

SIEMENS

SITRANS L

Capacitance switches SITRANS LCS100 2-wire mA and Relay Version

Operating Instructions




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7ML700/7ML701 (compact enclosure)
7ML702 (rod version)
7ML703 (cable version)

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

 DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
 WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
 CAUTION
indicates that minor personal injury can result if proper precautions are not taken.
NOTICE
indicates that property damage can result if proper precautions are not taken.


If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

 WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

1.1 Purpose of this documentation

These instructions contain all information required to commission and use the device. Read the instructions carefully prior to installation and commissioning. In order to use the device correctly, first review its principle of operation.

The instructions are aimed at persons mechanically installing, connecting and commissioning the device, as well as service and maintenance engineers.

1.2 Designated use

Use the device in accordance with the information on the nameplate and in the Technical specifications (Page 61).

1.3 Checking the consignment

1. Check the packaging and the delivered items for visible damages.
2. Report any claims for damages immediately to the shipping company.
3. Retain damaged parts for clarification.
4. Check the scope of delivery by comparing your order to the shipping documents for correctness and completeness.



WARNING

Using a damaged or incomplete device

Risk of explosion in hazardous areas.

- Do not use damaged or incomplete devices.

1.4 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit <https://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under <https://www.siemens.com/cert>.

NOTICE
Unauthorized product information or software
Use only authorized Siemens websites when accessing any product information or software, including firmware updates, device integration files (EDD, for example), as well as other product documentation. Using unauthorized product information or software could result in a security incident, such as breach of confidentiality, or loss of integrity and availability of the system.
For more information, see Product documentation and support (Page 79).

1.5 Transportation and storage

To guarantee sufficient protection during transport and storage, observe the following:

- Keep the original packaging for subsequent transportation.
- Devices/replacement parts should be returned in their original packaging.
- If the original packaging is no longer available, ensure that all shipments are properly packaged to provide sufficient protection during transport. Siemens cannot assume liability for any costs associated with transportation damages.

NOTICE
Insufficient protection during storage
The packaging only provides limited protection against moisture and infiltration.
<ul style="list-style-type: none"> • Provide additional packaging as necessary.

Special conditions for storage and transportation of the device are listed in Technical specifications (Page 61).

1.6 Notes on warranty


The contents of this manual shall not become part of or modify any prior or existing agreement, commitment or legal relationship. The sales contract contains all obligations on the part of Siemens as well as the complete and solely applicable warranty conditions. Any statements regarding device versions described in the manual do not create new warranties or modify the existing warranty.


The content reflects the technical status at the time of publishing. Siemens reserves the right to make technical changes in the course of further development.


Safety notes

2.1 Safety notes

Special attention must be paid to warnings and notes highlighted from the rest of the text by grey boxes.

 WARNING
Relates to a caution symbol on the product, and means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.






 WARNING
Means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.

 CAUTION
Means that failure to observe the necessary precautions can result in considerable material damage.

Note

Means important information about the product or that part of the operating manual.

2.2 Safety marking symbols


In manual	On Product	Description
		Caution: refer to accompanying documents (manual) for details.
		Earth (ground) Terminal
		Protective Conductor Terminal

2.3 Preconditions for use

This device left the factory in good working condition. In order to maintain this status and to ensure safe operation of the device, observe these instructions and all the specifications relevant to safety.

Observe the information and symbols on the device. Do not remove any information or symbols from the device. Always keep the information and symbols in a completely legible state.

2.3.1 Improper device modifications

 WARNING
Improper device modifications Risk to personnel, system, and environment can result from modifications to the device, particularly in hazardous areas. <ul style="list-style-type: none">• Only carry out modifications that are described in the instructions for the device. Failure to observe this requirement cancels the manufacturer's warranty and the product approvals. Do not operate the device after unauthorized modifications.

2.4 Requirements for special applications

Due to the large number of possible applications, each detail of the described device versions for each possible scenario during commissioning, operation, maintenance or operation in systems cannot be considered in the instructions. If you need additional information not covered by these instructions, contact your local Siemens office or company representative.

Note

Operation under special ambient conditions


We highly recommend that you contact your Siemens representative or our application department before you operate the device under special ambient conditions as can be encountered in nuclear power plants or when the device is used for research and development purposes.


2.5 Use in hazardous areas

Qualified personnel for hazardous area applications

Persons who install, connect, commission, operate, and service the device in a hazardous area must have the following specific qualifications:

- They are authorized, trained or instructed in operating and maintaining devices and systems according to the safety regulations for electrical circuits, high pressures, aggressive, and hazardous media.
- They are authorized, trained, or instructed in carrying out work on electrical circuits for hazardous systems.
- They are trained or instructed in maintenance and use of appropriate safety equipment according to the pertinent safety regulations.

 WARNING
Use in hazardous area Risk of explosion. <ul style="list-style-type: none">• Only use equipment that is approved for use in the intended hazardous area and labeled accordingly.• Do not use devices that have been operated outside the conditions specified for hazardous areas. If you have used the device outside the conditions for hazardous areas, make all Ex markings unrecognizable on the nameplate.

 WARNING
Loss of safety of device with type of protection "Intrinsic safety Ex i" If the device or its components have already been operated in non-intrinsically safe circuits or the electrical specifications have not been observed, the safety of the device is no longer ensured for use in hazardous areas. There is a risk of explosion. <ul style="list-style-type: none">• Connect the device with type of protection "Intrinsic safety" solely to an intrinsically safe circuit.• Observe the specifications for the electrical data on the certificate and/or in Technical specifications (Page 61).

Description

3.1 Measurement principle

The SITRANS LCS100 detects the capacitance around its probe. Due to the active shield technology it has an increased insensitivity to material buildup on the probe.

3.2 Application

The SITRANS LCS100 is a capacitance switch for:

- Level detection of liquids, solids (powder and granules), slurries and foam
- Interface detection (for example, oil / water or foam / liquid)

It works in all types of vessels, pipes, and silos within a wide range of applications, such as:

- Food, brewery, dairy, beverage, and pharmaceuticals
- Chemical and petrochemical
- Water and waste water
- Machine building industry

It can also be used for leakage detection in double walled vessels, tanks and silos or in moldings and collecting ponds.

3.3 Features

Process

- Measurement independent from influence of the vessel wall
- Factory provided precalibration allows measurement of most applications without sensitivity setting on site
- Active shield electrode for compensation of material buildup
- Potted construction protects from shock, vibration, humidity, condensation
- Dielectric constant of 1.5 or more
- Process temperature up to 125°C
- Intrinsically Safe (IS) design for Hazardous areas (requires external barrier)
- Approvals CE, UKCA, UKEX, ATEX, IECEx, FM, CSA, INMETRO, WHG, VLAREM II

Electronics

- 4-wire DC with relay signal output
- 2-wire 8/16 mA
- 4-20mA continuous mode (4mA = uncovered probe, 20mA = probe covered with high dielectric material)
- Terminal or M12 connection
- Sensitivity setting by potentiometer, including visual feedback via LED
- Remote Test with external signal conditioning instrument

Mechanics

- Corrosion resistant construction with enclosure made of thermoplastic polyester, wetted parts made of PPS, PVDF, PEEK and 316L stainless steel
- Compact probe length
- Pipe extension (max. 4m [157,5"]), optional sliding sleeve allows to change the switch point easily during operation of the device
- Cable extension (max. 20m [787,4"]), cuttable by user
- Various process connections: threaded (including G½" hygienic), flanged (screwed) or Tri-clamp

Installing/mounting

4.1 Basic safety notes

4.1.1 Proper mounting

4.1.1.1 Process pressure

Improper installation may result in loss of process pressure. Observe possible pressure limitation from the used flange type or in case of use of the sliding sleeve.

4.1.1.2 Chemical resistance against the medium

Materials of construction are chosen based on their chemical compatibility (or inertness) for general purposes. For exposure to specific environments, check with chemical compatibility charts before installing.

4.1.1.3 Fastening of the threaded process connection

Mounting torque for the thread may not exceed 40 Nm (metal thread)/ 20 Nm (plastic thread). Use a open-end wrench. Do not fasten by turning the housing, as this will destroy the device.

4.1.1.4 EHEDG approval/Food grade material

The materials are available for the use under normal and predictable applications (according to Reg. (EC) No. 1935/2004). Other conditions can influence the safety.

NOTICE

Incorrect mounting

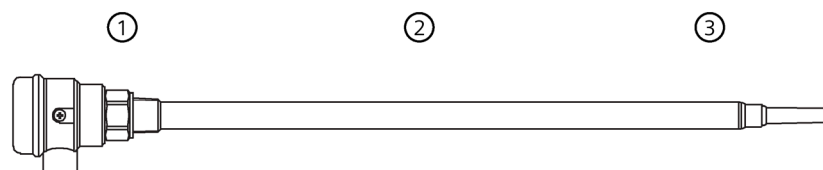
The device can be damaged, destroyed, or its functionality impaired through improper mounting.

- Before installing ensure there is no visible damage to the device.
- Make sure that process connectors are clean, and suitable gaskets and glands are used.
- Mount the device using suitable tools. Refer to the information in Technical specifications (Page 61).

4.2 Mounting

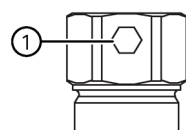
Handling precautions

To prevent damage of the pipe extension, all devices with a pipe longer than 2 m (6.5 ft) must be supported at these three points when lifting from a horizontal position.



- ① At the process connection or flange
- ② Midway across the pipe
- ③ At the end of the pipe before the probe

Sliding sleeve



- ① Tighten both straining screws with 15 Nm to obtain resistance against pressure

Direction of the cable glands (enclosure Ø65mm [2.56"])

When the unit is mounted from the side, ensure, that the cable glands face downwards and are closed to avoid water penetration into the housing. The enclosure can be rotated against the process connection after mounting.

Sealing

Ensure proper seal of the process connection thread in case of process pressure.

Hygienic process connection

Observe that the correct "On site process connection" is present, see G 1/2" hygienic process connection/EHEDG approval (Page 75).

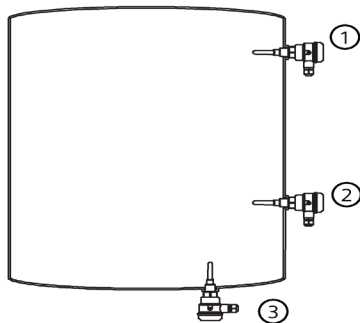
4.3 Liquids applications

4.3.1 LCS100 compact version

! CAUTION

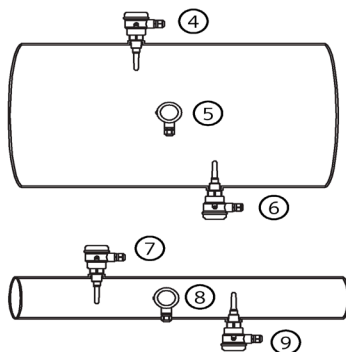
Observe:

- General distances of the probe, see Probe mounting distances - liquids (Page 19).
- Distance to material flow (filling)
- Max. permitted mechanical load, see Environmental (Page 66).



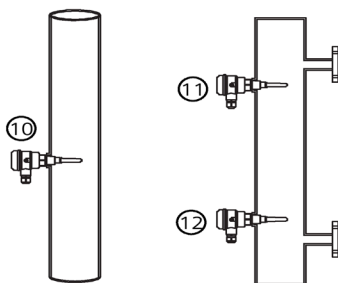
Vertical vessel

- ① Full detector horizontal
- ② Demand or empty detector horizontal
- ③ Empty detector vertical from the bottom



Horizontal vessel

- ④ Full detector vertical
- ⑤ Demand or empty detector horizontal
- ⑥ Empty detector vertical from the bottom



Horizontal pipe

- ⑦ Full detector vertical
- ⑧ Demand or empty detector horizontal
- ⑨ Empty detector vertical from the bottom

Vertical pipe

- ⑩ Full, demand or empty detector horizontal

Bypass

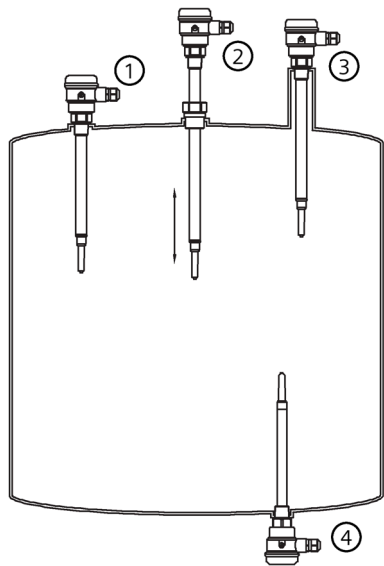
- ⑪ Full detector horizontal
- ⑫ Demand or empty detector horizontal

4.3.2 LCS100 rod version

CAUTION

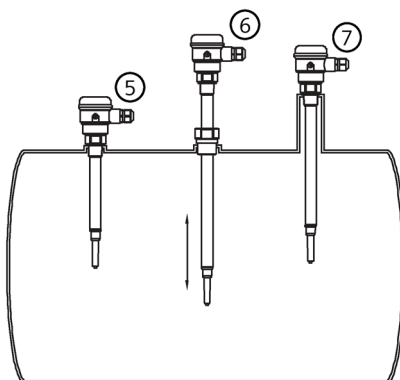
Observe:

- General distances of the probe, see Probe mounting distances - liquids (Page 19).
- Distance to material flow (filling)
- Max. permitted mechanical load, see Environmental (Page 66).



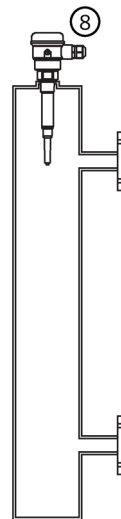
Vertical vessel: Full, demand, or empty detector

- ① Vertical
- ② Vertical with sliding sleeve
- ③ Vertical with long mounting socket
- ④ Vertical from bottom



Horizontal vessel

- ⑤ Full, demand, or empty detector vertical
- ⑥ Vertical with sliding sleeve
- ⑦ Vertical with long mounting socket

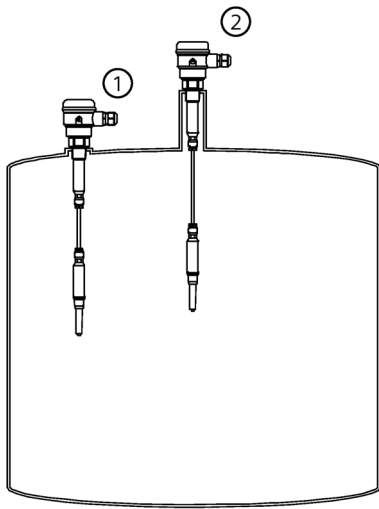


Bypass

- ⑧ Full, demand, or empty detector vertical

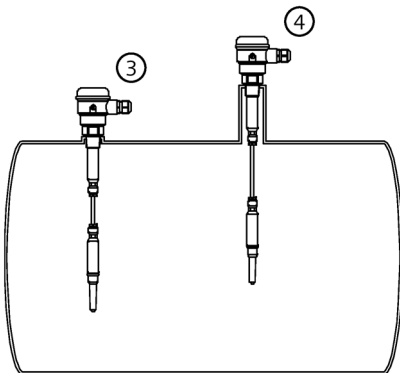
4.3.3 LCS100 cable version

<p>! CAUTION</p> <p>Observe:</p> <ul style="list-style-type: none">• General distances of the probe to the vessel wall, see Probe mounting distances - liquids (Page 19). Consider that the hanging probe can move sideways with material movement.• Distance to material flow (filling)• Max. permitted mechanical load, see Environmental (Page 66).
--



Vertical vessel: Full, demand, or empty detector

- ① Vertical
- ② Vertical with long mounting socket



Horizontal vessel: Full, demand, or empty detector

- ③ Vertical
- ④ Vertical with long mounting socket

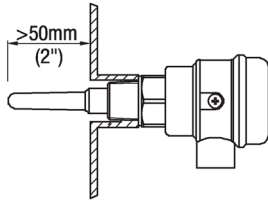
4.3.4 Probe mounting distances - liquids

Probe distance

- Observe nozzle length (Probe should lead into the product).
- Observe minimum distance between two probes, and to the metal vessel wall.

