

LMG100 Econolev Magnetic level gauge KTEK products

Measurement made easy



Introduction

ABB offers the standard LMG100 Econolev Magnetic Level Gauge with a 316 stainless steel chamber, a custom engineered float and all accessories with 316 stainless steel construction.

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1.0 Introduction

1.1 General Description

Features:

- Rugged construction
- Safe for flammable, corrosive, and toxic liquids
- Suitable for pressures from full vacuum to maximum specified pressure
- Special types for high and low temperature operations
- Positive zero indication
- Available with integral limit switches & transmitters

The basic LMG100 systems consist of a float, float chamber and an indicator assembly. The float chamber is connected directly to the process vessel. The float chamber contains a magnet assembly and is designed and weighted to float in the process liquid submerged approximately 70 to 80%. The indicator assembly consists of a sealed polycarbonate tube containing the shuttle indicator and a graduated scale corresponding to the desired operating range. The indicator assembly is mounted in close proximity to the float chamber. Magnetic coupling exists between the float and the indicator. As the float follows changing liquid level, the indicator changes position to reflect that level due to the coupling action.

2.0 Storage and Handling Information

To prevent damage to the shipping tubes and/or crates that the level gauges are transported in, these items should not be over-exposed to inclement weather. The LMG100 Magnetic Level Gauge should be stored in such a manner that would not allow the indicator tube to be immersed or submerged in any liquid. Sufficient precautions should be taken so that the polycarbonate indicator tubes are not broken or damaged. There are no special storage requirements for the EC chamber themselves, but if there is a transmitter and/or switch, the storage requirements of the transmitter and/or switch must be met. See data sheets for specific requirements.

3.0 Installation

3.1 Float Information

The LMG100 float is shipped inside the chamber unless specified for separate shipment. Most floats are labeled to indicate the top of the float, the specific gravity of the fluid, and the serial number of the chamber for which they are designed. The top of the float can be found by locating the magnet placement and direction with respect to the indicator in the scale. The indicator should be attracted to the float, not repelled, when inserted correctly.

Floats and indicators are designed so that the magnetic actuation point of the magnets coincide with the fluid level at the reference specific gravity. If specific gravity decreases, the float will have more of its length below the fluid level and give a visual indication that is lower than actually exists. If the fluid specific gravity has significantly changed after the unit has been placed in service.

3.2 Leveling

The chamber must be vertically level to insure proper operation of the float and its follower. A unit that is not leveled properly may decouple unexpectedly due to friction with the sides or because the float travels too far away from the indicator.

3.3 Limit Switches

To signal specific liquid levels, the LMG100 can be equipped with different types of ABB limit switches. Magnetically actuated limit switches are the most commonly used devices. They can be clamped to the measuring chamber and are adjustable over the entire measuring range. They are actuated by a magnet incorporated into the float. The process operating conditions will define what limit switch type may be used (Table 3-1).

Available magnetically actuated switches (Table 3-1):

Reed Type: MS30 & MS30EX

Cam Action Type: MS40, MS40EX, & MS41

Pneumatic Type: PS35 & PS45

3.3 Limit Switches (continued)

All limit switches are delivered as factory assembled to the LMG100 in most cases (Figure 3-1). Please consult the applicable limit switch product data sheets for specifications, dimensions, ratings, and approvals.

