

Overview



SITRANS LR 300 is a pulse radar level instrument for liquids and slurries in process vessels and extreme or hazardous process conditions to a maximum range of 20 m (65 ft).

Benefits

- Auto False-Echo Suppression
- Infrared Intrinsically Safe handheld or remote programming
- 5.8 GHz (U.S.A. 6.3 GHz)
- Built-in diagnostics
- Various flanges, horn and waveguide antenna options available
- Extremely high signal-to-noise ratio

Application

The SITRANS LR 300 is available both for standard applications and for applications that require explosion proof protection.

The SITRANS LR 300 features a compact design and robust construction and is available with an epoxy-coated aluminum or stainless steel enclosure. Operating at low frequency and high signal transmission speed, it is virtually unaffected by atmospheric or temperature conditions. It provides reliable measurement in environments with harsh chemicals, steam, dust, encrustation, turbulence and agitation.

The high resistance PTFE rod antenna is chemically immune and resistant to material buildup. The SITRANS LR 300 can communicate using the following protocols: Modbus®, HART® or optional PROFIBUS PA.

When using the flange or threaded antenna options, the SITRANS LR 300 is easily installed by positioning the unit on a standpipe, bolting or threading it in place and connecting it to the power supply. There's no need to fill or empty the vessel for calibration or commissioning.

- Key Applications: liquid bulk storage tanks, agitated process vessels

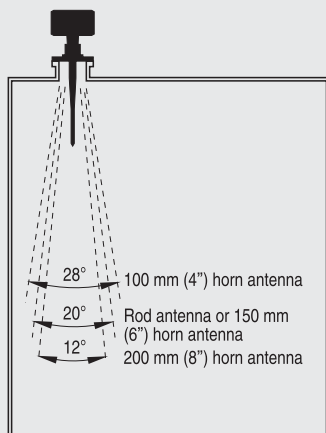
SITRANS L Level instruments

Continuous measurement - Radar transmitters

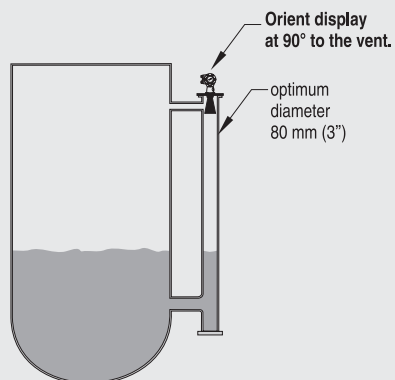
SITRANS LR 300

Configuration

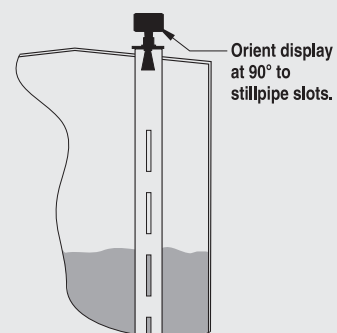
Installation



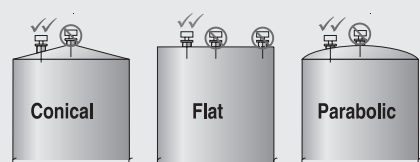
Mounting unit on bypass



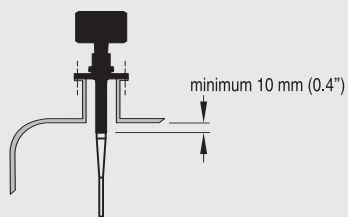
Mounting unit on stilling well



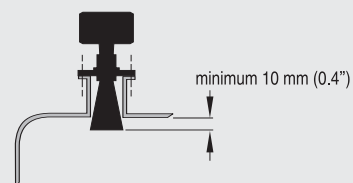
Mounting unit on vessel



Clearance: Shielded Rod



Clearance: Horn Antenna



SITRANS LR 300 installation

SITRANS L Level instruments

Continuous measurement - Radar transmitters

SITRANS LR 300

Technical specifications

Mode of operation

Measuring principle	Radar level measurement
Frequency	5.8 GHz (U.S.A. 6.3 GHz)

