

Installation and Maintenance Manual

Forbes Marshall Air Vent and Dial Thermometer Assembly

FMAV53-D

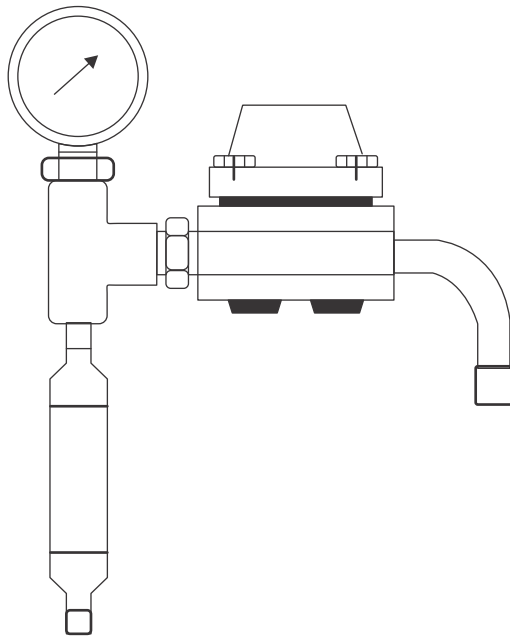


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PLEASE NOTE - Throughout this manual this cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked. This symbol denotes CAUTION, WARNING or DANGER.



1. Preface:

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

Forbes Marshall Air Vent and Dial Thermometer Assembly[FMAV53-D] Size: DN15 (½")

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 Air Vent, FMAV53-D, is an airvent trap with a dial thermometer assembly which can be installed on steam mainlines for effective removal of air from the steam system. It also comes with an optional assembly consisting of 'Air Bottle'.

3.2 Sizes and Pipe Connections:

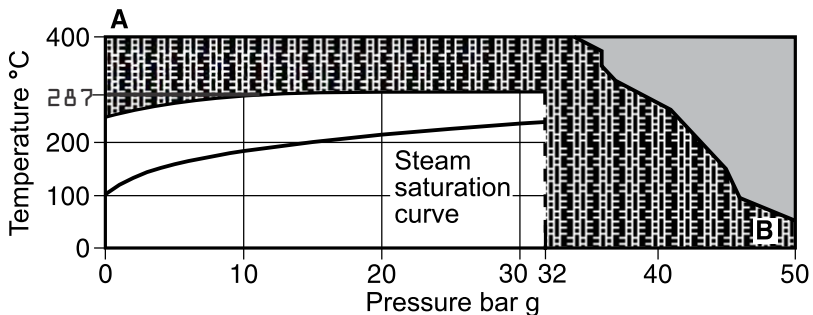
DN15 Screwed BSPT with or without Air Bottle.

3.3 Limiting Conditions for Air Vent (FMAV53):


PMO-Max. Operating Pressure 32 bar g

TMO-Max. Operating Temperature 287°C

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.

A - B Screwed & Socket Weld Ends

3.5 Temperature Range for Dial Thermometer:

a) 0-180°C b) 0-250°C

Note: Available in both NON-IBR and IBR

Dimensions (approx.) in mm. (Refer to figure 1 and 2)

Size	A	B
FMAV53-D with Air Bottle	800	225
FMAV53-D without Air Bottle	240	225

3.6 ThermoPod filling for FMAV53-D

As a standard the FMAV53 is supplied with filling C(6 C Subcooling)

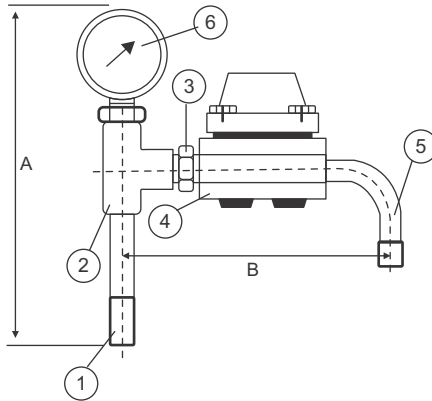


Figure 1: Forbes Marshall Air Vent and Dial Thermometer Assembly without Air Bottle

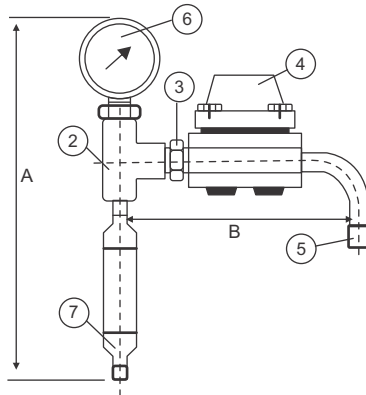


Figure 2: Forbes Marshall Air Vent and Dial Thermometer Assembly with Air Bottle

Material:

Sr. No.	Part	Material	Standard
1	Pipe	Carbon Steel	ASTM A 106 Gr. B
2	Equal Tee	FCS	ASTM A 234 Gr. WPB
3	Hex. Nipples	FCS	-
4	Airvent Trap FMAV53	Carbon Steel	ASTM A 105
5	Long bend 90deg	Carbon Steel	ASTM A 106 Gr. B
6	Bimetallic Dial Thermometer	Stainless Steel	-
7	Air Bottle	Carbon Steel	ASTM A 106 Gr. B

4. Product Working Principle:

The Forbes Marshall Air Vent and Dial Thermometer Assembly [FMAV53] works on thermostatic principle operates on the steam temperature difference from air. Steam increases the pressure inside the thermostatic element i. e. thermopod, causing the trap to close. As non-condensate gases surrounding the thermopod, the temperature begins to drop and the thermopod contracts and opens the valve.

