

User Manual

SE605H
Conductivity Sensor



Read before installation.
Keep for future use.

www.knick.de



Supplemental Directives

READ AND SAVE THIS DOCUMENT FOR FUTURE REFERENCE. BEFORE ATTEMPTING TO ASSEMBLE, INSTALL, OPERATE OR MAINTAIN THE PRODUCT, PLEASE ENSURE A COMPLETE UNDERSTANDING OF THE INSTRUCTIONS AND RISKS DESCRIBED HEREIN. ALWAYS OBSERVE ALL SAFETY INFORMATION. FAILURE TO COMPLY WITH INSTRUCTIONS IN THIS DOCUMENT COULD RESULT IN SERIOUS INJURY AND/OR PROPERTY DAMAGE. THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE.



These supplemental directives explain how safety information is laid out in this document and what content it covers.

Safety Chapter

This document's safety chapter is designed to give the reader a basic understanding of safety. It illustrates general hazards and gives strategies on how to avoid them.

Warnings

This document uses the following warnings to indicate hazardous situations:

Symbol	Category	Meaning	Remark
	WARNING	Designates a situation that can lead to death or serious (irreversible) injury.	The warnings contain information on how to avoid the hazard.
	CAUTION	Designates a situation that can lead to slight or moderate (reversible) injury.	
<i>None</i>	NOTICE	Designates a situation that can lead to property or environmental damage.	

Symbols Used in this Document





Symbol	Meaning
	Reference to additional information
	Interim or final result in instructions for action
	Sequence of figures attached to an instruction for action
	Item number in a figure
(1)	Item number in text

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1 Safety

This document contains important instructions for the use of the product. Always follow all instructions and operate the product with caution. If you have any questions, please contact Knick Elektronische Messgeräte GmbH & Co. KG (sometimes hereafter referred to as “Knick”) using the information provided on the back page of this document.

1.1 Intended Use

The SE605H (the “product”) is a coaxial 2-electrode sensor with a measuring range of 0 ... 1000 $\mu\text{S}/\text{cm}$. The sensor body and sensing electrodes are made of stainless steel. The sensor is ideal for use in the hygienic measuring and monitoring of ultrapure water. The measurement data is output via a suitable industrial transmitter.

The defined operating conditions must be observed when using this product.

→ *Specifications, p. 32*

Sealing from the process is only ensured if the SE605H sensor is operated with Knick weld-in sockets. → *Accessories, p. 28*

If weld-in sockets from other manufacturers are used, they must be tested and evaluated by the operating company.

1.2 Personnel Requirements

The operating company shall ensure that any personnel using or otherwise interacting with the product is adequately trained and has been properly instructed.

The operating company shall comply and cause its personnel to comply with all applicable laws, regulations, codes, ordinances and relevant industry qualification standards related to product. Failure to comply with the foregoing shall constitute a violation of operating company’s obligations concerning the product, including but not limited to an unintended use as described in this document.

1.3 Residual Risks

The product has been developed and manufactured in accordance with generally accepted safety rules and regulations. The SE605H sensor was subjected to a risk assessment. Nevertheless, not all risks can be sufficiently reduced; the following residual risks remain:

Environmental Influences

The effects of pressure, moisture, corrosion, chemicals, and ambient temperature can negatively impact on safe operation of the product.

Observe the following instructions:

- Only operate the SE605H sensor in compliance with the stated operating conditions. → *Specifications, p. 32*
- If using chemically aggressive process media, regularly check the SE605H sensor for damage.
- Adhering and sticky process media may interfere with measurements. Regularly remove adherents. As required, recalibrate the SE605H sensor. → *Cleaning, p. 21*
→ *Calibration, p. 22*

1.4 Hazardous Substances

In certain situations (e.g., sensor replacement), personnel may come into contact with the following hazardous substances:

- Process medium
- Cleaning medium

This document specifies the personal protective equipment that needs to be used when carrying out handling instructions.

The operating company is responsible for conducting a hazard assessment.

See the relevant manufacturers' safety data sheets for hazard and safety instructions on handling hazardous substances.

1.5 Operation in Hazardous Locations

The SE605H-X is certified for operation in explosive atmospheres.

Observe all applicable local and national codes and standards for the installation of equipment in explosive atmospheres. For further guidance, consult the following:

- IEC 60079-14
- EU directives 2014/34/EU and 1999/92/EC (ATEX)
- NFPA 70 (NEC)
- ANSI/ISA-RP12.06.01


The electrical and thermal parameters of the sensors must be adhered to.

→ *Electrical and Thermal Parameters in Hazardous Locations, p. 7*

Memosens Ex sensors are marked by an orange-red ring.

Combined with a model CA/MS-***X**, model CA/MS-***X**-L measuring cable, or a certified measuring cable that is identical in hardware and function, the sensor may be connected to a suitable measuring device, as specified in the Certificates BVS 15 ATEX E141 X and IECEx BVS 15.0114 X.

1.6 Electrical and Thermal Parameters in Hazardous Locations

Certificate Number	Marking
BVS 16 ATEX E 037 X	 II 1G
IECEX BVS 16.0030X	Ex ia IIC T4 Ga
JPEX DEK19.0046X	Ex ia IIC T4 Ga

Thermal Parameters

Temperature class	Ambient Temperature Range Ta	Maximum Permissible Process Temperature
T4	-20 °C < Ta < 115 °C (-4 °F < Ta < 239 °F)	115 °C (239 °F)

Special Conditions

- The measuring cable and sensor may only be used within the ambient temperature range specified for the temperature class.
- The measuring cable, including its connecting head, must be protected from electrostatic charging if it passes through areas of Zone 0 (category 1G).

- The Memosens sensors may not be operated in electrostatically critical process conditions. Intense vapor or dust flows directly impacting on the connection system must be avoided.
- Metallic process connection parts must be mounted at the installation site so that they are electrostatically conductive ($< 1 \text{ M}\Omega$).

