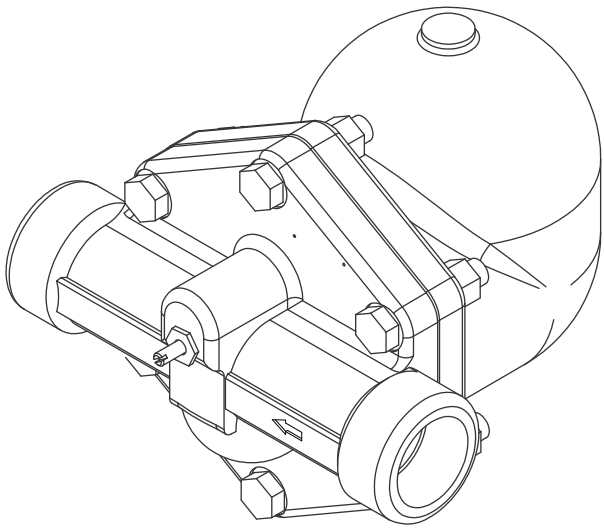
# Installation and Maintenance Manual

## Single Orifice Float Trap with SLR / TV

SOFT31 (DN40, 50)



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**PLEASE NOTE - Throughout this manual this cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked. This symbol denotes CAUTION, WARNING or DANGER.**

## 1. Preface:

This manual is intended for anyone using, commissioning, servicing, or disposing the below mentioned products safely and efficiently.

**Single Orifice Float Trap With SLR/TV [SOFT31(DN40,50)]**

**Sizes: DN40 (1 ½ "), DN50 (2")**

**PLEASE NOTE:**

Throughout this manual the following cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked.

## 2. Important Safety Notes:

Read this section carefully before installing/operating/maintaining the product. The precautions listed in this manual are provided for personnel and equipment safety. Furthermore, Forbes Marshall accepts no responsibility for accidents or damage occurring as a result of failure to observe these precautions. Note that the product is designed to perform for non-contaminated fluids only. A contamination in the form of chemical, foreign particle etc. can lead to problem with product performance and life of the product.

If these products in compliance with the operating instructions are, properly installed, commissioned, maintained and installed by qualified personnel (refer Section 2.7) the safety operations of these products can be guaranteed. General instructions for proper use of tools and safety of equipments, pipeline and plant construction must also be complied with.

### 2.1 Intended use:

Check if the product is suitable for intended use/ application by referring to the installation and maintenance instructions, name plates and technical information sheets.

i) The product is suitable for use as defined in the technical information sheet. In case the need arises to use the product on any other fluid please contact Forbes Marshall for assistance.

ii) Check for the suitability in conformance to the limiting conditions specified in technical information sheet of the product.

iii) The correct installation and direction of fluid flow has to be determined.

iv) Forbes Marshall products are not intended to resist external stresses, hence necessary precautions to be taken to minimize the same.

### 2.2 Accessibility and Lighting :

Safe accessibility and working conditions are to be ensured prior to working on the product.

### 2.3 Hazardous environment and media :

The product has to be protected from hazardous environment and check to ensure that no hazardous liquids or gasespass through the product.

**2.4 Depressurizing of systems and normalizing of temperature:**

Ensure isolation and safety venting of any pressure to the atmospheric pressure. Even if the pressure gauge indicates zero, do not make an assumption that the system has been depressurized.

To avoid danger of burns allow temperature to normalize after isolation.

**2.5 Tools and consumables:**

Ensure you have appropriate tools and / or consumables available before starting the work. Use of original Forbes Marshall replacement parts is recommended.

**2.6 Protective clothing:**

Consider for the requirement of any protective clothing for you/ or others in the vicinity for protection against hazards of temperature (high or low), chemicals, radiation, dangers to eyes and face, noise and falling objects.

**2.7 Permits to work:**

All work to be carried out under supervision of a competent person. Training should be imparted to operating personnel on correct usage of product as per Installation and Maintenance instruction. “Permit to work” to be complied with (wherever applicable), in case of absence of this system a responsible person should have complete information and knowledge on what work is going on and where required, arrange to have an assistant with his primary goal and responsibility being safety. “Warning Notices” should be posted wherever necessary

**2.8 Handling:**

There is a risk of injury if heavy products are handled manually. Analyze the risk and use appropriate handling method by taking into consideration the task, individual, the working environment and the load.

