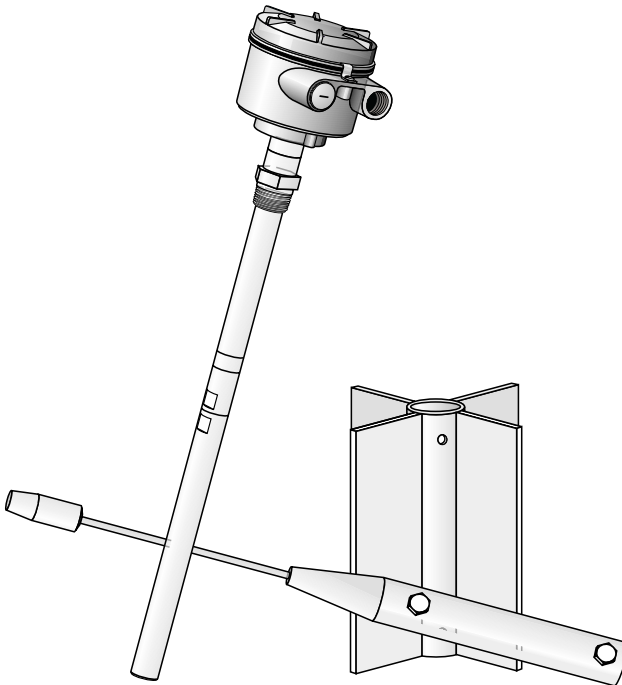


SIEMENS

**POINTEK CLS 300
CAPACITANCE · LIQUIDS/SOLIDS**

Instruction Manual

June 2001



POINTEK CLS 300

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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While we have verified the contents of this manual for agreement with the instrumentation described, variations remain possible. Thus we cannot guarantee full agreement. The contents of this manual are regularly reviewed and corrections are included in subsequent editions. We welcome all suggestions for improvement.

Technical data subject to change.

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Table of Contents

Introduction to the Pointek CLS 300	2
Pointek CLS 300 Outputs	2
Pointek CLS 300 Features.....	2
Pointek CLS 300 Applications.....	2
Specifications	3
Installation	6
Location.....	6
Configuration and Dimensions	7
Standard Version.....	8
High Temperature Version.....	9
Ceramic Active Shield Insulator	10
Thermal Isolator.....	10
Rod Version.....	10
Changing Probe Length	11
Cable	13
Cable Tensile Strength.....	14
Cable Weights.....	14
Shortening the Cable.....	14
Mounting	15
Multiple units.....	15
Wall Restriction.....	15
Process Cautions.....	16
Interconnection	17
Trip Amplifier	17
Relay Output Connection.....	18
Solid State Switch.....	18
Diode Protection.....	18
Ancillary 2-Wire Output Connection	19
Power Connection (3 or 4 wire connection).....	19
Operation	20
Setup	20
Start Up	21
Alarm Output.....	22
Troubleshooting	25
Maintenance.....	25
Appendix I: Application Notes	26
Application Notes.....	26
Appendix II: CE Conformity	27
Index	28

Introduction to the Pointek CLS 300

Note: Pointek CLS 300 is to be used only in the manner outlined in this instruction manual.

The Pointek CLS 300 capacitance level switch provides output on high or low process material levels. When the measured material is at the desired level, the change in capacitance is sensed and a level alarm is triggered. This could be either a **high level alarm** (material rising to reach the desired level) or a **low level alarm** (material falling to reach desired level).

Pointek CLS 300 Outputs

- One form **C** (SPDT) relay
- One isolated, non-polarized, solid-state switch

Pointek CLS 300 Features

- NPT, BSPT, JIS (other connections on request)
- Corrosion resistant construction, PFA, Ceramic, and 316L stainless steel wetted parts
- 25m (82 ft) maximum insertion length
- Rugged shear and abrasion resistant probe
- Fully adjustable process alarm: level, time delay
- Field adjustable insert length
- ESD protection to 55 kv continuous discharge
- Active shield technology

Pointek CLS 300 Applications

- Liquids, slurries, powders, granules, and solids
- Chemical and petrochemical
- High pressure and temperature
- Power Industry (fly-ash)

Specifications

Probe

Process Connections

NPT/BSPT/JIS¹

Wetted Parts

Standard Version:

AISI 316L/PFA/Peek²

High Temperature Version:

AISI 316L/Ceramics Al₂O₃ (99.7%)²

Probe Lengths

Rod Version:

min. 350mm (14") - max. 1000mm (40")

Rope/Cable Version:

min. 500mm (20") - max. 25000mm (985")

Max. Tensile Force

1900kg (4188lbs)

Pressure Range³

-1 to +35 barg (-14.6 to +511 psig)

Temperature Range³

Standard Version:

-40 to 200° C (-40 to 392° F)

High Temperature Version:

-40 to 400° C (-40 to 752° F)

Min. Dielectric Constant (ϵ_r):

1.5

Enclosure

Aluminium

Epoxy Coated

Yes

NEMA/CSA/IP-Rating

4/Type4/IP65

Cable Inlet

2 X ½"NPT

Certifications

CENELEC/FM/CSA

¹ Other process connections available on request. See Probe: Standard on page 5, or Probe: Cable on page 5.

² For a chemical resistance list for PFA/Peek /Ceramic, contact your local distributor.

³ See the Pressure/Temperature Curve in Appendix I: Application Notes on p. 26.

Power Supply and Transmitter

Supply Voltage

2 - 250 Vac/dc any polarity galvanically isolated

Power consumption

2VA/2Watt

Wiring connections

Max. 2.5mm²

Temperature ranges

Operation (Storage): -40 to 85° C (-40 to 185° F)

Signal indicators

Three:

1. Adjustment control
2. Output status
3. Power

Adjustment Potentiometers

Two:

1. Time delay adjustment
2. Sensitivity adjustment

Adjustment Switches

5PST dip switch:

- time delay select
- fail safe selection
- time delay test/adjust
- high/low sensitivity

Min. Sensitivity

1% change in actual capacitance

Max. Temperature Drift

0.2% of Actual Capacitance Value

Measurement Frequency

600 (kHz) max.

ESD protection

Protected to 55kV continuous discharge.

Output Functions

Relay Contact

Contact:	Form C (SPDT) (selectable NC or NO contact)
Max. Contact Load (dc):	5A/30V dc
Max. Contact Load (ac):	8A/250V ac ($\cos\phi=1$)
Max. Switching Capacity:	150Watt/2000VA
Min. Contact Load:	10mA/5Vdc
Time Delay (ON and/or OFF):	1 - 60 sec.

