Instruction Manual · July 2004

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in one

pointek

CLS 200

SIEMENS

Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Warning: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

Note: Always use product in accordance with specifications.

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Safety Notes

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

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

WARNING[1]: 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.

Safety marking symbols

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

1. This symbol is used when there is no corresponding caution symbol on the product.

The Manual

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 CLS 200. This manual applies to the Pointek CLS 200 only.

This manual will help you set up your Pointek CLS 200 for optimum performance. Pointek CLS 200 is available in two models, and the manual is in two parts:

- Part I: Pointek CLS 200 analog model
- Part II: Pointek CLS 200 digital model with integral display
  - IIA. Information common to any digital unit
  - IIB. Standalone unit, locally controlled using 3-button keypad
  - IIC. Unit installed on a network: remote control via PROFIBUS PA, local control using 3-button keypad

Appendices provide information common to both models:

- Appendix A: Operating Principles
- Appendix B: Maintenance and Repair
- Appendix C: Shortening the cable
- Appendix D: Installation and Dimensions
- Appendix E: Approvals

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Application Examples

The application examples used in this manual illustrate typical installations using Pointek CLS 200: 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.

If you require more information, please contact your Siemens Milltronics representative. For a complete list of Siemens Milltronics representatives, go to:

www.siemens.com/milltronics.

Abbreviations and Identifications

Short form	Long Form	Description	Units
CE / FM / CSA	Conformitè Europèene / Factory Mutual / Canadian Standards Association	safety approval	
COM	common	relay input	
εr		dielectric constant	
ESD	Electrostatic Discharge		
Ex	Explosion Proof	safety approval	
Exd	Flame Proof	safety approval	
FEP	Fluorinated Ethylene Polymer	modified polymer	
FKM	Fluorelastomer		
FPM	Perfluoroelastomer		
IS	Intrinsically Safe	safety approval	
LCD	Liquid Crystal Display		
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	
PPS	Polyphenylene Sulfide	polymer	
PTFE	Polytetrafluoroethylene	thermoplastic fluoropolymer	
PVDF	Polyvinylidene Fluoride	engineered fluoropolymer	
SPDT	Single Pole Double Throw	change-over contact	

Notes

Part I: Pointek CLS 200 analog model

Pointek CLS 200 analog model

Notes:

- Pointek CLS 200 is to be used only in the manner outlined in this instruction manual, otherwise protection provided by the equipment may be impaired.
- Pointek CLS 200 is available in two models: the analog model, and the digital model with integral local display. Part I of the manual only discusses the analog model. Please see Part II, page 27 onwards, for information on the digital model

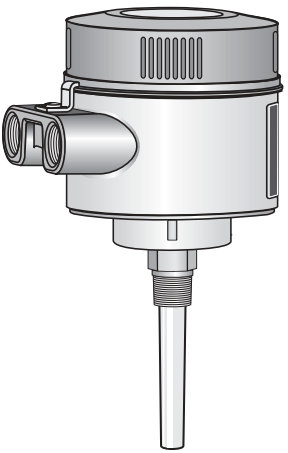
Pointek CLS 200 is a versatile capacitance switch with a high level of chemical resistance; ideal for level detection of interfaces, solids, liquids, slurries, and foam, and for simple pump control.

The switch responds to the presence of any material with a dielectric constant of 1.5 or more by detecting a change in capacitance, which is registered as a change in oscillating frequency. It can be set to detect before contact or on contact with the probe. The design 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 non-conductive vessel such as concrete or plastic.

The power supply is galvanically isolated and accepts a wide range of voltages (12- 250 V AC/DC). The stainless steel and PPS[1] materials used in the probe construction provide a high level of chemical resistance, and a temperature rating up to 125 ^{o}C (257 ^{o}F) on the process wetted portion of the probe.

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

Pointek CLS 200, analog model



1. Polyphenylene Sulfide

Pointek CLS 200 Applications

- Liquids, slurries, powders, granules, and solids
- Foods and pharmaceuticals
- Chemical and petrochemical
- High pressure and temperature

Pointek CLS 200 Features

- Potted construction protects signal from shock, vibration, humidity and/or condensation
- High chemical resistance
- Level detection independent of tank wall/pipe
- High/low gain switch covers wide range of applications/materials
- 3 LED indicator for adjustment control, output status and power
- Rigid, cable, and sanitary versions available
- Easy installation and maintenance
- Levelwatch[1] network friendly for Internet-based remote monitoring

1. Levelwatch.com provides the tools for remote monitoring and inventory management

Specifications: analog model

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

Pointek CLS 200

Power

• 12 to 250 V AC/DC	2 VA/2 W max.
• explosion proof	12 to 250 V AC/DC 2 VA/2 W max.
• auxiliary source	from power connector
• separate supply necessary	no

Performance

Measurement frequency	5.5 MHz @ εr = 1 1.1 MHz @ εr = 80
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, rated 8 A at 250 V AC/5 A at 30 V DC.
• solid-state switch	rated 250 V AC/300 V DC, 100 mA max.
• time delay	**ON/OFF alarm**, selectable 1 to 60 seconds duration

- hysteresis — dependent on εr: max. 2 mm (0.08") @ εr = 1.5
- failsafe operation — Failsafe High or Failsafe Low
- terminal — removable terminal block, 2.5 mm^2 max.
- delay timers — 2 (Alarm ON to OFF) and (Alarm OFF to ON)

Mechanical

Electrode

Model	Length (max)	Process Connections[a]	Extension	Tensile (max)	Sensor[b]
Standard	5.5 m (18 ft)	¾ " , 1" , or 1 ½" BSPT or NPT; 1 1/4" NPT only; 316[1] stainless steel	316[1] stainless steel	n/a	PPS (Polyphenylene Sulfide)[c]
Sanitary	5.5 m (18 ft)	1", 1 ½ ", and 2"; 3A compliant tri-clamp:	316[1] stainless steel	n/a	PPS (Polyphenylene Sulfide)[c]
Cable	35 m (115 ft)	¾ " , 1" , or 1 ½" BSPT or NPT; 1 1/4" NPT only; 316[1] stainless steel	FEP (Fluorinated Ethylene Polymer)	180 kg (400 lbs)	PPS (Polyphenylene Sulfide)[c]

a. Other process connections available on request.

b. Process seal (sensor to stainless steel body):
standard: FKM (Fluoroelastomer) O-ring
optional (very high chemical resistance): FPM (Perfluoroelastomer) O-ring

c. Option: PVDF (Polyvinylidene Fluoride)

1. Or 1.4404 material.

Enclosure

- termination — removable terminal block, 2.5 mm^2 max.
- construction — powder-coated aluminum with gasket
- optional thermal isolator — 316[1] stainless steel
- cable entry — 2 x M20 thread (option: 1 x 1/2" NPT with adaptor, and 1 x plugged entry)
- ingress protection — Type 4 / NEMA 4 / IP68

Note: The use of approved watertight conduit hubs/glands is required for Type 4 / NEMA 4, Type 6 / NEMA 6, IP68 (outdoor applications).

Weight

Example:

- compact Pointek CLS 200, 100 mm (4") insertion length, 3/4" process connection — 1 kg (2.20 lb.) approx.

Environmental

- location — indoor/outdoor
- altitude — 2000 m (6562 ft.) max.
- ambient temperature
  - general applications — –40 to 85 °C (–40 to +185 °F)
  - in potentially explosive atmospheres — check the temperature class shown on the product nameplate
- storage temperature — –40 to 85 °C (–40 to +185 °F)
- relative humidity — suitable for outdoor (Type 4 / NEMA 4 / IP 68)
- installation category — II
- pollution degree — 4

1. Or 1.4404 material.

Process

Note: Please see *Pressure versus Temperature Curves* on page 95.

- dielectric constant (εr) — 1.5 minimum
- temperature (at process connection) — standard configuration:
  –40 to 85 °C (–40 to 185 °F)
  standard configuration with extension:
  –40 to 125 °C (–40 to 257 °F)
  slide coupling:
  ambient temperature
- pressure (vessel) — standard configuration:
  0 to 25 bar, gauge/365 psi, gauge/2500 kPa, gauge (nominal)
  cable configuration:
  0 to 10 bar, gauge/150 psi, gauge/1000 kPA, gauge (nominal)
  slide coupling:
  ambient pressure

Approvals (verify against product nameplate)

CE, $CSA_{NRTL/C}$, FM, ATEX, 3A.

Vlarem, WHG

Lloyd's Register of Shipping, categories ENV1, ENV2, and ENV5

Application: Pointek CLS 200 analog model

Level Detection

Note:
- For a more detailed explanation, please see *Operating Principles* on page 94.
- For more detailed instructions on setting the dip switches and potentiometers, please see *Operation: Pointek CLS 200 analog model* from page 19 onwards.

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 P1. This determines how large the difference in capacitance needs to be before the output is switched. Dip switch 5 allows you to adjust the sensitivity. The sensitive electronics can be set to detect the change in capacitance either as the level approaches the antenna tip, or when the probe is covered.

Alarm Signalling

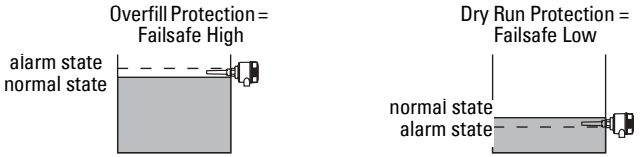
Relay and Solid-state Switch

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 page 20.)

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.

Fault Signalling

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 CLS 200 analog 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 page 20, and make the appropriate connections to suit your application.

Failsafe High is used in applications where Pointek CLS 200 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 CLS 200 is set to turn off a pump when the level becomes too low (probe uncovered). When Failsafe Low is selected, CLS 200 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	uncovered	covered	uncovered	covered	uncovered	covered	uncovered	covered
switch	CLOSED	OPEN	OPEN		OPEN	CLOSED	OPEN	
alarm	OFF	ON	ON		ON	OFF	ON	

1. Or, if the trip point is set to detect the approaching level, when that trip point is reached.
2. See *Failsafe/Alarm Setting: S3* on page 21 for details.

Installation

Please see *Appendix E: Installation, Pointek CLS 200, analog and digital models* on page 114. You will find details on:

- location
- dimensions
- mounting: restrictions and process cautions

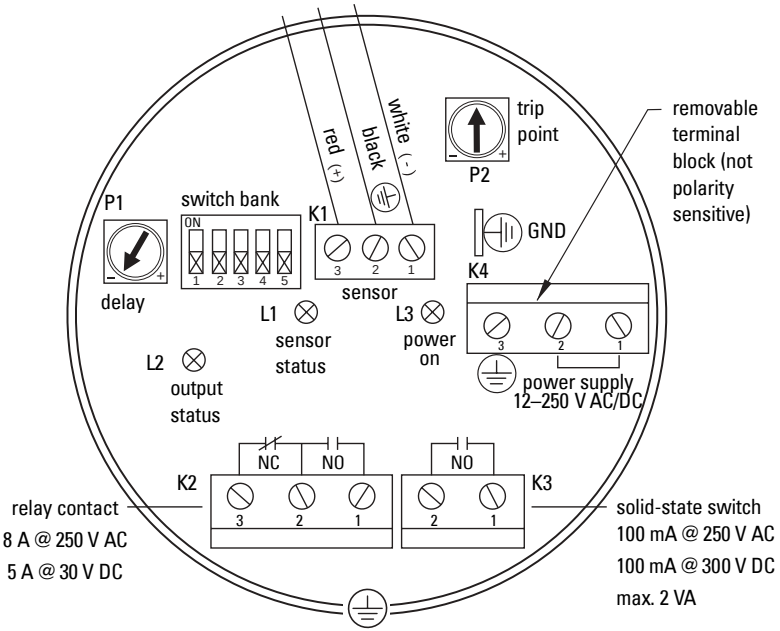
Wiring: Pointek CLS 200 analog model

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

Notes:

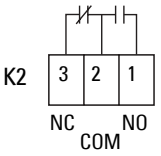
- Use shielded twisted pair cable, wire gauge 20 AWG to 14 AWG (0.5 mm^2 to 2.0 mm^2).
- Maximum working voltage between adjacent relay contacts is 250 V.
- Relay contact terminals are for use with equipment which has no accessible live parts and wiring which has insulation suitable for at least 250 V.

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. Strip the cable jacket for approximately 70 mm (2.75") from the end of the cable, and thread the wires through the gland.
3. Connect the wires to the terminals (polarity is not important).
4. Ground the instrument according to local regulations.
5. Tighten the gland to form a good seal.
6. If you wish to carry out a function test, follow the test procedures on page 18.



Note: Switch and potentiometer settings are for illustration purposes only.

Relay Output Connection

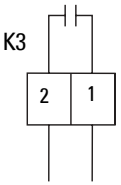


The relay is shown in a de-energized state.

K2 contact ratings:

- 8 A at 250 V AC
- 5 A at 30 V DC

Solid-state Switch



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

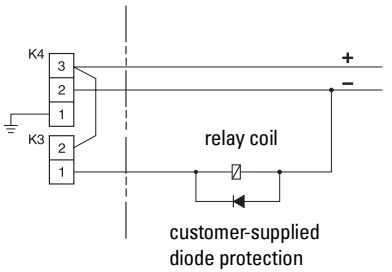
The switch is shown in de-energized state.

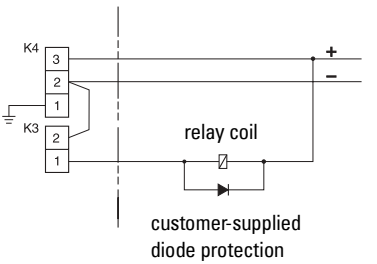
K3 contact ratings:

- 250 V AC, 100 mA max., non-polarized (max. 2 VA)
- 300 V DC, 100 mA max, non-polarized (max. 2 VA)

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.

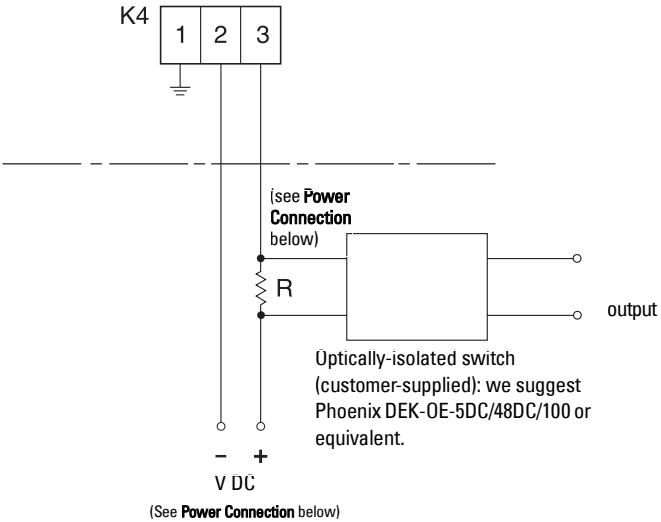




Switch capacity:

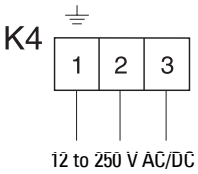
- 250 V AC, 100 mA max., 2 VA/2 W max
- 300 V DC, 100 mA max., 2 VA/2 W max

Ancillary 2-Wire Output Connection



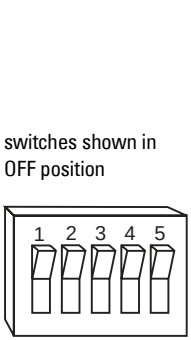
Power Connection

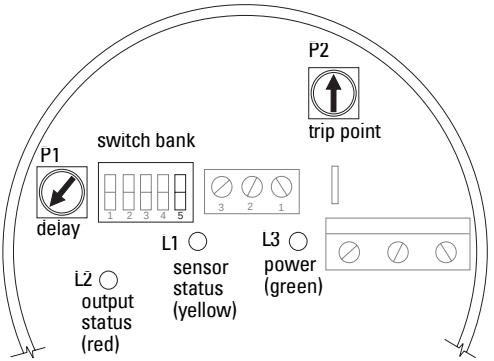
Nominal	24 V DC	48 V DC
V DC	22 to 26 V	46 to 50 V
R	120 Ω	234 Ω



Functionality Test

To test the basic functionality of the probe and potentiometers:





Preparation

1. Ensure green power light **L3** is on.
2. Turn the delay potentiometer **P1** and the trip point potentiometer **P2** fully counter-clockwise (minimum delay and minimum sensitivity respectively).
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:

- Slowly turn the trip point potentiometer **P2** clockwise until the yellow sensor status light **L1** glows. Shortly afterwards, the red output status light **L3** will glow. This concludes the sensitivity test.

Test the delay:

1. Turn the trip point potentiometer **P2** fully counterclockwise (minimum sensitivity).
2. Turn the delay potentiometer **P1** about 1/8 turn clockwise (delay set point).
3. Slowly turn the trip point potentiometer **P2** clockwise until the yellow sensor status light **L1** glows. After an appropriate delay the red output status light **L3** will glow. This concludes the delay test.

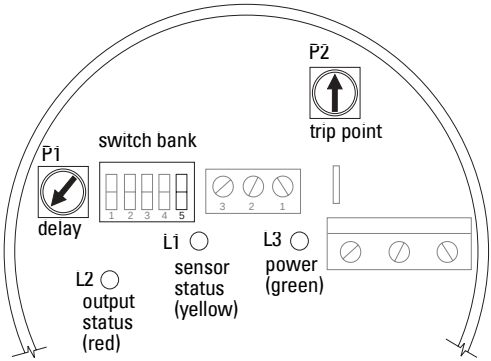
Test the switch function:

1. Turn the delay potentiometer **P1** and trip point potentiometer **P2** fully counter clockwise (minimum delay and sensitivity respectively).
2. Slowly turn the trip point potentiometer **P2** clockwise until the yellow sensor status light glows.
3. Slightly turn the trip point potentiometer **P2** counterclockwise 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 **L3** will glow. This concludes the switch function test.

Operation: Pointek CLS 200 analog model

User Interface

- A switch bank of five dip switches allows you to control the settings for Pointek CLS 200 (analog 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.



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

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

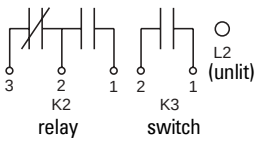
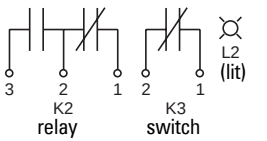
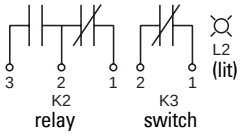
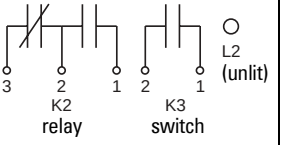
a. The manual assumes that the pump should be turned off in the event of a failure. If this is not the case in your process, please see the relay schematic below, and make the appropriate connections to suit your application.

Failsafe

The Failsafe function controls the response of Pointek CLS 200 to a fault so that the process will be put into a safe mode of operation. (See *Fault Signalling* on page 13 for further details). Failsafe and Alarm mode are interconnected:

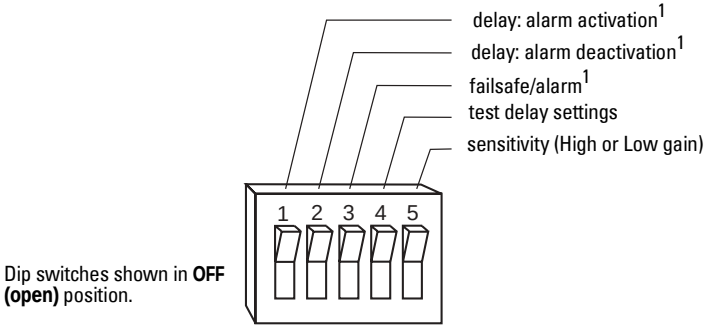
- High Alarm/Failsafe High
- Low Alarm/Failsafe Low

Relay and solid-state switch functionality

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

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.



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)

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

Sensitivity setting (high or low): S5

S5-ON	High sensitivity	Use this setting for measuring dry solids or non-conductive 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	

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 CLS 200 to Low alarm/no delays:

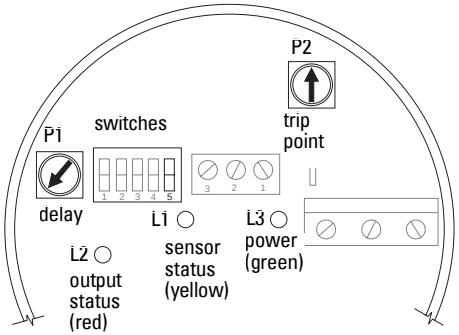
- turn P1 fully counter-clockwise (no delay interval)
- set dip switches S1, S2 and S5 to ON, S3 and S4 to OFF

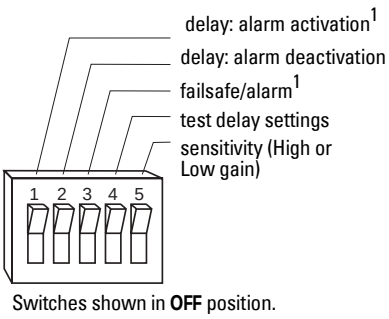
S1-ON	Delay disabled	
S2-ON	Delay disabled	
S3-OFF	Low alarm	• probe uncovered = alarm ON/relay de-energized
S4-OFF	Test function disabled	• normal operation
S5-ON	High sensitivity	• default setting • for dry solids or non-conductive liquids

Start Up

After Pointek CLS200 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





Switches shown in **OFF** position.