**2.9 Freezing:**

Provision should be made to protect systems which are not self-draining, against frost damage (in environment where they may be exposed to temperatures below freezing point) to be made.

**2.10 Product Disposal:**

It is necessary to dispose this product only in accordance with local regulations at the authorized, qualified collecting point specified for equipment’s and its parts—Please refer the part details mentioned in the material table of this manual. Please follow all waste disposal guidelines (Management & Handling) as published by local governing authorities in India & abroad

**2.11 Returning products:**

Customers and Stockist are reminded that, when returning products to Forbes Marshall they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk.

This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

## 3. Brief Product Information:

### 3.1 Description:

The Forbes Marshall Single Orifice Float Trap, SOFT31, is a single orifice condensate drain trap of cast iron body and stainless steel internals.

### 3.2 Sizes and Pipe Connections:

DN40 and 50 Screwed BSPT/NPT

Flange connection: #125, PN16

**Note:** Available Non-IBR only

### 3.3 Available Types:

SOFT31 with Thermostatic air Vent (TV)

SOFT31 with Steam Lock Release (SLR)

### 3.4 Limiting Conditions:

| | Screwed Version | # 125 Flange | PN16 Flange |
|---|---|---|---|
| PMA Maximum Allowable pressure | 13 bar g at 220°C | 10.1 bar g at 180°C | 13 bar g at 180°C |
| TMA Maximum Allowable temperature | 220°C at 13 bar g | 180°C at 10.1 bar g | 180 at 13 bar g |
| PMO Maximum Operating pressure | 13 bar g | 10.2 bar g | 13 bar g |
| TMO Maximum Operating temperature | 220°C at 13 bar g | 180°C at 10.1 bar g | 180°C at 13 bar g |
| Minimum Operating Temperature | 0°C | 0°C | 0°C |
| △ PMX Maximum differential pressure | | | |
| SOFT31-4.5 | | 4.5 bar g | |
| SOFT31-10 | | 10 bar g | |
| SOFT31-13 | | 13 bar g | |
| Cold hydraulic test pressure | | 26 bar g | |

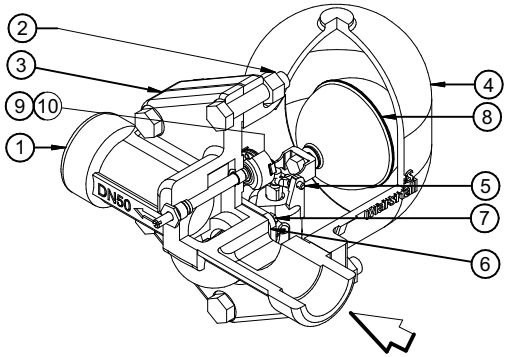



**Figure : 1: Single Orifice Float Trap With SLR/TV**

## Material

| Sr.No. | Part | Material | Standard |
|---|---|---|---|
| 1. | Body | Cast Iron | IS 210 FG 260 |
| 2a. | Cover bolts | Carbon Steel | H.T.IS1367 Gr8.8 |
| 2b. | Cover buts | Carbon Steel | H.T.IS1367 Gr8 |
| 3. | Cover gasket | Reinforced exfoliated graphite | |
| 4. | Cover | Cast Iron | IS 210 FG 260 |
| 5. | Main valve assly. with erosion deflector | Stainless Steel | BS 3148 Part 2 ANC - 2 |
| 6. | Main valve assly. gasket | Reinforced exfoliated graphite | |
| 7. | Main valve assly. studs & nuts | Stainless Steel Type 431 | ASTM A276 |
| 8. | Ball float | Stainless Steel Type 304 | ASTM A240 |
| 9. | Air vent assly. | Stainless Steel Type 316 | ASTM A240 |
| 10. | Air vent seat gasket | Stainless Steel Type 410 | ASTM A240 |
| *11. | SLR unit | Stainless Steel Type 316 | ASTM A276 |
| *12. | SLR unit gasket | Graphite | |
| *13. | SLR seat | Stainless Steel Type CA40 | ASTM A743 |
| *14. | SLR seat gasket | Stainless Steel Type 410 | ASTM A240 |
| 15. | Deflector plate | Stainless Steel Type 304 | ASTM A240 |