Solid State switch

Output:	Galvanically isolated
Safety:	Non-polarity sensitive transistor
Max. Load:	2 Watt
Max. Switch Voltage:	250Vac/300Vdc
Max. Load Current:	100mA
Voltage Drop	Below 1 Volt typical @ 50mA
Time Delay (On and/or Off)	1 - 60 sec.

Two (2) Wire Switch

With customer supplied external trip devices

Probe - Standard

Length

350mm (14") to 1000mm (40")

Process Size (in inches)

NPT: ¾, 1, 1¼, 1½

BSPT: ¾, 1, 1½

JIS: 1, 1½

Insulating Material

Standard Version:

PFA

High Temperature Version:

Ceramic

No insulation on active probe

Tensile kg load

Not applicable

Probe Diameter

19mm

Probe - Cable

Length

500mm (20") to 25000mm (985")

Process Size

NPT/BSPT: 1¼" minimum

Insulating Material

AISI 316L SS

PFA insulation optional

Tensile kg load

1900 kg (4188 lbs.)

Electrode Dimensions

Cable:

Insulated: 9mm (0.35")

Non insulated: 6mm (0.24")

Weight:

32 x 250mm (1.26 x 9.84")

Butterfly:

175 x 168mm (6.89 x 6.61")

Approvals

CE, CSA, NRTL/C, FM, CENELEC

Please verify against device nameplate.

Installation

Location

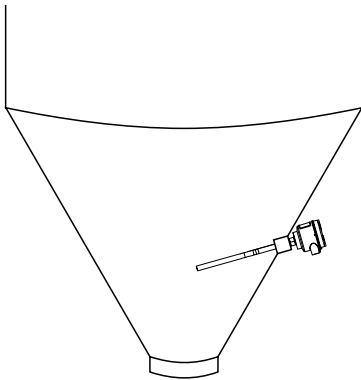
Notes:

- 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.

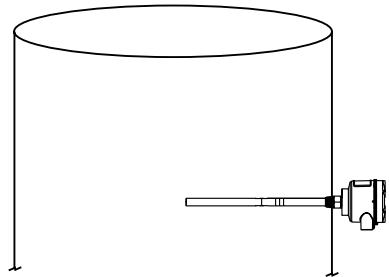
The Pointek CLS 300 as supplied in the standard probe lengths is normally mounted on the vessel top (high detection alarm) or through the tank wall at the detection level (high or low detection alarm).

