LLT100 Laser level transmitter
Measurement made easy
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**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 and gas, chemicals, food and beverages, power, pulp and paper, pharmaceuticals, and water and 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

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**Main features**

ABB brings level transmitters to the next level of non-contact measurements by packaging laser ranging technology with the features required by industrial applications. Using a pulsed laser to perform time-of-flight measurement, the LLT100 provides accurate distance measurements while being powered by a 4 to 20 mA current loop. Available in an aluminum or stainless steel housing, it comes with a variety of process interfaces. It can meet the demands of hazardous areas, 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 range
- Explosion-proof class 1, division 1
Product configurations

Base model
Ideal for measuring levels 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. This affordable and powerful level transmitter can be used in a wide variety of applications, including hazardous areas.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>0.5 to 100 m (2 ft to 330 ft)</td>
</tr>
<tr>
<td>Process fitting</td>
<td>ASME class 150, NPS 2 in</td>
</tr>
<tr>
<td></td>
<td>DN 50 PN 16 flat face</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>–40 to 60 °C (–40 to 140 °F)</td>
</tr>
<tr>
<td>Process pressure</td>
<td>–1 to 2 bar (29 psi)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>11 mm (0.4 in)</td>
</tr>
</tbody>
</table>

Hygienic model
Ideal for food and beverage or pharmaceutical applications. Model fitted with a 4-inch triclover clamp interface with hygienic certifications. As with all models, available with aluminum or stainless steel housing.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>0.5 to 100 m (2 to 330 ft)</td>
</tr>
<tr>
<td>Process fitting</td>
<td>4-in triclover clamp</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>–40 to 60 °C (–40 to 140 °F)</td>
</tr>
<tr>
<td>Process pressure</td>
<td>–1 to 1 bar (15 psi)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>11 mm (0.4 in)</td>
</tr>
</tbody>
</table>
Product configurations

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

- **Range**: 0.5 to 100 m (2 to 330 ft)
- **Process fitting**: ASME class 150/300, NPS 2 in
  - DN 50 PN 16/40 raised face
- **Process temperature**: –40 to 60 °C (–40 to 140 °F)
- **Process pressure**: –1 to 50 bar (720 psi)
- **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
Functions

Rotating display with touch through-the-glass interface

Industrial housing, IP67 and explosion-proof class 1/division 1 (also zone 1)

Pressure-rated flanges available

Powered from a 4 to 20 mA loop, HART communication

Eye safe, class 1 laser beam

Advantages and new features

The laser transmitter measures any solid or liquid, at short or long range. A single configuration can meet a wide variety of requirements.

The 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, LLT100s configured with fused glass process flanges are 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, lessening the need for preventive maintenance. For very high dust levels, a purge ring can be added to the dust tube to provide an air flow to enhance 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.
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**Solid applications**

A typical LLT100 application is to measure the level of solids in silos and tanks. These vessels can be found in various industries such as mining, aggregates, chemicals, food and beverages, power, pulp and paper, pharmaceuticals, etc.

The high sensitivity of the LLT100 allows level measurements in tall vessels. The transmitter’s narrow laser beam can be precisely aimed to circumvent obstacles. Its installation is very flexible, as the transmitter can be placed close to the wall or angled inside the vessel.

Finally, material build-up on vessel walls has no effect on the measurement, as the narrow beam angle (<0.3 degrees) prevents most interactions with the vessel sides.

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

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**Liquid applications**

Liquid level measurements represent a large portion of level measurement applications. The LLT100 can detect any liquid, even transparent ones.

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

In liquid measurement applications, the laser beam must be as perpendicular as possible to the liquid surface. Beam alignment should be within ±5 degrees of the vertical. To help in performing laser beam alignment, 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 up to 50 bar (725 psi).
Mixer/obstruction

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

The very narrow beam (<0.3 degrees) of the LLT100 allows installation of the instrument at almost any place on top of the vessel and its positioning between the vessel wall and the edge of the mixer, thus 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 blades cross the path of the laser beam.

Positioning

Another application for the LLT100 is accurate position measurement for wagons, tipper cars or other moving objects.

