

# Level Measurement

## Point level measurement – Capacitance switches

### Pointek CLS100

#### Overview



Pointek CLS100 is a compact 2-wire inverse frequency shift capacitance switch for level detection in constricted spaces, interfaces, solids, liquids, slurries and foam.

#### Benefits

- Easy installation with verification by built-in LED
- Low maintenance with no moving parts
- Sensitivity adjustment
- Integrated cable or PBT enclosure versions available
- Intrinsically Safe, Dust Ignition Proof, and General Purpose options available

#### Application

Pointek CLS100's short insertion length of 100 mm (4 inch) and versatility in various applications and in vessels or pipes makes it a good replacement for traditional capacitance sensors.

Its advanced tip-sensing technology provides accurate, repeatable switchpoint performance. The PPS (Polyphenylene sulfide) probe [optional PVDF (Polyvinylidene Fluoride)] is chemically resistant with an effective process operating temperature range from -30 to +100 °C (-22 to +212 °F) (7ML5501), and -10 to +100 °C (14 to 212 °F) (7ML5610). The fully potted design ensures reliability in a vibrating environment such as agitated tanks up to 4 g. When used with a SensGuard protection cover, the CLS100 is protected from shearing, impact, and abrasion in tough primary processes.

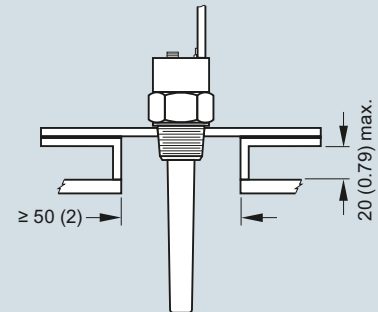
The Pointek CLS100 is available in three versions. The integral cable version has a stainless steel process connection and probe options of PPS or PVDF. The fully synthetic version has a thermoplastic polyester enclosure with a PPS process connection combined with a PPS probe. The standard enclosure version has a thermoplastic polyester enclosure with a stainless steel process connection in combination with a PPS or PVDF probe.

- Key Applications: liquids, slurries, powders, granules, food and pharmaceuticals, chemicals, hazardous areas

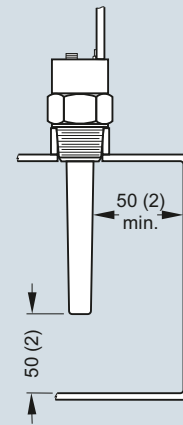
#### Configuration

##### Installation

##### Standpipes



##### Wall restriction



Pointek CLS100 installation, dimensions in mm (inch)

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### Technical specifications

	<b>Stainless steel process connection (integral cable or enclosure version) (7ML5501)</b>	<b>Fully synthetic process connection (enclosure version only) (7ML5610)</b>
<b>Mode of operation</b>		
Measuring principle	Inverse frequency shift capacitive level detection	Inverse frequency shift capacitive level detection
<b>Input</b>		
Measured variable	Change in picroFarad (pF)	Change in picroFarad (pF)
<b>Output</b>		
Output signal		
• Alarm output	4 ... 20/20 ... 4 mA 2-wire loop	4 ... 20/20 ... 4 mA 2-wire loop
• Switch output <sup>1)</sup>	Solid-state: 30 V DC/30 V AC, max. 82 mA	Max. switching voltage: 60 V DC/30 V AC Max. switching current: 1 A
• Fail-safe mode	Min. or max.	Min. or max.
<b>Accuracy</b>		
Repeatability	2 mm (0.08 inch)	2 mm (0.08 inch)
<b>Rated operating conditions<sup>2)</sup></b>		
Installation conditions		
• Location	Indoor/outdoor	Indoor/outdoor
Ambient conditions		
• Ambient temperature	-30 ... +85 °C (-22 ... +185 °F)	-10 ... +85 °C (14 ... 185 °F)
• Installation category	I	I
• Pollution degree	4	4
Medium conditions		
• Relative dielectric constant $\epsilon_r$	Min. 1.5	Min. 1.5
• Process temperature	-30 ... +100 °C (-22 ... +212 °F)	-10 ... +100 °C (14 ... 212 °F)
• Pressure (vessel)	-1 ... +10 bar g (-14.6 ... +146 psi g), nominal <sup>2)</sup>	-1 ... +10 bar g (-14.6 ... +146 psi g), nominal
• Degree of protection		
- Enclosure version	IP68/Type 4/NEMA 4	IP68/Type 4/NEMA 4
- Integral cable version	IP65/Type 4/NEMA 4	Not applicable
• Cable inlet	½" NPT (M20x1.5 optional)	½" NPT (M20x1.5 optional)
<b>Design</b>		
	<u>Enclosure/Integral cable version</u>	<u>Fully synthetic version</u>
Material		
• Body (Enclosure version)	Thermoplastic polyester	Thermoplastic polyester
• Lid (Enclosure version)	Transparent thermoplastic polycarbonate (PC)	Transparent thermoplastic polycarbonate (PC)
• Integrated cable body (Integral cable version)	316L stainless steel	Not applicable

