TI01529C/07/EN/02.21
71534925
2021-07-31

Technical Information
Memosens CLS82E

Hygienic conductivity sensor
Digital with Memosens technology

Cell constant k = 0.57 cm^{-1}

Application

For measurements where very diverse conductivities must be measured in one measuring system.

Typical applications include:
- Phase separations
- Chromatography
- Fermentations
- CIP monitoring in small pipes
- Ultrafiltration
- Cleaning of ballast water on ships
- Cleaning of water in a ship's wake

Sensors with temperature probes are used in conjunction with conductivity measuring devices that support automatic temperature compensation:
- Liquiline CM442/CM444/CM448
- Liquiline CM42
- Liquiline CM14

The resistivity in MΩ · cm can also be measured using these transmitters.

Your benefits

- High measuring accuracy as cell constant is individually measured
- Manufacturer inspection certificate stating the individual cell constant
- Hygienic process connections for installation in pipes or flow vessel
- Easy to clean thanks to electropolished surfaces
- Can be sterilized up to 140 °C (284 °F)
- Stainless steel 1.4435 (AISI 316L) meets the highest demands of the pharmaceutical industry
- IP68 protection
- The entire sensor is certified according to EHEDG and 3-A
- FDA conformity

Endress+Hauser
People for Process Automation

[Continued from front page]

Other advantages provided by Memosens technology

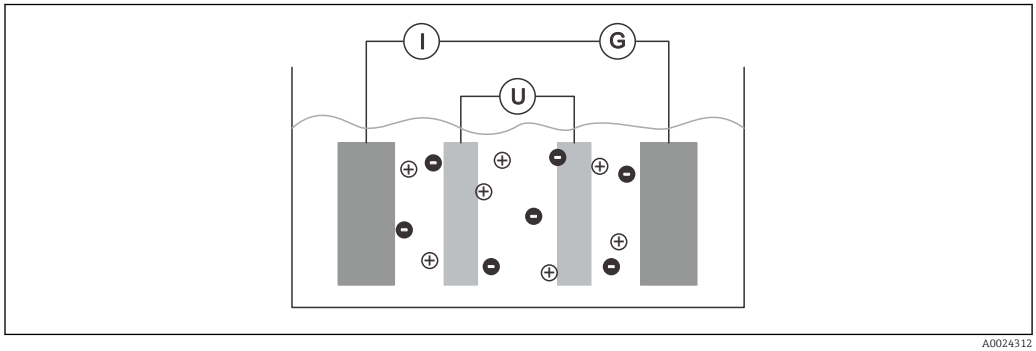
- Maximum process safety
- Data security thanks to digital data transmission
- Very easy to use as sensor data are saved in the sensor
- Predictive maintenance can be performed by recording sensor load data in the sensor

Table of contents

Function and system design

Measuring principle

The measuring cell has four electrodes. An alternating current is applied via the outer electrode pair. At the same time, the voltage applied is measured at the two inner electrodes. The electrolytic conductivity between the electrodes can be reliably established based on the measured voltage and the current flow caused by the liquid's resistance. The advantage of this technology compared to traditional two-electrode sensors is that electrochemical effects at the live electrodes are suppressed by the two additional voltage measuring electrodes.