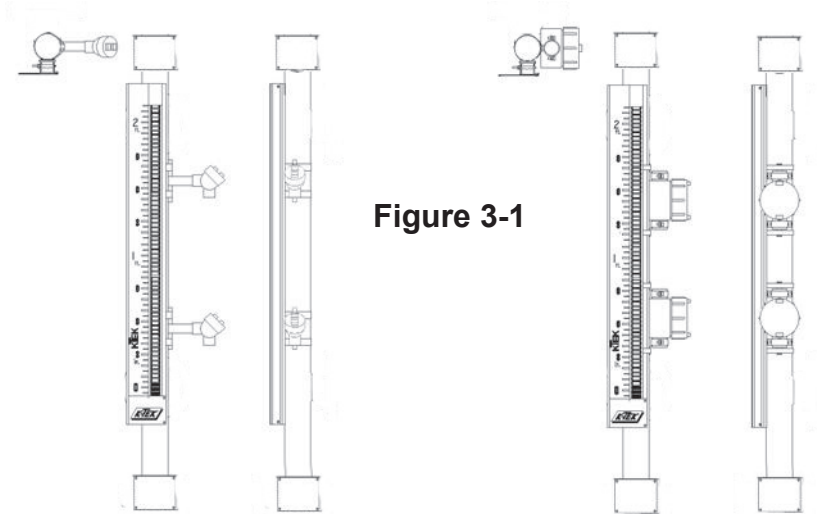


Figure 3-1

3.3.1 Limit Switch Use

A magnetically actuated limit switch is usually mounted using two stainless steel clamps that are fastened, then attached to the switch housing and strapped around the LMG100 chamber. The switch can be easily positioned by loosening the clamp with a 5/16" nut driver and sliding the switch to the correct position on the chamber (Figure 3-2).

Figure 3-2

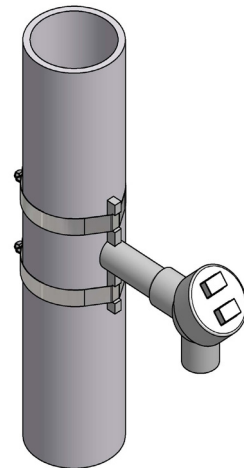









Table 3-1

Model #	Agency Approvals	Enclosure		Switching Mechanism			Application						
		Type	Rating	Electrical Connection	Type	Rating	Min Process Temp	Max Process Temp	Dead-band	Contacts	High Temp	Vibration	High Corrosion
MS30 	FM, CSA	Hermetically Sealed	NEMA 4x	1/2" MNPT	Reed	AC/DC 1 amp	-40°F (-40°C)	300°F (149°C); 600°F (316°C)	1/8"	SPDT	•		
MS30/EX 	FM, CSA	Hermetically Sealed, Explosion Proof	NEMA 4x	1/2" FNPT	Reed	AC/DC 1amp	-40°F (-40°C)	300°F (149°C); 600°F (316°C)	1/8"	SPDT	•		
MS40 	FM, CSA	Stainless Steel	NEMA 4x	1/2" FNPT	Cam Driven, Snap Action	AC: 10 amp DC: 2.6 amp	-60°F (-51°C)	300°F (149°C); 600°F (316°C)	7/8"	DPDT	•	•	•
MS40/EX 	FM, CSA	Stainless Steel, Explosion Proof	NEMA 4x	3/4" FNPT	Cam Driven, Snap Action	AC: 10amp DC: 1/2 amp	-60°F (-51°C)	300°F (149°C); 600°F (316°C)	13/16"	DPDT	•	•	•
MS41 	FM, CSA, ATEX	Stainless Steel, Dual Compartment, Hermetically Sealed, Explosion Proof	NEMA 4x	1/2" FNPT	Cam Driven, Snap Action	AC: 10amp DC: 2.6 amp	-320°F (-195°C) with option	300°F (149°C); 1000°F (538°C)	15/16"	DPDT	•	•	•
PS35 	Non-electric	Stainless Steel	NEMA 4x	1/8" MNPT port	Pneumatic	15 to 100 psig	0°F (-18°C)	180°F (82°C); 450°F (232°C)	1"	Pneumatic Signal			•
PS45 	Non-electric	Stainless Steel	NEMA 4x	1/8" MNPT port	Pneumatic	1 to 100 psig	0°F (-18°C)	180°F (82°C); 450°F (232°C)	15/16"	Pneumatic Signal			•

*Requires use of insulation pad or insulation jacket / rod mount assembly. Consult specific product data sheet for detailed guidance.

3.4 Magnetostrictive Transmitter Installation

Use the following steps to successfully install a Magnetostrictive Level Transmitter (MLT) on an existing Magnetic Level Gauge (MLG). Read all directions carefully before performing any operation. The common mounting location of the transmitter will be on the left hand side of the gauge (when facing the scale) at 90° from the scale.

