Data sheet DS/LMT200-EN Rev. B

LMT200
External mount magnetostrictive level transmitter

High accuracy non-intrusive liquid level and interface level detection
K-TEK Level products

Measurement made easy



Features

- Calibrated from the factory
- High Accuracy: .01% of Full Scale or +/- 1.27mm
- Never Requires Re-Calibration: Set It & Forget It
- Easy setup with waveform display
- Not affected by agitation, foam or emulsion layers
- No oscilloscope required
- Designed to Mount Externally to K-TEK KM26 or other Magnetic Level Gauge
- Superior Sensor (Patent #5,473,245)
- Local Indication with HMI Display
- Dual Compartment Housing with Separate Field Terminal Compartment
- Loop Powered to 15.24m (50ft) Probe Length
- Total and/or Interface Level Measurement
- Temperature Range: -195.5 to 426.6ºC (-320 to 800ºF) with options
- Field Replaceable / Upgradable Electronics Module
- Built-in RFI / EMI Filter
- Digital Communications
- Online Self-verification

Options

- Two Level Indications
- Glass Viewing Window
- 316 Stainless Steel Enclosure
- Built-in surge protection

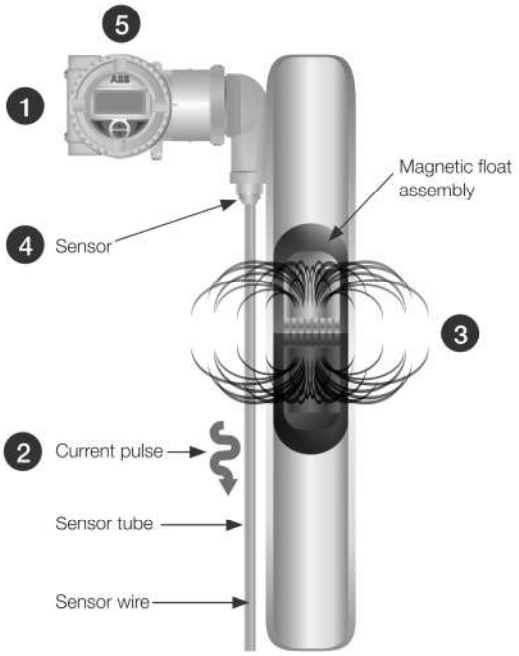
Power and productivity for a better world™

LMT200
External mount magnetostrictive level transmitter

Principle of Operation:

The LMT200 is based upon the magnetostrictive principle.

1. The device electronics generates a low energy current pulse at fixed intervals.
2. The electrical pulses create a magnetic field which travels down a specialized wire inside the senor tube.
3. The interaction of the magnetic field around the wire and the magnetic float causes a torsional stress wave to be induced in the wire. This torsion propagates along the wire at a known velocity, from the position of the magnetic float and toward both ends of the wire.
4. A patented sensing element placed in the transmitter assembly converts the received mechanical torsion into an electrical return pulse.
5. The microprocessor-based electronics measures the elapsed time between the start and return pulses (Time of Flight) and converts it into a position measurement which is proportional to the level of the float.





LMT200 non-intrusive single level installation.
Top and bottom mount shown.



LMT200 non-intrusive level and interface installation.
Top and bottom mount shown.

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Specifications		
Electronic transmitter:		
Repeatability	± 0.005% of Full Scale or 0.305 mm (0.012 in), whichever is greater	
Non-linearity	± 0.01% of Full Scale or 0.864 mm (0.034in), whichever is greater	
Measuring accuracy	± 0.01% of Full Scale or 1.27 mm (0.050 in), whichever is greater[1]	
Supply voltage	12 to 42 Vdc - 4-20mA HART loop powered	
Output/Communications	4-20mA HART7®	
User Interface	Interactive display, DTM, EDDL with NE107 messaging	
Power consumption	4-20mA	at 36.0 Vdc - 3.6mA 0.13 watts; 21mA 0.76 watts at 12.0 Vdc - 3.6mA 0.043 watts; 21mA 0.25 watts
	HART® mode (3.6mA)	at 36.0 Vdc 0.144 watts at 12.0 Vdc 0.048 watts
Maximum line resistance	4-20mA	at 36.0 Vdc and 21mA, 1142 ohms* at 24.0 Vdc and 21mA, 571 ohms at 12 Vdc and 21mA, < 72 ohms** *Maximum allowable with HART® communication is 700 ohms **See the current/resistance chart
	HART® mode (3.6mA)	< 650 to 700 ohms
Polarity protection	Diode in series with loop	
Update rate	10 measurements per second	
Minimum measuring span	76.2mm (3.0in) consult factory if less is required	
Damping	Field Adjustable, Range: 0.1 to 60 seconds	
Alarm output	NE43, Software or Hardware selectable. Upscale (21 mA) or Downscale (3.6 mA)	
Surge Suppression	Integral surge suppression available with option code S1	
Ambient temperature	-40 to 85ºC (-40 to 185ºF) Ambient[2]	
Humidity	0 to 100% RH	
Linearization	21 Point Table Available	
Enclosure	Dual Compartment	
Enclosure material	Cast Low Copper Aluminum with Powder Coat or 316 Stainless Steel	
Device tag material	AISI 316 Stainless Steel	
Electrical connection	Two M20 x 1.5 or two 1/2in FNPT, Adapters and Bus Connectors also available	
Ingress protection	IP66, NEMA 4X	
Sensor tube:		
Material	316/L Stainless Steel	
Standard probe length	304.8mm to 15.24 m (1 to 50 ft); 90 degree probes (SEH Option) 304.8mm to 7.62m (1 to 25 ft)	
Probe length tolerance	± 3.2mm (0.125in) up to 3.0m (10ft); +/- 6.4mm (0.25in) up to 6.0m (20ft); ± 9.0mm (0.35in) up to 9.0m (29.5ft); +/- 25.4mm (1.0in) up to 15.24m (50ft)	
Mounting	Stainless Steel Clamps for KM26 Magnetic Level Gauge Chamber Included; Optional Vibration Isolation Mounts	

