Questtec SOLUTIONS

The New Standard of Level

Glass-Trac Level-Trac
Steam-Trac Magne-Trac

230-01
5/12

INSTALLATION, OPERATION, AND MAINTENANCE INSTRUCTIONS FOR STEAM-TRAC ST-350, ST-450, ST-1000 AND ST-1600 WATER GAGES

I. RECEIPT AND STORAGE

Upon receipt of gage, check all components carefully for damage incurred in shipping. If damage is evident or suspected, do not attempt installation. Notify carrier immediately and request damage inspection.

The equipment should be stored indoors until ready for installation.

The user should confirm:

1. That the gage model and pressure temperature rating stamped on nameplate conforms to the description on the user's purchase order.
2. That the operating conditions described in the purchase order agree with the actual operating conditions at the installation site.

The water gage should be stored indoors, in a dry location, until ready to install.

II. INSTALLATION

Installation should only be undertaken by qualified experienced personnel who are familiar with this equipment and have read and understood all the instructions in this manual.

Quest-Tec recommends that all water gage installations be provided with gage valve sets designed for the specific service. Ball checks are not recommended in steam service, as they will preclude the option of periodic blowdown, and if engaged will isolate the gage from service causing a false reading. An additional set of straight-through blocking valves should be installed between the gage valves and the vessel.

The gage should be mounted and connected so that it does not support the piping weight. Piping not properly supported, independent of the gage, may subject gages to stresses that can cause leaks or glass breakage.

High mechanical loads may be imposed on a gage by the expansion or contraction of pipes due to temperature fluctuation. Such mechanical loads on the gage can be minimized by the use of an expansion loop and/or a tie bar or water column. Failure to allow for expansion or contraction can result in leaks or glass breakage.

Gages over 100 lbs. in weight should be supported with brackets to avoid imposing high mechanical loads on the connecting valves, and piping, and to prevent damage from vibration.

For added safety, a system of indirect viewing by means of mirrors can be installed to protect personnel from the hazards of possible gage failure or glass breakage.

Bolt torque is vital to the proper operation of a water gage because gaskets take compression set under initial bolt pressure at assembly. Tightening of nuts before installation, to proper values (Table 1) and in the sequence specified (Figure 1) is necessary to assure pressure retaining capability of a steam-water gage to specific design ratings.

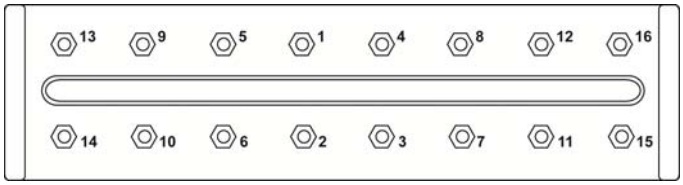
Note: The following procedure is to be done on both sides of the gage for all studs that are threaded through the chamber. All others may be tightened on one side only.

Using a torque wrench, tighten nuts in five foot-pound increments, following the sequence in Figure 1.

Table 1 : **Torque Values**

Gage Model	Ft/lbs	Nm
ST-300*/350	32	43
ST-450/600*	40	54
ST-1000	40	54
ST-1600	80	108

Figure 1—Bolt Tightening Sequence



ST-350 replaced ST-300 and ST-450 replaced ST-600
Note: This document should be reviewed in its entirety prior to installation of equipment.

III. OPERATION:

Assure that all installation procedures have been completed.

Check to determine that all connections are pressure tight.

Assure that nuts have been re-torqued to their proper values as specified in Table 1.

Inspect to be sure that glass is clean and free of any damage such as cracks, scratches, pits, and chips.

Gages should be brought into service slowly. To avoid excessive thermal shock or mechanical stress on the glass or chambers, the connecting valves must open slightly, and the gage temperature and pressure allowed to slowly equalize with the vessel.

If the gage is equipped with valves which have a ball check, the valves must be opened all the way after pressure and temperature have equalized to permit operation of the ball check in the event of gage failure. Valves equipped with automatic ball checks may cause misreading of the gage where the liquid level fluctuates rapidly causing the ball checks to accidentally seat.

The gage should be periodically blown down to keep the inside glass surface clean. Blowdown frequency is best determined by plant personnel most familiar with the specific application. Quest-Tec recommends no more than once per week.

Blowdown Procedure:

1. Close both the steam and water valves between the boiler drum and the water gage.
2. Open the drain valve fully on the bottom of the water column or water gage.
3. Crack open the steam valve and allow to pass through the gage for 15 seconds.
4. Close the steam valve.
5. Close the drain valve, and slowly open the gage valves allowing pressure to build slowly.

