

THE DIFFERENCE IS CLEARLY VISIBLE

MAGNA-SITE

MAGNETIC LIQUID LEVEL GAUGE

KENCO ENGINEERING

ENGINEERED LIQUID LEVEL SOLUTIONS

MAGNA-SITE – MAGNETIC LEVEL GAUGE

OPERATING PRINCIPLE

The KENCO Magna-Site Magnetic Liquid Level Gauge is used to determine the volume of liquid contained within a vessel. Because the Magna-Site eliminates the need for glass, high pressure applications and hazardous locations are protected from the danger of a chemical spill due to glass failure.

The KENCO Magna-Site utilizes three major components: the gauge housing chamber, the magnetic float and the magnetic flag assembly.

The gauge housing chamber is mounted adjacent to the side of the vessel. It is constructed to withstand the same temperatures and pressures as the tank itself. It is equipped with the appropriate tank mounting connections for easy installation and to allow equalization of liquid level in tank and gauge.

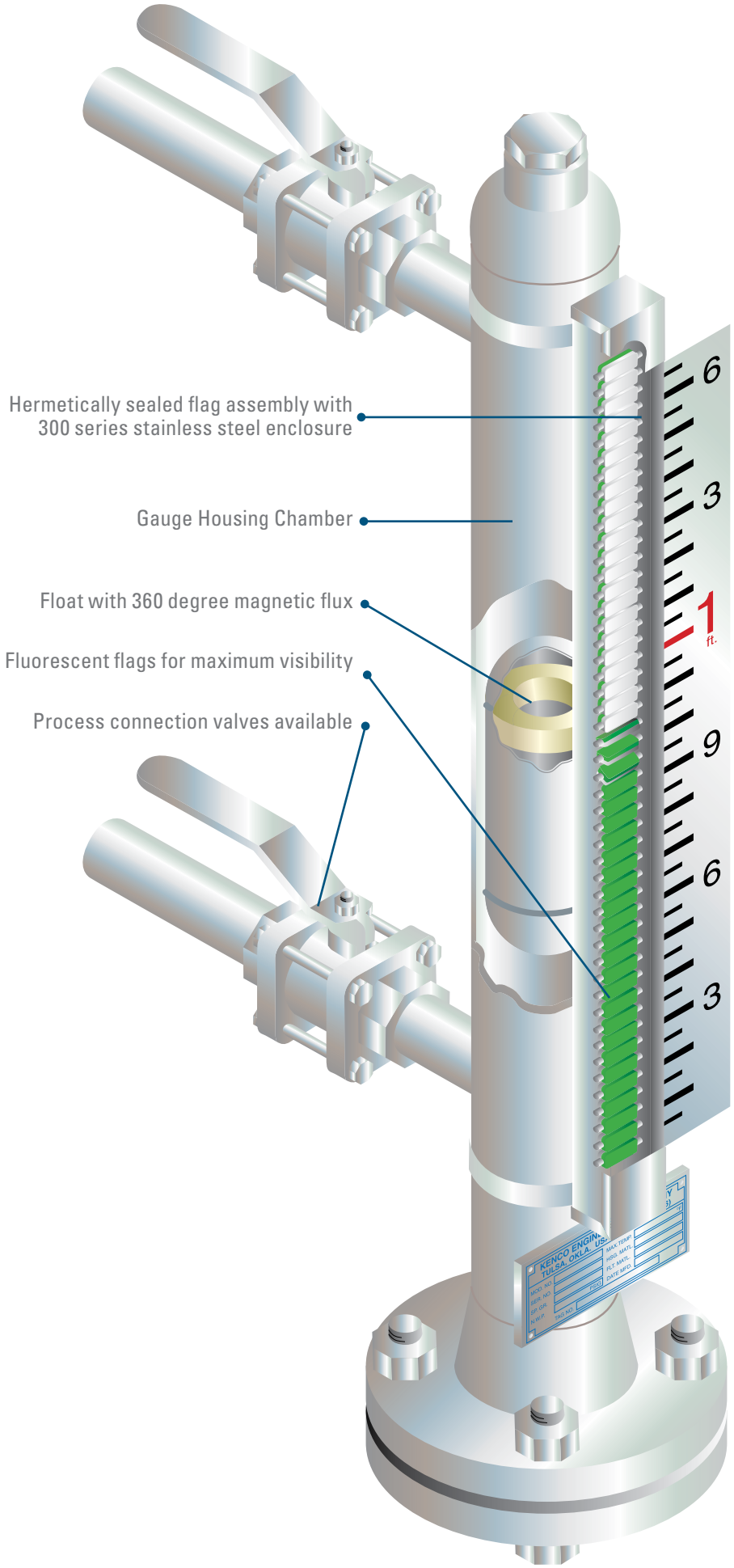
Inside the gauge housing chamber is the magnetic float, which contains radially-positioned magnets to provide a 360 degree magnetic-flux field. Each float is internally weighted based on specific gravity so that the liquid level in the gauge coincides with the location of the magnets inside the float.