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 constant	OFF (low)

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

General applications (Failsafe Low, no delay)

Preparation

- Ensure that **L3** (green) is lit.
- Turn the trip point and delay potentiometers **P1** and **P2** fully counterclockwise (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** clockwise until **L1** (yellow) glows.
2. Turn **P2** back (counterclockwise) 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 counterclockwise (to minimum).
- Turn trip point potentiometer **P2** fully 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** counterclockwise until **L1** stops glowing. To get the true feel for the correct position, adjust **P2** clockwise then counterclockwise several times to ensure that **L1** stops glowing. (This adjustment is very sensitive, and we recommend repeating this exercise to finetune **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 counterclockwise (to minimum).
- Turn trip point potentiometer **P2** fully 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** counterclockwise 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 CLS 200 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 page 18.

Operation

After completing the setup, replace the lid and secure the lid clip. Pointek CLS 200 (analog model) is now ready to operate.

Troubleshooting: Pointek CLS 200 analog model

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.	Check sensitivity **S5** sensor (and zener barrier if used).
	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.	Check sensitivity **S5** sensor (and zener barrier if used).
	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.	

Part II: Pointek CLS 200 digital model

IIA: information common to any digital unit

- **about Pointek CLS 200**
- **specifications**
- **application**
- **installation**

IIB: standalone unit

- **wiring: standalone unit**
- **local operation using 3-button keypad**

IIC: unit on a PROFIBUS PA network

- **wiring: unit on a network:**
- **communications: SIMATIC PDM and PROFIBUS PA**
- **communications structure: block models**
- **remote operation via PROFIBUS PA**
- **error messages (PROFIBUS PA)**

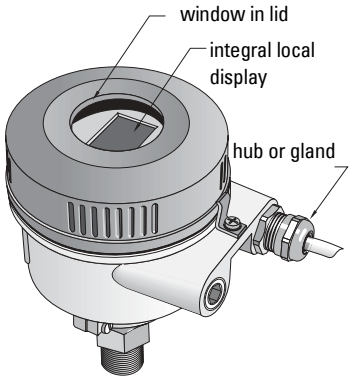
Pointek CLS 200 digital model

Notes:
- Part II of the manual discusses the digital model only. Please see Part I, page 6 onwards, for information on the analog model.
- Pointek CLS 200 is to be used only in the manner outlined in this instruction manual, otherwise protection provided by the equipment may be impaired.

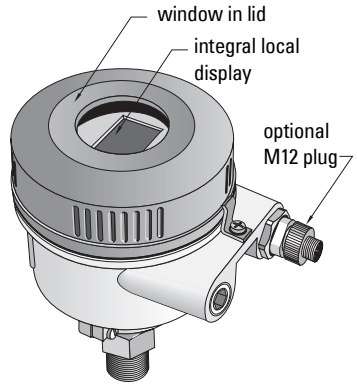
Pointek CLS 200 (digital model) can be used:

- as a standalone unit, programmed locally using the three-button keypad, or
- installed as part of a network, programmed remotely via SIMATIC PDM (or locally using the three button keypad).

standalone unit



unit on a network



Pointek CLS 200 is a versatile capacitance switch with a high level of chemical resistance; 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 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 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 non-conductive vessel such as concrete or plastic.

The power supply is galvanically isolated and can accept voltages in the range 9 to 32 V DC, depending on the application. The stainless steel and PPS[1] materials used in the probe construction provide a high level of chemical resistance, and a temperature rating up to 125 ^{o}C (257 ^{o}F) on the process wetted portion of the probe.

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

Pointek CLS 200 Applications

- Liquids, slurries, powders, granules, and solids
- Foods and pharmaceuticals
- Chemical and petrochemical
- High pressure and temperature

Features

- Potted construction protects signal from shock, vibration, humidity, and/or condensation
- High chemical resistance
- Level detection independent of tank wall/pipe
- High/low gain switch covers wide range of applications/materials
- Integrated local display
- Rigid, cable, and sanitary versions available
- Easy installation and maintenance
- Levelwatch[2] network friendly for Internet-based remote monitoring
- Communication via PROFIBUS PA (profile version 3.0, Class B)
- Explosion-proof Intrinsically Safe (IS) transmitter design for hazardous areas
- IS and compression-proof design for use in potentially explosive atmospheres

1. Polyphenylene sulfide
2. Levelwatch.com provides the tools for remote monitoring and inventory management.

Specifications: digital model

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

Pointek CLS 200

Power

• bus voltage	
- general purpose	9 to 32 V DC, 12.5 mA
- Intrinsically Safe	9 to 24 V DC, 12.5 mA
• starting current ≤ current of normal operation	yes
• fault current (max. uninterrupted current minus current of normal operation)	0 mA
• fault disconnect equipment (FDE)	yes
• auxiliary source	bus powered
• separate supply necessary	no

Performance

Measurement frequency	5.5 MHz @ εr = 1 1.1 MHz @ εr = 80
Repeatability	approx. 1% of measurement

Interface

Configuration

- locally, using 3 button keypad (for standalone operation) or
- remotely, using SIMATIC PDM (for installation on a network)

Local Digital Display

- LCD

Output (bus)	PROFIBUS PA (IEC 61158 CPF3 CP3/2) Bus physical layer: IEC 61158-2 MBP(-IS)
• polarity-independent	yes
• simultaneous communication with Master Class 2	4 (max.)

Cyclic User data

- byte output — 2 bytes representing one value
- byte input — 0
- device profile — PROFIBUS PA Profile for Process Control Devices Version 3.0, Class B
- function blocks — 1
- discrete input — 1
- logical inversion — parameterizable

Simulation functions

- output — yes
- input — yes
- failsafe — parameterizable (last usable value, substitute value, erroneous value)

Block Structure

- physical block — 1
- transducer block — 1
- transducer block discrete input — yes
- monitoring measuring limits — yes

Alarm Outputs

- solid-state switch — yes
- time delay — controlled by software
  2 delay timers (Fall Time and Rise Time)
- hysteresis — 100% adjustable, in 1 count increments[1] on the display
- repeatability — ± 1% of the measurement
- failsafe operation — Failsafe High or Failsafe Low
- terminal — removable terminal block, 2.5 mm^2 max.
- transducer block — yes
- relay — optional (with added pcb board)
  max. 8 V @ 230 V AC
- mA signal — optional (with added pcb board)
  4 or 20 mA[2]/ NAMUR output: 0.6 mA to 1.0 mA; or 2.1 mA to 2.8 mA[3]

1. The frequency value is always represented in 'counts': see *Counts* on page 94 for more detail.
2. At 24 V DC max. resistance is (24 V – [20mA * 250 Ohms]) = 19 V /20 mA = 950 Ohms
3. At 24 V DC max. resistance is (24 V – [2.4 mA * 250 Ohms]) = 23.4 V / 2.4 mA = 9750 Ohms.

Diagnostics

- input reed contact: for test function

Mechanical

Electrode

Model	Length (max)	Process Connections[a]	Extension	Tensile (max)	Sensor[b]
Standard	5.5 m (18 ft)	¾ " , 1" , or 1 ½" BSPT or NPT; 1 1/4" NPT only 316[1] stainless steel	316[1] stainless steel	n/a	PPS (Polyphenylene Sulfide)[c]
Sanitary	5.5 m (18 ft)	1", 1 ½ ", and 2"; 3A compliant tri-clamp	316[1] stainless steel	n/a	PPS (Polyphenylene Sulfide)[c]
Cable	35 m (115 ft)	¾ " , 1" , or 1 ½" BSPT or NPT; 1 1/4" NPT only 316[1] stainless steel	FEP (Fluorinated Ethylene Polymer)	180 kg (400 lbs)	PPS (Polyphenylene Sulfide)[c]

a. Other process connections available on request.

b. Process seal (sensor to stainless steel body):
standard: FKM (Fluoroelastomer) O-ring
optional (very high chemical resistance): FPM (Perfluoroelastomer) O-ring

c. Option: PVDF (Polyvinylidene Fluoride)

1. Or 1.4404 material.

Enclosure

- termination — removable terminal block, 2.5 mm^2 max.
- construction — powder-coated aluminum with gasket
- optional thermal isolator — 316[1] stainless steel
- cable entry — 2 x M20 thread (option: 1 x 1/2" NPT with adaptor, and 1 x plugged entry)
- ingress protection — Type 4 / NEMA 4 / IP68

Note: The use of approved watertight conduit hubs/glands is required for Type 4 / NEMA 4, Type 6 / NEMA 6, IP68 (outdoor applications).

Weight

Example: 1 kg (2.20 lb.) approx.

- compact Pointek CLS 200, 100 mm (4") insertion length, 3/4" process connection

Environmental

- location — indoor/outdoor
- altitude — 2000 m (6562 ft.) max.
- ambient temperature — –40 to 85 °C (–40 to 185 °F), (in potentially explosive atmospheres, note the temperature classes)
- local display — –30 to 85 °C (–22 to 185 °F)
- storage temperature — –40 to 85 °C (–40 to 185 °F)
- relative humidity — suitable for outdoor (Type 4 / NEMA 4 / IP 68)
- installation category — II
- pollution degree — 4

1. Or 1.4404 material.

Process

Note: Please see *Pressure versus Temperature Curves* on page 95.

- dielectric constant (εr) — 1.5 minimum
- temperature (at process connection) — standard configuration:
  –40 to 85 °C (–40 to 185 °F)
  slide coupling:
  ambient temperature
  standard configuration with extension:
  –40 to 125 °C (–40 to 257 °F)
- pressure (vessel) — standard configuration:
  0 to 25 bar, gauge/365 psi, gauge/2500 kPa, gauge (nominal)
  slide coupling:
  ambient pressure
  cable configuration:
  0 to 10 bar, gauge/150 psi, gauge/1000 kPA, gauge (nominal)

Approvals (verify against product nameplate)

CE, $CSA_{NRTL/C}$, FM, ATEX, 3A

Vlarem, WHG

Lloyd's Register of Shipping, categories ENV1, ENV2, and ENV5

Application: Pointek CLS 200 digital model

Level Detection

Note: For a detailed explanation, please see *Operating Principles* on page 94.

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 trigger either a high or a low level alarm. The sensitive electronics can be set to detect the change in capacitance as the level approaches the antenna tip. or as it covers the tip.

Alarm Signalling

Solid-state Switch

The solid-state switch can be set to react either to a diagnosed fault in the instrument, or to a change in the process level. (See *Mode 23: Alarm output trigger (default: dIAG)* on page 55.)

Fault Signalling

For fault signalling via PROFIBUS PA, see *Error Messages and References: PROFIBUS PA* on page 87. For more detail, please consult the PROFIBUS PA User and Installation Guideline (order number 2.092) available for download from www.profibus.com.

Installation: Pointek CLS 200 standalone unit

Please see *Appendix E: Installation, Pointek CLS 200, analog and digital models* on page 114. You will find details on:

- location
- dimensions
- mounting: restrictions and process cautions

Wiring: standalone unit

Electrical Connection

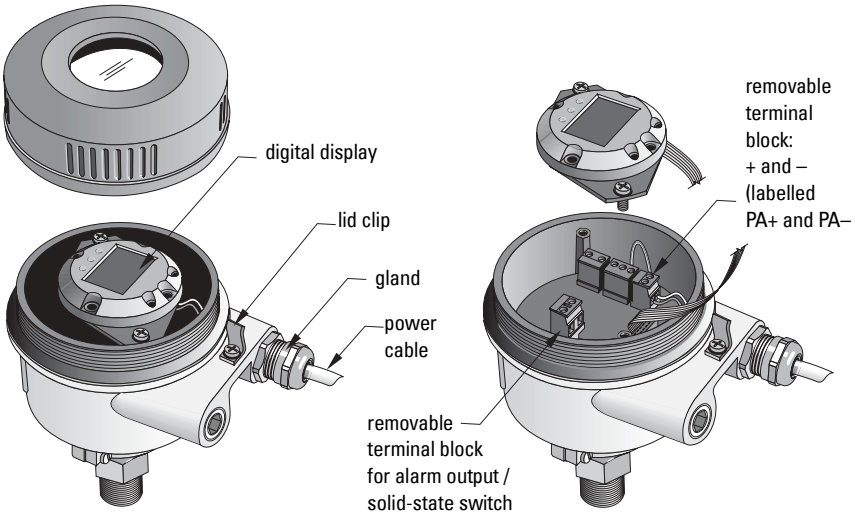
! WARNING:

- **All field wiring must have insulation suitable for at least 250 V AC.**
- **Observe the specifications of the examination certificate valid in your country.**
- **Observe the laws and regulations valid in your country for electrical installations in potentially explosive atmospheres.**
- **Ensure that the available power supply complies with the power supply specified on the product nameplate and specified in the examination certificate valid in your country.**
- **Dust-proof protection caps in the cable inlets must be replaced by suitable screw-type glands or dummy plugs, which are appropriately certified for transmitters with explosion-proof protection.**

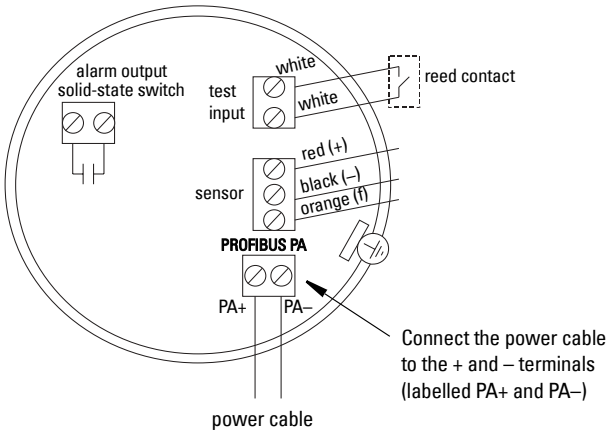
Notes:

- Use shielded, twisted pair cable, wire gauge 20 AWG to 14 AWG (0.5 mm^2 to 2.0 mm^2). Avoid locating Pointek CLS 200 near large electrical equipment wherever possible.
- Connect the cable shield to earth (for example, to the housing by means of a metallic screwed gland).

Connection to screw terminals (standalone unit)



1. Loosen the lid clip and unscrew the lid of the enclosure.
2. Unscrew and lift up the digital display.
3. Strip the cable jacket for approximately 70 mm (2.75") from the end of the cable, and thread the wires through the gland.
4. Connect the wires to the + and – terminals shown below (labelled "PA+" and "PA–"): polarity is not important. The terminal can be removed and replaced to simplify connection.



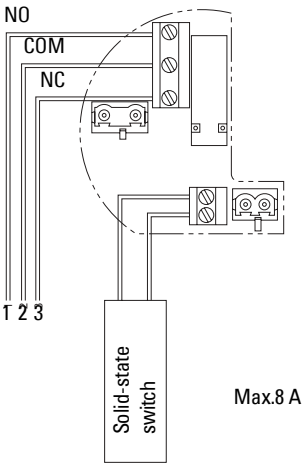
(continued on next page)

5. If you want to use the Alarm Output, connect the wires of an optional input to the Alarm Output terminals (polarity is not important). The terminal can be removed and replaced to simplify connection.
6. Ground the instrument[1] according to local regulations.
7. Tighten the gland to form a good seal.
8. Replace the digital display.
9. To adjust the transmitter locally, using the keypad, go to *Local operation using the keypad* on page 44. After adjustment, replace the enclosure lid and tighten the lid clip.

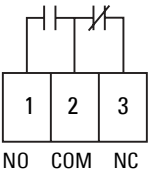
Optional PCB boards

Notes:
- For use with the digital model, standalone version.
- For use only in general purpose applications.

Relay output



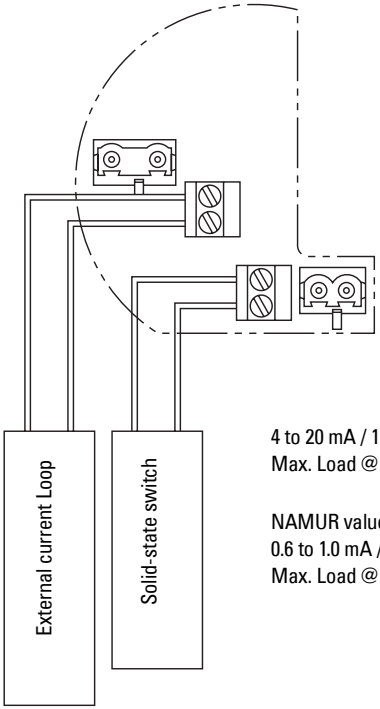
Relay output connection



The relay is shown in a de-energized state.

1. The usual PROFIBUS PA recommendation is to ground the shield on both the device side and the cable side. In some cases (for example, on cathodically protected tanks), it may be preferable to ground one side only, to avoid ground loops.

mA signal



4 to 20 mA / 12 to 30 V DC
Max. Load @ 24 V DC: 820 Ω

NAMUR values:
0.6 to 1.0 mA / 2.1 to 2.8 mA @ 12 to 30 V DC
Max. Load @ 24 V DC: 6200 Ω

Local Operation: Pointek CLS 200 (standalone unit)

- Local operation gives you access to all the functions listed in the table on page 46, *Quick Reference: operating functions using input keypad*.
- An extended range of functions is available only via remote operation using PROFIBUS PA: see *Remote Operation via PROFIBUS PA: Pointek CLS 200* on page 76.

User Interface

You can parameterize the transmitter using the input keypad, and view measuring results, error messages and modes of operation on the digital display.

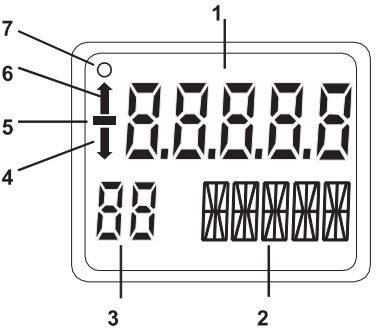
Input keypad

Three keys **M**, ⇑ and ⇓, are located below the display (see *Local operation using the keypad* on page 44). The keys are accessible when you open the lid. The lid must be closed again after programming.

Digital display

The digital display locally displays one of the following:

- the measured value and associated units
- the logical level
- the numerical value and mode number
- an error message and status information.



1 – Primary Reading (displays measured value, or logical level, or an error message)
2 – Auxiliary Reading (displays the Bar Graph, or Units, or Status [error code])
3 – Indicator for Write Protection / Mode number/ Simulation
4 – Down arrow indicates switch output open
5 – Negative sign
6 – Up arrow indicates switch output closed
7 – Communication Indicator - visible when communications are in progress

Measured value, logical level, or error message display

The primary reading field consists of five 7-segment fields plus the arrow sign. It displays the measured value, logical level, or an error message. The symbols give you further information:

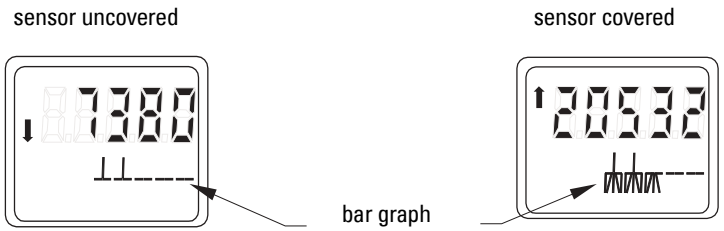
↑ Alarm output switch is closed[1].

↓ Alarm output switch is open[1].

○ Communication active. This symbol becomes active for at least 0.3 seconds, and represents communication currently taking place as acyclic and/or cyclic data transmission.

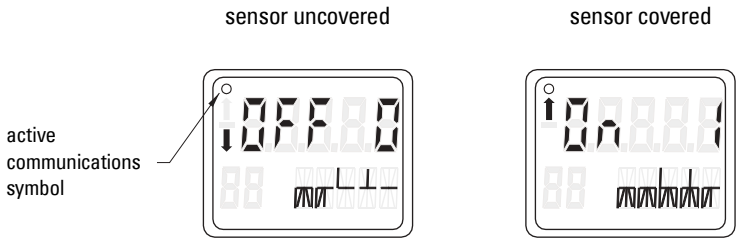
Measured value display

The default startup display is the measured value display. It shows the value (in counts[2]) when Sensor has been selected in Mode 13.



Logical level display

The logical level display shows the value when the OUT parameter of the Discrete input function block is selected in Mode 13.



Error message display:

For an example of an Error message, see *Error signalling* on page 43.

1. The alarm output switch functions according to the setting selected in *Mode 24: Contact type (default: CLOSE)*, on page 56.
2. See *Counts* on page 94 for more details.

Bar graph / Unit / Status display

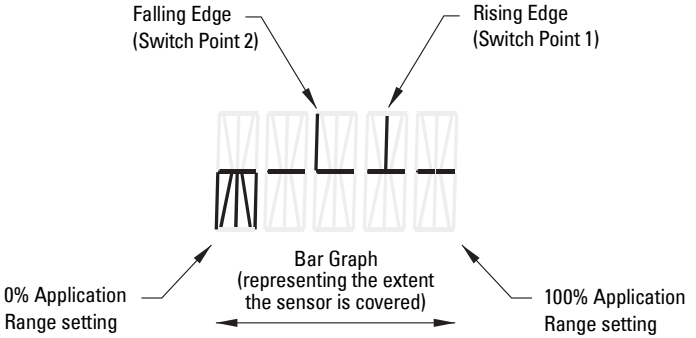
The auxiliary reading field consists of five 14-segment fields. It displays the Bar Graph, Units, or a Status code.

Bar Graph

The Bar Graph represents the extent to which the sensor is covered during normal operation. It is displayed when one of the three following options is selected:

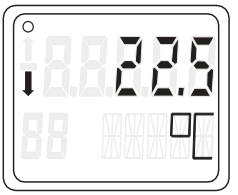
- The OUT parameter of the Discrete input function block
- the Primary Value of the Transducer Block
- the Sensor Value discrete of the Transducer Block

The 0% and 100% Application Range settings terminate the Bar Graph at each end. The two Switch Points (Falling Edge and Rising Edge) are indicated as black vertical lines.



Units

The corresponding physical unit is displayed in the auxiliary reading field when Electronics Temperature is selected in Mode 13.

