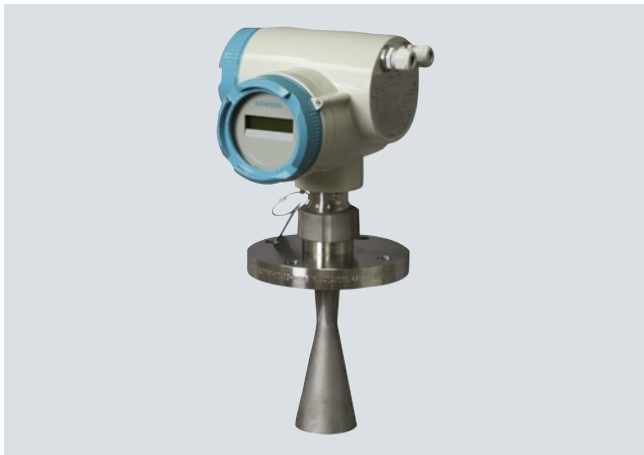


Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

Overview



The SITRANS LR400 is a 4-wire, 24 GHz FMCW radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and high pressure, to a range of 50 m (164 ft); ideal for low dielectric media.

Application

It provides excellent results on low dielectric media.

SITRANS LR400 is available for standard applications and for applications that require explosion proof protection.

SITRANS LR400 features robust enclosure, flange and horn components. It is virtually unaffected by atmospheric or temperature conditions within the vessel.

Safe on-site local programming is simple using the Intrinsically Safe handheld programmer. SIMATIC PDM can be used for easy remote programming.

The characteristics of 24 GHz and high signal-to-noise ratio contribute to exceptional signal reflection, regardless of the dielectric value of the medium.

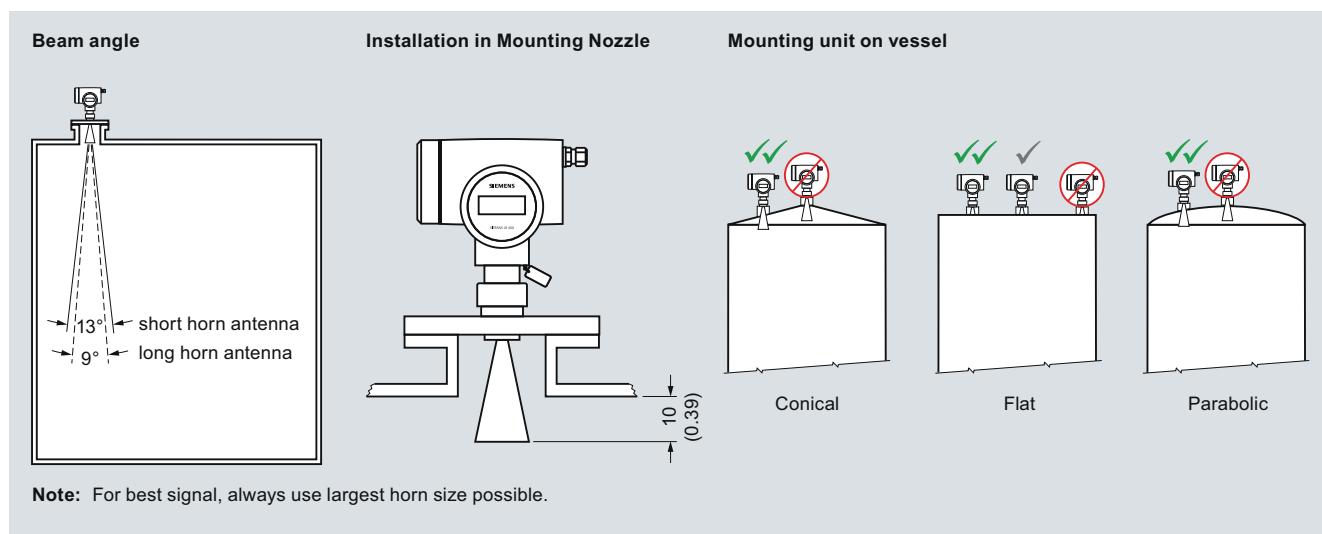
- Key applications: long-range liquid or slurry applications, high temperature or high pressure, low dielectric media, such as LPG (liquid, petroleum, gas)