Attached to the gauge housing chamber is the magnetic flag assembly. This is the visual means of liquid level indication for the KENCO Magna-Site. The assembly is made up of a series of bicolored, fluorescent flags. As the magnetic float rises and falls with the liquid level in the gauge housing chamber, a magnet embedded in each flag reacts to the 360 degree magnetic flux of the float. This magnetic interaction causes each flag to rotate 180 degrees. The flags below the magnetic flux of the float will flip to fluorescent green, while those flags above the float level remain bright white.

When your application priorities are safety, visibility and accuracy, the KENCO Magna-Site is the low-maintenance, cost-effective solution.

GAUGE FEATURES

- Maximum safety – No glass is used in the construction
- Optimum visibility – Fluorescent flags are visible from great distances
- Float with 360 degree magnetic flux – Maintains a strong magnetic field in all directions; turbulent liquids will not cause flag assembly to give an inaccurate level indication
- Double flag protection – Flags are hermetically sealed inside a Teflon® encapsulated assembly which is shrouded by a 300 series stainless steel enclosure on three sides with a UV stabilized high-impact clear polycarbonate shield
- Adjustable viewing angles – Flag assembly can be rotated to any angle to provide maximum visibility
- Multiple mounting options – Engineered construction allows for a variety of mounting configurations
- Compatibility – A broad range of materials can be used to withstand harsh chemicals
- Remote level indication – Explosion-proof magnetostrictive level sensor/transmitter provides a 4-20mA signal output
- Height scale – 304 stainless steel with no. 3 finish and large etched characters/lines for easy reading
- High/Low level switches – Explosion-proof switches can signal an alarm, operate a pump/valve or act as an emergency shut down
- Convenience – Easy installation and very low maintenance
- Warranty – Three year guarantee against defects
- Reliability – KENCO has been building magnetic liquid level gauges since 1985



INDUSTRIES SERVED

- Chemical and Petrochemical Refineries
- Water and Waste Treatment
- Pulp and Paper Processing
- Power Plants
- Pharmaceutical Processing
- Food and Beverage Processing

COMMON APPLICATIONS

- Fuels and Solvents
- Oil Production and Refining
- Lubrication Oils
- Detergents and Soaps
- Boiler Feedwater Tanks
- Fertilizers and Pesticides
- Ammonia Tanks
- Scrubber Tanks
- Storage Tanks
- Acid Tanks

WHAT MAKES THE DIFFERENCE CLEARLY VISIBLE?

FLOAT CHARACTERISTICS

- 360 degree magnetic-flux field provides constant interaction with flag assembly in turbulent liquids
- Internally weighted based on specific gravity so that location of magnets inside float coincide with liquid level in gauge
- Cylindrical geometric shape ensures more accuracy in interface specific gravity applications
- Rare earth magnet assembly has an unusually high energy output volume and is highly resistant to demagnetization; they will not demagnetize at high temperatures like ceramic magnets
- Standard float material is 316 stainless steel. Other float materials are available. Call KENCO for applications requiring special float materials.
- Standard float good to a minimum specific gravity of 0.50 (floats for lower specific gravities available)
- 360 degree magnetic-flux field is ideal for interaction with KENCO magnetostrictive transmitter
- Compact length minimizes ground clearance requirements



FLAG ASSEMBLY FEATURES

- Fluorescent flags for maximum visibility
- No glass in flag assembly
- Shield is UV stabilized high-impact clear polycarbonate
- Chamber is hermetically sealed and nitrogen filled to prevent internal condensation and ensure 100% flag rotation every time
- Totally enclosed with clear F.E.P. Teflon® tubing for maximum chemical resistance from puncture of F.E.P. Teflon®
- 300 series stainless steel is more compatible to corrosive environments than aluminum
- Double O-ring seal assures that the flag assembly will not lose its nitrogen-filled atmosphere
- Each flag contains an Alnico 8 magnet, making each flag highly demagnetization
- Flags are UV stabilized, high-temperature thermoplastic and molded in color to prevent fading
- No ceramic magnets are used
- About the sealing process:
  The end block on one end of the flag rail is equipped with a positive stop charge valve to allow the flag assembly to be hermetically sealed. The flag assembly is attached to a vacuum pump through a manifold which is connected to a cylinder of ultra high-purity nitrogen gas. We evacuate the flag assembly with a vacuum pump to 28" Hg and then internally pressurized it with ultra high-purity nitrogen gas to a maximum of 5 psig.

