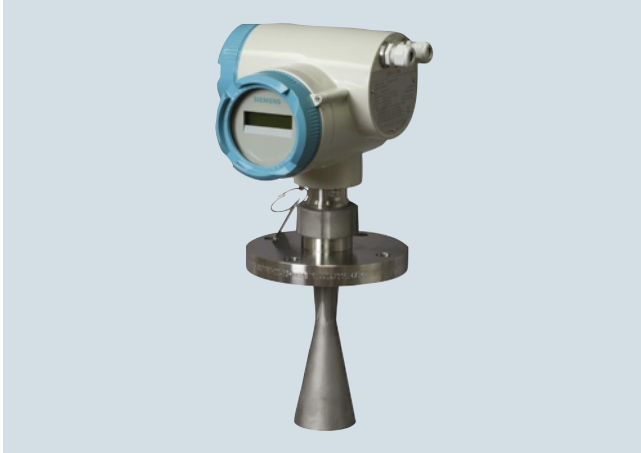




Overview



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.

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

Application

It provides excellent results on low dielectric media.

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

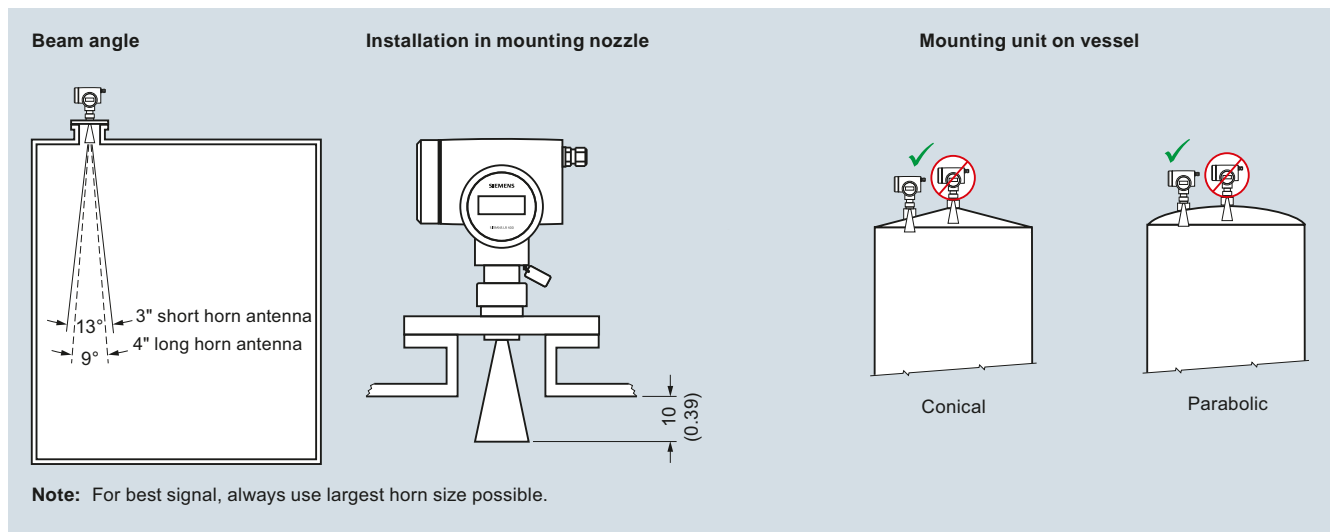
SITRANS LR400 features robust enclosure, flange and horn components. It is virtually unaffected by atmospheric or temperature conditions within the vessel.

