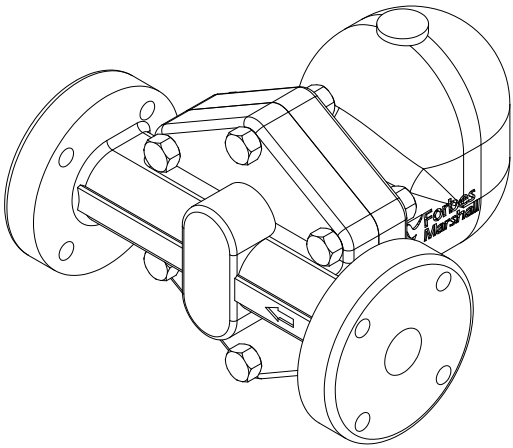
Installation and Maintenance Manual

Forbes Marshall Air Eliminator

FMAE53



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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.

Forbes Marshall Air Eliminator , FMAE53

Sizes: DN15 (1/2”), DN20 (3/4”), DN25 (1”)

PLEASE NOTE:

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

2. Important Safety Notes:

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

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

2.1 Intended use:

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

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

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

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

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

2.2 Accessibility and Lighting:

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

2.3 Hazardous environment and media:

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

2.4 Depressurizing of systems and normalizing of temperature:

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

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

2.5 Tools and consumables:

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

2.6 Protective clothing:

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

2.7 Permits to work:

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

2.8 Handling:

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

2.9 Freezing:

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

2.10 Product Disposal:

It is necessary to dispose this product only in accordance with local regulations at the authorized, qualified collecting point specified for equipments 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 Eliminators, FMAE53, are ball float type air or gas eliminators used for liquid systems, with cast steel, cover and stainless steel internals.

3.2 Size and Pipe Connections:

DN 15, 20, 25

Screwed BSPT / NPT / socket weld able to ANSI B 16.11 / Flanged ANSI B 16.5 class 150,300,600, BS Table H, J, K, R, DIN PN 10,16,25 and 40

Note:

1. DN 15 ASA 150 is available only with weld on flanges.
2. Flangesthickness is common for each size as shown in dimensional details.

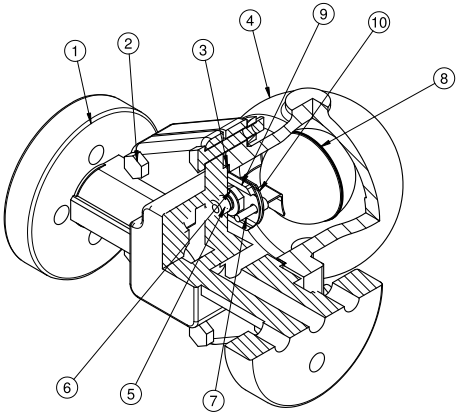


Figure 1 : Forbes Marshall Air Eliminator

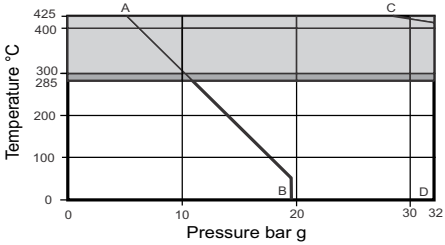
Material :

No	Part	Material	Standard
1	Base flanged Base screwed	Cast steel Forged carbon steel	ASTM A 216 Gr. WCB ASTM A 105
2	a)Cover bolts	Carbon steel	ASTM A 193 B7
	b)Cover Nuts	Carbon steel	ASTM A 194 2H
3	Cover Gasket	Reinforced exfoliated graphite	
4	Cover	Cast steel	ASTM A 216 Gr. WCB
5	Valve seat	Stainless steel	ASTM A 743 Gr. CA 40
6	Valve seat Gasket	Stainless steel	ASTM A 240 TYPE 410
7	Pivot frame assly set screws	 Stainless steel	 IS 1364
8	Ball float & lever	Stainless steel Type304	ASTM A 240
9	Support frame	Stainless steel Type304	ASTM A 240
10	Pivot frame	Stainless steel Type304	ASTM A 240

3.3 Limiting Conditions

FMAE53 4.5	Max. differential pressure of 4.5 bar g
FMAE53 10	Max. differential pressure of 10 bar g
FMAE53 13	Max. differential pressure of 13 bar g
FMAE53 21	Max. differential pressure of 21 bar g
FMAE53 32	Max. differential pressure of 32 bar g
Body design conditions	32 bar g @ 425 °C
Cold hydraulic test pressure	64 bar g

3.4 Operating Range:



A - B Flanged #150.