	<b>Stainless steel process connection (integral cable or enclosure version) (7ML5501)</b>	<b>Fully synthetic process connection (enclosure version only) (7ML5610)</b>
Sensor length (nominal)	100 mm (4 inch)	100 mm (4 inch)
Process connection material of probe/wetted parts <sup>3)</sup>	Connection: 316L stainless steel; Process seal: FKM (optional FFKM); Sensor: PPS (optional PVDF) <sup>4)</sup>	PPS process connection and PPS sensor (Uni-Construction)
Connection (Enclosure version)	Internal 5-point terminal block, ½" NPT wiring entrance, M20x1.5 optional	Removable internal 5-point terminal block, ½" NPT wiring entrance, M20 x 1.5 optional
Connection (Integral cable version)	4 conductors, 1 m (3.3 ft), 0.5 mm <sup>2</sup> (22 AWG), shielded, polyester jacket	Not applicable
Process connection	¾" NPT [(Taper), ANSI/ASME B1.20.1] R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G 1" [(BSPP), EN ISO 228-1/ PF (JIS-P), JIS B 0202]	¾" NPT [(Taper), ANSI/ASME B1.20.1] R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]
<b>Power supply</b>		
• Standard	12 ... 33 V DC	12 ... 33 V DC
• Intrinsically Safe	10 ... 30 V DC (Intrinsically Safe barrier required)	Not applicable
<b>Certificates and approvals</b>		
	<ul style="list-style-type: none"> <li>• General: CE, CSA, FM, C-TICK</li> <li>• Marine: Lloyds 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 T4</li> <li>• 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</li> <li>• Overfill protection: WHG (Germany)</li> </ul>	<ul style="list-style-type: none"> <li>• General: CSA, FM</li> </ul>

<sup>1)</sup> When synthetic process connection version (7ML5610) is used in wet locations, switching voltage of the relay is limited to 35 V DC/16 V AC.

<sup>2)</sup> When operation is in areas classified as hazardous, observe restrictions according to relevant certificate. See also Pressure/Temperature curves on page 4/16.

<sup>3)</sup> For Caustic Materials please contact [ceg.smpi@siemens.com](mailto:ceg.smpi@siemens.com) <http://www.siemens.com/automation/support-request> for alternative O Rings

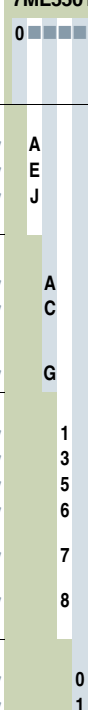
<sup>4)</sup> When FFKM O-ring (Option A22) is selected, process temperature is restricted to -20 °C (-4 °F).

