MODERN ENGINEERED PRODUCTS, INC.

MAGNA-SITE MAGNETIC LIQUID LEVEL GAUGE FROM KENCO

OPERATING PRINCIPLE

The KENCO Magna-Site is a magnetic liquid level gauge used to determine the volume of liquid contained within a tank. 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 tank. 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 indicators since 1985

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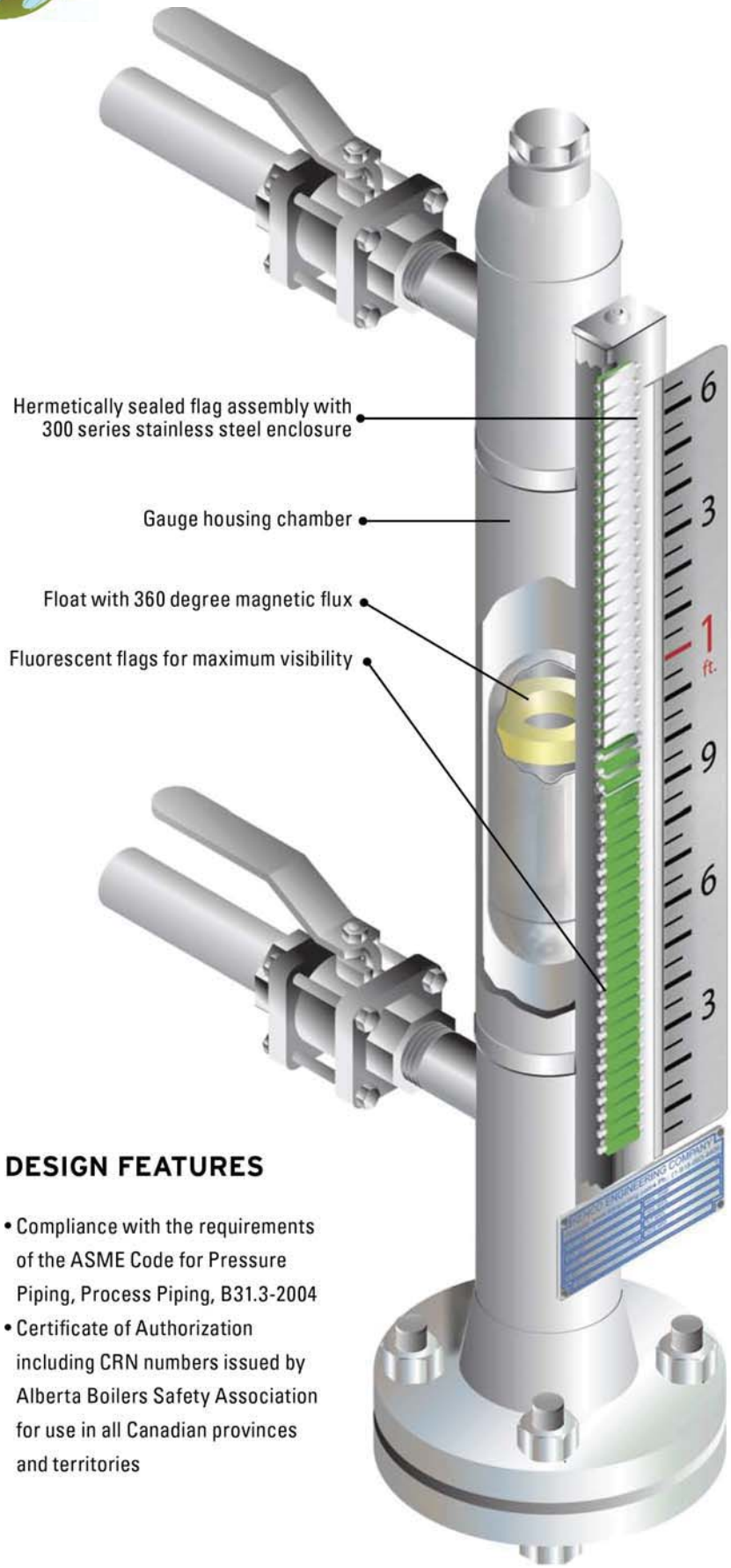

