

ABB MEASUREMENT & ANALYTICS | DATA SHEET

# LMT200 external mount magnetostrictive level transmitter

High accuracy non-intrusive liquid level  
and interface level detection





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# Measurement made easy

## K-TEK Level products

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### Features

- Calibrated from the factory
- High accuracy: .01 % of full scale or  $\pm 1.27$  mm
- No re-calibration needed: set it and 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 15.24 m (50 ft) probe length
- Total and/or interface level measurement
- Temperature range:  $-195.5$  to  $426.6$  °C ( $-320$  to  $800$  °F) with options
- Field replaceable/upgradable electronics module
- Built-in RFI/EMI filter
- Digital communications
- Online self-verification
- HART 7<sup>®</sup> and FOUNDATION Fieldbus™ ITK6.3.0
- Global hazardous location approvals and SIL 2/3 capable

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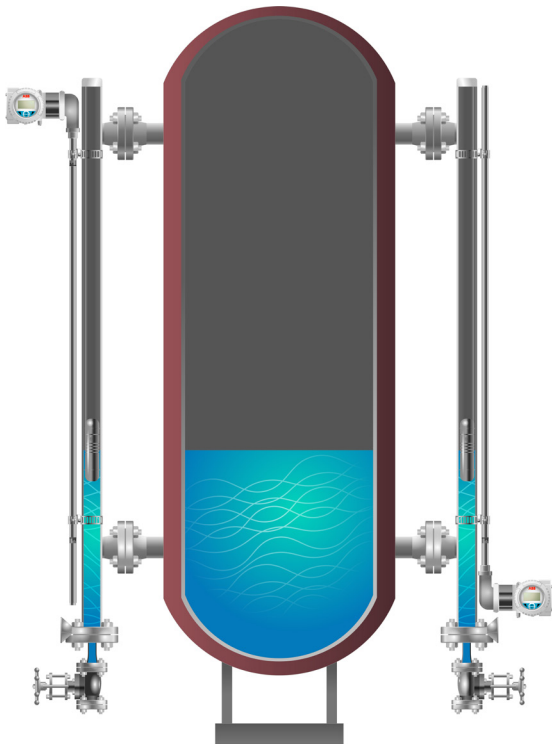
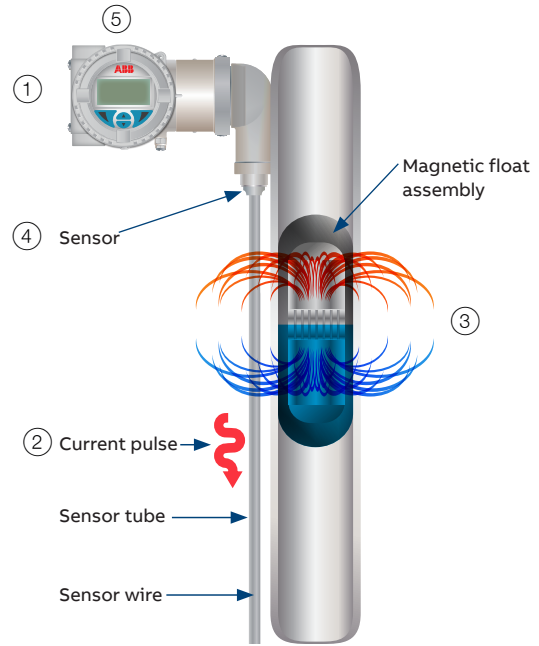
### Options

- Two level indications
- Glass viewing window
- 316 stainless steel enclosure
- Built-in surge protection

## Principle of operation:

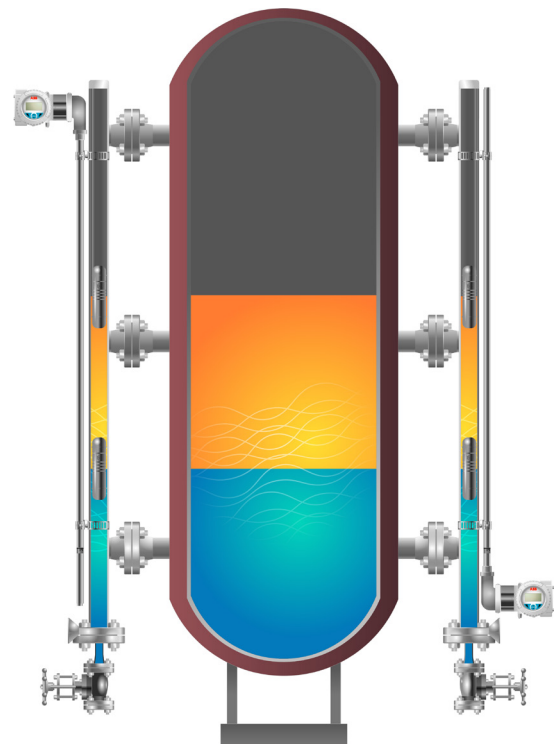
The LMT200 is based upon the magnetostrictive principle.

- 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 sensor 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.

