SIEMENS
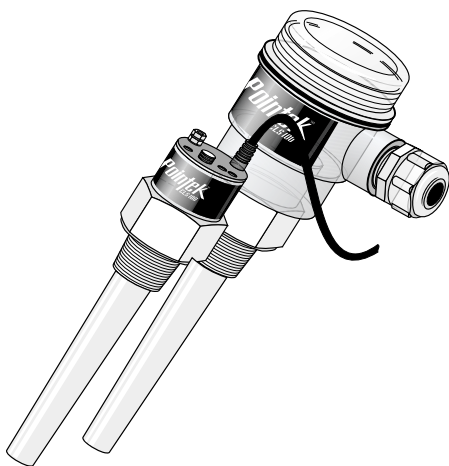
POINTEK CLS 100
CAPACITANCE · LIQUIDS/SOLIDS

Instruction Manual   June 2001

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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Table of Contents

Introduction to the Pointek CLS 100

Note: Pointek CLS 100 is to be used only in the manner outlined in this instruction manual.

The Pointek CLS 100 capacitance level switch provides 4 or 20 mA output and solid state switch contact for detection of high and low process material levels. When the measured material approaches or contacts the switch's probe, an increase in capacitance is sensed and a high level alarm can be triggered. If a low level alarm is required then the lack of material contact is sensed and this condition triggers the low level alarm.

Pointek CLS 100 Features

- NPT, BSPT process connections
- Corrosion resistant construction, Kynar© and 316 stainless steel wetted parts
- Non-polarized, solid-state switch
- 4 or 20, and 20 or 4 mA loop alarm output

Pointek CLS 100 Applications

- Liquids, slurries, powders, granules, and solids
- Foods and pharmaceuticals
- Chemical and petrochemical
- Relatively high pressure and temperature
- Hazardous areas

Specifications

Electrical/Instrument

Power
standard:	10 – 33V dc
intrinsically safe:	10 – 30V dc

Alarm Output:
mA:	4/20 mA loop or 20/4 mA 2-wire loop
solid state switch:	standard:

- 40 Vdc / 28 Vac
- 100 mA max
- 2 VA max

intrinsically safe:

- 30V dc

repeatability:	2mm (0.08")
mode:	high or low

Mechanical

common:	probe / wetted, 316 stainless steel process connection and Kynar®[1] sensor
cable version:	• body / housing, 316 stainless steel
	• process connection, 3/4" NPT or 1" BSPT
	• 1m (3.3 ft) of 4 conductor, 22 AWG, shielded, polyester jacket
enclosure version:	• body: impact proof ABS
	• lid: translucent ABS
	• internal 5-point terminal block
	• ½" NPT wiring entrance (PG 13 on special order)

Environmental

location:	indoor/outdoor
altitude:	2000m max
ambient temperature:	-40 to 85 °C (-40 to 185 °F)
ingress protection:	Type 4X / NEMA 4X / IP65
installation category:	II
pollution degree:	4

Process

dielectric constant (εr):	1.5 min
temperature	−40 to 110 °C (−40 to 230 °F)
pressure (vessel)	0 absolute to 1000 kPa (10 bar or 146 psi) gauge, nominal

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[1] ® Kynar is a registered trade mark of ELF Atochem

Approvals

cable version:	• CSA
	• CENELEC
	• FM
	• KEMA
enclosure version:	• CSA
	• CENELEC
	• FM
	• KEMA

Installation

Location

The Pointek CLS 100 is normally mounted into the vessel top (high detection alarm) or through the tank wall at the detection level (high or low detection alarm).
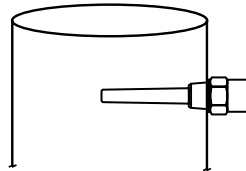
Horizontal
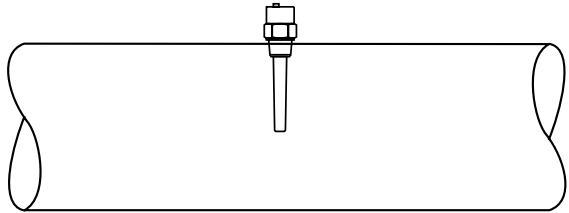
Angle
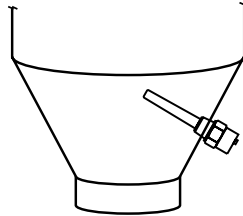
Vertical