INDUSTRIES SERVED

- 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

DESIGN FEATURES

- Compliance with the requirements of the ASME Code for Pressure Piping, Process Piping, B31.3-2004
- Certificate of Authorization including CRN numbers issued by Alberta Boilers Safety Association for use in all Canadian provinces and territories

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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 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. Contact KENCO for applications requiring special float materials
- Standard float good to a minimum specific gravity of 0.50
- 360 degree magnetic flux field is ideal for interaction with KENCO Magnetostrictive Transmitter
- Float is non-vented, so vapors cannot condense inside float
- Compact length minimizes ground clearance requirements

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FLAG ASSEMBLY FEATURES

- Fluorescent flags for maximum visibility
- No glass in flag assembly
- Shield is UV-stabilized high-impact clear polycarbonate
- Enclosure 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
- 300 series stainless steel chamber provides maximum protection from puncture of F.E.P Teflon® tubing
- 300 series stainless steel enclosure is more compatible to corrosive environments than aluminum
- Double O-ring seal assures that the flag assembly will not lose its nitrogen aaaafilled atmosphere
- Each flag contains an Alnico 8 magnet, making each flag highly resistant to demagnetization
- Flags are UV-stabilized, high-temperature thermoplastic and molded in color to prevent fading
- No ceramic magnets are used
- Maximum constant service temperature of 400°F
- 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 pressurize it with ultra high-purity nitrogen gas.

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 environments
- Alnico 8 magnets are nickel plated to withstand severe environments

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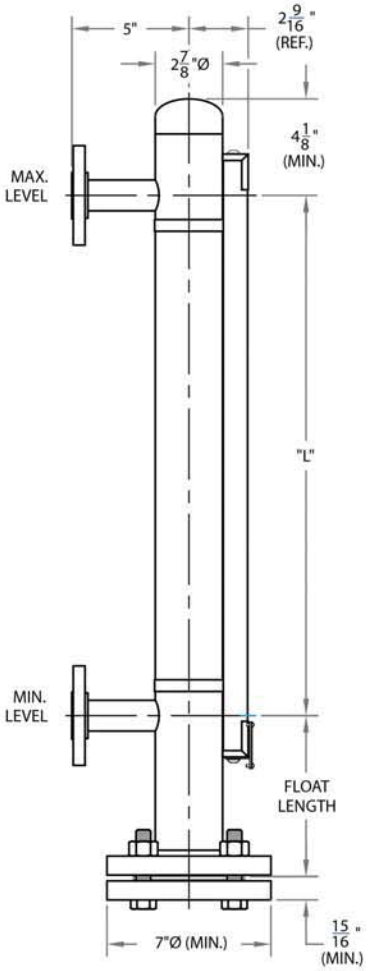
MOUNTING STYLE OPTIONS

KMLG-C:
Flanged Side Connections

ALL KMLG DIAGRAMS:

L = Length of indication (suppied by customer)



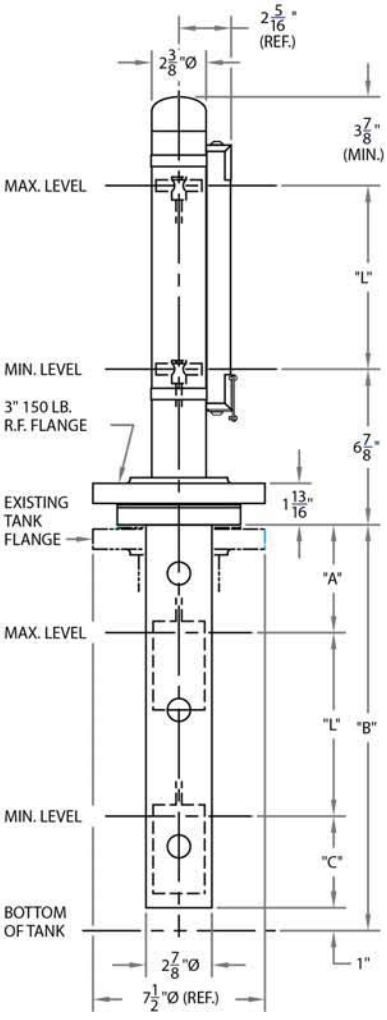
KMLG-D:
Tank Top Mounted Flange Connection

