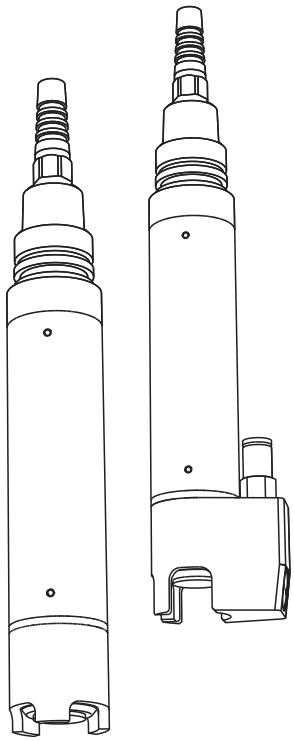
Level Pressure Flow Temperature Analytics Registration Systems Components Services Solutions

Operating Instructions

Oxymax COS61D

Dissolved oxygen sensor
With Memosens protocol



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Endress+Hauser
People for Process Automation

Documentation information

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.

Symbols used

→ 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).

Additional information, tips

Permitted or recommended

Forbidden or not recommended

Table of contents

1 Basic safety instructions

1.1 Requirements for 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 by the plant operator to carry out the specified activities.
- ► The electrical connection may only be performed by an electrical technician.
- ► The technical personnel must have read and understood these Operating Instructions and must follow the instructions they contain.
- ► Measuring point faults may only be rectified by authorized and specially 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.

1.2 Designated use

The oxygen sensor is suitable for continuous measurement of dissolved oxygen in water.

Typical applications are:
- Measuring, monitoring and regulating the oxygen content in activated sludge basins.
- Monitoring the oxygen content in the sewage treatment plant outlet.
- Monitoring, measuring and regulating the oxygen content in public waters and fish farming water.
- Monitoring of oxygen enrichment in drinking water.

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.

1.3 Occupational safety

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

Electromagnetic compatibility
With regard to electromagnetic compatibility, this device has been tested in accordance with the applicable European standards for industrial applications.
The electromagnetic compatibility indicated only applies to a device that has been connected in accordance with the instructions in these Operating Instructions.

1.4 Operational safety

- ► Before commissioning the entire measuring point, make sure all the connections are correct. Ensure that electrical cables and hose connections are not damaged.
- ► Do not operate damaged products, and safeguard them to ensure that they are not operated inadvertently. Mark the damaged product as defective.
- ► If faults cannot be rectified, the products must be taken out of service and secured against unintentional commissioning.

⚠ CAUTION
The cleaning system is not switched off during calibration or maintenance activities
Risk of injury due to medium or cleaning agent
- ► If a cleaning system is connected, switch it off before removing a sensor from the medium.
- ► If you are not switching off the cleaning system because you wish to test the cleaning function, wear protective clothing, goggles and gloves or take other appropriate measures.

1.5 Product safety

The product 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. Relevant regulations and European standards have been observed.

2 Identification

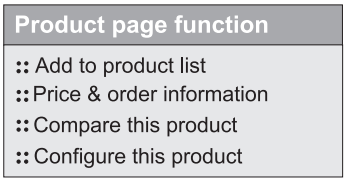
2.1 Product page and configurator

You can create a complete and valid order code by using the configurator on the internet product page.

Product page link:
www.products.endress.com/cos61d

2.2 Order code

1. You can choose from the following options on the product page located on the right:



2. Click "Configure this product".
3. The configurator opens in a separate window.
   Use the radio buttons to configure the order code from the nameplate of your device.
4. Afterwards, you can export the order code as a PDF or Excel file.
   To do so, click the appropriate button at the top of the page.

2.3 Scope of delivery

The following items are included in the delivery:
- Oxygen sensor with transport protection cap for membrane protection
- Operating Instructions (on CD only)
- Brief Operating Instructions (paper version)

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

3 Installation

3.1 Incoming acceptance, transport, storage

- ► Make sure the packaging is undamaged!
- ► Inform the supplier about any damage to the packaging.
  Keep the damaged packaging until the matter has been settled.
- ► Make sure the contents are undamaged!
- ► Inform the supplier about damage to the contents. Keep the damaged products until the matter has been settled.
- ► Check that the order is complete and agrees with your shipping documents.
- ► The packaging material used to store or to transport the product must provide shock protection and humidity protection. The original packaging offers the best protection. Also, keep to the approved ambient conditions (see "Technical data").
- ► If you have any questions, please contact your supplier or your local sales center.