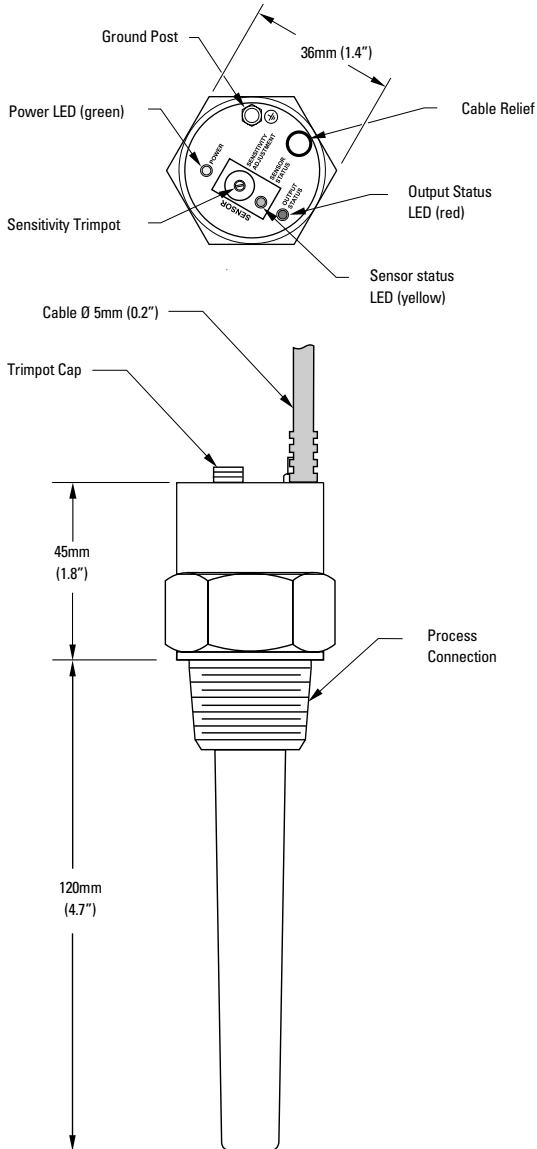# Outline and Dimension

Cable Version

Ground Post

36mm (1.4")

Power LED (green)

Cable Relief

Sensitivity Trimpot

Output Status
LED (red)

Sensor status
LED (yellow)

Cable Ø 5mm (0.2")

Trimpot Cap

45mm
(1.8")

Process
Connection

120mm
(4.7")

Enclosure Version

Power LED (green)

Sensitivity Trimpot

Sensor Status LED (yellow)

Output Status LED (red)

80mm (3.2")

Cable Entrance

65mm (2.6")

Terminal Block

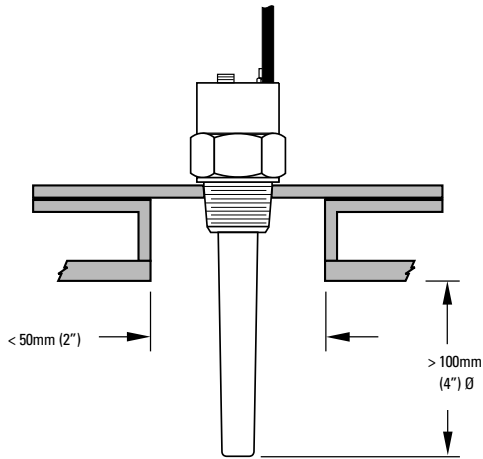Process Connection

65mm (2.6")

