

Level instruments

Continuous level measurement - Radar transmitters

SITRANS LR400

Overview

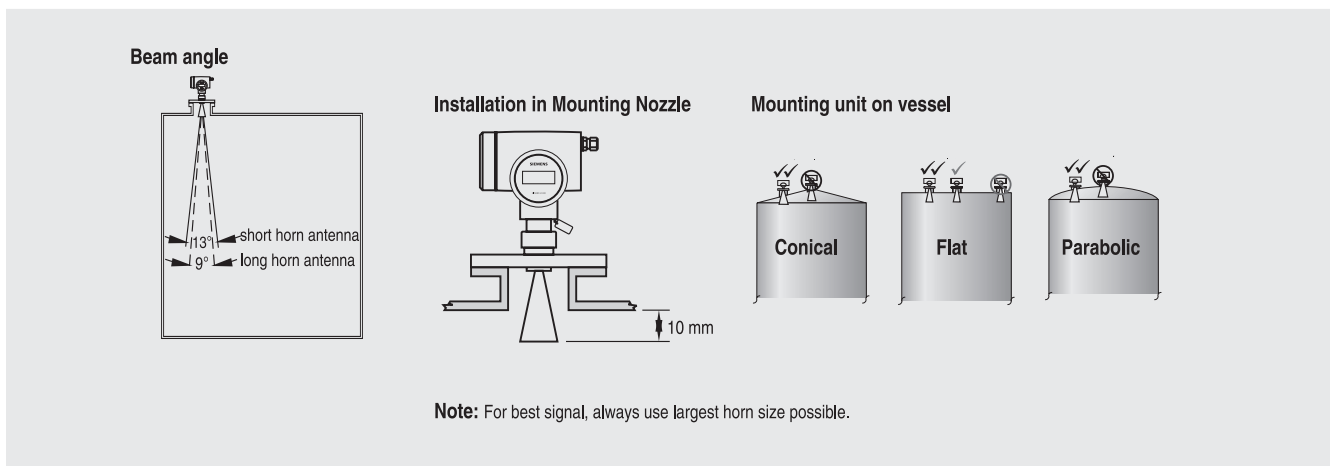


The SITRANS LR400 is a 4-wire, 24 GHz FMCW radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and high pressure, to a range of 50 m (164 ft); ideal for low dielectric media.

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

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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Technical specifications

Mode of operation		Programming	
Measuring principle	FMCW radar level measurement	Intrinsically Safe Siemens handheld programmer (ordered separately)	Infrared receiver
Frequency	24 to 25 GHz FMCW	<ul style="list-style-type: none"> Approvals for handheld programmer 	IS model with ATEX EEx ia IIC T4, CSA/FM Class I, Div. 1, Groups A, B, C, D T6 @ max. ambient temperature of +40 °C (+104 °F)
Measuring range	0.35 to 50 m (1.15 to 164 ft)		
Output		Handheld communicator	HART communicator 375
Analog output (HART®)		PC	SIMATIC PDM
<ul style="list-style-type: none"> Signal range Load 	Optically isolated 4 to 20 mA Max. 600 Ω (330 Ω for [ia] versions, Area classification options G, L, P, S)	Display (local)	Alphanumeric LCD for readout and entry
<ul style="list-style-type: none"> Relay 	NC or NO function, max. DC 50 V, max. 200 mA, rating 5 W	Power supply	
Communication	HART, optional PROFIBUS PA	100 to 230 V AC ± 15% (50/60 Hz), 6 W (12 VA)	
PROFIBUS PA protocol	Layer 1 and 2, Class A, Profile 3.0	or 24 V DC +25/-20%, 6 W (optional)	
Performance (Reference conditions)		Certificates and approvals	
<ul style="list-style-type: none"> Dead band Error in measurement at +25 °C (+77 °F) - Repeatability - Fail-safe 	0 to 350 mm from bottom edge of flange ≤ 5 mm from 2 to 10 m ≤ 15 mm from 10 to 50 m ≤ 1 mm mA signal programmable as high, low or hold (LOE)	<ul style="list-style-type: none"> Safety Shipping Radio Hazardous areas 	CSA _{US/C} , CE, FM, C-TICK <ul style="list-style-type: none"> Lloyd's Register of Shipping ABS Europe (R&TTE, CETECOM), Industry Canada, FCC, C-TICK 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
Rated operating conditions		Optional equipment	
<ul style="list-style-type: none"> Amb. temperature for enclosure Location Installation category Pollution degree 	-40 to +65 °C (-40 to +149 °F) Indoor/outdoor II 4	Purging (self-cleaning) system PTFE dust cover	
Medium conditions			
Dielectric constant	$\epsilon_r > 1.4$		
Process temperature range			
<ul style="list-style-type: none"> Standard With optional temperature extension 	-40 to +200 °C (-40 to +392 °F) -20 to +200 °C (-4 to +392 °F) for SITRANS LR400 with ATEX rating -40 to +250 °C (-40 to +482 °F)		
Vessel Pressure	Up to 40 bar g (process connection dependent)		
Design			
Weight	Approx. 12.2 kg (26.8 lbs) with 3" 150 psi flange		
Materials			
<ul style="list-style-type: none"> Enclosure Degree of protection Cable inlet 	Die-cast aluminum, painted IP67/Type 4X/NEMA 4X, Type 6/NEMA 6 2x M20x1.5 or ½" NPT		
Process connections			
<ul style="list-style-type: none"> Flat faced flanges Raised face flanges 	316L stainless steel, 80, 100, 150 mm, bolt holes matching EN 1092-1 and JIS B 2220 316L stainless steel, 3", 4", 6", bolt holes matching ASME B 16.5		

