

Techtrol Bicolor Level Gauge - TBLG



Without Viewing Hood



With Viewing Hood

Every Techtrol product should be installed properly, maintained regularly and used within its specified limits to ensure accurate & trouble free performance with extended working life.

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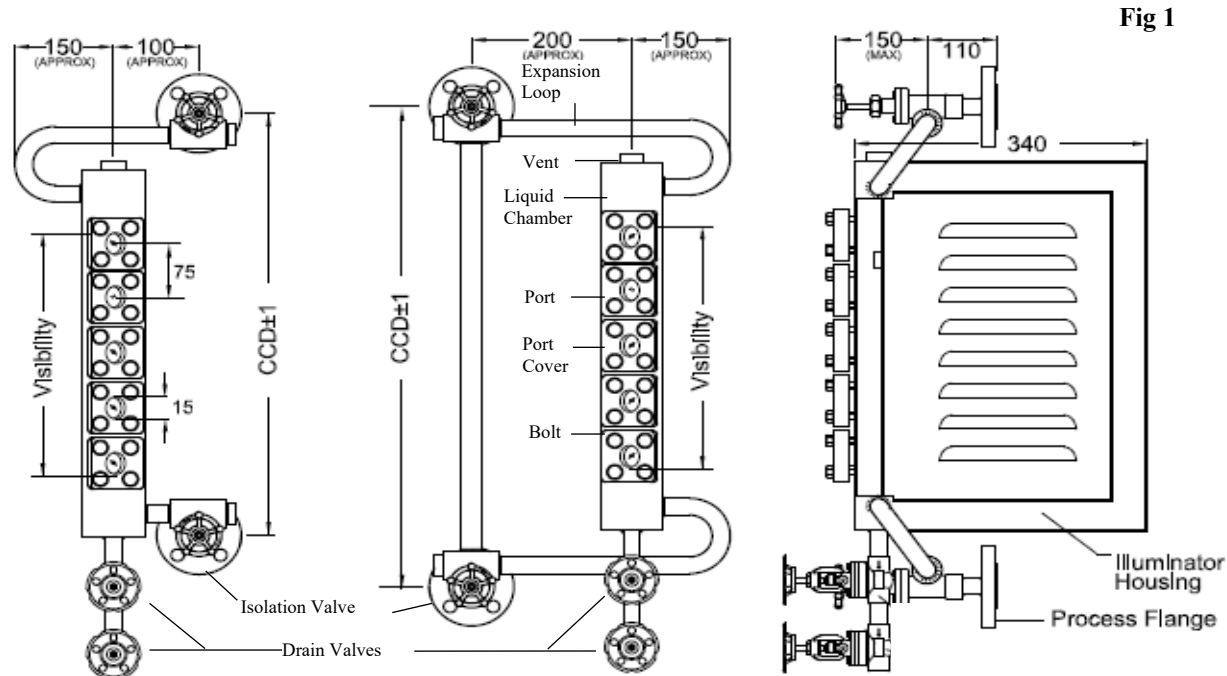
1. About the Manual

This manual has been prepared as a guide for personnel involved in installation or maintenance. All instructions must be read and understood thoroughly before attempting any installation, operation or maintenance.

2. Construction & Working

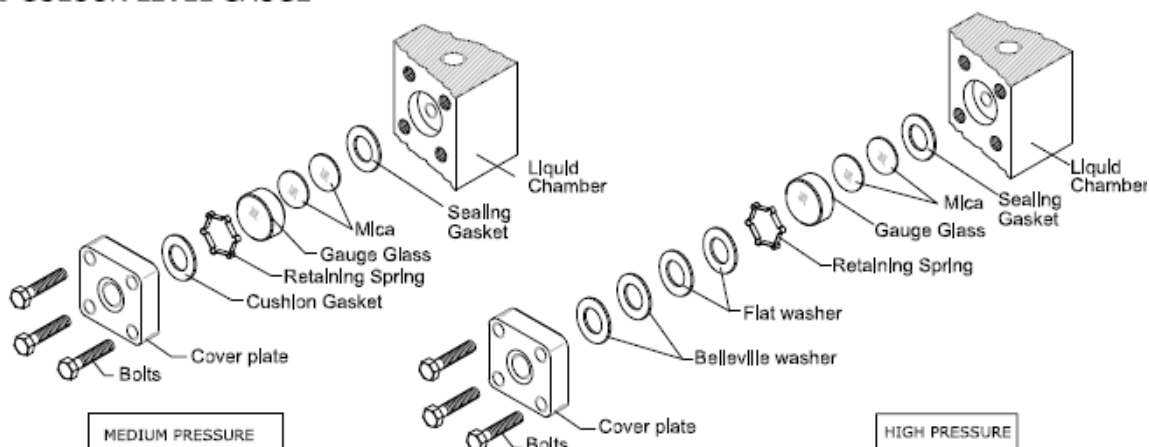
It consists of trapezoid shaped liquid chamber in metallic construction with 5 to 21 number equi-spaced ports in front and rear of non-parallel vertical plane. Circular gauge glass with inner mica sheet is fitted on each port with sealing/ cushion gasket and cover plate (fig 1 & 2a & b).