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 [up to 250 °C (480 °F)] or high pressure, low dielectric media, such as LPG (liquid, petroleum, gas) without the need for stilling pipes

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)	Optically isolated 4 ... 20 mA Max. 600 Ω (330 Ω for [ia] versions, Area classification options G, L, P, S)
• Signal range	
• Load	
• 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	-40 ... +200 °C (-40 ... +392 °F) -20 ... +200 °C (-4 ... +392 °F) for SITRANS LR400 with ATEX rating
• Standard	
• 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 inch 150 psi flange
Materials	Die-cast aluminum, painted IP67/Type 4X/NEMA 4X, Type 6/NEMA 6 2x M20x1.5 or ½" NPT
• Enclosure	
• Degree of protection	
• Cable inlet	
Process connections	316L stainless steel, 80, 100, 150 mm, bolt holes matching EN 1092-1 and JIS B 2220
• Flat faced flanges	
• Raised face flanges	316L stainless steel, 3 inch, 4 inch, 6 inch, 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	INMETRO
• Flame Proof/Increased Safety (Brazil)	
• Explosion Proof (Canada/USA)	CSA/FM Class I, Div. 1, Groups B, C, D; Class II, Div. 1, Groups E, F, G; Class III T6 ATEX II 1/2 G EEx dem IIC T6
• Flame Proof/Increased Safety (Europe)	
• Flame Proof/Increased Safety with Intrinsically Safe output(Europe)	ATEX II 1/2 G EEx dem [ia] IIC T6

Optional equipment

Purging (self-cleaning) system
PTFE dust cover

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS LR400	7ML5421-	SITRANS LR400	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.		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		Order handheld programmer separately	
Process temperature range		Approvals	
-40 °C ... +200 °C (-40 ... +392 °F), standard	0	General Purpose, CSA _{US/IC} , Industry Canada, FCC, CE and R&TTE	B
-40 °C ... +250 °C (-40 ... +482 °F), high temperature extension	1	ATEX II 2G EEx d IIC T6; CE, R&TTE; INMETRO Ex d IIC T6	E
Process connection		ATEX II 2G EEx dem IIC T6; CE, R&TTE; INMETRO Ex de mb II T6	F
Universal flange 3 inch/80 mm ¹⁾	A	ATEX II 2G EEx dem [ia] IIC T6; CE, R&TTE; INMETRO Ex de [ia] mb IIC T6 ³⁾	G
Universal flange 4 inch/100 mm ¹⁾	B	ATEX II 1/2 GD EEx d IIC T6; CE, R&TTE; INMETRO Ex d IIC T6 ²⁾	J
Universal flange 6 inch/150 mm ¹⁾	D	ATEX II 1/2 GD EEx dem IIC T6; CE, R&TTE; INMETRO Ex de mb IIC T6 ²⁾	K
DN 80, PN 16, Type A, flat faced	S	ATEX II 1/2 GD EEx dem [ia] II T6; CE, R&TTE; INMETRO Ex de [ia] mb IIC T6 ²⁾³⁾	L
DN 80, PN 40, Type B1, raised face	C	FM Class I, Div. 1, Groups B, C, D; Class II/III, Div. 1, Groups E, F, G; FCC ²⁾	T
DN 100, PN 16, Type A, flat faced	T	CSA Class I, Div. 1, Groups B, C, D; Class II/III, Div. 1, Groups E, F, G; FCC ²⁾	U
DN 100, PN 40, Type B1, raised face	G		
DN 150, PN 16, Type A, flat faced	U	Local operation	
3" ASME, 150 lb, raised face	E	Local Display Only. Handheld programmer not included (Order programmer separately)	2
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 B or D, and for area classification 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		

- 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

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
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	7ML1998-5FH06
German	7ML1998-5FH36
French	7ML1998-5FH16
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 DVD containing the ATEX Quick Start and Operating Instructions library.	A5E32007509
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)	7MF4997-1DA
HART modem/USB (for use with a PC and SIMATIC PDM)	7MF4997-1DB
One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART (two required) ¹⁾	7ML1930-1AP
One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA (two required) ¹⁾	7ML1930-1AQ
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
For applicable back up point level switch - see point level section on page 4/9	