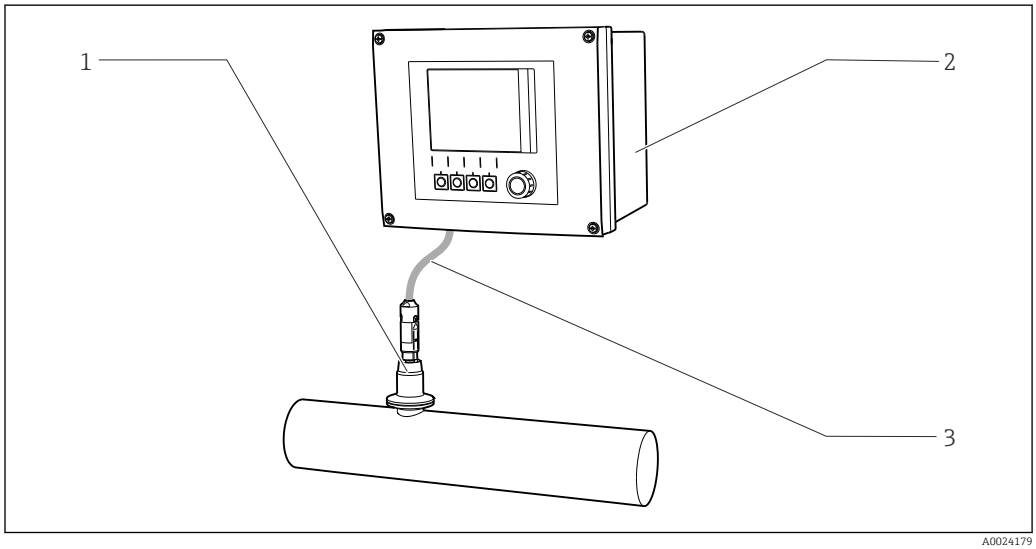
A0024312

1 Conductivity measurement

I Current intensity measurement
U Voltage measurement
G Generator

Measuring system

A complete measuring system comprises at least:
- Conductivity sensor Memosens CLS82E
- Transmitter, e.g. Liquiline M CM42
- Measuring cable, e.g. Memosens data cable CYK10



A0024179

2 Example of a measuring system

1 Memosens CLS82E
2 Transmitter Liquiline CM44x
3 Measuring cable

Communication and data processing

Communication with the transmitter

Always connect digital sensors with Memosens technology to a transmitter with Memosens technology. Data transmission to a transmitter for analog sensors is not possible.

Digital sensors can store measuring system data in the sensor. These include the following:
- Manufacturer data
  - Serial number
  - Order code
  - Date of manufacture
- Calibration data
  - Calibration date
  - Cell constant
  - Delta cell constant
  - Number of calibrations
  - Serial number of the transmitter used to perform the last calibration or adjustment
- Application data
  - Temperature application range
  - Conductivity application range
  - Date of initial commissioning
  - Maximum temperature value
  - Hours of operation at high temperatures

Dependability

Reliability

Memosens technology digitizes the measured values in the sensor and transmits the data to the transmitter via a . The result:
- If the sensor fails or there is an interruption in the connection between the sensor and transmitter, this is reliably detected and reported.
- The availability of the measuring point is reliably detected and reported.

Maintainability

Easy handling
Sensors with Memosens technology have integrated electronics that store calibration data and other information (e.g. total hours of operation or operating hours under extreme measuring conditions). Once the sensor has been connected, the sensor data are transferred automatically to the transmitter and used to calculate the current measured value. As the calibration data are stored in the sensor, the sensor can be calibrated and adjusted independently of the measuring point. The result:
- Easy calibration in the measuring lab under optimum external conditions increases the quality of the calibration.
- Pre-calibrated sensors can be replaced quickly and easily, resulting in a dramatic increase in the availability of the measuring point.
- Thanks to the availability of the sensor data, maintenance intervals can be accurately defined and predictive maintenance is possible.
- The sensor history can be documented with external data carriers and evaluation programs.
- Thus, the current application of the sensors can be made to depend on their previous history.

Integrity

With inductive transmission of the measured value using a non-contact connection, Memosens guarantees maximum process safety and offers the following benefits:
- All problems caused by moisture are eliminated.
  - Plug-in connection remains free from corrosion
  - Measured value distortion from moisture is not possible.
  - The plug-in system can even be connected under water.
- The transmitter is galvanically decoupled from the medium.
- EMC safety is guaranteed by screening measures for the digital transmission of measured values.

Input

Measured variables

- Conductivity
- Temperature

Measuring ranges

Conductivity [1]	1 µS/cm to 500 mS/cm

1) In relation to water at 25 °C (77 °F)

Temperature	-5 to 140 °C (23 to 284 °F)

Cell constant

k = 0.57 cm^{-1}

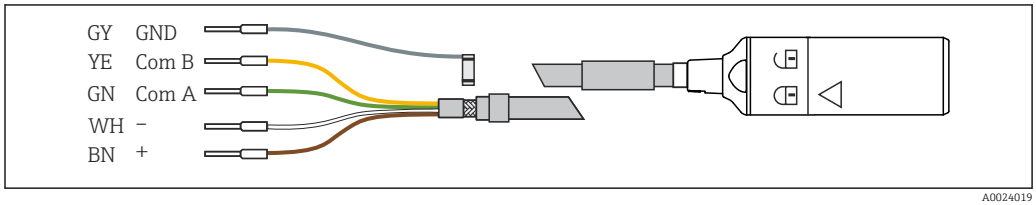
Temperature compensation

Pt1000 (Class A according to IEC 60751)

Power supply

Electrical connection

The electrical connection of the sensor to the transmitter is established using the measuring cable CYK10.