An illuminator with bi-color glass filter (red & green) and a light source housed in a steel enclosure with louvres are fitted on the rear side of the gauge. Liquid chamber is fitted between two end blocks with isolation valves through single or double expansion loops (fig.1). Stand pipe is provided with double expansion loop for better circulation and robustness. The gauge mounting is oriented on right or left side of the process connections. It is provided with two drain valves for extra safety. Refer Table-1 for CC distance, visibility and number of ports in catalog.



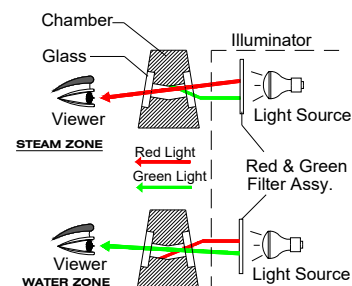
Gauge Glass Fitment at every Port

BI-COLOUR LEVEL GAUGE

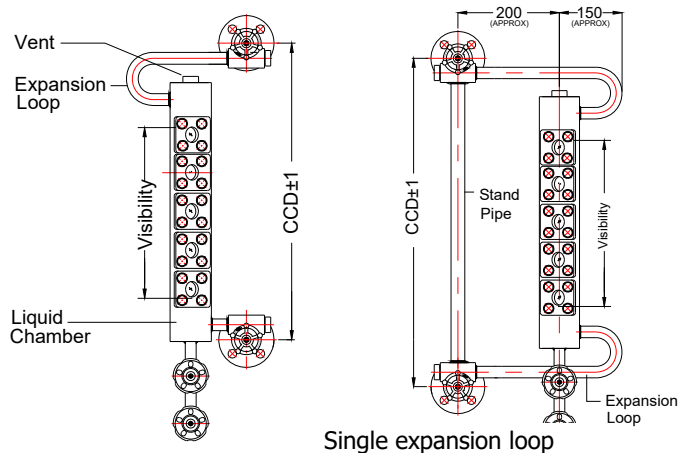


Working of Gauge

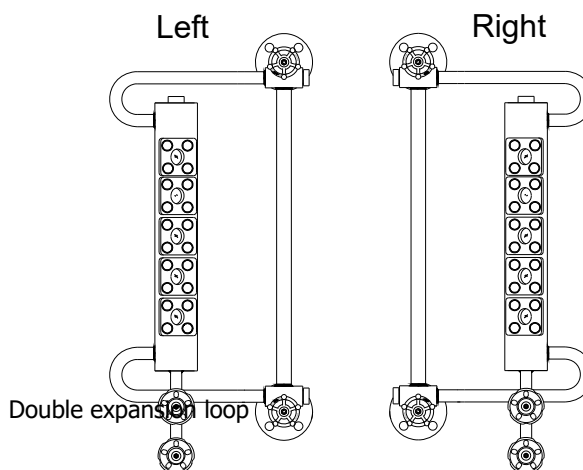
The light rays from illuminator pass through bi-colored filter assembly and fall on inclined glass fitted on trapezoid shaped chamber and get refracted in steam or water according to its refractive index. It appears to the viewer as red color when light passes through steam and green color when light passes through water, due to difference in their refractive index.