## Specifications

<b>Electronic transmitter</b>	
Repeatability	±0.005 % Of full scale or 0.315 mm (0.012 in), whichever is greater
Non-linearity	±0.01 % Of full scale or 0.86 mm (0.034 in), whichever is greater
Measuring accuracy	±0.01 % Of full scale or 1.27 mm (0.050 in), whichever is greater <sup>1</sup>
Supply voltage	12 to 43 V DC for 4 to 20mA HART loop powered, 9.0 to 32 V DC for Foundation™ Fieldbus
Output/Communications	4 to 20 mA HART7® or FOUNDATION Fieldbus ITK6.3.0
User interface	Interactive display, DTM, EDDL with NE107 messaging
Power consumption	4 to 20 mA
	HART mode (3.6 mA)
	FF mode (17 mA)
	at 36.0 V DC – 3.6 mA 0.13 W; 21mA 0.76 W at 12.0 V DC – 3.6 mA 0.043 W; 21mA 0.25 W
	at 36.0 V DC 0.144 W at 12.0 V DC 0.048 W
	at 9.0 V DC 0.153 W at 32.0 V DC 0.544 W
Maximum line resistance	4 to 20 mA
	HART mode (3.6 mA)
	FF mode (17 mA)
	at 36.0 V DC and 21mA, 1142 Ω* at 24.0 V DC and 21mA, 571 Ω at 13.5 V DC and 21mA, < 72 Ω**
	*Maximum allowable with HART communication is 700 Ω **See the current/resistance chart
	< 650 to 700 ohm
	at 32.0 V DC, 1500 Ω. at 9.0 V DC, 50 Ω.
Polarity protection	Diode in series with loop
Update rate	10 measurements per second
Minimum measuring span	76.2 mm (3.0 in) consult factory if less is required
Damping	Field adjustable, range: 0.1 to 60 s
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 meeting IEC61000-4-5, 1kV/2kV, criteria B
Ambient temperature	–40 to 85°C (–40 to 185°F) ambient <sup>2</sup>
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
Remote transmitter	Standard remote distances of 5 m (16 ft), 10 m (33 ft), 20 m (66 ft), 30 m (98 ft)
Device tag material	AISI 316 stainless steel
Electrical connection	Two M20 x 1.5 or two ½ in FNPT, adapters and bus connectors also available
Ingress protection	IP66, NEMA 4X
<b>Sensor tube</b>	
Material	316/L Stainless Steel
Standard probe length	304.8mm to 15.24 m (1 to 50 ft); 90 degree probes (SEH option) 304.8 mm to 7.62 m (1 to 25 ft)
Probe length tolerance	±3.2 mm (0.125 in) up to 3.0 m (10 ft); ±6.4 mm (0.25 in) up to 6.0 m (20 ft); ±9.0 mm (0.35 in) up to 9.0 m (29.5 ft); ±25.4 mm (1.0 in) up to 15.24 m (50 ft)
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.



## 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.



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)

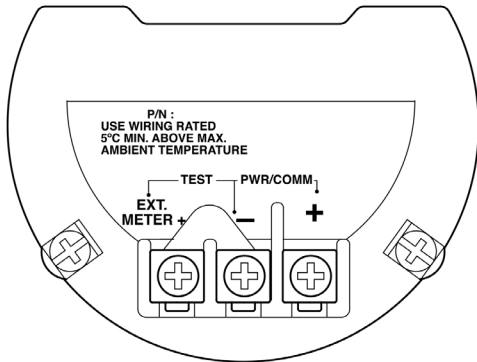
- Display of the waveform for device performance confirmation
- Display of the current level as well as interface or the temperature of the measuring medium (optional)
- Application-specific visualizations which the user can select. Four operator pages can be configured to display multiple values in 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



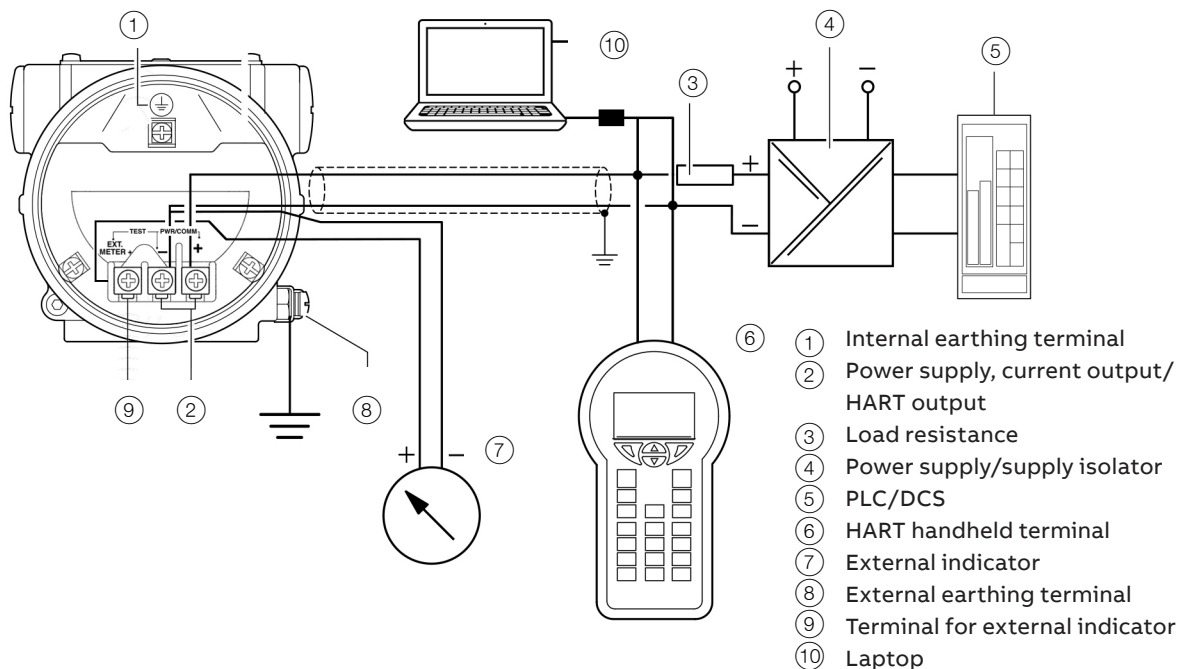
## Electrical connections

### 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



For connecting the signal voltage/supply voltage, twisted cables with a conductor cross-section of 0.8 to 0.35 mm<sup>2</sup> (18 to 22 AWG) 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 to 20 mA) and the power supply are conducted via the same conductor pair.

The transmitter works with a supply voltage between 12 to 42 V DC. For devices with the type of protection 'Ex ia, intrinsic safety' (ATEX, IECEx, FM US or FM Canadian 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.

