

Operating Instructions

Condumax CLS12/CLS13

Conductivity sensors for high-temperature applications







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1 About this document

1.1 Safety information

Structure of information	Meaning
<p> DANGER</p> <p>Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ► Corrective action</p>	<p>This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation will result in a fatal or serious injury.</p>
<p> WARNING</p> <p>Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ► Corrective action</p>	<p>This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation can result in a fatal or serious injury.</p>
<p> CAUTION</p> <p>Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ► Corrective action</p>	<p>This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.</p>
<p> NOTICE</p> <p>Cause/situation If necessary, Consequences of non-compliance (if applicable) ► Action/note</p>	<p>This symbol alerts you to situations which may result in damage to property.</p>

1.2 Symbols

-  Additional information, tips
-  Permitted
-  Recommended
-  Not permitted or not recommended
-  Reference to device documentation
-  Reference to page
-  Reference to graphic
-  Result of an individual step

2 Basic safety instructions

2.1 Requirements for the personnel

- Installation, commissioning, operation and maintenance of the measuring system may be carried out only by specially trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may be performed only by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions contained therein.
- Faults at the measuring point may only be rectified by authorized and specially trained personnel.



Repairs not described in the Operating Instructions provided must be carried out only directly at the manufacturer's site or by the service organization.

2.2 Intended use

The sensor measures conductivity in water or steam circuits, such as in the power plant and energy industry:

- Condensate monitoring
- Boiler feedwater monitoring
- Boiler blowdown monitoring

The sensor can be used in all applications with a low conductivity and high, CLS13 with very high, temperatures and pressures.

Sensor versions with explosion protection approval according to ATEX, FM or CSA are suitable for use in hazardous areas.

Any use other than that intended puts the safety of people and the measuring system at risk. Therefore, any other use is not permitted.

The manufacturer is not liable for harm caused by improper or unintended use.

2.3 Workplace safety

The operator is responsible for ensuring compliance with the following safety regulations:

- Installation guidelines
- Local standards and regulations
- Regulations for explosion protection

Electromagnetic compatibility

- The product has been tested for electromagnetic compatibility in accordance with the applicable international standards for industrial applications.
- The electromagnetic compatibility indicated applies only to a product that has been connected in accordance with these Operating Instructions.

2.4 Operational safety

Before commissioning the entire measuring point:

1. Verify that all connections are correct.
2. Ensure that electrical cables and hose connections are undamaged.

Procedure for damaged products:

1. Do not operate damaged products, and protect them against unintentional operation.
2. Label damaged products as defective.

During operation:

- ▶ If errors cannot be rectified,
take products out of service and protect them against unintentional operation.

2.5 Product safety

2.5.1 State-of-the-art technology

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. The relevant regulations and international standards have been observed.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

1. Verify that the packaging is undamaged.
 - ↳ Notify the supplier of any damage to the packaging.
Keep the damaged packaging until the issue has been resolved.
2. Verify that the contents are undamaged.
 - ↳ Notify the supplier of any damage to the delivery contents.
Keep the damaged goods until the issue has been resolved.
3. Check that the delivery is complete and nothing is missing.
 - ↳ Compare the shipping documents with your order.
4. Pack the product for storage and transportation in such a way that it is protected against impact and moisture.
 - ↳ The original packaging offers the best protection.
Make sure to comply with the permitted ambient conditions.

If you have any questions, please contact your supplier or your local Sales Center.

3.2 Product identification

3.2.1 Nameplate

The nameplate provides you with the following information on your device:

- Manufacturer identification
 - Extended order code
 - Serial number
 - Safety information and warnings
- Compare the information on the nameplate with the order.

3.2.2 Identifying the product

Product page

www.endress.com/cls12

www.endress.com/cls13

Interpreting the order code

The order code and serial number of your product can be found in the following locations:

- On the nameplate
- In the delivery papers

Obtaining information on the product

1. Go to www.endress.com.
2. Page search (magnifying glass symbol): Enter valid serial number.
3. Search (magnifying glass).
 - ↳ The product structure is displayed in a popup window.
4. Click the product overview.
 - ↳ A new window opens. Here you will find information pertaining to your device, including the product documentation.

