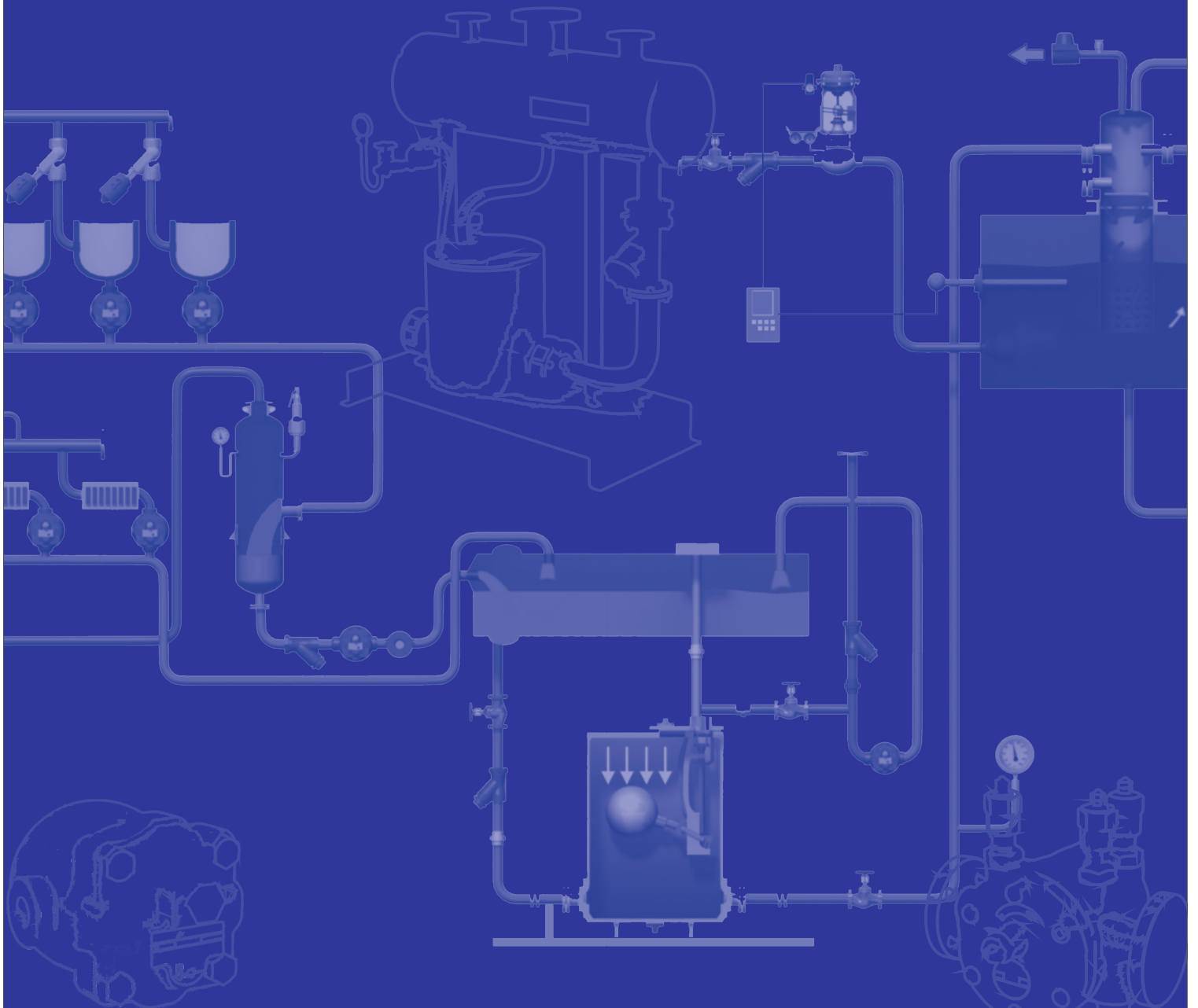


Guide to Sustaining Performance of Condensate Recovery Systems



Are your condensate recovery assets working?

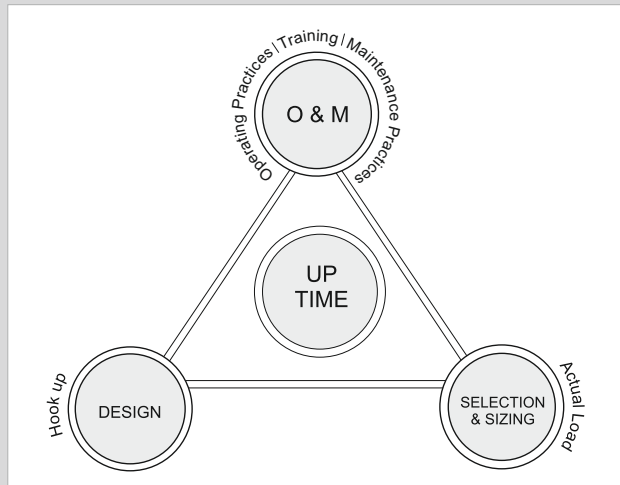
Your company invested in the equipment to make a difference. Keep it running

Sustained Performance Factors

In today's competitive environment with increasing energy costs, all industries want their steam systems running at peak efficiency with least down time. Sustained performance depends on three factors:

- Design that enables maintenance, not just performance and efficiency.
- Selection and sizing that is appropriate for current loads.
- Operation and maintenance practices that prevent failures.

A continuous improvement approach covering all three factors is the only way to achieve sustained high performance over time.



Disciplined continuous improvement in Operation and Maintenance practices can only go so far. Without all three factors, shortened service life problems will occur, impacting plant-level and company-level results, such as reliability, safety, and energy efficiency.



Even Forbes Marshall steam assets need maintenance for sustained performance

Despite exceptional product engineering, nothing lasts forever. Condensate systems are vulnerable to issues such as corrosion, build-up and wear and tear. With the right design, selection and sizing, followed by scheduled maintenance and/or component replacement, these problems can be avoided.

Common Condensate System Performance Issues

The condensate recovery system is a vital part of the steam system function. Issues with non functioning or unmaintainable condensate systems can affect the entire plant's KRAs, energy, water stress and process downtime.

Steam loss through packing leaks, failed open traps, open bypass valves, and valve gland leaks.

Low condensate recovery factor

Pump overflows and stoppages

Scaling and corrosion

Process production issues due to poor quality steam

Reduced equipment reliability and life

Increased downtime/equipment repairs



A chemical plant gets water use under control through maintenance practices of the pump

We found a customer had nine condensate pumps working and one overflowing. The Forbes Marshall team discussed maintenance procedures with on-site personnel and found they had not cleaned the motive steam strainer since commissioning. This small error was causing a lack of pressure in an otherwise working pump unit.

After cleaning and replacement, the plant's water-discharge was reduced enabling compliance of the company's environmental policy. In addition, the customer's team learned pump repair to prevent further issues.

Foreign particles cause pump overflow

The deposits on the Forbes Marshall spring loaded disc check valve led to leakage causing overflow of pump.

We found that the pump had not been maintained since installation. This was specially of concern since the pump was out in the open without protection.

Maintenance was carried out on the discharge valve enabling the pumps to cycle normally and reducing the quantity of make up water required. Additionally, the maintenance team gained useful in sights on the importance of maintenance

Corrosion

An unmaintained pump had completely corroded internal components that had to be replaced all at once.

The team was appraised of the simple preventive care process to enhance the life cycle of the asset .

This simple repair procedure limits both time as well as unnecessary CAPEX of replacing entire pump. The engineers also spotted a water quality issue which had potential to affect the entire pipeline.