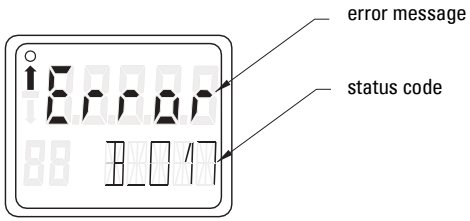


Status Code

See *Error signalling* on page 43 for an example of the Status Code display.

Error signalling

If hardware or software errors occur in the transmitter, the error message appears in the primary reading field. A status code is displayed in the auxiliary display which indicates the type of error (see *Status* on page 66). This information is also available via the PROFIBUS interface.



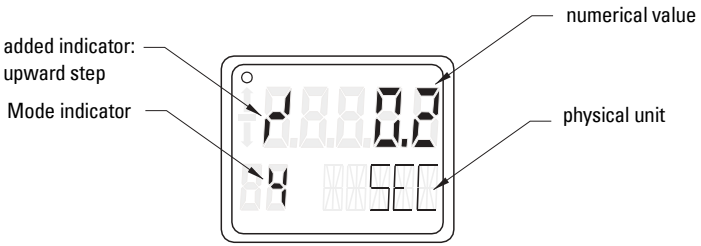
Mode Indicator

The Mode indicator consists of two 7-segment fields.

In local operation

- the Mode indicator displays the currently selected Mode.

  For example:
  A Rise Time delay of 0.2 seconds has been set in Mode 4.



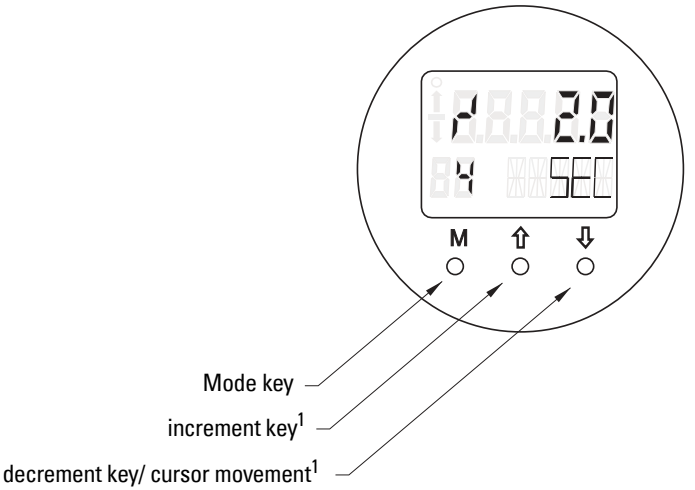
If no mode is selected

- the digital display will be in the measured value display function.
- the Mode indicator can display either:
  a. active simulation **Si** (see *Simulation*, on page 79), or,
  b. active lock **L**, **LC**, **LA**, or **LL** (see *Lock*, page 86)

Local operation using the keypad

Notes:
- The HW Write Protection must be disabled for keypad operation (see *Mode 10: HW Write Protection (default: OFF, display – –)*, on page 51).
- If HW Write protection is enabled, it is possible to read parameters, but any attempt to make changes will be rejected (error code F_001: see *Status codes*, on page 48).

The keypad consists of three input keys below the display: ⇑, ⇓, and **M**. A flashing digit indicates the position of the cursor.



Mode selection and adjustment

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

Note: The master reset function is available only via SIMATIC PDM**.**

- To select a mode, press **M (**mode key).
- To change a value in a mode, press ⇑ to increment a value, or ⇓ to decrement a value.
- To move the cursor to the right, press ⇑.
- To switch to the next mode, press **M** again. To cycle forwards though the menu, press **M** repeatedly. To move backwards through the menu, hold M and tap ⇑
- To abort editing, press **M** while a digit is flashing, and before editing the least significant digit.

1. The ⇑ and ⇑ keys can both be used to open the Edit function: see *Editing numerical values:* on the next page.

Editing numerical values:

Numerical values are always set from the most significant digit first, and the cursor position is indicated by a flashing digit.

- If no cursor is flashing, press ⇑ or ⇓ to activate the cursor.
- Press ⇑ to edit the flashing digit, or increment the value.
- Press ⇓ to move the cursor to the right and edit the next digit.
- When you reach the least significant digit and have finished editing, press ⇓ once again to store the edited value.

Quick Reference: operating functions using input keypad

Function, Parameter in PDM	Mode	Key function			Display, or explanation
	M	⇑	⇓	⇑ and ⇓	
Measured value display[a]					Measured value (selected in Mode 13)
Error display					Error, if transmitter is disturbed
Sensor test	2	Either key activates test			Displays GOOD or FAIL D
Rise Time	4	Open Edit mode, or increment digit.	Move cursor to the right; or decrement digit; or store edited value.		Time in seconds. Range: 0.0 to 100.0 s
Fall Time	5	Open Edit mode, or increment digit.	Move cursor to the right; or decrement digit; or store edited value.		Time in seconds. Range: 0.0 to 100.0 s
HW Write Protection	10	Either key activates keylock.		Hold for 5 seconds to release[b]	When activated, parameter changes are inhibited. For locking options, see *Lock*, on page 86.
Display Source	13	Increment or decrement value to make selection.			Select source of measured value to be displayed
Unit	14	Increment or decrement value to make selection.			Select physical unit for measured value (if Electronics Temperature selected in Mode 13).
Node address (PROFIBUS only)	15	Open Edit mode, or increment digit.	Move cursor to the right; or decrement digit; or store edited value.		Assign slave address on the PROFIBUS-line (0 to 126)
PROFIBUS Ident Number	16	Increment or decrement value to make selection.			Select device mode: according to profile; or, according to profile with full device specific support.

Function, Parameter in PDM	Mode	Key function			Display, or explanation
Application Range, Lower Limit / 0%	19	Open Edit mode, or increment digit.	Move cursor to the right; or decrement digit; or store edited value.		Adjust lower limit of application range.
Application Range, Upper Limit / 100%	20	Open Edit mode, or increment digit.	Move cursor to the right; or decrement digit; or store edited value.		Adjust upper limit of application range.
Alarm output trigger	23	Increment or decrement value to make selection.			Select the source event to switch the alarm output. See *Mode 23: Alarm output trigger (default: dIAG)*, page 55.
Contact type	24	Increment or decrement value to make selection.			Set contact functionality in case of event: - Make contact / Break contact Logical inversion of alarm output switch. See *Mode 24: Contact type (default: CLOSE)*, page 56.
Switch Point 1 (Rising Edge) OFF to ON	25	Open Edit mode, or increment digit.	Move cursor to the right; or decrement digit; or store edited value.		Set % of range at which switch will change from OFF to ON.
Switch Point 2 (Falling Edge) ON to OFF	26	Open Edit mode, or increment digit.	Move cursor to the right; or decrement digit; or store edited value.		Set % of range at which switch will change from ON to OFF.
Local Status Text	27	Increment or decrement value to make selection.			Select presentation of the status text. See *Mode 27: Local Status Text (default: EnGLI)*, page 59.

a. If **L** appears in the Mode indicator field of the display, the HW Write Protection is activated.

b. If **LA** or **LL** appears in the Mode indicator field of the display after releasing the HW Write Protection, there is an additional block on local operation via the bus. *Lock*, on page 86 explains how to release this using SIMATIC PDM. In measuring mode, if neither **L**, **LA**, nor **LL**, appears in the Mode indicator display field, local operation is possible.

Status codes

Every measured value which can be displayed is given a status to identify its quality. If it is classified as **Bad** or **Uncertain** the text **Error** alternates with the measured value in the display and the status code alternates with the unit or Bar Graph.

If the status is not equal to 128 (80H), irrespective of error signalling, its content is displayed in the auxiliary display as a decimal figure preceded by a letter designating the signal quality. The status display has priority, and neither the physical unit nor the Bar Graph is visible.

Examples:

B_016: Quality Bad (**B**ad) - Sensor failure

U_075: Quality Uncertain (**U**ncertain) - Substitute value - Constant

G_164: Quality good (**G**ood) – Maintenance Required

The status codes can be found in *Status* on page 66.

You can select the status representation in *Mode 27: Local Status Text (default: EnGLI)*, on page 59. The options are: numeric form as described above, or a text string in English, French, German, Spanish, or Italian. This is presented as rolling text.

Error messages

In the case of exceptional events, error messages can appear during local operation and are displayed for around 10 seconds after the occurrence of the error.

Error messages available		
Error code	**Meaning**	**Corrective Action**
F_001	Local operation disabled	Release HW Write Protection
F_002	Change of bus address not possible as the device is exchanging data with master class 1	End communication with master class 1
F_003	Change of PROFIBUS Ident Number not possible as the device is exchanging data with master class 1	End communication with master class 1
F_008	Local adjustment of parameters blocked by SIMATIC PDM	Enable “Local operation” with SIMATIC PDM

Mode 2: Sensor test (default: OFF)

Notes:
- If the capacitance value changes too quickly during the sensor test, the reading may say the sensor failed.
- If the range of operation is small, the output may switch unexpectedly during a sensor test.
- Make sure the process value is stable during the test phase (a dramatic change of level in the filling medium could cause an apparent failure).

The Sensor Test checks the circuitry including the sensor, from the sensor connection to the point where the output signal is generated. While the sensor test is active, the sensor value increases by a specific offset. This is verified by the electronics. For the duration of the test sequence, the measured value is accompanied by an uncertain status (U_064) to distinguish from a real measured value. If the sensor test is successful the readout is GOOD. If the test fails, the readout is FAIL D.

There are three methods of activating a sensor test:

- locally, using the keypad
- locally, using a magnet
- remotely, via PROFIBUS PA

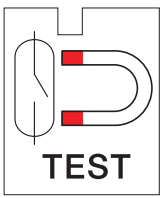
Keypad activated sensor test

- Select Mode 2.
- Press ⇑ or ⇓ to start the test.
- After a few seconds, the display shows **GOOD** or **FAIL D**.
- Press **M** to exit.

Magnet-activated sensor test[1]

To carry out a test without opening the lid or entering Mode 2, use a bar magnet.

- Bring the magnet close to the test area indicated on the housing.
- The sensor test starts, and finishes automatically after 10 seconds.
- The auxiliary reading displays either SENSOR TEST SUCCESSFUL, or SENSOR TEST FAILED, as rolling text.



Sensor test using PROFIBUS PA

- Please see *Sensor Test* on page 86 for details.

1. Test magnet is supplied with the instrument.

Mode 4: Rise Time (default: 1.0 s)

Rise Time is a delay setting which adjusts the response time of the signal[1] to the sensor becoming covered (Rising Edge). It affects the Primary Value of the Transducer Block and the following Discrete Input Function Block. Possible values range from 0.0 to 100.0 s, in 0.1 s intervals.

An upward step  to the left of the numerical value is an additional indicator.

To set Rise Time:

- Select Mode 4.
- Press ⇑ or ⇓ to open Edit Mode.
- Press ⇑ or ⇓ to adjust the value digit by digit.
- Press ⇓ to save the value.
- Press **M** to exit.

Mode 5: Fall Time (default: 1.0 s)

Fall Time is a delay setting which adjusts the response time of the signal[1] to the sensor becoming uncovered (Falling Edge). It affects the Primary Value of the Transducer Block and the following Discrete Input Function Block. Possible values range from 0.0 to 100.0 s, in 0.1 s intervals.

A downward step  to the left of the numerical value is an additional indicator.

To set Fall Time:

- Select Mode 5.
- Press ⇑ or ⇓ to open Edit Mode.
- Press ⇑ or ⇓ to adjust the value digit by digit.
- Press ⇓ to save the value.
- Press **M** to exit.

1. The bar graph, and numerical value in counts, continue to respond instantaneously to changes in level.

Mode 10: HW Write Protection (default: OFF, display – –)

Note: When HW Write Protection is enabled, **L** appears in the Mode display field, in normal measuring mode.

Protects parameters from unintentional overwriting. This prevents parameter changes both locally via the keypad and remotely via SIMATIC PDM. The parameters are still readable.

To enable HW Write Protection:

- Select Mode 10.
- Press ⇑ or ⇓ to activate keylock and to disable operation: **L** appears in the numerical value field.
- Press **M** to exit.

To disable HW Write Protection

- Select Mode 10.
- Hold ⇑ and ⇓ simultaneously for more than 5 seconds: **L** disappears from the numerical value field.
- Press **M** to exit.

Mode 13: Display Source (default: 0)

Determines which value will be displayed.

To select the display source from the options shown in the table below:

- Select Mode 13.
- Press ⇑ or ⇓ to set the value for the desired source.
- Press ⇓ to save the value.
- Press **M** to exit

You can assign the physical unit in Mode 14, if Electronics Temperature is selected as the display source.

Display Source	Value	Auxiliary Reading	Units
From Discrete input function block: OUT	**0**	OUT	none (Bar Graph is displayed)
From Transducer block: Primary Value	**1**	PRIM	none (Bar Graph is displayed)
Sensor Value	**2**	SENS	Digits (Bar Graph is displayed)
From transducer block electronics temperature: Electronics temperature	**3**	TMP E	Temperature (T)

Mode 14: Unit (default: °C)

Note: Mode 14 only becomes available after Electronics Temperature is selected in Mode 13.

If Electronics Temperature is selected as the display source in Mode 13, you can change the corresponding physical unit by selecting one of the following options:

Physical Unit	Display
K	K
°C	°C
°F	°F
°R	°R

To set the physical unit:

- Select Mode 14: the primary reading field displays **Unit**, and the physical unit appears in the auxiliary reading field.
- Press ⇑ or ⇓ to select the desired physical unit.
- Press **M** to exit.

Mode 15: Node address[1] (default: 3)

Sets the node address of the device on PROFIBUS. The permitted range is from 0 to 126.

To set the PROFIBUS node address:

- Select Mode 15. The current node address is shown in the primary reading field.
- Press ⇑ or ⇓ to open Edit mode.
- Enter the node address in the permitted range: press ⇑ to change the value of each digit, and press ⇓ to move the cursor to the next digit.
- Press ⇓ after editing the least significant digit, to terminate the procedure and to save the value.
- Press **M** to exit.

Note:
- While the device is in cyclic data exchange with a class 1 Master, it is not possible to change the address. Abort the cyclic communication to change the address.
- Ensure that you set a unique node address to the device. Otherwise, the devices with the same addresses will cause confusion on the bus.

1. Not used for standalone device.

Mode 16: PROFIBUS Ident Number[1] (default: 1)

Determines which of two device operating modes to select. Pointek CLS 200 device recognizes two operating modes in relation to the DP Master:

Mode	Description	
0	Conforms to profile version 3.0 Class B device with no extensions.	Generic: can substitute transmitters conforming to PROFIBUS PA profile 3.0, one Discrete Input Function Block.
1	Conforms to profile version 3.0 Class B device with extensions.	Device-Specific: full functional range of Pointek CLS 200 with Discrete Input Function Block.

To set the device operating mode:

- Select Mode 16. The current device operating Mode (**0** or **1**) appears in the primary reading field.
- Press ⇑ or ⇓ to select the desired operating mode.
- Press **M** to exit.

Mode 19: 0% Application Range setting

This point corresponds to the left limit of the bar graph in the digital display.

For reliable and accurate detection of the process material, select the example in the table below that most closely resembles your application, and adjust the setup conditions accordingly.

Application	Material	Setup conditions
General applications	dry solids low viscosity liquids	Sensor uncovered and a minimum of 100 mm (4") free space all around.
Demanding applications	hygroscopic / wet solids high viscosity and high conductivity liquids	Sensor immersed and then uncovered, but retaining as much buildup of material as possible on the sensor.
Interface detection	liquid A / liquid B foam / liquid	Immerse the sensor in the material that has the lowest dielectric constant.

1. Not used for standalone device.

To view the current 0% value:

- Select Mode 19.
- The current 0% value appears in the primary reading field, and the auxiliary field displays **diGiT**.
- Press **M** to exit, or:

To adjust the 0% Application Range setting:

- Follow the setup procedure that most closely resembles your application.
- Press ⇑ or ⇓.
- The display switches to the current measured Sensor Value in digits.
- Press ⇑ or ⇓ to open Edit mode: the Sensor value is frozen.
- If necessary, adjust the calibration point. Press ⇑ to edit the value of each digit, and press ⇓ to move the cursor to the next digit.
- After editing or leaving the least significant digit unchanged, press ⇓ to terminate procedure and save the new value.
- The display shows the new value for the 0% Application Range setting.
- Press **M** to exit.

Mode 20: 100% Application Range setting

This point corresponds to the right limit of the bar graph in the digital display.

For reliable and accurate detection of the process material, select the example in the table below that most closely resembles your application, and adjust the setup conditions accordingly.

Application	Material	Setup conditions
General applications	dry solids low viscosity liquids	Sensor fully covered
Demanding applications	hygroscopic / wet solids high viscosity and high conductivity liquids	Sensor fully covered
Interface detection	liquid A / liquid B foam / liquid	Immerse the sensor in the material that has the highest dielectric constant.

To view the current 100% value:

- Select Mode 20.
- The current 100% value appears in the primary reading field, and the auxiliary field displays **diGiT**.
- Press **M** to exit, or:

To adjust the 100% Application Range setting:

- Follow the setup procedure that most closely resembles your application.
- Press ⇑ or ⇓.
- The display switches to the current measured Sensor Value in digits.
- Press ⇑ or ⇓ to open Edit mode: the Sensor value is frozen.
- If necessary, adjust the calibration point. Press ⇑ to edit the value of each digit, and press ⇓ to move the cursor to the next digit.
- After editing or leaving the least significant digit unchanged, press ⇓ to terminate procedure and save the new value.
- The display shows the new value for the 100% Application Range setting.
- Press **M** to exit.

Mode 23: Alarm output trigger (default: dIAG)

The alarm output can be forced to switch for one of several reasons. The table below lists the possible triggers:

Selection message	Trigger description	Cause	Remark
OFF	Deactivated		
dIAG	Diagnosis (diagnostic interrupt)	Sensor Value above sensor range	
		Sensor Value below sensor range	
		Electronics temperature above nominal range	
		Electronics temperature below nominal range	
		Memory check of RAM, ROM, EEPROM not passed (test running in background)	

Selection message	Trigger description	Cause	Remark
OUt_d	Output Value (process interrupt)	Logical Level (OUT parameter)	Affected by Application Range, upper and lower limits; Rise Time; Fall Time; and Inversion
ALErt	Diagnostic Alarm Limit exceeded	Sensor Value higher than Diagnostic Alarm upper limit.	Diagnostic Alarm Limits are set with SIMATIC PDM

To select the trigger which will force the alarm output to switch:

- Select Mode 23. The current selection (**OFF**, **dIAG**, **Out_d**, or **ALErt**) appears in the primary reading field.
- Press ⇑ or ⇓ until the desired selection message appears.
- Press **M** to save and exit.

Mode 24: Contact type (default: CLOSE)

The alarm output switch can function in one of two ways:

- Make contact (close)
- Break contact (open)

To select the contact type.

- Select Mode 24. The current contact type (**OPEn**, **CLOSE**) appears in the primary reading field.
- Press ⇑ or ⇓ to select the desired contact type.
- Press **M** to save and exit.

! WARNING: If you change this parameter, the position of the switch changes immediately. Adapted applications or devices can react unintentionally.

Note:

- This adjustment is independent of the Inversion Output parameter of the Discrete input function block, which can only be adapted remotely.

Mode 25: Switch Point 1/Rising Edge/OFF to ON (default: 75%)

Note: 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.

Allows you to adjust the switch behavior by setting the percentage of the Application Range (defined in Mode 19 and Mode 20) at which point the logical switch will change from OFF to ON.

An upward step appears to the left of the numerical value, as an additional indicator.

Switch Point 1 must have a value greater than or equal to the value for Switch Point 2. If you enter a lower value, Switch Point 2 will be adjusted to the same value.

- If hysteresis[1] equals 0, you have one Switch Point in the Bar Graph
- If hysteresis does not equal 0, you have two Switch Points in the Bar Graph: one for Rising Edge (Switch Point 1), and one for Falling Edge (Switch Point 2).

You determine the unit in which you want to make the adjustment by setting the display source (Mode 13) to 2 (Sensor Value) and selecting the desired unit with Mode 14.

The permitted range is limited by the distance of the Switch Point to the next Measuring Limit.

To view the current setting for Switch Point 1:

- Select Mode 25.
- The current setting appears in the primary reading field.
- Press **M** to exit, or:

To adjust the setting:

- Press ⇑ or ⇓.
- The display switches to the current measured Sensor Value in percent of the Application Range (0 to 100%).
- Press ⇑ or ⇓ to open Edit mode: the Sensor value is frozen.
- Press ⇑ to edit the value of each digit, and press ⇓ to move the cursor to the next digit.
- After editing or leaving the least significant digit unchanged, press ⇓ to terminate procedure and save the new value.
- You see the new setting for Switch Point 1.
- Repeat the process, or press **M** to exit.

1. The difference in value between Switch Points 1 and 2.

Mode 26: Switch Point 2/Falling Edge/ON to OFF (default: 25%)

Note: 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.

Allows you to adjust the switch behavior by setting the percentage of the Application Range (defined in Mode 19 and Mode 20) at which point the logical switch will change from ON to OFF.

A downward step appears to the left of the numerical value, as an additional indicator.

Switch Point 2 must have a value less than or equal to the value for Switch Point 1. If you enter a higher value, Switch Point 1 will be adjusted to the same value.

- If hysteresis[1] equals 0, you have one Switch Point in the Bar Graph
- If hysteresis does not equal 0, you have two Switch Points in the Bar Graph: one for Rising Edge (Switch Point 1), and one for Falling Edge (Switch Point 2).

