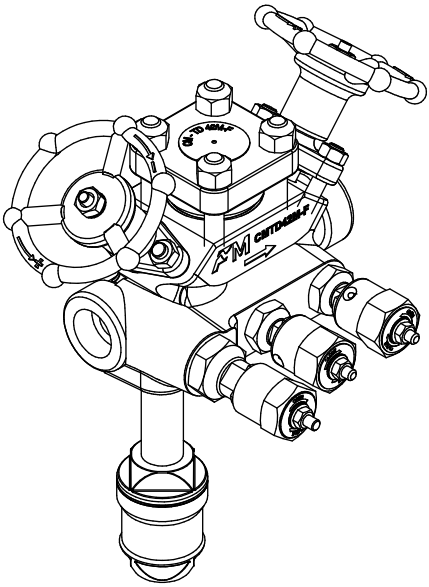
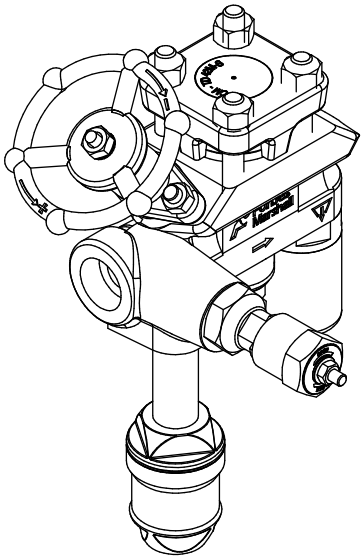
Installation and Maintenance Manual

Compact Startup Module Thermodynamic Trap Full Version and Standard Version

CMTD42M-FST and CMTD42M-SST





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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.

Compact Startup Module - Thermodynamic Trap Full Version and std. Version [CMTD42M-FST and CMTD42M-SST]

Size: DN 15 (½") and DN 20 (¾")

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 gases pass 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:

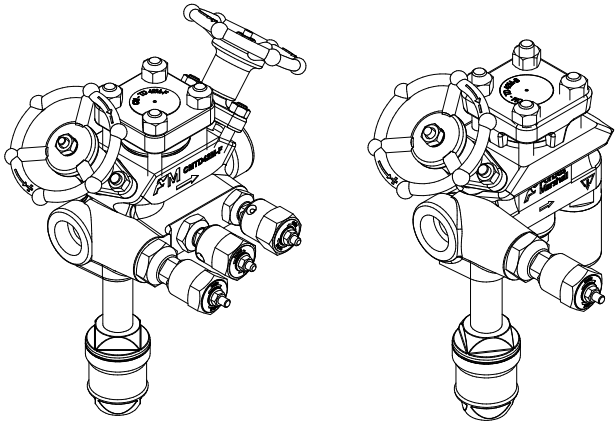
Customers and Stockist are reminded that, when returning products to Forbes Marshall they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk.

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 Compact Module Thermodynamic Trap, CMTD42M-FST, is a compact thermodynamic trap module designed with an in built bypass valve, a trap vent valve and a trap test valve for steam applications upto 17 bar g. Replaceable trap internals and inbuilt strainer eases inline maintenance. The CMTD42M-FST has an integral upstream and downstream piston valve, which isolates the upstream piping of the steam trap. A startup trap is provided at the bypass outlet. It helps in removing old condensate (upto 490º C) during startup conditions.



CMTD42M-FST **CMTD42M-SST**

Figure 1: Compact Module - Thermodynamic Trap Full Version and std Version

3.2 Sizes and Pipe Connections:

DN 15, 20 Socket weldable,Screwed end connection.
(Available with class 150, 300, 600 weld on flanges on request)
Note: Available with IBR certificate on request

3.3 Limiting Conditions:

Body design conditions	17 bar g
PMA Maximum allowable pressure	17 bar g
TMA Maximum allowable temperature	400 ºC
Minimum Allowable Temperature	0°C
*PMO Maximum operating pressure	17 bar g@230°C
TMO Maximum operating temperature	230 °C
Minimum operating temperature	0 ºC
Designed for a maximum cold hydraulic test pressure of 26 bar g	

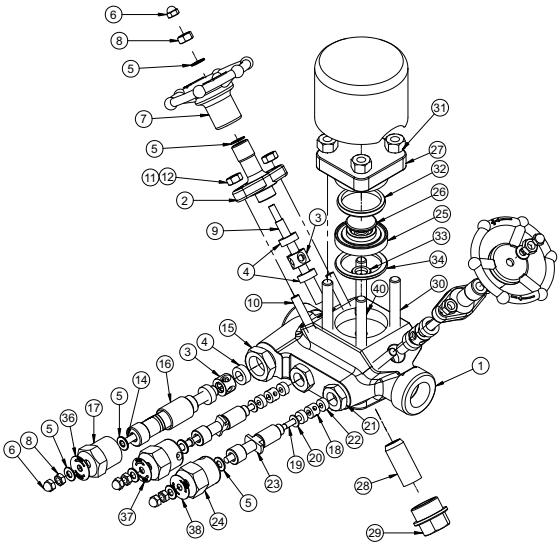
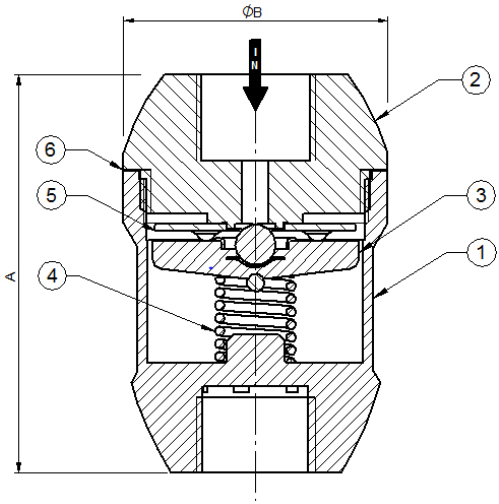