2 Product

2.1 Package Contents

- SE605H in the version ordered
- User Manual
- Quality Certificate
- Control Drawing¹⁾
- EU Declaration of Conformity¹⁾

¹⁾ Part of package contents only for Ex-approved products.

2.2 Product Identification

The different versions of the SE605H are encoded in a product code.

2.2.1 Product Code

Hygienic 2-Electrode Conductivity Sensor		SE605H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Explosion protection	None		N																				
	ATEX		X																				
Communication	Memosens		M																				
			S																				
Process connection	Ingold socket, 25 mm (G 1¼")						H	0															
	Ingold socket, 25 mm (G 1¼"), 50 mm long						H	Z															
	Clamp 1.5"						J	1															
	Clamp 2"						J	2															
Gasket material	FKM FDA								F														
	EPDM FDA								E														
	FFKM FDA								H														
	FKM FDA USP VI								V														
	EPDM FDA USP VI								U														
	FFKM FDA USP VI								W														
Special version ¹⁾	None									/	0	0	0										
	Customer-specific special datasheet									/	0	0	F										
	CondCheck ²⁾									/	0	0	P										
Certificates ³⁾	None																		-	0	0	0	
	Inspection Certificate 3.1 according to EN 10204																			-	0	0	3
	FDA - USP VI																			-	0	0	U
	Surface Ra < 0.4 µm																			-	0	0	4
	Surface Ra < 0.8 µm																			-	0	0	8
	FDA																			-	0	0	F

¹⁾ Can be combined.

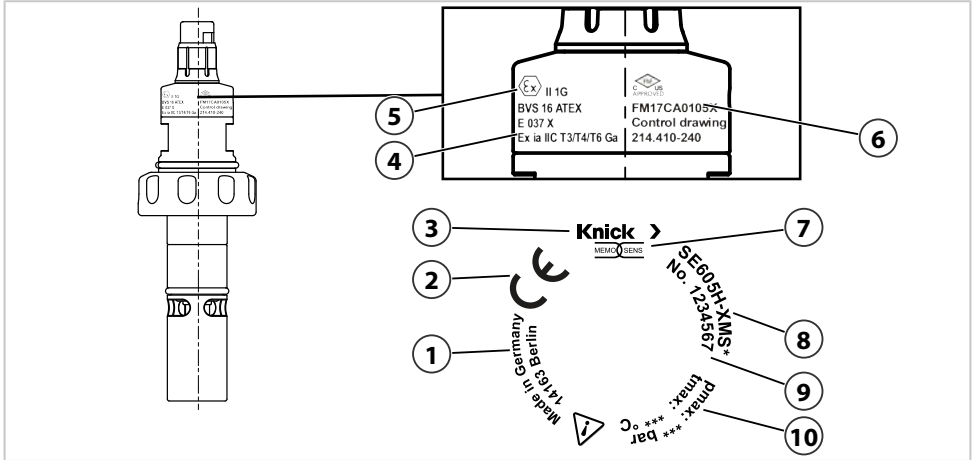
²⁾ Only available without explosion protection (N).

³⁾ Can be combined. Max. three certificates possible.

2.3 Nameplates

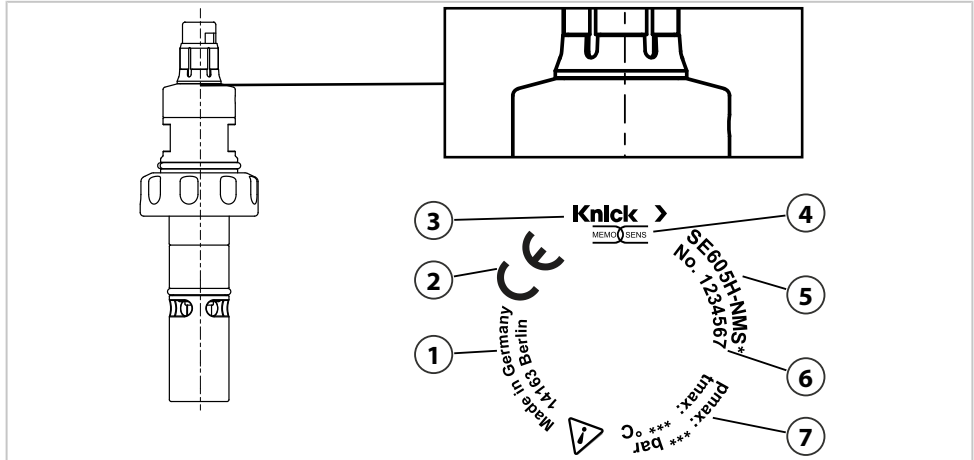
The SE605H is identified by a nameplate.

Nameplate, Version With EX Approval



- | | |
|--|---|
| 1 Manufacturer's address with designation of origin | 6 Approval / FM approval |
| 2 Conformity mark with identification number | 7 Memosens technology logo |
| 3 Manufacturer | 8 Type (product code) |
| 4 EX marking | 9 Serial number |
| 5 ATEX marking | 10 Max. operating pressure and temperature |

Nameplate, Version Without EX Approval



1	Manufacturer's address with designation of origin	5	Type (product code)
2	Conformity mark	6	Serial number
3	Manufacturer	7	Max. operating pressure and temperature
4	Memosens technology logo		

2.4 Symbols and Markings



Special conditions and danger points! Observe the safety information and instructions on safe use of the product as outlined in the product documentation.



CE marking with identification number¹⁾ of the notified body involved in production control.



ATEX marking¹⁾ of the European Union for operation of the SE605H-X in hazardous locations. → *Operation in Hazardous Locations, p. 7*



FM approval for US and Canada



Sensors approved for operation in hazardous locations are marked with an orange ring on the Memosens connector.