3.2 Installation conditions

3.2.1 Dimensions

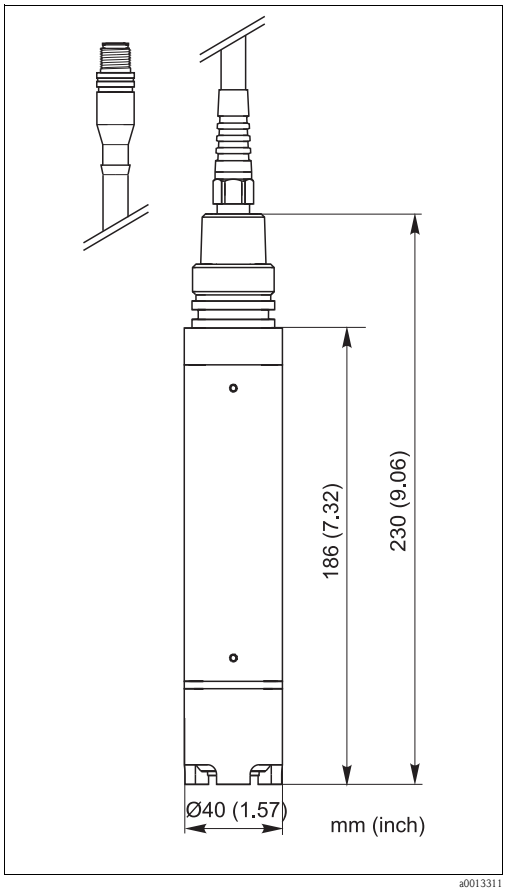


Fig. 1: With optional M12 plug

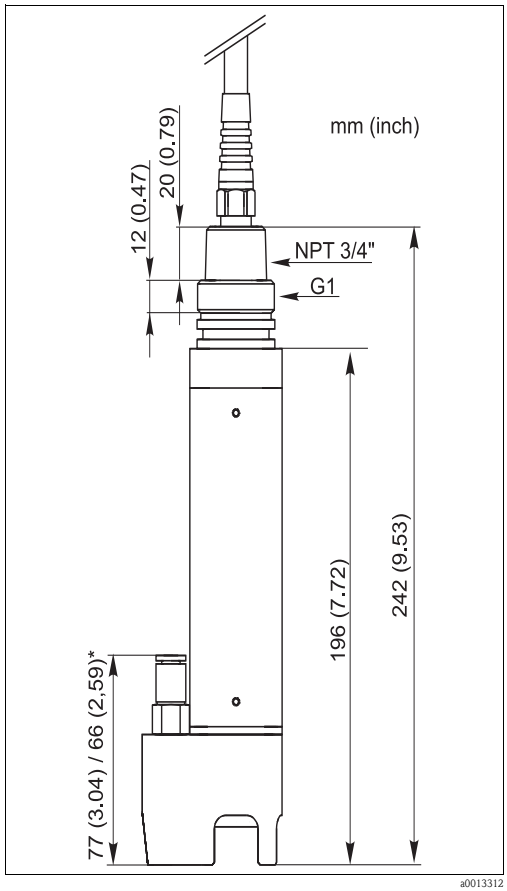


Fig. 2: With optional cleaning unit

** depending on cleaning unit version*

3.2.2 Angle of installation

The sensor can be installed up to the horizontal in an assembly, support or a suitable process connection.

The optimum installation angle is 45° (e.g. with assembly CYA112).

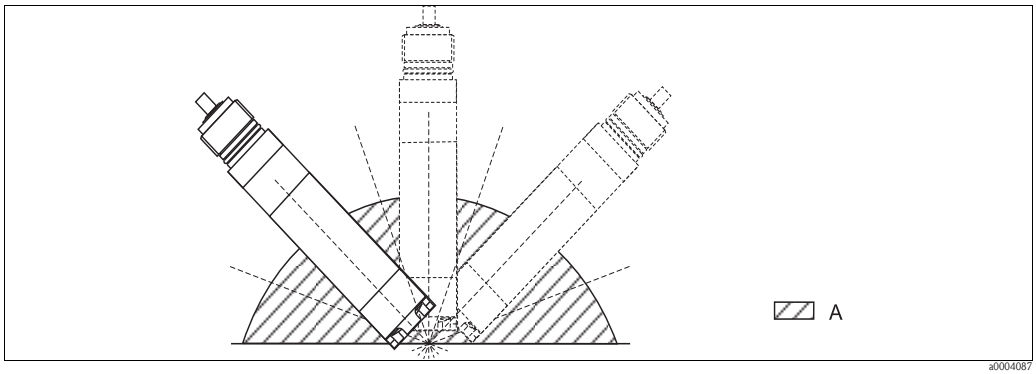


Fig. 3: Angle of installation

A Permissible installation positions: 0 ... 180 °, optimum angle 45 °

► Make sure you comply with the instructions for installing sensors. You will find them in the Operating Instructions for the assembly used.

3.2.3 Mounting location

- Select the installation location so that there is easy access for later calibration.
- Make sure that upright posts and assemblies are secured safely and vibration-free.
- Select an installation location which produces a typical oxygen concentration.

3.3 Installation instructions

3.3.1 Measuring system

A complete measuring system comprises:
- Oxygen sensor Oxymax COS61D
- Multi-channel transmitter Liquiline CM44x
- Sensor cable, optionally with M12 plug
- Assembly, e.g. COA250 flow assembly, CYA112 immersion assembly or COA451 retractable assembly

Optional:
- CYH112 assembly holder for immersion operation
- Cleaning system

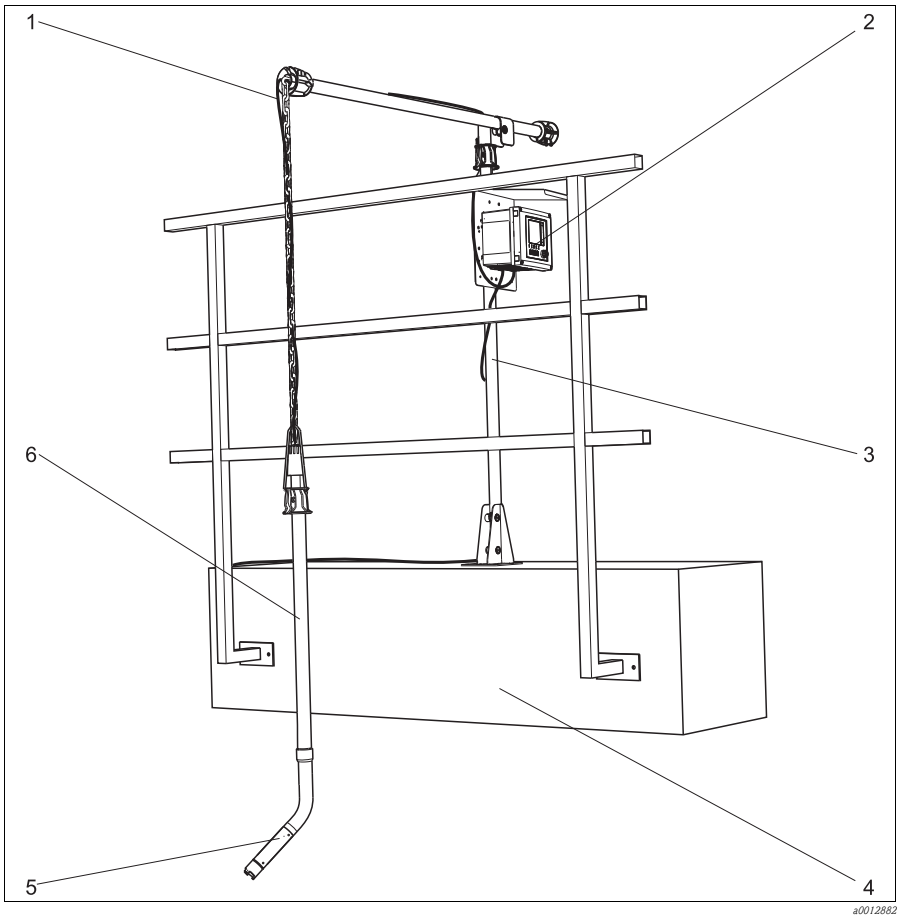


Fig. 4: Measuring system (example)

1	*Sensor cable*	*4*	*Basin rim with rail*
2	*Transmitter Liquiline CM44x*	*5*	*Oxygen sensor Oxymax COS61D*
3	*Flexdip CYH112*	*6*	*Flexdip CYA112*

3.3.2 Installing a measuring point

For immersed operation, install the individual modules away from the basin on a solid base. Only carry out the final installation at the intended installation location.