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Benefits

- Easy installation and commissioning, low maintenance
- Self-calibration with internal reference
- Built-in diagnostics
- Auto False-Echo Suppression and advanced echo processing
- 24 GHz and high signal-to-noise ratio
- Communication using HART or PROFIBUS PA
- Programming using infrared Intrinsically Safe handheld programmer or with SIMATIC PDM or HART handheld device

Configuration



SITRANS LR400 installation, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

Technical specifications

Mode of operation	
Measuring principle	FMCW radar level measurement
Frequency	24 ... 25 GHz FMCW
Measuring range	0.35 ... 50 m (1.15 ... 164 ft)
Output	
Analog output (HART)	
• Signal range	Optically isolated 4 ... 20 mA
• Load	Max. 600 Ω (330 Ω for [ia] versions, Area classification options G, L, P, S)
• Relay	NC or NO function, max. DC 50 V, max. 200 mA, rating 5 W
Communication	HART, optional PROFIBUS PA
PROFIBUS PA protocol	Layer 1 and 2, Class A, Profile 3.0
Performance (Reference conditions)	
Dead band	0 ... 350 mm from bottom edge of flange
Error in measurement at 25 °C (77 °F)	≤ 5 mm from 2 ... 10 m ≤ 15 mm from 10 ... 50 m
• Repeatability	≤ 1 mm
• Fail-safe	mA signal programmable as high, low or hold (LOE)
Rated operating conditions	
Amb. temperature for enclosure	-40 ... +65 °C (-40 ... +149 °F)
Location	Indoor/outdoor
Installation category	II
Pollution degree	4
Medium conditions	
Dielectric constant	$\epsilon_r > 1.4$
Process temperature range	
• Standard	-40 ... +200 °C (-40 ... +392 °F) -20 ... +200 °C (-4 ... +392 °F) for SITRANS LR400 with ATEX rating
• With optional temperature extension	-40 ... +250 °C (-40 ... +482 °F)
Vessel Pressure	Up to 40 bar g (process connection dependent)
Design	
Weight	Approx. 12.2 kg (26.8 lb) with 3" 150 psi flange
Materials	
• Enclosure	Die-cast aluminum, painted
• Degree of protection	IP67/Type 4X/NEMA 4X, Type 6/NEMA 6
• Cable inlet	2x M20x1.5 or ½" NPT
• Process connections	
• Flat faced flanges	316L stainless steel, 80, 100, 150 mm, bolt holes matching EN 1092-1 and JIS B 2220
• Raised face flanges	316L stainless steel, 3", 4", 6", bolt holes matching ASME B 16.5

Programming	
Intrinsically Safe Siemens handheld programmer (ordered separately)	Infrared receiver
• Approvals for handheld programmer	IS model with ATEX EEx ia IIC T4, CSA/FM Class I, Div. 1, Groups A, B, C, D T6 at max. ambient temperature of 40 °C (104 °F)
Handheld communicator	HART communicator 375
PC	SIMATIC PDM
Display (local)	Alphanumeric LCD for readout and entry
Power supply	
	100 ... 230 V AC ± 15% (50/60 Hz), 6 W (12 VA) or 24 V DC +25/-20%, 6 W (optional)
Certificates and approvals	
Safety	CSA _{US/C} , CE, FM, C-TICK
Shipping	• Lloyd's Register of Shipping • ABS
Radio	Europe (R&TTE, CETECOM), Industry Canada, FCC, C-TICK
Hazardous areas	ATEX II 1/2 G EEx dem [ia] IIC T6 ATEX II 1/2 G EEx dem IIC T6 CSA/FM Class I, Div. 1, Groups B, C, D; Class II, Div. 1, Groups E, F, G; Class III T6, INMETRO
Optional equipment	
	Purging (self-cleaning) system PTFE dust cover