Input

Measuring range	0.4 to 20 m (1.3 to 65 ft)
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Output

Output signal	
• Analog output	Optically isolated, 4 to 20 mA
- Load	Max. 450 Ω
- Accuracy	0.02 mA
• Communications	Modbus/RS-485 connection, HART or optional PROFIBUS PA

Performance (reference conditions)

• Error in measurement at +20 °C (+68 °F)	± 15 mm from 0.4 to 10 m $\pm 0.15\%$ from 10 to 20 m
- Temperature drift	$< \pm 0.25\%$ of range, -40 to +60 °C (-40 to +140 °F)
- Repeatability	± 2 mm, up to 3 m ± 3 mm, from 3 m to 5 m ± 5 mm, from 5 m to 10 m ± 10 mm, from 10 m to 20 m
- Fail-safe	mA signal programmable as high, low or hold (Loss of Echo)

Rated operating conditions

Installation conditions

• Location	Indoor/outdoor
Ambient conditions (enclosure)	
• Ambient temperature	-40 to +60 °C (-40 to +140 °F)
• Installation category	II
• Pollution degree	4

Medium conditions

• Dielectric constant ϵ_r	$\epsilon_r > 1.6$ (For $\epsilon_r < 3$, use waveguide antenna or stillpipe)
• Temperature	-40 to +200 °C (-40 to +392 °F)
• Pressure (vessel)	Dependent on process connection and temperature (refer to derating curves)

Design

• Enclosure	
- Material	Aluminium, epoxy coated or optional stainless steel
- Cable inlet	2 x 1/2" NPT or M20x1.5
• Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68
• Weight	6.5 kg (14.3 lbs) with 2"/150 psi flange; weight varies depending on flange size and pressure rating
• Dielectric rod antennas	
- Material	PTFE
- Dimensions	41 cm (16.3") long including integral gasket (other antenna types available)

Process connections

• Flange	Flat faced flanges: 316L stainless steel, 50, 80, 100, 150, 200 mm (2, 3, 4, 6, 8"), bolt hole pattern to ASME, DIN and JIS sizes
• Other connections	Available

Power supply

• Universal power supply unit	24 to 230 V AC $\pm 15\%$, 40 to 70 Hz, 28 VA (11 W) 24 to 230 V DC $\pm 15\%$, 9 W
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Certificates and approvals

• Safety	CSA _{NRTL/C} , CE, FM
• Marine	<ul style="list-style-type: none"> Lloyd's Register of Shipping ABS Type Approval
• Radio	Europe, Industry Canada, FCC
• Explosion Proof	<ul style="list-style-type: none"> ATEX II 1/2 G EEx de IIC T6 ATEX II 1/2 G EEx de [ia] IIC T6 CSA Class I, Div 1, Groups A, B, C, D, E, F, G FM Class I, Div.1, Groups A, B, C, D, E, F and G
• Sanitary	3A Sanitary (Sanitary rod antenna only)

Communication

• Intrinsically Safe Siemens Milltronics handheld programmer	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
• Programmer (remote keypad)	Modbus, HART or optional PROFIBUS PA; upgradable Flash via RS-485
• PC	SIMATIC PDM
• Display (local)	alphanumeric and multi-graphic liquid crystal for readout and entry

SITRANS L Level instruments

Continuous measurement - Radar transmitters

SITRANS LR 300

Selection and Ordering data

Order No.

SITRANS LR 300, horn antenna version

C) 7 ML 5 4 1 1 -

Pulse radar level instrument for liquids and slurries in process vessels and extreme or hazardous process conditions up to 20 m (65 ft).