An tipper car that is improperly positioned when it unloads its cargo can causes damages 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.
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## Specification

### Measurement

**Range**
- 0.5 to 30 m (2 to 100 ft) for liquids
- 0.5 to 100 m (2 to 330 ft) for solids
- 0.5 to 200 m (2 to 660 ft) for positioning applications

**Resolution**
- 5 mm (0.2 in)

**Typical accuracy**
- 11 mm (0.4 in)

**Measuring beam**
- Laser wavelength: 905 nm, eye safe, Class 1
- Laser beam divergence: < 0.3°

### Environmental conditions

**Operating temperature**
- –40 to 60 °C (–40 to 140 °F)

**Storage temperature**
- –40 to 85 °C (–40 to 185 °F)

**Survival temperature**
- –40 to 80 °C (–40 to 175 °F)

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

### Vibration resistance

Compliant with IEC 60068–2–6:2007 Environmental testing – Part 2–6: Tests – Test Fc: Vibration (sinusoidal), 10–150 Hz 0.35mm–50m/s²

### Output

**Analog**
- 4 to 20 mA, NAMUR compliant

**Digital**
- HART 7 (multi-variable output)

**Communication**
- Local HMI, EDD/DTM, handheld

### Power supply

Powered from the current loop
- 4 to 20 mA, 16 to 42 V DC (if using HART, minimum input voltage is 21 V DC)

**Heated lens option**
- 24 V DC (3 W)

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![Image]

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### Mechanical

**Housing material**
- Powder coated aluminum (standard),
- 316L stainless steel (SST)(option)

### Dimensions (W × H × D)

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

**Weight of standard model**
- Aluminum housing with universal aluminum flange: 3.7 kg (8.2 lb)
- 316L SST housing with universal SST flange: 8.6 kg (19.0 lb)

**Weight of pressure-rated model (depending on flange)**
- Aluminum housing: 6.7 to 7.2 kg (14.8 to 15.9 lb),
- 316L SST housing: 10.0 to 10.5 kg (22.1 to 23.2 lb)

**Weight of hygienic model**
- Aluminum housing: 5.8 kg (12.8 lb)
- 316L SST housing: 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**
- Flange A: Aluminum, borosilicate window, silicone O–ring
- Flange B: 316L SST, borosilicate window, silicone O–ring
- Flanges B, C, D, F: 316L SST, fused borosilicate window
- Flange H: 316L SST, polycarbonate window, silicone SB70 O–ring, FDA and 3–A approved

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¹ When using a reflective target
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**Specification**

**Operation**

**Display**
- Integrated 128 x 64 pixels LCD display with through-the-glass (TTG) interface

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

**Laser**

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

**Measuring laser safety**
- Always on IEC60825-1 Ed. 2, 2007
- A Class 1 laser is safe for all conditions of use.

**Optical**

**Total optical aperture**
- 50 mm (2 in)

**Standard window material (flanges A and B)**
- Tempered borosilicate glass

**Pressure rated window material (flanges C, D, F, G)**
- Borosilicate fused glass

**Hygienic window material**
- Polycarbonate window

**Lens impact resistance**
- Tested at 4 joules

**Beam divergence**
- Δ < 0.3°

**Beam spot width**

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

**Beam direction**
- 90° ±5° from mounting flange for liquids measurements
Specification

Approvals

- CE
  - Electromagnetic compatibility Directive (EMC) 2014/30/EU
  - Low Voltage Directive (LVD) 2014/35/EU
  - Restriction of Hazardous Substances Directive (RoHS) 2011/65/EU
  

- ATEX, IECEx, KCs
  
  For flanges A and B:
  - II 2 (1) G Ex db [op is T6 Ga] IIC T85°C…T100°C Db –50°C ≤ Ta ≤ +75°C…+85°C
  - Ex db [op is T6 Ga] IIC T85°C…T100°C Db –50°C ≤ Ta ≤ +75°C…+85°C – IP66/IP67
  
  For flanges C, D, F, and G:
  - II 2 (1) G Ex db [op is T6 Ga] IIC T85°C…T100°C Db –50°C ≤ Ta ≤ +75°C…+85°C – IP66/IP67

