

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Overview



SITRANS LC500 is an inverse frequency shift capacitance level or interface transmitter for extreme and critical process conditions, such as oil and liquified natural gas (LNG) as well as toxic and aggressive chemicals and vapors.

Benefits

- Patented Active-Shield technology so measurement is unaffected by material buildup in active shield section
- Simple push-button calibration and integrated local display
- Inverse frequency approach provides high resolution
- 2-wire loop powered 4 to 20/20 to 4 mA measurement signal
- Pre-detection alarm and full function diagnostics
- High temperature and pressure resistant (optional)
- Full-function diagnostics comply with NAMUR NE 43
- Easy calibration locally or via HART (using SIMATIC PDM software)

Application

SITRANS LC500's advanced electronics provide one-step, push-button calibration and local display for easy on-site installation and setup.

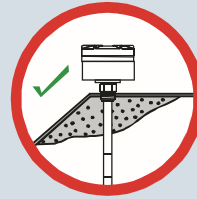
The unique mechanical probe design coupled with a high performance transmitter gives superior performance in toxic and aggressive chemicals, acids, caustics, adhesives and in viscous conductive and non-conductive materials.

The SMART 2-wire transmitter has HART communications for remote commissioning and inspection.

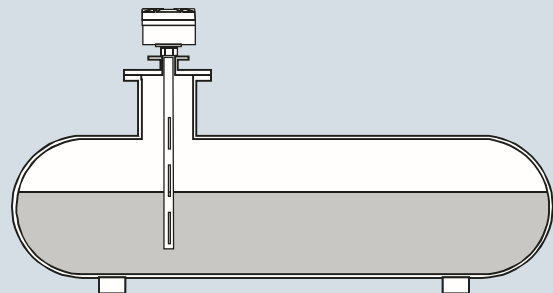
- Key Applications: Oil/water or foam/liquid interface measurement in separators or coalescers, cryogenic applications including CO₂ and liquified natural gas (LNG), distillation/regeneration tanks with high temperatures

Configuration

Installation



Build up of material or condensation in active shield area does not affect switch operation.



Mounting on non-linear vessels in non-conductive fluids using stilling well.

SITRANS LC500 installation, dimensions in mm (inch)

Technical specifications

Input	
Measuring range	1 ... 3 300 pF
Span	Min. 3.3 pF
Output	
Solid-state switch	
• Output	Galvanically isolated
• Protection	Bipolar
• Max. switching voltage	<ul style="list-style-type: none"> • 30 V DC • 30 V peak AC
• Max. load current	82 mA
• Voltage drop	< 1 V, typical at 50 mA
• Time delay (pre or post switching)	1 ... 60 s
Loop current	3.6 ... 22 mA/22 ... 3.6 mA (2-wire current loop)
Accuracy (transmitter)	
Temperature stability	0.15 pF (0 pF) or < 0.25 % (typically < 0.1%) of actual measured value, whichever is greater over the full temperature range
Non-linearity and repeatability	< 0.1 % of range and actual measured value respectively
Accuracy	Deviation < 0.1 % of measured value

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Rated operating conditions¹⁾

Installation conditions	
• Location	Indoor/outdoor
Ambient conditions	
• Ambient temperature (transmitter)	-40 ... +85 °C (-40 ... +185 °F) ²⁾
• Installation category	II
• Pollution degree	4
Medium conditions	
• Relative dielectric constant ϵ_r	Min. 1.5
• Process temperature	Temperature rating of process seal is pressure dependent. See Pressure/Temperature curves on page 4/323.
- Standard (PFA) ³⁾	-50 ... +200 °C (-58 ... +392 °F)
- Cryogenic version	-200 ... +200 °C (-328 ... +392 °F)
	Contact ceg.smpi@siemens.com for details.
• Process pressure	Pressure rating of process seal is temperature dependent. See Pressure/Temperature curves on page 4/323.
• Standard (PFA)	-1 ... 150 bar g (2175 psi g)

Design

Material	
• Wetted parts material	316L stainless steel
- Standard rod	
• Probe insulation (rod)	PFA
• Cable	316 stainless steel/ 316 stainless steel PFA
Probe diameter	
• Rod version	16 mm (0.63 inch) or 24 mm (0.95 inch)
• Cable version	9 mm (0.35 inch) with PFA jacket, 6 mm (0.24 inch) without PFA jacket
Active shield length	
• Minimum (rod version)	50 mm (1.97 inch), customer selectable (Order code Y02)
Probe length	
• Rod version	Max. 3.5 m (138 inch) with 16 mm rod, PFA Max. 5.5 m (216 inch) with 24 mm rod, PFA
• Cable version	Max. 35 m (1 378 inch)
Process connection of probe	
• Threaded mounting	NPT [(Taper), ANSI/ASME B1.20.1] R [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]
• Flange mounting	ASME, EN 1092-1
Enclosure	
• Material	Aluminum, epoxy-coated
• Cable inlet	2 x 1/2" NPT (2 x M20x1.5, IP68 adapter, optional)
• Degree of protection	Type 4X/NEMA4X/IP65, IP68

Power supply	12 ... 33 V DC
User Interface	
Display	Local LCD, 4 digit, each 0 ... 9 and limited alpha characters
Rotary function switch	For selecting programmable menu items
Push buttons	Red +, blue -, used in conjunction with rotary switch for programming
Features	
Measurement current signaling	According to NAMUR NE 43, signal 3.8 ... 20.5 mA, fault \leq 3.6 or \geq 21 mA (22 mA)
Safety	<ul style="list-style-type: none"> • Inputs/outputs fully galvanically isolated • Polarity-insensitive current loop • Fully potted • Integrated safety barrier
Diagnostics with fault alarm when:	Primary variable (PV) out of limits, system failure in measurement circuit, deviation between A/D and D/A converter, check sum, watch dog and self-checking facility
Function rotary switch	Positions 0 ... 9, A ... F
SMART communication	Conforming to HART Communication Foundation (HCF)
Certificates and approvals	
General Purpose	CE, CSA, FM, C-TICK
Non-incendive/Non-sparking	<ul style="list-style-type: none"> • CSA/FM Class 1, Div. 2, Groups A, B, C, D T4 ATEX II 3G 2D EEx nA [ib] IIC • T6 ... T4 T100 °C
Dust Ignition Proof (Intrinsically Safe Probe Circuit)	<ul style="list-style-type: none"> • CSA/FM Class II and III, Div. 1, Groups E, F, G • ATEX II 1/2 GD EEx d [ia] T6 to T1 T100 °C
Explosion Proof (Intrinsically Safe Probe Circuit)	<ul style="list-style-type: none"> • FM Class 1, Div. 1, Groups A, B, C, D T4 • ATEX II 1/2 GD EEx d [ia] IIC T6 to T1
Marine	Lloyds Register of Shipping, Categories ENV1, ENV2, ENV3 and ENV5, Bureau Veritas

¹⁾ When operation is in areas classified as hazardous, observe restrictions according to relevant certificate. See also Pressure/Temperature curves on page 4/323.

²⁾ Thermal isolator is used if process connection temperature exceeds 85 °C (185 °F).

³⁾ Not recommended for steam environments

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

SITRANS LC500 probe version	Standard		Extended Cable version with Rod Sensor
Process connection types	Threaded or welded flange	Single piece flanged	Threaded or welded flange
Threaded	Available as standard	–	Available as standard
Flange	Available as standard	Available as standard	Available as standard
Process connection materials			
Stainless steel 316L	Available as standard	Available as standard	Available as standard
Probe insulation			
PFA	Available as standard	Available as standard	Available as standard
Length and Process parameters¹⁾			
Rod length for PFA 16 mm version	Min. 200 mm (7.87 inch) Max. 3 500 mm (137.80 inch)	Min. 200 mm (7.87 inch) Max. 3 500 mm (137.80 inch)	Min. 200 mm (7.87 inch) Max. 3 500 mm (137.80 inch)
Rod length for PFA 24 mm version	Min. 200 mm (7.87 inch) Max. 5 500 mm (216.54 inch)	Min. 200 mm (7.87 inch) Max. 5 500 mm (216.54 inch)	Min. 200 mm (7.87 inch) Max. 5 500 mm (216.54 inch)
Cable length	Min. 1 000 mm (39.37 inch) Max. 35 000 mm (1 377.95 inch)	Min. 1 000 mm (39.37 inch) Max. 35 000 mm (1 377.95 inch)	Min. 5 000 mm (196.85 inch) ²⁾ Max. 35 000 mm (1 377.95 inch) ²⁾
Maximum process pressure	See Pressure/Temperature curves for specific probe type		5 bar g (73 psi g)
Maximum process temperature			100 °C (212 °F)

¹⁾ See Pressure/Temperature curves for specific probe type

²⁾ Refers to total insertion length. See dimension drawing on page 4/331 for further explanation - Not available as standard

