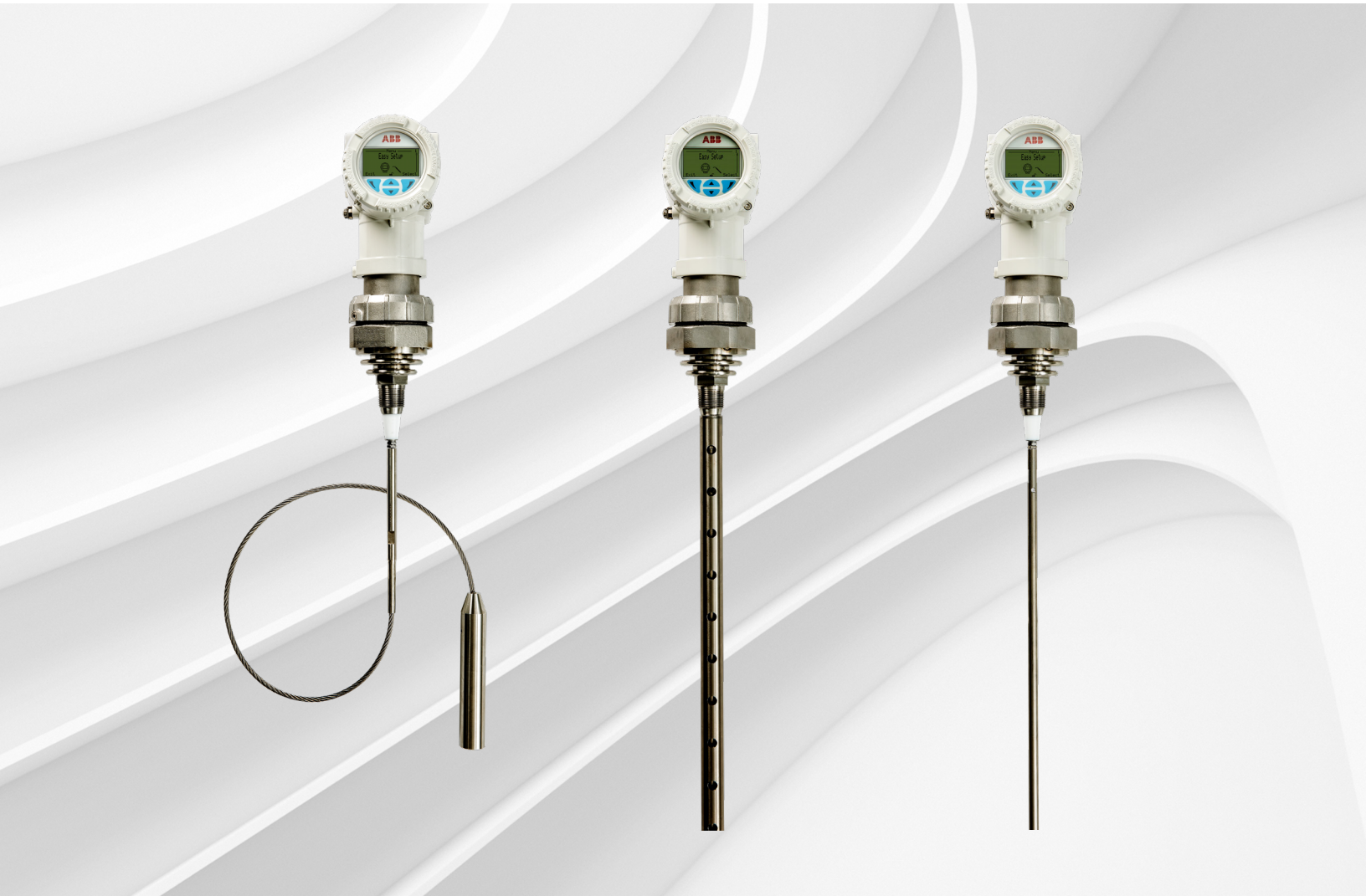
ABB MEASUREMENT & ANALYTICS | DATA SHEET

LWT300 Series

Guided Wave Radar Level Transmitter
Level and Interface Level Measurement



Measurement made easy

LevelExpert™: the expert inside

LevelExpert concentrates 20 years of industrial level measurement experience into an intelligent instrument made to accurately detect levels, even in the most demanding conditions.

Forget about baseline mapping and echo selection; LevelExpert knows how to find the right level through the clutter. The expert is now inside your guided-wave radar.

LWT300 series instruments cover a wide range of applications. They can meet your needs for applications up to 204 °C (400 °F) and 207 bar (3,000 psi).

Customer benefits

With fast and reliable settings, ABB's LWT300 series of instruments emphasizes measurement made easy. With its LevelExpert technology based on 20 years of experience, simply enter installation data and basic process conditions, and let LevelExpert do the rest: no echo mapping or baseline correction required.

Unlike traditional guided wave radar that uses device parameters requiring multiple adjustments, the LWT300 series of instruments does it for you. The instrument uses built-in intelligence to differentiate between the actual level and other false signals. It also keeps monitoring all these false signals while maintaining a reliable level reading. It is like having a level expert in each device.

ABB’s LWT300-series transmitters are equipped with on-board diagnostics that can be used for safety monitoring, improved reliability, downtime reduction, and performance verification. Standard on-board diagnostics monitor minimum and maximum electronics temperatures, input voltage, probe loss or breakage, buildup detection, and leakage of the primary process seal. These diagnostic features assist you in troubleshooting common problems without extensive testing. They also allow device health monitoring without requiring removal from the process or taking the device offline, thus saving valuable time and improving uptime.

Main features

To meet the most challenging applications, the LWT300 series of instruments offers a wide range of configurations.

Temperature range: –40 to 204 °C (–40 to 400 °F)
Maximum process pressure: vacuum to 207 bar (3,000 psi)

- LevelExpert software for easy configuration, reliable surface detection and easy troubleshooting
- Alternative measurement method using threshold settings
- 2-wire powered, and HART 7 communication model, with SIL 2 (no redundancy), SIL 3 (redundant configuration)
- Modbus and LevelMaster communication models
- Certified for potentially explosive atmospheres

HART REGISTERED

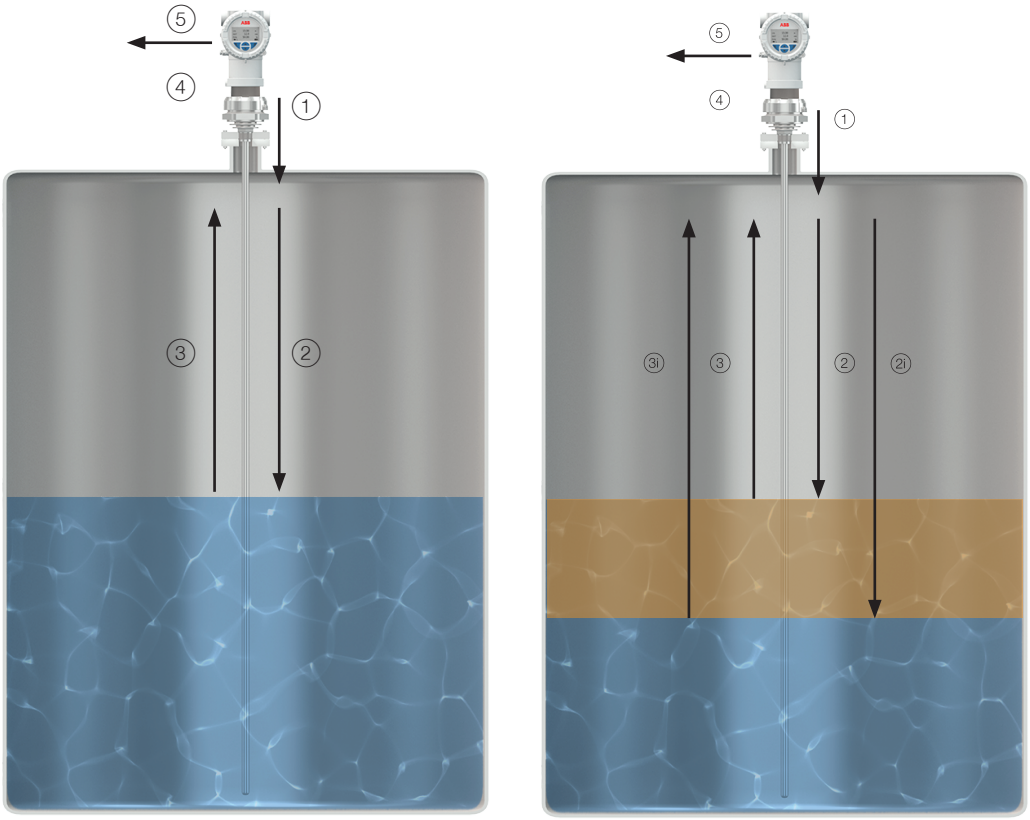


How the technology works

Guided wave radar uses very low power microwave energy to determine the level or interface of the products being measured.

