

Capacitance Switches

POINTEK CLS100

Compact Operating Instructions • 03/2013



SIEMENS

Pointek CLS100 Quick Start Manual

Note:

- Use Pointek CLS100 only in the manner outlined in this instruction manual.
- For applications in areas classified as Hazardous, observe any restrictions according to the relevant certificate.

Pointek CLS100 is a compact 2-wire capacitance switch for level detection in constricted spaces, interfaces, solids, liquids, slurries, and foam. The stainless steel process connection versions (7ML5501) have an effective process temperature range of -30 to +100 °C (-22 to +212 °F) and the synthetic process connection version (7ML5610) has an effective process temperature range of -10 to +100 °C (+14 to +212 °F).

Pointek CLS100 versions:

- **Integral cable** version with stainless steel process connection and probe options of PPS or PVDF
- **Enclosure** version (thermoplastic polyester enclosure) with stainless steel process connection in combination with a PPS or PVDF probe
- **Enclosure** version (thermoplastic polyester enclosure) with fully synthetic process connection combined with a PPS probe

Features

- NPT, R (BSPT), G (BSPP) process connections
- Corrosion resistant construction, PPS, and 316L stainless steel (optional PVDF wetted parts)
- Non-polarized, solid-state switch or relay output (enclosure version with fully synthetic process connection only)

Applications

- Liquids, slurries, powders, granules, and solids
- Foods and pharmaceuticals
- Chemical and petrochemical
- Hazardous areas

Specifications

Power

	Fully synthetic process connection, enclosure version	Stainless steel process connection, integral cable or enclosure version
Power supply		
Standard	12-33 V DC	12-33 V DC
Intrinsically safe	not applicable	10-30 V DC (intrinsically safe barrier required)

Alarm Output(s)

	Fully synthetic process connection, enclosure version	Stainless steel process connection, integral cable or enclosure version
• mA	4/20 mA or 20/4 mA 2-wire current loop detection	
• solid state switch	not available	30 V DC/30 V AC 82 mA max. Limited to 30 V DC/16 V AC 82 mA max. in wet locations
• relay output		
- max. switching voltage	60 V DC or 30 V AC; limited to 30 V DC/16 V AC in wet locations	not available
- max. switching current	1 A	
- max. switching power	60 W	
• intrinsically safe	not available	30 V DC max. (suitable barrier required)
• repeatability	2 mm (0.08")	



WARNING: A wet location is a location where water or other conductive liquid may be present and is likely to increase the risk of electric shock.

Environmental

- ambient temperature:
 - 316L SS process connection (integral cable or enclosure version) -30 to +85 °C (-22 to +185 °F)
 - fully synthetic process connection (enclosure version) -10 to +85 °C (+14 to +185 °F)
- ingress protection:
 - Enclosure version Type 4 / NEMA 4 / IP68
 - Integral cable version Type 4 / NEMA 4 / IP65
- installation category: I
- pollution degree: 4

Mechanical

- common probe/wetted parts: PPS process connection and PPS sensor; or 316L process connection and PPS or PVDF sensor.
[Standard Metal process connection seal is FKM (e.g. Viton). FFKM (e.g. Kalrez) is optional].
- **cable version (SS process connection):**
 - integral cable body: 316L stainless steel
 - 316L stainless steel process connection: 3/4" NPT or R 1" (BSPT), or G 1" (BSPP)
 - 1 m (3.3 ft) of 4 conductor, 22 AWG, shielded, polyester jacket

- **enclosure version (SS process connection):**
 - housing: VALOX® (thermoplastic polyester)
 - lid: transparent thermoplastic polycarbonate (PC)
 - 316L stainless steel process connection: 3/4" NPT, or R 1" (BSPT), or G 1" (BSPP)
 - internal 5-point terminal block
 - 1/2" NPT wiring entrance (optional M20 x 1.5" cable entry)
- **enclosure version (fully synthetic process connection):**
 - housing: VALOX® (thermoplastic polyester)
 - lid: transparent thermoplastic polycarbonate (PC)
 - fully synthetic process connection: 3/4" NPT or R 1" (BSPT)
 - internal removable 5-point terminal block
 - 1/2" NPT wiring entrance (optional M20 x 1.5" cable entry)

Process Conditions

- relative dielectric constant (ϵ_r): 1.5 minimum
- temperature:
 - 30 to +100 °C (–22 to +212 °F) (enclosure version with stainless steel process connection)
 - 10 to +100 °C (+14 to +212 °F) (enclosure version with fully synthetic process connection)
- pressure (vessel): –1 to 10 bar (146 psi) gauge, nominal