INDEX

Best Practices to Keep Condensate System Up and Running

Between and Across Condensate Assets

Condensate Recovery Pump Selection, Accessories, and Maintenance

Troubleshooting Condensate Recovery Pumps

Process Trap Performance

Troubleshooting Process Traps

Mainline Trap Performance

Troubleshooting Mainline Traps

Precision Engineered and Just in Time Supply

The Forbes Marshall Approach to Sustained Steam System Performance

Proven Performance

www.forbesmarshall.com

Best Practices to Keep Condensate System Up and Running

The condensate system relies on traps and pumps to get condensate back to the feedwater tank where it can save the most energy and water stress.

Pressure powered pumps should be paired with flash vessels.

Lines and fittings also play an important role in performance.

Proper Sizing

- Ⓐ Check that the pump capacity and pressures match and pump does not exceed labeled limits, especially after plant expansions and process modifications.
- Ⓑ Check sizing of pipes and other condensate components after changes to the rest of the steam system.
- Ⓒ Upsize line size when multiple pumps and/or distances of 100m+ are covered.

Proper Installation

- Ⓓ Shelter the pump unit from corrosive elements like rain, immersion and chemicals.
- Ⓔ Check pump and traps for proper direction of flow.
- Ⓕ Install hookups that permit online maintenance, such as bypass and isolation valves.
- Ⓖ Insulate components with removable jackets instead of fixed insulation so they do not trap moisture nor impede access.
- Ⓗ Allow room for access to components for easy service.

Supervised Operation

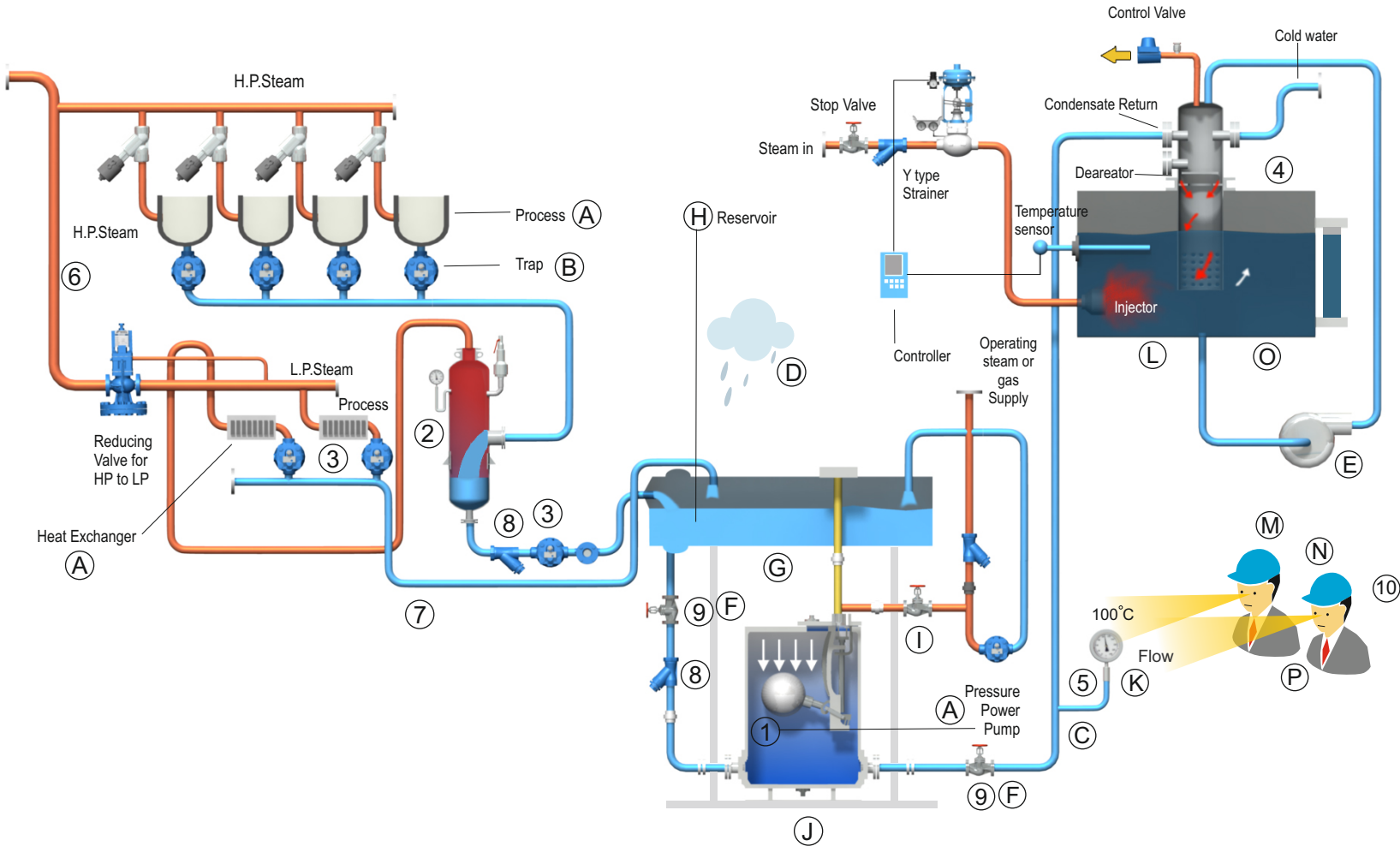
- Ensure inlet valves and exhaust valves are open as needed.
- Close bypass valves during operation.
- Know your condensate recovery factor by installing a condensate recovery meter on the pump and monitoring it on an hourly basis to detect performance drops
- Monitor and correct boiler water quality regularly to prevent corrosion.
Maintain a pH of 10.1 to 11.0
- Monitor viewglass and traps regularly.

Preventive Maintenance

- Inspect and clean system components following maintenance schedules as recommended in the product manual
- Check pipes, boiler corrosion and water quality regularly as sediment, acidity and oxygen can corrode condensate system components.
- Train all team members in maintenance and repair procedures to keep skill fresh and to instil proactive maintenance mind-set

