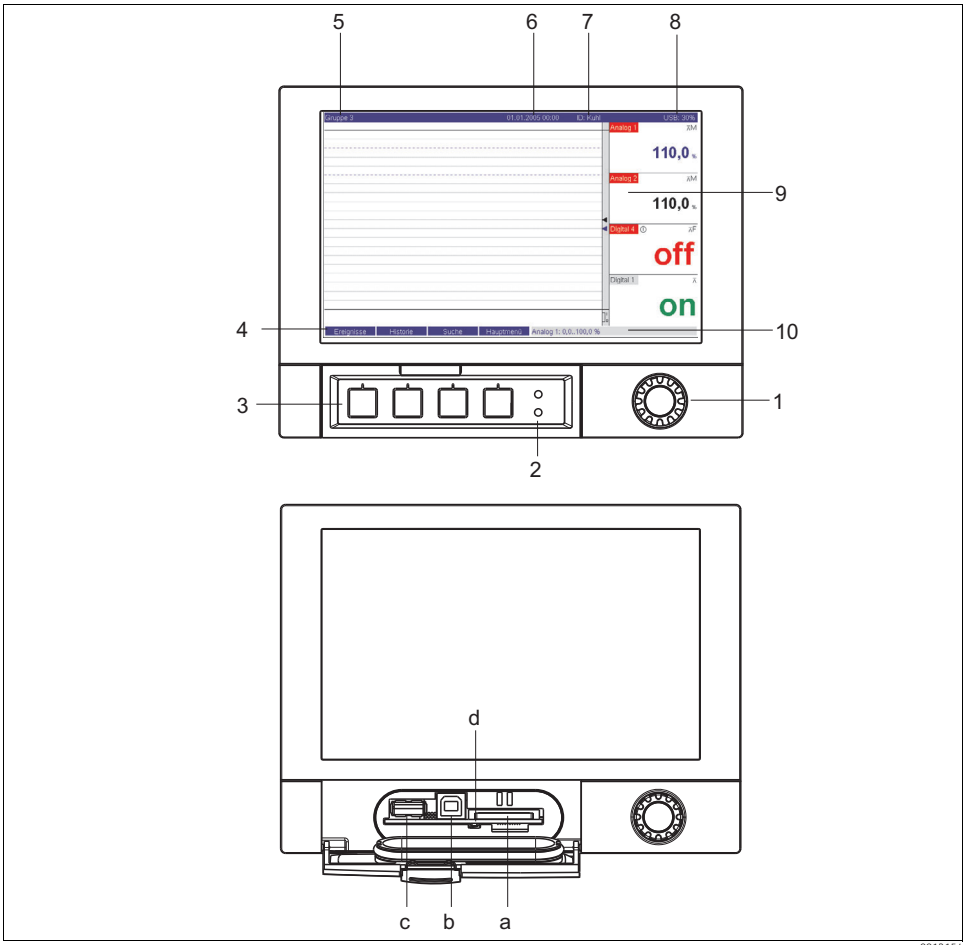


Fig. 6: Device display/operating units

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

Operating element (Item No.)	Operating function (Display mode = measured value display) (Setup mode = operating in the Setup menu)
d	LED at SD slot Yellow LED lit when the unit writes to the SD card or reads it. **NOTICE** **Removing the SD card while yellow LED (d) is lit** Risk of data loss! ▶ Wait until yellow LED does not flash anymore.

1) Overview of symbols, Chapter "Overview of the symbols used".

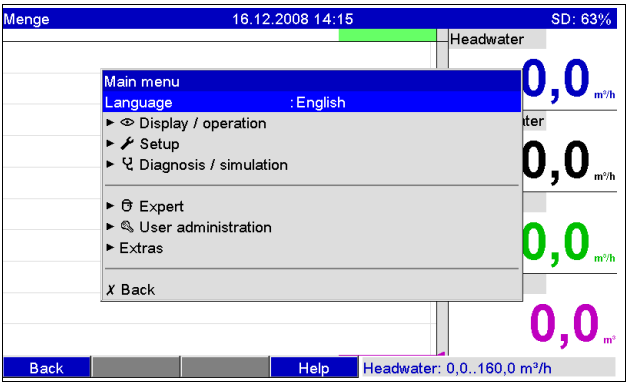
6.2 Switching on

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

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

6.2.1 Configuring the operating language

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



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6.3 Setup

6.3.1 General information

When ordered as a complete measuring system the unit is factory-calibrated and preset with the related sensor and armature. Operation of measuring loop based on basic settings is guaranteed when switching on the device.

You can also start up or configure your unit via PC and the supplied PC software. The following are available for this:

1. Front USB B system interface (see Section 6.3.3)
2. SD card slot for reading in the parameters stored on the SD card (see Section 6.3.4)
3. USB A socket on the front or rear of the device to read in parameters stored on a USB stick (see Section 6.3.5)
4. Rear system interfaces RS232/RS485/Ethernet (see Section 6.3.3)

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

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

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

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

Procedure for unit configuration/setup

Start

▼

System settings (language, date/time, communication, safety, etc.)

