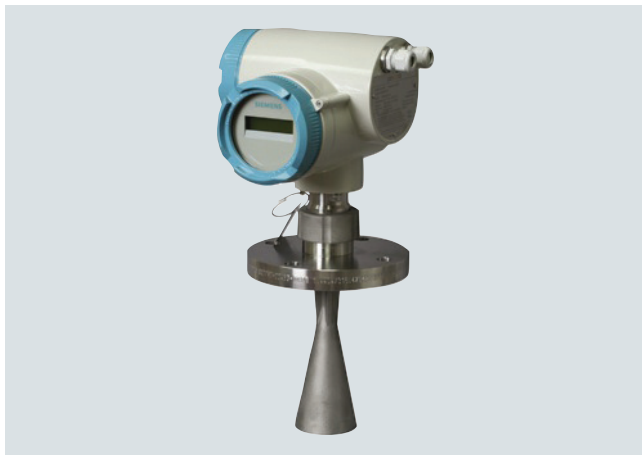


Level Measurement

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.

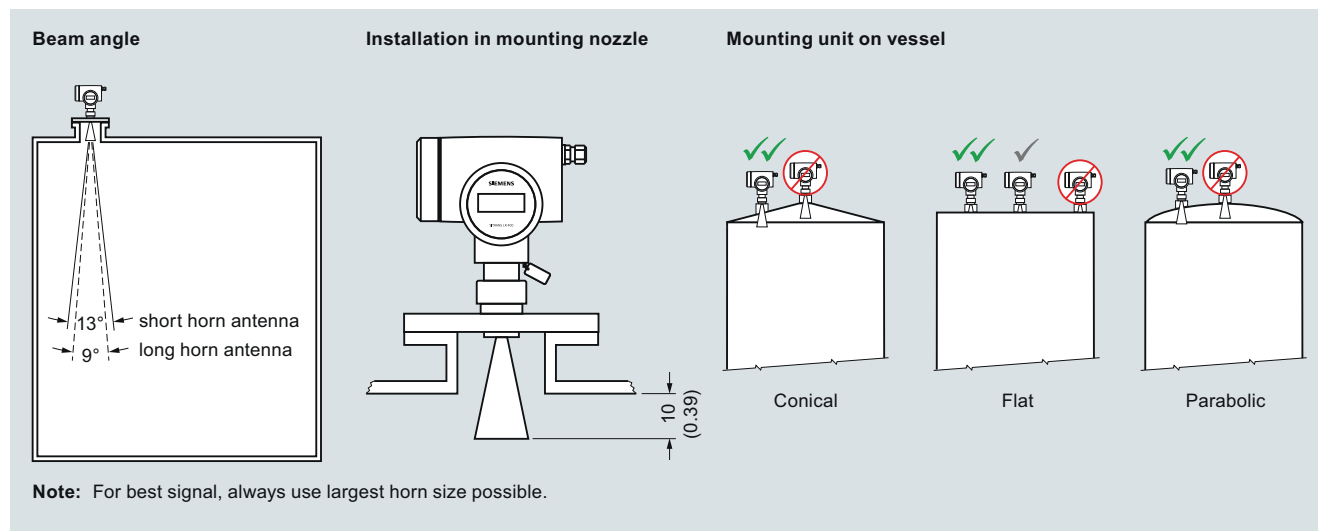
The characteristics of 24 GHz and high signal-to-noise ratio contribute to exceptional signal reflection, regardless of the dielectric value of the medium.