The symbol on Knick products means that the waste devices must be disposed of separately from unsorted municipal waste.

¹⁾ Dependent on the ordered version. → *Product Code, p. 10*

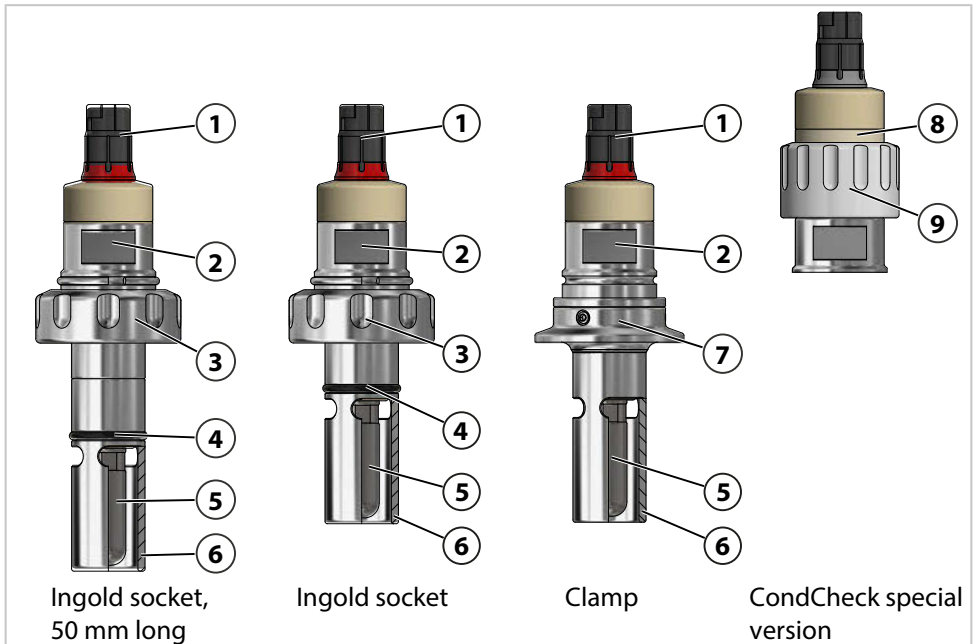
2.5 Design and Function

The SE605H sensor features a temperature detector and outer and inner electrodes made of stainless steel.

Note: The temperature detector is used for automatic measured value compensation, but not to display the temperature or control the process temperature.

The sensor is attached either to a flow-through fitting, a container, or piping with different process connections.

A Memosens measuring cable is required for connection to an industrial transmitter. This cable is plugged into the Memosens connector.



- 1 Memosens connector
- 2 A/F 24
- 3 Coupling nut G1¼"
- 4 O-ring 21 x 2.5 mm
- 5 Inner electrode

- 6 Outer electrode
- 7 Clamp 1.5" or 2"
- 8 Test connection with two test jacks
- 9 Coupling nut

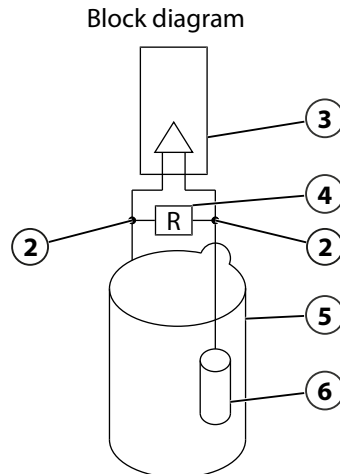
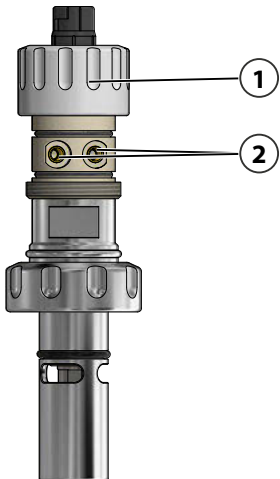
2.6 Measuring Principle

Contacting conductivity measurements involve applying an alternating voltage to the electrodes of the sensor, which is located in a measurement solution. The movement of the ions in the process medium toward their oppositely charged electrode generates a current flow. According to Ohm's law, this produces the electrical resistance or its reciprocal, the conductance G .

Taking into account the cell constants determined by the sensor geometry, the conductance is used to determine the conductivity of the process medium.

2.7 CondCheck Special Version Design and Function

The special version of the SE605H sensor with CondCheck is used to check or verify the Memosens measured value. The measurement is only possible if the inner electrode is insulated from the outer electrode. The sensor must be dry. The check should be carried out with a defined test resistor that has a low capacitive component.



- | | |
|---------------------------------------|-------------------|
| 1 Coupling nut | 4 Test resistor |
| 2 Test jacks, \varnothing 4 mm | 5 Outer electrode |
| 3 Memosens electronics in sensor head | 6 Inner electrode |

3 Installation

3.1 General Installation Instructions

The sensor is designed for use with a Memosens-capable industrial transmitter.

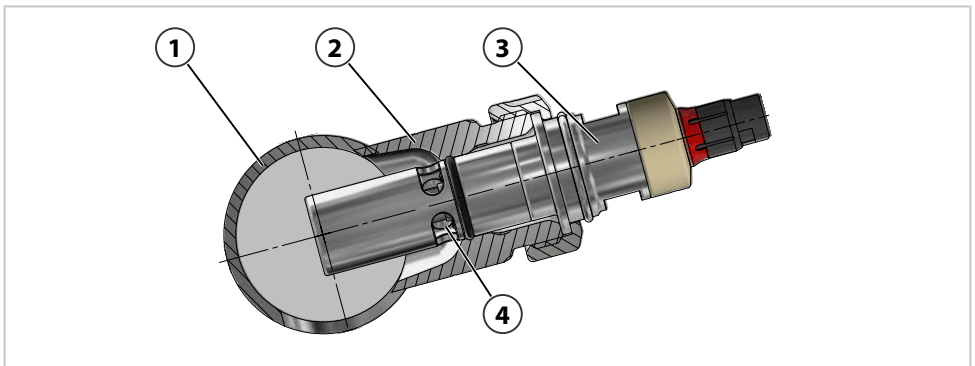
Locations where the SE605H sensor is used:

- flow-through fittings
- vessels
- piping
- bypass systems

Note: More information on Knick industrial transmitters can be found at www.knick.de.
→ www.knick.de

The following conditions apply when installing the SE605H sensor:

- The process medium must surround or flow through the vents.



