



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

## Technical Information

# Condumax W CLS19

## Conductivity sensors

Two-electrode sensors with

cell constants  $k = 0.01 \text{ cm}^{-1}$  or  $k = 0.1 \text{ cm}^{-1}$



### Application

Measurement in pure and ultrapure water:

- Monitoring ion exchangers
- Reverse osmosis

The measuring range of the sensors depends on the cell constant  $k$ :

- $k = 0.01 \text{ cm}^{-1}$ : 0.04 to 20  $\mu\text{S}/\text{cm}$
- $k = 0.1 \text{ cm}^{-1}$ : 0.1 to 200  $\mu\text{S}/\text{cm}$

Sensors with a Pt 100 temperature sensor are used together with conductivity transmitters equipped with automatic temperature compensation:

- Liquiline M CM42
- Liquisys M CLM223/253

For measurement of specific resistance,  $\text{M}\Omega \cdot \text{cm}$  measuring ranges are available in the menus of these transmitters.

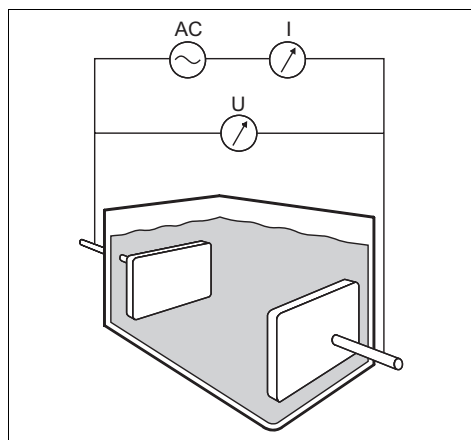
### Your benefits

- Installation in pipes or flow chambers
- Pt 100 temperature sensor for temperature compensation
- Compact design
- Very good price

## Function and system design

### Measuring principle

### Conductive measurement of conductivity



The conductivity of liquids is measured with the following measurement setup: Two electrodes are immersed in the medium. An AC voltage is applied to these electrodes which generates a current in the medium.

The electric resistance or its reciprocal value, the conductance  $G$ , is calculated according to Ohm's law. The specific conductivity  $\kappa$  is determined using the cell constant  $k$  that is dependent on the sensor geometry.

Conductive measurement of conductivity

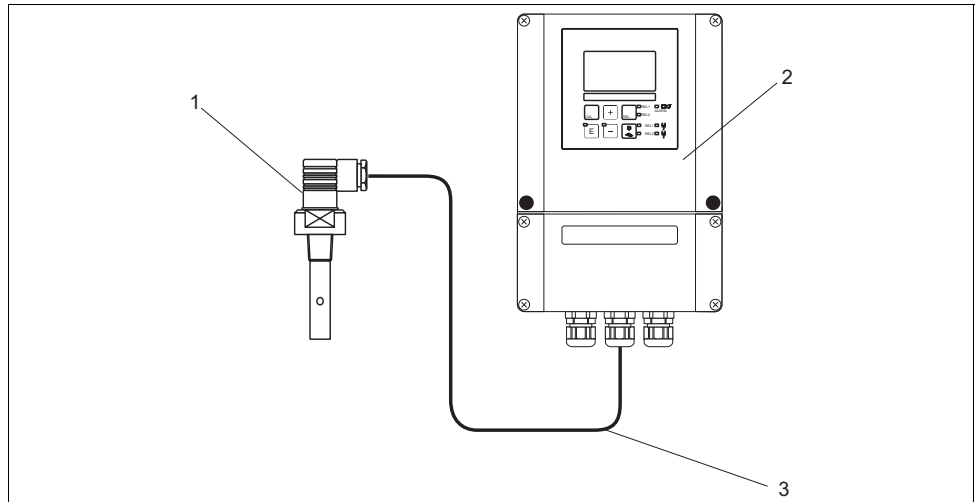
AC Power supply  
 I Current meter  
 U Voltage meter