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

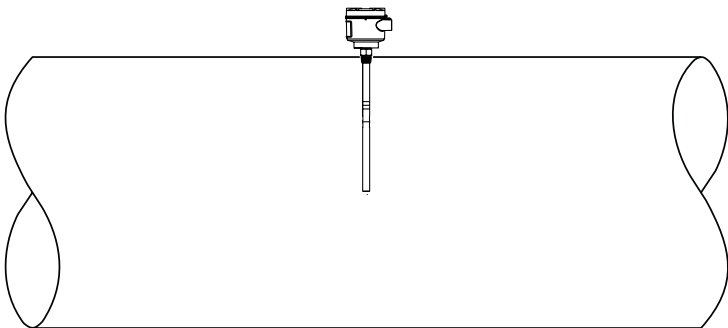
Angle



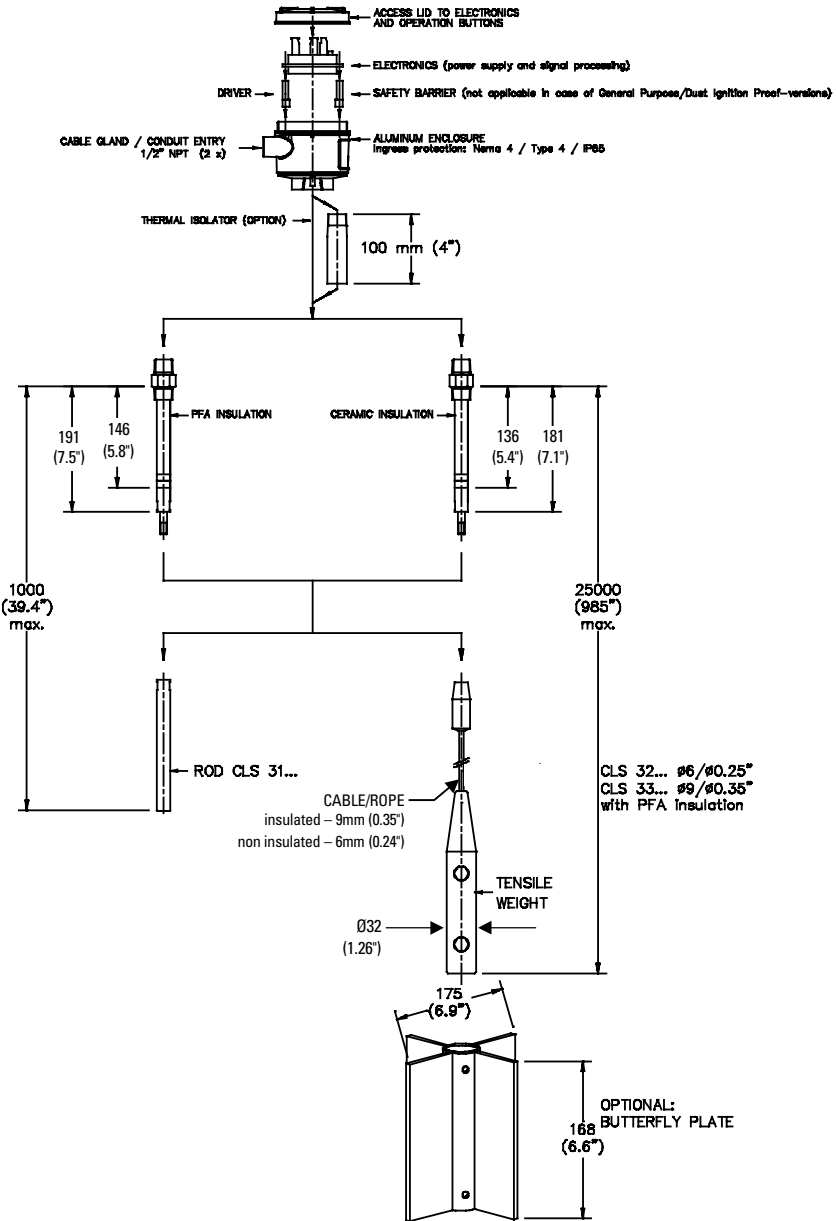
Horizontal



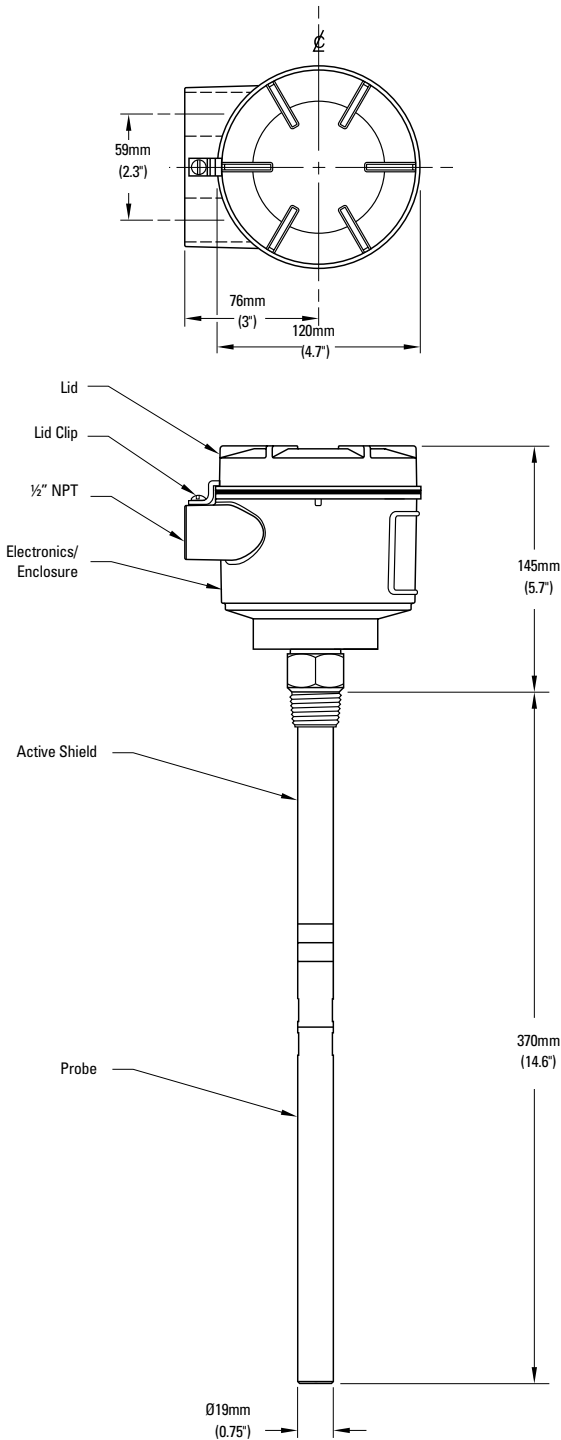
Vertical



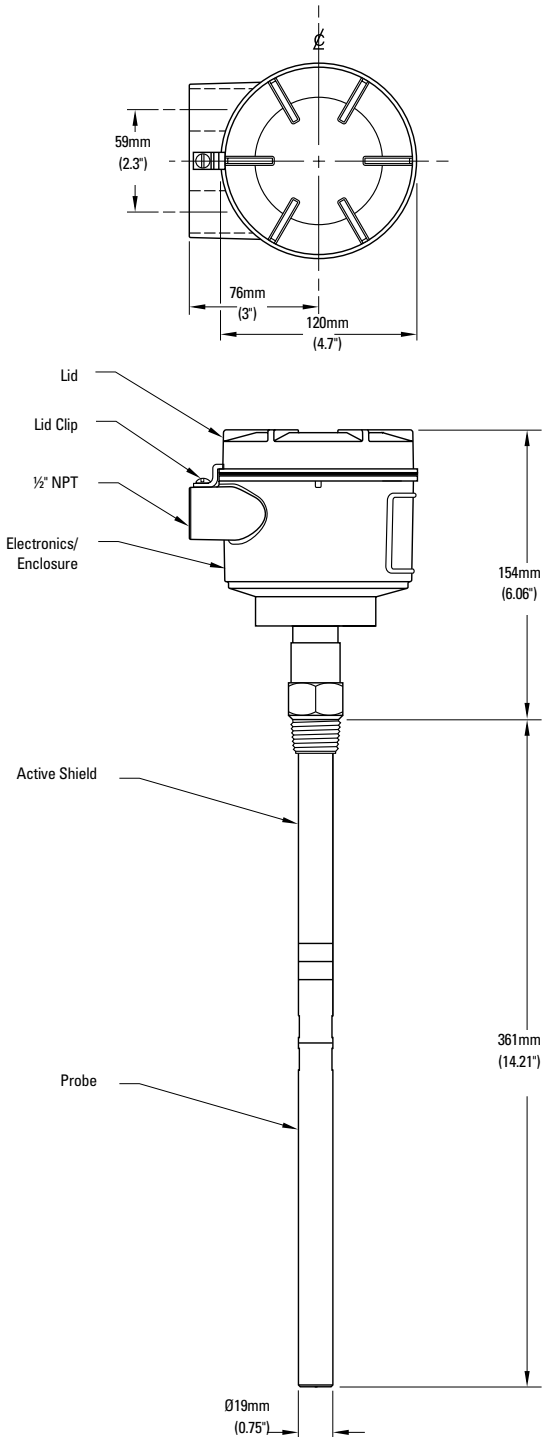
Configuration and Dimensions



Standard Version



High Temperature Version



Ceramic Active Shield Insulator

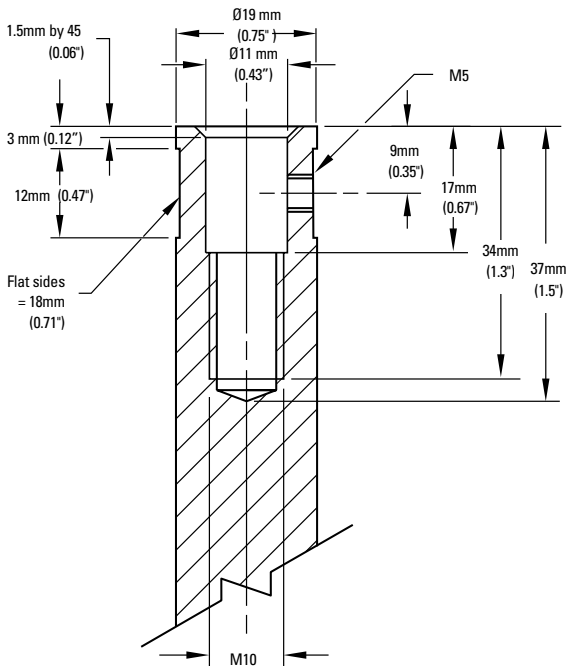
We recommend the High Temperature version, which includes a ceramic Active Shield insulator, when the process temperature is greater than 200° C/ 392° F and/or when the product to be detected is very abrasive. The high temperature version is rated for applications up to 400° C / 752° F. See Temperature and Pressure Recommendations for Application on page 26.

