

Quality

MACHINING & METALWORKS INC.



Installation
&
Operating Instructions





Installation

Inspect and consider the following points before installation of Quality Gauges and Valves.

- Upon receipt of a liquid level gauge, check all components carefully for any possible damage incurred during shipment. If any damage is evident or suspected, do not attempt installation.
- Make sure that the model number and assembly number stamped on the name plate is as your purchase order indicates. Also verify the operating condition at the installation site is the same as indicated on your purchase order and that those conditions correspond to the technical data for that particular gauge.
- Make sure the gauge chamber is not supporting any pipeline in order to avoid any undue strain on the gauge.
- When the gauge is longer than four feet or weighs more than one hundred pounds, consider supporting the gauge with brackets, especially when there is any vibration. This will prevent any overloading of the gauge and valve connections.
- Differential thermal expansion between the vessel and gauge can impose severe mechanical loads on the gauge, especially if the vessel contains hot or cryogenic liquid. To prevent these unwanted loads, install an expansion loop between the gauge and vessel or use a reasonably long run of piping.
- To prevent injury or loss of product should glass breakage occur, always provide shut off valves with an automatic ball check between the gauge and the vessel. It is highly recommended that one uses Quality Valves with Quality Gauges.
- Bolt torque is very important for the proper operation of liquid level gauges. Due to gauge gaskets relaxing over a period of time, the bolt torque should be checked before the gauge is installed. After initial installation, bolt torque should be checked again after the first few hours of operation. The gauge should always be isolated from the process system by closing the upper and lower valves. Drain the gauge to relieve pressure before performing any torque inspections or any general maintenance.

Torque for:

| | |
|-------------------------------------|-----------------------|
| standard gasket or grafoil | 30 - 35 ft.lb. |
| 25% glass filled Teflon | 20 ft.lb |
| Pure Teflon and Kel-F shield | 15 ft.lb |

- The user must create maintenance schedules, safety manuals and inspection reports for the use of liquid level gauges and valves. The onus is on the end user of the product since the end user is most familiar with the application and process conditions.



Operating Instructions

Rapid opening of isolation valves can cause glass breakage and/or possible injury to personnel. Gauges should be brought into service slowly.

All Quality Gauges should be slowly brought into service. These gauges should be warmed up at a slow and even rate when they are used with vessel containing hot fluid. This is accomplished by slowly and carefully opening the shut-off valve.

- Partially open top (gas side) valve by 1/4 to 1/2 turn
- Slowly open the bottom (liquid side) valve by 1/4 to 1/2 turn

Wait until the gauge is fully warmed up and free of any signs of leakage before proceeding with the operating process and opening the valves fully.

- The gauge level should rise to equalize with the tank level. Wait for the gauge level to stop rising before proceeding.

The shut-off valve must be fully open while the gauge is in operation.

- **A partially open valve will prevent automatic ball checks from seating and lead to a dangerous situation to personnel and loss of process fluid.**
- Failure to properly open ball check valves could result in the seating of the ball checks, thereby blocking the flow of fluid into the gauge and causing an incorrect gauge level reading.

The gauges should be isolated periodically for the bolt torque to be checked.

During system shutdown, it is best to leave the shutoff valves open so the gauge can cool and depressurize along with the system. If the shutoff valves are closed during shutdown, high pressure liquid can be trap in the gauge.

Danger:

Never exceed the pressure rating. This could result in mechanical failure of the gauge components and cause a serious personal injury, death or property damage.

Hot Torque of Glass Gauge

When a new glass gauge is installed in high temperature service and it is not equipped with spring washers, a hot torque procedure must be performed. This ensures that all bolting and components are properly seated for optimum performance. This procedure must also be performed after any maintenance is done to the equipment.

All work must be done by a qualified technician. All plant rules and procedures must be followed, including any lock out / tag out requirement.

The hot torque procedure should be performed as follows:

- The gauge should be in service long enough for the equipment to reach operating temperature, or at least 200° F (93° C).
- Upon reaching the desired temperature, isolate the glass gauge from service.
- Fully open the drain valve to evacuate pressure and process fluid from the gauge.
- Immediately re-torque the gauge nut to the values stated on page 16. There should be rotation of approximately 1/8th of a turn or more. The proper torque pattern is also diagrammed in Maintenance Procedure.
- If there is no movement in the nut/bolt, the equipment was **not** heated properly. Repeat the procedure.
- Once the hot torque procedure is completed, close the drain valve and return the equipment to service. Carefully check for any equipment leaks and verify proper operation of the glass gauge. Follow the Operating Instructions to bring the gauge into service.



Cleaning Glass in Steam Service

Proper cleaning and maintenance of flat glass gauges in steam service is vital for enhanced performance and service life. The gauge glass must be kept clean to ensure the visible water level in the chamber accurately represents the water level in the boiler. Note that the frequency and method of blow-down may affect service life and performance of glass level gauges.