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

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

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Technical specifications

Mode of operation		Design	
Measuring principle	FMCW radar level measurement	Weight	Approx. 12.2 kg (26.8 lb) with 3" 150 psi flange
Frequency	24 ... 25 GHz FMCW	Materials	Die-cast aluminum, painted IP67/Type 4X/NEMA 4X, Type 6/NEMA 6
Measuring range	0.35 ... 50 m (1.15 ... 164 ft)	• Enclosure	2x M20x1.5 or ½" NPT
Output		• Degree of protection	
Analog output (HART)	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	• Cable inlet	
• Signal range		Process connections	316L stainless steel, 80, 100, 150 mm, bolt holes matching EN 1092-1 and JIS B 2220
• Load		• Flat faced flanges	316L stainless steel, 3", 4", 6", bolt holes matching ASME B 16.5
• Relay		• Raised face flanges	
Communication	HART, optional PROFIBUS PA	Programming	
PROFIBUS PA protocol	Layer 1 and 2, Class A, Profile 3.0	Intrinsically Safe Siemens handheld programmer (ordered separately)	Infrared receiver
Performance (Reference conditions)		• Approvals for handheld programmer	IS model with, CSA/FM Class I, Div. 1, Groups A, B, C, D T6 at max. ambient temperature of 40 °C (104 °F)
Dead band	0 ... 350 mm from bottom edge of flange	Handheld communicator	HART communicator 375
Error in measurement at 25 °C (77 °F)	≤ 5 mm from 2 ... 10 m ≤ 15 mm from 10 ... 50 m	PC	SIMATIC PDM
• Repeatability	≤ 1 mm	Display (local)	Alphanumeric LCD for readout and entry
• Fail-safe	mA signal programmable as high, low or hold (LOE)	Power supply	
Rated operating conditions		100 ... 230 V AC ± 15 % (50/60 Hz), 6 W (12 VA) or 24 V DC +25/-20 %, 6 W (optional)	
Amb. temperature for enclosure	-40 ... +65 °C (-40 ... +149 °F)	Certificates and approvals	
Location	Indoor/outdoor	Safety	CSA _{US/C} , CE, FM, C-TICK
Installation category	II	Shipping	• Lloyd's Register of Shipping • ABS
Pollution degree	4	Radio	Europe (R&TTE, CETECOM), Industry Canada, FCC, C-TICK
Medium conditions		Hazardous	CSA/FM Class I, Div. 1, Groups B, C, D; Class II, Div. 1, Groups E, F, G; Class III T6
Dielectric constant	$\epsilon_r > 1.4$	• Explosion Proof (Canada/USA)	
Process temperature range	-40 ... +200 °C (-40 ... +392 °F) -20 ... +200 °C (-4 ... +392 °F) for SITRANS LR400 with ATEX rating	Optional equipment	
• Standard	-40 ... +250 °C (-40 ... +482 °F)	Purging (self-cleaning) system PTFE dust cover	
• With optional temperature extension			
Vessel Pressure	Up to 40 bar g (process connection dependent)		

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

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Selection and Ordering data

Order No.

SITRANS LR400

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
-40 °C ... +250 °C (-40 ... +482 °F), high temperature extension

Process connection

Universal flange 3 inch/80 mm¹⁾
Universal flange 4 inch/100 mm¹⁾
Universal flange 6 inch/150 mm¹⁾
3" ASME, 150 lb, raised face
3" ASME, 300 lb, raised face
4" ASME, 150 lb, raised face
4" ASME, 300 lb, raised face
6" ASME, 150 lb, raised face
(Note: Flange bolting patterns and facings dimensionally correspond to ASME standard.)

Antenna

Horn antenna, long 93 mm (3.66 inch) diam. for 100 mm (4 inch) nozzles
Horn antenna, short 74 mm (2.91 inch) diam. for 80 mm (3 inch) nozzles

Antenna purging system

None
Purging system
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
FKM for -20 ... +200 °C (-4 ... +392 °F) flange temperatures²⁾

Output/communication

4 ... 20 mA, HART
PROFIBUS PA

Power supply/cable inlet

100 ... 230 V AC
• 2 x ½" NPT
24 V DC
• 2 x ½" NPT

Approvals

General Purpose, CSAUS/c, Industry Canada, FCC, CE and R&TTE
FM Class I, Div. 1, Groups B, C, D; Class II/III, Div. 1, Groups E, F, G; FCC²⁾

Local operation

Local Display Only. Handheld programmer not included (**Order programmer separately.**)

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

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. 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

Order No.

Spanish

7ML1998-5FH06

Note: The Operating Instructions should be ordered as a separate line item on the order.

7ML1998-5FH22

Multi-language Quick Start manual

7ML1998-5QN83

This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.

Accessories

Handheld programmer Intrinsically Safe, EEx ia

Order No.

Long horn dust cover, PTFE

7ML5830-2AJ

Short horn dust cover, PTFE

7ML1930-1AH

HART modem/RS 232

7ML1930-1AJ

(for use with a PC and SIMATIC PDM)

7MF4997-1DA

HART modem/USB

7MF4997-1DB

(for use with a PC and SIMATIC PDM)