Approvals

Stainless steel process connection (integral cable or enclosure version) (7ML5501)

- General: CE, CSA, FM
- Marine: Lloyd's Register of Shipping, categories ENV1, ENV2, and ENV5
- Dust Ignition Proof (barrier required): CSA/FM Class II and III, Div. 1, Groups E, F, G INMETRO
- Intrinsically Safe (barrier required): CSA/FM Class I, II and III, Div. 1, Groups A, B, C, D, E, F, G T4 ATEX II 1 GD 1/2GD EEx ia IIC T4 to T6 T107 °C INMETRO: DNV 12.0082 X Ex ia IIC T6 Ga Ex tb IIIC T62 °C Db IP68 –40 °C ≤ Ta ≤ +40 °C –20 °C ≤ Ta ≤ +40 °C (7ML5610-0...) Ex ia IIC T4 Ga

1. © VALOX is a registered trademark of the General Electric Company.

Ex tb IIIC T107 °C Db

IP68

-40 °C ≤ Ta ≤ +85 °C

-20 °C ≤ Ta ≤ +85 °C (7ML5610-0...)

DNV #OCP 0017

ABNT NBR IEC 60079-0:2008, ABNT NBR IEC 60079-11:2009

e ABNT NBR IEC 60079-31:2011

- Overfill protection: WHG (Germany)
- C-TICK (Australia)

Fully synthetic process connection (enclosure version only) (7ML5610)

- General: CSA, FM
- Marine: Lloyd's Register of Shipping, categories ENV1, ENV2, and ENV5

Note: EMC testing was conducted on the CLS100 metal version while mounted in a metallic vessel and wired using shielded cable. The sensitivity was set by turning sensitivity potentiometer 2 turns counter-clockwise from the set point.

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. Warning notices are accompanied by a clarification of the level of caution to be observed.



