Data sheet DS/LLT100–EN Rev.C

LLT100
Laser level transmitter

The new standard in industrial laser level transmitters

Measurement made easy

Customer benefits

The LLT100 is specifically made for industrial applications and harsh environments. It provides continuous, non-contact level measurement capabilities for process automation and inventory management in industries such as mining, aggregates, oil & gas, chemicals, food & beverages, power, pulp & paper, pharma, and water & waste water.

Optimize process or inventory management

- Precise measurement of any solid or liquid
- Independent of material properties

Low cost of ownership

- Fast and flexible installation
- No maintenance
- Single product configuration works for many applications

Main features

ABB brings laser level transmitters to the next level of non-contact measurements by packaging laser ranging technology with the required features for industrial applications. Using a pulsed laser to perform time of flight measurement, the LLT100 provides accurate distance measurements while being powered from the 4 – 20 mA loop. Available in aluminum or stainless steel body, it comes with a variety of process interfaces. It can meet the demands of hazardous area locations, high pressure and high temperature applications.

Convenient

- Easy setup function
- Articulated embedded graphical user interface
- 2-wire powered and HART 7 communication

Reliable

- Dust and fog penetration capabilities
- Accurate measurement at short and long distances
- Explosion-proof class 1, division 1 (zone 1)

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Product configurations

Base model

Ideal for measuring level of solids at up to 100 m (328 ft) and liquids at up to 30 m (98 ft) when the process is at normal pressures. Affordable, powerful level transmitter for a wide range of applications, even in hazardous areas.

Range	0.5 m to 100 m (2 ft to 330 ft)
Process fitting	ASME class 150, NPS 2 in. DN 50 PN 16 flat face
Operating temperature	–40 °C to +60 °C (–40 °F to +140 °F)
Process pressure	–1 bar to +2 bar (29 psi)
Typical accuracy	±11 mm (0.4 in.)

Hygienic model

Ideal for food and beverage or pharmaceutical applications. Model fitted with a 4 in. triclover clamp interface with hygienic certifications. As all models, available with aluminum or stainless steel enclosure.

Range	0.5 m to 100 m (2 ft to 330 ft)
Process fitting	4 in. triclover clamp
Operating temperature	–40 °C to +60 °C (–40 °F to +140 °F)
Process pressure	–1 bar to +1 bar (15 psi)
Typical accuracy	±11 mm (0.4 in.)

High pressure models

Ideal for high-pressure applications. Same performance as the base model, but fitted with a choice of pressure rated flanges. As all models, is certified for use in hazardous area zone 1, and laser beam can be sent safely into zone 0.

Range	0.5 m to 100 m (2 ft to 330 ft)
Process fitting	ASME class 150/300, NPS 2 in. DN 50 PN 16/40 raised face
Process temperature	–40 °C to + 60 °C (–40 °F to +140 °F)
Process pressure	–1 bar to +50 bar (720 psi)
Typical accuracy	±11 mm (0.4 in.)

Accessories

Configure the transmitter to a wide variety of applications.

- Dust tube
- Purge ring for dust tube
- Cooling tube (increases maximum process temperature to 280 °C [535 °F])
- Heated window (requires 4-wire power)
- Through-The-Glass HMI
- Flange adapters
- Alignment laser pointer
- External relays
- Rotating bracket, swivel flange

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Functions

Advantages/New features

Laser transmitter measures any solid or liquid, from close to long range. A single instrument meets a wide variety of demands.

LLT100 can be used in challenging hazardous areas, in the presence of potentially explosive dust or gases. It can be used in class 1/division 1 (zone 1) environments. For zone-rated environments, the LLT100 configured with fused glass process flanges is approved for forming the barrier between zone 1 and zone 0 and sending its laser beam into zone 0.

For dusty applications, the dust tube prevents dust deposition on the window, removing the need for preventive maintenance. For very high dust level, a purge ring can be added to the dust tube to provide an air flow to enhance the dust protection.

High temperature applications are made possible by the addition of a cooling tube. Cooling tubes with different process interfaces and different pressure ratings are available.

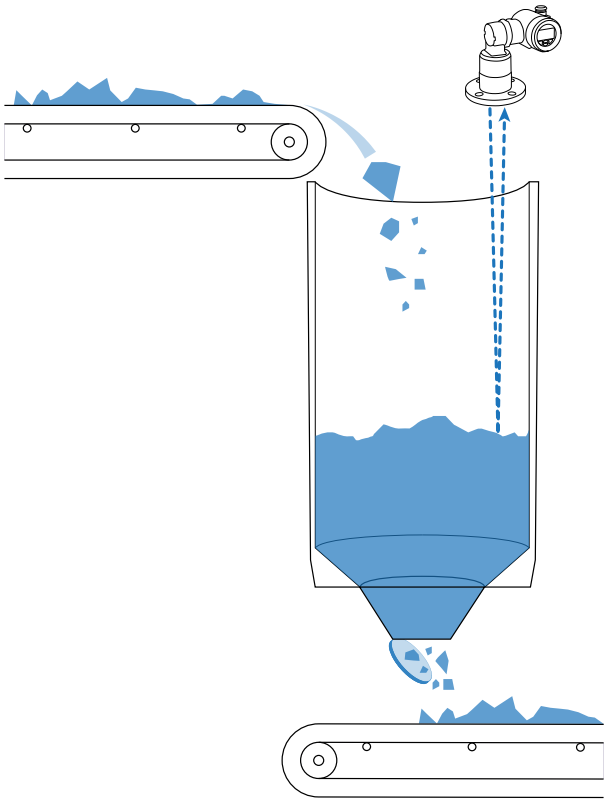
Solid application

A typical LLT100 application is to measure the level of solid materials in silos or tanks. They can be found in various industries such as mining, aggregates, chemicals, food and beverages, power, pulp and paper, pharma.

The high sensitivity of the LLT100 allows level measurement in tall vessels. Its narrow laser beam can be precisely aimed around obstacles, and instrument installation is very flexible, as the transmitter can be placed close to the wall or be aimed at an angle inside the vessel.

Finally, material build-up on vessel sides as no effect on the measurement, as the narrow beam (beam angle <0.3 degrees) does not interact with the vessel sides.

The new LLT100 sets the new standard for industrial laser level measurement.



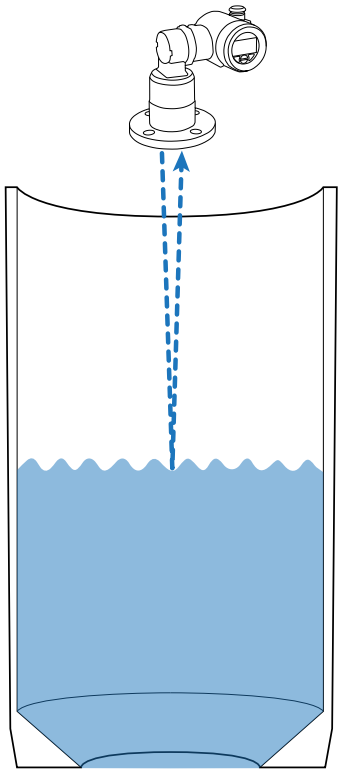
Liquid application

Liquid measurement represents a large portion of level applications. LLT100 can detect any liquid, even transparent liquids.

The LLT100 comes with the heated window option to prevent condensation on its optics.

In liquid application, the laser beam must be as perpendicular as possible to the liquid surface. Alignment of the beam should be within ±5 degrees from vertical. To help in performing the alignment of the beam, the swivel flange accessory is very convenient as it provides a simple and efficient way to precisely align the laser beam.

For high pressure applications, the LLT100 comes with a variety of process flanges, rated at pressures up to 50 bar (725 psi).