Single or Double Expansion Loops



Gauge Mounting Orientation



3. Technical Specifications

| | |
|---------------------------------|---|
| Gauge Glass | 1) Tempered Borosilicate (Medium pressure) 2) Aluminosilicate (High pressure) |
| Gasket/ Cushion | SS Graphite |
| Mica | High quality grade with clear transparency |
| Liquid Chamber (Gauge Body) | 1) CS SA516 Gr. 70, CS A105 (IBR), 2) ASTM 182F SS316 (Non-IBR) |
| Port Cover/ Cover Plate | CS ASTM A105 or ASTM 182F SS316 |
| Bolts | ASTM A193 Gr. B7 Bolts |
| Process Connection | 3/4" or 1" Socket weld or ASME Flange |
| Process Conn. MOC | CS ASTM A105 (IBR), ASTM A182 F SS316 (Non-IBR) |
| Isolation Valves | Integral Offset Needle Valve x Auto Ball Check x Bolted Bonnet MOC- CS A105 (IBR) or ASTM A182 F SS316 (Non-IBR) |
| Stand Pipe | CS ASTM A106 Gr B or ASTM A312 TP SS316 |
| Expansion Loop | CS ASTM A106 Gr B or ASTM A312 TP SS316; Single expansion loop for optg. pressure <50 kg/cm ² |
| Vent | 1/2" NPT Plug |
| Drain Valves | 1/2" Socket weld Globe Valve x CS A106 or ASTM A182 F SS316 |
| CC Distance (CCD) | 535 to 1815 mm (CCD beyond 1140 mm in dual section with flanged coupler joint – multiport design) |
| No. of Ports | 05 to 21 |
| CC Dist. Bet ⁿ Ports | 70 mm |
| Visible Port Dia. | 15 mm |
| Gauge Mtg. Orientation | Left or right |
| Illuminator | SS Enclosure ventilating louvers housed with high intensity LED Bulbs |
| Conduit Connection | 1/2" NPT cable gland, brass |
| Power Supply | 230 VAC or 24 VDC |
| Viewing Hood | SS MOC (For clear visibility) |
| Max Temperature | 300°C |
| Max Optg. Pressure | 1) upto 60 kg/cm ² (Medium), 2) upto 80 kg/cm ² (High Pressure) |
| Max Test Pressure | 1) upto 120 kg/cm ² (Medium), 2) upto 160 kg/cm ² (High Pressure) |

4. Unpacking & Checking:

1. Unpack the gauge carefully and check for any damages during transit.
2. Check all the fasteners and screws are not loosened in transit. Tighten them adequately.
3. Check the product received is in line with purchase order/requirement.

5. Storage and Handling:

1. Gauges and its spare parts should be stored in dry location and non-corrosive atmosphere with its original packing.
2. Store the gauge in fully assembled condition with its original packing, in case required to store before installation.
3. Products should not be stacked over each other. Any sharp or heavy material should not be kept on them.
4. Cover and protect the flange faces from damage.
5. Avoid shocks and impacts during transportation & handling which may damage the gauge.
6. Take due cognizance of instructions/markings on packing boxes such as "Handle with Care", "Fragile Instruments", "Up-Right Arrow" to avoid damages during handling and storage

6. Precautions for Installation

1. Ensure the process connections of level gauges matches with counter flanges on the vessel.
2. Level gauge should be installed parallel to the tank side and vertically in plumb.
3. Mount the gauge on vessel with correct gaskets.



CAUTION

- **Instruction manual should be read & understood before installation of gauge.**
- **Installation should be carried out by qualified & experienced personnel.**
- **It is strongly recommended that two people work together at this stage, particularly when installing the gauge on the vessel and removing the gauge from vessel.**
- **Tank /vessel must be relieved of all pressure prior to installation.**

7. Taking Gauge in Operation:

7.1 Commissioning and Placing Gauge in Service

1. Any tank isolation valves between the gauge and boiler drum should be closed. Drain should be opened and gauge should be completely emptied of its contents.
2. In case the tank isolation valves are not provided, then vessel/ boiler should be relieved from pressure
3. Open the **drain valves** of the gauge fully.
4. Open upper and lower **drum isolation valves**.
5. Slowly open the upper **gauge isolation valve** and allow the gauge to heat for 10 minutes without pressure buildup.
6. Gradually close the drain valve over a 15-minute interval to allow pressure to increase slowly in the gauge.
7. Close the gauge drain valve fully.
8. Fully open the **upper gauge isolation valve**. Open the **lower gauge isolation valve**.

7.2 Viewing Water Level

Water level shall be observed from approximate 2 meters away, standing in front of the gauge glass.

7.3 Removing Gauge from Service

1. Close the upper and lower drum isolation valves, if provided.
2. Close the upper and lower gauge isolation valves.
3. Slowly open the drain valve to very slowly depressurize the gauge. Depressurization should take 15 minutes.
4. Fully open the drain valve.

7.4 Port Inspection

1. Remove the gauge from vessel (follow the procedure 7.2 above) and place it on work bench.
2. Visually check the mica-glass in each port for a white or opaque appearance using flash light.
3. Check both sides of the gauge, while illuminating the port with the flashlight from the backside.
4. Ports with a white or opaque appearance must be replaced before the gauge is put back into service. Continued operation with white or opaque ports can result in catastrophic glass failure and violent discharge of high temperature steam.
5. Refer procedure 8 for replacement of glass/mica sheet.