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

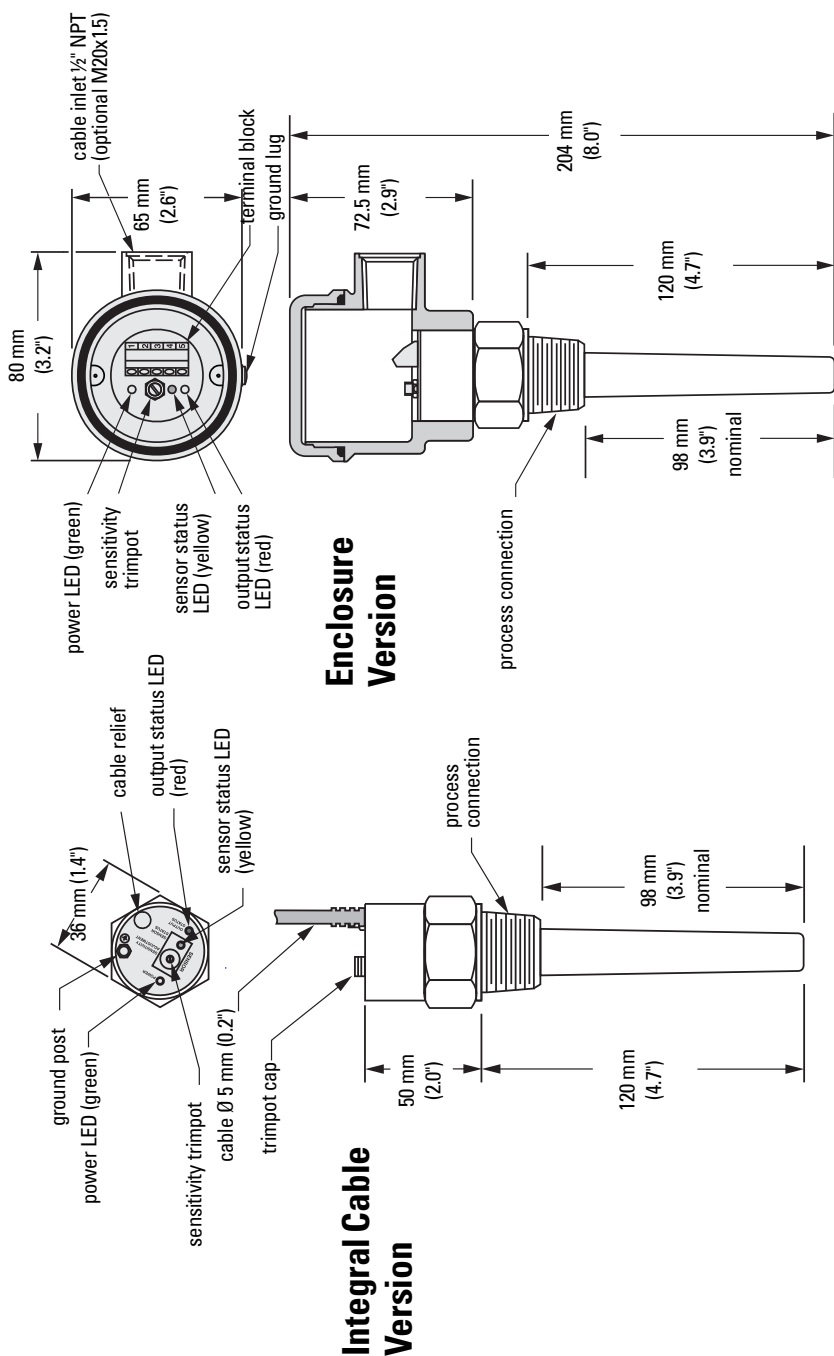


WARNING - Parts of the enclosure are non-conducting and may generate an ignition-capable level of electrostatic charge under certain extreme conditions. The user should ensure that the equipment is not installed in a location where it may be subjected to external conditions which might cause a build up of electrostatic charge on non-conducting surfaces. Additionally, cleaning of the equipment should be done only with a damp cloth.

Maintenance

The Pointek CLS100 requires no maintenance or cleaning.

Dimensions



Mounting

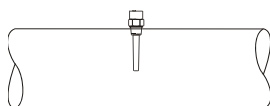
Location

Note:

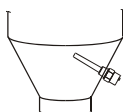
- Installation shall only be performed by qualified personnel and in accordance with local governing regulations.
- This product is susceptible to electrostatic shock. Follow proper grounding procedures.
- When using multiple units, sensors must be 100 mm apart. Mount diagonally if vertical space is restricted.

Pointek CLS100 is normally mounted into the vessel top (high detection alarm) or through the tank wall at the detection level (high or low detection alarm).

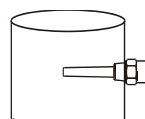
Vertical



Angle



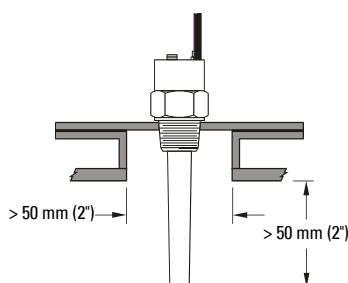
Horizontal



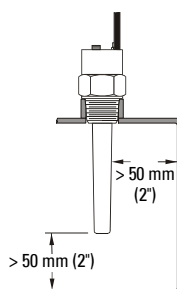
Installation Features and Restrictions

Note: Mounting diagrams apply to all versions.

Standpipes



Wall Restriction

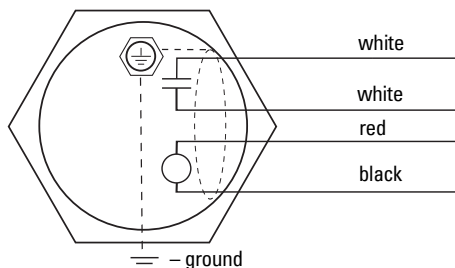


Process Cautions:

- Keep out of path of falling material.
- Consider material surface configuration when installing unit.
- Protect probe from falling material.
- Avoid areas where material buildup occurs.

Connections

Cable Version



Symbols

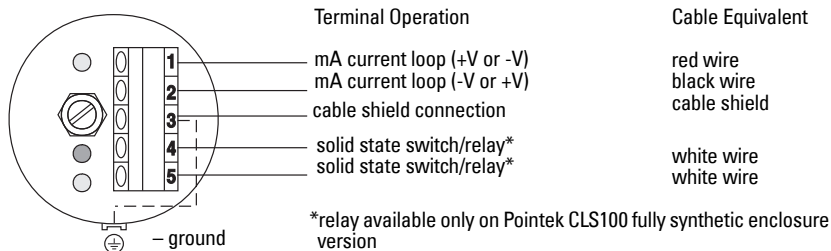


Solid state switch, normally open unpowered.



V supply / mA 2-wire current loop detection 4/20 or 20/4 mA

Enclosure Version



Note: The mA current loop can be wired in either polarity to determine high or low level operation as shown in the examples beginning on page 9.

The cable shield should be connected to terminal 3 on the terminal block along with the provided ground wire.

