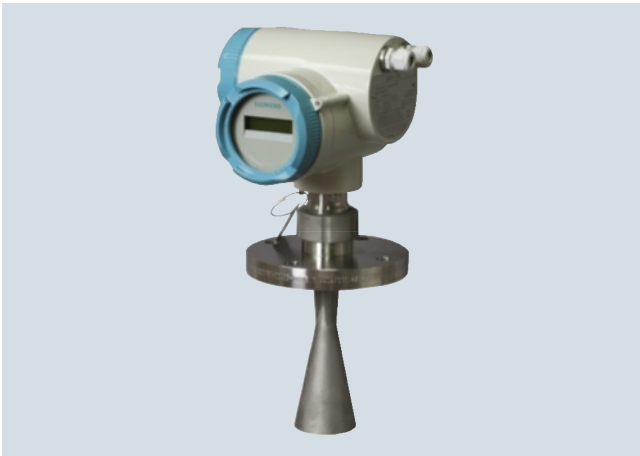


# Level Measurement

## Continuous level measurement – Radar transmitters

SITRANS LR400

### Overview

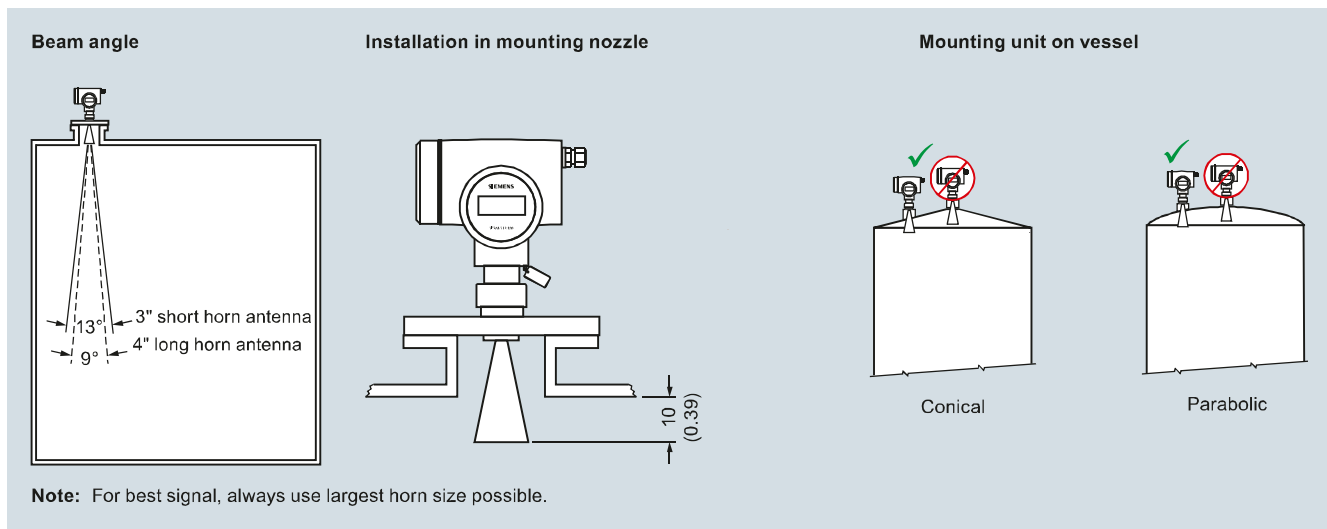


The SITRANS LR400 is a 4-wire, 24 GHz FMCW radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and high pressure, to a range of 50 m (164 ft); ideal for low dielectric media.