3 Measuring cable CYK10

Performance characteristics

Measuring uncertainty

Each individual sensor is factory-measured in a solution with approx. 50 µS/cm using a reference measuring system traceable to NIST or PTB. The exact cell constant is entered into the manufacturer inspection certificate supplied. The uncertainty of measurement in determining the cell constant is 1.0 %.

Response time

Conductivity	$t_{95} \leq 2$ s
Temperature [1]	
With Pg 13.5 or Clamp	$t_{90} \leq 16$ s [2]
With other process connection	$t_{90} \leq 28$ s [2]

1) DIN VDI/VDE 3522-2 (0.3 m/s laminar)
2) With temperature prediction activated as standard

Measured error

Conductivity	
In the range 1 µS/cm to 1 mS/cm [1]	≤ 2 % of reading
In the range 1 mS/cm to 500 mS/cm [1]	≤ 4 % of reading
Temperature	
With Pg 13.5 or Clamp	≤ 0.5 K, in measuring range -5 to 100 °C (23 to 212 °F) ≤ 1.0 K, in measuring range 100 to 140 °C (212 to 284 °F)
With other process connection	≤ 1.0 K, in measuring range -5 to 140 °C (23 to 284 °F)

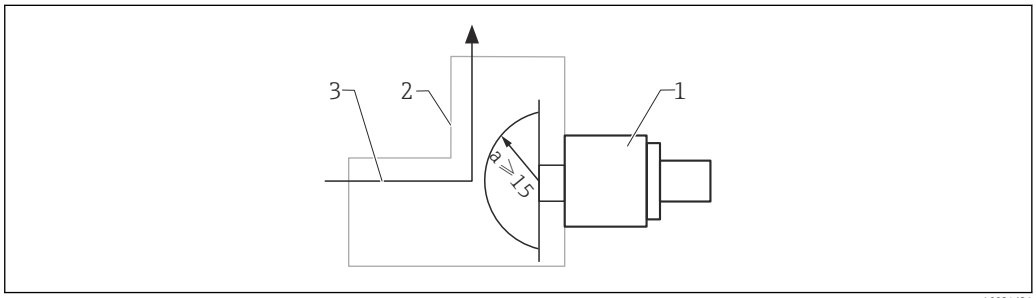
1) In as-delivered state (factory adjustment at 50 µS/cm)

Repeatability	**Conductivity**	≤ 0.2 % of reading, in specified measuring range
	Temperature	≤ 0.05 K

Installation

Installation instructions

Symmetrical installation is recommended in order to guarantee linearity. The distance to the side walls and opposite walls must be at least 15 mm.