For a complete installation of a measuring point, proceed as follows:

1. Install a retractable or a flow assembly (if used) into the process.
2. Connect the water supply to the rinse connections (if you use an assembly with cleaning function).
3. Install and connect the oxygen sensor.

NOTICE

No assembly used, sensor not correctly installed, grounding regulations not observed

Risk of damaging the sensor cable, no protection to electromagnetic interferencies

- ► Screw the sensor into the assembly so that the cable is not twisted.
- ► Avoid exerting excessive tensile force on the cable (e.g. from jerky pulling).
- ► Select the installation location so that there is easy access for later calibration.
- ► When using metallic assemblies and installation equipment, comply with national grounding regulations.
- ► Observe the sensor installation instructions of the Operating Instructions of the assembly used.

3.4 Installation examples

3.4.1 Immersion operation

Upright post and chain assembly

For large basins, where sufficient installation distance is required from the basin edge (aeration basin, especially), it is advisable to use the upright post and chain assembly. The free swinging of the immersed assembly practically rules out vibrations from the upright post.
According to this effect, the sensor life time can be extended.

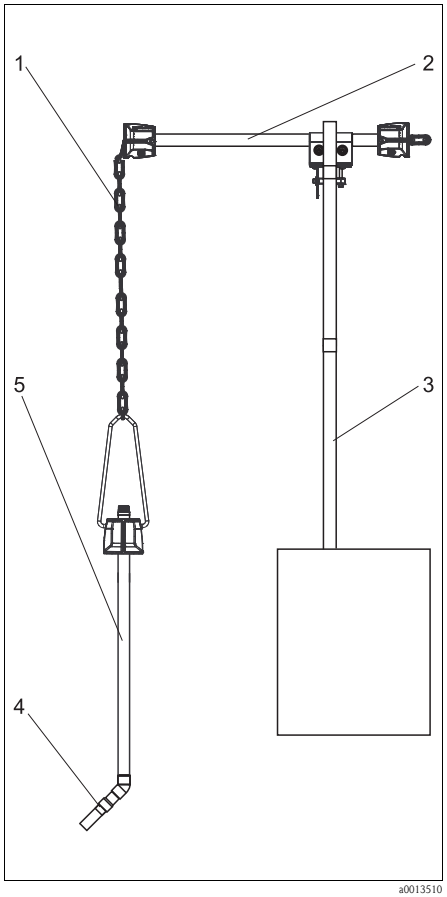


Fig. 5: Chain holder, rail mounted

1 Chain
2 Flexdip CYH112 holder
3 Rail
4 Oxymax sensor
5 Flexdip CYA112 wastewater assembly

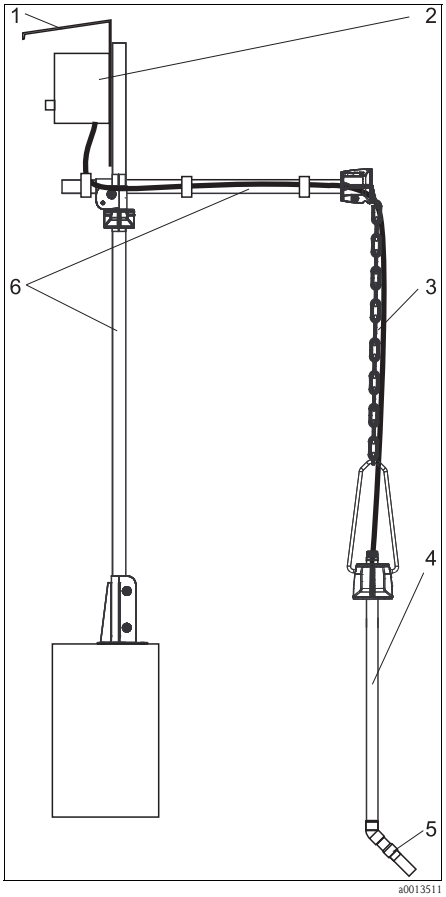


Fig. 6: Chain holder, mounted to a post

1 Weather protection cover
2 Liquiline CM44x controller
3 Chain
4 Flexdip CYA112 wastewater assembly
5 Oxymax sensor
6 Flexdip CYH112 holder

Upright post and fixed immersion assembly

The preferable type of installation for strong or turbulent flow (> 0.5 m/s) in the basin or open channels is to secure the device to an upright post and a securely mounted immersion tube. If the flow is very strong, a second transverse pipe can be installed with its own pipe support.

