Brief Operating Instructions

# Memograph CVM40

Graphic transmitter for inline photometers and data manager

Endress+Hauser

People for Process Automation
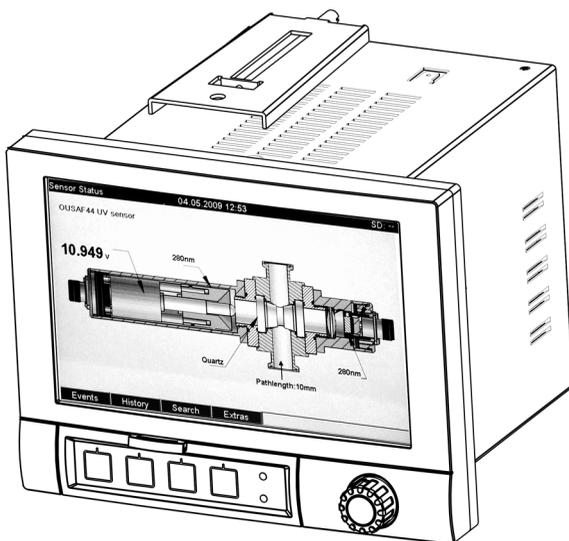
# Table of contents

# 1      Safety instructions

## 1.1     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.

## 1.2     Installation, commissioning and operation

Please note the following items:
- Installation, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel.
  Trained personnel must be authorized for the specified activities by the system operator.
- Electrical connection must only be carried out by a certified electrician.
- Technical personnel must have read and understood these Operating Instructions and must adhere to them.
- Before commissioning the entire measuring point, check all the connections. Ensure that electrical cables and hose connections are not damaged.
- Do not operate damaged products and secure them against unintentional commissioning. Mark the damaged product as being defective.
- Measuring point faults may only be rectified by authorized and specially trained personnel.
- If faults can not be rectified, the products must be taken out of service and secured against unintentional commissioning.
- Repairs not described in these Operating Instructions may only be carried out at the manufacturer's or by the service organization.

## 1.3     Operational 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.

## 1.4 Return

If the device has to be repaired, please return it *cleaned* to the sales center responsible.
Please use the original packaging, if possible.

## 1.5 Notes on safety icons and symbols

**Safety icons**

⚠ Warning!
This symbol alerts you to hazards that can cause serious damage to the instrument or to persons if ignored.

☞ Caution!
This symbol alerts you to possible faults which could arise from incorrect operation. They could cause damage to the instrument if ignored.

✎ Note!
This symbol indicates important items of information.

## 1.6 Document symbols

→ 🗎 1  This symbol indicates a cross reference to a defined page (e.g. p. 1).

→ 🖾 2  This symbol indicates a cross reference to a defined figure (e.g. fig. 2).

# 2    Identification

## 2.1    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
- Link to 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.

# 3 Installation

## 3.1 Measuring system

A complete measuring system comprises:

- Memograph CVM40
- An optical sensor, e.g. OUSAF44
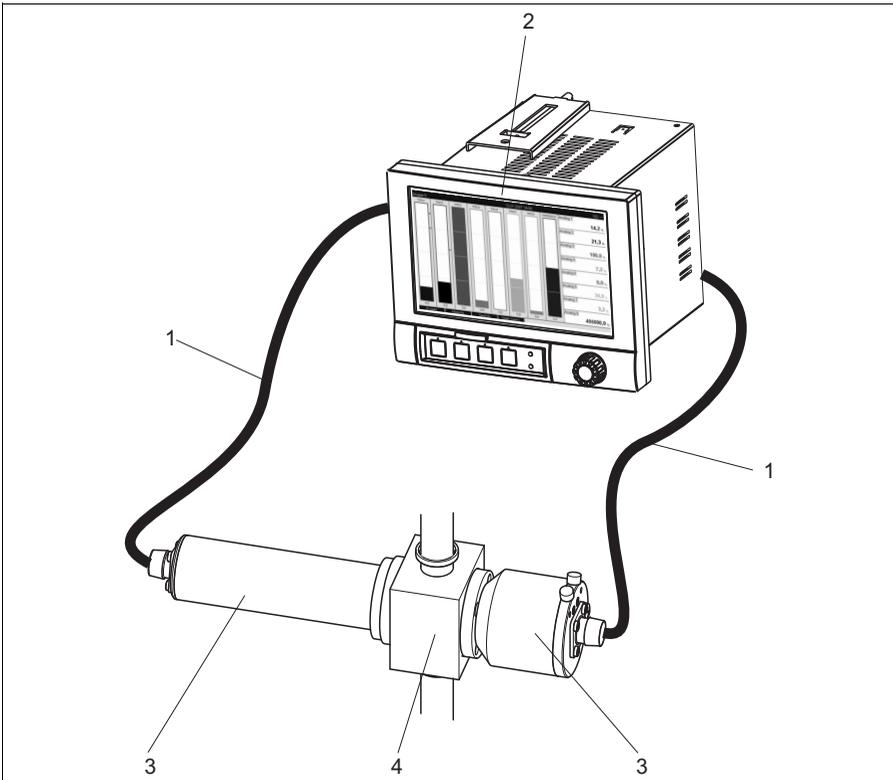- Flow assembly, e.g. OUA260
- Cable set, e.g. OUK40



