Installation and Maintenance Manual

Compact Module Thermodynamic Trap

CMTD62M-F

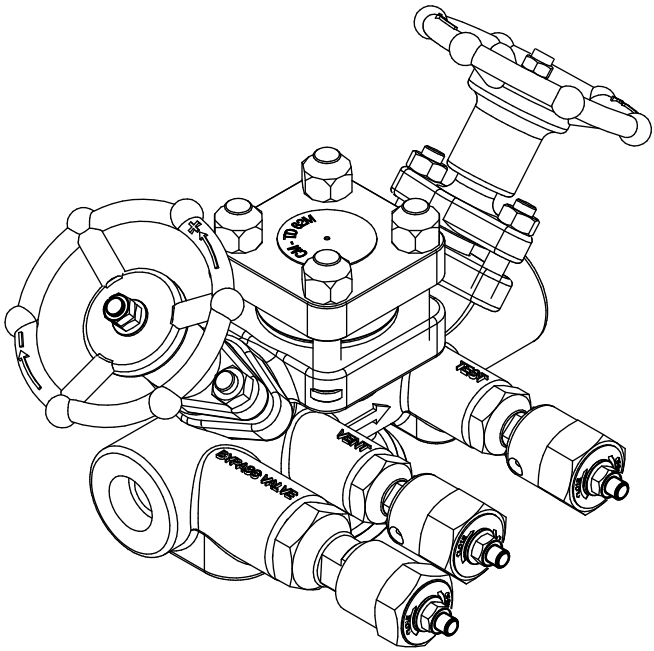


Table of Contents

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 Module – Thermodynamic Trap [CMTD62M-F]

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 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.

2.11 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

3. Brief Product Information:

3.1 Description:

The Forbes Marshall Compact Module - Thermodynamic Trap CMTD62M-F is designed with an inbuilt bypass valve for high pressure steam applications up to 62 bar g.

Replaceable trap internals and inbuilt strainer eases inline maintenance. The CMTD62M-F has an integral up steam piston valve which isolates the upstream piping of the steam trap

Its full version (CMTD62M-F) has added features such as a downstream piston valve that helps isolate the module from downstream piping and to check the trap condition a trap test valve is also provided.

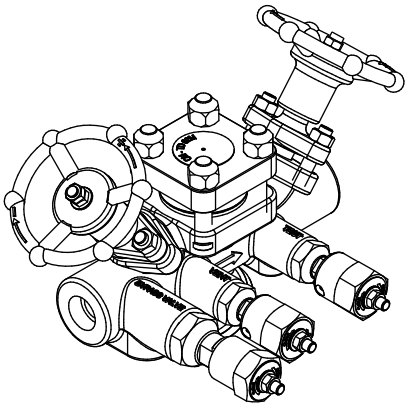


Figure 1 : Compact Module - Thermodynamic Trap

3.2 Sizes and Pipe Connections:

DN 15,20 Socket weldable end connection

Note: Available with IBR certificate on request

3.3 Limiting Conditions:

Body design conditions	ANSI 600
PMA Max. allowable pressure	103 bar g @ 93°C
TMA Max. allowable temperature	525°C @ 37.2 bar g
PMO Max. operating pressure	62 bar g @ 482°C
TMO Max. operating temperature	525 °C @37.2bar g
Minimum allowable temperature	0°C
Max. operating back pressure	80% of upstream pressure
Cold hydraulic test pressure	93 bar g (IBR)