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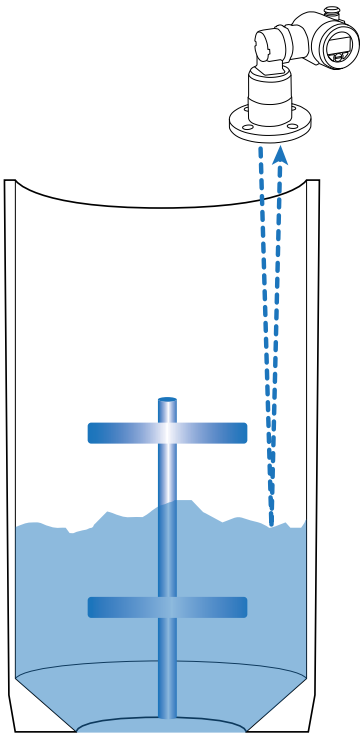
Mixer/Obstruction

Another challenge in the field of level measurement is the reliable measurement in the presence of obstructions or mixing blades.

The narrow beam of the LLT100 allows to install the device at almost any place at the top of the vessel. Coupled with the fact that the laser beam is very narrow (<0.3 degrees), it can easily be positioned between the vessel wall and the edge of the mixer, providing reliable measurements. When it is not possible to avoid the mixer blades, the LLT100 has advanced processing functions that can still perform the measurement reliably by efficiently tracking the real level when the mixer crosses the path of the laser beam.

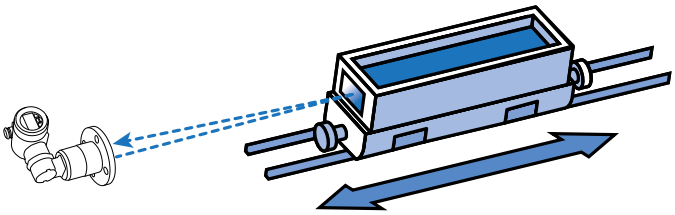


Positioning

Another application for the LLT100 is to measure the position of wagons, tripper cars or other moving objects in order to position them accurately.

A tripper car being positioned in the wrong place when it unloads its cargo causes wasted time, damage, and lost time. Similarly, the LLT100 can be used to prevent collisions by moving cranes and other machinery.

The LLT100 can provide accurate position measurement at distances up to 200 m (660 ft) with the added use of a reflector.



Specification

Measurement

Range

0.5 m to 30 m (2 ft to 100 ft) for liquids
0.5 m to 100 m (2 ft to 330 ft) for solids
0.5 m to 200 m (2 ft to 660 ft) for positioning applications with reflective target

Resolution

5 mm (0.2 in.)

Typical accuracy

±11 mm (0.4 in.)

Measuring beam

Laser wave length: 905 nm, eye safe, Class 1

Laser beam divergence

< 0.3°

Environmental conditions

Operating temperature

–40 °C to +60 °C (–40 °F to +140 °F)

Storage temperature

–40 °C to +85 °C (–40 °F to +185 °F)

Survival temperature

–40 °C to +80 °C (–40 °F to +175 °F)

Process pressure

Base model:	–1 bar to +2 bar (29 psi)
Hygienic model:	–1 bar to +1 bar (15 psi)
Pressure-rated model:	–1 bar to +49.6 bar (719 psi), depending on flange

Output

Analog

4 – 20 mA, NAMUR compliant

Digital

HART 7 (multi-variable output)

Communication

Local HMI, EDD/DTM, handheld

Power supply

Powered from the loop

4 – 20 mA, 16 VDC to 42 VDC (If using HART, minimum input voltage is 21 VDC)

Heated lens option

24 VDC (3 W)

Mechanical

Enclosure material

Powder coated aluminum (standard), 316L stainless steel (option)

Dimensions (W × H × D)

Universal – flat flange: 247 mm × 215 mm × 165 mm (9.7 in. × 8.5 in. × 6.5 in.)
Class 150 – raised flange: 240 mm × 242 mm × 154 mm (9.5 in. × 9.5 in. × 6.1 in.)
Class 300 – raised flange: 247 mm × 242 mm × 165 mm (9.7 in. × 9.5 in. × 6.5 in.)
DIN PN 16 – raised flange: 247 mm × 242 mm × 165 mm (9.7 in. × 9.5 in. × 6.5 in.)
DIN PN 40 – raised flange: 247 mm × 242 mm × 165 mm (9.7 in. × 9.5 in. × 6.5 in.)
Hygienic flange: 223 mm × 215 mm × 137 mm (8.8 in. × 8.5 in. × 5.4 in.)

Weight of standard model

Aluminum enclosure with universal aluminum flange: 3.7 kg (8.2 lb)
316L stainless steel enclosure with universal stainless steel flange: 8.6 kg (19.0 lb)

Weight of pressure rated model

Aluminum enclosure: 6.7 kg to 7.2 kg (14.8 lb to 15.9 lb) depending on flange
316L stainless steel enclosure: 10.0 kg to 10.5 kg (22.1 lb to 23.2 lb) depending on flange

Weight of hygienic model

Aluminum enclosure: 5.8 kg (12.8 lb)
316L stainless steel enclosure: 9.1 kg (20.1 lb)

Protection class

IP66/IP67/Nema 4X (for all versions except flange H which is IP66/type 4X)

Process fitting

Flange (ASME 2 in., DN50), hygienic fitting/triclover 4 in. (ISO2852)

Wetted parts

Aluminum, cemented borosilicate window (base model)
316L SST, cemented borosilicate window (base model, hygienic model)
316L SST, fused borosilicate window (high pressure models)

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Operation

Display

Integrated 128 × 64 pixels LCD display with TTG (Through-The-Glass) interface

Software features

Volume computation, damping, filtering, thresholds/alarms, user-defined display (with HMI)

Optical

Total optical aperture

50 mm (2 in.)

Standard window material

Tempered borosilicate cemented glass

Pressure rated window material

Borosilicate fused glass

Lens impact resistance

Impact tested at 4 joules

Beam divergence

$\Delta < 0.3°$

Beam spot width

Distance	1 m (3 ft)	3 m (10 ft)	5 m (16 ft)	10 m (33 ft)	20 m (66 ft)	30 m (98 ft)	50 m (164 ft)	100 m (328 ft)	150 m (492 ft)
Approx. spot width	0.7 cm (0.3 in)	2.0 cm (0.8 in)	3.3 cm (1.3 in)	6.6 cm (2.6 in)	13.5 cm (5.3 in)	20 cm (7.9 in)	34 cm (13.4 in)	69 cm (27.2 in)	108 cm (42.5 in)

Beam direction

90° ± 5° from mounting flange for measurements of liquids

Laser

Measuring laser

905 nm near infrared pulsed semiconductor laser
7.1 µW average power output
45 W peak power output

Measuring laser life expectancy

25 years typical MTBF

Measuring laser safety

Always on IEC60825-1 Ed 2, 2007
A class 1 laser is safe for all conditions of use.