1. The model number will appear as AT600/B/... to identify electronics housing mounted on the bottom of the probe.
2. Compare the measuring length of the transmitter (the last numbers in the model number) with the measuring length of the MLG and the center to center dimension of the MLG to determine if the transmitter should match the scale measurement or the center to center of the process connections.
3. Identify the "Factory Zero Mark" sticker on the sensor tube of the transmitter.
4. Block the MLG from the process.
5. Drain the MLG following plant procedures for pressure relief and disposal of process fluids.
 - B. If the transmitter measuring length matches the center to center of the gauge, align the zero mark with the center of the bottom process connection.
6. Slightly loosen all but the uppermost worm gear clamps which attach the scale assembly to the MLG.
7. Realign the zero mark of the transmitter with the corresponding zero on the MLG.
8. Starting with the highest transmitter mounting clamp, loosen each transmitter clamp, slide the clamp over or through the mounting tab of the transmitter, and tighten the clamp.
9. Repeat step 12 until all transmitter mounting clamps are tightened.
10. Tighten all scale mounting clamps being sure to align the scale vertically on the MLG.
11. To confirm the zero of the transmitter, apply power to the terminal strip of the magnetostrictive transmitter. If the transmitter reads higher than "zero", raise the transmitter. If the transmitter reads lower than "zero", lower the transmitter.
12. Attach proper field wiring to the transmitter according to the instruction manual, included with the transmitter.
13. Open the process to the MLG using the procedure included in Section 3.6.

3.5 Isolation Valves

Valves should be installed between the tank and the KM26 for maintenance purposes and are available as an option.

Care must be used when opening the valves to prevent a surge of fluid or gases through the chamber. A surge can cause the float to be propelled against the far stop causing damage to the float shell and/or the indicator glass. Failure to comply may result in damage to the float and expense to the customer. Gradually open the upper isolation valve prior to the lower one to equalize the pressure in the level gauge chamber with the pressure in the vessel. After the pressure has equalized, gradually open the lower isolation valve. At this point, the level indicator may show a liquid level if enough liquid is present.

CAUTION



3.6 Replacing Indicator Tube

1. Remove the machine screw in the upper tube holder. Remove the upper tube holder by sliding it out of the end of the channel (do not pull forward). For units 60" or longer remove all of the stainless steel wires that retain the tube in the channel. Slide the tube to be replaced out of the end of the channel.
2. Before installing replacement tube, check for proper orientation. The bottom of the shuttle tube will have an orange "PAC-MAN" shaped silicon bumper inside the tube. The bottom of the magnetic bar graph glass tube will have an indentation to align with the bottom tube holder. Insert the replacement tube into the bottom holder. Install the top holder using the machine screw to hold in place. Replace any stainless steel wires necessary to retain the tube in the channel.

4.0 Troubleshooting

4.1 Indicator Decoupling

Causes:

- Float is upside down. Remove, check field strength of magnets, and install correctly. Proximity to opposing field may weaken magnetic field.
- Scale assembly is not flat against the chamber due to missing straps. Magnetic field strength drops exponentially with distance. Add gear clamps to eliminate channel separation from chamber. Add stainless steel retaining wires to eliminate indicator tube separation from channel.
- Float stop springs have been bent or broken. Adjust or replace springs as needed to prevent float travel outside the range of the indicator tube.
- Scale has been moved allowing float travel outside of range or causing too much separation from the float. Reposition the scale.
- Float or indicator de-magnetizing by proximity to other magnetic material, high temperature, or repulsive fields. Consult factory for re-magnetization of float or replace the float and/or indicator and remove the source of demagnetization. Sources include floats and switches installed upside down, close ferrous materials, nearby magnetic fields, magnetic particles from process piping, etc.
- Indicator tube is no longer sealed and contains moisture or dirt. This increases friction inside the tube. Replace the tube.
- Chamber is not vertically level causing increased friction between the shuttle and glass and increased distance between the float and the scale assembly. Adjust the position of the chamber.
- Indicator tube incorrectly installed. See directions for installation.
- Magnetic particles from the process fluid stuck to float. This distorts the magnetic field and changes the float buoyancy. Remove and clean float and install magnetic traps in the process connections.
- If for some reason, magnetic coupling is lost, it can be restored by following three simple steps.
 1. Using a permanent magnet, locate the float inside the chamber.
 2. Take the permanent magnet and raise the follower to the same level as the float.
 3. Remove the magnet to the side as quickly as possible to set the follower in a spinning motion.

4.2 Float Sinks or Sticks

- Process specific gravity is lower than was specified at the time of order. Identify true minimum specific gravity requirements considering temperature and pressure variations and order new float providing minimum and operating specific gravity.
- Magnetic particles in the process fluid have become attached to the float changing its buoyancy. Install magnet traps in the process connection lines, then clean and reinstall float.
- Solidification of process fluids on the surface of the float have changed its buoyancy. Consider replacing with a Teflon® (registered trademark of DuPont) "S" coated float,
- Solidification of process fluid on the interior of the chamber has decreased the clearance for the float. Consider reducing the amount of solidifying particles in the chamber.

