

Installation and Maintenance Manual

Forbes Marshall Safety Relief Valve

FMSRV (DN20-50)

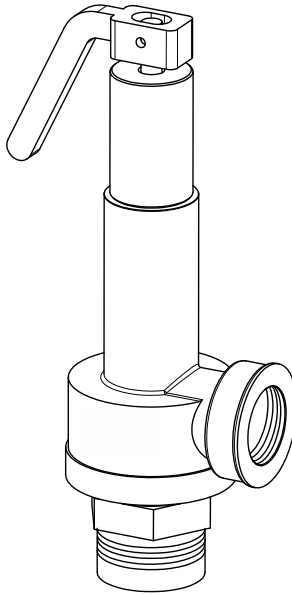


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PLEASE NOTE - Throughout this manual this cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked. This symbol denotes **CAUTION**, **WARNING** or **DANGER**.



1. Preface:

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

Forbes Marshall Safety Relief Valve[FMSRV (DN20-50)]

Sizes: DN20 (3/4"), DN25 (1"), DN40 (1 1/2"), DN50 (2")

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 Safety Relief Valve FMSRV is a high lift safety relief valve with gun metal seat, valve and brass internals suitable for use on steam, air and water

3.2 Size and Pipe Connections:

DN 20, 25, 40 and 50

Screwed BSPT/BSP/NPT

Available with IBR certificate

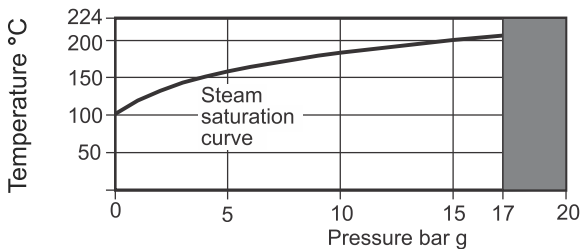
3.3 Limiting Conditions:

PMO maximum operating pressure	17.5 bar g
TMO maximum operating temperature	224°C
Cold hydraulic test pressure	35 bar g

For following set pressure ranges 6 colour coded springs are available

05 to 15 psi	White
15 to 35 psi	Yellow
35 to 75 psi	Green
75 to 125 psi	Blue
125 to 175 psi	Red
175 to 250 psi	Black

3.4 Operating Range:



 The product must not be used in this region.