Approvals

CE	ATEX Directive 2014/34/EU Electromagnetic compatibility Directive (EMC) 2014/30/EU Low Voltage Directive (LVD) 2014/35/EU Restriction of Hazardous Substances Directive (RoHS) 2011/65/EU	Applied standards: EN 61326-1:2013, EN/IEC 60529, EN/IEC 61010-1:2010, EN/IEC 60825-1
ATEX, IECEx, KCs	ATEX: FM16ATEX0032X, IECEx FMG 16.0023X, KCs registration no: 17-AV4BO-0305X For flanges A and B: II 2 (1) G Ex db [op is T6 Ga] IIC T6...T5 Gb –50 °C ≤ Ta ≤ +75 °C...+85 °C II 2 (1) D Ex tb [op is Da] IIIC T85°C...T100°C Db –50 °C ≤ Ta ≤ +75 °C...+85 °C - IP66/IP67 Ex db [op is T6 Ga] IIC T6...T5 Gb –50 °C ≤ Ta ≤ +75 °C...+85 °C Ex tb [op is Da] IIIC T85°C...T100°C Db –50 °C ≤ Ta ≤ +75 °C...+85 °C - IP66/IP67 For flanges C, D, F, and G: II 1/2 (1) G Ex db [op is T6 Ga] IIC T6...T5 Ga/Gb –50 °C ≤ Ta ≤ +75 °C...+85 °C II 2 (1) D Ex tb [op is Da] IIIC T85°C...T100°C Db –50 °C ≤ Ta ≤ +75 °C...+85 °C - IP66/IP67 Ex db [op is T6 Ga] IIC T6...T5 Ga/Gb –50 °C ≤ Ta ≤ +75 °C...+85 °C Ex tb [op is Da] IIIC T85°C...T100°C Db –50 °C ≤ Ta ≤ +75 °C...+85 °C - IP66/IP67	EN/IEC 60079-0, EN/IEC 60079-1, EN/IEC 60079-0, EN/IEC 60079-1, EN/IEC 60079-31, EN/IEC 60529
FM	FM16US0106X, FM16CA0060X US & CANADA, ENCL. Type 4X, IP66/IP67, “Seal not required” - “DUAL SEAL” For flanges A, B, C, D, F, and G and only for housings AI and SI: US: Class I, Division 1, Groups A, B, C, D T5 –50 °C ≤ Ta ≤ 85 °C US: Class I, Division 1, Groups A, B, C, D T6 –50 °C ≤ Ta ≤ 75 °C CAN: Class I, Division 1, Groups B, C, D T5 –50 °C ≤ Ta ≤ 85 °C CAN: Class I, Division 1, Groups B, C, D T6 –50 °C ≤ Ta ≤ 75 °C Class II/III, Division 1, Groups E, F, G T5 –50 °C ≤ Ta ≤ 85 °C Class II/III, Division 1, Groups E, F, G T6 –50 °C ≤ Ta ≤ 75 °C For flanges A, B, C, D, F, and G and only for housings AM and SM: US only: Class I, Division 1, Groups A, B, C, D T5 –50 °C ≤ Ta ≤ 85 °C US only: Class I, Division 1, Groups A, B, C, D T6 –50 °C ≤ Ta ≤ 75 °C US only: Class II/III, Division 1, Groups E, F, G T5 –50 °C ≤ Ta ≤ 85 °C US only: Class II/III, Division 1, Groups E, F, G T6 –50 °C ≤ Ta ≤ 75 °C For flanges A and B: Class I, Zone 1, AEx/Ex db [op is T6 Ga] IIC T6...T5 Gb –50 °C ≤ Ta ≤ +75 °C...+85 °C Zone 21, AEx/Ex tb [op is Da] IIIC T85°C...T100°C Db –50 °C ≤ Ta ≤ +75 °C...+85 °C For flanges C, D, F, and G: Class I, Zone 0/1, AEx/Ex db [op is T6 Ga] IIC T6...T5 Ga/Gb –50 °C ≤ Ta ≤ +75 °C...+85 °C Zone 21, AEx/Ex tb [op is Da] IIIC T85°C...T100°C Db –50 °C ≤ Ta ≤ +75 °C...+85 °C	FM Class 3600:2011, FM Class 3615:2006, FM Class 3616:2011, FM Class 3810:2005, ANSI/ISA 61010-1:2012, ANSI/ISA 60079-0:2013, ANSI/UL 60079-1:2015, ANSI/ISA 60079-26: 2011, ANSI/ISA 60079-28:2013, ANSI/ISA 60079-31:2015 , ANSI/ISA 12.27.01:2011, ANSI/NEMA 250:2014, ANSI/IEC 60529:2004 CSA-C22.2 No. 0.4:2013, CSA-C22.2 No. 0.5:2012, CSA-C22.2 No. 25:2014, CSA-C22.2 No. 30:2012, CSA-C22.2 No. 94:2011, CAN/CSA-C22.2 No. 60079-0:2015, CAN/CSA-C22.2 No. 60079-1:2011, CAN/CSA-C22.2 No. 60079-31:2015, CSA- C22.2 No. 60529:2015,CAN/CSA-C22.2 No. 61010-1:2012
CSA	CLASS - C363186 - ELECTRICAL EQUIPMENT FOR MEASUREMENT USE - Certified to US Standard CLASS - C363106 - ELECTRICAL MEASUREMENT AND TEST EQUIPMENT - Certified to CAN Standard	CAN/CSA-C22.2 No. 61010-1-12 UL Std. No. 61010-1 (3rd Edition)
3A	3-A Certificate authorization number: 3500	Applied standard 3-A #46-03 Sanitary standard for refractometers and energy absorbing optical sensors for milk and milk products

LLT100
Laser level transmitter

Dimensions

Dimensions in mm (in.)

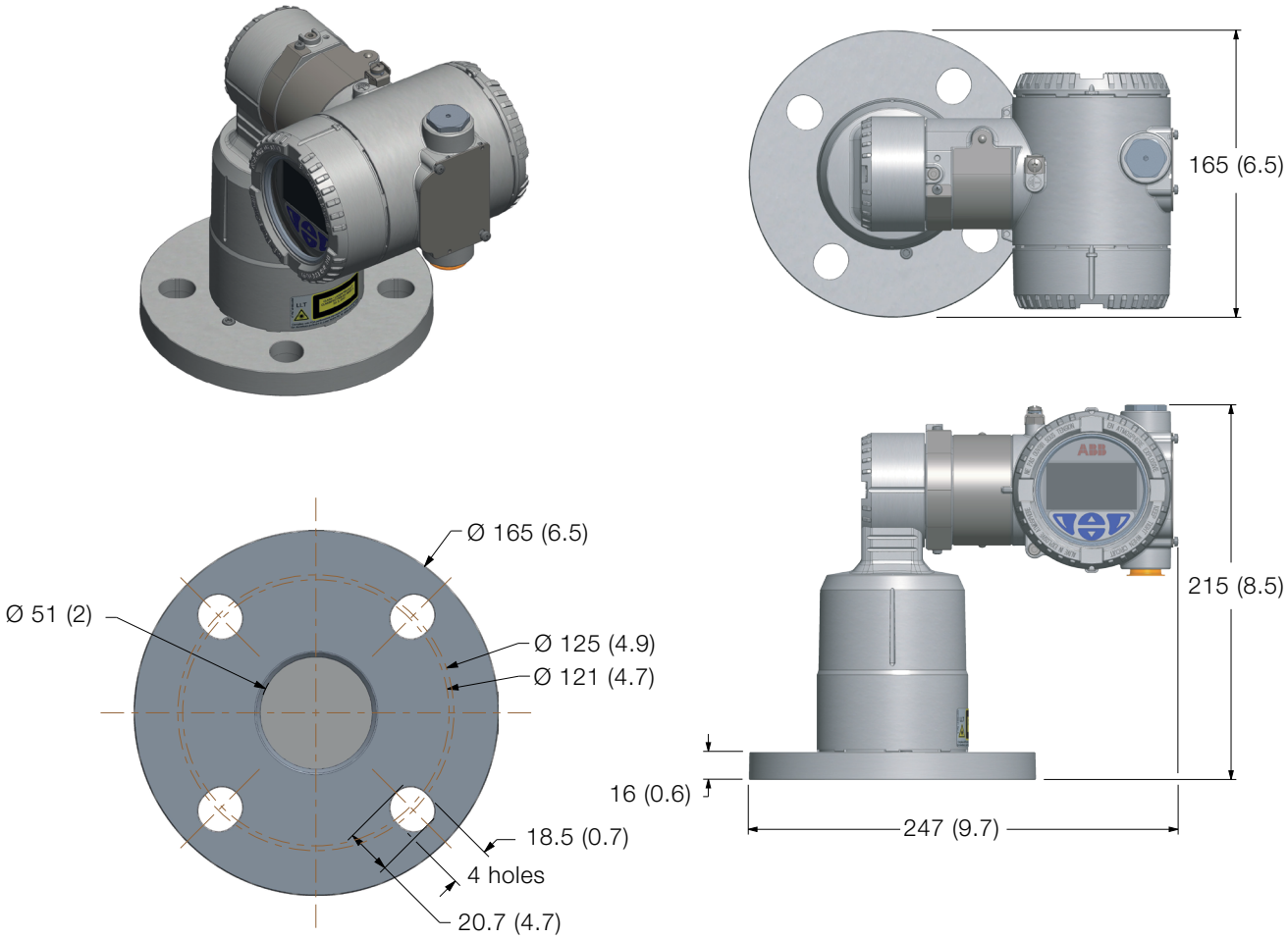

Fig. 1: LLT100 with universal flange (aluminum and stainless steel)

Dimensions in mm (in.)