Quick Respond

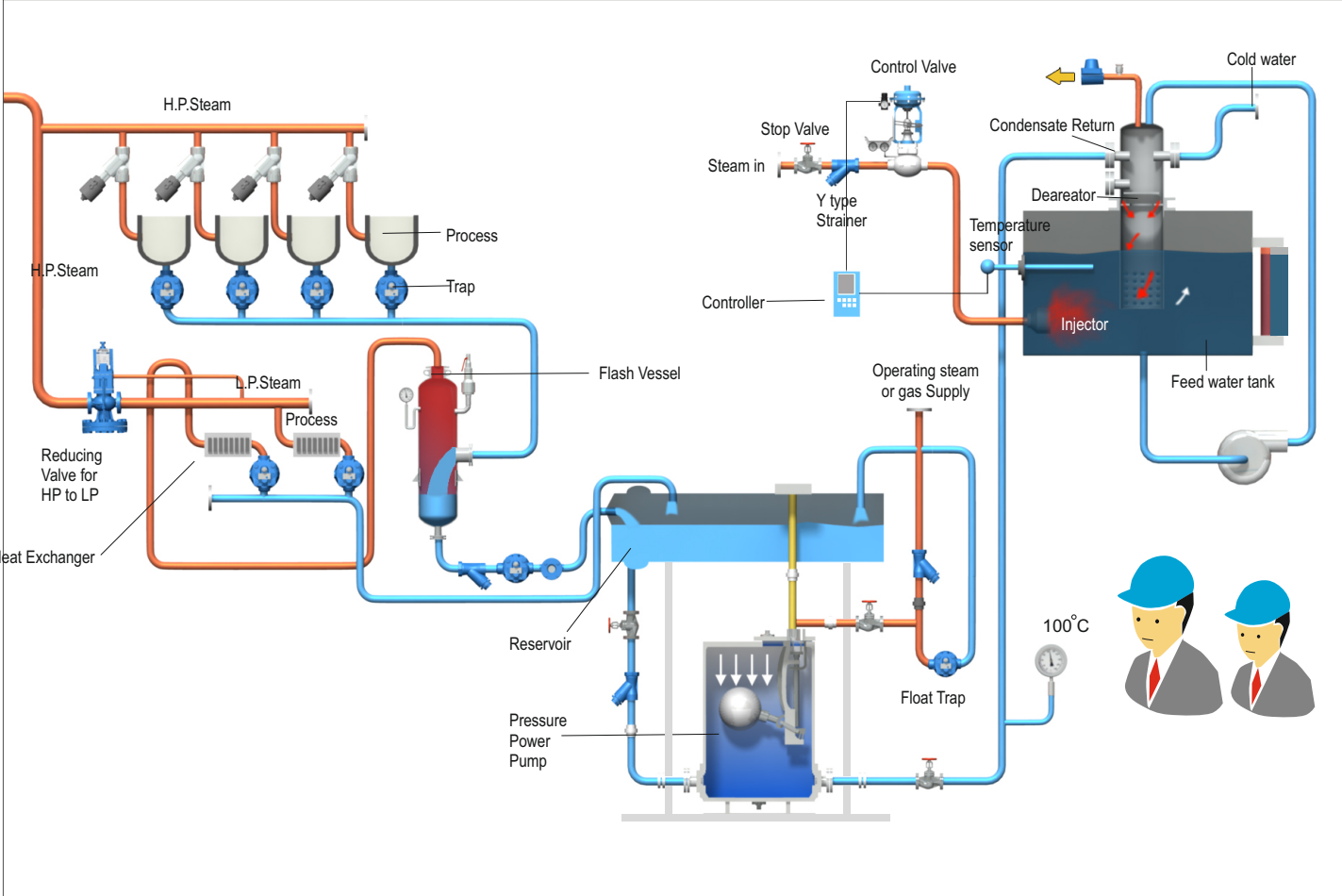
- Connect hookups that permit online maintenance, such as bypass flushing and isolation valves.
- Insulate components with removable jackets instead of fixed insulation so they do not trap moisture nor impede access.
- Keep a supply of precision engineered spare parts and replacement of critical items on hand.



Steam System Asset	
1	Pressure Powered Packaged Pump Unit with recovery water
2	Flash Steam Recovery Vessel
3	Trap
4	Feedwater Tank
5	Discharge Pressure
6	Steam Lines
7	Condensate Return Lines
8	Strainer
9	Isolation valve
10	Team

Between and Across Condensate Assets

Upstream assets, lines, and system-level factors in sustaining performance



Sizing and Selection

Check line sizing for the capacity at which your plant is running and to compensate for distances.

In larger plants, lines over 100m should be upsized accordingly.

Multiple pumps on a line will affect the performance of each pump.

For multi pump arrangements critical points to consider are direction of flow, number of pumps and therefore correct line size

Maintenance

Inspection of strainers and accessories before/after pumps and traps often reveals clogs and problems that affect pump operation.

Multi Pump Hook-up

Important to have a top entry angled to the direction of flow.

Safety Note

Read the safety notes in the product manual FIRST before installing/operating/maintaining the product. The precautions listed in the manual are 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. See the manual for proper use and care.

Task	Daily	Monthly	Quarterly	Yearly
Boiler House	<p>Check frequency and quantity of make up water. Flag deviation.</p> <p>Ensure standby pumps are ready for operations</p> <p>Ensure water quality standards are maintained and recorded</p> <p>Plot feedwater tank profile. Flag deviation.</p>	<p>Ensure safeties of feed water systems are proved working</p> <p>Alternate standby pumps and systems</p> <p>Maintain change over standby system and keep ready for use.</p>	<p>Review non conformances and rectify. Target focus:</p> <p>1) Data discrepancy or gaps in data</p> <p>2) Establish critical components that need to be maintained without taking off line and plan to implant.</p>	<p>Retighten electrical connections on condensate recovery pumps, condensate recovery meters and feed water tank electrical control systems.</p> <p>Look for carbon build-up at connections and rectify.</p>
Lines	<p>Carry out house keeping checks for leaks, vibrations, pressure/ temperature gauge readings. Flag deviations.</p>	<p>Test pH of condensate and plot trend.</p> <p>Ensure insulation health</p> <p>Test gaps of system and safety systems</p>	<p>Check insulation quality and repairs</p> <p>Ensure anti corrosion measures (are intact) - like painting, clamping.</p>	<p>Plan to replace lines that have gone beyond service life. Rule of the thumb, well maintained steam and condensate lines have a minimum life of 15 years. Calibrate all gauges.</p>
Strainers	<p>Check differential pressures do not deviate abnormally.</p> <p>Flag deviation</p> <p>Ensure standby strainers are well vented.</p>	<p>Change over of duplex strainers every month</p>	<p>Review cleaning frequency based on condition monitoring</p>	<p>Replace weakened screens / elements</p>

Corrosion in Pipelines

Steam systems are also affected by scale, foaming, carry over from boilers and corrosion.

In a steam and condensate system, pipeline debris such as scale, rust, jointing compound, weld material and other solids may find their way into the pipe line system. These foreign particles mix with steam and get settled on the surfaces of internal components. Rust and foreign particles are also an issue if the pipe lines are very old. Excess dissolved oxygen in the steam and condensate lines leads to pitting corrosion.

Preventing Corrosion at the Source

Optimum chemical dosing is critical.

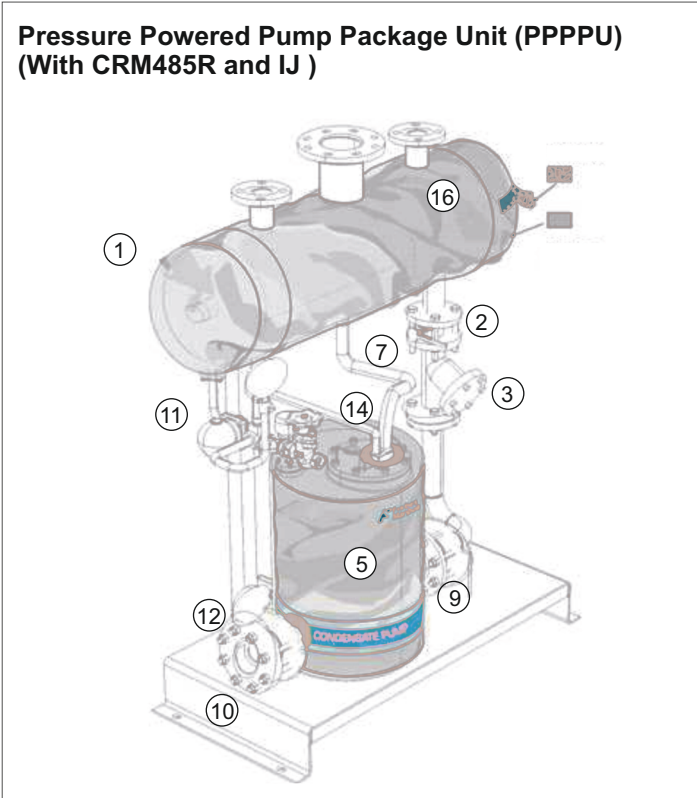
Boiler water should be maintained at a pH of 10.1 to 11. Lower pH will cause rust and corrosion in the entire steam system.