*Fig. 1: Example of a measuring system*

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

## 3.2    Installation conditions

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

Caution!

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

## 3.3    Installation instructions

### 3.3.1    Mounting the device

Panel cutout and installation / design, dimensions



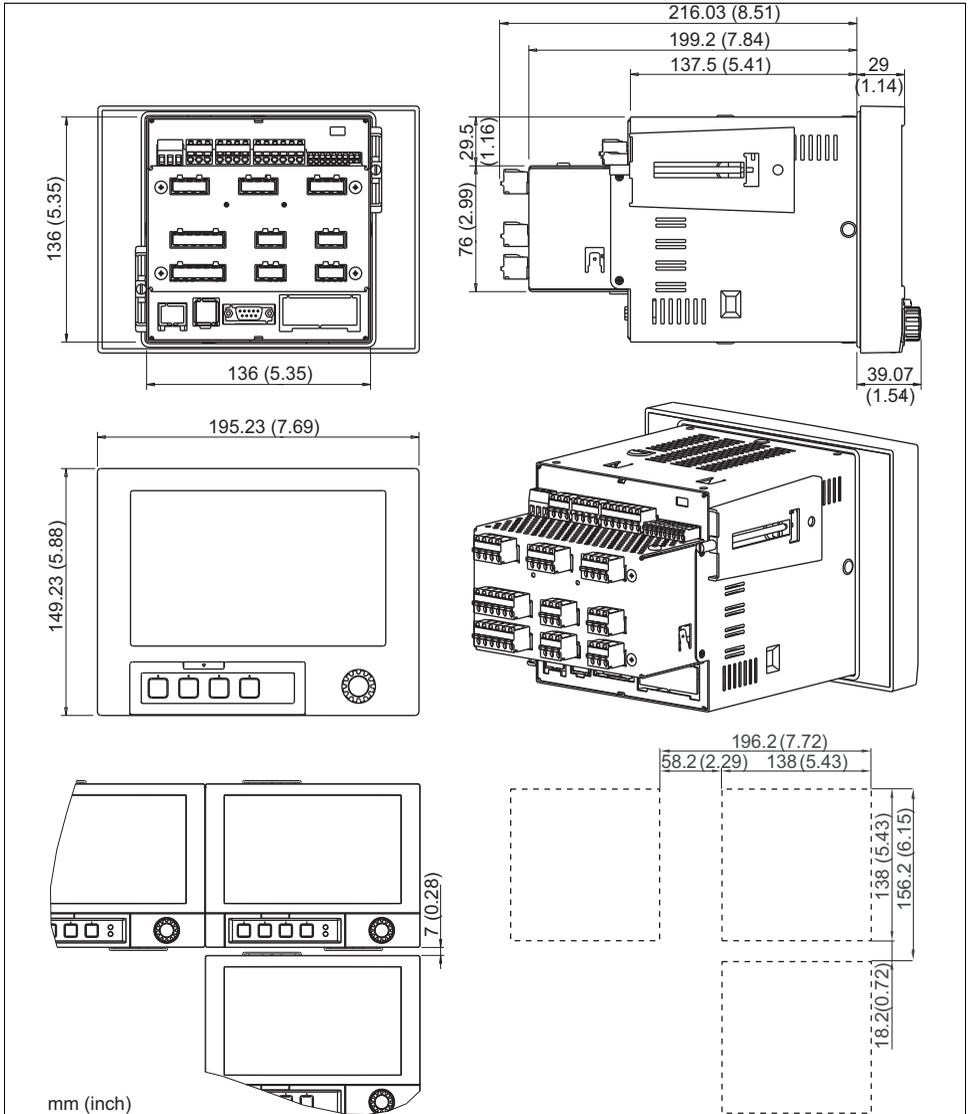*Fig. 2:  Dimensions / panel cutout*

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

✎   Note!
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).