Antenna version

Stainless steel 316L with PTFE emitter
Stainless steel 316L with PTFE emitter and purging kit¹⁾
Sliding waveguide system 1000 mm long¹⁾ and 2)

Flange design (Flat faced, 316L Stainless Steel)

DN 50, PN 16, Type A, flat faced¹⁾
DN 80, PN 16, Type A, flat faced
DN 100, PN 16, Type A, flat faced

DN 150, PN 16, Type A, flat faced
DN 200, PN 16, Type A, flat faced
2" ASME, 150 lb¹⁾

3" ASME, 150 lb, flat faced
4" ASME, 150 lb, flat faced
6" ASME, 150 lb, flat faced

8" ASME, 150 lb, flat faced¹⁾
DN 50, PN 40, flat faced¹⁾
DN 80, PN 40, flat faced

DN 100, PN 40, flat faced
DN 150, PN 40, flat faced
DN 200, PN 40, flat faced

2" ASME, 300 lb, flat faced¹⁾
3" ASME, 300 lb, flat faced
4" ASME, 300 lb, flat faced

6" ASME, 300 lb, flat faced
8" ASME, 300 lb, flat faced
JIS, DN 50, 10K¹⁾

JIS, DN 80, 10K
JIS, DN 100, 10K
JIS, DN 150, 10K

JIS, DN 200, 10K

(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2238 standard.)

Communication/output

4 to 20 mA, HART, Modbus
PROFIBUS PA, Modbus

Process seal/Gasket

FKM
Nitrile, only for sliding waveguide systems
FFKM [-35 to +200 °C (-31 to +392 °F)]

Enclosure/Cable inlet

Aluminum, Epoxy painted

2 x 1/2" NPT
2 x M20x1.5

Stainless steel 316L

2 x 1/2" NPT
2 x M20x1.5

Selection and Ordering data

Order No.

SITRANS LR 300, horn antenna version

C) 7 ML 5 4 1 1 -

Pulse radar level instrument for liquids and slurries in process vessels and extreme or hazardous process conditions up to 20 m (65 ft).

Horn size/Waveguide options

80 mm horn³⁾
100 mm horn³⁾

150 mm horn
200 mm horn

100 mm horn with 100 mm waveguide extension³⁾

100 mm horn with 150 mm waveguide extension³⁾

100 mm horn with 200 mm waveguide extension³⁾

100 mm horn with 250 mm waveguide extension³⁾

150 mm horn with 100 mm waveguide extension

150 mm horn with 150 mm waveguide extension

150 mm horn with 200 mm waveguide extension

150 mm horn with 250 mm waveguide extension

200 mm horn with 100 mm waveguide extension

200 mm horn with 150 mm waveguide extension

200 mm horn with 200 mm waveguide extension

200 mm horn with 250 mm waveguide extension

Waveguide only - Waveguide length 500 mm to 3000 mm (in 1 mm increments) (Add order code

Y01 and plain text: "waveguide length ...mm")

Horn with custom waveguide lengths 101 to 2000 mm (Add order code Y01 and plain text:

"waveguide length ...mm", and Add order code Y03

and plain text: "horn size ...mm")⁴⁾

Approvals

General Purpose, CE, CSA_{US/C}⁵⁾

CSA Class I, Div I, Groups A to G, CE⁵⁾

ATEX II 1/2 G EEx de IIC T6, CE⁵⁾ and 6)

FM Class I, Div I, Groups A to G, FCC, 6.3 GHz, for U.S.A. only

General Purpose, FM, FCC, 6.3 GHz, for U.S.A. only

ATEX II 1/2 G EEx de [ia] IIC T6

Pressure rating

Rating per pressure/temperature curves in manual
0.5 bar (7.25 psi maximum)

Further designs

Please add "-Z" to Order No. and specify Order code(s).

Acceptance test certificate: Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000

Inspection Certificate Type 3.1 per EN 10204

Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]:
Measuring-point number/identification (max. 16 characters) specify in plain text

Horn with waveguide extension custom lengths:
Enter the total length of the waveguide in plain text description (1 mm increments)

Enter the Horn size in plain text description
[100 mm (3.94"), 150 mm (5.91"), and 200 mm (7.87") only]