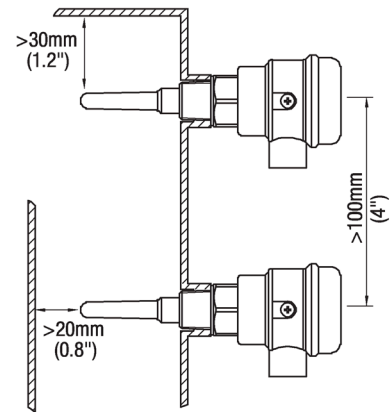
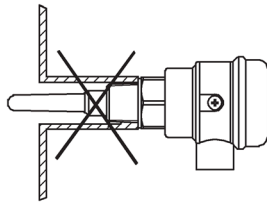
Correct

Probe leads into the product



Wrong

Nozzle too long



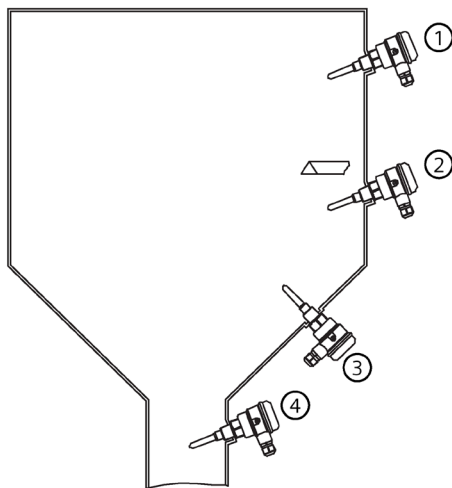
4.4 Solids applications

4.4.1 LCS100 compact version

⚠ CAUTION

Observe:

- General distances of the probe, see Probe mounting distances - solids (Page 23).
- Distance to material flow (filling)
- Max. permitted mechanical load, see Environmental (Page 66).
- Wearing due to abrasive bulk material



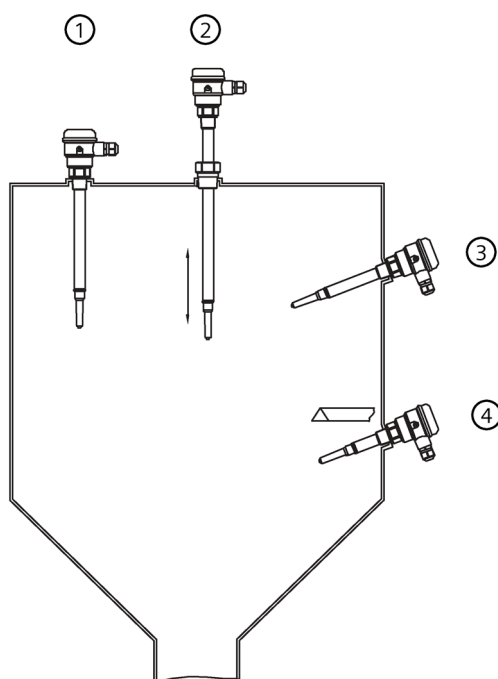
- ① Full detector horizontal or oblique. Slight incline mounting helps remaining material to fall off more easily
- ② Demand or empty detector horizontal or oblique. Slight incline mounting helps remaining material to fall off more easily. Protective angle recommended depending on load and abrasion of the material
- ③ Empty detector oblique from the bottom
- ④ Empty detector in the silo outlet

4.4.2 LCS100 rod version

CAUTION

Observe:

- General distances of the probe, see Probe mounting distances - solids (Page 23).
- Distance to material flow (filling)
- Max. permitted mechanical load, see Environmental (Page 66).
- Wearing due to abrasive bulk material



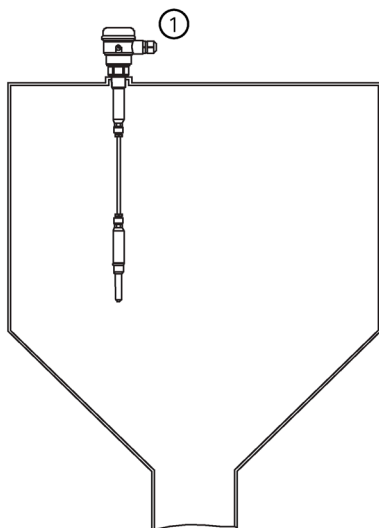
- ① Full detector vertical
- ② Full detector with sliding sleeve
- ③ Full detector horizontal or oblique. Slight incline mounting helps remaining material to fall off more easily
- ④ Demand or empty detector horizontal or oblique. Slight incline mounting helps remaining material to fall off more easily. Protective angle recommended depending on load and abrasion of the material

4.4.3 LCS100 cable version

! CAUTION

Observe:

- Distance of the probe to the silo wall, see Probe mounting distances - solids (Page 23).
- Consider that the hanging probe can move sideways with material
- Distance to material flow (filling)
- Max. permitted mechanical traction, see Environmental (Page 66).
- Empty detector: Do not install in the center of the silo due to high traction with moving material
- Wearing due to abrasive bulk material



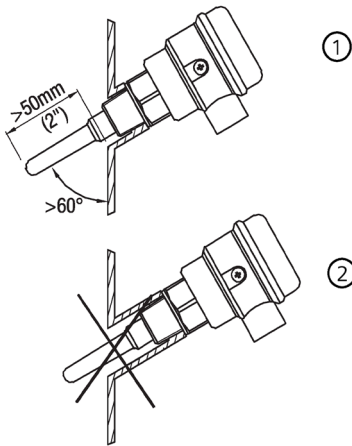
① Full, demand or empty detector vertical

4.4.4 Probe mounting distances - solids

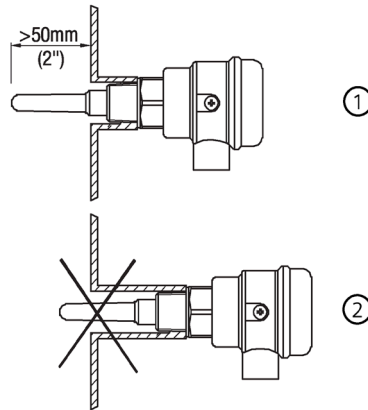
Probe distance

Observe nozzle length.

Oblique mounting



Horizontal mounting



① Correct

Probe leads into the product

①

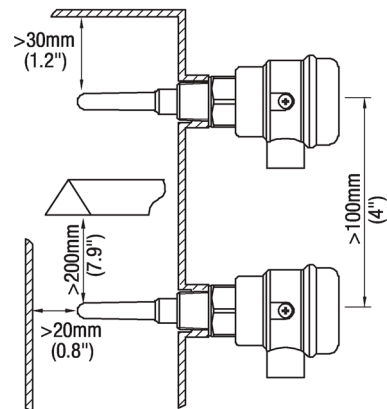
② Wrong

Nozzle too long

②

Observe mounting angle to ensure, that the active tip of the probe has enough distance to the metal silo wall.

Observe minimum distance between two probes, to metal vessel wall, and to protective angle.



Connecting

5.1 Handling

In the case of inexpert handling or handling malpractice, the electric safety of the device cannot be guaranteed.

5.2 Installation regulations

The local regulations or VDE 0100 (Regulations of German Electro technical Engineers) must be observed.

5.3 Power supply switch

A power-supply-disconnecting switch must be provided and marked near the device.

5.4 Wiring diagram

The electrical connections have to be made according to the wiring diagram.

5.5 Supply voltage

Compare the supply voltage applied with the specifications given on the name plate before switching the device on.

The unit must be supplied from a SELV source providing electrical isolation between the input and output, in order to meet the applicable safety requirements of IEC 61010-1.

Observe reduced supply voltage ratings in wet locations. A wet location is a location where water or other conductive liquid may be present and is likely to increase the risk of electric shock.

5.6 Cable gland and field wiring cables

With use of terminal block and cable gland:

The screwed cable gland must have following specifications:

- Ingress protection IP68
- Temperature range from -40°C to 10 K above max. ambient temperature
- UL or VDE certified (depending on the country where the unit is installed)
- Pull relief

Make sure that the screwed cable gland safely seals the cable and that it is tight (danger of water intrusion).

The field wiring cables must have following specifications:

- The diameter has to match to the clamping range of the used cable gland.
- The cross section has to match with the clamping range of the connection terminals and consider the max. current.
- The temperature rating must be at least 10 K above max. ambient temperature.

Cut the field wiring cables to appropriate length to fit properly into the housing.

5.7 M12 mating plug and field wiring cables

With use of M12 plug:

The mating plug must have following specifications

- M12x1 according to IEC 61076-2-101, female, 4-pole, coding A-standard
- Ingress protection IP68
- Temperature range from -40°C to 10 K above max. ambient temperature

The field wiring cables must have following specifications:

- The diameter and cross section has to match to the specification of the mating plug.
- The temperature rating must be at least 10 K above max. ambient temperature.
- Install the field wiring cables according to the instructions of the mating plug.

5.8 Relay protection

Provide protection for relay contacts / solid state relay against spikes with inductive loads

5.9 Protection against static charging

The unit must be earthed in any case to avoid static charging of the unit, especially on applications with pneumatic conveying.

For Non-Ex units: Functional earthing is satisfactory, see Functional earthing (Page 26).

For Ex-units: The external equipotential bonding terminal must be connected to ground, see Intrinsically safe version (Page 29).

5.10 Functional earthing

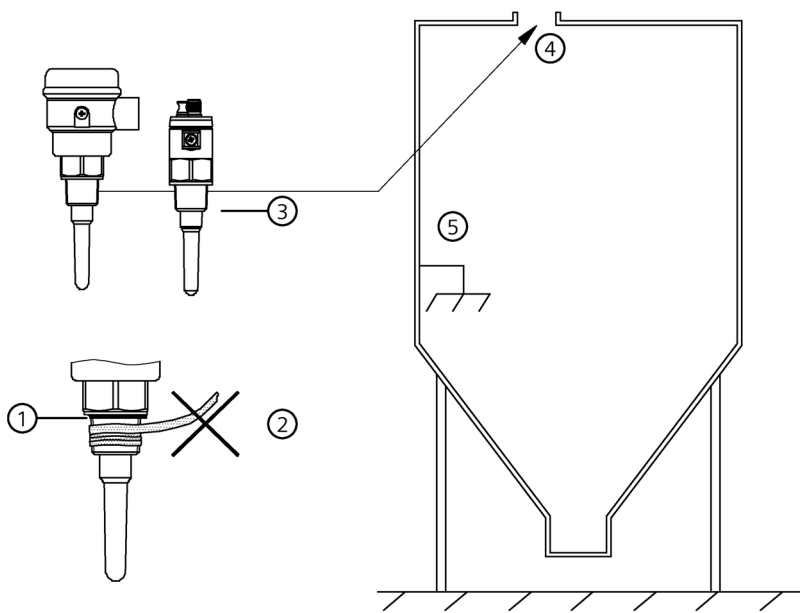
The unit must have connection to earth for proper functioning using one of the methods below..

Earthing through metal process connection

⚠ CAUTION

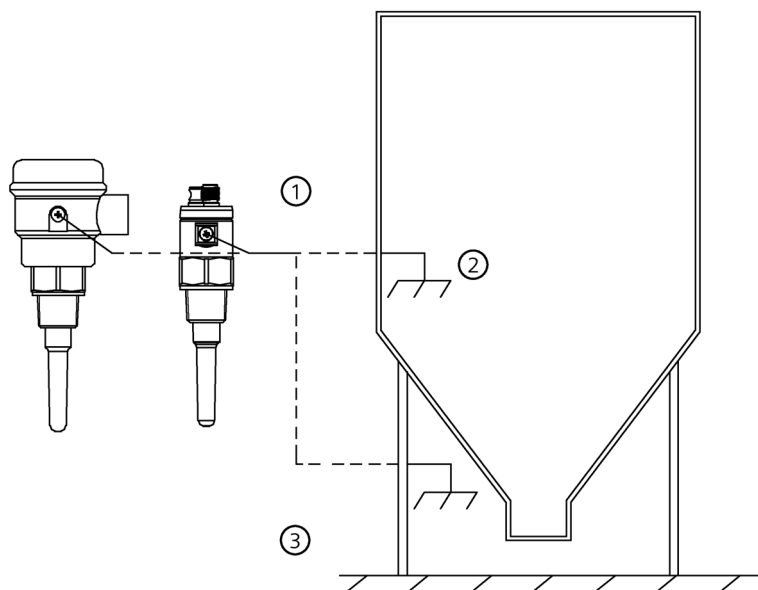
Ex applications

This grounding method alone is not applicable for Ex applications.



- ① Use flat sealing
- ② Do not use PTFE (Teflon) tape
- ③ Metal process connection
- ④ Metal nozzle
- ⑤ Metal vessel (earthed)

Earthing through external equipotential bonding terminal

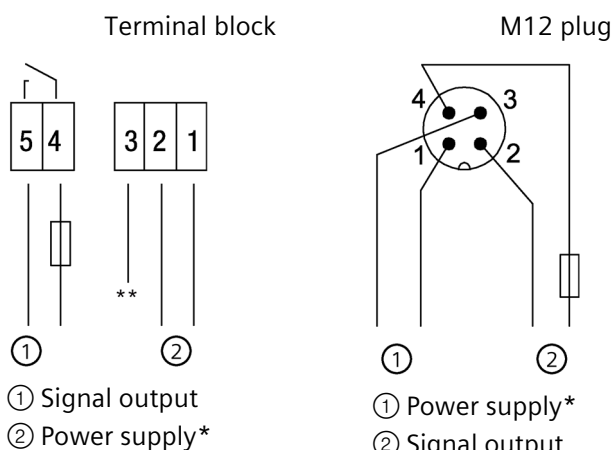


- ① Standard cable max. 5 m
- ② Metal vessel (earthed)
- ③ For non-metal vessel, use grounded parts close to the vessel (example, metal fixing elements of the vessel)

5.11 Standard version (General Purpose)

4-wire operation with DC supply and relay (signal output)

Power supply: 9 .. 33 V DC, 0,7W incl. 10% of EN 61010-1
 Signal output: Floating relay SPST
 Max. 60 V DC or 30 V AC; Limited to 35 V DC or 16 V AC in wet locations
 Max. 1 A, 60 W
 External fuse: max.1A, fast or slow, HBC, 250V



- ① Signal output
- ② Power supply*

- ① Power supply*
- ② Signal output

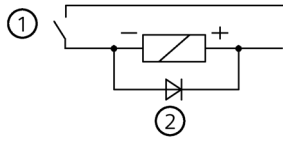
* Polarity determines output logic, see table Output logic (Page 30).