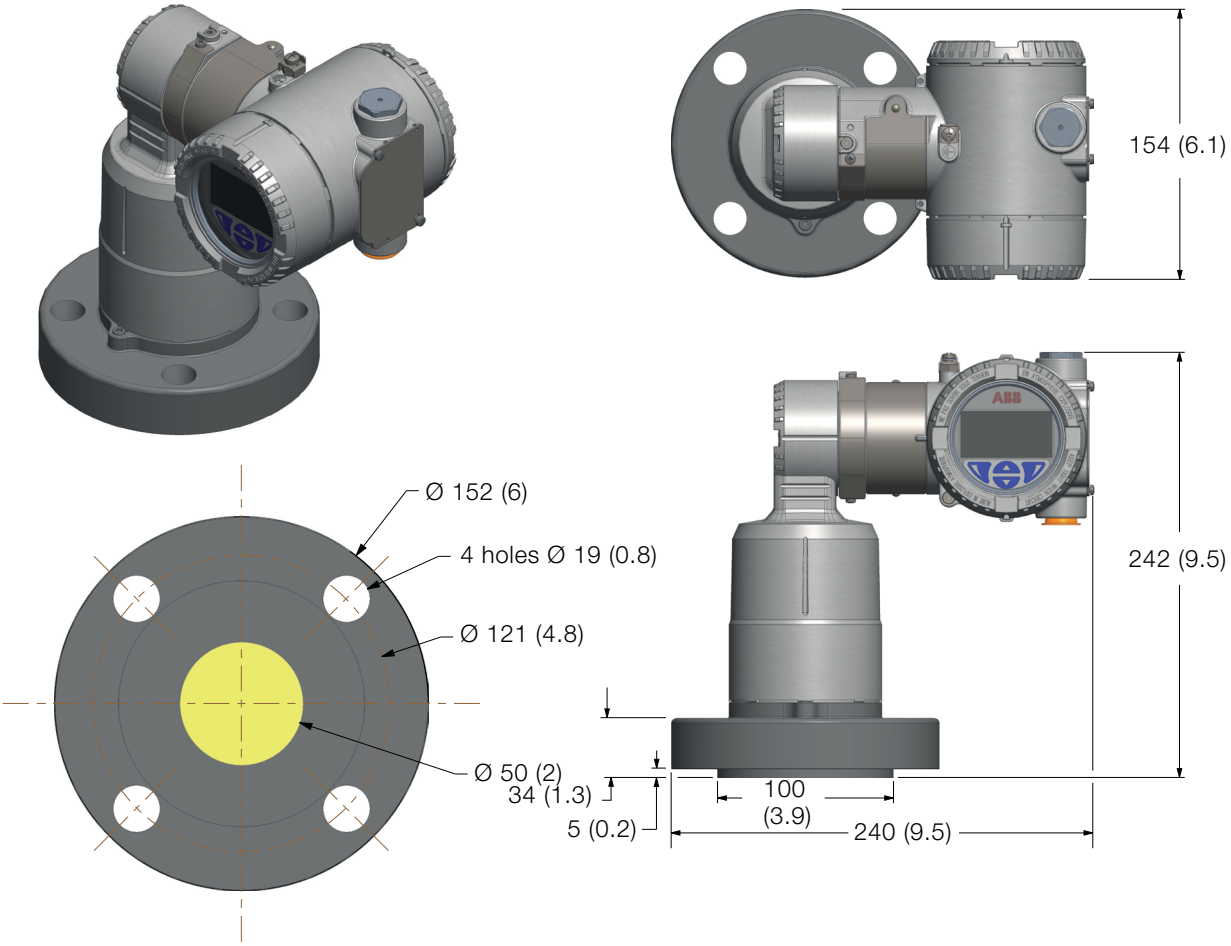

Fig. 2: LLT100 with class 150 flange

LLT100
Laser level transmitter

Dimensions in mm (in.)

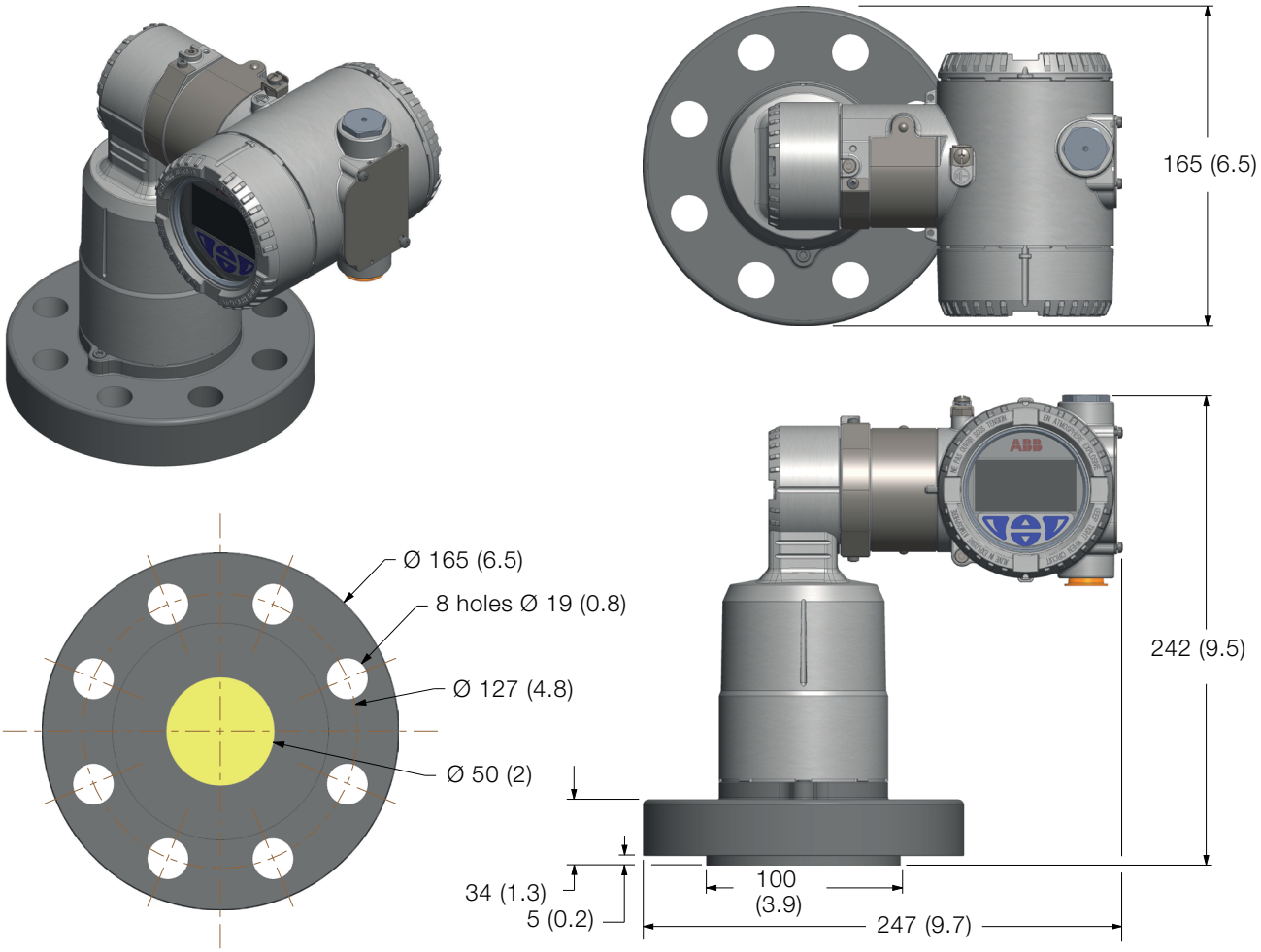

Fig. 3: LLT100 with class 300 flange

Dimensions in mm (in.)