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

4

Selection and Ordering data	Article No.
SITRANS LC500, Threaded or Welded Flange with Cable Sensor	7ML5513-
Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.	
Version¹⁾	
Cable, 9 mm (0.35 inch) diameter, 316 stainless steel with PFA insulation, weighted	
<u>Add Order code Y01 and plain text:</u>	
<u>"Insertion length ... mm"</u>	
1 000 ... 2 000 mm (39.37 ... 78.74 inch)	0 E
2 001 ... 4 000 mm (78.78 ... 157.48 inch)	1 E
4 001 ... 6 000 mm (157.52 ... 236.22 inch)	2 E
6 001 ... 8 000 mm (236.26 ... 314.96 inch)	3 E
8 001 ... 10 000 mm (315 ... 393.70 inch)	4 E
Longer lengths possible to a max. of 35 000 mm (114.83 ft). Contact ceg.smpi@siemens.com for details.	
Cable, 6 mm (0.24 inch) diameter, 316L stainless steel, non-insulated, weighted (non-conductive media only)	
<u>Add Order code Y01 and plain text:</u>	
<u>"Insertion length ... mm"</u>	
1 000 ... 2 000 mm (39.37 ... 78.74 inch) ²⁾	0 F
2 001 ... 4 000 mm (78.78 ... 157.48 inch) ²⁾³⁾	1 F
4 001 ... 6 000 mm (157.52 ... 236.22 inch) ²⁾³⁾	2 F
6 001 ... 8 000 mm (236.26 ... 314.96 inch) ²⁾³⁾	3 F
8 001 ... 10 000 mm (315 ... 393.70 inch) ²⁾³⁾	4 F
Cable lengths up to 25 000 mm (984.25 inch) are possible for non-conductive media. Cable lengths up to 15 000 mm (590.55 inch) are possible for conductive media.	
Contact ceg.smpi@siemens.com for details.	
Process connection (316L stainless steel)	
Threaded connection	
1½" NPT [(Taper), ANSI/ASME B1.20.1]	C 0
R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	F 0
1¼" NPT [(Taper), ANSI/ASME B1.20.1]	K 0
G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	L 0
Welded flange, raised face	
1½", ASME, 150 lb	B 1
1½", ASME, 300 lb	B 2
1½", ASME, 600 lb	B 3
2", ASME, 150 lb	C 1
2", ASME, 300 lb	C 2
2", ASME, 600 lb	C 3
3", ASME, 150 lb ³⁾	D 1
3", ASME, 300 lb ³⁾	D 2
3", ASME, 600 lb ³⁾	D 3
4", ASME, 150 lb ³⁾	E 1
4", ASME, 300 lb ³⁾	E 2
4", ASME, 600 lb ³⁾	E 3
6", ASME, 150 lb ³⁾	F 1
6", ASME, 300 lb ³⁾	F 2
6", ASME, 600 lb ³⁾	F 3
Welded flange, Type A flat faced	
DN 40, PN 16	K 4
DN 40, PN 40	K 5
DN 50, PN 16	L 4
DN 50, PN 40	L 5
DN 80, PN 16	M 4
DN 80, PN 40 ³⁾	M 5
DN 100, PN 16 ³⁾	N 4
DN 100, PN 40 ³⁾	N 5
DN 125, PN 16 ³⁾	P 4
DN 125, PN 40 ³⁾	P 5
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1 standard.)	

Selection and Ordering data	Article No.
SITRANS LC500, Threaded or Welded Flange with Cable Sensor	7ML5513-
Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.	
Approvals	
General Purpose: CE, CSA, FM, C-TICK, KC	1
CSA / FM Class I, Div. 2, Groups A, B, C, D	2
CSA / FM Class II, III, Div. 1, Groups E, F, G T4	4
ATEX II 3G 2D EEx nA [ib] IIC T6 ... T4 T 100 °C	6
ATEX II 1/2 GD EEx d [ia] IIC T6 ... T1 T 100 °C	
FM Class I, Div.1, Groups A, B, C, D, T4	
Enclosure/Cable inlet	
<u>Aluminum epoxy coated</u>	
2 x ½" NPT, IP68	1
2 x M20x1.5 (IP68, adapter)	2
Options	
No additional options	
With mounting eye ⁴⁾	A
	B
Thermal isolator	
Without thermal isolator	
Isolator, only for use when temperature range is outside of -40 ... +85 °C (-40 ... +185 °F), explosion proof approval -40 ... +70 °C (-40 ... +158 °F)	A
	B
Electronic output	
2-wire loop current 4 ... 20 mA (transmitter MSP 2002-2 _3300 pF)	1
1) A minimum span of 3 pF must be maintained	
2) Available with non-conductive media only	
3) Custom shipping methods required. Contact factory for more details.	
4) Available in PFA insulated version only	

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Insertion length, specify in plain text: Y01: ... mm	Y01
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Operating Instructions	See page 4/322
Accessories	See page 4/322

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS LC500, Threaded or Welded Flange, with Rod Sensor Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.	7ML5515-	SITRANS LC500, Threaded or Welded Flange, with Rod Sensor Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.	7ML5515-
Version Rod, 16 mm (0.63 inch), PFA insulated <u>Add Order code Y01 and Y02 and plain text:</u> <u>"Insertion length ... mm and active shield length ... mm"</u> 200 ... 1 000 mm (7.87 ... 39.37 inch) ¹⁾ 1 001 ... 2 000 mm (39.41 ... 78.74 inch) 2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾ 3 001 ... 3 500 mm (118.15 ... 137.80 inch) ²⁾ Rod, 16 mm (0.63 inch), PFA insulated with 35 mm (1.38 inch) stilling well in 316L stainless steel <u>Add Order code Y01 and Y02 and plain text:</u> <u>"Insertion length ... mm and active shield length ... mm"</u> 200 ... 1 000 mm (7.87 ... 39.37 inch) ¹⁾³⁾ 1 001 ... 2 000 mm (39.41 ... 78.74 inch) ³⁾ 2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾³⁾ 3 001 ... 3 500 mm (118.15 ... 137.80 inch) ²⁾³⁾ Rod, 24 mm (0.94 inch), PFA insulated <u>Add Order code Y01 and Y02 and plain text:</u> <u>"Insertion length ... mm and active shield length ... mm"</u> 200 ... 1 000 mm (7.87 ... 39.37 inch) ⁴⁾ 1 001 ... 2 000 mm (39.41 ... 78.74 inch) ⁴⁾ 2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾⁴⁾ 3 001 ... 4 000 mm (118.15 ... 157.48 inch) ²⁾⁴⁾ 4 001 ... 5 000 mm (173.26 ... 196.88 inch) ²⁾⁴⁾ 5 001 ... 5 500 mm (196.89 ... 216.54 inch) ²⁾⁴⁾ Rod, 24 mm (0.94 inch), PFA insulated with 48 mm (1.89 inch) stilling well in 316L stainless steel <u>Add Order code Y01 and Y02 and plain text:</u> <u>"Insertion length ... mm and active shield length ... mm"</u> 200 ... 1 000 mm (7.87 ... 39.37 inch) ⁵⁾ 1 001 ... 2 000 mm (39.41 ... 78.74 inch) ⁵⁾ 2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾⁵⁾ 3 001 ... 4 000 mm (118.15 ... 157.48 inch) ²⁾⁵⁾ 4 001 ... 5 000 mm (173.26 ... 196.88 inch) ²⁾⁵⁾ 5 001 ... 5 500 mm (196.89 ... 216.54 inch) ²⁾⁵⁾	0 A 1 A 2 A 3 A 0 B 1 B 2 B 3 B 0 C 1 C 2 C 3 C 4 C 5 C 0 D 1 D 2 D 3 D 4 D 5 D	Welded flange, raised face 1½", ASME, 150 lb 1½", ASME, 300 lb 1½", ASME, 600 lb 2", ASME, 150 lb 2", ASME, 300 lb 2", ASME, 600 lb 3", ASME, 150 lb ²⁾ 3", ASME, 300 lb ²⁾ 3", ASME, 600 lb ²⁾ 4", ASME, 150 lb ²⁾ 4", ASME, 300 lb ²⁾ 4", ASME, 600 lb ²⁾ 6", ASME, 150 lb ²⁾ 6", ASME, 300 lb ²⁾ 6", ASME, 600 lb ²⁾ Welded flange, Type A flat faced DN 40, PN 16 DN 40, PN 40 DN 50, PN 16 DN 50, PN 40 DN 80, PN 16 DN 80, PN 40 ²⁾ DN 100, PN 16 ²⁾ DN 100, PN 40 ²⁾ DN 125, PN 16 ²⁾ DN 125, PN 40 ²⁾ (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1 standard.)	B 1 B 2 B 3 C 1 C 2 C 3 D 1 D 2 D 3 E 1 E 2 E 3 F 1 F 2 F 3 K 4 K 5 L 4 L 5 M 4 M 5 N 4 N 5 P 4 P 5
Process connection (316L stainless steel) Threaded connection ¾" NPT [(Taper), ANSI/ASME B1.20.1] 1" NPT [(Taper), ANSI/ASME B1.20.1] 1½" NPT [(Taper), ANSI/ASME B1.20.1] 2" NPT [(Taper), ANSI/ASME B1.20.1] R ¾" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] R 2" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] 1¼" NPT [(Taper), ANSI/ASME B1.20.1] G ¾" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] G 2" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	A 0 B 0 C 0 D 0 E 0 F 0 J 0 K 0 N 0 P 0 R 0 S 0 T 0	Approvals General Purpose: CE, CSA, FM, C-TICK, KC CSA / FM Class I, Div. 2, Groups A, B, C, D CSA / FM Class II, III, Div. 1, Groups E, F, G T4 ATEX II 3G 2D EEx nA [ib] IIC T6 ... T4 T 100 °C ATEX II 1/2 GD EEx d [ia] IIC T6 ... T1 T 100 °C FM Class I, Div.1, Groups A, B, C, D, T4	1 2 4 6
Enclosure/Cable inlet Aluminum epoxy coated 2 x ½" NPT, IP68 2 x M20 x1.5 (IP68, adapter)			1 2
Options No additional options Slotted holes instead of standard vent holes in stilling well (refer to Operating Instructions for dimensions.) ⁶⁾			A B
Thermal isolator/remote version Without thermal isolator or remote electronics Thermal isolator, only for use when temperature range is outside of -40 ... +85 °C (-40 ... +185 °F), explosion proof approval -40 ... +70 °C (-40 ... +158 °F) Remote electronics with mounting bracket and cable ⁷⁾			A B
<ul style="list-style-type: none"> Length: 2 m (79 inch) Length: 3 m (118 inch) Length: 4 m (158 inch) Length: 5 m (197 inch) 			C D E F

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data

SITRANS LC500, Threaded or Welded Flange, with Rod Sensor

Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.

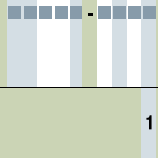
Electronic output

2-wire loop current 4 ... 20 mA
(transmitter MSP 2002-2_3300 pF)

- 1) A minimum span of 3 pF must be maintained
- 2) Custom shipping methods required. Contact factory for more details.
- 3) Available with process connection 1½" or larger
- 4) Available with process connection 1" or larger
- 5) Available with process connection 2" or larger
- 6) Available with version 0B ... 3B, 0D ... 5D and 0F only
- 7) Available with approval option 1 only

Article No.