7.5 Gauge and Water Column Blow down:

The level gauge, connecting pipes and valves must be kept free from obstructions caused by sediment in order for the gauge to provide proper level indication. In addition, sediment deposits on the mica will reduce the gauge visibility. The gauge should be blown down as required to eliminate sediment. However, excessive gauge blow down will reduce the mica life and should also be avoided. This procedure begins with gauge in service.

- a) Close the upper gauge valve.
- b) Slowly open the gauge drain valve for about a minute. This will clear sediment from the lower gauge piping and lower valve. Shut the gauge drain valve.
- c) Open the upper gauge valve.
- d) Shut the lower gauge isolation valve.
- e) Slowly open the gauge drain valve. This will clear sediment from the gauge, the upper gauge piping and upper valve. Shut the gauge drain valve.
- f) Open the lower gauge isolation valve.
- g) Check the gauge for clarity. Repeat the procedure again if necessary

8. Replacement of Glass/Mica Sheet

- a) Ensure that the gauge is properly isolated, depressurized and cooled down before performing any maintenance. Follow section 7.2 to remove gauge from service.
- b) If it is planned to replace all ports, it is recommended that the gauge be removed from the line and repaired on a workbench. It is easier to control the cleanliness and alignment of parts if the repairs are performed on a workbench.
- c) Remove illuminator by removing screws.
- d) Use 16-17 spanner size to remove the bolts and port cover.
- e) Discard the old port assembly (glass, cushion, mica & gaskets) items
- f) Carefully clean the gauge body recess. Ensure there are no traces of the old gaskets, glasses and mica or dirt.
- g) Do not use any grease to clean the gaskets.
- h) Carefully clean the port cover. Absolute cleanliness is must while assembling the gauge.
- i) Ensure port assembly is done in correct sequence with all new spare kit. Do not use any old parts of port assembly.
- j) Handle the glass by the edges and do not contact the sealing gasket or mica surfaces. Ensure that it is properly centered and fully seated against the cushion gasket

- k) Install two cover bolts on diagonal side and finger tight to hold the assembly in place.
- l) Install the remaining cover bolts and **torque uniformly to 30 to 35 ft-lbs (41 to 48 Nm)**. A torque wrench must be used
- m) Re-install the illuminator if removed.
- n) When all repairs are complete, place the gauge in service by following the procedure in section 7.1.

9. LED Bulb Replacement

- a) Remove the gauge from service and switch off the supply of illuminator.
- b) Remove the screws of illuminator cover.
- c) Take out the faulty bulb and replace it with new.
- d) Close the illuminator cover and tighten the screws.
- e) Put the gauge in service.



CAUTION

Inspection and maintenance schedule should be followed to insure the mica-glass-gasket assembly is replaced before the mica protective shield is dissolved. Gauge glass that appears white or is opaque should be immediately replaced.

10. Maintenance

- 01. The mica shields protect the glass from the erosive effects of high temperature steam & water
- 02. Inspection and maintenance schedule should be followed to insure the mica- glass-gasket assembly is replaced before the mica protective shield is dissolved.
- 03. Gauge glass that appears white or is opaque must be immediately replaced. Failure to promptly replace can result in sudden discharge of hazardous high temperature steam.

04. The level gauge connecting pipes and valves must be kept free from obstructions caused by sediment, in order to provide proper level indication. In addition, sediment deposits on the mica will reduce the gauge visibility.
05. The gauge should be blown down as required to eliminate sediment according to preventative maintenance blow down schedule. Refer 7.4
06. Check for any leakages near gasket, change it if necessary and re-tighten the bolts.
07. Check for loose electrical connections and retighten them.
08. Take care when removing the instrument from any vessel. This is a 2 man operation. The assembly must be kept vertical when removing from the vessel to prevent damage to the lever assembly.
09. Check periodically LED bulbs. Replace in case it is faulty.

11. Troubleshooting:

| SL | Problem | Cause | Solution |
|----|---------------------------------|---|--|
| 1 | Illuminator light does not glow | No power Supply or Supply voltage not sufficient Bulb does not glow (faulty) | Ensure and check sufficient power supply is provided Replace Bulb |
| 2 | Red/Green image is poor | Mica sheet / glass has become opaque or damaged | Replace the mica sheet/glass |
| 3 | Leakages from the port | Loose bolting Gaskets worn out | Tighten the bolts Replace the gaskets (follow procedure 8) |

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