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# Level Measurement

## Point level measurement – Capacitance switches

### Pointek CLS100

Selection and Ordering data	Article No.
<b>Pointek CLS100, stainless steel process connection</b>	<b>7ML5501-</b>
Compact 2-wire inverse frequency shift capacitance switch for level detection in constricted spaces, interfaces, solids, liquids, slurries and foam	
<b>Process connection</b>	
¾" NPT [(Taper), ANSI/ASME B1.20.1]	● <b>A</b>
R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	● <b>E</b>
G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	● <b>J</b>
<b>Approvals</b>	
General Purpose: CE, CSA, FM, C-TICK	● <b>A</b>
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 <sup>1)</sup>	● <b>C</b>
CSA/FM Class II and III, Div. 1, Groups E, F, G <sup>1)</sup>	● <b>G</b>
<b>Device version</b>	
Integral cable version (PPS probe)	● <b>1</b>
Enclosure version (PPS probe), ½" NPT cable inlet	● <b>3</b>
Integral cable version with PVDF probe body	● <b>5</b>
Enclosure version with PVDF probe body (½" NPT cable inlet)	● <b>6</b>
Enclosure version (PPS probe), M20 x 1.5 cable inlet	● <b>7</b>
Enclosure version with PVDF probe body, M20 x 1.5 cable inlet	● <b>8</b>
<b>Overfill protection</b>	
Not required	● <b>0</b>
Required	● <b>1</b>

<sup>1)</sup> Barrier or Intrinsically Safe power supply required for Intrinsically Safe protection

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.


Selection and Ordering data	Order code
<b>Further designs</b>	
Please add "-Z" to Article No. and specify Order code(s).	
Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 20 characters) specify in plain text	● <b>Y17</b>
FFKM seal O-ring <sup>1)</sup>	● <b>A22</b>
Inspection Certificate Type 3.1 per EN 10204	● <b>C12</b>

Operating Instructions	Article No.
Quick start manual, multi-language	<b>A5E32146158</b>
Note: due to ATEX regulations one Quick start manual is included with every product. This device is shipped with the Siemens Milltronics manual DVD containing ATEX Quick Starts and Operating Instructions.	

<sup>1)</sup> See Temperature restriction on page 4/16

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Selection and Ordering data	Article No.
<b>Accessories</b>	
Sensguard, ¾" NPT (PPS) Only available for CLS100 with ¾" NPT thread	<b>7ML1830-1DL</b>
Sensguard, R 1" (BSPT) (PPS) Only available for CLS100 with ¾" NPT thread	<b>7ML1830-1DM</b>
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosures	<b>7ML1930-1AC</b>
Siemens Intrinsically Safe Barrier (DC powered), ATEX II 1 G EEx ia	<b>7NG4124-0AA00</b>
½" NPT cable gland, nickel plated brass, fits cable diameter 6 ... 12 mm (0.24 ... 0.47 inch) -40 ... +100 °C (-40 ... +212 °F), IP68 (General Purpose)	<b>7ML1830-1JA</b>
M20 x 1.5 cable gland, PA polyamide, ATEX II 2G EEx e II, fits cable diameter 7 ... 12 mm (0.28 ... 0.47 inch), -20 ... +70 °C (-4 ... +158 °F), IP68 (General Purpose)	<b>7ML1830-1JC</b>