Manufacturer address

Endress+Hauser Conducta GmbH+Co. KG
Dieselstraße 24
70839 Gerlingen
Germany

3.3 Scope of delivery

The scope of delivery includes:

- Sensor (version as ordered)
- Operating instructions

4 Installation

4.1 Installing the sensor

1. Mount the sensor directly on a process connection that matches the version or alternatively install it in a CLA751 flow assembly.
2. Ensure that the electrodes are fully immersed in the medium during measurement.
 - ↳ The insertion depth must be at least 50 mm (1.97 in).
3. If using the sensor in the ultrapure water range:
Work under air-evacuated conditions.
 - ↳ This prevents CO₂ in the air from dissolving in the water and increasing the conductivity by up to 3 µS/cm as a result of (weak) dissociation.

4.2 Post-mounting check

1. Are the sensor and cable undamaged?
2. Is the sensor installed in the process connection and is not suspended from the cable?

5 Electrical connection

WARNING

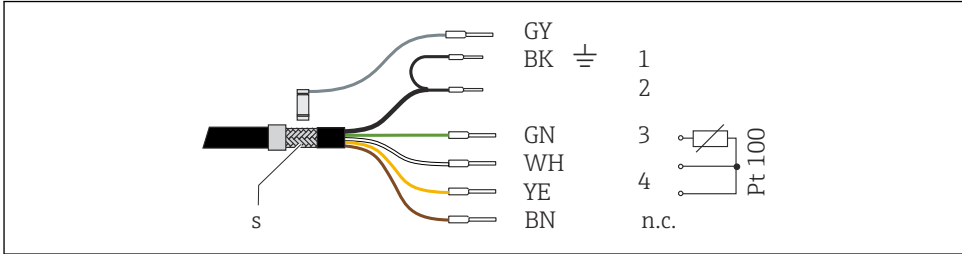
Device is live!

Incorrect connection may result in injury or death!

- ▶ The electrical connection may be performed only by an electrical technician.
- ▶ The electrical technician must have read and understood these Operating Instructions and must follow the instructions contained therein.
- ▶ **Prior** to commencing connection work, ensure that no voltage is present on any cable.

5.1 Connecting the sensor

The sensor is connected via the fixed cable or via the measuring cable CYK71 with a shield. The wiring diagram is provided in the Operating Instructions of the transmitter used.



A0061797

1 Measuring cable CYK71

1 Coax BK, shield (outer electrode)

2 Coax, inner, conductivity (inner electrode)

3 PT100

4 PT100

s Outer shield

Pt100 Temperature

n.c. Do not connect

A VMB junction box and another CYK71 cable are required for the cable extension.

5.2 Ensuring the degree of protection

Only the mechanical and electrical connections which are described in these instructions, and which are necessary for the required intended use, may be established on the device delivered.

► Exercise care when carrying out the work.

Otherwise, the individual types of protection (Ingress Protection (IP), electrical safety, EMC interference immunity) agreed for this product can no longer be guaranteed due, for example, to covers being left off or cable (ends) that are loose or insufficiently secured.

5.3 Post-connection check

Device health and specifications	Action
Is the outside of the sensor, assembly or cable free from damage?	► Perform a visual inspection.
Electrical connection	Action
Are the mounted cables strain-relieved and not twisted?	► Perform a visual inspection. ► Untwist the cables.
Is a sufficient length of the cable cores stripped, and are the cores positioned in the terminal correctly?	► Perform a visual inspection. ► Pull gently to check they are seated correctly.

Device health and specifications	Action
Are the power supply and signal lines correctly connected?	▶ Refer to the wiring diagram for the transmitter.
Are all screw terminals tightened?	▶ Tighten the screw terminals.
Are all the cable entries installed, tightened and leak-tight?	▶ Perform a visual inspection. In the case of lateral cable entries:
Are all cable entries mounted on the side or pointing downwards?	▶ Point cable loops downward so that water can drip off.

6 Commissioning

Prior to initial commissioning, ensure that:

- The sensor is correctly installed
- The electrical connection is correct

1. Check the temperature compensation and damping settings on the transmitter.

WARNING

Escaping process medium

Risk of injury from high pressure, high temperatures or chemical hazards!

- ▶ Before applying pressure to an assembly with cleaning system, ensure that the system has been connected correctly.
- ▶ If you cannot reliably establish the correct connection, do not install the assembly in the process.