HIGH-TEMPERATURE FLAG ASSEMBLY FEATURES

- Flags are 316 stainless steel
- Flag color is heat cured at 400°F with heat resistant paint
- All 300 series stainless steel flag assemblies are ideal for severe environment
- Alnico 8 magnets are nickel plated to withstand severe environments.



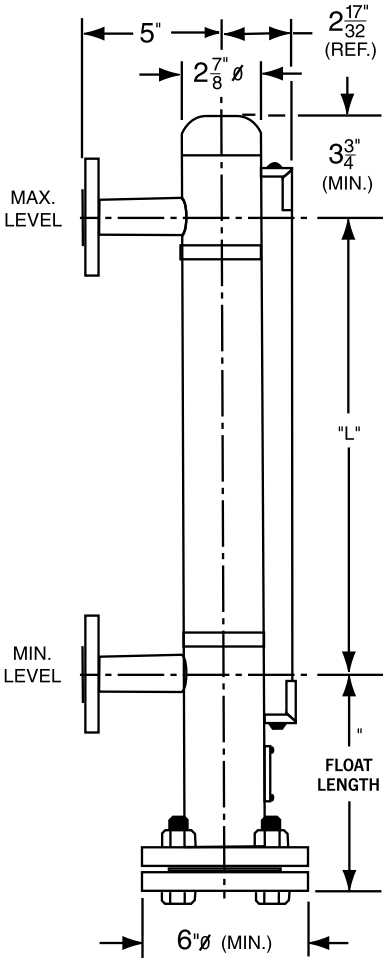
MOUNTING STYLE OPTIONS

MLG-C: FOR USE WITH SIDE FLANGE CONNECTIONS



ALL MLG DIAGRAMS:

L = Length of indication desired by customer



MLG-D: FOR USE ON TOP OF TANK, UNDERGROUND TANK APPLICATIONS

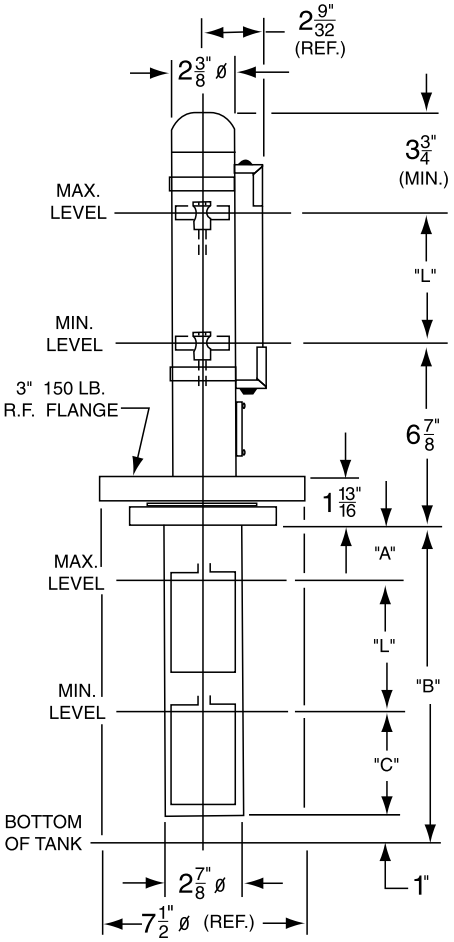


MLG-D DIAGRAM ONLY:

A = Distance from raised face portion of existing tank flange to maximum tank liquid level desired by customer

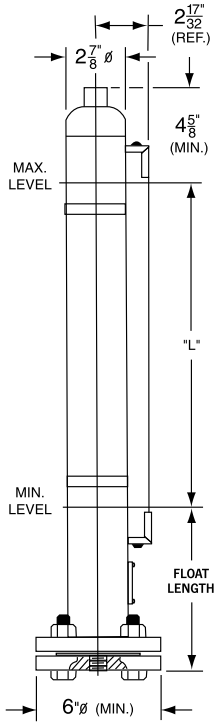
B = Distance from raised face portion of existing tank flange to inside bottom surface of tank (supplied by customer)

C = Submerged float length (dimension will vary depending on liquid specific gravity)