204mm (8.0")
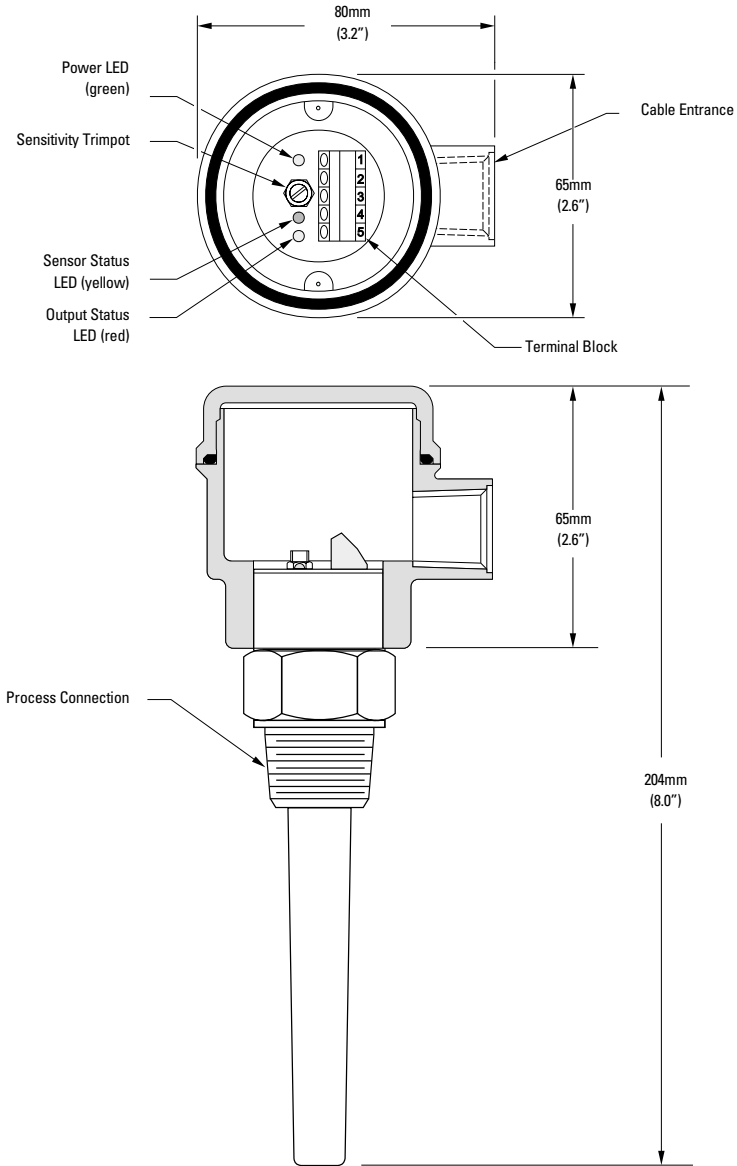
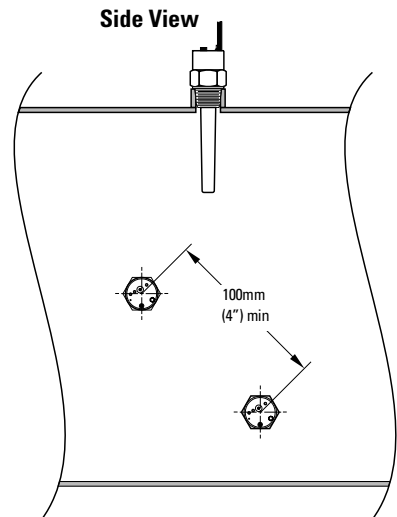# Mounting

Installation Features and Restrictions

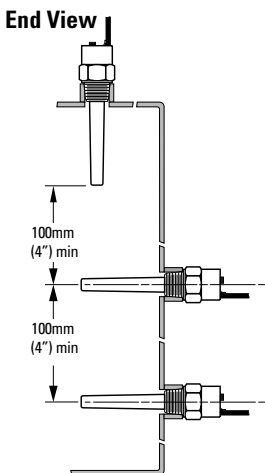Please note the following installation features and restrictions to ensure that your unit operates properly.

Note: All sample mounting diagrams show the Cable version but apply to the Enclosure version also.

Standpipes

Multiple Units

Sensors must be 100mm apart.   Mount diagonally if vertical space is restricted.