* Not shown in the drawing

### 3.6 Product Dimension and Drawing:

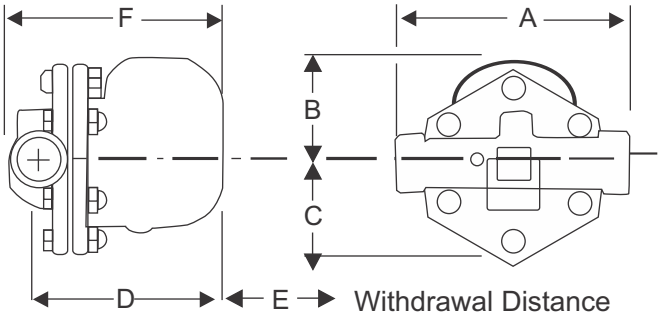



**Figure 2: Dimensional Drawing of SOFT31 screwed ends**

**Dimensions (approx.) in mm**

| Size | A | B | C | D | E | F | Weight |
|---|---|---|---|---|---|---|---|
| DN40 | 270 | 127 | 110 | 244 | 200 | 274 | 17.5 kg |
| DN50 | 300 | 140 | 125 | 250 | 205 | 286 | 22 kg |

General Tol : ±3

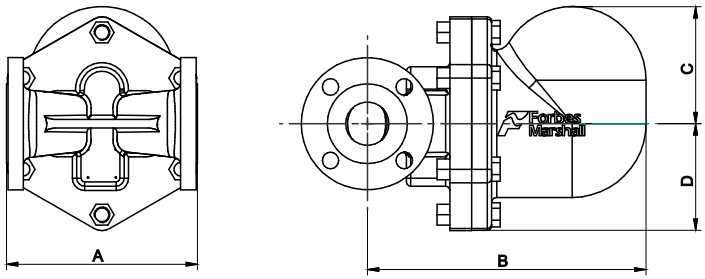


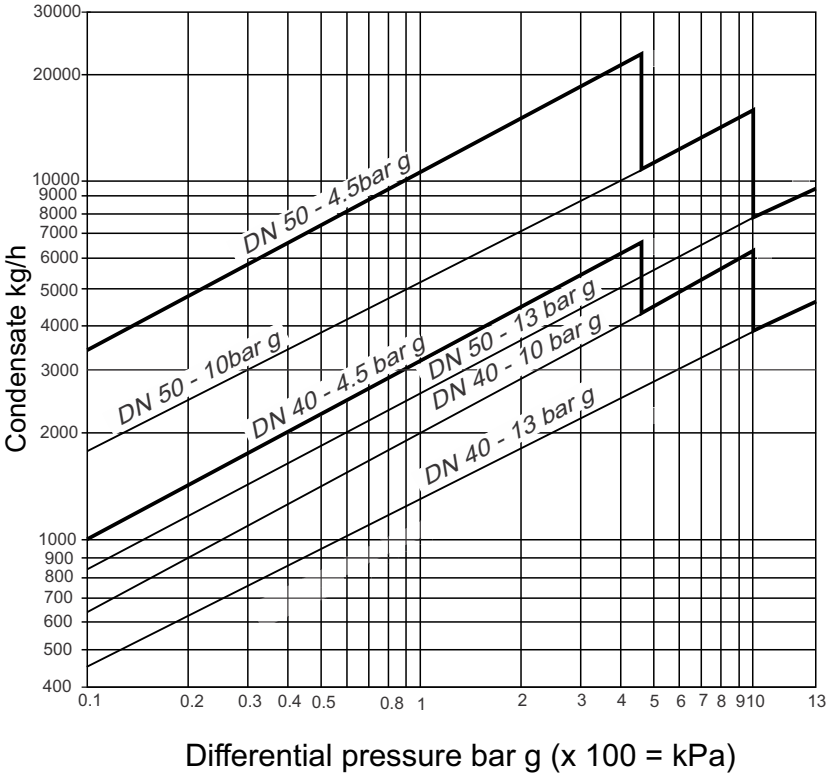

**Figure 3: Dimensional Drawing of SOFT31 Flanged ends**

**Dimensions (approx.) in mm (Flanged Version)**

| Size(DN) | A | B | C | D | Weight |
|---|---|---|---|---|---|
| DN40 ASME 125 | 221 | 323 | 135 | 123 | 25 kg |
| DN40 PN10/16 | 230 | 323 | 135 | 123 | 25 kg |
| DN50 ASME 125 | 220 | 319 | 122 | 108 | 27 kg |
| DN50 PN10/16 | 230 | 319 | 122 | 108 | 27 kg |

General Tol : ±3

**3.7 Capacity Chart:**



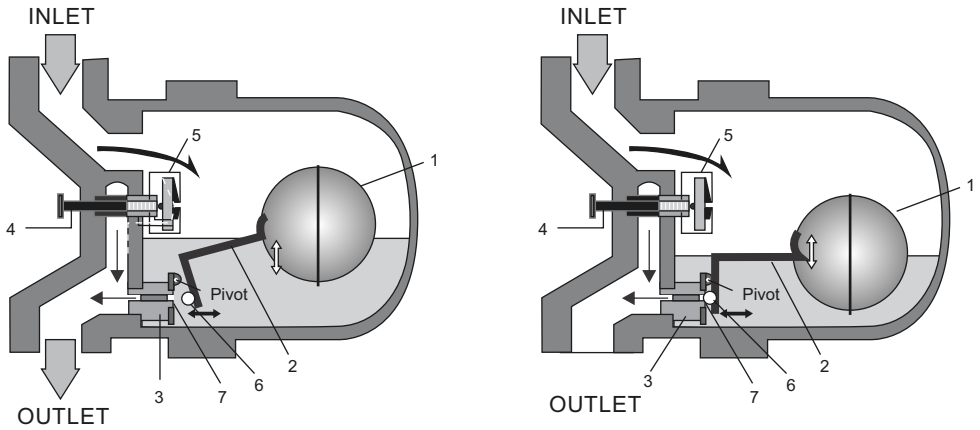
## 4. Product Working Principle: (Refer to Figure 3)

Figure 3 shows a simple float trap operational representation. A float trap works on the Buoyancy Principle. Condensate enters the trap body and raises the float **(1)**. The position of the float **(1)** depends upon the level/load of condensate (flowrate). The float trap continues to discharge condensate continuously and doesn't allow back up of condensate as long as the load is within the discharge capacity.

When the condensate load drops, the float **(1)** lowers in position and closes the outlet valve **(3)** with the ball **(6)** resting on the orifice **(7)**.

SLR **(4)** is a needle valve which releases steam that can steam lock the trap during start-up or in operation if the steam reaches the trap before the condensate.

On the start up the air present in the pipeline/process equipment is released through the thermostatic vent **(5)**.




3(a) Trap Discharge Open

3(b) Trap Discharge Closed

**Figure3: Single Orifice Float trap working**

*The float trap in the figure 3. shows a TV+SLR assembly. SOFT31(DN40/50) comes with only TV or SLR assembly

## 5. Installation Guidelines :(Refer to Figure 4, 5 , and 6)

**Note:** Before implementing any installations observe the 'Important Safety notes" in section 2. Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation.

**Installation checks and Steps:**

1. Check the correct installation location/position and the direction of fluid flow.
2. Remove protective covers from all connections where appropriate, before installation.
3. Ensure the availability of all components as shown in Figure 4, to ensure the operation of the trap.