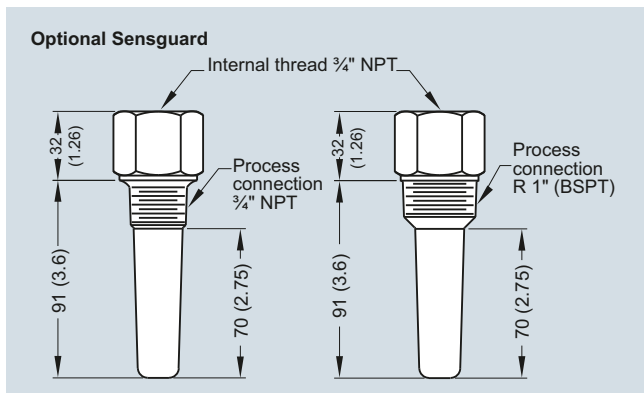
Selection and Ordering data	Article No.
<b>Pointek CLS100, PPS process connection</b>	<b>7ML5610-</b>
Compact 2-wire inverse frequency shift capacitance switch for level detection in constricted spaces, interfaces, solids, liquids, slurries and foam	
<b>Process connection (PPS)</b>	
¾" NPT [(Taper), ANSI/ASME B1.20.1] (PPS probe body)	● <b>A</b>
R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] (PPS probe body)	● <b>B</b>
<b>Approvals</b>	
General Purpose: CSA, FM	● <b>D</b>
<b>Versions/Options</b>	
Enclosure version, PPS process connection, ½" NPT cable inlet	● <b>1</b>
Enclosure version, PPS process connection, M20 x 1.5	● <b>2</b>
<b>Overfill protection</b>	
Not required	● <b>0</b>
Required	● <b>1</b>

Selection and Ordering data	Order code
<b>Further designs</b>	
Please add "-Z" to Article No. and specify Order code(s).	
Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 20 characters) specify in plain text	● <b>Y17</b>
FFKM seal O-ring <sup>1)</sup>	<b>A22</b>
Inspection Certificate Type 3.1 per EN 10204	<b>C12</b>
<b>Operating Instructions</b>	Article No.
Quick start manual, multi-language	<b>A5E32146158</b>
Note: due to ATEX regulations one Quick start manual is included with every product. This device is shipped with the Siemens Milltronics manual DVD containing ATEX Quick Starts and Operating Instructions.	
<b>Accessories</b>	
Sensguard, ¾" NPT (PPS) Only available for CLS100 with ¾" NPT thread	<b>7ML1830-1DL</b>
Sensguard, R 1" (BSPT) (PPS) Only available for CLS100 with ¾" NPT thread	<b>7ML1830-1DM</b>
Tag, stainless steel, 12 x 45 mm, (0.47 x 1.77 inch) one text line, suitable for enclosures	<b>7ML1930-1AC</b>

<sup>1)</sup> See Temperature restriction on page 4/16

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

### Options



Optional Sensguard, dimensions in mm (inch)

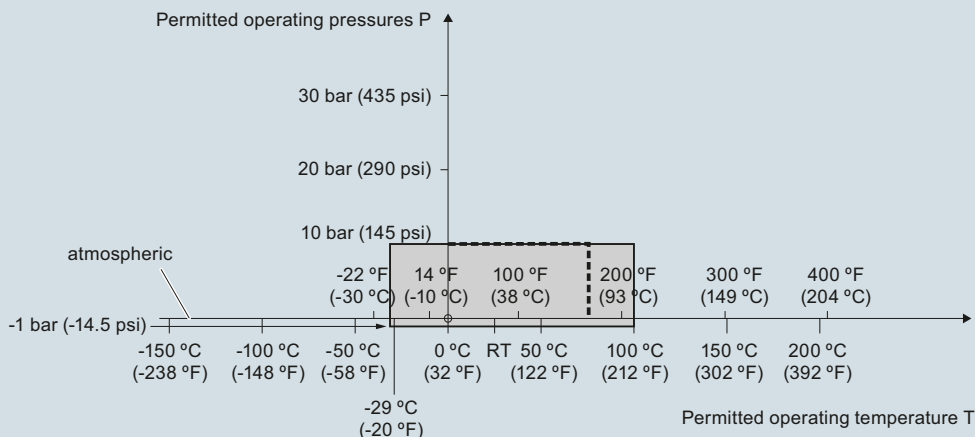
# Level Measurement

## Point level measurement – Capacitance switches

### Pointek CLS100

#### Characteristic curves

Pressure/temperature curve  
 CLS100  
 Threaded process connections  
 (7ML5501)