Thermal Isolator

If the ambient temperature of the transmitter is expected to exceed 85° C/185° F, use a thermal isolator. An isolator provides a separation distance between a high process temperature inside the vessel and the electronic housing outside the vessel. This reduces the operating temperature of the electronics to a value equal to or less than 85° C/185° F.

Rod Version

The rod version of the CLS 300 is available in standard lengths from 350mm (14") up to 1000mm (40"). Other lengths using stainless steel or other metals can be attached as an electrode when required. Ensure that the thread end conforms to the exact dimensions as shown below. Lengths of rod are not recommended beyond 1000mm (40").



Changing Probe Length

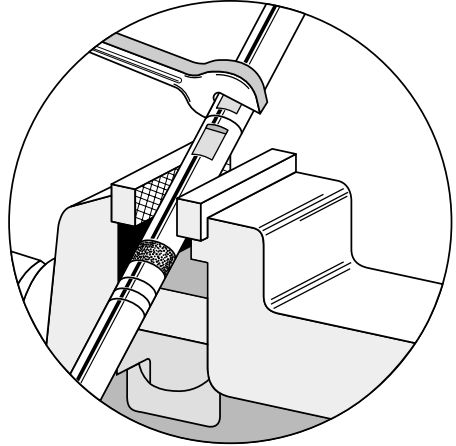
The probe length can be shortened in the field by cutting the electrode.

Warning: To prevent damage, do not apply torque directly to the main probe assembly.

Option 1

If the electrode is removable:

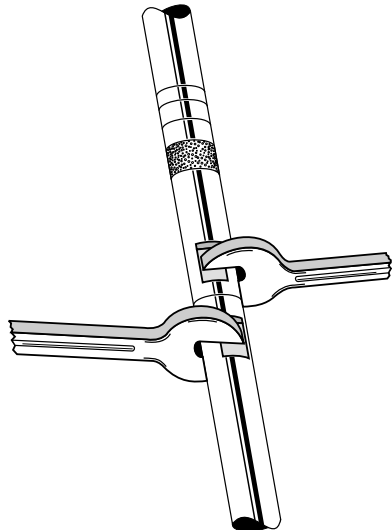
1. Remove the electrode by releasing the set screw and turning the threaded electrode end counter-clockwise
2. Place the upper part of the electrode in a vice as shown.
3. Use a wrench to loosen the lower portion of the electrode.



Option 2

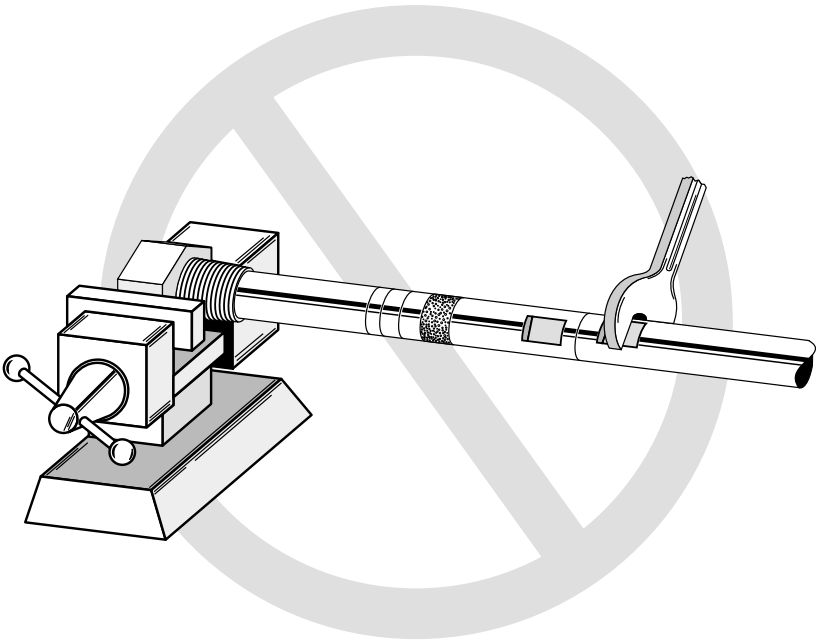
If electrode is NOT removable:

1. With unit mounted in place, place two wrenches as shown.
2. Hold the upper wrench steady and turn the lower one counter-clockwise to loosen the lower portion of the electrode.

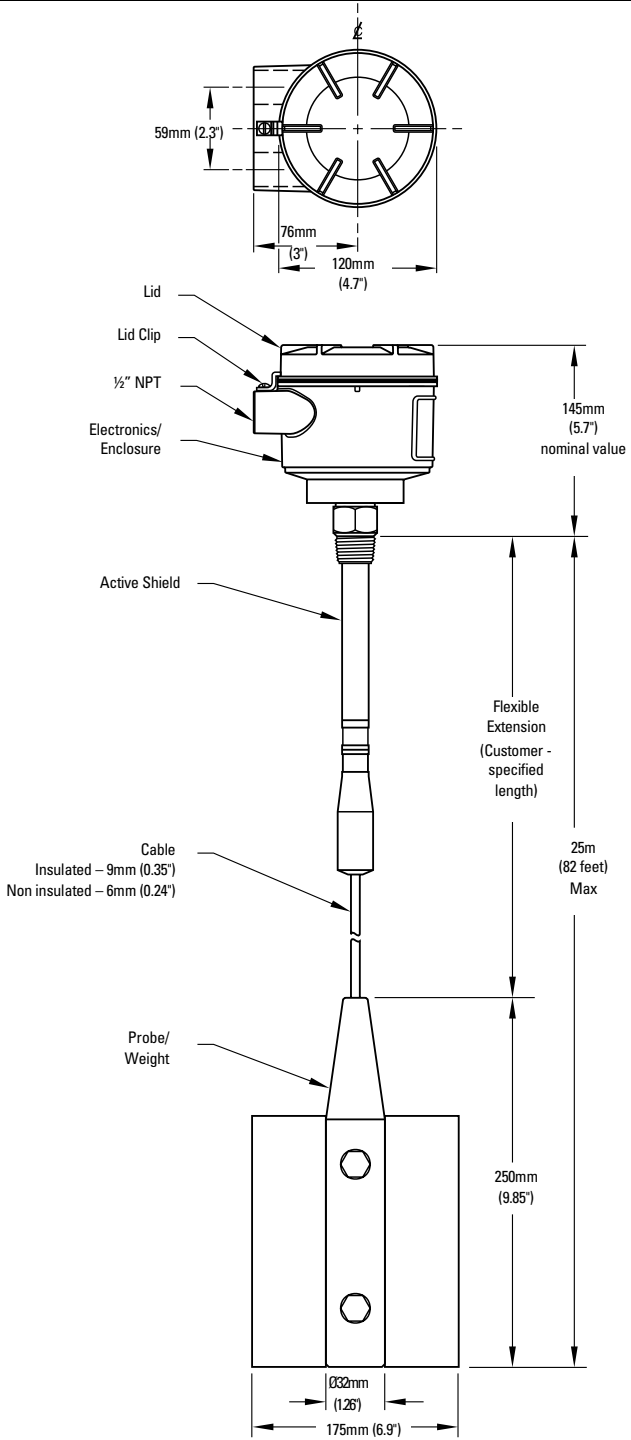


The Wrong Way

If the process connection itself is put in the vice, the probe's internal parts will rotate along with the wrench and the unit may fail.