To obtain optimum performance, it is important to understand the basic principles of operation. The instrument electronics housing (a.k.a. “the head”) is fitted with a special adapter (the coupler) that serves as a connection between the head and the process in which measurements will be taken. A rod or cable (the probe) hangs from the coupler into the product being measured and acts as a wave guide. The probe guides the microwave energy to the product surface, instead of having it be dispersed in a cone, as it would if there was no probe.

A measurement cycle consists of the following:
The head sends a very short pulse of microwave energy through the coupler and down the probe (1). That pulse travels along the length of the probe (2) (2i) and, when it encounters the product surface (or some other change in the dielectric constant), some of the energy is reflected and travels back towards the coupler (3) (3i). When the reflected energy reaches the coupler, it is sensed by the electronics (4). By measuring the time elapsed between the initial pulse and the reflected one, the electronics can calculate the product level (5).

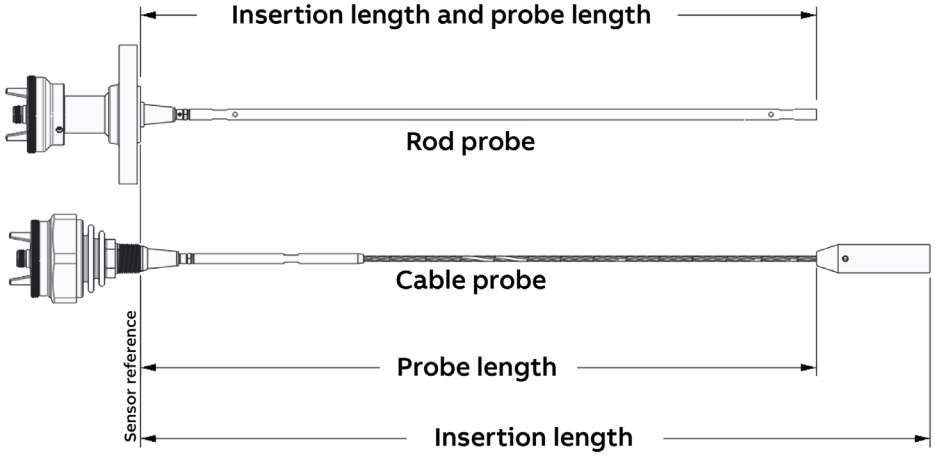


When two liquids are in the tank and are separated, if the dielectric constant difference between the two is more than 10, it is possible to detect the total level and the interface level at the same time. The radar wave will go through the first layer (having a low dielectric constant) and reach the top of the second layer (having a higher dielectric constant).

Since microwave energy travels at the speed of light, one complete measurement cycle is made up of several thousand pulses. The time domain reflectometry (TDR) sampling technique is used to reconstruct, from these numerous pulses, a waveform that can be processed by the instrument microprocessor. Depending on instrument configuration and probe length, measurement cycles are created up to five times every second. Results from these cycles are processed to generate a current output proportional to the level of the product.

How to measure probe length

The probe length is defined in one of two ways, depending on the type of process interface. For a threaded interface, the probe length is measured from the thread closest to the bottom of the coupler to the end of the probe, excluding accessories such as a cable weight. For a flanged interface, the probe length is measured from the bottom of the flange to the end of the probe, excluding accessories.

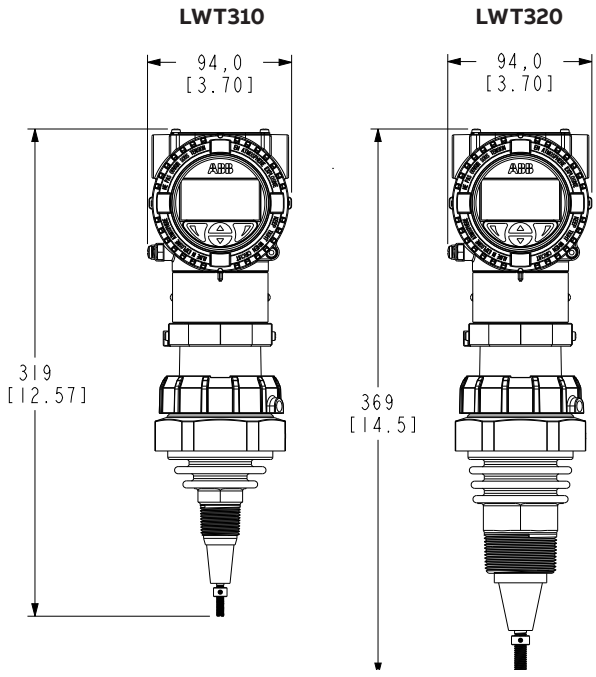


LWT310 vs. LWT320

The LWT300 series is comprised of the LWT310 and LWT320. The LWT310 fits in a 19-mm (¾-in) NPT interface while the LWT320 fits in a 38-mm (1 ½-in) NPT interface. Both are offered in flanged versions.

For solids applications, the LWT320 is recommended, since it can withstand a higher pull force. The LWT320 is also useful for applications with a 38 mm (1 ½-in) NPT interface.

	LWT310	LWT320
NPT interface	**19 mm (¾ in)**	**38 mm (1 ½ in)**
Cable probe diameter	**4.8 mm (3⁄16 in)**	**6.4 mm (¼ in)**
Rod probe diameter	**9.5 mm (⅜ in)**	**12.7 mm (½ in)**
Coaxial probe diameter	**22 mm (⅞ in)**	**n/a**
Maximum pull force	**450 kg (1,000 lb)**	**635 kg (1,400 lb)**

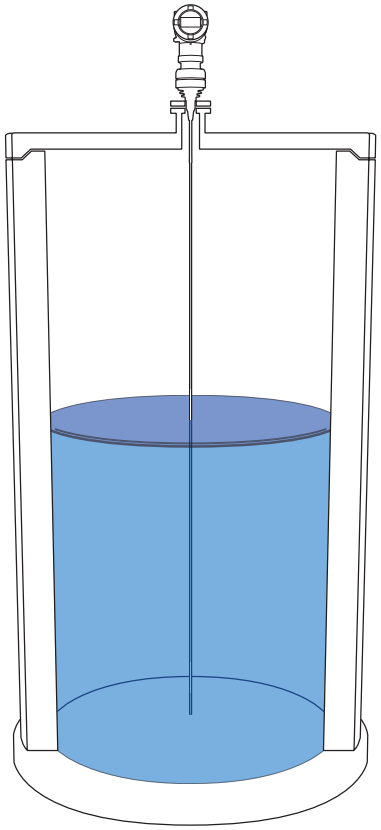


Applications

Storage vessel
Storage vessels are one of the most common applications for guided wave radar.

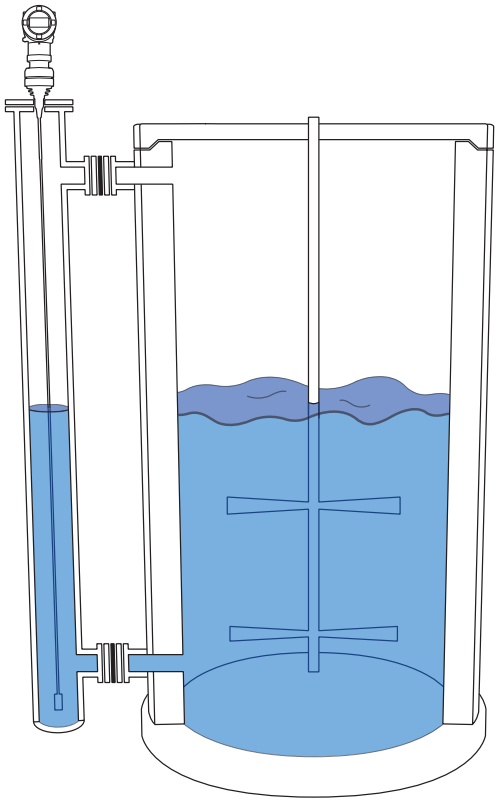
- Guided wave works where most other technologies fail because of its very strong signal-to-noise ratio (SNR) and its ability to master fluids with low or changing dielectrics.
- Instrument signal **is not** affected by mist, spray, turbulence, flashing, changing pressures or temperatures, or changing dielectrics.
- Foam generally does not affect the signal, but **excessive** foam can cause a negative offset.
- Light buildup can be managed, but heavy buildup should be avoided.
- Probe selection: rod and coaxial probes can be used at depths between 0.3 m (12 in) and 6.1 m (20 ft). Cable probes are preferred and can be used from 0.3 m (12 in) up to 20 m (66 ft).