** See "cable shield" below

5.12 Cable shield

Protection of Relay contact:

Observe a protection diode in case of connecting an inductance (e.g. external relay)



- ① Signal output
- ② External relay with protection diode

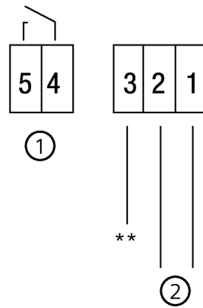
2- wire operation with 8/16 mA loop

8/16 mA loop: 9 .. 33 V DC, 0,7W incl. 10% of EN 61010-1

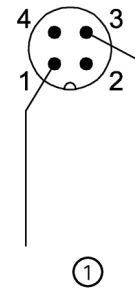
External resistor in loop: The above stated voltage is the resulting voltage on the unit. Any voltage drop on an external series resistance must be considered.

$$R_{max} = (V_{supply} - 9 V) / 16 \text{ mA}$$

Example: 24 V supply allows R_{max} of 938 Ohms



- ① Not used
- ② 8/16 mA loop*



- ① 8/16 mA loop*
Pin 2, 4 not used

* Polarity determines output logic, see table Output logic (Page 30).

** See "cable shield" below

5.12 Cable shield

It is recommended to use a shielded cable for stable measurement.

With Terminal block: The cable shield can be connected either to terminal 3 or on the other side to earth. Do not connect both sides of the shield to earth. Note: terminal 3 is internal connected to the external equipotential bonding terminal on the enclosure.

With M12 plug: With use of common M12 cables, the cable shield is connected with the M12 cap nut. Since the M12 thread on LCS100 is made of plastics, the cable shield on the M12 cap nut is not connected with LCS100 and must be connected on the other side to ground.

5.13 Intrinsically safe version

2-wire operation with 8/16 mA loop

8/16 mA loop: 10.8 .. 30 V DC, 0,7W incl. 10% of EN 61010-1

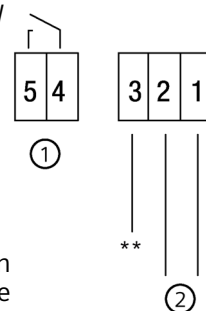
Intrinsically safe supply required (barrier or signal conditioning instruments): $U_i=30\text{ V}$ $I_i=160\text{ mA}$ $P_i=0,8\text{ W}$, $C_i=7,6\text{ nF}$ $L_i=0,3\text{ mH}$

External resistor in loop: The above stated voltage is the resulting voltage on the unit. Any voltage drop on an external series resistance must be considered.

$R_{\max} = (V_{\text{supply}} - 10.8\text{ V}) / 16\text{ mA}$

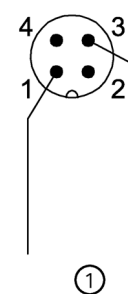
Example: 24 V supply allows R_{\max} of 825 Ohms

Terminal block



- ① Not used
- ② 8/16 mA loop*

M12 plug



- ① 8/16 mA loop*
- Pin 2,4 not used

* Polarity determines output logic, see table Output logic (Page 30).

** See "cable shield" below

4-wire operation with DC supply and solid state relay (signal output)

This operation is only available for LCS100 compact with enclosure $\varnothing 65\text{mm}$ (2.56") and connection via terminal block (Solid state relay integrated).

Power supply: 10.8 .. 30 V DC, 0,7W incl. 10% of EN 61010-1

Intrinsically safe barrier required: $U_i=30\text{ V}$ $I_i=160\text{ mA}$ $P_i=0,8\text{ W}$, $C_i=7,6\text{ nF}$ $L_i=0,3\text{ mH}$

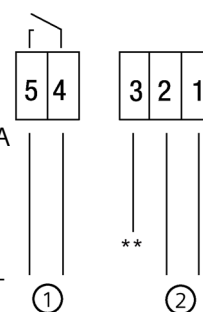
Signal output: Solid state relay

Max. switching voltage / current: 30 V DC / 82mA

For connection to an intrinsically safe "switch amplifier for contact input" or to an intrinsically safe PLC with integrated input card for contact input.

$U_i=30\text{ V}$ $I_i=200\text{ mA}$ $P_i=350\text{ mW}$, $C_i=4,2\text{ nF}$, $L_i=0$

Terminal block

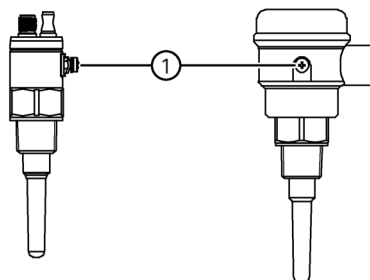


- ① Signal output
- ② Power supply*

* Polarity determines output logic, see table Output logic (Page 30).

** See "cable shield" below

External equipotential bonding terminal



① Connect with equipotential bonding of the plant

5.14 Cable shield

It is recommended to use a shielded cable for stable measurement.

With Terminal block: The cable shield can be connected either to terminal 3 or on the other side to earth. Do not connect both sides of the shield to earth. Note: terminal 3 is internally connected to the external equipotential bonding terminal on the enclosure.

With M12 plug: With use of common M12 cables, the cable shield is connected with the M12 cap nut. Since the M12 thread on LCS100 is made of plastics, the cable shield on the M12 cap nut is not connected with LCS100 and must be connected on the other side to ground.







5.15 Output logic

Terminal block

					Fault
White LED					2Hz
Setting	FSL	FSH	FSL	FSH	n.a.
Supply polarity	L+	L-	L+	L-	n.a.
Terminal 1	L+	L-	L+	L-	
Terminal 2	L-	L+	L-	L+	
Yellow LED					
Relay (Terminal 4+5)					
8/16 mA loop (Terminal 1+2)	8 mA	16 mA	16 mA	8 mA	3.6 mA

FSL = Fail safe low FSH = Fail safe high

M12 plug

					Fault
White LED	●		☀		☀ 2Hz
Setting	FSL	FSH	FSL	FSH	n.a.
Supply polarity M12, Pin 1 M12, Pin 3	L+ L-	L- L+	L+ L-	L- L+	n.a.
Yellow LED	●	☀	☀	●	●
Relay (M12, Pin 2+4)					
8/16 mA loop (M12, Pin 1+3)	8 mA	16 mA	16 mA	8 mA	3.6 mA

FSL = Fail safe low FSH = Fail safe high

5.16 Hazardous area installations

5.16.1 Use of Operating Instructions

For use and assembly, refer to the instructions in this Operating Instruction. It does contain all instruction as required by ATEX Directive 2014/34/EU, Annex II, 1/0/6 and Ordinance INMETRO n° 115/2022.

5.16.2 General notes

Refer to appropriate certificate for application in specific hazardous environment.

The equipment has not been assessed as a safety related device (as referred to by Directive 2014/34/EU Annex II, clause 1.5).

The certificate numbers have an 'X' suffix, which indicates that specific condition of use apply. Those installing or inspecting this equipment must have access to the certificates.

5.16.3 Qualification of personnel / Service / Repair

Installation and inspection of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice.

5.16 Hazardous area installations

Repair of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice.

Components to be incorporated into or used as replacements in the equipment shall be fitted by suitably trained personnel in accordance with the manufacturer's documentation.

Turn off power before servicing any device (the transmitter is in operation when the power supply is switched on). When removing the unit from vessel, take care of process pressure and material passing the opening.

5.16.4 Certificates / List of standards

For the latest certificates, see Certificates (<https://support.industry.siemens.com/cs/ww/en/ps/17450/cert>).

See EU - Declaration of conformity for the list of standards valid for ATEX certificates.

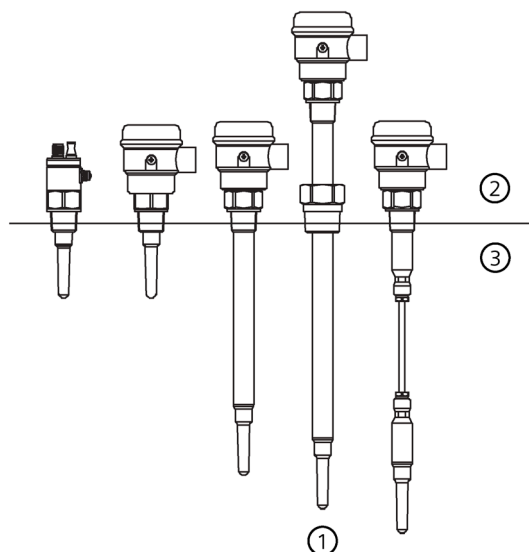
5.16.5 Year of manufacturing

Marking on the name plate is done according to IEC 60062 as follows:

Year of manufacturing	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Marking code	M	N	P	R	S	T	U	V	W	X

5.16.6 Permitted zones for installation

Devices can be installed as follows:



- ① Sliding sleeve
- ② Ambient side
- ③ Process side

		Dust applications	Gas applications	
		Marking Da/Db	Marking Ga/Gb	Marking Ga
Ambient side	EPL	Db	Gb	Ga
	Category	2D	2G	1G
	Zone	21	1	0
Process side	EPL	Da	Ga	Ga
	Category	1D	1G	1G
	Zone	20	0	0

Not all approvals are available with all models, see selection list for more information

5.16.7 Warnings for installation

Intrinsically safe supply

For intrinsically safe models, power must be supplied from an Intrinsically Safe power source, otherwise protection is no longer guaranteed.

Process pressure

Devices with Ex Approval are approved for atmospheric pressure.

A detailed explanation is given below for ATEX and applies analogously for other Ex approvals:

The scope of the ATEX directive is generally limited to atmospheric pressure, see ATEX directive 2014/34/EU Chapter 1 Art.2 (4). Atmospheric pressure is defined as absolute pressure 0.8bar to 1.1bar, see ATEX guideline §50 and IEC 60079-0 chapter 1 Scope. The technical background is that an explosive atmosphere which is compressed (overpressure) or released (underpressure) can exhibit different explosion behaviour than under atmospheric conditions.

The standards for the types of protection against explosion (IEC 60079 series), on which a type approval according to the ATEX directive is based, are designed for atmospheric conditions and do not automatically cover deviating pressure conditions. Thus, an ATEX type approval issued in accordance with this directive only covers atmospheric pressure.

This applies to all manufacturers.

A deviating operating pressure can be assessed and approved by an expert for the respective application.

Regardless of this, the design of the level indicators is suitable for a vessel overpressure / underpressure in accordance with the specified technical data.

Chemical resistance against the medium

If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised. Aggressive substances: e.g. acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials. Suitable precautions: e.g. establishing from the material's data sheet that it is resistant to specific chemicals.

Versions with cable gland mounted by default

Below-mentioned cable diameters and tightening torques of the nut shall be observed for the installation.

Cable gland: M20x1.5

Cable diameter: 6 mm to 12 mm (0.24 .. 0.47")

Tightening torque: Depending on the used cable and therefore to be determined by the user.

5.16.8 Specific conditions of use

Electrostatic charge

For gas- and dust-explosive atmospheres:

The apparatus shall be installed in a way that electrostatic charging hazards on non-metallic parts outside the process can be excluded.

For gas-explosive atmospheres only:

The apparatus shall be installed in a way that electrostatic charging hazards on non-metallic parts inside the process can be excluded.

Applications Ga/Gb or Da/Db

The installation of the apparatus into the separation wall shall be in a way that technical tightness on the process connection is ensured.

The apparatus shall only be used in process media for which the chemical resistance of the materials, which are in contact with the process media, is ensured.

The materials which are in contact with the process media are defined by positions 5 and 6 of the type code.

Intrinsic safety

For dust-explosive atmospheres only:

The intrinsically safe circuits of the apparatus shall be regarded as grounded in the event of a fault. To avoid danger from circulating fault currents, appropriate measures, acc. to IEC / EN 60079-14 and depending on the installation shall be considered (e. g. equipotential bonding along the intrinsically safe circuits).

Ambient and process temperature range

The relation between ambient temperature range, process temperature range and temperature class (for gas) or maximum surface temperature (for dust) is shown in the thermal parameters table.

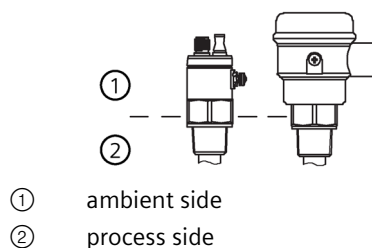
With option FFKM O-ring seal lower ambient temperature range and lower process temperature range are limited to -20°C (-4°F).

Details see next page

Max. permitted temperature close to the enclosure

If the process temperature exceeds the permissible ambient temperature, the max. resulting temperature close to the enclosure (see dotted line) shall not exceed the related max. permissible ambient temperature (see next page), taking the worst case conditions into account.

This shall be verified by measurement when installed.



5.16.9 Ambient and process temperature range, max. surface temperature and temperature class

The temperature marking on the nameplate  refers to the instruction manual. In the following tables the relevant temperature ratings are shown.