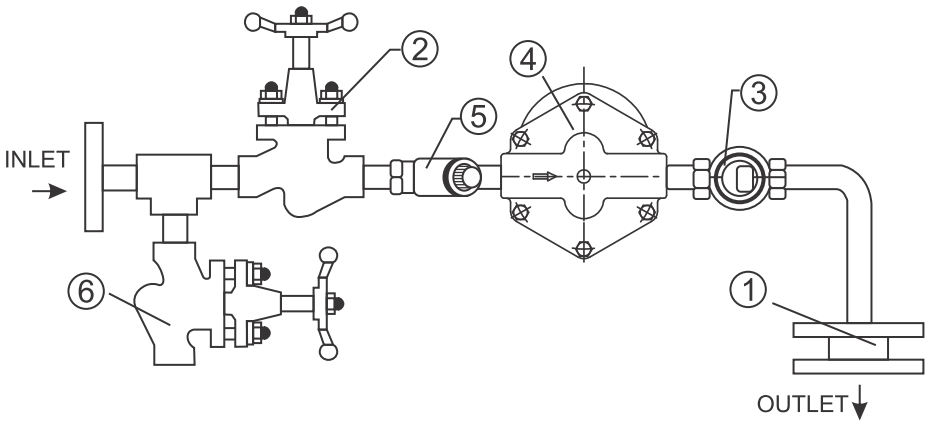



**Figure 4 : Single Orifice Float trap module**

*Typical / Representative Installation and may vary based on application and site.

| Item No. | Description |
|---|---|
| 1 | Spring Loaded Check Valve |
| 2, 6 | Stop Valve |
| 3 | View Glass |
| 4 | Single Orifice Float Trap |
| 5 | Strainer |

4. If the trap is to discharge to atmosphere ensure it is to a safe place, the discharging fluid may be at a temperature of 100 °C (212°F).
5. Install the trap such that the arrow on the name plate points downward to achieve proper orientation of the trap.

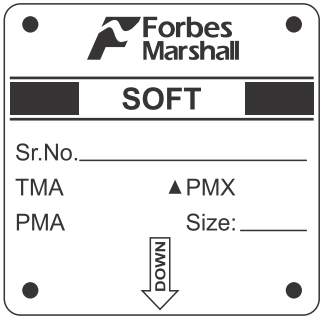



**Figure5: Single Orifice Float trap name plate**

6. The arrow on the casting should be in the direction of the flow.

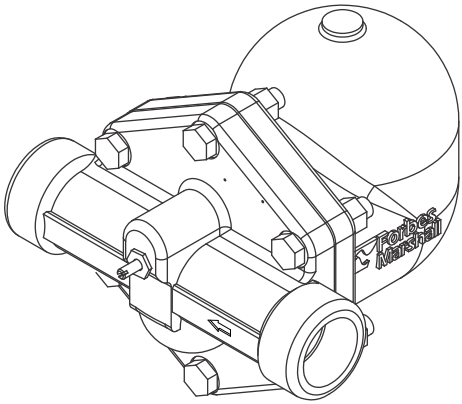



**Figure6: Cover casting with the arrow**

## 6. Start-up and Commissioning

### 6.1 Flushing of Lines : (Refer to Figure 4)

As part of pre-installation all fluid handling equipment particularly piping should be thoroughly cleaned of scale and the internal debris which accumulates during construction. This is accomplished by blowing or flushing with air, steam, water and other suitable medium.

Follow these steps to carry out the flushing.

1. Close the stop valve **(2)** and open the bypass stop valve **(6)**.
2. Let the condensate drain for 10-15 minutes or until clear condensate starts coming out, whichever is earlier.
3. Now slowly close the bypass stop valve **(6)** and open the stop valve **(2).**

### 6.2 Commissioning: (Refer to Figure 4)

After installation or maintenance ensure that the system is fully functioning by confirming condensate is passing through it.

i) After flushing of lines is complete, ensure by-pass stop valve **(6)** closed and stop valve **(2)** opened.

ii) Check for leaks and attend if any.

### 6.3 Setting of Steam Lock Release (SLR): (Refer to figure 7)

1. Loosen the gland nut **(1)** by one thread.
2. Rotate the stem **(2)** in clockwise direction. This moves the stem **(2)** towards SLR seat.
3. Once the stem touches SLR seat, rotate the stem **(2)** in anti-clockwise direction by 1/4$^{th}$ of a turn.
4. Check for normal discharge pattern and leaks if any.

**Note: The SLR unit should only be used to prevent 'steam locking' and therefore is designed to pass a small amount of steam, it is not recommended that the SLR be left in the fully open condition as this may lead to premature trap failure and more frequent maintenance schedules.**


**Figure 7: SLR setting**

## 7. Maintenance Guidelines :

Before undertaking any maintenance on the product it must be isolated from both supply line and return line and any pressure should be allowed to safely normalise to atmosphere. The product should then be allowed to cool. With suitable isolation repairs can be carried out with the product in the line. When re-assembling, make sure that all joint faces are clean. Once completed open isolation valves slowly and check for leaks.