1 Piping

2 Ingold socket

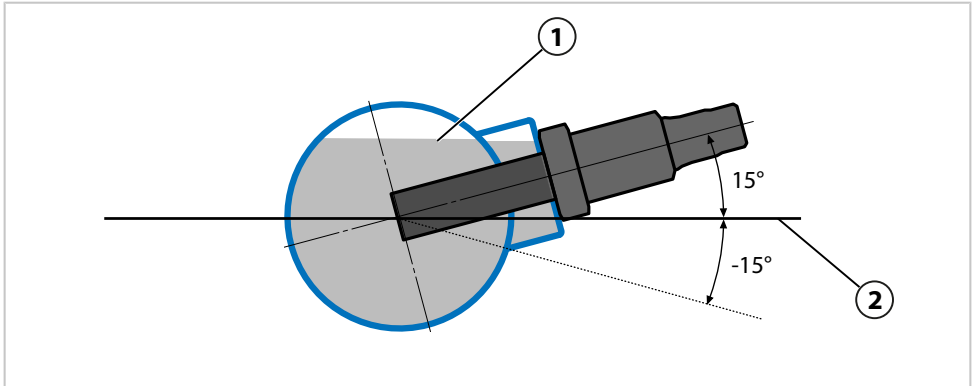
3 SE605H sensor

4 Vents

Installation Position

The SE605H sensor can be installed in any position.

Recommended Installation Position:



01. Install the SE605H sensor at an angle of $\pm 15^\circ$ to the horizontal plane (2).

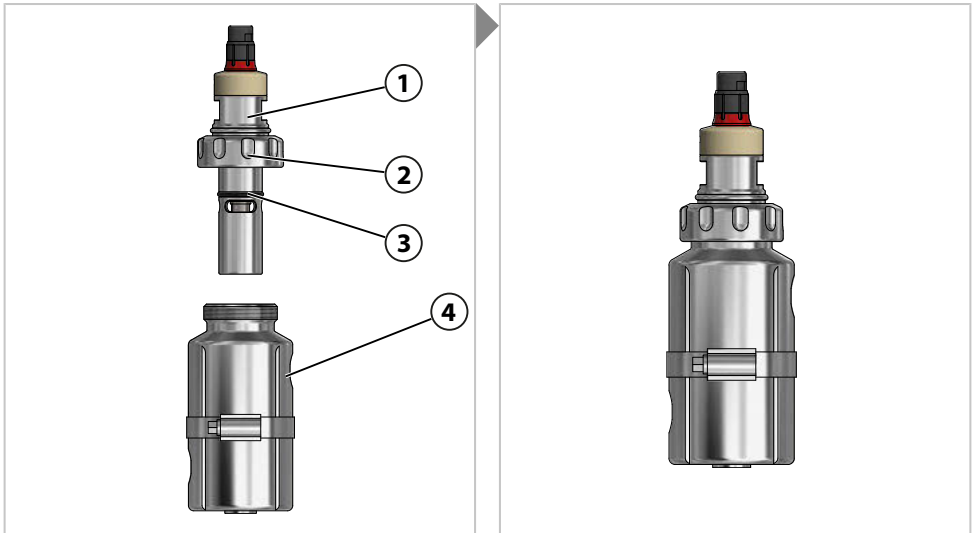
02. Note the fill level (1).

Note: Installation angle greater than 15° : Cavities or bubbles can occur in the weld-in socket and influence the measurement result.

Note: Installation angle upside down: The measuring point may become clogged. Clean the sensor regularly. → *Cleaning, p. 21*

3.2 Installation in ARF203 Flow-Through Fitting

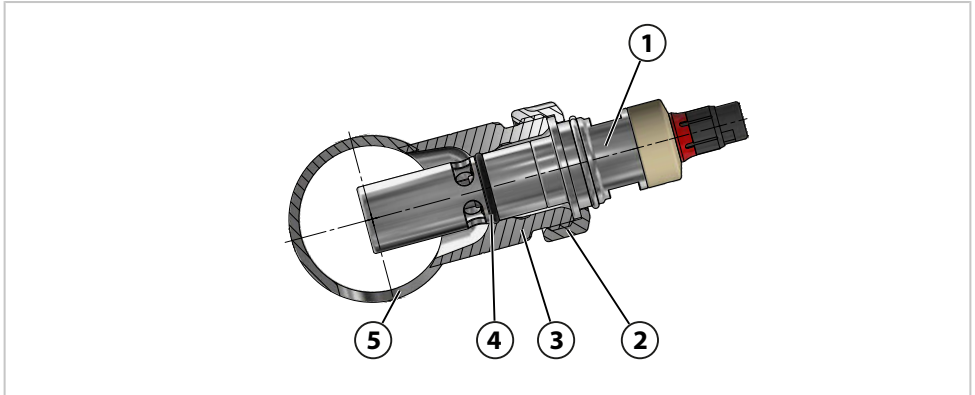
⚠ CAUTION! Process medium containing hazardous substances may escape when the sensor is released. Depressurize the process/drain off process medium prior to installing, replacing, or removing the sensor.