To view the current setting for Switch Point 2:

- Select Mode 26.
- The current setting appears in the primary reading field.
- Press **M** to exit, or:

To adjust the setting:

- Press ⇑ or ⇓.
- The display switches to the current measured Sensor Value in percent of the Application Range (0 to 100%).
- Press ⇑ or ⇓ to open Edit mode: the Sensor value is frozen.
- Press ⇑ to edit the value of each digit, and press ⇓ to move the cursor to the next digit.
- After editing or leaving the least significant digit unchanged, press ⇓ to terminate procedure and save the new value.
- You see the new setting for Switch Point 2.
- Repeat the process, or press **M** to exit.

1. The difference in value between Switch Points 1 and 2.

Mode 27: Local Status Text (default: EnGLI)

Sets the format for representing Sensor Status. The default setting is a numeric format: a quality classification of one letter is followed by an underscore and a decimal figure representing the status code (e.g. U_075).

You can select between the numeric format described above, or text as English, German, French, Spanish, or Italian strings. The strings are represented as rolling text.

Language format	Display message
numeric	**U_075**
Italian	**ItALI**
Spanish	**ESPAn**
French	**FrAnC**
German	**dEUtS**
English	**EnGLI**

To select the status format:

- Select Mode 27.
- The current setting is shown in the primary reading field.
- Press ⇑ or ⇓ to select a new format.
- Press **M** to save and exit.

Installation: Pointek CLS 200 on a network

Please see *Appendix E: Installation, Pointek CLS 200, analog and digital models* on page 114. You will find details on:

- location
- dimensions
- mounting: restrictions and process cautions

Wiring: connection to a PROFIBUS PA network

Electrical Connection

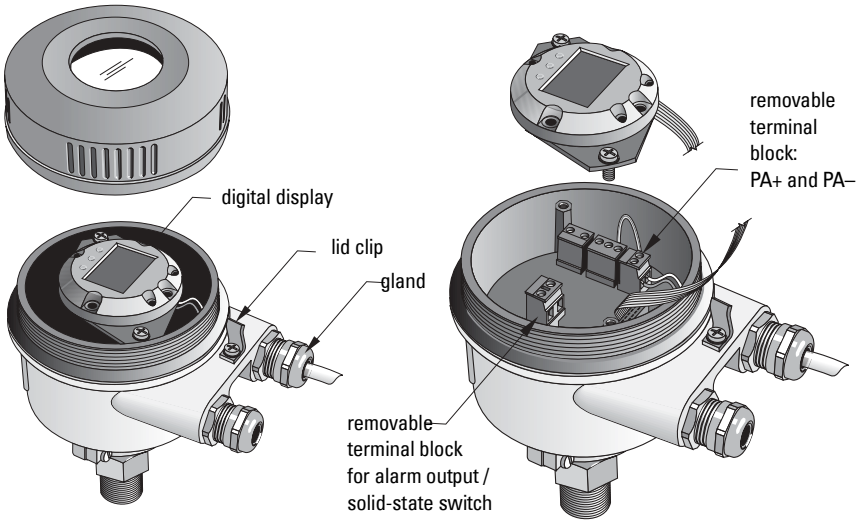
! WARNING:

- **All field wiring must have insulation suitable for at least 250 V AC.**
- **Observe the specifications of the examination certificate valid in your country.**
- **Observe the laws and regulations valid in your country for electrical installations in potentially explosive atmospheres.**
- **Ensure that the available power supply complies with the power supply specified on the product nameplate and specified in the examination certificate valid in your country.**
- **Dust-proof protection caps in the cable inlets must be replaced by suitable screw-type glands or dummy plugs, which are appropriately certified for transmitters with explosion-proof protection.**

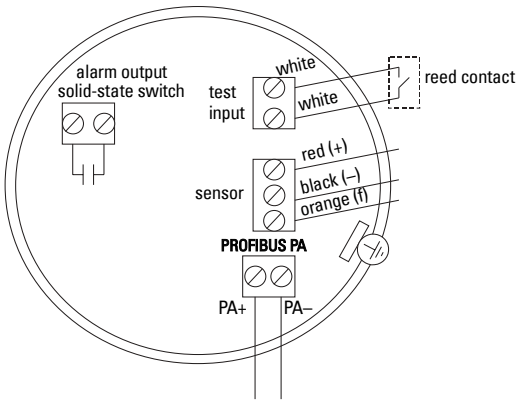
Notes:

- Use shielded, twisted pair cable, wire gauge 20AWG to 14AWG (0.5 mm^2 to 2.5 mm^2). Lay PROFIBUS PA cable separately from power cable with voltages greater than 60 V.
- Avoid locating Pointek CLS 200 near large electrical equipment wherever possible.
- Connect the cable shield to earth (for example, to the housing by means of a metallic screwed gland).

PROFIBUS PA connection to screw terminals

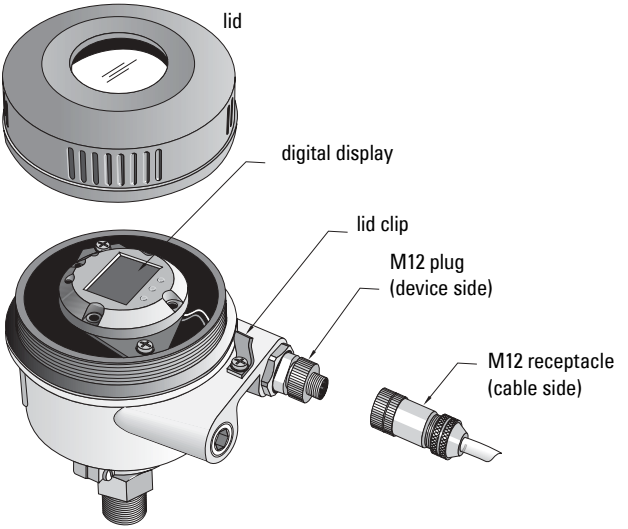


1. Loosen the lid clip and unscrew the lid of the enclosure.
2. Unscrew and lift up the digital display.
3. Strip the cable jacket for approximately 70 mm (2.75") from the end of the cable, and thread the wires through the gland.
4. Connect the PROFIBUS PA wires to the "PA+" and "PA–"terminals shown below (polarity is not important). The terminal can be removed and replaced to simplify connection.
5. If you want to use the Alarm Output, connect the wires of an optional input to the Alarm Output terminals (polarity is not important). The terminal can be removed and replaced to simplify connection.
6. Ground the instrument according to local regulations.
7. Tighten the gland to form a good seal.
8. Replace the digital display.
9. If you want to adjust the transmitter locally, using the keypad, go to page 44: if not, replace the enclosure lid.

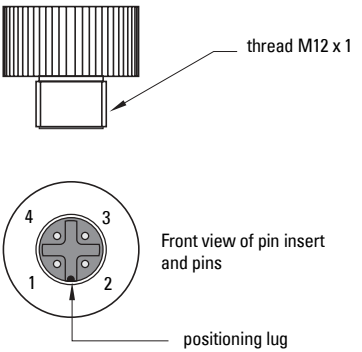


PROFIBUS PA connection via M12 plug

If an M12 plug is already installed on the housing of Pointek CLS 200, you will need a female M12 receptacle on the end of the cable, to complete the bus connection to PROFIBUS PA.

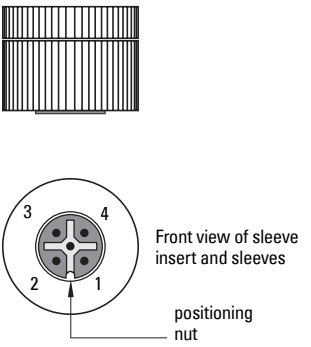


Follow the instructions accompanying the female receptacle. The pin assignment is shown below.



PIN	PROFIBUS PA
1	PA+
2	not connected
3	PA–
4	shield, connected to ground[1]

Pin assignment: device side



PIN	PROFIBUS PA
1	PA+
2	not connected
3	PA–
4	shield, connected to ground[1]

Pin assignment: cable side

1. Although the PROFIBUS PA recommendation is usually to ground the shield on both the device side and the cable side (to avoid interference), in some cases, it may be preferable to ground one side only, to avoid ground loops.

   This is particularly important if the device is mounted on cathodically protected tanks.

Communications via PROFIBUS PA: Pointek CLS 200 digital model

Note: The following instructions assume that the user is familiar with PROFIBUS PA.

PROFIBUS PA is an open industrial protocol. Full details about PROFIBUS PA can be obtained from PROFIBUS International at www.profibus.com

Pointek CLS 200 is a Class B, Profile Version 3.0, PA device. It supports Class 1 Master for cyclic data exchange, and Class 2 for acyclic services: (see *Cyclic versus Acyclic Data* on page 65 for details).

You will need a software package to configure Pointek CLS 200. We recommend SIMATIC Process Device Manager (PDM) by Siemens. (You can find more information at www.fielddevices.com: go to Products and Solutions > Products and Systems > Process Device Manager.)

SIMATIC PDM

SIMATIC PDM is a software package for designing, parameterizing, commissioning, diagnosing and maintaining Pointek CLS 200 and other process devices.

SIMATIC PDM contains a simple process monitor of the process values, alarms and status signals of the device. Using SIMATIC PDM you can

- display,
- set,
- change,
- compare,
- check the plausibility of,
- manage, and
- simulate,

process device data.

Device Description

In order to use **Process Device Manager (PDM)** with PROFIBUS PA, you will need the Device Description for Pointek CLS 200, which will be included with new versions of PDM. You can locate the Device Description in **Device Catalog**, under **Sensors/Level/ Capacitive/Siemens Milltronics**. If you do not see **Pointek CLS 200** under Siemens Milltronics, you can download it from our web site: www.siemens.com/milltronics. Go to the Pointek CLS 200 product page and click **Downloads**. After downloading the DD file, you need to execute DeviceInstall.

Configuration

To configure a Profibus Class 1 Master (for example, a PLC), you will need a **GSD** file.

The GSD file

The GSD file **SIEM80E9.GSD** can be downloaded from the Pointek CLS 200 product page on our web site: www.siemens.com/milltronics, under **Downloads**.

Setting the PROFIBUS address

When your instrument is shipped, the PROFIBUS address is set to 126. You can set it locally (see *Mode 15: Node address (default: 3)*, on page 52) or remotely via the bus, using a parameterization tool such as SIMATIC PDM or HW-Konfig.

When cyclic data transfer with a Class 1 Master is in process, the address can only be changed via the bus.

Bus address (Device Address)

Values	Range: 0 to 126
	Pre-set: 126

Bus Termination

Note: PROFIBUS PA MUST be terminated at both extreme ends of the cable for it to work properly. Please refer to the PROFIBUS PA User and Installation Guidelines (order number 2.092), available from www.profibus.com

Power Demands

To determine how many devices can be connected to a bus line, calculate the combined maximum current consumption of all the connected devices (10 mA for Pointek CLS 200). Allow a current reserve for safety.

Cyclic versus Acyclic Data

When data is requested from a device via PROFIBUS PA, there are two data transfer methods. Cyclic data is requested and provided at every bus scan: acyclic data is requested and provided as needed.

- Input and output information is always requested at every bus scan and is set up as cyclic data.
- Configuration information is needed infrequently, and is set up as acyclic data.

Acyclic Data Transmission

Pointek CLS 200 supports up to four simultaneous connections by a Class 2 Master (C2 connection). It does not support Class 1 Master (C1 connection).

Cyclic Data Transmission

Cyclic data transmission transfers the user data relevant for process automation between the Class 1 Master (control or automation system) and the transmitter.

When you configure Pointek CLS 200 on the PROFIBUS PA bus, there is one slot available for modules, and the Level Status module is automatically inserted.

Transmission of user data via PROFIBUS PA

The user data is continuously updated by the cyclic service of PROFIBUS PA. The user data is the OUT parameter of the discrete input function block and is composed of the Logical Level and Status bytes.

The 2 bytes must be read consistently[1], in a contiguous chunk: they must not be read byte by byte, and must not suffer an interrupt. If you are using an S7-300 / 400, you will need to use SFC14 DPRD_DAT: Read Consistent Data of a Standard PD Slave.

Byte	Out
Byte 1	Logical Level
Byte 2	Status

Logical Level

The Logical Level indicates the level of the material.

Inversion	Sensor Status	Logical Level
OFF	uncovered	= **0** (zero)
OFF	covered	= **1**

1. Consistent in this context means all-at-one-time.

Status

Status provides information on:

- the usability of the measured value in the user programme
- the device status (self-diagnosis/system diagnosis)
- additional process information (process alarms)

The codes for the Status byte are listed in the following tables. Possible causes for an error are given, along with measures to correct it

Status Codes for Good Quality				
Hex	**Digital display**	**PDM display**	**Cause**	**Corrective Measure**
80	---	Good	Normal operation	---
84	G_132	Good; Active block alarm	A parameter relevant for the behavior of the device has been changed. The display is extinguished after 10 seconds.	Note to the control system
8D	G_141	Good; Active critical alarm; Limit underflow	The Sensor Value exceeds the Lower Diagnostic Alarm Limit[a]	Check installation and sensor adjustment.
8E	G_142	Good; Active critical alarm; Limit overflow	The Sensor Value exceeds the Upper Diagnostic Alarm Limit[a]	Check installation and sensor adjustment.
A4	G_164	Good; Maintenance required	Maintenance interval has expired	Maintenance work, electronics servicing, or sensor servicing, is required.

a. Set via PROFIBUS PA, in counts (see *Counts*an explanation of counts).

Status Codes for Bad Quality				
Hex	**Digital display**	**PDM display**	**Cause**	**Corrective Measure**
00	---	Bad	Is used if no other information is available	
0F	B_015	Bad; Device failure; Value constant	Device has an irreparable Error.	Replace the electronics.
10	B_016	Bad; Sensor failure	Sensor test failed	Check sensor

Status Codes for Bad Quality				
Hex	**Digital display**	**PDM display**	**Cause**	**Corrective Measure**
11	B_017	Bad; Sensor failure; Limit underflow	Sensor shows an error. Measured level too small	Check sensor
12	B_018	Bad; Sensor failure; Limit overflow	Sensor shows an error. Measured level too high	Check sensor
1F	B_031	Bad; Out of service; Value constant	The function block is put out of order with a target mode command. A parameterized safety value is supplied.	For normal operation, reset the target mode to "AUTO."

During simulation, the device can process and output the simulated status in addition to the ones listed above, according to the Fail Safe Mode setting.

Status Codes for Uncertain Quality				
Hex	**Digital display**	**PDM display**	**Cause**	**Corrective Measure**
40	U_064	Uncertain	Sensor test in progress; no error detected.	To return to normal operation, deactivate sensor test.
47	U_071	Uncertain, Last usable value, Value constant	"Fail Safe" input condition is met; the parameterized safety setting is set to "keep last valid value."	Consult the log of measured data.
4B	U_075	Uncertain, Substitute value, Value constant	Value is not an automatic measured value. This identifies a parameterized, static substitute value or a preset value.	Consult the log of measured data.
4F	U_079	Uncertain, initial value, Value constant	After run-up, an initial value is entered in the device memory.	Reject the value in the user program.
50	U_080	Uncertain, Value inaccurate	Unreliable operating parameters or maintenance alarm	Check the operating parameters, e.g. the permitted ambient temperature. Immediate maintenance work required.

Configuring the user data

The user data which is made available to the control system or the open-loop control via PROFIBUS PA is supplied by the function block (see *Discrete input function block*, on page 72).

The Discrete input function block supplies the content of the OUT parameter.

Notes:
- To configure STEP 7, use HW-Konfig.
- To configure STEP 5, use COM_PROFIBUS.

Diagnosis

In addition to information on the usability of the measured value, Pointek CLS 200 can actively report information on its own status. Diagnoses are important information, which an automation system can use to introduce remedial measures.

Standard PROFIBUS DP mechanisms are used to transport diagnostic information and actively report it to the Class 1 Master. For this, PROFIBUS DP provides a protocol to transmit information ranked higher than user data to the Class 1 Master.

The content of the "Device status" parameter from the physical block is reported and, in addition, information on whether a change of status has occurred (event arrived/ event gone).

The diagnostic object consists of 4 bytes. For Pointek CLS 200 only the first two bytes are relevant.

Diagnostic Messages				
Byte	**Bit**	**Meaning when value = 1**	**Cause**	**Corrective Measure**
Byte 0	0	---		
	1	---		
	2	---		
	3	Electronics temperature is too high	The temperature of the measuring transducer electronics (which is monitored by the measuring transducer) exceeds 85°C.	Reduce the ambient temperature to within the permissible range

Diagnostic Messages				
Byte	**Bit**	**Meaning when value = 1**	**Cause**	**Corrective Measure**
Byte 0 (cont'd)	4	Memory error	An error has been found. (During operation, the memories are constantly checked for check sum errors and read/write errors.)	Replace the electronics.
	5	Measurement failure	Either the sensor has failed, or the sensor limits are being exceeded.	Have the sensor checked by the service department.
	6	---		
	7	---		
Byte 1	0	---		
	1	---		
	2	---		
	3	Restart (goes to **0** after 10 s)	The supply current has been fed to the device; or a warm start[a] has been triggered using SIMATIC PDM; or the internal watchdog has expired.	Check the cabling and the power unit
	4	Coldstart[b] (goes to **0** after 10 s)	The device has been reset to its factory settings.	
	5	Maintenance required	A service interval has expired.	Service the device, and reset the messages using SIMATIC PDM.

Diagnostic Messages				
Byte	**Bit**	**Meaning when value = 1**	**Cause**	**Corrective Measure**
Byte I (cont'd)	6	---		
	7	Ident Number violation	You have changed the parameter PROFIBUS Ident Number during cyclic operation. The device is reporting the violation of the Ident number and showing you a preliminary failure warning. In the case of a warm restart, the device will no longer participate in cyclical communication of reference data without a change in the system configuration.	Adjust the configuration data (change of GSD), so that it is consistent with the Ident number set in the device.

a. With a warm start, most, if not all, of the volatile data is preserved.

b. With a cold start, all volatile data is lost.

Note: The instrument status can be simulated using SIMATIC PDM. This allows you to test the reaction of the automation system to errors.

Self tests

Pointek CLS 200 carries out the following self tests:

Self Tests				
Self test function	**Algorithm**	**Frequency**	**Diagnostic error message**	**Corrective Measure**
Measure the electronics temperature	If electronics temperature exceeds 85 °C	Every measurement cycle/ 60 ms	Electronics temperature too high	Reduce the ambient temperature to within the permissible range
RAM test	Writing and verifying every cell with a byte (walking one and walking zero[a]) to detect defect cells and crosstalk	45 s	Memory error	Replace the electronics.

Self Tests				
Self test function	**Algorithm**	**Frequency**	**Diagnostic error message**	**Corrective Measure**
Code test	Summarizing the bytes and comparison with a checksum	45 s	Memory error	Replace the electronics and, if necessary, the measuring cell.
Sensor test	If measurement returns a value outside the sensor range determined by Measuring Limits	every measurement cycle/ 60 ms	Measurement failure	Have the sensor checked by the service department.
Check service timers	If a service timer reaches the parameterized warning or alarm limit	60 ms	Maintenance required	Carry out the servicing and reset the messages using SIMATIC PDM.
Watchdog trigger	The program must pass specific checkpoints. If all checkpoints are not passed within a specific time, the watchdog timer expires and a restart will be carried out	2 s	Restart	Check the cabling and the power unit to ensure the power supply to Pointek CLS 200

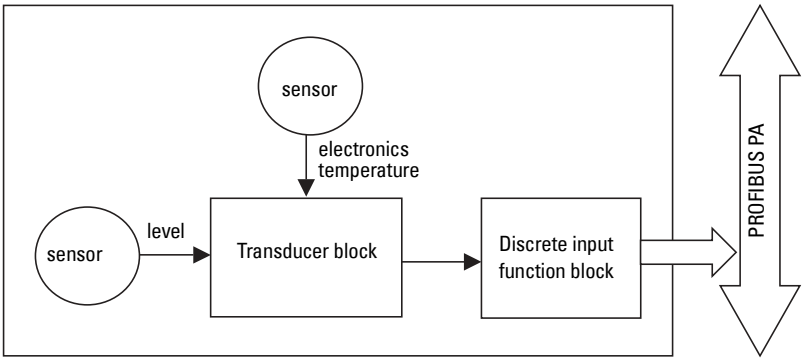
a. A walking one and zero is a method of checking each bit in each location of volatile memory.

Communication structure: Pointek CLS 200 (PROFIBUS PA)

Block model for recording and processing measured values

The functions of the device are divided into blocks for different areas of responsibility. They can be parameterized by acyclic data transfer via PDM

Block connection diagram for recording and processing measured values



Transducer block

The Transducer block carries out adjustments to the sensor. Its output value (Primary Value) is the status of the switch that indicates whether the sensor is covered by the medium or not.

The Transducer block carries out the required temperature measurement functions and monitors the permitted temperature limits.

Discrete input function block

In the Discrete input function block, the Primary Value is processed further and is adjusted to the automation task: that is, it looks after conversion, and Failsafe operations.

The output of this block supplies the measured value and the associated status information to PROFIBUS PA.

Parameters for local digital display

The values of the following parameters from the measuring and function blocks can be presented on the digital display. One of the options shown below must be selected in *Mode 13: Display Source (default: 0)*: see page 51.