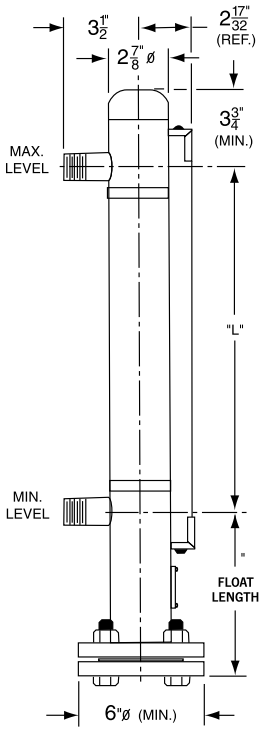


CALL KENCO FOR WELDING SPECIFICATIONS AND OPTIONS. KENCO IS ABLE TO PROVIDE FULL PENETRATION WELDS, X-RAYS, AND WELD MAPS. MATERIAL CERTIFICATIONS AND CERTIFIED DRAWINGS ARE AVAILABLE UPON REQUEST.

MLG-A: FOR USE WITH FEMALE NPT END CONNECTIONS

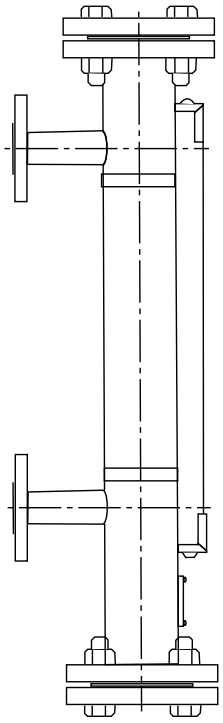


MLG-B: FOR USE WITH MALE NPT SIDE CONNECTIONS

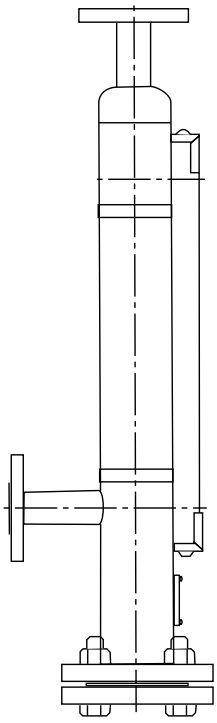


OTHER GAUGE HOUSING CONFIGURATIONS

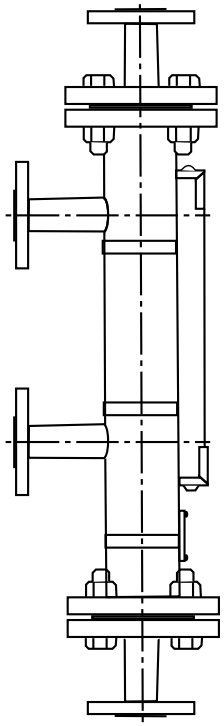
(Housing can be modified as required to meet your specific needs)



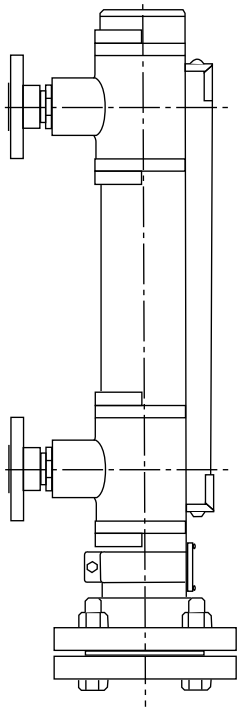
MLG-E Removable Flange Top Connection



MLG-F Fixed Flange Vent Connection



MLG-G Removable Flange Vent Connection



MLG-C-PVC with PVC Gauge Housing

KENCO MAGNETOSTRICTIVE TRANSMITTER

TRANSMITTER FEATURES



- Digital Display for zero and span settings and readout
- Readout available as a % of span, a 4-20 mA output or any unit of measure
- CSA and ATEX approved explosion-proof housing
- Temperature range: -40 to 300°F (call Kenco for higher temperature requirements)
- No maintenance required
- Immune from electrical and mechanical noise
- HART® Communications standard