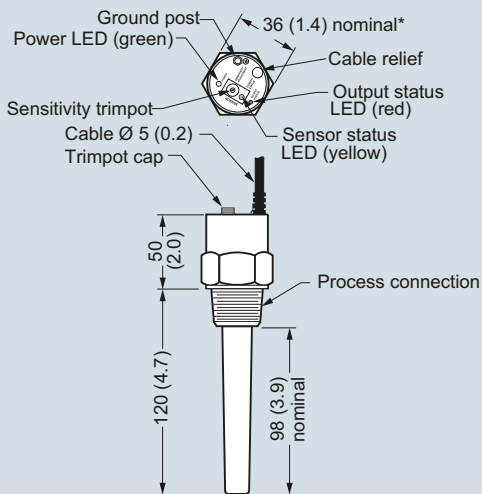


--- Example:  
 Permitted operating pressure = 10 bar (145 psi) at 75 °C

Pointek CLS100 Process Pressure/Temperature derating curves

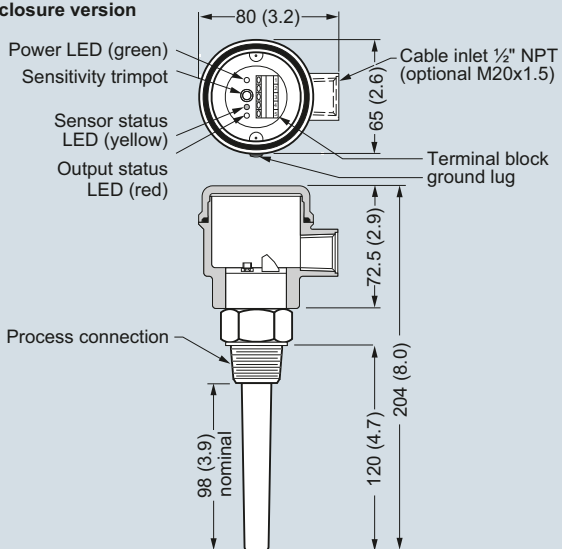
#### Dimensional drawings

##### Integral cable version



\*Some G thread configurations deviate from this size.

##### Enclosure version



Pointek CLS100, dimensions in mm (inch)

# Level Measurement

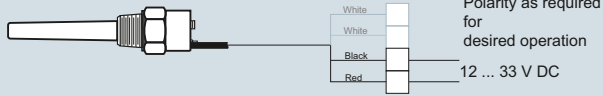
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Pointek CLS100

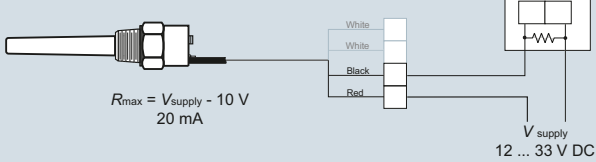
### Schematics

#### Integral Cable Version - Non Intrinsically Safe only

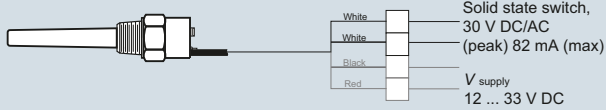
##### LOW/HIGH Alarm



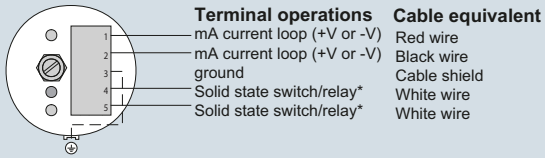
##### 4/20 mA Loop Alarm



##### Solid State Switch Version



#### Enclosure and Fully Synthetic Version



- \* Switch/relay normally open in unpowered state
- \* Relay not available on Pointek CLS100 IS version (7ML5501)

#### Note:

When driving an inductive load (for example, an external relay), a protection diode must be connected in the correct polarity to prevent possible switch damage due to inductive spikes generated by switching the inductor (please refer to instruction manual). Intrinsically Safe Models - please follow local regulations and area classifications; refer to instruction manual for more details.