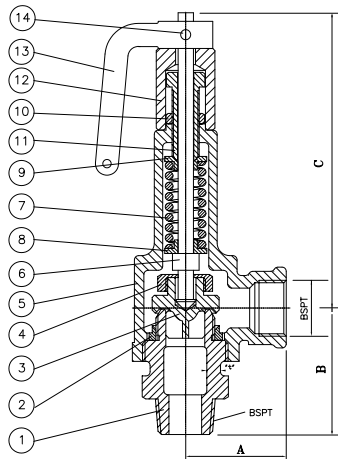


Figure 1: Forbes Marshall Safety Relieve Valve

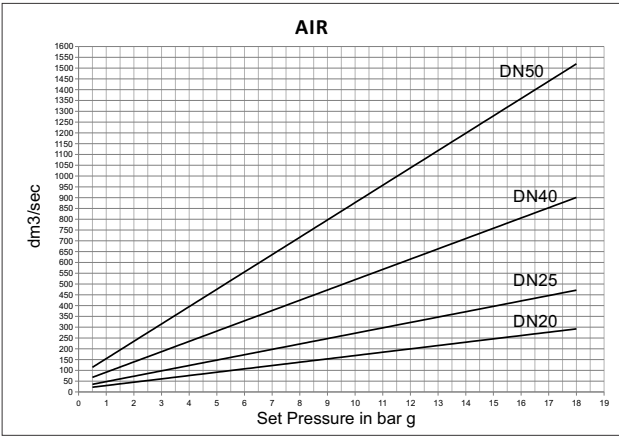
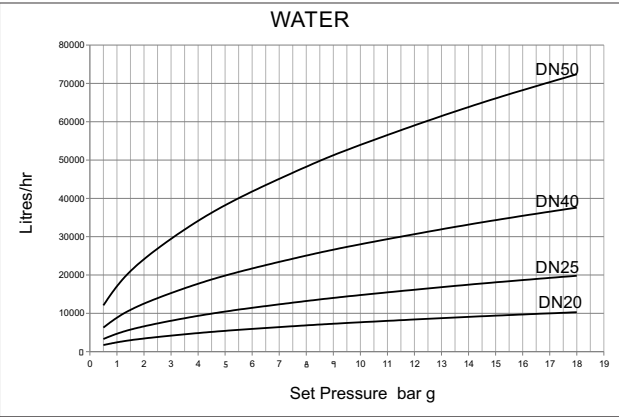
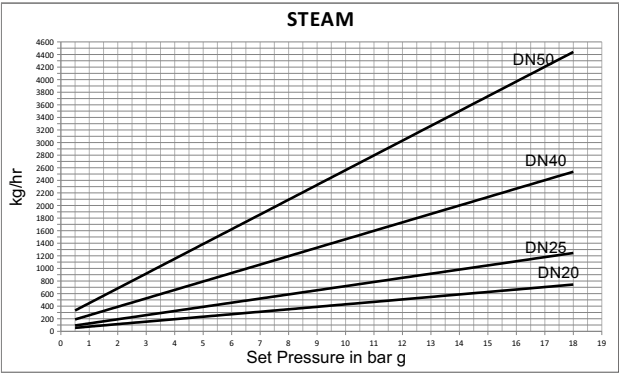
Materials:

No	Part	Material
1	Seat	Gun metal
2	Seat ring	Gun metal
3	Valve	Gun metal
4	Spindle lock nut	Brass
5	Bonnet	IS 210 Gr. FG260
6	Spindle	Brass
7	Spring	Stainless steel
8	Bottom spring guide	C 20
9	Top spring guide	C 20
10	Adj. locking nut	Brass
11	Adj. bolt	Brass
12	Cap	C20
13	Lever	Aluminium
14	Lever fulcrum pin	C20
15	Seat ring locking screw and nut (not shown)	Brass

Dimensions: (approx.) in mm (Refer to Figure 1)

Size DN	A	B	C
20	48	60	145
25	60	65	160
40	73	84	205
50	80	108	250

3.5 Capacity Chart:



4. Product Working Principle : (Refer to Figure 1)

The Forbes Marshall safety relief valve is normally set at a pressure which is 10% above the working pressure of the system. This is referred to as a set pressure. When the safety pressure reaches blow off pressure the safety relief valve opens to its full lift to discharge full capacity. The valve closes at reset pressure.

The steam enters the safety relief valve through the inlet from the bottom. When the steam reaches the set point, it lifts the valve (3) off the seat (1), working against the spring (7) present inside the valve body. (The set pressure can be changed using the adjustment bolts (11)). As long as the steam pressure exceeds the set pressure, the valve remains open. As soon as it comes below the set pressure, the spring force pushes the valve (3) back onto the seat (1).

The seat ring (10) guides the valve (3) back to the seat (1).

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 valve should always be mounted vertically upwards with its main axis kept vertical.
2. There should be no intervening valve or any fitting between the piping and the safety relief valve which could isolate the FMSRV (Refer to 2a).
3. The inlet connection should never be smaller than the valve inlet and output pipe should be either equal or larger than the valve outlet.
4. Where the outlet pipework is directed upwards a small bore drain should be provided at the lowest point. Take the drain to a place where discharge will not create any hazard or inconvenience (Refer to 2b).
5. Each safety relief valve should have its own discharge pipe.
6. Make sure that safety relief valve is set to the correct pressure.
7. safety relief valves should not be insulated.
8. Excessive pressure loss at the inlet of a safety relief valve when it operates will cause extremely rapid opening and closing of the valve, observed as chattering or hammering. This may result in reduced capacity as well as damage to seating faces and the other parts of the valve. When normal pressure is restored it is possible that the valve will leak. Therefore the Valve should be fitted 8-10 pipe diameters downstream of Converging or Diverging Fittings or Bends (Refer to 2c)