Wall Restriction

50mm
(2″) min

50mm
(2″) min
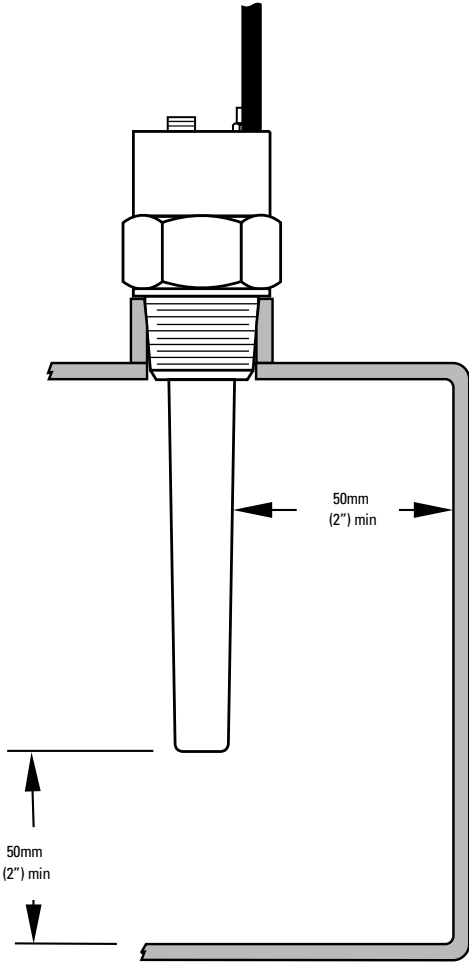
Process Cautions

Caution: Keep out of path of falling material.
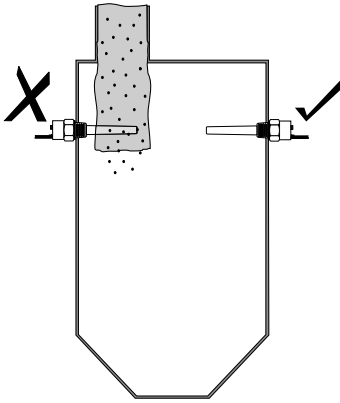
Caution: Consider material surface configuration when installing unit.
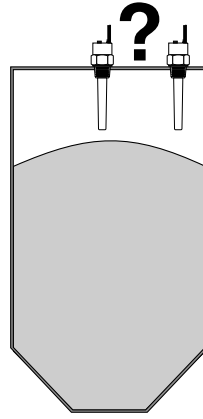
Caution: protect probe from falling material.
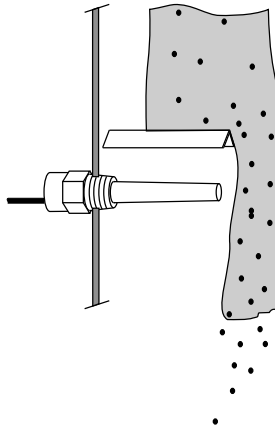
Caution: avoid areas where material build up occurs.
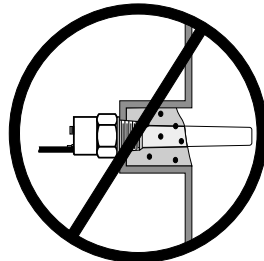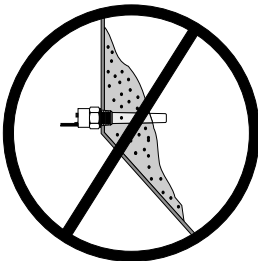
Connections

Cable Version

white

white

red

black

solid state switch, normally open unpowered

V supply / mA loop modulator (4 or 20 mA)

Enclosure Version

Terminal Operation	Cable Equivalent
mA current loop (+V or -V)	red wire
mA current loop (-V or +V)	black wire
ground	cable shield
solid state switch	white wire
solid state switch	white wire
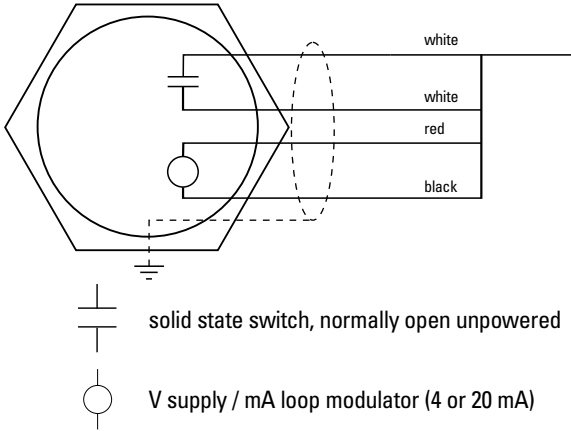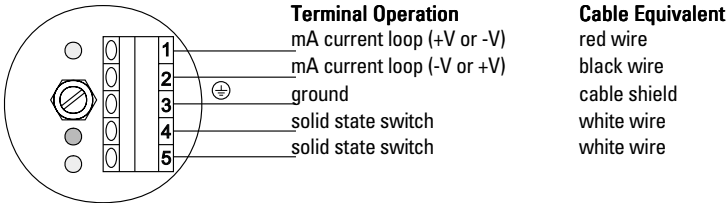
Note: The mA current loop can be wired in either polarity to determine high or low level operation as shown in the examples starting on page 13.