Note: Do not mount the probe where it can touch vessel walls or internal structures. Do not install the probe in the fill stream of the vessel. Coaxial probes or stilling wells are best if there is excessive foaming or installation in the fill stream that cannot be avoided. Rod and coaxial probes allow measurements very close to the EOP. Cable probes with a heavy weight should be used in extremely turbulent or agitated conditions. A tie-down should be considered if the probe must remain stationary.

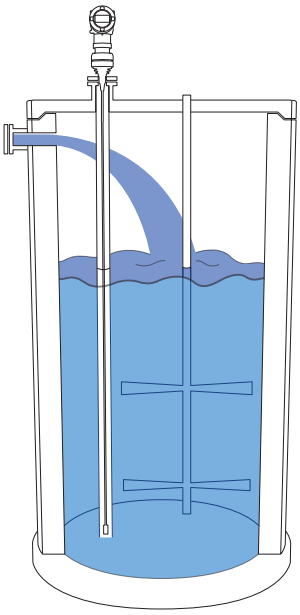


External chamber/bridle/displacer replacement/MagWave™
Applications such as boiler drums, feedwater heaters, compressed hydrocarbons and process vessels with multiple obstructions require external chambers.

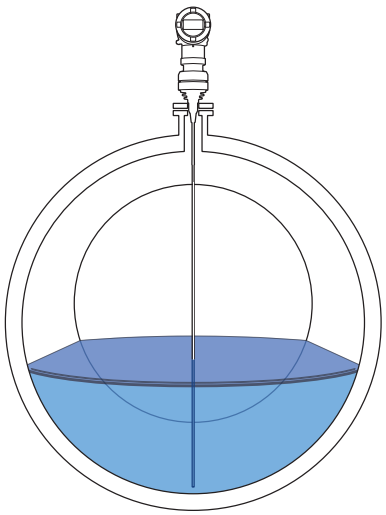
The LWT310 guided wave radar is the best measurement choice for installation in external chambers, bridles, and displacer retrofits. Due to the concentrated signal, it is used for measuring low dielectric fluids. If a chamber is 100 mm (4 in) or smaller, this actually helps to further concentrate the signal.



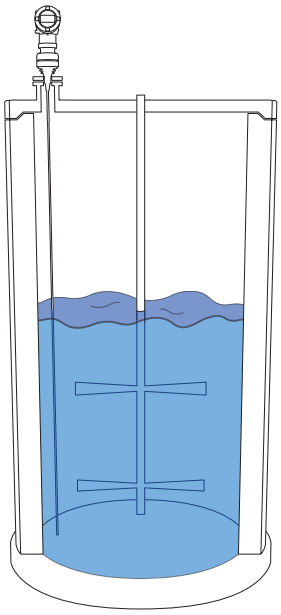
Stilling wells
Stilling wells are used if the probe must be installed in the process fill stream, to avoid obstructions and agitators, as well as to retain signal strength in applications with very low dielectric fluids and long measuring lengths.



Horizontal cylinder
Horizontal cylinders are commonly used as settling tanks, separation vessels, and storage tanks. The LWT310 is not affected by the internal geometry of horizontal cylinders. Unlike traditional non-contact devices, which must contend with false level reflections being created by the cylinder walls, the LWT retains the signal on the probe. Furthermore, the LWT is able to measure close to the end of the probe, allowing measurement until the vessel is near empty.



Agitated vessel
Reactor vessel and mixing tanks often have agitator blades. Best practice is to use a non-contact device such as the LLT100 laser, LST300 ultrasonic or a stilling well in these applications. If these solutions are not possible, guided wave radar can be used in agitated vessels without a stilling well, but care should be taken to ensure that the probe cannot become detached or make contact with the agitator blade. Considerations should be made for attaching the probe at the bottom, lateral forces and vibration. Consult engineering for assistance in these applications.



Open sumps and lift stations
- The LWT310 works well in open sumps, lift stations, cooling tower sumps, catch basins, etc.
- Signal is unaffected by rain, turbulent surface conditions, floating debris, algae growth, or foam.
- Probe selection: Rod and coaxial probes can be used at depths comprised between 0.3 m (12 in) and 6.1 m (20 ft). Cable probes can be used from 0.3 m (12 in) up to 20 m (66 ft)

Note: Coaxial probes are best when personnel may touch the sensor probe, excessive foaming may occur, or if installation in the fill stream cannot be avoided. Rod and coaxial probes allow measurements very close to the EOP. In extremely turbulent or agitated conditions, cable probes with a heavy weight should be used. A tie-down should be considered if the probe must remain stationary.

Plastic vessels
In plastic vessels, RF waves slow down when interacting with the sides of the vessel.

LWT300-series instruments can easily compensate for this effect, providing accurate level measurement.

For RF waves to be properly guided down the probe, a conductive launch plate must be used (metal plate of flange) at the top of the vessel.

Specifications

Accuracy
2 mm (5⁄64 in) or 0.03%

Resolution
1 mm (3⁄64 in)

Temperature drift (digital)
±0.2 mm/10 °C (max ±2.5 mm)

Measurement range[1]
Maximum: 20.00 m (66 ft)
Minimum: 0.05 m (0.16 ft) (with rod probe; for more details, see accuracy diagram on next page)

Update rate
5 Hz, typical (probe length dependant)

Temperatures
Ambient operating
–40 to 85 °C (–40 to 185 °F)[2]
Process
–40 to 204 °C (–40 to 400 °F)
Storage
–40 to 85 °C (–40 to 185 °F)
Process seal type vs temperature rating
- Viton (–26 to 204 °C [–15 to 400 °F])
- Kalrez (–20 to 204 °C [–4 to 400°F])
- EPDM (–50 to 120 °C [–58 to 248 °F])
- Markez (–10 to 204 °C [14 to 400 °F])

Process pressure
- –1 to 207 bar at 38 °C (–14.5 to 3,000 psi at 100 °F)
- –1 to 83 bar at 204 °C (–14.5 to 1,200 psi at 400 °F)

Dielectric constant
- 1.4 (minimum)
- DC contrast for interface measurement: >10
- Minimum top level layer thickness when measuring interface level: 50 mm (2 in)

Process viscosity
- Coaxial probe: 500 cp
- Cable probe or rod probe: 10,000 cp

Power supply
- 15.5 to 42 V DC (4–20 mA functionality)
- 21 to 42 V DC (HART functionality)
- 10.5 to 28.5 V DC @ 30 mW (max.) (Modbus units)
- 15.5 to 30 V DC (intrinsic safety)[3]

Power consumption
- 56 mW (@ 15.5 V DC, 3.6 mA)
- 903 mW (@ 42 V DC, 21.5 mA)
- 30 mW (Modbus units)

Line resistance
950 Ω (maximum @ 36 V, 21.5 mA)

Enclosure material
Powder-coated aluminum or 316 L stainless steel

Vibration resistance
IEC 60068-2-64
IEC 60068-2-6

EMI/EMC
- ICES-003 & FCC part 15 subpart B, CISPR11, Class A (Industrial Environment)
- EN 61326-1, EN 61326-3-1 & NE021

Protection class
IP 66/68
Enclosure Type 4X/6P

Process connections
Threaded
¾ in (LWT310) or 1 ½ in (LWT320). Optional adapter bushings are available for 3- and 4-inch process connections (LWT310).
Flanged
ASME flanges: from 1 ½ to 8 in, class 150 to 900
DN flanges: from DN 20 to DN 200, PN25 to PN160

Display
- Integrated 128 × 64 pixel liquid crystal display (LCD) with through-the-glass (TTG) interface
- Push button display (does not allow waveform display on screen for troubleshooting)