SITRANS L Level instruments

Continuous measurement - Radar transmitters

SITRANS LR 300

Selection and Ordering data	Order No.
SITRANS LR 300, horn antenna version Pulse radar level instrument for liquids and slurries in process vessels and extreme or hazardous process conditions up to 20 m (65 ft).	C) 7ML5411-
Instruction manual English French German Note: Instruction manual should be ordered as a separate line item on the order. Multi-language Quick start manual (Due to ATEX regulations, one Quick start manual is included with every product.) This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.	C) 7ML1998-5CL05 C) 7ML1998-5CL14 C) 7ML1998-5CL34 C) 7ML1998-5QA85
Accessories Handheld programmer for SITRANS LR 300, Intrinsically Safe, EEx ia Enclosure wrench Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77"), for fastening on mounting-eye, one text line, (e.g. for Sensors) HART modem/RS-232 (for use with a PC and SIMATIC PDM) HART modem/USB (for use with a PC and SIMATIC PDM) RS 485 to RS 232 converter, not isolated, port powered One metallic cable gland M20x1.5, rated -40 °C (-40 °F) to +80 °C (+176 °F) for General Purpose or ATEX EEx e installations (available for HART only) One metallic cable gland M20x1.5, rated -40 °C (-40 °F) to +80 °C (+176 °F) with integrated shield connection (available for PROFIBUS PA)	C) 7ML5830-2AH 7ML1830-1HB 7ML1930-1BJ D) 7MF4997-1DA D) 7MF4997-1DB C) 7ML1830-1HA 7ML1930-1AP 7ML1930-1AQ

1) Available with pressure rating option 1 only

2) Available with horn size option C, D, E only

3) For stilling well applications only

4) Order standard waveguide lengths 100, 150, 200, 250 mm (3.93, 5.91, 7.87, 9.84") by choosing options from *Horn size/Waveguide options*

5) Includes European Radio and Industry Canada approvals, 5.8 GHz

6) Available with communication option 0 only

C) Subject to export regulations AL: N, ECCN: EAR99

D) Subject to export regulations AL: N, ECCN: EAR99H

SITRANS L Level instruments

Continuous measurement - Radar transmitters

SITRANS LR 300

Selection and Ordering data

SITRANS LR 300, sanitary version

Pulse radar level instrument for liquids and slurries in process vessels and extreme or hazardous process conditions up to 20 m (65 ft).

Antenna version

PTFE, one piece rod antenna
UHMW-PE, one piece rod antenna

Process connection

Sanitary fitting clamp

Configuration/connection size

Only for rod antenna
• 2" (50.8 mm) connection
• 3" (76.2 mm) connection
• 4" (101.6 mm) connection

Antenna extension

Without antenna extension

Mounting Clamp

No mounting clamp
Mounting clamp included¹⁾

Enclosure/cable inlet

Aluminum, epoxy coated
• 2 x 1/2" NPT
• 2 x M20x1.5

Stainless steel 316L
• 2 x 1/2" NPT
• 2 x M20x1.5

Communication/output

4 to 20 mA, HART, Modbus
PROFIBUS PA, Modbus

Approvals

General Purpose, CE, CSA_{US/C}²⁾
CSA Class I, Div I, Groups A to G, CE²⁾
ATEX II 1/2 G EEx de IIC T6, CE²⁾ and ³⁾

FM Class I, Div I, Groups A to G, FCC, 6.3 GHz, for U.S.A. only
General Purpose, FM, FCC, 6.3 GHz, for U.S.A. only
ATEX II 1/2 G EEx de [ia] IIC T6

Pressure rating

rating per pressure/temperature curves in manual
0.5 bar (7.25 psi maximum)

Further designs

Please add "-Z" to Order No. and specify Order code(s).

Acceptance test certificate: Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000

Inspection Certificate Type 3.1 per EN 10204

Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]:
Measuring-point number/identification (max. 16 characters) specify in plain text

Order No.

C) 7ML 5 4 1 2 -

0
1

A

A

B

C

0

0

1

0

1

2

3

A

B

A

D

E

F

G

J

0

1

Order code

C11

C12

Y15

Selection and Ordering data

Instruction manual

English

French

German

Note: The instruction manual should be ordered as a separate line item on the order.

Multi-language Quick start manual (Due to ATEX regulations, one Quick start manual is included with every product.)

This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.