7ML5515-



Selection and Ordering data

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Insertion length, specify in plain text: Y01: ... mm

Active shield length, specify in plain text
[min. length is 50 mm (2 inch)]: Y02: ... mm

Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]:
Measuring-point number/identification
(max. 27 characters) specify in plain text

Manufacturer's test certificate: M to DIN 55350,
Part 18 and to ISO 9000

Inspection Certificate Type 3.1 per EN 10204

Manufacturing Test Report (Electrode Test)

Operating Instructions

Accessories

Order code

Y01

Y02

Y15

C11

C12

C18

See page 4/322

See page 4/322

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500


Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS LC500, Single Piece Flanged with Rod Sensor	7ML5517-	SITRANS LC500, Single Piece Flanged with Rod Sensor	7ML5517-
Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.		Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.	
Version		<u>Single piece flange, Type B1 raised face</u>	
Rod, 16 mm (0.63 inch), PFA insulated <u>Add Order code Y01 and Y02 and plain text:</u> <u>"Insertion length ... mm and active shield length ... mm"</u> 250 ... 1 000 mm (9.84 ... 39.37 inch) ¹⁾	0 A	DN 40, PN 16	K 4
1 001 ... 2 000 mm (39.41 ... 78.74 inch)	1 A	DN 40, PN 40	K 5
2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾	2 A	DN 50, PN 16	L 4
3 001 ... 3 500 mm (118.15 ... 137.80 inch) ²⁾	3 A	DN 50, PN 40	L 5
Rod, 16 mm (0.63 inch), PFA insulated with 35 mm (1.34 inch) stilling well in 316L stainless steel <u>Add Order code Y01 and Y02 and plain text:</u> <u>"Insertion length ... mm and active shield length ... mm"</u> 250 ... 1 000 mm (9.84 ... 39.37 inch)	0 B	DN 80, PN 16	M 4
1 001 ... 2 000 mm (39.41 ... 78.74 inch)	1 B	DN 80, PN 40 ²⁾	M 5
2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾	2 B	DN 100, PN 16 ²⁾	N 4
3 001 ... 3 500 mm (118.15 ... 137.80 inch) ²⁾	3 B	DN 100, PN 40 ²⁾	N 5
Rod, 24 mm (0.94 inch), PFA insulated <u>Add Order code Y01 and Y02 and plain text:</u> <u>"Insertion length ... mm and active shield length ... mm"</u> 250 ... 1 000 mm (9.84 ... 39.37 inch)	0 C	DN 125, PN 16 ²⁾	P 4
1 001 ... 2 000 mm (39.41 ... 78.74 inch)	1 C	DN 125, PN 40 ²⁾	P 5
2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾	2 C	<u>Single piece flange with PTFE flange facing</u> (applicable with versions 0A ... 3A and 0C ... 5C) ⁴⁾	
3 001 ... 4 000 mm (118.15 ... 157.48 inch) ²⁾	3 C	1½", ASME, 150 lb	B 4
4 001 ... 5 000 mm (173.26 ... 196.88 inch) ²⁾	4 C	1½", ASME, 300 lb	B 5
5 001 ... 5 500 mm (196.89 ... 216.54 inch) ²⁾	5 C	1½", ASME, 600 lb	B 6
Rod, 24 mm (0.94 inch), PFA insulated with 48 mm (1.89 inch) stilling well in 316L stainless steel <u>Add Order code Y01 and Y02 and plain text:</u> <u>"Insertion length ... mm and active shield length ... mm"</u> 250 ... 1 000 mm (9.84 ... 39.37 inch)	0 D	2", ASME, 150 lb	C 4
1 001 ... 2 000 mm (39.41 ... 78.74 inch) ²⁾³⁾	1 D	2", ASME, 300 lb	C 5
2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾³⁾	2 D	2", ASME, 600 lb	C 6
3 001 ... 4 000 mm (118.15 ... 157.48 inch) ²⁾³⁾	3 D	3", ASME, 150 lb ²⁾	D 4
4 001 ... 5 000 mm (173.26 ... 196.88 inch) ²⁾³⁾	4 D	3", ASME, 300 lb ²⁾	D 5
5 001 ... 5 500 mm (196.89 ... 216.54 inch) ²⁾³⁾	5 D	3", ASME, 600 lb ²⁾	D 6
Process connection (316L stainless steel) <u>Single piece flange, raised face</u>		4", ASME, 150 lb ²⁾	E 4
1½", ASME, 150 lb	B 1	4", ASME, 300 lb ²⁾	E 5
1½", ASME, 300 lb	B 2	4", ASME, 600 lb ²⁾	E 6
1½", ASME, 600 lb	B 3	6", ASME, 150 lb ²⁾	F 4
2", ASME, 150 lb	C 1	6", ASME, 300 lb ²⁾	F 5
2", ASME, 300 lb	C 2	6", ASME, 600 lb ²⁾	F 6
2", ASME, 600 lb	C 3	Single piece flange with PTFE flange facing (applicable with versions 0A ... 3A, 0C ... 5C) ⁴⁾	
3", ASME, 150 lb ²⁾	D 1	DN 40, PN 16	K 6
3", ASME, 300 lb ²⁾	D 2	DN 40, PN 40	K 7
3", ASME, 600 lb ²⁾	D 3	DN 50, PN 16	L 6
4", ASME, 150 lb ²⁾	E 1	DN 50, PN 40	L 7
4", ASME, 300 lb ²⁾	E 2	DN 80, PN 16	M 6
4", ASME, 600 lb ²⁾	E 3	DN 80, PN 40 ²⁾	M 7
6", ASME, 150 lb ²⁾	F 1	DN 100, PN 16 ²⁾	N 6
6", ASME, 300 lb ²⁾	F 2	DN 100, PN 40 ²⁾	N 7
6", ASME, 600 lb ²⁾	F 3	DN 125, PN 16 ²⁾	P 6
		DN 125, PN 40 ²⁾	P 7
		(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1 standard.)	

4

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS LC500, Single Piece Flanged with Rod Sensor Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.	7ML5517- 	Further designs Please add "-Z" to Article No. and specify Order code(s).	
Approvals General Purpose: CE, CSA, FM, C-TICK, KC CSA / FM Class I, Div. 2, Groups A, B, C, D CSA / FM Class II, III, Div. 1, Groups E, F, G T4 ATEX II 3G 2D EEx nA [ib] IIC T6 ... T4 T 100 °C ATEX II 1/2 GD EEx d [ia] IIC T6 ... T1 T 100 °C FM Class I, Div.1, Groups A, B, C, D, T4	1 2 4 6	Insertion length, specify in plain text: Y01: ... mm Active shield length, specify in plain text [min. length is 50 mm (2 inch)]: Y02: ... mm Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000 Inspection Certificate Type 3.1 per EN 10204 Manufacturing Test Report (Electrode Test)	Y01 Y02 Y15 C11 C12 C18
Enclosure/Cable inlet Aluminum epoxy coated 2 x 1/2" NPT, IP68 2 x M20 x1.5 (IP68, adapter)	1 2	Operating Instructions Accessories	See page 4/322 See page 4/322
Options None Slotted holes instead of standard vent holes in stilling well (Refer to manual for dimensions ⁵⁾	A B		
Thermal isolator/remote version Without thermal isolator Isolator, only for use when temperature range is outside of -40 ... +85 °C (-40 ... +185 °F), explosion proof approval -40 ... +70 °C (-40 ... +158 °F) Remote electronics with mounting bracket and cable ⁶⁾	A B		
<ul style="list-style-type: none"> Length: 2 m (79 inch) Length: 3 m (118 inch) Length: 4 m (158 inch) Length: 5 m (197 inch) 	C D E F		
Electronic output 2-wire loop current 4 ... 20 mA (transmitter MSP 2002-2_3300 pF)	1		

- 1) A minimum span of 3 pF must be maintained
- 2) Custom shipping methods required. Contact factory for more details.
- 3) Available with process connection 2" or larger, and only available with process connection options C1 ... F3, L4 ... P5
- 4) Not available with versions 0E and 0F
- 5) Available with version 0B ... 3B, 0D ... 5D and 0F only
- 6) Available with approval option 1 only