4.3 Switch Does Not Work

- Switch installed upside down. Remove and install correctly.
- Float does not travel past the switch during operation. Float may encounter float stop prior to activating switch. Switch point should be a minimum of 1" inside the upper and lower stop points for the float.
- Contacts damaged due to excessive load, inductive load, or dead short in the circuit. Replace the switch.
- Magnet has been demagnetized by proximity to magnetic source or ferrous materials. Replace the switch and remove the interference. (continued on next page)
- Distance between the switch and float is too large. Strap may be loose.
- Float has become demagnetized and indicator also decouples readily. Have the float re-magnetized at the factory and remove the source of demagnetizing.

5.0 Parts Ordering

ABB can provide custom fit insulation for most installations. Contact the factory for details. Each KM26 is built to the customer's specifications, which makes parts for these units unique. Each unit is given a serial number to provide ABB a means to track exactly how the unit was constructed. To order parts, specify the LMG100's serial number and the part number suffix shown on the drawings that follow.

6.0 Customer Specific Product Information

Use this area to record pertinent information about your purchased unit.

Serial Number _____

Process Fluid _____

Process Temperature _____

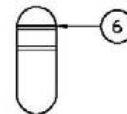
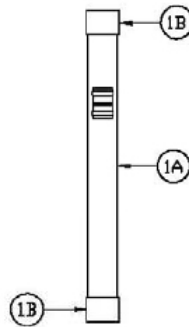
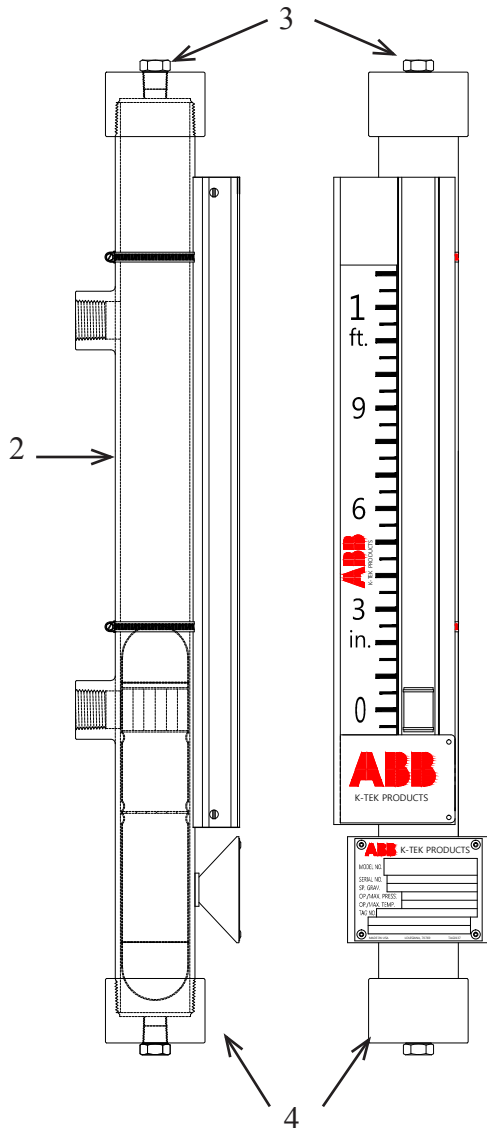
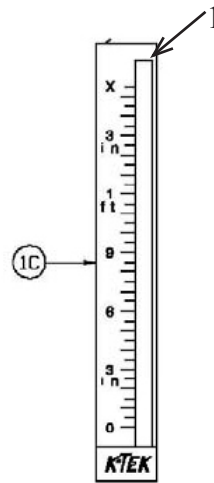
Process Pressure _____

Fluid Specific Gravity (SG) _____

Tag # _____

7.0 Appendix A

ITEM	DESCRIPTION	PART NO.
1	SCALE ASSEMBLY (INCLUDES 1-ABC)	SER NO - 1
1A	TUBE WITH FOLLOWER	SER NO - 1A
1B	TUBE HOLDER	SER NO - 1B
1C	SCALE	SER NO - 1C
2	LMG100 CHAMBER	SER NO - 2KS
3	VENT PLUG	SER NO - 3KS
4	THREADED CAPS	SER NO - 4KS
6	FLOAT	SER NO - 6KS
7	DRAIN PLUG	SER NO - 7KS




8.0 APPENDIX B

8.1 Unpacking


Unpack the instrument carefully. Inspect all units for damage. Report any concealed damage to carrier within 24 hours. Check the contents of the packing slip and purchase order. Check and record the serial number. This can be used to reference when ordering spare or replacement parts for the MLG and/or related accessories.