Cable



Cable Tensile Strength

Do not exceed the tensile strength of the cable at 1900kg/4188lbs.

Always confirm that the load carrying capability of the silo/tank roof is sufficient to withstand the actual force on the cable conditions, especially where the force will be, or could be, as great as 1900kg/4188 lbs. A cable (rope) probe with a PFA jacket reduces the amount of possible product build-up on the probe as well as the tensile force on the cable.

Cable Weights

A standard weight with optional attachable Butterfly enhancer is available for the cable version. We recommend the Butterfly weight for lower dielectric constant materials (often in solids) because it increases the change in capacitance when the material comes in contact with the cable end. This occurs when the silo is quite tall (> 15 m/45 ft) and the dielectric constant is less than ($\epsilon_r < 4$).

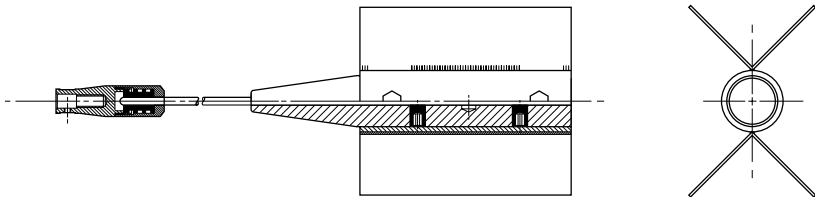
Shortening the Cable

Methods

- An angle grinder (preferably with a disc suitable for stainless steel)
or
- Wire cutters (suitable for piano cable $\varnothing 6 - 9$ mm).

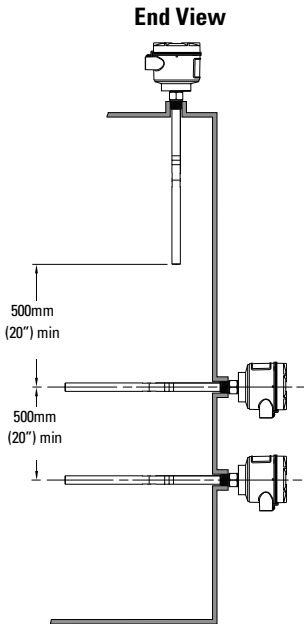
Procedure

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

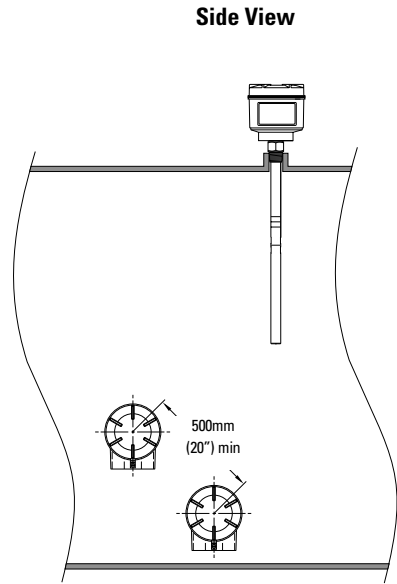


Mounting

Multiple units

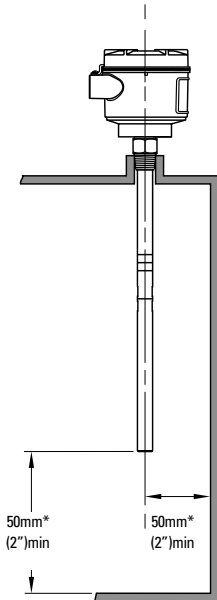


Sensors must be 500mm (20") apart.



Mount diagonally if vertical space is restricted

Wall Restriction

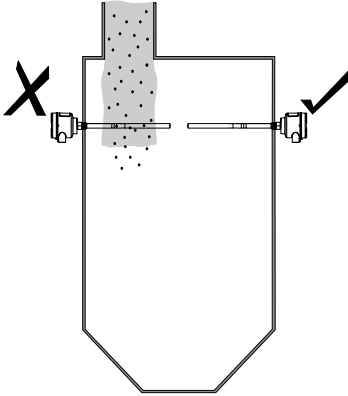


Note: These drawings are not to scale

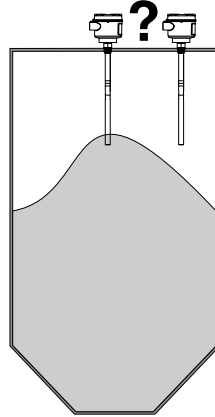
* standard version

Process Cautions

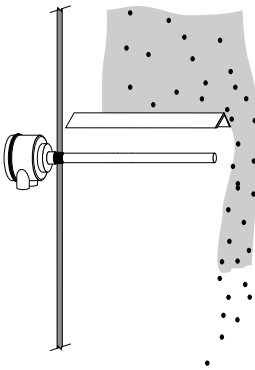
Caution: Keep unit out of path of falling material.



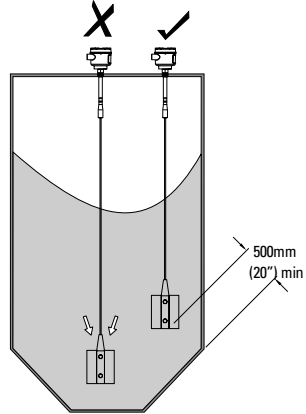
Caution: Consider material surface configuration when installing unit.