Accessories

Handheld programmer for SITRANS LR 300, Intrinsically Safe, EEx ia

Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77"), for fastening on mounting-eye, one text line, (e.g. for Sensors)

Sanitary fitting clamp, stainless steel:

2" (50.8 mm)

3" (76.2 mm)

4" (101.6 mm)

Enclosure wrench

HART modem/RS-232 (for use with a PC and SIMATIC PDM)

HART modem/USB (for use with a PC and SIMATIC PDM)

RS 485 to RS 232 converter, not isolated, port powered

One metallic cable gland M20x1.5, rated -40 °C (-40 °F) to +80 °C (+176 °F) for General Purpose or ATEX EEx e installations (available for HART only)

One metallic cable gland M20x1.5, rated -40 °C (-40 °F) to +80 °C (+176 °F) with integrated shield connection (available for PROFIBUS PA)

¹⁾ Available with pressure rating option 1 only

²⁾ Includes European Radio and Industry Canada approvals, 5.8 GHz

³⁾ Available with communication option A only

C) Subject to export regulations AL: N, ECCN: EAR99

D) Subject to export regulations AL: N, ECCN: EAR99H

Order No.

C) 7ML1998-5CL05

C) 7ML1998-5CL14

C) 7ML1998-5CL34

C) 7ML1998-5QA85

C) 7ML5830-2AH

7ML1930-1BJ

7ML1830-1HD

7ML1830-1HE

7ML1830-1HF

7ML1830-1HB

D) 7MF4997-1DA

D) 7MF4997-1DB

C) 7ML1830-1HA

7ML1930-1AP

7ML1930-1AQ

SITRANS L Level instruments

Continuous measurement - Radar transmitters

SITRANS LR 300

Selection and Ordering data	Order No.
SITRANS LR 300, rod antenna version C) 7ML 5 4 1 3 -	
Pulse radar level instrument for liquids and slurries in process vessels and extreme or hazardous process conditions up to 20 m (65 ft).	
Antenna version	
PTFE	0
Process connection	
<u>Flange version (Flat faced, 316L Stainless Steel)</u>	
DN 50, PN 16, Type A, flat faced	AA
DN 80, PN 16, Type A, flat faced	BA
DN 100, PN 16, Type A, flat faced	CA
DN 150, PN 16, Type A, flat faced	DA
2" ASME, 150 lb, flat faced	FB
3" ASME, 150 lb, flat faced	GB
4" ASME, 150 lb, flat faced	HB
6" ASME, 150 lb, flat faced	JB
DN 50, PN 40, flat faced	AC
DN 80, PN 40, flat faced	BC
DN 100 PN 40, flat faced	CC
DN 150 PN 40, flat faced	DC
2" ASME 300 lb, flat faced ¹⁾	FD
3" ASME, 300 lb, flat faced	GD
4" ASME, 300 lb, flat faced	HD
6" ASME, 300 lb, flat faced	JD
JIS, DN 50, 10K	AE
JIS, DN 80, 10K	BE
JIS, DN 100, 10K	CE
JIS, DN 150, 10K	DE
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2238 standard.)	
<u>Threaded version (316L Stainless Steel)</u>	
1½" NPT (ANSI/ASME B1.20.1)	LA
2" NPT (ANSI/ASME B1.20.1)	MA
1½" BSPT (EN 10226-1)	LC
2" BSPT (EN 10226-1)	MC
1½" G (EN ISO 228-1)	LE
2" G (EN ISO 228-1)	ME
Antenna extension, or inactive shield length	
<u>Without antenna extension</u>	0
<u>PTFE extension</u>	
50 mm (1.97")	1
100 mm (3.94")	2
<u>Stainless steel 316L extension²⁾</u>	
100 mm (3.94")	3
150 mm (5.91")	4
200 mm (7.87")	5
250 mm (9.84")	6
Custom inactive shield length 101 mm to 1000 mm (in 1 mm increments) <u>Add order code Y01 and plain text: "Inactive shield length...mm"</u> ²⁾	7
Process Seal/Gasket	
Integral Gasket ³⁾ and ⁴⁾ 4)	0
FKM O-ring ⁵⁾	1
Enclosure/Cable inlet	
<u>Aluminum, Epoxy painted</u>	
2 x ½" NPT	0
2 x M20x1.5	1
<u>316L Stainless steel</u>	
2 x ½" NPT	2
2 x M20x1.5	3
Communication/output	
4 to 20 mA, HART, Modbus	A
PROFIBUS PA, Modbus	B