### Important properties

- **Electrodes**  
 Condumax W CLS19 has coaxial measuring electrodes made of polished, stainless steel 1.4571 (AISI 316Ti).
- **Temperature sensor**  
 In addition, a Pt 100 temperature sensor is installed to measure the medium temperature.
- **Easy connection**  
 The sensors are connected via a 4-pole DIN-plug that can be secured with a screw. For introduction of the measuring cable, the plug is equipped with a Pg 9 cable gland.
- **Installation**  
 The sensor can be installed directly via the NPT 1/2" process connection.  
 Mounting the sensor in cross or T-pieces with DN 20 requires a PVC-threaded coupling that is available as accessory.  
 For easy installation in cross or T-pieces with DN 32, 40 or 50, adapter couplings (made of PVC for cementing) and a 1 1/2" clamp coupling (made of PVDF) are available as accessories.
- **Durability**  
 The sensor is pressure-proof up to 6 bar at 20°C (87 psi at 68°F) and can be applied with temperatures of up to 60°C at 1 bar (140°F at 14.5 psi).

**Measuring system**

- A complete measuring system comprises:
- a CLS19 conductivity sensor
  - a transmitter, e.g. Liquisys M CLM253
  - a CYK71 measuring cable

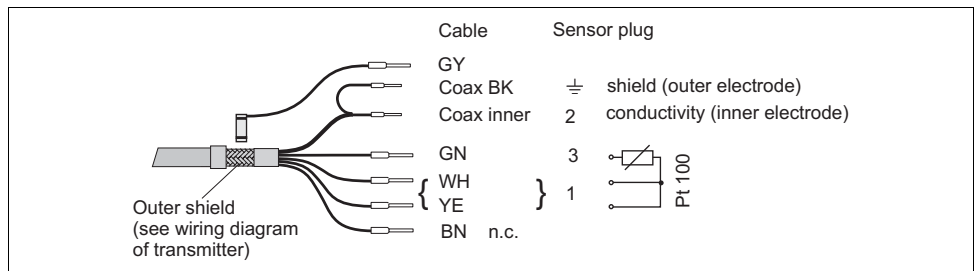


Measuring system example

- 1 Condumax W CLS19
- 2 Liquisys M CLM253 transmitter
- 3 Special measuring cable

**Input**

<b>Measured values</b>	Conductivity Temperature	
<b>Cell constant k</b>	Depending on ordered version: k = 0.01 cm <sup>-1</sup> k = 0.1 cm <sup>-1</sup>	
<b>Measuring ranges</b>	Conductivity	(referenced to water at 25°C (77°F))
	k = 0.01 cm <sup>-1</sup> :	0.04 µS/cm to 20 µS/cm
	k = 0.1 cm <sup>-1</sup> :	0.1 µS/cm to 200 µS/cm
	Temperature	-10 to 60°C (14 to 140°F)
<b>Temperature sensor</b>	Pt 100	
<b>Cable specification</b>	The Condumax W is connected to the transmitter using the special measuring cable CYK71.	

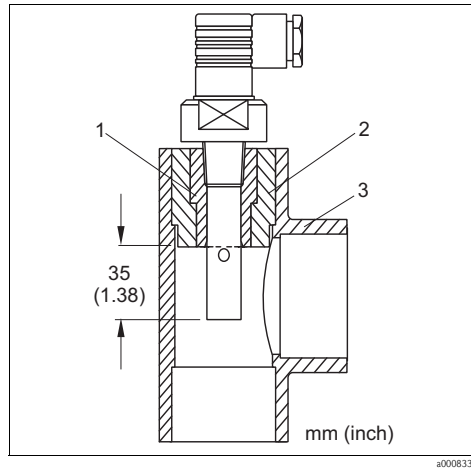


Special measuring cable CYK71

## Installation

### Installation instructions

The sensors are mounted directly via the NPT 1/2" process connection. Optionally, they can be installed in cross or T-pieces.