KMLG-D DIAGRAM ONLY:

A = Distance from raised face portion of existing tank flange to maximum tank liquid level (supplied 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)



Dimensional Note:

All dimensions are for reference purposes only and are subject to change at any time without notice.

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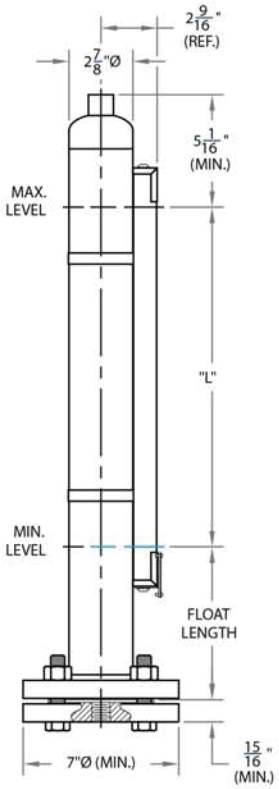
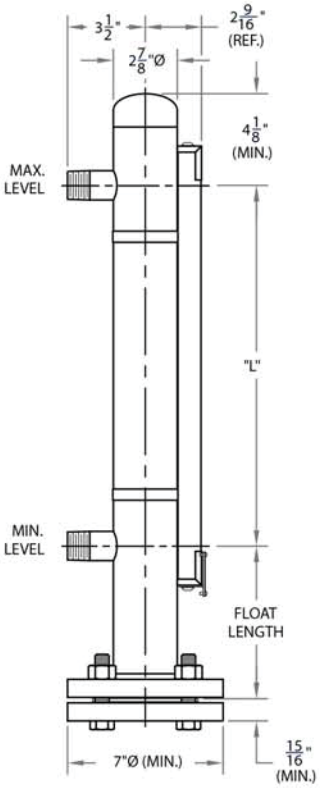
WELDING SPECIFICATIONS, X-RAYS, WELD MAPS, DYE PENETRANT TESTING, PMI TESTING, HYDROTEST REPORTS, MATERIAL CERTIFICATIONS, AND CERTIFIED DRAWINGS ARE AVAILABLE UPON REQUEST.

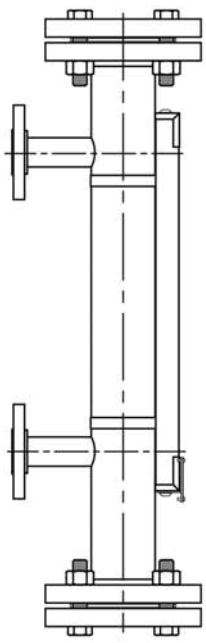
KMLG-A
Female NPT End Connections



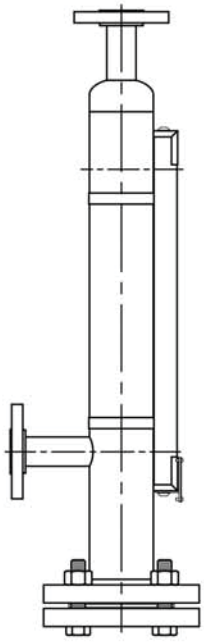
KMLG-B
Male NPT Side Connections



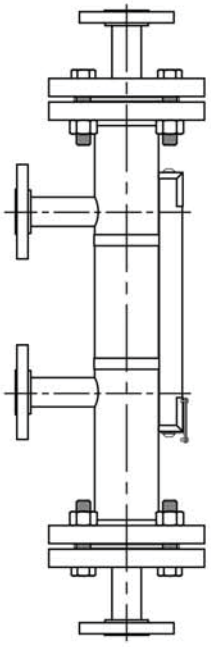
OTHER GAUGE HOUSING CONFIGURATIONS
(Housing can be modified as required to meet your specific needs)



