CPI REFLEX GAUGE G34 INSTALLATION, OPERATING & MAINTENANCE INSTRUCTIONS

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A RUGGED FLAT GLASS GAUGE FOR LOW PRESSURE TEMPERATURE APPLICATIONS FOR PRESSURES AND TEMPERATURES UP TO 35 BAR.G AT 250^{0}C .

GENERAL

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

Each isolating valve incorporates an automatic safety valve. Should the sightglass be broken, the abnormal flow of liquid acting on the ball in the safety 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 handwheel. Other parts of the valves are constructed in stainless steel.

THE REFLEX COLUMN ASSEMBLY

The Reflex Column Assembly consists of the following items:

Viewing Window Toughened Borosilicate Reflex Glass to BS 3643:1975

Column Liquid chamber and top plate - stainless steel 316

Columns are assembled using two compressed gaskets to seal the Reflex Glass and high tensile steel bolts and nuts. All metal parts are rust proofed.

GAUGES FITTED WITH ISOLATING VALVES TOP AND 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 AT BOTTOM ONLY AND 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.

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

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APPLICATION

Use the CPI Reflex 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, users 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. Multi section gauges are fitted with support plates. These plates are fitted to relieve the CPI units of excess weight bearing. Appropriate fixing points should therefore be fitted to the tank to accommodate the support plates and be fixed to them.
4. Open valves and check gauge for leaks. Rectify any leaks in accordance with maintenance information instructions.

OPERATING INSTRUCTIONS

To Open Gauge:

1. Open top valve fully (if fitted).
2. Open bottom valve slowly until fully open (to prevent auto safety valve 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:

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 Reflex Glass	Mis-use. 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 plates on Reflex Column	Damaged gaskets. Loose bolts.	Renew Tighten – see note 4

OPERATION FAULT NOTES

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 reflex glass, and therefore the ASV would close, preventing the tank contents from reaching the sightglass. In order to prevent this occurring, the lower valve must be opened very slowly. If the ASV has sealed off the sightglass, 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 level 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 reflex 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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Note 4

After the gauge is first put into service, or after change of glass, once the gauge has reached its normal operating temperature and pressure, carefully compress the glass joints by following up the tightening nuts working at opposite sides alternatively starting from the middle. THIS MUST BE REPEATED SEVERAL TIMES WITHIN THE FIRST HOURS, and in case any sign of leaks should appear.
If perfect sealing cannot be obtained this way, it will be necessary to replace the gaskets and eventually the glass too.

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	D
Drain valve leak through spout when closed	Replace 'O' Ring	28	H
Drain valve leak through spindle/seal nut	Replace 'O' Ring	24	E
Leak from valve body near handwheel	Tighten gland nut. Replace gland and 'O' ring	3 & 4	G
Leak from tank to gauge when valve is closed	Replace 'O' Ring	21	G
Leak from adaptor and end plate	Replace 'O' Ring	16	A

MAINTENANCE INSTRUCTIONS

A. To Remove Gauge from Tank

1. Close isolating valves and isolate gauge if required
2. Remove flange gauge fixing bolts
3. Remove gauge from tank complete with gasket if required
4. Check and renew gasket if required
5. Refit gauge to tank complete with gasket
6. Refit flange gauge fixing bolts
7. Open isolating valves and check for leaks

B. To Replace Reflex Glass and/or Gaskets (see figure 3)

1. Close main valve and drain column
2. Remove bolts at the front of the column around the window apertures

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3. Remove front cover plate, reflex glass and gaskets
4. Replace damaged or worn parts and re-assemble column, refit bolts and tighten
5. Open top valve fully
6. Open lower valve slowly to prevent ASV closing
7. If ASV operates, close lower valve and then re-open slowly again – test for leaks, if any rectify
8. Close valves