IV. MAINTENANCE

Maintenance should only be undertaken by qualified experienced personnel who are familiar with this equipment and have read and understood all the instructions in this manual.

During system shutdown, the gage valves should be left open to permit the gage to lose pressure and cool with the rest of the system. Failure to leave the valves open during system shutdown will trap high pressure fluid in the gage.

The user must determine upon evaluation of his or her own operating experience an appropriate maintenance schedule necessary for the specific application. Realistic maintenance schedules can only be determined with full knowledge of the services and application situation involved.

Maintenance Inspection

Glass

Regular and careful attention must be given to the cleaning and inspection of glass. Glass that is etched or even slightly scratched is weakened and may break under pressure. Cleaning of Glass

Keep glass clean using a commercial glass cleaner. DO NOT use wire brushes, metal scraper, or any device which could scratch the glass.

Inspect the surface of the glass for any signs of clouding, etching, scratching or deep physical damage such as bruises, checks, or corrosion that extends through the outer surface of the glass into the interior. Shining a light at approximately a 45° angle will aid in detecting some of these conditions, which will glisten more brightly than the surrounding glass when reflecting light. Detection of any such problem areas or any surface wear is sufficient evidence of damage. Immediately take steam-water gage out of service. Do not proceed with operation of steam-water gage until glass has been replaced.

Shields (ST-450/1000/1600, only)

Shields which show any signs of clouding, wear, or deterioration are an indication that the gage glass has been exposed, or could soon become exposed to the contained fluid. Immediately take steam-water gage out of service. Do not proceed with operation of steam-water gage until shields and glass have been replaced.

Gaskets

A gage which leaks at the gasket must be immediately taken out of service. Do not proceed with operation of water gage until glass, gaskets, and cushions have been replaced.

Spring Washers

Carefully examine spring washers for evidence of cracking or flattening.

Connections

A gage which leaks at the connections should be taken out of service, and its connections should be remade using a good grade of high temperature pipe sealant.

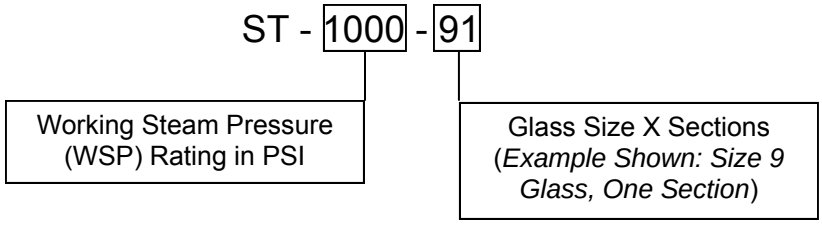
Removal

Do not attempt to remove the water gage from connecting piping, unless the gage has been relieved of all pressure, has been allowed to reach ambient temperature, and has been drained of all fluid.

Disassembly

1. Lay gage on bench.
2. Hold gage firmly, and loosen nuts starting at both ends of each section and then proceeding from both ends to the center of each section (reverse order of Figure 1).
3. Remove nuts and spring washers.

Steam-Trac Water Gage Model Numbering



Spare Part Kits for Steam-Trac Water Gages	
Description	*Part Number*
ST-300/350, Size 4 Glass, Gasket Kit	1-011-30-304
ST-300/350, Size 5 Glass, Gasket Kit	1-011-30-305
ST-300/350, Size 6 Glass, Gasket Kit	1-011-30-306
ST-300/350, Size 7 Glass, Gasket Kit	1-011-30-307
ST-300/350, Size 8 Glass, Gasket Kit	1-011-30-308
ST-300/350, Size 9 Glass, Gasket Kit	1-011-30-309
ST-450/600/1000/1600, Size 6 Glass, Shield, Gasket Kit	1-011-30-606
ST-450/600/1000/1600, Size 7 Glass, Shield, Gasket Kit	1-011-30-607
ST-450/600/1000/1600, Size 8 Glass, Shield, Gasket Kit	1-011-30-608
ST-450/600/1000/1600, Size 9 Glass, Shield, Gasket Kit	1-011-30-609
ST-300/350, U-Bolt (1), Nuts (2) Washers (2) Kit	1-012-30-300
ST-450/600, Stud (1), Nuts (2), Washers (4) Kit	1-012-30-600
ST-1000, Stud (1), Nuts (2), Washers (4) Kit	1-012-30-100
ST-1600, Stud (1), Nuts (2), Washers (4) Kit	1-012-30-160

Quest-Tec Steam-Trac products are designed and equipped specifically for steam service and in compliance to ASME Section 1, PG60. Steam service, unlike service for process, is characterized by frequent cycling with a corresponding increase and decrease of temperature and pressure. We also manufacture a complete line of water columns, and remote level indicators in full compliance to ASME Section 1, PG60, as well as a full line of process glass and magnetic level gages.