Figure 2: Compact Startup Module Thermodynamic Trap Full Version and Standard Version

Material:

No	Part	Material	No	Part	Material
1	Body	ASTM A105	21	DV2 Lock Nut	ASTM A276 Gr 410
2	Bonnet	ASTM A105	22	DV2 Sealing Stack	SS 304 + Graphite
3	DV1 Spacer	ASTM A276 Gr 410	23	DV2 Bonnet	ASTM A276 Gr410
4	DV1 Sealing Stack	SS 304 + graphite	24	DV2 Hex Knob	SG Iron 400/15
5	Plain Washer	SS 304	25	Seat	Tool Steel AISI D2
6	Hex Lock Nut	SS 304	26	Disc	Tool Steel AISI D2
7	Hand Wheel	SG Iron 400/15A	27	Top Cover	ASTM A105
8	Hex Nut LH	Ss304	28	Screen	SS 304
9	Stem Piston	ASTM A276 Gr 316	29	Strainer Cap	ASTM 743 GR CA 40
10	M8 Stud	ASTM A193 B7	30	Stud	ASTM A193 B7
11	Belleville Washer	Spring Steel	31	Nut	ASTM 194 2H
12	Hex Nut	ASTM 194 2H	32	Top Cover Gask	SS304 + graphite
13*	DV1 Plain Washer	SS 304	33	Inner Seat Gask	SS304 + graphite
14	DV1 Stem Piston	ASTM A276 Gr 316	34	Outer Seat Gask	SS304 + graphite
15	DV1 Lock Nut	ASTM A276 Gr 410	35	Nameplate	SS 304
16	DV1 Bonnet	ASTM A276 Gr 410	36	DV1 Direction Plate	SS 304
17	DV1 Hex Knob	SG Iron 400/15A	37	DV2 Direction Plate	SS 304
18	DV2 Spacer	ASTM A276 Gr 410	38	DV3 Direction Plate	SS 304
19	DV2 Stem Piston	ASTM A276 Gr 316	39*	Rivet	MILD STEEL
20	DV2 Plain Washer	SS 304	40	Ferrule	SS 304

Note: start up trap Materials are shown in Fig 3

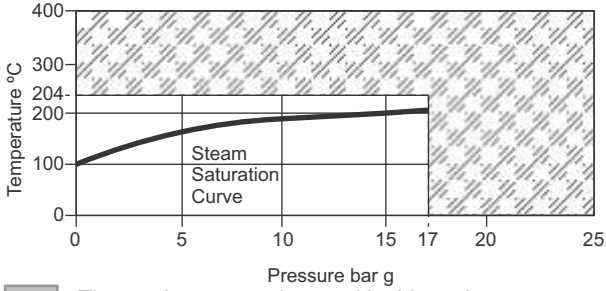


Start-up Thermostatic Main Line Trap

Material:

No	Part	Material	Standard
1	Body	Stainless Steel	ASTM A276 SS304
2	Seat	Stainless Steel	ASTM A743 GR CA40
3	Thermal Element	Stainless Steel	SS316
4	Spring	Stainless Steel	ASTM A 276 SS302
5	Spacer Plate	Stainless Steel	ASTM A 276 SS304
6	gasket	Stainless Steel	ASTM A 240 SS304

3.4 Operating Range:



The product cannot be used in this region

3.5 Product Dimension and Drawing in mm :

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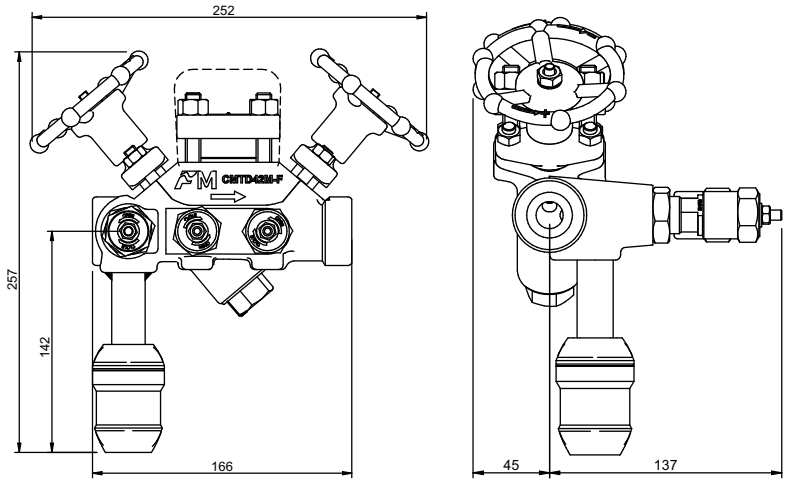