## Power supply

### Devices with HART communication

Terminals	PWR/COMM + /PWR/COMM -
Supply voltage	12 to 42 V DC
Residual ripple	Maximum 5 % or $\pm 1.5$ V
Power consumption	< 1 W

### Current Output/HART output

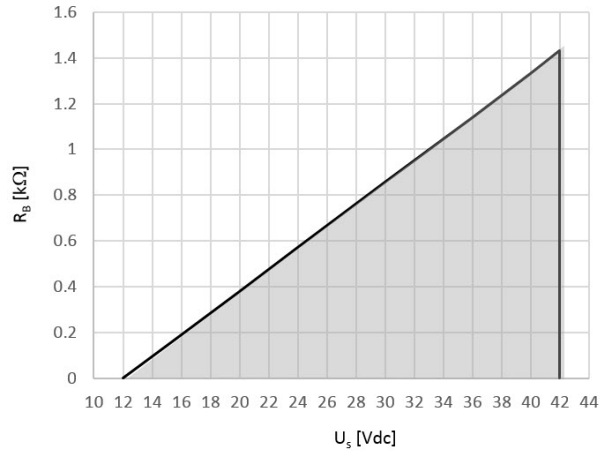
Only for devices with HART communication

Terminals: PWR/COMM + /PWR/COMM -

In HART communication, the smallest load is  $R_b = 250 \Omega$ . 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:

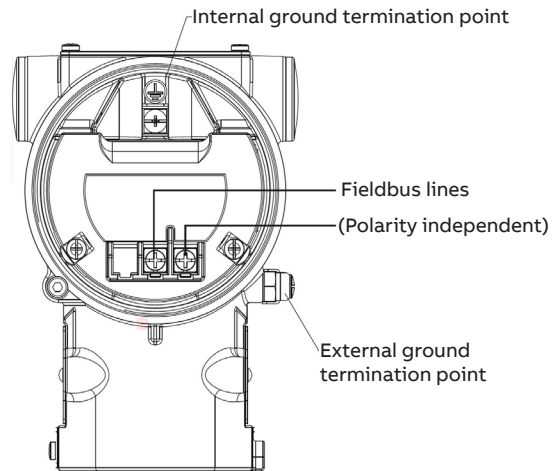
$$R_b = \frac{U_s - \text{min operating voltage (12.0) V DC}}{I_b}$$

- $R_b$  Load resistance
- $U_s$  Supply voltage
- $I_b$  Singal current



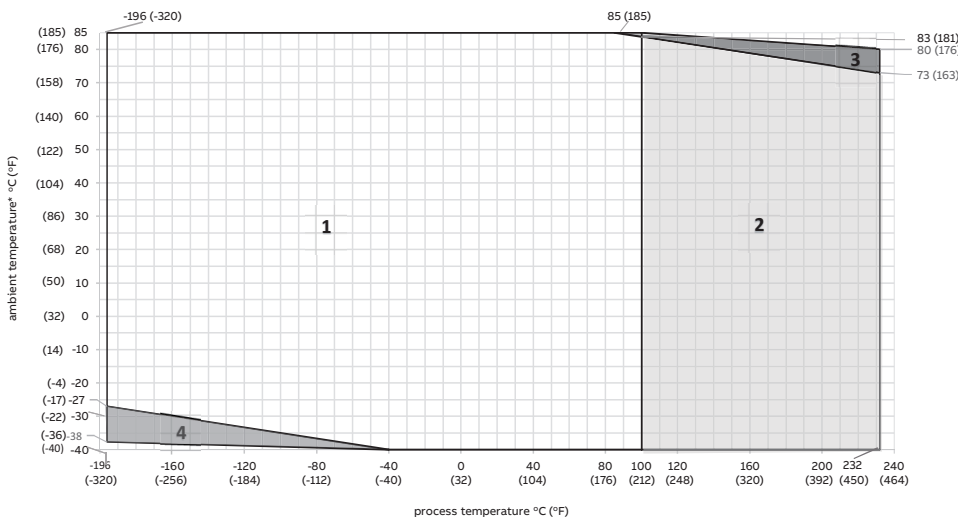
### Devices with Foundation Fieldbus communication

Terminal	Function/comment
Bus connection	Power supply, polarity insensitive



## Probe selection guide

Probe selection chart - Cryogenic



- Directions:**
- determine the minimum and maximum ambient and process temperature of the installation.
  - Plot the intersection between the two temperatures on the chart.
  - Choose the appropriate probe by matching the zone number with the probe type.

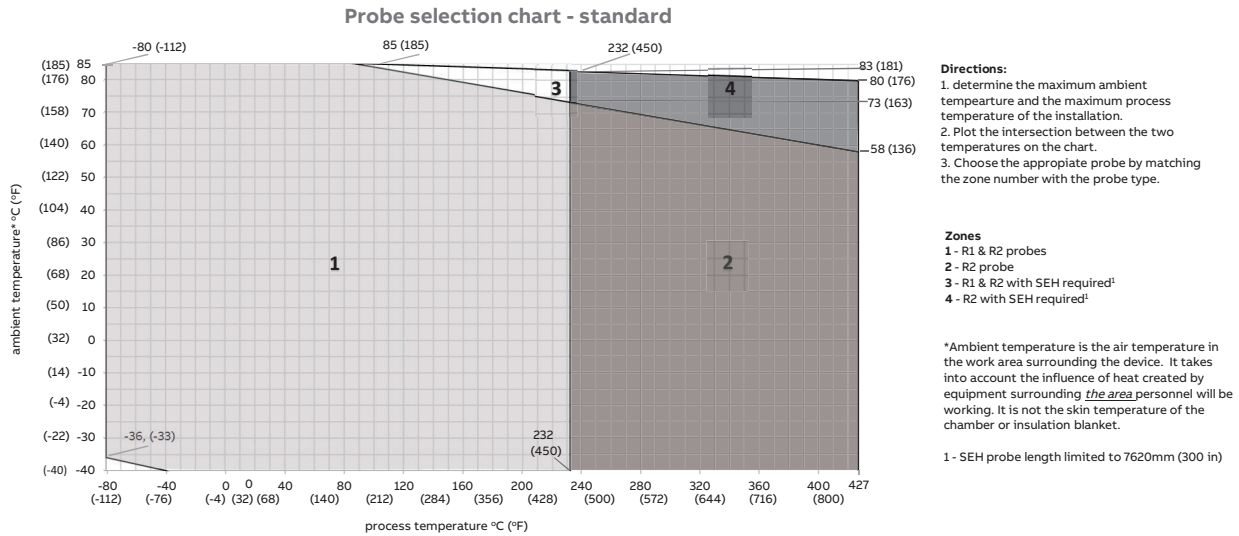
- Zones**
- 1 - All probes - C1, C2, C3 & C4
  - 2 - C2, C4
  - 3 - C2, C4 with SEH required<sup>1,2</sup>
  - 4 - C1, C2, C3 and C4 with SEH required<sup>3</sup>

<sup>1</sup>Ambient temperature is the air temperature in the work area surrounding the device. It takes into account the influence of heat created by equipment surrounding the area personnel will be working. It is not the skin temperature of the chamber or insulation blanket.