01. Check the SE605H sensor **(1)** and O-ring 20 x 2.5 mm **(3)** for damage.
02. Fit the sensor **(1)** in the ARF203 flow-through fitting **(4)** and tighten the coupling nut **(2)**.
03. Test for leaks.
 - ✓ The SE605H sensor is mechanically installed.

3.3 Installation in Piping

⚠ CAUTION! Process medium containing hazardous substances may escape when the sensor is released. Depressurize the process/drain off process medium prior to installing, replacing, or removing the sensor.



01. Check the SE605H sensor **(1)** and O-ring 20 x 2.5 mm **(4)** for damage.
02. Check the distance to the pipe wall **(5)**. If necessary, calibrate the sensor.
→ *Calibration, p. 22*
03. Fit the sensor **(1)** in the pipe socket **(3)**.
04. Tighten the coupling nut **(2)**.
05. Test for leaks.
✓ The SE605H sensor is mechanically installed.

3.4 Electrical Installation

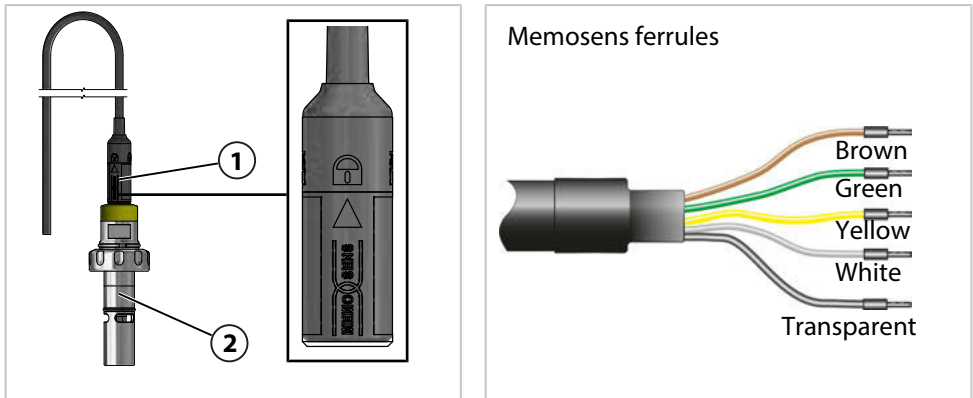
3.4.1 General Information on Electrical Installation

The SE605H sensor is electrically connected to a Memosens-capable industrial transmitter.

Note: More information on Knick industrial transmitters can be found at www.knick.de.
→ www.knick.de

3.4.2 Sensor Cable

A Memosens cable of type CA/MS-***N** or similar is required for the sensor's electrical connection. → *Accessories, p. 28*



01. Plug the Memosens cable **(1)** onto the SE605H sensor **(2)**.
02. Turn to close the bayonet coupling.
03. Connect the Memosens cable's ferrules or M12 plug to the industrial transmitter.
✓ SE605H has been electrically installed.

Memosens Cable Terminal Assignments

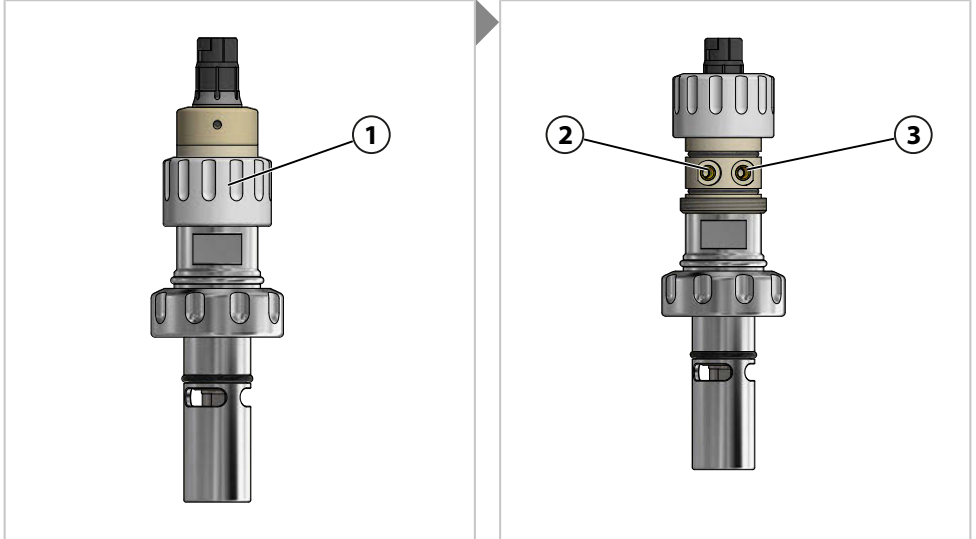
Wire Color	Terminal
Brown	Power supply +
Green	RS485 (A)
Yellow	RS485 (B)
White	Power supply – (GND)
Transparent	Shield

4 Operation

4.1 CondCheck Special Version: Checking the Measured Value

Note: Prior to measurement, the inner electrode must be insulated from the outer electrode and the sensor must be dry.

Checking the Measured Value



01. As necessary, remove the SE605H sensor from the process and clean it.
→ *Cleaning, p. 21*
02. Sufficiently insulate the inner from the outer electrode.
03. Loosen the protective cap **(1)** and push it up.
04. Connect the test resistor to the test jacks **(2)** and **(3)**.
05. Read the resistance value off the connected measuring device.
06. Remove the test resistor from the test jacks **(2)** and **(3)**.
07. Remove the insulation between the inner and outer electrodes.
08. Push down the protective cap **(1)** and fasten it finger tight.
✓ The measured value has been checked.

5 Maintenance, Cleaning, Calibration

5.1 Maintenance

The SE605H sensor does not require any maintenance.

5.2 Cleaning

If deposits are visible, clean the SE605H sensor.