Figure 3: Dimensional drawing of CMTD42M-FST

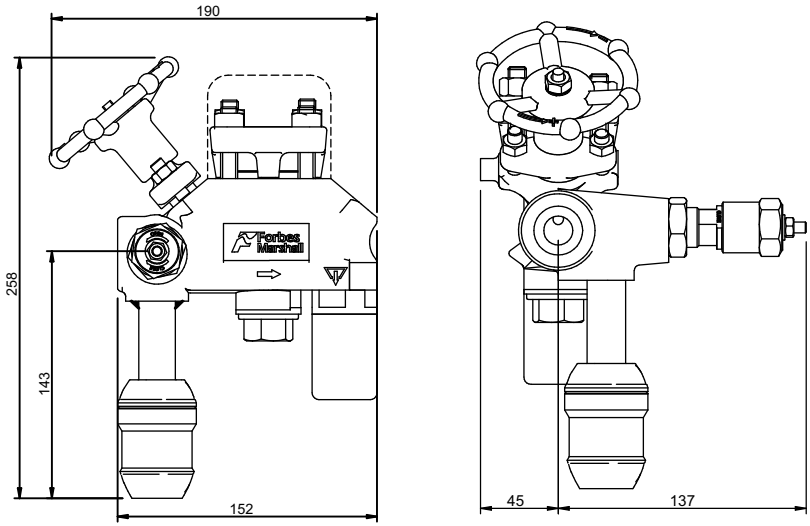
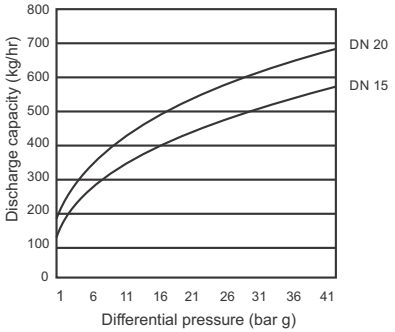
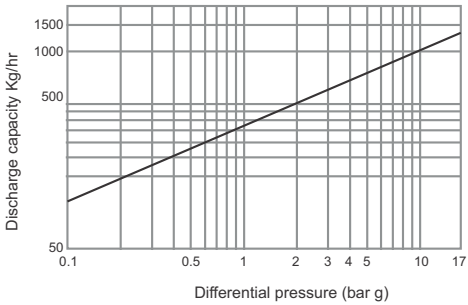


Figure 3: Dimensional drawing of CMTD42M-SST

3.6 Capacity Chart:



Hot Capacity Chart



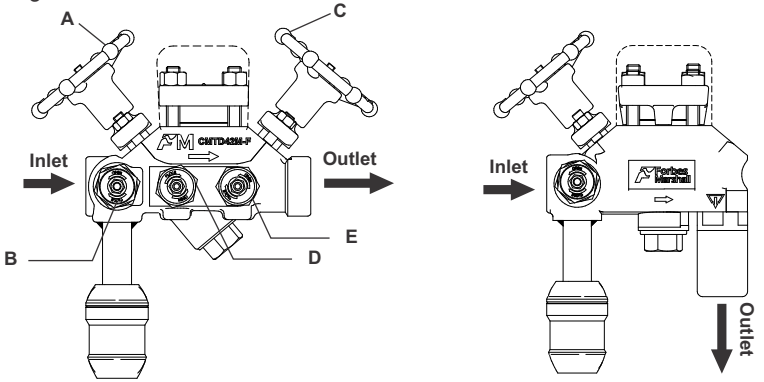
Cold Capacity Chart

4. Product Working Principle:

The compact module thermodynamic trap [CMTD42M-FST] works on thermodynamic principle using the dynamic effect of flash steam as hot condensate passes through the trap.

4.1. Operation of Compact Module Thermodynamic [CMTD42M-FST]: [Refer Fig. 2 and 4]

1. The Compact Module Thermodynamic trap [CMTD42M-FST] is a compact steam trap module comprising of a thermodynamic steam trap, upstream isolation valve (A) and downstream isolation valve (C) to protect the steam trap, a trap test valve (D) to test the steam trap functioning, a bypass valve (B) before the steam trap to bypass the flow during maintenance of the steam trap and a trap vent valve (E) to release pressure in the steam trap safely at the time of maintenance as shown in figure 4.