For use at altitude ≤ 2000 m (6,562ft):

Ambient temperature range	Process temperature range	Max. Surface temperature (EPL Da or Db)	Temperature class (EPL Ga or Gb)
-40 .. +50°C (-40 .. +122°F) (1)	-40 .. +50°C (-40 .. +122°F) (1)	T ₂₀₀ 80°C	T6
-40 .. +65°C (-40 .. +149°F) (1)	-40 .. +65°C (-40 .. +149°F) (1)	T ₂₀₀ 95°C	T5
-40 .. +85°C (-40 .. +185°F) (1)	-40 .. +100°C (-40 .. +212°F) (1)	T ₂₀₀ 130°C	T4
-40 .. +85°C (-40 .. +185°F) (1)	-40 .. +125°C (-40 .. +257°F) (1)	T ₂₀₀ 155°C	T3

(1) With option FFKM O-ring seal: Lower ambient and process temperature limited to -20°C (-4°F)

For use at altitude > 2000 m ... ≤ 3000m (>6.562 ... ≤ 9.843ft):

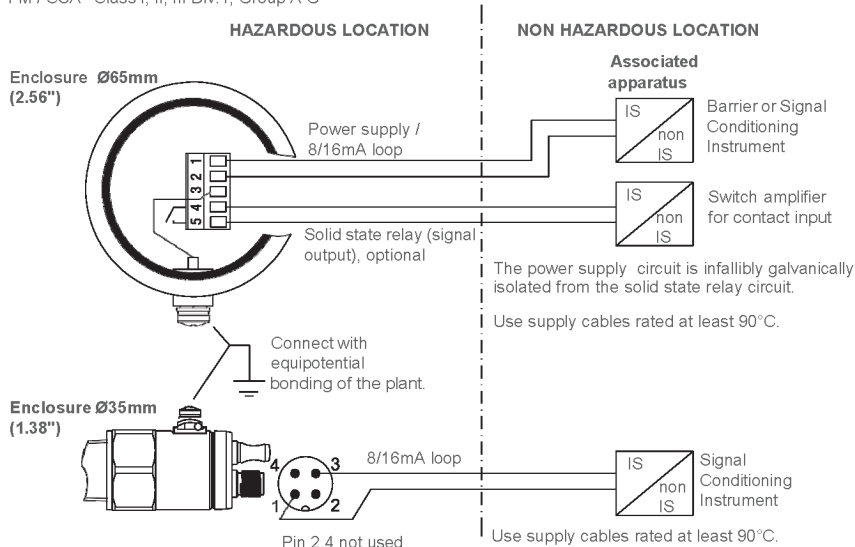
Ambient temperature range	Process temperature range	Max. Surface temperature (EPL Da or Db)	Temperature class (EPL Ga or Gb)
-40 .. +45°C (-40 .. +113°F) (1)	-40 .. +45°C (-40 .. +113°F) (1)	T ₂₀₀ 80°C	T6
-40 .. +58°C (-40 .. +136°F) (1)	-40 .. +58°C (-40 .. +136°F) (1)	T ₂₀₀ 95°C	T5
-40 .. +76°C (-40 .. +168°F) (1)	-40 .. +90°C (-40 .. +194°F) (1)	T ₂₀₀ 130°C	T4
-40 .. +76°C (-40 .. +168°F) (1)	-40 .. +112°C (-40 .. +233°F) (1)	T ₂₀₀ 155°C	T3

(1) With option FFKM O-ring seal: Lower ambient and process temperature limited to -20°C (-4°F)

5.16.10 FM/CSA Approval - Control drawing

FM / CSA Approval - Control drawing

FM / CSA Class I, II, III Div.1, Group A-G



For use at altitude ≤ 2000m (6.562ft):

Ambient temperature range	Process temperature range	Max. Surface temperature	Temperature class
-40 .. +50°C (-40 .. +122°F) (1)	-40 .. +50°C (-40 .. +122°F) (1)	80°C	T6
-40 .. +65°C (-40 .. +149°F) (1)	-40 .. +65°C (-40 .. +149°F) (1)	95°C	T5
-40 .. +85°C (-40 .. +185°F) (1)	-40 .. +100°C (-40 .. +212°F) (1)	130°C	T4
-40 .. +85°C (-40 .. +185°F) (1)	-40 .. +125°C (-40 .. +257°F) (1)	155°C	T3

(1) With option FFKM O-ring seal: Lower ambient and process temperature limited to -20°C (-4°F)

For use at altitude > 2000m ... ≤ 3000m: (>6.562 ... ≤ 9.843ft)

Ambient temperature range	Process temperature range	Max. Surface temperature	Temperature class
-40 .. +45°C (-40 .. +113°F) (1)	-40 .. +45°C (-40 .. +113°F) (1)	80°C	T6
-40 .. +58°C (-40 .. +136°F) (1)	-40 .. +58°C (-40 .. +136°F) (1)	95°C	T5
-40 .. +76°C (-40 .. +168°F) (1)	-40 .. +90°C (-40 .. +194°F) (1)	130°C	T4
-40 .. +76°C (-40 .. +168°F) (1)	-40 .. +112°C (-40 .. +233°F) (1)	155°C	T3

(1) With option FFKM O-ring seal: Lower ambient and process temperature limited to -20°C (-4°F)

Entity parameters:

Power supply / 8/16mA loop: $U_i=30\text{ V}$ $I_i=160\text{ mA}$ $P_i=0,8\text{ W}$ $C_i=7,6\text{ nF}$ $L_i=0,3\text{ mH}$ Solid state relay: $U_i=30\text{ V}$ $I_i=200\text{ mA}$ $P_i=350\text{ mW}$ $C_i=4,2\text{ nF}$ $L_i=0$

Associated Apparatus:

The Associated Apparatus must have ratings as follows:

Max. output voltage U_o or V_{oc} or $V_t < U_i$ Max. output current I_o or I_{sc} or $I_t < I_i$ Max. output power $P_o < P_i$ Max. allowed capacitance C_o or $C_a > C_i + C_{cable}$

5.16 Hazardous area installations

Max. allowed inductance L_o or $L_a > L_i + L_{cable}$

Observe installation manual of the manufacturer of the Associated Apparatus.

For FM:

Use a FM certified intrinsic safe Associated Apparatus. Installation must be in accordance with the National Electrical Code (NFPA 70, articles 504 and 505) and ANSI/ISA RP 12.06.01.

Each intrinsically safe wiring must be installed as a separate intrinsically safe circuit per the requirements of ANSI/NFPA 70 (National Electrical Code) for intrinsically safe installations.

For CSA:

Use a CSA certified intrinsic safe Associated Apparatus. Installation must be in accordance with the Canadian Electrical Code.

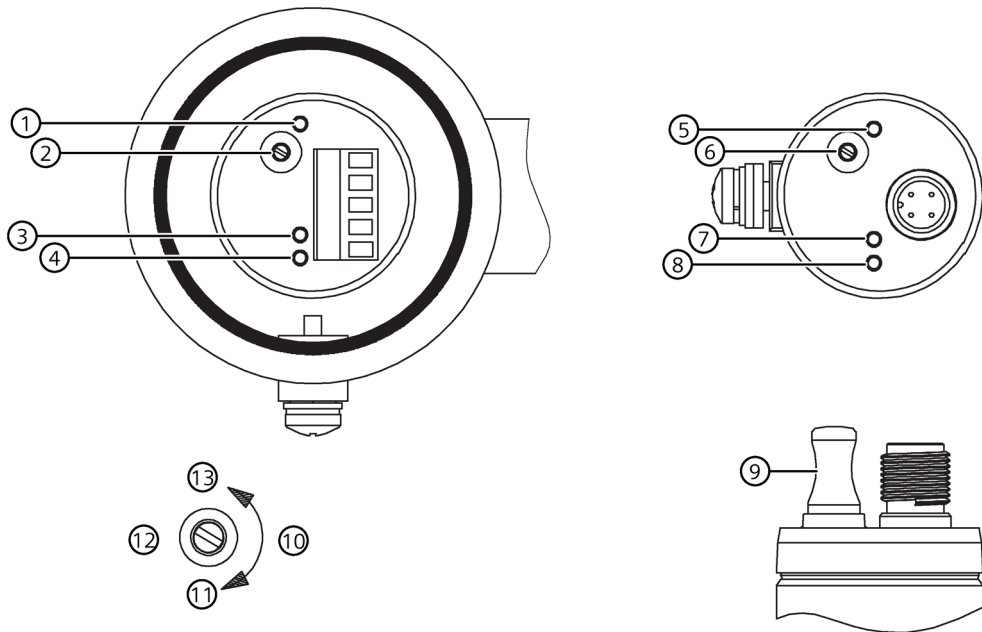
Operating

6.1 Operating elements (LEDs)

Operating elements

Enclosure Ø65mm (2.56")







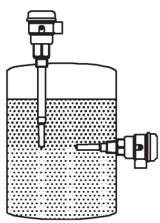

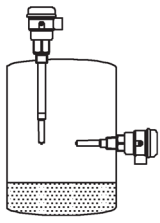


Enclosure Ø35mm (1.38")



- | | | | |
|---|---------------|---|--------------------------------------|
| ① | LED green | ⑦ | LED white |
| ② | Potentiometer | ⑧ | LED yellow |
| ③ | LED white | ⑨ | Remove sealing cap for potentiometer |
| ④ | LED yellow | ⑩ | Sensitivity |
| ⑤ | LED green | ⑪ | High |
| ⑥ | Potentiometer | ⑫ | Potentiometer: 15 turns |
| | | ⑬ | Low |

LEDs

Green	ON		Power on
	OFF		Power off

Yellow	ON		Current loop: 16mA Relay: activated 
	OFF		Current loop: 8mA Relay: idle 
	Blinks for a few times, then stops blinking		The number of blinks indicates the position of the potentiometer after it was turned.
White	ON		Unit indicates covered Capacitance on probe > set switchpoint 
	OFF		Unit indicates uncovered Capacitance on probe < set switchpoint 
	Blinks slowly (every 2 seconds)		Potentiometer is on the max. sensitive position (max. clockwise stop), the 4-20mA continuous mode is active (see Advanced calibration (Page 43))
	Blinks fast (twice per second)		Diagnostics has indicated a failure

6.2 Factory calibration

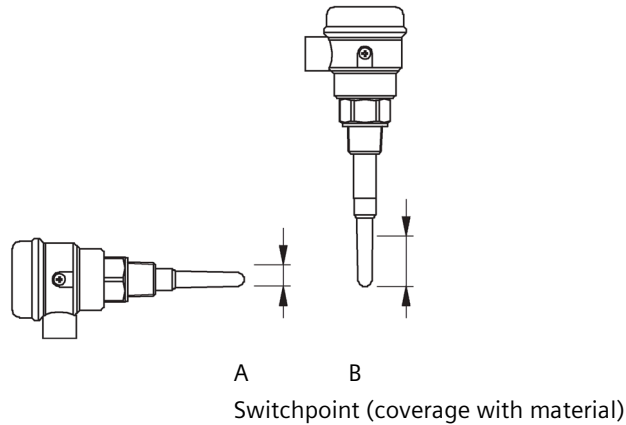
Switchpoint factory calibration - General applications

Factory calibration is applicable for general applications.

Typical general application	On site calibration
<ul style="list-style-type: none"> • Low viscosity liquids • Water based liquids • High conductivity liquids without buildup • Dry solids 	Not required

Switchpoint with factory calibration

The unit is factory calibrated to measure dielectric constant of material ≥ 2.0 .
With factory calibration, the probe must be covered with a certain height of material in order to switch from uncovered to covered (switchpoint), as follows:



Dielectric constant of measured material	Probe horizontal A	Probe vertical B
< 2.0	not possible with factory calibration	
2.0	5mm (0.2")	20mm (0.8")
2.0 ... 3.0	0mm (0.0")	15mm (0.6")
3.0 ... 5.0	-5mm (-0.2")*	8mm (0.3")
5 ... 10	-8mm (-0.3")*	5mm (0.2")
>10 ... 40	-10mm (-0.4")*	3mm (0.1")

* Switchpoint is below the probe (material not touching the probe)

The stated values are valid under following conditions:

- The distance of the probe to a metal wall is not smaller than stated here Probe mounting distances - liquids (Page 19) and Probe mounting distances - solids (Page 23)
- The Sensguard (see Options and accessories (Page 77)) is not used
- Conductive material is not present

Note

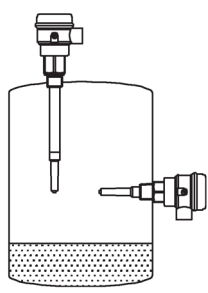
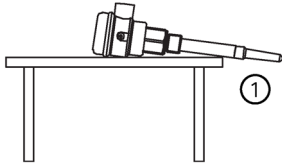
The active shield technology in combination with the length of the probe, resulting in adequate distance between internal measurement electrode and ground electrode, reduces the influence of various measured capacitance due to the mounting situation and of moderate material buildup. As a result, no on site calibration is required for general applications.

6.3 Recalibration

Switchpoint setting - In case of recalibration or if factory calibration is not applicable

1. Ensure that the probe is uncovered.

The unit will calibrate to an uncovered probe

	 <p>① Probe</p>
<p>Setting with mounted sensor: Ensure material level is well below the probe</p>	<p>Setting on the bench: Take care not to touch the probe and keep the probe at least 200 mm (7.87") away from any material (for example, the table).</p>

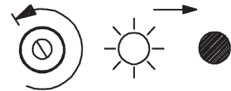
2. Set switchpoint with potentiometer.

Note: 1 second after stopping to turn the potentiometer, the yellow LED blinks for a few times, then stops blinking. This allows to identify the position of the potentiometer which enables more easy service in case external technicians are contacted.

If LED white is off, turn clockwise until LED white is on.



Turn counter clockwise until LED white just stops glowing.



Turn further counter clockwise per chart below:



Dielectric constant of material	Number of turns
1.6 .. 2	1
2 .. 3	2
3 .. 4	3
>4	4

The stated values assume that the distance of the probe to a metal wall is not smaller than stated on Probe mounting distances - liquids (Page 19) and Probe mounting distances - solids (Page 23) and that the Sensguard (see Options and accessories (Page 77)) is not used. Depending on the application and the required switchpoint, the number of turns can be varied.

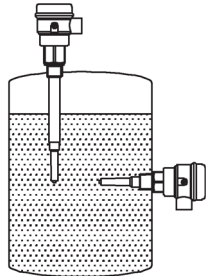
3. Switchpoint setting is finished.

6.4 Advanced calibration

Switchpoint setting - demanding applications

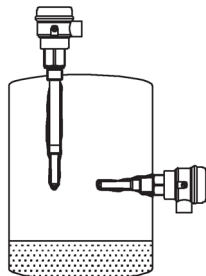
Typical demanding application	On site calibration
<ul style="list-style-type: none">• Material with heavy buildup (non conductive):• High viscosity liquids• Hygroscopic/wet solids	Probe covered and then uncovered, retaining max. possible material buildup
<ul style="list-style-type: none">• Heavy buildup (conductive)	Consult manufacturer

1. Ensure material level is well above the probe.



2. Ensure material level is well below the probe.

It is important that as much material buildup as possible is retaining on the probe.



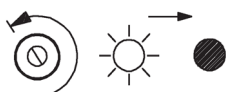
3. Set switchpoint with potentiometer.

Note: 1 second after stopping to turn the potentiometer, the yellow LED blinks for a few times, then stops blinking. This allows to identify the position of the potentiometer which enables more easy service in case external technicians are contacted.

If LED white is off, turn clockwise until LED white is on.



Turn counter clockwise until LED white just stops glowing.



Turn further counter clockwise per chart below:



Dielectric constant of material	Number of turns
1.6 .. 2	1
2 .. 3	2
3 .. 4	3
>4	4

The stated values assume that the distance of the probe to a metal wall is not smaller than stated here Probe mounting distances - liquids (Page 19) and here Probe mounting distances - solids (Page 23) and that the Sensguard (see Options and accessories (Page 77)) is not used.

Depending on the application and the required switchpoint the number of turns can be varied.