Note: Do not discard the shipping container until all parts/components are verified and checked.

8.2 Pre-Installation Checklist

CAUTION  • If equipment is used in a manner not specified by ABB, protection provided by equipment may be impaired.

- Manually move the float from 0% to 100% and back to 0% prior to startup/check out in order to reinitialize any switch accessories (only required if magnetically actuated switches are supplied). Switches may inadvertently change state during any rough handling during transport.
- Remove float prior to pressurizing tank/vessel.

CAUTION  Float damage may occur if not removed prior to any pressure testing.

- Verify the MLGs center-to-center dimension equals that of the tank/vessel.

8.3 Equipment & Tools

- Open-end wrenches or an adjustable wrench to fit the process studs/nuts. A torque wrench is also recommended.
- Flat-blade screwdriver or 5/16" nut driver
- Digital multimeter or digital volt/ammeter if transmitters or switches are attached
- Level
- Gasket for mating flanges
- Teflon® (registered trademark of DuPont) tape & "never seize" for threaded units
- Pipe wrench for threaded units


8.4 Placing an MLG in Service (Startup)

Ensure that the operating conditions (temperature, pressure, and specific gravity, etc) are within the maximum ratings of the MLG. At the bottom area of each MLG is a nameplate that indicates all of the relevant process specifications, serial number, and tag number.

Install the MLG float (this should have been accomplished in pre-installation steps). The float is marked ">>>> UP >>>>" to insure proper orientation when placing float inside chamber. MLGs are supplied with float start and stop springs. Verify these are installed at top and bottom locations.

The float chamber should be closed with no openings to the atmosphere. Check to see that all drain and vent plugs are securely in place and all vent and drain valves are closed.

The following procedural sequence is critical in pressurized applications.

CAUTION  When the MLG is mounted and ready to be applied to the liquid service, the TOP process connection valve should be opened FIRST and should be opened very slowly to allow pressure to equalize. This allows process fluid or vapor to enter the MLG at a slow and controlled rate that is reasonable and ultimately allows the MLG to reach operating pressure and temperature in a safe fashion.

8.0 Appendix B

When the MLG has reached process pressure, then the BOTTOM process connection can be opened slowly. Once this is accomplished, the startup procedure has been completed.



Vent or Drain valves should not be used during startup for pressure relief from the process under any circumstances. This has the potential to permanently damage the instrument and is a hazard to personnel.

8.5 Maintenance

1. LMG100s are supplied with ½” vent and drain plugs (and associated valves) in the top and bottom of the float chamber to allow cleaning and removal of the process fluid as required. MLGs should be cleaned and inspected based on the severity of the service.

To perform cleaning procedure:

- A. Block in the float and chamber with the process connection isolation valves or ensure the associated vessel/tank is empty or out of service. Follow steps outlined in “Removing an MLG from Service”.
 - B. Following a complete fluid drain from the MLG, remove the drain flange and allow the float to slide out of the chamber bottom. Be sure to examine the float for any excessive wear and clean as needed.
 - C. Clean the chamber inside wall with a bottle brush or scrubbing tool. Some processes may require a solvent of some type for cleaning.
 - D. If the MLG is located where the bottom drain is near the floor or other equipment where it is difficult to reach, it is possible to configure an instrument with the top flange in place of a standard weld cap/ vent plug. This allows the MLG to be cleaned and serviced through the chamber top end.
2. After cleaning the MLG chamber, replace the float and screwed cap.
 3. Verify that the stainless steel pipe/gear clamps are tight and ensure that the scale assembly has the “positive zero” in the correct location relative to the chamber and float.
 4. Use a permanent magnet or KTEK magnet tool to attract the “shuttle” until it is again coupled to float inside the chamber. (This step is not required if a magnetic bargraph type indicator is utilized.)
 5. Magnetic Traps are available to reduce magnetic particulate travel from the tank/vessel to the chamber. Consult the ABB factory for ordering information and configuration details.

