SIEMENS

Point level

Capacitance switches Pointek CLS200/CLS300 standard

Operating Instructions

7ML5630 (CLS200 standard, rod version)
7ML5631 (CLS200 standard, cable version)
7ML5632 (CLS200 standard, sanitary connection)
7ML5633 (CLS200 standard, sliding coupling)
7ML5650 (CLS300 standard, rod version)
7ML5651 (CLS300 standard, cable version)

05/2021
A5E47827796-AA

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

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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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Document order number: A5E47827796
Ⓟ 05/2021 Subject to change

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Safety notes

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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.

1.1 Safety marking symbols

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

The manual

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Note

Please follow the installation and operating procedures for a quick, trouble-free installation and to ensure the maximum accuracy and reliability of your Pointek CLS200/ 300. This manual applies to the Pointek CLS200/300 Standard model only.

Pointek CLS200/300 is available in two models, Standard and Digital. For information on the CLS200/300 Digital model, please see manual 7ML19985JJ02.

Note

This manual applies to CLS200 Standard devices manufactured after July 2010 and CLS300 Standard devices manufactured after January 2011. Units manufactured prior to these dates will use Operating Instructions 7ML19985JH01.

This manual will help you set up your Pointek CLS200/300 Standard for optimum performance.

Sections in this manual are designated as follows:

- Pointek CLS200/300 Standard (Page 10) - an introduction to Pointek CLS200/300 Standard model and to the manual
- Technical data (Page 50)
- Pointek CLS200 (Page 14)
- Installation: Pointek CLS300 Standard (Page 21)
- Wiring (Page 27)
- Pointek CLS200 (Page 36)
- Pointek CLS300 (Page 42)
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- Dimensions (Page 77)
- Shortening the cable (Page 101)
- Product documentation and support (Page 108)
- Application (Page 106)

For other Siemens Milltronics level measurement manuals, go to: www.siemens.com/level (http://www.siemens.com/level) and look under Level Measurement.

2.1 Application examples

The application examples used in this manual illustrate typical installations using Pointek CLS200/300; other configurations may also apply.

In all examples, substitute your own application details. If the examples do not apply to your application, check the applicable parameter reference for the available options.

Abbreviations and identifications

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Short form	Long Form	Description	Units
CE / FM / CSA	Conformitè Europèene / Factory Mutual / Canadian Standards Association	safety approval	
ϵ_r		relative dielectric constant	
ESD	Electrostatic Discharge		
Ex	Explosion Proof	safety approval	
Exd	Flame Proof	method of protection for hazardous area	
FEP	Fluorinated Ethylene Polymer	modified polymer	
FKM/FPM	Fluorelastomer		
FFKM/FFPM	Perfluoroelastomer		
IS	Intrinsically Safe	method of protection for hazardous area	
LCD	Liquid Crystal Display		
LUI	Local User Interface		
µF	micro Farads	10^{-6}	Farad
µs	micro Seconds	10^{-6}	Seconds
NC	normally closed	relay contact position	
NO	normally open	relay contact position	
pF	pico Farads	10^{-12}	Farad
PDM	Process Device Manager	configuration tool	
PEEK	Polyaryletherether-ketone	organic polymer	
PPS	Polyphenylene Sulfide	polymer	
PTFE	Polytetrafluoroethylene	thermoplastic fluoro-polymer	
PVDF	Polyvinylidene Fluoride	engineered fluoropoly-mer	

Pointek CLS200/300 Standard

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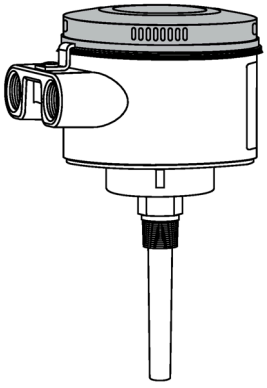
Note

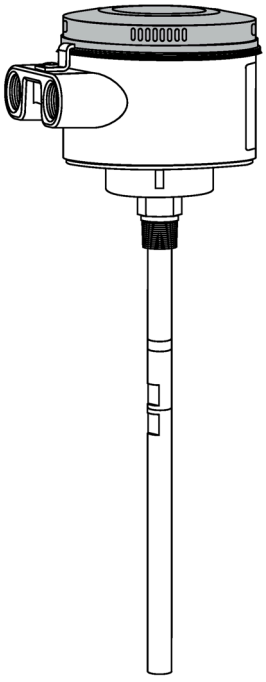
- Pointek CLS200/300 is available in two models: the standard model, and the digital model with integral local display. For information on the CLS200/300 Digital, please see manual 7ML19985JJ02.
- Pointek CLS200/300 is to be used only in the manner outlined in this instruction manual, otherwise protection provided by the equipment may be impaired.
- This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.

Pointek CLS200/300 is a versatile capacitance switch, ideal for level detection of interfaces, solids, liquids, slurries, and foam, and for simple pump control. The switch responds to the presence of any material with a relative dielectric constant of 1.5 or more by detecting a change in capacitance, which is registered as a change in oscillating frequency.

The switch can be set to detect before contact or on contact with the probe. The design of the CLS200 Standard allows the instrument to operate independently of the tank wall or pipe, so it does not require an external reference electrode for level detection in a nonconductive vessel such as concrete or plastic[1)]. The CLS300 Standard requires a connection to earth/ground for effective capacitance measurement.

The power supply is galvanically isolated and can accept voltages in the range 12 to 250 V AC/DC, depending on the application. The materials used in the probe construction provide a high level of chemical resistance, and an excellent temperature rating on the process wetted portion of the probe: up to 125 °C (257 °F) for the CLS200 and 400 °C (752 °F) for the CLS300.





Modular design and construction provide a wide choice of configurations, including rod, cable, and sanitary versions. When used with a SensGuard protection cover, the CLS200 sensor is protected from shearing, impact, and abrasion, in tough primary processes.

[1)] Refer to Technical data (Page 50) for CE applications.

4.1 Pointek CLS200/300 applications

Pointek CLS200/300 is designed for level detection and simple pump control in a variety of applications:

- Liquids, solids (powder and granules), slurries, interface detection (for example, oil/water), and foam detection
- Foods and pharmaceuticals
- Chemical and petrochemical
- High pressure and temperature

4.2 Pointek CLS200/300 features

- Potted construction protects components from shock, vibration, humidity, and/or condensation
- High chemical resistance on probes
- Level detection independent of tank wall/pipe (CLS200 only)[1)]
- Freely programmable set up covers wide range of applications/materials
- Integrated Local User Interface (LUI) for ease of use
- Rigid and cable versions available
- Patented Active Shield minimizes the effect of product build-up at the sensor mounting point (CLS300 only)

[1)] Refer to Technical data (Page 50) for CE applications.

Installation

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5.1 Safety notes

Process pressure

The device construction allows process over-pressure up to 10 or 25 bar (146 or 365 psi). This pressure is allowed for test purposes. The definition of the Ex approvals are only valid for a container-over-pressure between -0.2 to +0.1 bar (-2.9 to +1.45 psi). For higher or lower pressures, approvals are not valid.

Process and ambient temperature

Please check the ambiment and process temperatures at Flame Proof and Dust Ignition Proof (CLS200) (Page 71) for the specific configuration you are about to use or install.

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.

Cable entry devices / blanking elements

- **Dust Ignition proof.** For use in potentially explosive dust atmospheres: The cable entry devices and the blanking elements of unused apertures shall be of a certified type, suitable for the conditions of use and correctly installed. The minimum ingress protection requirement of IP6X according to EN 60529 must be satisfied.
- **Flameproof.** For use with potentially explosive gas atmospheres: the cable entry devices and the blanking elements of unused apertures shall be of a certified flameproof type, suitable for the conditions of use and correctly installed.
- **Versions with cable gland mounted by default.** The used cable gland is only suitable for fixed installations. The installer is responsible for providing appropriate strain-relief to prevent pulling or twisting.
- **Versions with blanking element mounted by default.** Blanking elements are not to be used with any form of adaptors or reducers.

Versions with cable gland / blanking element mounted by default

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

- Cable gland M20x1.5 (Dust Ignition proof, Intrinsically Safe, Type of protection n)
  - Cable diameter: 6 mm to 12 mm
  - Tightening torque - depending on the cable used and therefore to be determined by the user
- Cable gland M20x1.5 (Flameproof)
  - Cable diameter: bedding 3.1 mm to 8.6 mm / overall 6.1 mm to 13.1 mm
  - Tightening torque - number of turns depends on overall cable diameter of the used cable (e.g. 1 turn/cable diameter 12.5 mm to 5.5 turns/cable diameter 6.5 mm).
- Blanking element M20x1.5 (all versions)
  - Tightening torque: 32.5 Nm

5.2 Pointek CLS200

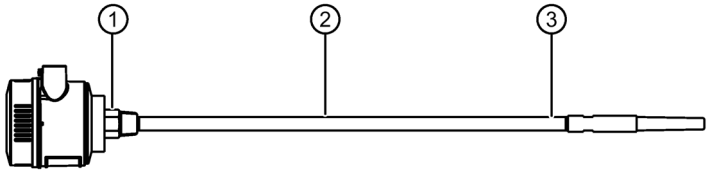
Note

- Installation shall only be performed by qualified personnel and in accordance with local governing regulations.
- This product is susceptible to electrostatic shock. Follow proper grounding procedures.
- The housing may only be opened for maintenance, local operation, or electrical installation.
- Before installing the instrument, verify that the environment complies with any restrictions specified on the product nameplate.
- To ensure compliance with CE EMC regulations, please install in accordance with the testing details on Approvals (verify against product nameplate) in Pointek CLS200/300 (Page 50).

5.2.1 Handling precautions

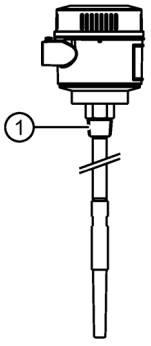
NOTICE
To prevent damage, all CLS200 units with a rod longer than 2 m (6.5 ft) must be handled as described below.

When lifting CLS200 from a horizontal position, support it at these three points:



① At the process connection of flange
② Midway along the rod
③ At the end of the rod before the sensor

Once vertical, CLS200 may be held by the process connection or flange:



① At the process connection or flange

Note

Unit shown is CLS200 Standard Extended Rod Version. Handling precautions apply to all CLS200 Standard units with rods longer than 2 m (6.5 ft).

5.2.2 Location

Recommended:

- Provide a sun shield to protect the transmitter from direct heat radiation.

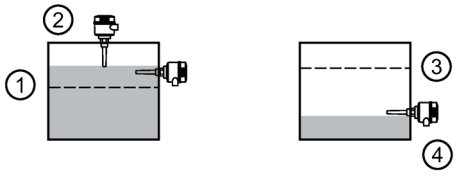
Precautions:

- Avoid mounting Pointek CLS200 in locations subject to strong vibrations in the vicinity, whenever possible.
- Do not exceed the permissible ambient temperature limits (see Environmental in Pointek CLS200/300 (Page 50) for details).

5.2.3 Mounting

Pointek CLS200 (compact threaded probe shown)

High level alarm **Low level alarm**



① Normal process level
② Vertical
③ Normal process level
④ Horizontal

For high level alarm (level exceeds normal process level):

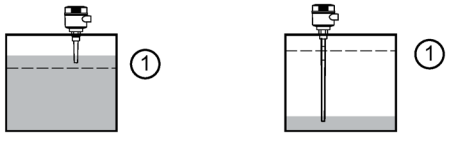
- normally mounted into the vessel top, or
- mounted through the tank wall at the detection level

For low level alarm (level drops below normal process level):

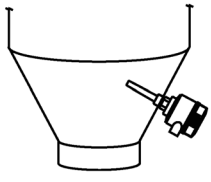
- mounted through the tank wall at the detection level

Pointek CLS200 typical configuration with extensions:

High level alarm **Low level alarm**



① Normal process level



For high or low level alarm:

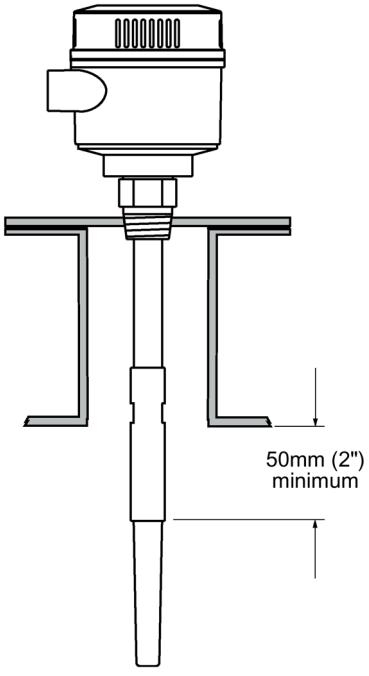
- designed for top mounting. The probe suspends vertically so that it reaches into the process at the desired detection level (high or low detection alarm).

5.2.3.1 Mounting restrictions

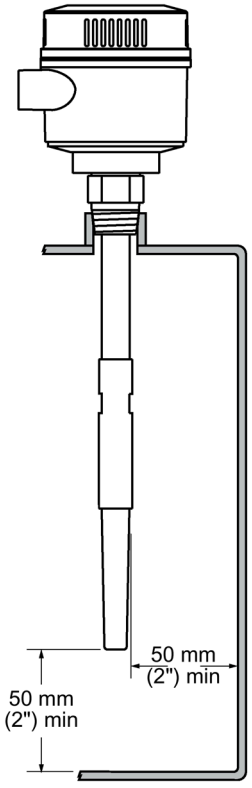
Note

- Keep the sensor at least 50 mm (2") away from any nozzle or tank wall.
- If multiple units are used, allow at least 100 mm (4") between them, to prevent interference.

In nozzle

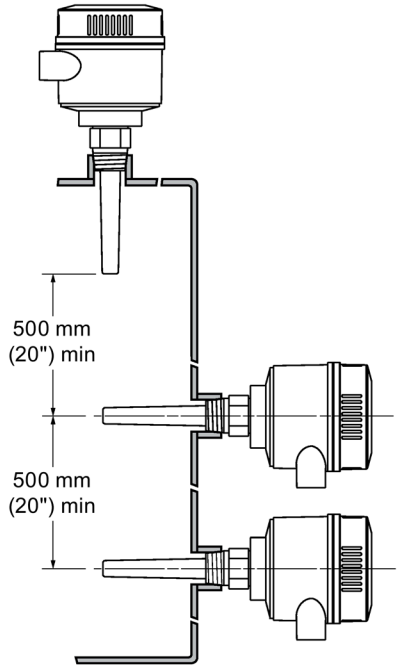


Close to tank walls

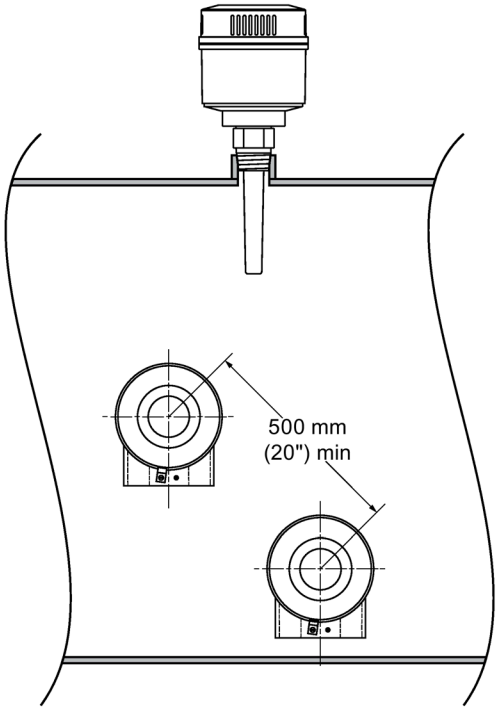


Multiple units

Side view



End view



Sensors must be at least 100 mm (4") apart. Mount diagonally if space is restricted

See also

Hazardous area installation (Page 68)

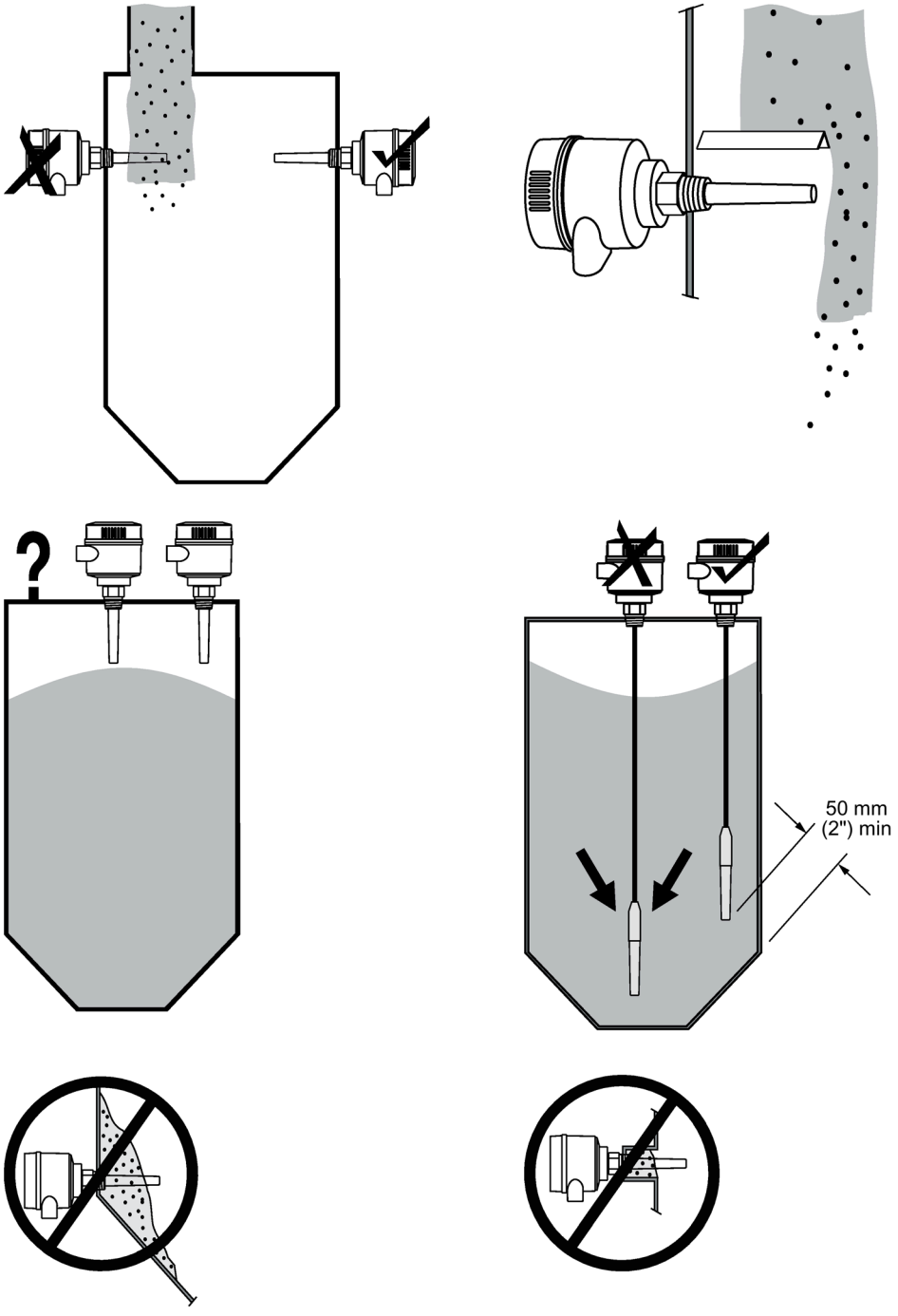
5.2.3.2 CLS200 dimensions

Dimensions for all versions of the Pointek CLS200 Standard can be found in CLS200 (Page 77).

5.2.4 Process cautions CLS200

NOTICE

- The maximum allowable torque on a horizontally installed rod is 15 Nm.
- Keep unit out of path of falling material, or protect probe from falling material.
- Consider material surface configuration when installing unit.
- Tensile load must not exceed probe or vessel rating (See Tensile(max) under Electrode - CLS200 Standard table in Pointek CLS200/300 (Page 50)).
- Avoid areas where material build up occurs.


?
50 mm
(2") min

5.3 Pointek CLS300

5.3.1 Installation: Pointek CLS300 Standard

Note

- Installation shall only be performed by qualified personnel and in accordance with local governing regulations.
- This product is susceptible to electrostatic shock. Follow proper grounding procedures.
- The housing may only be opened for maintenance, local operation, or electrical installation.
- Before installing the instrument, verify that the environment complies with any restrictions specified on the product nameplate.
- To ensure compliance with CE EMC regulations, please install in accordance with the testing details on Approvals (verify against product nameplate) in Pointek CLS200/300 (Page 50).

5.3.2 Location

Recommended:

- Provide a sun shield to protect the transmitter from direct heat radiation.

Precautions:

- Avoid mounting Pointek CLS300 Standard in locations subject to strong vibrations in the vicinity, whenever possible.
- Do not exceed the permissible ambient temperature limits (see Pointek CLS200/300 (Page 50) for details).

5.3.3 Mounting

Pointek CLS300 typical configuration:

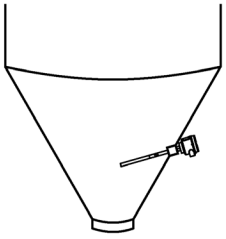
For high level alarm (level exceeds normal process level):

- normally mounted into the vessel top, or
- mounted through the tank wall at the detection level

For low level alarm (level drops below normal process level):

- mounted through the tank wall at the detection level

Angled mounting:



Pointek CLS300 cable version:

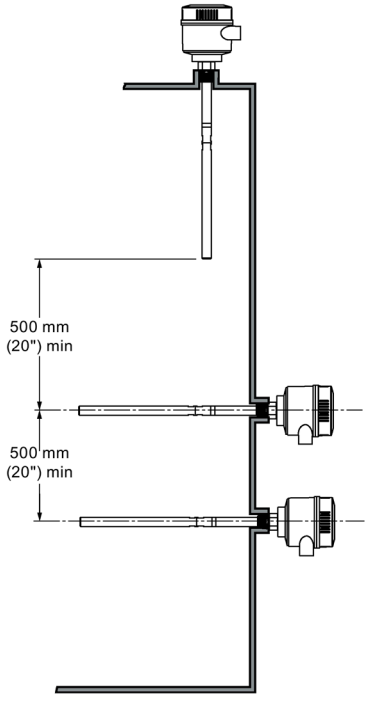
The cable version is designed for top mounting. The cable suspends vertically so that it reaches into the process at the desired detection level (high or low detection alarm).