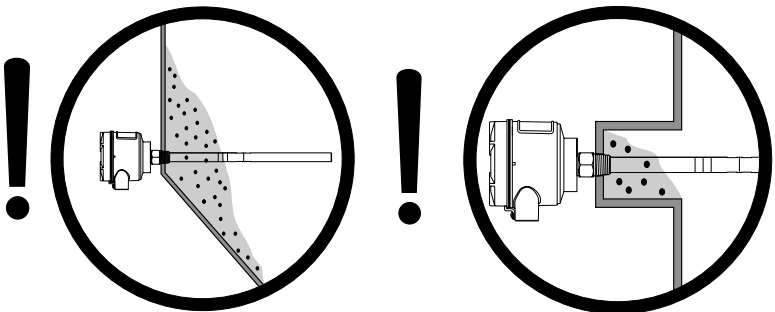
Caution: Protect probe from falling material.



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



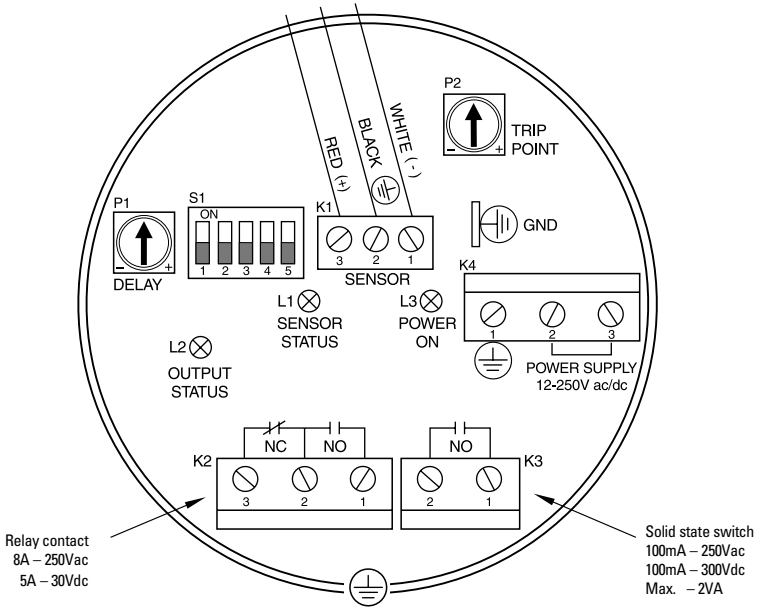
Note: buildup of material in active shield area does not affect switch.



Interconnection

Trip Amplifier

Loosen the lid clip and remove the enclosure cover to access connectors and electronics. The identification label is on the underside of the enclosure cover.



Notes:

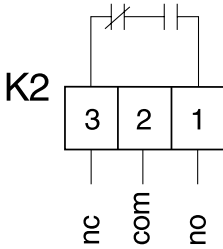
- Switch and potentiometer settings are for illustration purposes only. Refer to Setup on page 20.
- Relay contact terminals are for use with equipment having no accessible live parts and wiring having insulation suitable for at least 250V ac.
- Maximum working voltage between adjacent relay contacts shall be 250V ac

Warning:



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

Relay Output Connection

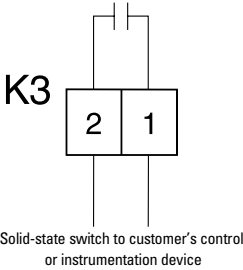


Relay shown in de-energized state.

K2 contact ratings:

- 8A at 250V ac
- 5A at 30V dc

Solid State Switch



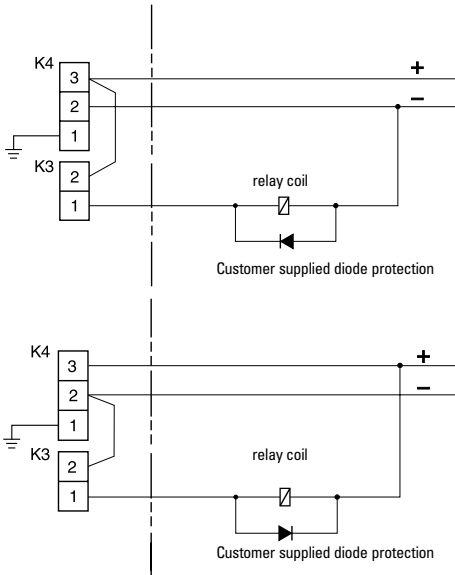
Switch shown in de-energized state.

K3 contact ratings:

- 250V ac, 100mA, max, non-polarized (max 2VA)
- 300V dc, 100mA max, non-polarized (max 2VA)

Diode Protection

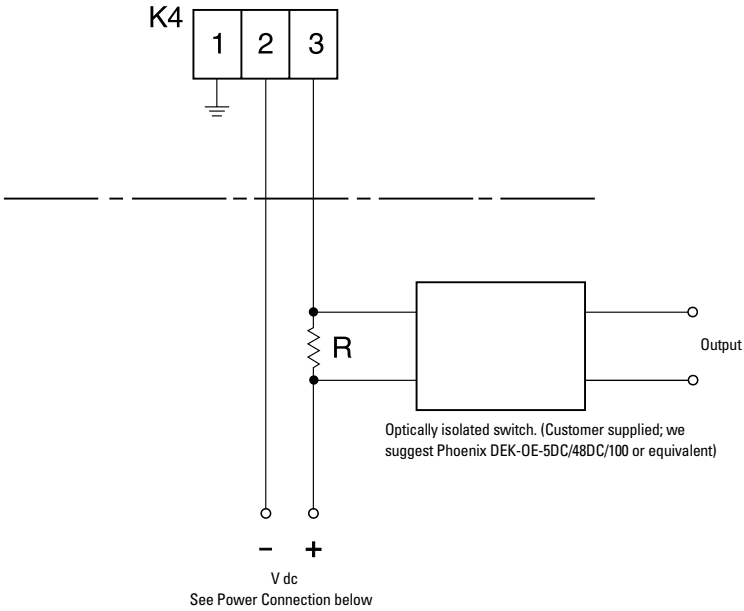
When driving an external relay with either the solid stated switch and/or relay outputs using dc power, protection diodes must be connected in the correct polarity across the relay coil to prevent possible switch/relay damage resulting from inductive spikes generated by the relay coil.



Switch capacity:

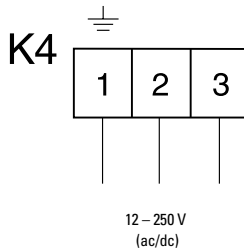
- 250V ac
100mA max.
2VA/2W max
- 300V dc.
100mA max.
2VA/2W max

Ancillary 2-Wire Output Connection



Power Connection (3 or 4 wire connection)

Nominal	24V dc	48 V dc
DC volts	22-26	46-50
R (Ω)	120	234



Operation

Setup

Note: Setup can be done in the field with the Pointek CLS 300 mounted into process, or in the shop prior to mounting.