C - D Flanged #300.

This product **must not** used in this region.

This product should not be used in this region as damage to the internals may occur.

3.5 Product Dimension and Drawing:

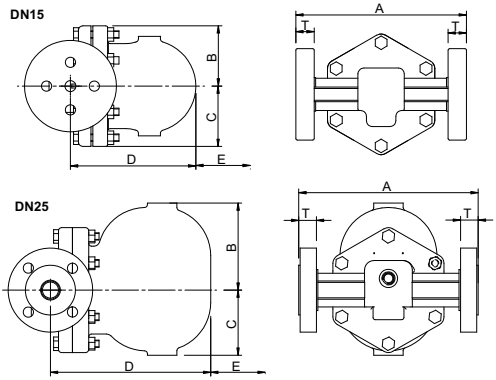


Figure 2 : Dimensional Drawing of FMAE53 Flanged

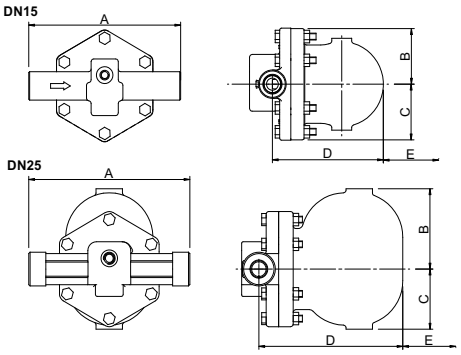


Figure 3 : Dimensional Drawing of FMAE53 Screwed/Socket Weldable

Flanged

Size (DN)	A	B	C	D	E	T	Wt (kg)
DN15/20	230	68	84	172	120	21	11
DN25	240	119	88	225	160	24	30

Screwed/Socket Weldable

Size (DN)	A	B	C	D	E	T	Wt (kg)
DN15/20	230	68	84	172	120	--	11
Dn25	240	119	88	225	160	--	25

4. Product Working Principle: [Refer figure 1]

The Forbes Marshall Air EliminatorFMAE53 operates on the basis of the Buoyancy principle. It utilizes float lever assembly which releases air and traps to condensate or water. Initially when the ball float and lever (8) is at the bottom, the lever connected to the float pulls the outlet valve off its seat (5) and the air present in the system is discharged. As the condensate fills inside the cover (4), the float and lever (8) rises up due to buoyancy and the valve sits on the seat (5), hence effectively preventing the escape of condensate.

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. The arrow on the name plate must point downwards. The arrow on the casting indicates the flow direction.
2. To remove the accumulated liquid from Air Eliminator, a ½" pipe balance line can be installed as shown in figure 4. This ensures that the condensate is removed from Air Eliminator to make space for the incoming air.

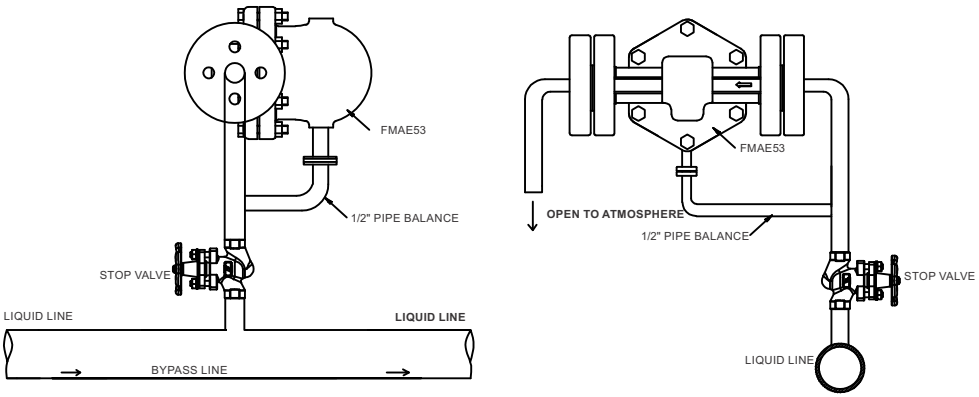


Figure 4: Forbes Marshall Air Eliminator installation horizontally on condensate line

Note: If the Forbes Marshall Air Eliminator is to discharge to atmosphere ensure it is to a safe place, the discharging air or gas may be at a temperature of 100°C (212°F).

