

INSTALLATION, OPERATION, AND MAINTENANCE INSTRUCTIONS

FOR ARMOR-TRAC LEVEL GAUGES

1.0 INTRODUCTION

Questtec Armor-Trac Liquid Level Gages are classified as transparent armored tubular liquid level gages. They are designed to provide visual verification of the liquid level in a vessel or tank in low pressure applications. These simple and durable instruments are constructed to ensure a safe and accurate indication of level. Their applications include everything from water to highly corrosive chemicals that are compatible with Borosilicate glass and PTFE plastic. Some assemblies must have compatibility with 316 SS or Carbon Steel as needed.

Questtec level gages are constructed with the following components:

1. One armored shield, with two flanges. Materials can be carbon steel, 300 series stainless, CPVC or fiberglass.
2. Two PTFE Teflon Max-Seal inserts that seal each sight-tube end.
3. One sight tube for single tube gages or two sight tubes for Double Tube gages.

Questtec level gauges are produced according to precise customer specifications for length and diameter. Max-Seal inserts seal the ends of each sight tube and serve as the raised sealing face of every gauge flange. All gauges ensure clear visibility through each shield section. Side-mounted gauge connectors can be provided for level gauges, whether threaded or flanged, with or without isolation valves.

Upon receipt of the equipment, carefully examine all components for any shipping-related damage. Promptly notify the shipping carrier of any damage and request an inspection. Ensure that the gage model number and ratings align with the minimum application specifications. Furthermore, confirm that the gage material is appropriate for both the process media and the surrounding environment.

2.0 INSTALLATION

It is essential to read and review all installation steps before you attempt the gage installation. Ignoring this could result in damage to the equipment and may void the gage warranty. To achieve trouble-free performance, Questtec level gages should be installed, operated, and maintained with careful consideration of the application.

CAUTIONS: PLEASE OBSERVE THE FOLLOWING CAUTIONS.

- Armor-Trac gages are rated 150 PSI @ 150 Degrees F. Please ensure this rating is suitable for the application
- To prevent any piping strain on the level gauge, ensure that it is connected or mounted in a way that does not support or stress the piping.
- Differential thermal expansions between the vessel and the level gauge can create significant mechanical stress on the equipment. This is particularly relevant when the system involves hot or cryogenic fluids. To mitigate this issue, consider installing an expansion loop between the gauge and the vessel or using a sufficiently long run of piping.
- For level gauges exceeding 10 ft in length or weighing more than 75 lb, support brackets should be utilized. Additionally, gauges exposed to excessive vibration should include auxiliary mounting brackets. These support brackets will help prevent overloading the process connections and piping.

- Always install isolation valves between each level gauge connection and the vessel.
- During unpacking, ensure that all flange protectors are removed. Single tube level gauges typically have sponge protectors placed between the sight tubing and the shield, which can be taken out at the user's discretion.
- Take care to prevent tools and other loose items from hitting or scratching the sight tubing through the viewing slot.
- Align instrument flanges carefully with connection flanges. If the gauge is either too long or too short, do not proceed with the final installation. Consult the factory if the gauge has been measured incorrectly.
- Proper alignment is essential for both level gauges. If the gauge connections are not vertically level or are horizontally misaligned, do not attempt installation.
- Level gauges with flanged side-mounted gauge connectors will need gaskets placed between the connection flange and the gauge connector. Verify the gasket material for compatibility with the process.
- Ensure that bolt torque is applied evenly to connection flanges. Incorrect flange bolt torque can lead to distortion of the Teflon sight tube inserts, causing strain to be transmitted to the sight tubing.

3.0 OPERATION

Please read and review all installation steps before attempting gage operation. Failure to do so may result in equipment damage and void the gage warranty.

WARNING: MAKE SURE THE OPERATING CONDITIONS, TEMPERATURE, AND PRESSURE ARE WITHIN THE MAXIMUM RATING OF THE GAGE. DO NOT ATTEMPT TO OPERATE ANY GAGE IF THERE IS ANY QUESTION CONCERNING PROCESS CONDITIONS AND OVERALL GAGE RATINGS.

1. Verify that the gage is vertically plumb, as dictated by the application.
2. Verify that all level gage connection valves are closed.

