Operating Instructions

Condumax CLS15D/16D/21D

Sensors with Memosens protocol

For conductive measurement of conductivity in liquids
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").

<table>
<thead>
<tr>
<th>Safety message structure</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶️ DANGER</td>
<td>This symbol alerts you to a dangerous situation. Failure to avoid the situation will result in a fatal or serious injury.</td>
</tr>
<tr>
<td>Cause (/consequences)</td>
<td></td>
</tr>
<tr>
<td>Possible consequences if ignored</td>
<td></td>
</tr>
<tr>
<td>► Preventive measures</td>
<td></td>
</tr>
<tr>
<td>▶️ WARNING</td>
<td>This symbol alerts you to a dangerous situation. Failure to avoid the situation can result in a fatal or serious injury.</td>
</tr>
<tr>
<td>Cause (/consequences)</td>
<td></td>
</tr>
<tr>
<td>Possible consequences if ignored</td>
<td></td>
</tr>
<tr>
<td>► Preventive measures</td>
<td></td>
</tr>
<tr>
<td>▶️ CAUTION</td>
<td>This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.</td>
</tr>
<tr>
<td>Cause (/consequences)</td>
<td></td>
</tr>
<tr>
<td>Possible consequences if ignored</td>
<td></td>
</tr>
<tr>
<td>► Preventive measures</td>
<td></td>
</tr>
<tr>
<td>NOTICE</td>
<td>This symbol alerts you to situations that can result in damage to property and equipment.</td>
</tr>
<tr>
<td>Cause/situation</td>
<td></td>
</tr>
<tr>
<td>Possible consequences if ignored</td>
<td></td>
</tr>
<tr>
<td>► Action/note</td>
<td></td>
</tr>
</tbody>
</table>

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).
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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 conductivity sensors are designed for conductive measurement of the conductivity in liquids. They are applied in the following fields:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Fields of application</th>
<th>Hazardous areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condumax CLS15D</td>
<td>Measurements in pure and ultrapure water</td>
<td>approved for hazardous areas, zone 1</td>
</tr>
<tr>
<td>Condumax CLS16D</td>
<td>Measurements in pure and ultrapure water</td>
<td>approved for hazardous areas, zone 1</td>
</tr>
<tr>
<td></td>
<td>hygienic processes</td>
<td></td>
</tr>
<tr>
<td>Condumax CLS21D</td>
<td>Measurements in media with medium or high</td>
<td>approved for hazardous areas, zone 1</td>
</tr>
<tr>
<td></td>
<td>conductivities</td>
<td></td>
</tr>
</tbody>
</table>

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 prevailing standards and regulations.
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.

1.5 Product safety

1.5.1 State of the art
The sensor has been designed and tested according to the state of the art and left the factory in perfect functioning order.
Relevant regulations and European standards have been met.

1.5.2 Safety instructions for electrical equipment in hazardous locations

ATEX /NEPSI II 1G Ex ia IIC T3 / T4 / T6, IECEx Ex ia IIC T6 Ga

- The inductive sensor-cable plug-in system Memosens is suitable for use in hazardous areas in accordance with the EC type examination certificate BVS 04 ATEX E 121.
  The related EC declaration of conformity forms an integral part of this document.
- The certified conductivity sensor types CLS15D / CLS16D / CLS21D may only be connected via the CYK10-G measuring cable to the certified intrinsically safe digital sensor output circuits of the transmitter Liquiline M, type CM42-*G........... in accordance with the EC type examination certificate EX 5 05 03 30266 012 (1. to 5. supplement).
- The electrical connection must correspond to the wiring diagram of the used transmitter.
- Metallic process connection parts must be mounted at the mounting location electrostatically conductive (< 1 MΩ).
- The sensors type CLS15D with non-metallic process connections and the sensors type CLS21D may only be used in liquid media with a conductivity of at least 10 nS/cm.
- The sensors type CLS15D with non-metallic process connections may not be operated under process conditions in which an electrostatic charging of the sensor and in particular of the electrically separated outer electrode is likely to occur.
- The CYK10-G measuring cable must be protected from electrostatic charging if it is run through zone 0.
- The maximum permitted cable length is 100 m.
- Ex versions of digital sensors with Memosens technology are indicated by an orange-red ring in the plug-in head.
- The regulations for electrical installations in hazardous areas (EN/IEC 60079-14) must be observed for the use of the devices and sensors.
Basic safety instructions