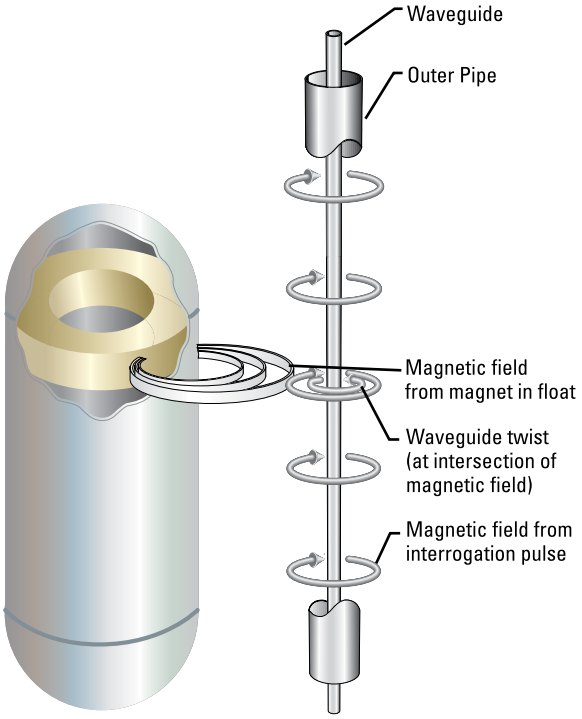
KENCO LEVEL TRANSMITTERS

KENCO loop powered transmitters electronically monitor the location of the magnetic float within the Magna-Site gauge housing, providing an output in a unit of measure, as a % of span or a 4-20 mA output. The transmitter is available up to a length of 300 inches. Zero and span may be adjusted by using the HART® communications protocol or it may be manually calibrated using the keypad display inside of the explosion proof housing. These transmitters operate within a process temperature range of -40°F to 300°F. Field replaceable electronics are potted and encapsulated. KENCO transmitters are available as standard with NEMA 4X/7 explosion-proof housings. These housings feature an industrial epoxy coating for corrosion resistance. All KENCO level transmitters use non-contacting, magnetostrictive technology. This simple design ensures no scheduled maintenance or re-calibration – ever. Accurate, non-contact float location sensing is achieved with absolutely no wear to any of the sensing elements.

PRINCIPLE OF MAGNETOSTRICTION

The level transmitter is composed of two concentric members. The outermost member is a protective 304 stainless steel chamber that withstands aggressive or harsh process industry environments. The heart of the transmitter design is the innermost member, the waveguide, a formed element constructed of a proprietary magnetostrictive material.

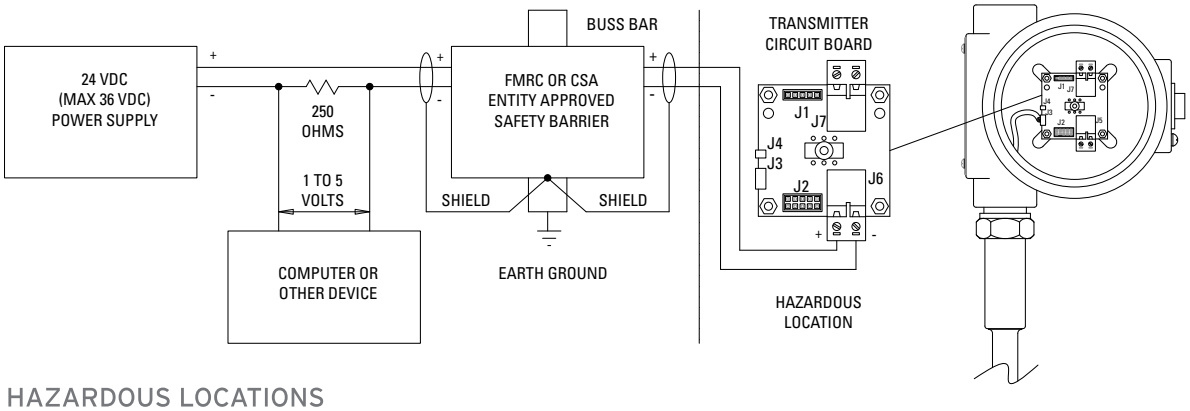
A pulse is induced in the waveguide by the momentary interaction of two magnetic fields, one from an electric current pulse launched along the waveguide and the other from the magnet inside the float. This interaction produces a strain pulse that travels along the waveguide. The location of the magnet inside the float is determined by measuring the elapsed time between the launching of the electronic pulse and the detection of the strain pulse by the sensor head. The time period measurement is used to produce a 4-20mA output.



ELECTRICAL CONNECTIONS AND WIRING PROCEDURES

A typical intrinsically safe connection for the KMD Transmitter includes protective safety barriers, a power supply, and a reading or monitoring device.