- 1 PVC-threaded coupling (see Accessories)
- 2 Adapter coupling for cementing for DN 32, 40 or 50 (see Accessories AM 32, 40 or 50)
- 3 Cross or T-piece DN 32, 40 or 50

Installation in cross or T-piece

When mounting the sensor, make sure that the electrodes are completely wetted by the medium. When working in ultrapure water, ingress of air must be avoided since dissolved air, particularly CO<sub>2</sub>, may increase conductivity by up to 3 μS/cm.

## Environment

### Ingress protection

IP 65

## Process

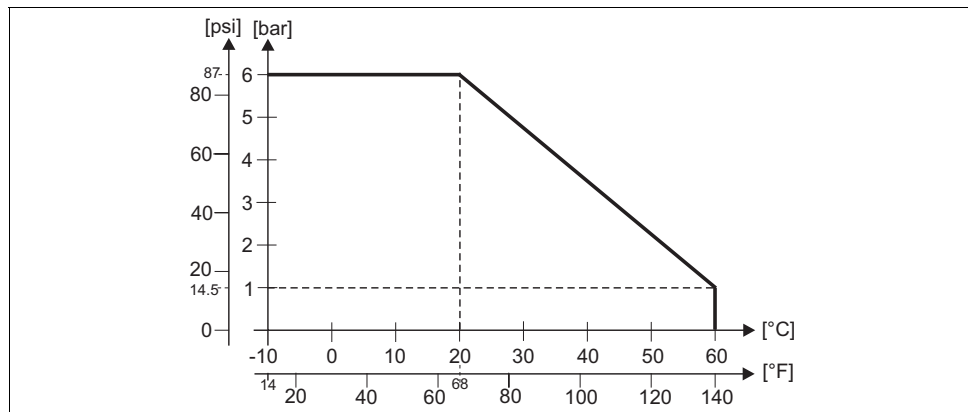
### Process temperature

-10 to 60°C (14 to 140°F)

### Process pressure

6 bar at 20°C (87 psi at 68°F)

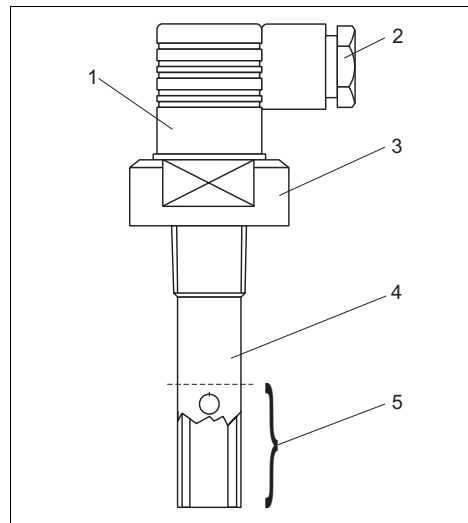
### Pressure/temperature load curve



Pressure/temperature load curve of CLS19

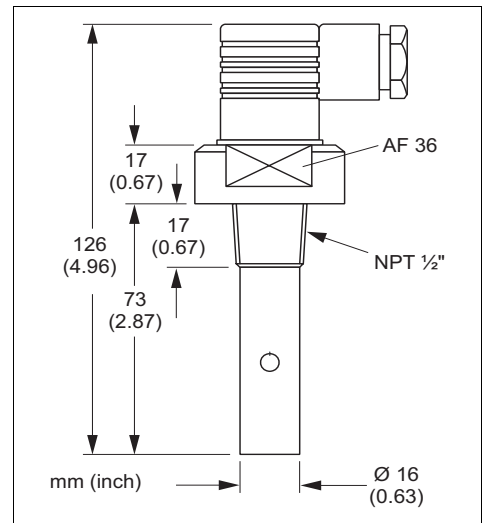
## Mechanical construction

### Design, dimensions



CLS19 design

- 1 Connection head
- 2 Measuring cable outlet
- 3 Threaded shaft (PES)
- 4 Electrodes (coaxially arranged)
- 5 Minimum immersion depth