ATEX/NEPSI II 3G Ex nL IIC T3 / T4 / T6

- The inductive sensor-cable plug-in system Memosens is suitable for use in hazardous areas, zone 2. The related EC declaration of conformity forms an integral part of this document.
- The certified conductivity sensor types CLS15D / CLS16D / CLS21D may only be connected via the CYK10-V measuring cable to the certified intrinsically safe digital sensor output circuits of the transmitter Liquiline M, type CM42-*V........
- The electrical connection must correspond to the wiring diagram of the used transmitter.
- Metallic process connection parts must be mounted at the mounting location electrostatically conductive (< 1 MΩ).
- The sensors type CLS15D with non-metallic process connections and the sensors type CLS21D may only be used in liquid media with a conductivity of at least 10 nS/cm.
- The sensors type CLS15D with non-metallic process connections may not be operated under process conditions in which an electrostatic charging of the sensor and in particular of the electrically separated outer electrode is likely to occur.
- The maximum permitted cable length is 100 m.
- The regulations for electrical installations in hazardous areas (EN/IEC 60079-14) must be observed for the use of the devices and sensors.
# 2 Identification

## 2.1 Type code for versions with Ex approval

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condumax</td>
<td>CLS15D</td>
<td>xx G</td>
</tr>
<tr>
<td></td>
<td>CLS16D</td>
<td>xx G</td>
</tr>
<tr>
<td></td>
<td>CLS21D</td>
<td>xx G</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condumax</td>
<td>CLS15D</td>
<td>xx V</td>
</tr>
<tr>
<td></td>
<td>CLS16D</td>
<td>xx V</td>
</tr>
<tr>
<td></td>
<td>CLS21D</td>
<td>xx V</td>
</tr>
</tbody>
</table>

Process connections, material no Ex relevance

for use in hazardous locations,
ATEX/NEPSI II 1G Ex ia IIC T3/T4/T6 Ga,
IECEx Ex ia IIC T6 Ga

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condumax</td>
<td>CLS15D</td>
<td>xx V</td>
</tr>
<tr>
<td></td>
<td>CLS16D</td>
<td>xx V</td>
</tr>
<tr>
<td></td>
<td>CLS21D</td>
<td>xx V</td>
</tr>
</tbody>
</table>

Process connections, material no Ex relevance

for use in hazardous locations,
ATEX/NEPSI II 3G Ex nL IIC T3/T4/T6

## 2.2 Nameplate

The nameplate can be found on the sensor.

The following information is provided on the nameplate:

- Order code
- Extended order code
- Serial number
- Cell constant (nominal value)
- Protection class
- Pressure specification at 20 °C
- Continuous service temperature
- Ex marking for versions with Ex approval

Compare the data on the nameplate with your order.

## 2.3 Order code interpretation

### 2.3.1 Product page links

- www.products.endress.com/cls15d
- www.products.endress.com/cls16d
- www.products.endress.com/cls21d
2.3.2 Product configurator

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

<table>
<thead>
<tr>
<th>Product page function</th>
</tr>
</thead>
<tbody>
<tr>
<td>:: Add to product list</td>
</tr>
<tr>
<td>:: Price &amp; order information</td>
</tr>
<tr>
<td>:: Compare this product</td>
</tr>
<tr>
<td>:: Configure this product</td>
</tr>
</tbody>
</table>

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.