These valves are not suitable for mounting on boilers

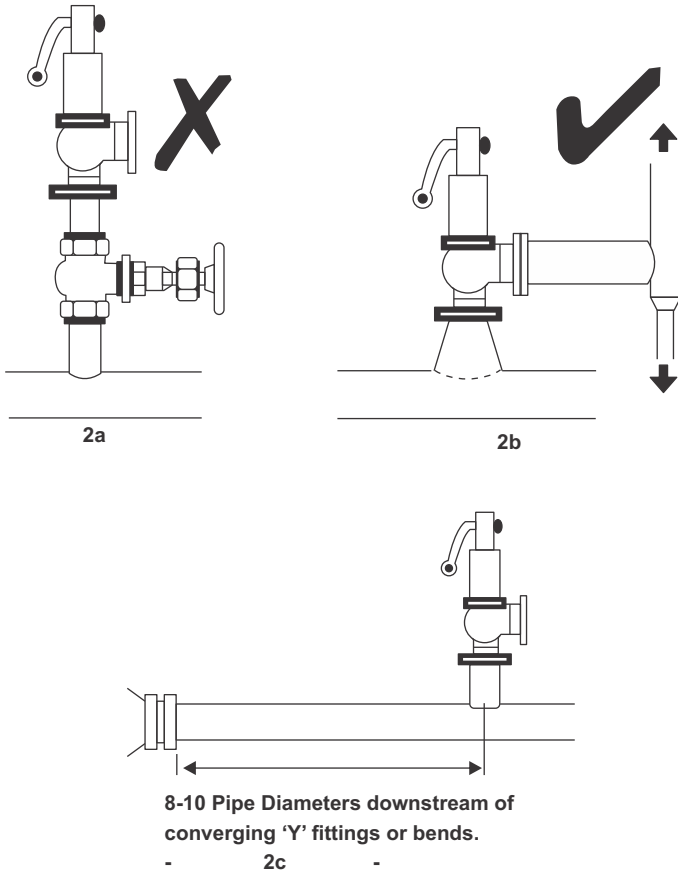


Figure 2: Correct Installation of Forbes Marshall Safety Relief Valve

6. Startup 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.

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

6.2 Safety relief valve setting : (Refer to Figure 1)

1. The safety relief valve should be set at a pressure, which is 10% above the working pressure of the system.
2. Forbes Marshall safety relief valve, FMSRV (DN20-50) comes with 6 color-coded springs w.r.t. set pressure ranges

White - 05 to 15 psi Yellow – 15 to 35 psi

Green – 35 to 75 psi Blue 75 to 125 psi

Red – 125 to 175 psi Black 175 – 250 psi

The range is marked on the safety relief valve cover body; safety relief valve can be set in this range.

3. To set the safety relief valve, please remove the cir clip, pin, lever **(13)** and cap.
4. Before setting of safety relief valve, please ensure that the safety relief valve discharge is routed at safe location.
5. Charge the steam line and ensure that the steam pressure is 10% more than the system operating pressure and test the safety relief valve by shutting down the downstream stop valve without the chance of downstream process being over pressurized.
6. If safety relief valve is not blowing at that pressure, then loosen the adjustment lock nut **(10)** and do the set pressure adjustment with adjustment bolt **(11)**. By rotating adjustment bolt in clockwise direction, set pressure increases and it decreases by rotating it in anticlockwise direction.
7. After setting the required set pressure, hold the adjustment bolt and tighten the adjustment lock nut **(10)**.

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 atmosphere. The product should then be allowed to cool.

7.1 Routine and Preventive Maintenance:

Sr.No	Parameters to be checked	Frequency for checking and maintaining						
		Immediately	Daily	Weekly	Monthly	Quarterly	Half yearly	Annually
1	Visual inspection for leakages		Y					
2	Testing of safety relief valve					Y		
3	Cleaning of internals							Y

*Re-certification by respective regulatory authorities as and when required.

7.2 Tool Kit:

To carry out any maintenance of the FMSRV use the tools mentioned in the table below.