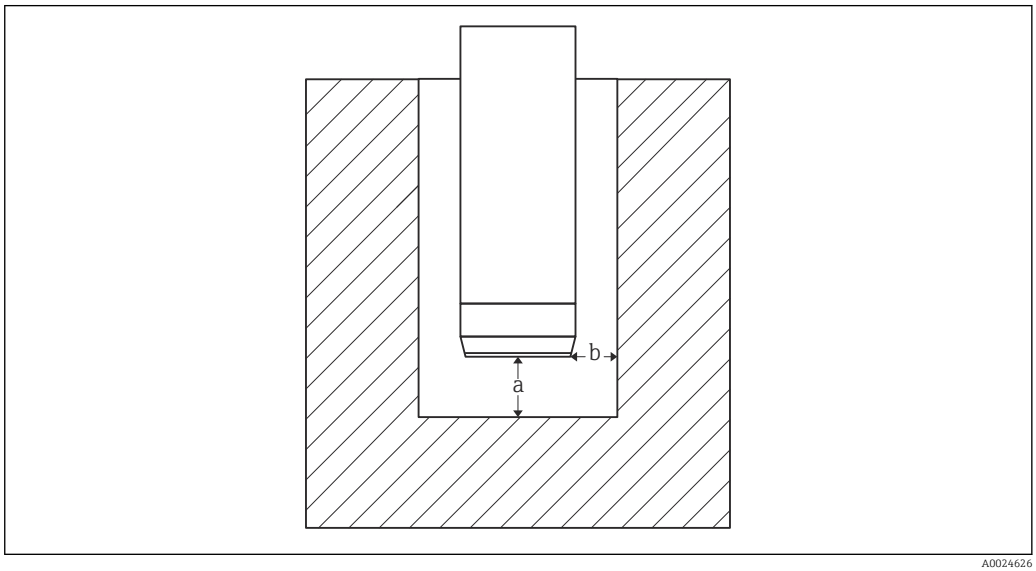
A0024621

4 Minimum distance between pipe and end of the measuring cell

1 Sensor
2 Pipe
3 Direction of flow

The ionic current in the liquid is affected by the walls in confined installation conditions. This effect is compensated by what is referred to as the installation factor. The installation factor can be entered in the transmitter for the measurement or the cell constant is corrected by multiplying by the installation factor.

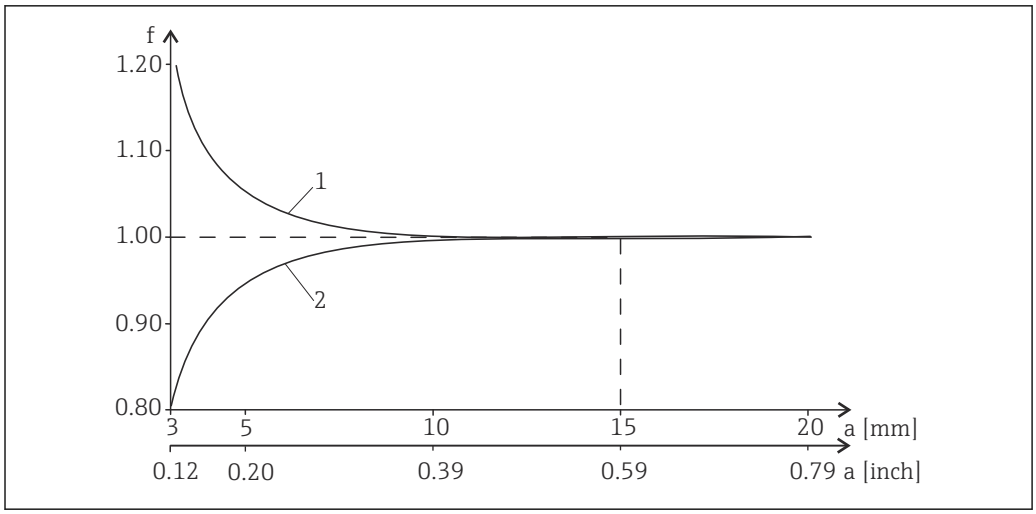
The value of the installation factor depends on the diameter and the conductivity of the pipe nozzle as well as the sensor's distance to the wall. The installation factor can be disregarded (f = 1.00) if the distance to the wall is sufficient (a > 15 mm). If the distance to the wall is smaller, the installation factor increases for electrically insulating pipes (f > 1) and decreases for electrically conductive pipes (f < 1). The installation factor can be determined using calibration solutions.