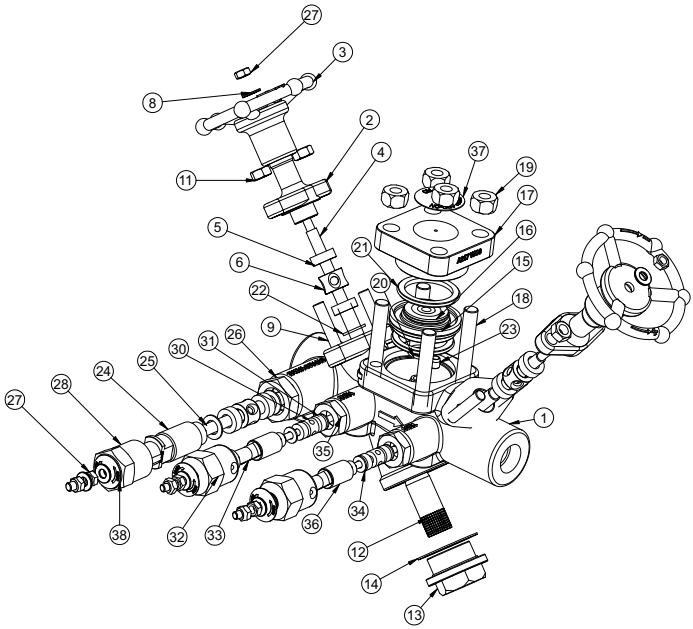


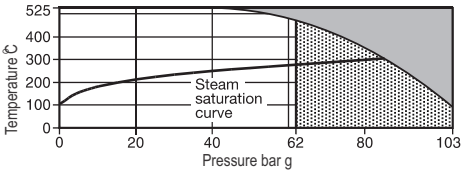
Figure 2 : Exploded View of Compact Module - Thermodynamic Trap

Material:

No.	Part	Material	No.	Part	Material
1	Body	ASTM A217 Gr. WC6	21	Spiral Wound Gasket	Spiral Wound (S.S. / Graphite)
2	Bonnet	ASTM A217 Gr. WC6	22	Plain Washer	S.S. 304
3	Handwheel	SG Iron 400 / 15A	23	Ferrule	S.S. 304
4	Stem – Piston	ASTM – A276 Type 316	24	DV1Bonnet	ASTM A276 Gr. SS410
5	Sealing Stack	Graphite + S.S. 304	25	DV1 Stem Piston	ASTM A276 Gr. SS316
6	Spacer	ASTM A276 Type 316	26	DV1 Lock Nut – M22 X 1.5	ASTM A 276 Gr SS304
7	M6 LH Cleeve lock Nut	AISI 1010 Gr 8	27	DV1 M6 LH Hex Nut	S.S. 304
8	M6 Plain Washer	S.S. 304	28	DV1 Hex Knob	ASTM A 108 GR 1018/1020
9	M8 Studs	ASTM A193 B16	29	Isotub*	S.S. 304
10	Bellevielle Washer M8*	Spring Steel	30	DV2 Spacer	ASTM A276 Type 410
11	M8 Hex Nuts	ASTM A194 Gr. 8M	31	DV2 Sealing stack	Graphite + Ss304
12	Strainer Screen	S.S. 316 Screen with 100 Mesh	32	DV2 Hex Knob	ASTM A 108 GR 1018/1020
13	Strainer Cap	ASTM A217 Gr. WC6	33	DV2 Stem Piston	ASTM A276 Gr. Ss316
14	Strainer Cap Gasket	S.S. Exfoliated graphite	34	DV2 Plain Washer	S.S. 304
15	Seat	B.S. 4659 Gr. BD2	35	DV2 M15 X 1 Lock Nut	ASTM A 276 Gr SS304
16	Disc	B.S. 4659 Gr. BD2	36	DV2 Bonnet	ASTM A217 Gr.WC6
17	Top Cover	ASTM A217 Gr. WC6	37	Name Plate	S.S. 304
18	Stud M10 X 1.5 X 55L	ASTM A193 Gr. B16	38	DV1 Direction Plate	S.S. 304
19	M10 Nuts	ASTM A194 Gr. 8M	39	Rivet *	-
20	Spiral Wound Gasket	Spiral Wound (S.S. / Graphite)			

*Item not shown.