CAUTION:

LEVEL GAGES SHOULD BE BROUGHT INTO SERVICE VERY SLOWLY, BECAUSE THERMAL SHOCK CAN LEAD TO GAGE FAILURE. THEREFORE, CONSIDER BOTH THE AMBIENT AND PROCESS TEMPERATURES WHEN PLACING THE INSTRUMENT INTO SERVICE. IF THE DIFFERENCE BETWEEN THESE TWO TEMPERATURES IS SIGNIFICANT, THE BOROSILICATE SIGHT TUBING SHOULD BE EXPOSED TO PROCESS TEMPERATURES AS SLOWLY AND EVENLY AS POSSIBLE. THE RATE OF TEMPERATURE CHANGE SHOULD NOT EXCEED 50 ° F (28° C) PER MINUTE.

3. When the level gage is mounted correctly and ready for placement into service, PARTIALLY OPEN THE TOP PROCESS CONNECTION VALVE FIRST and very slowly to allow initial pressure and temperature equalization between the vessel and level gage. This allows the process conditions of the vessel to equalize with the gage slowly and reach operating conditions at a slow even rate.

WARNING: DO NOT OPEN THE BOTTOM VALVE FIRST. IF THE BOTTOM CONNECTION VALVE IS OPENED FIRST WITH THE TOP VALVE CLOSED WHILE THE VESSEL IS UNDER ELEVATED TEMPERATURE AND PRESSURE, THE PROCESS MEDIA COULD INDUCE THERMAL SHOCK.

4. After the level gage has reached process conditions, continue to open the TOP process connection slowly, allowing any liquid or condensate to enter the gage. Liquid accumulation may occur through the top connection with the bottom connection closed if the level gage is under elevated temperature and pressure.
5. When the level gage has attained normal process conditions, open the BOTTOM connection valve slowly. This will allow proper fluid entry in the level gage under normal operating conditions. When a fluid level becomes established, continue opening the bottom valve completely. At this point, the level gage installation should be complete. Allow at least 30 minutes for both top and bottom valve procedures.

6. Check for connection leaks.

CAUTION: WHILE THE LEVEL GAGE IS IN OPERATION, CONNECTION VALVES MUST BE OPENED COMPLETELY. A PARTIALLY OPENED VALVE WILL PREVENT THE AUTOMATIC BALL CHECKS FROM SEATING PROPERLY, WHICH COULD CREATE A SAFETY HAZARD AND LOSS OF PROCESS PRODUCT.

NOTE: During a system shutdown, it is recommended to leave the level gage connection valves open. This allows the gage to cool and depressurize with the entire system.

4.0 MAINTENANCE

Maintenance should be conducted on a regular scheduled basis by technicians familiar with process equipment. Complying with a scheduled maintenance program and inspection will prolong equipment performance. Equipment that is neglected due to lack of maintenance is subject to safety hazards.

INSPECTION PROCEDURES:

- Level gages should be isolated from the process system by closing the upper and lower connection valves. Drain the level gage through the blind flange, drain plugs or drain valves.
- The sight tubing should be inspected on a regular basis for any signs of clouding or scratching. In new process applications, the sight tubing should be inspected daily.
- To examine for scratches use a very bright concentrated hand light. Anything that reflects distinctly should be examined closely. Visible scratches or crescent shaped markings that glisten are cause for sight tube replacement.
- If the inner sight-tubing surface appears cloudy or rough from chemical corrosion and will not respond to cleaning procedures, the sight tubing should be replaced.

CLEANING:

- Sight tubing should be cleaned with any non-abrasive solvent. When regular cleaners are ineffective, diluted muriatic acid can be applied. Observe safety instructions when handling dangerous chemicals. Avoid using steam.
- Never use harsh abrasives; wire brushes or metal scrapers, which can scratch sight tubing. This especially true with gages containing PFA Teflon liners.
- If gage components appear normal without signs of wear, cleaning can be performed without removing the sight tubing and inserts. Leave the sight tubing and inserts intact.
- Remove all but one of the connecting bolts and pivot the gage outward for servicing.
- Do not attempt to clean sight tubing while equipment is in service.
- Questtec does not recommend using steam for clean-out purposes. Steam injection can induce thermal shock on all borosilicate sight tubing, regardless of gage rating capacity.