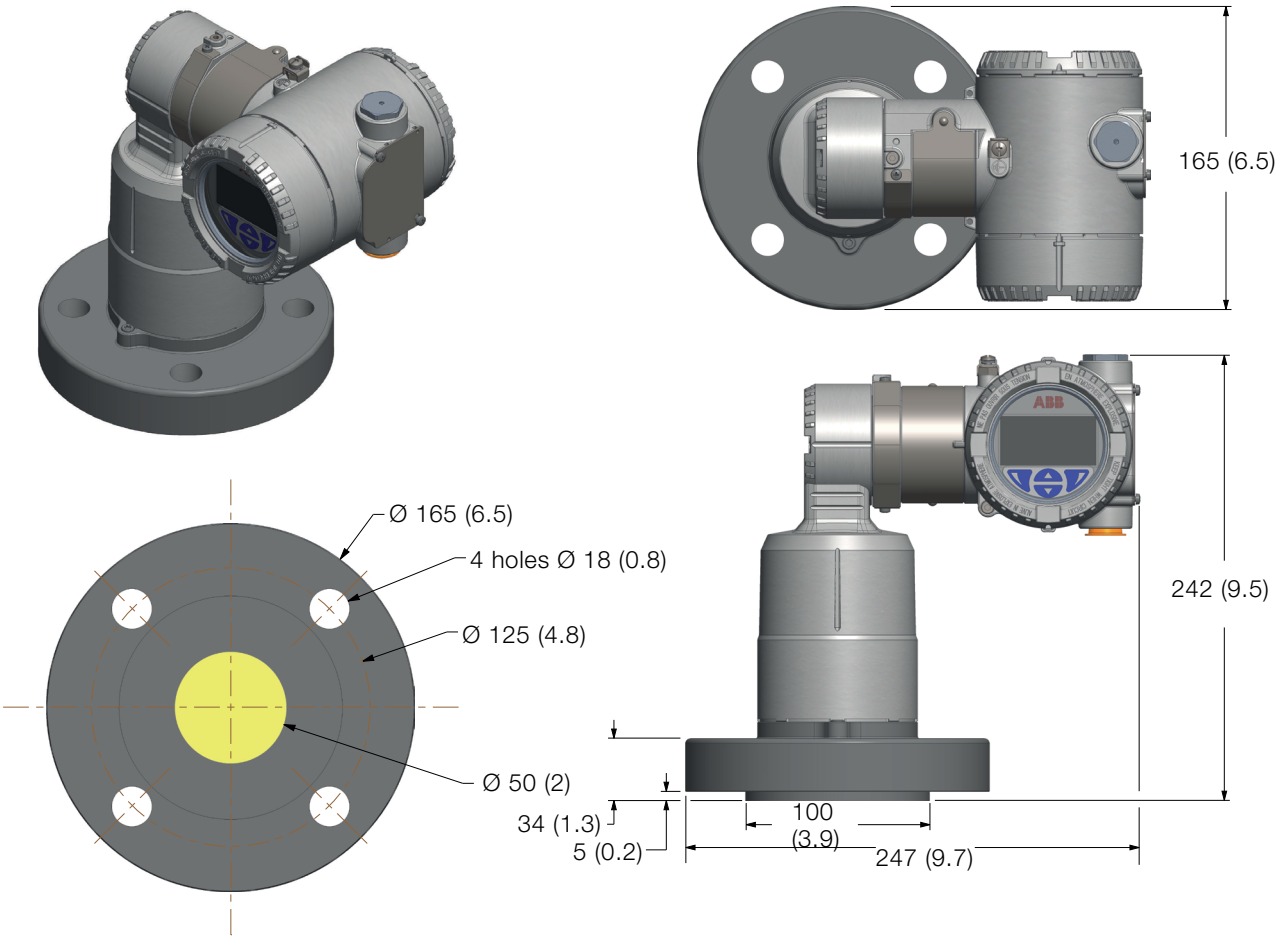

Fig. 4: LLT100 with PN16 / PN 40 flange

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Laser level transmitter

Dimensions in mm (in.)

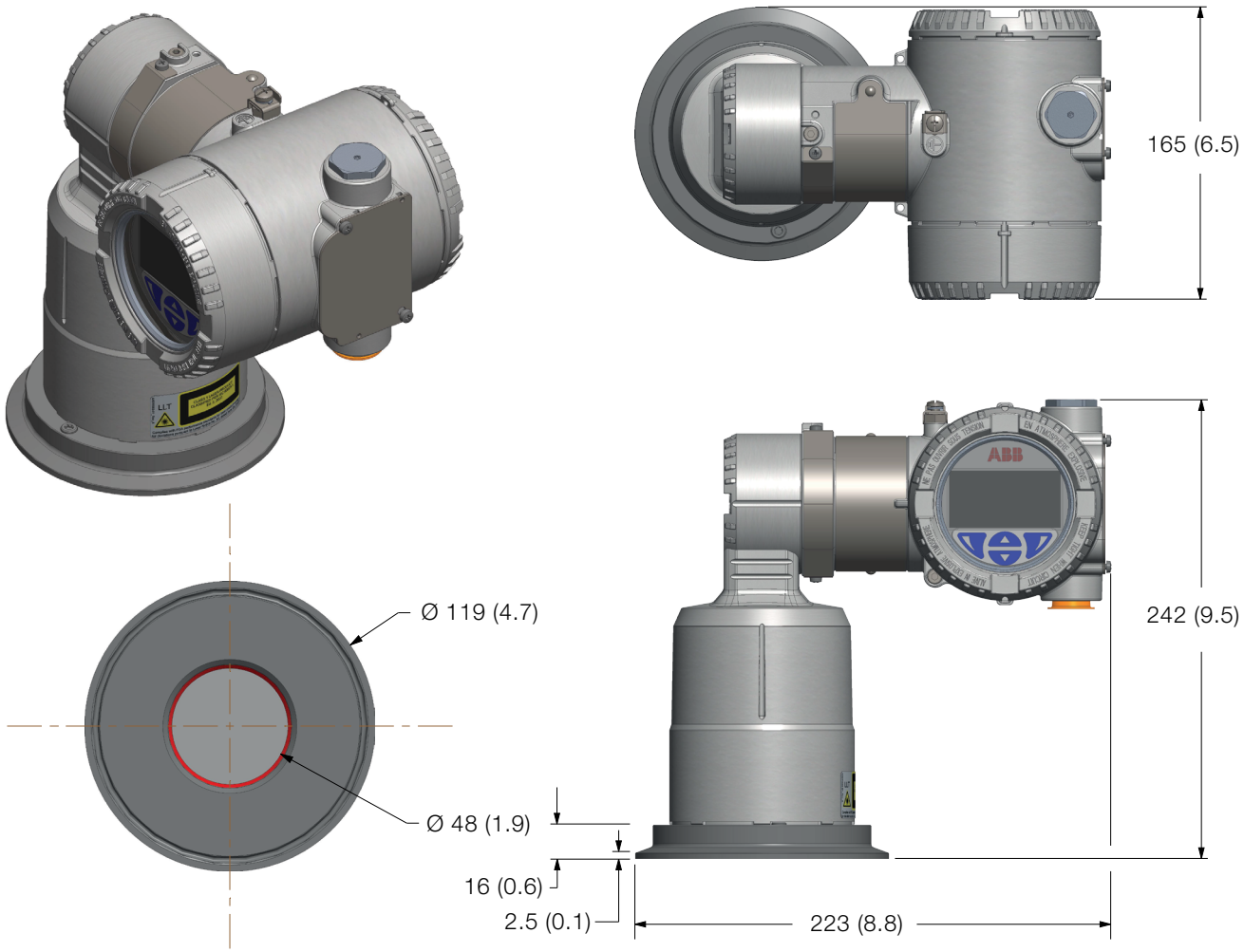
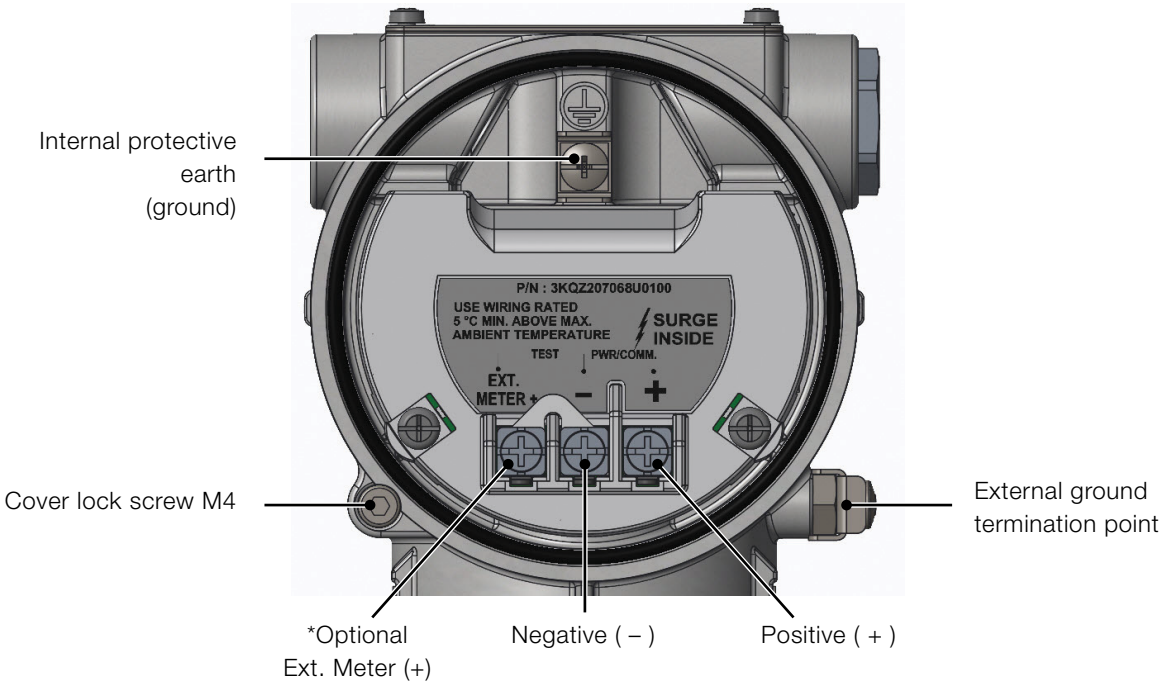