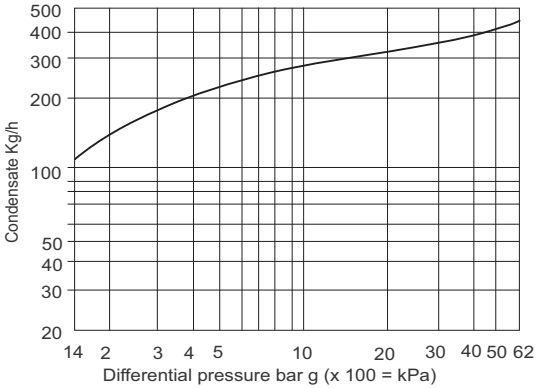
3.4 Operating Range:



The product must not be used in this region.

The product should not be used in this region or beyond its operating range as damage to the internals may occur.

3.5 Capacity Chart:



3.6 Product Dimension and Drawing:

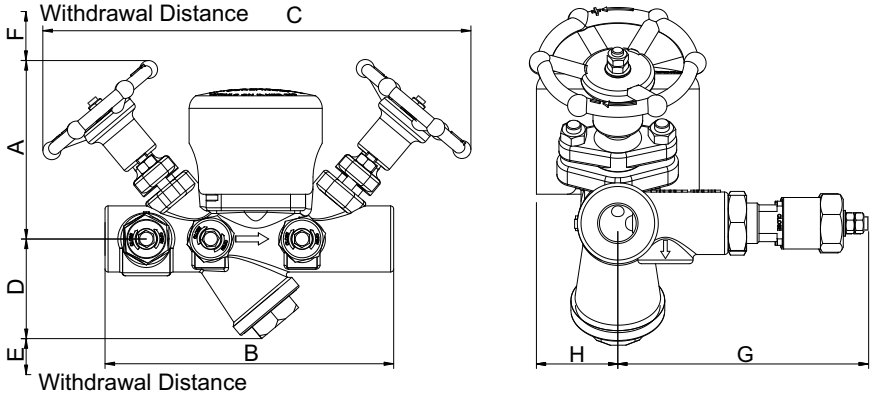


Figure 3 : Dimensional Drawing of CMTD62M-F

Dimensions/Weight (approx.) in mm and kg. (Valves in closed Conditions)

Size	A	B	C	D	E	F	G	H	Weight
DN15	120	192	340	66	20	51	118	44	6.5 kg
DN20	120	192	340	66	20	51	118	44	6.5 kg

4. Product Working Principle:

The Compact module – thermodynamic trap 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 : [Refer Fig. 2 and 4]

1. The Compact Module Thermodynamic trap is a compact steam trap module comprising of a 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 Fig. 4.

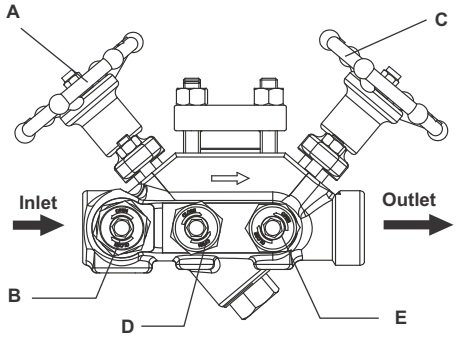


Figure 4 : Compact Module Thermodynamic Trap [CMTD62M-F]

2. A leak – tight seal in the isolation valve is obtained by a piston, operated by a hand wheel (3) and a stem-piston (4), moving through two sealing stacks (5) separated by a spacer (6). 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.
3. 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 (9) and the special material / composition of the sealing stacks (laminated / stainless steel) compensating pressure and temperature variations.
4. During operation, the upstream and downstream valves are kept fully open while the bypass, trap vent and trap test valves are tightly shut respectively.
5. The compact module thermodynamic trap operates on thermodynamic principle using the Bernoullis' theorem i.e. the total pressure energy (static and dynamic) for a moving fluid is same at all points.

6. 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).
7. 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).
8. 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.
9. 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.
10. The compact module – thermodynamic trap 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 as this will 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 & 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 & scale from entering the steam trap. If particles become entrapped between the disc and seat, the high velocities can cause rapid wear & 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, 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.