[1] Measurement accuracy is recorded at factory ambient conditions (23.88 ˚F +/-5.6 ˚C (75 ˚F +/-10 ˚F)) using a calibration magnet. Accuracy may be further influenced by other factors such as float hysteresis, installation, process conditions and ambient conditions.
[2] Some agency approvals may differ.
HART® is a registered trademark of the FieldComm Group

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Float Design for ABB K-TEK Products - KM26S

Every KM26 MLG float is precisely engineered to customer application, ensuring optimal accuracy and performance.

Precisely spaced magnets create a 360° magnetic field coverage, safeguarding level transmitter and gauge performance, even the most challenging applications.

Several materials of construction available including Titanium, Monel®, Hastelloy® C, Stainless Steel, and Plastics. Tefzel®, Halar®, TEFLON® S protective coatings are also available.

Process pressures to 344 Bar (5000 PSI) to full vacuum.

Tefzel® (Registered trademark of DuPont)
Hastelloy® (Registered trade mark of Haynes International, Inc.)
Monel® (Registered trademark of the INCO)
Halar® (Registered trademark of Solvay Solexis)



A minimum of 75 grams of buoyancy are engineered into every KM26 float ensuring optimal performance even in the most difficult process applications.



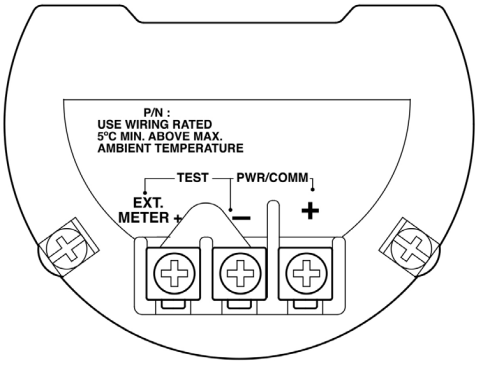
HMI Indicator (Option)

- Display of the waveform for device performance confirmation
- Display of the current level as well as interface or the temperature of the measuring medium (optional)
- Application-specific visualizations which the user can select. Four operator pages can be configured to display multiple values in parallel
- Plain text fault diagnostics in conformance to NE107
- Menu-guided parameter settings with four buttons
- “Easy Set-up” function for fast commissioning
- Parameter settings of the device through the front glass with the housing closed
- During ongoing operation, the HMI Indicator can be connected or disconnected and therefore also used as a configuration tool for other devices

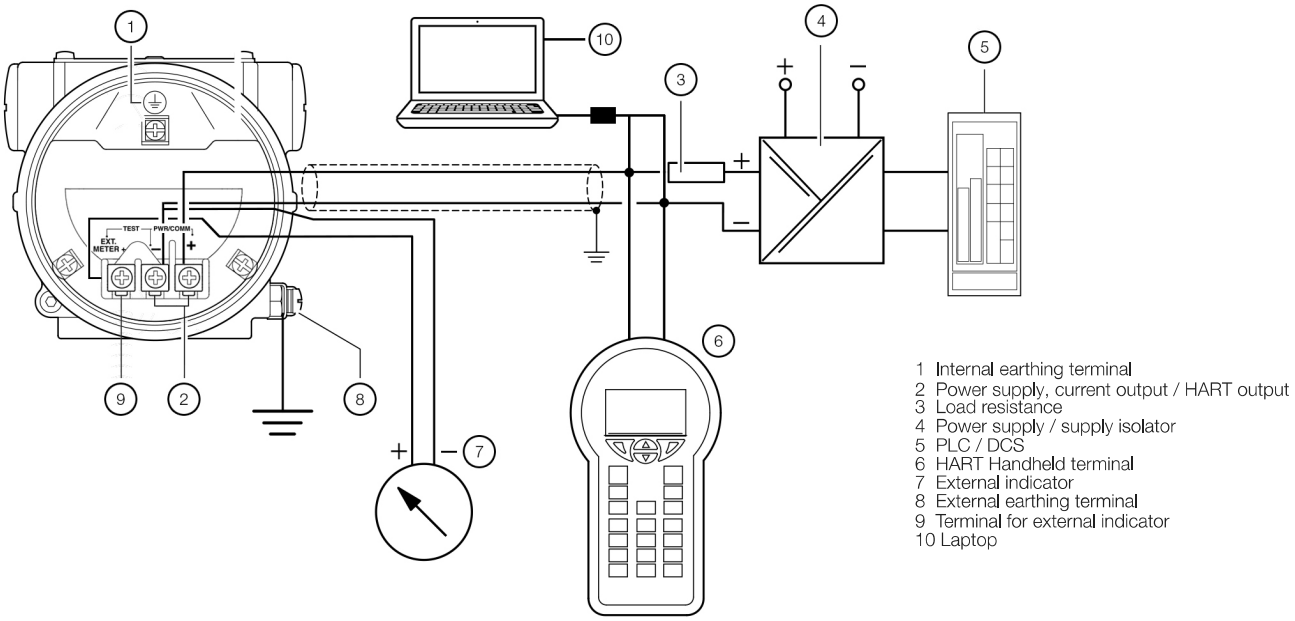
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Electrical Connections