A glass gauge on a boiler enables the operator to visually observe and verify the actual water level in the boiler. However, if not properly cleaned and maintained, a glass gauge can appear to show a normal water level when the boiler may actually be operating in a “low” or “low-low” water condition. A stain or coating can develop on the inside of the glass where it is in contact with boiling water. After time, this stain gives the appearance of water in the boiler, especially when the glass gauge is completely full or empty.

Also, the connection lines to the glass gauge can become clogged with sediment, causing an apparent normal water level when the boiler water may be low. After performing the blow-down procedure, if the water level does not return to the normal level promptly, the connecting piping may be partially clogged and require cleaning.

Recommended blow-down procedure:

1. Close both the (top) steam and (bottom) water valves between the boiler drum and the gauge.
2. Open the drain valve fully on the bottom of the gauge.
3. Slightly open the water valve to clean the pipe and valve of any blockage or sediment. Once clear, close the water valve.
4. Slightly open the steam valve and allow a **gentle** rush of steam to pass through the gauge. **The steam should not pass through for longer than 20 seconds.**
5. Close the steam valve.
6. Inspect the gauge to ensure that all foreign matter is flushed from the glass or mica.
7. If the gauge is not visually clean, repeat steps 3 and 4.
8. Close the drain valve, open the steam valve 1/4 – 1/2 turn, then open the water valve 1/4 – 1/2 turn, slowly bringing the equipment back to its normal operating level. Once the level has equalized, fully open both valves. See Operating Instructions for further instructions.
9. When bringing the gauge into service, liquid should quickly enter the glass gauge. This indicates that the lines are free of sludge, sediment or scale buildup.

Blow-down should be conducted on a routine basis, or as necessary based on water quality. Conducting blow-down more often than required to keep glass clean can lead to premature mica and glass wear, and eventually leakage or glass failure.

Maintenance Procedures

Gauge Glass should be given regular and careful attention.

- Glass gauges must be inspect glass for any clouding, etching, scratching, cracks or corrosion. To examine the glass for scratches, shine a very bright, concentrated light at about a 45° angle. Anything that glistens brightly should be looked at closely. Any scratch that glistens and catches a fingernail and/or any star- shaped or crescent-shaped mark that glistens is reason for replacement. An inner (chemical) glass surface that appears cloudy or roughened and can't be cleaned has likely been chemically attacked and should be replaced.
- Glass gauges may be taken out of service and the glass cleaned through the top-mounted offset pattern valve. Keep glasses clean using commercial glass cleaners (Windex, Glass Wax, Bon Ami, Lava Soap, Super Soilax, household detergents, etc.). Where regular cleaners do not work, use dilute acids such as hydrochloric (muriatic) acid. Carefully observe safety rules when handling these chemicals. Cleaning should be done without removing the glass. This may require circulating the cleaner if the process side of the glass is not accessible. Never use harsh abrasives, wire brushes, metal scrapers, etc. that could scratch the glass. DO NOT attempt to clean any glass while the gauge is in service.

Shields showing any signs of clouding, wear or deterioration, are an indication that the gauge glass has been exposed or could be exposed to the contained fluid.

Check for gasket leaks.

Check for leaks in the connections.

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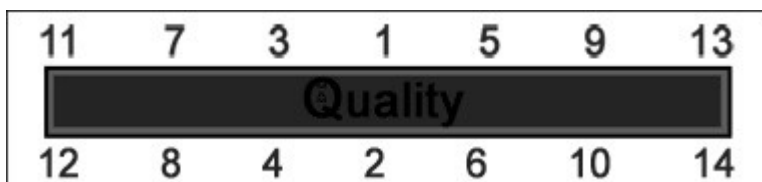
Quality Gauge Assembly

Numbers indicate proper bolt torquing sequence

For Q10 & Q20 Series torque at 32 ft. lb

For Q30 Series torque at 42 ft. lb

Odd Pair of Bolts



Even Pair of Bolts

| | | | | | | | |
|----------------|----|---|---|---|---|----|----|
| 15 | 11 | 7 | 3 | 1 | 5 | 9 | 13 |
| Quality | | | | | | | |
| 16 | 12 | 8 | 4 | 2 | 6 | 10 | 14 |

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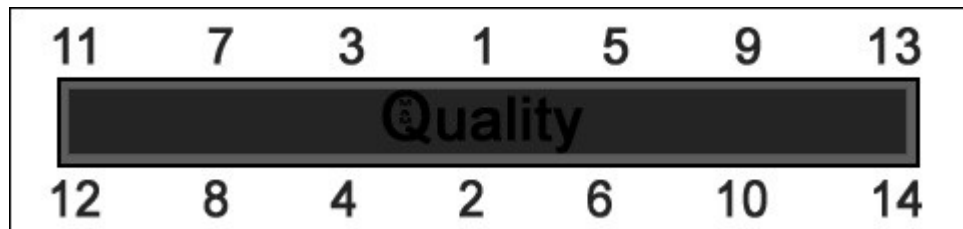
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