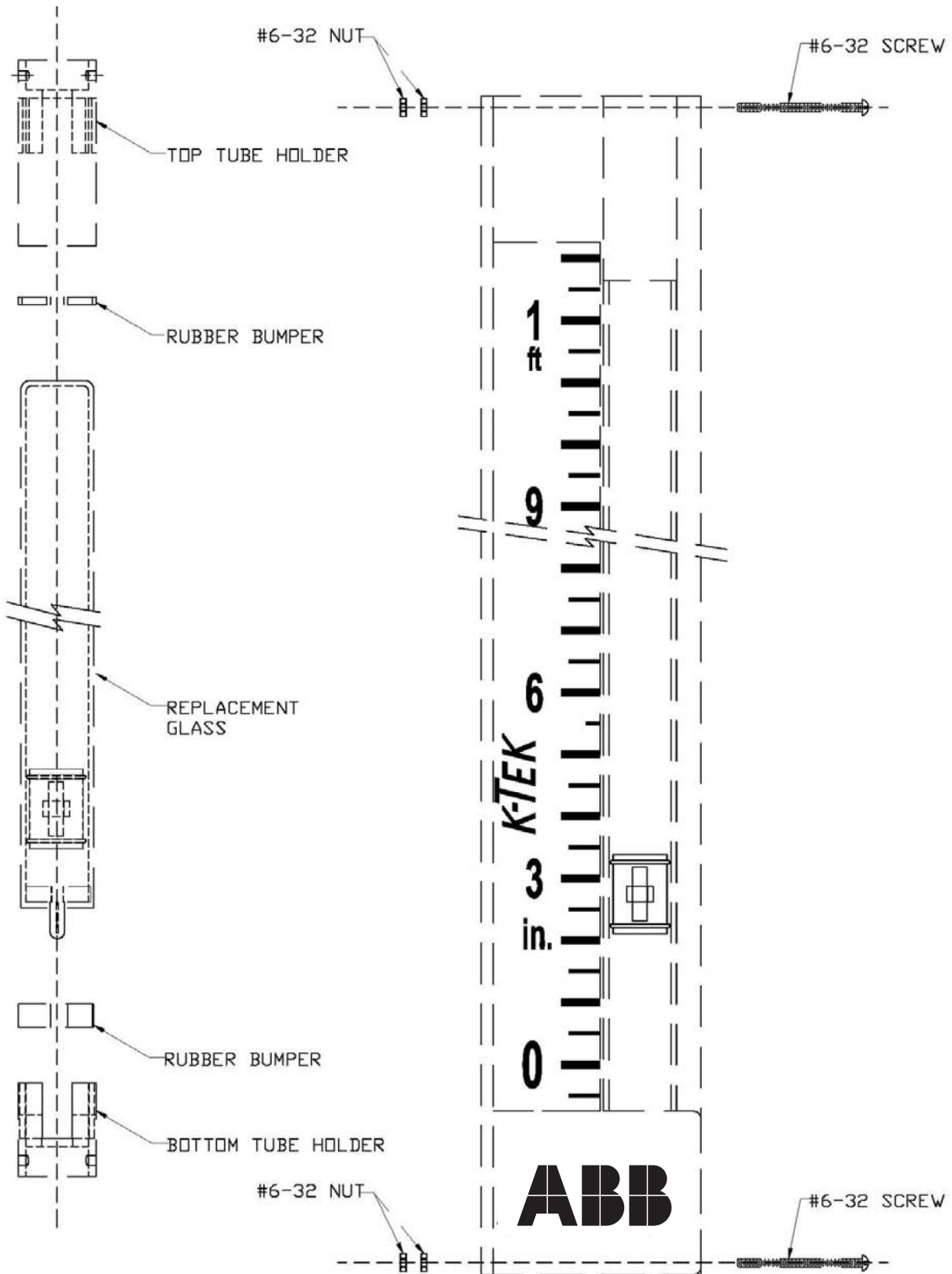
8.6 Replacement Tube Installation Procedure (Retrofit or Replacement)