Devices with HART® communication
Current output / HART® output



Terminal	Function / Comment
PWR/COMM +	Power supply, current output / HART® output
PWR/COMM -	
EXT. METER	Not assigned



1 Internal earthing terminal
2 Power supply, current output / HART output
3 Load resistance
4 Power supply / supply isolator
5 PLC / DCS
6 HART Handheld terminal
7 External indicator
8 External earthing terminal
9 Terminal for external indicator
10 Laptop

For connecting the signal voltage / supply voltage, twisted cables with a conductor cross-section of 18 … 22 AWG / 0.8 … 0.35 mm2 and a maximum length of 1500 m (4921 ft.) must be used. For longer leads a greater cable cross section is required.
For shielded cables the cable shielding must only be grounded on one side (not on both sides).
For the earthing on the transmitter, the inner terminal with the corresponding marking can also be used.
The output signal (4 ...20 mA) and the power supply are conducted via the same conductor pair.
The transmitter works with a supply voltage between 12 ... 42 V DC. For devices with the type of protection “Ex ia, intrinsic safety” (ATEX, IEC, FM, and CSA approval), the supply voltage must not exceed 30 V DC. In some countries the maximum supply voltage is limited to lower values. The permissible supply voltage is specified on the name plate on the top of the transmitter.

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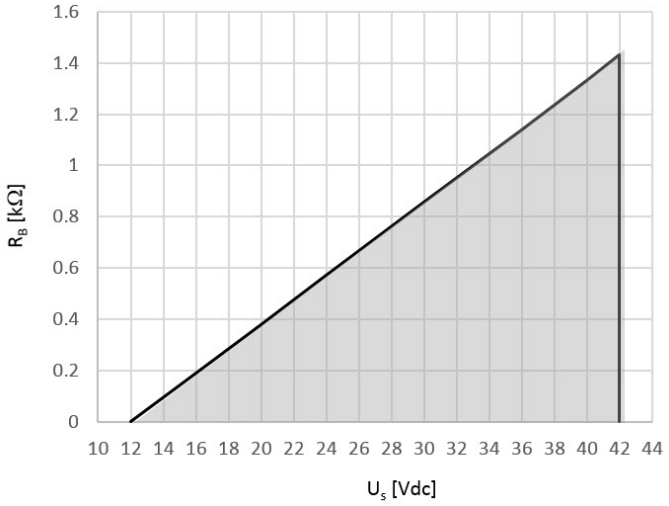
Power Supply	
Devices with HART® communication	
Terminals	PWR/COMM + / PWR/COMM -
Supply Voltage	12 ... 42 V DC
Residual Ripple	Maximum 5 % or Uss = ±1.5 V
Power consumption	< 1 W

Current Output / HART® Output
Only for devices with HART® communication

Terminals: PWR / COMM + / PWR/COMM -

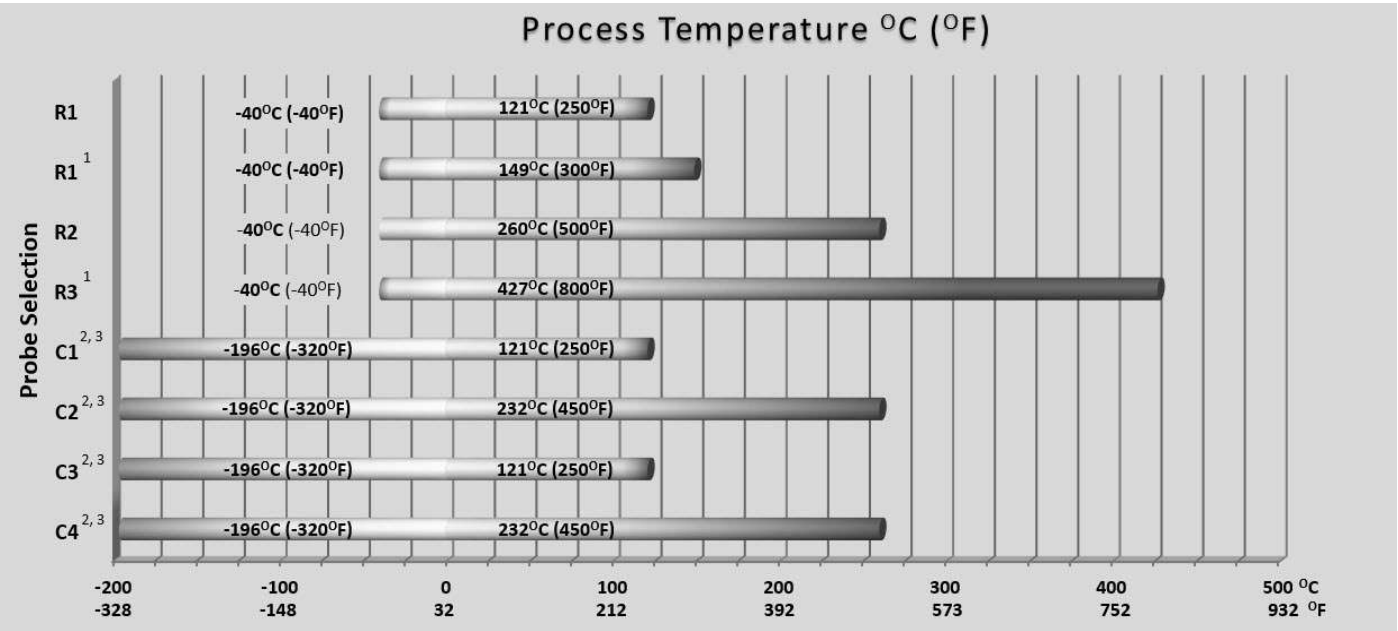
In HART® communication, the smallest load is R_B = 250 Ω. The load is R_B is calculated as a function of the available supply voltage U_S and the selected signal current I_B as follows:

