CPI TUBULAR GAUGE G23 INSTALLATION, OPERATING & MAINTENANCE INSTRUCTIONS

SEETRU LIMITED
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Type G23

General information

The CPI Tubular gauge is designed and constructed to provide direct level observation of liquids, including chemicals and solvents. The gauge column is fixed to the outside of a tank and isolated from the tank by screw down valves which control the flow of liquid into the column and isolate the gauge when completely closed.

Each isolating valve incorporates an automatic safety valve (**ASV**). Should the sight glass be broken, the abnormal flow of liquid acting on the ball in the valve, forces it forward onto the seat in the valve body, thereby checking the flow of liquid until the isolating valves can be closed.

Warning: The automatic safety valves are only able to operate when the isolating valves are fully open. It is vital that the isolating valves are always left in a fully open or fully closed position. Never leave them in a partially open position.

The isolating valves and valveless units are constructed of Stainless Steel 316 wetted parts, PTFE seals and plastic hand wheel. Other parts of the valves are constructed in Stainless Steel.

The tubular column assembly

There are two types of Tubular Column Assemblies:

1. Tubular borosilicate glass tube protected by a Stainless-Steel guard tube, model **G231**. (Fig 1)

2. Tubular borosilicate glass tube protected by a Stainless-Steel guard tube, as above, but further protected by a polycarbonate tube which completely covers the Stainless-Steel guard tube, model **G232**. (Fig 2) **Double Guard Tube**.

All metal parts are rust proofed.

Gauges fitted with isolating valves top & bottom

On these gauges the column can be removed without draining the tank.
Before removal, close both isolating valves and drain the column.

Gauges fitted with isolating valve bottom & a valveless unit at the top

On these gauges, the tank contents must be below the top unit, the bottom isolating valve must be closed, and the column drained before attempting to remove the column.

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Note: Valveless units should not be fitted on pressurised tanks or installed on other tanks below the highest liquid level, as they cannot be fitted with automatic safety valve (**ASV**).
Sampling/Drain Valves or Drain/Vent Plugs should be fitted to isolating valves if tank needs to be drained.

Application

Use the CPI Tubular gauge only with fluids which guarantee reliable function, and to which the materials employed, that come into contact with the fluid, are adequately resistant.

In addition: No heavy soiling
No coarse particles
No crystallization

Installation

Installation must be undertaken by a qualified technician and to good engineering practice. In addition, user's attention is drawn to our joint responsibility to ensure that the health and safety at work act is not contravened by incorrect installation, commissioning, or servicing.

Fitting Gauge to Tank:

1. Ensure that the tank flanges are vertically in line with each other and that the flange faces are parallel to the tank wall. Make sure that there are no obstructions between the gauge and tank flange faces.
2. Fit suitable gaskets between gauge and tank flange and secure flanges together using suitable nuts, bolts, and washers. Make sure column is in no way strained, then tighten bolts.
3. The gauge is supplied in a single section up to 1000mm. Longer columns are supplied, in general, with intermediate supports, which divide the column into sections, each not exceeding 1000mm. A suitable support pad will be required on the tank, to fix the support bracket.
4. Open isolation valves and check gauge for leaks. Rectify any leaks in accordance with maintenance information instructions.

Operating instructions

To Open Gauge:

1. Open top isolation valve fully (if fitted).
2. Open bottom isolation valve slowly until fully open (to prevent auto safety valve (**ASV**) snapping shut). If auto safety valve does close off flow of liquid into column, close isolating valve fully and then open approximately half a turn to allow liquid to find its own level, then open fully.

To Close Gauge:

1. Close isolating valves fully.

To Drain Gauge: (Fig 3)

1. Close isolating valves fully.
2. Open drain valve or unscrew drain plug. Protect hands from flow of liquid.
3. Close drain valve or replace drain plug immediately after draining.