### 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)

### 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

# Level Measurement

## Continuous level measurement – Radar transmitters

### SITRANS LR400

#### Technical specifications

<b>Mode of operation</b>		<b>Design</b>	
Measuring principle	FMCW radar level measurement	Weight	Approx. 12.2 kg (26.8 lb) with 3 inch 150 psi flange
Frequency	24 ... 25 GHz FMCW	Materials	Die-cast aluminum, painted
Measuring range	0.35 ... 50 m (1.15 ... 164 ft)	<ul style="list-style-type: none"> <li>Enclosure</li> <li>Degree of protection</li> </ul>	IP67/Type 4X/NEMA 4X, Type 6/NEMA 6
<b>Output</b>		<ul style="list-style-type: none"> <li>Cable inlet</li> </ul>	2x M20x1.5 or ½" NPT
Analog output (HART) <ul style="list-style-type: none"> <li>Signal range</li> <li>Load</li> </ul>	Optically isolated 4 ... 20 mA Max. 600 Ω (330 Ω for [ia] versions, Area classification options G, L, P, S) NC or NO function, max. DC 50 V, max. 200 mA, rating 5 W	Process connections	316L stainless steel, 80, 100, 150 mm, bolt holes matching EN 1092-1 and JIS B 2220
<ul style="list-style-type: none"> <li>Relay</li> </ul>		HART, optional PROFIBUS PA Layer 1 and 2, Class A, Profile 3.0	<ul style="list-style-type: none"> <li>Flat faced flanges</li> </ul>
Communication		<ul style="list-style-type: none"> <li>Raised face flanges</li> </ul>	
PROFIBUS PA protocol		<b>Programming</b>	
<b>Performance (Reference conditions)</b>		Intrinsically Safe Siemens handheld programmer (ordered separately)	Infrared receiver
Dead band	0 ... 350 mm from bottom edge of flange	<ul style="list-style-type: none"> <li>Approvals for handheld programmer</li> </ul>	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)
Error in measurement at +25 °C (+77 °F) <ul style="list-style-type: none"> <li>Repeatability</li> <li>Fail-safe</li> </ul>	≤ 5 mm from 2 ... 10 m ≤ 15 mm from 10 ... 50 m ≤ 1 mm mA signal programmable as high, low or hold (LOE)	Handheld communicator	HART communicator 375
<b>Rated operating conditions</b>		PC	SIMATIC PDM
Amb. temperature for enclosure	-40 ... +65 °C (-40 ... +149 °F)	Display (local)	Alphanumeric LCD for readout and entry
Location	Indoor/outdoor	<b>Power supply</b>	
Installation category	II	100 ... 230 V AC ± 15 % (50/60 Hz), 6 W (12 VA) or 24 V DC +25/-20 %, 6 W (optional)	
Pollution degree	4	<b>Certificates and approvals</b>	
<b>Medium conditions</b>		Safety	CSA <sub>US/C</sub> , CE, FM, C-TICK
Dielectric constant	$\epsilon_r > 1.4$	Shipping	<ul style="list-style-type: none"> <li>Lloyd's Register of Shipping</li> <li>ABS</li> </ul>
Process temperature range <ul style="list-style-type: none"> <li>Standard</li> </ul>	-40 ... +200 °C (-40 ... +392 °F) -20 ... +200 °C (-4 ... +392 °F) for SITRANS LR400 with ATEX rating	Radio	Europe (R&TTE, CETECOM), Industry Canada, FCC, C-TICK
<ul style="list-style-type: none"> <li>With optional temperature extension</li> </ul>	-40 ... +250 °C (-40 ... +482 °F)	Hazardous	INMETRO
Vessel Pressure	Up to 40 bar g (process connection dependent)	<ul style="list-style-type: none"> <li>Flame Proof/Increased Safety (Brazil)</li> <li>Explosion Proof (Canada/USA)</li> </ul>	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
		<ul style="list-style-type: none"> <li>Flame Proof/Increased Safety (Europe)</li> <li>Flame Proof/Increased Safety with Intrinsically Safe output(Europe)</li> </ul>	ATEX II 1/2 G EEx dem [ia] IIC T6
		<b>Optional equipment</b>	
		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.
<b>SITRANS LR400</b>	<b>7ML5421-</b>	<b>SITRANS LR400</b>	<b>7ML5421-</b>
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.	
<b>Order handheld programmer separately</b>		<b>Order handheld programmer separately</b>	
<b>Process temperature range</b>		<b>Approvals</b>	
-40 °C ... +200 °C (-40 ... +392 °F), standard	0	General Purpose, CSA <sub>USC</sub> , 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
<b>Process connection</b>		ATEX II 2G EEx dem IIC T6; CE, R&TTE; INMETRO Ex de mb II T6	F
Universal flange 3 inch/80 mm <sup>1)</sup>	A	ATEX II 2G EEx dem [ia] IIC T6; CE, R&TTE; INMETRO Ex de [ia] mb IIC T6 <sup>3)</sup>	G
Universal flange 4 inch/100 mm <sup>1)</sup>	B	ATEX II 1/2 GD EEx d IIC T6; CE, R&TTE; INMETRO Ex d IIC T6 <sup>2)</sup>	J
Universal flange 6 inch/150 mm <sup>1)</sup>	D	ATEX II 1/2 GD EEx dem IIC T6; CE, R&TTE; INMETRO Ex de mb IIC T6 <sup>2)</sup>	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 <sup>2)3)</sup>	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 <sup>2)</sup>	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 <sup>2)</sup>	U
DN 100, PN 40, Type B1, raised face	G		
DN 150, PN 16, Type A, flat faced	U	<b>Local operation</b>	
3" ASME, 150 lb, raised face	E	Local Display Only. Handheld programmer not included ( <b>Order programmer separately</b> )	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.)			
<b>Antenna</b>			
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		
<b>Antenna purging system</b>			
None	0		
Purging system	1		
Note: Available with process connections B or D, and for area classification B only			
<b>Process seal/gasket</b>			
PTFE for -40 ... +250 °C (-40 ... +482 °F) flange temperatures	1		
FKM for -20 ... +200 °C (-4 ... +392 °F) flange temperatures <sup>2)</sup>	3		
<b>Output/communication</b>			
4 ... 20 mA, HART	0		
PROFIBUS PA	1		
<b>Power supply/cable inlet</b>			
100 ... 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		