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

Selection and Ordering data	Order No.
SITRANS LR400	L) 7ML5421-
4-wire, 24 GHz FMCW radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and high pressure, to a range of 50 m (164 ft); ideal for low dielectric media.	
Order handheld programmer separately!	
Process temperature range	
-40 °C ... +200 °C (-40 ... +392 °F), standard	0
-40 °C ... +250 °C (-40 ... +482 °F), high temperature extension	1
Process connection	
Universal flange 3"/80 mm ¹⁾	A
Universal flange 4"/100 mm ¹⁾	B
Universal flange 6"/150 mm ¹⁾	D
DN 80, PN 16, Type A, flat faced	S
DN 80, PN 40, Type B1, raised face	C
DN 100, PN 16, Type A, flat faced	T
DN 100, PN 40, Type B1, raised face	G
DN 150, PN 16, Type A, flat faced	U
3" ASME, 150 lb, raised face	E
3" ASME, 300 lb, raised face	F
4" ASME, 150 lb, raised face	J
4" ASME, 300 lb, raised face	K
6" ASME, 150 lb, raised face	N
JIS, DN 80 10K	Q
JIS, DN 100 10K	R
JIS, DN 150 10K	V
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2220 standard.)	
Antenna	
Horn antenna, long 93 mm (3.66 inch) diam. for 100 mm (4 inch) nozzles	D
Horn antenna, short 74 mm (2.91 inch) diam. for 80 mm (3 inch) nozzles	K
Antenna purging system	
None	0
Purging system	1
Note: Available with process connections A, B or D, and for area classifications A or B only	
Process seal/gasket	
PTFE for -40 ... +250 °C (-40 ... +482 °F) flange temperatures	1
FKM for -20 ... +200 °C (-4 ... +392 °F) flange temperatures ²⁾	3
Output/communication	
4 ... 20 mA, HART	0
PROFIBUS PA	1
Power supply/cable inlet	
100 ... 230 V AC	
• 2 x M20x1,5	B
• 2 x ½" NPT	C
24 V DC	
• 2 x M20x1,5	E
• 2 x ½" NPT	F
Area classification	
General Purpose, CSAUS/C, Industry Canada, FCC, CE and R&TTE	B
ATEX II 2G EEx d IIC T6; CE, R&TTE	E
ATEX II 2G EEx dem IIC T6; CE, R&TTE	F
ATEX II 2G EEx dem [ia] IIC T6; CE, R&TTE ³⁾	G
ATEX II 1/2 GD EEx d IIC T6; CE, R&TTE ²⁾	J
ATEX II 1/2 GD EEx dem IIC T6; CE, R&TTE ²⁾	K
ATEX II 1/2 GD EEx dem [ia] IIC T6; CE, R&TTE ²⁾³⁾	L

Selection and Ordering data	Order No.
SITRANS LR400	L) 7ML5421-
4-wire, 24 GHz FMCW radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and high pressure, to a range of 50 m (164 ft); ideal for low dielectric media.	
Order handheld programmer separately!	
FM Class I, Div. 1, Groups B, C, D; Class II/III, Div. 1, Groups E, F, G; FCC ²⁾	D) T
CSA Class I, Div. 1, Groups B, C, D; Class II/III, Div. 1, Groups E, F, G; FCC ²⁾	D) U
Local operation	
Local Display Only. Handheld programmer not included (Order programmer separately.)	2
1) Available with antenna purging system option 1 only, universal, 0.5 bar g (7.25 psi g) maximum	
2) Available with process temperature range option 0 only	
3) Available only with power supply option E or F	
D) Subject to export regulations AL: N, ECCN: EAR99H.	
L) Subject to export regulations AL: N, ECCN: 3A991X.	