4. Switchpoint setting is finished.

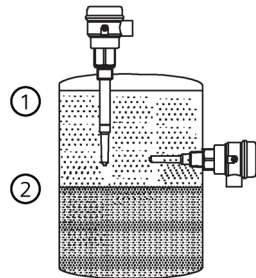
Switchpoint setting - Interface detection

Typical interface application	On site calibration
<ul style="list-style-type: none"> • Ignoring liquid A/ detecting liquid B • Ignoring foam/ detecting liquid 	Immerse probe in liquid A or foam

1. Immerse probe in liquid A or in foam which should NOT be detected.

Ensure that liquid A or foam (which should NOT be detected) is covering the probe.

Liquid A or foam must have a lower dielectric constant than liquid B, which should be detected.



- ① Liquid A or foam
- ② Liquid B

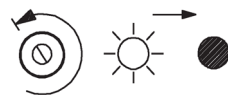
2. Set switchpoint with potentiometer.

Note: 1 second after stopping to turn the potentiometer, the yellow LED blinks for a few times, then stops blinking. This allows to identify the position of the potentiometer which enables more easy service in case external technicians are contacted.

If LED white is off, turn clockwise until LED white is on.



Turn counter clockwise until LED white stops glowing.



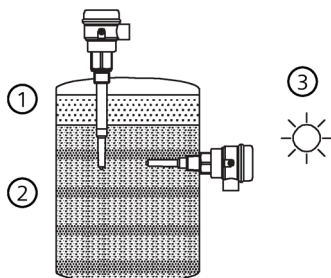
Turn further counter clockwise per chart below:	
Dielectric constant of liquid A or foam	Number of turns
≤ 10	1
> 10	1/2

The stated values assume that the distance of the probe to a metal wall is not smaller than stated here Probe mounting distances - liquids (Page 19) and Probe mounting distances - solids (Page 23) and that the Sensguard, see Options and accessories (Page 77) , is not used.

Depending on the application and the required switchpoint, the number of turns can vary. The sensitivity is now set so that liquid A or foam is NOT detected.

3. Immerse probe in liquid B which should be detected.

Ensure that liquid B (which should be detected) is covering the probe.



- ① Liquid A or foam
- ② Liquid B
- ③ LED white

LED white glows.

4. Switchpoint setting is finished.

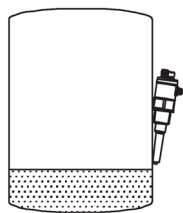
6.5 Advanced Calibration - Measurement through non-metal vessel wall

Switchpoint setting - Measurement through non metal vessel wall

Typical application	On site calibration
Measuring through non metal vessel wall	Material below probe

1. Ensure material level is well below the probe.

The unit will calibrate to an uncovered probe.



Non-metal vessel wall

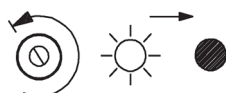
2. Set switchpoint with potentiometer.

Note: 1 second after stopping to turn the potentiometer, the yellow LED blinks for a few times, then stops blinking. This allows the user to identify the position of the potentiometer which enables more easy service in case external technicians are contacted.

If LED white is off, turn clockwise until LED white is on.



Turn counter clockwise until LED white stops glowing.



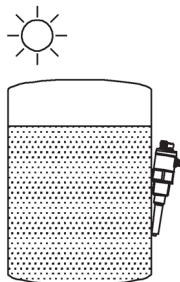
Turn further counter clockwise per chart below:

	Dielectric constant of material	Distance a (material to probe)	Number of turns
<p>A diagram showing a probe tip touching a vertical wall. A horizontal double-headed arrow labeled 'a' indicates the distance from the probe tip to the wall. Above the diagram, a potentiometer symbol has a curved arrow indicating counter-clockwise rotation.</p>	≥ 3	$\leq 10\text{mm (0.4")}$	1/4
	> 40	$\leq 20\text{mm (0.8")}$	1/2

Depending on the application and the required switchpoint, the number of turns can vary.

3. Ensure material level is well above the probe.

LED white glows.



4. Switchpoint setting is finished.

See also

Advanced calibration (Page 43)

6.6 Advanced possibilities

The unit allows following useful advanced possibilities, which are related to the position of the potentiometer

Indicating the actual position of the potentiometer

1 second after stopping to turn the potentiometer, the yellow LED blinks for a few times, then stops blinking. This allows to identify the actual position of the potentiometer which enables more easy service in case external technicians are contacted.

Note: The signal output (relay, transistor) does not follow the blinking. See Table below.

Relation of potentiometer position to sensitivity

The position of the potentiometer is clearly related to the dielectric constant and therefore to the sensitivity of the unit.

See Table below.

Selected mode	Required min. dielectric constant of material to be detected (1)	Position of the potentiometer = No. of potentiometer turns, see (2) below	Number of blinking of yellow LED, see (3) below
4-20mA continuous mode	not applicable (see below)	0 ... 2	0
switch mode	1 (Probe in air)	3	1
	1.5	4	2
	2	5	3
	3	6	4
	4	7	5
	6	8	6

Selected mode	Required min. dielectric constant of material to be detected (1)	Position of the potentiometer = No. of potentiometer turns, see (2) below	Number of blinking of yellow LED, see (3) below
	8	9	7
	11	10	7
	15	11	8
	25	12	8
	40	13	9
	60	14	9
	90	15	9

1. The stated values are valid under following conditions:

- The distance of the probe to a metal wall is not smaller than stated here Probe mounting distances - solids (Page 23) and here Probe mounting distances - liquids (Page 19).
- The probe is mounted inside the vessel (no measurement from outside through the vessel wall).
- The Sensguard, see Options and accessories (Page 77), is not used.
- Conductive material is not present.

2. To set the position of the potentiometer to a certain sensitivity, do following steps:

a) Turn potentiometer clockwise for min. 15 turns, thus stop position is safely reached.



b) Turn potentiometer counter clockwise according to the number of turns stated in the table above.



3. Yellow LED starts blinking 1 second after stopping to turn the potentiometer.

4-20mA continuous mode

The output can be set to 4-20 mA continuous mode.

In this mode the loop current is related to the measured dielectric constant.

This mode can help you measure critical or special applications safely. In this mode, you can:

- Detect material buildup.
- Detect small changes in capacitance in material with a low dielectric constant and measure through non-metallic walls.
- Better understand the capacitance change in some applications.

The loop current is related to the measured dielectric constant as follows:

- 4mA is related to an uncovered probe in air with dielectric constant = 1 (1)
- 16mA is related to a covered probe with dielectric constant = 90 (1, 2)

The stated values are valid under following conditions:

1. The distance of the probe to a metal wall is not smaller than stated, see Probe mounting distances - solids (Page 23) and Probe mounting distances - liquids (Page 19).
2. Probe must be covered with enough height of material. The probe is mounted inside the vessel (no measurement from outside through the vessel wall). Conductive material is not present.

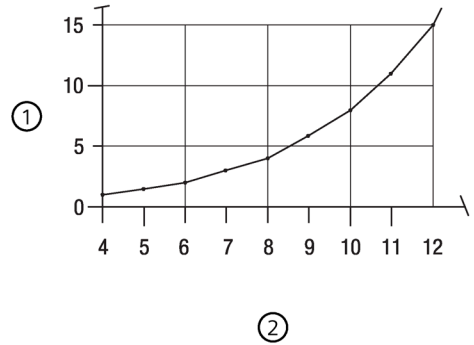
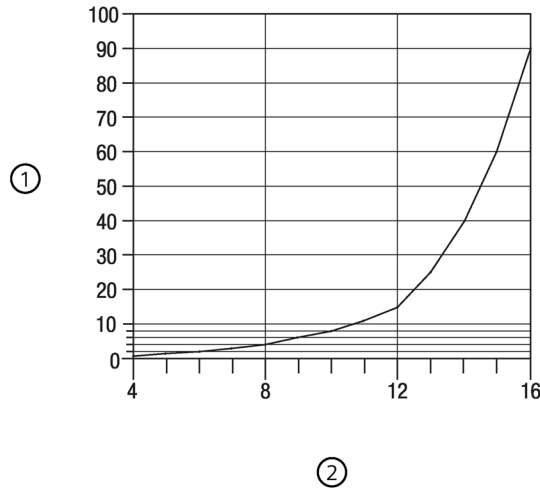
The measured dielectric constant in relation to loop current/mA is non-linear and this allows for better resolution when measuring low dielectric materials.

The mode is selected by turning the potentiometer clockwise for min. 15 turns, until stop position is safely reached (= max. sensitive position). LED white must blink.



Note

The relay output is not operable with this mode. It is idle. The yellow LED is off.



- ① Measured dielectric constant
- ② Loop current / mA

6.7 WHG Proof Test

The implementation of the WHG proof test is done in accordance with the documentation "Technical Description" for WHG, Annex 8, Proof Test, by following possibilities:

Filling the vessel

Filling the vessel until the switchpoint is reached and monitoring the correct reaction of the system

Simulation of the level

Suitable simulation of the level or of the physical measurement effect

This can be done for example by dismantling the sensor and immersion into the original medium.

Interruption of the supply voltage

Interruption of the supply voltage of LCS100 for > 2 sec and monitoring the correct reaction of the system

With connection of an additional signal conditioning instrument, which meets the requirements of clause 3 and 4 of the ZG-ÜS.

The LCS100 starts a self diagnostics routine when the power supply is applied with a defined startup behaviour, see Diagnostics/Remote function test (Page 60). Possible functional failures can be monitored by the reaction of the system.

Pushing the Test Key on a signal conditioning instrument

Pushing the Test Key on a signal conditioning instrument and monitoring the status indicator on the signal conditioning instrument

With connection of an additional signal conditioning instrument, which meets the requirements of clause 3 and 4 of the ZG-ÜS.

This possibility is described with use of the signal conditioning instrument Siemens SITRANS SCSC or TCSC as follows:

Use of signal conditioning instrument with Test Key: Siemens SITRANS SCSC or TCSC

SITRANS SCSC/ TCSC

The signal conditioning instrument is available as single channel SCSC (connection of one LCS100) or double channel TCSC (connection of two LCS100).

The operation manual of SITRANS SCSC or SITRANS TCSC is mandatory. Following notes give support for the connection with LCS100.

Function of the Test Key

The Test Key on the SITRANS signal conditioning instrument interrupts the supply voltage of the LCS100. When the supply voltage is applied, the LCS100 starts a self diagnostics routine with a defined startup behaviour (see Diagnostics/Remote function test (Page 60)). Possible functional failures will be evaluated by the signal conditioning instrument, which switches to the overflow state and indicates the failure by a LED

Interaction with LCS100

The SITRANS signal conditioning instrument is set to Mode "Max. Adjustment" (overflow protection).

For a correct interaction with LCS100, the supply polarity for LCS100 is set in a way, that the loop current with covered sensor is 16mA, see Output logic (Page 30):

SITRANS LCS100	Connection to Sitrans
Terminal 1 / M12 Pin 1	+ Polarity
Terminal 2 / M12 Pin 3	- Polarity
Wiring diagram, see below.	

Wiring

1- channel unit SITRANS SCSC

LCS100 with Terminal block	LCS100 with M12 plug
①	SITRANS LCS100
②	8/16 mA loop (2-wire operation)
③	SITRANS SCSC

Wiring

2- channel unit SITRANS TCSC

Two LCS100 units can be connected to SITRANS TCSC:

LCS100 with Terminal block	LCS100 with M12 plug
①	SITRANS LCS100

LCS100 with Terminal block	LCS100 with M12 plug
②	8/16 mA loop (2-wire operation)
②	SITRANS TCSC

Adjustment SITRANS SCSC/TCSC

The SITRANS SCSC/TCSC with connection of LCS100 is adjusted as follows:

	DIL-switch:	Setting:
	1 Mode (min./max. adjustment)	Max.
	2 Switch-on pulse monitoring* On/Off	On
	3 to 7	**
	1 Mode (min./max. adjustment), channel 1	Max.
	2 Switch-on pulse monitoring* On/Off	On
	3 to 6	**
	7 Two-point control On/Off	Off
	8 Mode (min./max. adjustment), channel 2	Max.
<p>* While switching on, the sensors deliver a defined switching sequence in which the switching conditions empty/full/failure are run through. This switching sequence is checked and evaluated when switch-on pulse monitoring is activated. If this does not correspond to the definition or is completely missing, the SITRANS SCSC displays a fault. A function test is only triggered by pressing the test key. This function test is not carried out automatically when switching on the SITRANS SCSC.</p>		
<p>** These settings are not defined for the interaction with LCS100 and can be set by the user under consideration of the WHG requirements.</p>		

Service and maintenance

7.1 Basic safety notes

Note

The device is maintenance-free.

7.1.1 Maintenance

The device is maintenance-free. However, a periodic inspection according to pertinent directives and regulations must be carried out.

An inspection can include:


- Ambient conditions
- Seal integrity of the process connections, cable entries, and cover
- Reliability of power supply, lightning protection, and grounds

7.2 Maintenance and repair work


7.2.1 Opening the lid (cover)

 WARNING
Opening the lid (cover) Before opening the lid for maintenance reasons observe following items: <ul style="list-style-type: none">• No dust deposits or whirlings are present.• No rain can enter into the housing.


7.2.2 Frequent check of the unit

 WARNING
Frequent check of the unit To ensure durable safety in hazardous locations and with electrical safety, the following items must be checked frequently depending on the application: <ul style="list-style-type: none">• Mechanical damage or corrosion of any components (housing side and process side) and of the field wiring cables• Tight sealing of the process connection, cable glands and, enclosure lid• Properly connected external PE cable (if present)


7.2.3 Cleaning

 WARNING
Cleaning If cleaning is required by the application, following must be observed: <ul style="list-style-type: none">• Cleaning agent must comply with the materials of the unit (chemical resistance). Mainly the lid sealing, cable gland and the surface of the unit must be considered. The cleaning process must be done in a way, that: <ul style="list-style-type: none">• The cleaning agent cannot enter into the unit through the lid sealing or cable gland.• No mechanical damage of the lid sealing, cable gland or other parts can happen. Units with EHEDG (EL class I) certification, which are used in the respective EHEDG application must be cleaned according to the respective regulations. The device has been developed for Cleaning in Place (CIP) application and must not be dismantled for cleaning. Units with explosion certification (not valid if units have as well EHEDG certification): A possible accumulation of dust on the unit does not increase the maximum surface temperature and must therefore not be removed for purposes of maintaining the surface temperature in hazardous locations.


7.2.4 Max. temperature for CIP

 WARNING
Max. temperature for CIP 135°C (275°F), duration 60min 150°C (302°F), duration 30min (only for SITRANS LCS100 with process connection G 1/2" hygienic) Ambient temperature limited to 50°C (122°F), unit de-energized.