A0024626

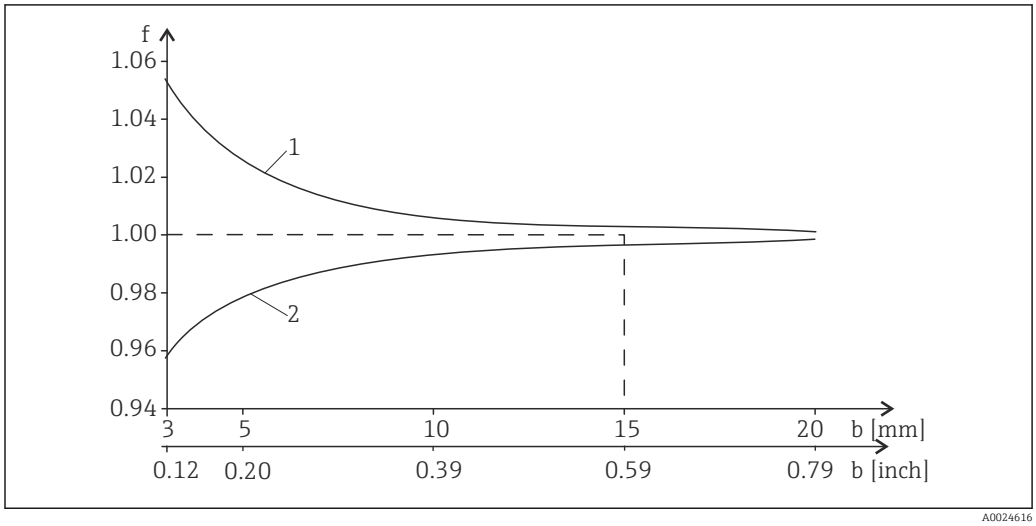
5 Schematic drawing of the sensor in confined installation conditions

a Wall distance
b Gap width



6 Relationship between installation factor f and wall distance a

1 Electrically insulating pipe wall
2 Electrically conductive pipe wall



7 Relationship between installation factor f and gap width b

1 Electrically insulating pipe wall
2 Electrically conductive pipe wall

Hygienic properties

For 3-A-compliant installation, please observe the following:
- After the device has been mounted, hygienic integrity must be guaranteed.
- 3-A-compliant process connections must be used.

Installation factors for assemblies

For flow assemblies or assemblies with a basket protector where it is not possible to maintain a distance a >15 mm (→ 4, 7) to the sensor element, it is advisable to determine the installation factor by calibrating in the assembly used in order to guarantee the specified sensor measured error.

Environment

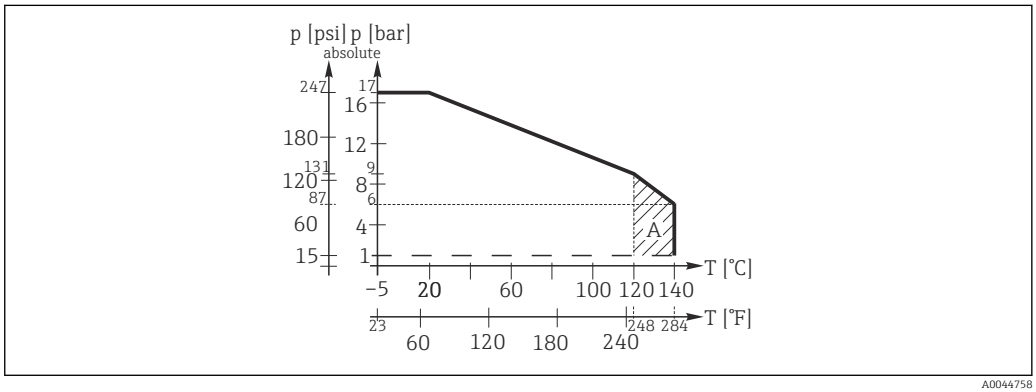
Ambient temperature	−20 to 60 °C (−4 to 140 °F)

Storage temperature	-25 to +80 °C (-10 to +180 °F)
Humidity	5 to 95 %
Degree of protection	IP 68 / NEMA type 6P (1.9 m water column, 20 °C, 24 h)

Process

Process temperature	Normal operation:	-5 to 120 °C (23 to 248 °F)
	Sterilization (max. 45 min.):	Max. 140 °C (284 °F) at 6 bar (87 psi)
Process pressure	17 bar (247 psi) at 20 °C (68 °F) 9 bar (131 psi) at 120 °C (248 °F)	