5.3.3.1 Mounting restrictions

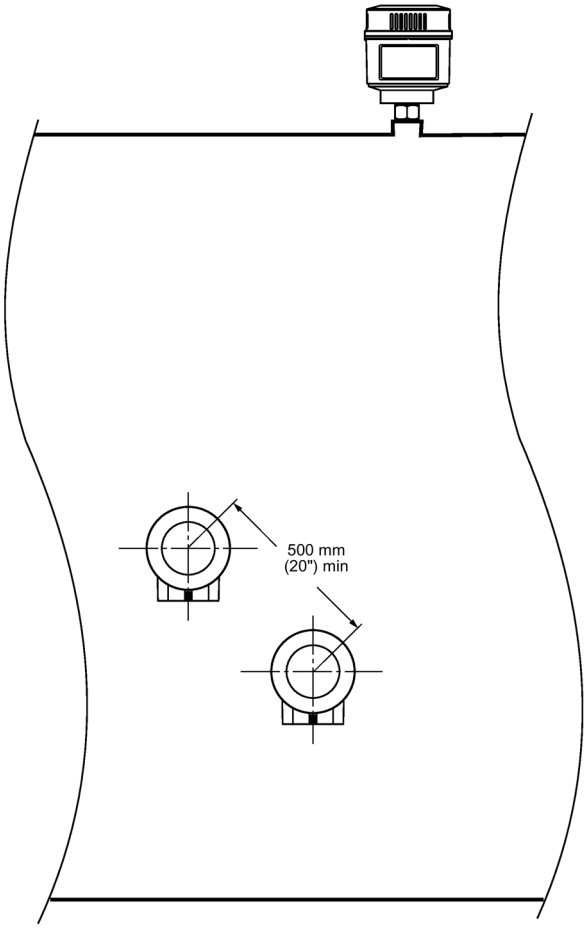
Note

- Keep the sensor at least 50 mm (2") away from any nozzle or tank wall.
- If multiple units are used, allow at least 500 mm (20") between them, to prevent interference.

Multiple Units

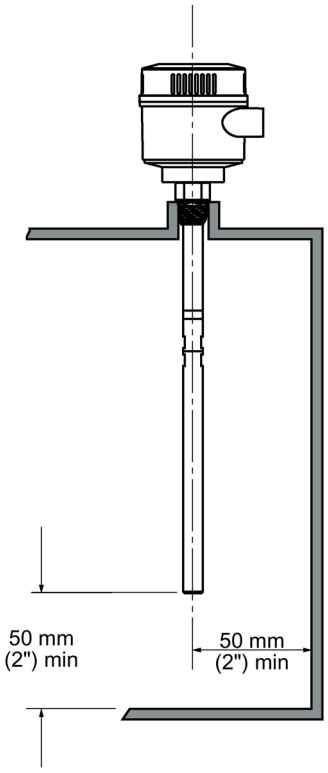


Sensors must be 500 mm (20") apart.



Mount diagonally is space is restricted.

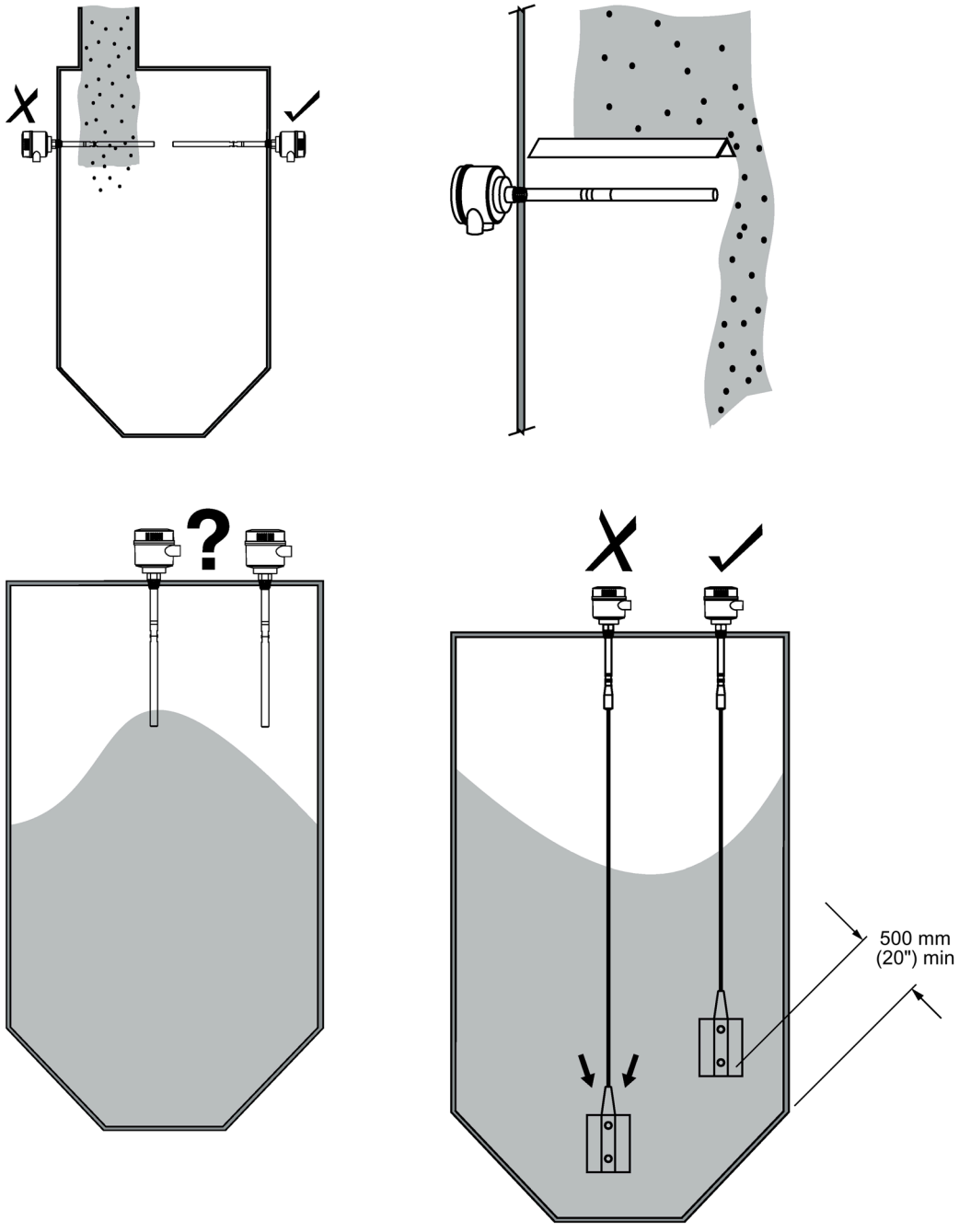
Wall Restrictions



5.3.4 Process cautions CLS300

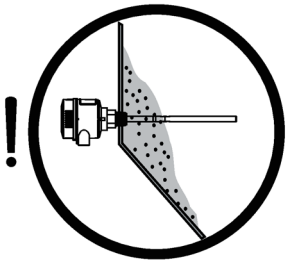
CAUTION

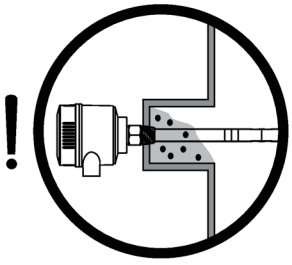
- The maximum allowable torque on a horizontally installed rod is 15 Nm.
- Keep unit out of path of falling material, or protect probe from falling material.
- Consider material surface configuration when installing unit.
- Tensile load must not exceed probe or vessel rating.


?
500 mm
(20") min

Note

Buildup of material in Active Shield area does not affect switch operation.





5.3.5 CLS300 dimensions

Dimensions for all versions of the Pointek CLS300 Standard can be found in CLS300 (Page 88).

Wiring

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⚠ WARNING
All field wiring must have insulation suitable for at least 250 V.

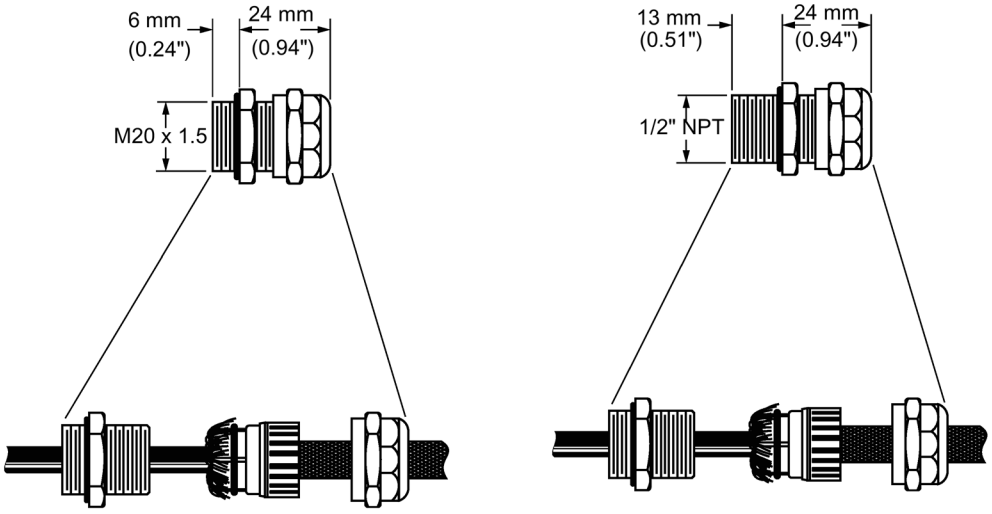
Note

- Only qualified personnel are authorized to install and operate this equipment in accordance with established safety practices and standards.
- The Protective Earth Terminal indicated by must be connected to reliable ground. Use a crimp type cable socket for 4 mm screw diameter, ring form or U-form (e.g DIN 46234). In case of non-metallic vessels, the external earth wire should be connected to an earthed component which is earthed near the vessel.
- All wiring must be done by qualified personnel in accordance with all governing regulations.
- The equipment must be protected by a 16A fuse or circuit breaker in the building installation.
- A circuit breaker or switch in the building installation, marked as a disconnect switch, shall be in close proximity to the equipment and within easy reach of the operator.
- Use shielded cable, wire gauge 20 AWG to 14 AWG (0.5 mm^2 to 2.0 mm^2). For CE installations use a cable with a braided metallic shield (or armoured cable where applicable).
- Maximum working voltage between adjacent relay contacts is 250 V.
- Relay contact terminals are for use with equipment which has no accessible live parts and wiring which has insulation suitable for at least 250 V.
- Cable entry devices and closing elements of unused apertures must meet a temperature range from min. -40 °C to 10 K above max. ambient temperature.

1. Loosen the lid clip and remove the lid to access the connectors and electronics. (For quick reference, the diagram on the next page can also be found on the underside of the lid, together with a guide to switch function).
2. Connect the wires to the terminals (polarity is not important).
3. Ground the instrument according to local regulations.
4. Tighten the gland to form a good seal.
5. If you wish to carry out a function test, follow the test procedures in Functionality tests - CLS200 (Page 33).

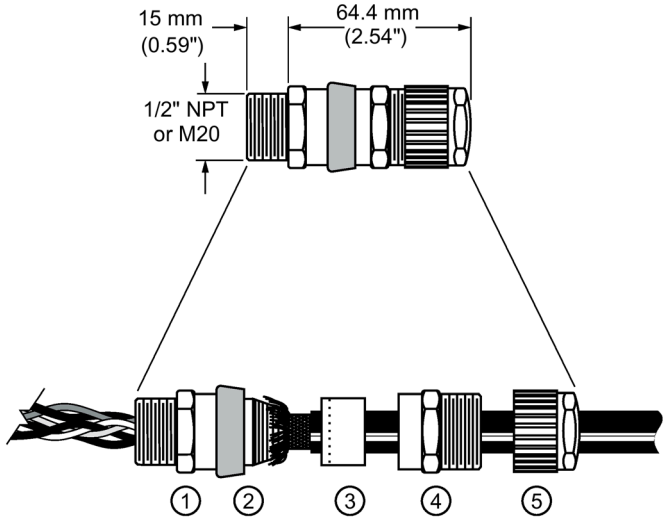
6.1 Recommended cable entries (equivalents can be used)

General purpose cable entry: M20 (A5E03252531) and ½" NPT (A5E03252530)



1. Strip cable and expose braided shield.
2. Feed cable through dome nut and clamping insert. Fold braided shield over clamping insert. Make sure that braided shield overlaps the O-ring by 3/32" (2 mm) and covers the entry 360 degrees.
3. Push clamping insert into body and tighten dome nut. Assemble into housing.

Hazardous location cable entry: M20 (A5E03252528) and ½" NPT (A5E03252527)



① Entry (with captive deluge seal)
② Diaphragm seal/armour spigot
③ Reversible armour clamp
④ Middle nut
⑤ Back nut

1. Strip the cable to suit equipment and expose armour/braid.
2. Push the cable through the diaphragm shield/armour spigot (4). Pre-fitted cable guide (4.1) can now be discarded. The diaphragm seal can be rolled back to ease assembly as required. Spread armour/braid over the diaphragm seal/armour spigot (4) until the end of the armour/braid is up against the shoulder of the armour cone. Position the armour clamping ring (3).
3. Place the entry (5) and position over the diaphragm seal/armour spigot (4). Move the sub-assembly (1) and (2) up to meet the entry (5).
4. Hold the entry (5) in position with a wrench to prevent rotation. Hand tighten the middle nut (2) to the entry (5), and turn a further 1/2 to 3/4 turn with a wrench.

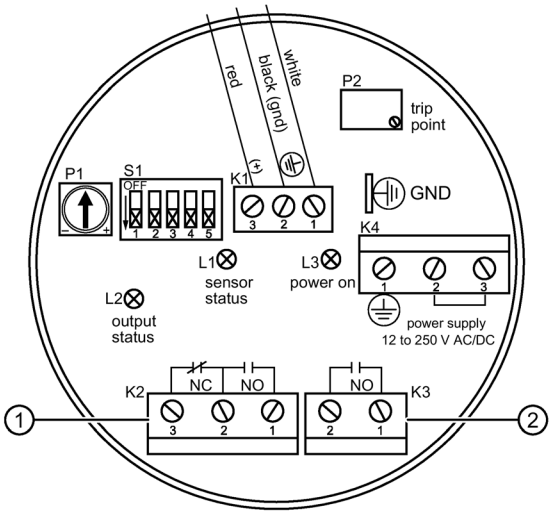
Note

Support the cable to prevent it from twisting. To ease the wiring inside the enclosure, it may be beneficial to strip the inner sheath of the cable.

5. Unscrew the middle nut (2) and visually inspect that the armour/braid has been successfully clamped between the diaphragm seal/armour spigot and the armour clamping ring (3). If armour/braid is not clamped, repeat assembly. (Armour/braiding should be fitted 360 degrees around the entry.)
6. Reassemble the middle nut (2) onto the entry component (5). Tighten up the middle nut (2) until hand tight, then using a wrench, turn the nut through 1/4 turn. Tighten the backnut (1) to form a seal around the cable, then tighten a further full turn using a wrench. Ensure that the middle nut (2) does not rotate when tightening the backnut (1).

Note

The deluge seal on this gland locates on assembly and requires no further action. Locate shroud over cable gland, if applicable.



① Relay contact
8 A @ 250 V AC, 2000 VA
5 A @ 30 V DC, 150 W

② Solid state switch
30 V DC/30 V AC (peak)
82 mA max

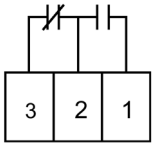
Note

Switch and potentiometer settings are for illustration purposes only.

6.2 Relay output connection

The relay is shown in a de-energized/unpowered state.

K2 contact ratings:



- max. switching voltage/current (DC): 30 V DC / 5 A
- max. switching voltage/current (AC): 250 V AC / 8 A
- max. switching capacity: 150 W / 2000 VA

Note

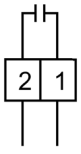
Switch and potentiometer settings are for illustration purposes only.

6.3 Solid-state switch

Solid-state switch to customer's control or instrumentation device.

The switch is shown in de-energized/unpowered state.

K3 contact ratings:



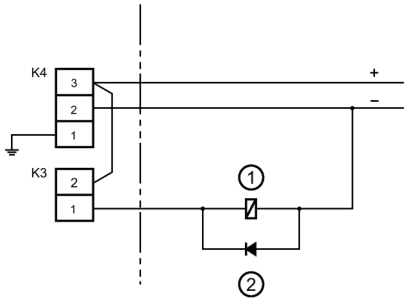
- Maximum Voltage: 30 V DC or peak AC
- Maximum Current: 82 mA
- Non-polarized

Connect protective earth wire to terminal provided in housing. Use crimp type cable socket for 4 mm screw diameter, ring form or U-form (e.g. DIN 46234)

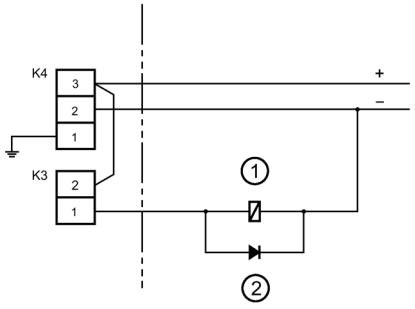
6.3.1 Diode protection

When driving an external relay with either the solid-state switch and/or relay outputs using DC power, protection diodes must be connected in the correct polarity across the relay coil to prevent possible switch/relay damage resulting from inductive spikes generated by the relay coil.

Customer-supplied diode protection



Customer-supplied diode protection



① Relay coil
② Customer-supplied diode protection

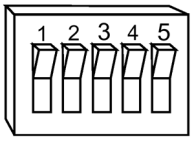
6.3.2 Power connection

Nominal	**24 V DC**	**48 V DC**
V DC	22 to 26 V	46 to 50 V
R	120 Ω	234 Ω

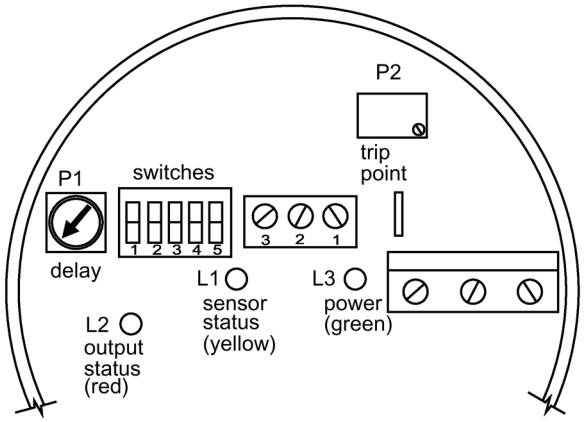
Connect protective earth wire to terminal provided in housing and marked with

6.4 Functionality tests - CLS200

To test the basic functionality of the probe and potentiometers:



Switches shown in OFF position



Preparation

1. Ensure the green power LED L3 is on.
2. Set DIP switches S1 to S4 OFF (rocker down as shown in diagram above).
3. Set DIP switch S5 ON (rocker up, opposite to diagram above).
4. Turn the delay potentiometer P1 fully counter-clockwise.
5. If the yellow sensor status LED L1 is not on, turn the trip-point potentiometer P2 counter-clockwise until it just turns on.
6. Turn the trip-point potentiometer P2 clockwise until LED L1 just turns off.
7. Set DIP switch S5 OFF (rocker down as shown in diagram above).

Test Procedures

Test the switch function:

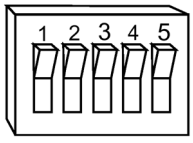
- Grasp the probe with your hand. LED L1 should turn on. LED L2 should turn on after a slight delay, and the output relay may provide an audible click.

Test the delay:

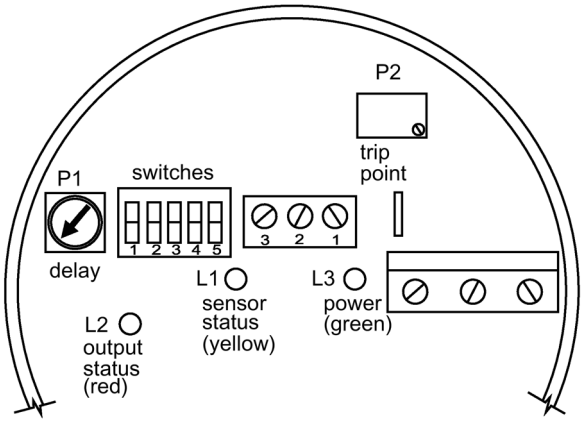
1. Grasp the probe with your hand. L1 should turn on (glow) immediately. The red output status LED L2 should turn on after a delay.
2. Turn the delay potentiometer P1 clockwise about 1/8 of a turn.
3. Grasp the probe with your hand. L1 should turn on immediately, but L2 should turn on after a longer delay than in Step 1.

6.5 Functionality tests - CLS300

To test the basic functionality of the probe and potentiometers:



Switches shown in OFF position



Preparation

1. Ensure green power light L3 is on.
2. Turn the delay potentiometer P1 fully clockwise (minimum delay).
3. Set dip switches S1 to S4 OFF (full potentiometer control activated).
4. Set switch S5 ON (high sensitivity).

Test Procedures

Test the sensitivity of the sensor:

- If the yellow sensor status LED (L1) is on, turn potentiometer P2 clockwise until it turns off.
- Slowly turn the trip point potentiometer P2 counter-clockwise until the yellow sensor status light L1 glows. Shortly afterwards, the red output status light L2 will glow. This concludes the sensitivity test.