# 4 Wiring

## 4.1 Electrical connection

⚠ Warning!
- The electrical connection must only be carried out by a certified electrician.
- Technical personnel must have read and understood the instructions in this manual and must adhere to them.
- Ensure that there is no voltage at the power cable before beginning the connection work.

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

# 4.2    Wiring diagram
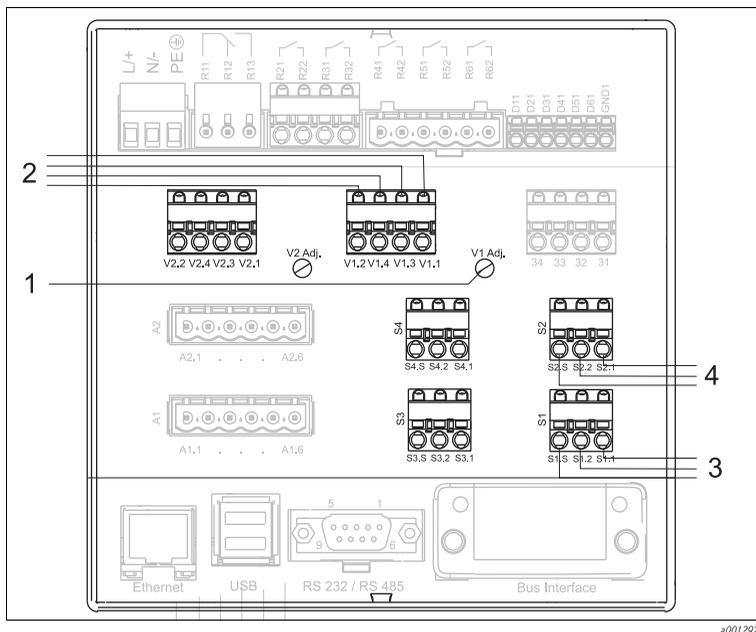


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*Fig. 3:   Wiring diagram with terminals for lamps and sensors*

*1        Lamp voltage adjustment*
         *Turn clockwise: voltage decrease*
         *Turn counter-clockwise: voltage increase*
*2        V1.1: Lamp voltage +*
         *V1.3: Lamp sense +*
         *V1.4: Lamp sense –*
         *V1.2: Lamp voltage –*
*3        S1.1: Photo diode anode (For measurement detector)*
         *S1.2: Photo diode cathode (For measurement detector)*
         *S1.S: Shield*
*4        S2.1: Photo diode anode (For reference detector or second sensor)*
         *S2.2: Photo diode cathode (For reference detector or second sensor)*
         *S2.S: Shield*

**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 OUSAF11 sensor, the lamp voltage needs to be reduced from 12V to 5V. User has to do this change prior to connecting the sensor. Refer to the sensor manual for the lamp voltage of the respective sensor.
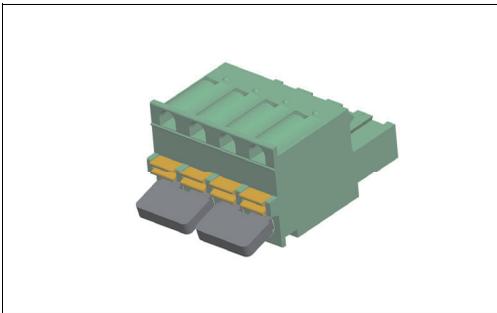
⚠ Caution!
Use this tool before connecting any new sensor type to the transmitter.
Failure in doing so can damage the lamp.

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.   Select in the main menu of CVM40 "Diagnosis/simulation" and then "Sensor status".