Temperature/pressure ratings

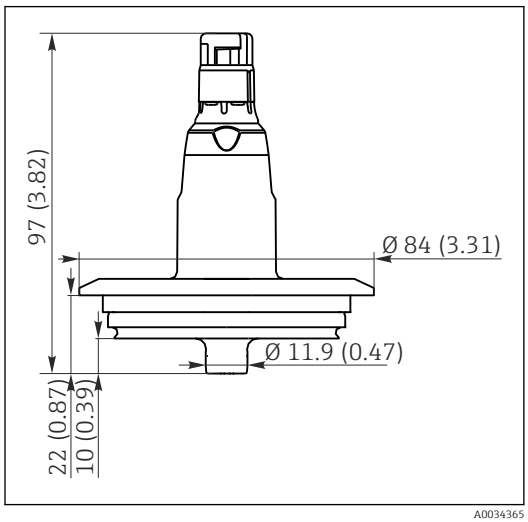


8 Pressure/temperature ratings

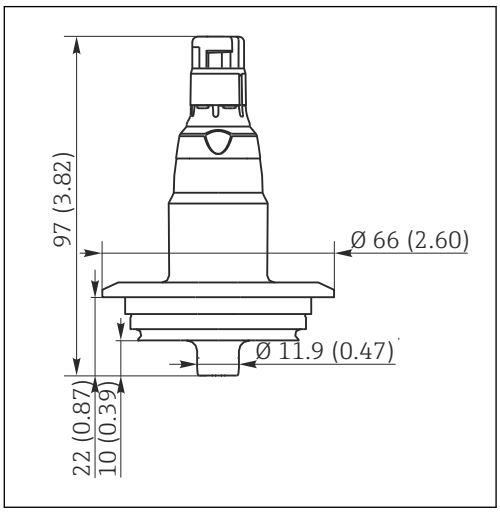
A Can be sterilized for a short time (45 min.)

Mechanical construction

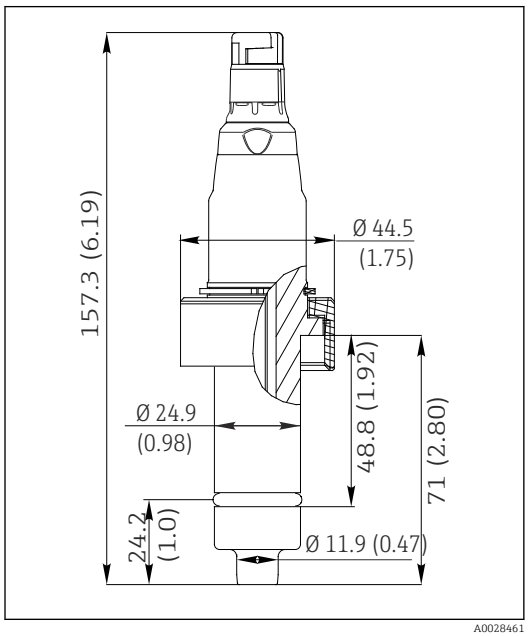
Dimensions in mm (in)