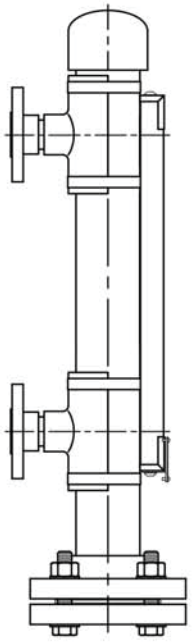
KMLG-E
Removable Flange Top Connection



KMLG-F
Fixed Flange Vent Connection



KMLG-G
Removable Flange Vent Connection



KMLG-C
PVC/CPVC Gauge Housing

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MODERN ENGINEERED PRODUCTS, INC.

KENCO MAGNETOSTRICTIVE TRANSMITTER

TRANSMITTER FEATURES

- Digital display for zero and span settings and readout
- Readout available as a % of span, 4-20mA, Feet, Inches, Meters, Centimeters, or Millimeters
- CSA certified explosion-proof housing
- CSA and ATEX certified as intrinsically safe
- Process temperature range: -40 to 400°F (contact 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 4-20mA 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 the explosion-proof housing. These transmitters operate within a process temperature range of -40°F to 400°F. Field replaceable electronics are potted and encapsulated. KENCO transmitters are available as standard with NEMA Type 4X explosion-proof housings. These housings feature an industrial epoxy coating for corrosion resistance. This KENCO level transmitter uses a 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 316 stainless steel tube 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.

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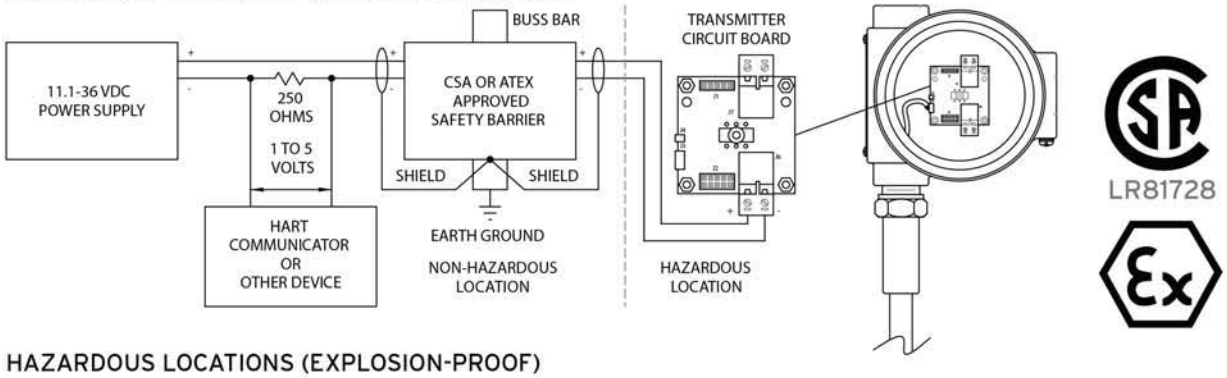
ELECTRICAL CONNECTIONS AND WIRING PROCEDURES

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

HAZARDOUS LOCATIONS (INTRINSICALLY SAFE)



LR81728

HAZARDOUS LOCATIONS (EXPLOSION-PROOF)