1 - SEH probe length limited to 7620mm (300 in)  
 2 - C1 and C2 probes can be used with SEH up to 83 (181). See chart.



## ...Probe selection guide



## Approvals

### Flameproof marking

- ATEX/IECEX
  - II ½ G Ex db IIC T6..T2 Ga/Gb
  - FM15ATEX0074X
  - IECEX FME 17.0004X
  - Power supply 42 V DC/2 W max.
- FM (C and US) approved
  - CLI zone 1, AEx/Ex db IIC T6 to T2 Gb
  - US – CLI GP ABCD, T6 to T2
  - Canada – CLI GP BCD, T6 to T2

### Protection by enclosure marking

- ATEX/IECEX
  - II 2 D Ex tb IIIC T85 °C to T300 °C Db FM15ATEX0074X
  - IECEX FME17.0004X power supply 42 V DC/2W max.
- FM (C and US) approved
  - Zone 21 AEx/Ex tb IIIC T80 °C to T165 °C Db
  - US – CLII GP EFG, CLIII T6 to T2
  - Canada – CLII GP EFG, CLIII T6 to T2

### Intrinsic/non-incendive marking

- ATEX/IECEX
  - II 1 G Ex ia IIC T6toT4 Ga
  - II 1 D Ex ia IIIC T80 °C Da;
  - FISCO field device, FF–816 for (PA/FF output)
  - FM17ATEX0062X – IECEX FME17.0004X
  - II 3 G Ex ic IIC T6..T4 Gc
  - II 3 D Ex ic IIIC T80 °C Dc
  - FISCO field device, FF–816 for (PA/FF output)
  - II 3 G Ex nA IIC T6..T4 Gc
  - FM17ATEX0063X – IECEX FME17.0004X
- FM (C and US) approved
  - CLI DIV1/GP ABCD, CLII/DIV1/GP EFG, CLIII;
  - CLI ZONE 0 AEx/Ex ia IIC T6 to 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 to T4;
  - CLI ZONE 2, Ex nL IIC T6 to T4;
  - FISCO field device, FF–816 for (PA/FF output)
  - per 3KXL140000G0109

## Ordering information

Example of code:

**LMT200.M1.S6.R1.B1.D1.L2.H1-TS.AV // GD2.M5 ML = 1234.12mm**

**LMT200 model codes**

LMT200 external mount	LMT200.....xxx-	xx	xx	xx
<b>Approvals</b>				
General purpose		Y0		
INMETRO, ATEX/IECEX flameproof, intrinsically safe, non-sparking (protection type marked by customer)		B4		
NEPSI (China), intrinsically safe		C1		
NEPSI (China), flameproof housing		C2		
NEPSI (China), non-sparking		C3		
NEPSI (China), ATEX/IECEX flameproof, intrinsically safe, non-sparking (protection type marked by customer)		C4		
ATEX/IECEX intrinsic safety		E1		
ATEX/IECEX flameproof housing		E2		
ATEX/IECEX flameproof non-sparking (Ex nA)		E3		
EAC, intrinsically safe		G1		
EAC, flameproof housing		G2		
EAC, non-sparking		G3		
KOSHA intrinsic safety		K1		
KOSHA flameproof housing		K2		
KOSHA non-sparking		K3		
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		
Combination approval – North American (meeting FM and Canadian standards) and INMETRO – flameproof/explosion proof, intrinsically safe, non-incendive/non-sparking (protection type marked by customer)		M2		
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		
Others		Z9		
<b>Probe material</b>				
316/L SS			S6	
Special			Z9	
<b>Probe style and probe type</b>				
5/8 in rigid probe, -80 to 232.22 °C (-112 to 450 °F). See temperature chart for full selection detail				R1
5/8 in rigid probe, -80 to 426.66 °C (-112 to 800 °F). See temperature chart for full selection detail				R2
5/8 in rigid probe for cryogenic services, -195.55 to 121 °C (-320 to 250 °F) with N2 purge. See temperature chart for full selection detail				C1 <sup>1</sup>
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 N2 purge. See temperature chart for full selection detail.				C3 <sup>1</sup>
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 recommended to use the C3 option so that removal of the transmitter is possible without damaging the insulation.

## ...Ordering information

Example of code:

**LMT200.M1.S6.R1.B1.D1.L2.H1-TS.AV // GD2.M5 ML = 1234.12mm**

**LMT200 model codes (continued)**

LMT200 external mount	LMT200.....xxx-	xx	
<b>Mounting orientation</b>			
Bottom left connected electronic housing		B1	
Bottom right connected electronic housing		B2	
Top left connected electronic housing		T1	
Top right connected electronic housing		T2	
<b>Housing</b>			
Aluminum with 2 x M20 x 1.5		D1	
Aluminum with 2 x NPT ½ in		D2	
316L stainless steel with 2 x M20 x 1.5		D3	
316L stainless steel with 2 x NPT ½ in		D4	
Remote/aluminum/2 x M20 x 1.5*		R1	
Remote/aluminum/2 x NPT ½ in*		R2	
Remote/stainless steel/2 x M20 x 1.5*		R3	
Remote/stainless steel/2 x NPT ½ in*		R4	
Special		Z9	
Through the glass (TTG) push buttons, display and glass cover			L2
Special			ZZ
<b>Output</b>			
Single 4 to 20 mA + HART			H1
FOUNDATION Fieldbus			F1
Special			Z9

\* Only available with Y0, E1 and N1 approvals code.