C. To replace Rear Joint Plate Seal

1. Close main valve and drain column
2. Remove bolts around the joint plate at the rear end of the column
3. Remove joint plate and seal
4. Refit joint plate, complete with new seal. Refit bolts and tighten
5. Open top valve full
6. Open lower valve slowly to prevent ASV closing
7. If ASV operates, close lower valve and then re-open slowly again – test for leaks, if any rectify
8. Close valves

D. To replace Gland Seals

1. Close main valve and drain column
2. Remove bolts on main valves and intermediate joining unit if fitted and remove bolts, clamps and 3 ancillary parts
3. Remove column from valves and/or intermediate joining unit
4. Unscrew connecting spigots from bodies, replace ‘O’ rings in each body. Refit bodies to column
5. Remove spigot bodies from column and replace ‘O’ rings in each body. Refit bodies to column
6. Refit clamp plates, ancillary equipment and bolts at each end of column and tighten bolts. Ensure ‘O’ rings are in ancillary parts
7. Open top valve fully
8. Open lower valve slowly
9. If ASV operates, close lower valve and then re-open slowly again – test for leaks, if any rectify
10. Close valves

E. To replace spindle ‘O’ rings on drain valve assembly

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 sightglass drained.

1. Loosen grub screw in side of drain body. Withdraw from body complete with plunger
2. Remove seal nut at base of drain valve body
3. Replace ‘O’ rings 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 valve and check for leaks – rectify if any
8. Close main valve

F. To remove Flange Gasket

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WARNING: The tank must be drained to a level below the 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

G. To replace Gasket and/or Gland Assembly

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

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

1. Turn valve handwheel anticlockwise as far as it will go. The gland nut (6) will then be visible with easy access to the end of the body. Remove this nut
2. Remove set screw (8) and locking nut (9)
3. Withdraw spindle assembly from body
4. Separate handwheel from spindle
5. Remove gland nut (6) and spindle nut (5)
6. Replace gland and spindle nut
7. Replace gland and 'O' rings as necessary
8. 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
9. Tighten gland nut
10. Fill tank
11. Open valve, check for leaks, rectify if any
12. Close valve

H. To inspect or renew ASV 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
5. Inspect or renew ball and clip
6. Check internal passages are clear
7. Refit ball and clip
8. Check that tank flange face is smooth and clean. Refit 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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ILLUSTRATED PARTS

Reflex Column Assembly – Figure 1

Item Number	Number Off Per Column	Description
1	1	Back Plate
2	2	Cushion Gasket (see note 1)
3	1	Mica Shield (if required)
4	1	Reflex Glass (see note 1)
5	1	Front Plate
6	See note 2	Bolt
7	See note 2	Washer
8	See note 2	Nut
9	As required	Connection Back Plate (fitted to two or more columns)
10	As required	Back Plate 'O' Ring (fitted to two or more columns)

Note 1: If any spare parts are required please state which size gaskets and glass are required. Number 6 (glass dimensions 34 x 250 x 17.5) or Number 9 (glass dimensions 34 x 340 x 17.5).

Note 2: For a Number 6 column assembly 12 bolts, washers and nuts are required. For a Number 9 column assembly 16 bolts, washers and nuts are required.