Selection and Ordering data	Order No.
SITRANS LR 300, rod antenna version C) 7ML 5 4 1 3 -	
Pulse radar level instrument for liquids and slurries in process vessels and extreme or hazardous process conditions up to 20 m (65 ft).	
Approvals	
General Purpose, CE, CSA _{US/C} ⁶⁾	A
CSA Class I, Div I, Groups A to G, CE ⁶⁾	D
ATEX II 1/2 G EEx de IIC T6, CE ⁷⁾	E
FM Class I, Div I, Groups A to G, FCC, 6.3 GHz, for U.S.A. only	F
General Purpose, FM, FCC, 6.3 GHz, for U.S.A. only	G
ATEX II 1/2 G EEx de [ia] IIC T6	J
Pressure rating	
rating per pressure/temperature curves in manual	0
0.5 bar (7.25 psi maximum)	1
Further designs	Order code
Please add "-Z" to Order No. and specify Order code(s).	
Acceptance test certificate: Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Inactive custom shield lengths: Enter the total length of the inactive shield in plain text description (in 1 mm increments).	Y01
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	Y15
Instruction manual	
English	C) 7ML1998-5CL05
French	C) 7ML1998-5CL14
German	C) 7ML1998-5CL34
Note: Instruction manual should be ordered as a separate line item on the order.	
Multi-language Quick start manual (Due to ATEX regulations, one Quick start manual is included with every product.)	C) 7ML1998-5QA85
This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.	
Accessories	
Handheld programmer for SITRANS LR 300, Intrinsically Safe, EEx ia	C) 7ML5830-2AH
Antenna rod, PTFE	7ML1830-1HC
Antenna extension, 50 mm (2"), PTFE	7ML1830-1CH
Antenna extension, 100 mm (4"), PTFE	7MH1830-1CG
Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77"), for fastening on mounting-eye, one text line, (e.g. for Sensors)	7ML1930-1BJ
Enclosure wrench	7ML1830-1HB
HART modem/RS-232 (for use with a PC and SIMATIC PDM)	D) 7MF4997-1DA
HART modem/USB (for use with a PC and SIMATIC PDM)	D) 7MF4997-1DB
RS 485 to RS 232 converter, not isolated, port powered	C) 7ML1830-1HA
One metallic cable gland M20x1.5, rated -40 °C (-40 °F) to +80 °C (+176 °F) for General Purpose or ATEX EEx e installations (available for HART only)	7ML1930-1AP
One metallic cable gland M20x1.5, rated -40 °C (-40 °F) to +80 °C (+176 °F) with integrated shield connection (available for PROFIBUS PA)	7ML1930-1AQ

1) For use with pressure rating option 1 only.

2) For use with all process connection options except AA, FB, AC, FD, AE, LA, LC and LE

3) Available with flat faced flange process connections only

4) Available with Antenna extension options 0, 1, 2 only

5) Not available for combination of flat faced flanges with Antenna extension options 0, 1 or 2

6) Includes European Radio and Industry Canada approvals, 5.8 GHz

7) Available with communication option A only.

C) Subject to export regulations AL: N, ECCN: EAR99

D) Subject to export regulations AL: N, ECCN: EAR99H

SITRANS LR 300

5

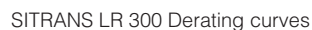
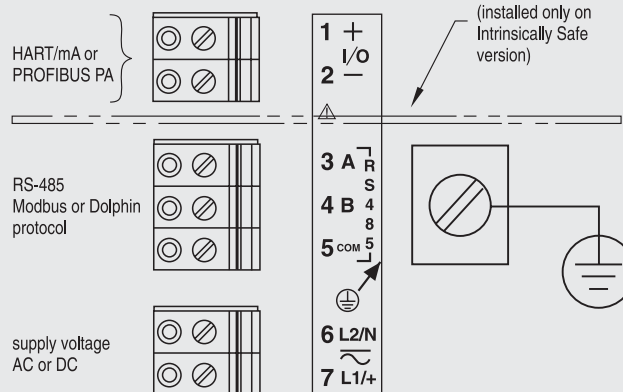