Alarm Output Status

Alarm Status	Covered Yellow LED ON	Uncovered Yellow LED OFF	Power Connection
High (fail safe)	Red LED OFF 4mA SSS* = open	Red LED ON 20mA SSS = closed	Black wire + V
High (non fail safe)	Red LED ON 20mA SSS = closed	Red LED OFF 4mA SSS = open	Red wire + V
Low (fail safe)	Red LED ON 20mA SSS = closed	Red LED OFF 4mA SSS = open	Red wire + V
Low (non fail safe)	Red LED OFF 4mA SSS = open	Red LED ON 20mA SSS = closed	Black wire + V

Note: *SSS is the solid state switch

Definitions

Alarm Conditions as defined below can be detected in a fail-safe or non fail-safe mode.

Fail Safe
- The sensor connection arrangement of the CLS 100 is fail-safe if the output status is in alarm status when power fails, which is an open contact state.
- The sensor connection arrangement of the CLS 100 switches to the alarm status when power fails, which is an open contact state.

High Alarm
- Condition in which the material has reached a maximum level for the process (probe covered).

Low Alarm
- Condition in which the material has reached a minimum level for the process (probe uncovered).

Power / Alarm Wiring

Note: For terminal block equivalents see Enclosure Version on page 11.

Standard Version - Non Intrinsically Safe

LOW Alarm

white
white
black
red

-
+

Polarity as required for desired operation

10-33 V dc

HIGH Alarm

white
white
black
red

+
-

Polarity as required for desired operation

10-33 V dc

4 / 20 mA Loop Alarm

$$Rmax = \frac{V\ supply - 10\ V}{20\ ma}$$

*For example, 250Ω gives 1 or 5 volt dc switch voltage to PLC.

white
white
black
red

V supply
10–33V dc
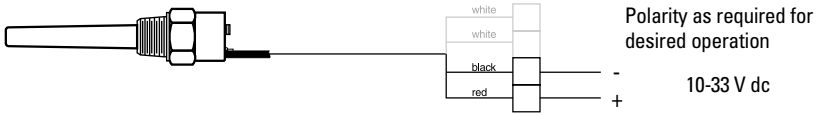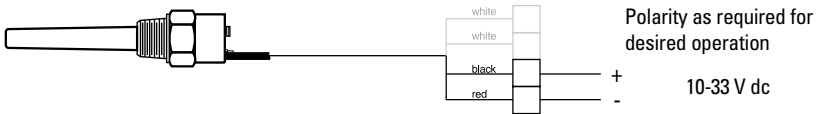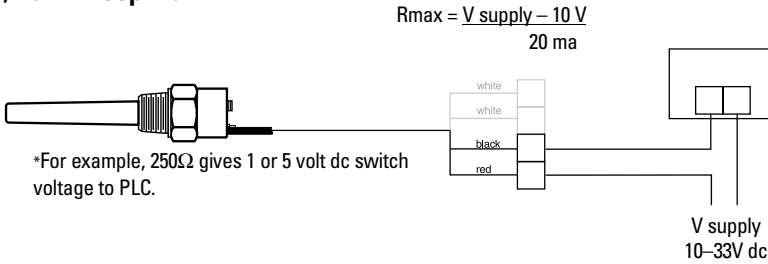
Solid State Switch Application

Standard Version - Non Intrinsically Safe

white
white
black
red

Solid state switch,
40 Vdc / 28 Vac,
100 mA max
2 VA max

10-33 V dc
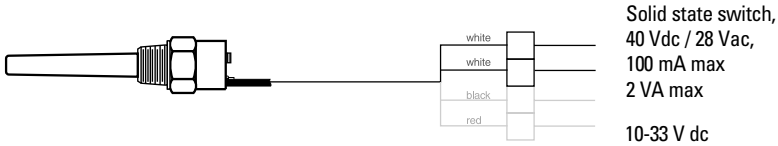
Protection Diodes

Always use a protection diode when driving an external relay with the solid state switch. This prevents possible switch damage due to inductive spikes generated by the relay coil.