Test the delay:

1. Turn the trip point potentiometer P2 clockwise, until the yellow sensor status LED L1 turns off.
2. Turn the delay potentiometer P1 about 1/8 turn clockwise (delay set point).
3. Slowly turn the trip point potentiometer P2 counter-clockwise until the yellow sensor status light L1 glows. After an appropriate delay the red output status light L2 will glow. This concludes the delay test.

Test the switch function:

1. Turn the delay potentiometer P1 fully counter-clockwise.
2. Turn the trip point potentiometer P2 clockwise until the yellow sensor status LED L1 is off.

3. Slowly turn the trip point potentiometer P2 counter-clockwise until the yellow sensor status light glows.
4. Slowly turn the trip point potentiometer P2 clockwise until the yellow sensor status light just stops glowing. Grasp the probe with your hand. The yellow sensor status light L1 will glow, indicating switch function. After an appropriate delay the red output status light L2 will glow. This concludes the switch function test.

Operation

7

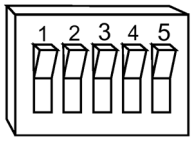
7.1 Pointek CLS200

7.1.1 User interface

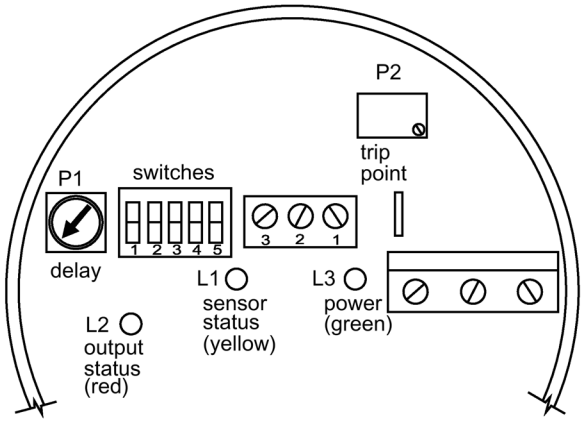
- A switch bank of five dip switches allows you to control the settings for Pointek CLS200 (standard model).
- Three LEDs (L2, L1, and L3) indicate output status, sensor status, and power ON or OFF.
- Two potentiometers (P1 and P2) adjust the alarm delay and trip point settings.

Note

Turning P2 clockwise decreases sensitivity; counter-clockwise increases sensitivity.



switches shown in OFF position



7.1.1.1 Indicators

Three LEDs (L1, L2, and L3) indicate power status, sensor status, and alarm output status:

LED status	Sensor status: L1 (yellow)	Output status: L2 (red)	Power status: L3 (green)
Lit	sensor contacting, or very close to, process material (material capacitance greater than setpoint for P2)	alarm OFF (relay energized/ switch closed)	power ON
Unlit	sensor not contacting process material (material capacitance less than setpoint for P2)	alarm ON (relay de-energized/ switch open)	no power

7.1.1.2 Alarm output

The relay and solid-state switch are connected, and provide the alarm output:

	Relay	Solid-state switch	Output status/Red LED
Alarm OFF	energized	closed	lit
Alarm ON	de-energized	open	unlit

Alarm Output Status

There are two alarm options:

	Probe	Relay	Solid-state switch	Output status/ Red LED
Low Alarm	uncovered (level too low)	de-energized	open[1)]	unlit
High Alarm	covered (level too high)	de-energized	open[1)]	unlit

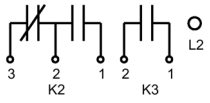
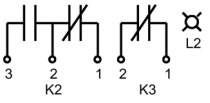
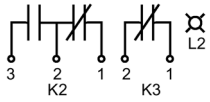
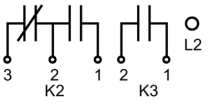
[1)] The manual assumes that the pump should be turned off in the event of a failure. If this is not the case in your process, please see the relay schematic below, and make the appropriate connections to suit your application.

Failsafe

The Failsafe function controls the response of Pointek CLS200 to a fault so that the process will be put into a safe mode of operation. (See Fault signaling (Page 107) for further details). Failsafe and Alarm mode are interconnected:

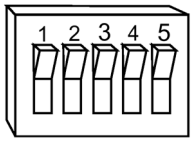
- High Alarm/Failsafe High
- Low Alarm/Failsafe Low

Relay and solid-state switch functionality

Alarm Mode	Dip Switch	Covered Probe	Uncovered Probe
Failsafe High	S3 - ON 		
Failsafe Low	S3 - OFF 		

7.1.1.3 Switch bank

4 dip switches (S1, S2, S3, and S5) control settings for the alarm output. The fifth dip switch (S4) is used only to test the delay settings.



① Delay: alarm activation
② Delay: alarm deactivation
③ Failsafe/alarm
④ Test delay settings
⑤ Set-up mode / run mode

Dip switches shown in **OFF (open)** position.

Failsafe/Alarm Setting: S3

- When Failsafe switch S3 is ON, it inverts the relay function, and the functioning of S1 and S2.

Alarm Mode				
High	S3-ON	probe covered	alarm activated (ON)	relay de-energized
Low	S3-OFF	probe uncovered	alarm activated (ON)	relay de-energized

Delay Settings: S1 and S2

Use the delay function to slow the response, and compensate for turbulence or false readings.

- Delay potentiometer P1 can be adjusted to set a delay time from 1 to 60 seconds.
- Two separate delay settings are controlled by S1 and S2:
  - for alarm activation (alarm ON)
  - for alarm de-activation (alarm OFF)
- When switches are OFF (open) the delay is enabled.
- The position of Failsafe switch S3 determines how S1 and S2 function.

S3- ON	High alarm/ over-fill protection	S1-ON	disables delay of alarm de-activation (alarm OFF)
		S2-ON	disables delay of alarm activation (alarm ON)
S3- OFF	Low alarm/dry run protection	S1-ON	disables delay of alarm activation (alarm ON)
		S2-ON	disables delay of alarm de-activation (alarm OFF)

Set-up mode / run mode: S5

S5-ON	Set-up mode	Use this setting only during trip-point set-up.
S5-OFF	Run mode	Use this setting during normal operation after set-up is complete.

Test settings: S4

When S4 is set to ON, it inverts the signal, allowing you to test the delay settings from P1, or to verify that S1 and S2 are in the correct position.

S4-ON	Enable test	Observe the response of the output status and sensor status LEDs to verify the delay interval set by potentiometer P1.
S4-OFF	Normal operation	

7.1.1.4 Setup

WARNING

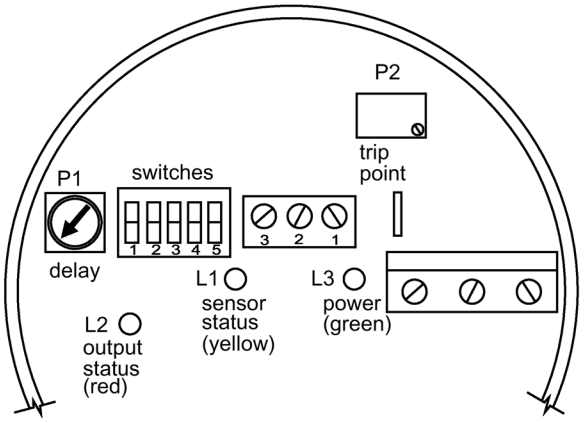
It is essential to check settings during the process itself, and confirm that they are correct, before regular operation commences.

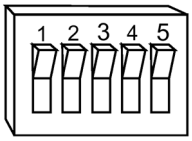
Initial setup can be carried out prior to mounting into the process, but it is extremely important to calibrate the unit and adjust the sensitivity on the product itself.

7.1.1.5 Start up

After Pointek CLS200 is properly mounted apply power to the unit. The green LED (L3) glows, indicating the unit is powered and operational.

Setpoint Adjustment





① Delay: alarm activation[1)]
② Delay: alarm deactivation
③ Failsafe/alarm[1)]
④ Test delay settings
⑤ Setup mode / run mode

[1)] When S3 is set to ON, it inverts the relay function, and the functioning of S1 and S2.

Use the potentiometers P1 and P2 to adjust the alarm delay and setpoint. Follow the setup procedure for the application that most closely describes your operation:

Application	Material	Setup conditions
General	• dry solids • low viscosity liquids	sensor uncovered; min. 100 mm (4") free space all around
Demanding	• hygroscopic / wet solids • high viscosity and high conductivity liquids	sensor immersed then uncovered; but retaining max. possible material buildup
Interface detection	• liquid A / liquid B • foam / liquid	immerse sensor in whichever material has lowest dielectric constant

Calibration for general applications (Failsafe low, no delay)

1. Ensure the green power LED L3 is on.
2. Set DIP switches S1 to S4 toOFF.
3. Set DIP switch S5 ON (set-up mode).

4. Ensure the probe is uncovered. If the yellow sensor status LED L1 is not on, turn the trip-point potentiometer P2 counter-clockwise until it just turns on.
5. Turn the trip-point potentiometer P2 clockwise until LED L1 just turns off.
6. Set DIP switch S5 to OFF (run mode).

Calibration for demanding applications (Failsafe low, no delay)

1. Ensure that the green power LED L3 is on.
2. Set DIP switches S1 to S4 to OFF.
3. Set DIP switch S5 to ON (set-up mode).
4. Turn the delay potentiometer P1 fully counterclockwise.
5. Adjust the material level of the process so that the sensor is immersed.
6. Adjust the material level of the process so that the sensor is uncovered, but retains as much buildup of material as possible on the sensor.
7. If the yellow sensor status LED L1 is not on, turn the trip point potentiometer P2 counter-clockwise until it just turns on.
8. Turn the trip point potentiometer P2 clockwise until LED L1 just turns off.
9. Set DIP switch S5 to OFF (run mode).

Calibration for interface detection (Failsafe low, no delay)

1. Ensure that the green power LED L3 is on.
2. Set DIP switches S1 to S4 to OFF.
3. Set DIP switch S5 to ON (set-up mode).
4. Turn the delay potentiometer P1 fully counter-clockwise.
5. Adjust the material level of the process so that the sensor is covered by the material with the lowest relative dielectric constant.
6. If the yellow sensor status LED L1 is not on, turn the trip point potentiometer P2 counter-clockwise until it just turns on.
7. Turn the trip point potentiometer P2 clockwise until LED L1 just turns off.
8. Set DIP switch S5 to OFF (run mode).

Delay alarm output

If you want to slow the Pointek CLS200 response, to compensate for turbulence or false readings, set a delay interval using potentiometer P1, and set S1 and/or S2 to OFF, to enable the delay for either alarm activation, alarm de-activation, or both.

If an immediate alarm output is critical, set the appropriate switch to ON, to disable the delay.

The functioning of S1 and S2 depends on the alarm setting:

High alarm/ overfill protection	S1-ON	disables delay of alarm de-activation (alarm OFF)
	S2-ON	disables delay of alarm activation (alarm ON)
Low alarm/ dry run protection	S1-ON	disables delay of alarm activation (alarm ON)
	S2-ON	disables delay of alarm de-activation (alarm OFF)

To test the delay function, follow the test procedure on Functionality tests - CLS200 (Page 33).

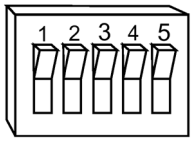
Operation

After completing the setup, replace the lid and secure the lid clip. Pointek CLS200 Standard model is now ready to operate.

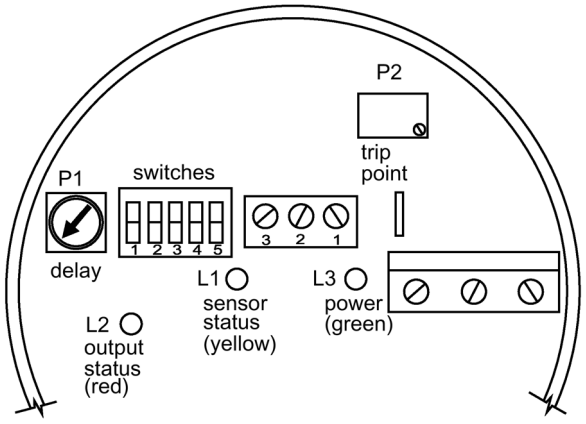
7.2 Pointek CLS300

7.2.1 User interface

- A switch bank of five dip switches allows you to control the settings for Pointek CLS300 (standard model).
- Three LEDs (L2, L1, and L3) indicate output status, sensor status, and power ON or OFF.
- Two potentiometers (P1 and P2) adjust the alarm delay and trip point settings.



Switches shown in OFF position



7.2.1.1 Indicators

Three LEDs (L1, L2, and L3) indicate power status, sensor status, and alarm output status:

LED status	Sensor status: L1 (yellow)	Output status: L2 (red)	Power status: L3 (green)
Lit	sensor contacting, or very close to, process material (material capacitance greater than setpoint for P2)	alarm OFF (relay energized/ switch closed)	power ON
Unlit	sensor not contacting process material (material capacitance less than setpoint for P2)	alarm ON (relay de-energized/ switch open)	no power

7.2.1.2 Alarm output

The relay and solid-state switch are connected, and provide the alarm output:

	Relay	Solid-state switch	Output status/Red LED
Alarm OFF	energized	closed	lit
Alarm ON	de-energized	open	unlit

Alarm Output Status

There are two alarm options:

	Probe	Relay	Solid-state switch	Output status/ Red LED
Low Alarm	uncovered (level too low)	de-energized	open[a)]	unlit
High Alarm	covered (level too high)	de-energized	open[a)]	unlit

[a)] The manual assumes that the pump should be turned off in the event of a failure. If this is not the case in your process, please see the relay schematic below, and make the appropriate connections to suit your application.

Failsafe

The Failsafe function controls the response of Pointek CLS300 to a fault so that the process will be put into a safe mode of operation. (See Fault signaling (Page 107) for further details). Failsafe and Alarm mode are interconnected:

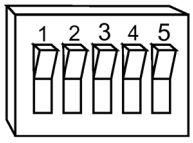
- High Alarm/Failsafe High
- Low Alarm/Failsafe Low

Relay and solid-state switch functionality

Alarm Mode	Dip Switch	Covered Probe	Uncovered Probe
Failsafe High			
Failsafe Low			

7.2.1.3 Switch bank

4 dip switches (S1, S2, S3, and S5) control settings for the alarm output. The fifth dip switch (S4) is used only to test the delay settings.



① Delay: alarm activation
② Delay: alarm deactivation
③ Failsafe/alarm
④ Test delay settings
⑤ Sensitivity (High or Low gain)

Dip switches shown in **OFF (open)** position.

Failsafe/Alarm Setting: S3

When Failsafe switch S3 is ON, it inverts the relay function, and the functioning of S1 and S2.

Alarm Mode				
High	S3-ON	probe covered	alarm activated (ON)	relay de-energized
Low	S3-OFF	probe uncovered	alarm activated (ON)	relay de-energized

Delay Settings: S1 and S2

Use the delay function to slow the response, and compensate for turbulence or false readings.

- Delay potentiometer P1 can be adjusted to set a delay time from 1 to 60 seconds.
- Two separate delay settings are controlled by S1 and S2:
  - for alarm activation (alarm ON)
  - for alarm de-activation (alarm OFF)
- When switches are OFF (open) the delay is enabled.
- The position of Failsafe switch S3 determines how S1 and S2 function.

S3- ON	High alarm/ overfill protection	S1-ON	disables delay of alarm de-activation (alarm OFF)
		S2-ON	disables delay of alarm activation (alarm ON)
S3- OFF	Low alarm/dry run protection	S1-ON	disables delay of alarm activation (alarm ON)
		S2-ON	disables delay of alarm de-activation (alarm OFF)

Sensitivity setting (high or low): S5

S5-ON	High sensitivity	Use this setting for measuring dry solids or nonconductive liquids.
S5-OFF	Low sensitivity	Use this setting for measuring conductive liquids, or viscous conductive solids that can build up on the sensor

Test settings: S4

When S4 is set to ON, it inverts the signal, allowing you to test the delay settings from P1, or to verify that S1 and S2 are in the correct position.

S4-ON	Enable test	Observe the response of the output status and sensor status LEDs to verify the delay interval set by potentiometer P1.
S4-OFF	Normal operation	

7.2.1.4 Setup

WARNING

It is essential to check settings during the process itself, and confirm that they are correct, before regular operation commences.

Initial setup can be carried out prior to mounting into the process, but it is extremely important to calibrate the unit and adjust the sensitivity on the product itself.

For a simple application, set Pointek CLS300 to Low alarm/no delays:

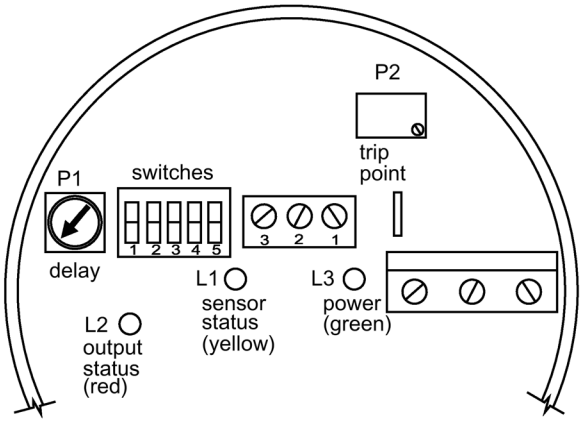
- turn P1 fully counter-clockwise (no delay interval)
- set dip switches S1, S2 and S5 to ON, S3 and S4 to OFF

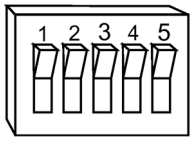
S1-ON	Delay disabled	
S2-ON	Delay disabled	
S3-OFF	Low alarm	• probe uncovered = alarm ON/relay deenergized
S4-OFF	Test function disabled	• normal operation
S5-ON	High sensitivity	• default setting • for dry solids or non-conductive liquids

7.2.1.5 Start up

After Pointek CLS300 is properly mounted and the switch bank is set up, apply power to the unit. The green LED (L3) glows, indicating the unit is powered and operational.

Setpoint Adjustment





① Delay: alarm activation[1)]
② Delay: alarm deactivation
③ Failsafe/alarm[1)]
④ Test delay settings
⑤ Setup mode/run mode

Switches shown in OFF position

[1)] When S3 is set to ON, it inverts the relay function, and the functioning of S1 and S2.

Use the potentiometers P1 and P2 to adjust the alarm setpoints. Follow the setup procedure for the application that most closely describes your operation:

Application	Material	Setup conditions	S5
General	• dry solids • low viscosity liquids	sensor uncovered; min. 100 mm (4") free space all around	ON (high)
Demanding	• hygroscopic / wet solids • high viscosity and high conductivity liquids	sensor immersed then uncovered; but retaining max. possible material buildup	OFF (low)
Interface detection	• liquid A / liquid B • foam / liquid	immerse sensor in whichever material has lowest dielectric con-stant	OFF (low)

General applications (Failsafe Low, no delay)

Preparation

- Ensure that L3 (green) is lit.
- If the yellow sensor status LED L1 is on, turn trip point potentiometer P2 clockwise until it is off.
- Turn the delay potentiometer P1 fully counter-clockwise (to minimum).
- Set dip switches S1 to S4 to OFF, and S5 to ON (high sensitivity).

Configuration

1. With sensor uncovered and a minimum 100 mm (4") free space all around, turn the trip point potentiometer P2 counter-clockwise until L1 (yellow) glows.
2. Turn P2 back (clockwise) until L1 stops glowing.

Demanding applications (Failsafe Low, no delay, sensitivity adjusted for viscous, conductive material)

Preparation

- Ensure that L3 (green) is lit.
- Turn the delay potentiometer P1 fully counter-clockwise (to minimum).
- Turn trip point potentiometer P2 fully counter-clockwise (to maximum).
- Set dip switches S1 to S4 to OFF (full potentiometer control).
- Set S5 to OFF (low sensitivity).

Configuration

1. Adjust the material level of the process so that the sensor is immersed: L1 (yellow) should glow. If L1 does not glow, reset S5 to ON (high sensitivity) The appropriate position of S5 depends on the dielectric properties of the material).
2. Adjust the material level of the process so that the sensor is uncovered, but retains as much buildup of material as possible on the sensor.
3. Adjust trip point P2 clockwise until L1 stops glowing. To get the true feel for the correct position, adjust P2 counter-clockwise then clockwise several times to ensure that L1 stops glowing. (This adjustment is very sensitive, and we recommend repeating this exercise to fine tune P2, until a very small adjustment causes L1 to stop glowing.)

Interface detection (Failsafe Low, no delay, sensitivity adjusted to detect an interface)

Preparation

- Ensure that L3 (green) is lit.
- Turn delay potentiometer P1 fully counter-clockwise (to minimum).
- Turn trip point potentiometer P2 fully counter-clockwise (to maximum).

- Set dip switches S1 to S4 to OFF (full potentiometer control).
- Set S5 to OFF (low sensitivity).

Configuration

1. Immerse the sensor in the material that has the lowest dielectric constant. L1 (yellow) should glow. If not, reset S5 to ON (high sensitivity).
2. Adjust P2 clockwise until L1 stops glowing.
3. Immerse the sensor in the material that has the highest dielectric constant. L1 should glow.

Delay alarm output

If you want to slow the Pointek CLS300 response, to compensate for turbulence or false readings, set a delay interval using potentiometer P1, and set S1 and/or S2 to OFF, to enable the delay for either alarm activation, alarm de-activation, or both.

If an immediate alarm output is critical, set the appropriate switch to ON, to disable the delay.

The functioning of S1 and S2 depends on the alarm setting:

High alarm/ overfill protection	S1-ON	disables delay of alarm de-activation (alarm OFF)
	S2-ON	disables delay of alarm activation (alarm ON)
Low alarm/ dry run protection	S1-ON	disables delay of alarm activation (alarm ON)
	S2-ON	disables delay of alarm de-activation (alarm OFF)

To test the delay function, follow the test procedure on Functionality tests - CLS300 (Page 34).

