Steam and Condensate Manifold

Built to last long, waste less, save space
Steam and Condensate Manifold

In the oil and petrochemical industry, steam tracing is generally used to maintain required temperature and viscosity of products, in order to enable them flow thoroughly and avoid choking by solidification or freezing. Due to individual trapping for all tracer lines, the trap population will be high. Steam for tracing is supplied to the individual steam tracing circuits with the help of steam supply manifolds. Condensate is evacuated through condensate collection manifolds which have compact tracing traps and is finally transferred to condensate headers through steam operated pumping traps.

These single station manifolds are built to last long, save space and time during commissioning. They reduce energy losses in working condition and make maintenance easy.

Fabrication Vs Forged Manifold

**Fabricated Manifold**
15 Components; 14 Welds; Minimum 6 Material Certificates

Fabricated Manifolds are made up of several individual components welded together. They are huge, occupy large space and need onsite fabrication and testing thereby leading to an increase in labour costs.

Due to their complexity and size, these manifolds are difficult to insulate.

**Forged Manifold**
Single Component; No Welds; Minimum 2 Material Certificates

The Forbes Marshall steam and condensate manifold is a single forged component. It is compact, weld free, lightweight and uniform in design which eliminates the need for on-site fabrication and testing.

It has integral glandless piston valves with SS reinforced graphite sealing ring and therefore zero leaks. It makes maintenance easy and has low cost of ownership.

**Product Cut Section**

**Features**
Class VI-shutoff in isolation

Forbes Marshall manifolds are certified for PED approval and the design complies to section VIII-Div.1.

The main pressure retaining parts are all available with IBR / third party certification.

They come with optional insulation jackets and mounting kit, making the assembly more efficient and safe.
**Typical Application**
Steam is distributed through one manifold to the tracer line attached to the product line. At the end of the tracer line, the steam trap discharges the condensate into another manifold and is returned to the condensate main.

**Steam Supply Manifold Station**
A Forbes Marshall steam distribution manifold station comprises of,
- Root isolation valve (glandless piston type)
- Y-type strainer
- Manifold (4/8/12 way)
- Compact module thermodynamic trap
- Single assembly and compact design leading to easy procurement, installation and maintenance

**Insulation Jacket**
Radiation heat loss can further be reduced by installing an insulation jacket on the manifolds.

**Features and Benefits**
- One piece, light weight
- Velcro type fitting thereby easy fitting and removal of jacket
- Individual valves can be accessed
- Can be easily removed for maintaining the valve
- Waterproof, fireproof
- Long life

**Mounting Kit**
Installation made easy
Conventional Vs Compact Condensate Return Manifold Station

In the refinery and petrochemical industry, conventionally condensate from the tracing lines is collected with tracing trap assembly, outlet of which is connected to the inlet valve of the fabricated manifold as shown in the figure 1.

While, a single factory fitted compact assembly simplifies problems associated with fabrication and providing an organized trapping station in the condensate return as shown in the figure 2.

**Fig. 1 : Conventional Fabricated Condensate Manifold Station**

**Fig. 2 : Compact Condensate Manifold Station**

<table>
<thead>
<tr>
<th>Comparison of Features</th>
<th>Conventionally Fabricated Trap Assembly (Refer Fig. 1)</th>
<th>Compact Condensate Manifold Assembly (Refer Fig. 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components / Welds (for 4-way manifold)</td>
<td>77 / 76</td>
<td>9 / 4</td>
</tr>
<tr>
<td>Valve leakage</td>
<td>Leakage either through flanges / welds / joints</td>
<td>Zero leakage due to inbuilt glandless piston valves</td>
</tr>
<tr>
<td>Energy losses</td>
<td>High pressure and temperature drop due to multiple components</td>
<td>Single component and shorter piping reduces pressure and temperature losses</td>
</tr>
<tr>
<td>Time to install</td>
<td>24 hours+</td>
<td>Less than 45 minutes</td>
</tr>
<tr>
<td>Compact dimensions</td>
<td>More than 1400mm</td>
<td>Overall dimension 630mm</td>
</tr>
<tr>
<td>Heat radiation loss</td>
<td>High due to large surface area</td>
<td>60% lesser than conventional due to low surface area</td>
</tr>
<tr>
<td>Ease of maintenance</td>
<td>High cost and substantial time for maintenance - required to shut-off the line for replacement</td>
<td>Reduced cost and maintenance time plant can be kept live while trap is being replaced or components removed</td>
</tr>
<tr>
<td>Galvanic corrosion</td>
<td>Possible</td>
<td>Not possible because of 5mm SS overlay on connect. This is done with friction welding</td>
</tr>
<tr>
<td>On-site fabrication</td>
<td>Welding and testing needs to be done</td>
<td>Eliminates onsite fabrication and testing</td>
</tr>
<tr>
<td>Cost of ownership</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>
Enhancing Safety Further
Discharges from bypass lines are also connected to common header