### 7.1 Routine and preventive maintenance:

Please refer to the maintenance schedule mentioned in the table below to undertake routine maintenance of the trap.

| Sr.No. | Parameters to be checked | Frequency for checking and maintaining | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Single Orifice Float Trap** | Immediately | Daily | Weekly | Monthly | Quarterly | Half yearly | Annually |
| 1 | Test medium pressure steam traps(3.5 barg to 17.5 barg). | | | Y | | | | |
| 2 | Repair / Replace SOFT31 when testing shows leaks. | Y | | | | | | |
| 3 | Clean strainers of SOFT31 | | | | Y | | | |
| 4 | Clean internals of SOFT31 | | | | | Y | | |
| 5 | Visual inspection for leakages. | | Y | | | | | |
| 6 | Arresting any other leaks. | Y | | | | | | |

**7.2 Tool Kit :**

To carry out any maintenance on the SOFT31 please use the tools mentioned below:

| Trap Size | Components | Tool | Tool Size |
|---|---|---|---|
| DN40 | SLR seat | Box spanner | 17mm (A/F) |
| | Gland Nut | Open Spanner | 22mm (A/F) |
| | Float Unit Assembly : | M8 box spanner, M6 thread | |
| | | Allen Key | 3mm |
| | | Plier | 1No |
| | | Ball punch | |
| | | Hammer | |
| | Tightening of Float Unit Assembly to the base plate | Open spanner | 10mm (A/F) |
| | | Screw driver | 12 inch |
| | float unit assembly | M6 stud nut runner | |
| | M10 Bolt for outside covering | Box spanner | 19 mm (A/F) |
| DN50 | SLR Seat | box spanner | 17 mm (A/F) |
| | Gland nut | Open spanner | 22 mm (A/F) |
| | Float Unit Assembly : | M8 box spanner, M6 thread | |
| | | Allen key | 3mm |
| | | Plier | 1No |
| | | Ball punch | |
| | | Hammer | |
| | Tightening of Float Unit Assembly to the body | Open spanner | 13mm (A/F) |
| | | Screw driver | 12 inch |
| | float unit assembly | M8 stud nut runner | M8 X 1.25 |
| | M10 bolts for outside covering(6 bolts) | Box spanner | 24 mm (A/F) |

**7.3 Recommended tightening torques :**

| Components | Torque Range |
|---|---|
| SLR seat | 35 Nm |
| Tightening of Float Unit Assembly to the base plate | 35 Nm |
| M10 Bolt for outside covering | 25-35 Nm |

**7.4 Maintaining/ replacing the main valve assembly :** (Refer to Figure 8)

1. Unscrew cover bolts **(1)** and lift off the cover **(6).**
2. Unscrew main valve assembly nuts**,** and dismantle the main valve assembly **(3).**
3. Remove the deflector plate **(5).**
4. Replace the main valve assembly **(3)** and gaskets **(4)** with new ones.
5. Place back the deflector plate **(5)** and refit the assembly**(3).**
6. Put the cover **(6)** back in base **(2)** ensuring dowel **(10)** in correct position and tighten the cover bolts (1) with recommended torques.