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	ATEX rating is available on request only.
Measured Variable	Product Level
Full-Range	0.5 to 25′ (152 mm to 7620 mm)
Non-linearity Fullspan	0.020% F.S. or 1/32″ (0.794 mm), whichever is greater
Repeatability	0.01% F.S. or 0.015″ (0.381 mm), whichever is greater
Process Operating Temperature	-40 to 400°F. Contact KENCO for higher temperature requirements
TRANSMITTER LOOP	
Input Voltage Range	11.1 to 36 Vdc
Reverse Polarity Protection	Series diodes
Safety Approval	CSA certified explosion-proof: Class I, Division 1, Groups B, C, D; Class II, Division 1, Groups E, F, G; Class III ATEX certified intrinsically safe: EEx ia IIB T4 CSA certified intrinsically safe: Class I, Division 1, Groups A, B, C, D; Class II, Division 1, Groups E, F, G; Class III
CALIBRATION	
Zero Adjust Range	Anywhere within the active length
Span Adjust Range	FS ≥ 0.5′ (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	316 stainless steel
FIELD INSTALLATION	
Transmitter Length	20″ to 300″ (508 mm to 7620 mm)
Wiring	Two-wire, twisted, shielded pair cable to screw terminals through a 3/4″ (19 mm) NPT conduit opening
DISPLAY	
Measured Variables	Liquid Level
Update Rate	3 seconds
Size	0.5″
Number of Digits	16
Units	% of span, 4-20mA, Feet, Inches, Meters, Centimeters, or Millimeters

HART® COMMUNICATIONS standard

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

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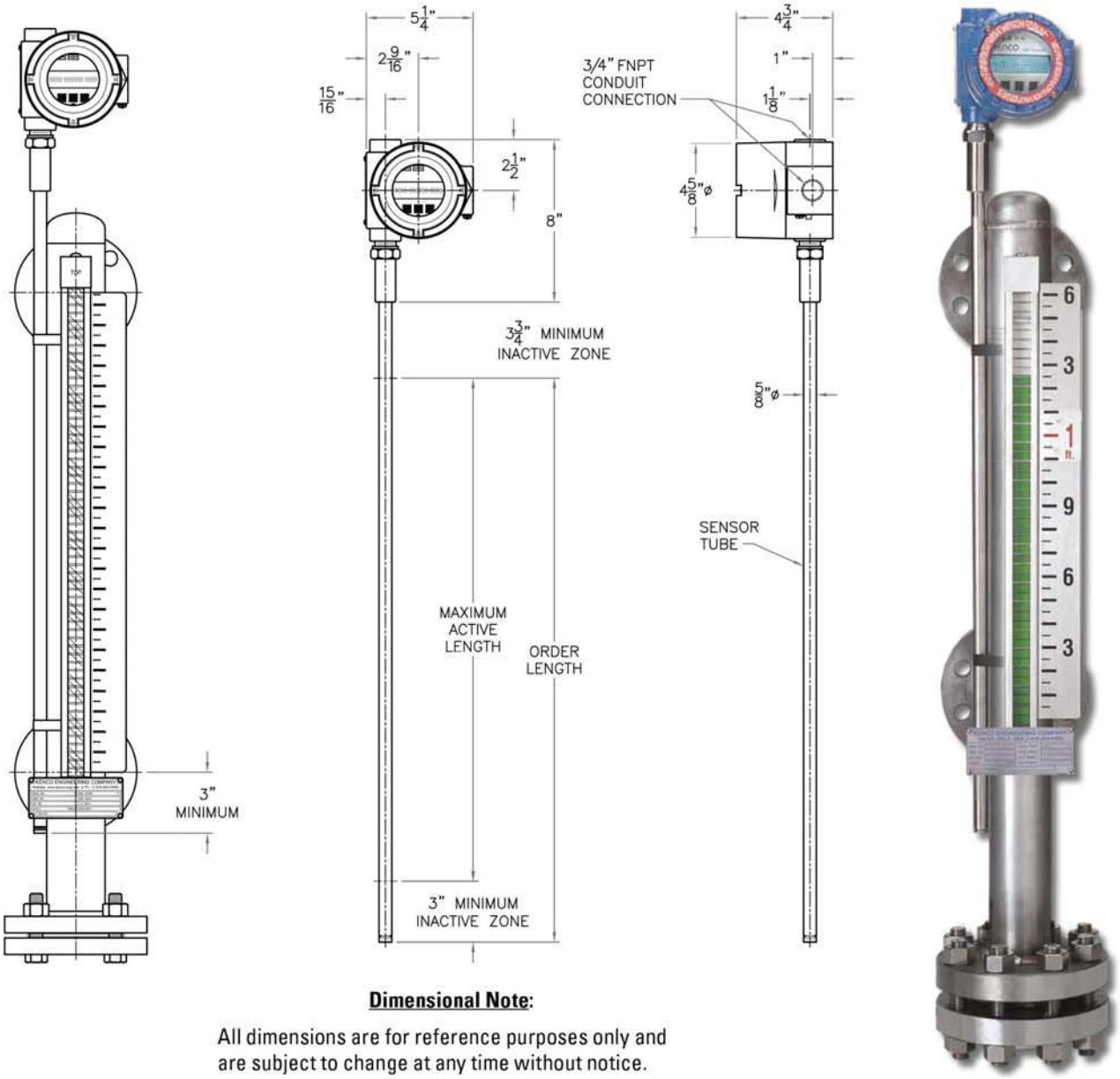
TRANSMITTER DIMENSIONS