Communication protocols
- 4–20 mA analog output with HART 7 communication
- Modbus communication
- LevelMaster communication

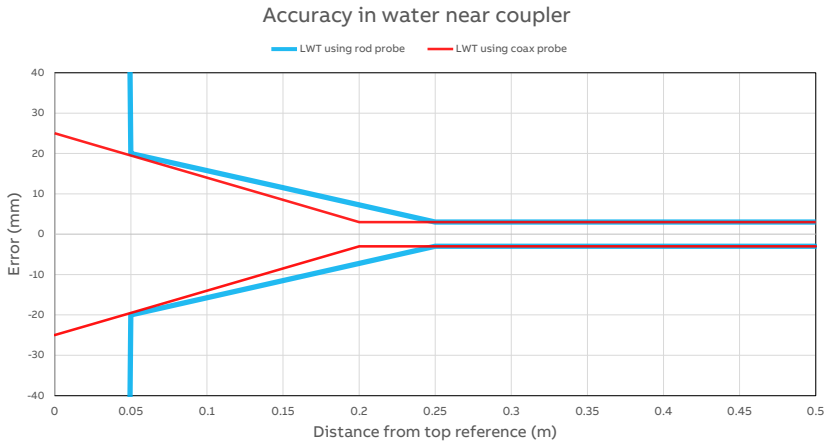
Lifespan
MTBF: 76 years

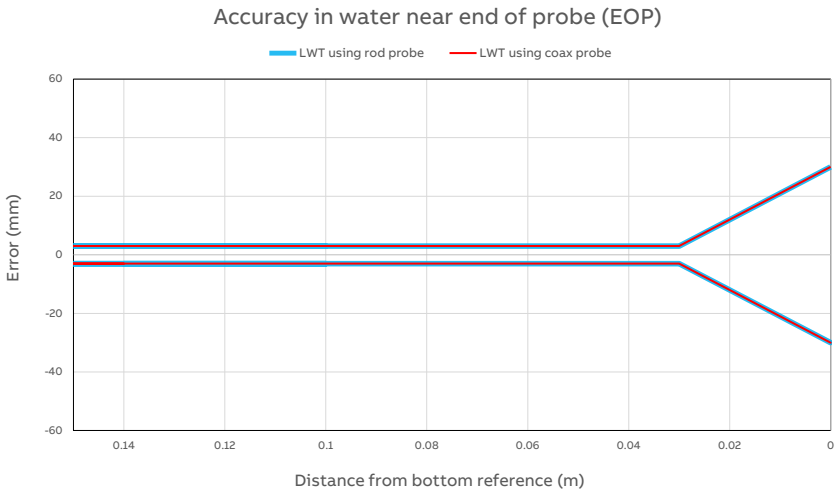
Wetted materials
- C-276 alloy
- 304L stainless steel
- 316L stainless steel

[1] From process connection
[2] See tables in FM/CSA approval certificate for limits of different protection methods.
[3] For all wiring, see drawings # 3KXL001177U0109, 3KXL001177U0209 and 3KXL001177U0309. ENCL TYPE 4X, 6P. IP66/68

Deadband and accuracy near coupler (top) and end of probe (bottom)

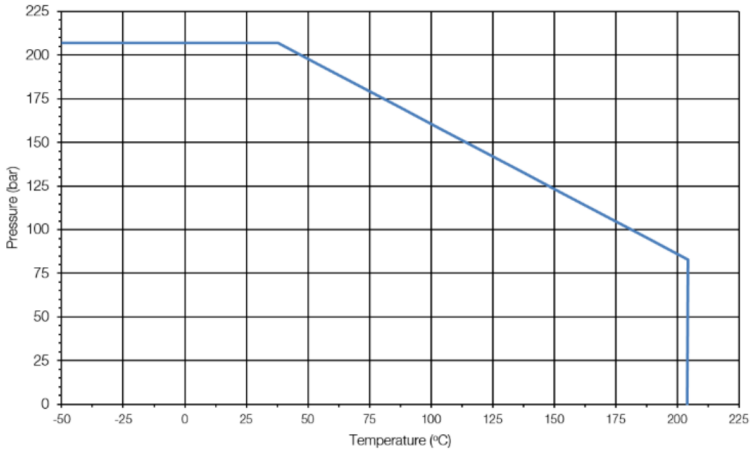
Instruments from the LWT300 series can measure at distances very close to the top and bottom of the probe; however, accuracy decreases in these regions. The following plots show this reduced accuracy for different probes. Notice the short deadband for rod probes (the same applies to cables, even if not shown) and the absence of deadband for coaxial probes.





Pressure/temperature curves[1]

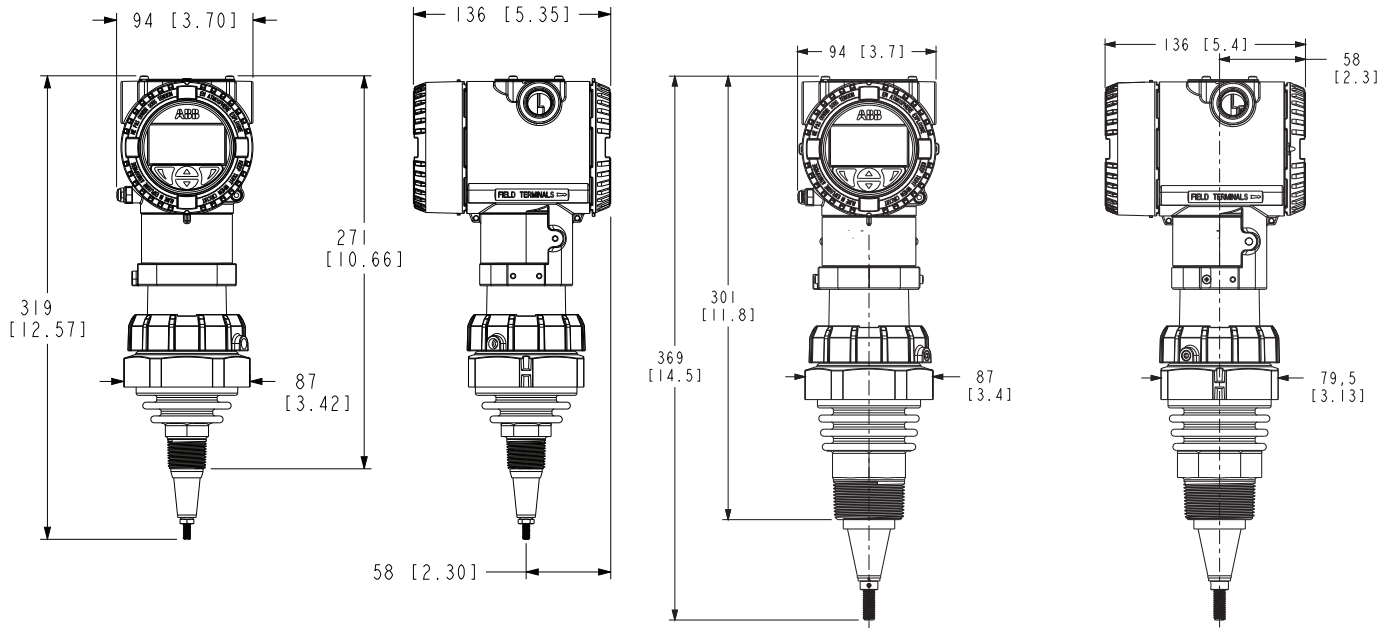
For LWT310 and LWT320.