Condensate Manifold Station with Insulated Piping
Discharges from bypass lines are also connected to common header
Compact Fittings Used in Steam and Condensate Manifold Station

### Compact Module Thermodynamic Trap CMTD42M-F

- **Upstream isolation valve**
- **Downstream isolation valve**
- **Trap bypass valve**
- **Trap vent valve**
- **Trap test valve**
- **Inlet**
- **Outlet**

### Pipeline Connector FMPC53

- **Upstream isolation valve**
- **Inlet**
- **Universal connection trap**
- **Trap bypass valve**
- **Trap vent valve**
- **Trap test valve**
- **Outlet**

### Pipeline Connector FMPC52

- **Upstream isolation valve**
- **Inlet**
- **Universal connection trap**
- **Trap bypass**
- **Outlet**

Universal Connection Traps to be used with Pipeline Connectors

### Universal Connection Thermostatic Trap FMTLT63-U

### Universal Connection Thermodynamic Trap FMTD64-U

#### Features

The CMTD42M-F, Compact Module Thermodynamic Trap assembly has replaceable seat and disc which eases online maintenance.

The FMPC53 and FMPC52 pipeline connector has a swivel connector trap with two allen bolts to ensure maintenance is quick and easily undertaken. The SS316L overlay on the trap contact area prevents galvanic corrosion.

All integral piston valves perform different operations making the steam system leak proof with class VI shutoff.

Trap de-pressurization piston (vent) valve offers a great advantage in safety. It protects the operator from direct contact with steam by venting out steam trapped between the trap and upstream isolation valve, when the trap is required to be removed or replaced.

A single permanent in-line connector significantly reduces installation time, cuts costs dramatically, and eliminates system leaks making it an energy efficient product.
### Technical Parameters of these Components

<table>
<thead>
<tr>
<th>Components</th>
<th>Material</th>
<th>PMO</th>
<th>TMO</th>
<th>Max. cold hydraulic test pressure</th>
<th>End connection type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam &amp; condensate Manifold (FMSCM4X, FMSCM8X, FMSCM12X)</td>
<td>A105 body with SS internals</td>
<td>57.5 bar g</td>
<td>425 °C</td>
<td>115 bar g</td>
<td>Refer table no. 1</td>
</tr>
<tr>
<td>Pipeline Connector (FMPC53 &amp; FMPC52)</td>
<td>A105 body with SS internals</td>
<td>57.5 bar g</td>
<td>425 °C</td>
<td>115 bar g</td>
<td>DN 15/20 Scrd BSPT / SW to ANSI B16.11 #600</td>
</tr>
<tr>
<td>Universal Tracer line Trap (FMTLT63-U)</td>
<td>CF8 body with SS internals</td>
<td>32 bar g</td>
<td>287 °C</td>
<td>64 bar g</td>
<td>Flanged swivel connection</td>
</tr>
<tr>
<td>Universal Thermodynamic Trap (FMTD64-U)</td>
<td>CA40 body with SS internals</td>
<td>42 bar g</td>
<td>425 °C</td>
<td>84 bar g</td>
<td>Universal connection</td>
</tr>
<tr>
<td>Compact Module Thermodynamic Trap (CMTD42M-F)</td>
<td>A105 body with SS internals</td>
<td>42 bar g</td>
<td>425 °C</td>
<td>84 bar g</td>
<td>Socket welded</td>
</tr>
</tbody>
</table>

### Operating Range

#### Manifold

![Graph](image1)

- The product must not be used in this region.
- Minimum operating pressure for steam service:
  - A-B Flanged ANSI Class 300; Screwed and socket weld
  - A-C Flanged ANSI Class 150.