$$R_B = \frac{U_S \text{ - min. operating voltage (12.0) Vdc}}{I_B}$$



R_B Load Resistance
U_S Supply Voltage
I_B Singal current

Probe Selection Guide



1. Requires chamber insulation or IHPAD
2. C3 and C4 options are Additionally, the C3 and C4 sensors are preferred for cryogenic insulated chambers, allowing sensor removal without destruction of the insulation. To use these options, chamber top must be dome or flat cap.
3. SEH option is required for bottom mount cryogenic applications in order to allow access to the terminals and display of transmitter. Also,typical bottom mounted installations are not designed with C3 or C4 sensors since chambers are designed for float removal from the bottom (flange).

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Approvals

Flameproof marking

- ATEX/IECEx
  - II 1/2 G Ex db IIC T6..T2 Ga/GbFM15ATEX0074X
  - IECEx FME150011X Power Supply 42 Vdc/2W Max
- FM (C and US) approved
  - CLI Zone 1, AEx/Ex db IIC T6…T2 Gb
  - US - CLI GP ABCD, T6…T2
  - Canada - CLI GP BCD, T6…T2

Protection by enclosure marking

- ATEX/IECEx
  - II 2 D Ex tb IIIC T85°C...T300°C Db FM15ATEX0074X
  - IECEx FME150011X Power Supply 42 Vdc/2W Max
- FM (C and US) approved
  - Zone 21 AEx/Ex tb IIIC T80°C…T165°C Db
  - US - CLII GP EFG, CLIII T6…T2
  - Canada - CLII GP EFG, CLIII T6…T2

Intrinsic / Non-Incendive marking

- ATEX/IECEx
  II 1 G Ex ia IIC T6…T4 Ga
  II 1 D Ex ia IIIC T80°C Da;
  FM15ATEX0072X - IECEx FME150011X
  II 3 G Ex ic IIC T6..T4 Gc
  II 3 D Ex ic IIIC T80°C Dc
  II 3 G Ex nA IIC T6..T4 Gc
  FM15ATEX0073X - IECEx FME150011X
- FM (C and US) approved
  CLI DIV1/GP ABCD, CLII/DIV1/GP EFG, CLIII;
  CLI ZONE 0 AEx/Ex ia IIC T6…T4 Ga;
  Zone 20 AEx ia IIIC T80°C; CLII/III DIV1 Ex ia IIIC T80°C;
  CLI/DIV2/GP ABCD; CLII/DIV2/GP FG; CLIII;
  CLI ZONE 2, AEx nC IIC T6…T4;
  CLI ZONE 2, Ex nL IIC T6…T4;
  per 3KXL140000G0109

Example of Code:
LMT200.M1.S6.R1.B1.D1.L2.H1-TS.AV.AR // GD2.M5 ML = 1234.12mm

LMT200 Model Codes				
LMT200 External Mount	**LMT200.....xxx-**	xx	xx	xx
Approvals				
General Purpose		Y0		
ATEX / IECEx Intrinsic Safety		E1		
ATEX / IECEx Flameproof housing		E2		
ATEX / IECEx Flameproof Non-Sparking (Ex nA)		E3		
ATEX / IECEx Ex ic Category 3		E8		
Multi-Approval - North American (meeting FM and Canadian Standards) / ATEX / IECEx Explosion Proof or Flameproof, Intrinsic Safety or Non-Sparking (Protection Type marked by Customer)		M1		
North American Intrinsic Safety		N1		
North American (meeting FM and Canadian Standards) Explosion Proof / Flameproof		N2		
North American (meeting FM and Canadian Standards) Non-Incendive / Non-Sparking		N3		
North American (meeting FM and Canadian Standards) Ex ic		N8		
Others		Z9		
Probe Material				
316/L SS			S6	
Special			Z9	
Probe Style and Probe Type				
5/8 in. Rigid Probe, -40 to 121.11°C (-40 to 250°F)				R1
5/8 in. Rigid Probe, -40 to 232.22°C (-40 to 450°F)				R2
5/8 in. Rigid Probe, -40 to 426.66°C (-40 to 800°F)				R3
5/8 in. Rigid Probe for Cryogenic Services, -195.55 to 121.11°C (-320 to 250°F,) with Vapor Seal				C1[1]
5/8 in. Rigid Probe for Cryogenic Services, -195.55 to 232.22°C (-320 to 450°F,) with Vapor Seal				C2[1]
3/4 in. NPS Sensor Well with 5/8 in. Rigid Probe for Cryogenic Services, -195.55 to 121.11°C (-320 to 250°F) with Vapor Seal				C3[1]
3/4 in. NPS Sensor Well with 5/8 in. Rigid Probe for Cryogenic Services, -195.55 to 232.22°C (-320 to 450°F), with Vapor Seal				C4[1]
Special				Z9

[1] Due to the insulation thickness, it is likely the SEH option will be required if cyrogenic units are bottom mounted. It is also recommeded to use the C3 or C4 options so that removal of the transmitter is possible without damaging the insulation.