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Selection and Ordering data	Order No.	Selection and Ordering data	Order No.
SITRANS LR400	L) 7ML5421-	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.		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		ATEX II 2G EEx d IIC T6; CE, CETECOM ³⁾	M
-40 °C to +200 °C (-40 to +392 °F), standard	0	ATEX II 2G EEx dem IIC T6; CE, CETECOM ³⁾	N
-40 °C to +250 °C (-40 to +482 °F), high temperature extension	1	ATEX II 2G EEx dem [ia] IIC T6; CE, CETECOM ^{2) 4)}	P
Process connection		ATEX II 1/2 GD EEx d IIC T6; CE, CETECOM ^{2) 3)}	Q
Universal flange 3"/80 mm ¹⁾	A	ATEX II 1/2 GD EEx dem IIC T6; CE, CETECOM ^{2) 3)}	R
Universal flange 4"/100 mm ¹⁾	B	ATEX II 1/2 GD EEx dem [ia] IIC T6; CE, CETECOM ^{2) 3) 4)}	S
Universal flange 6"/150 mm ¹⁾	D	FM Class I, Div. 1, Groups B, C, D; Class II/III, Div. 1, Groups E, F, G; FCC ²⁾	T
DN 80, PN 16, Type A, flat faced	S	CSA Class I, Div. 1, Groups B, C, D; Class II/III, Div. 1, Groups E, F, G; FCC ²⁾	U
DN 80, PN 40, Type B1, raised face	C		
DN 100, PN 16, Type A, flat faced	T	Local operation	
DN 100, PN 40, Type B1, raised face	G	Local Display Only. Handheld programmer not included (Order programmer separately.)	2
DN 150, PN 16, Type A, flat faced	U	Further designs	Order code
3" ASME, 150 lb, raised face	E	Please add "Z" to Order No. and specify Order code(s).	
3" ASME, 300 lb, raised face	F	Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000	C11
4" ASME, 150 lb, raised face	J	Inspection Certificate Type 3.1 per EN 10204	C12
4" ASME, 300 lb, raised face	K	Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters); specify in plain text	Y15
6" ASME, 150 lb, raised face	N	Instruction manual	Order No.
JIS, DN 80 10K	Q	English	C) 7ML1998-5FH06
JIS, DN 100 10K	R	German	C) 7ML1998-5FH36
JIS, DN 150 10K	V	French	C) 7ML1998-5FH15
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2220 standard.)		Spanish	C) 7ML1998-5FH22
Antenna		Multi-language Quick start manual	C) 7ML1998-5QN83
Horn antenna, long 93 mm (3.66") diam. for 100 mm (4") nozzles	D	This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and instruction manual library.	
Horn antenna, short 74 mm (2.91") diam. for 80 mm (3") nozzles	K	Accessories	
Antenna purging system		Handheld programmer Intrinsically Safe, EEx ia	7ML5830-2AJ
None	0	Long horn dust cover, PTFE	7ML1930-1AH
Purging system	1	Short horn dust cover, PTFE	7ML1930-1AJ
Note: Available with process connections A, B or D, only, and available for Area Classifications A or B only		HART modem/RS-232 (for use with a PC and SIMATIC PDM)	D) 7MF4997-1DA
Process seal/gasket		HART modem/USB (for use with a PC and SIMATIC PDM)	D) 7MF4997-1DB
PTFE for -40 to +250 °C (-40 to +482 °F) flange temperatures	1	One metallic cable gland M20x1.5, rated -40 to +80 °C (-40 to +176 °F) for General Purpose or ATEX EEx e installations (available for HART only)	7ML1930-1AP
FKM for -20 to +200 °C (-4 to +392 °F) flange temperatures ²⁾	3	One metallic cable gland M20x1.5, rated -40 to +80 °C (-40 to +176 °F) with integrated shield connection (available for PROFIBUS PA)	7ML1930-1AQ
Output/communication		SITRANS RD100 Remote display - see RD100 on page 5/304	
4 to 20 mA, HART	0	SITRANS RD200 Remote display - see RD200 on page 5/306	
PROFIBUS PA	1		
Power supply/cable inlet			
100 to 230 V AC			
• 2 x M20x1.5	B		
• 2 x 1/2" NPT	C		
24 V DC			
• 2 x M20x1.5	E		
• 2 x 1/2" NPT	F		
Area classification			
General Purpose, CE, CETECOM ³⁾	A		
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 ⁴⁾	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) 4)}	L		
		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) Germany and Belgium end customers only	
		4) Available only with power supply option E or F	
		C) Subject to export regulations AL: N, ECCN: EAR99	
		D) Subject to export regulations AL: N, ECCN: EAR99H	
		L) Subject to export regulations AL: N, ECCN: 3A991X	