Orient the diode based on the current flow.
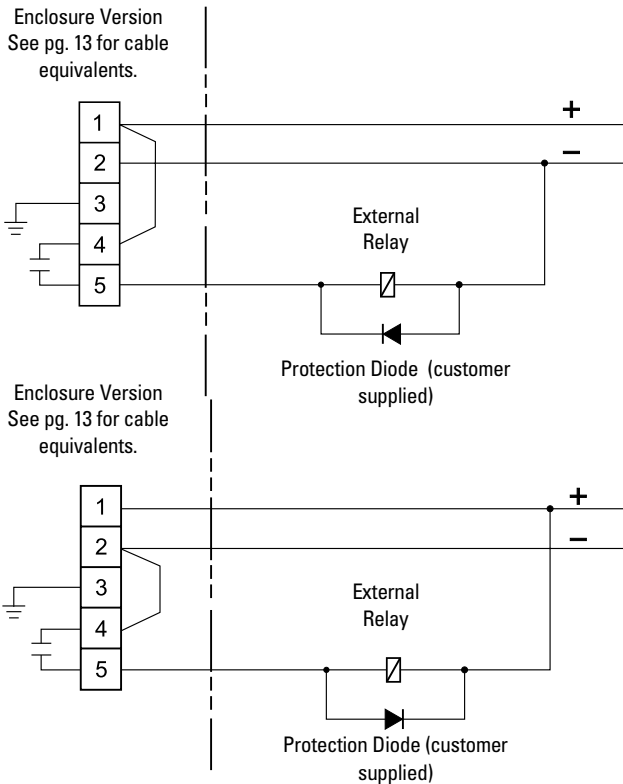
Connection Diagram – Hazardous Location

Hazardous (Classified) Location

Class I, Div. 1, Groups A, B, C, and D
Class I, Div. 1, Groups C and D

Temperature class T4 for class I, Div. 1 applications
-40°C ≤ ambient temperature < +40°C

PoinTek CLS 100 unit

Solid state relais
Isolation = 0.12 mm   White
Isolation = 0.12 mm   Black

Isolation = 0.5 mm   Red
Isolation = 0.5 mm   Black

Top view

Non - hazardous Location

(1) — Current loop
(2) — Current loop
(3) — Ground
(4) — Solid state relais
(5) — Solid state relais

For groups A, B, C or D

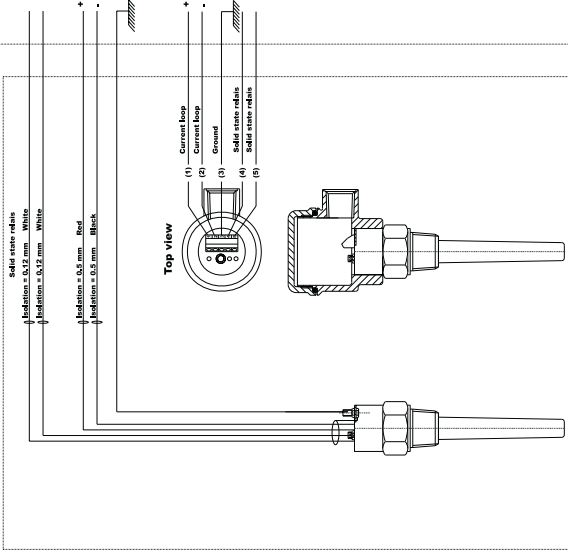| Current loop barriers: (Red and black wires) Voc or Vt	SS relay barrier: (White wires) Voc or Vt	Current sum of both barriers' Isc or It must not exceed following:	Maximum cable length
30 Vdc	30 Vdc	100 mA	1211 feet
30 Vdc	24 Vdc	120 mA	1211 feet
26 Vdc	24 Vdc	150 mA	1084 feet

For groups C or D only:

Current loop barriers: (Red and black wires) Voc or Vt	SS relay barrier: (White wires) Voc or Vt	Current sum of both barriers' Isc or It must not exceed following:	Maximum cable length
30 Vdc	30 Vdc	260 mA	3678 feet
30 Vdc	24 Vdc	310 mA	3678 feet

NOTES:
1) Two FMRC or CSA approved single or dual channel barriers which meet the voltage (Voc or Vt) and current (Isc or It) parameters shown in the tables for the appropriate group can be used. The Ca and La entity parameters specified in the barrier manufacturers' control drawings are not used. Instead, the instrument's cable length is limited to the lengths shown in the tables.
2) All other installation instruction provided in the barrier manufacturers' control drawing must be followed.
3) FM: Installation must be in accordance with the National Electrical Code (ANSI/NFPA 70) and ANSI/ISA-RP12.6
4) For Canada: Installation must be in accordance with the Canadian Electrical Code, Section 18.
The installation must meet all applicable sections of the Canadian Electrical Code (C.E.C.).