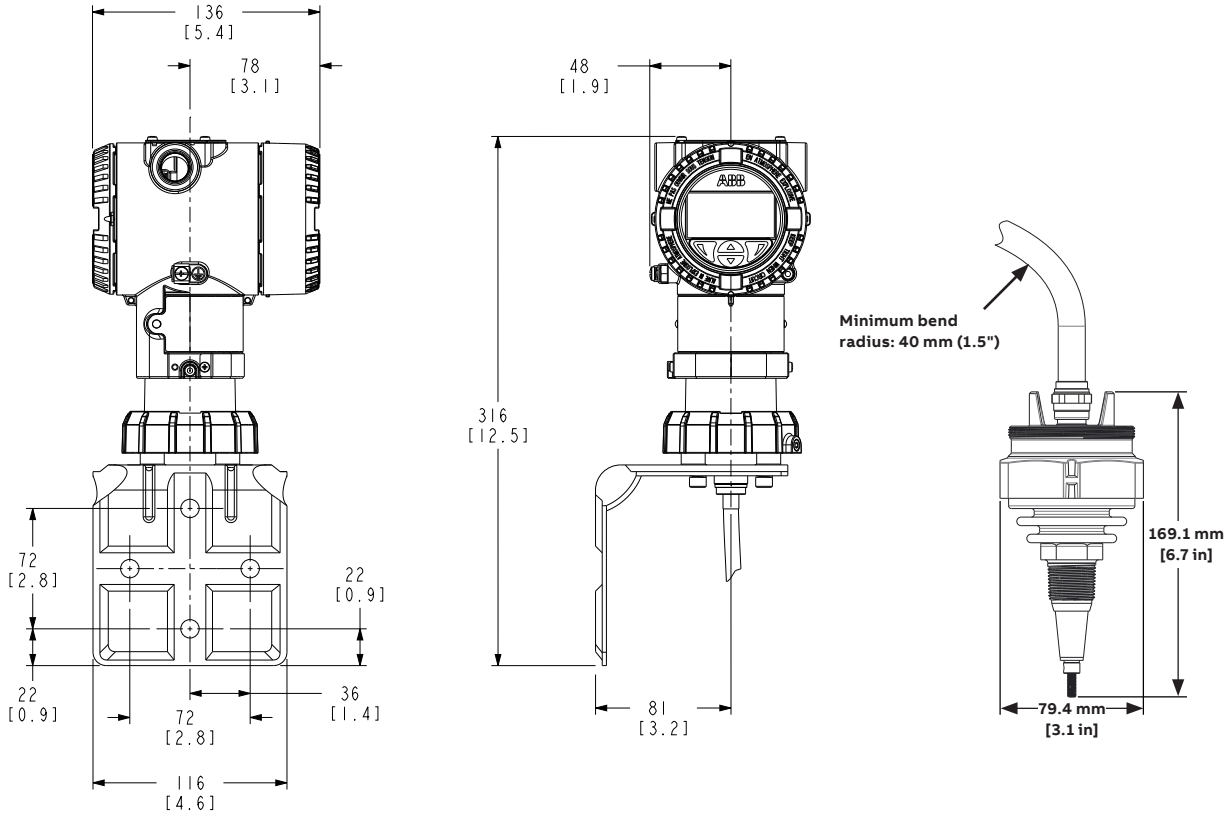
[1] Coupler temperatures are based on O-ring temperature ratings. Please refer to the O-ring chart for more information.

Dimensions (mm [in])

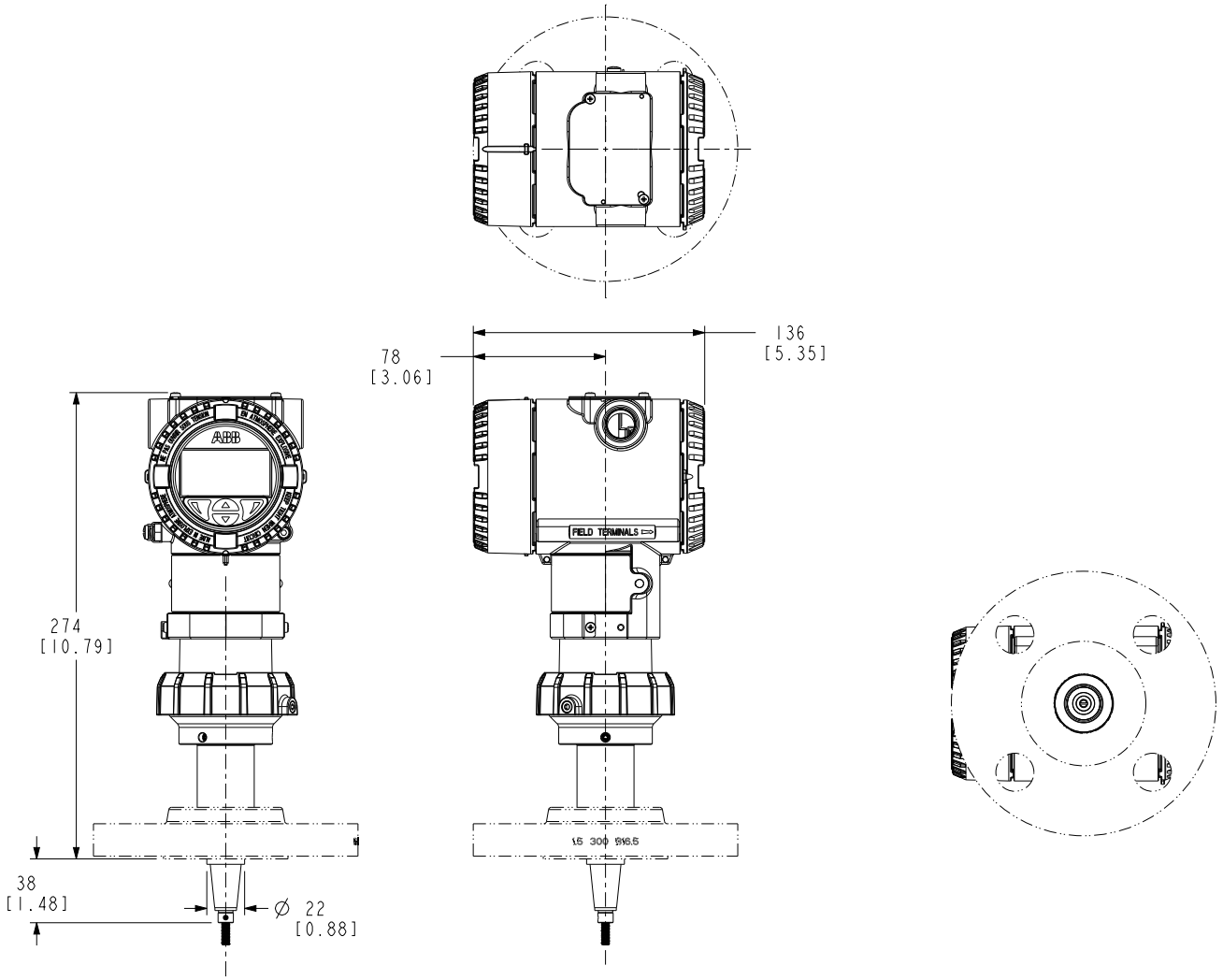
Instrument, threaded interface (LWT310 left, LWT320 right)