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

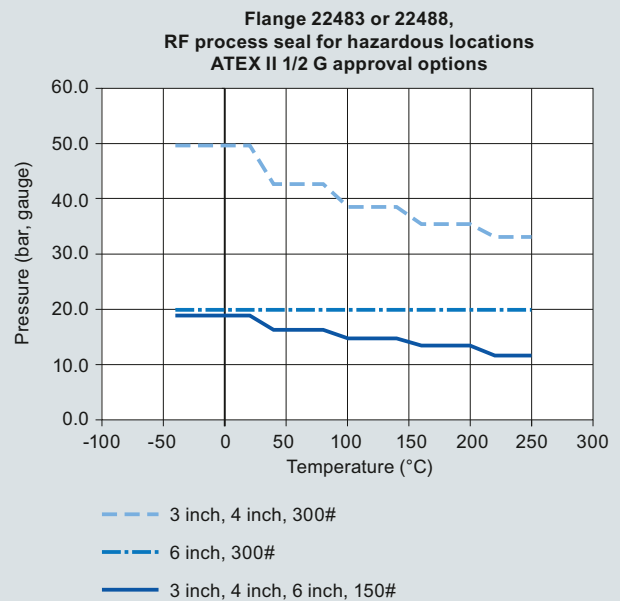
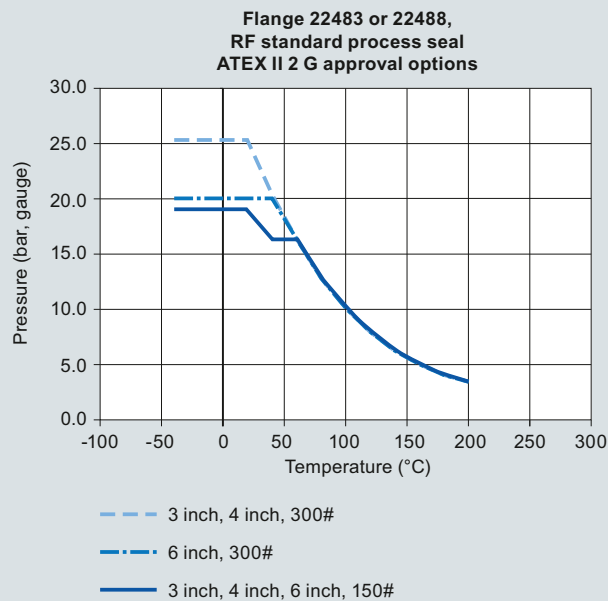
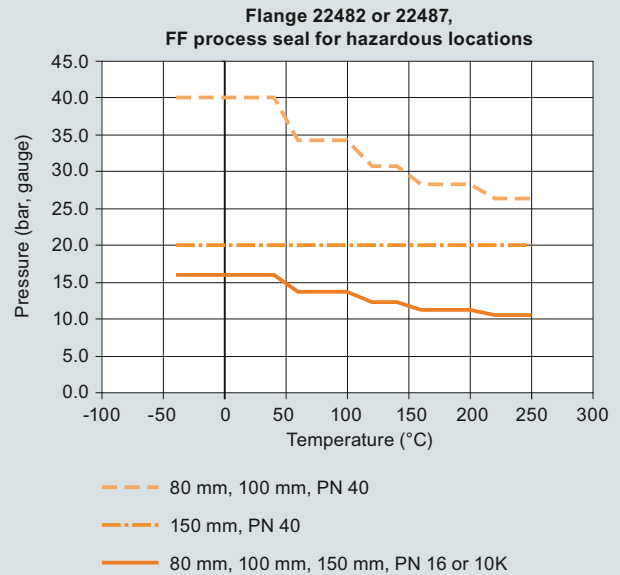
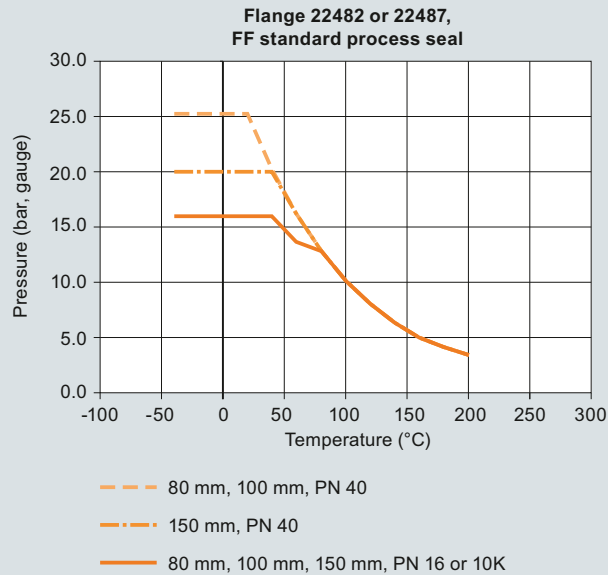
7ML5750-1AA00-0