USE DIMENSIONS ONLY - DO NOT SCALE
DIMENSIONS ARE IN MILLIMETERS
Third Angle Projection

CONFIDENTIAL
IMPORTANT NOTICE

G		TEXT FOR CSA CHANGED						09-11-00		
0	-							26-11-07		
Rev.		Revision / ECN Description				Drawn	Appr.	Date		

Product Group: POINTEK
Date: 28-11-07
Drawn: RM
Checked: RM
Approved: R. Mulder
Location: Breda

SIEMENS MILLTRONICS PROCESS INSTRUMENTS b.v.
Hildernisstraat 19, 4823 AB Breda, The Netherlands

TITLE:
CONTROL DRAWING
POINTEK CLS100

DRAWING No: A10151R0

File No.: A10151R0.evwG   Plot at: 15x20x1

Tolerance Unless Otherwise Noted:
No Decimal ± 0.5   Angle ± 5°
1 Place Decimal ± 0.1
2 Place Decimal ± 0.01

Scale: 1:1   Size: A1
Rev.: G
Sheet 1 of 1

For groups A, B, C or D

Current loop barriers: (Red and black wires) Voc or Vt	SS relay barrier: (White wires) Voc or Vt	Current sum of both barriers' Isc or It must not exceed following:	Maximum cable length
30 Vdc	30 Vdc	100 mA	1211 feet
30 Vdc	24 Vdc	120 mA	1211 feet
26 Vdc	24 Vdc	150 mA	1084 feet

For groups C or D only:

Current loop barriers: (Red and black wires) Voc or Vt	SS relay barrier: (White wires) Voc or Vt	Current sum of both barriers' Isc or It must not exceed following:	Maximum cable length
30 Vdc	30 Vdc	260 mA	3678 feet
30 Vdc	24 Vdc	310 mA	3678 feet

NOTES:
1) Two FM/RC or CSA approved single or dual channel barriers which meet the voltage (Voc or Vt) and current (Isc or It) parameters shown in the tables for the appropriate group can be used. The Ca and La Entity parameters specified in the barrier manufactures' control drawings are not used. Instead, the instrument's cable length is limited to the lengths shown in the tables.
2) All other installation instruction provided in the barrier manufactures' control drawing must be followed.
3) FM: Installation must be in accordance with the National Electrical Code (ANSI/NFPA 70) and ANSI/ISA-RP12.6
4) For Canadian: Installation must be in accordance with the Canadian Electrical Code (C.E.C.)
   The installation must meet all applicable sections of the Canadian Electrical Code (C.E.C.), Section 18.
5) Barriers are not required for Division 2 hazardous location installations, provided the voltages to the Solid state relay and current loop wires do not exceed 30 Vdc

Non - hazardous Location
PoinTek CLS 100 unit

Solid state relais
Isolation = 0,12 mm White
Isolation = 0,12 mm White
Isolation = 0,5 mm Red
Isolation = 0,5 mm Black

Top view

Ground

(1) – Current loop +
(2) – Current loop -
(3) –
(4) – Solid state relais
(5) –

Hazardous (Classified) Location

FM/CSA Class II & III, Div. 1, Groups E, F, G. T4
FM/CSA Class I, Div. 2, Groups A, B, C, D T4
FM/CSA Class II & III, Div. 2, Groups F & G (E, F, G for CSA) T4.

USE DIMENSIONS ONLY - DO NOT SCALE				
DIMENSIONS ARE IN MILLIMETERS				

TITLE:
CONTROL DRAWING
POINTEK CLS100

DRAWING No: A10174R0

SIEMENS MILLTRONICS PROCESS INSTRUMENTS b.v.

Sheet 1 of 1 Rev. D

Operation

Unscrew the clip to access the terminals.

Setup

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

Start Up

After the CLS is properly mounted and wired, apply power to the unit. The green LED lights to indicate the unit is powered and operational.

Indicators

Three LEDs indicate the following:

Yellow =sensor status: When the trim pot is properly set, this LED indicates when the sensor is in contact with the process material (material capacitance is greater than the setpoint).

This LED is off when the sensor is out of contact with the process material (material capacitance is less than the setpoint).