# Level Measurement

## Continuous level measurement – Radar transmitters

### SITRANS LR400

Selection and Ordering data	Order code
<b>Further designs</b>	
Please add <b>"-Z"</b> 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	<b>Y15</b>
Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	<b>C11</b>
Inspection Certificate Type 3.1 per EN 10204	<b>C12</b>
<b>Operating Instructions</b>	
Article No.	
English	<b>7ML1998-5FH06</b>
German	<b>7ML1998-5FH36</b>
French	<b>7ML1998-5FH16</b>
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.	<b>A5E32007509</b>
<b>Accessories</b>	
Article No.	
Handheld programmer Intrinsically Safe, EEx ia	<b>7ML5830-2AJ</b>
Long horn dust cover, PTFE	<b>7ML1930-1AH</b>
Short horn dust cover, PTFE	<b>7ML1930-1AJ</b>
HART modem/RS 232 (for use with a PC and SIMATIC PDM)	<b>7MF4997-1DA</b>
HART modem/USB (for use with a PC and SIMATIC PDM)	<b>7MF4997-1DB</b>
One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART (two required) <sup>1)</sup>	<b>7ML1930-1AP</b>
One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA (two required) <sup>1)</sup>	<b>7ML1930-1AQ</b>
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	<b>7ML5750- 1AA00-0</b>
For applicable back up point level switch - see point level section on page 4/9	