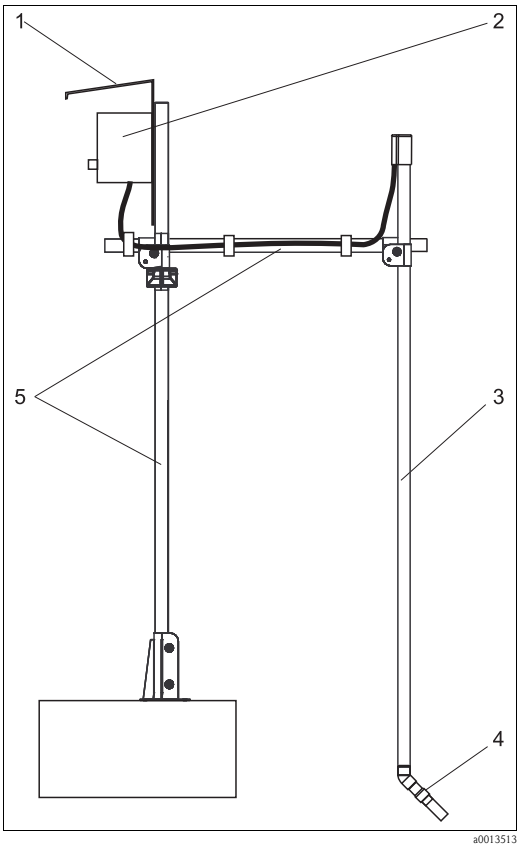


Fig. 7: Assembly holder with immersion tube

1 Weather protection cover CYY101
2 Controller Liquiline CM44x
3 Immersion assembly Flexdip CYA112
4 Oxymax sensor
5 Assembly holder Flexdip CYH112

Basin rim mounting with immersion assembly

For fixing to the sides of the basin or channel, we recommend the pendulum holder of the immersion tube. Optionally, you can also use the assembly with a float.

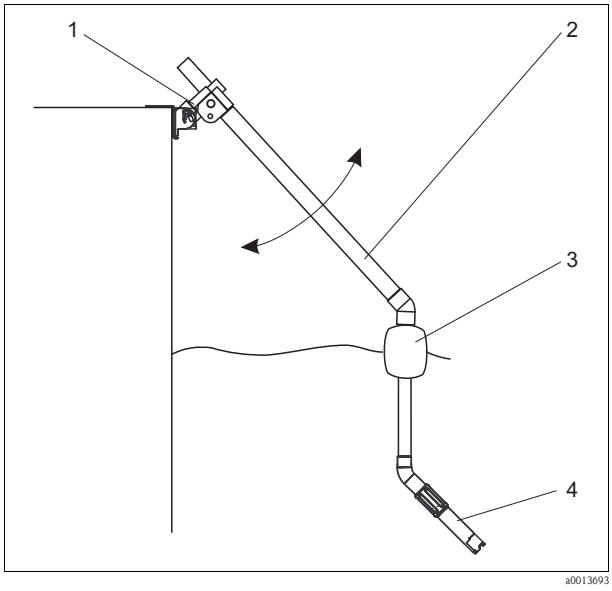
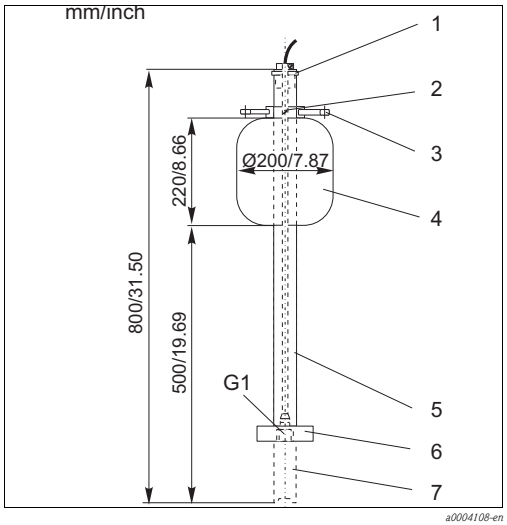


Fig. 8: Basin rim mounting

1 Pendulum holder CYH112
2 Assembly Flexdip CYA112
3 Float of assembly CYA112
4 Oxymax sensor

Floating body

To aid installation in strongly fluctuating water levels, e.g. in rivers or lakes, there is a floating body COA 110-50 available (→ 9).



1 Cable route with strain relief and rain protection
2 Mounting ring for ropes and chains with locking screw
3 Lugs Ø15, 3 x 120 ° for anchoring
4 Saltwater-resistant plastic float
5 Pipe 40x1, stainless steel 1.4571 (AISI 316Ti)
6 Shock absorber and weight
7 Oxygen sensor

Fig. 9: Floating body

3.4.2 Flow assembly

The COA250 flow assembly with automatic self-venting is suitable for use in pipelines or hose connections. The inlet is at the bottom of the assembly, the outlet at the top (connection thread G¾). It can be installed in a pipe by using two 90° pipe brackets to allow inflow to the assembly (→ 11, Pos. 6).

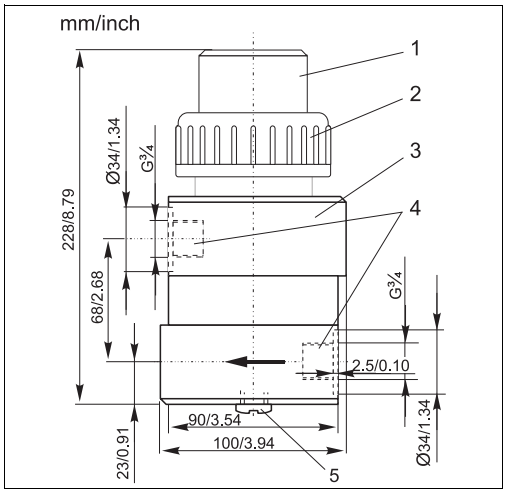


Fig. 10: Flow assembly COA250

1 Screw-in part for sensor
2 Screw ring
3 Meter body
4 Connection thread G¾
5 Dummy plug (connection for spray head CUR3)

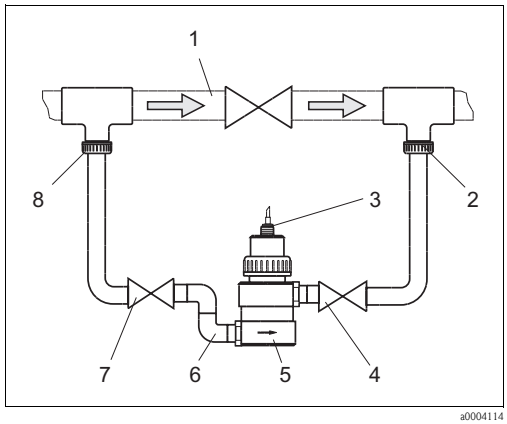


Fig. 11: Bypass installation with manually actuated valves or solenoid valves

1 Main line
2 Medium return
3 Oxygen sensor
4, 7 Manually actuated or solenoid valves
5 Flow assembly COA250
6 90 ° pipe bracket
8 Medium removal

3.5 Post-installation check

- ► Sensor and cable undamaged?
- ► Compliance with permissible sensor installation position?
- ► Is the sensor installed in an assembly and is not suspended from the cable?
- ► Avoid moisture by rain by putting the protective cap on the assembly?