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS LC500, Extended Cable version with Rod Sensor, threaded connection or welded flange¹⁾ Inverse frequency shift capacitance level and interface transmitter for short range continuous measurement in large storage vessels.	7ML5523-	SITRANS LC500, Extended Cable version with Rod Sensor, threaded connection or welded flange¹⁾ Inverse frequency shift capacitance level and interface transmitter for short range continuous measurement in large storage vessels.	7ML5523-
Version²⁾ Rod, 16 mm (0.63 inch), PFA insulated and 316L stainless steel flexible extension tube Total insertion length: <u>Add Order code Y01 and plain text: "Total insertion length ... mm and Y02 and plain text: Active shield length ... mm"³⁾⁴⁾</u> <ul style="list-style-type: none"> • 5 000 ... 10 000 mm (196.85 ... 393.70 inch)¹⁾ • 10 001 ... 15 000 mm (393.74 ... 590.55 inch)¹⁾ • 15 001 ... 20 000 mm (590.59 ... 787.40 inch)¹⁾ • 20 001 ... 25 000 mm (787.44 ... 984.25 inch)¹⁾ • 25 001 ... 30 000 mm (984.29 ... 1181.10 inch)¹⁾ • 30 001 ... 35 000 mm (1 181.14 ... 1 377.95 inch)¹⁾ Rod, 24 mm (0.94 inch), PFA insulated and 316L stainless steel flexible extension tube Total insertion length: <u>Add Order code Y01 and plain text: "Total insertion length ... mm and Y02 and plain text: Active shield length ... mm"³⁾⁴⁾</u> <ul style="list-style-type: none"> • 5 000 ... 10 000 mm (196.85 ... 393.70 inch)¹⁾ • 10 001 ... 15 000 mm (393.74 ... 590.55 inch)¹⁾ • 15 001 ... 20 000 mm (590.59 ... 787.40 inch)¹⁾ • 20 001 ... 25 000 mm (787.44 ... 984.25 inch)¹⁾ • 25 001 ... 30 000 mm (984.29 ... 1 181.10 inch)¹⁾ • 30 001 ... 35 000 mm (1 181.14 ... 1 377.95 inch)¹⁾ 	0 A 1 A 2 A 3 A 4 A 5 A	Enclosure/Cable inlet <u>Aluminum epoxy coated</u> 2 x 1/2" NPT, IP68 2 x M20x1.5 (IP68, adapter)	1 2 A B A B
Process connection (316L stainless steel) <u>Threaded connection</u> 2" NPT [(Taper), ANSI/ASME B1.20.1] R 2" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G 2" [(BSPP), EN ISO 228-1/PF (JIS-P) JIS B 0202] <u>Welded flange, raised face</u> 2", ASME, 150 lb 2", ASME, 300 lb 3", ASME, 150 lb ¹⁾ 3", ASME, 300 lb ¹⁾ 4", ASME, 150 lb ¹⁾ 4", ASME, 300 lb ¹⁾ 6", ASME, 150 lb ¹⁾ 6", ASME, 300 lb ¹⁾ <u>Welded flange, Type A flat faced</u> DN 50, PN 16 DN 50, PN 40 DN 80, PN 16 DN 80, PN 40 ¹⁾ DN 100, PN 16 ¹⁾ DN 100, PN 40 ¹⁾ DN 125, PN 16 ¹⁾ DN 125, PN 40 ¹⁾ (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1 standard.)	A 0 B 0 D 0 C 1 C 2 D 1 D 2 E 1 E 2 F 1 F 2 L 4 L 5 M 4 M 5 N 4 N 5 P 4 P 5	Options No additional options With mounting eye	A B
Approvals General Purpose: CE, CSA, FM, C-TICK, KC CSA / FM Class I, Div. 2, Groups A, B, C, D CSA / FM Class II, III, Div. 1, Groups E, F, G T4 ATEX II 3G 2D EEx nA [ib] IIC T6 ... T4 T 100 °C ATEX II 1/2 GD EEx d [ja] IIC T6 ... T1 T 100 °C FM Class I, Div. 1, Groups A, B, C, D T4	1 2 4 6	Thermal isolator Without thermal isolator Isolator, only for use when temperature range is outside of -40 ... +85 °C (-40 ... +185 °F), explosion proof approval -40 ... +70 °C (-40 ... +158 °F)	A B
		Electronic output 2-wire loop current 4 ... 20 mA (transmitter MSP 2002-2 _3300 pF)	1

- 1) Custom shipping methods required. Contact factory for more details.
- 2) A minimum span of 3 pF must be maintained.
- 3) See dimension drawings on page 4/331 for further explanation of Y01.
- 4) Inactive length is equal to the flexible extension plus transition. See dimension drawings on page 4/331 for further explanation of Y02.

4

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Insertion length, specify in plain text: Y01: to mm	Y01
Active shield length, specify in plain text [min. length is 50 mm (2 inch)]: Y02: to mm	Y02
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Operating Instructions	
English	7ML1998-5GE04
French	7ML1998-5GE12
Spanish	7ML1998-5GE21
German	7ML1998-5GE33
Note: The Operating Instructions should be ordered as a separate line item on the order.	
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	
Accessories	
<u>General Purpose</u>	
1/2" NPT General Purpose Cable Entry IP68/IP69K NEMA6, -40 ... -100 °C (-40 ... -212 °F), cable size 6 ... 12 mm (0.236 ... 0.472 inch)	7ML1830-1JA
M20x1.5 General Purpose Cable Entry IP68/IP69K NEMA6, -40 ... -100 °C (-40 ... -212 °F), cable size 7 ... 12 mm (0.275 ... 0.472 inch)	7ML1830-1JC
<u>Hazardous Locations</u>	
1/2" NPT EMC rated Cable Gland: Dust Ignition Proof, Flameproof Exd, and Increased Safety ATEX II 2 GD ExtD A21 (Zone 1, Zone 2, Zone 21, Zone 22, and in Gas Groups IIA, IIB and IIC) -60 ... +80 °C IP66, IP67, IP68, NEMA4X, cable sizes 5.5 ... 12 mm (0.216 ... 0.472 inch)	7ML1830-1JB
M20 EMC rated Cable Gland: Dust Ignition Proof, Flameproof Exd, and Increased Safety ATEX II 2 GD ExtD A21 (Zone 1, Zone 2, Zone 21, Zone 22 and in Gas Groups IIA, IIB and IIC) -60 ... +80 °C IP66, IP67, IP68, NEMA4X, cable sizes 5.5 ... 12 mm (0.216 ... 0.472 inch)	7ML1830-1JD
Transmitter, MSP 2002-1, 330 PF ¹⁾	7ML1830-1JP
Transmitter, MSP 2002-2, 3 300 PF ¹⁾	7ML1830-1JQ
Transmitter, MSP 2002-3, 6 600 PF (used with conductive fluids and probe lengths >10 000 mm) ¹⁾	7ML1830-1JR
SITRANS RD100 Remote display - see Chapter 7	
SITRANS RD200 Remote display - see Chapter 7	
SITRANS RD500 web, datalogging, alarming, ethernet, and modem support for instrumentation - see Chapter 7	7ML5750-1AA00-0

¹⁾ Transmitters not suitable for Intrinsically Safe application (ATEX II 1G EEx ia IIC T4 or CSA/FM Class 1 Div. 1 Groups A, B, C and D)

Please contact ceg.smpi@siemens.com for special requests.

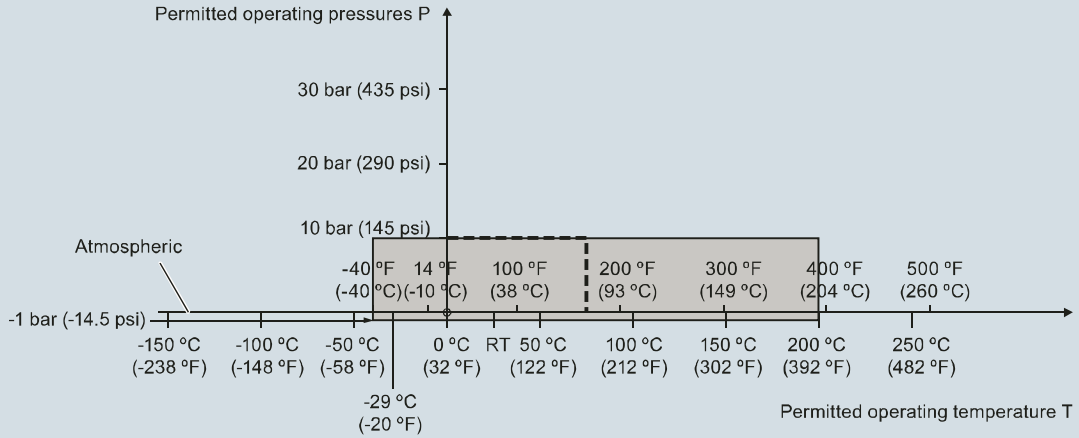
Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Characteristic curves

Pressure/temperature curve
LC500 cable probes
threaded process connections
(7ML5513)



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

SITRANS LC500 Process Pressure/Temperature derating curves (7ML5513)

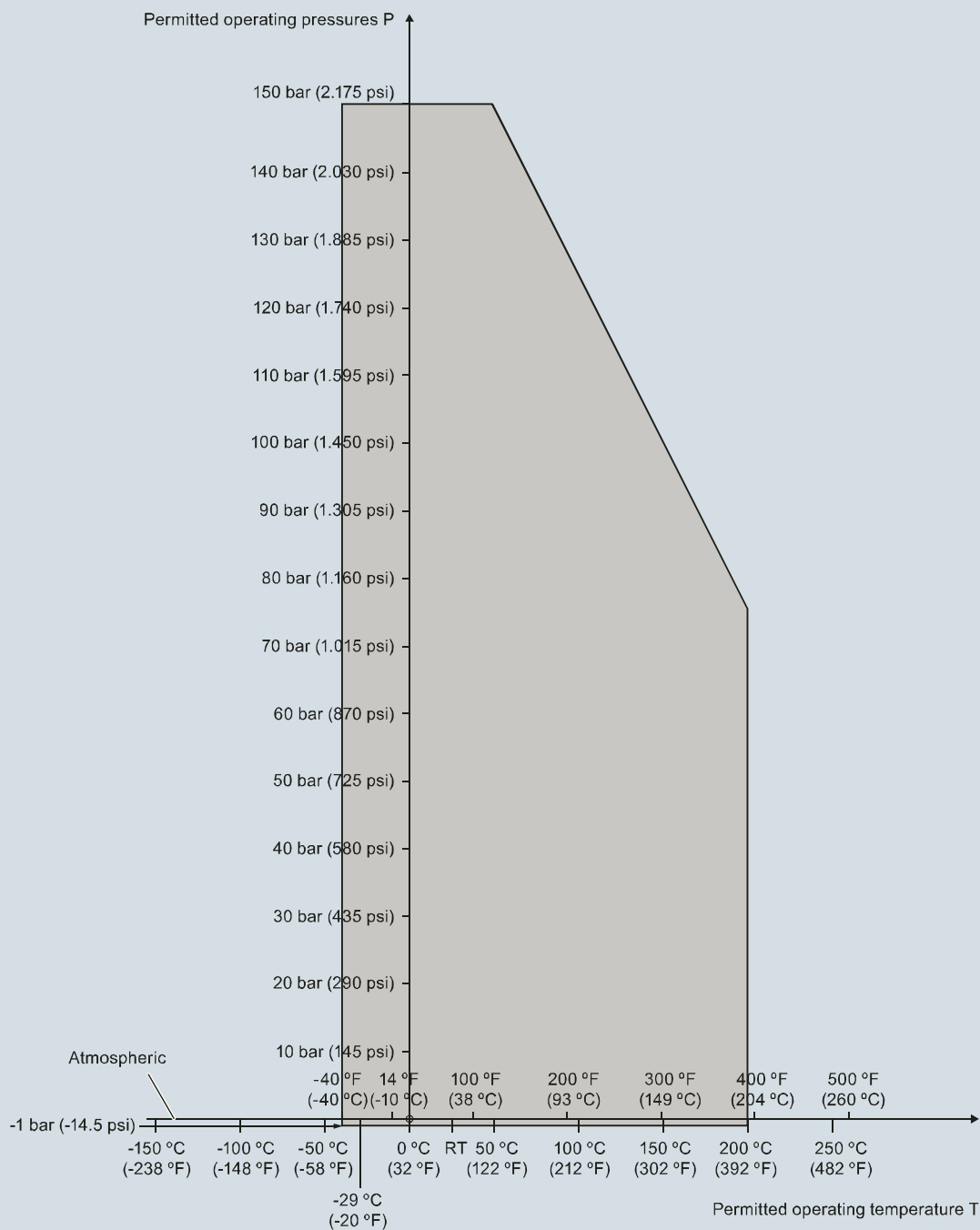
4

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Pressure/temperature curve
 LC500 PFA rod probes
 Threaded process connections
 (7ML5515)