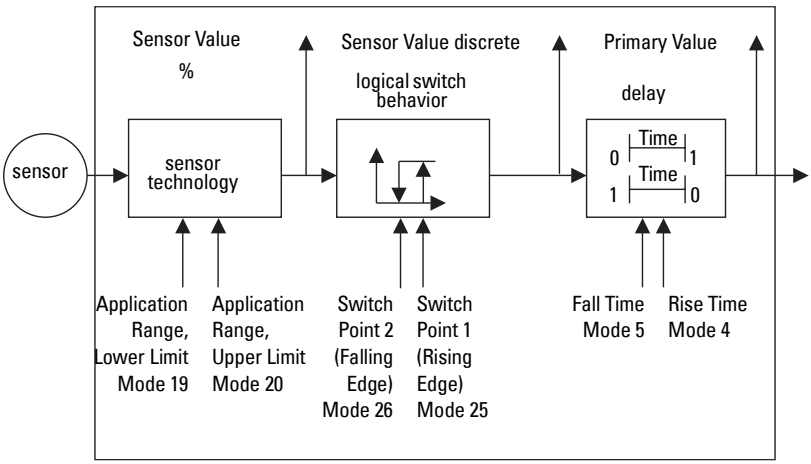
Block	Parameter	Can be displayed locally
Transducer block	Primary Value	yes
	Sensor Value discrete	no
	Sensor Value	yes
Transducer block Electronics temperature	Electronic temperature	yes
Discrete input function block	Output	yes

Description of the blocks

Transducer block

The figure below shows the signal flow of measured values from the sensor through the Transducer block into the output value (Primary Value). The parameters of the individual functions (switch behavior and delay) can be changed via acyclic access (SIMATIC PDM).

Transducer block function groups



How it works:

The frequency value (represented in 'counts'[1]) is checked to see if it is within its measuring limits. If the limit is exceeded, this results in a **Bad** status and the error message **Failure in measurement**. The frequency value is stored in Sensor Value.

The analog signal from the sensor is transformed into a discrete signal which controls the behavior of the logical switch. The switch point is provided with a hysteresis.

The delay function provides the discrete signal with individual delay times for rising and falling delay (Rise Time and Fall Time). The delay function acts as a filter that compensates for a medium with an agitated surface. The result of the filtered signal is the Primary Value.

Electronics temperature

The transducer block also monitors the internal temperature of the device electronics. If the temperature exceeds permitted limits, it does not change the sensor value, but it does change the status.The permitted limits correspond to those of the permitted ambient temperature.

If a temperature limit is exceeded, the status changes to **GOOD – Active Critical Alarm – Limit Overflow/Underflow**. The status of the Sensor Value, the Sensor Value discrete, and the Primary Value in the Transducer block Discrete input, receive the status **UNCERTAIN – Value inaccurate**. This action is accompanied by a PROFIBUS diagnostic message **Electronics temperature too high**.

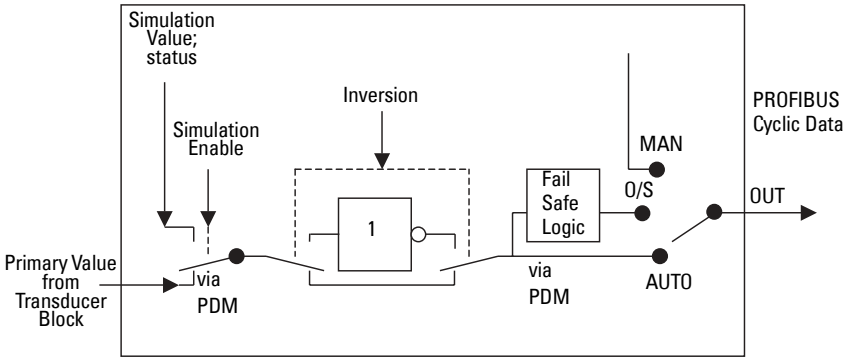
Drag indicators[2] allow you to check the maximum and minimum temperatures that have occurred.

1. See *Counts* on page 94 for more detail.
2. See *Drag indicators* on page 83 for more detail.

Discrete input function block

The figure below shows how measured values are processed within the Discrete input function block.

Discrete input function block function groups



How it works

The Discrete input function block allows you to control modifications to the output value (PROFIBUS cyclic data):

- Select Inversion ON or OFF: when ON, the Primary Value from the Transducer block, or a simulation value given by the simulation switch, will be inverted.
- Select Failsafe options: if the status of the Primary Value or Simulation Value is **bad**, the fault logic can output either the last usable measured value, or a given substitute value.
- Select one of 3 settings:

Setting	description	Output value
AUTO	automatic	the automatically-recorded measured value
MAN	manual	a manually-set fixed simulation value
O/S	function block disabled	the preset safety value.

- The result is the output parameter (OUT).

Remote Operation via PROFIBUS PA: Pointek CLS 200

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

The full range of Pointek CLS 200 functions is available only via remote operation using PROFIBUS PA.

To use PROFIBUS PA, you will need a PC configuration tool: we recommend SIMATIC PDM. Please consult the proprietary operating instructions or online help for details on using SIMATIC PDM.

Measured Values

In measuring operations, measured values such as the logical level are provided via PROFIBUS PA. PROFIBUS PA communication is indicated on the digital display by the communication character **o** (see *Logical level display* on page 41).

Functions

The device menu gives you access to the following functions:

- upload from/download to the device
- set address
- master reset
- write locking
- sensor test
- simulation

Changing parameter settings

Note: 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.

- First launch SIMATIC PDM, connect to Pointek CLS 200, and upload data from the device (the status fields change to **Loaded**).
- Adjust parameter values in the parameter view field (right side of screen).
- After adjusting the value, press **Enter** (the status fields read **Changed**).
- When you have completed the adjustments, open the **Device** menu, download data to the device, and save parameter settings offline (the status fields go blank).

Filling level status:

Adjust 0 % application range setting

The lower limit of the application range (0%) corresponds to the left limit of the bar graph in the digital display.

For reliable and accurate detection of the process material, select the example in the table below that most closely resembles your application, and follow the setup procedure.

Application	Material	Setup procedure
General applications	dry solids low viscosity liquids	Sensor uncovered and a minimum of 100 mm (4") free space all around
Demanding applications	hygroscopic / wet solids high viscosity and high conductivity liquids	Sensor immersed and then uncovered, but retaining as much build up of material as possible on the sensor.
Interface detection	liquid A / liquid B foam / liquid	Immerse the sensor in the material that has the lowest dielectric constant.

1. Follow the setup procedure that most closely resembles your application.
2. Open the menu **View – Display** and select the tab **Transducer Block: Discrete Input (Part 1)**. Make a note of the Sensor_Value (digits)
3. Close **Display** window, and copy the sensor value to the parameter view field:
   > Input > Transducer Block: Discrete Input > Range of Application> 0%.
   Press **Enter**: the status field reads **Changed**.
4. If no more settings need adjusting, download the data to the device and save the parameter settings offline (the status fields go blank). Otherwise, continue to adjust other parameters as required.

Adjust 100 % application range setting

Adjusts the upper limit of the application range (100%). This point corresponds to the right limit of the bar graph in the digital display.

For reliable and accurate detection of the process material, select the example in the table on page 78 that most closely resembles your application, and follow the setup procedure.

Application	Material	Setup procedure
General applications	dry solids low viscosity liquids	Sensor fully covered
Demanding applications	hygroscopic / wet solids high viscosity and high conductivity liquids	Sensor fully covered
Interface detection	liquid A / liquid B foam / liquid	Immerse the sensor in the material that has the highest dielectric constant.

1. Follow the setup procedure that most closely resembles your application.
2. Open the menu **View – Display** and select the tab **Transducer Block: Discrete Input (Part 1)**. Make a note of the Sensor_Value (digits)
3. Close **Display** window, and copy the sensor value to the parameter view field: **> Input > Transducer Block: Discrete Input > Range of Application > 100%**. Press **Enter**: the status field reads **Changed**.
4. If no more settings need adjusting, download the data to the device and save the parameter settings offline (the status field goes blank). Otherwise, continue to adjust other parameters as required.

Inversion

When Inversion Output = **On**, the level status undergoes a logical inversion. If you want to invert the logic of the level status:

- Go to **Output > Function Block: Discrete Input > Inversion Output > Off or On**
- Press **Enter**: the status field reads **Changed**

Delay

You can adjust the timing behavior of the transmitter using two independent delay times.

- **Rise Time (Off to On)** determines the delay of the signal flow from the moment the sensor becomes covered until the Primary Value is set.
- **Fall Time (On to Off)** determines the delay of the signal flow from the moment the sensor becomes uncovered until the Primary Value is reset.

The delay timers have a range of values from 0.0 to 100.0 seconds.

- Go to **Input > Transducer Block: Discrete Input > Delay > Rise Time (Off to On)** and set the value from 0 to 100 seconds.
- Go to **Fall Time (On to Off)**, and set the value from 0 to 100 seconds.
- Press **Enter**: the status field reads **Changed**.

Note: If the sensor status changes before the delay interval is complete, the timer is reset to its initial value and restarted.

Failsafe Mode

If the Transducer block delivers a measured value accompanied by a status message classifying the quality as bad (for example **Bad, sensor failure**), the Discrete input function block can react with one of three possible preset options.

Failsafe Mode	Description
The default value is used as the output value.	The predefined preset safety value is output (status code U_075).
Store the last valid output value.	The last valid output value is output (status code U_071).
The calculated output value is incorrect.	The bad output value is accompanied by the status which the Transducer block assigns to it (B_0xx).

Set the fault behavior in the Discrete input function block:

- Go to **Output > Function Block: Discrete Input > Fail Safe Mode > Fail Safe Mode** and select one of the 3 options.
- Press **Enter**: the status field reads **Changed**

You can use SIMATIC PDM to determine the fault location by looking at the Input and Sensor Values of the Transducer Block.

Simulation

Simulation functions help you when you are installing the transmitter. You can create process values without recording actual values. The full range of simulated process values can be utilized, which means that errors can also be simulated.

You can apply simulated values to test the measuring and function blocks:

- If you want to check the effect of your settings
- If there is a problem (for example, the device does not behave as expected)

Start with the logic block closest to the output value, then if the results of that simulation are as expected, gradually work back towards the sensor. (See pages 72, 73, and 75 for block diagrams of the transducer block, and discrete input function block.)

The LCD displays **Si** in the Mode display when Simulation is activated.

Output simulation

Output simulation allows you to provide process values for the cyclic class 1 Master, to test how the automation program processes those values.

Carry out the following settings:

1. Open the Device Menu **Simulation.**
2. Select the register **Output.**
3. Set the target mode to **MAN** (manual).
4. Enter the desired output value, the quality and the status.
5. Transfer the settings to the device.
6. You can view the output behavior, for example with SIMATIC PDM (open the View Menu **Display**).
7. To return to normal operation, reset the target mode to **AUTO** and press **Transfer**.

Input (Primary Value) simulation

Input Value simulation allows you to test the effects on the Primary Variable of your preset inversion and failsafe settings, and see how the output value is affected.

Carry out the following settings:

1. Open the Device Menu **Simulation**
2. Select the register **Input**.
3. Set the simulation mode to **Enabled**.
4. Enter the desired input value, the quality and the status.
5. Transfer the settings to the device.
6. You can view the output behavior, for example with SIMATIC PDM (open the View Menu **Display**).
7. To return to normal operation, reset the simulation mode to **Disabled** and press **Transfer**.

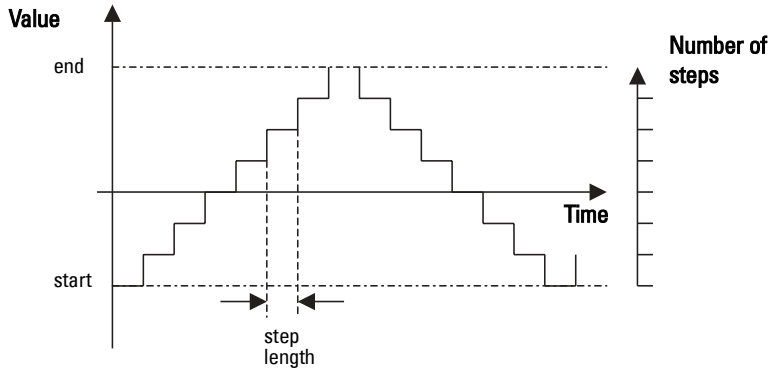
Sensor Value Simulation

By simulating the Sensor Value as a fixed value or as a parameterizable slope, you can test:

- the reaction to the Measuring Limits being exceeded
- the logic switch behavior
- the behavior of the delay timers

With a parameterizable slope you can make the simulation value dynamic. It runs from a starting value to an end value in a step function, dwelling on each step for the preset period of time. At the end value the direction is reversed.

Parameterizable slope



Carry out the following settings:

1. Open the Device Menu **Simulation.**
2. Select the register **Sensor Value**.
3. Set **Simulation Sensor Value**, then set the parameters:
   - for simulation mode **fixed**, enter a Sensor Value
   - for simulation mode **ramp,** adjust the ramp parameters
4. Transfer the settings to the device.
5. You can view the behavior of the Sensor Value Discrete, the Input (Primary) Value, and the Output, in SIMATIC PDM (open the View Menu **Display**, and select the register **Transducer Block: Discrete Input Part I**).
6. To return to normal operation, turn off **Simulation Sensor Value** and press **Transfer**.

Electronics temperature Simulation

By simulating the electronics temperature, you can test the effect of excessive temperatures on the measuring results:

1. Open the Device Menu **Simulation**
2. Select the register **Electronics Temperature**.
3. Set **Simulation Electronic Temperature**, then set the parameters:
   - either enter a fixed value for Electronics Temperature **fixed**
   - or adjust the ramp parameters for Electronic Temperature **ramp**
4. Transfer the settings to the device.
5. You can view the reaction in the status of the measured values (input and secondary variables), and the output, using SIMATIC PDM (open the View Menu **Display** and select the appropriate register).
6. To return to normal operation, turn off **Simulation Electronic Temperature** and press **Transfer**.

Maintenance Timer

Two service interval timers are contained in Pointek CLS 200:

- for the sensor
- for the electronics

Calibration and service intervals

Each timer has four possible settings:

- **Off**: the service interval function is inhibited, and the timer value remains steady at that point.
- **On (Timer)** monitors the time since the last service
- **On (Warning)** enables warning generation
- **On (Warning + Alarm)** enables generation of warning and alarm

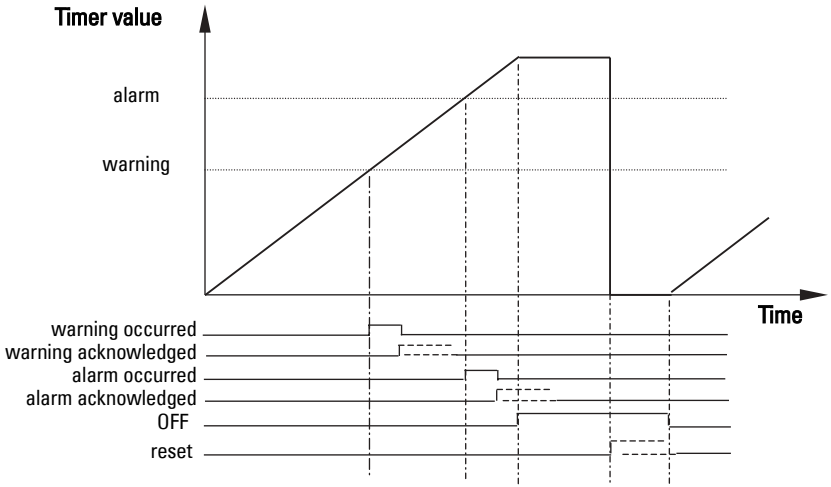
You can enter separate time intervals for the alarm stage, and for the warning stage.

Warning

1. As soon as the warning interval has expired, the first monitoring stage issues a warning. Measured values are accompanied by the status **Good, maintenance required**, and the diagnostic message **Maintenance required** is displayed. SIMATIC PDM can also display the service status and the value of the timer.
2. Acknowledge the warning. The diagnostic message is removed and the status is reset to **Good**. (There is no specific time requirement from the time the warning is acknowledged till servicing is carried out).
3. Carry out the service and reset the timer.

Alarm

1. If servicing is not carried out at the correct time, the second monitoring stage issues an alarm, to alert you that maintenance is now urgently required. Measured values are accompanied by the status **Uncertain, value inaccurate**, and the diagnostic message **Maintenance required** is displayed.
2. Acknowledge the alarm. The diagnostic message is removed and the status is reset to **Good**. (There is no specific time requirement from the time the alarm is acknowledged till servicing is carried out).
3. Carry out the service and reset the timer.



To edit the service intervals:

1. Go to **Diagnosis Settings**
   > Service interval for Electronics, or
   > Service interval for Sensor
2. Select a Warning/Alarm Activation setting.
3. Set Single Values Input to **Yes**.
4. Enter the time interval after which a warning should be issued.
5. Enter the additional time interval after which an alarm should be issued, once a warning has already occurred.
6. Press **Enter**: the status field reads **Changed**.

Drag indicators

Two pairs of drag indicators allow you to monitor the negative and positive peak values for the measured values Sensor Value and Electronics Temperature.

- Open the View Menu **Drag Indicators.**
- To reset the peaks to the actual measured value, click the appropriate **Reset** button.
- Press **Enter**: the status field reads **Changed**

Operating hours

An operating hours meter for the electronics is activated when the transmitter is first started.

- Open the View Menu **Operating hours.**

Switch Point adjustment

There are two switch points:

- Switch point 1 (Off to On)
- Switch point 2 (On to Off)

To adjust the switch behavior, set the percentage of the application range[1] at which point the logic switch will change from OFF to ON, or from ON to OFF.

- The application range must be defined first (see *Adjust 0 % application range setting*. and *Adjust 100 % application range setting* on page 77. Ensure your setup procedure follows the guidelines for the application which most resembles your operation).
- Open the menu **View–Display**, and select the register **Transducer Block: Discrete Input**, to view the actual Sensor Value, the Sensor Value Discrete, the actual valid Switch Point and Hysteresis
- Go to **Input > Transducer Block: Discrete Input > Switch behavior.**
- Edit the value of Switch Point 1 in the "Switch Point" field.
- Edit the value of Switch Point 2 to adjust the Hysteresis
- Click on "Transmit."
- Track the effect of the adjustment by looking at the Sensor Value Discrete.

Resetting

To reset the device, open the Device Menu **Master Reset**. The three reset options are:

- Factory reset (Restart/cold startup)
- Warm start (new start-up)
- Resetting the PROFIBUS address to 126

1. The application range is defined by the 0% and 100% settings (see page 77).

Factory Reset (Restart/cold startup)

If Pointek CLS 200 has been adjusted to such an extent that it can no longer fulfil its measuring tasks, you can use **Factory Reset** to recreate the delivery status. It resets most parameters to the factory setting.

During a Factory Reset, a check mark appears against the diagnostic message **Restart (cold startup) carried out** for about ten seconds, and the LCD displays **UPDATE ALERT**, as rolling text in the auxiliary reading field.

Warm start (new start-up)

A Warm start (new start-up) disconnects Pointek CLS 200, and restarts it. Communication is interrupted and re-established.

You will need this function if, for example, during communication with a cyclic Master, the PROFIBUS address has been changed.

During a Warm start, a check mark appears against the diagnostic message **New start-up (warm startup) carried out** for a few seconds. As long as there is no measured value result, the automation or control system records the status **Uncertain, initial value, Value constant**.

Resetting the PROFIBUS address to 126

If no other device in your system has the preset address 126, you can extend the PROFIBUS PA line during operation of the automation or control system, with an additional Pointek CLS 200 with the address 126. The only requirement is to change the address of the new integrated device to another value lower than 126.

If you remove a Pointek CLS 200 from the PROFIBUS channel, you should use this function to reset its address to 126 so that, if required, it can be reintegrated into this or another system.

Lock

Secures Pointek CLS 200 from changes.

Lock options	Effect	Turn on/off	Digital display
HW Write Protection	Parameter changes using SIMATIC PDM and settings via local operation are both disabled. Independent of the other lock functions.	Keypad Mode 10	L
Write locking	Prevents parameter changes via the bus. Local operation is possible.	SIMATIC PDM Online dialog: Write locking	Lc
Local Operation	If local operation is disabled, no access is possible using the keypad. Independently of this parameter, local operation is automatically enabled 30 s after a communication failure. Once communication has been re-established, the parameter **Local Operation** in the device is reset to the original setting.	SIMATIC PDM Local Operation	LA

You can also combine the locking functions

HW Write Protection	Write locking	Local Operation	Digital display
Off	Off	enabled	
On	On or Off	enabled or disabled	**L**
Off	Off	disabled	**LA**
Off	On	disabled	**LL**
Off	On	enabled	**Lc**

Sensor Test

Open the Device Menu to find and activate the Sensor Test via PDM, and to see the results (**test successful**, or **test failed**).

Error Messages and References: PROFIBUS PA

Note: For more detail, please consult the PROFIBUS PA User and Installation Guideline (order number 2.092), available for download from www.profibus.com.

Summary of error messages and status codes

Hex	Digital display	PDM display	Cause	Measure
00	---	Bad	Is used if no other information is available	
0F	B_015	Bad, Device failure, Value constant	Device has an irreparable error.	Replace the electronics.
10	B_016	Bad, Sensor failure	Sensor shows error.	Have the measuring cell checked by service personnel.
11	B_017	Bad, sensor failure, Limit underflow	Sensor shows an error. Measured level too low	Check sensor
12	B_018	Bad, sensor failure, Limit overflow	Sensor shows an error. Measured level too high	Check sensor
1F	B_031	Bad, Out of service, Value constant	The function block is placed out of service with a target mode command. A parameterized safety value is supplied.	For normal operation, reset the target mode to **AUTO**.

Hex	Digital display	PDM display	Cause	Measure
40	U_064	Uncertain	Sensor test in progress, no error detected.	To return to normal operation, deactivate sensor test.
47	U_071	Uncertain, Last usable value, Value constant	Input condition “Fail Safe” is met, the parameterized safety setting is set to “keep last valid value.”	Check the data log.
4B	U_075	Uncertain, Substitute value, Value constant	Value is not an automatic measured value. This identifies a parameterized, static substitute value or a preset value.	Check the data log.
4F	U_079	Uncertain, initial value, Value constant	After run-up, an initial value is entered in the device memory.	Reject the value in the user program.
50	U_080	Uncertain, Value not accurate	Unreliable operating parameters or maintenance alarm	Check the operating parameters, e.g. the permitted ambient temperature. Immediate maintenance work required.