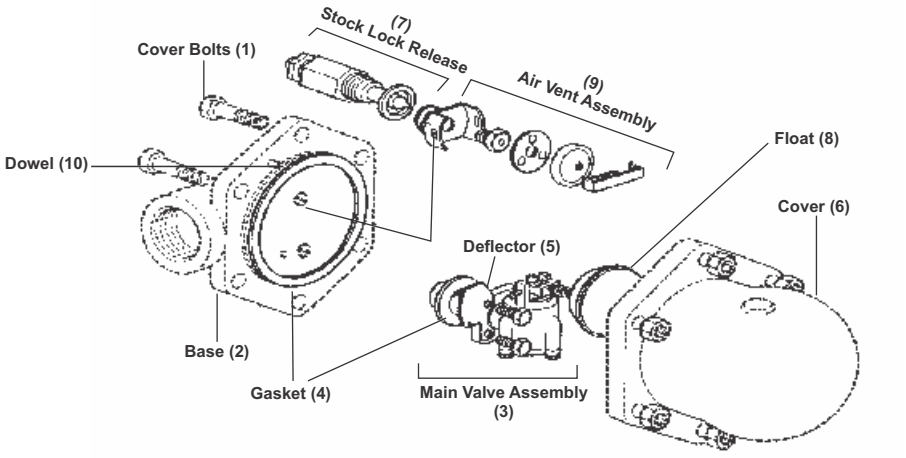



**Figure8: Maintaining the main valve assembly**

*The float trap in the figure 8. shows a TV+SLR assembly. SOFT31 (DN40/50) comes with only. TV or SLR

**7.5 Procedure to fit the steam lock release (SLR) assembly : (Refer to Figure 9)**

1. Unscrew the complete SLR assembly
2. Remove the SLR gasket. (not shown in the figure 9.)
3. Replace the SLR assembly and gasket with new ones.
4. Reset the SLR.

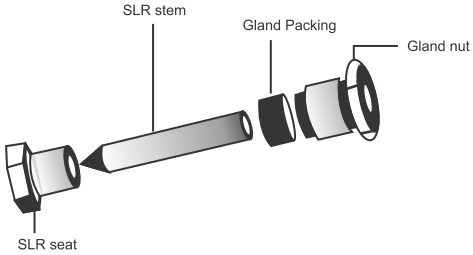



**Figure 9: SLR assembly**

**7.6 Inspection and maintenance of air vent assembly : (Refer to Figure 10)**

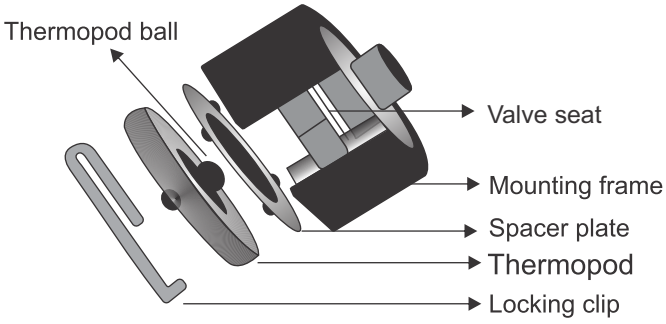



**Figure10: Maintaining the air vent assembly**

1. Remove locking clip, thermopod and spacer plate.
2. Fit new gasket between mounting frame and body of the trap. (not visible in the figure 10), Valve seat and mounting frame.
3. Assemble spacer plate, thermopod and fit the locking clip.

### 7.7 Steam trap testing:

Following methods can be used to determine the operating condition of a trap and determine if its working properly:

1. Testing traps through visual inspection.
2. Testing traps using temperature gun/equipment.
3. Testing traps using sound/ultrasound.
4. Testing traps through online monitoring.

## 8. Troubleshooting:

If the expected performance is unachievable after the installation of the single orifice float trap, check the following points for appropriate corrective measures.

| Failure Mode | Possible Cause | Remedy |
|---|---|---|
| **Not discharging at all.** | No condensate is discharged, and the surface temperature of the trap is low. | Check the installation. Check for the flow direction arrow on the cover casting and the name plate arrow on the base casting. |
| | | Check for blockage in the strainer |
| | | If the actual differential pressure is higher than the design ?P, the steam trap would have failed in closed position as the float buoyancy will not be adequate to open the main valve assembly |
| | | Check for blockage in main valve assembly and clean it. |
| | | Check if the ball float is punctured, if so replace it. Post replacement, check for water hammering in process to avoid reoccurrence. |
| | No condensate is discharged, and the surface temperature of the trap is high. | The trap is getting steam locked. Adjust the steam lock release setting by first closing it fully and then opening it by 1/4th turn. |
| **Leaking steam.** | Live steam continuously leaking through the outlet. | Check the installation. The arrow on the name plate should point downwards |
| | | Check main valve assembly for any deposition and clean it. |
| | | i) Clean and lap the seating area of main valve assembly<br>ii) Lightly stamp an SS ball on the seating area of main valve assembly |
| | | Check for SLR leakage/setting check for air vent leakage. |
| | Steam leaking from the trap body. | Tighten the cover nuts and bolts to the recommended torque. |
| | | Check the gasket for any possible damage and replace it if required. |