CMTD42M-FST **CMTD42M-SST**

Figure 4: Compact Module Thermodynamic Trap

2. CMTD42M-SST is similar to CMTD42M-FST in operation. outlet isolation valve, trap test and trap vent valves are absent in this version, Diffuser at outlet is provided.
3. A leak – tight seal in the isolation valve is obtained by a piston, operated by a hand wheel and a stem-piston (9), moving through two sealing stacks (4) separated by a spacer (3). With the piston fully retraced and held only by the upper separated sealing stack (ensuring no leak path to the environment) the valve is open. With the piston fully inserted and held by the lower sealing stack (ensuring no leak path between the valve inlet and outlet), the valve is closed.
4. The spacer allows flow through the valve whilst maintaining separation between the two sealing stacks. Consequently, the valve is soft seated, with contact between the piston and the sealing stacks assured by the stud bolts (10) and the special material / composition of the sealing stacks (laminated / stainless steel) compensating pressure and temperature variations.
5. During operation, the upstream and downstream isolation valves are kept fully open while the trap vent and trap test valves are tightly shut.
6. During Starup Condition, cold condensate is removed from the Start up trap placed at the bypass of the module. Once the hot condensate starts coming start up trap closes closes and The compact module thermodynamic trap operates on thermodynamic principle using the Bernoulli theorem i.e. the total pressure energy (static and dynamic) for a moving fluid is same at all points. start up trap works on balanced pressure trap principle and it operated below condensate temperature 90 deg C.
7. Condensate enters the trap post the integral strainer screen (12) in the trap. There is an increase in velocity (dynamic pressure) of the steam and a consequential pressure drop in static pressure resulting in disc (16) being drawn downward to the concentric seat rings (15).
8. As the disc (16) is drawn downwards, flash steam passes between the edge of the disc (16) and the inner face of the top cover (17) of trap. The flash steam occupies the space on the top surface of the disc (16).
9. The flash steam above the disc (16) exerts pressure on the larger area on the top surface area of disc (16) and overcomes the inlet pressure acting on a smaller area at the bottom of the disc (16). The disc (16) snaps shut against the concentric body seat rings (15) and prevents further flow.
10. This position of the disc (16) continue until the flash steam above the disc (16) starts condensing by radiating heat from the top cover (17).Post the condensation of flash steam the pressure acting on top of disc (16) is relieved and the cycle mentioned in points 6,7,8 and 9 is repeated.
11. The compact module thermodynamic trap [CMTD42M-FST] has an intermittent discharge pattern. The frequency of which is determinant by the condensate load and ambinent temperature.

Note:

1. **The upstream and downstream isolation valve spindle should be periodically checked to ensure adequate lubrication is present to ensure efficient valve operation. For Lubrication 'Molykote M30' lubricating oil is recommended. When fitted on high temperature applications or where severe weather conditions prevail, the lubrication should be checked more frequently.**
2. **Never tighten bonnet nuts when isolation valve is in open condition. Do not use isolation valve for throttling which result in excessive wear of internals. Operation of the handwheel should always be by the hand, it is not recommended to use a valve key or F key. If the handwheel is over-tightened, damage of the isolation valve internals may occur.**

5. Installation Guidelines:

Note: Before implementing any installations observe the 'Importance Safety Notes' in Section 2. Referring to the installation and maintenance instructions, name – plate and technical information sheet check the product is suitable for the intended installation.

1. Determine the correct installation position and the direction of fluid flow.
2. Remove protective covers from all connections and protective film from name-plate before installation on steam carrying pipe or other high temperature applications.

   Note: Lubricate the product before installation as indicated if stored for more than 6 months.
3. The preferred installation is in a horizontal pipe with the top cover uppermost as shown in figure 5. The steam trap will operate in any position, but the service life may be affected.

   Note: **When a socket weld steam trap is being installed the welding should be carried out to an approved procedure of a recognized standard.**
4. Observe the flow direction markings on the steam trap body. If the steam trap discharges to atmosphere, the discharge should be directed to a safe place.

   Note: The disc and seating surfaces of this steam trap have been produced to a high degree of flatness to achieve good shut – off under high pressure conditions. An integral strainer screen prevents dirt and scale from entering the steam trap. If particles become entrapped between the disc and seat, the high velocities can cause rapid wear and erosion. A separate strainer or dirt pocket will provide additional protection with better service life of the product.
5. Provide sufficient access for removal of integral strainer screen as well as handwheel and Hex knobs of isolation valves, bypass valve, trap vent valve and trap test valve. Provide sufficient space above trap assembly for removal of top cover during maintenance.

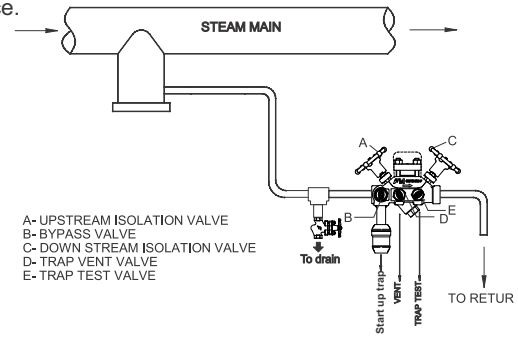


Figure5. Typical installation of CMTD42M-FST and CMTD42M-SST

6. The insulating cover may be removed to facilitate installation, but it must be replaced before the steam trap is put into service.
7. Ensure all the valves are either fully opened or tightly shut and never kept partially open / crack open.

   Note: If the steam 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).
8. Ensure to install a drain valve and flash the line from drain valve before use.

For socket weld / butt weld end connections coat the welded ends with primer and suitable high temperature paint immediately after welding before corrosion sets in.