## ...Ordering information

Example of code:

LMT200.M1.S6.R1.B1.D1.L2.H1-TS.AV // 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	xx	xxx	xx	xxx	xx	xx(x)	xx
<b>SIL certification</b>							
SIL2 (HFT=0) and SIL3 (HFT=1) – certified acc. to IEC61508	CS						
<b>Sensor probe options</b>							
90 degree bend housing extension (maximum probe length 7.62 m/25 ft)		SEH					
Add nitrogen purged vapor seal to standard probe		SEV <sup>1</sup>					
Sensor special		SEZ					
<b>Device identification plate</b>							
Add stainless steel hang tag, custom markings 4 lines, 22 characters per line			TS				
Other tagging special			TZ				
<b>Signal cable length (for remote transmitter only)</b>							
10 m (approx. 33 ft)				SC2			
30 m (approx. 98 ft)				SC6			
<b>Surge protector</b>							
Surge/transient protector					S1		
<b>Special other</b>							
Special paint or treatment on housing						STH	
Nuclear use, device to be used in a nuclear facility (application must be reviewed by ABB)						P4	
Special						PZ	
<b>Mounted accessories</b>							
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

\* in progress

1. SEV option is for R1, R2 sensors. C1, C3 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.

## ...Ordering information

Example of code:

LMT200.M1.S6.R1.B1.D1.L2.H1-TS.AV // 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- to//	xx(x)	xxx	xx	xx
<b>Certificates</b>				
PMI positive material identification	CHD			
Certificate of origin	GS1			
Other certificates	CZ			
<b>Drawings</b>				
Drawings for approval required prior to construction		GD1		
Drawings for record required		GD2		
Certified as built drawings required		GD3		
Other drawings		GDZ		
<b>Documentation language (installation, operation and maintenance manual) *</b>				
German <sup>1</sup>			M1 <sup>1</sup>	
Spanish <sup>1</sup>			M3 <sup>1</sup>	
English			M5	
Chinese			M6	
Portuguese			MA	
Russian			MB	
Other languages – 'contact factory'			MZ	
<sup>1</sup> in progress				
*English is default.				
Chinese is default if NEPSI approval is selected				

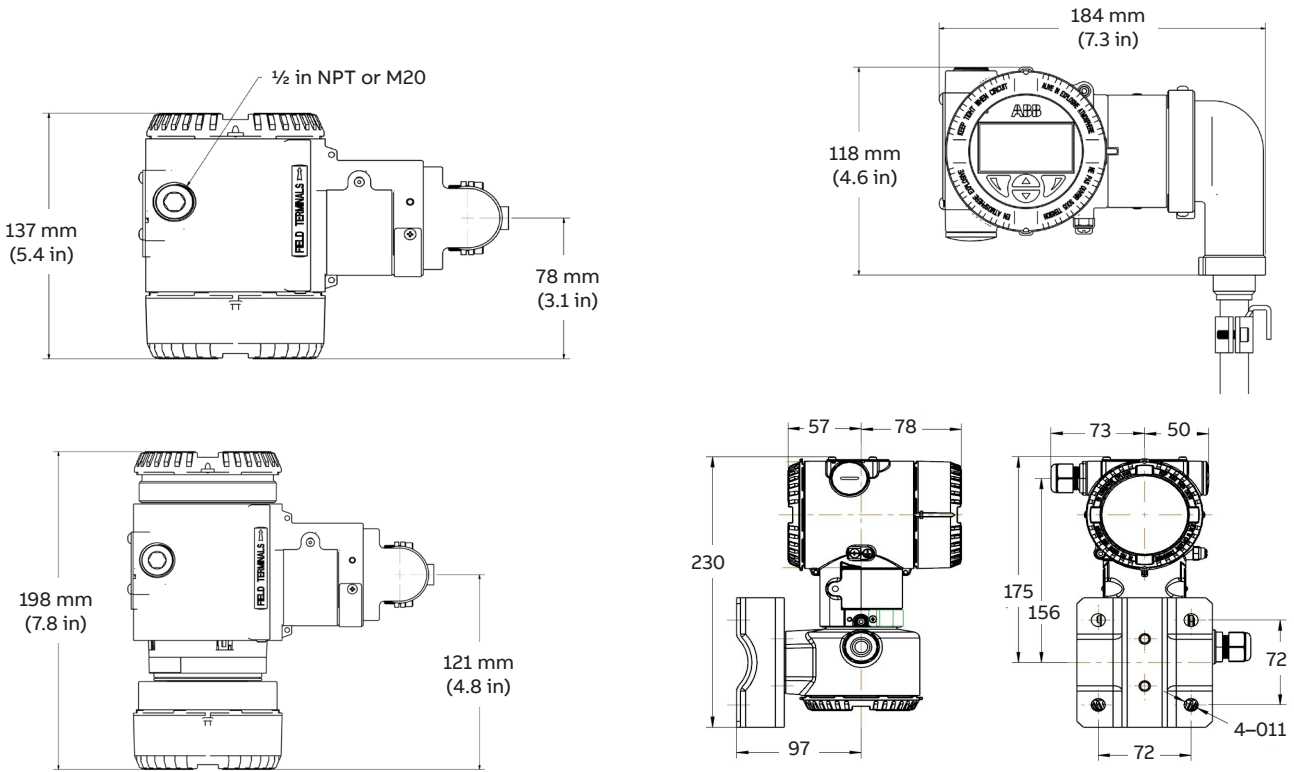
### Calibration and configuration

3–point calibration verification certificate, default values of 100, 50 and 0 % of span, or customer specified points	R3
5–point calibration verification certificate, default values of 100, 75, 50, 25 and 0 % of span, 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 <sup>1</sup>	CG
Special calibration	RZ