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Operation faults: General Faults

Fault	Possible Cause	Rectification
Gauge not filling	Empty Tank. Obstruction in gauge. Obstruction in valve. ASV closed.	Fill Clear Clear See Note 1
Filling to incorrect level	Incorrect use of gauge. Incorrectly installed. ASV closed.	See Notes 1 & 2 See Note 3 See Note 1
Broken sight tube	Misuse. Misalignment.	Renew Check alignment of tank flange face
Leak between flanges	Valve body loose. Flange bolts loose. Flange gasket damaged.	Tighten Tighten Renew
Leak between valve body and sight tube/drain valve adaptors	Loose retaining bolts. Damaged 'O' Ring.	Tighten Renew

Operation fault's:

Note 1

It must be appreciated that the automatic safety valve (**ASV**) is very sensitive to a sudden flow of liquid through the valve unit, and that the sudden surge of liquid into an empty gauge from a full tank is good assimilation of a broken sight glass, and therefore the **ASV** would close preventing the tank contents from reaching the sight glass. In order to prevent this occurring, the lower valve must be opened very slowly. If the **ASV** has sealed off the sight glass, normal operation may be resumed by the following means:

1. Close bottom valve which, when fully closed, re-opens the **ASV**.
2. Open bottom valve a half turn to allow liquid to find its own level, then open fully.

Note 2

It should be noted that when this gauge is fitted with valves at the top and bottom, the tank liquid level shown may be incorrect if the bottom valve is only operated. This is due entirely to the upper valve being closed, trapping the air in the upper part of the sight glass, so that the column of liquid is unable to find its natural level. This is corrected by opening the upper valve.

Note 3

If the CPI Tubular Gauge is installed on piping runs, the pipes should be rigid and supported so that the longitudinal expansion of the gauge is resisted.
In addition, the piping runs should be installed so that they run down from tank to gauge and hence be self venting, as any trapped air pockets will cause the gauge to read incorrectly.

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Isolating valve faults:

Note: The following table lists the most common faults found with isolating Valves. For rectification of the faults please refer to the appropriate Maintenance Instruction listed in the Maintenance section of this manual.

Fault	Remedy	Item Number	Maintenance Instruction
Leak between main valve body and adaptor	Replace 'O' Ring	12	A
Leak between main valve body and drain valve body	Replace 'O' Ring	12	A
Leak between main valve body and flange face	Replace Gasket	Customer component	D
Drain valve leak through spout when closed	Replace 'O' Ring	28	C
Drain valve leak through spindle/seal nut	Replace 'O' Ring	24	C
Leak from valve body near hand wheel	Tighten gland nut. Replace gland and 'O' ring	3 & 4	E
Leak from valve into gauge when valve is closed	Replace 'O' Ring	21	E
Leak from adaptor and sight tube	Replace 'O' Ring	16	A
Leak from flange and flange adaptor	Replace 'O' Ring	40	A

Maintenance instructions:

A. To Remove Gauge from Tank:

WARNING: *The tank must be drained to a level below the isolation valve before carrying out work to replace the flange gasket.*

1. Close isolating valves and isolate gauge if required.
2. Remove flange fixing bolts.
3. Remove gauge from tank complete with gasket if required.
4. Check and renew gasket if required.
5. Replace 'O' Ring (42) on flange adaptor to flange [if 2" flange adaptor is fitted]
6. Refit gauge to tank complete with new gasket.
7. Refit flange fixing bolts.
8. Open isolating valves and check for leaks.

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B. To Replace Sight Tube or Sight Tube Seals:

1. Close main isolation valve and drain sight tube (drain plug / drain valve).
2. Remove nuts (15) on both isolation valves and bolts (14), clamps (13), and ancillary parts.
3. Slide sight tube (18) and guard tube (16) assembly (complete with adaptors) out from between the two main isolating valves.
4. Unscrew the gland nuts (6) at each end of the sight tube, remove adaptors from each end (single section), or adaptor/intermediate support (multi section). Slide off guard tube, 'O' rings, bushes, gland nut and anti-rattle rings (if fitted).
5. Check sight tube and seals and replace if necessary.
6. Slide guard tube and ant-rattle rings, over sight tube, and refit gland nuts, bush's (36) and 'O' rings (19) onto the sight tube. Screw gland nuts into adaptors/intermediate support bracket.
7. Refit sight and gauge tube assembly between isolating valves.
8. Refit clamp plates, ancillary equipment and bolts at each end and tighten bolts – ensure 'O' rings are in grooves in ancillary parts (screw intermediate support bracket back to tank if fitted).
9. Close drain valve if fitted.
10. Open top isolating valve fully
11. Open lower isolating valve slowly to prevent **ASV** closing.
12. If **ASV** operates, close lower isolating valve and re-open slowly again – test for leaks, if any rectify
13. Close valves

C. To replace spindle 'O' rings on drain valve assembly:

***Note**: This operation can be carried out with drain valve in situ or removed from main valve. In either case the main valve must be closed, and the sight glass drained*.