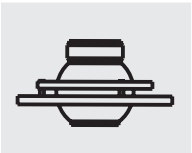

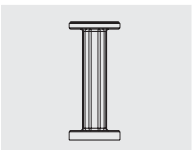
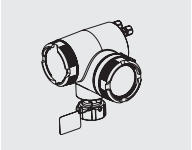
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Selection and ordering Data

SITRANS LR400 Spare parts

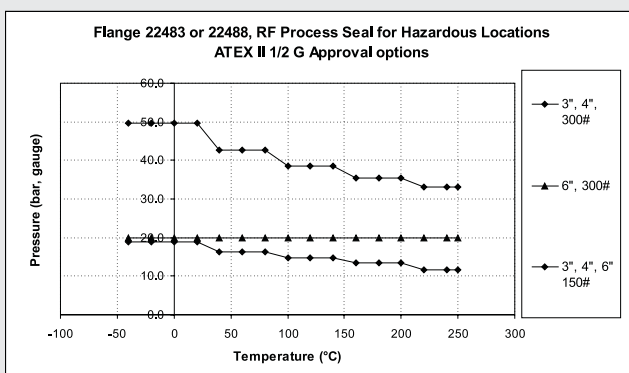
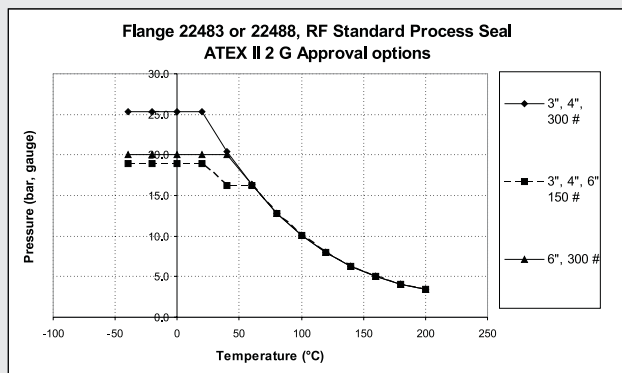
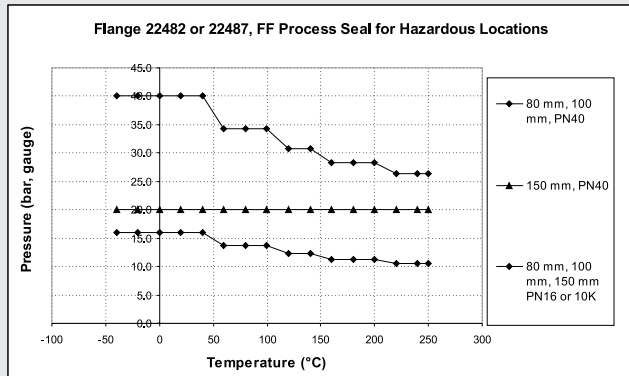
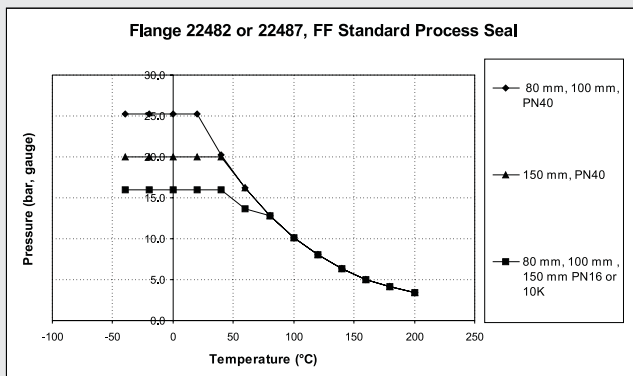
	Order No.		Order No.
4"/100 mm Universal Flange, without horn or hub. See note 1.	PBD-51035814		
6"/150 mm Universal Flange, without horn or hub. See note 1.	PBD-51035815		
8"/200 mm Universal Flange, without horn or hub. See note 1.	PBD-51035816		
Purging kit with Easy Aimer ball, no flange, no horn. See note 1.	PBD-51036110		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. See note 2.
Purging kit with Easy Aimer ball with 4"/100 mm flange, no horn. See note 1.	PBD-51035810		C) PBD-51035873
Purging kit with Easy Aimer ball with 6"/150 mm flange, no horn. See note 1.	PBD-51035811		C) PBD-51036481
Purging Kit with Easy Aimer ball with 8"/200 mm flange, no horn. See note 1.	PBD-51035812		C) PBD-51036482
Short horn antenna, no emitter supplied	PBD-22475K1A		SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, HART communication and GP, CE and CETECOM approvals. See note 2.
Long horn antenna, no emitter supplied	PBD-22475K2A		C) PBD-51036483
Short horn antenna, purged, no emitter supplied	PBD-22475K3A		C) PBD-51036484
Long horn antenna, purged, no emitter supplied	PBD-22475K4A		C) PBD-51036485
Replacement display module, SITRANS LR400 Liquids and Solids versions	PBD-51035410		C) PBD-51036486
4" Horn antenna extension kit with General Purpose approvals	PBD-51035474		
8" Horn antenna extension kit with General Purpose approvals	PBD-51035473		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. See note 2.
8" Horn antenna extension kit for hazardous units	PBD-51036180		C) PBD-51036486
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, HART® communication, and GP, CE, and CETECOM approvals. See note 2.	C) PBD-51036479		Note 1: Available with no pressure rating and with General Purpose approvals only
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, PROFIBUS PA communication and GP, CE, and CETECOM approvals. See note 2.	C) PBD-51036480		Note 2: Subject to export regulations AL: N, ECCN: 3A991X Please contact nacc.smpi@siemens.com for special requests.
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, HART communication and GP, CE, CSA, Industry Canada, FCC and R&TTE. See note 2.	C) PBD-51035867		C) Subject to export regulations AL: N, ECCN: 3A991X
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, PROFIBUS PA communication and GP, CE, CSA, Industry Canada, FCC and R&TTE. See note 2.	C) PBD-51035871		