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Order No. and specify Order code(s).	
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]; Measuring-point number/identification (max. 16 characters); specify in plain text	Y15
Test certificate: 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	C) 7ML1998-5FH06
German	C) 7ML1998-5FH36
French	C) 7ML1998-5FH16
Spanish	C) 7ML1998-5FH22
Note: The Operating Instructions should be ordered as a separate line item on the order.	
Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	C) 7ML1998-5QN83
Accessories	
Handheld programmer Intrinsically Safe, EEx ia	7ML5830-2AJ
Long horn dust cover, PTFE	7ML1930-1AH
Short horn dust cover, PTFE	7ML1930-1AJ
HART modem/RS-232 (for use with a PC and SIMATIC PDM)	D) 7MF4997-1DA
HART modem/USB (for use with a PC and SIMATIC PDM)	D) 7MF4997-1DB
One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART ¹⁾	7ML1930-1AP
One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA ¹⁾	7ML1930-1AQ
SITRANS RD100 Remote display - see Chapter 8	
SITRANS RD200 Remote display - see Chapter 8	
SITRANS RD500 web, datalogging, alarming, ethernet, and modem support for instrumentation - see Chapter 8	K) 7ML5750- 1AA00-0

¹⁾ Product shipped with plastic cable gland, rated to -20 °C.
If -40 °C rating required, then metallic cable gland is recommended.

C) Subject to export regulations AL: N, ECCN: EAR99.

D) Subject to export regulations AL: N, ECCN: EAR99H.

K) Subject to export regulations AL: N, ECCN: 5A991X.

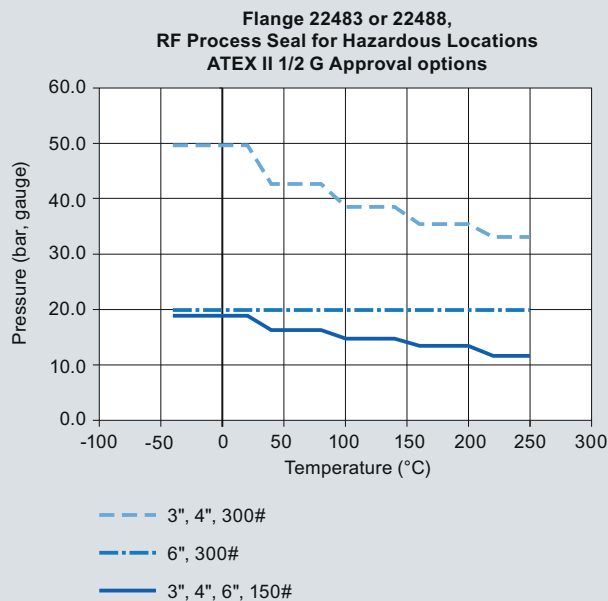
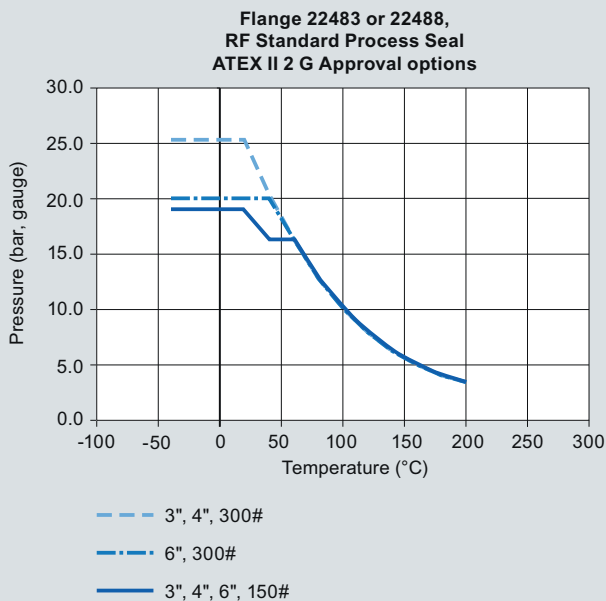
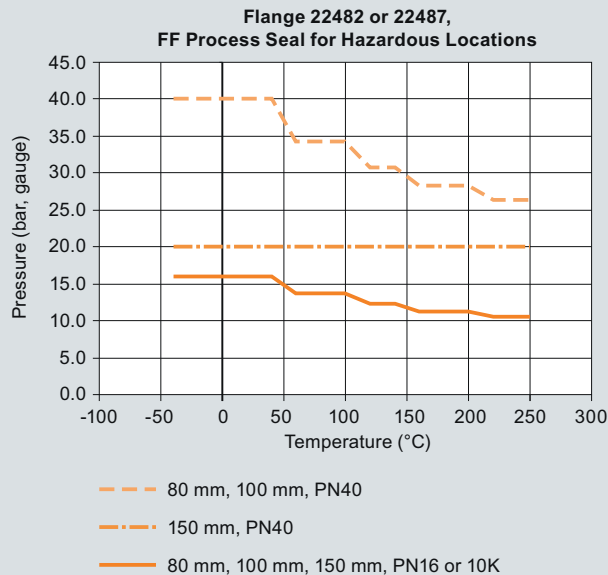
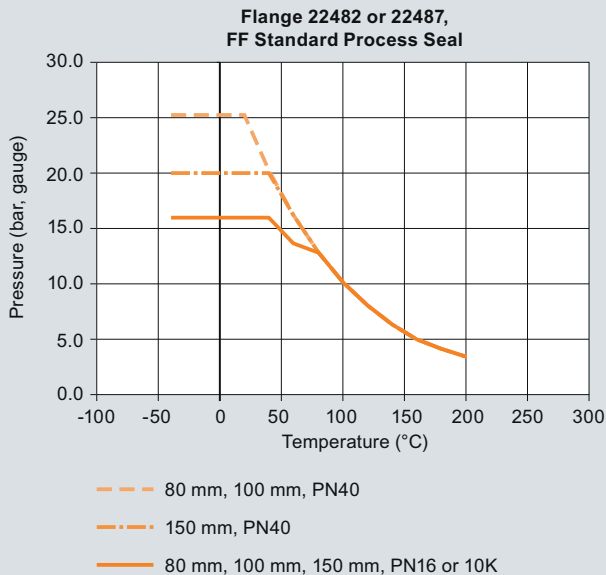
Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