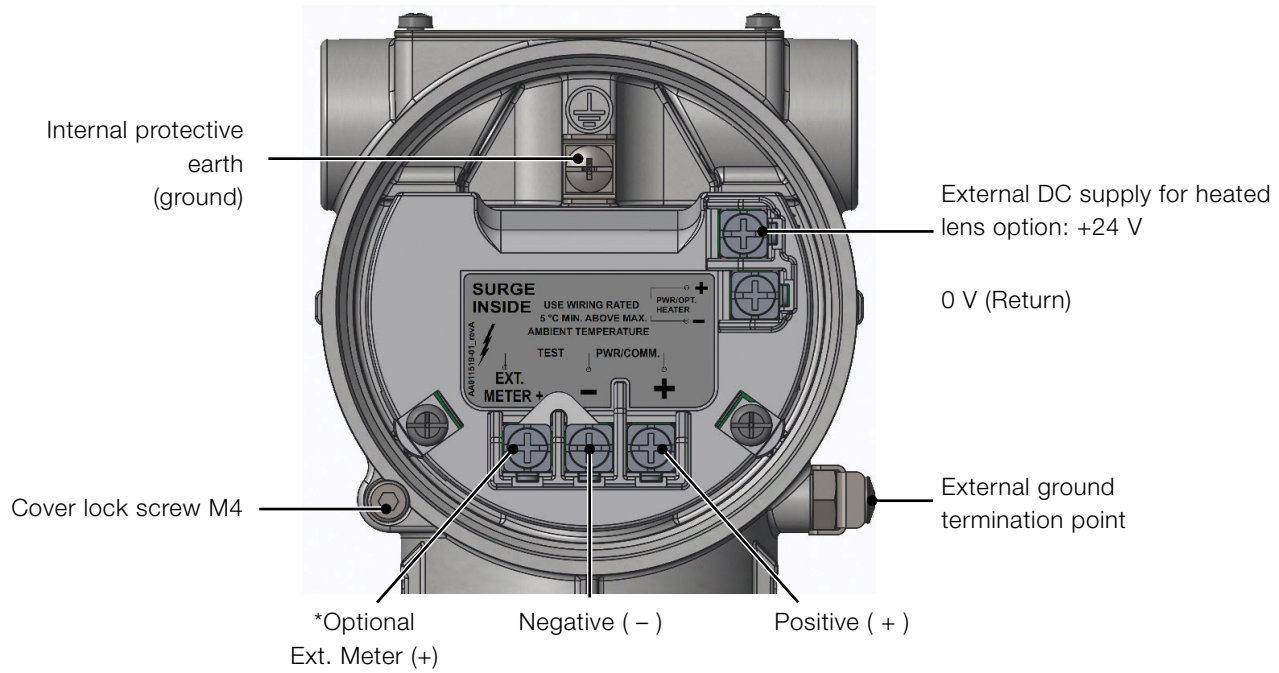
Fig. 5: LLT100 with triclover flange

Interface

HART terminal – 2 wires



HART terminal with heater option – 2 + 2 wires



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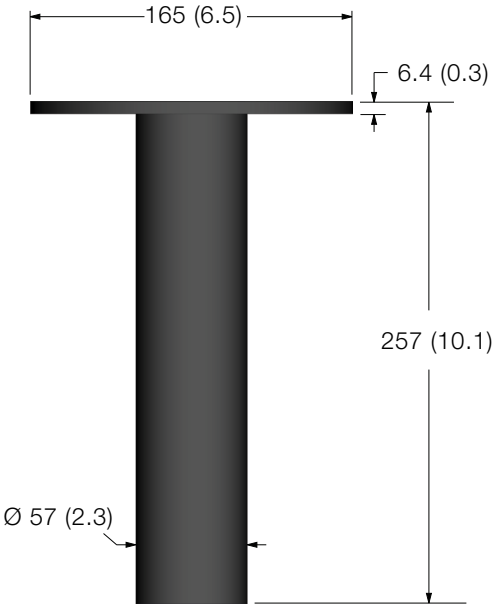
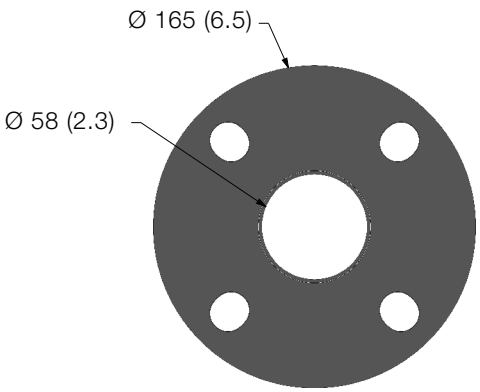
Accessories

Dust tube

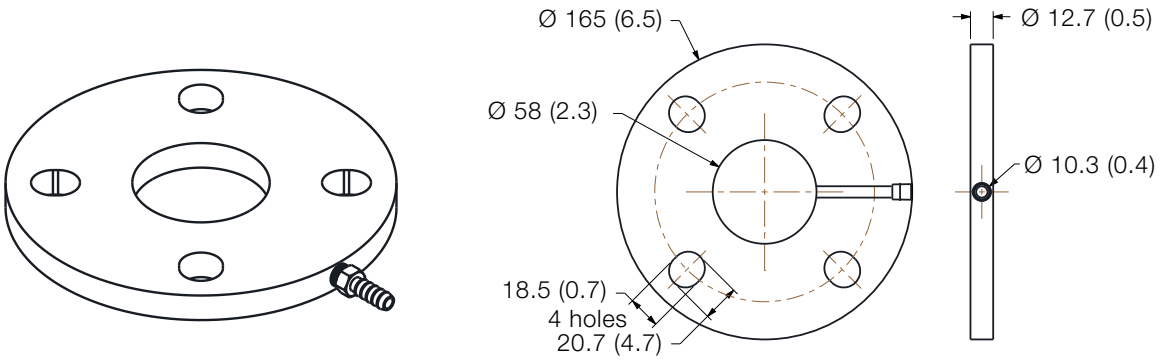
Dimensions in mm (in.)