⚠ CAUTION! Process medium containing hazardous substances may escape when the sensor is released. Depressurize the process/drain off process medium prior to installing, replacing, or removing the sensor.

01. Remove the SE605H sensor and rinse it if necessary.
02. Soak and partially dissolve deposits in an appropriate cleaning medium.
03. Remove deposits using a soft brush.
04. Rinse the sensor in demineralized water and dry it.
 - ✓ SE605H has been cleaned.

Recommended Cleaning Medium

Impurity	Cleaning Medium
Water-soluble substances	Deionized water
Greases and oils	Warm water and household dishwashing liquid
Heavy contamination	Ethanol or isopropanol
Lime and hydroxide deposits	Acetic acid (5 %) or hydrochloric acid (1 %)

See also

→ *Safety*, p. 5

5.3 Calibration

⚠ CAUTION! Process medium containing hazardous substances may escape when the sensor is released. Depressurize the process/drain off process medium prior to installing, replacing, or removing the sensor.

01. Remove the sensor.
02. Clean, rinse off, and dry the sensor. → *Cleaning, p. 21*
03. Fill the calibration beaker with the appropriate conductivity standard.
→ *Accessories, p. 28*
04. Immerse the sensor in the conductivity standard.
05. Calibrate and if necessary adjust the SE605H sensor with the industrial transmitter.
✓ SE605H has been calibrated/adjusted.

Note: More information on Knick industrial transmitters can be found at www.knick.de.
→ www.knick.de

6 Maintenance

6.1 Replacing the O-Rings

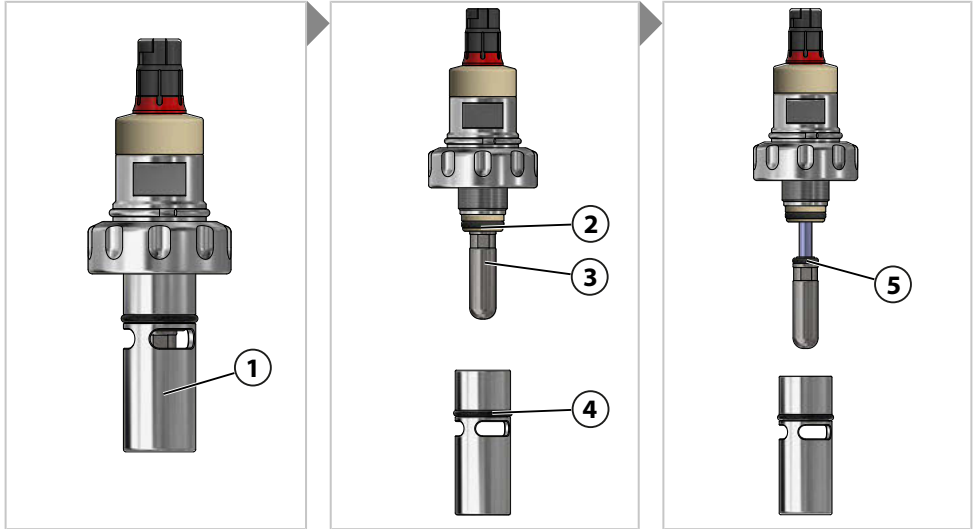
⚠ CAUTION! Process medium containing hazardous substances may escape when the sensor is released. Depressurize the process/drain off process medium prior to installing, replacing, or removing the sensor.

The operating company determines the appropriate inspection and maintenance intervals. Replace the O-rings at these intervals.

O-rings

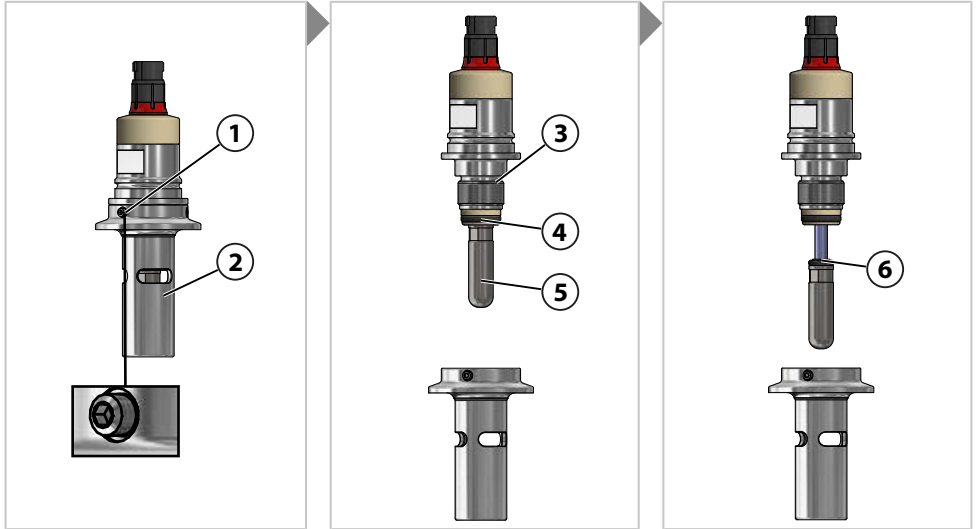
Product	O-ring Dimensions	Number	Material
SE605H-*MSH*	20 x 2.5 mm	1 piece	→ <i>Product Code, p. 10</i>
	15.5 x 2.6 mm	1 piece	
	8 x 2.5 mm	1 piece	
SE605H-*MSJ*	18 x 2 mm	1 piece	→ <i>Product Code, p. 10</i>
	15.5 x 2.6 mm	1 piece	
	8 x 2.5 mm	1 piece	