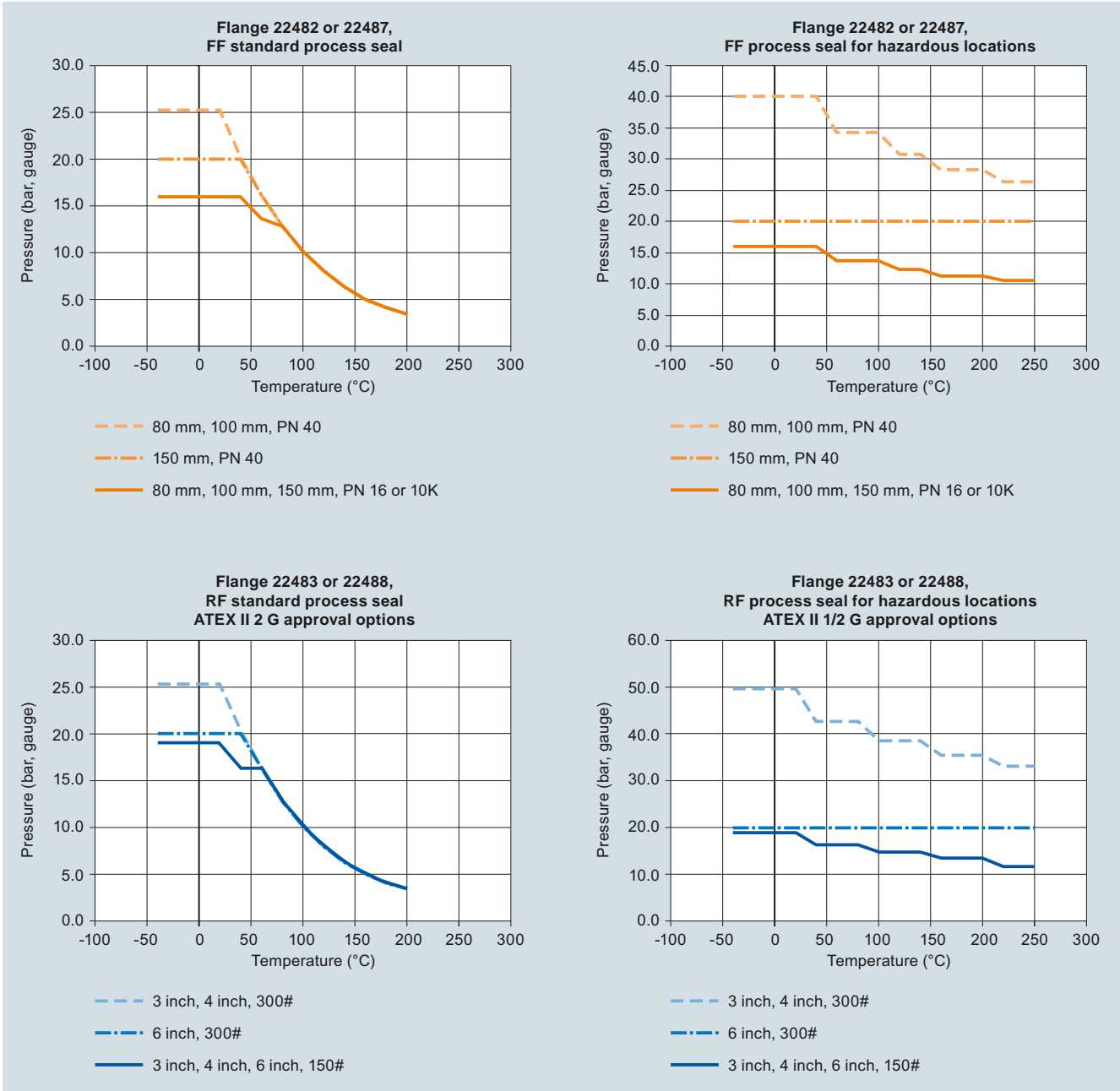
¹⁾ Product shipped with plastic cable gland, rated to -20 °C.
If -40 °C rating required, then metallic cable gland is recommended.