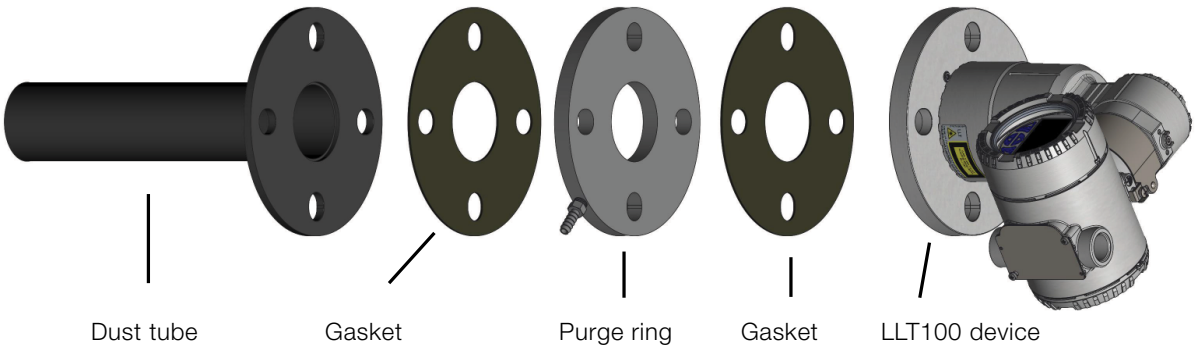


Purge ring

Dimensions in mm (in.)



Dust tube assembly with purge ring



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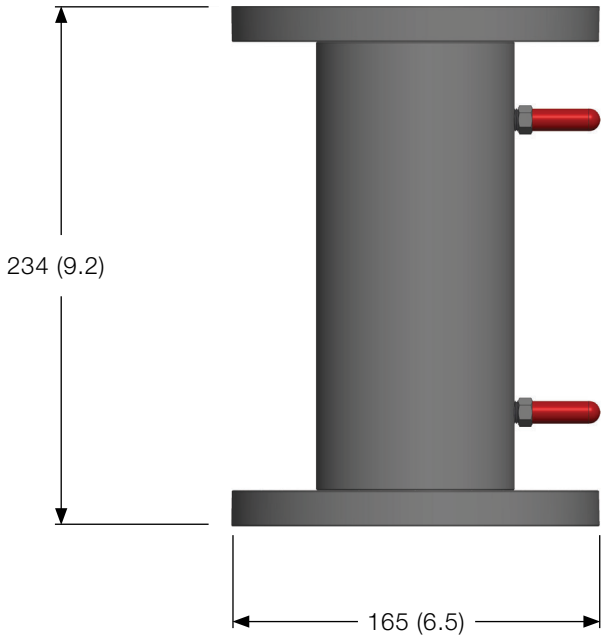
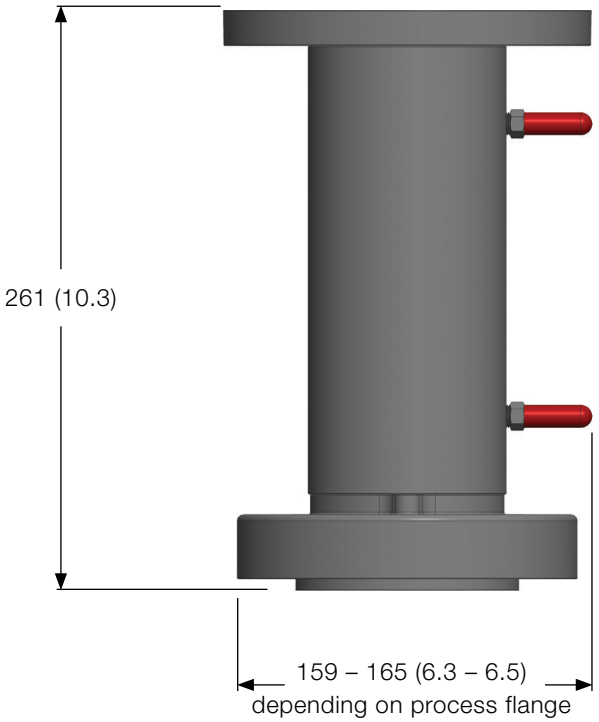
Cooling tube
Dimensions in mm (in.)



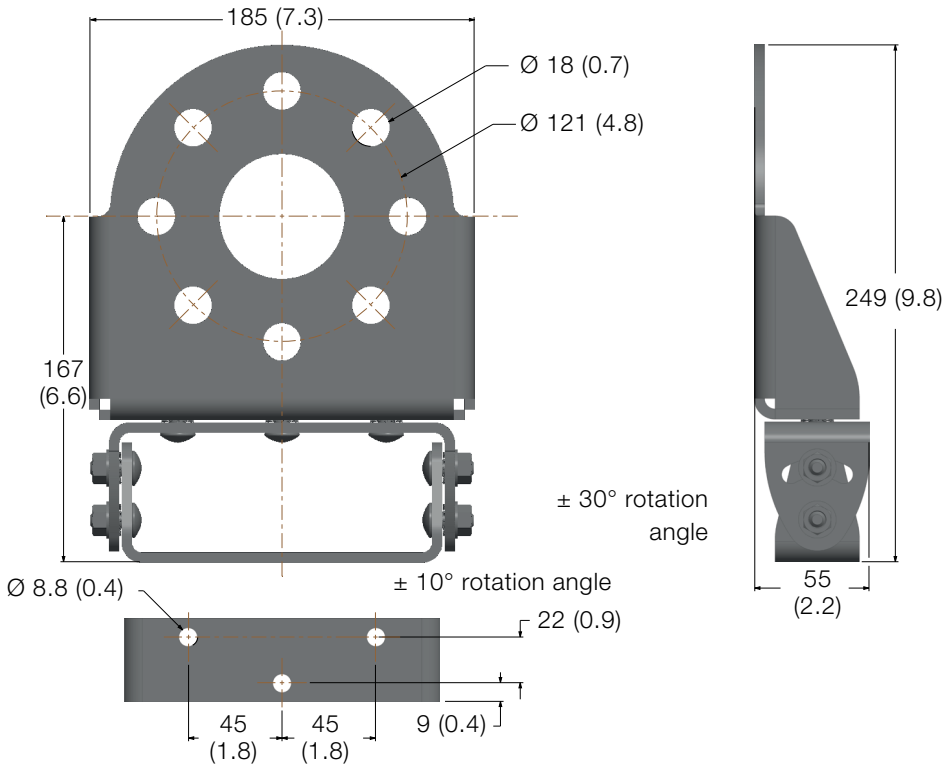
Cooling tube with universal flange



Cooling tube with pressure rated flange

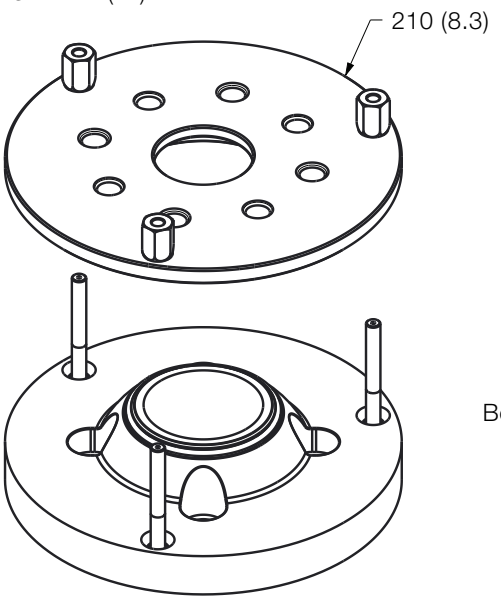
Adjustable pivot bracket

Dimensions in mm (in.)