4.   Adjust the voltage trimmer to the rated lamp voltage by using a small screwdriver.

5.   Take off the voltage sense tool.

6.   Connect the cable set of the new sensor to the lamp power supply.

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

## 4.3    Terminal assignment

⌁ Caution!

If high-energy transients occur when using long signal cables, we recommend connecting a suitable overvoltage protection (e.g. E+H HAW560/562).

Use shielded signal lines for serial interfaces!

### 4.3.1    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 |

✎    Note!

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

## 4.4    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".

# 5    Commissioning and operation

✎    Note!

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.
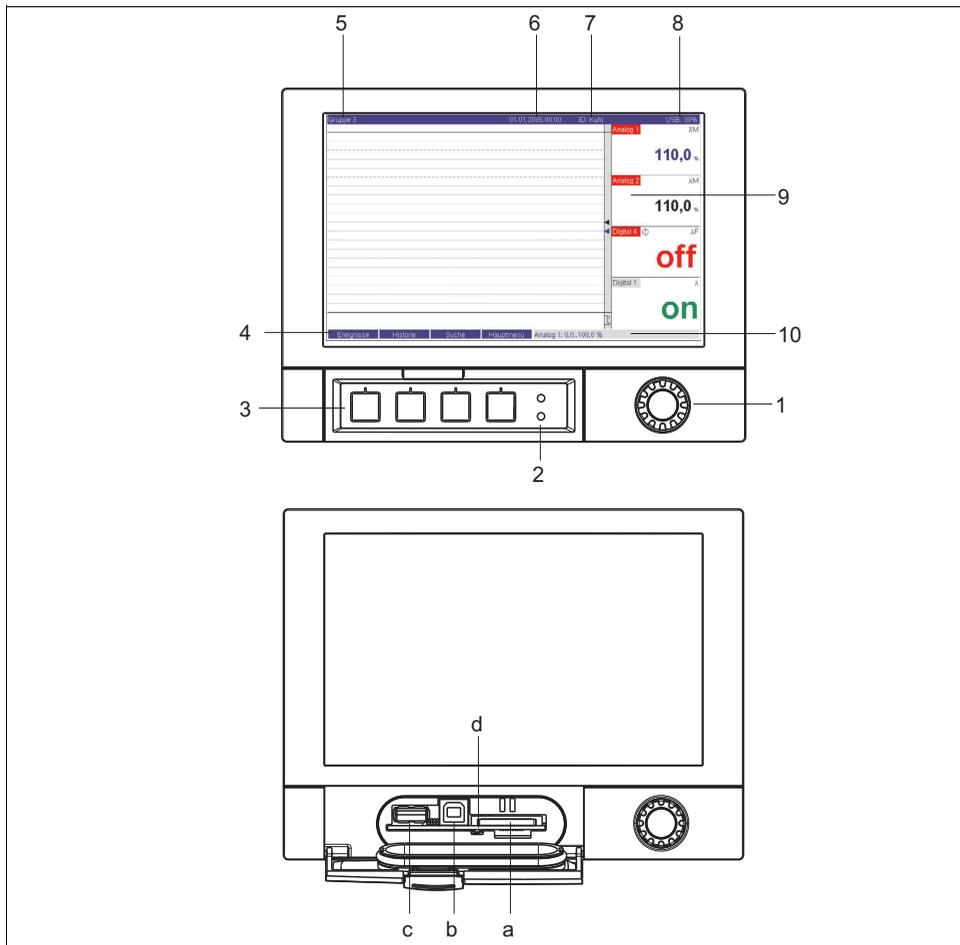
## 5.1    Display and operating elements



*Fig. 6:   Device display/operating units*

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| 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:) <br> ■ Green LED (top) lights up: power supply OK, unit working without faults <br> ■ 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 <br> In the Setup mode: name of the current operating item (dialog title) |
| 6 | In the Display mode: displays current date/time <br> In the Setup mode: — |
| 7 | In the Display mode: user ID (if the function is enabled) <br> 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. <br> Status symbols are displayed for the following functions (alternate with the memory information): simulation mode, data storage active, operating lock, batch active [1] <br> In the Setup mode: the current "direct access" operating code is displayed |
| 9 | In the Display mode: screen for measured value display <br> 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]. <br><br> ✎ Note! <br> 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. <br> In the Setup mode: different information can be displayed here depending on the display type. |
| a | Slot for SD card <br><br> 👆 Caution! <br> Do not remove the SD card if the yellow LED (d) is lit! Risk of data loss! |
| b | USB B socket type "function" e.g. for laptop |
| c | USB A socket type "host" e.g. for USB stick |
| d | LED at SD slot; yellow LED lit when the unit writes to the SD card or reads it. <br><br> 👆 Caution! <br> Do not remove the SD card if the yellow LED is lit! Risk of data loss! |

[1]　　　　Overview of symbols,　Chapter "Overview of the symbols used".