8.6.1 LMG100 Shuttle Replacement Tube Installation Procedure (refer to Figures 8-1 and 8-2)

1. Remove old tube and tube holders from scale.
2. Assemble new bottom tube holder to scale using a #6-32 machine screw. Note the orientation of grooves in tube holder that interface with matching feature on scale channel.
3. Insert tall rubber bumper into bottom tube holder. The flat face on tall rubber bumper should rest flat in holder cavity.
4. Carefully align replacement tube with shuttle indicator into scale channel and lower into bottom tube holder. Ensure the tube rests flat on rubber bumper and is firmly seated. The nipple on bottom end of tube should protrude through the slot in the rubber bumper.
5. Place rubber bumper on top of tube.
6. Align top tube holder with scale channel and slide down until top surface of the holder is flush with top of scale channel. The screw hole should align with the hole in the holder.
7. Use a #6-32 machine screw to lock top tube holder in place.
8. Tighten nut and install a second nut to lock tube holders in place.

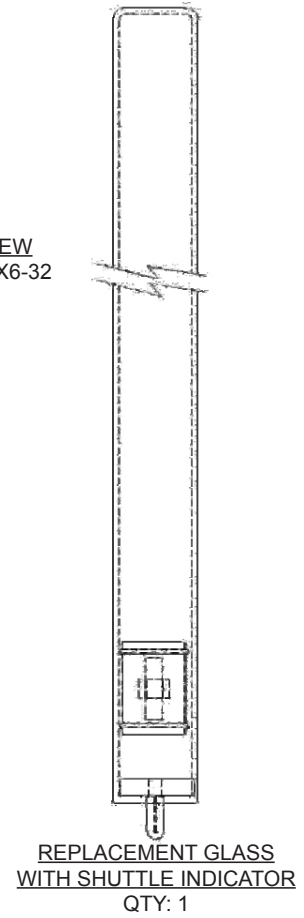
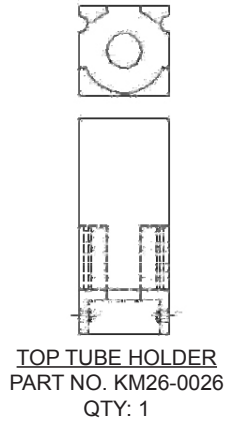
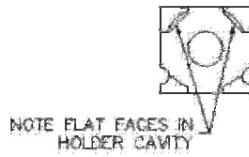
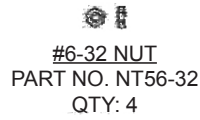
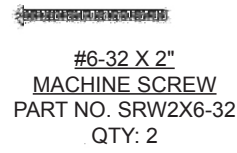
8.7 LMG100 Shuttle Replacement Glass Installation Procedure

Figure 8-1



8.9 Lmg100 Shuttle Replacement Glass Installation Procedure

Figure 8-2



9.0 Appendix C

9.1 Warranty Statement

5 YEAR WARRANTY FOR:

KM26 Magnetic Liquid Level Gauges; LMG100 Magnetic Level Gauge; MagWave Dual Chamber System; LS Series Mechanical Level Switches (LS500, LS550, LS600, LS700, LS800 & LS900) (does NOT include switching mechanisms, ie. MS30, MS40, MS41, PS35 & PS45); EC External Chambers, STW Stilling Wells and ST95 Seal Pots.

3 YEAR WARRANTY FOR:

KCAP300 & KCAP400 capacitance switches.

2 YEAR WARRANTY FOR:

AT100, AT100S and AT200 series transmitters; RS80 and RS85 liquid vibrating fork switches; RLT100 and RLT200 reed switch level transmitters; TX, TS, TQ, IX and IM thermal dispersion switches; IR10 and PP10 External Relays; MT2000, MT5000, MT5100 and MT5200 radar level transmitters; RI100 Repeat Indicators; KP paddle switches; A02, A75 & A77 RF capacitance level switches and A38 RF capacitance level transmitters; Buoyancy Level Switches (MS50, MS10, MS8D & MS8F); Magnetic Level Switches (MS30, MS40, MS41, PS35 & PS45).

1 YEAR WARRANTY FOR:

KM50 gauging device; AT500 and AT600 series transmitters; LaserMeter and SureShot series laser transmitters; LPM200 digital indicator; DPM100 digital indicators; APM100 analog indicators; KVIEW series digital indicators and controllers; GRANUPOINT and SLUDGEPOINT vibrating fork switches, SOLITRAK Electro-Mechanical Continuous Measuring Devices, KSONIK ultrasonic level switches, transmitters & transducers, ChuteMaster Microwave Transmitter / Receiver and TiltMaster Switches.