Alarm Output Status

Alarm Status	Covered Yellow LED ON	Uncovered Yellow LED OFF	Power Connection
high (fail-safe)	red LED OFF 4 mA SSS ¹ = open	red LED ON 20 mA SSS = closed	black wire + V
high (non fail-safe)	red LED ON 20 mA SSS = closed	red LED OFF 4 mA SSS = open	red wire + V
low (fail-safe)	red LED ON 20 mA SSS = closed	red LED OFF 4 mA SSS = open	red wire + V
low (non fail-safe)	red LED OFF 4 mA SSS = open	red LED ON 20 mA SSS = closed	black wire + V

1. Solid State Switch (SSS)

Definitions

The alarm conditions below can be detected in a fail-safe or non fail-safe mode.

Fail Safe

- The sensor connection arrangement is fail-safe if the output status is in high alarm status when power fails; open contact state prevents material overflow.
- The sensor connection arrangement switches to the fail-safe low alarm status when power fails; this open contact state prevents material running dry.

High Alarm

- When material reaches a maximum process level, covering the probe.

Low Alarm

- When material reaches a minimum process level, uncovering the probe.

Power/Alarm Wiring



WARNING: The DC input terminal shall be supplied from a source providing electrical isolation between the input and output, in order to meet the applicable safety requirements of IEC 61010-1.

Note:

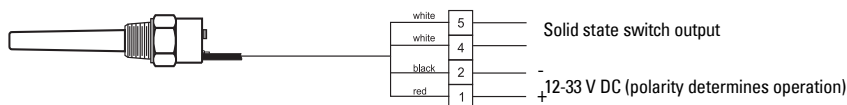
- For terminal block equivalents, see *Enclosure Version* on page 7.
- The solid-state output should only be used in circuits where the current is limited by a proper load.
- Due to the limited switching capabilities of the solid-state switch component, an auxiliary relay must be applied when switching high-current/high-voltage apparatus.



WARNING - Parts of the enclosure are non-conducting and may generate an ignition-capable level of electrostatic charge under certain extreme conditions. The user should ensure that the equipment is not installed in a location where it may be subjected to external conditions which might cause a build up of electrostatic charge on non-conducting surfaces. Additionally, cleaning of the equipment should be done only with a damp cloth.

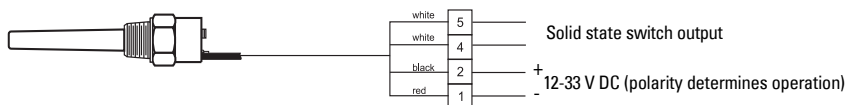
Non Intrinsically Safe Version

LOW Alarm



Note: numbers refer to enclosure versions. See p. 7

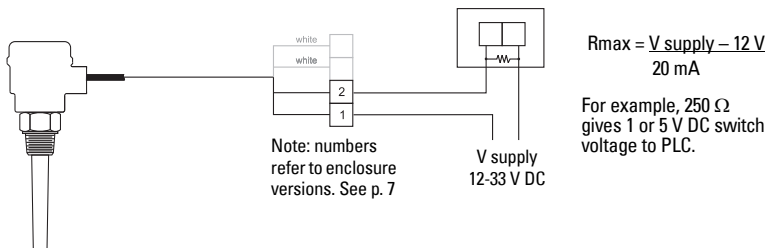
HIGH Alarm



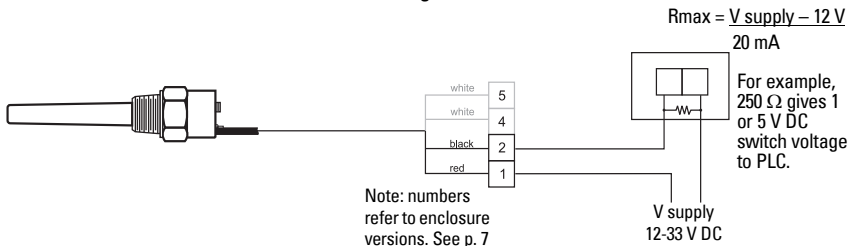
Note: numbers refer to enclosure versions. See p. 7

4 / 20 mA Loop Alarm Application

Fully Synthetic Process Connection (Enclosure Version)

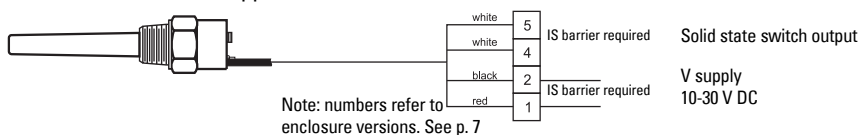


Stainless Steel Process Connection (Integral Cable or Enclosure Version)