Operation

After completing the setup, replace the lid and secure the lid clip. Pointek CLS300 Standard model is now ready to operate.

Troubleshooting

8

8.1 Pointek CLS200/300

Symptom	Observation	Action
No Alarm Response	L3 (green) off.	Check power supply voltage.
Alarm doesn't switch when sensor is uncovered.	L1 (yellow) doesn't respond when sensor is uncovered.	CLS200: Readjust trip point potentiometer P2. CLS300: Check sensitivity switch S5. Readjust trip point potentiometer P2.
	L1 (yellow) responds when sensor is uncovered.	Check that relay changes state when S3 is toggled ON and OFF.
Alarm doesn't switch on when sensor is covered.	L1 (yellow) doesn't respond when sensor is covered.	CLS200: Readjust trip point potentiometer P2. CLS300: Check sensitivity switch S5. Readjust trip point potentiometer P2.
	L1 (yellow) responds when sensor is covered.	Check that relay changes state when S3 is toggled ON and OFF
	L1 (yellow) flashes when material level approaches the alarm setpoint.	

Technical data

9

Note

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

9.1 Pointek CLS200/300

Power

Supply	12 to 250 V AC/DC (0 to 60 Hz)
Ex approvals	Max voltage which does not invalidate the intrinsically safe protection of the sensor (probe); Um = 250V AC
Power consumption	2W max.

Performance

Repeatability	±1% of measurement

Interface

Configuration	locally, using dip switches and potentiometers
Local display	3 LED indicators
Output	relay contact and solid-state switch
Polarity-independent	yes
Failsafe	relay and solid-state switch can be de-energized in the absence of a sensor signal

Alarm Outputs

Relay	1 Form C (SPDT) contact (selectable NC or NO contact) max. switching voltage/current (DC): 30 V DC / 5 A max. switching voltage/current (AC): 250 V AC / 8 A (resistive load)
Solid-state switch	rated 30 V DC or peak 30 V AC, 82 mA
Time delay	ON/OFF alarm, selectable 1 to 42 seconds duration / 1 to 100 seconds duration
Hysteresis	dependent on ϵ_r: max. 2 mm (0.08") @ ϵ_r = 1.5

Failsafe operation	Failsafe High or Failsafe Low
Delay timers	2: Alarm ON to OFF and Alarm OFF to ON

Mechanical

Electrode - CLS200 Standard

Model	Length (max)	Process Connections	Extension	Tensile (max)	Wetted Parts
Rod	5500 mm/ 216.5"	• Threaded: ¾", 1", or 1 ½" BSPT (R), BSPP (G) or NPT; 1 ¼" NPT only • Welded flange: ASME: 1", 1 ½", 2", 3" or 4" DN 25, 40, 50, 80 or 100	316L[1)] stainless steel	n/a	• 316L[1)] stainless steel (optional PFA coating) • FKM seals (optional FFKM) • PPS probe (optional PVDF)
Sanitary	5500 mm/ 216.5"	1", 1 ½ ", 2", 2 ½" and 3"sanitary clamp	316L[1)] stainless steel	n/a	• 316L[1)] stainless steel • FKM seals (optional FFKM) • PPS probe (optional PVDF)
Cable	30 m/ 98.4 ft	• Threaded: ¾ ", 1", or 1 ½" BSPT (R), BSPP (G) or NPT; 1 ¼" NPT only • Welded flange: ASME: 1", 1 ½", 2", 3" or 4" DN 25, 40, 50, 80 or 100	FEP (Fluorinated Ethylene Polymer)	180 kg/ 400 lbs	• 316L[1)] stainless steel • FEP jacketed cable • FKM seals (optional FFKM) • PPS probe (optional PVDF)

[1)] Or 1.4404 material.

Electrode - CLS300 Standard

Model	Length (max)	Process Connections	Tensile (max)	Wetted Parts
Rod (19 mm/ 0.75" dia.)	1000 mm/40"	• Threaded: ¾", 1", or 1 ½" BSPT (R), BSPP (G) or NPT; 1 ¼" NPT only • Welded flange: ASME: 1", 1 ½", 2", 3" or 4" DN 25, 40, 50, 80 or 100	n/a	• 316L[1)] stainless steel • FKM seals (optional FFKM • PFA lining on Active Shield • PEEK isolators
Cable	25000 mm/ 985"	• Threaded: 1 ½" BSPT (R), BSPP (G) or NPT; 1 ¼" NPT only • Welded flange: ASME: 1 ½", 2", 3" or 4" DN 40, 50, 80 or 100	1900 kg/ 4188 lbs	• 316L[1)] stainless steel Active Shield and cable weight • 316L1 stainless steel cable (optional PFA jacketed cable) • FKM seals (optional FFKM) • PEEK isolators
High Tem-pera-ture version	1000 mm/40"	• Threaded: ¾", 1", or 1 ½" BSPT (R), BSPP (G) or NPT; 1 ¼" NPT only • Welded flange: ASME: 1", 1 ½", 2", 3" or 4" DN 25, 40, 50, 80 or 100	n/a	• 316L[1)] stainless steel • Ceramic isolators

[1)] Or 1.4404 material.

Active Shield Length (CLS300 only):

Active Shield	Length		Minimum insertion length		
	Threaded	Flanged	Rod version	Cable version	High Temp. version
Standard length	125 mm/4.92"	105 mm/4.13"	350 mm/13.78"	500 mm/19.69"	350 mm/13.78"
Extended shield	250 mm/9.84"	230 mm/9.06"	500 mm/19.69"	1000 mm/40"	500 mm/19.69"
Extended shield	400 mm/15.75"	380 mm/14.96"	750 mm/29.53"	1000 mm/40"	750 mm/29.53"

Enclosure

Termination	• Removable terminal block • Tightening torque of terminal screws: 0.5 to 0.6 Nm • Conductor cross section:	
	1 conductor:	2 conductors with same cross section:

	• solid: 0.2 to 2.5 mm² • flexible: 0.2 to 2.5 mm² • flexible, with ferrule with or without plastic sleeve: 0.25 to 2.5 mm • AWG 24 to 12	• solid: 0.2 to 1.0 mm • stranded: 0.2 to 1.5 mm • stranded with ferrule without plastic sleeve: 0.25 to 1.0 mm • stranded, TWIN ferrule with plastic sleeve: 0.5 to 1.0 mm²
Construction	epoxy-coated aluminum with gasket	
Optional thermal isolator	316L[1)] stainless steel	
Cable entry	2 x M20 thread	
Ingress protection	Type 4 / IP65 standard, IP68 optional	
Separation between Zone 0 and Zone 1 (ATEX II 1/2G)	Material of the separation element (partition wall) • stainless steel, 1.4404 (316L) • Glass, Inconel 600 (Glass seal)	

Note

The use of approved watertight conduit hubs/glands is required for Type 4 / IP65 or IP68 (outdoor applications). For CE requirements the use of EMC rated cable entries is required for all CLS200 devices and for CLS300 devices with flange process connections.

Weight

Weight varies based on configuration. For example: compact Pointek CLS200/300, 1 kg (2.20 lb.) approx. 100 mm (4") insertion length, 3/4" process connection

[1)] Or 1.4404 material

Environmental

Location	indoor/outdoor
Altitude	2000 m (6562 ft.) max.
Ambient temperature • general applications • in potentially explosive atmospheres	–40 to 85 °C (–40 to +185 °F) refer to appropriate certificate
Storage temperature	–40 to 85 °C (–40 to +185 °F)
Relative humidity	suitable for outdoor
Installation category	II
Pollution degree	4

Process

Note

Please see Pointek CLS200 standard pressure versus temperature curves (Page 60) and Pointek CLS300 standard pressure versus temperature curves (Page 63).

relative dielectric constant (ϵ_r)	1.5 minimum
Temperature at process connection	
CLS200 temperature:[1)2)]	
• Without temperature extended shaft:	–40 to 85 °C (–40 to 185 °F) –20 to 85 °C (-4 to +185 °F) with option FFKM seal O-ring
• With temperature extended shaft	–40 to 125 °C (–40 to 257 °F) –20 to 125 °C (–4 to 257 °F) with option FFKM seal O-ring
CLS200 pressure (vessel): • rod version • cable version • sliding coupling version	 –1 to 25 bar g/–14.6 to 365 psi g (nominal) –1 to 10 bar g/–14.6 to 150 psi g (nominal) –1 to 10 bar g/–14.6 to 150 psi g (nominal)
CLS300 temperature:[1)2)] • Without temperature extended shaft	 –40 to 85°C (–40 to 185°F) –20 to 85 °C (-4 to +185 °F) with option FFKM seal O-ring
• With temperature extended shaft	–40 to 200°C (–40 to 392 °F) –20 to 200 °C (–4 to 392 °F) with option FFKM seal O-ring
• High temperature version	–40 to 400 °C (–40 to 752 °F)
• CLS300 pressure (vessel):	–1 to 35 bar g/–14.6 to 511 psi g (nominal)

[1)] At process connection

[2)] With ATEX approval: Depends on surface temperature and temperature and temperature class. See Flame Proof and Dust Ignition Proof (CLS200) (Page 71)and Flame Proof and Dust Ignition Proof (CLS300) (Page 74).

Approvals (verify against product nameplate)

CLS200

General Purpose	CSA, FM, CE
Dust Ignition Proof	ATEX II 1/2D, IIIC CSA/FM Class II, Div. 1 Gr. E, F, G Class III INMETRO
Flame proof/Explosion proof	ATEX II 1/2G, IIC CSA/FM Class I, Div. 1 Gr. A, B, C, D INMETRO

Marine	Lloyds Register of Shipping, Categories ENV1, ENV2 and ENV5
Overfill Protection	WHG (Germany)

Note

EN 61326 (CE EMC) testing was conducted on the Pointek CLS200 while mounted in a metallic vessel and wired using shielded cable, where the cable was terminated in an EMC cable gland at the device entry point.

CLS300

General Purpose	CSA, FM, CE
Dust Ignition Proof	ATEX II 1/2D, IIIC CSA/FM Class II, Div. 1, Gr. E, F, G, Class III INMETRO
Flame Proof / Explosion Proof	ATEX II 1/2G, IIC CSA/FM Class I, Div. 1, Gr. A, B, C, D INMETRO
Marine	Lloyds Register of Shipping, Categories ENV1, ENV2 and ENV5
Overfill Protection	WHG (Germany)

Note

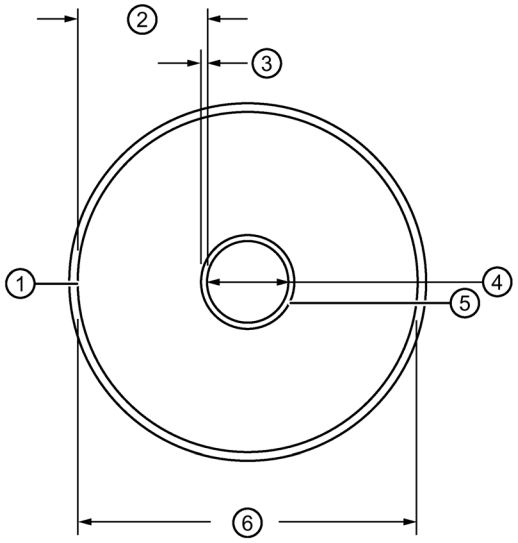
EN 61326 (CE EMC) testing was conducted on the Pointek CLS300 while mounted in a metallic vessel and wired using shielded cable. Units with flange process connections were tested while mounted in a metallic vessel with a metallic gasket and an EMC cable gland at the device entry point.

Technical reference

A

A.1 Operating principles

In capacitance measurement[1] inside a vessel or silo, the environment (typically, the vessel wall) acts as the reference electrode of a variable capacitor, and the probe supplies the measurement electrode. The dielectric[2] is composed of the vessel contents (air, vapor, liquid, solid, or a combination) and, if the measurement electrode is insulated, the insulating layer.



① Internal vessel wall
② Dielectric = contents plus insulation (non-conductive contents)
③ Dielectric = insulation (conductive contents)
④ Probe diameter (d)
⑤ Insulation (probe sleeve)
⑥ Internal vessel diameter (D)

The capacitance when the probe is uncovered (capacitance in air) will be different from the capacitance when the probe is covered (for example, capacitance in water). If the product is two immiscible liquids with different relative dielectric constants, (for example, oil and water) the capacitance will change at the interface between the two liquids.

[1] For definitions relating to capacitance, see the Glossary.

[2] The relative dielectric constant of air (vacuum) is 1: all other materials have a higher value.

A.2 High frequency oscillator

The Pointek CLS200/300 probe is equipped with a high frequency oscillator which responds to the capacitance. The inverse of frequency is proportional to the capacitance. A small change in capacitance results in a large change in frequency which is easy to detect, resulting in high resolution and accuracy.

A.3 Detection range

The functional detection range depends on the relative dielectric constant of the material monitored. The detection range will be shorter when the material has a lower relative dielectric constant, and longer when it has a higher relative dielectric constant.

See Technical data (Page 50), for performance information; also check the product nameplate on the enclosure, for details of your particular instrument.

A.4 CLS200 electrode

The Pointek CLS200 electrode is the primary sensor of the system. It supplies the electrical capacitance value. The reference is the environment at the time of setup.

The design of the Pointek CLS200 probe makes it very sensitive to changes in capacitance in the immediate vicinity of the electrode tip.

R = (Ca1 + Ca2)/(Ca1 + Ca2 + Cm1 + Cm2)

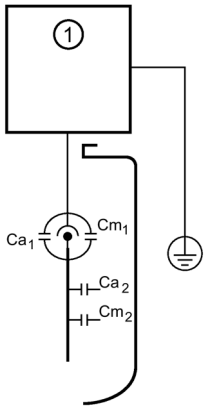
R = Ratio between initial capacitance and total capacitance

Ca_1 = Initial capacitance of the CLS200

Ca_2 = Initial capacitance (air) between the probe and the installation

Cm_1 = Capacitance increase of the CLS200 caused by product replacing air

Cm_2 = Capacitance increase between the probe and the installation caused by product replacing air.



① Measuring circuit

The initial capacitance of the CLS200 itself makes it possible to operate the CLS200 in a plastic tank where the Ca_2 and Cm_2 terms would disappear. However, a properly grounded metal tank will reduce the effects of external influences on the sensor.

The sensor can be set to detect either the change in capacitance as the product level approaches the electrode tip, or the change when the probe becomes covered.

A.5 CLS300 electrode

The Pointek CLS300 electrode is the primary sensor of the system. It supplies the electrical capacitance value.

The Pointek CLS300 patented Active Shield Technology electrically isolates the measurement section and reduces the effect of any non-measurement capacitance on the measurement capacitance. (Capacitance changes could result from uncontrolled variations occurring in the connection cable, process connection, and non-active parts of the probe.) This gives a better ratio of initial capacitance to total capacitance, resulting in higher accuracy.

R = Ratio between initial capacitance and total capacitance

Ca = Initial capacitance (air)

Cm = Capacitance Increase (product)

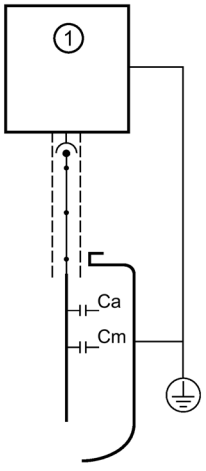
C1 = Capacitance connection point

C2 = Capacitance connection cable

C3 = Capacitance Process connection (includes active part)

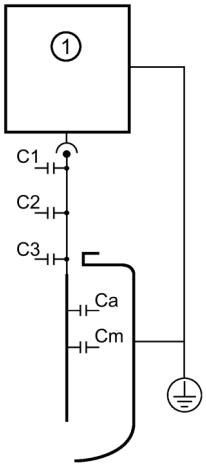
Pointek CLS300 with active shield

R = Ca/(Ca + Cm)



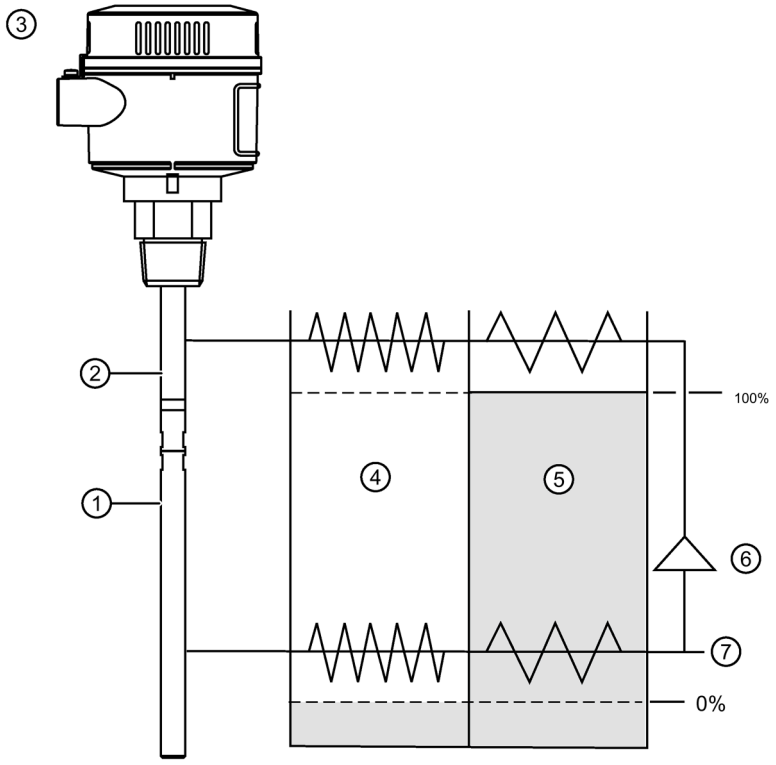
Conventional capacitance measurement

R = ((C1 + C2 + C3) + Ca) /((C1 + C2 + C3) + Ca + Cm)



① Measuring circuit

The measurement is further protected from interference by a buffer, which applies the frequency signal from the measurement section to the Active Shield section. This effectively eliminates any electrical potential difference between the shield and the measurement section and prevents additional changes in capacitance occurring, especially when material builds up at the probe entrance to the tank.



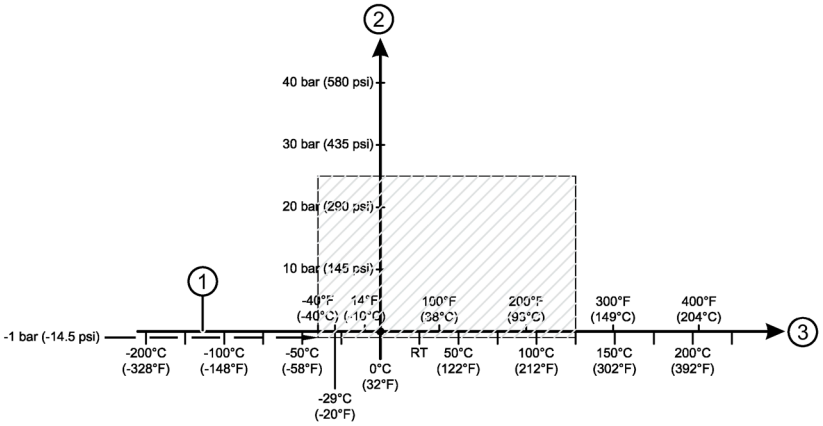
① Active measurement section
② Active shield
③ Pointek CLS300
④ Empty tank
⑤ Full tank
⑥ Buffer
⑦ Frequency (f) ≈ K / capacitance (C)

The relative lengths of the measurement section and Active Shield section can be specified to suit a particular application. If the measured range will be short relative to the total length of the electrode, specify a short measurement section. This increases the achievable resolution of the measurement, since any change in level will be greater relative to the length of the measurement section.

The powder-coated aluminum enclosure provides reliable operation in environments with dust, moisture, and high-frequency interference.