6. Start-up and Commissioning:

6.1. Flushing of lines: [Refer figure 5]

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 this step to carry out flushing of lines.

1. Close the upstream isolation valve 'A'and downstream isolation valve 'C', open the trap vent valve (DV2) 'D' until trap depressurize then close the trap vent valve (DV2) 'D' and later open the trap drain valve respectively.
2. Drain the condensate for 10-15 minutes or until clear condensate starts coming out, whichever is earlier.

Note:Trap bypass valve (DV1) (B) should be used to remove muck or dirt and not for welding fluxes and metal burrs. For a detailed procedure on flushing of lines please visit Forbes Marshall website.

6.2. Commissioning: [Refer figure 5]

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

1. After flushing of lines is complete, ensure that trap drain valve is closed. Upstream isolation valve 'A'and downstream isolation valve 'C' should be opened respectively.
2. To check swivel connector trap operation, first close the downstream isolation valve 'D' and open the Hex Knob of the trap test valve (DV3) 'E' to ensure trap discharge fluid, later close the Hex Knob of the trap test valve (DV3) 'E' respectively.
3. Ensure only upstream isolation valve 'A'and downstream isolation valve 'D' is open, similarly trap bypass valve (DV1) 'B', trap vent valve (DV2) 'D' and trap test valve (DV3) 'E' should be remained closed when the module is in operation.
4. Check for leaks and attend if any.

6.3. Commissioning with particular reference to vent air: [Refer figure 5]

With high pressure systems, initial start–up can take several hours (or days) to bring the system to normal operating pressure and temperature. To over – come this on start – up following procedure should be adopted.

1. With upstream isolation valve 'A' closed, bypass valve 'B' open, charge the line. This will discharge the air, condensate and any pipe debris.
2. After sufficient discharge bypass valve 'B' should be fully closed, and valves 'A' and 'C' slowly opened to the fully open position.
3. Ensure that valve 'A' and 'C' is fully open similarly bypass valve 'B', test valve 'D' and trap vent valve 'E' is fully closed.

Note:

When the trap is more than 2m (6ft) away from the vertical drain leg, a suitable drop leg at the inlet to the trap can improve its service life by ensuring that the steam trap does not see a mixture of steam and condensate.

Important Note:

After the steam trap has been in service at normal operating pressure and temperature for 24 hours, it is essential that the cover nuts are re-tightened to the suitable torques. This will ensure the correct compression of the gasket under service conditions.

7. Maintenance Guidelines:

Note: Before undertaking any maintenance of the product it must be isolated from both supply line and return line and ensure pressure is normalized to atmosphere. The product should then be allowed to cool. When re-assembling ensure that all joint faces are clean. Once completed open the upstream isolation handwheel 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 compact module – thermodynamic trap [CMTD42M-FST and CMTD42M-SST].

Sr. No.	Parameters to be checked	Frequency for checking various parameters						
		Immediate	Daily	Weekly	Monthly	Quarterly	Half Yearly	Annually
1	Test High Pressure steam traps		Y					
2	Test Medium Pressure steam traps (3.5 bar g to 17.0 bar g)			Y				
3	Test Low pressure steam traps (below 3.5 bar g)				Y			
4	Repair / Replace steam traps - when testing shows leaks	Y						
5	Clean internals / strainer of CMTD42M-FST					Y		
6	Lubrication of upstream and downstream isolation valve					Y		
7	Visual Inspection for leakages		Y					
8	Arresting any other leaks	Y						
9	Isolation Valve for CMTD42M-FST				Y			

7.2. Tool Kit:

To carry out maintenance of the compact module – thermodynamic trap [CMTD42M-FST] refer the tools mentioned in the table below:

Size	Component	Tool used and size
DN 15	Body and Cap	Box spanner of 32mm (A/F)

7.3. Recommended tightening torques:

Item	Size		Torque Range
Body (1) Cap (2)	DN 15	32 mm (A/F)	100-110 Nm

Table 1 Recommended Tightening Torques

7.4. Procedure to replace the disc and seat: [Refer Figure 2]

Note: The graphite stem sealing stack (4 and 22) and top cover gasket (32) contains a thin stainless steel support ring which may cause physical injury if not handled and disposed of carefully.

1. Spring off the insulating cover, unscrew the four nuts (31) and remove the top cover (27).
2. Lift off the disc (26).
3. Remove the top cover gasket (32) and lift out the seat unit (25). Insert screw – driver into the groove for easy removal.
4. Carefully remove the seat gaskets (33 and 34) from the body of the steam trap. Ensure that no damage is caused to the steam trap body (1).
5. Ensure that the gasket contact surface in the body is clean and fit new seat gaskets (33 and 34).
6. Fit new seat unit (25), new cover gasket (32) and new disc (26). Ensure that the disc is fitted with the grooves facing the seat.
7. Replace the top cover (27) ensuring the cover gasket remains in place.
8. Replace the 4 nuts (31). Tighten the nuts diagonally in sequence to a suitable torque of 45 – 40 Nm.

Note: The use of a thread lubricant is recommended.