7.2.5 Function test

 WARNING
Function test A frequent function test may be required depending on the application. Observe all relevant safety precautions related with a safe work depending on the application (e.g. hazardous locations, hazardous material, electric safety, process pressure). This test does not prove if the unit is sensitive enough to measure the material of the application. A function test is completed by touching the probe with appropriate means (e.g. grounded metal plate or hand) and monitoring if a correct change of the signal output from uncovered to covered occurs.


7.2.6 Production date

 WARNING
Production date The production date can be traced by the serial number on the nameplate. Please contact the manufacturer or your local distributor. For ATEX/UKEX/IEC-Ex versions, see Approvals (Page 68).

7.2.7 Impermissible repair and maintenance of the device

 WARNING
Impermissible repair and maintenance of the device <ul style="list-style-type: none">• Repair and maintenance must be carried out by Siemens authorized personnel only.

7.2.8 Spare parts

 WARNING
Spare parts All available spare parts are stated in the selection list.

7.3 Ordering of spare parts

Condition

- You have a Siemens Industry Mall account.

Procedure

- Open the PIA Life Cycle Portal (<https://www.pia-portal.automation.siemens.com>).
- Select the desired language.
- To find spare parts for your device, do one of the following:
 - Enter the complete order number of your device (e.g. 7ME4633-4KA51-8DC3-Z A05+B11+E06+F11) into the "Product number" field and click "Go".
 - Enter the serial number of your device (e.g. N1KXXXXXXXX) in the "Serial number" field and click "Go".
 - If you do not know the product or serial number, search for your device under "Product family".
- Navigate to the "Spare parts" tab.

You see the list of spare parts available for your device.



- Select a spare part and add it to your watch list.

The watch list opens.

- Click "Add to cart of Industry Mall".



The Siemens Industry Mall opens and you can order your spare part.

7.4 Transport

Observe the instructions as stated on the transport packaging, otherwise the products may get damaged.

Transport temperature: -40 .. +80°C (-40 .. +176°F) Transport humidity: 20 .. 85%.

Transport incoming inspections must be carried out to check for possible transport damage.

7.4.1 Storage

Products must be stored at a dry and clean place. They must be protected from influence of corrosive environment, vibration and exposure to direct sunlight.

Storage temperature: -40 .. +80°C (-40 .. +176°F)

Storage humidity: 20 .. 85%

7.5 Return procedure

To return a product to Siemens, see Returns to Siemens (www.siemens.com/returns-to-siemens).

Contact your Siemens representative to clarify if a product is repairable, and how to return it. They can also help with quick repair processing, a repair cost estimate, or a repair report/cause of failure report.

NOTICE

Decontamination

The product may have to be decontaminated before it is returned. Your Siemens contact person will let you know for which products this is required.

7.6 Disposal



Devices described in this manual should be recycled. They may not be disposed of in the municipal waste disposal services according to the Directive 2012/19/EC on waste electronic and electrical equipment (WEEE).

Devices can be returned to the supplier within the EC and UK, or to a locally approved disposal service for eco-friendly recycling. Observe the specific regulations valid in your country.

Further information about devices containing batteries can be found at: Information about battery / product return (WEEE)

(<https://support.industry.siemens.com/cs/document/109479891/>)

Note

Special disposal required

The device includes components that require special disposal.

- Dispose of the device properly and environmentally through a local waste disposal contractor.

Diagnostics and troubleshooting

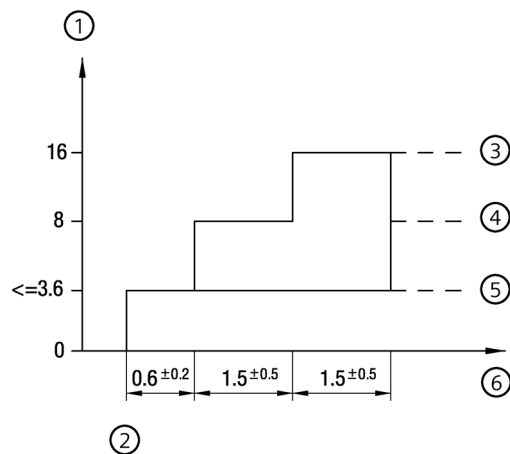
8.1 Troubleshooting

LEDs			Behaviour	Cause	Action
Green Power supply	Yellow Signal output	White Probe covered/uncovered			
OFF	OFF	OFF		Proper power supply not applied to device Connector came loose Defective component in device	Check power supply Refasten connector Contact distributor
ON	ON or OFF	ON	Probe is uncovered but LED white states covered	Sensitivity is set too high. Either sensitivity setting not properly done or too much material buildup	Reduce sensitivity (see Operating elements (LEDs) (Page 39)). If applicable clean probe from buildup
ON	ON or OFF	OFF	Probe is covered but LED white states uncovered	Sensitivity is set too low. Either sensitivity setting not properly done or too low dielectric constant from material.	Increase sensitivity (see Operating elements (LEDs) (Page 39)). Dielectric constant of material must be 1.5 or more
ON	ON or OFF	ON or OFF	Yellow LED lights opposite to white LED when this is not meant to happen	Incorrect polarity on power supply	Reverse polarity on power supply. See Output logic (Page 30).
ON	OFF	Blinks slowly (every 2 seconds)	Relay = idle	Potentiometer is on the clockwise stop position and thus the 4-20mA continuous mode is active.	If the switch mode is required, go to switchpoint setting (see Operating elements (LEDs) (Page 39))
ON	Blinks for a few times, then stops blinking	ON or OFF	Blinking happens after the potentiometer was turned	This is a normal operation. The blinking indicates the position of the potentiometer after it was turned.	No action required
ON	OFF	Blinks fast (twice per second)	Current loop = 3.6mA, Relay = idle	Diagnostics has indicated a failure	Contact distributor
ON	ON or OFF	ON or OFF	No respond (change of white and yellow LED) when potentiometer is turned and probe is uncovered	Defective component in device	Contact distributor
ON	ON or OFF	ON or OFF	Unequal current in current loop	Loop circuitry is connected against earth	Remove earth connection from loop circuitry

8.2 Diagnostics/Remote function test

The units starts a self diagnostics routine when the power supply is applied or interrupted for >2 seconds.

The loop current shows following behavior, which can be evaluated by an external signal conditioning instrument (accessory) or by a PLC:



- ① Loop current / mA
- ② Power supply applied
- ③ Diagnostics test is o.k. Measurement signal is present:
 - Loop current = 8 or 16mA
 - Relay = open or closed (depending on selected output logic, see Output logic (Page 30))
- ④ Diagnostics test is o.k. Measurement signal is present:
 - Loop current = 8 or 16mA
 - Relay = open or closed (depending on selected output logic, see Output logic (Page 30))
- ⑤ Diagnostics test failed:
 - Loop current $\leq 3,6$ mA
 - Relay = open
- ⑥ sec

Technical specifications

9.1 Specifications

Note

Siemens makes every attempt to ensure the accuracy of these specifications, but reserves the right to change them at any time.

9.2 Power

Power supply / signal output	Standard version (General Purpose)	<p>4-wire operation with DC supply and relay Supply: 9 - 33 V DC, 0.7W incl. 10% of EN 61010-1 Signal output: Relay SPST Max. switching voltage: 60 V DC or 30 V AC; Limited to 35 V DC or 16 V AC in wet locations Max. switching current / switching power: 1 A / 60 W</p> <p>2-wire operation with 8/16 mA loop 9 - 33 V DC, 0.7W incl. 10% of EN 61010-1 8/16 mA Tolerance: 8mA +/-0,5mA, 16mA -1mA/+2mA If required, the unit can be set to 4-20mA continuous current output (direct output of the measured capacitance). The stated voltage is the resulting voltage on the unit. Any voltage drop on an external series resistance must be considered.</p>
	Intrinsically safe version	<p>2-wire operation with 8/16 mA loop 10.8 - 30 V DC, 0.7W incl. 10% of EN 61010-1 8/16 mA or 16/8 mA Tolerance: 8mA +/-0,5mA, 16mA -1mA/+2mA</p> <p>Intrinsically safe barrier or signal conditioning instrument required: $U_i=30\text{ V}$ $I_i=160\text{ mA}$ $P_i=0,8\text{ W}$, $C_i=7,6\text{ nF}$ $L_i=0,3\text{ mH}$</p> <p>If required, the unit can be set to 4-20mA continuous current output (direct output of the measured capacitance). The stated voltage is the resulting voltage on the unit. Any voltage drop on an external series resistance must be considered.</p> <p>4-wire operation with DC supply and solid state relay This operation is only available for 7ML700, 7ML701 with enclosure Ø65mm (2.56") and connection via terminal block (Solid state relay integrated). Supply: 10.8 - 30 V DC, 0.7W incl. 10% von EN 61010-1 Intrinsically safe barrier required: $U_i=30\text{ V}$ $I_i=160\text{ mA}$ $P_i=0,8\text{ W}$, $C_i=7,6\text{ nF}$ $L_i=0,3\text{ mH}$ Signal output: Solid state relay Max. switching voltage / current: 30 V DC / 82mA For connection to an intrinsically safe "switch amplifier for contact input" or to an intrinsically safe PLC with integrated input card for contact input. $U_i=30\text{ V}$ $I_i=200\text{ mA}$ $P_i=350\text{ mW}$, $C_i=4,2\text{ nF}$ $L_i=0$</p> <p>The power supply circuit is infallibly galvanically isolated from the transistor circuit.</p>
Safety operation (FSL,FSH)	Selectable for minimum or maximum safety by polarity of power supply voltage	
Signal delay	Probe uncovered -> covered ca. 0.5 sec Probe covered -> uncovered ca. 0.5 sec	

Indicating light	Build in LEDs: Power (green), Signal output (yellow), Sensor status / Diagnostics (white)
Sensitivity	Adjustable by potentiometer
Electrical connection	With enclosure Ø65mm (2.56"): Terminal block, terminals 0.14 - 1.5 mm ² (AWG 28-16) With enclosure Ø65mm (2.56") and Ø35mm (1.38"): M12x1 according to IEC 61076-2-101, male, 4-pole, coding A-standard
Cable entry	With enclosure Ø65mm (2.56"): M20 x 1.5 screwed cable gland Clamping range (diameter) of factory provided cable glands: 6..12 mm (0.24 .. 0.47") or NPT 1/2" conduit
Overvoltage category	II
Protection class	III

9.3 Performance

Repeatability	approx. ± 2 mm, for water based liquids
---------------	---

9.4 Mechanical

Stainless steel process connection, version G 1/2" Hygienic

Material process connection	1.4404 (316L)
Material probe	PEEK ^(1,2)
Seal process connection-probe	FKM (optional FFKM) ⁽²⁾
Thread ⁽³⁾	G 1/2" Hygienic
Wetted sensor surface	Ra ≤ 0.8 µm (31 µin)
Hygienic design	EHEDG

Stainless steel process connection

Material process connection	1.4404 (316L)
Material probe	PPS (glass fibre reinforced) ^(1,2) Optional PVDF ^(1,2)
Seal process connection-probe	FKM (optional FFKM) ⁽²⁾
Thread ⁽³⁾	G 1/2", G 3/4", G 1", NPT 3/4"
Adapters for	G 1 1/2", NPT 1 1/4", NPT 1 1/2"
Tri-clamp	DN25 (1"), DN40 (1 1/2"), DN50 (2") DIN 32676 Type A (DIN 11851) and DIN 32676 Type C (ASME BPE 2009)
Flange (screwed) ⁽⁴⁾	DN 25, 40, 50; ASME 1", 1 1/2", 2"

Plastic process connection

Material process connection	PPS (glass fibre reinforced) ^(1, 2) Optional PVDF ^(1,2)
Material probe	PPS (glass fibre reinforced) ^(1,2) Optional PVDF ^(1,2)
Seal process connection-probe	FKM (optional FFKM) ⁽²⁾
Thread ⁽³⁾	G 1", NPT 3/4"

Pipe extension

Material process connection	1.4404 (316L)
Material pipe extension	1.4404 (316L)
Material probe	PPS (glass fibre reinforced) ^(1,2) Optional PVDF ^(1,2)
Seal pipe-probe	FKM (optional FFKM) ⁽²⁾
Thread ⁽³⁾	G 3/4", G 1", NPT 3/4"
Adapters for	G 1 1/2", NPT 1 1/4", NPT 1 1/2"
Flange (screwed) ⁽⁴⁾	DN 25, 40, 50; ASME 1", 1 1/2", 2"

Cable extension, with process connection 1.4404 (316L)

Material process connection	1.4404 (316L)
Material extension cable	FEP jacketed
Material probe and extension cable fixing	PPS (glass fibre reinforced) ^(1,2)
Seal process connection - extension cable	FKM (optional FFKM) ⁽²⁾
Seal extension cable- probe	FKM (optional FFKM) ⁽²⁾
Thread ⁽³⁾	G 3/4", G 1", NPT 3/4"
Adapters for	G 1 1/2", NPT 1 1/4", NPT 1 1/2"
Flange (screwed) ⁽⁴⁾	DN 25, 40, 50; ASME 1", 1 1/2", 2"

Cable extension, with process connection PPS

Material process connection	PPS (glass fibre reinforced) ^(1,2)
Material cable extension	FEP jacketed
Material probe and extension cable fixing	PPS (glass fibre reinforced) ^(1,2)
Seal process connection- extension cable	FKM (optional FFKM) ⁽²⁾
Seal cable- probe	FKM (optional FFKM) ⁽²⁾
Thread ⁽³⁾	G 1", NPT 3/4"
Adapters for	G 1 1/2", NPT 1 1/4", NPT 1 1/2"

⁽¹⁾ Discolouration is possible due to influence of UV and temperature. This has no negative effect to the material properties.

(2) Food grade, FDA registration number:

Seals 21 CFR 177.2600

PVDF 21 CFR 177.1550

PPS 21 CFR 175.300

PEEK 21 CFR 177.2415

(3) Thread types: G=DIN ISO 228-1, NPT=ASME B 1.20.1

(4) Flange pressure rating: DN25 PN16/40, DN40 PN16/40, DN50 PN16/25/40 ASME 150lbs, ASME 300lbs

	Extension length "L"	Tolerance length "L"
Stainless steel process connection	92 mm (3.6")	±5 mm (±0.2")
Plastic process connection	92 mm (3.6")	±5 mm (±0.2")
Pipe extension	300 .. 4000mm (11.8 .. 157")	±10 mm (±0.4")
Cable extension	400 .. 20.000mm (15.7 .. 787")	±15 mm (±0.6")

	Material Enclosure Ø65mm (2.56")	Material Enclosure Ø35mm (1.38")
Material Housing	Thermoplastic polyester (PBT/PC)	1.4404 (316L)
Material Lid	Transparent thermoplastic polycarbonate (PC)	Transparent thermoplastic polycarbonate (PC)
Material Seal between housing and lid	VMQ (vinyl-methyl-silicone)	VMQ (vinyl-methyl-silicone)
Material Nameplate	polyester film	polyester film

Ingress protection: Type 4X / IP68

Sound level: n/a (no sound is produced)

Overall weight (ca.)