▼

Inputs (universal inputs: signal type, input range, etc.)

▼

Inputs (digital inputs: function, designation, etc.)

▼

Inputs for mathematics channels

▼

Outputs (relay or analog/pulse outputs - if necessary)

▼

Application settings (limit values and alarm relays - if necessary)

▼

Application settings (signal grouping, text, softkeys)

▼

End

6.3.3 Setup - Inputs

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

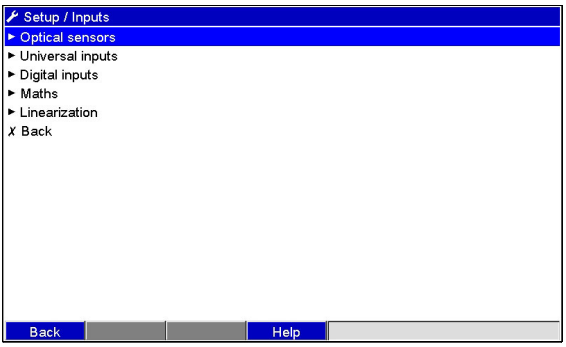

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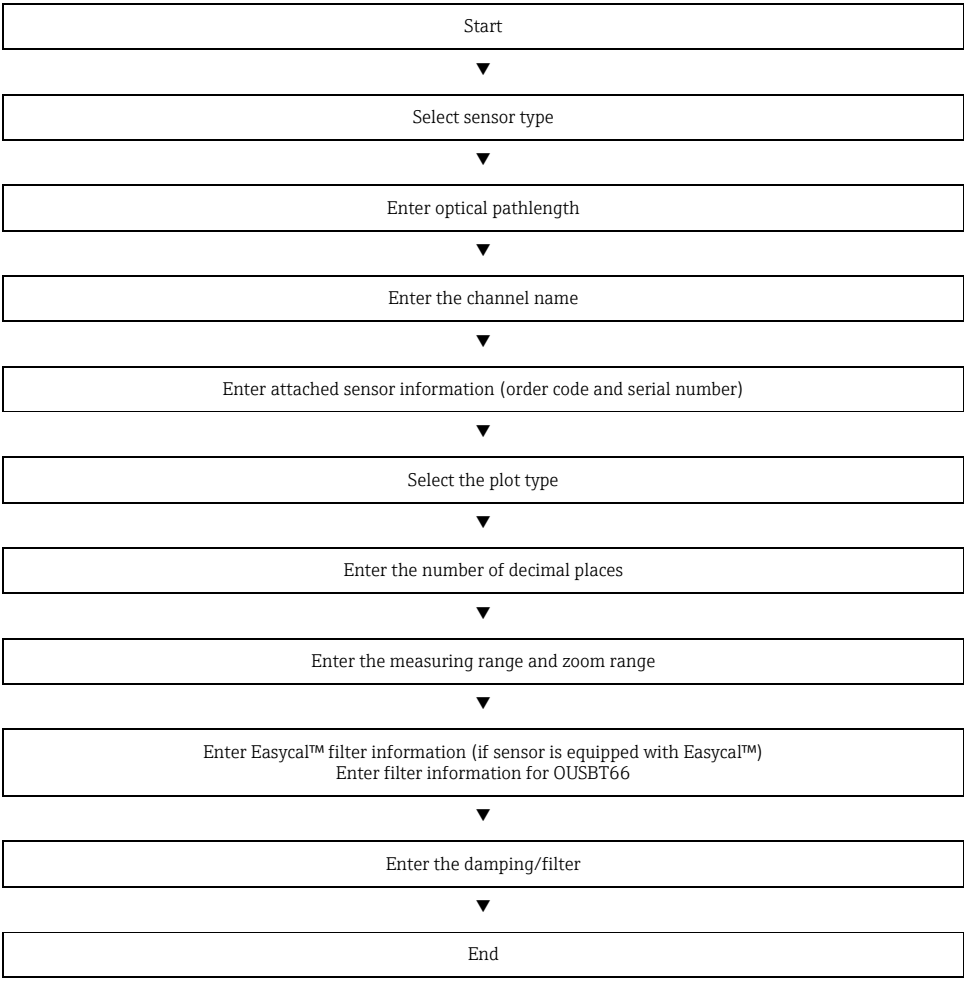
Fig. 7: Setup - Inputs

Setup - Inputs submenu: Optical sensors

Procedure for the signal settings of the optical sensors:



"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)
Submenu: Optical sensors, optical sensor x	View or change settings of the connected optical sensor for the selected channel. The unit can be equipped with a maximum of 2 optical sensors.