4 Wiring

⚠ WARNING
Device is energized
Improper connection can cause injury or death.
► 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.
► **Prior to beginning** any wiring work, make sure voltage is not applied to any of the cables.

4.1 Direct connection to the transmitter

Connection methods
- Sensor cable directly connected to the terminal connector of the basic module
- Optional: Sensor cable plug connected to the M12 sensor socket on the underside of the device. With this type of connection, the device is already wired at the factory.

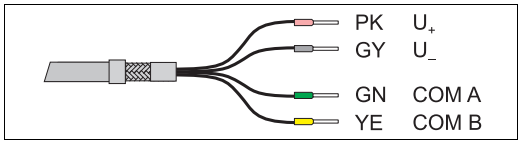


Fig. 12: Sensor cable with terminated cable cores

Observe the connection instructions in the Operating Instructions of the transmitter used.

4.2 Post-connection check

Instrument status and specifications	**Remarks**
Are the sensor, assembly, junction box or cable damaged?	Visual inspection
Electrical connection	**Remarks**
Does the supply voltage of the transmitter match the specifications on the nameplate?	
Are the installed cables strain-relieved and not twisted ?	
Is the cable type route completely isolated ?	Power cable/weak current cable
Are the power supply and signal cable correctly connected to the transmitter ?	Use the connection diagram of the transmitter.
Long enough length of cable core stripped and correct in terminal?	Check seating (pull slightly)
Are all the screws terminals properly tightened ?	Tighten
Are all the cable entries installed, tightened and sealed ?	For cable entries lateral: cable loops downwards for water to be able to drip off.
Are all the cable entries installed downwards or lateral ?	

5 Device description

5.1 Sensor design

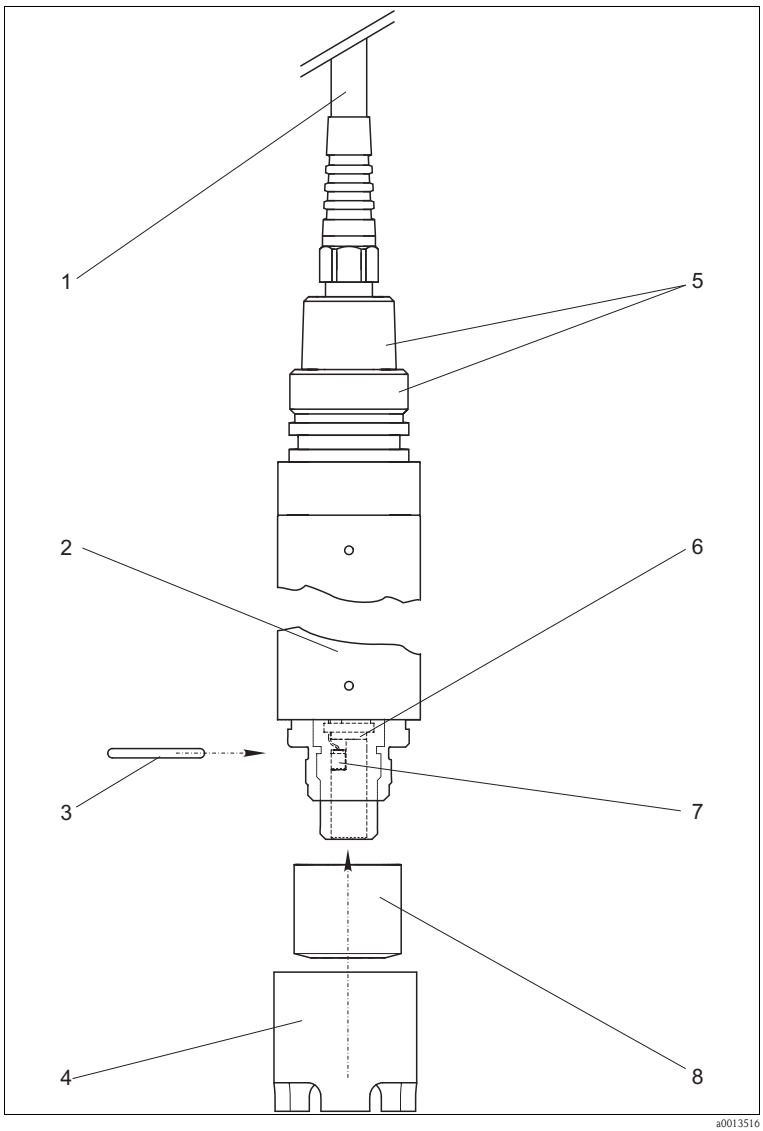


Fig. 13: Sensor design

1 Sensor cable
2 Sensor shaft
3 O-ring
4 Protection guard
5 Threaded connection
6 Detector
7 Emitter diode
8 Fluorescence cap

The sensor consists of the following function units:
- Sensor shaft
- Sensor head with optics (emitter and detector)
- Fluorescence cap
- Protection basket
- Alternatively to the protection basket, you can use a spray head COR 3 (optional, see "Accessories") for use in immersed operation with cleaning function.

5.2 Measuring principle

5.2.1 Memosens technology

Once connected to the transmitter, the data saved in the sensor are read digitally. You can call up these data using the corresponding DIAG menu.

Data that digital sensors save include the following:
- Manufacturer data
  - Serial number
  - Order code
  - Date of manufacture
- Calibration data
  - Calibration date
  - Calibration values
  - Number of calibrations
  - Serial number of the transmitter used to perform the last calibration
- Operational data
  - Date of commissioning
  - Hours of operation under extreme conditions
  - Data for sensor monitoring.