Stainless steel process conn.: 0.35 kg (0.77 lbs)

Plastic process connection: 0.25 kg (0.55 lbs)

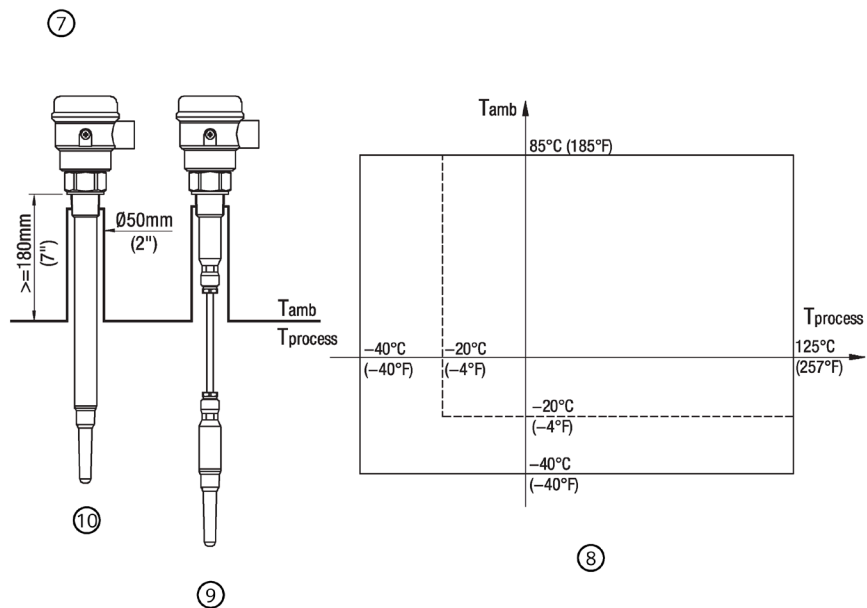
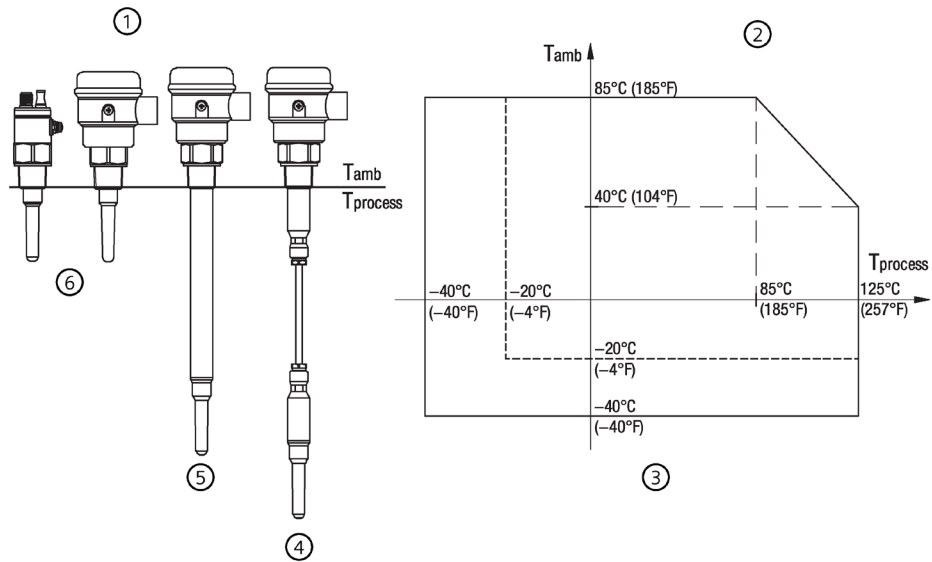
Pipe extension: 0.6 kg (1.32 lbs) + 0.85 kg/m (1.87 lbs per 39.3")

Cable extension: 0.6 kg (1.32 lbs) + 0.08 kg/m (0.18 lbs per 39.3")

All weights with threaded process connection.

9.5 Environmental

Ambient and process temperature (Non-Ex version)



- | | |
|---|---|
| ① Mounting with short socket | ⑥ LCS100 compact enclosure |
| ② Derating of ambient temperature with high process temperature | ⑦ Mounting with long socket |
| ③ Ambient- and process temperature limited to -20°C (-4°F) with option FFKM seal O-ring | ⑧ Ambient- and process temperature limited to -20°C (-4°F) with option FFKM seal O-ring |
| ④ LCS100 Rod version | ⑨ LCS100 Cable version |
| ⑤ LCS100 Cable version | ⑩ LCS100 Rod version |

**Ambient and process temperature
(Ex versions)**

Depending on Surface Temperature and Temperature Class. For more details, see Ambient and process temperature range, max. surface temperature and temperature class (Page 36).

Max. temperature for CIP	135°C (275°F), duration 60min 150°C (302°F), duration 30min (only for LCS100 Compact with process connection G 1/2" hygienic) Ambient temperature limited to 50°C (122°F), unit de-energized.	
Max. permitted mechanical torque	SITRANS LCS100 compact version	SITRANS LCS100 rod version
	*PEEK/PPS: max. 400N (at 40°C), PVDF: max 200N (at 40°C)	
Max. tractive force	LCS100 Cable version: 1.5 kN (at 40°C)	
Max. process pressure	SITRANS LCS100 compact version with stainless steel process connection	-1 to 25 bar (363 psi)
Observe possible pressure limitation from the flange type used!	SITRANS LCS100 compact version with plastic process connection	-1 to 10 bar (146 psi)
	SITRANS LCS100 rod version	-1 to 25 bar (363 psi)
	SITRANS LCS100 rod version with sliding sleeve	-1 to 10 bar (146 psi)
	SITRANS LCS100 cable extension	-1 to 10 bar (146 psi)
	Pollution degree	4
Relative Humidity	0 - 100%, suitable for outdoor use	
Altitude	max. 3,000 m (9,843 ft)	
Ventilation	Ventilation is not required	
Expected product lifetime	Following parameters have a negative influence on the expected product lifetime: High ambient- and process temperature, corrosive environment, high vibration, high flow rate of abrasive bulk material passing the probe.	

9.6 Process

Relative dielectric constant (ϵ_r)	Min. 1.5 Factory setting = 2.0 For dielectric constant of applicable materials: see external dielectric constant tables
Switching point	Depending on setting of potentiometer and dielectric constant value of measured material. See Operating elements (LEDs) (Page 39).
Repeatability	2 mm (0.08"), for water based liquids

9.7 Approvals

General Purpose * (Ordinary Locations)	CE UKCA FM / CSA
Hazardous Locations *	Intrinsically Safe: ATEX II 1G, 1/2G Ex ia IIC ATEX II 1/2D Ex ia IIIC UKEX II 1G, 1/2G Ex ia IIC UKEX II 1/2D Ex ia IIIC IEC Ex ia IIC IEC Ex ia IIIC FM / CSA IS Class I, II, III, Div. 1, Gr. A-G INMETRO Ex ia IIC INMETRO Ex ia IIIC
Overfill and leakage protection *, **	WHG VLAREM II
EMC	EN 61326
RoHS conform	According to directive 2011/65/EU
Hygienic *	EHEDG EL class I
Food grade material	Wetted parts with FDA registration. For more details, see Mechanical (Page 63).
Pressure Equipment Directive (2014/68/EU)	Pressure Equipment Directive (2014/68/EU) As the equipment does not have pressure-bearing housings of its own, it is not subject to the PED: - as "pressure accessory" (see 2014/68/EU Art. 2 (5) and PED Guidelines A-08, A-40) - nor as "safety accessory" (see 2014/68/EU Art. 2 (4) and PED Guidelines A-20, A-25)"

* Not all approvals are available with all models, see selection list for more information

** Relevant information for use in applications with WHG/VLAREM II: see external documentation "Technical Description" and notes to Proof Test WHG Proof Test (Page 51).

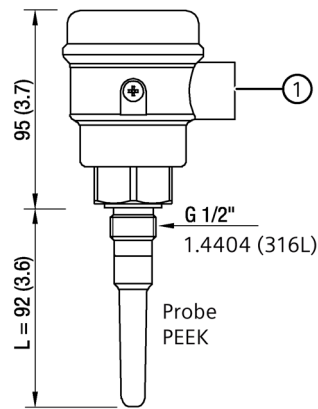
Dimension drawings

10.1 Short extension length

Compact version: Stainless steel process connection

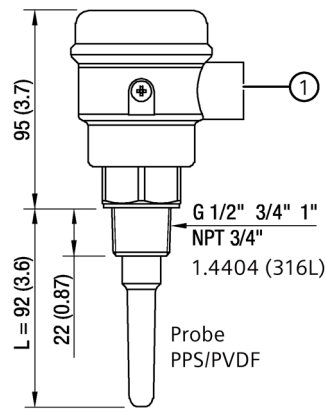
Enclosure Ø65mm (2.56")

G 1/2" hygienic

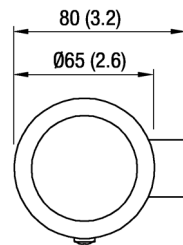


②

G 1/2" G3/4" G1"
NPT 3/4"



Top view

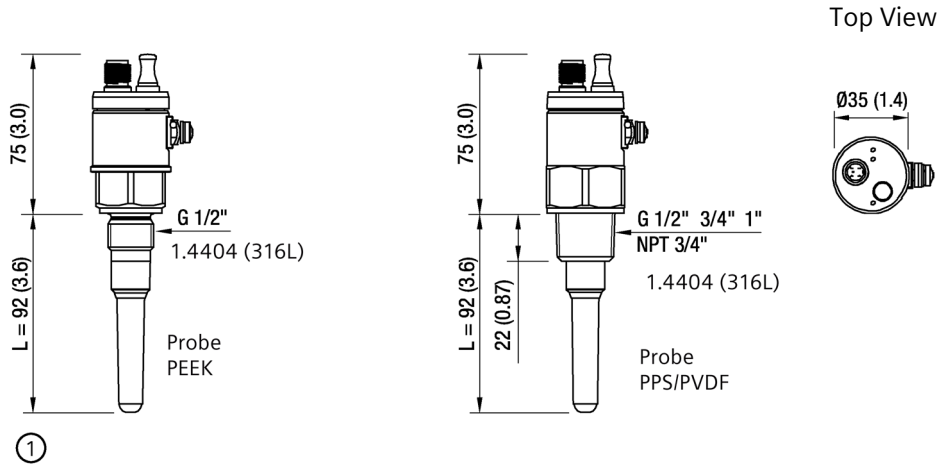


① See possible wiring options below

② Short extension length version with stainless steel process connection are available with certificate EHEDG EL class I

10.1 Short extension length

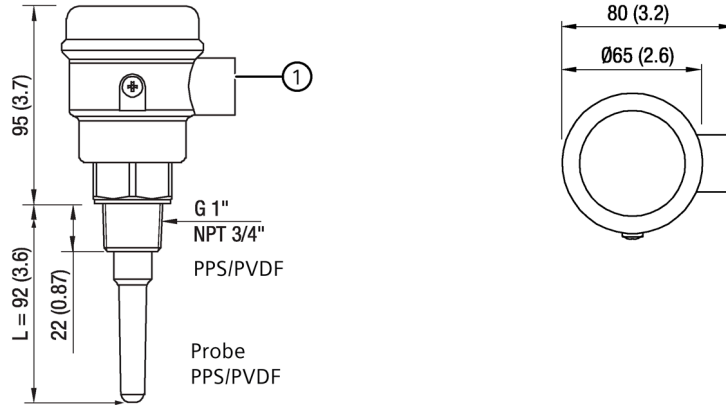
Enclosure Ø35mm (1.38")



- ① Short extension length version with stainless steel process connection are available with certificate EHEDG EL class I

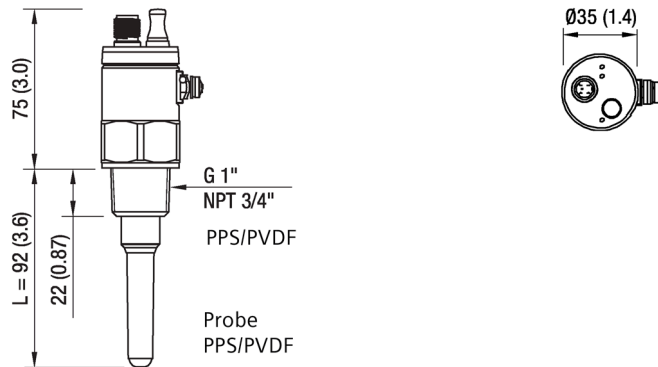
Compact version: Plastic process connection

Enclosure Ø65mm (2.56")



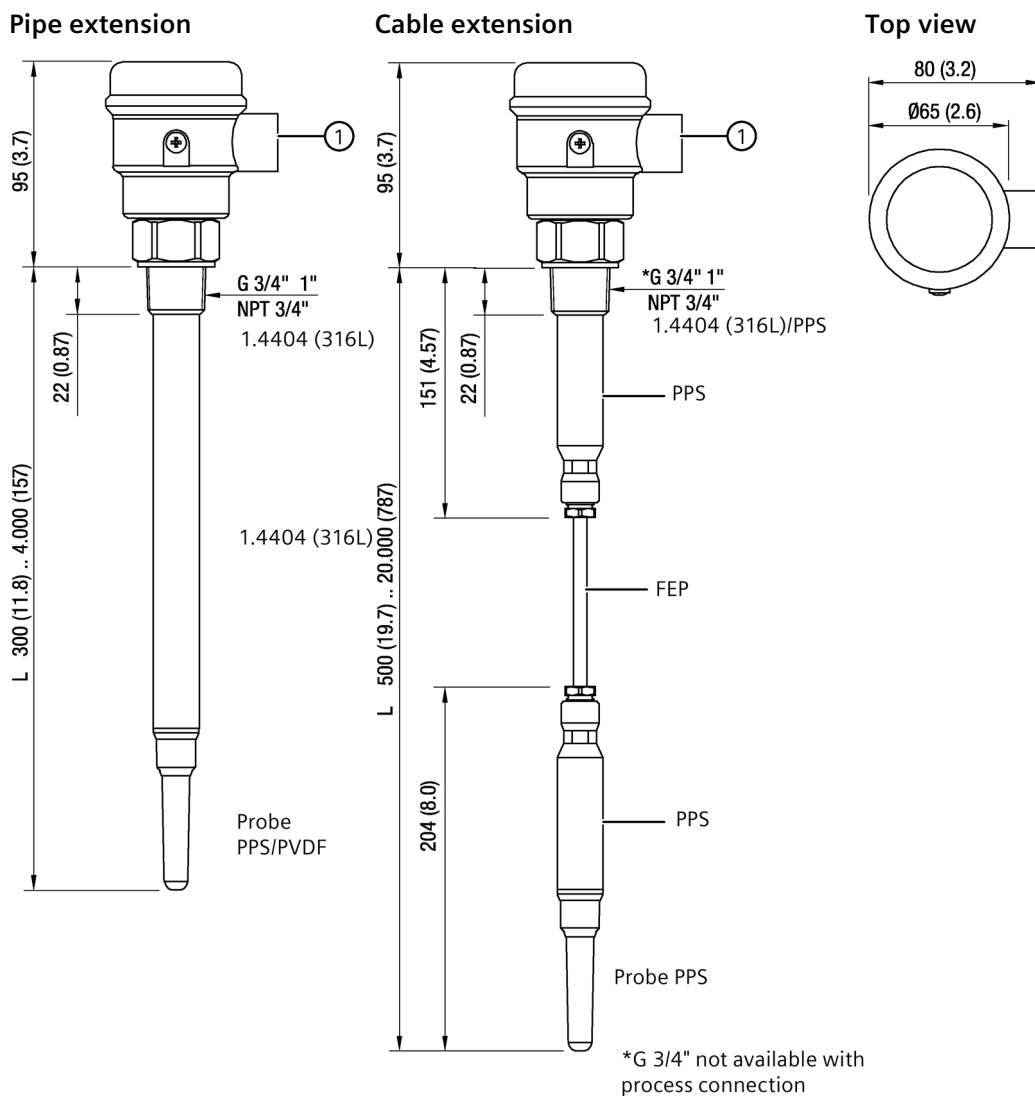
① See possible wiring options below

Enclosure Ø35mm (1.38")