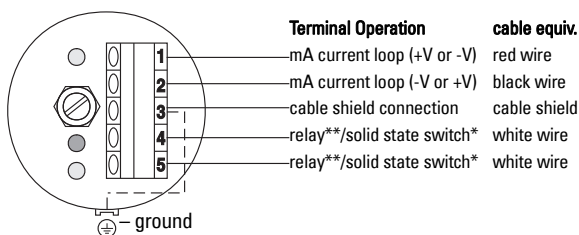


Intrinsically Safe Version only

Solid State Switch Application



Enclosure Version* and Fully Synthetic Process Connection Version**



*Solid State Switch

Max. switching voltage: 30 V DC or 30 V AC

Max. switching current: 82 mA

**Relay Contact Load

Max. switching voltage: 30 V AC or 60 V DC; limited to 35 V DC or 16 V AC max. in wet locations.

Max. switching current: 1 A
Max. switching power: 60 W



WARNING: A wet location is a location where water or other conductive liquid may be present and is likely to increase the risk of electric shock.

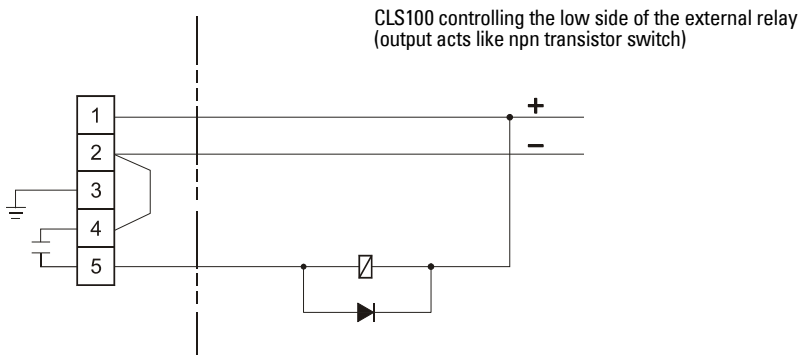
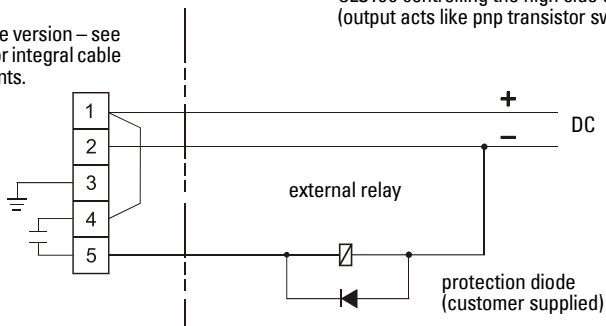
Protection Diodes

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

Orient the diode based on the current flow.

DC circuit with Protection Diode

enclosure version – see page 7 for integral cable equivalents.



Operation

Start Up

After the CLS100 is properly mounted and wired, apply power to the unit. The green LED lights to indicate the unit is powered and operational.

LED Indicators

- | | |
|------------------------|--|
| Yellow = sensor status | <ul style="list-style-type: none"> • ON indicates contact with the process material (material capacitance is greater than the set point). • OFF indicates when the sensor is out of contact with the process material (material capacitance is less than the set point). |
| Red = output status | <ul style="list-style-type: none"> • ON indicates the mA loop alarm and solid state switch contact status. Refer to <i>Alarm Output Status</i> on page 7. |
| Green = power | <ul style="list-style-type: none"> • ON indicates the CLS100 is properly powered. |

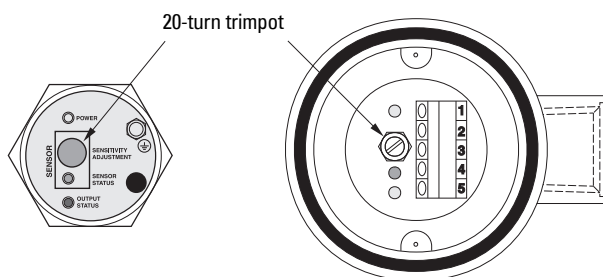
Alarm Output

Setpoint Adjustment

As a guide to adjusting the alarm set point for reliable and accurate detection of the process material, we have classified the materials and applications into three cases.

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

Please note that sensitivity of the unit can be adjusted by the user as required.



Case 1: General Applications

Characteristics

- dry solids
- low viscosity liquids

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.

Configuration

1. With sensor uncovered and a minimum 50 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: Demanding Applications,

Characteristics

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

Preparation

- Ensure that the green LED is **ON**.
- Turn the trimpot CCW (counter clockwise), until the yellow LED 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) material buildup on 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 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: Interface detection

Characteristics

- liquid A / liquid B, foam / liquid

Preparation

- Ensure that the green LED is **ON**.
- Turn the trimpot CCW (counterclockwise) until the yellow LED 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: In areas with high levels of EMI, the sensitivity potentiometer should be turned back two turns counter-clockwise after the setpoint is adjusted.