- FM
  - FM16US0106X, FM16CA0060X
  
  
  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

- CSA
  - CLASS – C363186 – ELECTRICAL EQUIPMENT FOR MEASUREMENT USE – certified to US standard
  - CLASS – C363106 – ELECTRICAL MEASUREMENT AND TEST EQUIPMENT – certified to CAN standard

- 3A
  - 3A Certificate authorization number: 3500

- CRN
  - Canadian registration number: 0F18455.5C (all provinces)

- AEC
  - Ex–маркировка
  - Russian custom union
  
  Ex db [op is T6 Ga] IIC T85°C…T100°C Db
  - Ex tb [op is Da] IIC T85°C…T100°C Db –50°C ≤ Tamb ≤ +75°C
  - Ex tb [op is Da] IIC T85°C…T100°C Db –50°C ≤ Tamb ≤ +85°C

- SIL 2 – Exida
  - Functional safety
  
  Random capability: Type B element, SIL 2 @ HFT = 0 ; route 1H
  Systematic capability: SC2 (SIL 2 capable)


Certificado N.º: TÜV 17.1989 X

Para LLT100 com janela cementada (cemented window)

Ex db [op is T6 Ga] IIC T85°C…T100°C Db
-50°C ≤ Tamb ≤ +75°C
-50°C ≤ Tamb ≤ +85°C

Para LLT100 com vidro fundido (fused glass)

Ex db [op is T6 Ga] IIC T85°C…T100°C Db
-50°C ≤ Tamb ≤ +75°C
-50°C ≤ Tamb ≤ +85°C

Segurança

Standards
- ABNT NBR IEC 60079–0:2016
- ABNT NBR IEC 60079–1:2013
- ABNT NBR IEC 60079–26:2016
- ABNT NBR IEC 60079–31:2014
- ABNT NBR IEC 60529:2017
- Portaria INMETRO nº 179 de 18/05/2010

CRN

Canadian registration number: 0F18455.5C (all provinces)

ASME B31.1 et B31.3, category F (measuring devices)

SIL 2 – Exida

Functional safety

Random capability: Type B element, SIL 2 @ HFT = 0 ; route 1H
Systematic capability: SC2 (SIL 2 capable)

IEC 61508: 2010 Parts 1–7
Dimensions

Dimensions in mm (in)

Figure 1  LLT100 with universal flange (aluminum and stainless steel)
Dimensions

Dimensions in mm (in)

Figure 2  LLT100 with class 150 flange
Dimensions

Dimensions in mm (in)

Figure 3  LLT100 with class 300 flange
## Dimensions

Dimensions in mm (in)

![LLT100 Dimensions Diagram](image)

**Figure 4** LLT100 with PN16/PN 40 flange
Dimensions

Dimensions in mm (in)

Figure 5  LLT100 with triclover flange
Interface

HART terminal with heater option – 2 + 2 wires

Figure 6  HART terminal with heater option
Accessories

Dust tube (P901)

Dimensions in mm (in)

Figure 7  Dust tube
### Accessories

**Purge ring (P910)**

Dimensions in mm (in)

- Ø 165 (6.5)
- Ø 58 (2.3)
- Ø 12.7 (0.5)
- Ø 10.3 (0.4)
- 18.5 (0.7)
- 4 holes
- 20.7 (4.7)

**Figure 8** Purge ring

**Dust tube assembly with purge ring**

- Dust tube
- Gasket
- Purge ring
- Gasket
- LLT100 device

**Figure 9** Dust tube with purge ring
## Accessories

**Cooling tube (P920)**

Dimensions in mm (in)

![Diagram of Cooling tube (P920)](image)

- **Height:** 234 (9.2) mm
- **Diameter:** 165 (6.5) mm

**Cooling tube (P921, P922, P923, P924)**

- **Height:** 293.5 (11.6) mm
- **Diameter:** 152.4 – 165 (6.0 – 6.5) mm

Depending on process flange

![Diagram of Cooling tubes](image)

*Figure 10  Cooling tubes*
## Accessories

### Adjustable pivot bracket (A900)

Dimensions in mm (in)

![Figure 11 Adjustable pivot bracket](image)

### Adjustable swivel flange (A910)

Dimensions in mm (in)