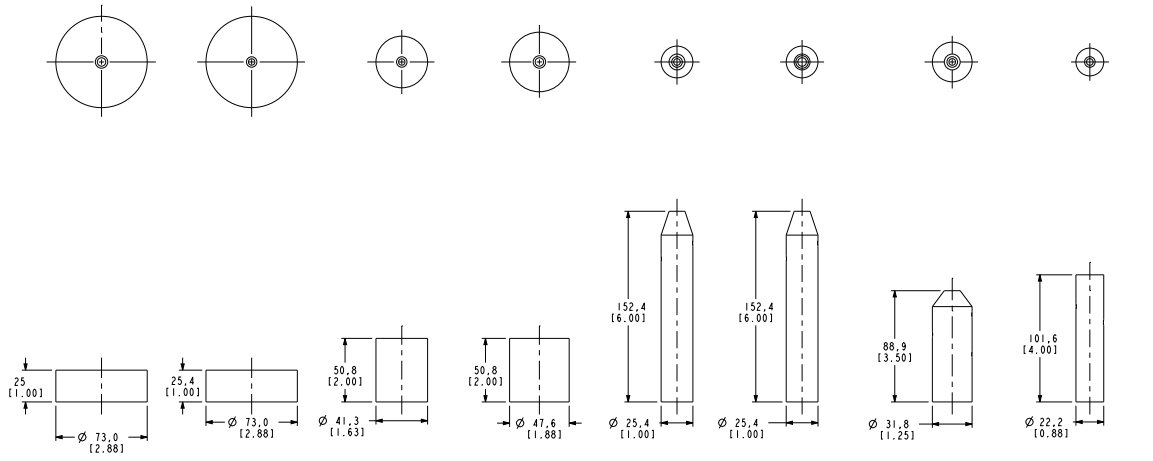
Remote head and coupler



Flanged interface

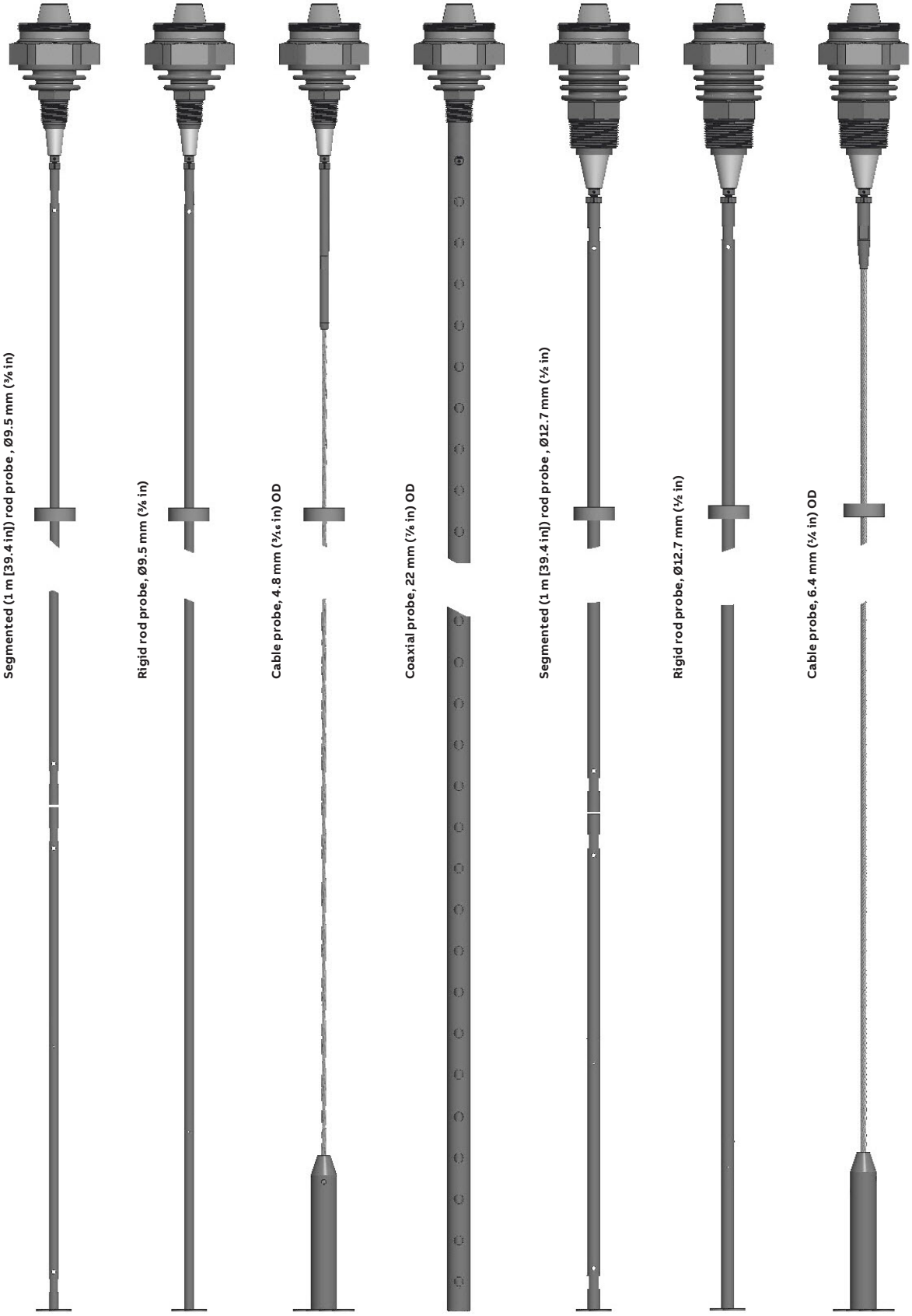


Probe weight options



QP6/QP7/QP8 (LWT320) | **QP6/QP7/QP8 (LWT310)** | **QP4/QP5 (LWT310)** | **QP4/QP5 (LWT320)** | **QP2 (LWT310)** | **QP2/QP3 (LWT320 only)** | **QP3 (LWT310)** | **QP1 (LWT310 only)**

Probe types


Segmented (1 m [39.4 in]) rod probe , Ø9.5 mm (⅜ in)
Rigid rod probe, Ø9.5 mm (⅜ in)
Cable probe, 4.8 mm (3⁄16 in) OD
Coaxial probe, 22 mm (⅞ in) OD
Segmented (1 m [39.4 in]) rod probe , Ø12.7 mm (½ in)
Rigid rod probe, Ø12.7 mm (½ in)
Cable probe, 6.4 mm (¼ in) OD

Approvals

Standard body		Applied standard
CE/UKCA		
	ATEX directive 2014/34/EU - UKEX UKSI 2016:1107 (as amended) – Schedule 3A, Part 1 ("nnnn" refers to the notified body doing factory surveillance)	EN 61326-1:2013, EN/IEC 60529, EN/IEC 61010-1:2010
	Electromagnetic Compatibility (EMC) directive 2014/30/EU	
	Restriction of Hazardous Substances (RoHS) directive 2011/65/EU	
	Waste of Electrical and Electronic Equipment (WEEE) 2012/19/EU	
CSA (cCSAus) **(Modbus units only)**		CSA 22.2 No.30 M1986 (R2007) CSA 22.2 No.60079-11:2014 CSA 22.2 No.25–17 FM 3600:2018 FM 3615:2018 FM 3616:2011 ANSI/ISA-60079-11:2009 CSA C22.2 No.60079-0:2019 CSA C22.2 No.60079-1:2016 CSA C22.2 No.60079-11:2014 CSA C22.2 No.60079-26:2016 CSA C22.2 No.60079-31:2015 ANSI/UL 60079-0:2019 ANSI/UL 60079-1:2015 ANSI/ISA 60079-11:2014 ANSI/UL 60079-26:2017 ANSI/UL 60079-31:2015 CSA 22.2 No.61010-1:2012 ANSI/ISA 61010-1:2012 ANSI/ISA 12.27.01:2011 ANSI/IEC 60529:2004 CSA C22.2 No. 60529:2005 (R2015) ANSI/NEMA 250:2014 CSA C22.2 No. 94:2011
	Explosion proof/dust-ignition proof with IS, SI probe (local configuration):	
	Class I, II, III, Division 1, Groups C-G T6…T1, T. Amb. –50°C to 70°C…85°C	
	Explosion proof/dust-ignition proof with IS, SI connection for probe (remote configuration):	
	Class I, II, III, Division 1, Groups C-G T6…T5, T. Amb. –50°C to 75°C…85°C	
	Flameproof/dust-ignition proof (local configuration):	
	Class I, Zone 0/1 AEx/Ex ia/db IIB T6…T1 Ga/Gb T. Amb. –50°C to 70°C…85°C	
	Zone 20/21 AEx/Ex ia/tb IIIC T77°C…T358°C Da/Db	
	Flameproof/dust-ignition proof (remote configuration):	
	Class I, Zone 1 AEx/Ex db [ia Ga] IIB T6…T5 Gb T. Amb. –50°C to 75°C…85°C	
	Zone 21 AEx/Ex tb [ia Da] IIIC T77°C…T87°C Db	
	Flameproof/dust-ignition proof (remote configuration):	
	CL I, ZONE 1, AEx/Ex db [ia Ga] IIB T6…T5 Gb	
	ZONE 21 AEx/Ex tb [ia Da] IIIC T77°C…T87°C Db	
ATEX, UKEX, IECEx **(HART units only)**[1]		EN/IEC 60079-0, EN/IEC 60079-1, EN/IEC 60079-11, EN/IEC 60079-15, EN/IEC 60079-26, EN/IEC 60079-31, EN/IEC 60529, CSA C22.1:2018, CSA C22.2 No. 25:2014, CSA 22.2 No. 30:1986 (R2012), CSA C22.2 No. 213:2017, CSA C22.2 No. 60079-0:2019, CSA C22.2 No. 60079-1:2011, CSA C22.2 No. 60079-11:2014, CSA C22.2 No. 60079-15:2016, CSA C22.2 No. 60079-31:2015, CSA C22.2 No. 61010-1:2012 (R2017), ANSI/ISA 12.27.01:2011, CSA C22.2 No. 60529:2005 (R2015)
	ATEX FM19ATEX0007X, UKEX FM21UKEX0201X, IECEx FMG 19.0006X	
	Flameproof/dust proof (local configuration):	
	II 1/2 G Ex ia/db IIB T6…T1 Ga/Gb –50 °C ≤ Ta ≤ +75 °C...+85 °C	
	II 1/2 D Ex ia/tb IIIC T77°C…T358°C Da/Db –50 °C ≤ Ta ≤ +75 °C...+85 °C	
	Flameproof/dust proof (remote configuration):	
	II (1)2 G Ex db [ia Ga] IIB T6…T5 Gb –50 °C ≤ Ta ≤ +75 °C...+85 °C	
	II (1)2 D Ex tb [ia Da] IIIC T77°C…87°C Db –50 °C ≤ Ta ≤ +75 °C...+85 °C	
	Intrinsically safe (local configuration):	
	II 1 G Ex ia IIC T4…T1 Ga –50 °C ≤ Ta ≤ +75 °C...+85 °C	
	II 1 D Ex ia IIIC T88°C…T368°C Da –50 °C ≤ Ta ≤ +75 °C...+85 °C	
	Intrinsically safe (remote configuration):	
	II 1 G Ex ia IIC T6…T4 Ga –50 °C ≤ Ta ≤ +75 °C...+85 °C	
	II 1 D Ex ia IIIC T52°C…T93°C Da –50 °C ≤ Ta ≤ +75 °C...+85 °C	
	Category 3 (Zone 2) (remote configuration only):	
	II (1)3 G Ex nAc [ia Ga] IIB T6…T4 Gc –50 °C ≤ Ta ≤ +75 °C...+85 °C	
	II (1)3 G Ex ic [ia Ga] IIB T6…T4 Gc –50 °C ≤ Ta ≤ +75 °C...+85 °C	
	II (1)3 D Ex ic [ia Da] IIIC T52°C…T93°C Dc –50 °C ≤ Ta ≤ +75 °C...+85 °C	