2.4 Temperature classes for hazardous locations

2.4.1 ATEX/NEPSI II 1G Ex ia IIC T3/T4/T6 Ga, IECEx Ex ia IIC T6 Ga

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Type</th>
<th>Process temperature $T_a$ within temperature class $T_n$ (°C)</th>
<th>Cat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condumax</td>
<td>CLS15D</td>
<td>-</td>
<td>$-20 \leq T_a \leq 135$ (T3) $-20 \leq T_a \leq 120$ (T4) $-20 \leq T_a \leq 70$ (T6)</td>
<td>II 1G</td>
</tr>
<tr>
<td>Condumax</td>
<td>CLS15D</td>
<td>-</td>
<td>$-20 \leq T_a \leq 135$ (T3) $-20 \leq T_a \leq 100$ (T4) $-20 \leq T_a \leq 50$ (T6)</td>
<td>II 1G</td>
</tr>
<tr>
<td>Condumax</td>
<td>CLS16D</td>
<td>-</td>
<td>$-5 \leq T_a \leq 135$ (T3) $-5 \leq T_a \leq 115$ (T4) $-5 \leq T_a \leq 65$ (T6)</td>
<td>II 1G</td>
</tr>
<tr>
<td>Condumax</td>
<td>CLS21D</td>
<td>-</td>
<td>$-20 \leq T_a \leq 135$ (T3) $-20 \leq T_a \leq 115$ (T4) $-20 \leq T_a \leq 65$ (T6)</td>
<td>II 1G</td>
</tr>
</tbody>
</table>

If the process temperatures indicated are observed, no impermissible temperatures for the temperature class in question occur at the equipment.
2.4.2 ATEX/NEPSI II 3G Ex nL IIC T3/T4/T6

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Process temperature $T_a$ within temperature class (Tn)</th>
<th>Cat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condumax</td>
<td>CLS15D - A ** V</td>
<td>$-20 , ^\circ C \leq T_a \leq +135 , ^\circ C$ (T3)</td>
<td>II 3G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$-20 , ^\circ C \leq T_a \leq +120 , ^\circ C$ (T4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$-20 , ^\circ C \leq T_a \leq +70 , ^\circ C$ (T6)</td>
<td></td>
</tr>
<tr>
<td>Condumax</td>
<td>CLS15D - B ** V</td>
<td>$-20 , ^\circ C \leq T_a \leq +135 , ^\circ C$ (T3)</td>
<td>II 3G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$-20 , ^\circ C \leq T_a \leq +100 , ^\circ C$ (T4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$-20 , ^\circ C \leq T_a \leq +50 , ^\circ C$ (T6)</td>
<td></td>
</tr>
<tr>
<td>Condumax</td>
<td>CLS16D - ** ** V</td>
<td>$-5 , ^\circ C \leq T_a \leq +135 , ^\circ C$ (T3)</td>
<td>II 3G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$-5 , ^\circ C \leq T_a \leq +115 , ^\circ C$ (T4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$-5 , ^\circ C \leq T_a \leq +65 , ^\circ C$ (T6)</td>
<td></td>
</tr>
<tr>
<td>Condumax</td>
<td>CLS21D - C ** V</td>
<td>$-20 , ^\circ C \leq T_a \leq +135 , ^\circ C$ (T3)</td>
<td>II 3G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$-20 , ^\circ C \leq T_a \leq +115 , ^\circ C$ (T4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$-20 , ^\circ C \leq T_a \leq +65 , ^\circ C$ (T6)</td>
<td></td>
</tr>
</tbody>
</table>

If the process temperatures indicated are observed, no impermissible temperatures for the temperature class in question occur at the equipment.

2.5 Certificates and approvals

2.5.1 CE conformity

Declaration of conformity
The product meets the requirements of the harmonized European standards. It thus complies with the legal requirements of the EC directives. The manufacturer confirms successful testing of the product by affixing the CE symbol.

2.5.2 EX approvals

- ATEX /NEPSI II 1G Ex ia IIC T3 / T4 / T6, IECEx Ex ia IIC T6 Ga
- FM/CSA IS/NI CL I Div. 1 & 2 GP A - D in combination with the Liquiline CM42 transmitter
- ATEX/NEPSI II 3G Ex nL IIC T3 / T4 / T6 for the use in Zone 2 with transmitter Liquiline CM42-KV***

ATEX and FM/CSA versions of digital sensors with Memosens technology are indicated by an orange-red ring in the plug-in head.