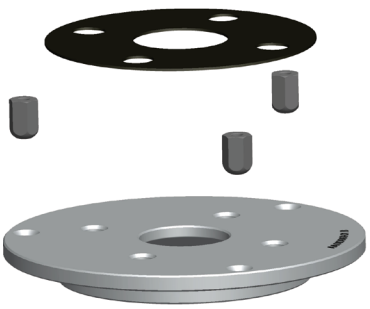


Adjustable swivel flange

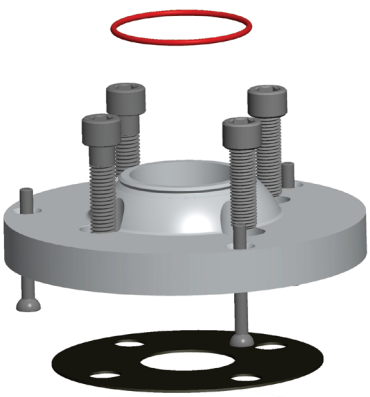
Dimensions in mm (in.)



Top flange



Bottom flange



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Accessories — specifications

Dust tube

Base plate diameter
165 mm (6.5 in.) mounts on LLT100 standard flange

Length
257 mm (10.1 in.)

Material
316 Stainless steel

Gasket material
Black compressible Buna-N rubber durometer rating shore 60A

Function
Static air space prevents dust buildup, can be purged. Offset from hot process interface to allow convection cooling, can be purged.

Flange reducer

Side A	2 in. ANSI class 150 raised face flange			DN50 PN40 raised face flange		
Side B raised face	3 in. ANSI class 150	4 in. ANSI class 150	6 in. ANSI class 150	DN80 PN40	DN100 PN40	DN150 PN40
Side B flat face	3 in. ANSI class 150	4 in. ANSI class 150	6 in. ANSI class 150	DN80 PN40	DN100 PN40	DN150 PN40
Material	304 Stainless steel					

Adjustable swivel flange

Outer diameter
210 mm (8.3 in.)

Mounting bolt pattern
3 bolt holes, 10 mm (0.4 in.) diameter

Tilt angle for aiming
Continuously adjustable from 0° to 6°

Material
Aluminum

Adjustable pivot bracket

Overall dimensions
185 mm × 249 mm × 55 mm (7.3 in. × 9.8 in. × 2.2 in.)

Opening diameter
60 mm (2.4 in.)

Mounting plate thickness
5 mm (0.2 in.)

Mounting bolt
4× HHCS 5/8-11 × 2 SS + 8× Washers + 2× lock washers + 4× nuts, bolt hole 8 × 18 mm (0.7 in.)

Reflector

Function
Reflective panel for positioning applications up to 200 m (656 ft)

Size
90 cm × 90 cm (36 in. × 36 in.)

Material
Aluminum with reflective paint

Cable glands

Description
Ex cable glands with ½ in. NPT or M20 thread size
Ex C1/D1 cable glands with ½ in. NPT or M20 thread size

Demo kit

Description
Rugged carrying case with LLT100, dust tube, battery pack, laser pointer tool

External laser pointer tool

Function
Laser pointer accessory used for targeting and aiming purpose.

Pointing laser
650 nm wavelength
Less than 1 mW output power

Pointing laser safety
Class 2M

Ordering information

Base model	LLT100	.XX	.X	.X	.X	.XX		.XXX	.XXX
Body and electrical connection									
Aluminum body – M20 × 1.5		AM							
Stainless steel body – M20 × 1.5		SM							
Aluminum body – ½ in. NPT		AI							
Stainless steel body – ½ in. NPT and electrical connection		SI							
Demo kit		DEMO							
Process flange									
ASME 2 in. class 150/DIN 50 mm PN16 bolt pattern, flat face, alu, cem. window			A						
ASME 2 in. class 150/DIN 50 mm PN16 bolt pattern, flat face, SS, cem. window			B						
ASME 2 in. class 150, SS, raised face, fused window			C						
ASME 2 in. class 300, SS, raised face, fused window			D						
DIN 50mm PN16, SS, raised face, fused window			F						
DIN 50mm PN40, SS, raised face, fused window			G						
Triclover 4 in., SS, cem. window			H						
Heated window									
No heated lens				N					
With heated lens – requires 24 V input				H					
Communication protocol									
4 – 20 mA HART					10				
Display									
None – (blind cover)						L0			
Digital LCD integral display with TTG (Through-The-Glass) activated keypad						L5			
Additional order codes									
Explosion Protection Certifications (multi-choice)									
None									
ATEX (Ex d Cat 1/2G and 2D)								E01	
IECEx (Ex d Cat 1/2G and 2D)								E02	
ATEX (Ex d Cat 2G and 2D)								E05	
IECEx (Ex d Cat 2G and 2D)								E06	
FMus (Ex d CI, CII, CIII D1) Groups ABCDEFG								E03	
cFM (Ex d CI, CII, CIII D1) Groups BCDEFG								E04	
KCs (Ex d Cat 1/2G and 2D)								E07	
KCs (Ex d Cat 2G and 2D)								E08	
Cable glands and plugs									
ATEX/IECEx C1/D1 Cable gland NPT-½ and stopping plug									G01
ATEX/IECEx C1/D1 Cable gland M20 and stopping plug									G02
ATEX/IECEx Cable gland NPT-½ and stopping plug									G03
ATEX/IECEx Cable gland M20 and stopping plug									G04

LLT100
Laser level transmitter

Accessory options — tube (multi-choice)	.XXXX	.XXXX	.XXXX	.XXXX	.XXXX	.XXX	.XXXX
Dust tube	P901						
Cooling tube, no window, no pressure rating	P920						
Cooling tube, with window, no pressure rating	P921						
Cooling tube, process interface NPS 2 in. class 150 flange with window	P922						
Cooling tube, process interface NPS 2 in. class 300 flange with window	P923						
Cooling tube, process interface DN 50 PN40 flange with window	P924						
Accessory options — bracket							
Rotating bracket		A900					
Swivel flange		A910					
Accessory options							
Purge ring for dust tube			P910				
Dry-contact relay (4 – 20 mA HART) (qty 2)			DCMA				
Laser alignment tool			LAS				
Adaptor to LM80 bolt pattern			ADA				
Gaskets and o-rings							
Gasket (qty 2) for flat face process flange (A or B) BUNA-N				G900			
Triclover o-ring (qty 10), 4 in. diameter				G901			
Process flange converter							
Stainless steel 3 in./DN80 adaptor plate, class 150 and DN80/PN6 bolt pattern, non-pressure rated					PC03		
Stainless steel 4 in./DN100 adaptor plate, class 150 and DN100/PN10 bolt pattern, non-pressure rated					PC04		
Stainless steel 6 in./DN150 adaptor plate, class 150 and DN150/PN10 bolt pattern, non-pressure rated					PC06		
3 in. raised face ANSI class 150 flange converter					FC04		
4 in. raised face ANSI class 150 flange converter					FC05		
6 in. raised face ANSI class 150 flange converter					FC06		
DIN80 raised face PN10 flange converter					FC10		
DIN100 raised face PN10 flange converter					FC11		
DIN150 raised face PN10 flange converter					FC12		
Certificate							
Material traceability certification						MTC	
Certificate of origin						COO	
Attested certificate of origin						ACO	
Calibration certificate						CC	
ID tag plate							
Supplemental wired-on stainless steel plate							WSSP
Supplemental screwed-on stainless steel plate							SSSP

Notes

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