NON-HAZARDOUS LOCATIONS (INTRINSICALLY SAFE):



LR81728

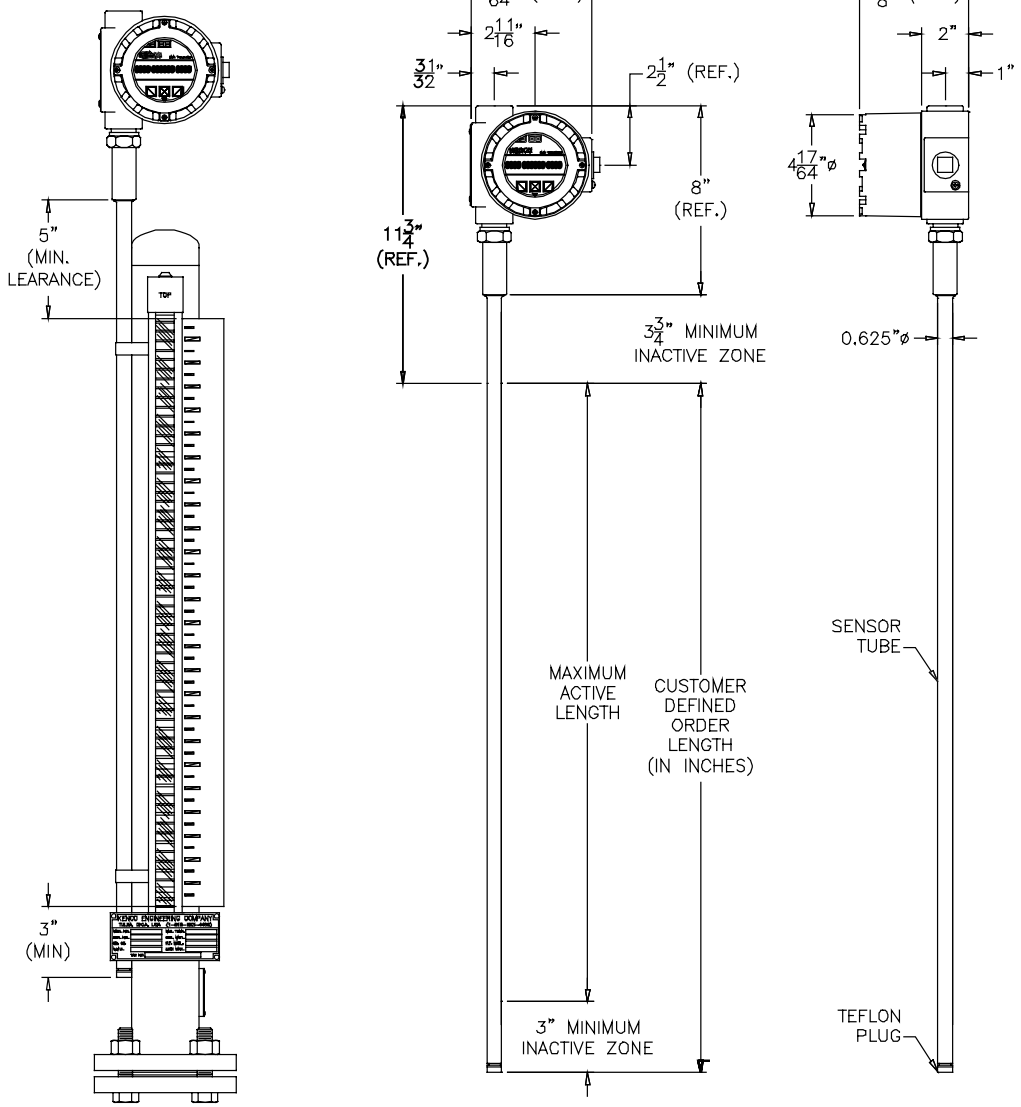
HAZARDOUS LOCATIONS

A typical explosion proof connection for the KMD Transmitter includes a power supply and a reading or monitoring device connected via an explosion proof conduit.