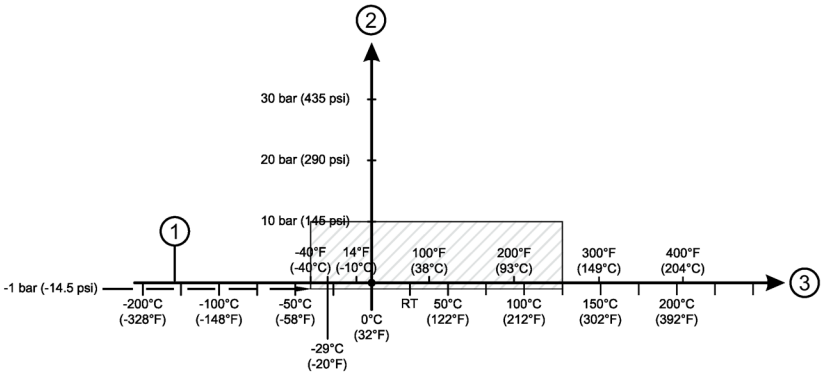
A.6 Pointek CLS200 standard pressure versus temperature curves

A.6.1 CLS200 compact and extended rod versions, threaded



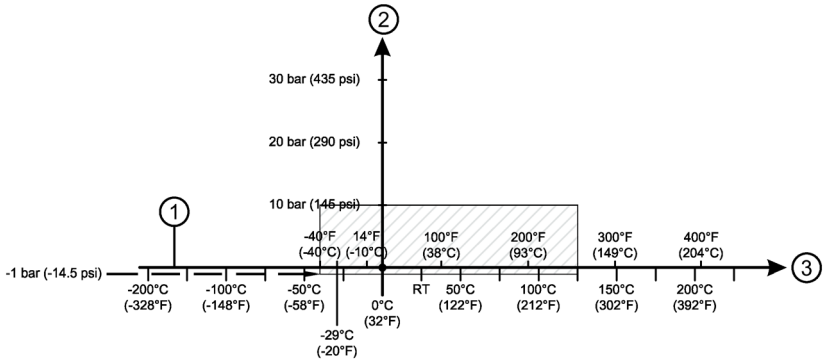
① Atmospheric
② Permitted operating pressure
③ Permitted operating temperature

A.6.2 CLS200 cable version, threaded



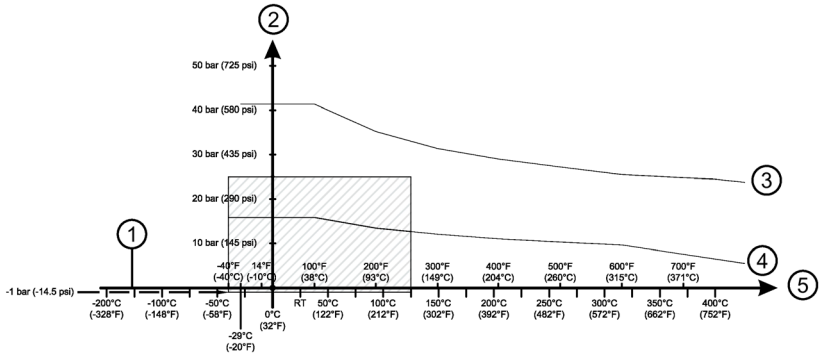
① Atmospheric
② Permitted operating pressure
③ Permitted operating temperature

A.6.3 CLS200 sanitary compact and extended rod versions



① Atmospheric
② Permitted operating pressure
③ Permitted operating temperature

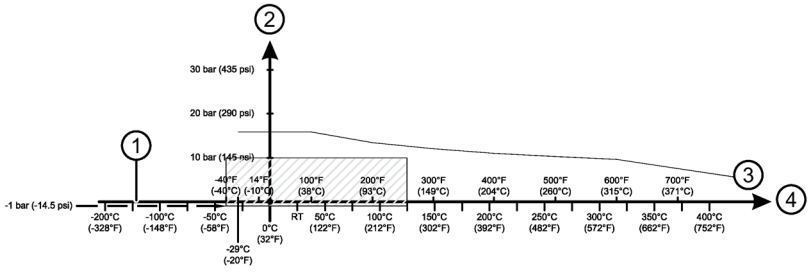
A.6.4 CLS200 compact and extended rod, ASME welded flange



① Atmospheric
② Permitted operating pressure
③ ASME 300 lb[1)]
④ ASME 150 lb[1)]
⑤ Permitted operating temperature

[1)] The curves denote the minimum allowable flange class for the shaded area below.

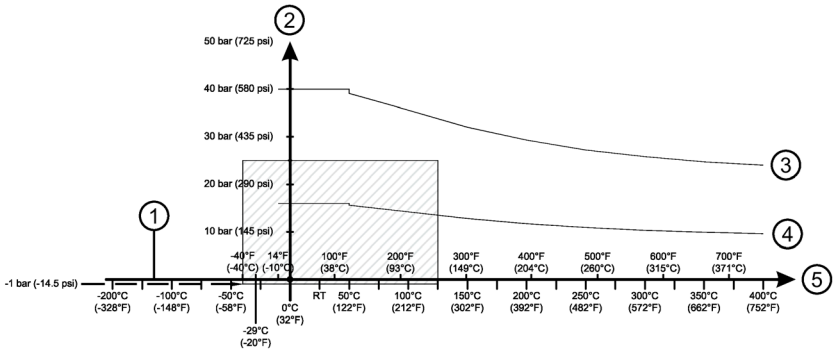
A.6.5 CLS200 cable, ASME welded flange



① Atmospheric
② Permitted operating pressure
③ ASME 150 lb[1)]
④ Permitted operating temperature

[1)] The curve denotes the minimum allowable flange class for the shaded area below.

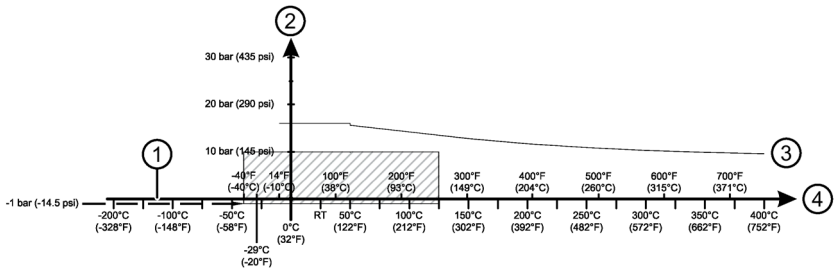
A.6.6 CLS200 compact and extended rod, EN welded flange



① Atmospheric
② Permitted operating pressure
③ PN 40[1)]
④ PN 16[1)]
⑤ Permitted operating temperature

[1)] The curves denote the minimum allowable flange class for the shaded area below.

A.6.7 CLS200 cable, EN welded flange

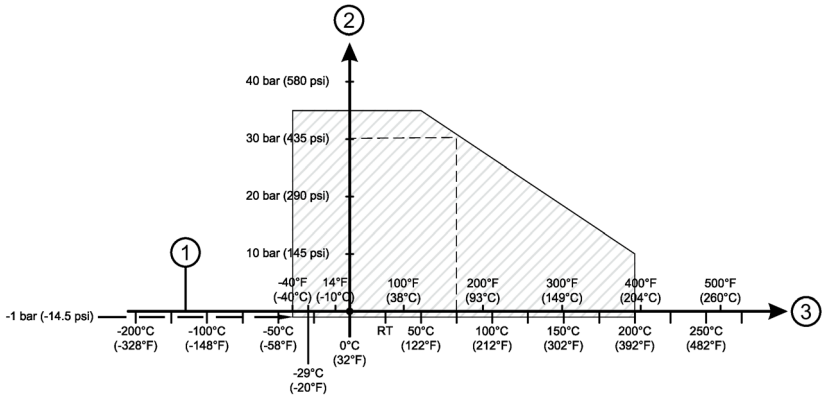


① Atmospheric
② Permitted operating pressure
③ PN 16[1)]
④ Permitted operating temperature

[1)] The curve denotes the minimum allowable flange class for the shaded area below.

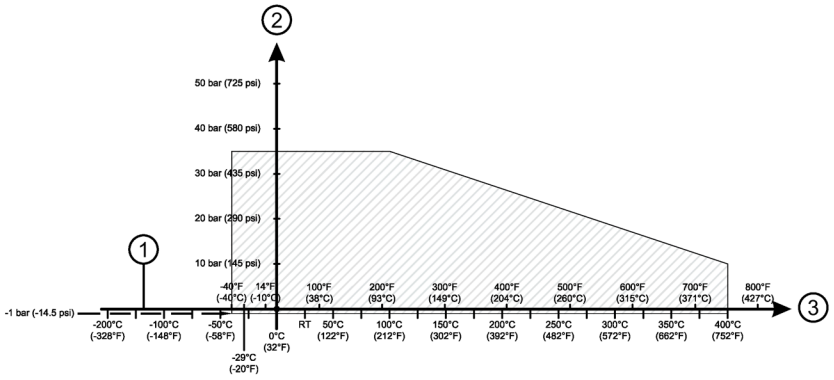
A.7 Pointek CLS300 standard pressure versus temperature curves

A.7.1 CLS300 standard, extended rod and cable versions, threaded



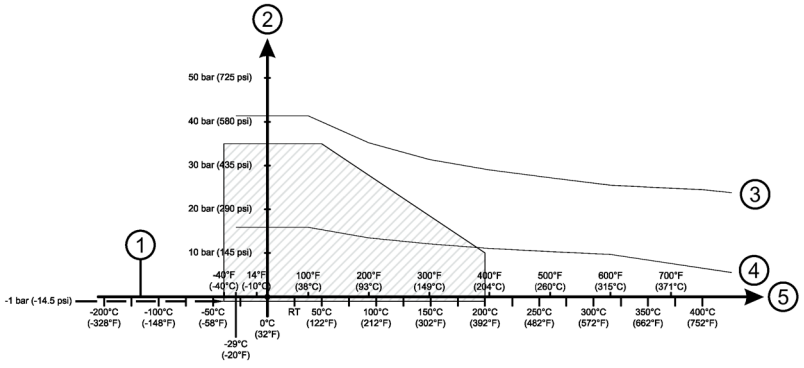
① Atmospheric
② Permitted operating pressure
③ Permitted operating temperature

A.7.2 CLS300 high temperature rod version, threaded



① Atmospheric
② Permitted operating pressure
③ Permitted operating temperature

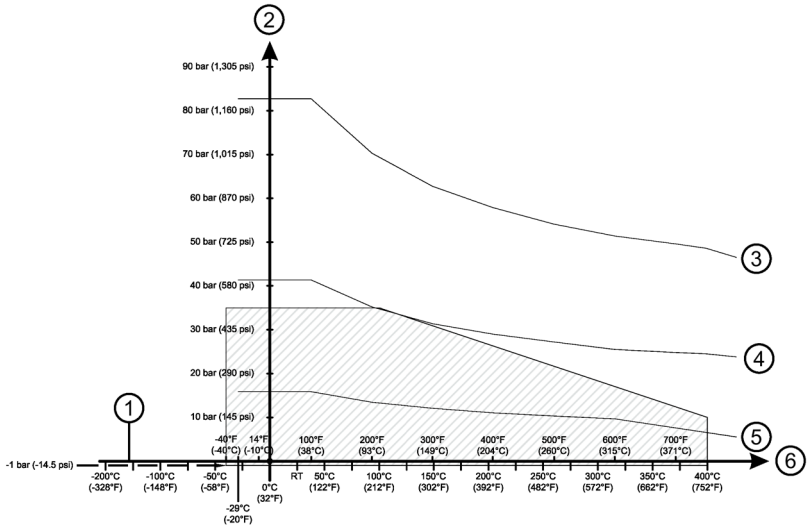
A.7.3 CLS300 standard, extended rod and cable versions, ASME welded flange



① Atmospheric
② Permitted operating pressure
③ ASME 300 lb[1)]
④ ASME 150 lb[1)]
⑤ Permitted operating temperature

[1)] The curves denote the minimum allowable flange class for the shaded area below.

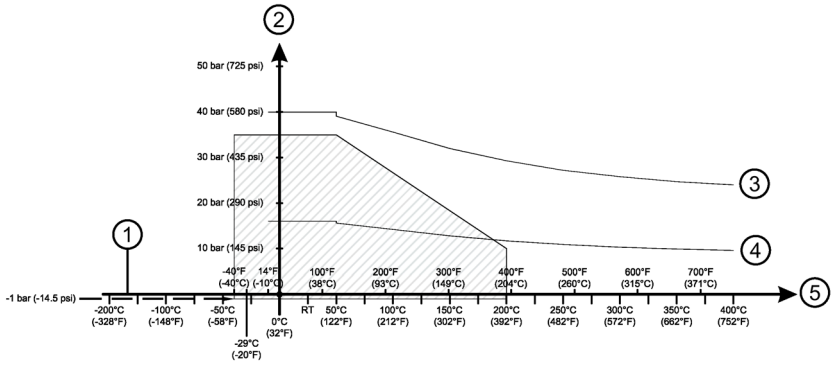
A.7.4 CLS300 high temperature rod version, ASME welded flange



① Atmospheric
② Permitted operating pressure
③ ASME 600 lb[1)]
④ ASME 300 lb[1)]
⑤ ASME 150 lb[1)]
⑥ Permitted operating temperature

[1)] The curves denote the minimum allowable flange class for the shaded area below.

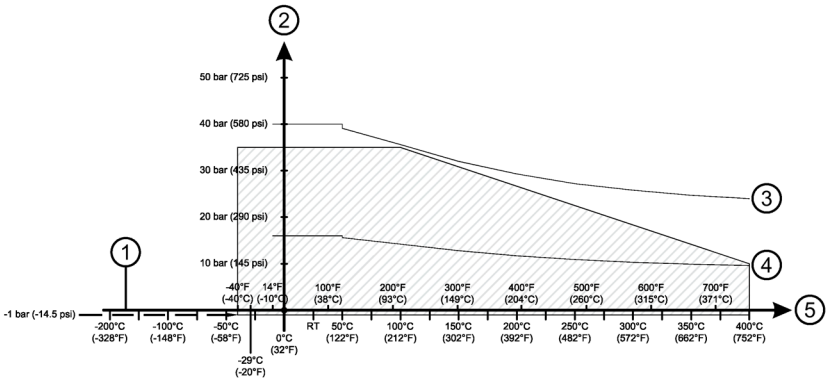
A.7.5 CLS300 standard, extended rod and cable versions, EN welded flange



① Atmospheric
② Permitted operating pressure
③ PN 40[1)]
④ PN 16[1)]
⑤ Permitted operating temperature

[1)] The curves denote the minimum allowable flange class for the shaded area below.

A.7.6 CLS300 high temperature rod version, EN welded flange



① Atmospheric
② Permitted operating pressure
③ PN 40[1)]
④ PN 16[1)]
⑤ Permitted operating temperature

[1)] The curves denote the minimum allowable flange class for the shaded area below.

Maintenance and repairs

B

Pointek CLS200/300 requires no maintenance or cleaning.

B.1 Unit Repair and Excluded Liability

All changes and repairs must be done by qualified personnel, and applicable safety regulations must be followed. Please note the following:

- The user is responsible for all changes and repairs made to the device.
- All new components must be provided by Siemens Milltronics Process Instruments Inc.
- Restrict repair to faulty components only.
- Do not re-use faulty components.

Hazardous area installation

C

C.1 Notes for use in hazardous locations

Use of this manual

For use and assembly, refer to the instructions in this manual. It contains all instructions required by ATEX Directive 2014/34/EU, Annex II, 1/0/6 and Ordinance INMETRO n°179/2010.

General notes

Refer to the appropriate certificate for application in specific hazardous environments. 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.

Qualifications of personnel / servicing / repair

- Installation and inspection of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (ABNT NBR IEC/EN 60079-14 and ABNT/NBR IEC/EN 60079-17 in Europe).
- Repair of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (e.g. ABNT NBR IEC/EN 60079-19 within Europe). Repair of flameproof path is not intended.
- 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.
- In potentially explosive atmospheres open the enclosure only when the device is not energized. Turn off power before servicing any device (the transmitter is in operation when the power supply is switched on). In case of removing the unit from vessel, take care of process pressure and material passing the opening.

ATEX list of certificates / list of standards

Certificate numbers: See EU - Declaration of Conformity for the list of standards valid for ATEX certificates.

ATEX year of manufacturing

Year of manufacture	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2029
Marking code	K	L	M	N	P	R	S	T	U	W	X

Electrostatic charge

The user shall ensure that the equipment is not installed where it may be subjected to external conditions which might cause a build-up of electrostatic charge on non-conducting surfaces.

Flameproof joints

The flameproof joints are not intended to be repaired.

Ambient and process temperature range

The relation between the ambient and process temperature ranges and the surface temperature or temperature class is shown in the thermal data tables.

Max. permitted temperature close to the enclosure

If the process temperature exceeds the max. permissible ambient temperature, the max, resulting temperature at the connection of the sensor head shall not exceed the related max. permissible ambient temperature, taking the worst case conditions into account. This shall be verified by measurement when installed.

C.2 CLS200 approvals

C.2.1 ATEX: Ex-marking (CLS200)

Dust Ignition Proof

With intrinsically safe output to probe

Integral version		II 1/2 D Ex ia/tb [ia Da] IIIC TX Da/Db
Remote version	Electronics enclosure	II 2(1) D Ex ia tb [ia Da] IIIC TX Db
	Level probe	II 1 D Ex ia IIIC TX Da II 1/2 D Ex ia IIIC TX Da/Db

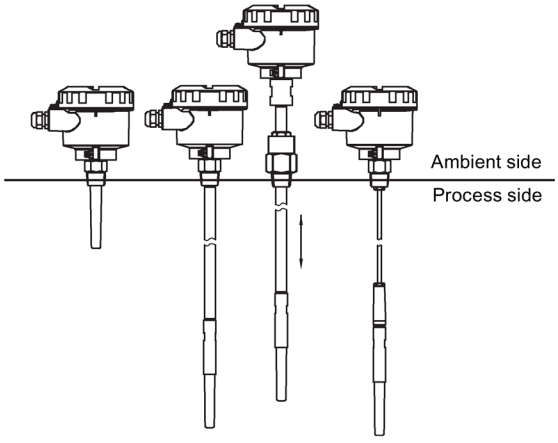
Flameproof / Dust Ignition Proof

With instrinsically safe output to probe

Integral version		II 1/2 G Ex ia/db [ia Ga] IIC TX Ga/Gb II 1/2 D Ex ia/tb [ia Da] IIIC TX Da/Db
Remote version	Electronics enclosure	II 2(1) G Ex db ia [ia Ga] IIC TX Gb II 2(1) D Ex ia tb [ia Da] IIIC TX Db
	Level probe	II 1 G Ex ia IIC TX Ga II 1 D Ex ia IIIC TX Da II 1/2 D Ex ia IIIC TX Da/Db

C.2.2 ATEX: permitted zones for installation (CLS200)

Rod version



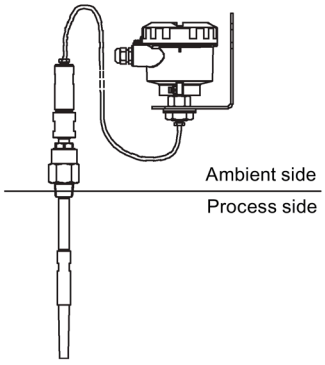
Ambient side

	Dust applications	Gas applications
Marking	Da/Db	Ga/Gb
EPL	Db	Gb
Category	2D	2G
Zone	21	1

Process side

	Dust applications	Gas applications
EPL	Da	Ga
Category	1D	1G
Zone	20	0

Cable version



Ambient side

	Dust applications		Gas applications
Marking (electronics enclosure)	Db	Db	Gb
EPL	Db	Db	Gb
Category	2D	2D	2G
Zone	21	21	1
Marking (sensor probe)	Da/Db	Da	Ga
EPL	Db	Da	Ga
Category	2D	1D	1G
Zone	21	20	0

Process side

	Dust applications		Gas applications
Marking	Da	Da	Ga
Category	1D	1D	1G
Zone	20	20	0

C.2.3 Flame Proof and Dust Ignition Proof (CLS200)

Flame Proof and Dust Ignition Proof

Applies to integral version and level probe of remote version

Ambient temperature range	Process temperature range	Max. surface temp (EPL Da)	Max. surface temp (EPL Db)	Temp class (EPL Ga or Gb)
-40 to +45 °C (-40 to +113 °F)	-40 to +45 °C (-40 to +113 °F)[2)]	T_{200} 95 °C	T55 °C	T6
-40 to +60 °C (-40 to +140 °F)	-40 to +60 °C (-40 to +140 °F)[2)]	T_{200} 110 °C	T70 °C	T5
-40 to +80 °C (-40 to +176 °F)	-40 to +95 °C (-40 to +203 °F)[1)2)]	T_{200} 145 °C	T90 °C	T4
-40 to +80 °C (-40 to +176 °F)	-40 to +125 °C (-40 to +257 °F)[1)2)]	T_{200} 175 °C	T90 °C	T3

Remote version: electronics enclosure

Ambient temperature range	Max. surface temperature (EPL Db)	Temperature class (EPL Gb)
-40 to +45 °C (-40 to +113 °F)	T55 °C	T6
-40 to +60 °C (-40 to +140 °F)	T70 °C	T6
-40 to +80 °C (-40 to +176 °F)	T90 °C	T5

[1)] For process temperature > 85 °C: only applicable for versions with thermal isolator

[2)] With option FFKM O-ring seal: lower process temperature limited to - 20 °C (-4 °F)

C.2.4 INMETRO (CLS200)

Flameproof with Intrinsically safe output to probe

Application in Zone 0 (category: 1G)

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

Application in Zone 1 (category: 2G)

Ambient temperature range	Process temperature range	Temperature class
-40 to +70 °C (-40 to +158 °F)	-40 to +85 °C (-40 to +185 °F)	T6
-40 to +85 °C (-40 to +185 °F)	-40 to +95 °C (-40 to +203 °F)[1)]	T5
-40 to +85 °C (-40 to +185 °F)	-40 to +125 °C (-40 to +257 °F)[1)]	T4

1) For process temperature > 85 °C: only applicable for versions with the thermal isolator

Dust ignition proof

The maximum surface temperature of T 100 °C is based on a maximum ambient temperature of +85 °C.