SITRANS LC500 Process Pressure/Temperature derating curves (7ML5515)

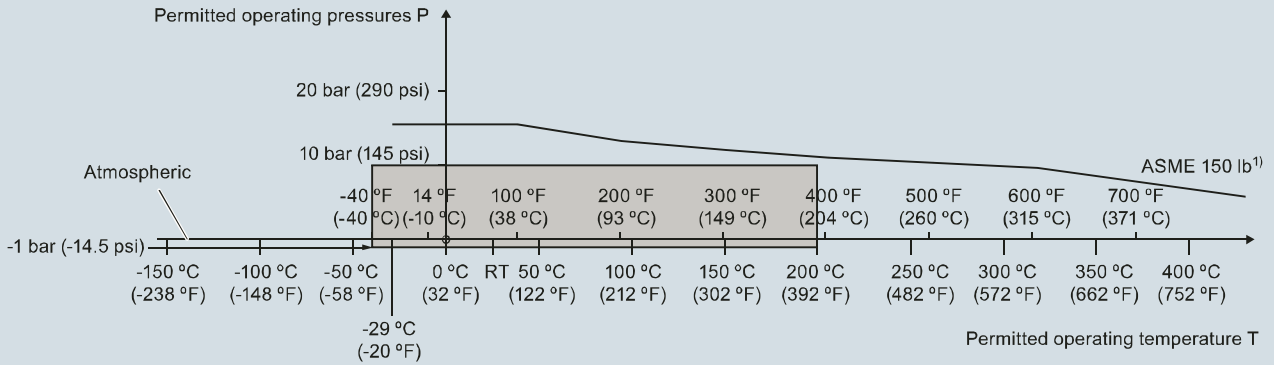
4

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Pressure/temperature curve
LC500 cable probes
ASME flanged process connections
(7ML5513)



1) The curve denotes the minimum allowable flange class for the shaded area below.

SITRANS LC500 Process Pressure/Temperature derating curves (7ML5513)

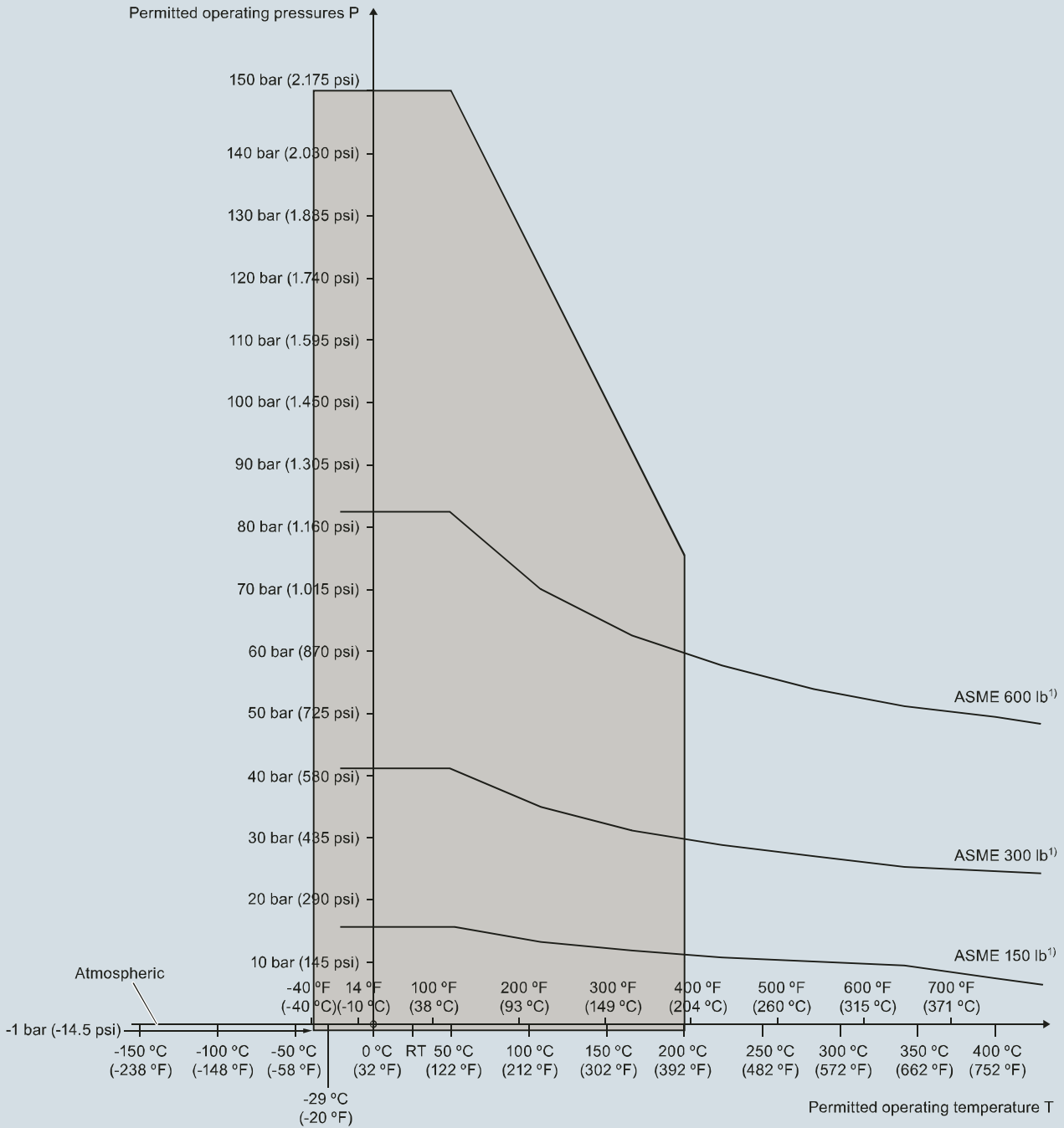
Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Pressure/temperature curve
 LC500 PFA rod probes
 ASME flanged process connections
 (7ML5515 and 7ML5517)

4



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

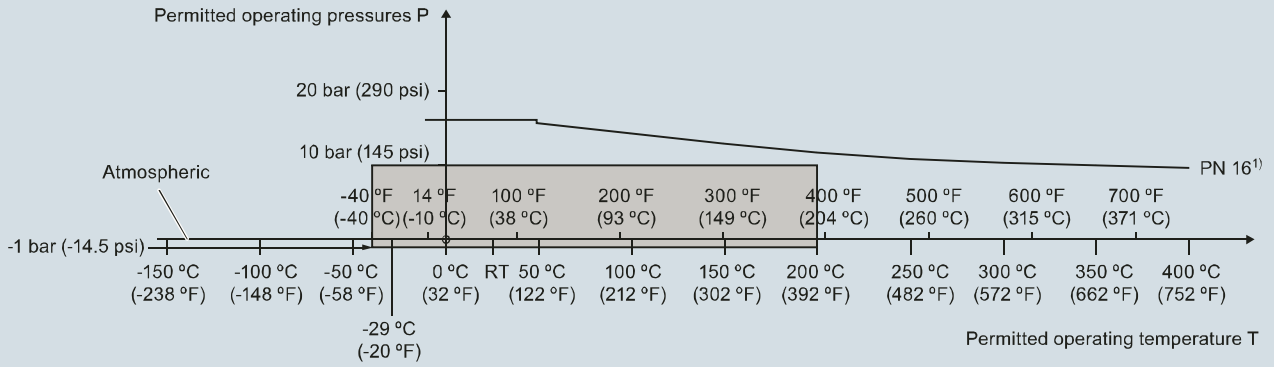
SITRANS LC500 Process Pressure/Temperature derating curves (7ML5515 and 7ML5517)

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Pressure/temperature curve
LC500 cable probes
EN flanged process connections
(7ML5513)



1) The curve denotes the minimum allowable flange class for the shaded area below.

