

LEVEL MEASUREMENT

Reflex Level Gauges

Installation, Operation & Maintenance

Comprehensive handling and service instructions for Series RLG direct visual liquid level indicators.

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01 / Safety & Handling

Safety Boundaries & Pre-Installation

General Safety Directives

Reflex level gauges are critical pressure-retaining components operating in potentially hazardous, high-temperature, and high-pressure environments. Personnel involved in the installation, operation, and maintenance of this equipment must be suitably trained and qualified. Always adhere to site-specific safety regulations, lockout/tagout (LOTO) procedures, and permit-to-work systems before interacting with the gauge. Never attempt to service, tighten, or disassemble a gauge while it is pressurized or at operating temperature.

WARNING: Thermal Shock Hazard

Toughened borosilicate glass is highly susceptible to thermal shock. Rapid introduction of hot media into a cold gauge, or cold media into a hot gauge, can cause catastrophic glass failure resulting in potential death or serious injury from fluid release. Always introduce process media gradually to allow the gauge chamber and glass to equalize in temperature.

Receiving, Handling & Storage

Upon receipt, inspect the packaging and the gauge assembly for any signs of transit damage. Pay particular attention to the reflex glass; any chips, scratches, or cracks severely compromise the pressure integrity of the glass and necessitate immediate replacement.

Lifting Guidance: When lifting or moving the gauge assembly, use nylon slings rigged securely around the main machined chamber body. Never lift the gauge by the isolation valves, the calibration scale plate, or the drain/vent connections, as this may induce stress and cause leakage.

Storage and Preservation: Store the gauge assembly indoors in a clean, dry environment, protected from weather, direct sunlight, and extreme temperature fluctuations. Ensure flange covers or thread protectors remain in place until installation to prevent ingress of dirt and protect sealing surfaces. Do not stack gauges or place heavy objects on the glass.

Order Document Precedence

This manual provides standard industrial procedures. However, final supplied geometry, dimensions, material limits, process connections, and specific torque values are governed exclusively by the approved order data sheet, approved project drawings, and the equipment nameplate (typically located on the chamber body or top flange). Always verify the nameplate ratings against actual line conditions prior to installation.

02 / Installation & Commissioning

Installation & Operating Procedures

Mechanical Installation

1. Ensure the vessel process connections are clean, plumb, and perfectly aligned with the gauge center-to-center distance.
2. Install the gauge using the appropriate flange gaskets or thread sealants as specified in the approved project documentation.
3. Support the gauge chamber independently if the assembly weight exceeds the allowable loading on the vessel nozzles.
4. Tighten flange bolting in a standard diametrically opposed cross-pattern to ensure even gasket compression. Ensure the installation is entirely stress-free; do not use the gauge body to pull misaligned vessel piping together.

Commissioning Procedure

WARNING: Commissioning Safety

Commissioning is when glass failure is most likely due to pressure and thermal transients on potentially transit-damaged glass. Personnel must wear appropriate PPE, including a face shield. Stand to the side of the gauge—never directly in front of the glass—while pressurizing.

1. Verify that the gauge drain and vent valves are fully closed and secured.
2. Ensure the vessel isolation valves are closed.
3. Very slowly crack open the top (vapor) isolation valve. This allows the gauge chamber to gradually equalize to vessel pressure and temperature, mitigating thermal shock.
4. Once pressure is equalized, slowly open the bottom (liquid) isolation valve to allow process fluid to enter the chamber.
5. Fully open both isolation valves for normal operation. If auto ball check valves are fitted, ensure they are fully back-seated to allow the ball to operate correctly in the event of glass failure.

Principle of Operation Review

The Series RLG Reflex Level Gauge provides direct visual indication without requiring external illumination. The rear face of the glass features precision-molded prismatic grooves. In the vapor space, light is totally internally reflected, making the zone appear bright silver. In the liquid space, the fluid wets the grooves, destroying the reflection and making the zone appear dark (black). The resulting sharp silver/black boundary indicates the liquid level.

Communicating-Vessel Accuracy

The gauge operates as a communicating vessel. The indicated level matches the true vessel level only when the fluid density in the gauge matches the fluid density in the vessel. Conditions such as flashing, boiling, or a cold gauge leg on a hot process service will cause density variations, resulting in the gauge reading lower than the actual vessel level.

03 / Troubleshooting

Troubleshooting Guide

Symptom	Probable Cause	Recommended Action
Faded or low visual contrast	Fouled prisms	Clean the glass per Routine Maintenance (Section 04). If the issue persists, the media may be too viscous or dirty for a reflex gauge.
Weeping or leakage at the cover plate	Gasket relaxation	Retorque the cover bolts per the approved procedure (cold only). Do not over-torque.
Indicated level is visibly incorrect	Density mismatch	Refer to Communicating-Vessel Accuracy (Section 02). Check for flashing, boiling, or cold-leg effects.
Glass hazing or etching	Chemical attack	Replace the glass immediately. Verify media compatibility with borosilicate glass. High-pH or steam applications may require a transparent gauge with a mica shield.
Glass cracked or leaking in service	Thermal shock, over-pressure, or impact	Evacuate the immediate area. Isolate top and bottom valves remotely if possible (auto ball checks, if fitted, will restrict flow). Do not approach until depressurized. Replace glass per Section 04.

04 / Maintenance & Glass Replacement

Maintenance & Glass Replacement

Routine Maintenance

Reflex level gauges require minimal routine maintenance. Visual inspection is recommended monthly or per the site maintenance schedule. A complete glass and gasket inspection is required at every unit shutdown. If the prismatic grooves become fouled by dirty or crystallizing media, the optical contrast will degrade. The gauge must be isolated, drained, and cleaned. Do not use abrasive tools on the glass prisms. After cleaning, the gauge must be returned to service strictly following the Commissioning Procedure (Section 02).

Glass and Gasket Replacement

1. Isolate the gauge by fully closing the top and bottom isolation valves.
2. Safely drain and vent the chamber in accordance with site environmental and safety procedures.
3. Loosen the U-bolts or studs sequentially and remove the cover plate.
4. Remove the old cushion gasket, reflex glass, and sealing gasket.
5. Carefully clean the gasket seating surface on the machined chamber. Do not scratch or gouge the metal surface.
6. Install a new sealing gasket, the new reflex glass (prisms facing the fluid), the new cushion gasket, and the cover plate.
7. Torque the cover bolts sequentially from the center outward in a cross-pattern, in multiple stages, strictly per the approved Globe United torque procedure for your model.
8. Perform a staged recommissioning and leak test per the Commissioning Procedure (Section 02), observing from the side. Verify and retorque the bolts (cold only) after the first thermal cycle, as flexible graphite and PTFE gaskets will relax after the first heat-up.

WARNING: Torque and Assembly

Never reuse glass or gaskets once the gauge has been disassembled. Use only Globe United-supplied or approved replacement glass and gaskets per the order datasheet; substitution voids the pressure rating. Cover bolts must be tightened sequentially, working from the center outward in a cross-pattern, in multiple stages. Borosilicate glass fails in bending, not compression. Exact torque values and tightening stages depend on the specific gauge model, rating, and bolt material. Consult Globe United technical support with your serial number to obtain the approved torque procedure before reassembly.

05 / Decommissioning & Document Control

Decommissioning & Support

Decommissioning and Removal

Before removal, verify the gauge is fully isolated from the process, cooled to a safe temperature, depressurized, drained, and purged of hazardous media per site safety protocols. Support the gauge body with appropriate lifting slings before unbolting flange connections. Cap all process connections immediately upon removal.

Document Control

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