9. After 24 hours check the torque on the top cover nuts (31).
10. Always open the isolation valves slowly and check for leaks.

7.5. Procedure to clean or replace the strainer screen: [Refer Figure 2]

1. Unscrew the strainer cap (29) using the spanner (32 A / F).
2. Remove the strainer screen (28). Fit a new or cleaned strainer screen into the recess in the strainer cap (29).
3. The strainer cap (29) screwed into the body and tightened to a suitable torque 142 – 158 Nm.

Note: The use of a thread lubricant is recommended.

7.6. Procedure to replace the cover studs: [Refer Figure 2]

1. After removing old cover studs (30), fit new cover studs.

Note: The use of a thread locking compound is recommended.

7.7. Procedure to Dismantling the Isolation Valve: [Refer Figure 2]

1. Using the handwheel (7) fully open the valve.
2. Remove bonnet nut (12) and washer (11) from stud (10) and carefully turn the handwheel in the closing direction to lift the bonnet (2).
3. Pull out the assembly of Handwheel (7), Bonnet (2) and Stem – piston (9). Care must be taken to avoid any bending or damage to the stem – piston (9).
4. Examine the stem – piston (9) for signs or scouring, corrosion etc. which could affect perfect tightness of the valve.
5. Check other parts for wear/damages and replace if necessary.

7.8. Repacking the Isolation valve: [Refer Figure 2 and 6]

1. With the valve dismantled, insert the valve internals with extractor tool through the two sealing stack (4) and Spacer (3).

2. Firmly tap to ensure that the tool bottoms out in the bore and with a quarter turn of the handle carefully remove the sealing stack (4) and the spacer (3).

3. Thoroughly clean the sealing ring housing and all the internals.

4. Fit new lower sealing stack (4), spacer (3) and new upper sealing stack (4), using Insertor tool. Use mallet to apply light strokes on inserter toolensuring they fit perfectly.

Note: The lower and upper sealing stack is the same.

5. Apply a thin layer of graphite based grease to threads only (not to internals and stem piston).

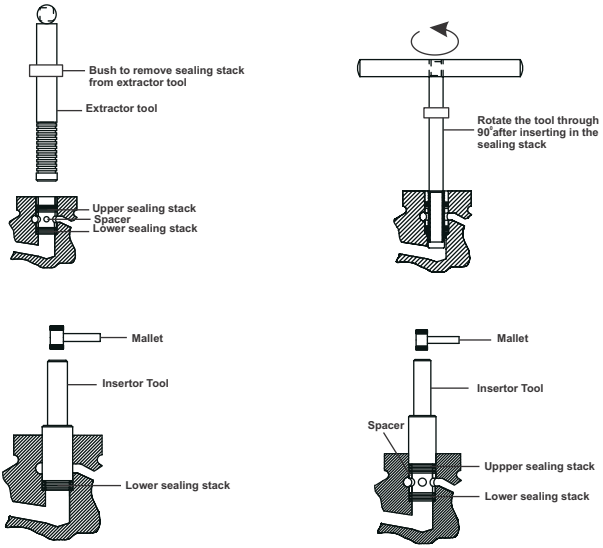


Figure 6. View showing Extractor tool and Insertor tool

7.9 Procedure to fit or replace the internals set: (Refer Figure1)

Note: The cover gasket contains a thin stainless steel support ring, which may cause physical injury if it is not handled and disposed carefully.

1. Remove the cap (2) from body (1) using box spanner.
2. Clean the internals & cap orifice (2) using WD40 liquid spray & clean with lint free cloth.
3. After cleaning fit new gasket (7) and internals with new strainer screen (6), refit the cap (2), using a little anti-seize compound on the threads
4. Ensure that the cap (2) is tighten to the recommended torque as mention in Table 1.
5. When maintenance is complete, open isolation valves slowly until the normal pressure is obtained.
6. Checks for leaks and attend if any.

7.10. Dismantling trap bypass valve (DV1), trap vent valve (DV2) andtrap test valve (DV3): [Refer Figure 2]

1. Using the Hex Knob (17 and 24) fully open the valve.
2. Loose the bonnet locknut (15 and 21) and carefully unscrew the bonnet (16 and 23) out from the valve body.
3. Turn the Knob in the opening direction to release the stem piston (14 and 19) from the sealing stack (4and 22) and so release piston / bonnet sub-assembly from the body.
4. Examine the stem – piston (14 and 19) for signs of scouring, corrosion etc., which could affect perfect tightness of the valve.
5. Check other parts for wear / damage and replace if necessary.

7.11. Repacking the trap bypass valve (DV1), trap vent valve (DV2) andtrap test valve (DV3): [Refer Figure 2 and 6]

1. With the valve dismantled, insert the valve internals with extractor tool through the two sealing stack (4 and 22) and spacer (3 and 18).
   Note: Separate extractor tools are available, use same extractor tool for isolation valve or trap bypass valve (DV1) and for trap vent valve (DV2) or trap test valve (DV3) use same extractor tool.
2. Firmly tap to ensure that the tool bottoms out in the bore and with a quarter turn of the handle carefully remove the sealing stacks (4 and 22) and the spacer (3 and 22).
3. Thoroughly clean the seating ring housing and all the internals.
4. Fit new lower sealing stack, spacer and new upper sealing stack, using insertor tool.
   Note: Separate insertor tools are available, use same insertor tool for isolation valve /trap bypass valve (DV1) and for trap vent valve (DV2) / trap test valve (DV3) use same insertor tool.
5. Use mallet to apply light strokes on insertor toolensuring they fit perfectly.
   Note: The lower and upper rings are the same.
6. Apply a thin layer of graphite based grease to threads only (not to internals and stem piston).