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

Characteristic curves



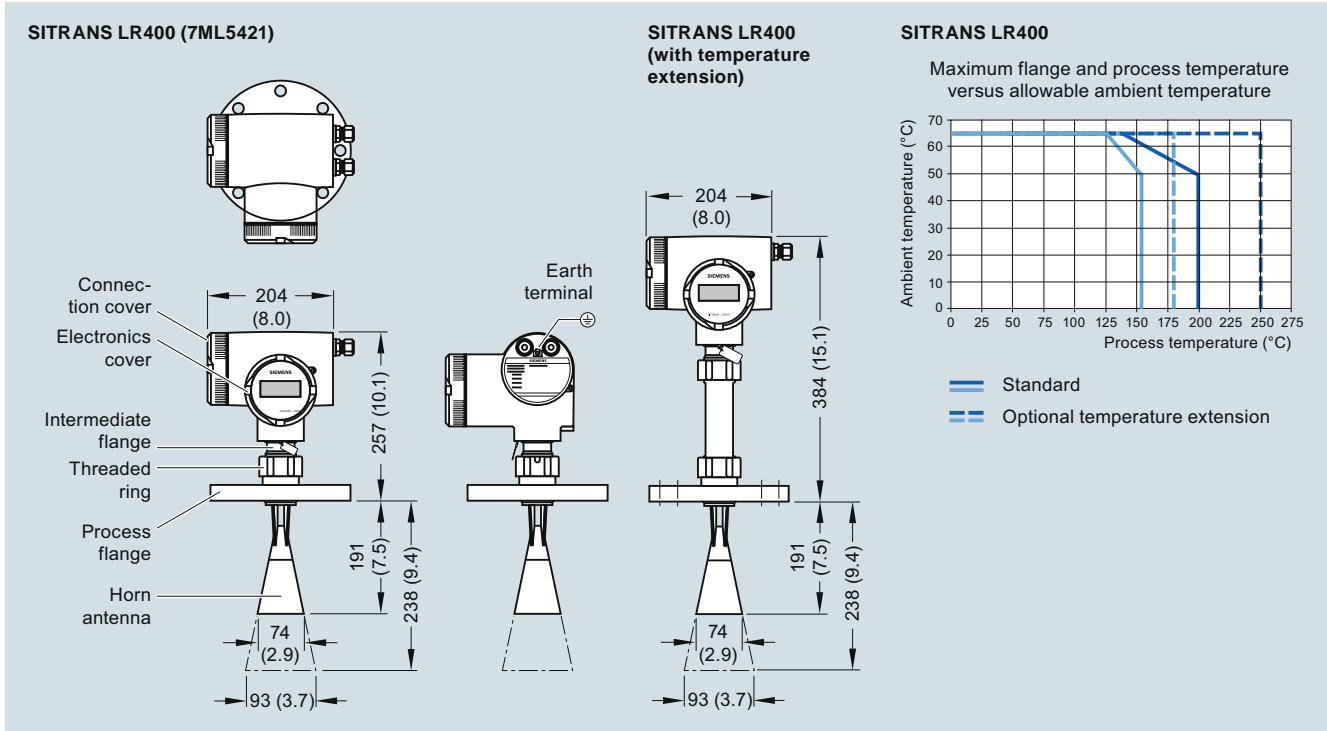
SITRANS LR400 Process Pressure/Temperature derating curves

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

Dimensional drawings



SITRANS LR400, dimensions in mm (inch)