[1] For all wiring, see drawings # 3KXL001177U0109, 3KXL001177U0209 and 3KXL001177U0309. ENCL TYPE 4X, 6P. IP66/68

Standard body		Applied standard
FM (cFMus) (HART units only)[1]		FM Class 3600:2011, FM Class 3610, FM Class 3611, 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 60079-11, ANSI/ISA 60079-15, ANSI/ISA 60079-26: 2011, ANSI/ISA 60079-31:2015, ANSI/ISA 12.27.01:2011, UL50, 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/CSAC22.2 No. 60079-0:2015, CAN/CSAC22.2 No. 60079-1:2011, CAN/CSAC22.2 No. 60079-11, CAN/CSAC22.2 No. 60079-15, CAN/CSAC22.2 No. 60079-26, CAN/CSAC22.2 No. 60079-31:2015, CSAC22.2 No. 60529:2015, CAN/CSAC22.2 No. 61010-1:2012
	FM19US0023X, FM19CA0013X	
	Explosion proof/dust-ignition proof with IS, SI probe (local configuration):	
	CL I,II,III, DIV 1, GR C-G, T6…T1 T. Amb. –50 °C to 70 °C…85 °C	
	Explosion proof/dust-ignition proof with IS, SI probe (remote configuration):	
	CL I,II,III, DIV 1, GR C-G, T6…T5 T. Amb. –50 °C to 75 °C…85 °C	
	Flameproof/dust-ignition proof (local configuration):	
	CL I, Zone 0/1, AEx/Ex ia/db IIB T6…T1 Ga/Gb T. Amb. –50 °C to 70 °C…85 °C	
	Zone 20/21 AExEx ia/tb IIIC T77 °C...T358 °C Da/Db	
	Flameproof/dust-ignition proof (remote configuration):	
	CL I, ZONE 1, AEx/Ex db [ia Ga] IIB T6…T5 Gb T. Amb. –50 °C to 75 °C…85 °C	
	ZONE 21 AEx/Ex tb [ia Da] IIIC T77 °C…T87 °C Db	
	Intrinsically safe IS, SI (local configuration):	
	CL I, II, III, DIV 1, GP A-G, T4…T1 T. Amb. –50 °C to 43 °C…75 °C	
	CL I, ZONE 0, AEx/Ex ia IIC T4…T1 Ga	
	Zone 20, AEx/Ex ia IIIC T88°C…T368 °C Da	
	Intrinsically safe IS, SI (remote configuration):	
	CL I, II, III, DIV 1, GP A-G T6…T4 T. Amb. –50 °C to 40 °C…85 °C	
	CL 1, ZONE 0, AEx/Ex ia IIC T6…T4 Ga	
	ZONE 20, AEx/Ex ia IIIC T52 °C…T93 °C Da	
	Division 2/Zone 2/22 (remote configuration only):	
	CL I, DIV 2, Gp C, D, T6…T4, with IS, SI connection for CL I, DIV 1, GROUPS C, D for remote probe. Supply/HART wiring may be installed with or without non-incendive field wiring.	
	Class I, Zone 2, AEx/Ex ic [ia Ga] IIB T6…T4 Gc	
	Zone 22, AEx /Ex ic [ia Da] IIIC T52 °C…T93 °C Dc	
	T. Amb. –50 °C to 40 °C…85 °C	
CRN		CAN/CSA No. B51:2014 ASME B31.1/ASME B31.3
	Canadian Registration Number (CRN) # 0F20795.5C	
	Category "F" Type of fittings - Measuring devices	
SIL (Safety Integrity Level)[2]		IEC 61508
	Certificate # TUV No. Z10 064584 0044 SIL 2/SIL 3 capable device	

[1] For all wiring, see drawings # 3KXL001177U0109, 3KXL001177U0209 and 3KXL001177U0309. ENCL TYPE 4X, 6P. IP66/68 (1 meter - 3 days)

[2] Only available with software revision 1 with Total Level Measurement and only with output H1 (4–20 mA).

Ordering information

	Main code										Optional code
LWT310/LWT320	**XX**	**XX**	**XX**	**XXX**	**X**	**XX**	**XXXX**	**XX**	**XX**	**XX**	**XXX**
Approvals[1]											
General purpose	Y0										
ATEX/UKEX/IECEx Intrinsically safe, Ex ia IIC Ga, Ex ia IIIC Da	E1										
ATEX/UKEX/IECEx Flameproof/dustproof housing, Ex db/ia, Ex tb ia	E2										
ATEX/UKEX/IECEx Non-sparking, Ex nAc/ia, Category 3/1 (remote probe only)	E3										
ATEX/UKEX/IECEx Ex ic/ia, Category 3/1 (remote probe only)	E9										
Combination Approval - US standards FMus, ATEX, UKEX, IECEx - Flameproof/explosion proof, intrinsically safe, dustproof (protection type to be marked by customer)	M1										
Combination Approval - Canadian standards cFM, ATEX, UKEX, IECEx - Flameproof/explosion proof, intrinsically safe, dustproof (protection type to be marked by customer) (also meeting FMus)	M2										
cFMus standards, intrinsically safe, Ex ia	N1										
FM US standards, explosion proof/flameproof/dustproof, Ex db/ia, Ex tb ia	N2										
cFMus standards, Non-incendive with intrinsically safe probe & Ex nAc/ia (remote probe only)	N3										
Canadian standards by FM Explosion proof/flameproof/dustproof Ex db/ia, Ex tb ia (also meeting FMus)	N4										
US standards by CSA (for Modbus communication only) Explosion proof/flameproof/dustproof Ex db/ia, Ex tb ia	N5										
cFMus standards, Ex ic / ia (category 3/1) (remote probe only)	N6										
Canadian standards by CSA (for Modbus communication only) Explosion proof/flameproof/dustproof Ex db/ia, Ex tb ia (also meeting CSAus)	N7										
Wetted material											
C-276 alloy		H1									
304L stainless steel		S4									
316L stainless steel		S6									
Seal type (O-ring)											
Viton, process service temperature range: –26 to 204 °C (–15 to 400 °F)			V0								
Kalrez, process service temperature range: –20 to 204 °C (–4 to 400 °F)			K0								
EPDM, process service temperature range: –50 to 120 °C (–58 to 248 °F)			E0								
Markez,process service temperature range: –10 to 204 °C (14 to 400 °F)			M0								
Process connection type and pressure rating											
ANSI/ASME, raised face Class 150				ARD							
ANSI/ASME, raised face Class 300				ARE							
ANSI/ASME, raised face Class 600				ARG							
ANSI/ASME, raised face Class 900				ARH							
DIN, raised face PN25				DRD							
DIN, raised face PN40				DRE							
DIN, raised face PN100				DRG							
DIN, raised face PN160				DRH							
NPT threaded connection				NTN							
Special (industry-recognized standard flanges only)				ZZZ							

[1] All approvals only available for 4 to 20 mA + HART communication, except for N5 and N7 which are only available for Modbus.