1. Loosen grub screw (26) inside of drain body (23). Unscrew plunger (29) from sealing nut (25).
2. Remove seal nut at base of drain valve body.
3. Replace 'O' rings (24 & 28) on plunger and seal nut.
4. Refit seal nut and plunger in body. Unscrew plunger to ensure seal nut seats in counter bore.
5. Tighten grub screw.
6. Screw Plunger into seal.
7. Open main isolating valve and check for leaks – rectify if any.
8. Close main valve

D. To remove Flange Gasket:

WARNING: *The tank must be drained to a level below the isolation valve before carrying out work to replace the flange gasket.*

1. Remove flange bolts.
2. Replace flange gasket.
3. Replace flange bolts and tighten bolts.

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E. To replace Gasket and/or Gland Assembly:

WARNING: *The tank must be drained to a level below the isolation valve before carrying out work to replace Gland 'O' Rings etc.*

***Note**: To replace spindle assembly the spindle must be removed from the body. (The body can be left in situ.)*

1. Turn isolation valve hand wheel (7) anticlockwise as far as it will go. The gland nut (6) will then be visible with easy access to the end of the body.
2. Remove set screw (8) and locking nut (9)
3. Withdraw spindle assembly from body.
4. Separate hand wheel from spindle (2)
5. Remove gland nut (6) and spindle nut (5)
6. Replace gland (4) and 'O' ring (3) as necessary.
7. Replace 'O' Ring (21) as necessary.
8. Replace gland and spindle nut.
9. Refit set screw and locking nut (ensure set screw locates in slot in spindle nut to prevent turning). Take care not to clamp – it should be free to slide but not turn.
10. Tighten gland nut.
11. Fill tank.
12. Open isolation valve, check for leaks, rectify if any.
13. Close valve

F. To inspect or renew ASV (automatic safety valve) ball:

1. Drain tank below level of valve being inspected.
2. Drain gauge column and remove from isolating valves.
3. Remove unit(s) from tank flange.
4. Remove retaining clip (27).
5. Inspect or renew ball (10) and retaining clip (11).
6. Check internal passages are clear.
7. Refit ball (10) and retaining clip (11)
8. Check that tank flange face is smooth and clean. Refit isolation valve unit to flange with gasket in position.
9. Refit gauge column
10. Refill tank
11. Open valves as previously described. Check for leaks and rectify, if any.
12. Close valves

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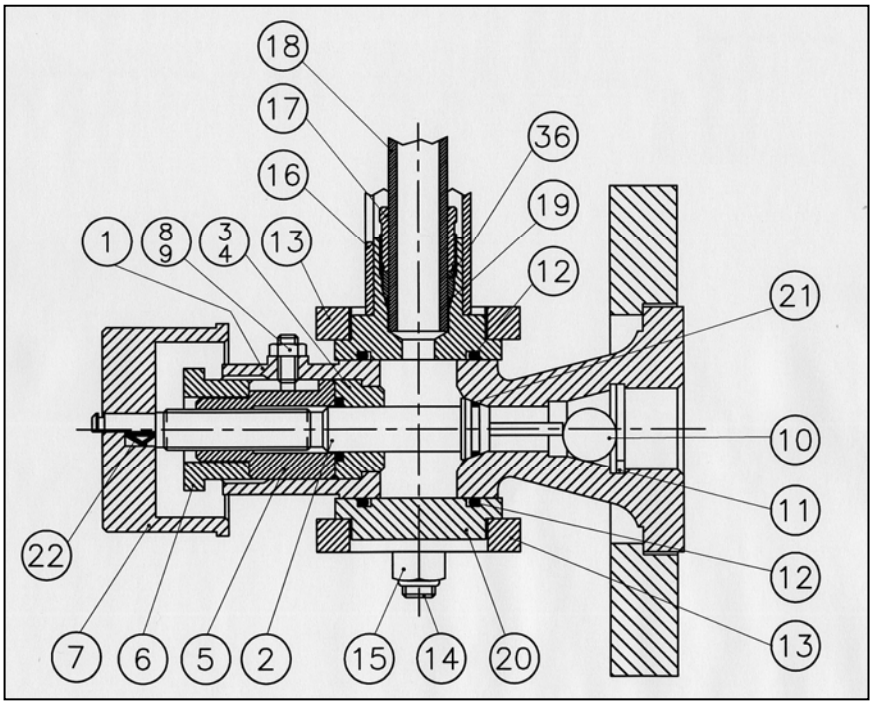
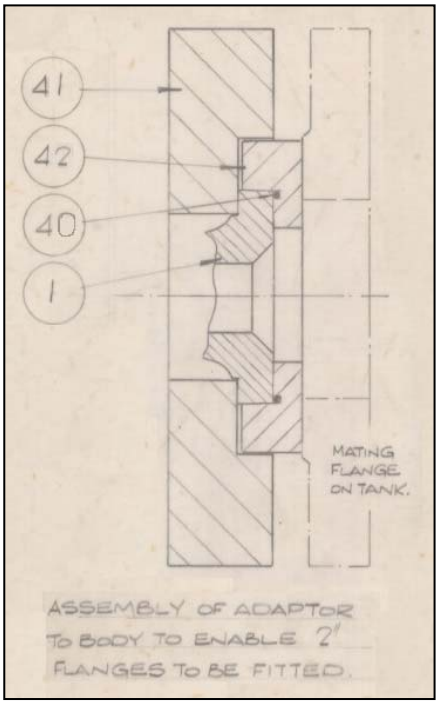
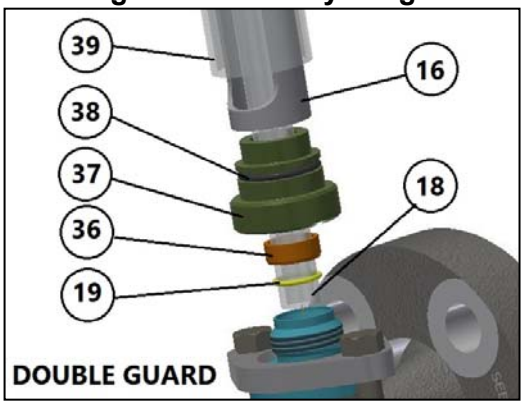
General Assembly,
Single guard tube Assy – Figure 1