2.5.3 Test certificate acc. to EN 10204 3.1
available for clamp 1½” process connection

2.5.4 Notified body

DEKRA EXAM GmbH
Bochum (Germany)
3 Installation

Clamp connection: (all sensors)

Sensors with clamp connections can be fixed using sheet metal brackets or solid brackets. Sheet metal brackets have a lower dimensional stability, uneven bearing surfaces causing point loads and sometimes sharp edges that can damage the clamp. We strongly recommend to always use solid brackets because of their higher dimensional stability. Solid brackets may be applied over the total pressure-temperature range (see temperature-pressure load curve).

3.1 CLS15D

The measuring surfaces of the sensor must be completely immersed in the medium during operation. Minimum immersion depth is 32 mm (1.26"). When working in ultrapure water, ingress of air must be prevented since dissolved air, particularly CO₂, may increase conductivity by up to 3 µS/cm.

![Fig. 1: With NPT ½" installed in T- or cross piece](image1)

1 T- or cross piece (DN 32, 40 or 50)
2 PVC-threaded coupling for cementing (NPT ½" for DN 20, see Accessories)
3 Adapter coupling for cementing (for DN 32, 40 or 50, see Accessories)

![Fig. 2: With NPT ½" installed in flow assembly 71042405](image2)

1 Sensor support NPT ½"
2 Inlet
3 Outlet
3.2 CLS16D

The sensors are mounted directly via the process connection. When installing the sensor in pipes, note the flow direction of the medium (see figure below).

Fig. 3: Permissible flow direction

Fig. 4: Non-permissible flow direction

The measuring surfaces must be completely immersed in the medium during operation. When working in ultrapure water, ingress of air must be prevented since dissolved air, particularly CO₂, may increase conductivity by up to 3 μS/cm.
3.3 CLS21D

The sensors are mounted directly via the process connection. Optionally, they can be installed in flow assemblies.

**Fig. 5: Installation in the CLA751 flow assembly**

**Fig. 6: Installation in the CLA752 flow assembly**
For installation of sensors with G1 thread in tanks, the CLA111 immersion and process assembly is available (see Accessories).

![Fig. 7: Dipfit CLA111, mounting versions A, B and D](image)

The measuring surfaces must be completely immersed in the medium during operation.

### 3.4 Post-installation check

- Are sensor and cable undamaged?
- Is the sensor installed via process connection and not suspended from the cable?
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 Connection to the transmitter
The sensor is connected to the transmitter via the measuring cable CYK10.

![Diagram of Measuring cable CYK10]

Fig. 8: Measuring cable CYK10
4.2 Wiring diagram for explosion-hazardous areas

4.2.1 Sensors for Zone 0

Fig. 9: Connection of CLSxxD-***(*)G and CYK10-G
4.2.2 Sensors for Zone 2

Fig. 10: Connection of CLSxxD-****(*)V and CYK10-V
5 Commissioning

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**

Incorrect connection of a cleaning unit to an assembly
Danger of medium leaking off
- Before applying compressed air to an assembly with cleaning facility, make sure the connections are correctly fitted. Otherwise, the assembly may not be inserted into the process.

6 Maintenance

6.1 Cleaning

**WARNING**

Burning chemicals
Danger of chemicals burns to the eyes and skin. Danger of damage to clothing and equipment.
- It is absolutely essential to protect the eyes and hands properly when working with acids, bases and organic solvents!
- Wear protective goggles and safety gloves.
- Clean away splashes on clothes and other objects to prevent any damage.
- Pay particular attention to the information provided in the safety data sheets for the chemicals used.