Hex	Digital display	PDM display	Cause	Measure
80	---	Good	Normal operation	---
84	G_132	Good, Active block alarm	A parameter relevant for the behavior of the device has been changed. The display is extinguished after 10 s.	Note to the control system
8D	G_141	Good, Active critical alarm, Limit underflow	The Sensor Value exceeds the Lower Diagnostic Alarm Limit	Check installation and sensor adjustment.

Hex	Digital display	PDM display	Cause	Measure
8E	G_142	Good, Active critical alarm, Limit overflow	The Sensor Value exceeds the Upper Diagnostic Alarm Limit	Check installation and sensor adjustment.
A4	G_164	Good, maintenance required	Maintenance interval has expired	Maintenance required: either: electronics servicing, or sensor servicing

When simulation is activated, the device can output the simulated status in addition to those listed above, considering the Failsafe Mode.

Hazardous Area Installation: Pointek CLS 200, digital model

! WARNINGS:

- **Turn off power before servicing any device.**
- **Please check the ambient and operating temperatures under *Environmental* on page 33, and *Process* on page 34; also check *Approvals (verify against product nameplate)* on page 34, for the specific configuration you are about to use or install.**
- **For intrinsically safe circuits, only certified current measuring devices compatible with the transmitter may be used.**
- **In potentially explosive atmospheres:**
  - **open the enclosure only when Pointek CLS 200 is not energized.**
  - **if a transmitter is to be used as category 1/2 equipment, please check the product nameplate, and see *Appendix D: Approvals*, page 103 onwards, to verify the protection type.**
- **Power must be supplied from an "Intrinsically safe " power source, otherwise protection is no longer guaranteed.**

Note: The transmitter is in operation when the power supply is switched on.

Operating the intrinsically-safe configuration in hazardous areas

- Pointek CLS 200 may only be operated on circuits which are certified as intrinsically safe. The CLS 200 complies with Category 1 / 2 and may be installed in zone 0.
- Maximum permissible ambient temperature range in potentially explosive atmospheres:

  –40 °C to maximum 85 °C (–40 ^{o}F to maximum 185 ^{o}F): T4

Under certain circumstances, the device may be used in atmospheric conditions outside the limits set in the EC-Type Examination Certificate (or the valid test certificate for its country):

- Any additional security measures required for use in potentially explosive atmospheres must be provided.
- The limit values defined in *Specifications: digital model* (page 30 onwards) must be observed in all cases.

Zone 0

Additional requirements for zone 0 installations:

- The use of approved watertight conduit hubs/glands is required for Type 4 / NEMA 4, Type 6 / NEMA 6, IP68 (outdoor applications).
- Materials of construction are chosen based on their chemical compatibility (or inertness) for general purposes. For exposure to specific environments, check with chemical compatibility charts before installing.

Notes

Appendices

Appendix A: Technical References

Operating Principles

Capacitance[1] measurement operates by forming a variable capacitor resulting from the installation of a measurement electrode in a vessel or silo. The environment at the time of setup acts as a reference.

Capacitance is affected by the surface area of the electrodes, the separation distance between the electrodes, and the dielectric constant of the vessel contents. The relative dielectric constant is the measure of a material's ability to store energy. The relative dielectric constant of air (vacuum) is 1: all other materials have a higher value.

If everything in the probe's environment stays consistent, with the exception of the vessel contents, the change in capacitance caused by a change in vessel contents can be used to provide level detection.

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.

The Pointek CLS 200 high frequency oscillator

The Pointek CLS 200 probe is equipped with a high frequency oscillator which responds to the capacitance. The inverse of frequency is proportional with the capacitance. A small change in frequency is easy to detect, resulting in high resolution and accuracy.

Counts

Frequency is always represented in 'counts', a dimensionless value generated from the inverse of frequency. The measured value is displayed in counts. (If you are using PROFIBUS PA, you can set the measuring limits, in counts.)

The Pointek CLS 200 electrode

The Pointek CLS 200 electrode[2] 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 CLS 200 probe makes it very sensitive to changes in capacitance in the immediate vicinity of the antenna tip. This makes it possible to operate Pointek CLS 200 in a plastic tank, though a properly grounded metal tank will shield the sensor from external influences.

1. For definitions relating to capacitance, see *Glossary*, page 127.
2. Usually insulated.

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

Detection Range

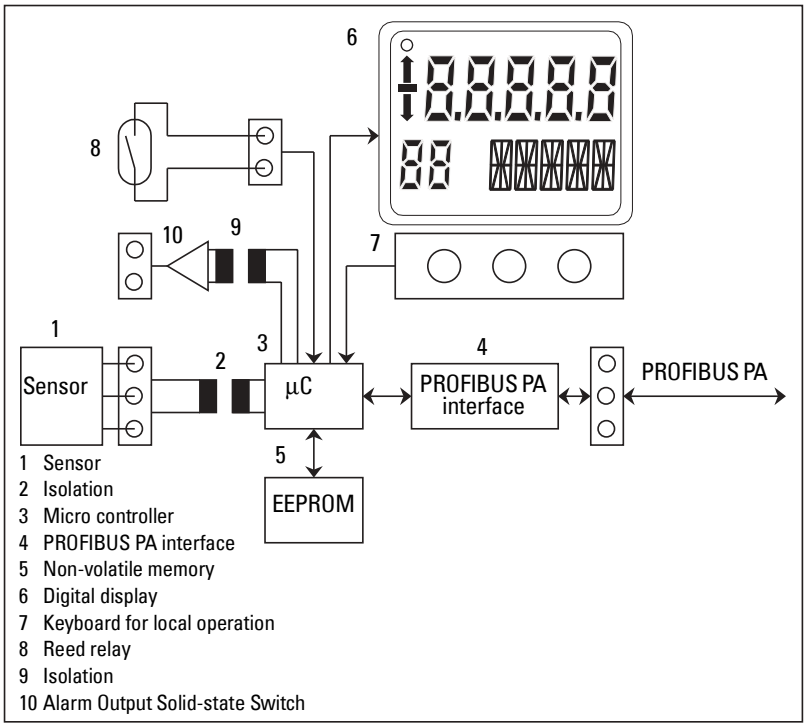
The functional detection range depends on the dielectric constant of the material monitored. The detection range will be shorter when the material has a lower dielectric constant, and longer when it has a higher dielectric constant.

See *Specifications: analog model*, page 8, for performance information: also check the product nameplate on the enclosure, for details of your particular instrument.

PROFIBUS PA electronics: mode of operation

The process variable to be measured is generally referred to as the input variable.

The input variable provided by the sensor is an isolated digital frequency signal. This is evaluated in a microprocessor and made available via PROFIBUS PA. The data for transmitter parameterization is stored in non-volatile memory.



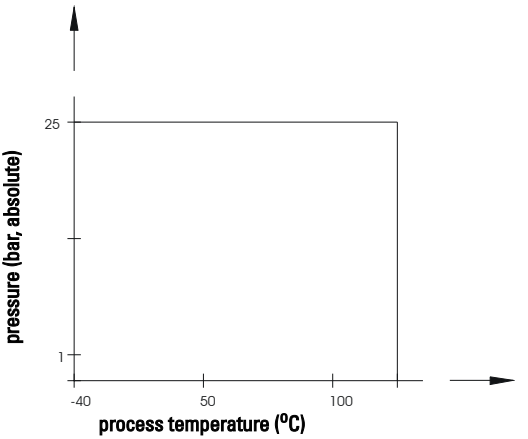
Sensor Test (Pointek CLS 200, digital version)

You can initialize a sensor test by activating the reed contact with a bar magnet[1] from outside the housing. For details, see *Magnet-activated sensor test*, on page 49.

Pressure versus Temperature Curves

Pointek CLS 200 compact and extended rod versions

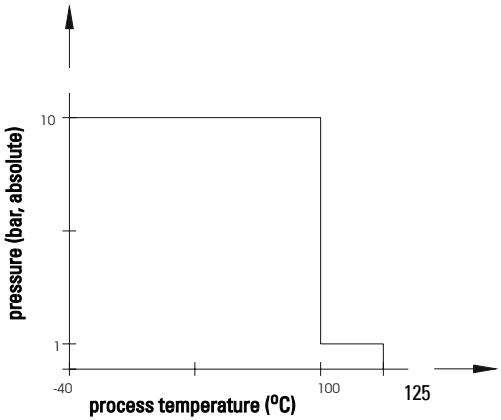
Notes:
- Check flange rating.
- Use thermal isolator if process temperature exceeds 85 °C (185 °F).



1. A test magnet will be supplied with the instrument.

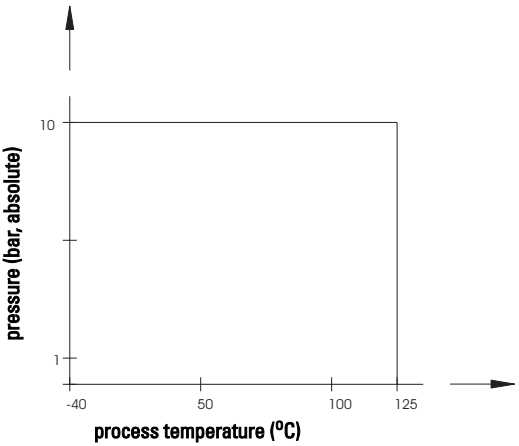
Pointek CLS 200 slide coupling version

Notes:
- Check flange rating.
- Use thermal isolator if process temperature exceeds 85 °C (185 °F).



Pointek CLS 200 extended cable version

Notes:
- Check flange rating.
- Use thermal isolator if process temperature exceeds 85 °C (185 °F)



Appendix B: Maintenance and Repairs

Pointek CLS 200 requires no maintenance or cleaning.

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.

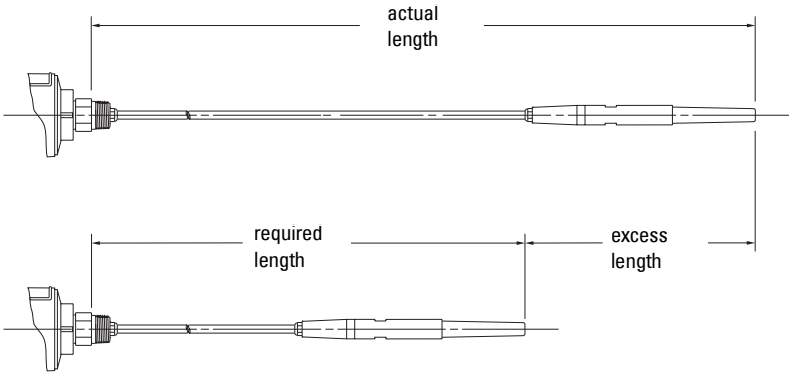
Appendix C: shortening the cable

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

Preparation

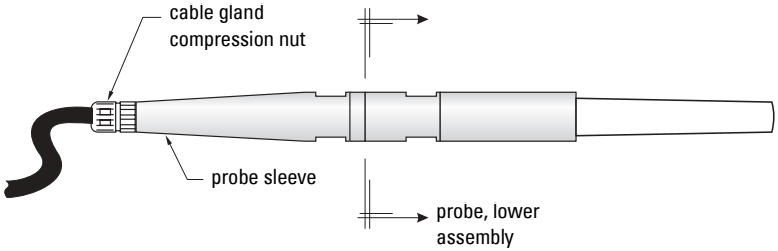
Determine the required cable length, and subtract that amount from the actual length, to find the excess length to cut off.

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

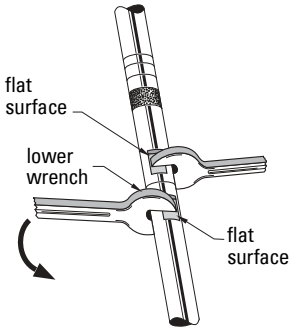


Steps

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



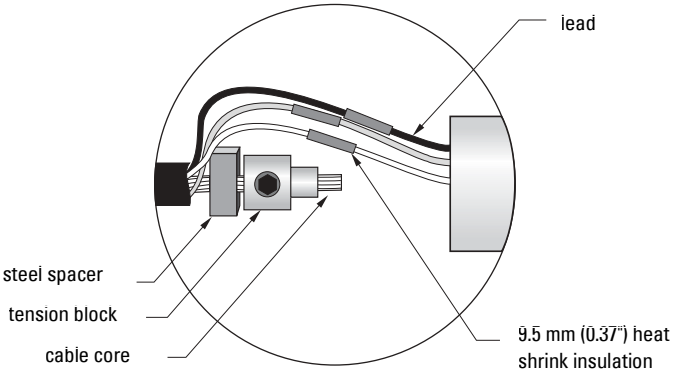
2. Unscrew the probe sleeve from the lower assembly using two 17 mm (0.67") wrenches across the flat surfaces, as shown below.



a. 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.

b. 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.



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

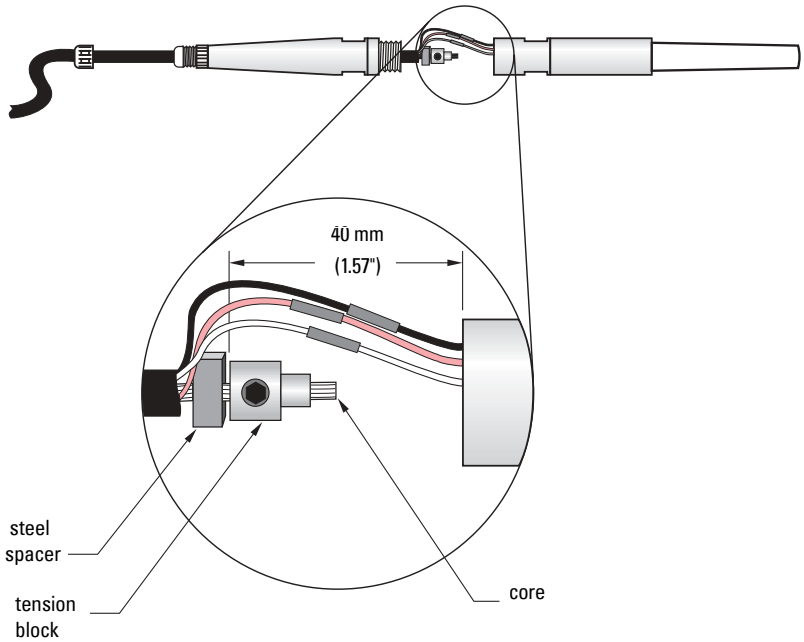
7. Cut off the excess cable.

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.

    The type of cable supplied depends on whether your instrument is analog or digital. To simplify correct connection , white heat shrink has been applied to the orange wire in the digital cable.

Cable type	Lead colors		
ditigal	red	black	white (heat shrink over orange)
analog	red	black	white

12. Make the solder connections and position the heat shrink to completely insulate each solder connection before shrinking it.



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.
17. Check that the instrument is operating correctly, using the test procedure on page 18.

Appendix D: Approvals

CE Certificate

WRITTEN CE DECLARATION OF CONFORMITY

We, Siemens Milltronics Process Instruments B.V.
Nikkelstraat 10 - 4823 AB BREDA - The Netherlands

declare, solely under own responsibility, that the product as mentioned in this declaration: Point Level Switch, Pointek CLS 200

complies with one or more of the following standards and / or normative documents, depending on the purchased version (as specified in the Pointek CLS200 configuration and price list):

Requirements	Remarks	Certificate No
Environment	Commercial, light Industrial and industrial	2008949-KRQ/EMC 01-4044
EN 61326: 1998	Product group standard for "Electrical equipment for measurement, control and laboratory use," from which:	
EN 55011: 1998	Emission – Class B	
EN 61000-4-2: 1995	Electrostatic Discharge (ESD) Immunity	
EN 61000-4-3: 1996	Radiated Electro-Magnetic Field Immunity	
EN 61000-4-4: 1995	Electrostatic Fast Transient (EFT) Immunity	
EN 61000-4-5: 1995	Surge Transient Immunity	
EN 61000-4-6: 1996	Conducted Radio-Frequency Disturbances Immunity	
ATEX Directive 94/9/EC	Audit Report No 2003068	KEMA 00ATEXQ3047
	II 1 G T100°C EEx ia IIC T6…T4	KEMA 03ATEX1008 X
	II 1/2 D T100°C	KEMA 03ATEX1008 X
	II 3 G - 2D EEx nA II T6…T4 T=100°C	KEMA 03ATEX1007 X
	II 1/2 GD EEx d [ia] IIC T6…T4 T=100°C	KEMA 02ATEX2039 X
	II 1/2 D T=100°C	KEMA 02ATEX2039 X
	II 1/2 G EEx d [ia] IIC T6…T4 T=100°C	KEMA 02ATEX2039 X
EN 50014: 1992	General Requirements	
EN 50020: 1994	Intrinsic Safety "i"	
EN 50284: 1999	Special Requirements for Category 1G Equipment	
EN 50281-1-1: 1998	Dust Ignition Proof	

The notified body: KEMA Quality B.V. – Utrechtseweg 310 – 6812 AR Arnhem – The Netherlands

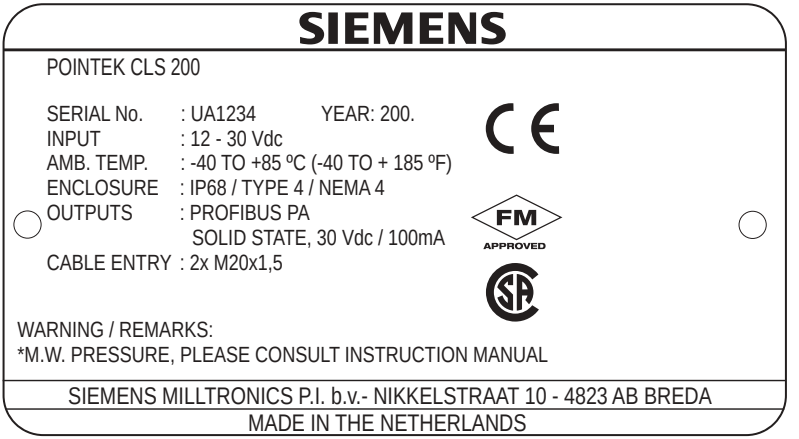
97/23/EC Pressure Equipment Directive Lloyd's Register
DAD No's: 8033472, 8033473, 8033628.

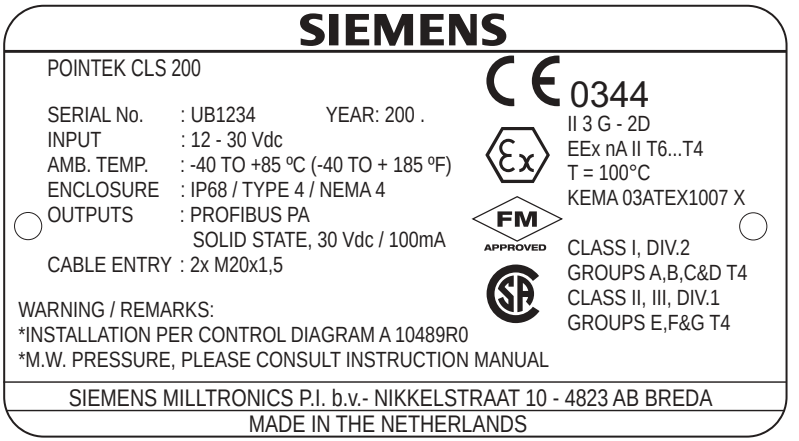
The notified body: BVQi, Westblaak 7, 3012 KC Rotterdam, The Netherlands

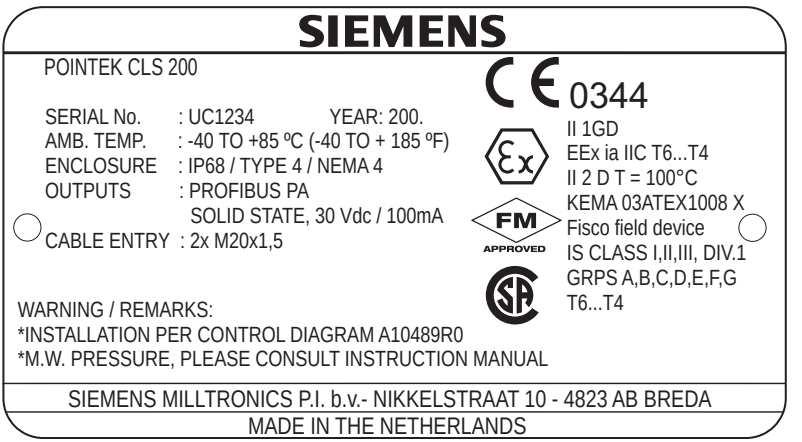
Location, Breda
Date, June 4, 2004

Representative:
Name, M. Fitterer
Function, Managing Director

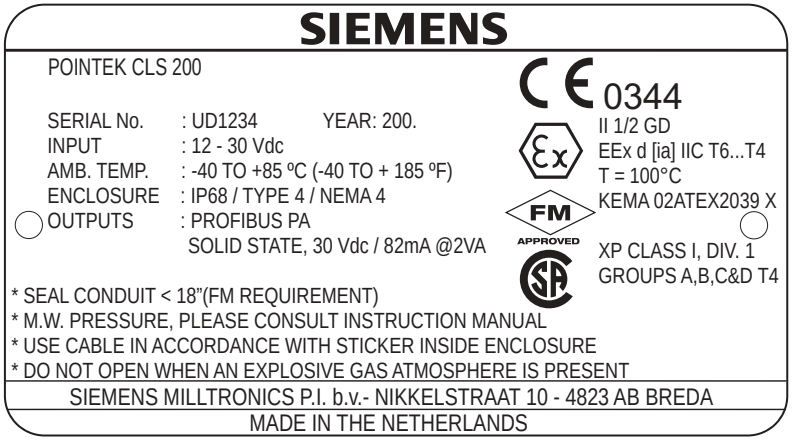
Product Nameplate: Pointek CLS 200

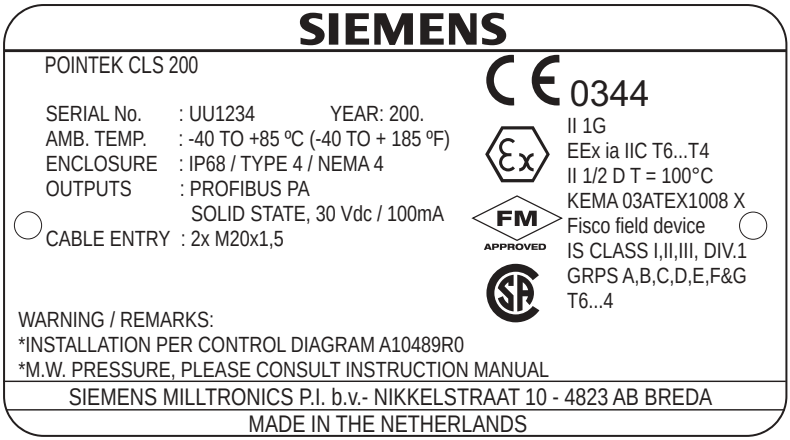






Product Nameplate: Pointek CLS 200 (continued)





KEMA certificates and schedules

KEMA

(1) **EC-TYPE EXAMINATION CERTIFICATE**

(2) Equipment or protective system intended for use in potentially explosive atmospheres – Directive 94/9/EC

(3) EC-Type Examination Certificate Number: **KEMA 03ATEX1007 X**

(4) Equipment or protective system: **Capacitive Level Switch Pointek CLS 200, Model 7ML550.-.....-0..1-z**

(5) Manufacturer: **Siemens Milltronics Process Instruments B.V.**

(6) Address: **Nikkelstraat 10, 4823 AB Breda, The Netherlands**

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. 2025944.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50021 : 1999 **EN 50281-1-1 : 1998**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment or protective system according to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

(12) The marking of the equipment or protective system shall include the following:

Ex **II 3 G** or **2 D** **EEx nA II T6 ... T4** **T 100 °C**

Arnhem, 15 June 2004
KEMA Quality B.V.