	Main code										Optional code
LWT310/LWT320	**XX**	**XX**	**XX**	**XXX**	**X**	**XX**	**XXXX**	**XX**	**XX**	**XX**	**XXX**
Process connection size											
DN 20/ANSI ¾ in **(LWT310 only)**					B						
DN 25/ANSI 1 in **(LWT310 only)**					C						
DN 40/ANSI 1 ½ in					E						
DN 50/ANSI 2 in					F						
DN 80/ANSI 3 in					H						
DN 100/ANSI 4 in					J						
DN 150/ANSI 6 in					M						
DN 200/ANSI 8 in					P						
Special (industry recognized standard flanges only)					Z						
Probe type											
LWT310 rod probes											
Rod probe Ø9.5 mm (⅜ in), 6.1 m (20 ft) maximum length						R2					
Rod probe Ø9.5 mm (⅜ in), 6.1 m (20 ft) maximum length, with Teflon™ sleeve[1]						RA					
Segmented rod probe (1 m [39.4 in]) Ø9.5 mm (⅜ in), 6.1 m (20 ft) maximum length						R5					
Segmented rod probe (1 m [39.4 in]) Ø9.5 mm (⅜ in), 6.1 m (20 ft) maximum length, with Teflon™ sleeve[1,2]						RB					
LWT320 rod probes											
Rod probe Ø12.7 mm (½ in), 6.1 m (20 ft) maximum length						R3					
Rod probe Ø12.7 mm (½ in), 6.1 m (20 ft) maximum length, with Teflon™ sleeve[1]						RG					
Segmented rod probe (1 m [39.4 in]), Ø12.7 mm (½ in), 6.1 m (20 ft) maximum length						R6					
Segmented rod probe (1 m [39.4 in]), Ø12.7 mm (½ in), 6.1 m (20 ft) maximum length, with Teflon™ sleeve[1,2]						RH					
LWT310 cable probes											
Cable probe 4.8 mm (3⁄16 in) O.D. 61 m (200 ft) maximum length[3]						F1					
Cable probe 4.8 mm (3⁄16 in) O.D. 61 m (200 ft) maximum length[3], with Teflon™ coating[1]						FT					
Cable probe 4.8 mm (3⁄16 in) O.D.,with Teflon™ spacers 61 m (200 ft) maximum length[3]						FB					
LWT320 cable probes											
Cable probe 6.4 mm (¼ in) O.D. 61 m (200 ft) maximum length[3]						F2					
LWT310 coaxial probes											
Coaxial probe 22 mm (⅞ in) O.D. with Teflon™ spacers 6.7 m (22 ft) maximum length						CT					
Probe material											
C-276 alloy							PMH1				
304/L stainless steel							PMS4				
316/L stainless steel							PMS6				
Housing											
Aluminum with 2 × M20 × 1.5								D1			
Aluminum with 2 × NPT ½ in								D2			
316L stainless steel with 2 × M20 × 1.5								D3			
316L stainless steel with 2 × NPT ½ in								D4			
Remote/Aluminum 2 × M20 × 1.5								R1			
Remote/Aluminum 2 × NPT ½ in								R2			
Remote/Stainless steel 2 × M20 × 1.5								R3			
Remote/Stainless steel 2 × NPT ½ in								R4			

[1] Teflon™ sleeve only protects the probe; coupler, flange and weight are not protected by the sleeve.

[2] Single sleeve provided separately, to be installed on the assembled probe once on site.

[3] Cable probe length longer than maximum measurement range (20 m) are offered for specific installation purposes.

	Main code											Optional code
	LWT310/LWT320	**XX**	**XX**	**XX**	**XXX**	**X**	**XX**	**XXXX**	**XX**	**XX**	**XX**	**XXX**
Display												
No display, with blind cover										L0		
With HMI TTG and display and glass cover										L2		
Output												
Single 4 to 20 mA + HART communication											H1	
Modbus and LevelMaster communication											M1	
Unmounted accessories												
Stopping plug, nickel-plated brass												A1
Cable gland, nickel-plated brass												A2
3 in to ¾ in bushing (Class 150)												A3
4 in to ¾ in bushing (Class 150)												A4
Other accessory												AZ
Remote electronics coaxial cable length (for remote coupler only)[1]												
1.5 m (≅5 ft)												SRW
3 m (≅10 ft)												SRT
5 m (≅16 ft)												SR1
6 m (≅20 ft)												SRR
10 m (≅32 ft)												SR2
15 m (≅49 ft)												SR3
20 m (≅66 ft)												SR4
25 m (≅82 ft)												SR5
30 m (≅98 ft)												SR6
35 m (≅115 ft)												SR7
40 m (≅131 ft)												SR8
45 m (≅147 ft)												SR9
50 m (≅164 ft)												SRA
60 m (≅197 ft)												SRB
Custom coaxial remote length (max. 60 m [197 ft])												SRZ
End-of-probe attachments												
Cable probe weight												
Cable weight (removable)												WC1
Cable weight (welded, LWT320 only)												WC2
Centering disks												
Metal centering disk												WD1
Device identification plate												
Additional stainless-steel hang tag												T1
Additional screwed-on steel tag plate												TD
Certificates												
Test report 2.2 acc. EN 10204												C1
MTR 3.1, Material monitoring with inspection certificate 3.1 acc. EN 10204												C2
Declaration of compliance with the order 2.1 acc. EN 10204												C4
With dye penetrant test on pressure bearing parts												C9
Certificate of origin												CO
Attested certificate of origin												AC
Printed record of configured settings in transmitter												CG
With hydrostatic test report												CH
PMI Positive Material Identification without carbon content												CJ
Material monitoring NACE MR 0175, MR 0103 with inspection certificate 3.1 acc. EN 10204												CN
SIL2 - certified acc. to IEC61508[2]												CS

[1] Coaxial cable length combined with expected measurement range should not exceed 60 m.

[2] Only available with software revision 1 with Total Level Measurement and only with output H1 (4–20 mA). Special order to be requested.

	Main code											Optional code
	LWT310/LWT320	**XX**	**XX**	**XX**	**XXX**	**X**	**XX**	**XXXX**	**XX**	**XX**	**XX**	**XXX**
Drawings												
Standard ABB drawings for approval prior to construction												GD1
Standard ABB drawing for record												GD2
Certified as built standard ABB drawings												GD3
Custom drawing considering customer requirements												GDZ
Documentation language (user and quick start guides, hard copy)												
German												M1
French												M4
English												M5
Programming and parameter settings												
Custom parameter settings												N6
Calibration type												
5-point calibration verification certificate, factory default 100, 75, 50, 25 and 0% of measurement length (maximum length of 7 m, points at longer distance guaranteed verified by design)												R5
9-point calibration verification certificate, factory default 100, 87.5, 75, 67.5, 50, 37.5, 25, 12.5 and 0% (maximum length of 7 m, points at longer distance guaranteed verified by design)												R9
Pipe or chamber internal diameter for spacer, weight or end-of-probe disk sizing												
Inner diameter ≥24.3 mm (0.96 in) and <34 mm (1.34 in), spacer O.D.: 22.3 mm (0.88 in) **(LWT310 only)**												QP1
Inner diameter ≥34 mm (1.34 in) and <42.8 mm (1.69 in)												QP2
Inner diameter ≥42.8 mm (1.69 in) and <54 mm (2.13 in)												QP3
Inner diameter ≥54 mm (2.13 in) and <66.7 mm (2.62 in)												QP4
Inner diameter ≥66.7 mm (2.62 in) and <82.8 mm (3.26 in)												QP5
Inner diameter ≥82.8 mm (3.26 in) and <102.3 mm (4.03 in) – Low profile for interface measurement												QP6
Inner diameter ≥102.3 mm (4.03 in) and <122.3 mm (4.81 in) – Low profile for interface measurement												QP7
Inner diameter ≥122.3 mm (4.81 in)												QP8
Custom dimension (not for gas phase compensation)												QPZ
Probe length UOM (this code will not appear on label – only the length + units)												
mm												QL3
in												QLN

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