![Figure 12 Adjustable swivel flange](image)
Accessories — specifications

**Dust tube**
Base plate diameter
165 mm (6.5 in) mounts on LLT100 flanges A and B
Length
257 mm (10.1 in)
Material
300 Stainless steel
Gasket material
Black compressible Buna-N rubber durometer rating shore 60A
Function
Static air space prevents dust buildup

**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

**Purge ring**
Diameter
1655 mm (6.5 in), mounts on LLT100 flanges A and B.
Function
Allow air purge in front of LLT100 window. Can be used with dust tube to purge tube.
Purge air flow:
– Must use oil–free dry air
– Recommended flow between 0.5 and 4 l/min
Purge fitting:
– ¼-barbed tube fitting

**Adjustable pivot bracket**
Overall dimensions
185 × 249 × 55 mm (7.3 × 9.8 × 2.2 in)
Opening diameter
60 mm (2.4 in)
Mounting plate thickness
5 mm (0.2 in)
Mounting bolt
4× HHCS 3/4–11 × 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 × 90 cm (36 × 36 in)
Material
Aluminum with reflective paint

**Cable glands**
Description
ATEX 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

<table>
<thead>
<tr>
<th>Base model</th>
<th>LLT100</th>
<th>XX</th>
<th>X</th>
<th>X</th>
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<th>XXX</th>
<th>XXX</th>
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</thead>
<tbody>
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<tr>
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<tr>
<td>Aluminum body – ½ in NPT</td>
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<td>Stainless steel body – ½ in NPT and electrical connection</td>
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<td><strong>Process flange</strong></td>
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<td>ASME 2 in class 150, SS, raised face, fused window</td>
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<td>Triclover 4 in, SS, polycarbonate window</td>
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<td><strong>Heated window</strong></td>
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<td>With heated lens – requires 24 V input</td>
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<td>4–20 mA HART</td>
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<td><strong>Display</strong></td>
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<tr>
<td>None – (blind cover)</td>
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<td>Digital LCD integral display with TTG (Through-the-Glass) activated keypad</td>
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<tr>
<td>IECEx (Ex d Cat 1/2G and 2D)</td>
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<td><strong>Cable glands and plugs</strong></td>
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Ordering information

**Accessory options — tube (multi-choice)**
- Dust tube
- Cooling tube, no window, no pressure rating
- Cooling tube, with window, no pressure rating
- Cooling tube, process interface NPS 2 in class 150 flange with window
- Cooling tube, process interface NPS 2 in class 300 flange with window
- Cooling tube, process interface DN 50 PN40 flange with window

**Accessory options — bracket**
- Rotating bracket
- Swivel flange

**Accessory options**
- Purge ring for dust tube
- Laser alignment tool
- Reflector panel
- Polycarbonate sight glass
- Adaptor to LM80 bolt pattern

**Gaskets and O–rings**
- Gasket (qty 2) for flat face process flange (A or B) BUNA–N
- Triclover O–ring (qty 10), 4 in diameter

**Process flange converter**
- Stainless steel 3 in/DN80 adapt plate, class 150 & DN80/PN6 bolt ptrn, non-pres. rated
- Stainless steel 4 in/DN100 adapt plate, class 150 & DN100/PN10 bolt ptrn, non-pres. rated
- Stainless steel 6 in/DN150 adapt plate, class 150 & DN150/PN10 bolt ptrn, non-pres. rated
- 3 in raised face ANSI class 150 flange converter
- 4 in raised face ANSI class 150 flange converter
- 6 in raised face ANSI class 150 flange converter
- DIN80 raised face PN40 flange converter
- DIN100 raised face PN40 flange converter
- DIN150 raised face PN40 flange converter

**SIL certification**
- SIL2, IEC 61508

**Certificate**
- Material declaration of compliance EN 10204-type 2.1
- Certificate of origin
- Canadian registration number marking on product
- Attested certificate of origin
- Calibration certificate

**ID tag plate**
- Supplemental declaration of compliance EN 10204-type 2.1 wired–on stainless steel plate
- Supplemental screwed–on stainless steel plate

**Hard copy user documentation**
- German hardcopy operating instruction manual
- French hardcopy operating instruction manual
- English hardcopy operating instruction manual
- Chinese hardcopy operating instruction manual
Notes