4.1 Operations of Forbes Marshall Air Vent [FMAV53] : [Refer figure.3]

1. The operating thermostatic element is a thermopod (2) containing a small quantity of a hydrocarbon liquid with a boiling point below that of water.
2. When steam is turned on during start-up, air is discharged as the valve is off its seat (3) and is wide open.
3. As air passes through the air vent, heat is transferred to the hydrocarbon liquid in the thermopod (2). The hydrocarbon liquid boils (based on thermopod (2) selected) before steam reaches the trap.
4. The vapour pressure within the thermopod (2) causes it to expand which closes the valve seat (3) and trap remains shut.
5. Heat loss from the trap cools hydrocarbon liquid condenses and the thermopod (2) contracts, opening the valve seat (3) and releasing air until steam temperature approaches again at which the cycle is repeated.

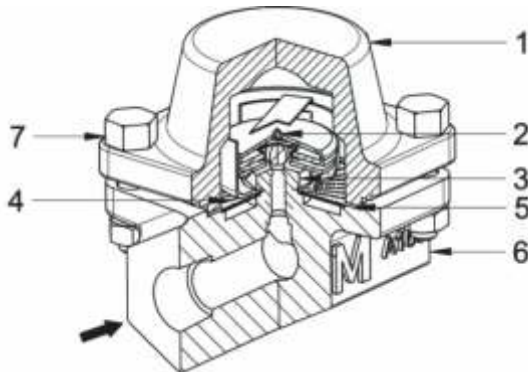


Figure 3: Forbes Marshall Air Vent [FMAV53]

5. Installation Guidelines:



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.

1. Before installing the Forbes Marshall Air Vent and Dial Thermometer Assembly [FMAV53-D], blow out the inlet piping to remove all dirt and oil.
2. Remove protective covers from all connections where appropriate, before installation.
3. The Forbes Marshall Air Vent and Dial Thermometer Assembly [FMAV53-D] should be installed vertically directly on the equipment from which trapped air needs to be vented out. Fit air collector pipe (7) or pipe (1) at the highest point in the Equipment where air is likely to be collected through DN 15 BSPT tapping as shown in figure 4 and 5 respectively
Note: Forbes Marshall Air Vent and Dial Thermometer Assembly [FMAV53-D] should be erected vertical.
4. Suitable isolation valves must be installed to allow for safe maintenance and air vent trap replacement.
5. Open isolation valves slowly until normal operating conditions are achieved. Check for leaks and correct operation.

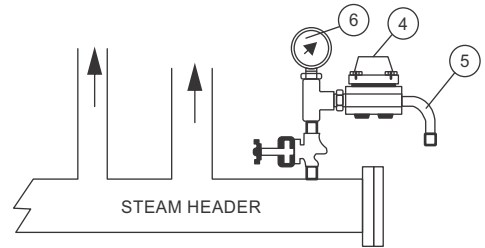
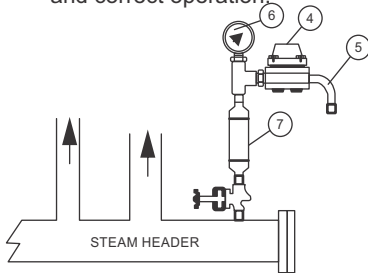


Fig.4: Installation of Forbes Marshall Air Vent and Dial Thermometer Assembly with Air Bottle

Fig.5: Installation of Forbes Marshall Air Vent and Dial Thermometer Assembly without Air Bottle

6. Start-up and Commissioning:

6.1. Flushing of lines:

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.

6.2. Commissioning:

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 bypass valve closed and isolation valve is opened.
2. Check for leaks and attend if any

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 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 air vent trap.

Sr. No.	PARAMETER TO BE CHECKED	FREQUENCY FOR CHECKING VARIOUS PARAMETERS						
		Immediate	Daily	Weekly	Monthly	Quarterly	Half Yearly	Annually
1	Test Forbes Marshall Air Vent & Dial Thermometer Assembly trap			Y				
2	Repair / Replace FMAV53-D when testing shows leaks	Y						
3	Clean internals of [FMAV53-D]						Y	
4	Visual Inspection for leakages		Y					
5	Arresting any other leaks	Y						

7.2. Tool Kit:

To carry out any maintenance on the Forbes Marshall Air Vent [FMAV53] please use the tools mentioned below:

Size	Component	Tool used & size
DN 15	Fixture 86139	-
	0.8mm perforated screen in the body	-
	Rocol on threads of the seat	-
	Valve seat	Box spanner of 17mm (A/F)
	4 M8 bolts and nuts	Box spanner of 13mm (A/F)

7.3. Recommended tightening torques:

Item	Torques
Cover Bolts	25 -35 Nm

Table1. Recommended tightening torques for FMAV53.