<sup>1</sup> in progress

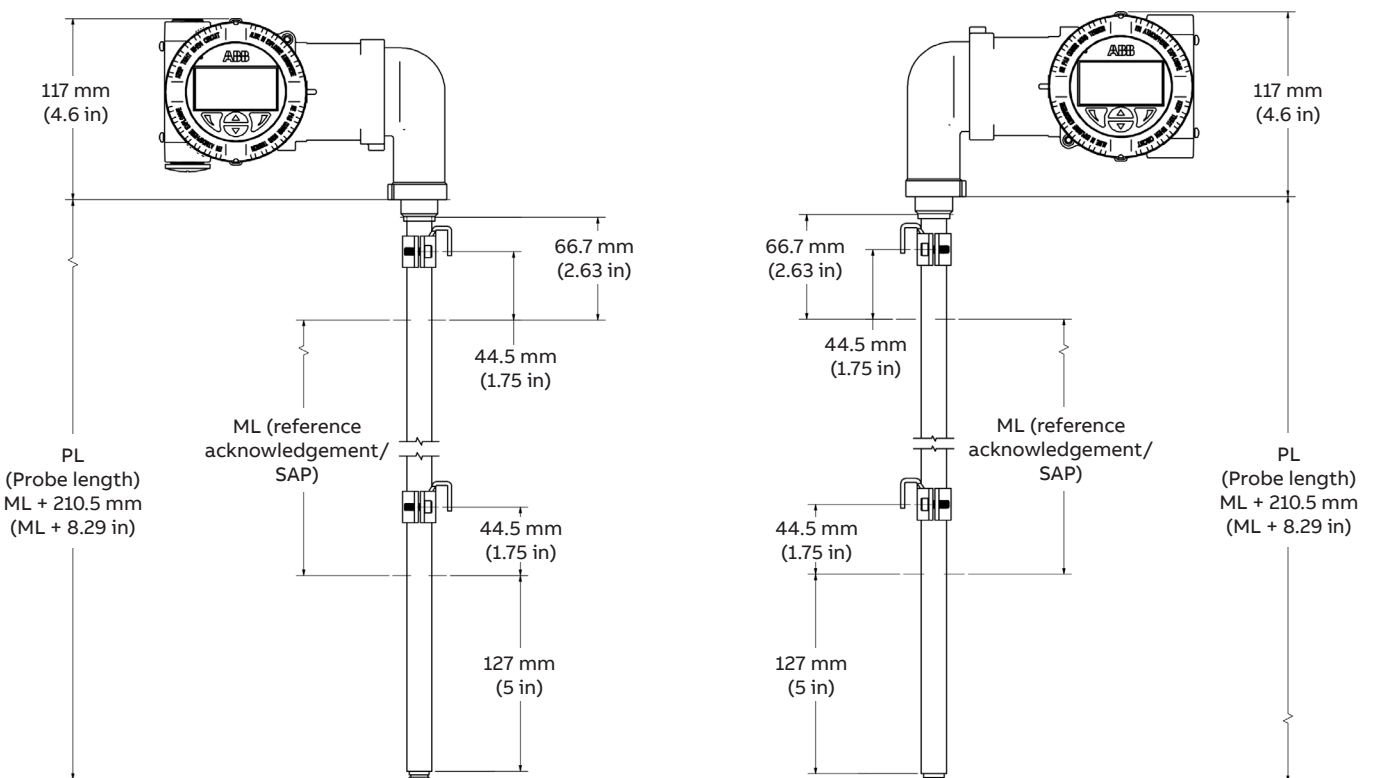
<b>Measuring length on LMT200</b>	<b>12345.12</b>
<b>Measuring Length (ML)</b>	
Inches	xxxxx.xx in
Millimeters	xxxxx.xx mm