Replacing the O-Rings with Sensor Model SE605H-*MSH*



01. Remove the sensor.
02. Unscrew the outer electrode **(1)**.
03. Unscrew the inner electrode **(3)**.
04. Replace the O-ring **(2)** 20 x 2.5 mm, the O-ring **(4)** 15.5 x 2.6 mm, and the O-ring **(5)** 8 x 2.5 mm.
05. Screw on the inner electrode **(3)** tightly.
06. Screw on the outer electrode **(2)** tightly.
07. Install the sensor.
 - ✓ O-ring replaced

Replacing the O-rings with Sensor Model SE605H-*MSJ*



01. Remove the sensor.
02. Loosen the set screws **(1)** using an Allen wrench A/F 4. Do not remove them.
03. Unscrew the outer electrode with Tri-Clamp **(2)**.
04. Unscrew the inner electrode **(5)**.
05. Replace the O-ring **(3)** 18 x 2 mm, the O-ring **(4)** 15.5 x 2.6 mm, and the O-ring **(6)** 8 x 2.5 mm.
06. Screw on the inner electrode **(5)** tightly.
07. Screw on the outer electrode with Tri-Clamp **(2)** tightly.
08. Tighten the set screws **(1)**.
09. Install the sensor.
 - ✓ O-ring replaced

7 Troubleshooting

Malfunction State	Possible Causes	Remedy
Incorrect measurement display ¹⁾	Visible deposits on sensor	Clean and calibrate sensor. → <i>Cleaning, p. 21</i> → <i>Calibration, p. 22</i>
No display of measured value ¹⁾	Faulty cable connection	Check terminal assignments on industrial transmitter. Check bayonet coupling on sensor.
	Sensor cable faulty	Replace the sensor cable.
	Sensor faulty	Replace the sensor.

¹⁾ Measured value on industrial transmitter.

8 Decommissioning

8.1 Removing the Sensor

⚠ CAUTION! Process medium containing hazardous substances may escape when the sensor is released. Depressurize the process/drain off process medium prior to installing, replacing, or removing the sensor.

01. Disconnect the sensor cable from the sensor.
02. Unscrew the sensor.
03. Seal off the process port appropriately.
 - ✓ SE605H has been removed.

8.2 Disposal

Local codes and regulations must be observed when disposing of the product.

The SE605H can contain various materials, depending on the version concerned.

→ *Product Code, p. 10*

Customers can return their waste electrical and electronic devices.

Details on the return and environmentally friendly disposal of electrical and electronic equipment can be found in the manufacturer's declaration on our website. If you have any queries, suggestions, or questions regarding the recycling of waste electrical and electronic equipment from Knick, please send an email to → support@knick.de

9 Accessories

CS-C147K/500 Conductivity Standard

Measured value:	147 $\mu\text{S}/\text{cm}$ at 25 °C (77 °F)
Volume size:	500 ml
Order code:	CS-C147K/500

CS-C15K/500 Conductivity Standard

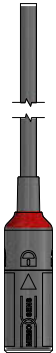
Measured value:	15 $\mu\text{S}/\text{cm}$ at 25 °C (77 °F)
Volume size:	500 ml
Order code:	CS-C15K/500

Memosens Cable CA/MS ¹⁾



Cable End	Cable Lengths	Order Designation
Ferrule	3 m	CA/MS-003NAA
	5 m	CA/MS-005NAA
	10 m	CA/MS-010NAA
	20 m	CA/MS-020NAA
M12 plug (8-pin)	3 m	CA/MS-003NCA
	5 m	CA/MS-005NCA
	10 m	CA/MS-010NCA
	20 m	CA/MS-020NCA

Memosens Cable CA/MS with Ex Approval ¹⁾



Cable End	Cable Lengths	Order Designation
Ferrule	3 m	CA/MS-003XAA
	5 m	CA/MS-005XAA
	10 m	CA/MS-010XAA
	20 m	CA/MS-020XAA
M12 plug (8-pin)	3 m	CA/MS-003XCA
	5 m	CA/MS-005XCA
	10 m	CA/MS-010XCA
	20 m	CA/MS-020XCA

ZU0320 Calibration Certificate for Conductivity Sensors

Determination of the individual cell constant with a measurement uncertainty of 1 %.

¹⁾ Other cable lengths and ends on request.



ZU0717 (Straight) Weld-In Socket for Tank Walls

Process connection: Ingold socket (Ø 25 mm, G1 ¼)



ZU0717/DN (Straight) Weld-In Socket for Pipelines

Process connection: Ingold socket (Ø 25 mm, G1 ¼)

adapted to DN50 ZU0717/DN50

adapted to DN65 ZU0717/DN65

adapted to DN80 ZU0717/DN80

adapted to DN100 ZU0717/DN100



ZU0718 (15° Incline) Weld-In Socket for Tank Walls

Process connection: Ingold socket (Ø 25 mm, G1 ¼)



ZU0718/DN (15° Incline) Weld-In Socket for Pipelines

for connecting with Ingold socket (Ø 25 mm, G1 ¼)

adapted to DN50 ZU0718/DN50

adapted to DN65 ZU0718/DN65

adapted to DN80 ZU0718/DN80

adapted to DN100 ZU0718/DN100

Weld-in sockets with an HSD (Handling Safety Design) safety function feature special grooves on the sealing surface for the process connection O-ring. These grooves prevent the O-ring from sealing if the Ingold coupling nut loosens inadvertently when process pressure is present. A minor leak means the loosening can be detected quickly and remedied before the Ingold coupling nut comes loose from the thread completely. This increases safety for personnel.