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Example of Code:
LMT200.M1.S6.R1.B1.D1.L2.H1-TS.AV.AR // GD2.M5 ML = 1234.12mm

LMT200 Model Codes (Continued)					
LMT200 External Mount	**LMT200.....xxx-**	xx	xx	xx	xx
Mounting Orientation					
None		Y0			
Bottom left connected electronic housing		B1			
Bottom right connected electronic housing		B2			
Top left connected electronic housing		T1			
Top right connected electronic housing		T2			
Housing					
Aluminum with 2 x M20 x 1.5			D1		
Aluminum with 2 x NPT 1/2 in.			D2		
316L Stainless Steel with 2 x M20 x 1.5			D3		
316L Stainless Steel with 2 x NPT 1/2 in.			D4		
Special			Z9		
Display					
No Display, with Blind Cover				L0	
With Through the Glass (TTG) Push Buttons, Display and Glass Cover				L2	
Special				Z9	
Output					
Single 4 ... 20 mA + HART®					H1
Special					Z9

The following codes behind the hyphen (-) are options which affect the construction and tagging of the transmitter.

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External mount magnetostrictive level transmitter

Example of Code:
LMT200.M1.S6.R1.B1.D1.L2.H1-TS.AV.AR // GD2.M5 ML = 1234.12mm
The following codes behind the hyphen (-) are options which affect the construction and tagging of the transmitter.

Options							
LMT200.....xxx-xxx.xx	xxx	xx	xx	xx	xx(x)	xx	xxx
Sensor Probe Options							
90 degree bend housing extension (maximum probe length 7.62 m / 25 ft.)	SEH						
Sensor special	SEZ						
Add Nitrogen purged vapor seal to standard probe	SEV[1]						
Device Identification Plate							
Add stainless steel hang tag, custom markings 4 lines, 22 characters per line		TS					
Other tagging special		TZ					
Electrical Connector Type							
M20 stainless steel adapter			U8				
M20 brass adapter			U9				
Electrical Connector Special			UZ				
Surge Protector							
Surge / Transient Protector				S1			
Special Other							
Transmitter special option					STT		
Special paint or treatment on housing					STH		
Special paint or treatment on flange					STF		
Nuclear use, device to be used in a nuclear facility (application must be reviewed by ABB)					P4		
Special					PZ		
Mounted Accessories							
Mounted to chamber with vibration isolators, minimum 2 assemblies and additional assemblies per additional 5 ft. of probe length						AV	
Valve position transmitter kit including mounting bracket and magnet assembly						AT	
Mounting Options							
Mounting to KM26 with shuttle							MKS
Mounting to KM26 with bar graph							MKB
User mounting to existing chamber without insulation							MKN
User mounting to existing KM26 with insulation blanket							MKH
User mounting to existing chamber. IHPAD insulation pad accessory required							MKP

[1] SEV option is for R1, R2 and R3 sensors. C1, C2, C3 and C4 include vapor seals.

All codes located behind the // are for additional requirements and order comments.
These codes will not be included on the device tag.

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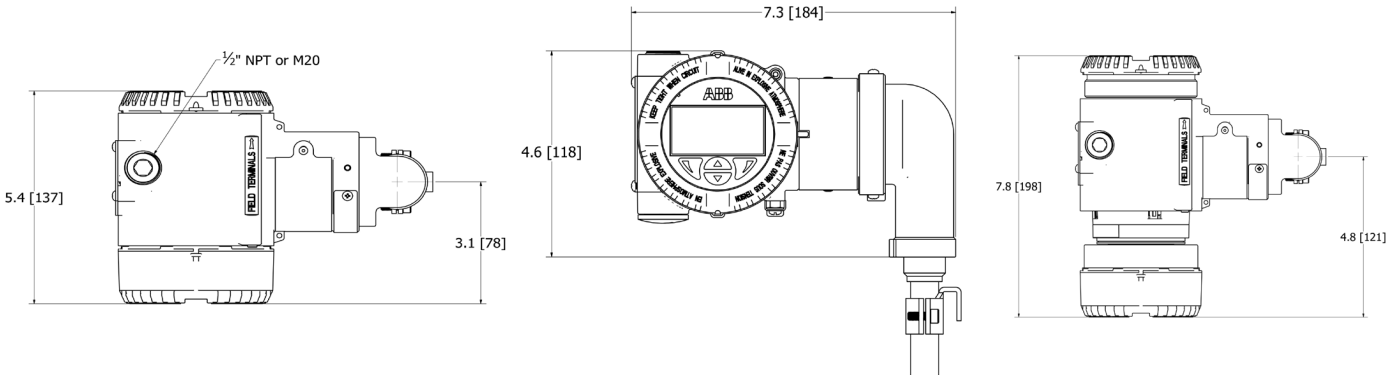
Example of Code:
LMT200.M1.S6.R1.B1.D1.L2.H1-TS.AV.AR // GD2.M5 ML = 1234.12mm
All codes located behind the // are for additional requirements and order comments.
These codes will not be included on the device tag.

Additional Order Requirements and Order Comments					
LMT200.....xxx- .../ /	xx(x)	xxx	xx	xx	xx
Certificates					
Declaration of compliance with the order 2.1 acc. EN 10204	C4				
Test report 2.2 acc. EN 10204	C1				
MTR 3.1, Material monitoring with inspection certificate 3.1 acc. EN 10204	C2				
MTR 3.2, Material monitoring with inspection certificate 3.2 acc. EN 10204	C3				
Material monitoring NACE MR 0175, MR 0103 with inspection certificate 3.1 acc. EN 10204	CN				
PMI Positive Material Identification with carbon content	CHC				
PMI Positive Material Identification without carbon content	CHD				
Other certificates	CZ				
Drawings					
Drawings for approval required prior to construction		GD1			
Drawings for record required		GD2			
Certified as built drawings required		GD3			
Other drawings		GDZ			
Documentation Language (installation, operation and maintenance manual)					
German			M1		
Italian			M2		
Spanish			M3		
French			M4		
English			M5		
Chinese			M6		
Portuguese			MA		
Russian			MB		
Others			MZ		
Calibration & Configuration					
3-point calibration verification certificate, factory default 100, 50 and 0 % of measurement length, or customer specified points				R3	
5-point calibration verification certificate, factory default 100, 75, 50, 25 and 0 % of measurement length, or customer specified points				R5	
Custom Linearization or Strapping table entered (up to 20 points)				RL	
Calibrate for two float application				RF	
Witnessed calibration, with certificate				RW	
Printed record of configured settings in transmitter				CG	
Special calibration				RZ	
Special					Z9