5.2.2 Oxygen measurement based on the principle of fluorescence quenching

- Sensor design:
  - Oxygen-sensitive molecules (markers) are integrated in an optically active layer (fluorescence layer).
  - The surface of the fluorescence layer is in contact with the medium.
  - The sensor optics are directed at the underside of the fluorescence layer.
- There is an equilibrium between the oxygen partial pressure in the medium and that in the fluorescence layer:
  - If the sensor is immersed in the medium, the equilibrium is established very quickly.
- Measuring process:
  - The sensor optics send green light pulses to the fluorescence layer.
  - The markers "answer" (fluoresce) with red light pulses.
  - The duration and intensity of the response signals is directly dependent on the oxygen contents and the partial pressure.
  - If the medium is free from oxygen, the response signals are long and very intense.
  - Oxygen molecules quench the marker molecules. As a result, the response signals are shorter and less intense.
- Measurement result:
  - The sensor returns a signal that is in proportion to the oxygen concentration in the medium.
  - The medium temperature and air pressure are already taken into account calculated in the sensor.
  - In addition to the standard values of concentration, saturation index and partial pressure, the sensor also returns a raw measured value in µs. The value corresponds to the decay time of the fluorescence and is approx. 20 µs in air, and approx. 60 µs in media free from oxygen.

5.2.3 Fluorescence cap

The oxygen dissolved in the medium is diffused into the fluorescence cap.
Suitable flow is not necessarily mandatory but it does improve the speed at which the measuring system responds and ensures a more representative measured value compared to a measurement in static medium.
The cap is only permeable for dissolved gases. Other substances dissolved in the liquid phase e.g. ionic substances, will not penetrate through the membrane. Therefore, medium conductivity has no impact on the measuring signal.

5.3 Calibration

Calibration is a means of adapting the transmitter to the characteristic values of the sensor.

The sensor is calibrated at the factory.
Normally, additional calibration is not required except in the event of the following:
- Changing the fluorescence cap

Within the framework of system monitoring and supervision, for example, the calibration can also be cyclically monitored (at typical time intervals, depending on operating experience) or renewed.

Ideally, use the calibration vessel (see Accessories) for calibration. For this purpose, unscrew the basket protector from the sensor and guide the sensor into the calibration vessel as far as it will go (resting on the vessel rim).

5.3.1 Types of calibration

The following types of calibration are possible:
- Slope
  - Air, water vapor-saturated
  - Air-saturated water
  - Air, variable
  - Data entry
- Zero point
  - Single-point calibration in nitrogen or oxygen-free water
  - Data entry
- Sample calibration
  - Slope
  - Zero point

5.3.2 Calibration intervals

You can determine the intervals with the following method:

1. Check the sensor one month after its being put into operation:
   - Remove the sensor from the medium.
   - Clean the outside of the sensor with a damp cloth.
   - Measure the oxygen saturation index at air after 20 minutes.
   - Protect the sensor against external influences such as sunlight and wind.
2. Decide using the results:
   a. If the measured value is not at 100 ±2 %SAT, you have to calibrate the sensor.
   b. Otherwise, lengthen the time to the next inspection.
3. Proceed as per Point 1 after two, four and/or eight months. In this way, you can determine the optimum calibration interval for your sensor.

5.3.3 Calculation example for the calibration value

As a check, you can calculate the expected calibration value (transmitter display) as shown in the following example (salinity is 0).

1. Determine:
   – The ambient temperature for the sensor (air temperature for "air" calibration method,water temperature for "air-saturated water" calibration type)
   – the altitude above sea level
   – the current air pressure **L** (=rel. air pressure to sea level) at the time of calibration. (If undeterminable, use 1013 hPa (407 inH_2O) for an approximate calculation.)
2. Define:
   – the saturation value **S** acc. to the first table
   – the factor **K** acc. to the second table

°C / °F	S [mg/l=ppm]	°C / °F	S [mg/l=ppm]	°C / °F	S [mg/l=ppm]	°C / °F	S [mg/l=ppm]
0 / 32	14.64	11 / 52	10.99	21 / 70	8.90	31 / 88	7.42
1 / 34	14.23	12 / 54	10.75	22 / 72	8.73	32 / 90	7.30
2 / 36	13.83	13 / 55	10.51	23 / 73	8.57	33 / 91	7.18
3 / 37	13.45	14 / 57	10.28	24 / 75	8.41	34 / 93	7.06
4 / 39	13.09	15 / 59	10.06	25 / 77	8.25	35 / 95	6.94
5 / 41	12.75	16 / 61	9.85	26 / 79	8.11	36 / 97	6.83
6 / 43	12.42	17 / 63	9.64	27 / 81	7.96	37 / 99	6.72
7 / 45	12.11	18 / 64	9.45	28 / 82	7.82	38 / 100	6.61
8 / 46	11.81	19 / 66	9.26	29 / 84	7.69	39 / 102	6.51
9 / 48	11.53	20 / 68	9.08	30 / 86	7.55	40 / 104	6.41
10 / 50	11.25						

Altitude [m / ft]	K	Altitude [m / ft]	K	Altitude [m / ft]	K	Altitude [m / ft]	K
0	1.000	550 / 1800	0.938	1050 / 3450	0.885	1550 / 5090	0.834
50 / 160	0.994	600 / 1980	0.932	1100 / 3610	0.879	1600 / 5250	0.830
100 / 330	0.988	650 / 2130	0.927	1150 / 3770	0.874	1650 / 5410	0.825
150 / 490	0.982	700 / 2300	0.922	1200 / 3940	0.869	1700 / 5580	0.820
200 / 660	0.977	750 / 2460	0.916	1250 / 4100	0.864	1750 / 5740	0.815
250 / 820	0.971	800 / 2620	0.911	1300 / 4270	0.859	1800 / 5910	0.810
300 / 980	0.966	850 / 2790	0.905	1350 / 4430	0.854	1850 / 6070	0.805
350 / 1150	0.960	900 / 2950	0.900	1400 / 4600	0.849	1900 / 6230	0.801
400 / 1320	0.954	950 / 3120	0.895	1450 / 4760	0.844	1950 / 6400	0.796
450 / 1480	0.949	1000 / 3300	0.890	1500 / 4920	0.839	2000 / 6560	0.792
500 / 1650	0.943						

3. Calculate the factor **L**:

$$\mathbf{L} = \frac{\textbf{relative air pressure during calibration}}{\textbf{1013 hPa}}$$

4. Calculate the calibration value **C**:

$$\mathbf{C = S \cdot K \cdot L}$$

Example

- Air calibration at 18°C (64 °F), altitude 500 m (1650 ft) above sea level, air pressure 1009 hPa (405 inH_2O)
- S = 9.45 mg/l, K = 0.943, L = 0.996

Calibration value C = 8.88 mg/l.