Dip Switch 1

- Set **ON** to change alarm relay status immediately when the sensor detects a change in frequency. Use this setting when time is critical.
- Set **OFF** to change the alarm relay status with a delay by the amount set on potentiometer #1 (P1). Use this setting when you want to slow the response to account for turbulence or false readings.

Dip Switch 2

- Set **ON** to change alarm relay status immediately when the sensor detects a change in frequency. Use this setting when time is critical.
- Set **OFF** to change the alarm relay status with a delay by the amount set on potentiometer #1 (P1). Use this setting when you want to slow the response to account for turbulence or false readings.

Dip Switch 3

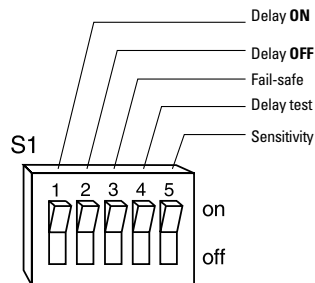
- Set **OFF** to indicate Low fail-safe selection.
- Set **ON** to indicate High fail-safe selection.

Dip Switch 4

- Set **ON** to test the delay of the alarm relays as set by the potentiometer #1 (P1).
- Set **OFF** for normal operation.

Dip Switch 5

- Set **ON** for normal sensitivity on the sensor. Use this setting when you are measuring dry solids or non-conductive liquids.
- Set **OFF** for low sensitivity on the sensor. Use this setting to measure conductive liquids or wet conductive solids which are likely to build up.



Switches shown in **OFF** position

	Delay On	Delay Off	Fail-safe	Delay Test	Sensitivity
	S1 - 1	S1 - 2	S1 - 3	S1 - 4	S1 - 5
On	Disabled	Disabled	High	Test	Normal
Off	Enabled	Enabled	Low	Normal	low

Start Up

After the CLS is properly mounted and the switch bank set up, apply power to the unit. The green LED (L3) lights to indicate the unit is powered and operational.

Indicators

Three LEDs indicate the following:

L1 (yellow) = sensor status:

When P2 is properly set, this LED indicates when the sensor is in contact with the process material (material capacitance is greater than set point, P2).

L1 is off when the sensor is out of contact with the process material (material capacitance is less than set point).

L2 (red) = output status:

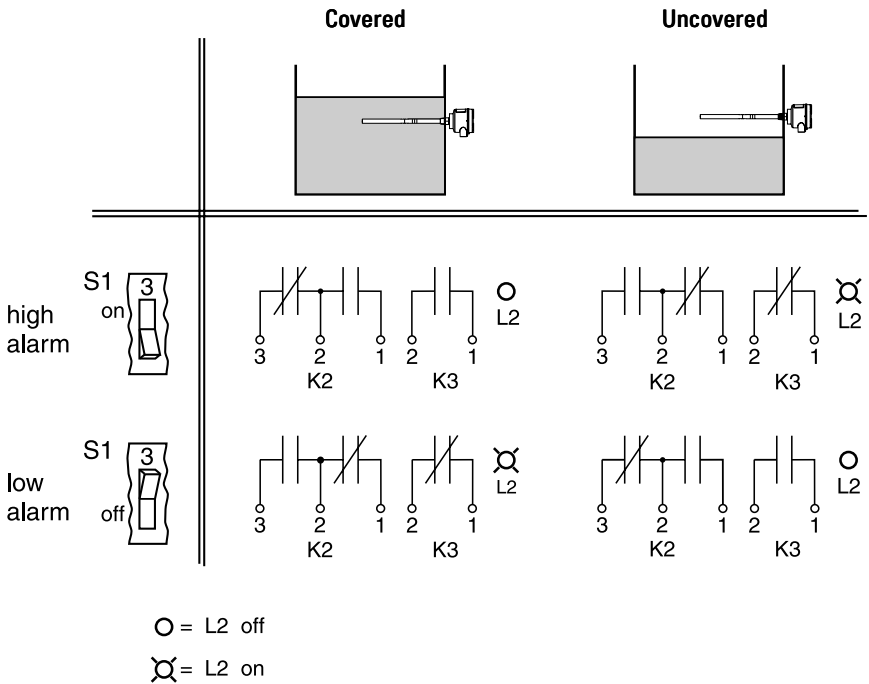
This LED indicates the relay and solid switch contact status. Refer to Operation\Output Status below.

L3 (green) = power:

This LED is on when the Pointek CLS is properly powered.

Alarm Output

Alarm Output Status



Setpoint Adjustment

As reference, and to assist adjusting the alarm setpoint for reliable and accurate detection of the process material, we have categorized the materials and applications into two cases.

Follow the setup procedure associated with the case which includes your application.

Case 1

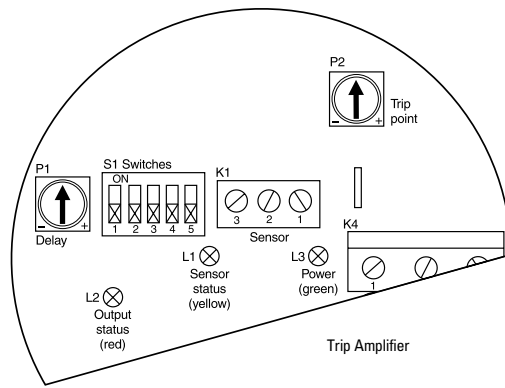
General applications, characterized by the following:

- dry solids
- low viscosity liquids
- hygroscopic / wet solids
- high viscosity and high conductivity liquids

Case 2

Interface detection:

- e.g. liquid A / liquid B, foam / liquid



Case 1

Preparation

- Ensure that L3 (green) is **ON**
- Turn both potentiometers, **P1** and **P2**, fully CCW (counter-clockwise)
- Set **S1** switches **1** to **4** to **OFF** and S1 switch 5 to **ON** (normal sensitivity)

Configuration

1. With sensor uncovered and a minimum 100mm free space all around, turn **P2** CW until L1 (yellow) goes **ON**.
2. Turn P2 CCW until L1 goes **OFF**.

Case 2

Preparation

- Ensure that L3 (green) is **ON**
- Turn potentiometer P1 fully CCW (counter-clockwise)
- Turn P2 fully CW (clockwise)
- Set S1 switches **1** through **5** to **OFF**

Configuration

1. Immerse the sensor in the material that has the lowest dielectric constant. L1 (yellow) should be **ON**. (If L1 does not light, set S1 switch 5 to **ON** [normal sensitivity]).
2. Adjust P2 CCW until L1 goes **OFF**.
3. Immerse the sensor in the material that has the highest dielectric constant, L1 should come **ON**.

Delay

The alarm actuation can be delayed for either, or both, **ON** alarm and **OFF** alarm conditions.