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

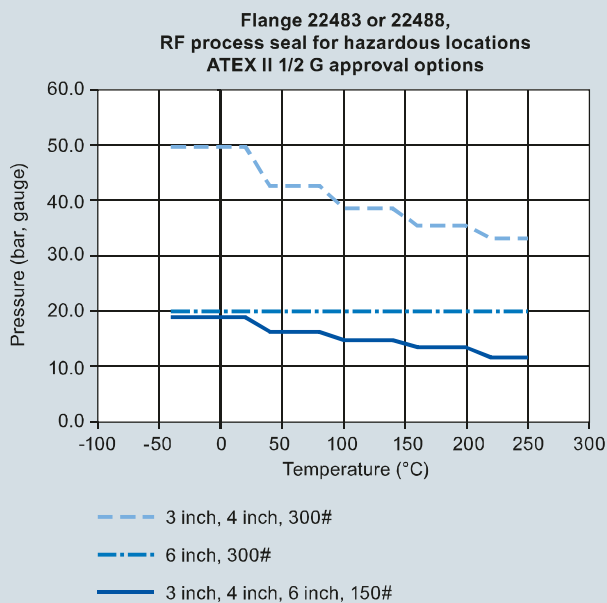
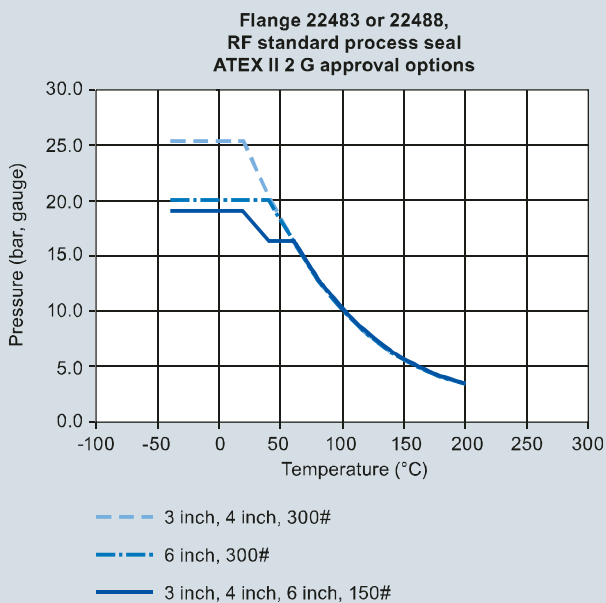
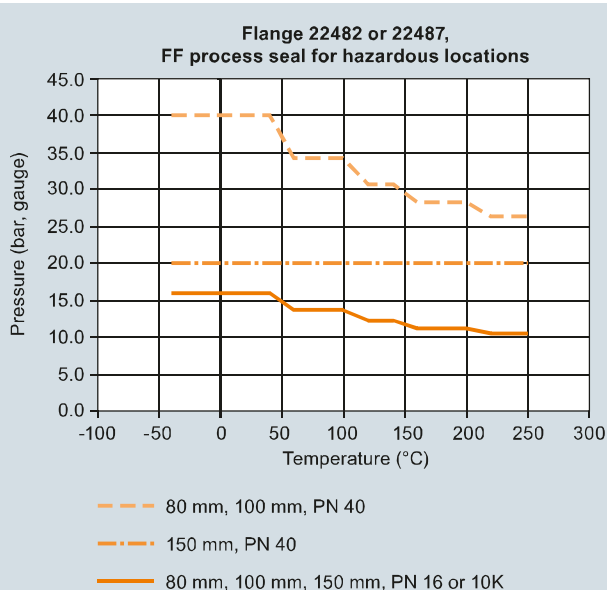
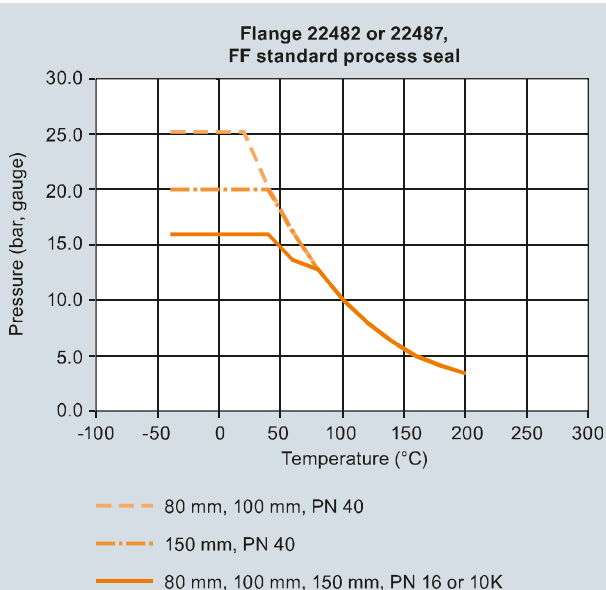
# Level Measurement

## Continuous level measurement – Radar transmitters

SITRANS LR400

### Characteristic curves

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SITRANS LR400 Process Pressure/Temperature derating curves