| Failure Mode | Possible Cause | Remedy |
|---|---|---|
| **Not discharging enough condensate.** | Reduced condensate carrying capacity of the trap. | Check parameters and trap sizing. The trap will not discharge enough condensate if the actual size is below the recommended size based on the condensate load. |
| | | Check for back pressure and corresponding discharge capacities as per the capacity charts.<br>i) Replace/repair the leaking and non-working traps with working traps, the leak traps may create/increase the back pressure on the other working traps connected to the same return line or,<br>ii) if there are more than one trap discharging in a single condensate return line, then ensure all the traps have an NRV installed on the outlet of each trap or,<br>iii) ensure all the by-pass valve are closed, if by-pass valve is leaking or if it is kept open in closed loop condition which creates/increases back pressure on the other working traps, connected to the same return line. |
| | Flooding of condensate. | Check whether the inlet strainer is partially blocked. |
| | | Check thermostatic valve seat orifice for blockage. If blocked, clean and lap. |
| | | Check main valve assembly for blockage. If blocked, clean and lap. |

## 9. Available Spares: (Refer to Figure 8)

The spare parts available are given in the following table

| Sr.No. | SPARE PART | PART No. | PART No. | SPARE CODE |
|---|---|---|---|---|
| 1 | VALVE HOUSING ASSEMBLY KIT, 40NB 4.5 BAR(G) | MAIN VALVE ASSEMBLY, GASKET, DEFLECTOR , STUDS/NUT & FLOAT | 3 | SPARE-15SOFT31O-4.5MVKIT |
| 2 | VALVE HOUSING ASSEMBLY KIT, 40NB 10.0 BAR(G) | | | SPARE-40SOFT31-10VHKIT |
| 3 | VALVE HOUSING ASSEMBLY KIT, 40NB 13.0 BAR(G) | | | SPARE-40SOFT31-13VHKIT |
| 4 | VALVE HOUSING ASSEMBLY KIT, 50NB 4.5 BAR(G) | MAIN VALVE ASSEMBLY, GASKET, DEFLECTOR , STUDS/NUT & FLOAT | 3 | SPARE-50SOFT31-4.5VHKIT |
| 5 | VALVE HOUSING ASSEMBLY KIT, 50NB 10.0 BAR(G) | | | SPARE-50SOFT31-10VHKIT |
| 6 | VALVE HOUSING ASSEMBLY KIT, 50NB 13.0 BAR(G) | | | SPARE-50SOFT31-13VHKIT |
| 7 | FLOAT KIT 40NB ALL DELTA P | BALL FLOAT & COVER/BASE GASKET (QTY 1 EACH ) | 8 | SPARE-40SOFT31-FKIT |
| 8 | FLOAT KIT 50NB ALL DELTAP | | | SPARE-50SOFT31-FKIT |
| 9 | GASKET KIT 40NB | COVER/BASE GASKET ( PACK OF 3 NOS. ) | 4 | SPARE-40SOFT31-GKIT |
| 10 | GASKET KIT 50NB | | | SPARE-50SOFT31-GKIT |
| 11 | SLR KIT40/50NB | SLR SEAT, GLAND PACKING, SLR STEM & GLAND NUT | 7 | SPARE-405025SOFT31-SLRKIT |
| 12 | AIR VENT ASSEMBLY KIT 40/50NB | VALVE SEAT, MOUNTING FRAME, SPACER PALTE, THREMOPOD & LOCKING CLIP | 9 | SPARE-1550SOFT-AVKIT |

**How to Order:**

Example: DN40 Single Orifice Float Trap, SOFT31, 13 bar g, TV, screwed BSPT

**How to Order Spares**

Always order spares using the description given in the column above, headed “Available Spares”, and stating the size and type and differential pressure of the trap.

For codes refer the user manual.

## 10. Warranty Period:

As per the ordering information and agreements in the contract.

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