Part	Tool	Size
For DN20		
Spindle lock nut	Open Spanner	24 mm (A/F)
Valve seat	Open Spanner	36/38 mm (A/F)
Adjustment bolt and lock nut	Open Spanner	16/17mm (A/F)
Blowdown ring lock nut	Open Spanner	8mm (A/F)
For DN25		
Spindle lock nut	Open Spanner	24mm (A/F)
Valve seat	Open Spanner	48 mm (A/F)
Adjust bolt and lock nut	Open Spanner	21mm (A/F)
Blowdown ring lock nut	Open Spanner	8mm (A/F)
For DN40		
Spindle lock nut	Open Spanner	30 mm (A/F)
Valve seat	Open Spanner	58mm (A/F)
Adjust bolt and lock nut	Open Spanner	26mm (A/F)
Blowdown ring lock nut	Open Spanner	8mm (A/F)
For DN50		
Spindle lock nut	Open Spanner	30 mm (A/F)
Valve seat	Open Spanner	71 mm (A/F)
Adjust bolt and lock nut	Open Spanner	30 mm (A/F)
Blowdown ring lock nut	Open Spanner	8mm (A/F)

7.3 Maintenance/Replacement Procedure : (Refer to Figure 1)

1. Before carrying out any maintenance on the valve, make sure that the system is isolated and depressurized.
2. Unscrew the whole safety release valve from the pipeline.
3. Remove the pin to release the easing lever **(13)**.
4. Remove the top cover.
5. Loosen the adjustment bolt locknut.
6. Rotate the adjustment bolt **(11)** anti clockwise to ease the spring tension inside the body.

Note: It is very important to ease off the spring tension before carrying out any further maintenance.

7. Clamp the Hexagonal valve seat to the vice.
8. Unscrew the blow down locking nut and screw **(15)**.
9. Use a pipe wrench to rotate the upper body to free the internals. A flat surface is provided on the body to get a good grip on the body.
10. Remove the whole internal assembly off the body valve.
11. Unscrew the seat ring **(2)** and clean the threads.
12. Clean the valve seat **(1)** and valve head **(3)**. Lap the head against seat in oscillation motion if required.
13. Reassemble the internals and fit it back in the valve body.
14. Fit the valve back on the pipeline.
15. For seat ring setting refer to section 7.4
16. Fit the easing lever **(6)** on the valve.
17. Set the valve to set pressure following the steps given in section 6.2.

7.4 Seat Ring Setting: (Refer to Figure 1)

To have the required reset pressure for a particular set pressure, the seat ring **(2)** should be adjusted after removing the seat ring locking screw **(15)**. Rotate the seat ring **(2)** in the clockwise direction towards the valve **(3)**. Once the seat ring **(2)** touches the valve **(3)**, rotate the seat ring **(2)** in anticlockwise direction, away from the valve **(3)** by $\frac{1}{4}$ of a turn. Ensure that the seat ring locking screw **(15)** is tightened and locked after adjustment.

8. Troubleshooting:

If the expected performance is unachievable after the installation of the valve, check the following points for appropriate corrective measures.

Failure Mode	Possible Cause	Remedy
Valve Leakage	Check for spring range	Refer to the spring ranges given in section 3.3
	Check for blow down ring setting	To have the required reset pressure for a particular set pressure, the blow down ring should be adjusted after removing the ring locking screw. Rotate the blow down ring in the clockwise direction towards the main valve head. Once the blow down ring touches the main valve head, rotate the ring in anticlockwise direction, away from the head by 1/4th of a turn. Ensure that the screw is tightened after adjustment.
	Valve seating surface dirty or damaged	It is usually sufficient to clean the seating surfaces and reassemble. If the seating surface has been damaged it is necessary to re-lap. When reassembling all foreign matter and scales should always be cleared away from the surrounding components, all lapping paste removed and seating surface cleaned.
Not Releasing the Pressure	Check the pressure setting of the valve	<ol style="list-style-type: none"> 1. It should be only 10% above the working pressure of the system 2. Make sure the spring range selected is not higher than mentioned in section 3.3, for a given pressure range.
Valve not giving popping action and delay in main valve head seating (blows off pressure till it drops off way below the set pressure)	Wrong Blow down ring setting (too far from the head)	To have the required reset pressure for a particular set pressure, the blow down ring should be adjusted after removing the ring locking screw. Rotate the blow down ring in the clockwise direction towards the main valve head. Once the blow down ring touches the main valve head, rotate the ring in anti-clockwise direction, away from the head by 1/4th of a turn. Ensure that the screw is tightened after adjustment.