7.4. Procedure to fit or replace thermopod and seat assembly: [Refer figure 3]

1. Remove the cover from body by unscrewing the cover bolts & nuts (7) using a box spanner.
2. Unscrew the thermopod & valve seat assembly set.
3. Remove the restraining clip from the thermopod & seat assembly and lift the thermopod (2) and spacer upwards & outwards.
4. Remove the gasket (5), and clean the internals using WD40 liquid spray and clean with lint free cloth.
5. After cleaning refit the thermopod & seat assembly and insert new cover gasket (5) make sure that the strainer screen (4) is correctly located.
6. Ensure that the cover bolts are tightened evenly. The recommended torques for tightening as shown in table 1.
7. When maintenance is complete, open isolation valves slowly until the normal pressure is obtained. Checks for leaks and attend if any

7.5. Procedure to clean or replace the strainer screen: [Refer figure 3]

1. Remove the cover from body by unscrewing the cover bolts and nuts (7) using a 13mm box spanner.
2. Replace with new strainer screen (4).
3. Ensure that the cover bolts are tightened evenly. The recommended torques for tightening as shown in table 1.
4. When maintenance is complete, open isolation valves slowly until normal pressure is obtained. Checks for leaks and attend if any

8. Troubleshooting:

If the expected performance is unachievable after installation of the Forbes Marshall Air Vent and Dial Thermometer Assembly [FMAV53-D], check the following points for appropriate corrective measures.

Failure Mode	Possible Cause	Remedy
No air discharge	Inlet pipe / *Air collector pipe is clogged	Clean inner surface area of inlet pipe / *Air Collector pipe.
	Strainer screen is clogged with rust or scale	Clean Strainer Screen if screen rusted replace with new one.
	Valve seat is blocked.	Clean the valve seat and thermopod ball surface then re-assemble the air vent trap for further steam leak check.
	Improper Installation	Check installation i.e. end pipe or *air collector pipe should be installed on vertical plane and Forbes Marshall Air Vent [FMAV53] on horizontal plane and fluid flow direction should be same as arrow on the air vent trap body.
Steam leakage or blowing from the outlet	Foreign material has between thermopod and valve seat.	Clean the valve seat and thermopod ball surface then re-assemble the air vent trap also check for further steam leak. If valve seat damage replace the valve seat assembly.
	Valve seat and thermopod ball (valve head) does not shut – off tightly.	Clean both valve seat and thermopod ball after that *seat stamping must be done.
	Air Vent trap installation in vertical plane	The air vent is designed for installation with the thermopod in a horizontal plane with the drip leg immediately preceding the air vent trap.
Steam leaks from location other than outlet	Improper tightening torque was used on the air vent trap cover nut & bolt	Tighten to the proper torque as mention in table 1.
	Cover gasket deterioration or damage	Replace with new cover gasket.
	Steam leakage from equal tee joint / Hex nipple	Isolate the assembly use Teflon tape to resolve leakage problem.
	Steam leakage from bimetallic dial thermometer	Replace with new Forbes Marshall Air Vent and Dial Thermometer Assembly FMAV53-D]

*Air collector pipe in case of Forbes Marshall Air Vent and Dial Thermometer Assembly with Air Bottle [FMAV53-D]

*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 part, use the spare parts listed in Section 9.

9. Available Spares:

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

Spares	Part No.	Spare Code
Thermopod & seat assembly set (State thermopod filling) 'U' fill Under cooled	A	SPARE-1520FMTLT53-UTPKIT
Thermopod & seat assembly set (State thermopod filling) 'T' fill Typical	A	SPARE-1520FMTLT53-TTPKIT
Thermopod & seat assembly set (State thermopod filling) 'C' fill -Close to Steam	A	SPARE-1520FMTLT53-CTPKIT
Strainer screen & gasket kit (Pack of 5)	B,C	SPARE-1520FMTLT53-SGKIT

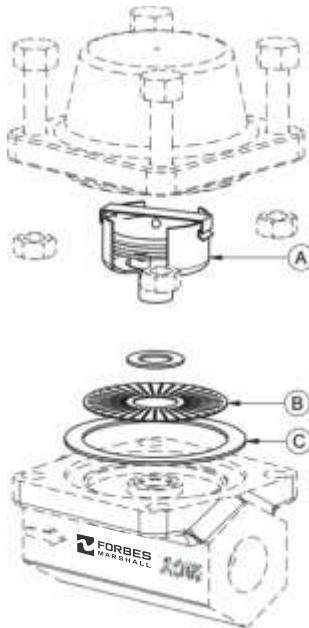


Figure 6: Parts available as spares (Heavy line) of Forbes Marshall Air Vent [FMAV53]

How to Order

Example: DN15 Forbes Marshall Air Vent, FMAV53-D with air bottle pipe, BSPT ends.
Temperature Range 0-180 °C.

10. Warranty Period:

As per ordering information and agreements in the contract.



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Krohne Marshall

Forbes Vyncke

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