Diagram of the Intrinsically Safe version of the shield. The diagram shows the internal wiring and terminal block. The terminal block is labeled with the following connections:

- 1 +
- 2 -
- 3 A
- 4 B
- 5 COM
- 6 L2N
- 7 L1/L

The diagram also shows the internal wiring and the terminal block. The terminal block is labeled with the following connections:

- 1 +
- 2 -
- 3 A
- 4 B
- 5 COM
- 6 L2N
- 7 L1/L



- recommended torque on terminal clamping screws, 0.5 to 0.6 Nm
- ground shields at one end only
- 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
- a circuit breaker or switch in the building installation, marked as the disconnect switch, shall be in close proximity to the equipment and within easy reach of the operator

- Increased safety, EEx e version
 - solid 4
 - flexible stranded 2.5
- General safety or hazardous EEx d version
 - rigid 0.2 to 4
 - flexible stranded 0.2 to 2.5
 - AWG 24 to 12

Part number:
7ML5830-2AH



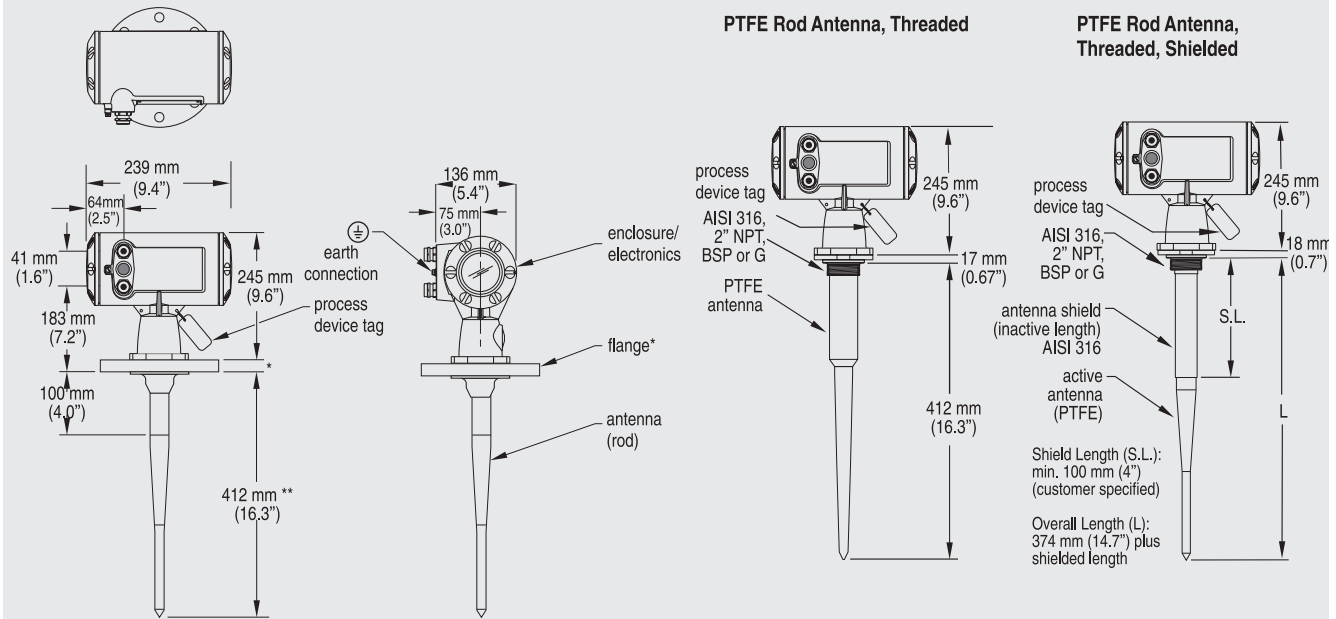
SITRANS LR 300 connections

SITRANS L Level instruments

Continuous measurement - Radar transmitters

SITRANS LR 300

Dimensional drawings



* Flange thickness 25 mm (1") nominal

**Standard length, 50 mm and 100 mm (2" and 4") antenna extensions available.