9. Available Spares:

	ITEM NO	SPARE CONSIST OF	SPARE SPECIFICATION	SPARE CODE
FMSRV	VALVE HEAD AND SPINDLE KIT	(STEAM SERVICE) VALVE HEAD, SPINDLE, SPINDLE LOCK NUT, SEAT RING SCREW & NUT PACK OF 1 EACH	DN20	SPARE-20FMSRV-VHSKIT
		(STEAM SERVICE) VALVE HEAD, SPINDLE, SPINDLE LOCK NUT, SEAT RING SCREW & NUT 1 PACK OF EACH	DN25	SPARE-25FMSRV-VHSKIT
		(STEAM SERVICE) VALVE HEAD, SPINDLE, SPINDLE LOCK NUT, SEAT RING SCREW & NUT PACK OF 1 EACH	DN40	SPARE-40FMSRV-VHSKIT
		(STEAM SERVICE) VALVE HEAD, SPINDLE, SPINDLE LOCK NUT, SEAT RING SCREW & NUT PACK OF 1 EACH	DN50	SPARE-50FMSRV-VHSKIT
		(LIQUID SERVICE) VALVE HEAD, SPINDLE, SPINDLE LOCK NUT, SEAT RING SCREW & NUT PACK OF 1 EACH	DN20	SPARE-20FMSRVL-VHSKIT
		(LIQUID SERVICE) VALVE HEAD, SPINDLE, SPINDLE LOCK NUT, SEAT RING SCREW & NUT PACK OF 1 EACH	DN25	SPARE-25FMSRVL-VHSKIT
		(LIQUID SERVICE) VALVE HEAD, SPINDLE, SPINDLE LOCK NUT, SEAT RING SCREW & NUT PACK OF 1 EACH	DN40	SPARE-40FMSRVL-VHSKIT
		(LIQUID SERVICE) VALVE HEAD, SPINDLE, SPINDLE LOCK NUT, SEAT RING SCREW & NUT PACK OF 1 EACH	DN50	SPARE-50FMSRVL-VHSKIT
	SPINDLE AND LOCK NUT	SPINDLE & LOCK NUT PACK OF 1 EACH	DN20	SPARE-20FMSRV-SLKIT
		SPINDLE & LOCK NUT PACK OF 1 EACH	DN25	SPARE-25FMSRV-SLKIT
		SPINDLE & LOCK NUT PACK OF 1 EACH	DN40	SPARE-40FMSRV-SLKIT
		SPINDLE & LOCK NUT PACK OF 1 EACH	DN50	SPARE-50FMSRV-SLKIT
		SPINDLE (LIQUID SERVICE) & LOCK NUT PACK OF 1 EACH	DN20	SPARE-20FMSRVL-SLKIT
		SPINDLE (LIQUID SERVICE) & LOCK NUT PACK OF 1 EACH	DN25	SPARE-25FMSRVL-SLKIT
		SPINDLE (LIQUID SERVICE) & LOCK NUT PACK OF 1 EACH	DN40	SPARE-40FMSRVL-SLKIT
		SPINDLE (LIQUID SERVICE) & LOCK NUT PACK OF 1 EACH	DN50	SPARE-50FMSRVL-SLKIT
	SPRING & GUIDE KIT	SPRING 05-15-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN20	SPARE-20FMSRV-5-15SGKIT
	SPRING & GUIDE KIT	SPRING 15-35-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN20	SPARE-20FMSRV-15-35SGKIT
		SPRING 35-75-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN20	SPARE-20FMSRV-35-75SGKIT
		SPRING 75-125-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN20	SPARE-20FMSRV-75-125SGKIT
		SPRING 125-175-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN20	SPARE-20FMSRV-125-175SGKIT