## 5.2    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.

### 5.2.1    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.
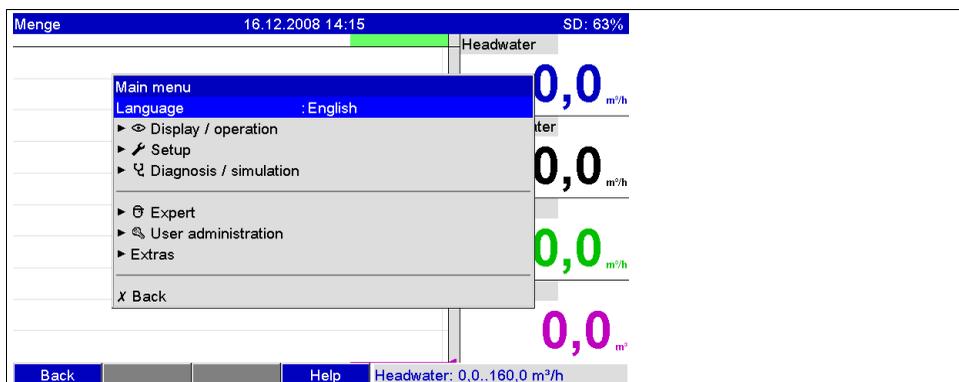
## 5.3    Setup

### 5.3.1    General information

✎    Note!
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 Operating Instructions on CD-ROM, Section 6.3.3)

2.    SD card slot for reading in the parameters stored on the SD card (see Operating Instructions on CD-ROM, 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 Operating Instructions on CD-ROM, Section 6.3.5)

4.  Rear system interfaces RS232/RS485/Ethernet (see Operating Instructions on CD-ROM, Section 6.3.3)

### 5.3.2   Setup directly at the unit (using keys/navigator)
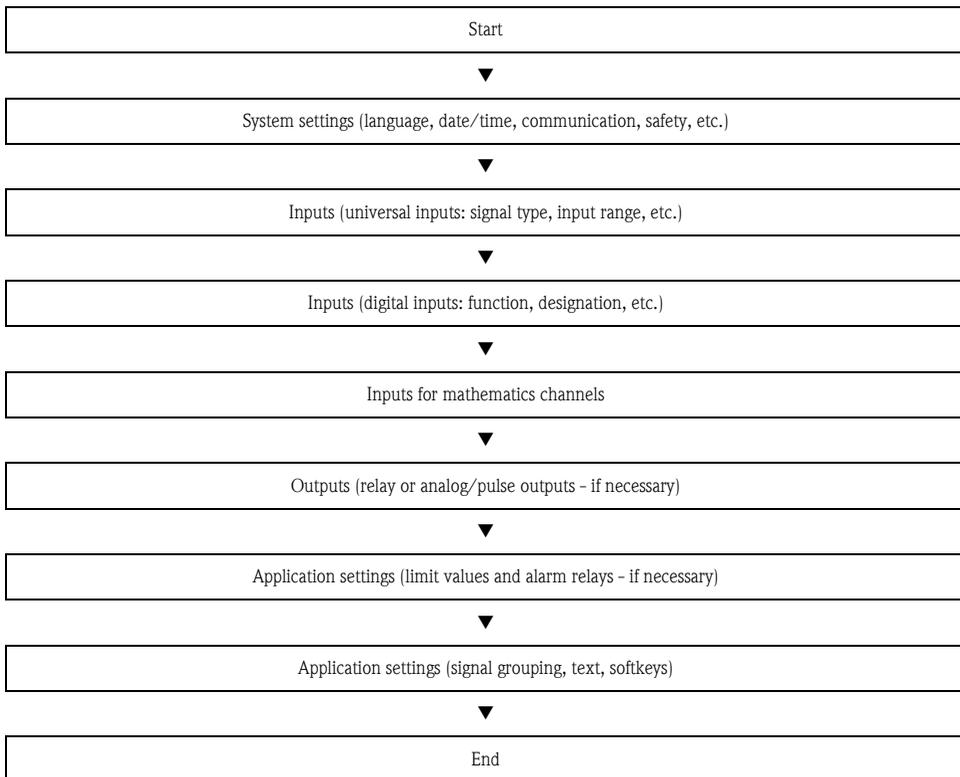
**Key functions in the setup**
The function of the operating keys is described in the fields directly above the corresponding keys on the screen. Free fields mean that no function is currently assigned to the keys in question.