Measuring length on LMT200		
Measuring Length (ML)	12345.12	
Inches	xxxxx.xx	IN
Millimeters	xxxxx.xx	MM

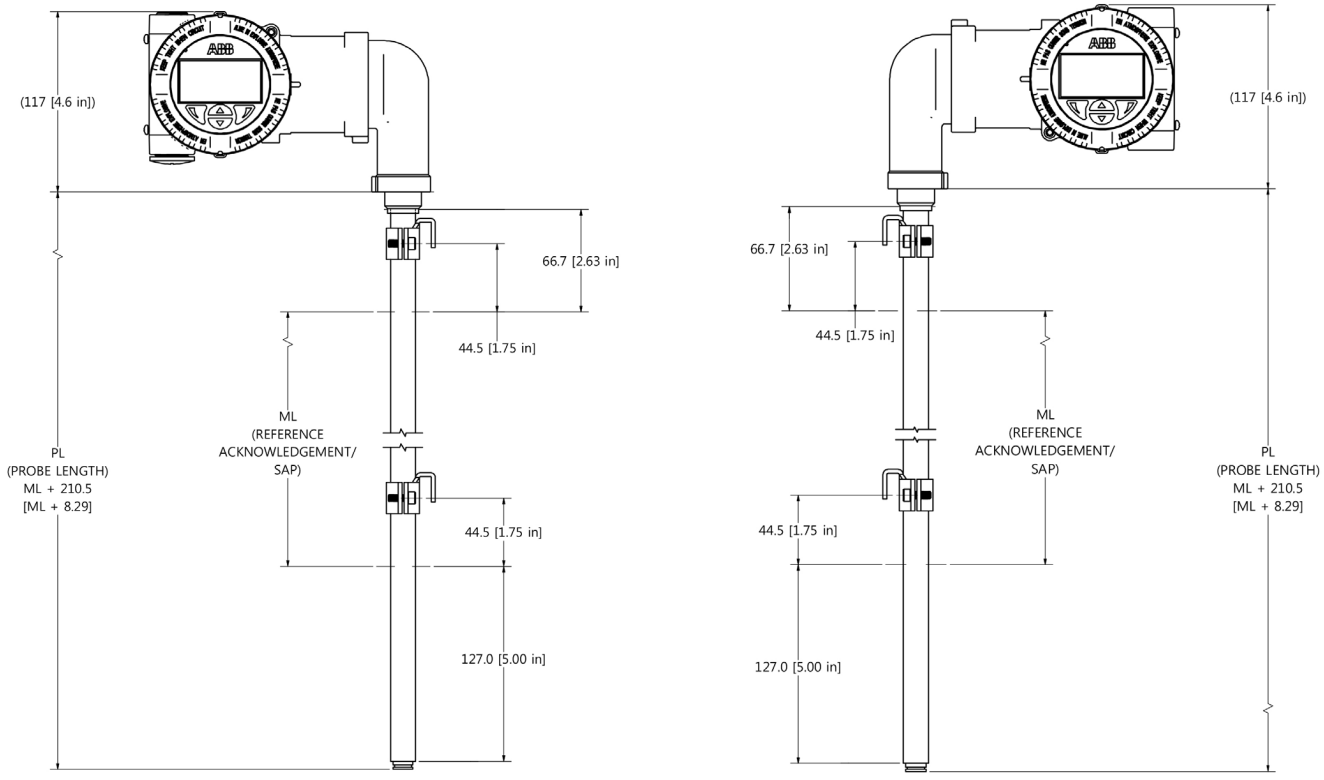
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Enclosures