	ITEM NO.	SPARE CONSIST OF	SPARE SPECIFICATION	SPARE CODE
FMSRV	SPRING & GUIDE KIT	SPRING 175-250-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN20	SPARE-20FMSRV-175-250SGKIT
		SPRING 05-15-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN25	SPARE-25FMSRV-5-15SGKIT
		SPRING15-35-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN25	SPARE-25FMSRV-15-35SGKIT
		SPRING 35-75-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN25	SPARE-25FMSRV-35-75SGKIT
		SPRING 75-125-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN25	SPARE-25FMSRV-75-125SGKIT
		SPRING125-175-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN25	SPARE-25FMSRV-125-175SGKIT
		SPRING 175-250-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN25	SPARE-25FMSRV-175-250SGKIT
		SPRING 05-15-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN40	SPARE-40FMSRV-5-15SGKIT
		SPRING 15-35-PSI,,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN40	SPARE-40FMSRV-15-35SGKIT
		SPRING 35-75-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN40	SPARE-40FMSRV-35-75SGKIT
		SPRING 75-125-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN40	SPARE-40FMSRV-75-140SGKIT
		SPRING125-175-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN40	SPARE-40FMSRV-140-175SGKIT
		SPRING 175-250-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN40	SPARE-40FMSRV-175-400SGKIT
		SPRING 05-15-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN50	SPARE-50FMSRV-5-15SGKIT
		SPRING 15-35-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN50	SPARE-50FMSRV-15-35SGKIT
		SPRING 35-75-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN50	SPARE-50FMSRV-35-75SGKIT
		SPRING 75-125-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN50	SPARE-50FMSRV-75-150SGKIT
		SPRING 125-175-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN50	SPARE-50FMSRV-150-175SGKIT
		SPRING 175-250-PSI,TOP AND BOTTOM SPRING GUIDE PACK OF 1 EACH	DN50	SPARE-50FMSRV-175-500SGKIT
	VALVE & SEAT KIT (GAS)	VALVE HEAD, SEAT, SEAT RING,RUBBER INSERT, SEAT RING SCREW& NUT PACK OF 1 EACH	DN20	SPARE-20FMSRV-VSGKIT

	የፕላንት	SPARE CONSIST OF	SPARE SPECIFICATION	SPARE CODE
FMSRV	VALVE & SEAT KIT (GAS)	VALVE HEAD,SEAT,SEAT RING,RUBBER INSERT ,SEAT RING SCREW& NUT PACK OF 1 EACH	DN25	SPARE-25FMSRV-VSGKIT
		VALVE HEAD,SEAT,SEAT RING,RUBBER INSERT ,SEAT RING SCREW& NUT PACK OF 1 EACH	DN40	SPARE-40FMSRV-VSGKIT
		VALVE HEAD,SEAT,SEAT RING,RUBBER INSERT ,SEAT RING SCREW& NUT PACK OF 1 EACH	DN50	SPARE-50FMSRV-VSGKIT
		VALVE HEAD,SEAT,SEAT RING,SEAT RING SCREW& NUT PACK OF 1 EACH	DN20	SPARE-20FMSRV-VSSKIT
		VALVE HEAD,SEAT,SEAT RING,SEAT RING SCREW& NUT PACK OF 1 EACH	DN25	SPARE-25FMSRV-VSSKIT
		VALVE HEAD,SEAT,SEAT RING,SEAT RING SCREW& NUT PACK OF 1 EACH	DN40	SPARE-40FMSRV-VSSKIT
		VALVE HEAD,SEAT,SEAT RING,SEAT RING SCREW& NUT PACK OF 1 EACH	DN50	SPARE-50FMSRV-VSSKIT
	ADJUSTMENT BOLT	ADJUSTMENT BOLT FOR LIQUID APPLICATION	DN20	SPARE-20FMSRV-ABKIT
		ADJUSTMENT BOLT FOR LIQUID APPLICATION	DN25	SPARE-25FMSRV-ABKIT
		ADJUSTMENT BOLT FOR LIQUID APPLICATION	DN40	SPARE-40FMSRV-ABKIT
		ADJUSTMENT BOLT FOR LIQUID APPLICATION	DN50	SPARE-50FMSRV-ABKIT

How to Order:

Example: 1 No. Forbes Marshall Forbes Marshall Safety Relief Valve, FMSRV, DN20 with BSPT ends and a set pressure of 6 bar g.

How to Order Spares:

Always order spares by using the description given in the column headed available spares. For codes refer user manual.

10. Warranty Period:

As per the ordering information and agreement in the contract.



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Codel International

Krohne Marshall

Forbes Vyncke

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