Pointek CLS100 connections

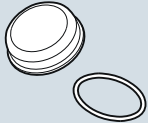
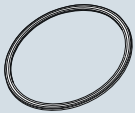
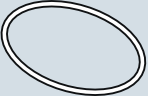
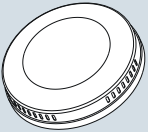
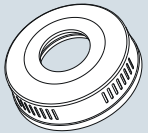

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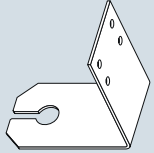


### Pointek CLS Specials

#### Selection and ordering data

##### Pointek Specials<sup>1)</sup>

	Article No.
<b>CLS100 Polycarbonate Lid and Gasket, FKM</b>	
	
Kit, Lid and gasket, CLS100 enclosure version	<b>A5E01163671</b>
<b>CLS100 Miscellaneous Parts</b>	
Custom length of cable is available only for 7ML5501-xxx1x and 7ML5501-xxx5x <sup>2)</sup>	
<b>CLS200 Gasket (IP65), Synprene</b>	
	
Spare gasket, enclosure version (IP65 versions only)	<b>A5E01163672</b>
<b>CLS200 Gasket (IP68), Silicone</b>	
	
Spare gasket, enclosure version (IP68 versions)	<b>A5E01163673</b>
<b>CLS200 Blind Lid</b>	
	
Spare aluminum blind lid (for standard versions only)	<b>A5E01163674</b>
<b>CLS200 Lid with window</b>	
	
Spare aluminum lid with window	<b>A5E01163676</b>
<b>CLS200 Sensor Kit for cable units</b>	
	
Kit, Sensor for cable units, PPS, Standard, FKM	<b>A5E01163677</b>

##### Pointek Specials<sup>1)</sup>

	Article No.
Kit, Sensor for cable units, PPS, Digital, FKM	<b>A5E01163678</b>
Kit, Sensor for cable units, PPS, Standard, FFKM	<b>A5E01163679</b>
Kit, Sensor for cable units, PPS, Digital, FFKM	<b>A5E01163680</b>
Kit, Sensor for cable units, PVDF, Standard, FKM	<b>A5E01163681</b>
Kit, Sensor for cable units, PVDF, Digital, FKM	<b>A5E01163682</b>
Kit, Sensor for cable units, PVDF, Standard, FFKM	<b>A5E01163683</b>
Kit, Sensor for cable units, PVDF, Digital, FFKM	<b>A5E01163684</b>
<b>CLS200 Mounting Bracket, 316L stainless steel</b>	
	
Spare mounting bracket	<b>A5E01163685</b>
<b>CLS200 PROFIBUS Connector (IP65)</b>	
	
Spare, PROFIBUS connector (IP65 versions only)	<b>A5E01163686</b>
<b>CLS200 Miscellaneous Parts</b>	
CLS200 with FFKM O-rings (any version) <sup>2)</sup>	
<b>CLS200 Electronics</b>	
Test magnet, digital version	<b>7ML1830-1JE</b>
Amplifier/power supply kit, standard version	<b>A5E03251681</b>
Amplifier/power supply, digital version	<b>7ML1830-1JF</b>
LCD display, digital version	<b>7ML1830-1JK</b>
<b>CLS300 Cable Extensions, 316L stainless steel</b>	
	
Kit, stainless steel cable extension, 1 m, adjustable by customer	<b>A5E01163688</b>
Kit, stainless steel cable extension, 3 m, adjustable by customer	<b>A5E01163689</b>
Kit, stainless steel cable extension, 5 m, adjustable by customer	<b>A5E01163690</b>
Kit, stainless steel cable extension, 10 m, adjustable by customer	<b>A5E01163691</b>
Kit, stainless steel cable extension, 15 m, adjustable by customer	<b>A5E01163693</b>
Kit, stainless steel cable extension, 20 m, adjustable by customer	<b>A5E01163695</b>