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

Characteristic curves



SITRANS LR400 Process Pressure/Temperature derating curves

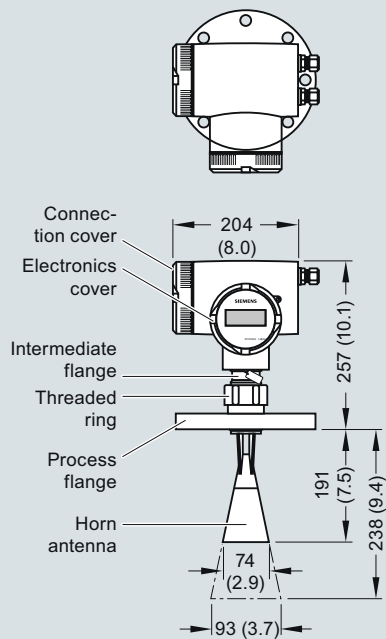
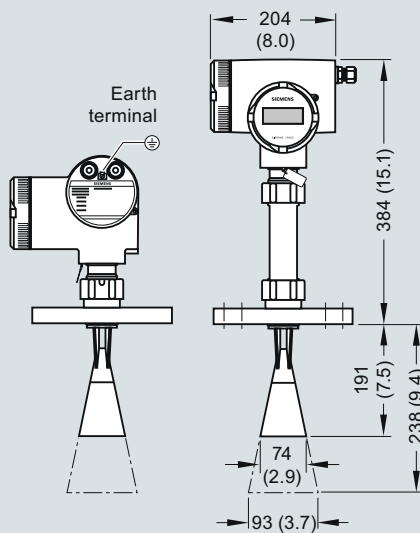
Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR400

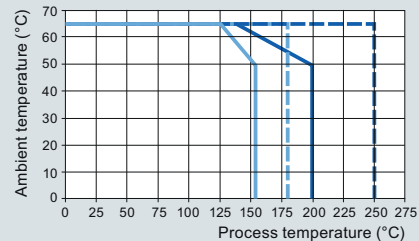
Dimensional drawings

SITRANS LR400 (7ML5421)

SITRANS LR400
(with temperature
extension)

SITRANS LR400

Maximum flange and process temperature
versus allowable ambient temperature



— Standard

- - - Optional temperature extension

SITRANS LR400, dimensions in mm (inch)

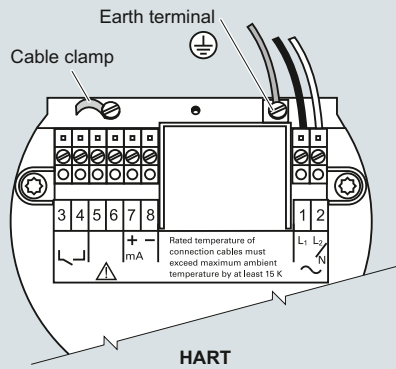
Level Measurement

Continuous level measurement – Radar transmitters

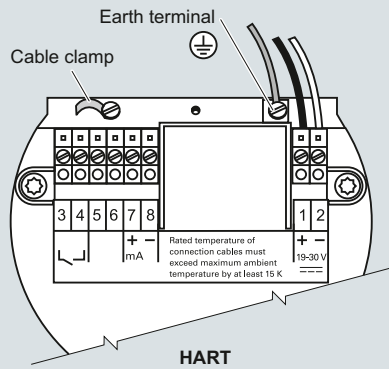
SITRANS LR400

Schematics

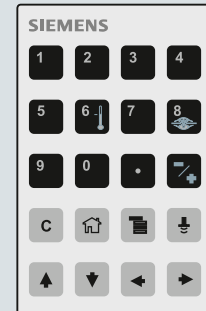
AC version



DC version

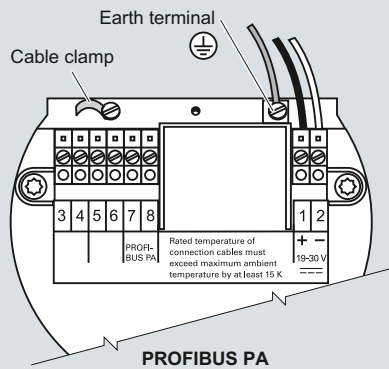
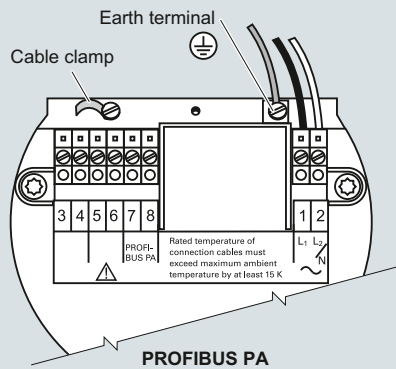


Hand programmer



SITRANS LR400

Part number:
7ML5830-2AJ



Notes

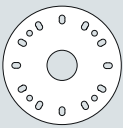
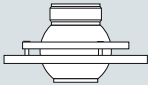
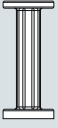
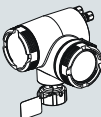
- Recommended torque on terminal clamping screws, 0.5 ... 0.6 Nm
- 4 ... 20 mA, PROFIBUS PA, DC input circuits, 14 ... 20 AWG, shielded copper wire
- AC input circuit, min. 14 AWG copper wire
- All field wiring must have insulation suitable for at least 250 V
- The equipment must be protected by a 15 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		Order 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 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 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	

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