## Enclosures



\*Drawings for reference only

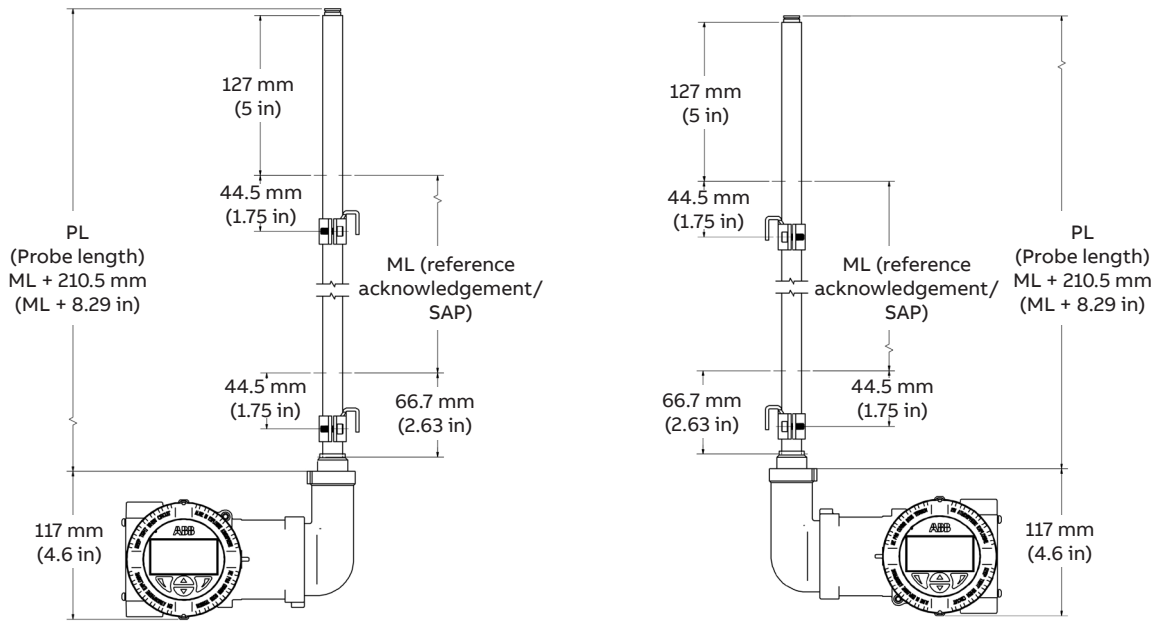
## Probe type R1, R2 – top mount



\*Drawings for reference only

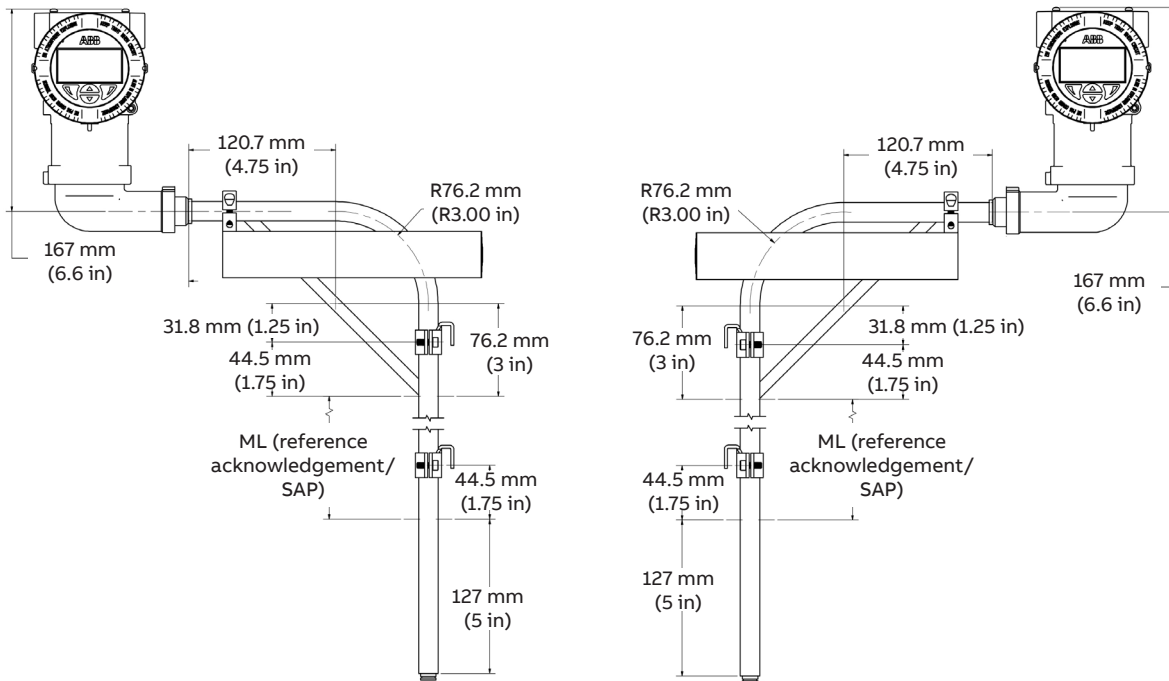


### Probe type R1, R2 – Bottom mount



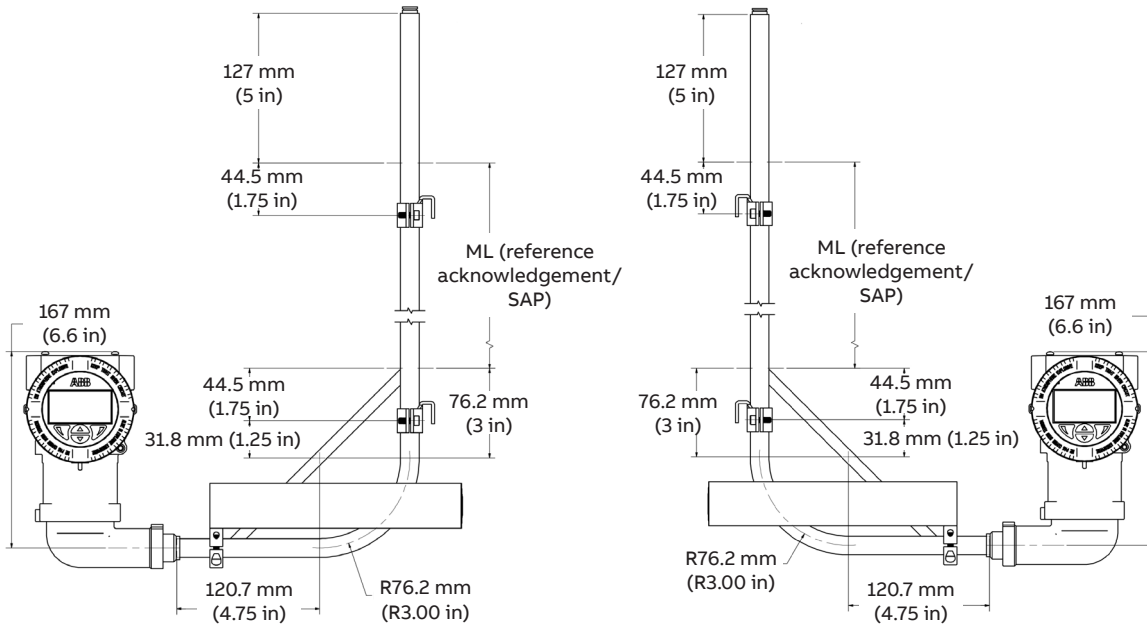
\*Drawings for reference only

### SEH 90 degree bend housing extension – Top mount



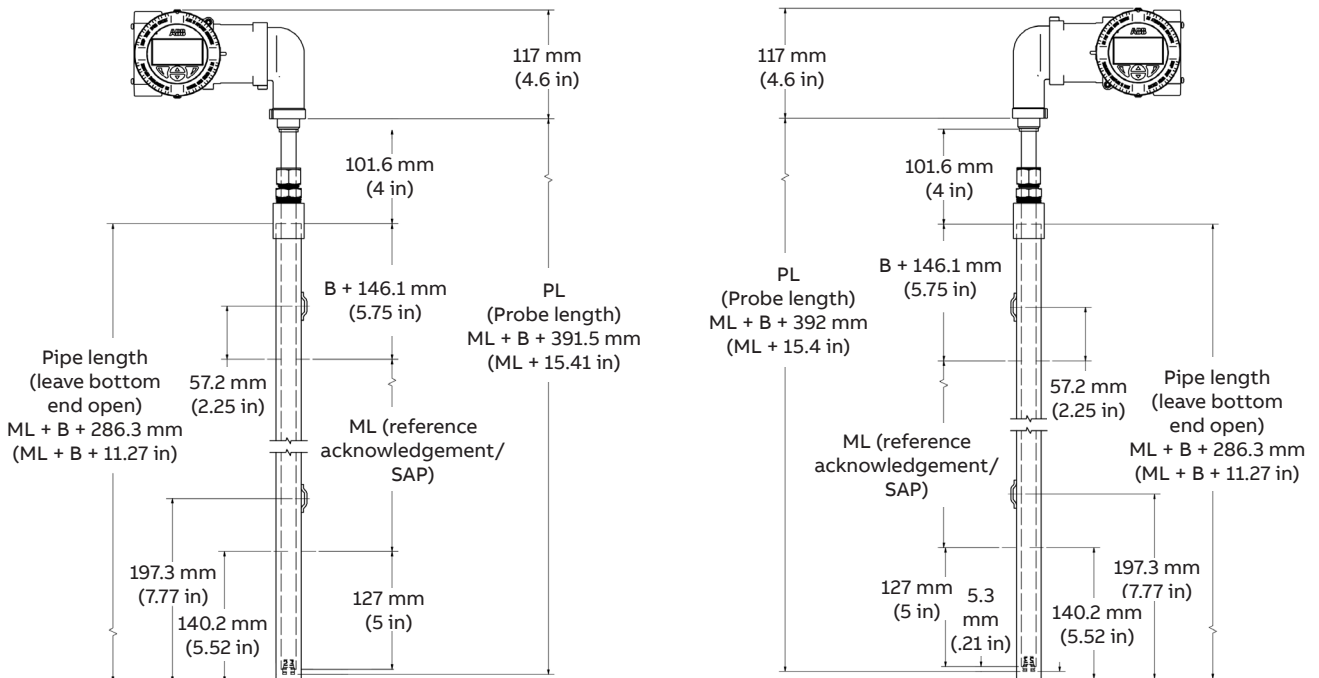
\*Drawings for reference only

### SEH 90 degree bend housing extension – bottom mount



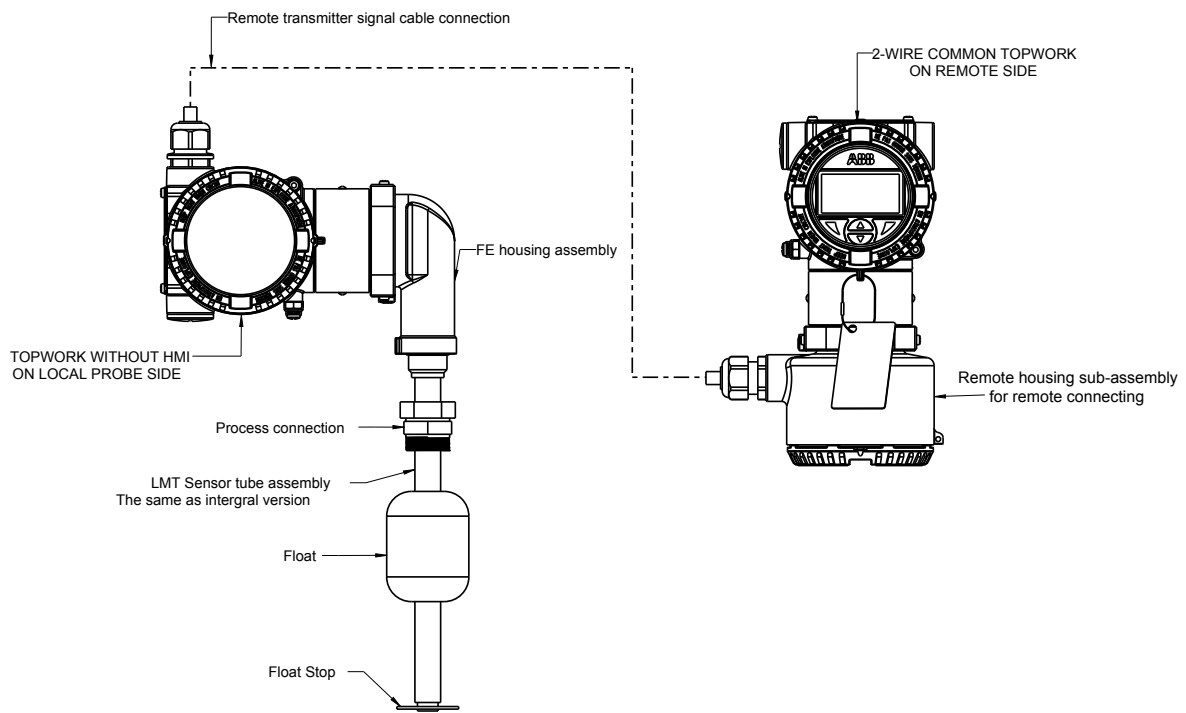
\*Drawings for reference only

### Cryogenic with insertion well – top mount



\*Drawings for reference only

## Remote transmitter option



\*Drawings for reference only

## Vibration isolator mount option

### Kit includes:

- 1 Vibration isolator
- 1 Chamber mounting clamp assembly
- 2 Bearing clamp assemblies



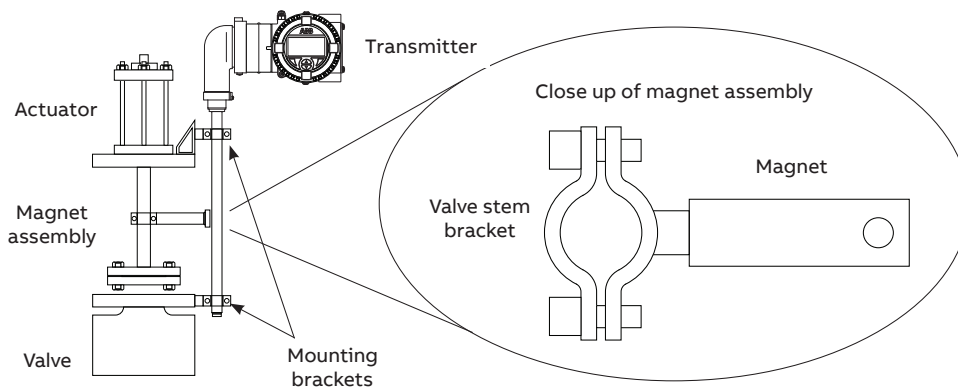
For measurement lengths (ML) of 914.4 mm (36 in) or less, a minimum of two VI-KIT assemblies are recommended for installation in high vibration applications.

For ML greater than 914.4 mm (36 in), the number of isolators required can be determined from the below chart.

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

## Position transmitter mounting option

### Example installation: LMT200 valve position transmitter and hydraulic control valve



### Acknowledgements

- HART is a registered trademark of the FieldComm Group.
- FIELDBUS FOUNDATION™ and FOUNDATION are registered trademarks of the Fieldbus Foundation.
- Tefzel® is a registered trademark of DuPont.
- Hastelloy® is a registered trademark of Haynes International, Inc.
- Monel® is a registered trademark of the INCO.

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## Notes





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Sales



Service

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