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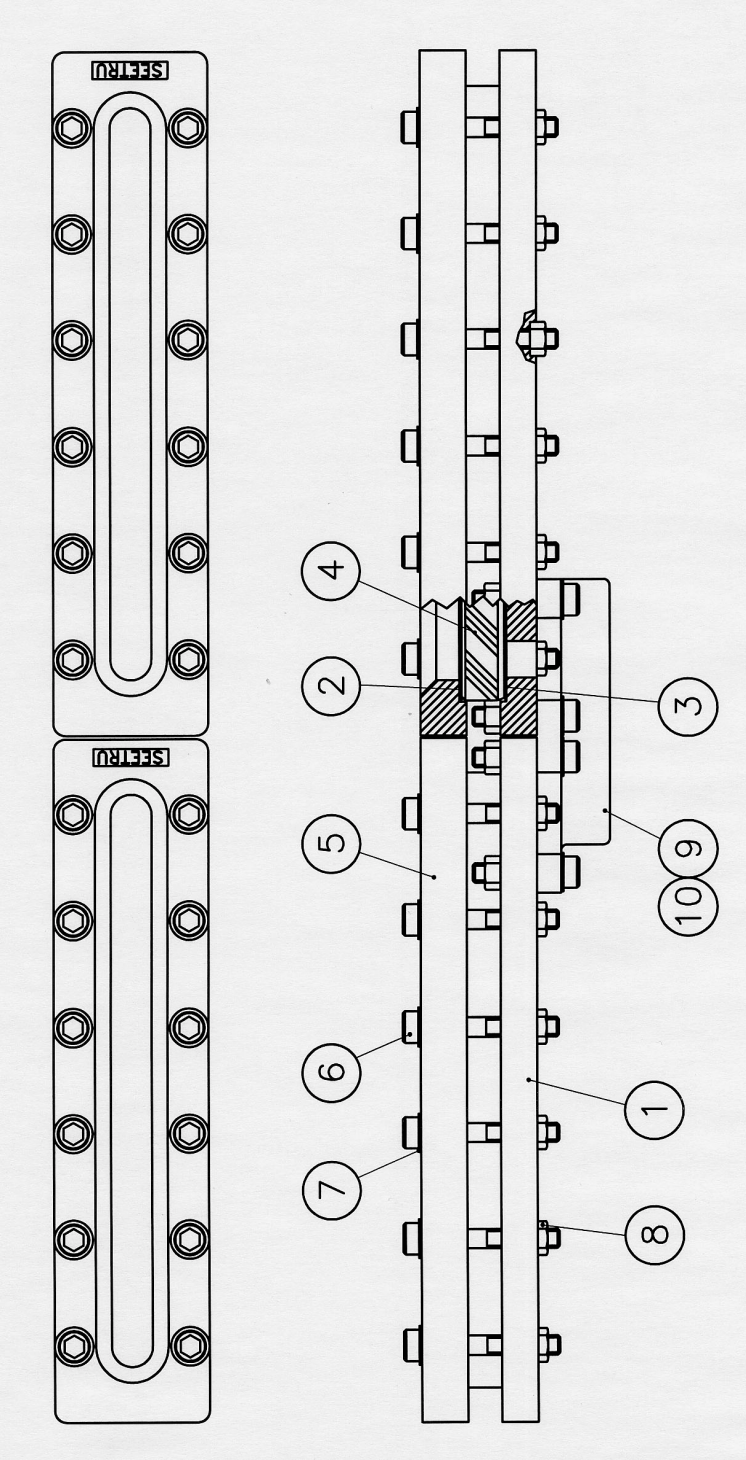
Figure 1



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Isolating Valves – Figure 2

Item Number	Number Off per Unit	Description
1	1	Valve Body
2	1	Spindle
3	1	'O' Ring
4	1	Gland
5	1	Spindle Nut
6	1	Gland Nut
7	1	Handwheel
8	1	Set Screw
9	1	Locknut
10	1	Ball
11	1	Retaining Clip
12	2	'O' Ring
13	2	Clamp
14	2	Bolt
15	2	Nut
16	1	'O' Ring
17	1	'O'Ring
18	1	End Plate
19	1	Adaptor
20	1	Blanking Plate
21	1	'O' Ring
22	1	Knob Clip
23	1	Drain Valve Body
24	1	'O' Ring
25	1	Sealing Nut
26	1	Set Screw
27	1	Retaining Clip
28	1	'O' Ring
29	1	Plunger
30	1	Drain Tube
31	1	Body – Drain Plug
32	1	Plug
33	1	'O' Ring
34	1	Drive Screw
35	1	Chain