Clean away fouling on the sensor as follows depending on the particular type of fouling:
- Oily and greasy films:
  Clean with grease remover, e.g. alcohol, acetone, as well as hot water and dishwashing detergent if necessary.
- Lime and metal hydroxide buildup:
  Dissolve buildup with diluted hydrochloric acid (3 %) and then rinse thoroughly with plenty of clear water.
- Sulfidic buildup (from flue gas desulphurising or sewage treatment plants):
  Use a mixture of hydrochloric acid (3 %) and thiocarbamide (commercially available) and then rinse thoroughly with plenty of clear water.
- Buildup containing proteins (e.g. food industry):
  Use a mixture of hydrochloric acid (0.5 %) and pepsin (commercially available) and then rinse thoroughly with plenty of clear water.
6.2  Seal replacement (CLS16D only)

6.2.1  Checking the sensors

Intact seals are a prerequisite for safe and accurate measurement. To ensure highest operational reliability and complete hygiene of the sensor according to 3-A Standard 74-, the seal should be replaced at regular intervals.

The actual maintenance intervals can only be determined by the operator since they strongly depend on the operating conditions such as:
- type and temperature of the medium
- type and temperature of the cleaning solution
- number of cleanings
- number of sterilizations
- ambient conditions

**Recommended intervals for seal replacement**

<table>
<thead>
<tr>
<th>Application</th>
<th>Seal replacement (recommended interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium temperature from 50 up to 100 °C (122 to 212 °F)</td>
<td>approx. every 18 months</td>
</tr>
<tr>
<td>Medium temperature below 50 °C (122 °F)</td>
<td>approx. every 36 months</td>
</tr>
<tr>
<td>Sterilization cycles, max. 145 °C (293 °F), 30 min</td>
<td>approx. 400 cycles</td>
</tr>
</tbody>
</table>

**Replacement of seals and recalibration**

If the sensor is exposed to very high loads, you can have it regenerated at the Endress+Hauser Service (see Accessories). Regeneration includes replacement of seals and recalibration of the sensor. Send the sensor to the responsible Endress+Hauser sales center.

6.2.2  Seal replacement

- Factory replacement of seals and factory recalibration of sensors;
  order no. 51505585

6.3  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
7 Technical data

7.1 Input

7.1.1 Measured variable

- Conductivity
- Temperature

7.1.2 Measuring range

Conductivity (referenced to water at 25 °C (77 °F))

<table>
<thead>
<tr>
<th>Model</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLS15D-A</td>
<td>0.04 to 20 μS/cm</td>
</tr>
<tr>
<td>CLS15D-B</td>
<td>0.10 to 200 μS/cm</td>
</tr>
<tr>
<td>CLS16D</td>
<td>0.04 to 500 μS/cm</td>
</tr>
<tr>
<td>CLS21D</td>
<td>10 μS/cm to 20 mS/cm</td>
</tr>
</tbody>
</table>

valid in the specified temperature range
specified measuring accuracy up to 100 °C (212 °F)

Temperature
specified measuring accuracy up to 100 °C (212 °F)

7.1.3 Cell constant

<table>
<thead>
<tr>
<th>Model</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLS15D-A</td>
<td>k = 0.01 cm⁻¹</td>
</tr>
<tr>
<td>CLS15D-B</td>
<td>k = 0.1 cm⁻¹</td>
</tr>
<tr>
<td>CLS16D</td>
<td>k = 0.1 cm⁻¹</td>
</tr>
<tr>
<td>CLS21D</td>
<td>k = 1.0 cm⁻¹, nominal</td>
</tr>
</tbody>
</table>

7.1.4 Temperature compensation

NTC
7.2 Performance characteristics

7.2.1 Accuracy

CLS15D
Each individual sensor is factory measured in a solution of approx. 5 μS/cm for cell constant 0.01 cm⁻¹ or approx. 50 μS/cm for cell constant 0.1 cm⁻¹ on a reference measuring system referred to NIST or DKD. The accurate cell constant is entered in the supplied quality certificate. The maximum measured error in cell constant determination is 1.0%.

CLS16D
Each individual sensor is factory-measured in a solution of approx. 5 μS/cm with a reference system traceable to NIST or DKD. The exact cell constant is entered into the supplied quality certificate. The maximum measured error in cell constant determination is 1.0 %.