Red = output status: This LED indicaties the mA loop alarm and solid state switch contact status. Refer to Alarm Output Status on page 12.

Green = power: This LED is on when the Pointek CLS is properly powered.

Alarm Output

Setpoint Adjustment

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

Follow the setup procedure associated to the case outline describing your application.

Case 1
General applications, characterized by the following:
- dry solids
- low viscosity liquids
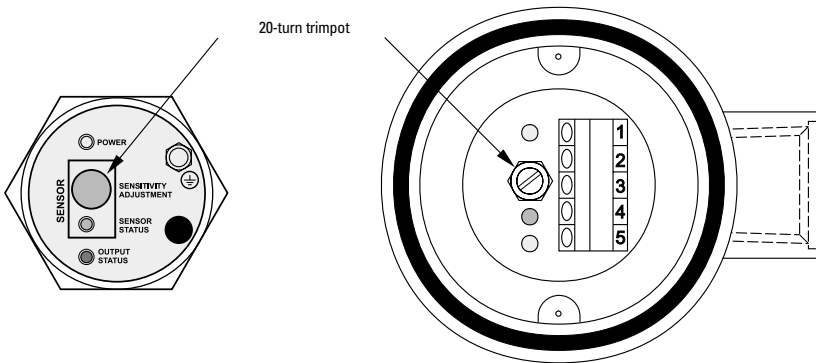
Case 2
Demanding applications, characterized by the following:
- hygroscopic / wet solids
- high viscosity and high conductivity liquids

Case 3
Interface detection:
- e.g. liquid A / liquid B, foam / liquid

Trim Pot Placement

20-turn trimpot

Case 1

Preparation
- Ensure that the green LED is **ON**.
- If yellow LED is **ON**, turn the trimpot CCW (counter clockwise) until the yellow LED goes **OFF**, otherwise go to step 1 below.

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

Case 2

Preparation
- Ensure that the green LED is **ON**.
- Turn the trimpot CCW (counter clockwise), until the yellow LED just goes **OFF**.

Configuration
1. Adjust the material level of the process so that the sensor is immersed, the yellow LED should be **ON**.
2. Adjust the material level of the process so that the sensor is uncovered, but retains significant (as much as possible) build up of material on the sensor.
3. Adjust the trimpot CCW until yellow LED goes **OFF**. To get the true feel for the correct position, please adjust the trimpot CW then CCW several times to ensure that the yellow LED is **OFF**. (This adjustment is very sensitive, and we recommend this practice exercise so you can fine tune the trimpot movement until the yellow LED L1 turns **OFF** with minimal adjustment.)

Case 3

Preparation
- Ensure that the green LED is **ON**.
- Turn the trimpot CCW (counter clockwise), until the yellow LED just goes **OFF**.

Configuration
1. Immerse the sensor in the material that has the lowest dielectric constant. The yellow LED should be **ON**.
2. Adjust the trimpot CCW until the yellow LED goes **OFF**.
3. Immerse the sensor in the material that has the highest dielectric constant; the yellow LED should come **ON**.

Note: After completing the setup, replace the trimpot cap. The unit is now in service, providing level detection of your process.

Troubleshooting

Symptom	Observation	Action
No switching action when sensor covered / uncovered	Green LED **OFF**	Check power connections and voltage
	Green LED **ON** yellow LED continuously **ON**	Reduce the sensitivity by turning the trimpot CCW
	Green LED **ON** yellow LED continuously **OFF**	Increase the sensitivity by turning the trimpot CW
No switching action when sensor covered / uncovered. Previous checks not effective	Green LED is **ON** Yellow LED doesn't change state as in 2 and 3 above.	Possible failed sensor – check with supplier

Maintenance

The Pointek CLS requires no maintenance or cleaning.

Appendix: Approvals

WRITTEN $C \, \epsilon$ 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 100

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 01-4044
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
	⟨Ex⟩ II 1/ 2 GD EEx d [ia] IIC T6…T4 $C \, \epsilon$ 0344	KEMA 00ATEX1038X
	T 100 °C IP 66	
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 is: N.V. KEMA – Utrechtseweg 310 – 6812 AR Arnhem – The Netherlands

Location:	Breda	**Representative Name:** C.S. van Gils
Date:	May 28, 2001	**Function:** Managing Director

Remark:

For specific safety specifications, please consult the instrument label.

Index

SIEMENS

7 M L 1 9 9 8 5 A U 0 1

Made in Canada