You do not need factor K from the table if your device returns the absolute air pressure L_{abs} (location-dependent air pressure) as the measured value.
Thus, the formula for calculation is: $C = S \cdot L_{abs}$.

6 Commissioning

6.1 Function check

Before first commissioning, check if:
- the sensor is correctly installed
- the electrical connection is correct.

If using an assembly with automatic cleaning, check the correct connection of the cleaning agent (e.g. water or air).

⚠ WARNING
Escaping process medium
Risk of injury from high pressure, high temperatures or chemical hazards
► Before applying compressed air to an assembly with cleaning facility, make sure the connections are correctly fitted.
► Do not install the assembly in the process if you cannot make the correct connection reliably.

6.2 Calibration

The sensor is calibrated at the factory. A new calibration is only needed in special situations.

6.3 Automatic cleaning

Compressed air is most suitable for cyclic cleaning. The cleaning unit is either ready supplied or can be retrofitted, and is attached to the sensor head. It operates at a capacity of 20-60 l/min. Optimum results are achieved with 2 bar (29 psi) and 60 l/min.

The following settings are recommended for the cleaning unit:

Type of soiling	Cleaning interval	Cleaning duration
Media containing grease and oils	15 min	20 s
Biofilm	60 min	20 s

7 Maintenance

Maintenance work must carried out at regular intervals. To ensure that it is carried out, we recommend you enter the maintenance dates into an operations logbook or in an operations calendar in advance.

The maintenance cycle primarily depends on:
- the system
- the installation conditions and
- the medium in which measurement is taking place.

The following activities must be carried out:
- Cleaning the sensor
- If necessary, replacing wear and tear materials:
  – sealing ring
  – electrolyte
  – fluorescence cap
- Check the measuring function:
  – Remove the sensor from the medium.
  – Clean and dry the membrane.
  – After about 10 minutes, measure the oxygen saturation index in air (without recalibration).
  – The measured value should be near to 100% SAT
- Recalibration.
  (if desired or required)

7.1 Cleaning

The measurement can be corrupted by sensor fouling or malfunction, e.g.:
- Buildup on the fluorescence cap
  –> cause longer response times and a reduced slope under certain circumstances.

To ensure reliable measurement, the sensor must be cleaned at regular intervals. The frequency and intensity of the cleaning operation depend on the measuring medium.

7.1.1 External cleaning

Clean the outside of the sensor:
- before every calibration
- at regular intervals during operation as necessary
- before returning it for repairs.

Depending on the type of soiling, proceed as follows:

Type of soiling	Cleaning
Salt deposits	Immerse the sensor in drinking water or in 1-5% hydrochloric acid for a few minutes. Afterwards, rinse it with copious amounts of water.
Dirt particles on the sensor body **(not cap!)**	Clean the sensor body mechanically with water and a suitable brush.
Dirt particles on the fluorescence cap	Clean with water and a soft sponge.

► After cleaning, rinse the sensor with copious amounts of clean water.

7.1.2 Cleaning the optics

The optics only need to be cleaned if medium has penetrated through a defective fluorescence cap.

To clean it, proceed as follows:

1. Unscrew the protection guard and fluorescence cap from the sensor head.
2. Carefully clean the optical surface with a soft cloth until the buildup is fully removed.
3. Clean the optics with drinking or distilled water.
4. Clean the optics and screw on a new fluorescence cap.

NOTICE
Damages, scratches on the optical surface
Faulty measured values
► Ensure that the optical surface is not scratched or damaged in any way.

7.2 Replacing wear and tear materials

7.2.1 Replacing the sealing ring

The sealing ring must be replaced if visibly damaged. For replacement, use only original sealing rings.

7.2.2 Replacing the fluorescence cap

The typical operating life of a fluorescence cap is more than 2 years. The sensor checks whether the cap is aging and issues a warning via the transmitter if the rate of aging reaches a specific value. The sensor is still able to measure at this stage. However, it is advisable to change the cap as quickly as possible.

Removing the old fluorescence cap

1. Remove the sensor from the medium.
2. Unscrew the protection guard.
3. Clean the outside of the sensor.
4. Unscrew the fluorescence cap.
5. Clean and dry the optical surface if necessary.

Installing the new fluorescence cap

6. Make sure that there are no dirt particles on the sealing surface.
7. Carefully screw the fluorescence cap onto the sensor head **until the stop.**
8. Screw the protection guard back on.

After replacing the fluorescence cap, the sensor must be recalibrated. Then insert the sensor into the medium and check that no alarm is displayed on the transmitter.

8 Accessories

In the following sections, you find the accessories available at the time of issue of this documentation.
For information on accessories that are not listed here, please contact your local service or sales center.

8.1 Connection accessories

CYK11 Memosens data cable
- Extension cable for digital sensors with Memosens protocol
- Ordering as per product structure (–> Online configurator, www.products.endress.com/cyk11)

8.2 Installation accessories

Flow assembly COA250
- For sensor installation in pipe lines, PVC
- Ordering acc. to product structure (–> Online configurator: www.products.endress.com/coa250)
- Technical Information TI00111C/07/EN

Retractable assembly Cleanfit COA451
- Manually driven retractable assembly, stainless steel, with ball valve, for oxygen sensors;
- Ordering acc. to product structure (–> Online configurator: www.products.endress.com/coa451)
- Technical Information TI00368C/07/EN

Holder system Flexdip CYH112 for water
- Modular holder system for sensors and assemblies in open basins, channels and tanks
- The holder system CYH112 works for nearly any type of fixing – fixing on the floor, wall or directly on a rail.
- Material: stainless steel
- Ordering acc. to product structure (–> Online configurator: www.products.endress.com/cyh112)
- Technical Information TI00430C/07/EN