Dissolved oxygen should be scavenged either by heating the water close to 100 degC or by adding O₂ scavenger chemicals in the boiler feed water.

Sodium sulphite can be fed into the boiler to prevent pitting corrosion, however higher quantity of sodium sulphite can also cause acidic condition.

Pump Selection, Accessories, and Maintenance

Pressure Powered Packaged Pump Unit, Flash Vessel and Accessories

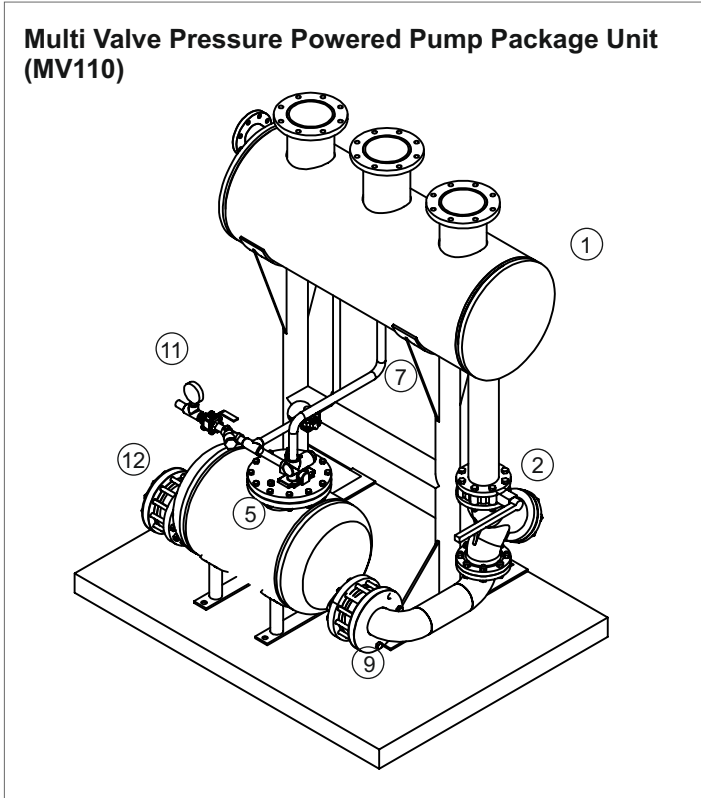


The pump components and its accessories

1	Receiver
2	Inlet Isolation Valve
3	Strainer
4	Exhaust Valve
5	Body Shell
6	Pump (with float assembly)
7	Vent
8	Motive Steam Inlet Valve
9	Inlet Disc Check Valve
10	Outlet Disc Check Valve
11	Pressure Gauge Steam
12	Pressure Gauge Outlet
13	Actuator Mechanism Assembly
14	Reed Sensor Assembly
15	Condensate recovery meter - 485 (CRM485R)
16	Insulation jacket
17	Flash Vessel

15 Condensate Recovery Meter - 485 (CRM485R)

Can also be configured to connect to a central monitoring software



Compact Pressure Powered Pump Package Unit (PPPPU-C) (With CRM485R and IJ)

Specially designed for use with individual equipments

17 Forbes Marshall Fla

1	Strainer
2	Float Trap
3	View Glass
4	Safety Valve
5	Pressure Guage

Maintaining Condensate Pumps

Please refer to the maintenance schedule mentioned in the table below to undertake routine maintenance of the Pressure Powered Pump Package Unit.

No.	Parameters To Be Checked	Frequency For Checking Various Parameters					
	Pressure Powered Pump Package Unit/ Flash Vessel	Daily	Weekly	Monthly	Quarterly	Half Yearly	Annually
1	Clean strainer of motive media line						
2	Clean condensate inlet strainer						
3	Visual inspection and cleaning of complete set of internals						
4	Condensate pump chamber draining						
5	Inlet/Exhaust valve leakage testing						
6	Check Valve Cleaning						
7	Operate motive line valve						
8	Operate Condensate inlet valve						
9	Lubrication of piston valves						
10	Pressure gauge calibration						
11	Checking of PPPPU motive pressure						
12	Checking of flash steam pressure in vessel						
13	Cleaning of motive line trap internals						
14	Cleaning of steam trap internals						
15	Visual inspection of leakages						
16	Arresting leaks						
17	Checking of float trap SLR setting						
18	Cleaning of strainer between flash vessel and pump						
19	Check air quality (in case motive media is air)						
20	Visual inspection of safety relief valve						
21	Overhauling and cleaning of safety relief valve						

Troubleshooting Pumps

Pressure Powered Packaged Pump Unit, Flash Vessel and Accessories

Failure Mode	Possible Cause	Remedy	Skill Responsibility
Pump stops working	a) Motive supply closed.	a) Open valves to supply motive pressure to pump.	Operations
	b) Motive line strainer choked.	b) Clean the strainer.	Maintenance
	c) Condensate inlet line closed.	c) Open condensate inlet valve and allow condensate to flow in pumping chamber.	Operations
	d) Condensate line strainer choked.	d) Clean the strainer.	Maintenance
	e) Condensate discharge line closed.	e) Open all discharge line valves to allow free discharge from pump to destination.	Maintenance
	f) Motive pressure insufficient to overcome back pressure.	f) Check motive and back pressure. Adjust motive pressure to 2 barg more than total back pressure.	Operations
	g) Float punctured.	g) Replace the float.	Maintenance
	h) Check the direction of the check valve.	h) Correct it if found wrong.	Maintenance
	i) Steam coming out continuously from exhaust line.	i) It means motive steam inlet valve is leaking Open the internals and clean the inlet valve. Replace it if found damaged.	Maintenance
	j) Exhaust valve leaking.	j) Open the pump internals and clean it. Also check the setting of valve actuator disc and correct it if found disturbed.	Maintenance

Failure Mode	Possible Cause	Remedy	Skill Responsibility
Pump working, overflows only during discharge	a) Check inlet check valve	a) Lap the seat and if the problem persists replace check valve	Maintenance
Pump working, continuously overflows	a) Pump under sized.	a) Verify the rated capacity as per the capacity table. Install additional pump as required.	Operations
	b) Inlet strainer partially choked	b) Clean the strainer. Ensure all valves are fully open.	Maintenance
	c) Motive line strainer partially choked.	c) Clean the strainer and ensure inlet valve is fully open.	Maintenance
	d) Live steam reaching pump receiver and receiver is pressurised.	d) Check the steam trap installed after the flash separator or process traps (if there is no flash separator), for leakage and rectify it.	Maintenance
	e) Receiver vent line is closed.	e) Make sure that the receiver is vented to atmosphere as recommended.	Operations
	f) Insufficient motive pressure to achieve rated capacity	f) Check motive pressure setting and maximum back pressure during operation. Compare with capacity table and increase motive pressure as required.	Operations
	g) Outlet check valve stuck open or leaking.	g) Open the check valve and clean it or replace it if found damaged.	Operations
	h) Motive isolation valve partially closed.	h) Check and ensure that motive isolation valve is fully open.	Operations
	l) Condensate return line size lesser than pump discharge.	l) Condensate return line size should be equal to or greater than pump discharge line.	Operations

Index

Best Practices

Across CRS Asset

Pump Selection & Maintenance

Pump Troubleshooting

Process Traps

Process Trap Troubleshooting

Main Line Traps (MLT)

MLT Troubleshooting

Precision Engineered & just in time supply

Knowledge

Float Trap Performance

Single Orifice Float Traps

Float-type

Forbes Marshall Single Orifice Float Trap (SOFT31)

EN-JS1025

SOFT 31

Size/Sr.No. TMA 220°C & PMOX

FOR SLR

FOR SLR

FOR SLR

FOR SLR

FOR SLR

FOR SLR

The SOFT and its Accessories	
Sr.No.	Part
1	Cover
2	Cover bolts
3	Cover gasket
4	Base
5	Flow direction allow location
6	Orientation/ Dimension location
7	SLR Setting guide location
8	Name Plate with ordering details
9	Safe Draw out distance 6" to 10"
10	SLR unit

Other Float Traps

Single Orifice Float Trap (SOFT53)

Compact Module Two Orifice Float Trap (CMTOFT)

Single Orifice Float Trap (SOFT500)

Steam Operated Pump Trap (SOPT)

Installation Note

Before implementing any installations observe the 'Important Safety Notes' in section 2 of the Manual. Referring to the installation and maintenance instructions, name-plate and technical information sheet, check that the product is suitable for the intended installation.