- 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.

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

## Procedure for unit configuration/setup

| 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 |
|---|

### 5.3.3   Setup – Inputs

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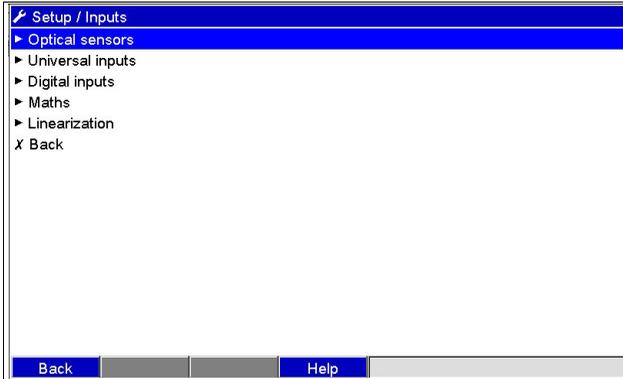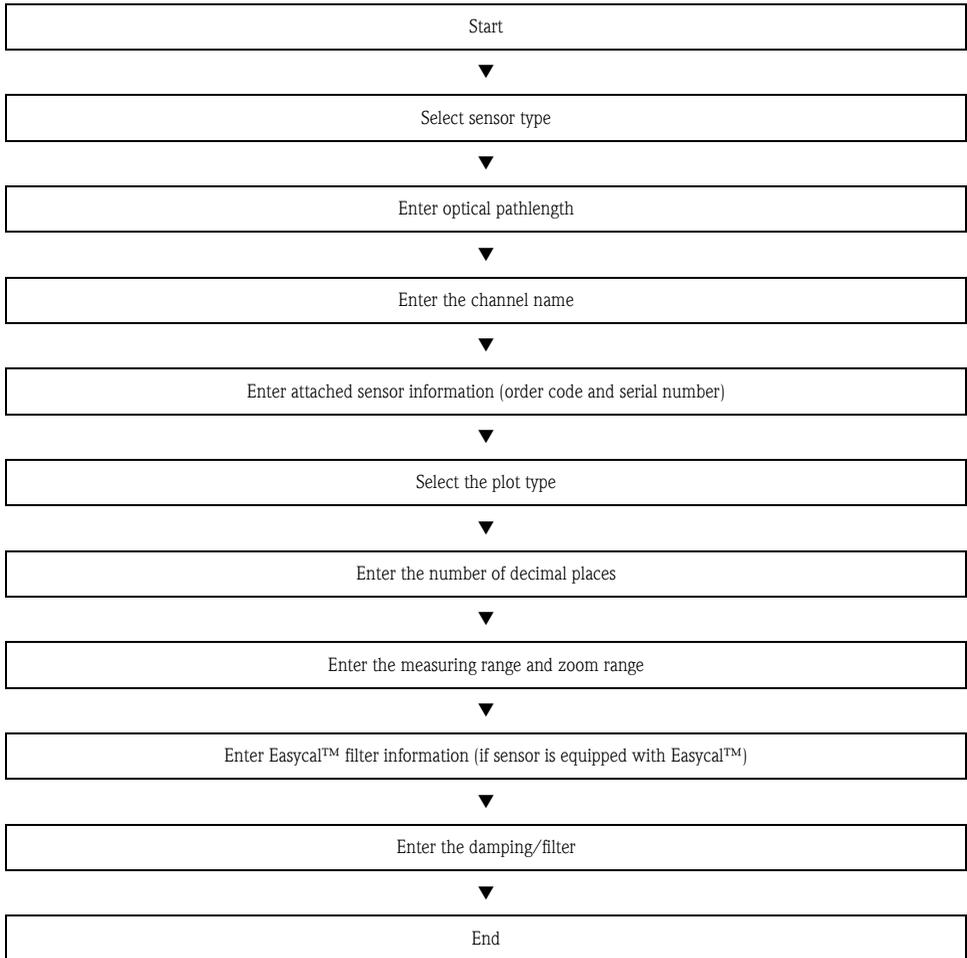