6. Start-up and Commissioning: [Refer figure 4]

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.

Note: For a detailed procedure on flushing of lines please visit Forbes Marshall website.

Follow these steps to carry out the flushing.

1. Close the downstream stop valve of Air Eliminator.
2. Clean the inlet pipe end and ½" pipe balance is flushed properly to remove muck or debris.

6.2. Commissioning:

After installation or maintenance ensure that the system is working satisfactorily.

1. After flushing of lines is complete, ensure the product is fitted properly.
2. Downstream stop valve is opened respectively
3. Check for leaks and attend if any.

7. Maintenance Guidelines:

Before undertaking any maintenance on the product it must be isolated from both supply line and return line and any pressure should be allowed to safely normalize to atmosphere. The product should then be allowed to cool. With suitable isolation repairs can be carried out with the product in the line.

7.1 Routine and Preventive Maintenance:

Please refer to the maintenance schedule mentioned in the table below to undertake routine maintenance of the Forbes Marshall Air Eliminator .

Sr. No.	Parameters to be checked	Frequency for checking and maintaining						
		Immediately	Daily	Weekly	Monthly	Quarterly	Half yearly	Annually
1	Repair / Replace FMAE53 - when testing shows leaks	Y						
2	Clean internals of FMAE53					Y		
3	Visual inspection for leakages		Y					
4	Arresting any other leaks	Y						

7.2 Tool Kit:

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

Components	Tool	Tool Size
Valve assembly	Box spanner	17 mm (A/F)
Body cover tightening	Box spanner	16 or 17 mm (A/F)
Air Eliminator assembly adjustment	Hammer	
	Seat punch	
	Screw driver	

7.3 Recommended tightening torques:

Components	Torque
Valve assembly	45 - 55 Nm
Body cover tightening	25-35 Nm

7.4 Maintaining/ Replacing the main valve assembly: (Refer to Figure 1)

1. Unscrew cover bolts **(2a)** and lift off the base **(1).**
2. Dismantle the pivot pin and remove the ball float and lever **(8).**
3. Unscrew the assembly set screws **(7),** and dismantle the pivot frame **(10).**
4. Remove the valve seat **(5)** along with the gasket **(6).**
5. Replace the valve seat **(5)** and the gasket **(6)** with a new one.
6. Fit support frame and pivot frame **(10)** by using two set screws **(7)** but do not tighten full.
7. Place the float arm and complete the assembly by placing the pin**.**
8. Now tighten the set screws **(7).**
9. Refit the cover **(4)** with new cover gasket **(3)** by using the cover bolts **(2).**

8. Troubleshooting:

If the accepted performance is unachievable after installation of the Forbes Marshall Air Eliminator, check the following points for appropriate corrective measures.

Failure Mode	Possible Cause	Remedy
Not Discharging at all	No air Venting	Check Installation. The arrow on the name plate must point downwards, the arrow on the casting indicates the flow direction. Install the balancing pipe as shown in figure 4
		Check for blockage in the inlet strainer
		Check for Valve and seat assembly blockage
Leaking liquid	Leakage through the outlet	Check valve and seat assembly for any deposition
		1. Clean and lap seating area 2. Lightly stamp the SS ball on the seating area
		Check if the float is damaged, if so replace it
	Leakage through the Air Eliminator body	Tighten the cover nuts and bolts to recommended torque.
		Check gasket for damage, replace if found so
Not discharging enough air	Reduced venting capacity	Check if the actual differential pressure is lower than the designed differential pressure
		Check Installation. The arrow on the name plate must point downwards, the arrow on the casting indicates the flow direction. Install the balancing pipe as shown in figure 4
		Check whether the inlet strainer is partially blocked
		Check parameters and Air Eliminator sizing. The FMAE53 will not discharge enough condensate if the actual size is below the recommended size based on the load.
		Check main valve seat orifice for blockage. If blocked, clean and lap

Note: Never attempt to modify the product. When replacing old parts with new parts use the spare parts listed in section 9.