Characteristic curves

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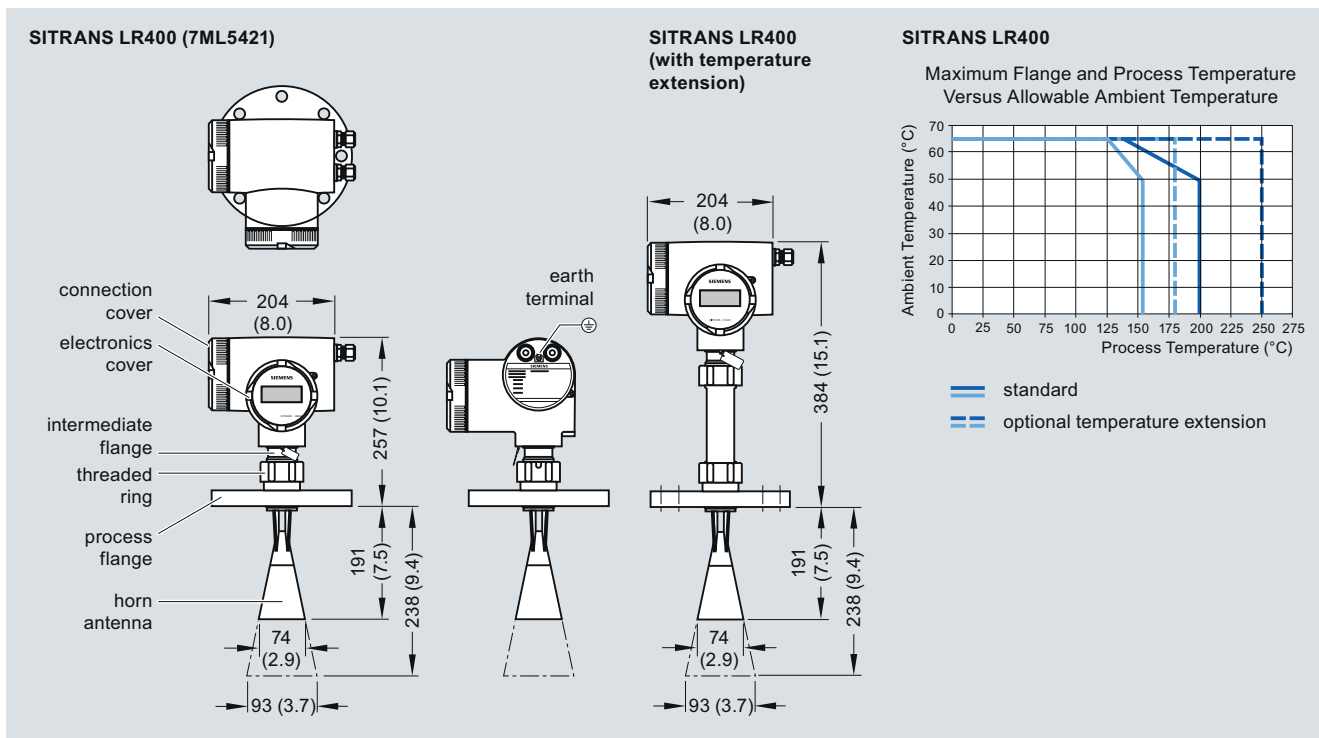
SITRANS LR400 Process Pressure/Temperature derating curves

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

Dimensional drawings



SITRANS LR400, dimensions in mm (inch)

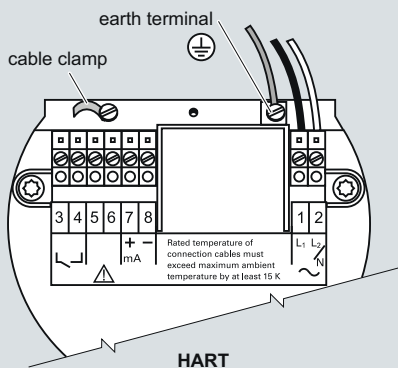
Level Measurement

Continuous level measurement – Radar transmitters

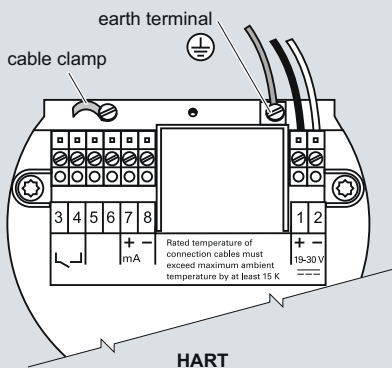
SITRANS LR400

Schematics

AC version



DC version

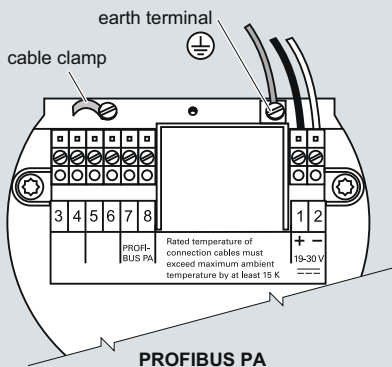
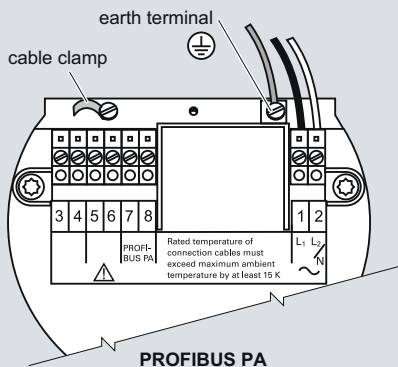