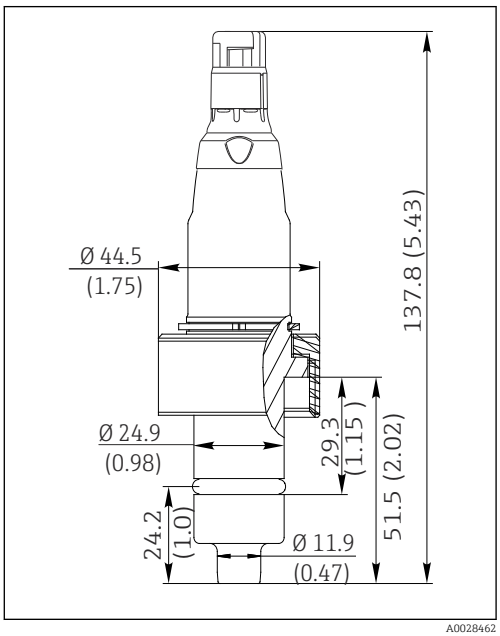
9 *Varivent N DN 40 - DN 125*



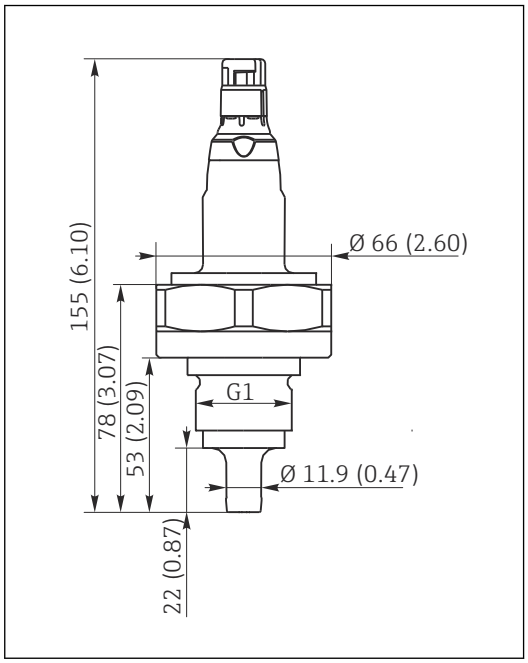
10 *Varivent F DN 25*



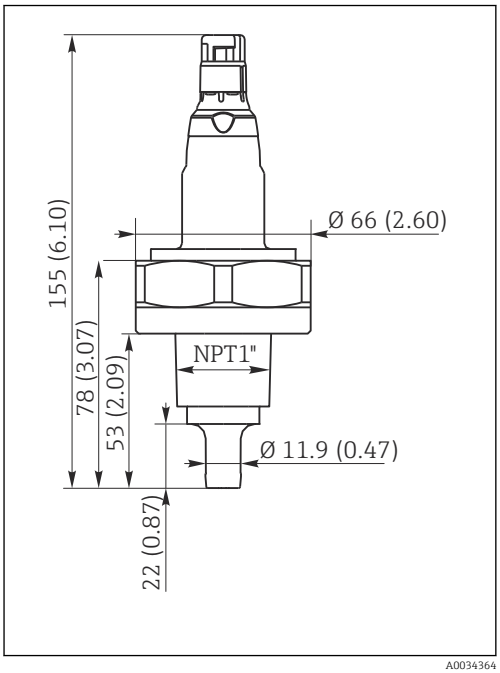
11 *DN 25 brown*



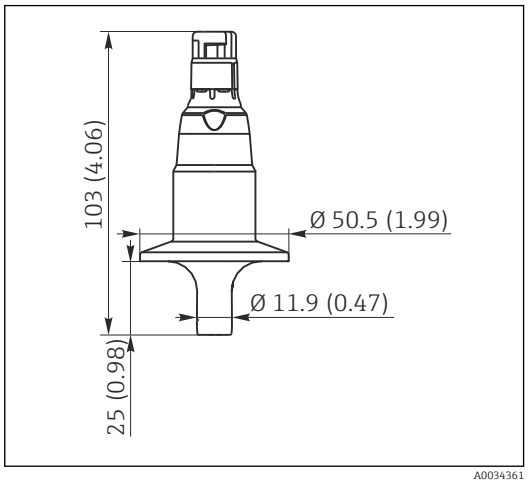
12 *DN 25 standard*



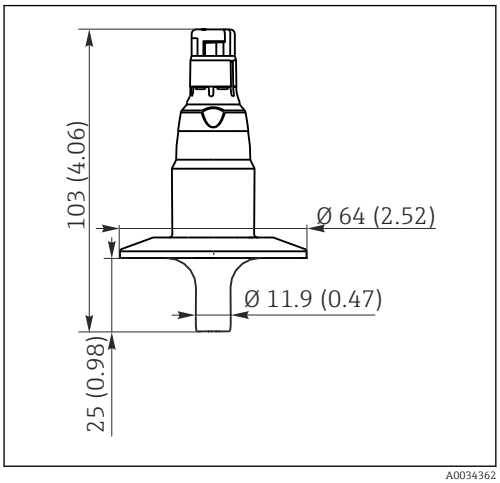
13 G1



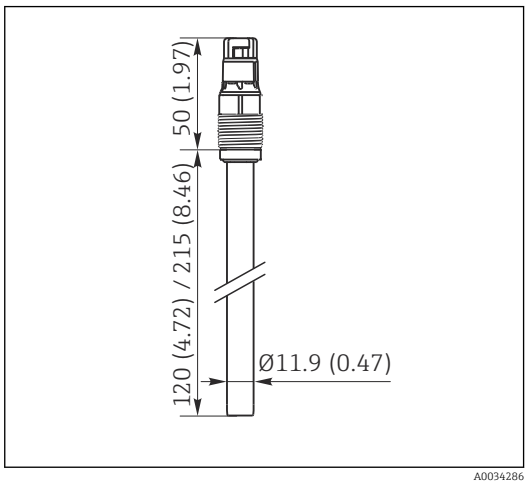
14 NPT1"