- Set **S1-1** and **S1-2**. (Refer to Setup\ Switch Bank on p. 20.)
- Adjust the delay time from 1 to 60 seconds by setting potentiometer **P1**.

Operation

After completing the setup, replace the Pointek CLS lid and lid clip. The unit is now in service, providing level detection of your process.

Troubleshooting

Symptom	Observation	Action
No alarm response	L3 (green LED) off	Check power supply
Alarm won't switch when material level moves down the electrode	L1 (yellow) doesn't respond to reducing level on the electrode	Check sensitivity, S1-5, electrode, connections to sensor input on trip amplifier (and zener barrier continuity if used)
	L1 (yellow) responds to reducing level on the electrode	Check that relay and L2 (red LED) changes state when S1-3 is toggled
Alarm doesn't switch when material level moves up the electrode	L1 (yellow) doesn't respond to the sensing electrode approaching or touching	Check sensitivity S1-5, electrode, (and zener barrier continuity, if used)
	L1 (yellow) responds to increasing level on the electrode	Check that relay and L2 (red LED) changes state when S1-3 is toggled
	L1 (yellow) flashes when approaching the alarm trip-point	

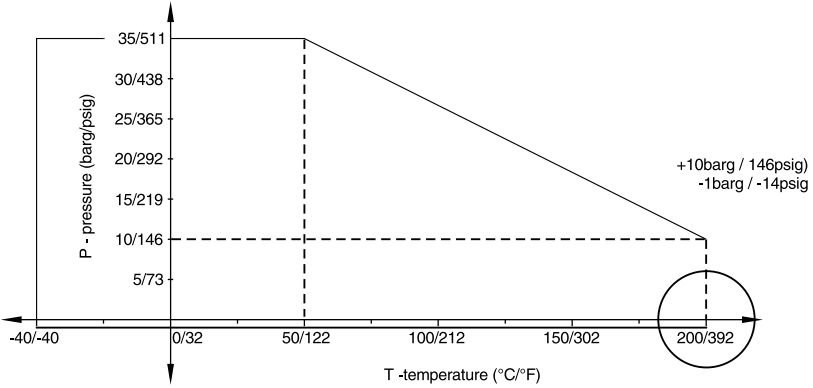
Maintenance

The Pointek CLS 300 requires no regular maintenance or cleaning. Even with significant build-up on the CLS 300 level detector electrode, the level switch will continue to operate. Build-up of material on the active shield area has little or no effect on the performance of the CLS 300.

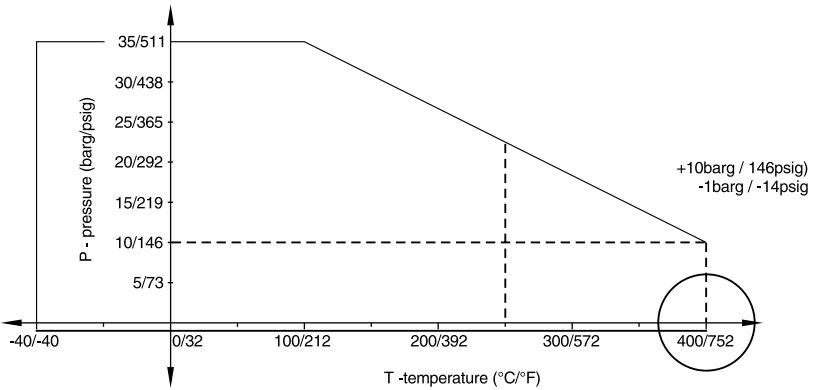
Appendix I: Application Notes

Application Notes

Temperature and Pressure Recommendations for Application



PT - CURVE FOR STANDARD VERSION



PT - CURVE FOR HIGH TEMPERATURE VERSION

Note: 1 bar = 100 Pascals

Appendix II: CE Conformity



WRITTEN 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

Point Level Switch, Pointek CLS 300

Mentioned in this declaration, complies with the following standards and/or normative documents:

Requirements	Remarks	Certificate No.
Environment	Commercial, light Industrial, and industrial	2008949-KRQ/EMC 01-4230
EN 61326: 1998	Product group standard for "Electrical equipment for measurement, control and laboratory use", from which:	
EN 50011: 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/ 2 GD EEx d [ia] IIC T6...T1  0344	KEMA 00ATEX2040X
	T 100 °C IP 66	
EN 50014: 1992	General Requirements	
EN 50018: 1994	Flameproof Enclosures "d"	
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 is: N.V. KEMA – Utrechtseweg 310 – 6812 AR Arnhem – The Netherlands

Location: Breda
Date: May 28, 2001

Named Representative: C.S. van Gils
Position: Managing Director

Note: For specific safety specifications, please consult the instrument label.

Index

2-Wire Connection	19	LEDs	21
3 or 4 wire connection	19	Location	6
About Pointek CLS 300	2	Angle	6
Adjusting Probe Length	11	Horizontal	6
Alarm Output	22	Vertical	6
Setpoint Adjustment	22	Maintenance	25
Status	22	Mounting	15
Ancillary 2-Wire Output Connection	19	Multiple Units	15
Appendix	26	Process Concerns	16
Appendix II	27	Wall Restriction	15
Application Notes	26	Operation	20
Applications	2	Alarm Output	22
Approvals	5	Set Up	20
Start Up	21		
Cable	13	Output status	21
Shortening it	14	Outputs	2
Tensile Strength	14	Pointek CLS 300	2
Weights	14	Applications	2
Ceramic Active Shield Insulator	10	Configuration	7
Configuration	7	Dimensions	8
DECLARATION OF CONFORMITY	27	Features	2
Dimensions	7	Outputs	2
High Temperature Version	9	Power	21
Standard Version	8	Power Connection	19
Diode Protection	18	3 or 4 wire connection	19
Dip Switches	20	Power Supply	4
Electrode		Protection diodes	18
Shortening the Probe	11	Relay Output Connection	18
Enclosure cover		Rod Version	10
removing	17	Sensor status	21
Features	2	Set Up	20
High Temperature Version	9	Dip Switches	20
Dimensions	9	Setpoint Adjustment	22
High Temperatures		Shield Insulator	10
Recommendations	10	Shortening Probe	11
Indicators	21	Solid State Switch	18
Installation	6	Solid stated switch	18
Location	6	Specifications	3
Interconnection	17	Standard Version	8
Ancillary 2-Wire Output Connection	19	Dimensions	8
Diode Protection	18	Start Up	21
Power Connection	19	Thermal Isolator	10
Relay Output Connection	18	Transmitter	4
Solid State Switch	18	Trip Amplifier	17
Trip Amplifier	17	Troubleshooting	25

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