CLS21D
Each individual sensor is factory measured in a solution of approx. 5 mS/cm on a reference measuring system referred to NIST or DKD. The accurate cell constant is entered in the supplied quality certificate. The maximum measured error in cell constant determination is 1.0 %.

7.2.2 Conductivity response time

\[ t_{95} \leq 3 \text{ s} \]

7.2.3 Temperature response time

CLS15D-A
\[ t_{90} \leq 39 \text{ s} \]

CLS15D-B
\[ t_{90} \leq 17 \text{ s} \]

CLS16D
\[ t_{90} \leq 13 \text{ s} \]

CLS21D
\[ t_{90} \leq 296 \text{ s} \]

7.2.4 Maximum measured error

CLS15D
2 % of the measured value

CLS16D
2 % of the measured value up to 200 μS/cm
3 % of the measured value from 200 to 500 μS/cm

CLS21D
5 % of the measured value
7.2.5  Repeatability

CLS15D
0.2 % of the measured value + 3 nS/cm

CLS16D
0.2 % of the measured value + 3 nS/cm

CLS21D
0.2 % of the measured value

7.3  Environment

7.3.1  Ambient temperature
-20 to +60 °C (-4 to +140 °F)

7.3.2  Storage temperature
-25 to +80 °C (-10 to +180 °F)

7.3.3  Humidity
5 to 95%

7.3.4  Protection degree
IP 68 / NEMA Type 6P (10 m water column, 25 °C, 168 h)

7.4  Process

7.4.1  Process temperature

CLS15D
Normal operation: -20 to 120 °C (-4 to 248 °F)
Sterilization (max. 1 h): max. 140 °C (284 °F)

CLS16D
Normal operation: -5 to 120 °C (23 to 248 °F)
Sterilization (max. 45 min): max. 150 °C (302 °F) at 5 bar (73 psi)

CLS21D
-20 to +135 °C (-4 to 275 °F) at 2.5 bar (36 psi)

The maximum temperature for communication between Memosens sensors and the transmitter is 130 °C (266 °F).
7.4.2 Process pressure

CLS15D
12 bar (170 psi) at 20 °C (68 °F)

CLS16D
12 bar (170 psi) at 20 °C (68 °F)
8 bar (120 psi) at 120 °C (248 °F)
0.1 bar abs. (1.5 psi abs. (depression)) at 20 °C (68 °F)

CLS21D
16 bar (230 psi) at 20 °C (68 °F)

7.4.3 Pressure/temperature load curves

Fig. 11: Mechanical pressure-temperature stability of CLS15D

A  Short-time sterilizable (1 h)
B  Thread version with fixed cable
Fig. 12: Mechanical pressure-temperature stability of CLS16D

A Short-time sterilizable (45 min)

Fig. 13: Mechanical pressure-temperature stability of CLS21D
7.5 Mechanical construction

7.5.1 Weight

CLS15D and CLS21D
Depending on version, approx. 0.3 kg (0.7 lb.)

CLS16D
Depending on version, approx. 0.13 to 0.75 kg (0.3 to 1.7 lb.)

7.5.2 Material

CLS15D
Electrodes: polished, stainless steel 1.4435 (AISI 316L)
Sensor shaft: polyether sulfone (PES-GF20)
O-ring, in contact with medium: EPDM (clamp version only)

CLS16D
Electrodes: electro-polished, stainless steel 1.4435 (AISI 316L)
Seal: molded seal ISOLAST (FFKM), listed with FDA

CLS21D
Electrodes: graphite
Sensor shaft: polyether sulfone (PES-GF20)
Thermal conductivity socket for temperature sensor: titanium 3.7035

7.5.3 Surface roughness

CLS15D
\( R_a \leq 0.8 \, \mu m \)  
\( R_a \leq 0.4 \, \mu m \) available as TSP C-LS020130-02

CLS16D
\( R_a \leq 0.8 \, \mu m \), electro-polished
\( R_a \leq 0.4 \, \mu m \), electro-polished, optional
### 7.5.4 Process connections