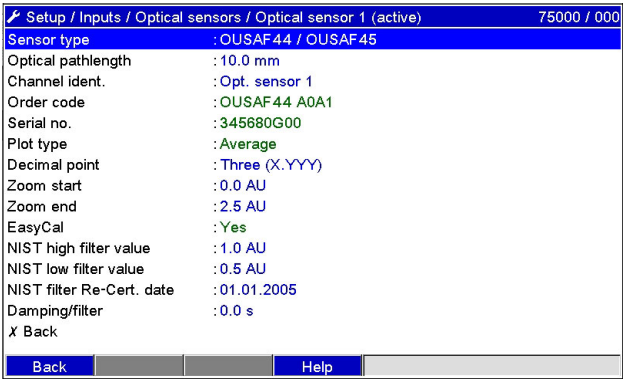


Fig. 8: Setup - Inputs, submenu: Optical sensors, Optical sensor

Sensor type	Select the connected optical sensor type (OUSAF44, OUSAF45, etc.). The channel is switched off if no sensor is selected (factory default). Picklist: **switched off**, OUSAF11/AF12/AF13, OUSAF21/OUSAF22/OUSAF23, OUSAF44/OUSAF45, OUSAF46, OUSTF10/OUSAF30, OUSBT65/OUSBT66
Optical pathlength	Enter the distance between both side glasses in the flowcell. The distance depends on the line size and the process connection.
Channel ident.	Identifier for the optical sensor connected to this input. 16-character entry. **Factory setting: Optical sensor x**
Order code	Displays the order code of the connected optical sensor.
Serial number	Displays the serial number of the connected optical sensor.

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)	
	Plot type	The optical sensors are scanned at 100ms cycles. Depending on the save cycle, the selected data are determined from the scanned values and saved (e.g. with a save cycle of 1 min., the average of 600 values (10x60) is calculated and saved). "Instantaneous value": the value pending for the save cycle is saved. **"Average":** the average value during the save cycle is calculated and saved. "Minimum value": the minimum value is calculated and saved. "Maximum value": the maximum value is calculated and saved. "Minimum + Maximum": both minimum and maximum values are saved (requires higher memory capacity)
	Decimal point	Number of places after decimal point for the display. Picklist is 0 to 5 places after the decimal point. This information is only used to better display the measured value. Factory setting: **one (X,Y)**
	Zoom start	If the total transmitter range is not being used then the lower value of the required range can be entered here (higher resolution). Example: transmitter 0 to 2.5 AU, required range: 0.75 to 2 AU. Set up "0.75" here. The zoom has no influence on the storage.
	Zoom end	As in "Zoom start". Enter the upper value of the required range here. Example: transmitter 0 to 2.5 AU, required range: 0.75 to 2 AU. Enter "2" here.
	Easycal™ (not available for OUSTF10, OUSAF30, OUSBT65/66,	Patented calibration method using NIST traceable filters.
	NIST high filter value (with Easycal™ only)	Enter the high neutral density filter value. Refer to the Easycal™ calibration certificate for the correct value.
	NIST low filter value (with Easycal™ only)	Enter the low neutral density filter value. Refer to the Easycal™ calibration certificate for the correct value.

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)	
	NIST filter Re-cert. date (with Easycal™ only)	Deadline for recertification of NIST filter. You will be reminded when this date arrives.
	Filter calibration (available for OUSBT65/OUSBT66)	Calibration method using traceable clip-on filters
	Calibration filter (only if "Filter calibration - Yes" is selected)	Enter filter value (2 AU). Refer to manufacturers certificate for correct values.
	Verification filter (only if "Filter calibration - Yes" is selected)	Enter filter value (0.35 AU). Refer to manufacturers certificate for correct values.
	Damping/filter	The more unwanted interference there is on the measurement signal the higher the value that should be entered here. Result: fast changes will be damped/suppressed. Factory setting: **0.0 s**
	Submenu: **Fault mode** (only available in the Expert setup!)	"Fault mode": **On**, Off "Fault switches": **Not used**, Relay 2-6 "Save event": **No**, Yes "Time delay": **0 s** "In event of an error": **Value is invalid**, Last valid value, Range start, Meas. range end, Free configuration
	Individual channel output (OUSAF21/22/23 only)	Enable the absorbance measurement on individual channels of a dual beam optical sensor if required.
	Absorbance monitoring (OUSTF10/OUSAF30 only)	Enable absorbance monitoring for turbidity measurement over 200 NTU. When absorbance monitoring is enabled, the absorbance of the direct beam is measured and displayed.
	Ref. ch. ident. (OUSAF21/22/23/30, OUSTF10 only)	Enter an identification text for the reference channel.

"Inputs" menu items	Configurable parameters (factory settings are highlighted in bold)	
	Meas. ch. ident. (OUSAF21/22/23 only)	Enter an identification text for the measurement channel.

If zero point adjustment or calibration is needed, refer to the sensor manual or select in the main menu of CVM40 "Diagnosis/simulation" and then "Optical zero".

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