PARAMETER	SPECIFICATIONS
LEVEL OUTPUT	
Measured Variable	Product Level
Full-Range	0.5 to 25 ft. (152 mm to 7.6 m)
Non-linearity Fullspan	0.020 % F.S. (Independent BSL) or 1/32 in. (0.794mm), whichever is greater.
Repeatability	0.01 % F.S. or 0.015 in. (0.381 mm), whichever is greater.
Sensor Operating Temperature	Operating temperature is -40 to 300°F. Contact Kenco for higher temperature requirements
TRANSMITTER LOOP	
Input Voltage Range	10.5 to 36.1 Vdc
Reverse Polarity Protection	Series diodes
Safety Approval	CSA certified explosion-proof - Class I, Division 1, Groups B, C, and D ATEX certified explosion-proof - II 1/2 G resp. II 2 G EEx ia IIB T4 resp. EEx ia IIA T4
CALIBRATION	
Zero Adjust Range	Anywhere within the active length
Span Adjust Range	FS ≥ 0.5 ft. (152 mm) from zero
ENVIRONMENTAL	
Sealing	Potted sensor cartridge and electronics
Humidity	0 to 100 % R.H.
Operating Temperature	-30 to 160°F (-34 to 71°C)
Materials	304 stainless steel
FIELD INSTALLATION	
Transmitter Length	Up to 25 ft. (7.6 meters)
Wiring	Two-wire connection, shielded cable or twisted pair to screw terminals through a 3/4 in. (12.7 mm) NPT conduit opening
DISPLAY	
Measured Variables	Liquid Level
Update Rate	3 seconds
Size	0.5"
Number of Digits	16
Measurement	% of span, a 4-20 mA output or any unit of measure

HART® COMMUNICATIONS standard

All specifications are subject to change without notice. Consult KENCO for verification of specifications critical to your needs.





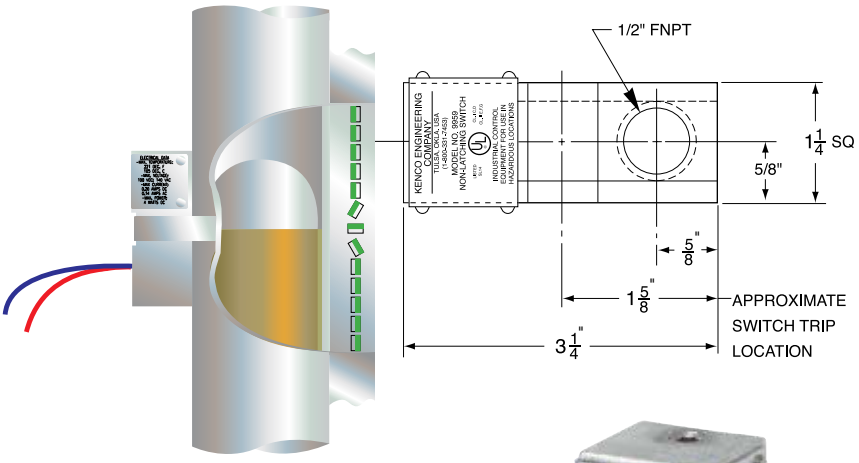
MOUNTING INSTRUCTIONS

The KMD transmitter is mounted directly to the housing of the KENCO Magnetic Liquid Level Gauge. In a typical configuration, the magnetic flag assembly and transmitter are attached to the gauge housing with mounting clamps provided. Install the transmitter to the right or left of the flag assembly by placing the transmitter sensor tube 90 degrees away from the flag assembly. Tighten the mounting clamps provided around the transmitter sensor tube. Allow for minimum inactive zone of 3 inches at the bottom of the sensor tube by placing bottom of sensor 3 inches below the zero setting (centerline of bottom gauge process connection).

NOTE: The transmitter head can be rotated 360 degreesx when mounted as shown to the right.
NOTE: The transmitter may also be mounted with the transmitter head at the foot of the gauge Consult factory for specifics.

MAGNA-SITE ACCESSORIES

EXPLOSION-PROOF HIGH- OR LOW-LEVEL SWITCHES



- Can activate alarms, pumps or valves when the liquid reaches high or low levels
- Does not come in contact with process liquid





HEIGHT SCALES

- Standard scales are 304 stainless steel with no. 3 finish
- Standard scales show height in feet/inches or meters/centimeters
- Large numerical characters offer increased visibility
- Standard scale division marks/characters are etched and paint filled
- Can be calibrated for any unit of measure

SPECIFICATIONS:

MODEL NUMBER 9958 – LATCHING SWITCH

UL approved for Class I, Div. 1, Div. 2, Groups C & D, Class II, Div. 1, Div. 2, Groups E, F & G

Housing Material: Aluminum (Other Materials Available)

Switch: SPDT, latching reed normally open or normally closed form C contacts

Maximum temperature: 221°F or 105°C. Consult factory for higher temperatures.

Maximum switching volts: 100 VDC, 140 VAC

Maximum switch current: 0.20 Amps DC, 0.14 Amps AC

Maximum power: 4 watts (4 V.A.)