After completing the setup, replace the trimpot cap on the cable version, or the lid on the enclosure version. The unit is now in service, providing level detection of your process.

Troubleshooting

Stainless Steel Process Connection (Integral Cable or Enclosure Version), Intrinsically Safe

Symptom	Cause	Action
Green LED off	Proper power not applied to device Power range must equal 12 to 33 V DC at all times (10 to 30 V DC for IS versions)	Check power source Minimum 12 V DC on the terminals when the signal current is 20 mA (minimum 10 V DC for IS versions)
Green LED off, with proper supply	Defective component in device	Contact distributor
Green LED on and Yellow LED on while not responding to product and/or adjustment	Proper power not applied to device. Power range must equal 12 to 33 V DC at all times (10 to 30 V DC for IS versions)	Check power source Minimum 12 V DC on the terminals when the signal current is 20 mA (minimum 10 V DC for IS versions)
Hysteresis region too great	Proper power not applied to device. Power range must equal 12 to 33 V DC at all times (10 to 30 V DC for IS versions)	Check power source. Minimum 12 V DC on the terminals when the signal current is 20 mA (minimum 10 V DC for IS versions)
Unequal current in red and black wire	Loop circuitry is DC biased w.r.t. ground Black wire exceeds ± 36 V DC against Ground	Correct loop circuitry Remove cause of voltage on the red wire and/or bias
Yellow LED won't come on or off	Defective component in device	Contact distributor
Too much current in loop	Supply voltage too high	Ensure power range equals 12 to 33 V DC at all times (10 to 30 V DC for IS versions)
Red LED lights opposite to the Yellow LED when this is not meant to happen	Incorrect polarity on red and black loop terminals	Reverse polarity on loop terminals

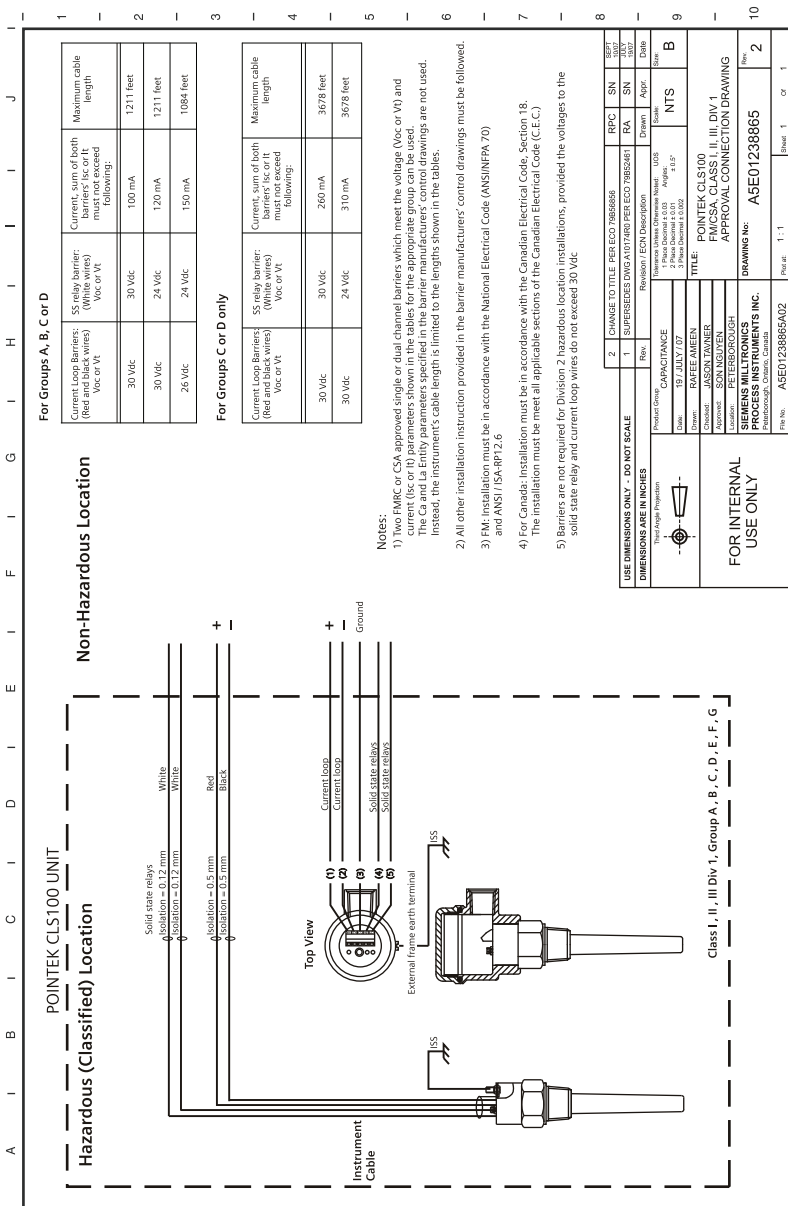
Red and Yellow LEDs are blinking fast	Proper power not applied to device. Power range must equal 12 to 33 V DC at all times (10 to 30 V DC for IS versions)	Check power source Minimum 12 V DC on the terminals when the signal current is 20 mA (minimum 10 V DC for IS versions)
Red and Yellow LEDs are blinking while switching	Proper power not applied to device. Power range must equal 12 to 33 V DC at all times (10 to 30 V DC for IS versions)	Check power source Minimum 12 V DC on the terminals when the signal current is 20 mA (minimum 10 V DC for IS versions)
Solid state contact does not follow status Red LED	Defective component in device. Probable cause: wrong wiring in this circuit.	Contact distributor
Yellow LED is lit while probe is not covered	May indicate significant product buildup.	Rotate sensitivity potentiometer further CCW (counter clockwise) Check sensor tip