Wastewater assembly Flexdip CYA112
- Modular assembly system for sensors in open basins, channels and tanks
- Versions in stainless steel or PVC
- Ordering per product structure (–> Online configurator: www.products.endress.com/cya112)
- Technical Information TI00432C/07/EN

Baffle plate OP
- extra protection for extreme flow conditions
- order no. 50028712

Membrane protection guard COY3-SK
- for sensor use in fish ponds
- order no. 50081787

8.3 Cleaning and calibration

Pressurized air cleaning system for COSXX
- Connection: 6/8 mm or 6.35 mm (¼")
- Materials: POM/V4A
- Order numbers
  - 6/8 mm: 71110801
  - 6.35 mm (¼"): 71110802

Compressor
- For cleaning system
- 230 V AC order number: 71072583
- 115 V AC order number: 71096199

Chemoclean
- Injector CYR10
- Ordering acc. to product structure
- Technical Information TI00046C/07/EN

Chemoclean COR3
- Spray head for sensor cleaning in immersion operation
- Material: PVC
- order no.: COR3-0

Calibration vessel
- for COS61/61D
- order no. 51518599

9 Trouble-shooting

9.1 Trouble-shooting instructions

Problem	Check	Remedial action
No display, no sensor reaction	Mains voltage to the transmitter?	Connect mains voltage.
	Sensor connected correctly?	Set up correct connection.
	Coating on the fluorescence cap?	Clean the sensor.
	Medium flow available?	Create flow.
Displayed value too low	With an optional M12 connection: Humidity or dirt in plug?	Cleaning by using cleaning alcohol.
	Sensor calibrated?	Recalibrate
	Medium flow available?	Create flow.
	Displayesd temperature clearly too high?	Check sensor, if necessary send sensor in for repair.
	Coating on the fluorescence cap?	Replace
	Fluorescence cap worn out?	Replace
Strong deviations in displayed value	Fluorescence cap damaged?	Replace fluorescence cap.
	EMC interference on the measuring system?	Cut measuring and signalling lines from h.v. power lines.

Make sure you comply with the instructions for troubleshooting in the Operating Instructions of the transmitter. If necessary, carry out a test of the transmitter.

9.2 Sensor checks

Only authorised and trained personnel may test the sensor!
You will also require a multimeter (voltage, resistance).

Check	Measure	Setpoint
Slope inspection	Place the sensor in the air, and dry with a paper towel.	After 10 minutes: approx. 100% SAT
Zero point inspection	Immerse the sensor in zero solution[1].	Display near to 0 mg/l (0% Sat)

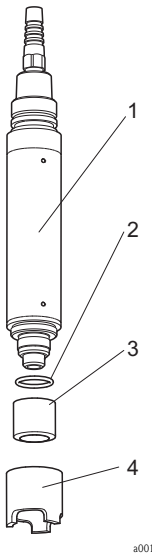
[1] How to use the zero solution:

1. Fill a large beaker (1.5 - 2 l) with approx. 1 l of water.
2. Pour a cap-full of the zero solution into the water.
3. Immerse the sensor into the water and wait a sufficient period of time (15 min. for oxygen depletion).
   The display drops to around 0 mg/l (0 %SAT).

Depending on the conditions (contact surface water/air), the zero solution is stable for up to 12 hours.

If there are deviations from the reference values, follow the troubleshooting instructions or contact your sales office.

9.3 Spare parts

	Position	Spare parts kit	order no.
 *Fig. 14: Spare parts*	1	Sensor	acc. to product structure
	2	Sealing ring – 2 pieces	51518597
	3	Sensor cap (fluorescence cap)	51518598
	without fig.	Zero solution – 3 units to produce 3 x 1 litre oxygen free solution	50001041

9.4 Return

The device must be returned if repairs or a factory calibration are required, or if the wrong device has been ordered or delivered. According to legal regulations, Endress+Hauser, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with medium.

To ensure swift, safe and professional device returns, please read the return procedures and conditions on the internet site:
www.services.endress.com/return-material

9.5 Disposal

The device contains electronic components and must therefore be disposed of in accordance with regulations on the disposal of electronic waste.
Please observe local regulations.

10 Technical data

10.1 Input

Measured variable	Dissolved oxygen [mg/l, % SAT, hPa] Temperature [° C, ° F]
Measuring range	With Liquiline CM44x: 0 to 20 mg/l (0 to 20 ppm) 0 to 200 % SAT 0 to 400 hPa

10.2 Performance characteristics

Response time	t_{90}: 60 s
Maximum measured error	0.01 mg/l or ±1 % of measured value (< 12 mg/l) ±2 % of measured value (from 12 to 20 mg/l)
Repeatability	±0.5 % of measuring range end
Lifetime of the sensor cap	>2 years (under reference operating conditions, protect against direct sun light)

10.3 Environment

Ambient temperature range	–20 to +60 °C (0 to 140 °F)
Storage temperature	–20 to +70 °C (0 to 160 °F) at 95% relative humidity, non condensing
Ingress protection	■ Fixed cable with terminated cable cores: IP 68 (test conditions: 10 m (33 ft) water column at 20 °C (68 °F) in 7 days) ■ Fixed cable with M12 plug: IP 68 (test conditions: 1 m (3.3 ft) water column, 3N KCl at 50 °C (122 °F) in 30 days)

10.4 Process

Process temperature	–5 to 60 °C (20 to 140 °F)
Process pressure	max. 10 bar (145 psi) abs.

10.5 Mechanical construction

Weight	With cable length 7 m (23 ft): 0.7 kg (1.5 lbs.) With cable length 15 m (49 ft): 1.1 kg (2.4 lbs.)	
Materials	Sensor shaft: Cap with fluorescence layer: Fluorescence layer:	stainless steel 1.4571 (AISI 316Ti) POM Silicone
Process connection	G1, NPT 3/4"	
Sensor cable	shielded 4-core fixed cable	
Cable connection to the transmitter	■ Terminal connection ■ optional: M12 plug	
Maximum cable length	max. 100 m (330 ft, (including cable extension))	
Temperature compensation	internal	

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