ZU0922 (Straight) Safety Weld-In Socket HSD for Boiler Walls

Process port: Ingold socket (Ø 25 mm, G1 ¼)



ZU0922/DN (Straight) Safety Weld-In Socket HSD for Piping

Process port: Ingold socket (Ø 25 mm, G1 ¼)

adapted to DN50 ZU0922/DN50

adapted to DN65 ZU0922/DN65

adapted to DN80 ZU0922/DN80

adapted to DN100 ZU0922/DN100



ZU0923 (15° Incline) Safety Weld-In Socket HSD for Boiler Walls

Process port: Ingold socket (Ø 25 mm, G1 ¼)



ZU0923/DN (15° Incline) Safety Weld-In Socket HSD for Piping

Process connection: Ingold socket (Ø 25 mm, G1 ¼)

adapted to DN50 ZU0923/DN50

adapted to DN65 ZU0923/DN65

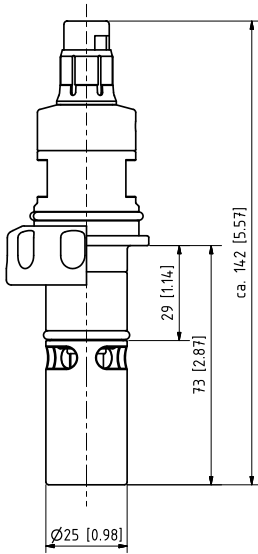
adapted to DN80 ZU0923/DN80

adapted to DN100 ZU0923/DN100

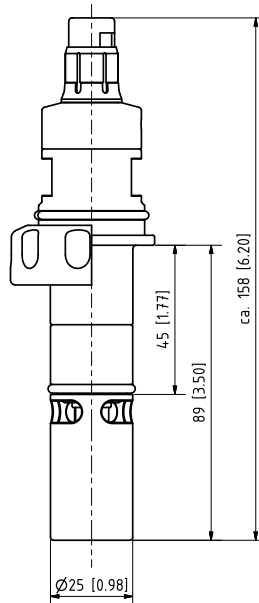
10 Dimension Drawings

Note: All dimensions are given in millimeters [inches].

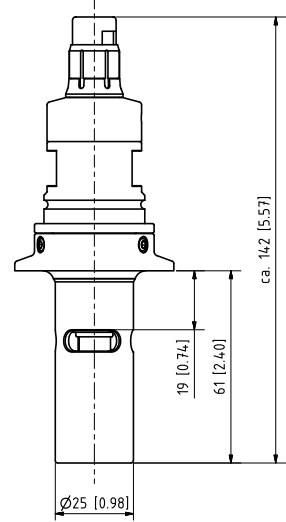
SE605H-*MSH0**



SE605H-*MSHZ**



SE605H-*MSJ***

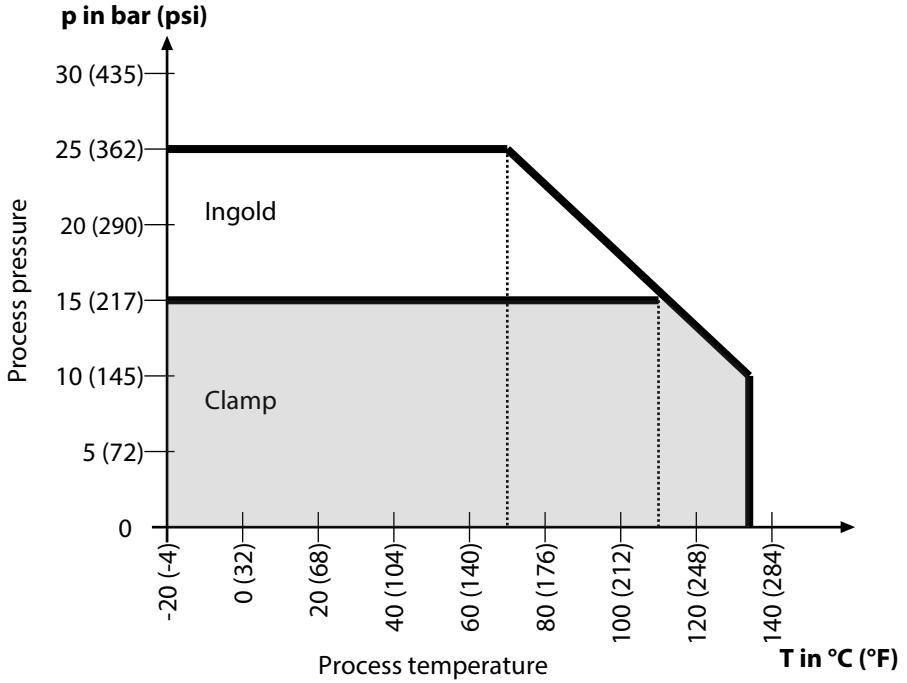


11 Specifications

Cell constant	0.021 /cm
Measuring range	0 ... 600 $\mu\text{S}/\text{cm}$ ($\pm 2\%$) 600 ... 1000 $\mu\text{S}/\text{cm}$ ($\pm 4\%$)
Material	
Sensor body	Stainless steel 1.4435
Electrodes	Stainless steel 1.4404
Insulator	PEEK
Seals	→ <i>Product Code, p. 10</i>
Test connection ¹⁾	PEEK, PVDF
Seal ¹⁾	FKM
Test jacks ¹⁾	CuZn gold-plated, \varnothing 4 mm, distance 14 mm
Temperature detector	NTC 30 k Ω
Temperature	
Medium	-20 ... 135 °C (-4 ... 275 °F)
Environment	-25 ... 80 °C (-13 ... 176 °F)
Ingold socket pressure	
-20 ... 70 °C (-4 ... 158 °F)	max. 25 bar (362.6 psi)
135 °C (275 °F)	max. 10 bar (145 psi)
Clamp pressure	
-20 ... 110 °C (-4 ... 230 °F)	max. 16 bar (232 psi)
135 °C (275 °F)	max. 10 bar (145 psi)
Process connection	→ <i>Product Code, p. 10</i>
Electrical connection	Memosens connector
Degree of protection	IP68
Dimensions	→ <i>Dimension Drawings, p. 31</i>
Weight	approx. 0.5 kg

¹⁾ CondCheck special version

Pressure/Temperature Diagram





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