*Drawings for Reference Only

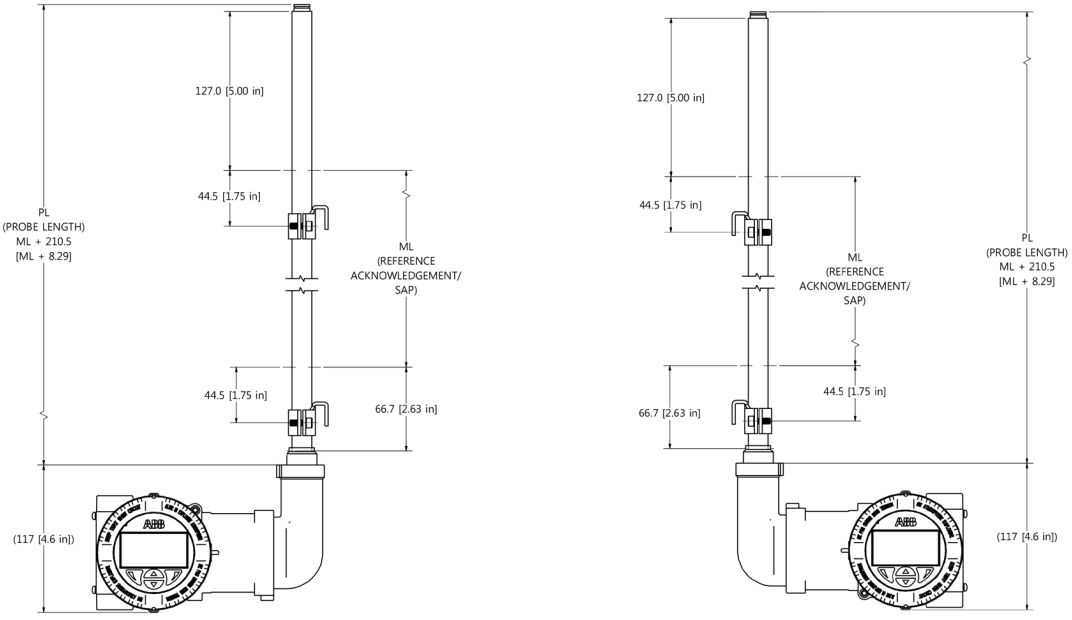
Probe Type R1, R2 & R3 - Top Mount



*Drawings for Reference Only

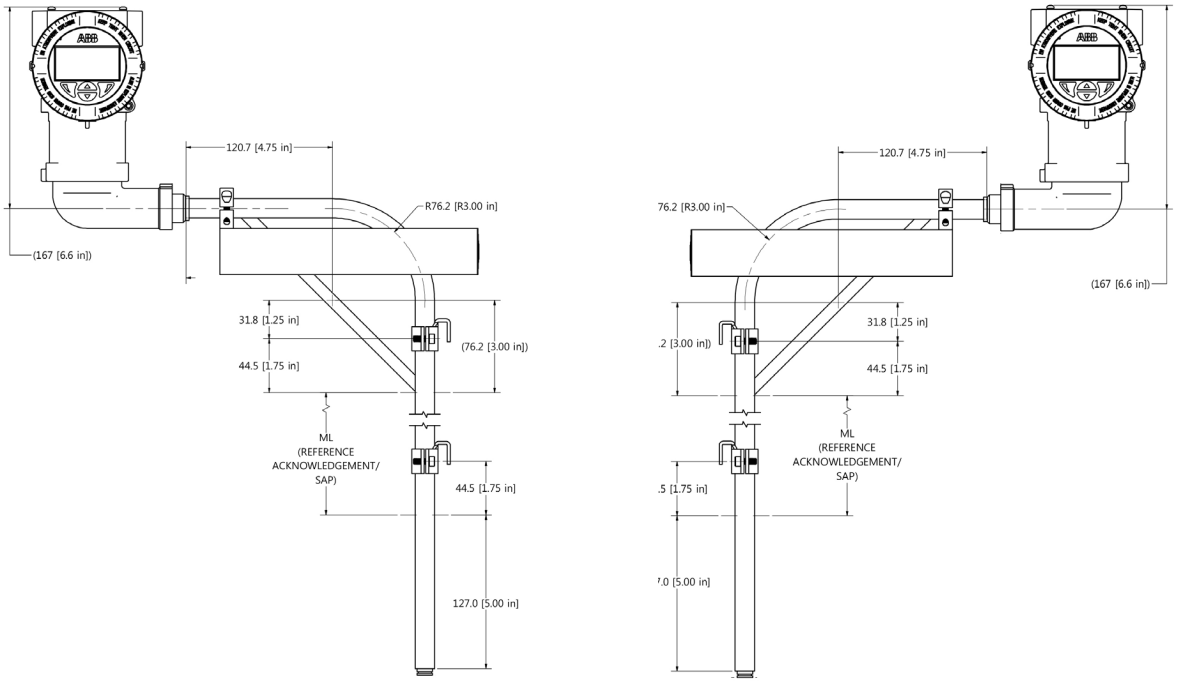
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Probe Type R1, R2 & R3 - Bottom Mount



*Drawings for Reference Only

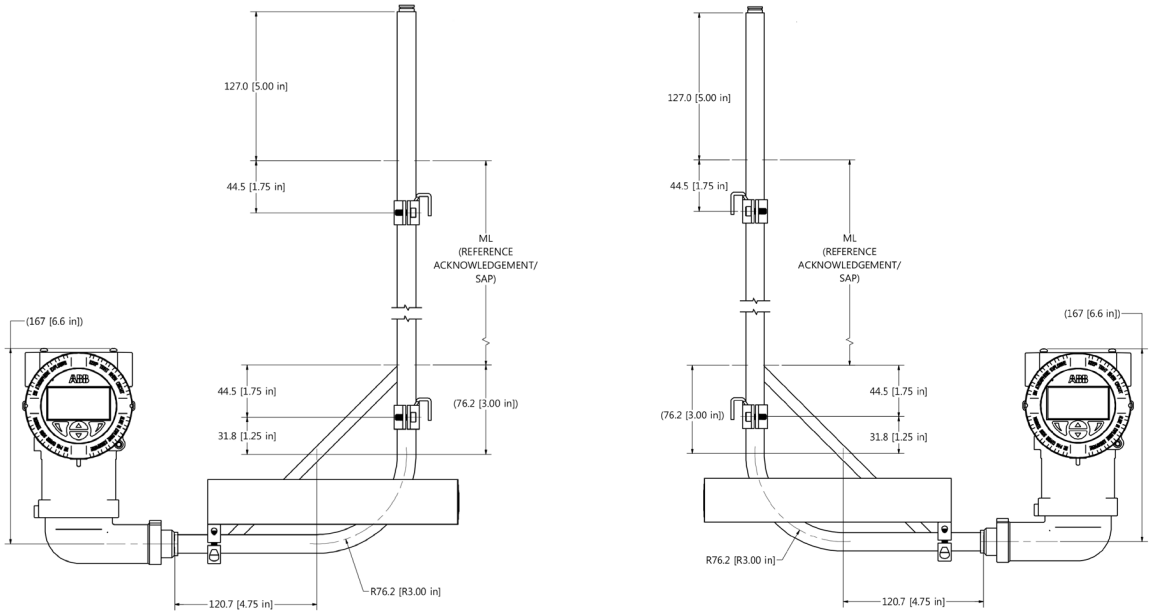
SEH 90 degree bend housing extension - Top Mount