C.2.5 FM/CSA (CLS200)

Explosion Proof / Dust Ignition Proof

Ambient temperature range	Process temperature range	Temperature class
-40 to +85 °C (-40 to +185 °F)	-40 to +125 °C (-40 to +257°F)	T4

See also

FM/CSA connection drawing (Page 76)

C.3 CLS300 approvals

C.3.1 ATEX: Ex-marking (CLS300)

Dust Ignition Proof

With intrinsically safe output to probe

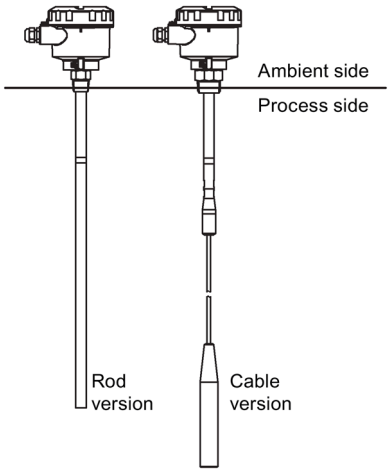
CLS300	II 1/2 D Ex ia/tb [ia Da] IIIC TX Da/Db
High temperature version	II 1/2 D Ex ia/tb [ia Da] IIIC TX Da/Db

Flameproof / Dust Ignition Proof

With intrinsically safe output to probe

CLS300	II 1/2 G Ex ia/db [ia Ga] IIC TX Ga/Gb II 1/2 D Ex ia/tb [ia Da] IIIC TX Da/Db
High temperature version	II 1/2 G Ex ia/db [ia Ga] IIC TX Ga/Gb II 1/2 D Ex ia/tb [ia Da] IIIC TX Da/Db

C.3.2 ATEX: permitted zones for installation (CLS300)



Ambient side

	Dust applications	**Gas applications**
Marking	Da/Db	Ga/Gb
EPL	Db	Gb
Category	2D	2G
Zone	21	1

Process side

	Dust applications	Gas applications
EPL	Da	Ga
Category	1D	1G
Zone	20	0

C.3.3 Flame Proof and Dust Ignition Proof (CLS300)

ATEX

Ambient temperature range	Process temperature range	Max. surface temperature (EPL Da)	Max. surface temperature (EPL Db)	Temperature class (EPL Ga or Gb)
-40 to +70 °C (-40 to +158 °F)	-40 to +75 °C (-40 to +167 °F)[1]	T_{200} 80 °C	T80 °C	T6
-40 to +80 °C (-40 to +176 °F)	-40 to +90 °C (-40 to +194 °F)[1][2]	T_{200} 95 °C	T90 °C	T5
-40 to +80 °C (-40 to +176 °F)	-40 to +125 °C (-40 to +257 °F)[1][2]	T_{200} 130 °C	T90 °C	T4
-40 to +80 °C (-40 to +176 °F)	-40 to +190 °C (-40 to +374 °F)[1][2]	T_{200} 195 °C	T90 °C	T3
-40 to +80 °C (-40 to +176 °F)	-40 to +285 °C (-40 to +545 °F)[3]	T_{200} 290 °C	T90 °C	T2
-40 to +80 °C (-40 to +176 °F)	-40 to +400 °C (-40 to +752 °F)[3]	T_{200} 405 °C	T90 °C	T1

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

[2] For process temperature > 85 °C: only applicable for versions with thermal isolator or High temperature version

[3] Only applicable for High temperature version

C.3.4 INMETRO (CLS300)

Flameproof with Intrinsically safe output to probe

Application in Zone 0 (category: 1G)

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

Application in Zone 1 (category: 2G)

Ambient temperature range	Process temperature range	Temperature class
-40 to +70 °C (-40 to +158 °F)	-40 to +80 °C (-40 to +176 °F)	T6
-40 to +85 °C (-40 to +185 °F)	-40 to +100 °C (-40 to +212 °F)[1]	T5

Ambient temperature range	Process temperature range	Temperature class
-40 to +85 °C (-40 to +185 °F)	-40 to +135 °C (-40 to +275 °F)[1)]	T4
-40 to +85 °C (-40 to +185 °F)	-40 to +200 °C (-40 to +392 °F)[1)3)]	T3
-40 to +85 °C (-40 to +185 °F)	-40 to +300 °C (-40 to +572 °F)[2)3)]	T2
-40 to +85 °C (-40 to +185 °F)	-40 to +400 °C (-40 to +752 °F)[2)3)]	T1

1) For process temperature > 85 °C: only applicable for versions with the thermal isolator or for High temperature version

2) Only applicable for High temperature version

3) Not applicable with Electronic module Digital (Profibus)

Dust ignition proof

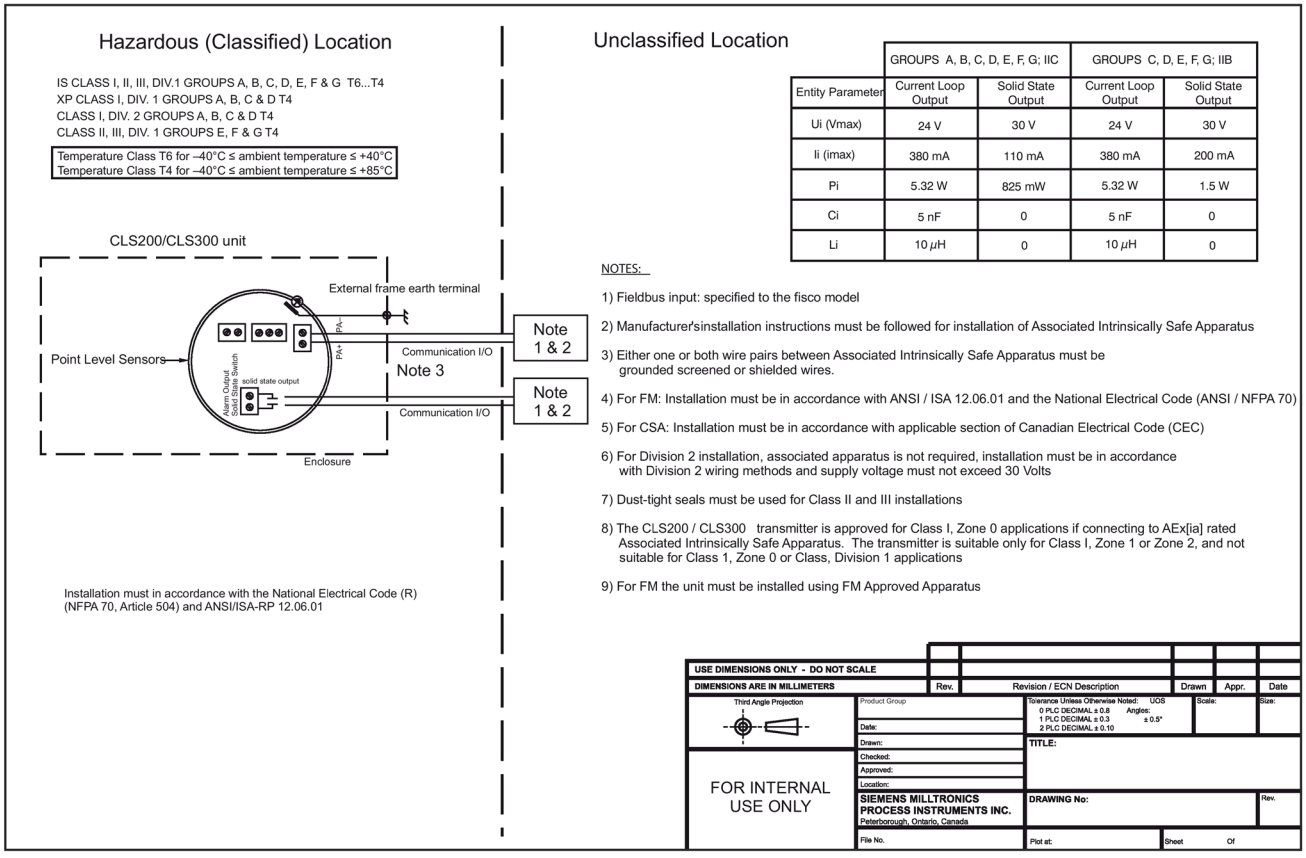
The maximum surface temperature of T 100 °C is based on a maximum ambient temperature of +85 °C.

C.3.5 FM/CSA (CLS300)

Explosion Proof / Dust Ignition Proof

Ambient temperature range	Process temperature range	Temperature class
-40 to +85 °C (-40 to +185 °F)	-40 to +125 °C (-40 to +257°F)	T4

C.4 FM/CSA connection drawing



Entity Parameter	GROUPS A, B, C, D, E, F, G; IIC		GROUPS C, D, E, F, G; IIB	
	Current Loop Output	Solid State Output	Current Loop Output	Solid State Output
Ui (Vmax)	24 V	30 V	24 V	30 V
Ii (imax)	380 mA	110 mA	380 mA	200 mA
Pi	5.32 W	825 mW	5.32 W	1.5 W
Ci	5 nF	0	5 nF	0
Li	10 μH	0	10 μH	0

NOTES:

1) Fieldbus input: specified to the fisco model

2) Manufacturer'sinstallation instructions must be followed for installation of Associated Intrinsically Safe Apparatus

3) Either one or both wire pairs between Associated Intrinsically Safe Apparatus must be grounded screened or shielded wires.

4) For FM: Installation must be in accordance with ANSI / ISA 12.06.01 and the National Electrical Code (ANSI / NFPA 70)

5) For CSA: Installation must be in accordance with applicable section of Canadian Electrical Code (CEC)

6) For Division 2 installation, associated apparatus is not required, installation must be in accordance with Division 2 wiring methods and supply voltage must not exceed 30 Volts

7) Dust-tight seals must be used for Class II and III installations

8) The CLS200 / CLS300 transmitter is approved for Class I, Zone 0 applications if connecting to AEx[ia] rated Associated Intrinsically Safe Apparatus. The transmitter is suitable only for Class I, Zone 1 or Zone 2, and not suitable for Class 1, Zone 0 or Class, Division 1 applications

9) For FM the unit must be installed using FM Approved Apparatus

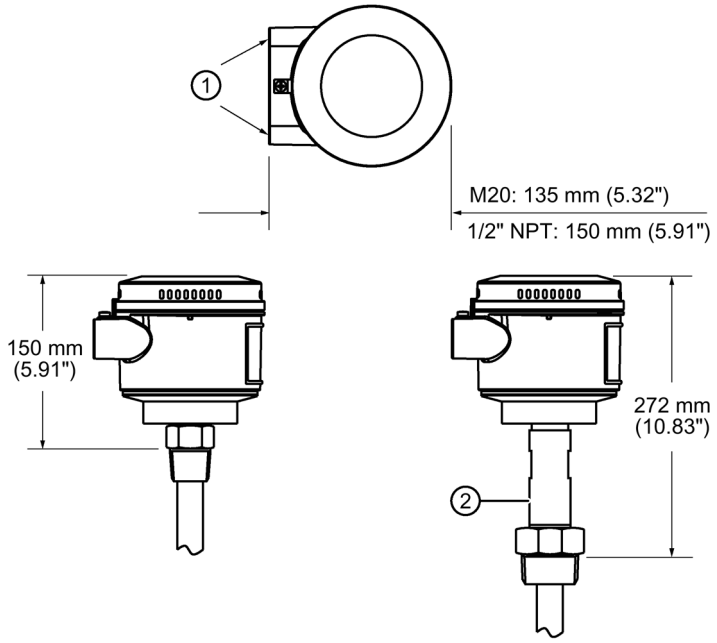
USE DIMENSIONS ONLY - DO NOT SCALE					
DIMENSIONS ARE IN MILLIMETERS	Rev.	Revision / ECN Description	Drawn	Appr.	Date
Third Angle Projection	Product Group	Tolerance Unless Otherwise Noted: UOS 0 PLC DECIMAL ± 0.8 Angles: 1 PLC DECIMAL ± 0.3 ± 0.5° 2 PLC DECIMAL ± 0.10	Scale:		Size:
	Date:				
	Drawn:	TITLE:			
	Checked:				
FOR INTERNAL USE ONLY	Approved:				
	Location:				
	SIEMENS MILLTRONICS PROCESS INSTRUMENTS INC. Peterborough, Ontario, Canada	DRAWING No:			Rev.
	File No.	Plot at:	Sheet	Of	

Dimensions

D

D.1 CLS200

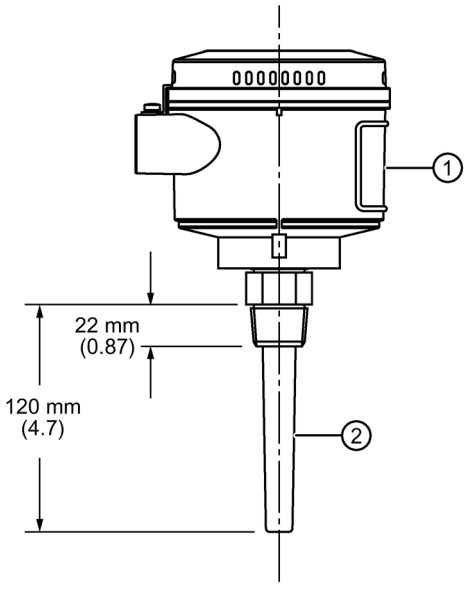
Enclosure, threaded process connection



① 2 cable entries
1/2 NPT or M20x1.5

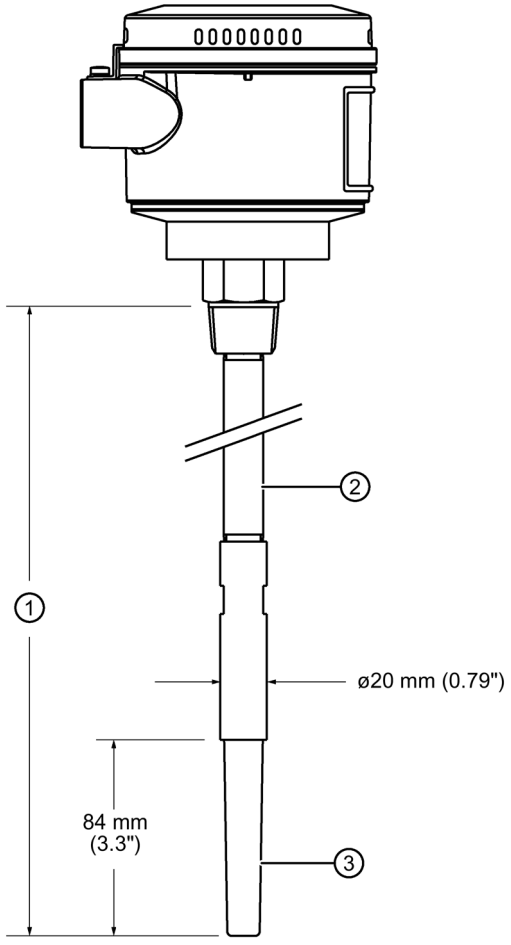
② Therman isolator

Compact version, threaded



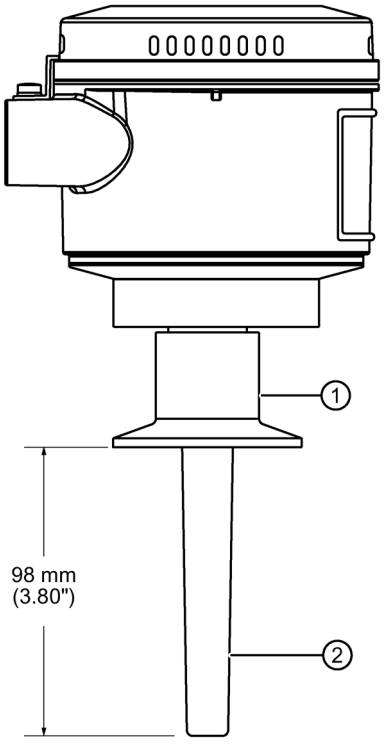
① Electronics/enclosure
② PPS or optional PVDF probe

Extended rod version, threaded



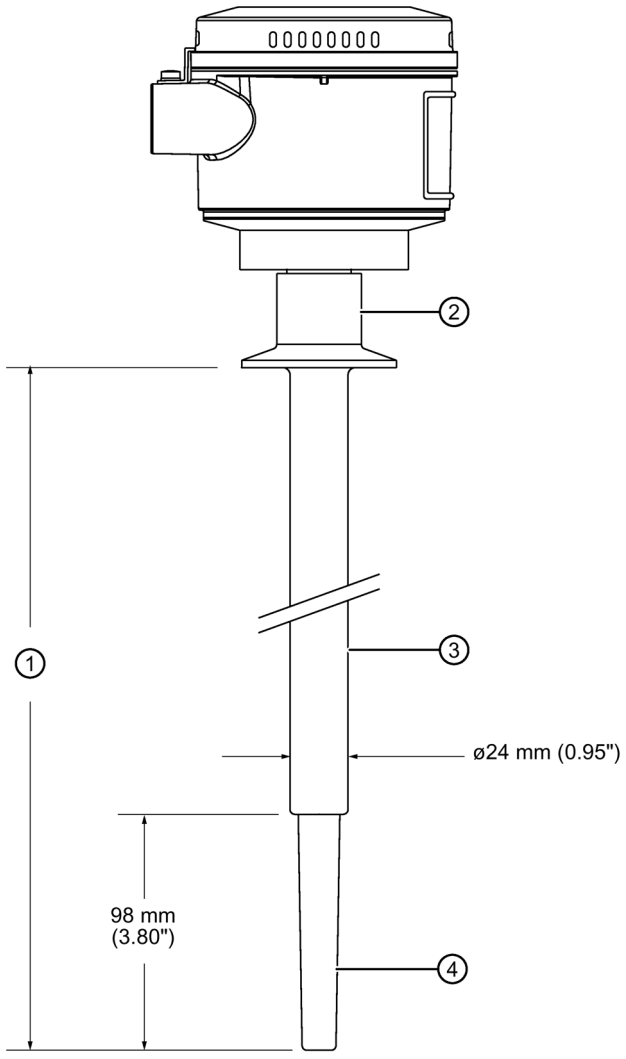
① Y01 (insertion length)
Min. insertion length = 200 mm (7.87")
Max. insertion length = 5500 mm (216")
② 316 L stainless steel extension
③ PPS or optional PVDF probe

Sanitary compact version



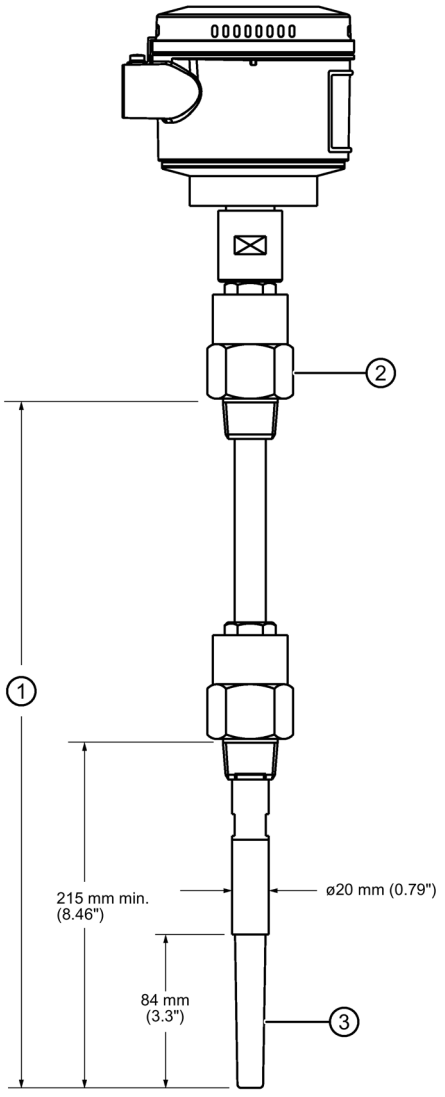
① 316L stainless steel sanitary process connection
② PPS or optional PVDF probe

Sanitary extended version



① Y01 (insertion length)
Min. insertion length = 110 mm (4.3")
Max. insertion length = 5500 mm (216")
② 316L stainless steel sanitary process connection
③ 316L stainless steel extension
④ PPS or optional PVDF probe

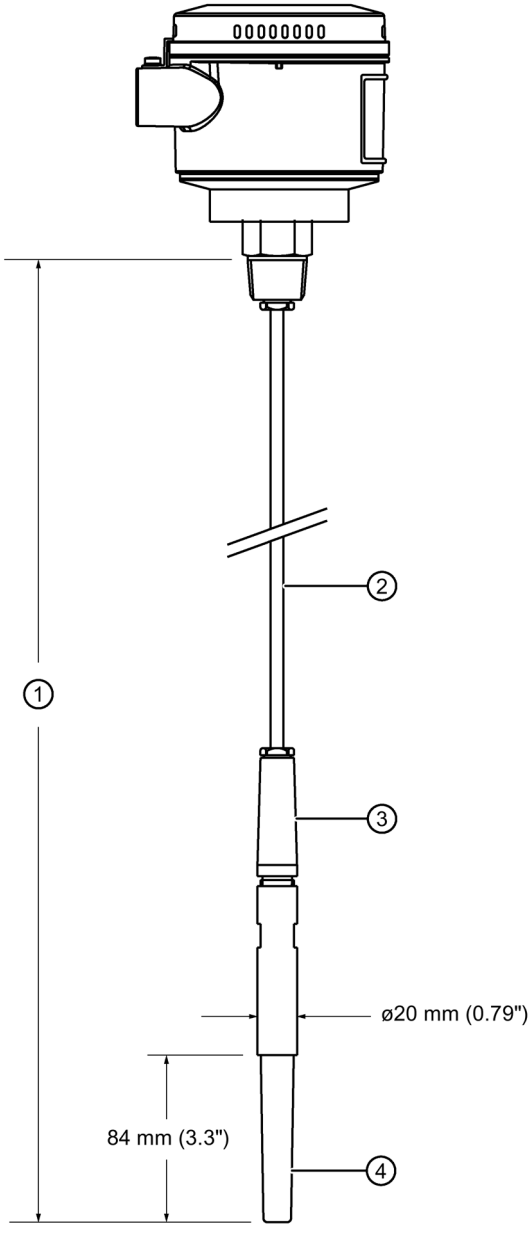
Sliding coupling version, threaded



① Y01 (insertion length)
Min insertion length = 350 mm (13.82")
Max insertion length = 5500 mm (216")
② 316L stainless steel sliding coupling
③ PPS or optional PVDF probe

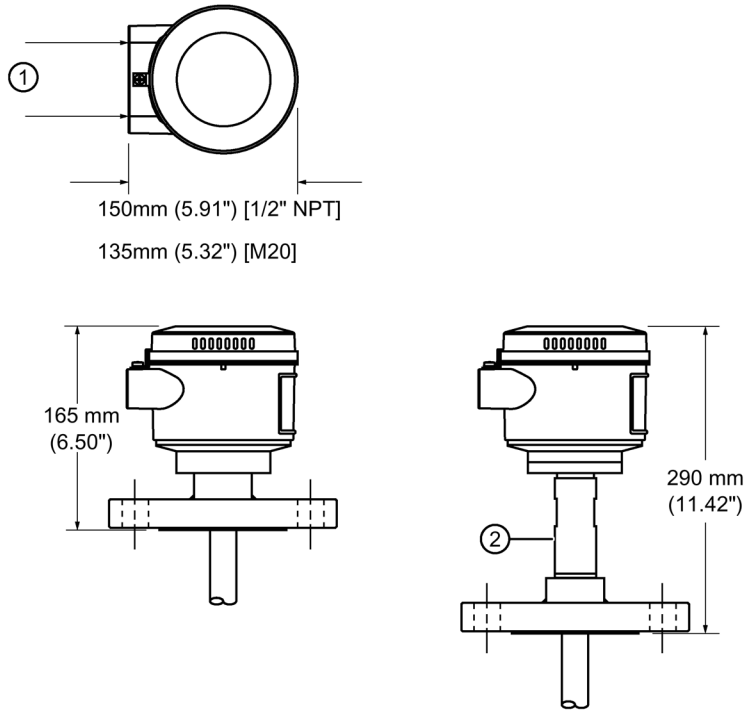
Extended cable version, threaded

Applicable for liquids and solids applications. Cable can be shortened on site.