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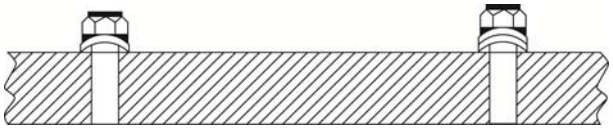
4. Tap covers with rubber hammer as needed to loosen, and remove.
5. Remove cushions, glass, shields, and gaskets.
6. Tap chamber or remaining covers as necessary with rubber hammer to break loose, and remove remaining components.
7. All removed glass, cushions, gaskets, and shields must be disposed of, and under no circumstances should be re-used and installed on a gage.
8. Clean the glass seating surfaces on the chamber and cover with a soft metal scraper (preferably brass). Make sure that all burrs, rust, and bits of old gasket are removed.
9. Extreme care must be taken to avoid gouging or scoring seating surfaces. Failure to properly clean gasket surfaces may result in gasket leaks and high stress points which may cause glass breakage.

Reassembly: ST-350

1. Clean threads U-bolts, and nuts to remove all paint, rust, and scale. Apply a light coat of oil to threads.
2. Refer to exploded view, Figure 4a.
3. Place the U-Bolts, under the chamber with vision slot up.
4. Install one sealing gasket, one glass, and one cushion over the vision slot. Verify that the molded prism side of the glass is facing down towards the chamber vision slot.
5. Carefully work the gage cover onto the U-bolts, being sure to keep the gasket/glass/cushion stack in position.
6. Install one spring washer under each nut (Fig. 3).
7. Install nuts. Using a torque wrench, tighten nuts in five foot-pound increments, following the sequence in Figure 1 until the torque value Table 1 for the specific water gage is reached.
8. Carefully inspect the vision slots on the reassembled gage to verify that the gaskets have remained in position.

Figure 3: Spring Washer Stacks



ST-350

ST-450
ST1000
ST-1600

Reassembly: ST-450, ST-1000 and ST-1600

1. Clean threads on studs, and nuts to remove all paint, rust, and scale. Apply a light coat of oil to threads.
2. Refer to exploded view, Figure 4b (ST-450 is shown, with ST-1000 and ST-1600, the studs will pass through the chamber).
3. Thread a nut to one end of each stud, add spring washer stack, and insert studs through bottom cover and lay out covers on bench, side by side, with the chamber. Use chamber to space covers and line them up with vision slots.
4. Install one cushion, one glass, one shield and finally sealing gasket inside the cover. (Note: HQ Mica shields are often supplied in one or more pieces. The thicker of two pieces should be placed on the process side.)
5. Carefully work the gage chamber onto the studs, being sure to keep the cushion/glass/shield/gasket stack in position.
6. Place gasket, shield, glass and cushion on to the remaining vision slot
7. Install cover in place being careful to maintain components aligned inside.
8. Install two spring washer under each nut (Fig. 3).
9. Install nuts. Using a torque wrench, tighten nuts in five foot-pound increments, following the sequence in Figure 1 until the torque value shown in Table 1 for the specific water gage is reached.

Figure 4A

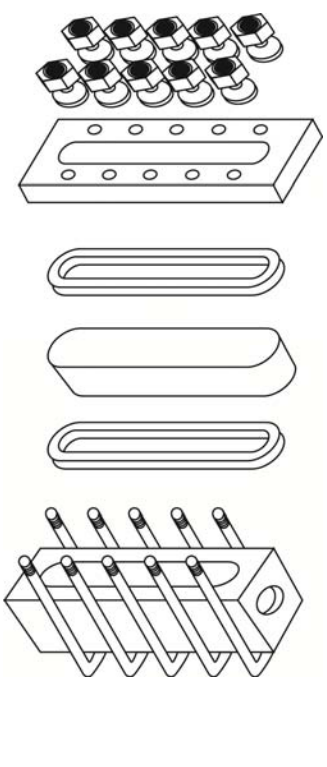


Figure 4B