Fully Synthetic Process Connection (Enclosure Version)

Symptom	Cause	Action
Green LED off	Proper power not applied to device Power range must equal 12 to 33 V DC at all times (10 to 30 V DC for IS versions)	Check power source Minimum 12 V DC on the terminals when the signal current is 20 mA (minimum 10 V DC for IS versions)
Green LED off, with proper supply	Defective component in device. Connector came loose	Contact distributor Refasten connector
Green LED on and Yellow LED on while not responding to product and/or adjustment	Proper power not applied to device. Power range must equal 12 to 33 V DC at all times (10 to 30 V DC for IS versions)	Check power source Minimum 12 V DC on the terminals when the signal current is 20 mA (minimum 10 V DC for IS versions)
Hysteresis region too great	Proper power not applied to device Power range must equal 12 to 33 V DC at all times (10 to 30 V DC for IS versions)	Check power source Minimum 12 V DC on the terminals when the signal current is 20 mA (minimum 10 V DC for IS versions)

Unequal current in red and black wire	Loop circuitry is DC biased w.r.t. ground Black wire exceeds ± 36 V DC against Ground	Correct loop circuitry Remove cause of voltage on the red wire and/or bias
Yellow LED won't come on or off	Defective component in device	Contact distributor
Too much current in loop	Supply voltage too high	Ensure power range equals 12 to 33 V DC at all times (10 to 30 V DC for IS versions)
Red LED lights opposite to the Yellow LED when this is not meant to happen	Incorrect polarity on red and black loop terminals	Reverse polarity on loop terminals
Red and Yellow LEDs are blinking fast	Proper power not applied to device Power range must equal 12 to 33 V DC at all times (10 to 30 V DC for IS versions)	Check power source Minimum 12 V DC on the terminals when the signal current is 20 mA (minimum 10 V DC for IS versions)
Red and Yellow LEDs are blinking while switching	Proper power not applied to device Power range must equal 12 to 33 V DC at all times (10 to 30 V DC for IS versions)	Check power source Minimum 12 V DC on the terminals when the signal current is 20 mA (minimum 10 V DC for IS versions)
Relay contact does not follow status Red LED	Proper power not applied to device Power range must equal 12 to 33 V DC at all times (10 to 30 V DC for IS versions) Defective component in device.	Check power source Minimum 12 V DC on the terminals when the signal current is 20 mA (minimum 10 V DC for IS versions) Contact distributor
Yellow LED is lit while probe is not covered	May indicate significant product buildup.	Rotate sensitivity potentiometer further CCW (counter clockwise). Check sensor tip

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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.
- Restrict repair to faulty components only.
- Do not re-use faulty components

Reparation af enheden og ansvarsbegrænsning:

Alle ændringer og reparationer skal udføres af kvalificeret personale, og de gældende sikkerhedsbestemmelser skal overholdes. Bemærk venligst følgende:

- Brugeren er ansvarlig for alle de på apparatet udførte ændringer og reparationer.
- Alle nye komponenter skal være leveret af Siemens.
- Reparer kun defekte komponenter.
- Defekte komponenter må ikke genbruges

Geräte Reparatur und Haftungsausschluss:

Alle Änderungen und Reparaturen müssen von qualifiziertem Personal unter Beachtung der jeweiligen Sicherheitsbestimmungen vorgenommen werden. Bitte beachten Sie:

- Der Benutzer ist für alle Änderungen und Reparaturen am Gerät verantwortlich.
- Alle neuen Bestandteile sind von Siemens bereit zu stellen.
- Reparieren Sie lediglich defekte Bestandteile.
- Defekte Bestandteile dürfen nicht wiederverwendet werden.