① Y01 (insertion length)
Min. insertion length = 500 mm (19.69")
Max. insertion lenth = 35000 mm (1378")
② FEP insulated cable ∅ 6 mm (0.3")
③ 316L stainless steel sensor weight
④ PPS or optional PVDF probe

CLS200 - flanged process connections

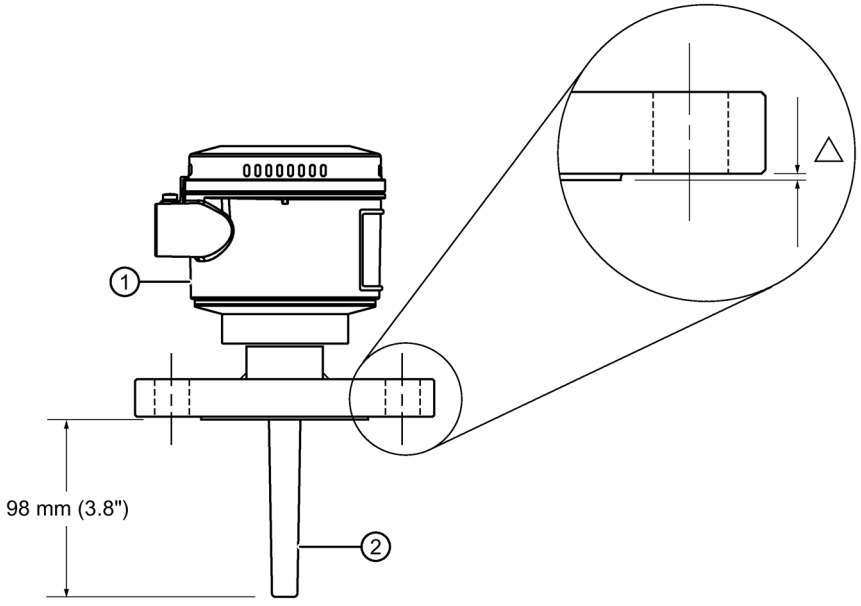


① 2 cable entries 1/2" NPT or M20x1.5
② Thermal isolator

Flange facing table

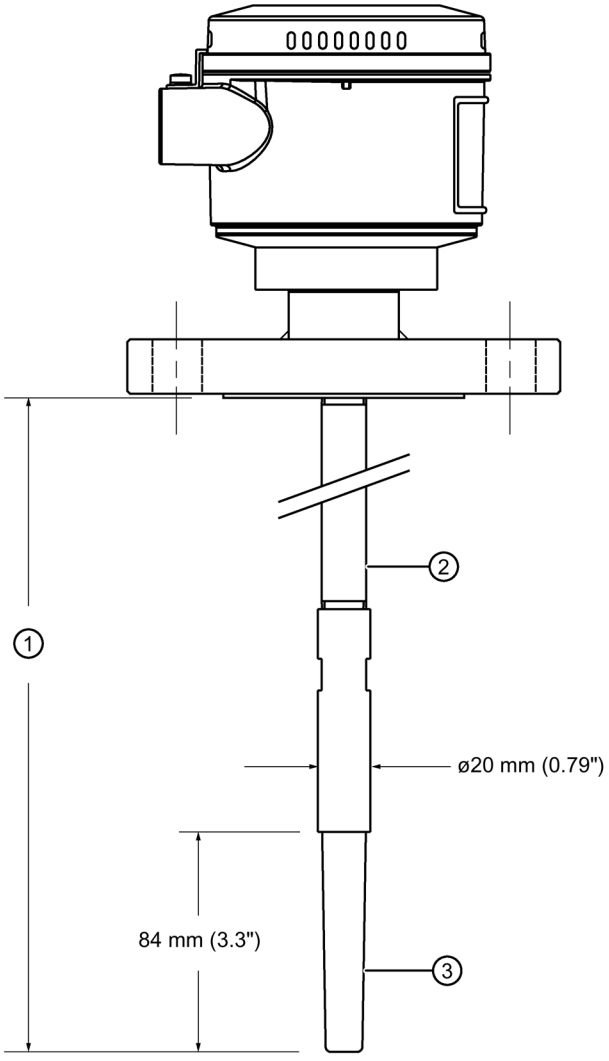
Flange Facing (raised face)	
Flange Class	**Facing thickness**
Δ ASME150/300	2 mm (0.08")
Δ ASME600/900	7 mm (0.28")
Δ PN16/40	2 mm (0.08")

Compact version, welded flange



① Electronics/enclosure
② PPS or optional PVDF probe

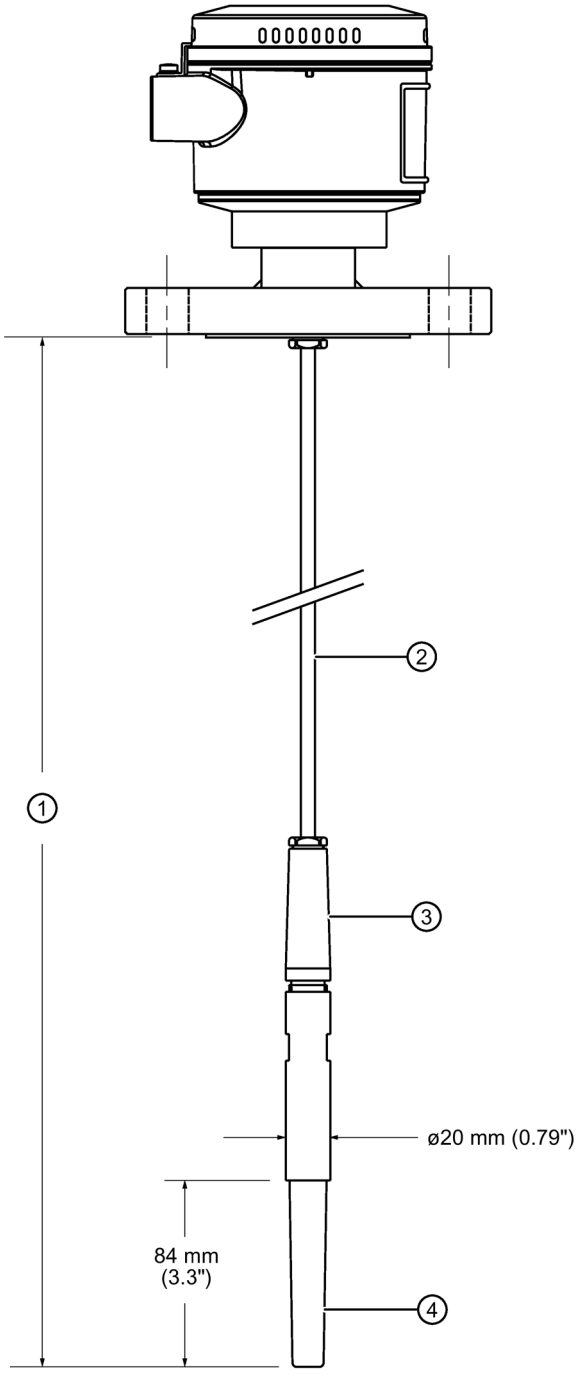
Extended rod version, welded flange



① Y01 (insertion length)
Min. insertion length = 200 mm (7.87")
Max. insertion length = 5500 mm (216")
② 316L stainless stell extension
③ PPS or optional PVDF probe

Extended cable version, welded flange

Applicable for liquids and solids applications. Cable can be shortened on site.



① Y01 (insertion length)
Min. insertion length = 500 mm (19.69")
Max. insertion length = 30000 mm (1181")

② FEP insulated cable ∅ 6 mm (0.3")

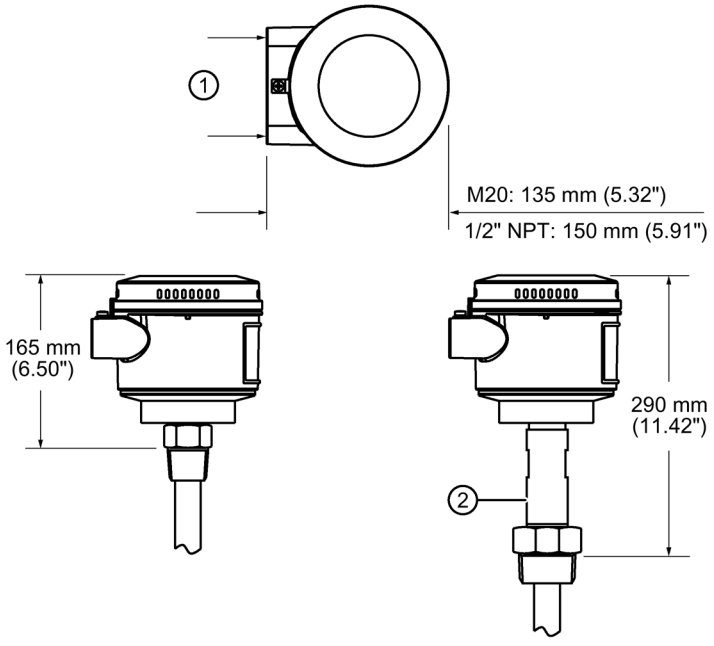
③ 316L stainless steel sensor weight

④ PPS or optional PVDF probe

D.2 CLS300

D.2.1 CLS 300 dimensions

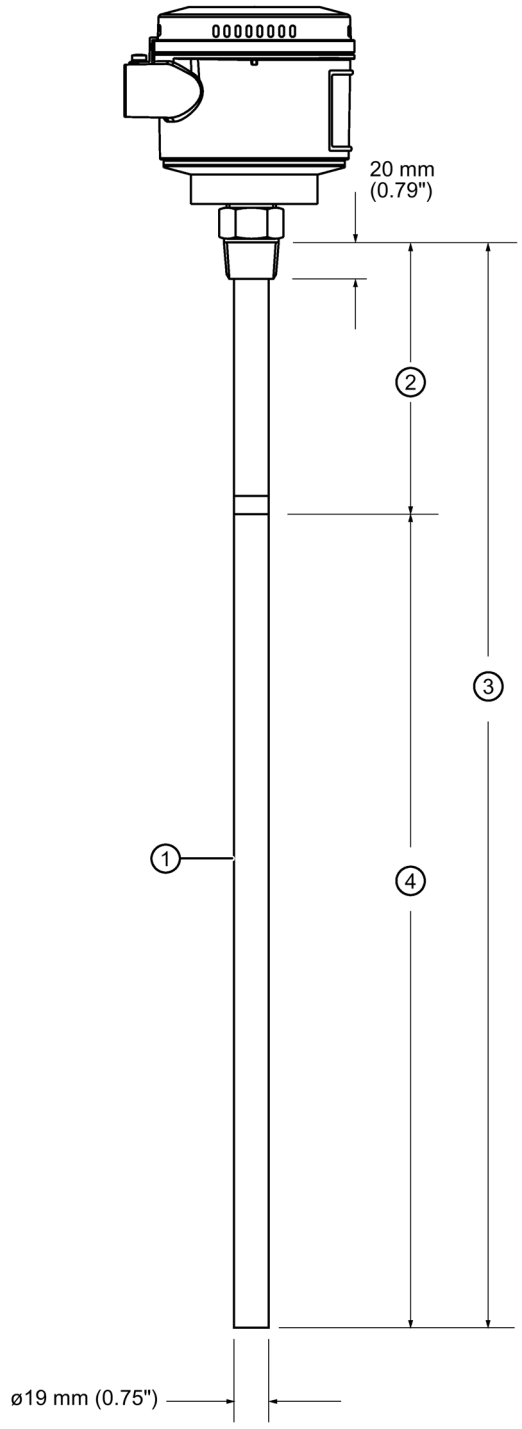
Threaded process connection



① 2 cable entries
1/2" NPT or M20x1.5

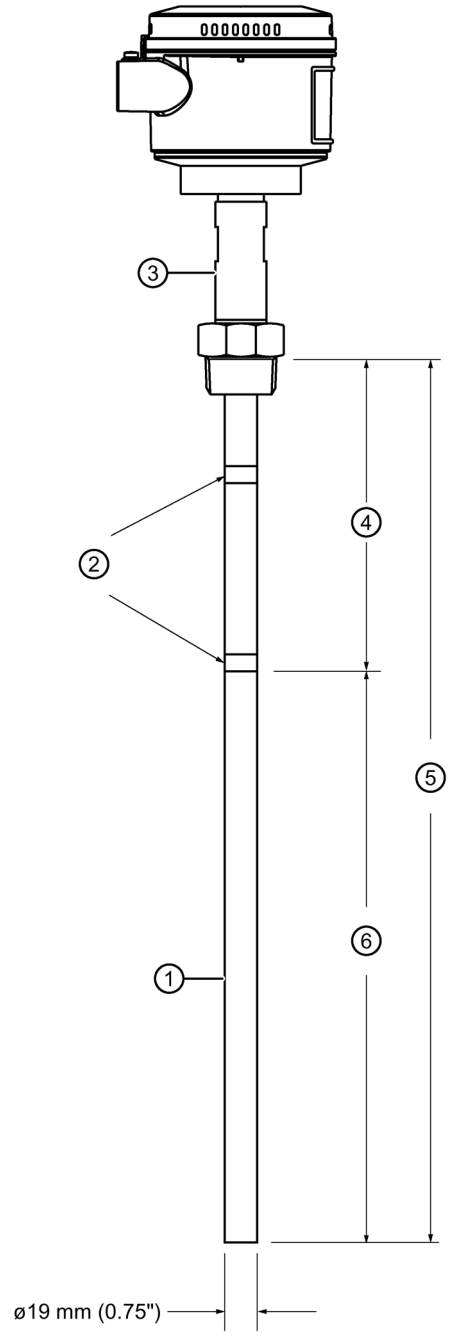
② Thermal isolator

Rod version, threaded



① Probe
② Y02[1)]
③ Y01 (insertion length)
④ Measuring length

High temperature rod version, threaded

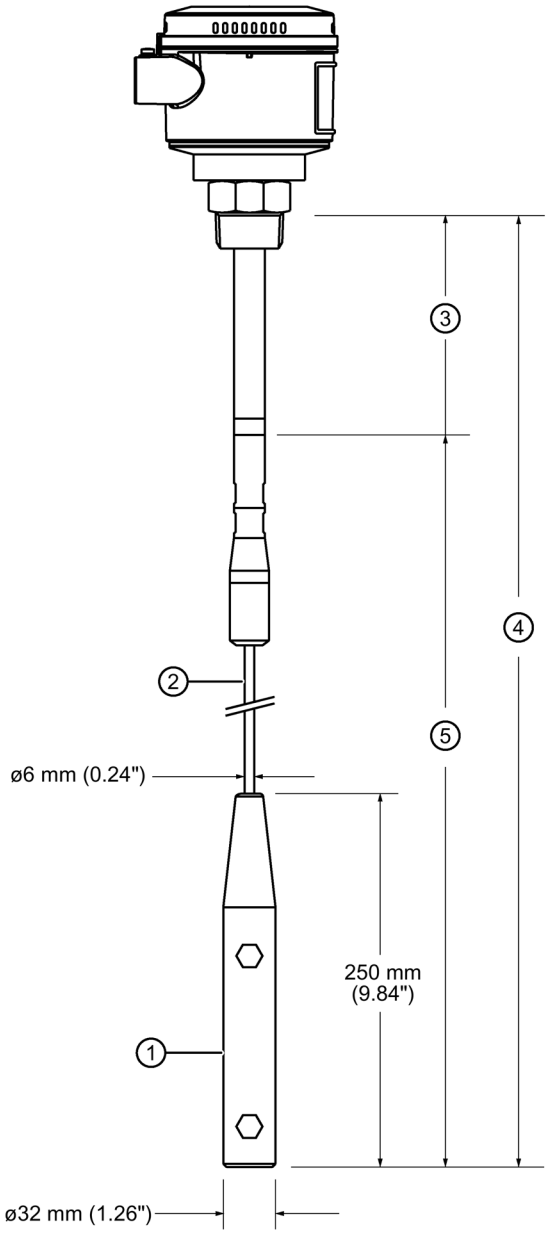


① Probe
② Ceramic insulator(s)
③ Thermal isolator
⑤ Y01 (insertion length)
Min.= 350 mm (14")
Max. 1000 mm (39")

④ Y02
Extended active shield (Y02): standard length 125 mm (4.92")
Optional active shield lengths: 250 mm (9.84") or 400 mm (15.75")

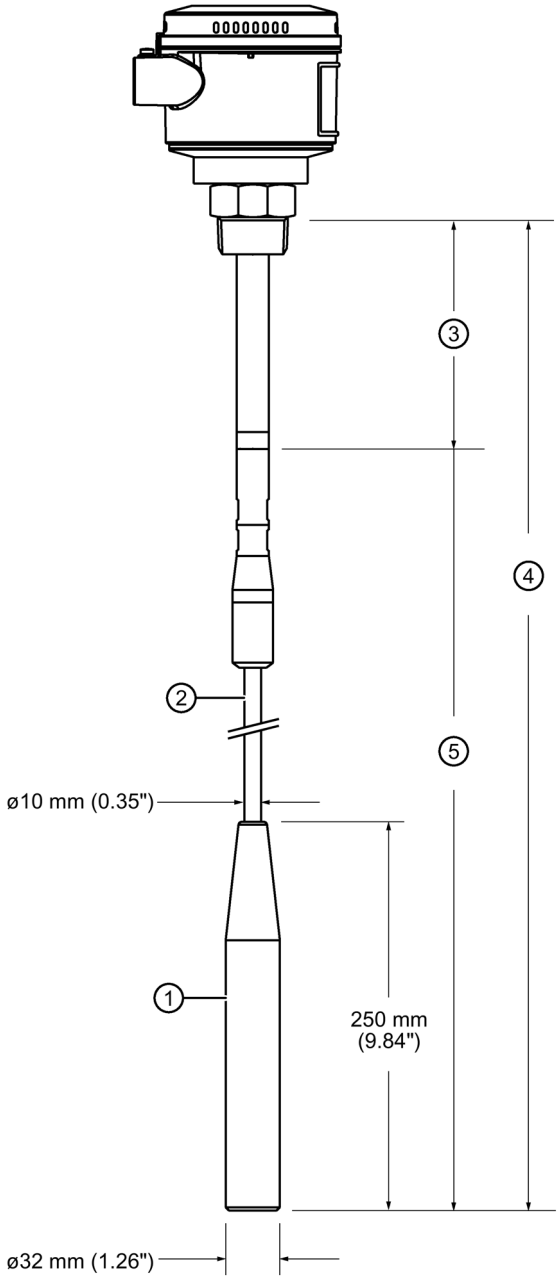
⑥ Measuring length

Non-insulated cable version, threaded



① Stainless steel weight
② Stainless steel cable
③ Y02
Extended active shield (Y02): standard length 125 mm (4.92")
Optional active shield lengths: 250 mm (9.84") or 400 mm (15.75")
④ Y01 (insertion length)
Min = 1000 mm (40")
Max = 25000 mm (984")
⑤ Measuring length

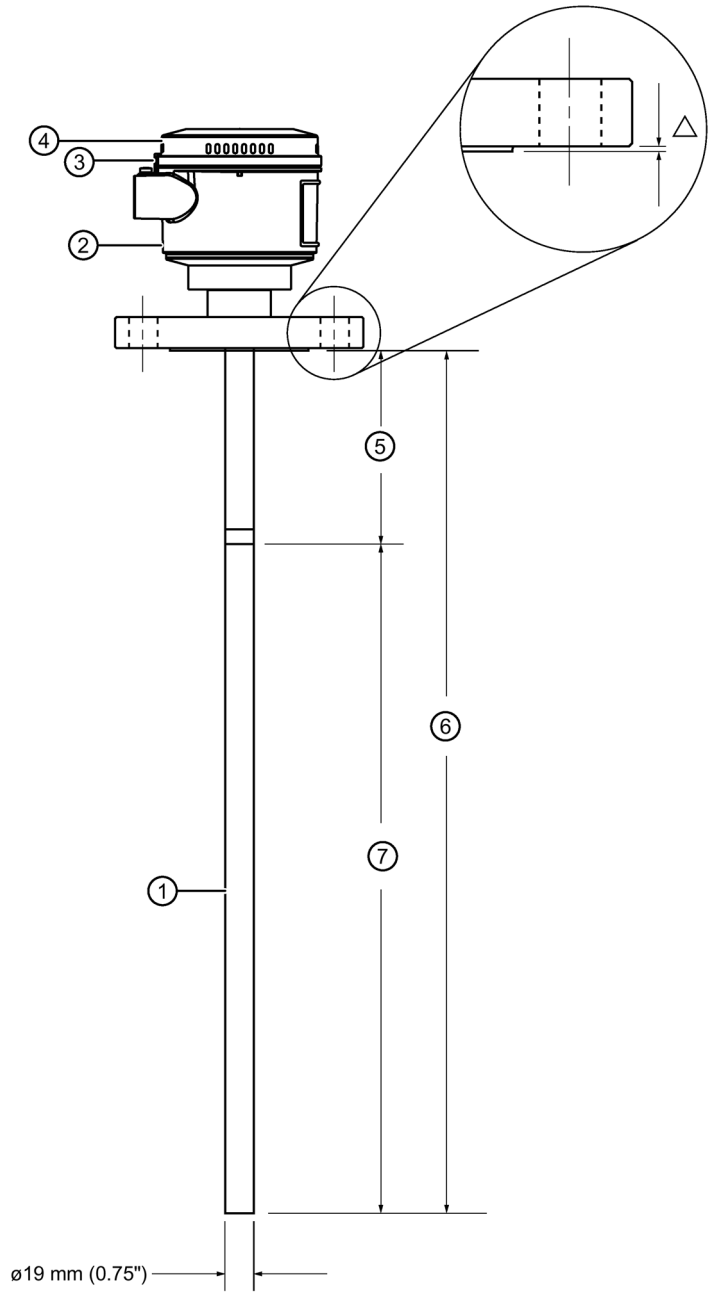
Insulated cable version, threaded



① Stainless steel weight
② PFA insulated cable
③ Y02[1)]
④ Y01 (insertion length)
Extended active shield (Y02): standard length 125 mm (4.92")
Optional active shield lengths: 250 mm (9.84") or 400 mm (15.75")
⑤ Measuring length