C.G. van Es
Certification Manager

* This Certificate may only be reproduced in its entirety and without any change

KEMA Quality B.V.
Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
P.O. Box 5185, 6802 ED Arnhem, The Netherlands
Telephone +31 26 3 56 20 08, Telefax +31 26 3 52 58 00

ACCREDITED BY THE DUTCH COUNCIL FOR ACCREDITATION

KEMA

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 03ATEX1007 X**

(15) **Description**

The Capacitive Level Switch Pointek CLS 200 Model 7ML550.-.....-0....-Z is used for the detection of the level limit of fluids or solids. The Level Switch is connected to the Profibus PA fieldbus. A separate solid state switch is available for use as alarm switch or as a level limit switch.
Optionally the Level Switch is provided with an indicator.

The Level Switch is avalable with an integral level probe or with a remotely mounted level probe.

The electronics enclosure of the Level Switch and the enclosure of the level probe ensure an ingress protection of at least IP 68 in accordance with EN 60529.

Ambient temperature range: -40 °C ... +40 °C for temperature class T6,
-40 °C ... +85 °C for temperature class T4.

Process temperature range -40 °C ... +125 °C.

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

Electrical data

Supply and signal circuit Profibus PA ..... (terminals PA+ and PA-)	supply 9 ... 32 Vdc, max. 15 mA
Switch output circuit ..... (terminals 4 and 5)	voltage max. 33 Vdc current max. 100 mA
Probe circuit ..... (remote probe only)	for connection to the Level Switch

(16) **Report**

KEMA No. 2025944.

(17) **Special conditions for safe use**

To maintain the degree of protection of the enclosure, when intended to be used in an explosive atmosphere caused by air/dust mixtures requiring the use of apparatus of equipment category 2 D, cable entry devices in accordance with Annex B of EN 50014, with a type of ingress protection of at least IP 68 shall be used and correctly installed.

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at (9).

KEMA

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 03ATEX1007 X**

(19) **Test documentation**

		dated
Drawing No.	BA0557, rev. 0	25.04.2004
	0.BD.0041, rev. A	13.11.2002
	A10637R0, rev. A	28.05.2004
	A10638R0, rev. 0	27.05.2004
	A10644R0, rev. A	28.05.2004
	A10645R0, rev. A	27.05.2004
	A10654R0, rev. B	10.06.2004
	A10672R0, rev. A	28.05.2004
	A10690R0, rev. A	28.05.2004
	BB0035, rev. A	15.06.2004
	A5E00111486C, rev. 2 (4 sheets)	28.10.2002
	A5E00117655E (6 sheets)	21.06.2002
	A5E00083375A, rev. 3	23.04.2001
	A5E00117657, rev. 3	05.07.2002
	A5E00117657B (3 sheets)	18.01.2002
	A5E00111488A	22.01.2002
	A5E00111488B	15.07.2002
	AKSV121, rev. 1.3	30.09.2002
	BB0035, rev. 0	18.05.2004
	TXRC21105, rev. A	03.06.2004
	TXRC21110, rev. A	03.06.2004
	222206, rev. B	19.05.2004
	222209, rev. F	15.06.2004

Page 3/3

KEMA

(1) **EC-TYPE EXAMINATION CERTIFICATE**

(2) Equipment or protective system intended for use in potentially explosive atmospheres – Directive 94/9/EC

(3) EC-Type Examination Certificate Number: **KEMA 03ATEX1008 X**

(4) Equipment or protective system: **Capacitive Level Switch Pointek CLS 200 Model 7ML550.-.....-0..1-z**

(5) Manufacturer: **Siemens Milltronics Process Instruments B.V.**

(6) Address: **Nikkelstraat 10, 4823 AB Breda, The Netherlands**

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. 2025944.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014 : 1997 EN 50020 : 2002 EN 50281-1-1 : 1998 EN 50284 : 1999

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment or protective system according to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

(12) The marking of the equipment or protective system shall include the following:

II 1 G EEx ia IIC T6 ... T4 and **II 1/2 D T 100 °C** or **II 2 D T 100 °C** or **II 1 GD EEx ia IIC T6 ... T4 T 100 °C**

Arnhem, 15 June 2004
KEMA Quality B.V.

C.G. van Es
Certification Manager

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ACCREDITED BY THE DUTCH COUNCIL FOR ACCREDITATION

KEMA

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 03ATEX1008 X**

(15) **Description**

The Capacitive Level Switch Pointek CLS 200 Model 7ML550.-.....-0..1-z is used for the detection of the level limit of fluids or solids. The Level Switch is connected to the Profibus PA fieldbus. A separate solid state output is available for use as alarm switch or as level limit switch.
Optionally the Level Switch is provided with an indicator.

The Level Switch is available with an integral level probe, or with a remotely mounted level probe.

The electronics enclosure of the Level Switch and the enclosure of the level probe ensure an ingress protection of at least IP 68 in accordance with EN 60529.

Ambient temperature range: -40 °C ... +40 °C for temperature class T6,
-40 °C ... +85 °C for temperature class T4.

Process temperature range -40 °C ... +125 °C.

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

Marking

Depending on the version, the equipment is marked as follows:

Integral version:	Ex	II 1 G II 1/2 D	EEx ia IIC T6 ... T4 T 100 °C
Remote version, enclosure:	Ex	II 1 G II 2 D	EEx ia IIC T6 ... T4 T 100 °C
Remote version, level probe:	Ex	II 1 GD	EEx ia IIC T6 ... T4 T 100 °C

Electrical data

Supply and signal circuit Profibus PA ..... (terminals PA+ and PA-)

in type of explosion protection intrinsic safety EEx ia IIC, only for connection to a certified intrinsically safe fieldbus in accordance with the FISCO Model according to IEC TS 60079-27, with following maximum values:

U_i = 24 V
I_i = 380 mA
P_i = 5,32 W
C_i = 5 nF
L_i = 10 µH

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Switch output circuit ..... (terminals 4 and 5) in type of explosion protection intrinsic safety EEx ia IIC or EEx ia IIB, only for connection to a certified intrinsically safe circuit, with following maximum values:

U_i	=	30	V	
I_i	=	110	mA	(apparatus group IIC)
		200	mA	(apparatus group IIB)
P_i	=	825	mW	(apparatus group IIC)
		1500	mW	(apparatus group IIB)
C_i	=	0	nF	
L_i	=	0	µH	

Probe circuit ..... in type of explosion protection intrinsic safety EEx ia IIC, only for connection to the intgrated probe or to a remotely mounted probe. Maximum cable length 333 m.

The probe circuit is infallibly galvanically isolated from the supply and signal circuit to a maximum voltage of 30 V.

The Solid state output switch is infallibly galvanically isolated form the signal and supply circuit and from the probe circuit to a maximum voltage of 30 V.

When the transmitter is connected to associated intrinsically safe apparatus in type of explosion protection EEx ia IIB or EEx ib IIC or EEx ib IIB, for the above mentioned probe circuit the type of explosion protection is still EEx ia IIC.

For application of the transmitter in a potentially explosive atmosphere caused by dust, the electrical data as listed for apparatus group IIB are applicable.

Routine tests

Transformer T1 shall be subjected to a routine test in accordance with EN 50020, clause 10.6, applying a test voltage of at least 500 Vac during 1 minute between the primary and secondary windings, without breakdown.

Installation instructions

When the Level Switch is used in explosive atmospheres caused by air/dust mixtures, requiring the use of apparatus of equipment category 2 D, cable entry devices shall be used that provide a degree of ingress protection of at least IP 68, that are suitable for the application and are correctly installed.

(16) **Report**

KEMA No. 2025944.

(17) **Special conditions for safe use**

1. When an insulated probe is used in a potentially explosive atmosphere caused by gas, damp or a non-conducting liquid, requiring equipment of apparatus group IIC, or when it is used in a potentially explosive atmosphere caused by air/dust mixtures, precautions must be taken to avoid ignition due to hazardous electrostatic charges.

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(13) **SCHEDULE**

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2. Because the enclosure of the Level Switch and optionally the process connection is made of aluminium alloy, when used in a potentially explosive atmosphere requiring apparatus of equipment category 1 G, the transmitter must be installed so, that even in the event of rare incidents, an ignition source due to impact or friction between the enclosure and iron/steel is excluded.

3. The intrinsically safe supply and signal circuit (Profibus PA) must be connected separately from the switch output circuit, in order to prevent current and/or voltage addition.

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at (9), additionally using draft standards IEC 61241-0 and IEC 61241-11 as a guide.

(19) **Test documentation**

		dated
Drawing No.	BA0557, rev. 0	25.05.2004
	0.BD.0041, rev. A	13.11.2002
	A10637R0, rev. A	28.05.2004
	A10638R0, rev. 0	27.05.2004
	A10644R0, rev. A	28.05.2004
	A10645R0, rev. A	27.05.2004
	A10654R0, rev. B	10.06.2004
	A10672R0, rev. A	28.05.2004
	A10690R0, rev. A	28.05.2004
	BB0035, rev. A	15.06.2004
	TXRC21105, rev. A	03.06.2004
	TXRC21110, rev. A	03.06.2004
	AKSV121, rev. 1.3	30.09.2002
	AKSV121.g0	10.02.2004
	AKSV121.g1	10.02.2004
	AKSV121.g2	10.02.2004
	AKSV121.g3	10.02.2004
	AKSV121.g4	10.02.2004
	AKSV121.g5	10.02.2004
	AKSV121.g6	10.02.2004
	A5E00111486C, rev. 2 (4 sheets)	28.10.2002
	A5E00117655E (6 sheets)	21.06.2002
	A5E00083375A, rev. 3	23.04.2001
	A5E00117657, rev. 3	05.07.2002
	A5E00117657B (3 sheets)	18.01.2002
	A5E00111488A	22.01.2002
	A5E00111488B	15.07.2002
	A5E00111486B	22.10.2002
	A5E00111486G	02.08.2002
	A5E00144036, rev. 02 (2 sheets)	22.01.2003
	A10697R0, rev. 0	18.05.2004
	222207, rev. C	01.06.2004
	222209, rev. F	15.06.2004
	240003, rev. A	28.05.2004

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KEMA amendment

KEMA

AMENDMENT 5

to EC-Type Examination Certificate KEMA 00ATEX2039 X

Manufacturer: **Siemens Milltronics Process Instruments B.V.**

Address: **Nikkelstraat 10, 4823 AB Breda, The Netherlands**

Description

In future the Capacitance Level Switch Type Pointek CLS 200 may also be constructed in accordance with the documentation stated below.

The level switch can be provided with a Profibus PA signal amplifier, reed switch and display unit.

Electrical data

Supply voltage	12 - 30 VDC
Power dissipation	max. 2 VA
Output	Profibus PA Solid state max. 30 Vdc, 82 mA

All other data remain unchanged.

Test documentation

	dated
Drawing No. A10513R0, rev. 0	26.03.2003
222208, rev. 0	04.07.2003
A5E00111486B	22.10.2002
A5E00111486C (sheet 1), rev. 2	28.10.2002
A5E00111486C (sheets 2 to 4), rev. 1	08.07.2002
A5E00111486G	02.08.2002
A5E00111488A	15.07.2002
A5E00111488B	15.07.2002
A5E00117657, rev. 3	05.07.2002
0.BA.0393, rev. 0	24.01.2003
reedpcb.xls	08.07.2003

Arnhem, 14 July 2003
KEMA Quality B.V.

T. Pijpker
Certification Manager

[2025878]

Appendix E: Installation, Pointek CLS 200, analog and digital models

! WARNING: All modifications or extensions to the device require the manufacturer's permission.

Notes:

- 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.

Location

Recommended:

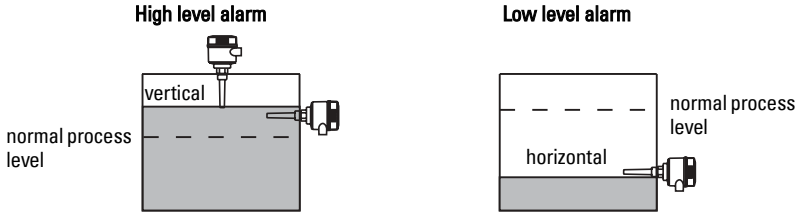
- Provide a sun shield to protect the transmitter from direct heat radiation.

Precautions:

- Avoid mounting Pointek CLS 200 in locations subject to strong vibrations in the vicinity, whenever possible.
- Do not exceed the permissible ambient temperature limits (see *Environmental* on page 10 for details).

Mounting

Pointek CLS 200 (standard probe length)



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

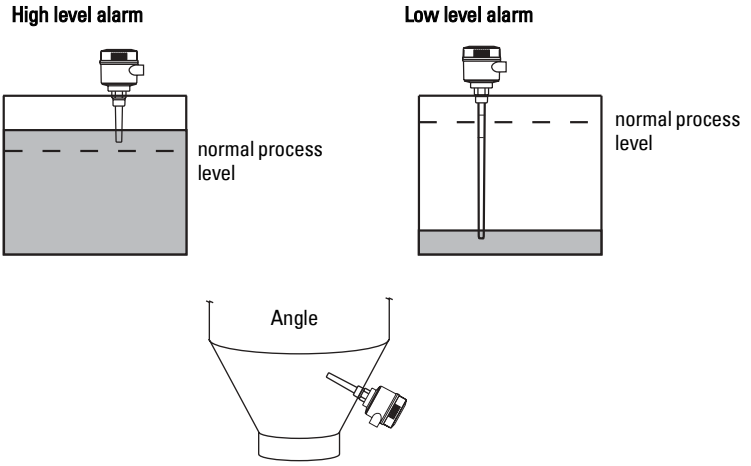
For low level alarm (level drops below normal process level):

- mounted through the tank wall at the detection level

Pointek CLS 200 standard configuration with extensions:

For high or low level alarm:

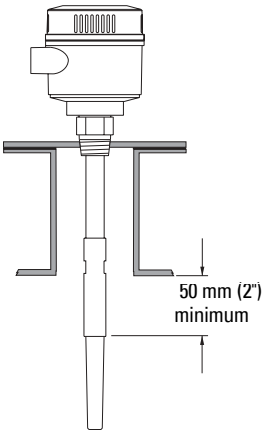
- designed for top mounting. The probe suspends vertically so that it reaches into the process at the desired detection level (high or low detection alarm).



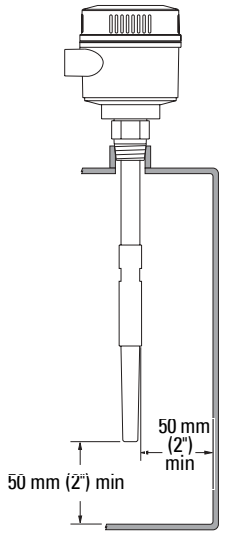
Mounting Restrictions

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

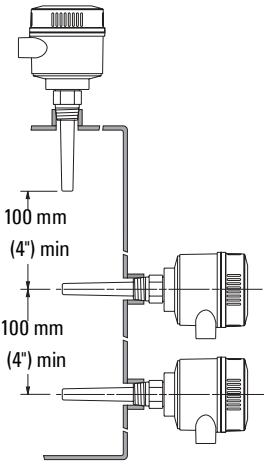


Close to tank walls



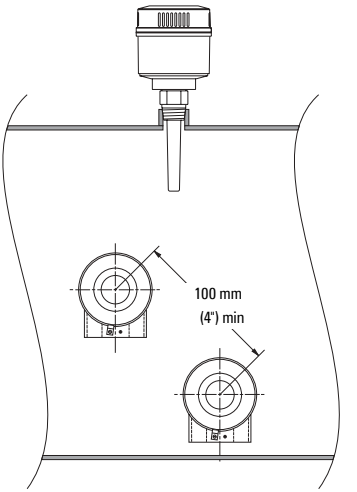
Multiple Units

End View



Sensors must be 100 mm (4") apart.

Side View

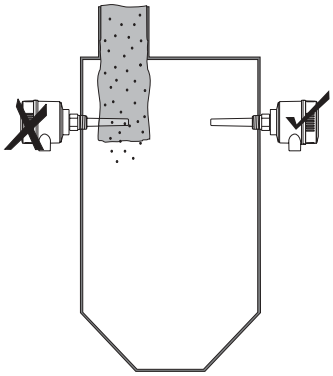


Mount diagonally if space is restricted.

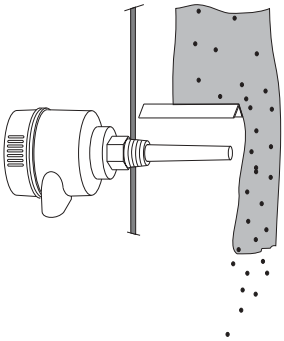
Process Cautions

Cautions:

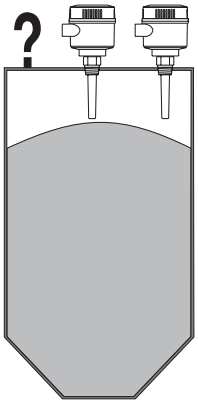
- The maximum allowable torque on a horizontally installed rod is 15 Nm.
- Keep unit out of path of falling material, or protect probe from falling material.

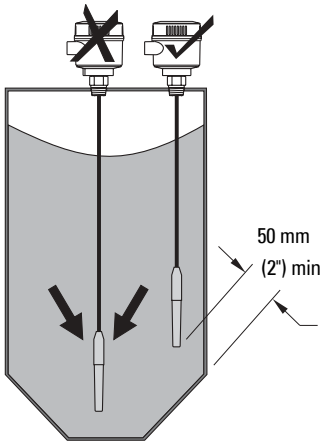


Caution: Consider material surface configuration when installing unit.

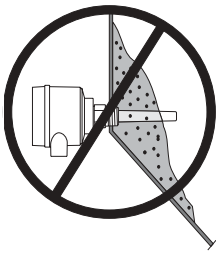


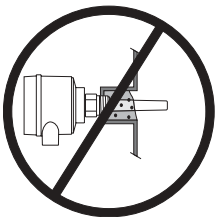
Caution: Tensile load must not exceed probe or vessel rating.





Caution: Avoid areas where material build up occurs.