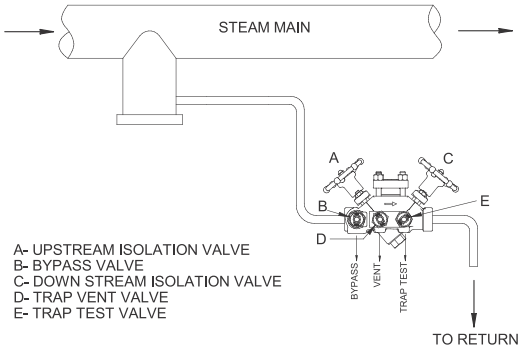


Figure 5 : Typical installation of CMTD62M-F on Main Steam Line.

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).

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 & 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 the trap depressurizes. Then close the trap vent valve (DV2) 'D' and later open the trap bypass valve (DV1) 'B' respectively.
2. Drain the condensate 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 bypass valve (DV1) 'B' is closed. Upstream isolation valve 'A' and downstream isolation valve 'C' should be opened.
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 the trap is discharging fluid, and later close the Hex Knob of the trap test valve (DV3) 'E'.
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 remain 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 the 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 respectively.

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 is not exposed to 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 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 [CMTD62M-F].

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 (17.5 bar g and above)		Y					
2	Test Medium Pressure steam traps (3.5 bar g to 17.5 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 CMTD62M-F					Y		
6	Lubrication of upstream and downstream isolation valve					Y		
6	Visual Inspection for leakages		Y					
7	Arresting any other leaks	Y						
8	Isolation Valve of CMTD62M-F				Y			

7.2. Tool Kit:

To carry out maintenance of the compact module – thermodynamic trap [CMTD62M-F] refer the tools mentioned in the table below:

Size	Part	Component	Tool used and Size
DN15/20	Upstream and Downstream trap isolation valve assembly	M8 studs	Stud Runner M8 X 1.25
		M8 Hex Nut	Open spanner 13mm (A/F)
		M6 LH Dome Nut	10 mm open spanner
		Sealing Stack	Insertor Tool (Available as Spares)
		Sealing Stack	Extractor Tool (Available as Spares)
	DV1 (Trap Bypass valve assembly)	Hexagonal knob	Open spanner 29 mm (A/F)
		DV1 Bonnet	Open spanner 19mm (A/F)
		DV1 lock nut	Open spanner 30 mm (A/F)
		M6 LH Dome Nut	Open spanner 10mm (A/F)
		Sealing Stack	Insertor Tool (Available as Spares)
		Sealing Stack	Extractor Tool (Available as Spares)
	DV2 (Trap Vent valve assembly) and DV3 (Trap Test valve assembly)	Hexagonal knob	Open spanner 29 mm (A/F)
		DV2 Bonnet	Open spanner 10 mm (A/F)
		DV2 lock nut	Open spanner 24 mm (A/F)
		M6 LH Dome Nut	Open spanner 10mm (A/F)
		Allen key	3mm
		Sealing Stack	Insertor Tool (Available as Spares)
		Sealing Stack	Extractor Tool (Available as Spares)
	Strainer Cap sub-	Strainer Cap	Open spanner 32mm (A/F)
	Top Cover Assembly	M10 Stud	Threaded Sleeve
		M10 Nuts	Open spanner 17mm (A/F)

7.3. Recommended Tightening Torques:

Item No.	Part	Torque Range
13	Strainer cap	142 – 158 Nm
18	Stud	20 – 25 Nm
19	Nut	45 – 50 Nm
11	Hex Nut	10 Nm
7	LH Dome Nut	0.1 Nm
24	DV1 Bonnet	18 Nm
26	DV1 Lock Nut	100 Nm
36	DV2 Bonnet	18 Nm
35	DV2 Lock Nut	100 Nm

Table 1 Recommended Tightening Torques

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

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

1. Remove the isotub (29), unscrew the four nuts (19) and remove the top cover (17).
2. Lift off the disc (16).
3. Remove the seat gasket (20) and lift out the seat unit (15). Insert screw – driver into the groove for easy removal. Ensure that the location ferrule (23) is also removed.
4. Carefully remove the seat gaskets (20 and 21) 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 (20 and 21).
6. Fit new seat unit (15) ensuring that the location ferrule (23) is firmly located in the body.
7. Fit new disc (16). Ensure that the disc is fitted with the grooves facing the seat (15).
8. Replace the top cover (17) ensuring the cover gasket remains in place.
9. Replace the 4 nuts (19). Tighten the nuts diagonally in sequence to a suitable torque of 45 – 50 Nm.