*Drawings for Reference Only

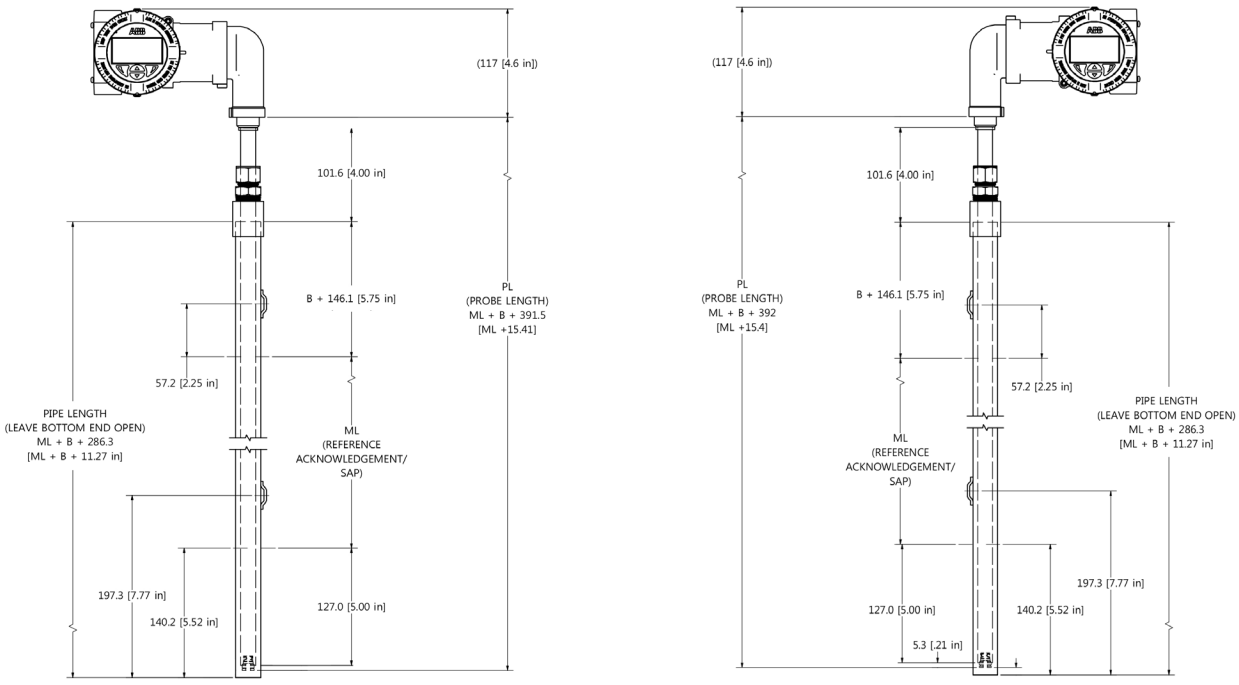
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SEH 90 degree bend housing extension - Bottom Mount



*Drawings for Reference Only

Cryogenic with insertion well - Top Mount



*Drawings for Reference Only

Vibration Isolator Mount Option

Kit Includes:
1 Vibration Isolator
1 Chamber mounting clamp assembly
2 Bearing clamp assemblies

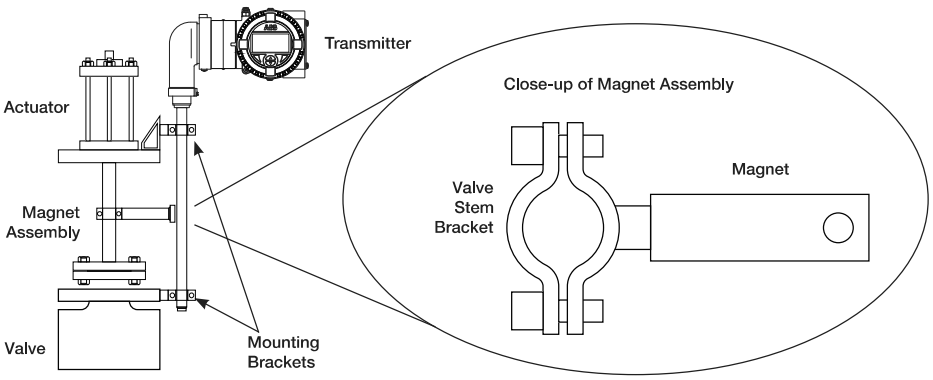


For measurement lengths (ML) of 914.4mm (36in) or less, a minimum of two VI-KIT assemblies are recommended for installation in high vibration applications. For ML greater than 914.4mm (36in), the number of isolators required can be determined from the below chart.

ML up to	# of Kits
914.4mm (36in)	2
1828.8mm (72in)	3
2286.0mm (90in)	4
2743.2mm (108in)	4
3200.4mm (126in)	5
3657.6mm (144in)	5
4114.8mm (162in)	6
4572.0mm (180in)	6
> 4572.0mm (180in)	consult factory

Position Transmitter Mounting Option

Example Installation: LMT200 Valve Position Transmitter and Hydraulic Control Valve



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