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Characteristic curves



SITRANS LR400 Process Pressure/Temperature derating curves

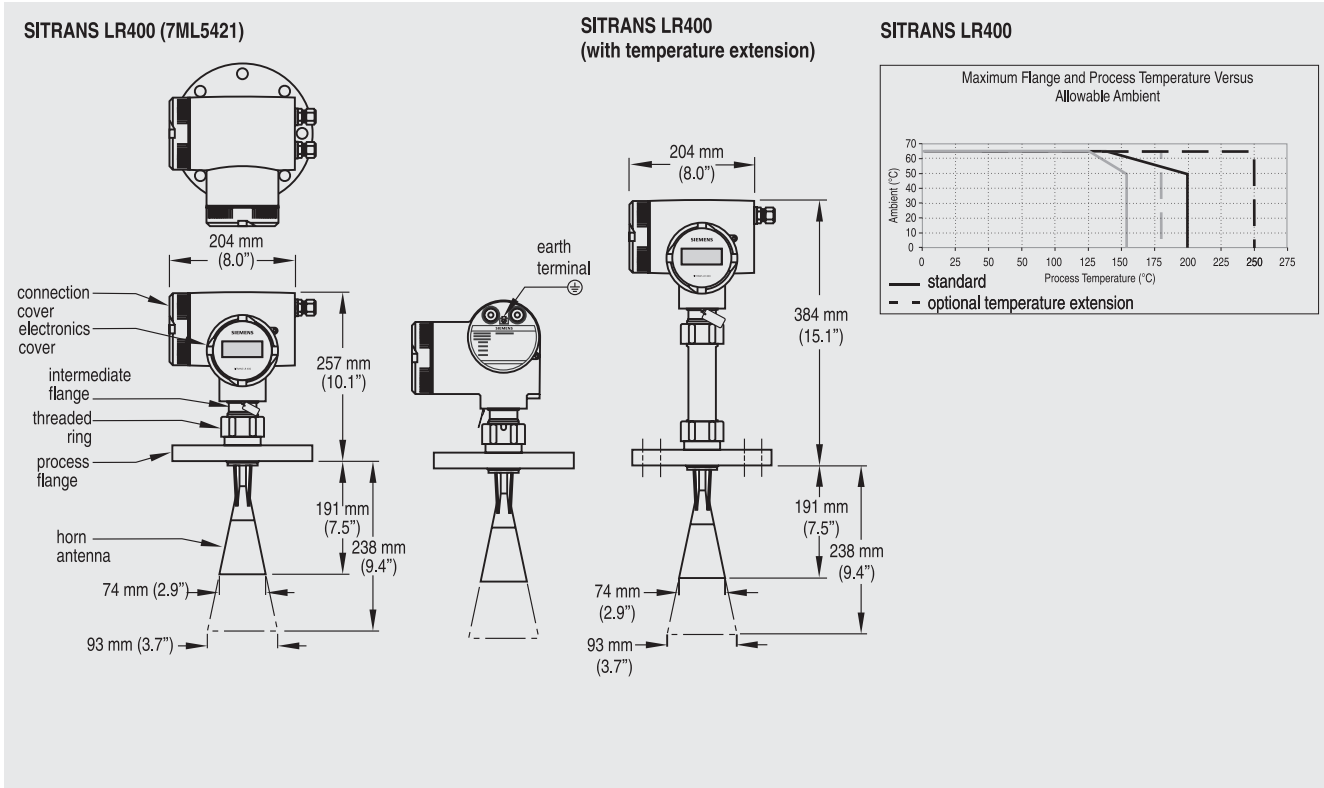
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Dimensional drawings



SITRANS LR400 dimensions

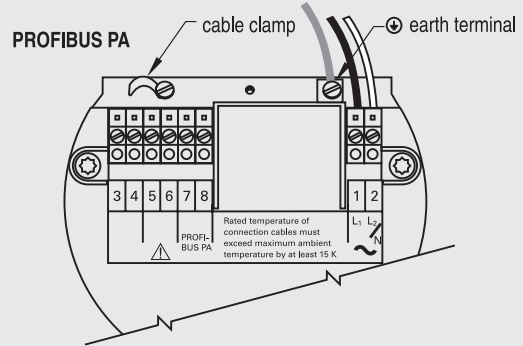
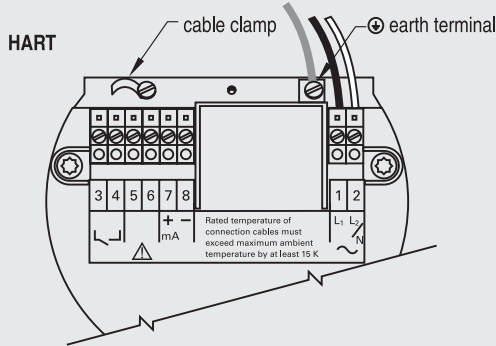
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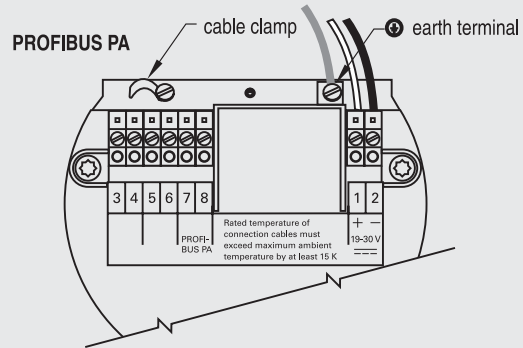
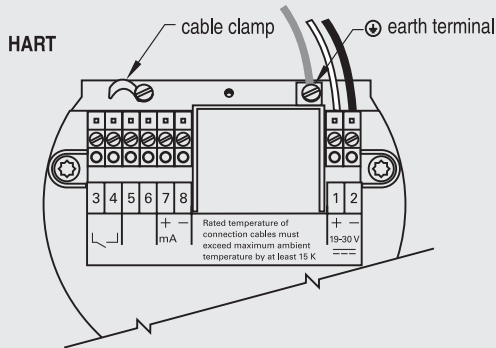
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Schematics

AC version



DC version



Notes

- recommended torque on terminal clamping screws, 0.5 to 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

Hand Programmer

Part number:
7ML5830-2AJ



SITRANS LR400

SITRANS LR400 connections

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