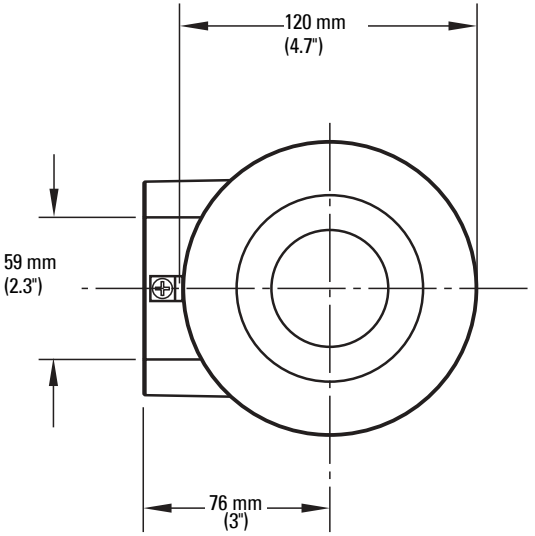




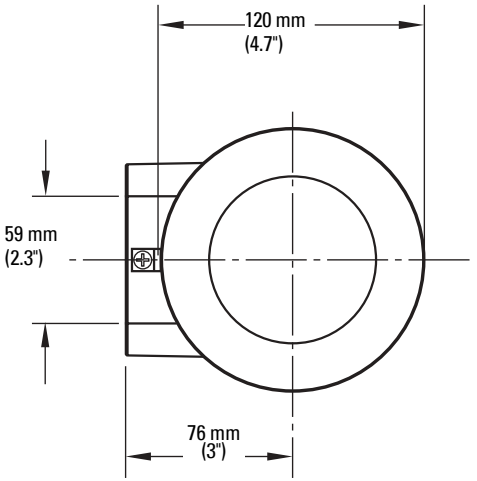
Dimensions

Standard Configuration

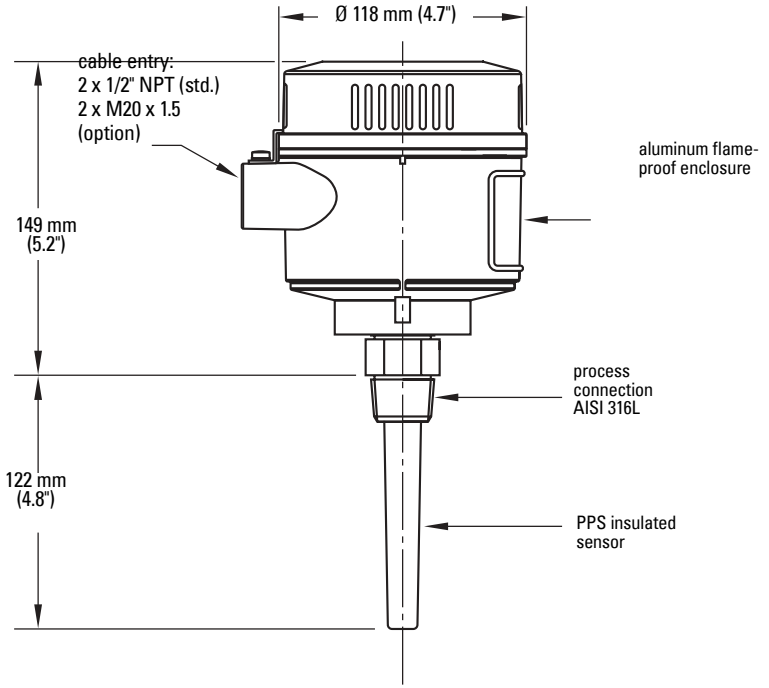
Lid with window



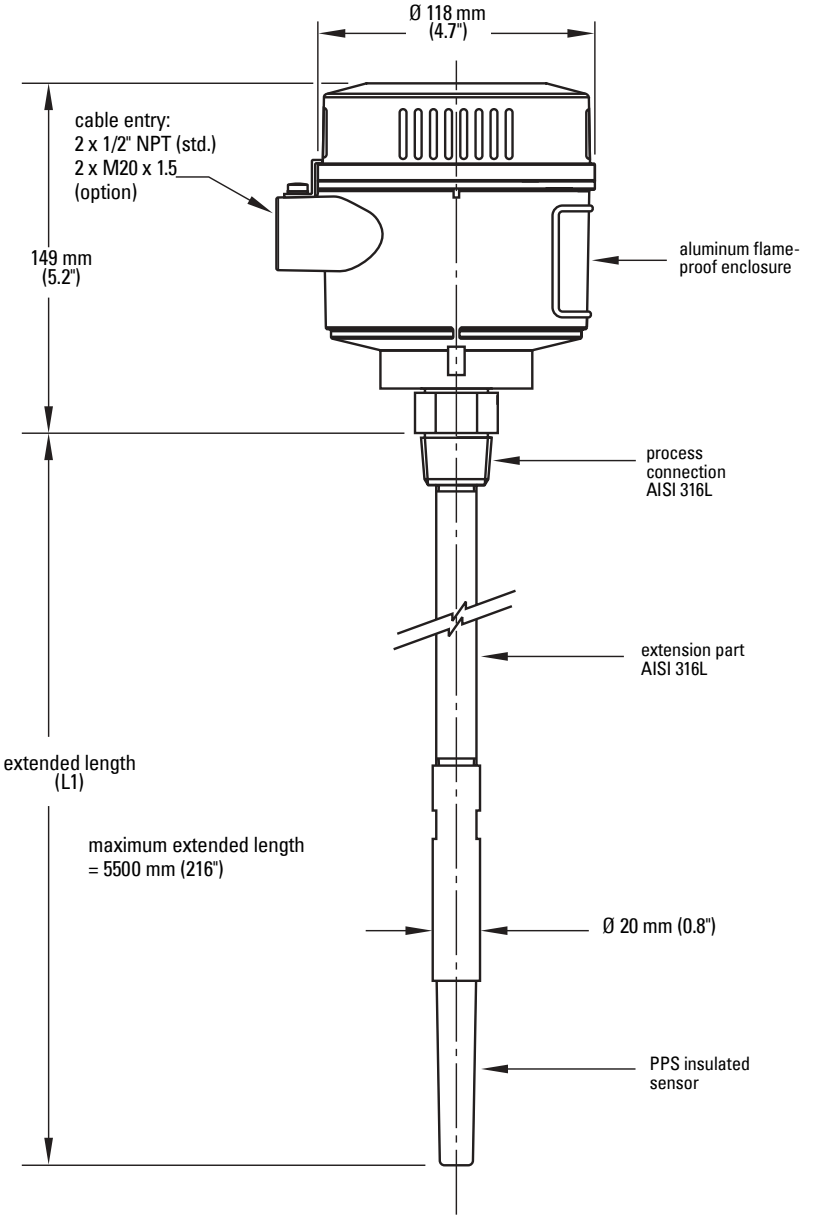
Lid without window



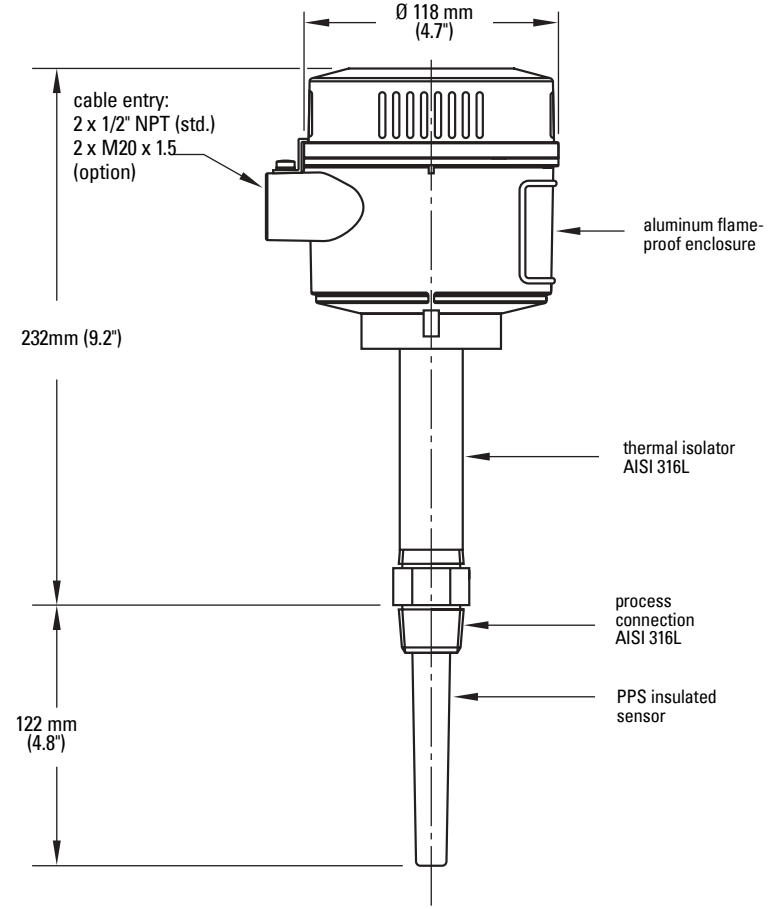
Compact version



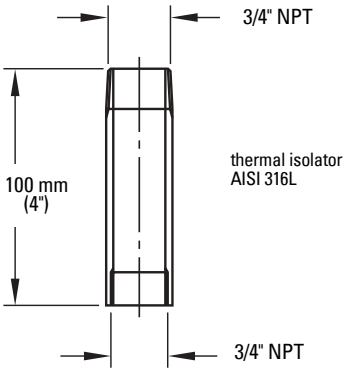
Standard Configuration with Extension



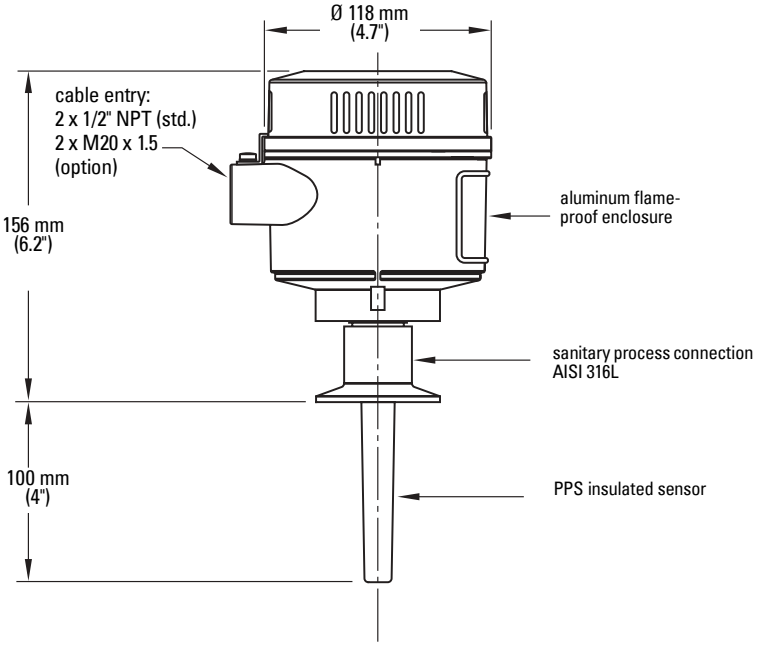
Standard Configuration with Thermal Isolator



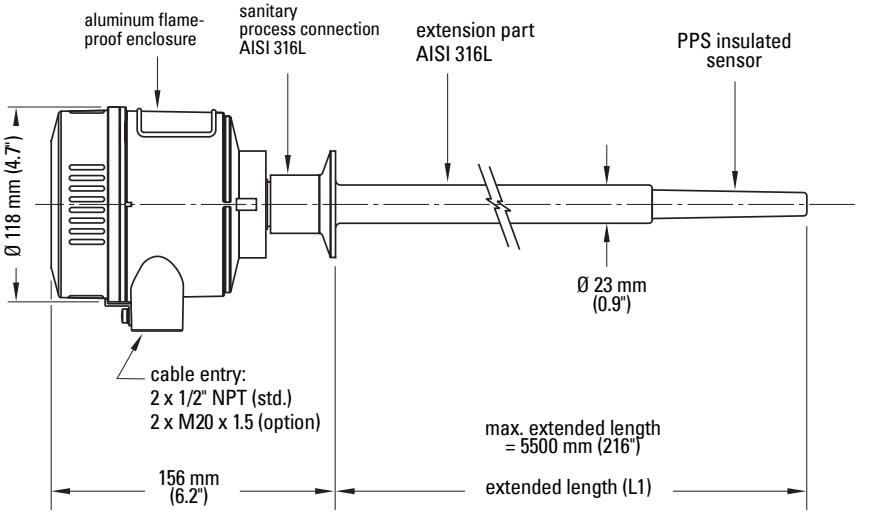
Thermal Isolator: Detail



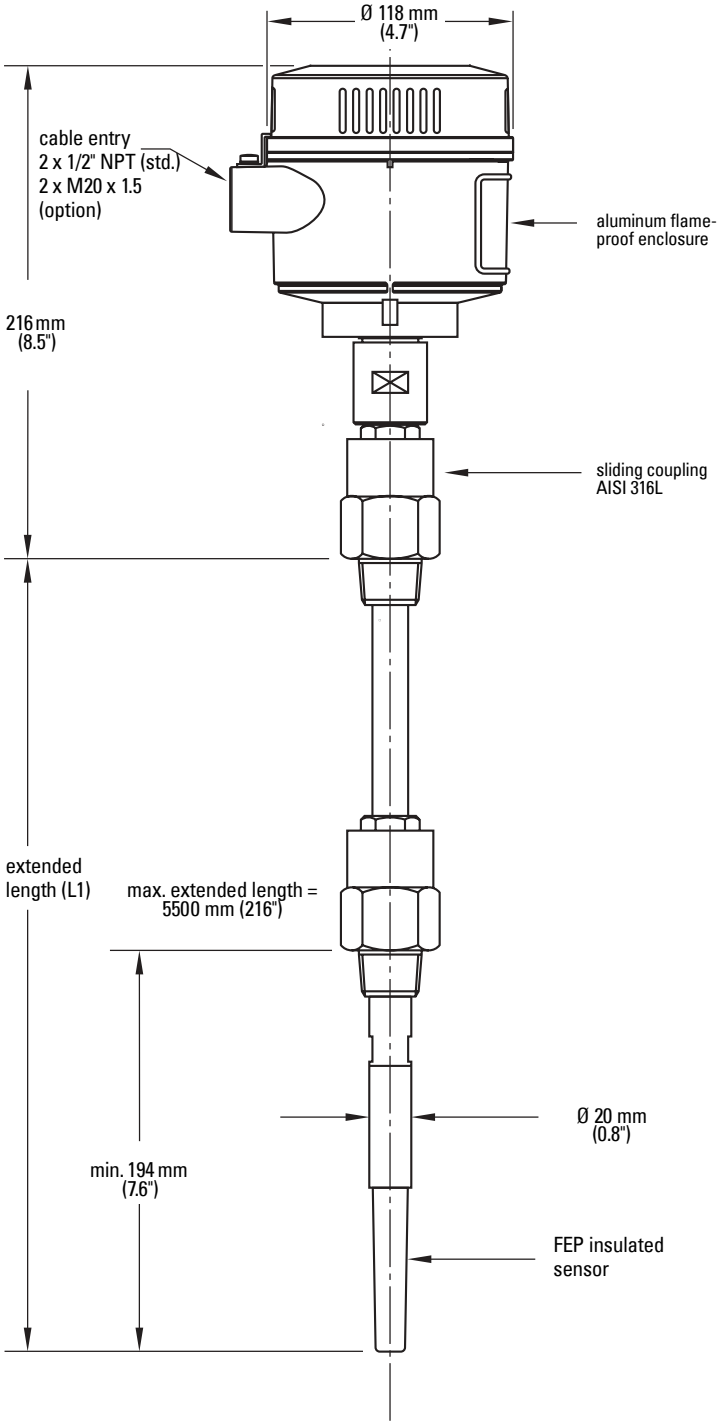
Sanitary Configuration



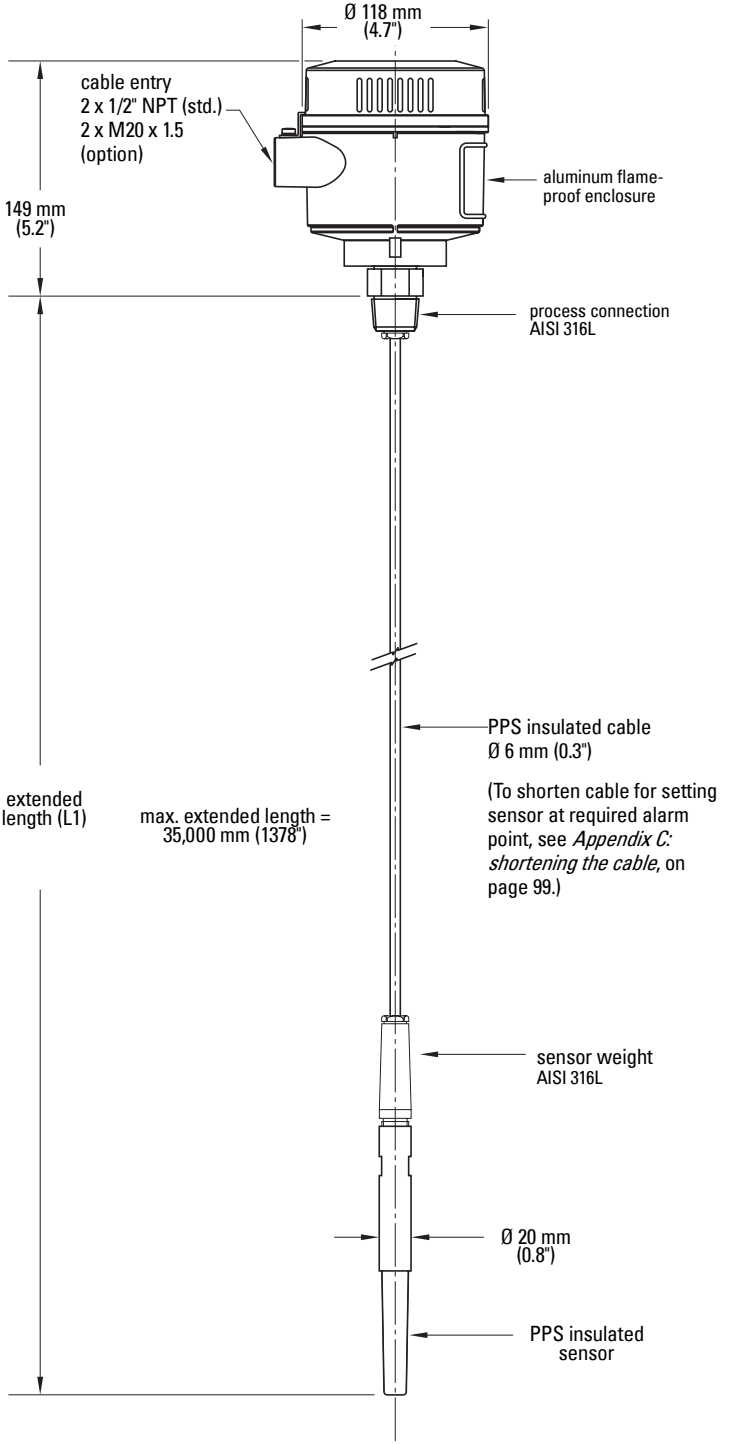
Sanitary Configuration with Extension



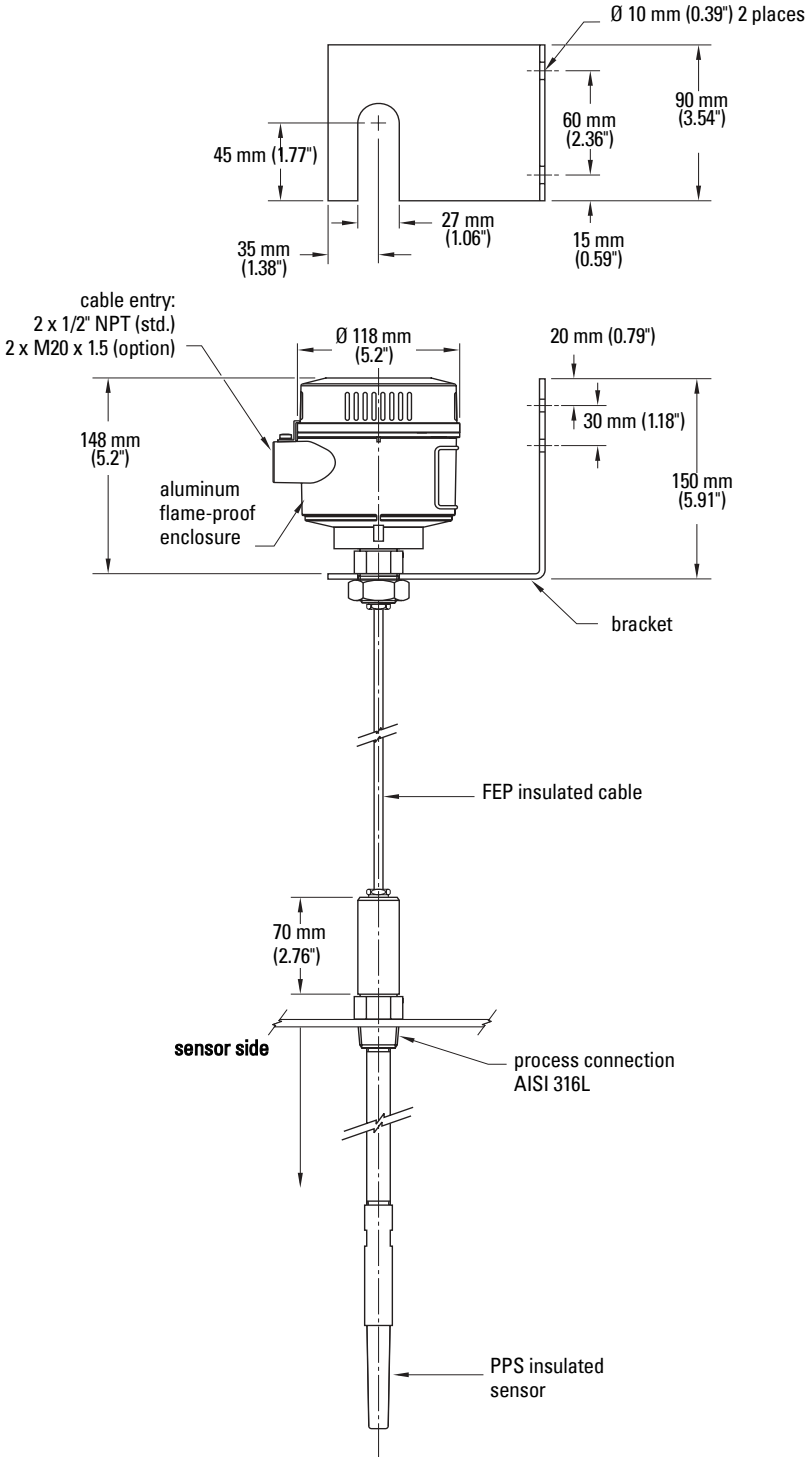
Pointek CLS 200 with sliding coupling



Cable Configuration



Remote Mounted Electronics



Notes

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 direct electric current.[1]

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 usually given relative to a vacuum /dry air: the dielectric constant of air is 1[1].

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.

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.

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

Notes

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www.siemens.com/milltronics

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