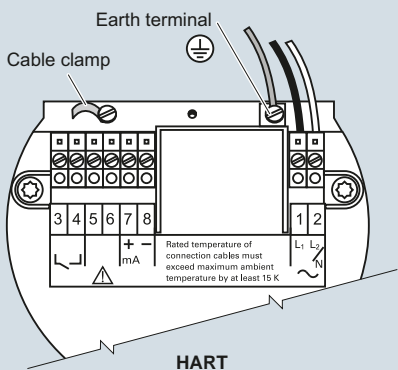
Level Measurement

Continuous level measurement – Radar transmitters

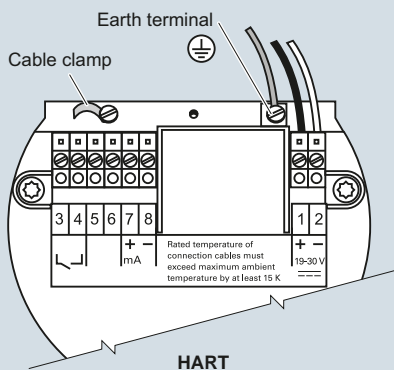
SITRANS LR400

Schematics

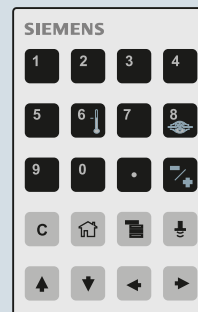
AC version



DC version

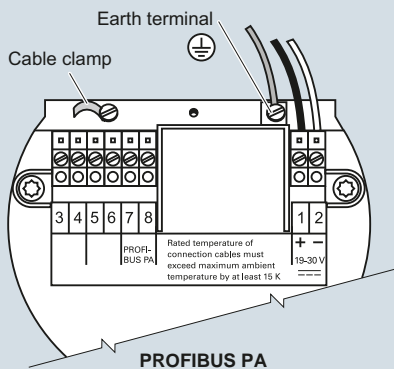
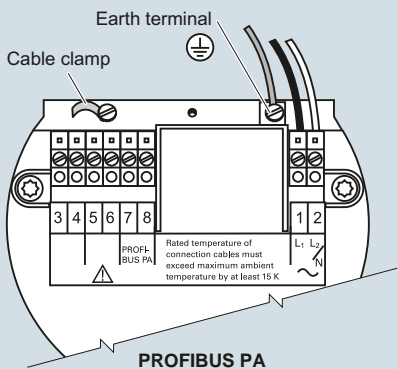


Hand programmer



SITRANS LR400

Part number:
7ML5830-2AJ



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

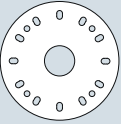
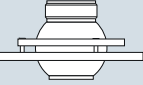
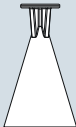
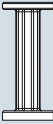
SITRANS LR400 connections

Level Measurement

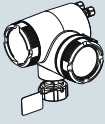
Continuous level measurement – Radar transmitters

SITRANS LR400 Specials

SITRANS LR400 Specials

	Article No.	
3 inch/80 mm Universal Flange, without horn or hub. ¹⁾	PBD: 51035813	
4 inch/100 mm Universal Flange, without horn or hub. ¹⁾	PBD: 51035814	
6 inch/150 mm Universal Flange, without horn or hub. ¹⁾	PBD: 51035815	
8 inch/200 mm Universal Flange, without horn or hub. ¹⁾	PBD: 51035816	
Purging kit with Easy Aimer ball, no flange, no horn. ¹⁾	PBD: 51036110	
Purging kit with Easy Aimer ball with 4 inch/100 mm flange, no horn. ¹⁾	PBD: 51035810	
Purging kit with Easy Aimer ball with 6 inch/150 mm flange, no horn. ¹⁾	PBD: 51035811	
Purging Kit with Easy Aimer ball with 8 inch/200 mm flange, no horn. 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 Specials

	Article No.	
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, HART communication, and GP, CE, and CETECOM approvals.	PBD: 51036479	
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, PROFIBUS PA communication and GP, CE, and CETECOM approvals.	PBD: 51036480	
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, HART communication and GP, CE, CSA, Industry Canada, FCC and R&TTE.	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.	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.	PBD: 51035873	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, HART communication and GP, CE and CETECOM approvals.	PBD: 51036481	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, PROFIBUS PA communication and GP, CE and CETECOM approvals.	PBD: 51036482	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, HART communication and GP, CE, CSA, Industry Canada, FCC and R&TTE.	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.	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.	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.	PBD: 51036486	

¹⁾ Available with no pressure rating and with General Purpose approvals only