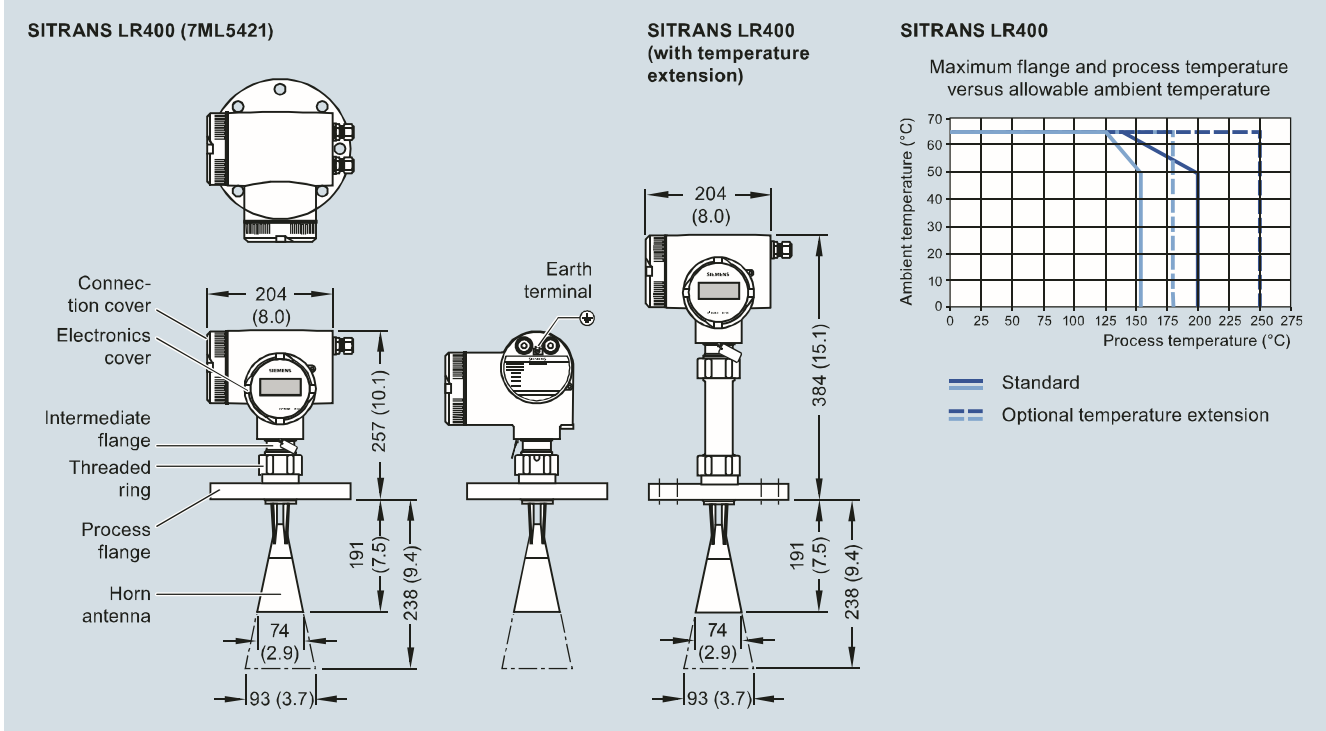
# Level Measurement

## Continuous level measurement – Radar transmitters

### SITRANS LR400

#### Dimensional drawings

4



SITRANS LR400, dimensions in mm (inch)

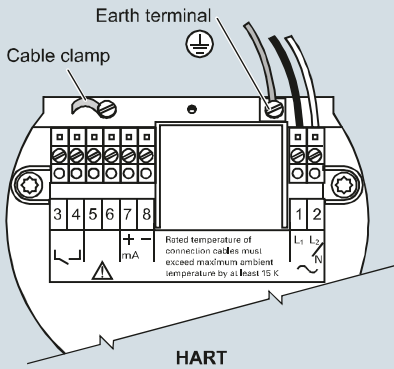
# Level Measurement

## Continuous level measurement – Radar transmitters

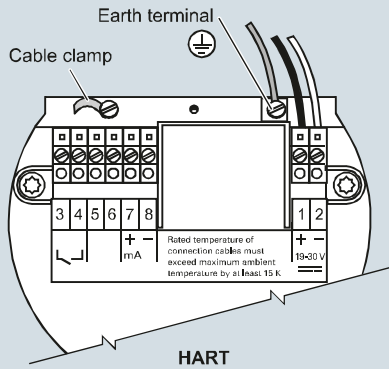
SITRANS LR400

### Schematics

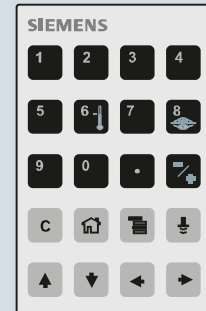
#### AC version



#### DC version

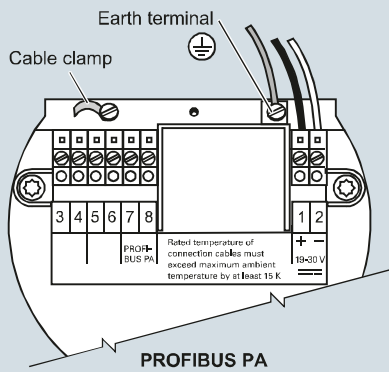
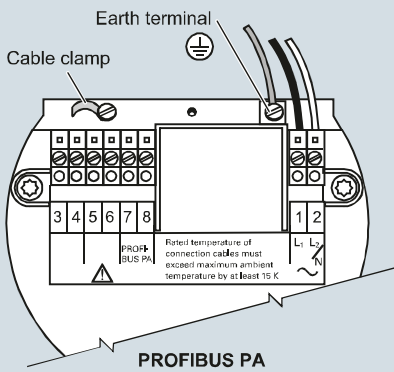