SPECIAL WARRANTY CONSIDERATIONS:

ABB does not honor OEM warranties for items not manufactured by ABB (i.e. Palm Pilots). These claims should be handled directly with the OEM.

ABB will repair or replace, at ABB's election, defective items which are returned to ABB by the original purchaser within the period specified above from the **shipment date** of the item and which is found, upon examination by ABB, to its satisfaction, to contain defects in materials or workmanship which arose only under normal use and service and which were not the result of either alterations, misuse, abuse, improper or inadequate adjustments, applications or servicing of the product. ABB's warranty does not cover the repair or replacement of units that fail from the effects of excessive vibration unless the units are originally designed for vibration application. In addition, **ABB's warranty does not include on-site repair or services**. Field service rates can be supplied on request.

If a product is believed to be defective, the original purchaser shall notify ABB and request a Returned Material Authorization before returning the material to ABB, with transportation **prepaid** by the purchaser. (To expedite all returns/repairs from outside of the United States, consult ABB's customer service team (service@ktekcorp.com) to determine an optimal solution for shipping method and turnaround time.) The product, with repaired or replaced parts, shall be returned to the purchaser at any point in the world with transportation prepaid by ABB for best-way transportation only. ABB is not responsible for expedited shipping charges. If the product is shipped to ABB freight collect, then it will be returned to the customer freight collect.

If inspection by ABB does not disclose any defects in material or workmanship, ABB's normal charges for repair and shipment shall apply (minimum 250.00 USD). The materials of construction for all ABB products are clearly specified and it is the responsibility of the purchaser to determine the compatibility of the materials for the application.

THE FOREGOING WARRANTY IS ABB'S SOLE WARRANTY AND ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED AND NEGATED TO THE MAXIMUM EXTENT PERMITTED BY LAW. NO PERSON OR REPRESENTATIVE IS AUTHORIZED TO EXTEND ANY OTHER WARRANTY OR CREATE FOR ABB ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ABB'S PRODUCTS. THE REMEDIES SET FORTH IN THIS WARRANTY ARE EXCLUSIVE OF ALL OTHER REMEDIES AGAINST ABB. ABB SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, OR SPECIAL DAMAGES OF ANY KIND. ABB'S SOLE OBLIGATION SHALL BE TO REPAIR OR REPLACE PARTS (FOUND TO BE DEFECTIVE IN MATERIALS OR WORKMANSHIP) WHICH ARE RETURNED BY THE PURCHASER TO ABB.

9.2 RMA Form



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***** IMPORTANT CUSTOMER NOTICE: PLEASE READ PRIOR TO RETURNING PRODUCTS TO ABB*****

Be sure to include the Return Authorization (RA) number on the shipping label or package to the attention: Customer Service. A copy of this document should also be included with the packing list. ABB wants to maintain a safe work environment for its employees. In the event, the returned product or material has been in contact with a potentially hazardous chemical, per federal regulations, the customer must provide evidence of decontamination and the related chemical composition and characteristics. In order to expedite your return, please include the applicable Material Safety Data Sheets (MSDS) and decontamination tags by affixing these documents in close proximity to the shipment label for identification purposes. (January 18, 2006)

Return Authorization Form	
Customer:	Date:
Contact Name:	Product:
Contact Email:	Serial No:
Contact Phone:	Job No:
Contact Fax:	Service Rep:

Completed by Customer	
Reason:	
Problem Found: None	
Action None	
Requested:	
Is expedited return shipping requested?	<input type="checkbox"/> Yes
<i>If yes, please provide a purchase order or your shipper's account number (ex FedEx or UPS). ABB pays return transport via standard ground shipments only.</i>	
Account #:	
If purchase order is issued, a copy of purchase order must be included with return authorization documentation.	
Is ABB authorized to repair items determined to be non-warranty?	<input type="checkbox"/> Yes
<i>If yes, a copy of purchase order must be included with return authorization documentation.</i>	
Customer PO#:	
Date:	
Has product been in contact with any potentially hazardous chemical?	
<i>If yes, documentation product and forward MSDS to ABB. "ATTN: Customer Service"</i>	
<input type="checkbox"/> Yes	

Return Repaired Product to Address	
Shipping Address:	Billing Address:
	Ship Via:

Contact us

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