If using an assembly with automatic cleaning function:

2. Check that the cleaning medium (water or air, for example) is connected correctly.
3. Following commissioning:
Maintain the sensor at regular intervals.
 - ↳ This is the only way to ensure reliable measurements.

7 Maintenance

CAUTION

Corrosive chemicals

Risk of chemical burns to the eyes and skin and risk of damage to clothing and equipment!

- ▶ It is absolutely essential to protect the eyes and hands properly when working with acids, alkalis and organic solvents!
- ▶ Wear protective goggles and safety gloves.
- ▶ Clean away splashes on clothes and other objects to prevent any damage.
- ▶ Comply with instructions in the safety data sheets for the chemicals used.

⚠ WARNING**Thiocarbamide**

Harmful if swallowed! Limited evidence of carcinogenicity! Possible risk of harm to the unborn child! Dangerous for the environment with long-term effects!

- ▶ Wear protective goggles, protective gloves and appropriate protective clothing.
- ▶ Avoid all contact with the eyes, mouth and skin.
- ▶ Avoid discharge into the environment.

⚠ CAUTION**Corrosive chemicals**

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- ▶ Wear protective goggles and safety gloves.
- ▶ Clean away splashes on clothes and other objects to prevent any damage.
- ▶ Comply with instructions in the safety data sheets for the chemicals used.

Clean away fouling on the sensor as follows depending on the type of fouling:

1. Oily and greasy films:
Clean with grease remover, e.g. alcohol, or hot water with an alkaline agent.
2. Lime and metal hydroxide buildup and low solubility (lyophobic) organic buildup:
Dissolve buildup with diluted hydrochloric acid (3 %) and then rinse thoroughly with plenty of clear water.
3. Sulfidic buildup (from flue gas desulfurization or wastewater treatment plants):
Use a mixture of hydrochloric acid (3 %) and thiocarbamide (commercially available) and then rinse thoroughly with plenty of clear water.
4. Buildup containing protein (e.g. in the food industry):
Use a mixture of hydrochloric acid (0.5 %) and pepsin (commercially available) and then rinse thoroughly with plenty of clear water.
5. Readily soluble biological buildup:
Rinse with pressurized water.

After cleaning, rinse the sensor thoroughly with plenty of water.

8 Repair

8.1 General information

The repair and conversion concept provides for the following:

- The product has a modular design
- Spare parts are grouped into kits which include the associated kit instructions
- Only use original spare parts from the manufacturer

- Repairs are carried out by the manufacturer's Service Department or by trained users
- Certified devices can only be converted to other certified device versions by the manufacturer's Service Department or at the factory
- Observe applicable standards, national regulations, Ex documentation (XA) and certificates

1. Carry out the repair according to the kit instructions.
2. Document the repair and conversion and enter, or have entered, in the Life Cycle Management tool (W@M).

8.2 Spare parts

Spare parts currently available for the device can be found at: www.endress.com/onetools

- ▶ Quote the serial number of the device when ordering spare parts.

8.3 Return

The product must be returned if repairs or a factory calibration are required, or if the wrong product was ordered or delivered. As an ISO-certified company and also due to legal regulations, Endress+Hauser is obliged to follow certain procedures when handling any returned products that have been in contact with medium.

www.endress.com/support/return-material

8.4 Disposal



If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

9 Technical data

9.1 Input

9.1.1 Measured variables

- Conductivity
- Temperature

9.1.2 Measuring ranges

Conductivity	(in relation to water at 25 °C (77 °F))
CLS12 / CLS13 -A	0.04 to 20 µS/cm
CLS12 / CLS13 -B	0.10 to 200 µS/cm
Temperature	
CLS12	-20 to 160 °C (-4 to 320 °F)
CLS13	-20 to 250 °C (-4 to 480 °F)

9.1.3 Cell constant

CLS12 / CLS13 -A	$k = 0.01 \text{ cm}^{-1}$
CLS12 / CLS13 -B	$k = 0.1 \text{ cm}^{-1}$

9.1.4 Temperature compensation

Pt 100 (class B as per IEC 60751)

9.2 Environment

9.2.1 Ambient temperature

-20 to 60 °C (-4 to 140 °F)

9.2.2 Storage temperature

-25 to +80 °C (-10 to +180 °F)