#### Hand programmer



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

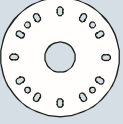
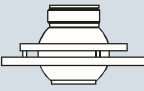


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# Level Measurement

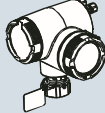
## Continuous level measurement – Radar transmitters

### SITRANS LR400 Specials

#### SITRANS LR400 Specials

	Article No.	
3 inch/80 mm Universal Flange, without horn or hub. <sup>1)</sup>	<b>PBD:</b> <b>51035813</b>	
4 inch/100 mm Universal Flange, without horn or hub. <sup>1)</sup>	<b>PBD:</b> <b>51035814</b>	
6 inch/150 mm Universal Flange, without horn or hub. <sup>1)</sup>	<b>PBD:</b> <b>51035815</b>	
8 inch/200 mm Universal Flange, without horn or hub. <sup>1)</sup>	<b>PBD:</b> <b>51035816</b>	
Purging kit with Easy Aimer ball, no flange, no horn. <sup>1)</sup>	<b>PBD:</b> <b>51036110</b>	
Purging kit with Easy Aimer ball with 4 inch/100 mm flange, no horn. <sup>1)</sup>	<b>PBD:</b> <b>51035810</b>	
Purging kit with Easy Aimer ball with 6 inch/150 mm flange, no horn. <sup>1)</sup>	<b>PBD:</b> <b>51035811</b>	
Purging Kit with Easy Aimer ball with 8 inch/200 mm flange, no horn. <sup>1)</sup>	<b>PBD:</b> <b>51035812</b>	
Short horn antenna, no emitter supplied	<b>PBD:</b> <b>22475K1A</b>	
Long horn antenna, no emitter supplied	<b>PBD:</b> <b>22475K2A</b>	
Short horn antenna, purged, no emitter supplied	<b>PBD:</b> <b>22475K3A</b>	
Long horn antenna, purged, no emitter supplied	<b>PBD:</b> <b>22475K4A</b>	
Replacement display module, SITRANS LR400 Liquids and Solids versions	<b>PBD:</b> <b>51035410</b>	
4" extension kit for horn antenna with General Purpose approvals	<b>PBD:</b> <b>51035474</b>	
8" extension kit for horn antenna with General Purpose approvals	<b>PBD:</b> <b>51035473</b>	
8" extension kit for horn antenna for hazardous units	<b>PBD:</b> <b>51036180</b>	

#### SITRANS LR400 Specials

	Article No.	
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, HART communication, and GP, CE, and CETECOM approvals.	<b>PBD:</b> <b>51036479</b>	
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, PROFIBUS PA communication and GP, CE, and CETECOM approvals.	<b>PBD:</b> <b>51036480</b>	
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, HART communication and GP, CE, CSA, Industry Canada, FCC and R&TTE.	<b>PBD:</b> <b>51035867</b>	
SITRANS LR400 Aluminum enclosure with AC power, M20 cable inlet, PROFIBUS PA communication and GP, CE, CSA, Industry Canada, FCC and R&TTE.	<b>PBD:</b> <b>51035871</b>	
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.	<b>PBD:</b> <b>51035873</b>	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, HART communication and GP, CE and CETECOM approvals.	<b>PBD:</b> <b>51036481</b>	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, PROFIBUS PA communication and GP, CE and CETECOM approvals.	<b>PBD:</b> <b>51036482</b>	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, HART communication and GP, CE, CSA, Industry Canada, FCC and R&TTE.	<b>PBD:</b> <b>51036483</b>	
SITRANS LR400 Aluminum enclosure with DC power, M20 cable inlet, PROFIBUS PA communication and GP, CE, and R&TTE.	<b>PBD:</b> <b>51036484</b>	
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.	<b>PBD:</b> <b>51036485</b>	
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.	<b>PBD:</b> <b>51036486</b>	

<sup>1)</sup> Available with no pressure rating and with General Purpose approvals only