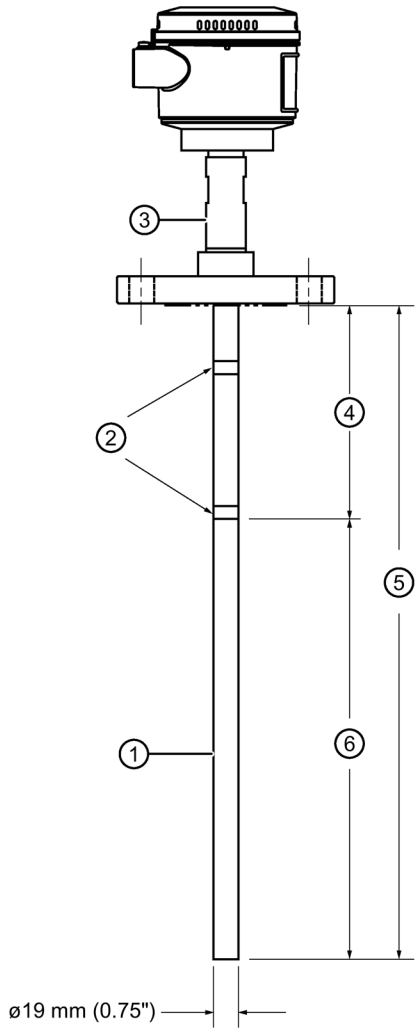
Flanged process connections

Rod version, welded flange



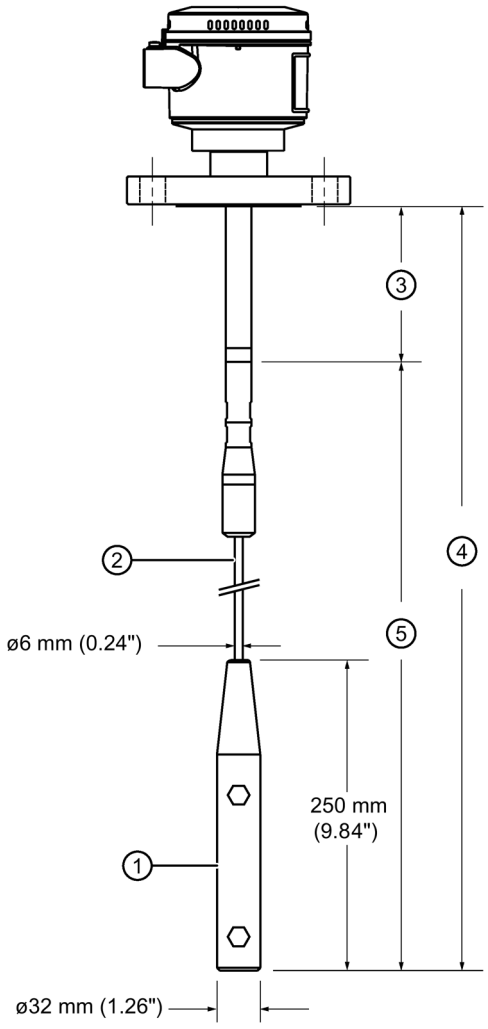
① Probe
② Electronic/enclosure
③ Lid clip
④ Lid
⑤ Active shield
⑥ Y01 (insertion length)
Min. = 250 mm (9.8")
Max. = 1000 mm (39.37")
⑦ Measuring length

High temperature rod version, welded flange



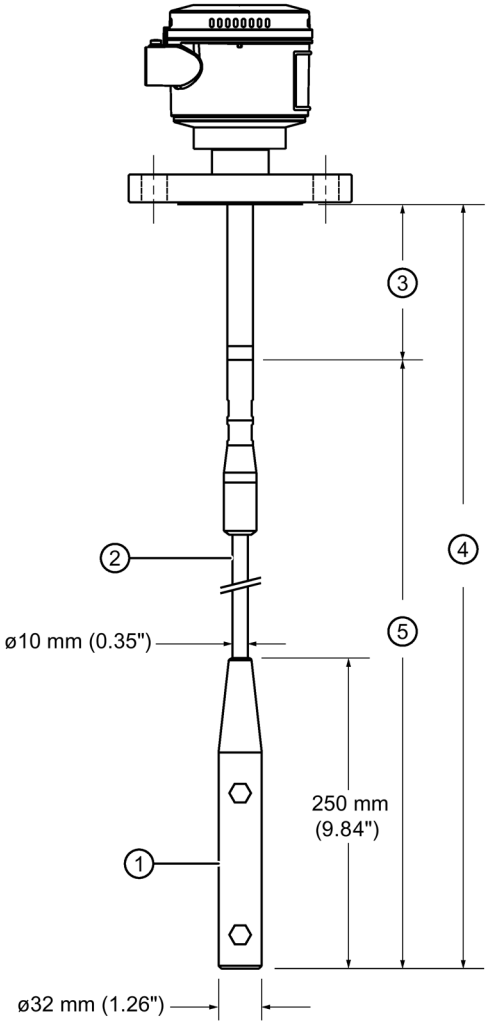
① Probe
② Ceramic insulator(s)
③ Thermal isolator
④ Y02[1)]
⑤ Y01 (insertion length)
Min. = 250 mm (9.8")
Max. 1000 mm (39.37")
⑥ Measuring length

Non-insulated cable version, welded flange



① Stainless steel weight
② Stainless steel cable
③ Y02
Extended active shield (Y02): standard length 125 mm (4.92")
Optional active shield lengths: 250 mm (9.84") or 400 mm (15.75")
④ Y01
Min = 1000 mm (40")
Max = 25000 mm (984")
⑤ Measuring length

Insulated cable version, welded flange

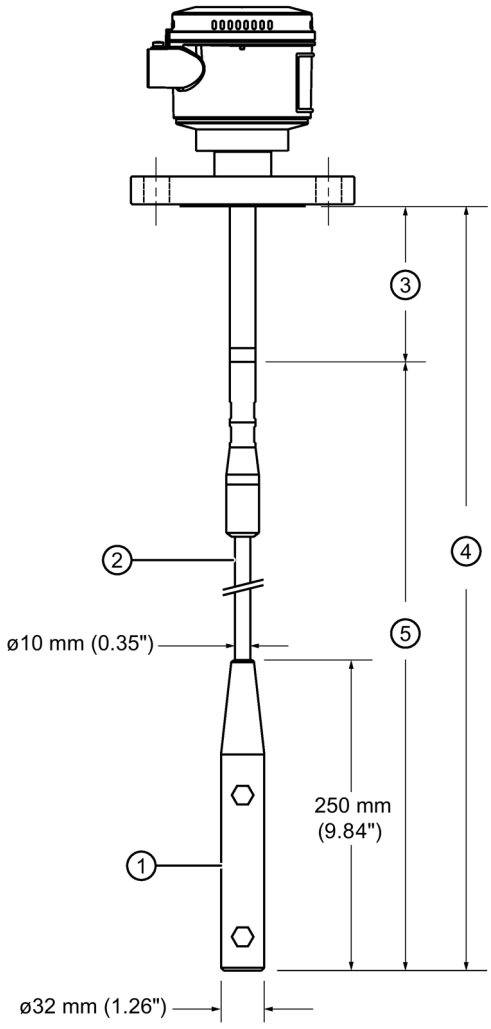


① Stainless steel weight
② PFA insulated cable
③ Y02[1)]
④ Y01[2)]
⑤ Measuring length

[1)] Extended acutive shield (Y02): standard length 105 mm (4.13"). Optional active shield lengths: 230 mm (9.06") or 380 mm (14.96")

[2)] Insertion length does not include any raised face/gasket face dimension (see Flange facing table (Page 100))

Insulated cable version, welded flange



① Stainless steel weight
② PFA insulated cable
③ Y02
Extended active shield (Y02): standard length 105 mm (4.13")
④ Y01 (insertion length)
Insertion length does not include any raised face/gasket face dimensions (see Flange facing table (Page 100))
⑤ Measuring lenth

D.2.2 Flange facing table

Flange Facing (raised face)	
Flange Class	**Facing thickness**
Δ ASME150/300	2 mm (0.08")
Δ ASME600/900	7 mm (0.28")
Δ PN16/40	2 mm (0.08")

Shortening the cable

E

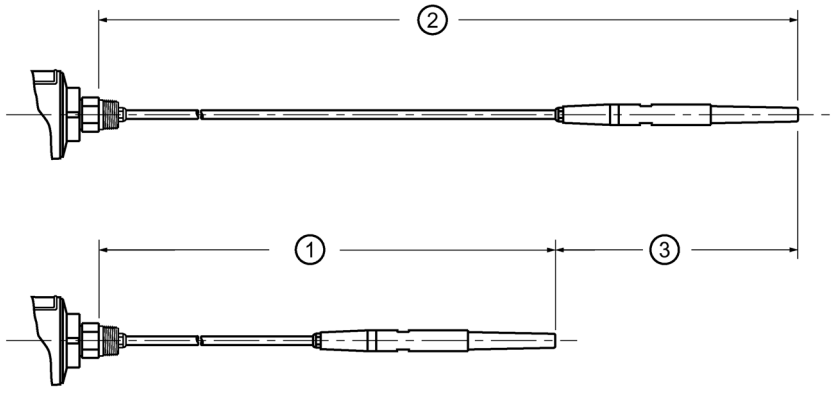
E.1 Pointek CLS200 Standard, cable version

⚠ CAUTION
Possible only with the general purpose configuration; please verify against product nameplate.

Preparation

Determine the required cable length, and subtract that amount from the actual length, to find the excess length to cut off.

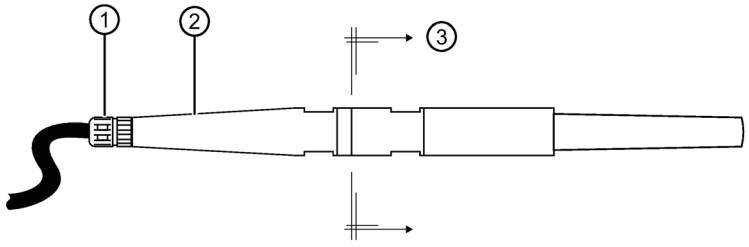
For example: 10 m (actual length) minus 9 m (required length) = 1 m (excess)



① Required length
② Actual length
③ Excess length

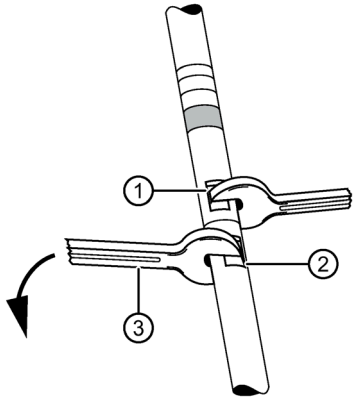
Steps

1. Unscrew the cable gland compression nut to relieve the sealing cone and release the cable.



① Cable gland compression nut
② Probe sleeve
③ Probe, lower assembly

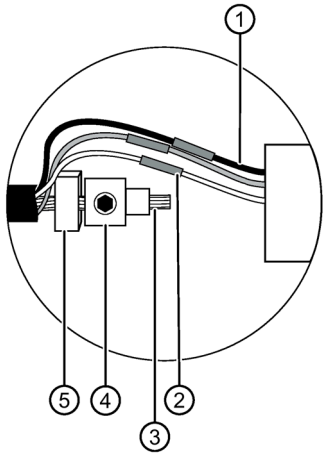
2. Unscrew the probe sleeve from the lower assembly using two 17 mm (0.67") wrenches across the flat surfaces, as shown below.



① Flat surface
② Flat surface
③ Lower wrench

– Place two wrenches on the flat surfaces of the probe as shown: hold the probe sleeve still, and turn the lower wrench counter-clockwise to loosen the probe lower assembly.
– Remove the lower assembly by turning the threaded electrode end counter-clockwise: this exposes the three leads, the tension block, and the steel spacer.

3. Remove the heat shrink insulation covering the solder connections.



① Lead
② 9.5 mm (0.37") heat shrink insulation
③ Cable core
④ Tension block
⑤ Steel spacer

4. Unsolder the connections.

Note

Do not cut the connections to the probe leads, as this can render them too short to work with later.

5. Remove the tension block, and save it for re-use in step 7.
6. Calculate the excess cable, then add back an allowance of 75 mm (3") for making the connections:

   For example, 1000 mm = excess

   less 75 mm = allowance for connections

   925 mm = excess cable to be removed 7.

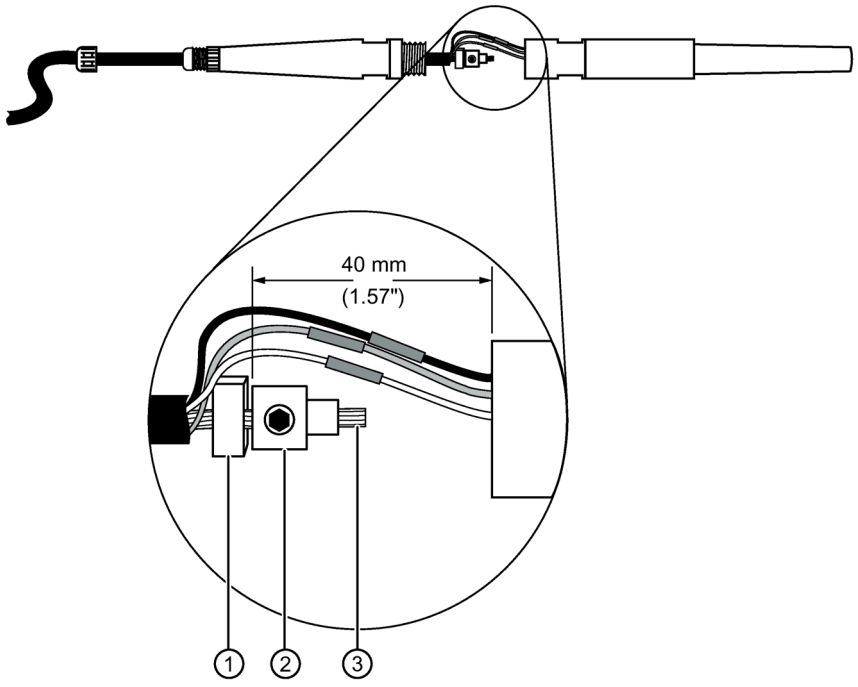
7. Cut off the excess cable.

⚠ CAUTION

To prevent wires from being pulled through the cable bundle, secure each wire close to where the outer black jacket stops prior to stripping cable insulation from it.

8. Remove approximately 75 mm (3") of cable jacket, shield, and filler strands.
9. Cut off the excess cable core, making sure the cut is clean and square
10. Replace the steel spacer and tension block, then shorten the leads to approximately 40 mm (1.6").

11. Prepare the leads for soldering, and if heat shrink is used to insulate splices, remember to slip on the heat shrink before soldering the leads.
12. Make the solder connections and position the heat shrink to completely insulate each solder connection before shrinking it.



① Steel spacer
② Tension block
③ Core

13. Remove any excess cable core, if necessary.
14. Apply PTFE type tape/sealant to all threads.
15. Add a pre-twist to the wires before screwing the probe sleeve and lower probe assembly together: hold the probe sleeve still, and gently turn the lower probe assembly counter-clockwise about 5 full turns. This avoids the wires being broken when the probe and probe sleeve are assembled.
16. Screw the lower probe assembly clockwise into the probe sleeve, and tighten it with a 17 mm (0.67") wrench.

See also

Functionality tests - CLS200 (Page 33)

E.2 Pointek CLS300 Standard, cable version

CAUTION
When shortening a PFA cable, be sure to take extra care not to damage the PFA coating.

Methods

1. An angle grinder (preferably with a disc suitable for stainless steel)

   Or

2. Wire cutters (suitable for piano cable Ø 6 to 9 mm).

Procedure

1. Loosen the three set screws and pull weight from the cable.
2. Grind/cut the cable to the required length, and then remove rough edges from the cable.
3. Ensure that cable strands are properly seated in the lay of the cable (i.e. no wire strands sticking outside the normal cable profile). Make sure ALL strands are properly seated before continuing the assembly.
4. Push the weight onto the cable while simultaneously rotating it counter-clockwise around the cable. Make sure that no cable strands are pushed out of their position in the cable and that the cable is fully inserted.
5. Re-fasten the weight by tightening the three set screws.

Application

F

F.1 Level detection

Note

- For a more detailed explanation, please see Operating principles (Page 56).
- For more detailed instructions on setting the dip switches and potentiometers, please see Pointek CLS200 (Page 36) (for CLS200) or Pointek CLS300 (Page 42) (for CLS300).

The difference in capacitance between a covered probe and an uncovered probe (for example, between a probe in water and a probe in air), is used to detect level, and to protect the process from a level that is either too high or too low.

The trip point is set by potentiometer P2. This determines how large the difference in capacitance needs to be before the output is switched. The sensitive electronics can be set to detect the change in capacitance either as the level approaches the probe tip, or when the probe is covered.

F.2 Alarm signaling

Relay and Solid-state Switch

The relay and solid-state switch are interlinked: when the change in capacitance is greater than the setting at the trip point, the output switches. (For a diagram illustrating the relay and solid-state switch contacts, see Pointek CLS200 (Page 36) (for CLS200) or Pointek CLS300 (Page 42) (for CLS300).)

Relay	Red LED	Solid-state switch	Alarm state
Energized	On	Closed	OFF
De-energized	Off	Open	ON

Alarm settings

The alarm can be set to protect the process from a level that is either too high or too low.

- high alarm: alarm ON/switch open when level is higher than the set point (probe becomes covered[1)])
- low alarm: alarm ON/switch open when level is below the set point (probe becomes uncovered)

The setting is selected by turning dip switch 3 on or off.

[1] Or, if the trip point is set to detect the approaching level, when that trip point is reached.

F.3 Fault signaling

The Failsafe function puts the process into a safe mode of operation in the event of a fault or failure (such as a loss of power). When the Pointek CLS200/300 standard model responds to a failure, the output switches according to the Failsafe setting [2] . There are two Failsafe options:

- Failsafe High
- Failsafe Low

Note

The following examples assume that the pump should be turned off in the event of a failure. If this is not the case in your process, please see the relay diagram on Pointek CLS200 (Page 36) (for CLS200) or Pointek CLS300 (Page 42) (for CLS300), and make the appropriate connections to suit your application.

Failsafe High is used in applications where Pointek CLS200/300 is set to turn off a pump when the level becomes too high (probe covered, or level too close to probe). When Failsafe High is selected, the device will respond to a failure (regardless of the true level) as if it were a high level alarm (alarm ON/solid-state switch open). The pump will stop, preventing an overfill.

Failsafe Low is used in applications where CLS200/300 is set to turn off a pump when the level becomes too low (probe uncovered). When Failsafe Low is selected, CLS200/300 will respond to a failure (regardless of the true level) as if it were a low level (alarm ON/ solid-state switch open). The pump will stop, preventing the pump from running dry.

	Failsafe High				**Failsafe Low**			
	no fault		fault		no fault		fault	
probe	uncov-ered	covered	uncov-ered	covered	uncov-ered	covered	uncov-ered	covered
switch	CLOSED	OPEN	OPEN		OPEN	CLOSED	OPEN	
alarm	OFF	ON	ON	ON	ON	OFF	ON	

[2] See Failsafe/Alarm Setting: S3 underSwitch bank (Page 38) (for CLS200) or in Switch bank (Page 44) (for CLS300) for details.

Product documentation and support

G

G.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.

G.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/service&support).

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

Glossary

capacitance

the property of a system of conductors and dielectrics that permits the storage of electricity when potential differences exist between the conductors. Its value is expressed as the ratio of a quantity of electricity to a potential difference, and the unit is a Farad.:

capacitor

a device in a circuit that has the potential to store an electric charge. Typically a capacitor has 2 conductors or electrodes separated by a layer of a nonconducting material called a dielectric. With the conductors on opposite sides of the dielectric layer oppositely charged by a source of voltage, the electrical energy of the charged system is stored in the polarized dielectric.

derating

to decrease a rating suitable for normal conditions according to guidelines specified for different conditions.

dielectric

a nonconductor of electric current.[1)]

[1)] Many conductive liquids/electrolytes exhibit dielectric properties; the relative dielectric constant of water is 80.

immiscible

incapable of mixing or attaining homogeneity.

implicit

for example in “the units are implicit in pF”, the units are implied, or assumed to be pF, because there is no other option.

miscible

capable of being mixed.

relative dielectric constant

the ability of a dielectric to store electrical potential energy under the influence of an electric field. This is measured by the ratio of the capacitance of a condenser with the material as

dielectric to its capacitance with vacuum as dielectric. The value is given relative to a vacuum /dry air: the relative dielectric constant of air is 1[1)].

[1)] Many conductive liquids/electrolytes exhibit dielectric properties; the relative dielectric constant of water is 80.

repeatability

the closeness of agreement among repeated measurements of the same variable under the same conditions.

saturation

a condition in which any further change of input no longer results in a change of output. For example, "the loop-current will saturate to 3.8 or 20.5 if the level exceeds the Range settings"

solid-state device

a device whose function is performed by semi-conductors or the use of otherwise completely static components such as resistors and capacitors.

stilling-well

a grounded metal tube with openings.

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