Installation Checks and Steps

1.Check the correct installation location/position and the direction of fluid flow. - Sr.No.5 and 6

2.Remove protective covers from all connections where appropriate, before installation.

3.Ensure the availability of all components as shown in the figure to ensure the operation of the trap.

INLET

OUTLET

Single Orifice Float trap module

7

Note:

The Steam Lock Release (SLR) unit should only be used to prevent 'steam locking' and therefore is designed to pass a small amount of steam, it is not recommended that the SLR be left in the fully open condition as this may lead to premature trap failure and more frequent maintenance schedules.

ROTATE STEM CLOCKWISE TO CLOSE SLR

Close

SLR Steam

Open

Maintaining Traps

Please refer to the maintenance schedule mentioned in the table below to undertake routine maintenance of the SOFT.

Sr. No.	Parameters to be checked	Frequency for checking and maintaining						
		Immediately	Daily	Weekly	Monthly	Quarterly	Half yearly	Annually
1	Test medium pressure SOFT31 (3.5 barg to 17.5 barg)							
2	Repair / Replace SOFT31 - when testing shows leaks							
3	Clean strainers of SOFT31							
4	Clean internals of SOFT31							
5	Visual inspection for leakages							
6	Arresting any other leaks							

Preventive 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 normalise to atmosphere. The product should then be allowed to cool. With suitable isolation, repairs can be carried out with the product in the line. When reassembling, make sure that all joint faces are clean. Once completed open isolation valves slowly and check for leaks.

Index

Best Practices Across CRS Asset Pump Selection & Maintenance Pump Troubleshooting Process Traps Process Trap Troubleshooting Main Line Traps (MLT) MLT Troubleshooting Precision Engineered & just in time supply Knowledge

Troubleshooting Float Traps

SOFT and TOFT

Failure Mode	Possible Cause	Remedy	Skill Responsibility
Not discharging at all	No condensate is discharged, and the surface temperature of the trap is low	Check the installation. Check the flow direction arrow on the cover casting and the name plate arrow on the base casting.	Maintenance
		Check for blockage in the strainer.	
		If the actual differential pressure is higher than the design pressure, the steam trap would have failed in closed position as the float buoyancy will not be adequate to open the valve seat.	
		Check for the valve and seat assembly for blockage	
		Check if the ball float is punctured, if so replace it Post replacement, check for water hammering in process to avoid reoccurrence.	
	No condensate is discharged, and the surface temperature of the trap is high	The trap is getting steam locked. Adjust the steam lock release setting by first dosing it fully and then opening it by 1/4th turn.	Maintenance
Leaking steam	Live steam continuously leaking through the outlet.	Check the installation. The arrow on the name plate should point downwards.	
		Check valve and seat assembly for any deposits and clean it.	
		i) Clean and lap the seating area. ii) Lightly stamp an SS ball on the seating area.	
		Check for SLR leakage/setting check for air vent leakage.	
	Steam leaking from the trap making faces	Tighten the cover nuts and bolts to the recommended torque.	
		Check the gasket for any possible damage and replace it if required.	

Failure Mode	Possible Cause	Remedy	Skill Responsibility
Not discharging enough condensate	Reduced condensate carrying capacity of the trap	Check parameters and trap sizing. The trap will not discharge enough condensate if the actual size is below the recommended size based on the condensate load.	Maintenance
		Check for back pressure and corresponding discharge capacities as per the capacity charts.	
		i) Replace/repair the leaking and non-working traps with working traps. The leaking traps may create/increase the back pressure on the working traps connected to the same return line	
		ii) there are more than one trap discharging in a single condensate return line, then ensure all the traps have an NRV installed on the outlet of each trap	
	Flooding of condensate	iii)Ensure all the by-pass valve are closed, if by-pass valve is leaking or if it is kept open In closed loop condition this creates/increases back pressure on the other working traps, connected to the same return line.	Operations
		Check whether the inlet strainer is partially blocked.	Maintenance
		Check thermostatic valve seat orifice for blockage. If blocked, clean and lap.	
		Check main valve seat orifice for blockage. If blocked, clean and lap.	

Index

Best Practices

Across CRS Asset

Pump Selection & Maintenance

Pump Troubleshooting

Process Traps

Process Trap Troubleshooting

Main Line Traps (MLT)

MLT Troubleshooting

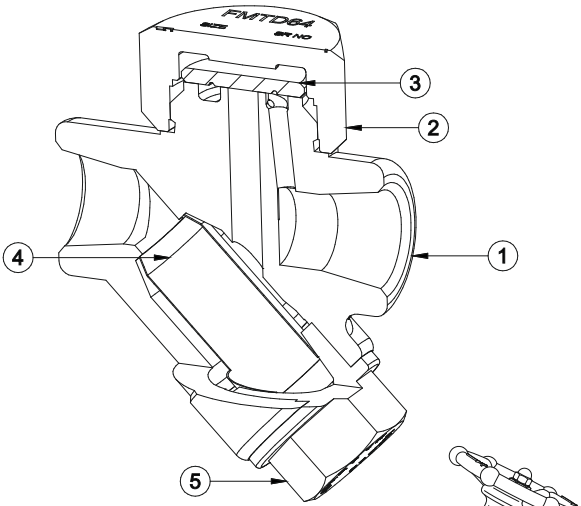
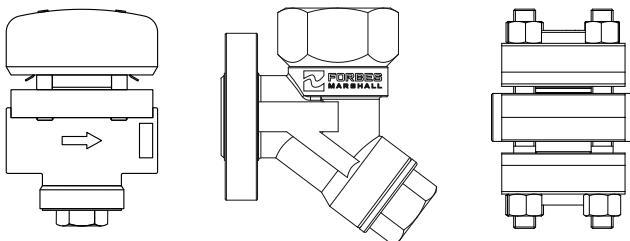
Precision Engineered & just in time supply

Knowledge

Forbes Marshall Thermodynamic Trap Performance

Forbes Marshall Thermodynamic Trap Maintenance and Accessories

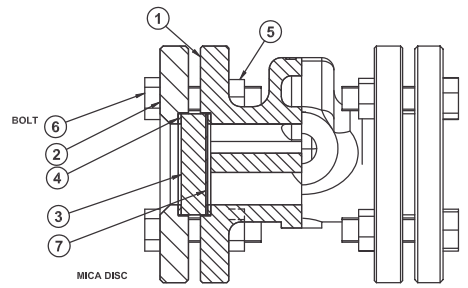
Forbes Marshall Thermodynamic Traps



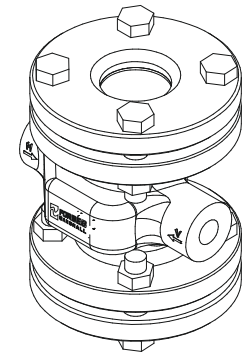
Compact Module Thermodynamic Trap

6 Accessory: Forbes Marshall View Glass

Useful for diagnosing whether traps are working

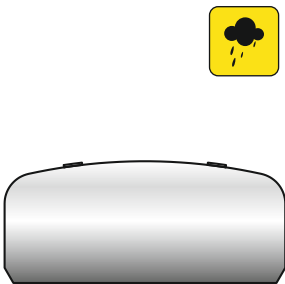


1	Body
2	Flange
3	Toughened glass
4	Gasket
5	Nut
6	Stud Bolt
7	Mica Disc

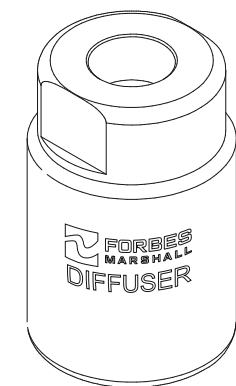


7 Accessory: ISOTUB

ISOTUB - An insulating cover which prevents the trap from being unduly influenced by excessive heat loss such as when subjected to low outside temperature, wind, rain etc.