10.2 Pipe extension and cable extension

Pipe extension and cable extension



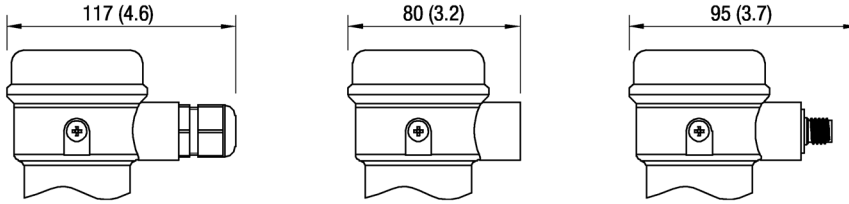
① See possible wiring options
below

Enclosure Ø65mm (2.56") Possible wiring

M20x1.5 cable gland

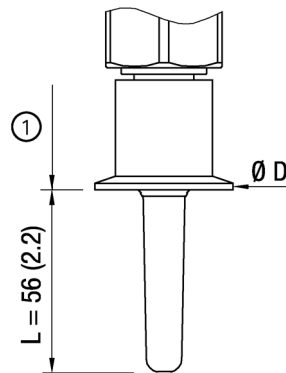
1/2" NPT conduit

M12 plug



10.3 Tri-clamp and flange

Tri-clamp



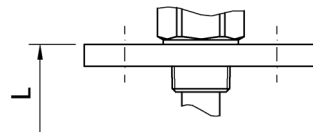
① To top:

Enclosure Ø65mm: 131 (5.2)

Enclosure Ø35mm: 110 (4.3)

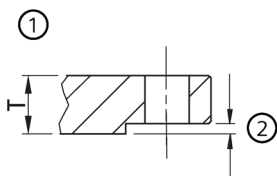
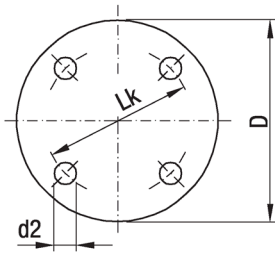
	ØD
DN 25 (1")	50.5 (1.99")
DN 40 (1 1/2")	50.5 (1.99")
DN 50 (2")	64 (2.52")

Flange



The flange is screwed to the process connection

10.3 Tri-clamp and flange



① Raised face

② Facing thickness

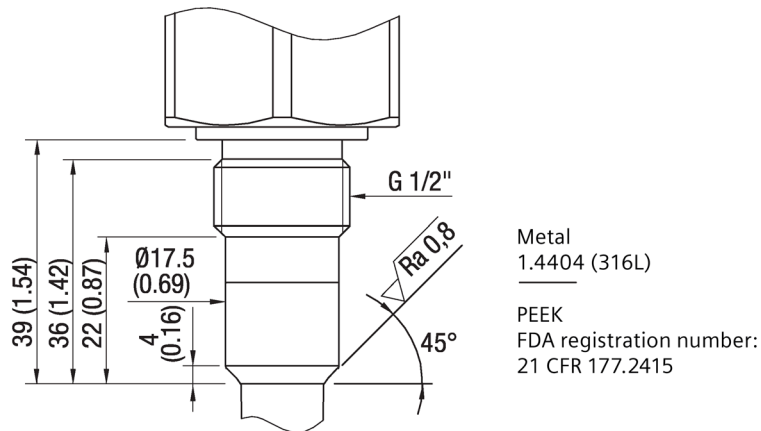
Type	Facing thickness
ASME 150 lbs	2 mm (0.08")
ASME 300 lbs	

	Code	Type	Number of holes	d2 mm (inch)	Lk mm (inch)	D mm (inch)	T thickness mm (inch)
ASME B16.5 Raised face	AL	1" 150 lbs	4	15.9 (0.63)	79.3 (3.12)	108.0 (4.25)	14.3 (0.56)
	AM	1" 300 lbs	4	19.1 (0.75)	88.9 (3.5)	123.8 (4.87)	17.5 (0.69)
	AN	1 1/2" 150 lbs	4	15.9 (0.63)	98.6 (3.88)	127.0 (5.0)	17.5 (0.69)
	AP	1 1/2" 300 lbs	4	22.2 (0.87)	114.3 (4.5)	155.6 (6.13)	20.6 (0.81)
	AQ	2" 150 lbs	4	19.1 (0.75)	120.7 (4.75)	152.4 (6.01)	19.1 (0.75)
	AR	2" 300 lbs	8	19.1 (0.75)	127.0 (5.0)	165.1 (6.5)	22.2 (0.87)
EN 1092-1 Type A Flat-faced	AH	DN25 PN16/40	4	14.0 (0.55)	85.0 (3.35)	115.0 (4.53)	18.0 (0.71)
	AJ	DN40 PN16/40	4	18.0 (0.71)	110.0 (4.33)	150.0 (5.91)	18.0 (0.71)
	AK	DN50 PN16/25/40	4	18.0 (0.71)	125.0 (4.92)	165.0 (6.5)	18.0 (0.71)

10.4 G 1/2" hygienic process connection/EHEDG approval

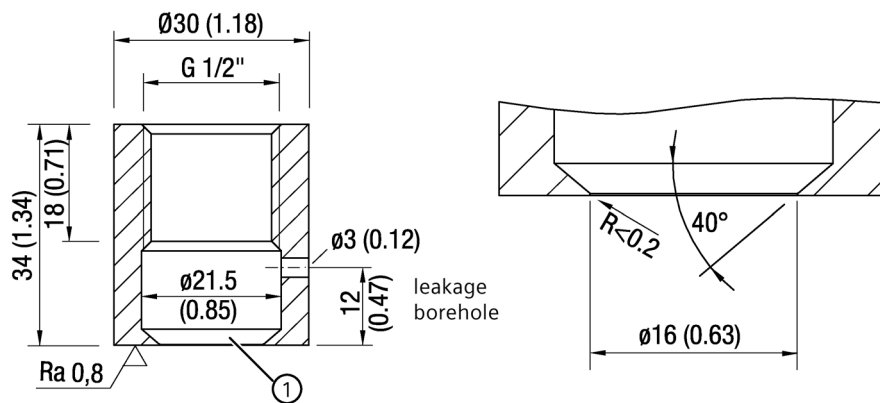
EHEDG versions: EHEDG (EL class I) approval is available for compact versions with stainless steel process connection G 1/2" hygienic

Process connection



Flush welding socket: design

The flush welding socket must meet the following design:



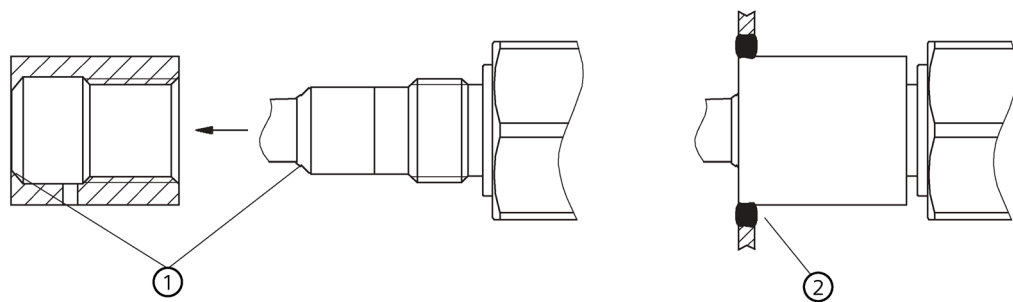
Metal type according to hygienic and further external requirements

Detail A: Sealing area between device and the on site process connection (metal)

Installation

Install the sensor according to the requirements given in EHEDG Guidelines 8, 10, and 37, that relates to mounting the sensor in a self-draining orientation. In tanks, the cleaning device must be positioned in such a way that the sensor is directly assessed and wetted for cleaning.

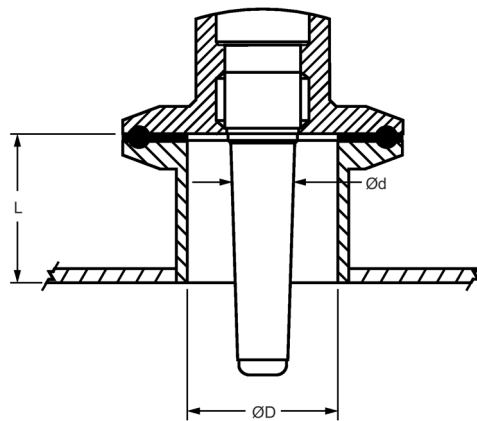
Flush welding socket: installation



① Metal-peek sealing
The support must be without a gap.
Do not use PTFE (Teflon) tape or similar.
Fixing torque: 15 Nm

② The food contact surface must be smooth (polished to $Ra < 0.8 \mu m$) and the welding has to be done according to EHEDG Guidelines 9 and 35.

T-piece: Installation

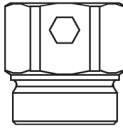


The sensor should be installed flush with the process area. The ratio between the depth of the upstand (L) and the diameter (D-d) of the upstand/Sensor shall be $L / (D-d) < 1$.

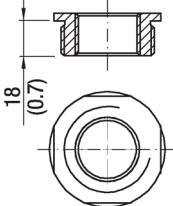
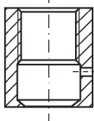
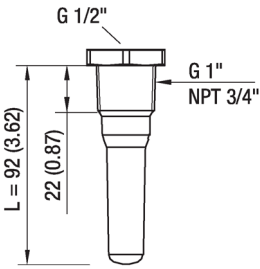
If welded adapters are used, the food contact surface must be smooth (polished to $Ra < 0.8 \mu m$). The welding must be done according to EHEDG Guidelines 9 and 35. Suitable pipe couplings and process connections with the applicable gaskets must be applied according to the EHEDG Position Paper "Easy cleanable Pipe couplings and Process connections".

Options and accessories

Options

Sliding sleeve	G 1 1/4" / G 1 1/2" / NPT 1 1/4" / NPT 1 1/2" Material: 1.4404 (316L) Sealing material to the extension pipe: FKM Max. process pressure: -1 to 10 bar (146 psi)	
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Accessories

Adapter for process connection	Adapter from G 1" thread to G 1 1/2" Adapter from NPT 3/4" thread to NPT 1 1/4" / NPT 1 1/2" Material: 1.4305 (303) or 1.4404 (316L) Max. process pressure: -1 to 25 bar (363 psi)	
Flush welding socket	For version with EHEDG (EL class I) certificate Fitting to CN 7120 with process connection G 1/2" hygienic Flush welding socket ø30/ G 1/2", 1.4404 (316L)	
Shortening kit	For cable extension version	
Sensguard	Outer thread (process connection): G1" DIN ISO 228-1 or NPT 3/4" ASME B 1.20.1 Internal thread: G 1/2" (requires short extension length version with process connection G 1/2" to fit in). Material: PPS Max. process pressure: -1 to 10 bar (146 psi)	

Complementary products (from outside companies)

Remote instrument	Operation with 8/16 mA, 2-wire current loop:
	Input: 8/16 mA Output: Relay Intrinsically safe and non-intrinsically safe operation: Implements self diagnostics when power supply is applied or test button on remote instrument is pressed, see Diagnostics/Remote function test (Page 60) and Advanced possibilities (Page 48)
M12 mating plug	4 pole, for version with M12 plug

Product documentation and support

A.1 Product documentation

Process instrumentation product documentation is available in the following formats:

- Certificates (<http://www.siemens.com/processinstrumentation/certificates>)
- Downloads (firmware, EDDs, software) (<http://www.siemens.com/processinstrumentation/downloads>)
- Catalog and catalog sheets (<http://www.siemens.com/processinstrumentation/catalogs>)
- Manuals (<http://www.siemens.com/processinstrumentation/documentation>)

You have the option to show, open, save, or configure the manual.

- "Display": Open the manual in HTML5 format
- "Configure": Register and configure the documentation specific to your plant
- "Download": Open or save the manual in PDF format
- "Download as html5, only PC": Open or save the manual in the HTML5 view on your PC

You can also find manuals with the Mobile app at Industry Online Support (<https://support.industry.siemens.com/cs/ww/en/sc/2067>). Download the app to your mobile device and scan the device QR code.

Product documentation by serial number

Using the PIA Life Cycle Portal, you can access the serial number-specific product information including technical specifications, spare parts, calibration data, or factory certificates.

Entering a serial number

1. Open the PIA Life Cycle Portal (<https://www.pia-portal.automation.siemens.com>).
2. Select the desired language.
3. Enter the serial number of your device. The product documentation relevant for your device is displayed and can be downloaded.

To display factory certificates, if available, log in to the PIA Life Cycle Portal using your login or register.

Scanning a QR code

1. Scan the QR code on your device with a mobile device.
2. Click "PIA Portal".

To display factory certificates, if available, log in to the PIA Life Cycle Portal using your login or register.

A.2 Technical support

Technical support

If this documentation does not completely answer your technical questions, you can enter a Support Request (<http://www.siemens.com/automation/support-request>).

For help creating a support request, view this video here (www.siemens.com/opensr).

Additional information on our technical support can be found at Technical Support (<http://www.siemens.com/automation/csi/service>).

Service & support on the Internet

In addition to our technical support, Siemens offers comprehensive online services at service & support (<http://www.siemens.com/automation/serviceandsupport>).

Contact

If you have further questions about the device, contact your local Siemens representative at Personal Contact (<http://www.automation.siemens.com/partner>).

To find the contact for your product, go to "all products and branches" and select "Products & Services > Industrial automation > Process instrumentation".

Contact address for business unit:

Siemens AG

Digital Industries

Process Automation

Östliche Rheinbrückenstr. 50

76187 Karlsruhe, Germany

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