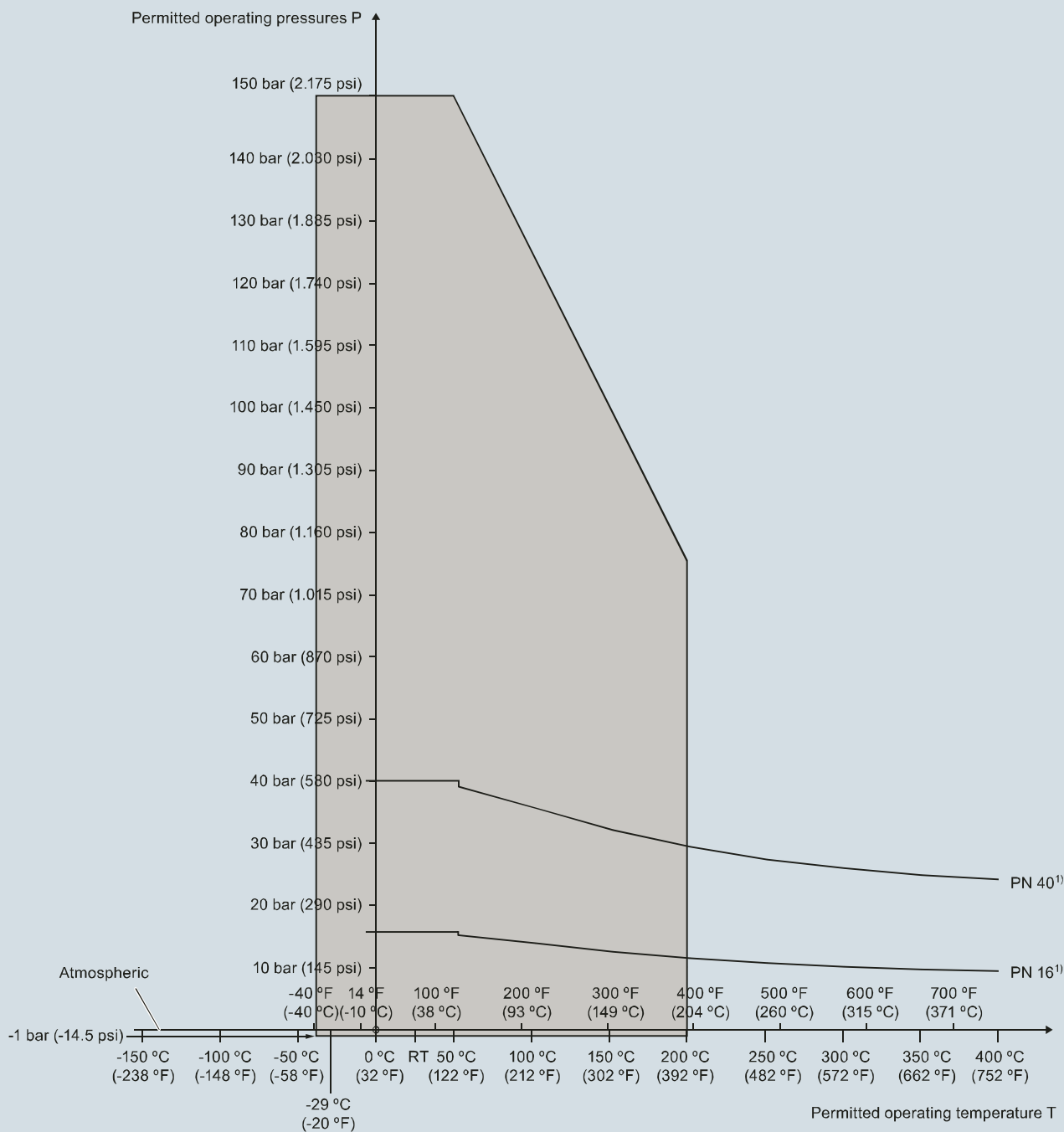
SITRANS LC500 Process Pressure/Temperature derating curves (7ML5513)

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Pressure/temperature curve
 LC500 PFA rod probes
 EN flanged process connections
 (7ML5515 and 7ML5517)



1) The curve denotes the minimum allowable flange class for the shaded area below.

SITRANS LC500 Process Pressure/Temperature derating curves (7ML5515 and 7ML5517)

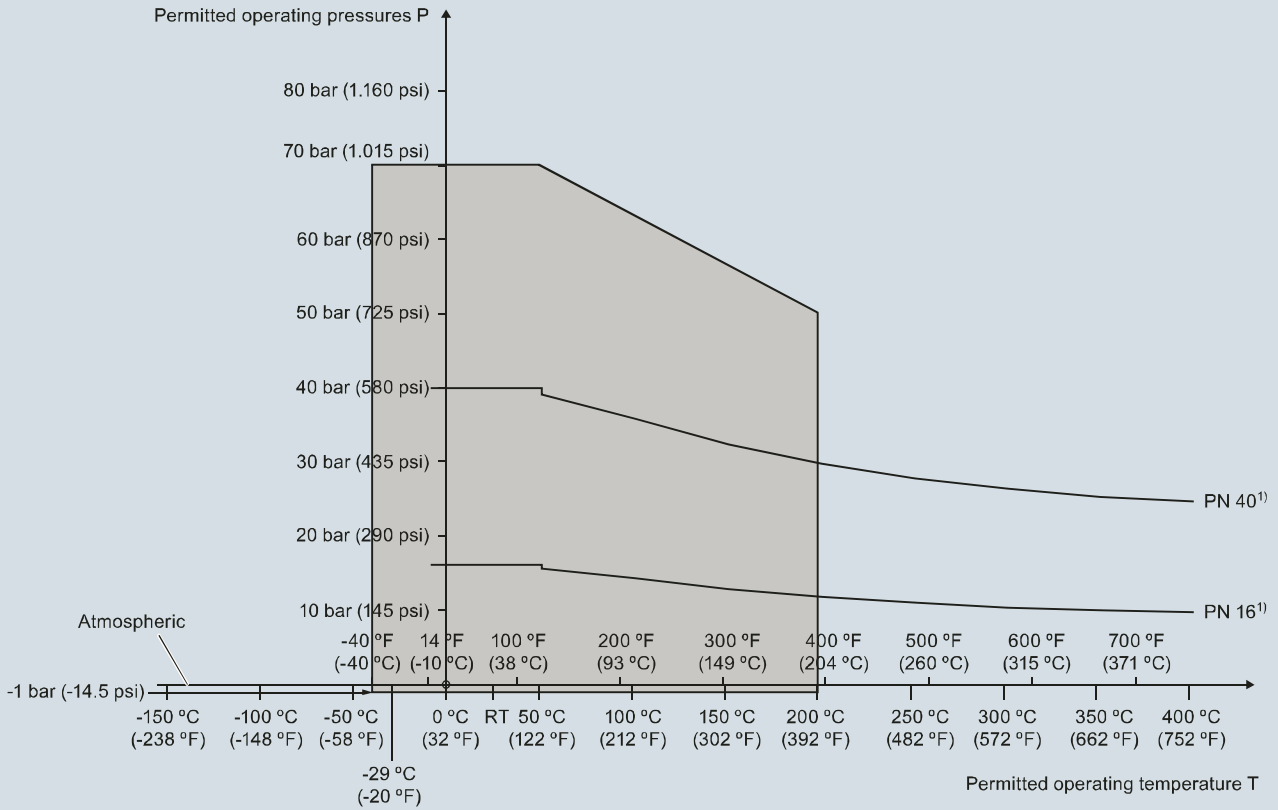
Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

4

Pressure/temperature curve
LC500 single piece flanged rod probes with PTFE facing
EN flanged process connections
(7ML5517)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

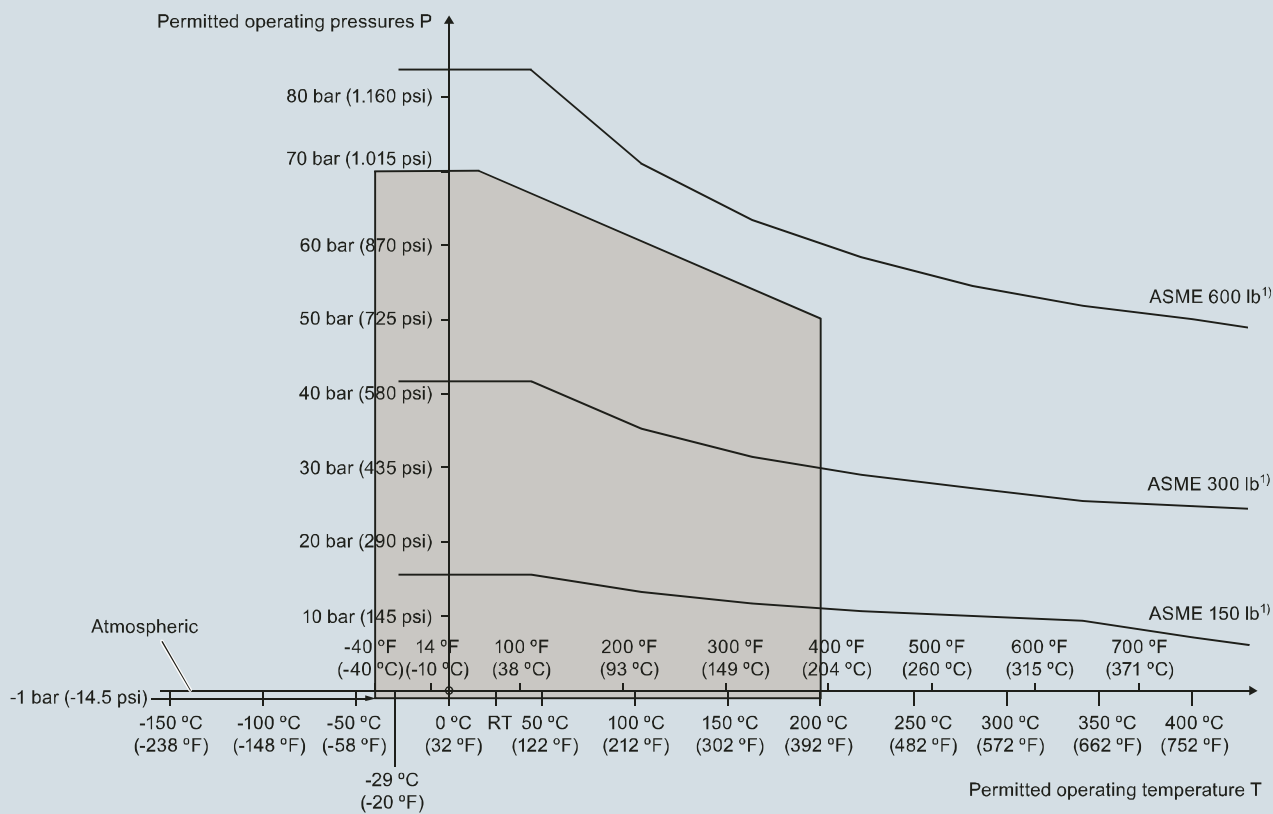
SITRANS LC500 Process Pressure/Temperature derating curves (7ML5517)

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Pressure/temperature curve
LC500 single piece flanged rod probes with PTFE facing
ASME flanged process connections
(7ML5517)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