**CLS15D**

Thread NPT ½" and ¾"
Clamp 1½" acc. to ISO 2852

**CLS16D**

Clamp 1", 1½", 2" acc. to ISO 2852 (also suitable for TRI-CLAMP, DIN 32676)
Tuchenhagen VARIVENT N DN 50 to 125
NEUMO BioControl D50

**CLS21D**

Thread G1
Thread NPT 1"
Clamp 2" acc. to ISO 2852
Dairy fitting DN 25 acc. to DIN 11851
Declaration of conformity

8.1 ATEX / NEPSI II 1G Ex ia IIC T3 / T4 / T6, IECEx Ex ia IIC T6 Ga

EG Konformitätserklärung
EC Declaration of Conformity
CE Déclaration de Conformité

Endress+Hauser Conducta Gesellschaft für Mess- und Regeltechnik mbH & Co. KG
Dienststrasse 24, 78639 Gerten, Germany

erklärt in alleiniger Verantwortung, dass die Produkte
declare in sole responsibility that the products
déclare sous sa seule responsabilité que les produits

Memosens
CLS15D-***G
CLS16D-***G
CLS21D-***G

CYK10-G**1

mit Kabel / with cable / avec câble

EG Bausenmusterprüfbescheinigung;
EC type examination certificate:
Ceritkat de Perxmen CE de type :
ausgestellt von / issued by / exposé par :

BVS 04 ATEX E 121 X
DEKRA EXAM GmbH

mit den Vorschriften folgender Europäischen Richtlinien übereinstimmend:
in conformity with the regulations of the following European Directives:
evt conforme aux prescriptions et directives Européennes suivantes:

94/9/EG (Geräte zur Verwendung in explosionsgefährdten Bereichen)
(Equipment for use in potentially explosive atmospheres)
(Appareils et systèmes de protection en atmosphère explosive)

2004/108/EG (Elektromagnetische Verträglichkeit)
(Electromagnetic Compatibility)
(Compatibilité électrotechnique)

Angewandte harmonisierte Normen oder normative Dokumente:
Applied harmonized standards or normative documents:
Normes harmonisées ou document normatives appliquées:
EN 61326-1:2006, EN 61326-2-1:2006

Benannte Stelle für C6 Überwachung:
Notified body for QA control:
Organisme notifié pour l’assurance qualité :

Gerlingen, 2008-07-07

Endress+Hauser
People for Process Automation

[Signature]
LV. Dr. Dietrich Kluiber
Manager Certification and Approvals

EG 153A/07/A3

a0018161
8.2 ATEX/NEPSI II 3G Ex nL IIC T3 / T4 / T6

EG-Konformitätserklärung
EC Declaration of Conformity
CE Déclaration de Conformité

Endress+Hauser Conducta Gesellschaft für Mess- und Regeltechnik mbH+Co. KG
Diepenerstrasse 24, 70839 Gerlingen, Germany

explärt in alleiner Verantwortung, dass die Produkte
declare in sole responsibility that the products
déclare sous sa seule responsabilité que les produits

Condumax W  CLS15D-***V
Condumax H  CLS16D-***V
Condumax W  CLS21D-***V
mit Kabel / with cable / avec câble  CYK10-V**1

mit den Vorschriften folgender Europäischen Richtlinien übereinstimmen:
are in conformity with the regulations of the following European Directives:
sont conformes aux prescriptions et directives Européennes suivantes:

94/9/EG  (Geräte zur Verwendung in explosionsgeführten Bereichen - Kategorie 3G)
(Conformity of equipment for use in potentially explosive atmospheres - Category 3G)
(Appareils et systèmes de protection en atmosphère explosive - Catégorie 3G)

2004/108/EG  (Elektromagnetische Verträglichkeit)
(Electromagnetic Compatibility)
(Compabilité électromagnétique)

Angewandte harmonisierte Normen oder normative Dokumente:
Applied harmonized standards or normative documents:
Normes harmonisées ou documents normatifs appliquées:
EN 60079-0:2006, EN 60079-15:2005

Gerlingen, 2008-10-08

[Signature]

Walter Kähler
Manager Certification and Approvals

Endress+Hauser