8 Accessory: Forbes Marshall Diffuser



- 80 % reduction in noise - well within safe dB range.
- Gentle discharge ensuring no erosion damage to infrastructure or injury to personnel

The Trap and its Accessories

Sr. No.	Part
1	Body
2	Cap
3	Disc groove orientation
4	Strainer
5	Strainer cap
6	View glass
7	Isotub
8	Diffusers

Maintaining Forbes Marshall Thermodynamic Traps

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

Sr. No.	Parameters to be checked	Frequency for checking and maintaining						
		Immediately	Daily	Weekly	Monthly	Quarterly	Half yearly	Annually
1	Test high pressure steam traps (17.5 bar g and above)							
2	Test medium pressure steam traps (3.5 bar g to 17.5 bar g)							
3	Test low pressure steam traps (below 3.5 bar g)							
4	Repair /replace steam traps - when testing shows leaks							
5	Clean internals/strainer of FMTD64							
6	Visual Inspection for leakages							
7	Arresting any other leaks							

Preventive 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 normalise to atmosphere. The product should then be allowed to cool. With suitable isolation repairs can be carried out with the product in the line. When re-assembling, make sure that all joint faces are clean. Once completed open isolation valves slowly and check for leaks.

Troubleshooting Thermodynamic Traps

For more, see the Forbes Marshall Thermodynamic Trap Manual

Failure Mode	Possible Cause	Remedy	Skill Responsibility
No condensate is discharged (blocked).	Inlet drip leg or strainer screen is clogged with rust or scale.	Flush inline drip leg and dean strainer screen. If strainer screen is rusted, replace with new strainer screen.	Maintenance
	Differential pressure is low.	Verify inlet and outlet pressure of the steam trap. Minimum differential pressure required is 0.25 bar g.	
	Air binding problem	Loosen cap 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 cap of the steam trap to check if it discharges condensate.	
Steam leakage	Steam leaking continuously	Ensure bypass valve is fully closed	Maintenance
		Check installation i.e. cap to be on top and fluid flow direction same as arrow on the steam trap body	
	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 the flat surface or the glass plate. Note: The total amount of metal from body seal face removed should not exceed 0.25mm (0.01").	
	Disc stuck to the cap.	Give a light tap on top of the cap and check. If step (inner surface of the cap) is worn out, replace with new steam trap.	
	Back pressure exceeds allowable value	Outlet pressure of the steam trap should not exceed 80% of the inlet pressure.	

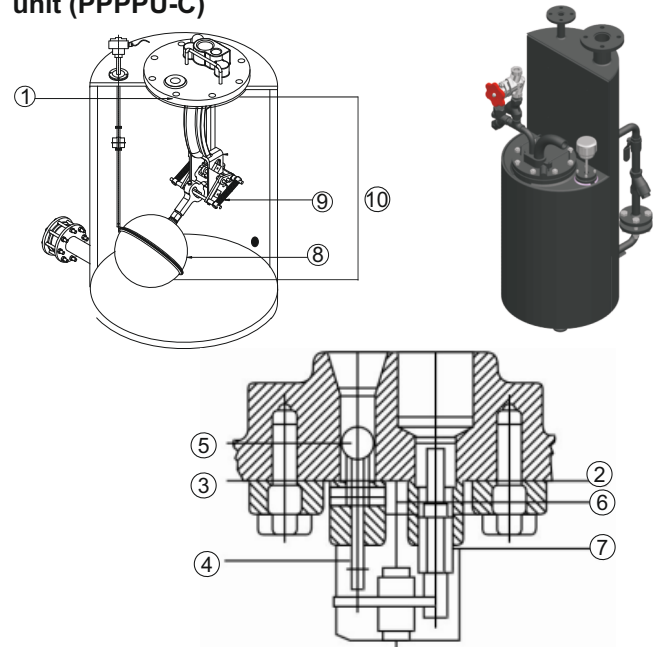
Failure Mode	Possible Cause	Remedy	Skill Responsibility
Motor-boating (chattering) of disc.	Scratch on disc or body seat.	Check if scratch depth is less, then disc and body seating faces flatness can be improved by lapping individually on flat surface or glass plate. If scratch depth is more replace with new disc. Note: The total amount of metal from body seat face removed should not exceed 0.25mm (0.01").	Maintenance
	Disc or body seat is worn.	Replace with new disc. If body seat is slightly worn it can be refaced by rapping on flat surface or glass plate. If body seat is more replace with new steam trap. Note: The total amount of metal out completely 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 the manual.

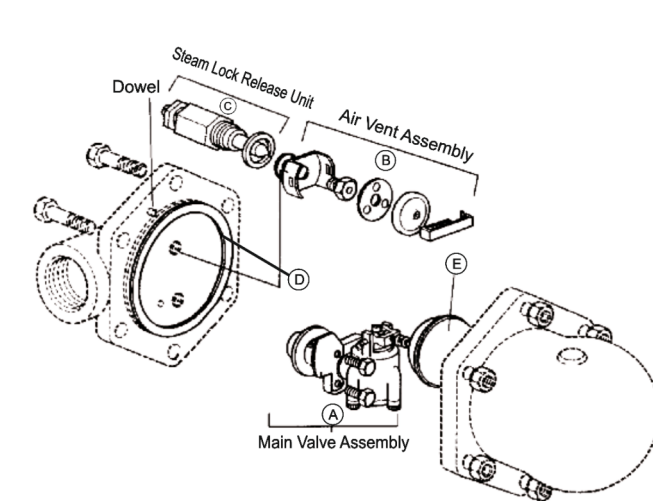
Inventory for timely response and preventive maintenance

Forbes Marshall engineers can advise on spares based on our experience across industries. We consider logistics, criticality of your downtime, and your risk profile to help you decide how many precision engineered spares and replacements to have on hand. Always specify Forbes Marshall Genuine Spares to be used your plant, as they are precision engineered and manufactured with care in our facilities.

Pressure powered pump package unit (PPPPU) and Compact Pressure powered pump package unit (PPPPU-C)



Single Orifice Float Trap (SOFT)



Pump Spares

Spares	Part No.	Spare Code
Spares Kit For PPPPU Internal	10	S2001086
Spares Kit For Gasket Set (set of 5)	1,2,3	S2001087
Spares Kit For PPPPU Inlet Valve Seat and Head Assembly	4,5	S2001088
Spares Kit For PPPPU Exhaust Valve Seat and Head Assembly	6,7	S2001089
Float Assembly	8	S2001030
Spares Kit For PPPPU Spring Assembly (Set of 2)	9	S2001046

How to Order

Example : DN 20 Compact Pressure Powered Pump Package Unit PPPPU-C

How to Order Spares

Always order spares giving description and P.C. No. given in the above table.