SITRANS LC500 Process Pressure/Temperature derating curves (7ML5517)

4

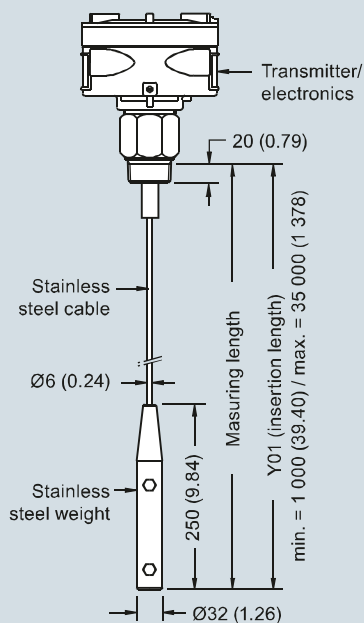
Level Measurement

Continuous level measurement – Capacitance transmitters

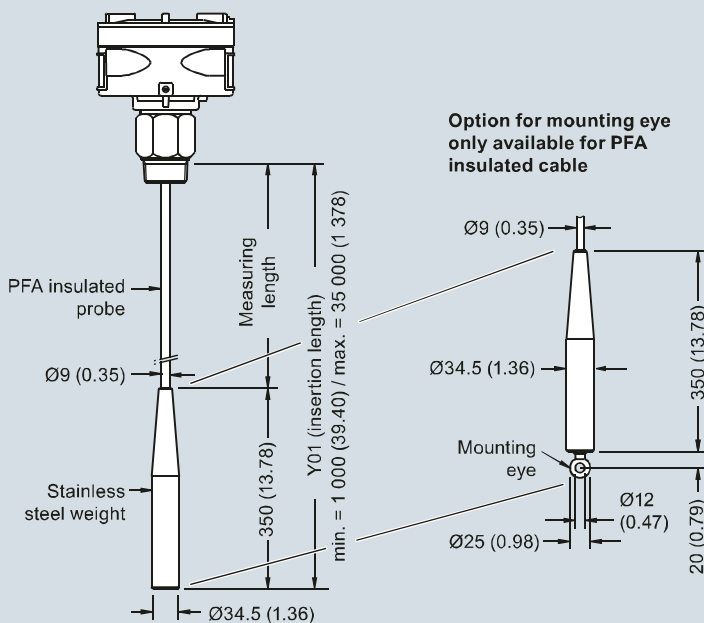
SITRANS LC500

Dimensional drawings

Cable version, non-insulated welded flange (7ML5513)

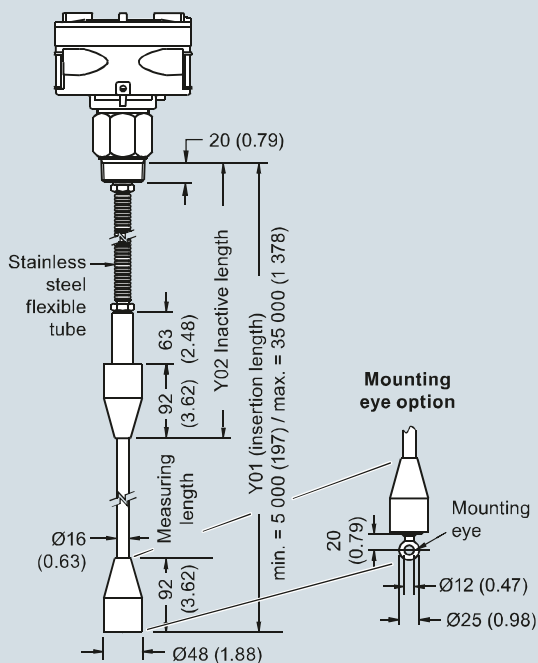


Cable version, insulated welded flange (7ML5513)

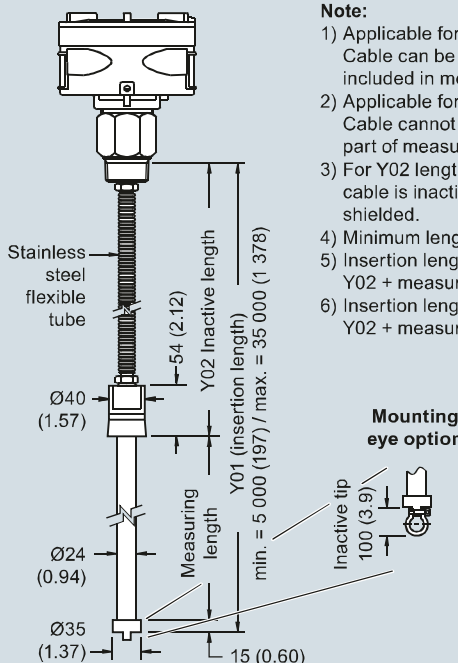


Option for mounting eye only available for PFA insulated cable

Extended cable version with rod sensor welded flange (7ML5523)



Extended cable version with rod sensor welded flange (7ML5523)



Note:

- 1) Applicable for non-conductive media only. Cable can be shortened on site. Weight is included in measuring length.
- 2) Applicable for both liquids and solids. Cable cannot be shortened. Weight is **not** part of measuring length.
- 3) For Y02 lengths greater than 5 000 (197), cable is inactive and is **not** actively shielded.
- 4) Minimum length = 200 (7.87)
- 5) Insertion length Y01 = Y02 + measuring length + 92 (3.62)
- 6) Insertion length Y01 = Y02 + measuring length + 15 (0.59)

SITRANS LC500 - Cable Versions, dimensions in mm (inch)

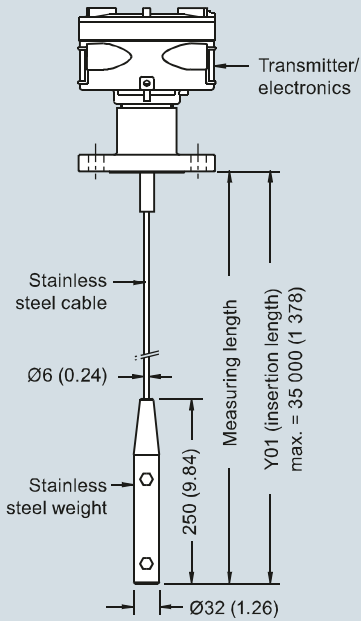
Level Measurement

Continuous level measurement – Capacitance transmitters

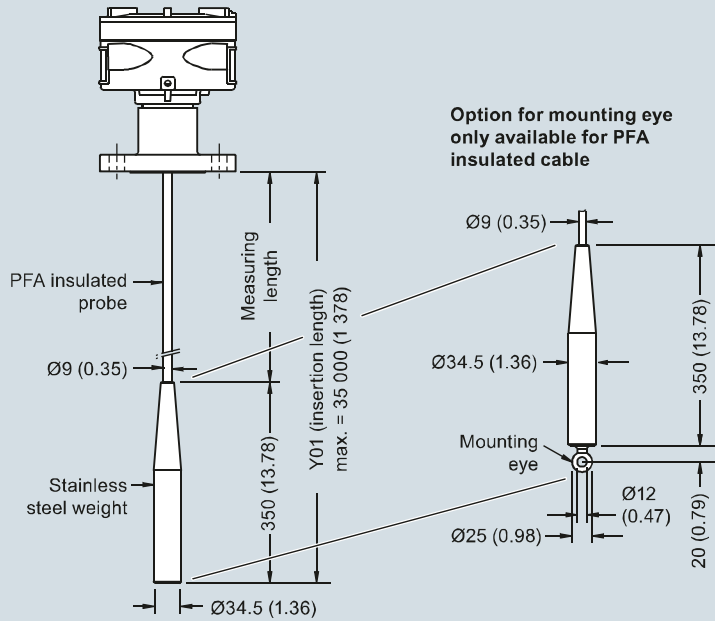
SITRANS LC500

4

Cable version, non-insulated¹⁾
Welded flange (7ML5513)

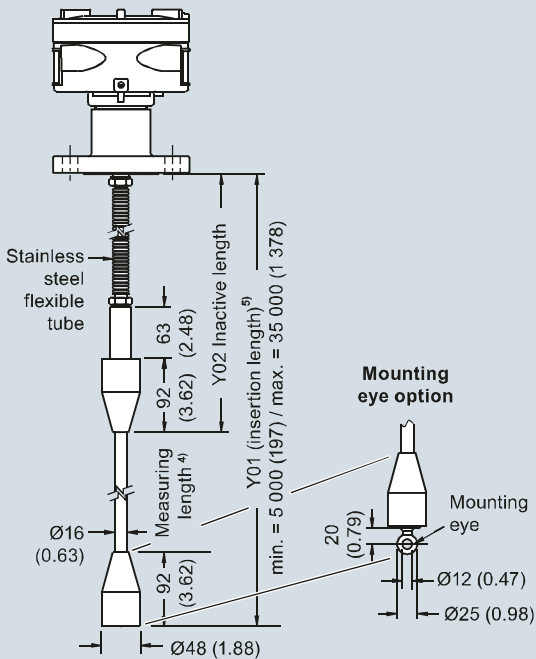


Cable version, insulated²⁾
Welded flange (7ML5513)

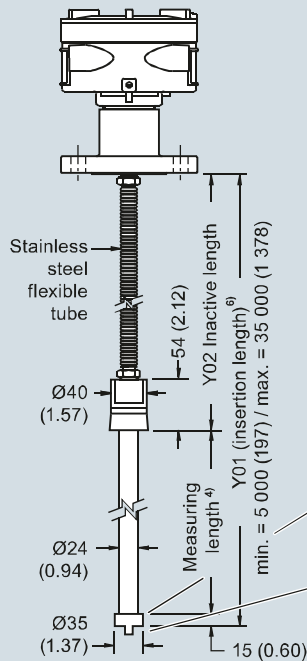


Option for mounting eye
only available for PFA
insulated cable

Extended cable version with rod sensor³⁾
Welded flange (7ML5523)



Extended cable version with rod sensor³⁾
Welded flange (7ML5523)