9. Available Spares: (Refer to the fig. 5)

Spare part	Part No.	Spare code
Main Valve Assembly (SN 15/20) 4.5 bar	A, B, C, D, E, F, G	SPARE-1520FMLDTAE53-4.5MVKIT
Main Valve Assembly (DN 15/20) 10 bar	A,B,C,D,E,F,G	SPARE-1520FMLDTAE53-10MVKIT
Main Valve Assembly DN (15/20) 14 bar	A,B,C,D,E,F,G	SPARE-1520FMLDTAE53-14MVKIT
Main Valve Assembly (DN 15/20) 21 bar	A,B,C,D,E,F,G	SPARE-1520FMLDTAE53-21MVKIT
Main Valve Assembly (DN 15/20) 32 bar	A,B,C,D,E,F,G	SPARE-1520FMLDTAE53-32MVKIT
Main Valve Assembly(DN 25) 4.5 bar	A,B,C,D,E,F,G	SPARE-25FMLDTAE53-4.5MVKIT
Main Valve Assembly(DN 25) 10 bar	A,B,C,D.E.F.G	SPARE-25FMLDTAE53-10MVKIT
Main Valve Assembly(DN 25) 14 bar	A,B,C,D,E,F,G	SPARE-25FMLDTAE53-14MVKIT
Main Valve Assembly(DN 25) 21 bar	A,B,C,D,E,F,G	SPARE-25FMLDTAE53-21MVKIT
Main Valve Assembly(DN 25) 32 bar	A,B,C,D,E,F,G	SPARE-25FMLDTAE53-32MVKIT
Set of Gaskets (Packet of 3)	F	SPARE-1520FMLDTAE53-GKIT
Float assly(DN 15/20) 4.5 bar	C	SPARE-1520FMLDTAE53-4.5FKIT
Float assly(DN 15/20) 10 bar	C	SPARE-1520FMLDTAE53-10FKIT
Float assly(DN 15/20) 14 bar	C	SPARE-1520FMLDTAE53-14FKIT
Float assly(DN 15/20) 21/32 bar	C	SPARE-1520FMLDTAE53-142132FKIT
Float assly(DN 25) 4.5 bar	C	SPARE-25FMLDTAE53-4.5FKIT
Float assly(DN 25) 10 bar	C	SPARE-25FMLDTAE53-10FKIT
Float assly(DN 25) 14 bar	C	SPARE-25FMLDTAE53-14FKIT
Float assly(DN 25) 21 bar	C	SPARE-25FMLDTAE53-21FKIT
Float assly(DN 25) 32 bar	C	SPARE-25FMLDTAE53-32FKIT

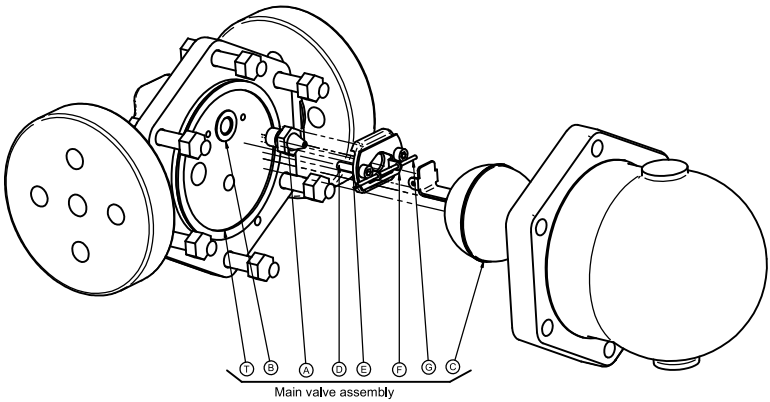


Fig. 5 : Exploded View Forbes Marshall Air Eliminator [FMAE53]

How to Order:
Example: 1 No. DN15 Forbes Marshall Air Eliminator, FMAE53, BSPT ends

10. Warranty Period:

As per the ordering information and agreement in the contract.

www.forbesmarshall.com

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