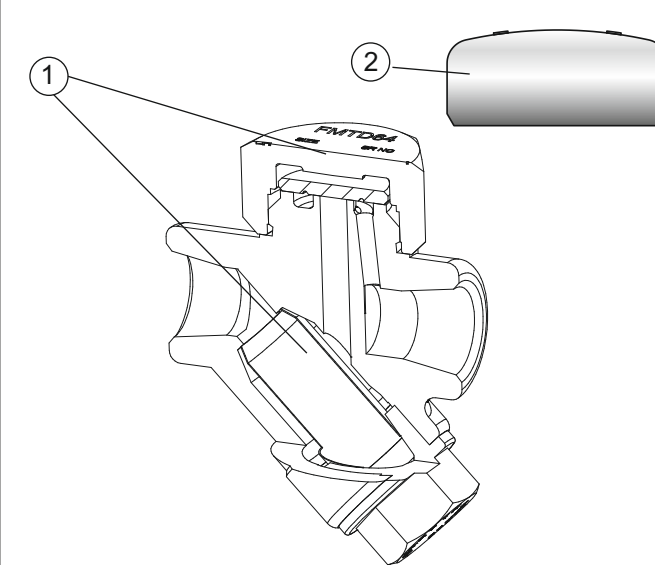
SOFT Spares

Available Spares	
Main Valve Assembly with Float (DN1 5, 20 & 25)	A
Main Valve Assembly (DN 40, 50)	A+E
Air Vent Assembly	B
Steam Lock Release Unit	C
Float	D
Sets of Gaskets (Pkt of 3)	E

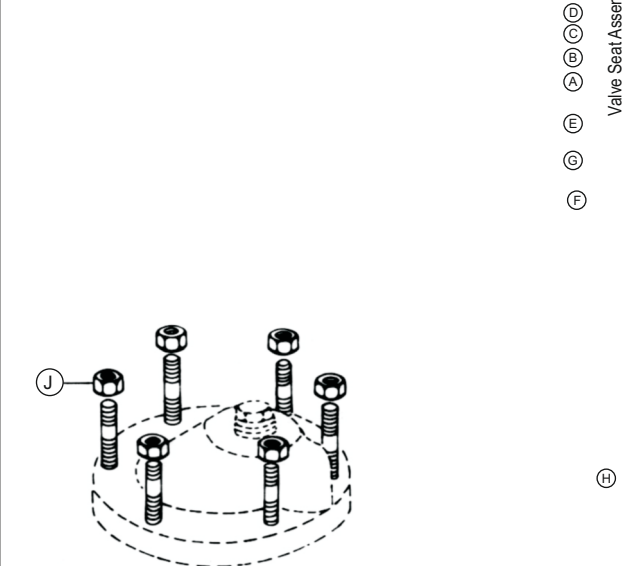
How to Order Spares

Always order spares using the description given in the column above, headed "Available Spares", and stating the size and type and differential pressure of the trap. For codes refer the user manual.

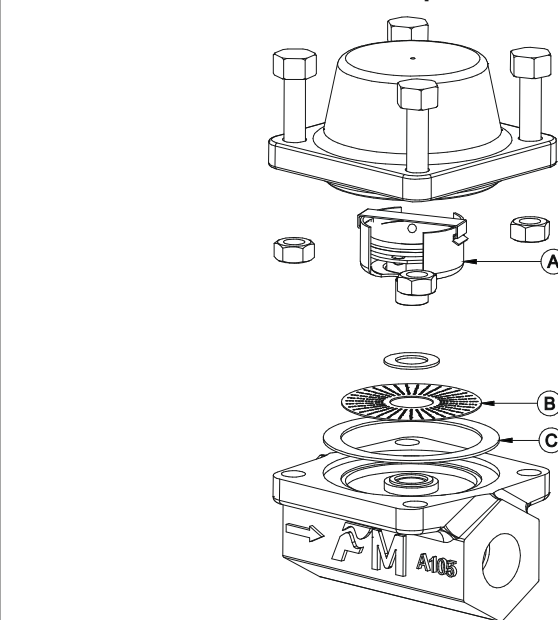
Forbes Marshall Thermodynamic Traps



Forbes Marshall Bucket Traps



Forbes Marshall Tracer Line Traps



Thermodynamic Traps Spares

1	Disc and screen kit for DN 15 (Pack of 3)	S2032089
1	Disc and screen kit for DN 20 (Pack of 3)	S2032092
2	Isotub	FGS2002130

How to Order

Example: 1No. DN15 Forbes Marshall Thermodynamic Trap FMTD64

How to Order Spares:

Always order spares by using the description given above and stating the size and type of trap.

Example: 1No. Strainer Screen for DN15 Forbes Marshall Thermodynamic Trap FMTD64

Bucket Traps Spares

Available Spares	
Valve and seat assembly	A,B,C (2 off),D
Bucket	E
Cover gasket and ferrule (pkt of 3 each)	F, G
Strainer screen	H
Set of cover studs and nuts (set of 6)	J

How to Order:

Example : 1 no. DN 20 Forbes Marshall Bucket Trap FMBT30/7 with screwed BSPT connections, IBR

How to Order Spares:

Always order spares by using the description given in the column headed 'Available Spares' and stating the size and series of the trap.

Example 1 No. Valve and Seat Assembly for DN 15 Forbes Marshall Bucket Trap FMBT30 for 6 bar g differential pressure

Tracer Line Traps Spares

Available Spares	
Thermopod and Seat Assembly set 'T' A (State Thermopod filling –'U' Fill or 'T' fill)	A
Strainer screen and Gasket Kit	B,C

How to Order

Example : Forbes Marshall Tracer Line Trap DN15 FMTLT53 having screwed BSPT connections with Thermopod 'U' filling. Or

Forbes Marshall Air Vent DN15 FMAV53 having screwed BSPT connections. FMTLT53 Steam Trap 'U' fill.

How to Order Spares

Always order spares by using the description given in the column above headed "Available Spares" and stating the size and type of steam trap. For codes refer user manual.

Example:1 No. Thermopod and seat assembly set for DN 15 FMTLT53 Steam Trap 'U' fill.

Knowledge, Service and Products

The Forbes Marshall Approach to Sustained Steam System Performance

Forbes Marshall Experience for Sustained Performance

As a Forbes Marshall customer, you'll experience our total team approach to supporting your goals for reliability, operational effectiveness, and risk management. In addition to our energy efficiency and improvement services, Forbes Marshall's Steam Asset Management engineers' are backed by a company with decades of service and innovation. Our visits to your plants allow us share our pride in serving your needs through knowledge, service and products.

Inspections

Our Engineers inspect your steam system regularly, one subsystem at a time, noting status and performance of critical components including Forbes Marshall products.

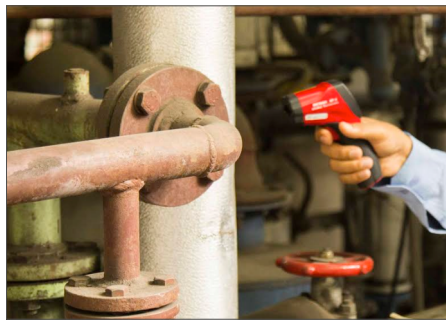
Knowledge

Our people share knowledge to help you and your team learn how to sustain performance, through the Health Snapshot, tips and on site training.

Actions, Plans, Parts

We work with you to identify actions to meet goals including repairs, preventive maintenance schedules, stocking, genuine Forbes Marshall spares, and lifecycle planning.