Επισκευή μονάδας και αποκλειόμενη ευθύνη:

Όλες οι αλλαγές και οι επισκευές πρέπει να πραγματοποιούνται από εξειδικευμένο προσωπικό, και πρέπει να τηρούνται όλοι οι σχετικοί κανόνες ασφαλείας. Σημειώστε τα παρακάτω:

- Ο χρήστης είναι υπεύθυνος για όλες τις αλλαγές και επισκευές που γίνονται στη συσκευή.
- Όλα τα καινούργια εξαρτήματα πρέπει να παρέχονται από τη Siemens.
- Περιορίστε τις επισκευές μόνο στα ελαττωματικά εξαρτήματα.
- Μην επαναχρησιμοποιείτε ελαττωματικά εξαρτήματα.

Reparación del dispositivo y límite de responsabilidad:

Las modificaciones y reparaciones deberán ser efectuadas por personal calificado de acuerdo con las normas de seguridad aplicables. Notas importantes:

- El usuario es el único responsable de las modificaciones y reparaciones del dispositivo.
- Recomendamos utilizar sólo recambios originales Siemens.
- Reparar sólo los componentes defectuosos.
- Los componentes defectuosos no se deben reutilizar.

Réparation de l'unité et limite de responsabilité :

Les modifications et réparations doivent être effectuées par un personnel qualifié en accord avec les consignes de sécurité applicables.

Remarques importantes :

- L'utilisateur est seul responsable des modifications et réparations effectuées sur l'unité.
- Utiliser seulement des composants fournis par Siemens.
- Réparer uniquement les composants défectueux.
- Les composants défectueux ne doivent pas être réutilisés.

Riparazioni dell'apparecchiatura e limiti di responsabilità:

Le modifiche e le riparazioni devono essere effettuate solo da personale qualificato, rispettando le normative sulla sicurezza. Note importanti:

- L'utente è responsabile delle eventuali modifiche e riparazioni effettuate sull'apparecchiatura.
- Utilizzare solo pezzi di ricambio originali forniti da Siemens.
- Riparare solo i componenti difettosi.
- E' importante non riutilizzare i componenti difettosi.

Reparatie van apparatuur en uitsluiting van aansprakelijkheid:

Alle modificaties en reparaties moeten worden uitgevoerd door gekwalificeerd personeel en de geldende veiligheidsvoorschriften moeten worden aangehouden. Let op:

- De gebruiker is verantwoordelijk voor alle modificaties en reparaties die worden uitgevoerd aan het apparaat.
- Alle nieuwe onderdelen moeten zijn geleverd door Siemens.
- Beperk de reparatie uitsluitend tot de defecte componenten.
- Defecte componenten niet opnieuw gebruiken.

Reparação da Unidade e Responsabilidade Excluída

Todas as alterações e reparações devem ser realizadas por pessoal qualificado e devem ser seguidas as regras de segurança aplicáveis. Por favor, note o seguinte:

- O usuário é responsável por todas as alterações e reparos efetuados no dispositivo.
- Todos os novos componentes devem ser fornecidos pela Siemens.
- Reparo restrito a apenas a componentes danificados.
- Não reutilize componentes danificados.

Yksikön korjaaminen ja vastuuvapaus:

Muutos- ja korjaustyöt saa suorittaa ainoastaan pätevä henkilökunta, ja voimassa olevia turvallisuusmääräyksiä on noudatettava. Pyydämme ottamaan huomioon seuraavat seikat:

- Käyttäjän on vastuussa kaikista laitteeseen tehdyistä muutoksista ja korjauksista.
- Kaikki uudet osat on hankittava Siemens:ltä.
- Korjaukset on kohdistettava ainoastaan viallisiin osiin.
- Viallisia osia ei saa käyttää uudelleen.

Reparation och ansvarsfrihet:

Alla ändringar och reparationer måste utföras av kompetent personal och under iakttagande av gällande säkerhetsbestämmelser. Observera att:

- Användaren ansvarar för alla ändringar och reparationer som görs på enheten.
- Alla nya delar måste komma från Siemens.
- Reparera endast med fel behäftade delar.
- Delar behäftade med fel får ej återanvändas.

For more information

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