CLS19 dimensions

**Weight** approx. 0.1 kg (0.22 lbs)

**Materials**  
 Electrodes stainless steel 1.4571 (AISI 316Ti)  
 Sensor shaft PES (Polyethersulfone)

**Process connection** NPT 1/2" thread

**Cable connection** Pg 9 cable gland

## Ordering information

### Product structure

Measuring range and cell constant	
A	Measuring range: 0.04 to 20 $\mu\text{S}/\text{cm}$ ( $k = 0.01$ )
B	Measuring range: 0.1 to 200 $\mu\text{S}/\text{cm}$ ( $k = 0.1$ )
Process connection and materials	
1A	Thread NPT 1/2", sensor shaft PES
Measuring cable connection	
1	4-pole connector with Pg 9
Temperature sensor	
A	Integrated Pt 100 temperature sensor
D	Without temperature sensor
CLS19-	<b>complete order code</b>

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## Accessories

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### Installation

#### Threaded couplings

PVC-threaded coupling

- For cementing in standard PVC cross or T-pieces with DN 20
- With G ½ internal thread, self-sealing with ½" NPT sensor thread
- Order no. 50066536

PVDF-threaded coupling

- With G ½ internal thread and G 1 external thread
- Pressure-proof up to 12 bar at 20°C (174 psi at 68°F), max. temperature 120°C at 1 bar (248°F at 14.5 psi), incl. O-ring
- Internal thread, self-sealing with NPT ½" sensor thread
- Order no. 50004381

#### Equalizing sleeves

PVC equalizing sleeves AM

- For adaptation of the PVC-threaded coupling to larger nominal diameters
- Diameters, order numbers:
  - AM 32: for installation into cross or T-pieces DN 32, order no. 50004738
  - AM 40: for installation into cross or T-pieces DN 40, order no. 50004739
  - AM 50: for installation into cross or T-pieces DN 50, order no. 50004740

#### Adapters

Adapter clamp 1 ½"

- Made of PVDF for mounting the conductivity sensor in a clamp adaption
- Order no. 50043781

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### Connection

#### Measuring cables

CYK71 measuring cable

- Non-terminated cable for the connection of sensors or the extension of sensor cables
- Sold by the meter, order numbers:
  - non-Ex version, black: 50085333
  - Ex version, blue: 51506616

#### Junction boxes

Junction box VBM

- For cable extension
- 10 terminals
- Cable entries: 2 x Pg 13.5 or 2 x NPT ½"
- Material: aluminum
- Ingress protection: IP 65 (≅ NEMA 4X)
- Order numbers:
  - cable entries Pg 13.5: 50003987
  - cable entries NPT ½": 51500177

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### Transmitters

Liquiline M CM42

- Modular two-wire transmitter for Ex and non-Ex areas
- Hart®, PROFIBUS or FOUNDATION Fieldbus available
- Ordering acc. to product structure, see Technical Information (TI381C/24/ae)

Liquisys M CLM223/253

- Transmitter for conductivity, field or panel-mounted housing,
- Hart® or PROFIBUS available
- Ordering acc. to product structure, see Technical Information (TI193C/24/ae)

**Calibration solutions**

Precision solutions referred to SRM (Standard Reference Material) of NIST for qualified calibration of conductivity measuring systems according to ISO, with temperature table,

- CLY11-A  
74  $\mu\text{S}/\text{cm}$  (reference temperature 25°C (77°F)), 500 ml (16.9 fl.oz);  
Order no. 50081902
- CLY11-B  
149.6  $\mu\text{S}/\text{cm}$  (reference temperature 25°C (77°F)), 500 ml (16.9 fl.oz);  
Order no. 50081903

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**Calibration set**

Concal calibration set

- Conductivity calibration set for ultrapure water applications
- Complete, factory-calibrated measuring set with certificate, traceable to SRM of NIST and DKD
- For comparative measurement in ultrapure water applications up to max. 10  $\mu\text{S}/\text{cm}$
- Order numbers, versions:
  - 230 V AC: 50083777
  - 115 V AC: 50083778

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