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*Fig. 7:   Setup – Inputs*

# Setup – Inputs submenu: Optical sensors

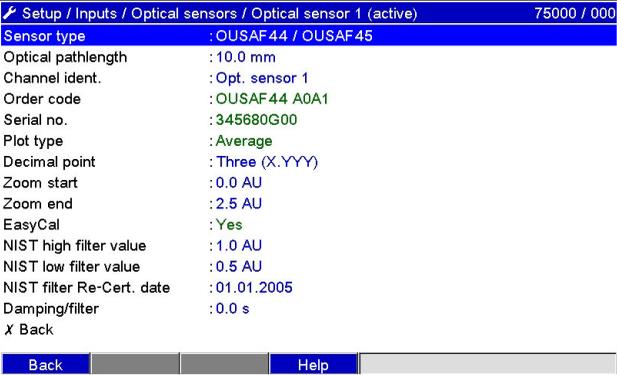## Procedure for the signal settings of the optical sensors:

| Start |
|:---:|

▼

| Select sensor type |
|:---:|

▼

| Enter optical pathlength |
|:---:|

▼

| Enter the channel name |
|:---:|

▼

| Enter attached sensor information (order code and serial number) |
|:---:|

▼

| Select the plot type |
|:---:|

▼

| Enter the number of decimal places |
|:---:|

▼

| Enter the measuring range and zoom range |
|:---:|

▼

| Enter Easycal™ filter information (if sensor is equipped with Easycal™) |
|:---:|

▼

| Enter the damping/filter |
|:---:|

▼

| End |
|:---:|

| "Inputs" menu items | Configurable parameters<br>(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.<br>The unit can be equipped with a maximum of 2 optical sensors.<br><br><br>*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).<br>Picklist: **switched off**, OUSAF11/AF12/AF13/DP11, 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.<br>16-character entry.<br>**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. |
| | **NIST filter Re-cert. date** (with Easycal™ only) | Deadline for recertification of NIST filter. You will be reminded when this date arrives. |

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

ℹ️   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".

# Index

# Declaration of Hazardous Material and De-Contamination

## RA No. ☐☐☐☐☐☐☐

Please reference the Return Authorization Number (RA#), obtained from Endress+Hauser, on all paperwork and mark the RA# clearly on the outside of the box. If this procedure is not followed, it may result in the refusal of the package at our facility.

Because of legal regulations and for the safety of our employees and operating equipment, we need the "Declaration of Hazardous Material and De-Contamination", with your signature, before your order can be handled. Please make absolutely sure to attach it to the outside of the packaging.

**Type of instrument / sensor** _____ **Serial number** _____

☐ **Used as SIL device in a Safety Instrumented System**

**Process data**     Temperature   _____ [°F]  _____ [°C]      Pressure   _____ [psi]  _____ [ Pa ]
Conductivity   _____ [μS/cm]      Viscosity   _____ [cp]  _____ [mm$^2$/s]

**Medium and warnings**

| | Medium /concentration | Identification CAS No. | flammable | toxic | corrosive | harmful/ irritant | other * | harmless |
|---|---|---|---|---|---|---|---|---|
| Process medium | | | | | | | | |
| Medium for process cleaning | | | | | | | | |
| Returned part cleaned with | | | | | | | | |

* explosive; oxidising; dangerous for the environment; biological risk; radioactive
Please tick should one of the above be applicable, include safety data sheet and, if necessary, special handling instructions.

**Description of failure**  _____
_____
_____

**Company data**

Company   _____      Phone number of contact person
_____      _____
Address      Fax / E-Mail  _____
_____
_____      Your order No. _____

"We hereby certify that this declaration is filled out truthfully and completely to the best of our knowledge.We further certify that the returned parts have been carefully cleaned. To the best of our knowledge they are free of any residues in dangerous quantities."

_____      _____      _____
(place, date)      Name, dept. (please print)      Signature

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