Note:

- 1) Applicable for non-conductive media only. Cable can be shortened on site. Weight is included in measuring length.
- 2) Applicable for both liquids and solids. Cable cannot be shortened. Weight is **not** part of measuring length.
- 3) For Y02 lengths greater than 5 000 mm (197 inch), cable is inactive and is **not** actively shielded.
- 4) Minimum length = 200 mm (7.87 inch)
- 5) Insertion length Y01 = Y02 + measuring length + 92 mm (3.62 inch)
- 6) Insertion length Y01 = Y02 + measuring length + 15 mm (0.59 inch)

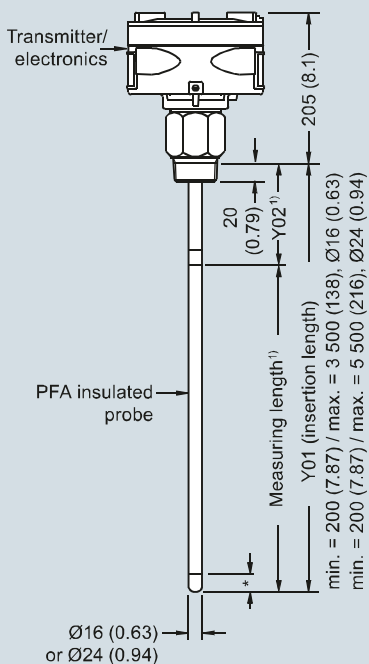
SITRANS LC500 - Cable Versions, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Rod version threaded (7ML5515)

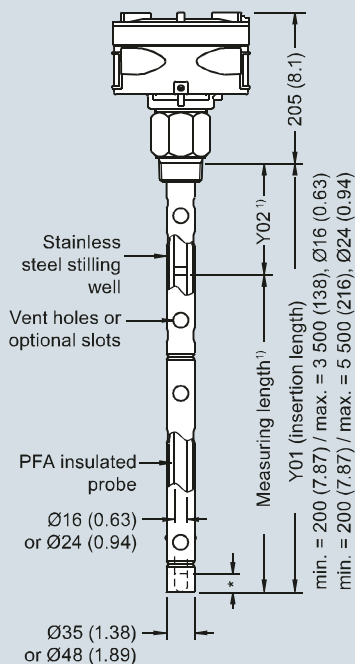


* = 30 (1.18) inactive tip

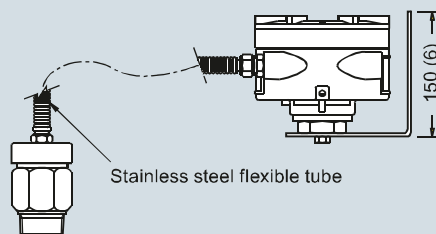
Note:

- 1) Minimum Y02 (active shield length) = 50 (1.96), minimum measuring length = 200 (7.87)

Rod version with stilling well threaded (7ML5515)

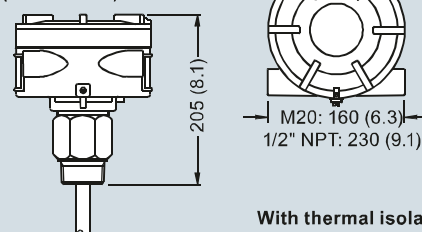


Remote electronics with mounting bracket option threaded (7ML5515)

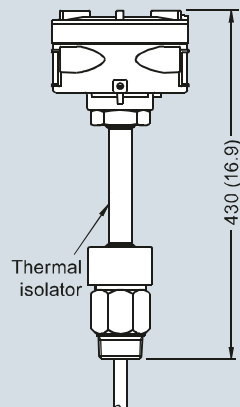


General purpose approval only.

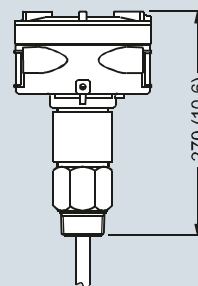
Standard configuration (all versions)



With thermal isolator option (all versions)



With explosion-proof seal option (all versions)



SITRANS LC500 - Rod Versions, dimensions in mm (inch)

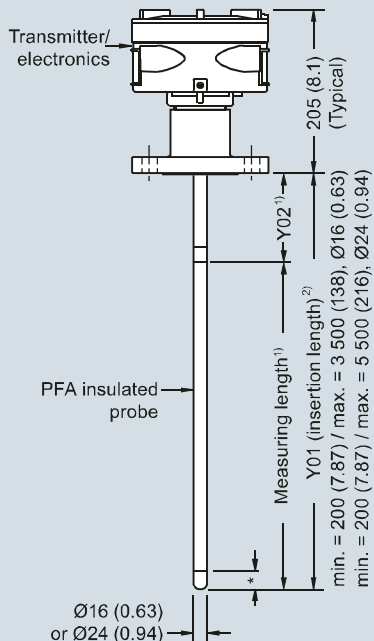
Level Measurement

Continuous level measurement – Capacitance transmitters

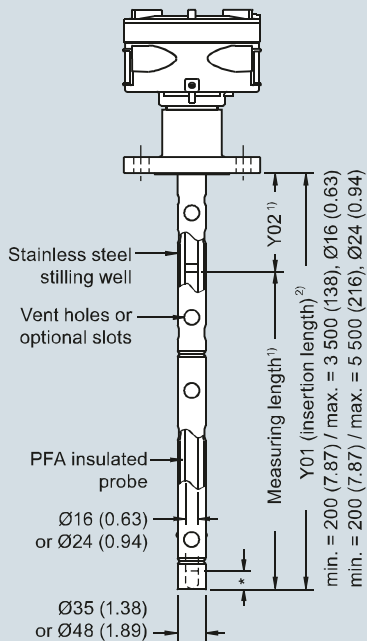
SITRANS LC500

4

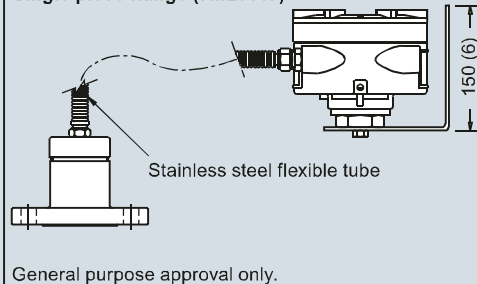
Rod version
Welded flange (7ML5515)
Single piece flange (7ML5517)



Rod version with stilling well
Welded flange (7ML5515)
Single piece flange (7ML5517)

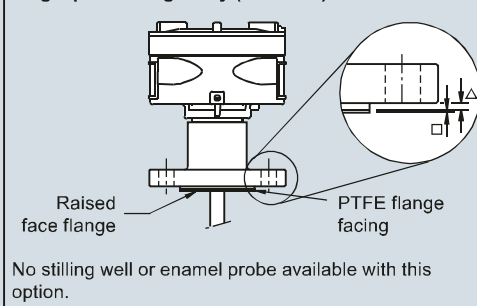


Remote electronics with mounting bracket option
Welded flange (7ML5515)
Single piece flange (7ML5517)

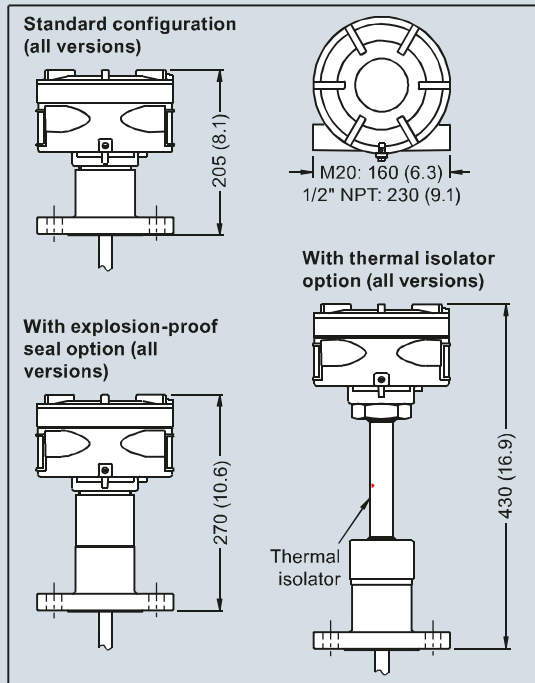


General purpose approval only.

PTFE flange facing option
single piece flange only (7ML5517)



* = 30 (1.18) inactive tip



Flange facing (raised face)	
Flange class	Facing thickness
△ ASME 150/300	2 (0.08)
△ ASME 600/900	7 (0.28)
△ PN16/25/40/64	2 (0.08)
□ PTFE facing (additional)	2 (0.08)

Notes:

- 1) Minimum Y02 (active shield length) = 50 (1.96), minimum measuring length = 200 (7.87)
- 2) Insertion length does not include any raised face/gasket face dimension (see Flange Facing table above).

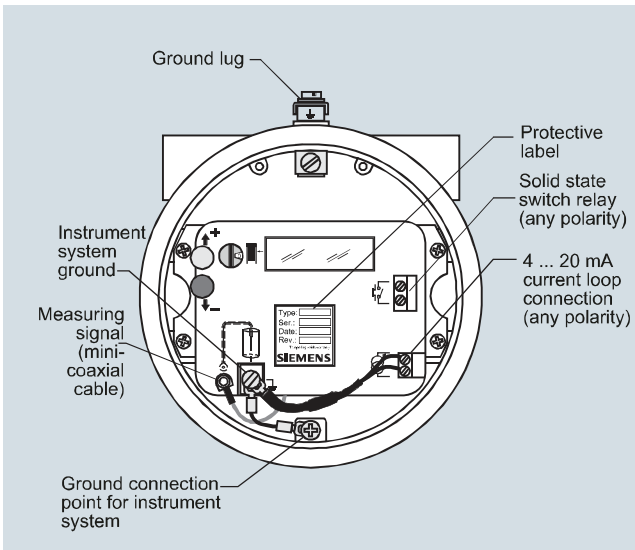
SITRANS LC500 - Rod Versions, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Schematics



SITRANS LC500 connections