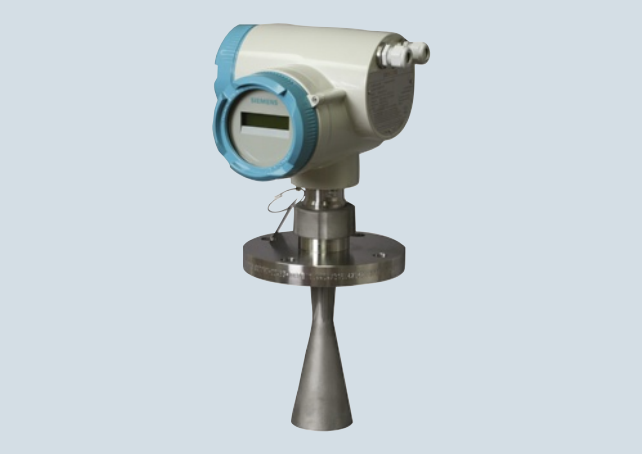
Overview



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.

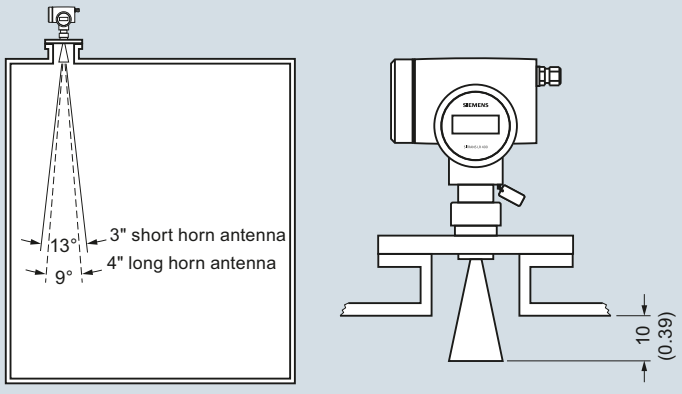
SITRANS LR400 features robust enclosure, flange and horn components. It is virtually unaffected by atmospheric or temperature conditions within the vessel.

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



Note: For best signal, always use largest horn size possible.

SITRANS LR400 installation, dimensions in mm (inch)

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	ε_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 inch 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 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	
• Flame Proof/Increased Safety (Brazil)	INMETRO
• 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
• Flame Proof/Increased Safety (Europe)	ATEX II 1/2 G EEx dem IIC T6
• 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

Selection and Ordering data	Article No.
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.	-
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 inch/80 mm[1]	A
Universal flange 4 inch/100 mm[1]	B
Universal flange 6 inch/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 (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2220 standard.)	V
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 Note: Available with process connections B or D, and for area classification B only	1
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

Selection and Ordering data	Article No.
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.	-
Order handheld programmer separately	
Approvals	
General Purpose, $CSA_{US/C}$, Industry Canada, FCC, CE and R&TTE	B
ATEX II 2G EEx d IIC T6; CE, R&TTE; INMETRO Ex d IIC T6	E
ATEX II 2G EEx dem IIC T6; CE, R&TTE; INMETRO Ex de mb II T6	F
ATEX II 2G EEx dem [ia] IIC T6; CE, R&TTE; INMETRO Ex de [ia] mb IIC T6[3]	G
ATEX II 1/2 GD EEx d IIC T6; CE, R&TTE; INMETRO Ex d IIC T6[2]	J
ATEX II 1/2 GD EEx dem IIC T6; CE, R&TTE; INMETRO Ex de mb IIC T6[2]	K
ATEX II 1/2 GD EEx dem [ia] II T6; CE, R&TTE; INMETRO Ex de [ia] mb IIC T6[2)3]	L
FM Class I, Div. 1, Groups B, C, D; Class II/III, Div. 1, Groups E, F, G; FCC[2]	T
CSA Class I, Div. 1, Groups B, C, D; Class II/III, Div. 1, Groups E, F, G; FCC[2]	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