   Note: The use of a thread lubricant is recommended. Replace the isotub (29) after servicing the steam trap.
10. After 24 hours check the torque on the top cover nuts (19).
11. 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 (13) using the spanner (32 A / F).
2. Remove the strainer screen (12). Fit a new or cleaned strainer screen into the recess in the strainer cap (13).
3. A new Strainer cap gasket (14) should be fitted and the strainer cap (13) 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 (18), fit new cover studs until the studs bottom out tightening to proper torque 20 – 25 Nm.

   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 (3) fully open the valve.
2. Remove bonnet nuts (11) and washer (10) from stud (9) and carefully turn the handwheel in the closing direction to lift the bonnet (2).
3. Pull out the assembly of Handwheel (3), Bonnet (2) and Stem – piston (4). Care must be taken to avoid any bending or damage to the stem – piston (4).
4. Examine the stem – piston (4) 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 internal with extractor tool through the two sealing stack (5) and Spacer (6).

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 and the spacer.

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

4. Fit new lower sealing stack (5), spacer (6) and new upper stack (5) using Inserter tool. Use mallet to apply light strokes on inserter tool ensuring they fit perfectly. (Refer Fig. 6)

   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).

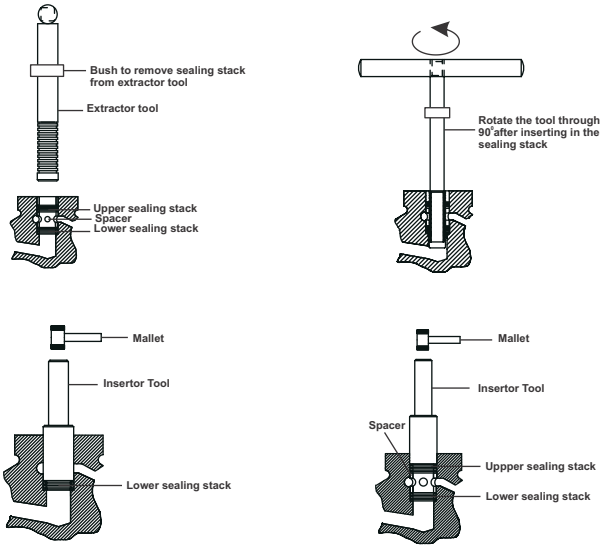


Figure 6 : View showing Extractor tool and Insertor tool

7.9. Reassembling the Isolation valve: [Refer Figure 2]

1. Take the piston / bonnet sub – assembly and turn the handwheel (3) in the opening direction until it is fully open.
2. Insert stem-piston (4) into the upper sealing stack (5) and push it down until it is possible to fit washers (10) and bonnet nuts (11) onto the studs (9) and then hand tighten.
3. Shut the valve fully, ensuring that the bonnet (2) is driven down straight, gradually tighten the bonnet nuts (11) to the recommended torque 10 Nm.
4. Replace if any insulation.

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

1. Using the Hex Knob (28 and 32) fully open the valve.
2. Loose the bonnet locknut (26 and 35) and carefully unscrew the bonnet (24 and 36) out from the valve body.
3. Turn the Hex Knob in the opening direction to release the stem piston (25 and 33) from the sealing stack (5 and 31) and so release piston / bonnet sub-assembly from the body.
4. Examine the stem – piston (25 and 33) 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) and trap test valve (DV3): [Refer Figure 2 and 7]

1. With the valve dismantled, insert the valve internals with extractor tool through the two sealing stacks (5 and 31) and spacer (6 and 30).