Hand Programmer



SITRANS LR400
Part number:
7ML5830-2AJ

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Notes

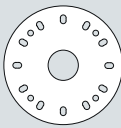
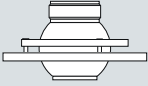


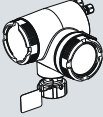
- recommended torque on terminal clamping screws, 0.5 ... 0.6 Nm
- 4 ... 20 mA, Profibus PA, DC input circuits, 14-20 AWG, shielded copper wire
- AC input circuit, min. 14 AWG copper wire
- all field wiring must have insulation suitable for at least 250 V
- the equipment must be protected by a 15 A fuse or circuit breaker in the building installation

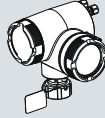
SITRANS LR400 connections

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400 Specials

SITRANS LR400 Specials		Order No.
3"/80 mm Universal Flange, without horn or hub. See note 1.	PBD-51035813	
4"/100 mm Universal Flange, without horn or hub. See note 1.	PBD-51035814	
6"/150 mm Universal Flange, without horn or hub. See note 1.	PBD-51035815	
8"/200 mm Universal Flange, without horn or hub. See note 1.	PBD-51035816	
Purging kit with Easy Aimer ball, no flange, no horn. See note 1.	PBD-51036110	
Purging kit with Easy Aimer ball with 4"/100 mm flange, no horn. See note 1.	PBD-51035810	
Purging kit with Easy Aimer ball with 6"/150 mm flange, no horn. See note 1.	PBD-51035811	
Purging Kit with Easy Aimer ball with 8"/200 mm flange, no horn. See note 1.	PBD-51035812	
Short horn antenna, no emitter supplied	PBD-22475K1A	
Long horn antenna, no emitter supplied	PBD-22475K2A	
Short horn antenna, purged, no emitter supplied	PBD-22475K3A	
Long horn antenna, purged, no emitter supplied	PBD-22475K4A	
Replacement display module, SITRANS LR400 Liquids and Solids versions	PBD-51035410	
4" extension kit for horn antenna with General Purpose approvals	PBD-51035474	
8" extension kit for horn antenna with General Purpose approvals	PBD-51035473	
8" extension kit for horn antenna for hazardous units	PBD-51036180	
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, HART communication, and GP, CE, and CETECOM approvals. L)	PBD-51036479	

SITRANS LR400 Specials		Order No.
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, PROFIBUS PA communication and GP, CE, and CETECOM approvals. L)	PBD-51036480	
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, HART communication and GP, CE, CSA, Industry Canada, FCC and R&TTE. L)	PBD-51035867	
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, PROFIBUS PA communication and GP, CE, CSA, Industry Canada, FCC and R&TTE. L)	PBD-51035871	
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, PROFIBUS PA communication and ATEX II 1/2 GD EEx d IIC T6, CE and R&TTE approvals. L)	PBD-51035873	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, HART communication and GP, CE and CETECOM approvals. L)	PBD-51036481	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, PROFIBUS PA communication and GP, CE and CETECOM approvals. L)	PBD-51036482	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, HART communication and GP, CE, CSA, Industry Canada, FCC and R&TTE. L)	PBD-51036483	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, PROFIBUS PA communication and GP, CE, CSA, Industry Canada, FCC and R&TTE. L)	PBD-51036484	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, HART communication and ATEX II 1/2 GD EEx d IIC T6, CE and R&TTE approvals. L)	PBD-51036485	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, PROFIBUS PA communication and ATEX II 1/2 GD EEx d IIC T6, CE and R&TTE approvals. L)	PBD-51036486	

- 1) Available with no pressure rating and with General Purpose approvals only
 2) Subject to export regulations AL: N, ECCN: 3A991X.
 Please contact ceg.smpi@siemens.com for special requests.
 L) Subject to export regulations AL: N, ECCN: 3A991X.