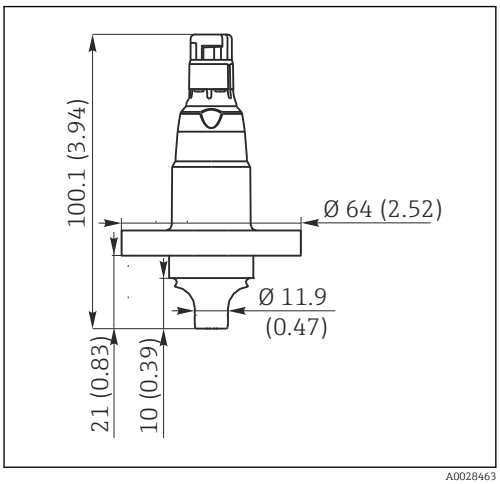
15 Clamp 1.5"



16 Clamp 2"



17 Pg 13.5



18 BioControl DN 25

All designs are supplied without a process seal.

Weight

Depending on the version, e.g.
- Process connection Pg 13.5: 0.06 to 0.09 kg (0.13 to 0.20 lbs)
- Process connection G1 or NPT: approx. 0.9 kg (1.98 lbs)

Materials (in contact with medium)

Sensor element: Platinum and ceramic (zirconium oxide)

Process connection: Stainless steel 1.4435 (AISI 316L)

*Only for CLS82E-**NA* [1] and CLS82E-**NB* [2]:*

Seal: EPDM

1) Connection DN25 standard
2) Connection DN25 B. Braun

Surface roughness

R_a < 0.38 µm

Certificates and approvals

Current certificates and approvals for the product are available via the Product Configurator at www.endress.com.

1. Select the product using the filters and search field.
2. Open the product page.

The **Configuration** button opens the Product Configurator.

Ordering information

Product page

www.endress.com/cls82e

Product Configurator

On the product page there is a **Configure** button to the right of the product image.

1. Click this button.
   ↳ The Configurator opens in a separate window.
2. Select all the options to configure the device in line with your requirements.
   ↳ In this way, you receive a valid and complete order code for the device.
3. Export the order code as a PDF or Excel file. To do so, click the appropriate button on the right above the selection window.

For many products you also have the option of downloading CAD or 2D drawings of the selected product version. Click the **CAD** tab for this and select the desired file type using picklists.

Scope of delivery

The scope of delivery includes:
- Sensor in the version ordered
- Operating Instructions

Accessories

The following are the most important accessories available at the time this documentation was issued.

- For accessories not listed here, please contact your Service or Sales Center.

Measuring cable

Memosens data cable CYK10
- For digital sensors with Memosens technology
- Product Configurator on the product page: www.endress.com/cyk10

Technical Information TI00118C

Memosens data cable CYK11
- Extension cable for digital sensors with Memosens protocol
- Product Configurator on the product page: www.endress.com/cyk11

Technical Information TI00118C

Calibration solutions

Conductivity calibration solutions CLY11
Precision solutions referenced to SRM (Standard Reference Material) by NIST for qualified calibration of conductivity measuring systems in accordance with ISO 9000
- CLY11-A, 74 µS/cm (reference temperature 25 °C (77 °F)), 500 ml (16.9 fl.oz)
  Order No. 50081902
- CLY11-B, 149.6 µS/cm (reference temperature 25 °C (77 °F)), 500 ml (16.9 fl.oz)
  Order No. 50081903
- CLY11-C, 1.406 mS/cm (reference temperature 25 °C (77 °F)), 500 ml (16.9 fl.oz)
  Order No. 50081904
- CLY11-D, 12.64 mS/cm (reference temperature 25 °C (77 °F)), 500 ml (16.9 fl.oz)
  Order No. 50081905
- CLY11-E, 107.00 mS/cm (reference temperature 25 °C (77 °F)), 500 ml (16.9 fl.oz)
  Order No. 50081906

Technical Information TI00162C

www.addresses.endress.com

Endress+Hauser

People for Process Automation