Dimensional Note:

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MOUNTING INSTRUCTIONS

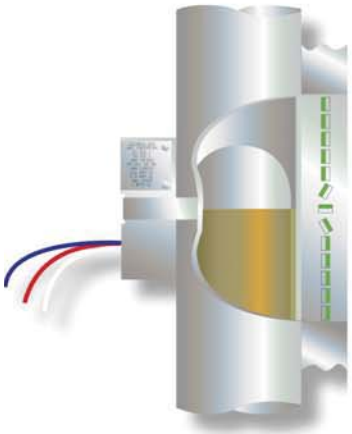
The KMD transmitter is mounted directly to the housing of the KENCO Magna-Site liquid level gauge. In a typical configuration, the magnetic flag assembly and transmitter are attached to the gauge housing with mounting clamps provided. Install the transmitter to the right or left of the flag assembly 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).

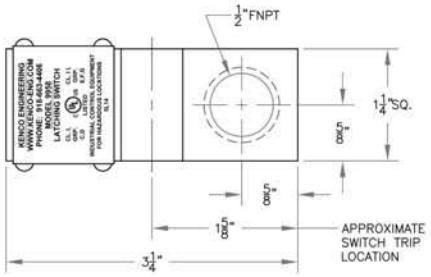
NOTE: The transmitter head can be rotated 360 degrees when mounted as shown.
NOTE: The transmitter may also be mounted with the transmitter head at the foot of the gauge. Contact KENCO for specifics.

MODERN ENGINEERED PRODUCTS, INC.

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

CL. I, GRP. C,D — cULus — CL. II, GRP. E,F,G
LISTED
INDUSTRIAL CONTROL EQUIPMENT FOR HAZARDOUS LOCATIONS

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

- C-UL-US 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. (Contact KENCO 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
- Conduit connection: 1/2" female NPT with 18 AWG x 18 " long wire leads

MODEL 9959 – NON-LATCHING SWITCH

- C-UL-US 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
- Conduit connection: 1/2" female NPT with 18 AWG x 18" long wire leads

INSULATION BLANKET

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

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APPLICATION WORKSHEET

REQUESTED BY: _____ COMPANY: _____

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

PHONE: _____ FAX: _____ EMAIL: _____

KMLG — [ ] — [ ] — [ ] — [ ] — [ ] — [ ] —

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

*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 Comments Box Below)*
* Note: 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)
LS=9958 Latching Switches (Specify Quantity)
NLS=9959 Non-Latching Switches (Specify Quantity)
IB=Insulation Blanket
ST=Steam Tracing
X=Other (Describe in Comments Box Below)

[ ] — [ ] — [ ] — [ ]

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

Liquid in Tank

Comments

Example: [KMLG – 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.

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