#### Universal balanced pressure thermostatic trap

![Graph](image2)

- Hot water capacity
- Cold water capacity

#### Pipeline connector

![Graph](image3)

- The product must not be used in this region.
- *PMO Max operating pressure recommended for saturated steam

### Product Specifications: Range, Dimensions

#### Table no. 1 - Manifold Product Range

The steam main / condensate return connection is DN 40 socket weld to ANSI B 16.11 Class 3000

<table>
<thead>
<tr>
<th>Manifold Type</th>
<th>No. of tracer conn.</th>
<th>DN</th>
<th>Tracer Conn</th>
<th>Certi-</th>
<th>Insulation</th>
<th>Mounting Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>20</td>
<td>BSP</td>
<td>NPT</td>
<td>SW</td>
</tr>
<tr>
<td>FMSCM4X</td>
<td>4</td>
<td>125</td>
<td>65</td>
<td>110</td>
<td>70</td>
<td>60</td>
</tr>
<tr>
<td>FMSCM8X</td>
<td>8</td>
<td>125</td>
<td>65</td>
<td>110</td>
<td>70</td>
<td>60</td>
</tr>
<tr>
<td>FMSCM12X</td>
<td>12</td>
<td>125</td>
<td>65</td>
<td>110</td>
<td>70</td>
<td>60</td>
</tr>
</tbody>
</table>

#### Table no. 2 - Manifolds

Dimensions / weights (approx.) in mm and kg

<table>
<thead>
<tr>
<th>Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>Wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMSCM4X</td>
<td>255</td>
<td>125</td>
<td>65</td>
<td>110</td>
<td>70</td>
<td>60</td>
<td>45</td>
<td>96</td>
<td>110</td>
<td>130</td>
<td>50</td>
<td>M12</td>
<td>55</td>
<td>8.5</td>
</tr>
<tr>
<td>FMSCM8X</td>
<td>505</td>
<td>125</td>
<td>65</td>
<td>110</td>
<td>70</td>
<td>60</td>
<td>45</td>
<td>96</td>
<td>110</td>
<td>130</td>
<td>50</td>
<td>M12</td>
<td>55</td>
<td>17</td>
</tr>
<tr>
<td>FMSCM12X</td>
<td>755</td>
<td>125</td>
<td>65</td>
<td>110</td>
<td>70</td>
<td>60</td>
<td>45</td>
<td>96</td>
<td>110</td>
<td>130</td>
<td>50</td>
<td>M12</td>
<td>55</td>
<td>25.5</td>
</tr>
</tbody>
</table>
50,000+ Manifold Stations

10 Greenfield Refinery Projects

Zero Leak Plant Status

70 years Experience

“We found this assembly very effective in terms of a single product to get specified by consultant (EIL Baroda), which in turn resulted in procuring single product & easy for installation at site. Compared to conventional way of fabricating the manifold, these assemblies have taken substantially less time for installation.”

Sr. Manager - Project, HPCL Mumbai

“We are appreciating the features included in this assembly, particularly about the trap bypass valve, trap depressurization valve and trap test valves in one assembly with so compact in nature and with in built piston valve technology. This has made our operation and maintenance very convenient and easy. We thank Forbes Marshall for providing such technology.”

Dy. Manager - Maintenance, BPCL, Kochi

“We have installed compact modules from Forbes Marshall which are in operation over the last three years. We have found the maintenance and safety features of trap test and vent valves very useful.”

General Manager - Operations Reliance Industries Ltd.

We found this very effective in procuring single product and easy for installation at site. This has reduced our execution time of around 2 months. We have saved lots of space by using these compact steam assemblies and everybody has appreciated Forbes Marshall for coming up with such simplifying the tracing trap assemblies and workmanship.”

Sr. Manager - Engg Services IOCL, Baroda

With the features included in this assembly, our in house team is carrying out regular check up of steam traps in this assembly on their own. These saved our time and cost both. During this activity, trap test valve eases checking of trap and trap depressurisation valve offers safety features (safe depressurisation of isolation area) during this maintenance job.”

Manager - Tech Services, HPCL Mittal (Guru Govind Singh Refinery, Bathinda)

Forbes Marshall
Krohne Marshall
Forbes Marshall Arca
Codel International
Forbes Solar
Forbes Vyncke
Forbes Marshall Steam Systems

Op 106th Milestone
Bombay Poona Road
Kasarwadi, Pune - 411 034.
INDIA
Tel : 91(0)20-27145595, 39858555
Fax : 91(0)20-27147413
Email : seg@forbesmarshall.com, ccmidc@forbesmarshall.com

B-85, Phase II, Chakan Indi Area
Sawardari, Chakan, Tal. Khed
Dist. Pune - 410 501. INDIA
Tel : 91(0)2135-393400

A-34/35, MIDC H Block
Pimpri, Pune - 411 018. INDIA.
Tel : 91(0)20-27442020, 39851199
Fax : 91(0)20-27442040

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www.forbesmarshall.com

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