Conduit Connection: 1/2" female NPT

MODEL 9959 – NON-LATCHING SWITCH

UL approved for Class I, Div. 1, Div. 2, Groups C & D, Class II, Div. 1, Div. 2, Groups E, F & G

Housing Material: Aluminum (Other Materials Available)

Switch: SPST, non-latching reed normally open form A contacts

Maximum temperature: 221°F or 105°C. Consult factory for higher temperatures.

Maximum switching volts: 100 VDC, 140 VAC

Maximum switch current: 0.25 Amps DC, 0.18 Amps AC

Maximum power: 7 watts (7 V.A.)

Conduit connection: 1/2" female NPT

INSULATION BLANKET

- Withstands temperatures up to 750°F
- Standard shell material is 18 Teflon® cloth
- Also available in other materials based on application
- Steam tracing also available



APPLICATION WORKSHEET

REQUESTED BY: _____ COMPANY: _____

ADDRESS: _____ CITY: _____ STATE: _____ ZIP: _____

PHONE: _____ FAX: _____ EMAIL : _____

MLG — [ ] — [ ] — [ ] — [ ] — [ ] — [ ] —

Mounting Style Options
A=FNPT End Connections
B=MNPT Side Connections
C=Flanged Side Connections
D=Top of Tank (Consult Factory)
E=Removable Flange Top Connection
F =Fixed Flange Vent Connection
G=Removable Flange Vent Connection
X=Special Configuration (Describe in Comments Box Below)

Indication Length (L)
(In Inches)

see pages 6-7

Process Connection Size
0.5=1/2"
0.75=3/4"
1=1"
1.5=1-1/2"
2=2"
2.5=2-1/2"
3=3"
4=4"
6=6"

***Pipe Flange Class**
150=150#
300=300#
600=600#
900=900#
1500=1500#
2500=2500#

Construction Material
A=316 SS
B=316 SS, Carbon Steel Flanges
C=304 SS
D=304 SS, Carbon Steel Flanges
E=PVC
F=CPVC
G=PTFE Lined 316 SS
H=PTFE Lined 316 SS, Carbon Steel Flanges
J=PTFE Lined 304 SS
K=PTFE Lined 304 SS, Carbon Steel Flanges
L=Alloy 20
N=Hastelloy C-276
R=Titanium

Note: Flanges are raised face unless otherwise specified

[ ] — [ ] — [ ] — [ ] — [ ] — [ ] — [ ] — [ ] —

Liquid Specific Gravity
0.50 and up
Consult factory for lower specific gravities

Interface Applications: To read the level of the lower liquid, please list the specific gravity of upper/lower liquids. Example = 0.85/1.0

Maximum Working Pressure (PSIG)

Maximum Operating Temperature (°F)

Vent/Drain Options
N=None
TVD=FNPT Vent/Drain
TD=FNPT Drain only
TV=FNPT Vent only
FVD= Flanged Vent/Drain
FD= Flanged Drain only
FV=Flanged Vent only
X=Other (Please Specify in Comments Box Below)

Vent/Drain Size
N=None
0.25=1/4"
0.5=1/2"
0.75=3/4"
1=1"
X=Other (Please Specify in Comments Box Below)

Scale
N=none
HS=304 SS Height Scale in Feet/Inches*
MHS=304 SS Height Scale in Meters/Centimeters*
XS=% scale, marked every 5%, labeled every 10%
SHS=Other special Scale (Describe in Coments Box Below)*
* Zero at the beginning of visual on lower end of gauge, unless otherwise specified.

Other Gauge Options
KMD=Kenco Magnetostrictive Transmitter
40=SCH. 40 Gauge Housing Pipe (SCH. 10 Standard)
FPW=Full Penetration Welds
LS=9958 Latching Switches (Specify Quantity)
NLS=9959 Non-Latching Switches (Specify Quantity)
IB=Insulation Blanket
ST=Steam Tracing
V=Valves (Describe in Comments Box Below)
X=Other (Describe in Comments Box Below)

[ ] — [ ] — [ ] — [ ]

Option 1 **Option 2** **Option 3** **Option 4**

Liquid in Tank

Comments

Example: [MLG – C – 36 – 2 – 150 – A – 0.71 – 175 – 100 – TVD – 0.5 – HS – LS(2)] is a Magna-Site with flanged side connections, 36" indication length (L), 2" 150 lb. R.F. flanged process connections, 316 stainless steel construction, float specific gravity of 0.71, a maximum working pressure of 175 psig at 100°F, 1/2" FNPT vent/drain, a 304 stainless steel height scale in feet/inches, and (2) 9958 latching switches.

Represented by:

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KENCO ENGINEERING