7.12. Reassembling the trap bypass valve (DV1), trap vent valve (DV2) andtrap test valve (DV3): [Refer Figure 2]

1. Take the piston / bonnet sub-assembly and turn the Hex Knob (17 and 24) in the opening direction until it is fully open.
2. Insert stem piston (14 and 19) into the upper sealing stack (4 and 22) and push it down carefully until it is possible to engage the bonnet (16 and 23) with threaded valve body and then screw the bonnet to rest on the sealing stacks.
3. Close the Hex Knob till its bottom face rest on the step provided on bonnet (16 and 23).
4. Tighten the bonnet slowly to compress sealing rings. Compress it by single thread rotation of bonnet.
5. In operation if leak persists from the bonnet then compress the rings slowly to stop the leakage.

7.13. Procedure to fit or replace the internals set: (Refer Figure1)

Note: The cover gasket contains a thin stainless steel support ring, which may cause physical injury if it is not handled and disposed carefully.

1. Remove the cap (2) from body (1) using box spanner.
2. Clean the internals & cap orifice (2) using WD40 liquid spray & clean with lint free cloth.
3. After cleaning fit new gasket (7) and internals with new strainer screen (6), refit the cap
   (2), using a little anti-seize compound on the threads
4. Ensure that the cap (2) is tighten to the recommended torque as mention in Table 1.
5. When maintenance is complete, open isolation valves slowly until the normal pressureis obtained.
6. Checks for leaks and attend if any.

7.14. Lubrication Procedure of the Valves:

Clean the valve unit before lubrication. Lubricate the valve frequently with *Molykote M30 oil or equivalent. Lubricate stem piston, bonnet threading of upstream and downstream isolation valve, trap bypass valve (Dv1), trap vent valve (DV2) and trap test valve (DV3). Open and close the valves 2 – 3 times after lubrication.

Note: *Molykote M30 lubricating oil is not available please use equivalent lubricating oil with specification as shown in table 2.

7.15. Steam traps testing:

Following methods can be used to determine the operating condition of a trap and determine if it's 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 installation of the Compact Startup Module –Thermodynamic Trap[CMTD42M-FST and CMTD42M-SST], check the following points for appropriate corrective measures.

Failure Mode	Possible Cause	Remedy
No Condensate is discharged.	Inlet drip leg or strainer screen is clogged with rust or scale.	Flush inline drip leg and clean strainer screen. If strainer screen is rusted, replace with new strainer screen.
	No condensate discharge.	Ensure Upstream and downstream isolation valves are fully open.
	Seize of the isolation valve.	Lubricate the valve frequently with *Molykote M30 oil.
	Air – Binding problem.	Loosen top cover and tighten to suitable torque.
	Steam trap body is hot but no condensate discharge.	To release flash steam locked (trapped) inside the steam trap, pour water on top cover of the steam trap to check it discharge condensate.
Steam leakage.	Check trap bypass valve (DV1),trap vent valve (DV2) and trap test valve (DV3) is open or partially closed.	Ensure trap bypass valve (DV1), trap vent valve (DV2) and trap test valve (DV3) is fully closed.
	Improper installation of the product.	Check installation i.e. top cover should be on top and fluid flow direction same as arrow on the steam trap body.
	Stem-piston is damaged or corroded	Check scouring, corrosion have occur on stem piston of upstream & downstream isolation valves, trap bypass valve (Dv1), trap vent valve (DV2) and trap test valve (DV3). If damaged replace with new stem piston and lubricate stem piston with *Molykote M30 oil.
	Sealing stack worn – out.	Check sealing stack of upstream & downstream isolation valves, trap bypass valve (DV1), trap vent valve (DV2)&trap test valve (DV3) are damage or worn. If worn-out replace with new sealing stack and Hex nut should be tight with proper torque.
	Foreign material or oil film on disc or body seat.	Clean both disc and body seat, flatness on disc and body seating faces can be improved by lapping individually on flat surface or glass plate. **Note:** The total amount of metal from body seat face removed should not exceed 0.25mm (0.01").