We have placed FM Stores around India for direct and rapid supply of common spares, to minimise your time from order to installation.



Plant-level Key Result Area Impacts

Reliability Excellence
Process uptime

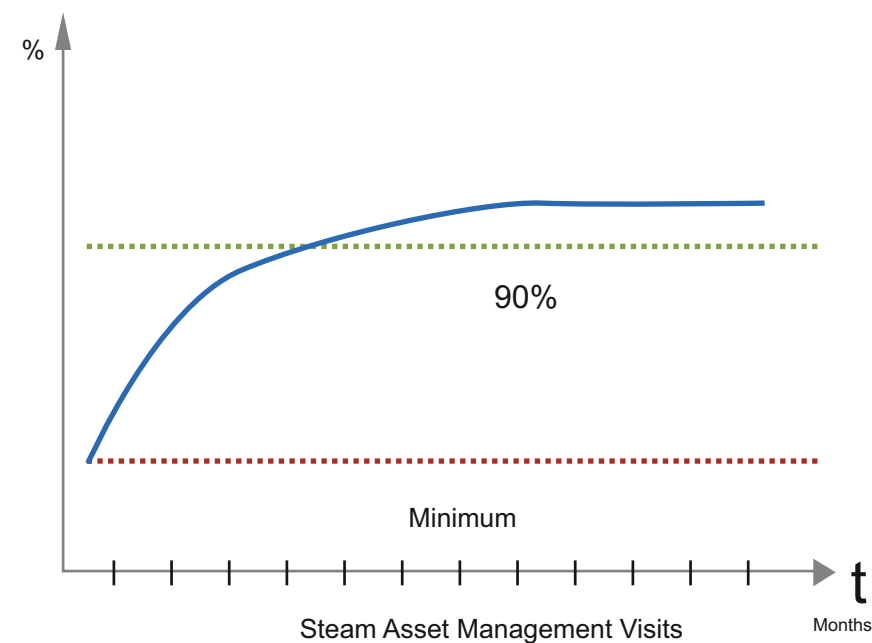
Operational Effectiveness
Fuel cost

Product and Process Quality
Quality of batches in continuous Processes

Safety
Mean time to failure of critical items

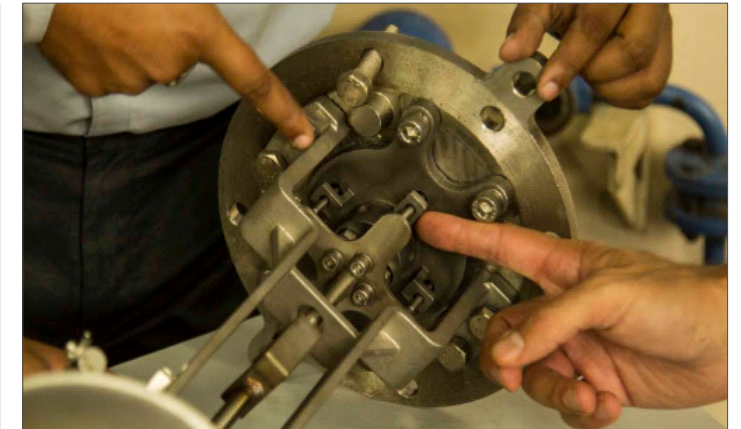
Environmental Care
Water consumption and discharge

Capital Effectiveness
Service life management



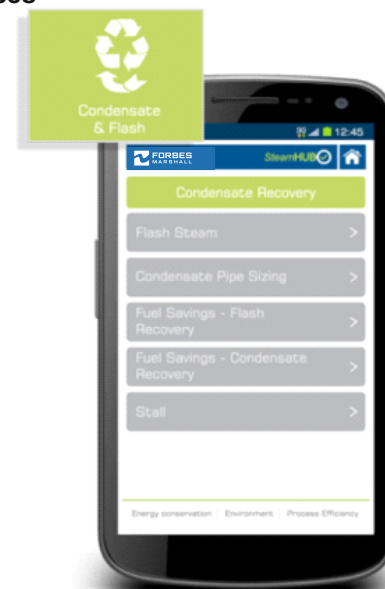
Learn More about Sustaining and Improving Performance

- Refer product manuals
- Download our apps for Android, iOS
- Visit us at www.forbesmarshall.com
- Call your Forbes Marshall engineering team to schedule training, audits and other services which will help your plant reach its potential.



Mobile resources

Product Hub



Forbes Marshall Training

Onsite Training in Product Operation and Maintenance

A critical aspect of sustaining performance depends on the maintenance team's preventative practices and readiness to handle problems when they occur.

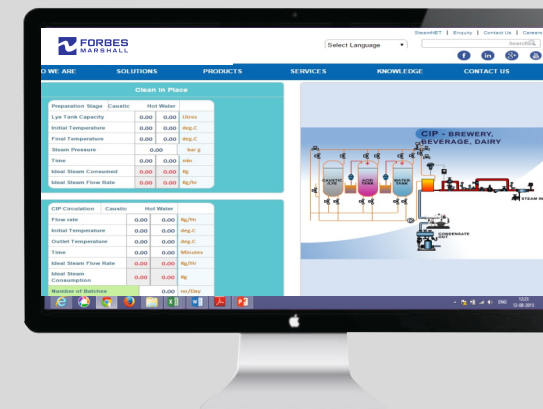
Forbes Marshall can do spot training with your team as part of our regular visits, for example, hands-on guidance for pump internal maintenance or trouble shooting.

Forbes Marshall Training Courses

Forbes Marshall also provides in depth training at our education facilities around India, where steam system professionals come to learn valuable skills and benefit from our experienced steam and instrumentation experts in a classroom and laboratory setting.

From Website

Installation and Maintenance Tips
Technical Information Sheets
Product manuals
SteamPedia



Forbes Marshall helps customers keep their steam systems working to meet their goals.

Years of Service to the Steam using Industries

70

Installed Condensate Recovery Systems

10,000

Proven for Operation Cycles

1,000,000

"Bypass valve opening has been completely eliminated in the plant. Without opening the bypass, temperature has been achieved effectively and repeatedly... We are constantly monitoring the steam consumption in the plant with the help of the vortex flowmeter. In case the consumption goes up, corrective action is taken immediately."

Utilities manager,
Solvent Extraction Plant
Gorakhpur, Uttar Pradesh, 2015

"Forbes Marshall Steam Systems Pvt Ltd has provided very well with the after-sales service and we are happy with the services of FMSSPL."

Manager
Brewery Plant
Uttar Pradesh, 2015

"After implementation of a sustained performance program at a refinery, steam trap performance rate went from 55.5% to 98.7%, remaining above 95% for at least 6 months. "Forbes Marshall has executed the contract with thorough professionalism and to our complete satisfaction."

General Manager - Operations
Oil Refinery
Maharashtra, 2009

"We are quite happy with the technical support from Forbes Marshall and recommend FM Boiler and products to all steam users for sustaining and enhancing boiler efficiency".

Chief Engineer
International Hotel Chain
Karnataka, 2013



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

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

Email : corpmtg@forbesmarshall.com, ccmidc@forbesmarshall.com

CIN No.: U28996PN1985PTC037806

www.forbesmarshall.com

© All rights reserved. Any reproduction or distribution in part or as a whole without written permission of Forbes Marshall Pvt Ltd, its associate companies or its subsidiaries ("FM Group") is prohibited.

Information, designs or specifications in this document are subject to change without notice. Responsibility for suitability, selection, installation, use, operation or maintenance of the product(s) rests solely with the purchaser and/or user. The contents of this document are presented for informational purposes only. FM Group disclaims liabilities or losses that may be incurred as a consequence of the use of this information.