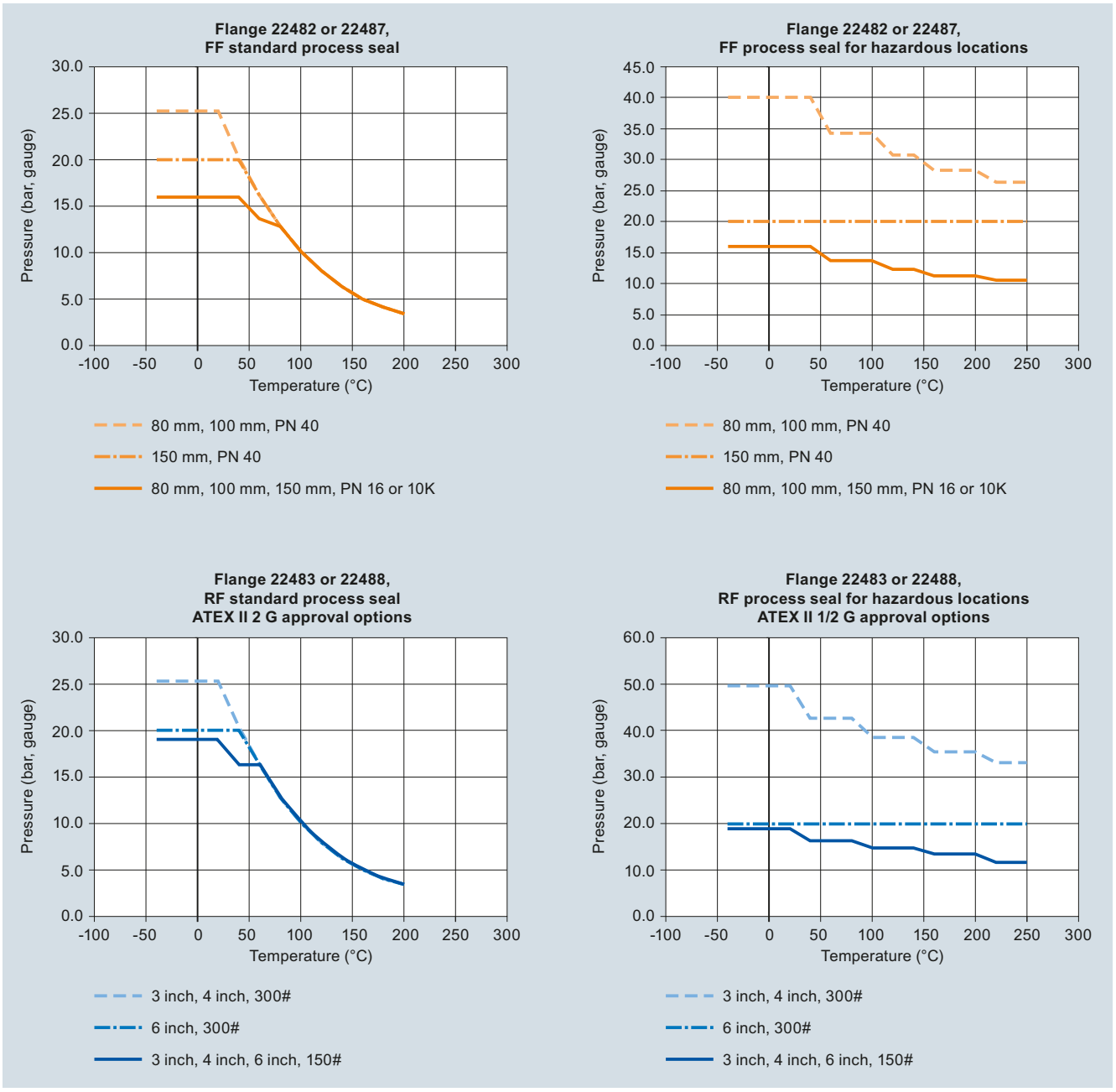
4

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	Article No.
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	Article No.
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.