9.2.3 Degree of protection

IP67

9.3 Process

9.3.1 Process temperature

CLS12

-20 to 160 °C (-4 to 320 °F)

CLS13

-20 to 250 °C (-4 to 480 °F)

9.3.2 Process pressure

CLS12

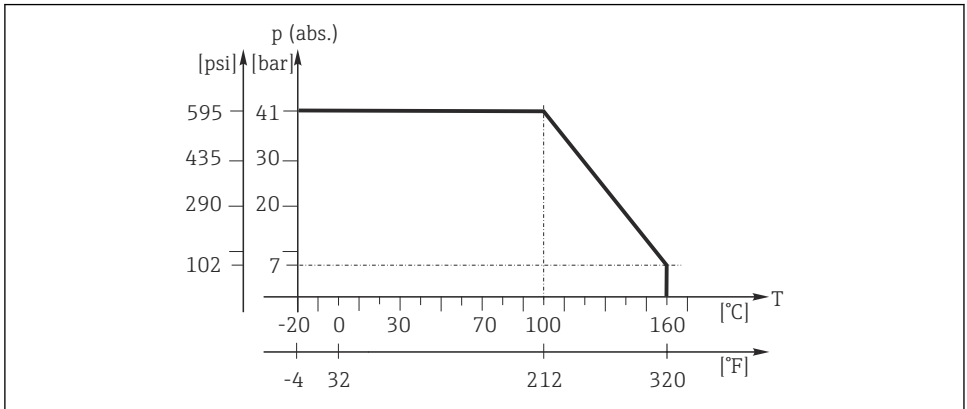
Without flow assembly CLA751	Up to 100 °C (212 °F): 1 to 41 bar (15 to 595 psi), absolute Up to 160 °C (320 °F): 1 to 7 bar (15 to 102 psi), absolute
In flow assembly CLA751	1 to 13 bar (15 to 185 psi), absolute

CLS13

1 to 41 bar (15 to 595 psi), absolute

9.3.3 Temperature/pressure diagram

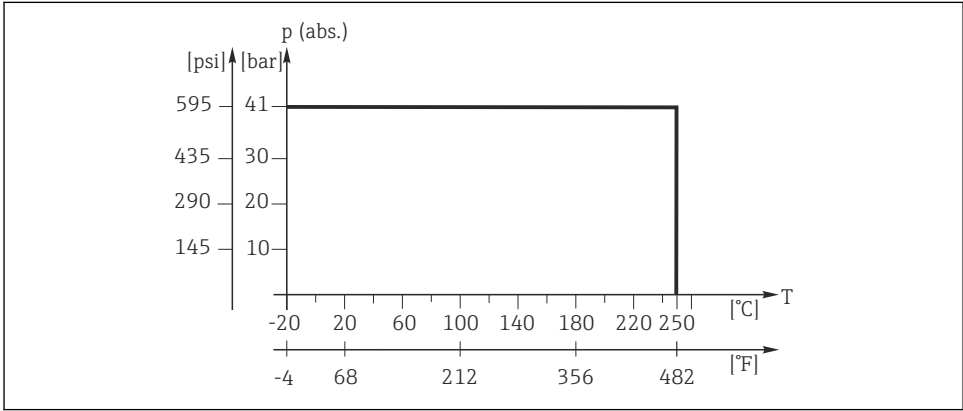
CLS12



A0046118

2 Mechanical pressure-temperature resistance

CLS13



A0048119

3 Mechanical pressure-temperature resistance

9.4 Mechanical construction

9.4.1 Weight

CLS12

Approx. 1.4 kg (3.1 lbs) depending on version

CLS13

Approx. 1.7 kg (3.75 lbs) depending on version

9.4.2 medium

CLS12

Electrodes	Stainless steel 1.4571 (AISI 316Ti)
Process connection	Stainless steel 1.4571 (AISI 316Ti)
Insulator body	PEEK
Seal	EPDM

CLS13

Electrodes	Stainless steel 1.4571 (AISI 316Ti)
Process connection	Stainless steel 1.4571 (AISI 316Ti)
Seals	FFKM
Insulator body	Ceramic

9.4.3 Process connection

CLS12 and CLS13

G1 thread

NPT 1" thread

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