   Note: Separate extractor tools are available, use same extractor tool for isolation valve or trap bypass valve (DV1) and for trap vent valve (DV2) / 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 stack and the spacer.
3. Thoroughly clean the sealing stack housing and all the internals.
4. Fit new lower sealing stack, spacer and new upper sealing stack, using Sealing stack Inserter tool.
5. **Note:** Separate insertor tools are available, use same insertor tool for isolation valve /trap bypass valve (DV1) & for trap vent valve (DV2) or trap test valve (DV3) use same insertor tool.
6. Use mallet to apply light strokes on inserter ensuring they fit perfectly.

   Note: The lower and upper sealing stack is the same.
7. 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) and trap test valve (DV3): [Refer Figure 2]

1. Take the piston or bonnet sub-assembly and turn the Hex Knob (28 and 32) in the opening direction until it is fully open.
2. Insert stem piston (25 and 33) into the upper sealing stack (5 and 31) and push it down carefully until it is possible to engage the bonnet (24 and 36) with threaded valve body and then screw the bonnet to rest on the sealing stack.
3. Close the Hex Knob till its bottom face rest on the step provided on bonnet.
4. Tighten the bonnet slowly to compress sealing stack. Compress it by single thread rotation of bonnet.
5. In operation if leak persists from the bonnet then compress the sealing stack slowly to stop the leakage.

7.13. 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.

7.14. 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 Module –Thermodynamic Trap [CMTD62M-F], 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 valve, trap bypass valve (DV1), trap test valve (DV2) andtrap 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)and trap test valve (DV3) are damage or worn. If worn-out replace with new sealing spacer 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”).
	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”).

Note: Never attempt to modify the product. When replacing part with new part, use the spare parts listed in Section 9.

*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 800N (Stand.– DIN51 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:

No.	Spares	Part No.	Spare Code
1	Spare Isolation Valve Internals Set (Sealing Stack, Spacer, Stem-Piston)	4,5,6	SPARE-
2	Dv1 Spare Kit (Dome Nut, M6 Plain Washer, M6 Hex Nut, Sealing stack, Spacer, Stem Piston)	4,5,6,7,22,27	S2004496
3	Spare for trap isolation valve/ trap bypass valve (DV1) Extractor and Insertor Tool	Refer Figure 7	FGS2035271
4	DV2/ DV3 Spare Kit (Dome Nut, M6 Plain Washer, M6 Hex Nut, Sealing stack, Spacer, Stem Piston)	7,27,30,31,33,34	S2004497
5	Spare for trap vent valve (DV2) / trap test valve (DV3) Extractor and Insertor Tool	Refer Figure 7	Fg2035270
6	Spare sealing stack for DV1 and isolation valve	5,6	S2004483
7	Seat and Disc	15,16	SPARE-
8	Strainer Screen	12	SPARE-
9	Spare gasket kit	20,21	SPARE-
10	Strainer gasket	14	S2040892
11	Cover stud and nut set	18,19	SPARE-
12	DN 15/20 insulating cover	29	SPARE-

How to Order:

Example : 1 no. DN 15 CMTD62M-F Compact Module Thermodynamic Trap - Full Version (with 3 valve) with action body socket weldable end connection, IBR

10. Warranty Period:

As per ordering information and agreements in the contract.

FORBES MARSHALL

www.forbesmarshall.com

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

A: **Forbes Marshall Pvt. Ltd.**
Opp. 106th Milestone, CTS 2220,
Mumbai-Pune Road, Kasarwadi,
Pune MH 411034 INDIA

P: +91(0)20-68138555

F: +91(0)20-68138402

E: ccmidc@forbesmarshall.com

Forbes Marshall International Pte. Ltd.
16A, Tuas Avenue 1,
#05-21, JTC Space @Tuas
Singapore - 639533

P: +65 6219 3890

CIN No: U28996PN1985PTC037806