Characteristic curves

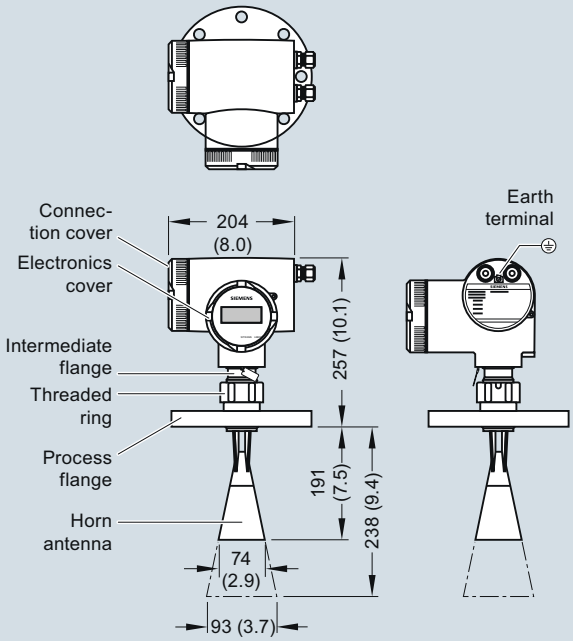


SITRANS LR400 Process Pressure/Temperature derating curves

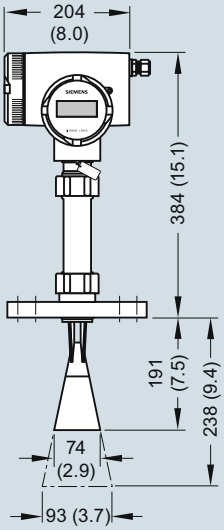
SITRANS LR400

Dimensional drawings

SITRANS LR400 (7ML5421)

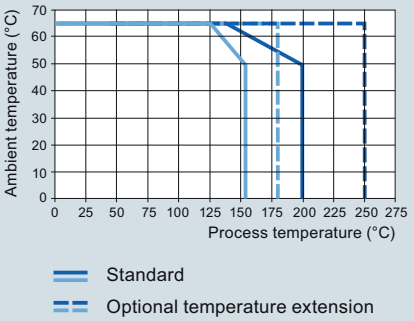


SITRANS LR400 (with temperature extension)



SITRANS LR400

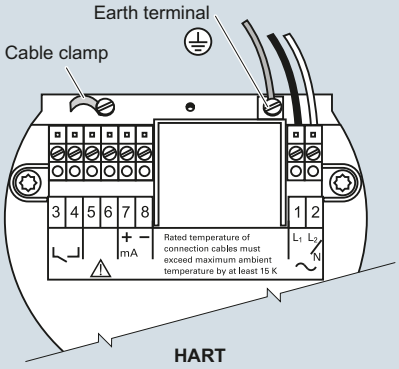
Maximum flange and process temperature versus allowable ambient temperature



SITRANS LR400, dimensions in mm (inch)

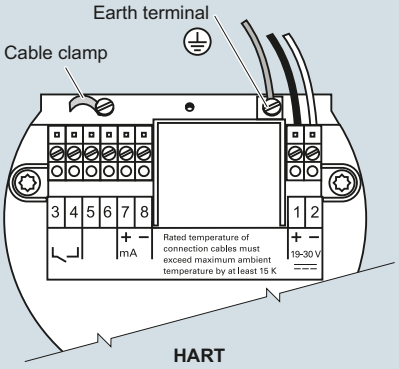
Schematics

AC version



HART

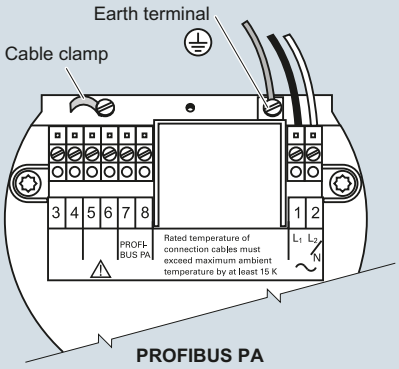
DC version



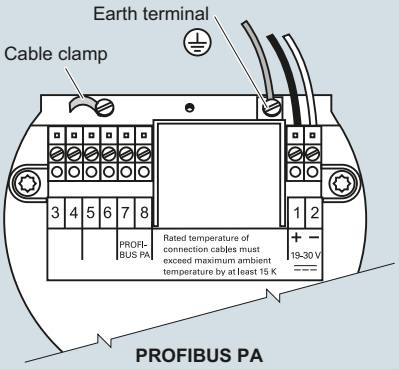
HART

Hand programmer

SITRANS LR400
Part number:
7ML5830-2AJ



PROFIBUS PA



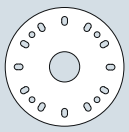
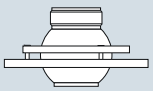
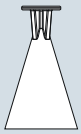
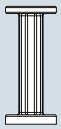
PROFIBUS PA

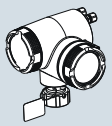
Notes

- 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

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 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