Failure Mode	Possible Cause	Remedy
Steam leakage.	Disc stuck to the top cover.	Give a light tap on top of the top cover and check step (inner surface of the top cover) is worn out. If step is worn out replace with new top cover.
	Back pressure exceeds allowable value.	Outlet pressure of the steam trap should not exceed 80% of the inlet pressure.
Motor-boating (chattering) of disc.	Scratch on disc or body seat.	Check if scratch depth is less than disc and body seating faces flatness can be improved by lapping individually on flat surface or glass plate. If scratch depth is more replace with new body seat. **Note:** The total amount of metal from body seat face removed should not exceed 0.25mm (0.01").
	Disc or body seat is worn.	Replace with new disc. If body seat is slightly worn it can be refaced by lapping on flat surface or glass plate. If body seat is worn more replace with new body seat. **Note:** The total amount of metal from body seat face removed should not exceed 0.25mm (0.01").
No condensate discharge (blocked) from Start up trap	Cap orifice is block	Clean the cap and thermopod ball surface then re-assemble the Trap.
	Thermopod may be over extended due to excessive internal pressure caused by superheat steam making it impossible for the thermopod ball (valve head) to lift off from valve seat.	Replace the thermopod assembly.
	Improper Installation.	Check installation with the inlet from the top and outlet at the bottom and thermopod in vertical line.
Steam leakage or blowing from the outlet from Start up trap	Foreign material has built-up between thermopod ball (valve head) and cap orifice.	Clean the cap and thermopod ball surface then re-assemble the steam trap, check for further steam leak and correct operation.
	Cap orifice damage due to wire drawing.	Replace the Instrument MainLine Trap
	Cap orifice and thermopod ball (valve head) does not shut-off tightly.	Clean both cap orifice and thermopod ball after that *seat stamping should be done.
	Check if the thermopod is in good condition. Thermopod should not be compressible when cool; any flabbiness indicates failure.	Replace with new thermopod assembly set.
Steam leaks from body from Start up trap	Spring / gasket deterioration or damage.	Replace with new spring and gasket

***Seat stamping procedure:** Place valve seat on the fixture with thermopod on the valve seat (thermopod ball side resting on the valve seat orifice) and tap slightly on the center with a mallet. Due to stamping a seating surface is formed on the valve seat orifice.

Note: Never attempt to modify the product. When replacing old parts with new parts, use the spare parts listed in Section9.
*Molykote M30 lubricating oil is not available please use equivalent lubricating oil with specification as shown in table 2.

Specification of Molykote M30			
Colour			Black
Composition			Synthetic oil
			Molybdenum disulphide Dispersant
Density	**Density at 20°C (68°F) (Standard - DIN 51 757)**		1.0 g/ml
Viscosity	**Base oil viscosity at 40°C (104°F) (Standard - DIN 51 562)**		120 mm3/s
Temperature	**Service temperature range**		Oil lubrication up to +200°C (397°F)
			Dry lubrication up to +450°C (842°F)
Load –carrying capacity, wear protection.	**Four-ball tester (VKA)**	**Weld Load (Standard – DIN 51 562 pt.2)**	2000 N
		Wear scar under 800 N (Standard – DIN 51 350 pt.3)	1.02 mm
		Almen-Wieland machine OK load.	20000 N
Storage life			1 years

Table 2: Specification of Molykote M30

9. Available Spares: [Refer figure 2]

Always order spares part by using the description & Spare Code No. given below and stating size.

No.		Spares		Spares Code
1	ISOLATION VALVE SPARE KIT	SEALING STACK, STUDS,BONNET, SPACER, STEM PISTON, PLAIN WASHER, LOCK NUT & CLEEVE LOCK NUT,BELLEVILLE WASHERS (PACK OF 1 SET)	15/20NB	SPARE-FMPC-MVINTKIT
2	STEM PISTON KIT	ISOLATION VALVE STEM PISTON (PACK OF 4 NOS.)	15/20NB	SPARE-1520FMSCM-STKIT
3	FASTENER KIT	SPARE CONSISTS OF COVER STUD & NUT, 04NOS EACH FOR 15/20NB CMTD42M-F	15/20NB	SPARE-1520CMTD42M-HKIT
4	SEAT & DISC KIT	SEATAND DISC 1 NO EACH , TOP COVER GASKET -1 NO., INNER & OUTER SEAT GASKETS 01NO EACH	15NB	SPARE-15CMTD42M-SDKIT
5	SEAT & DISC KIT	SEATAND DISC 1 NO EACH , TOP COVER GASKET -1 NO., INNER & OUTER SEAT GASKETS 01NO EACH	20NB	SPARE-20CMTD42M-SDKIT
6	SCREEN KIT	STRAINER SCREEN AND GASKET - 5 NO'S EACH FOR 15/20NB CMTD42M	15/20NB	SPARE-1520CMTD42M-SKIT
7	ISOTUB KIT	ISOTUB OF CMTD42M	15/20NB	SPARE-1520CMTD42M-ISOKIT
8	GASKET KIT	TOP COVER GASKET -1 NO., INNER & OUTER SEAT GASKETS 01NO EACH FOR 15/20NB CMTD42M	15/20NB	SPARE-1520CMTD42M-GKIT
9	Thermopod with Spacer Plate 'U' / STD fill			SPARE-THERMOPOD-TP32-UKIT
10	Spring Kit			SPARE-15ST-TLT-SKIT

How to Order:

Example: 1 No. DN 15 CMTD42M-FST Compact Module - Thermodynamic Trap - Full Version (DV1, DV2, DV3), socket weld able end connections, IBR

10. Warranty Period:

As per ordering information and agreements in the contract.

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