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Figure 2

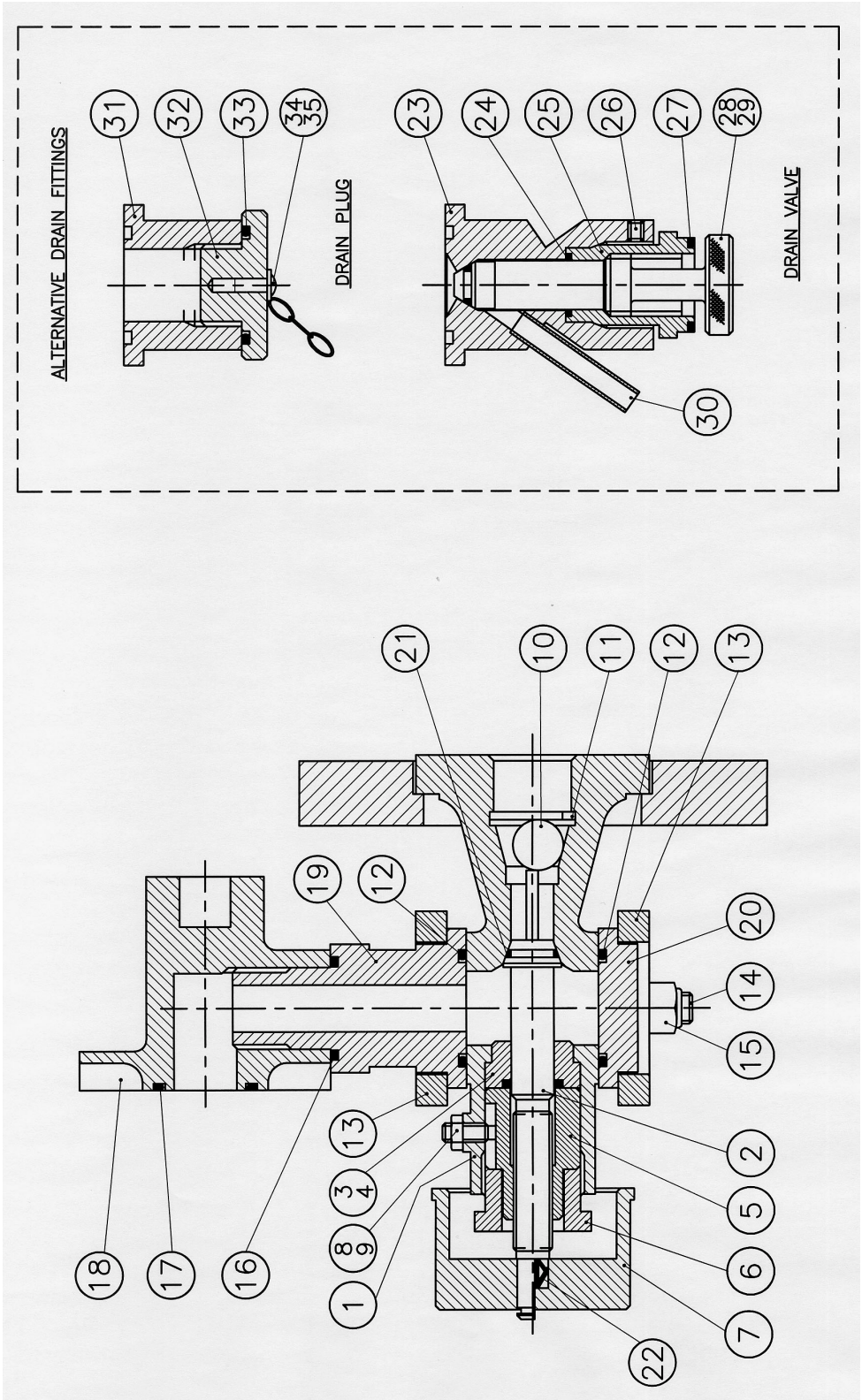

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Figure 3