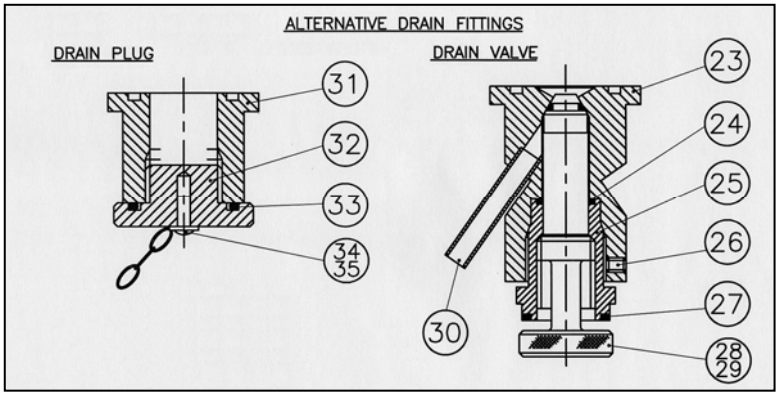


Flange adaptor (42)
for 2" flanges

General Assembly,
Double guard tube Assy – Figure 2



Drain Plug & Drain Valve Assy – Figure 3



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Parts list

Item Number	Number off per Unit	Description
1	1	Valve Body
2	1	Spindle
3	1	'O' Ring
4	1	Spindle Gland
5	1	Spindle Nut
6	1	Spindle Gland Nut
7	1	Hand wheel
8	1	Set Screw
9	1	Locknut
10	1	Ball (ASV)
11	1	Retaining Clip (ASV)
12	2	'O' Ring
13	2	Clamp
14	2	Bolt
15	2	Nut
16	1	Inner Guard Tube
17	1	Sight Tube Gland Nut
18	1	Sight Tube
19	1	'O' Ring
20	1	Blanking Plate
21	1	'O' Ring
22	1	Handle Clip
23	1	Body - Drain Valve
24	1	'O' Ring
25	1	Sealing Nut – Drain Valve
26	1	Set Screw
27	1	Retaining Clip – Drain Valve
28	1	'O' Ring
29	1	Plunger – Drain Valve
30	1	Drain Tube
31	1	Body – Drain Plug
32	1	Drain Plug
33	1	'O' Ring
34	1	Drive Screw
35	1	Chain
36	1	Gland Bush
37	1	Gland Nut – Double Guard Tube
38	1	'O' Ring – Double Guard Tube

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Parts list continued

Item Number	Number off per unit	Description
39	1	Outer Guard Tube
40	1	'O' Ring
41	1	2" Flange
42	1	Flange Adaptor