

## IBV Series

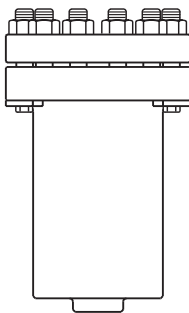
### Inverted Bucket Vertical Steam Traps

Installation and Maintenance Instructions

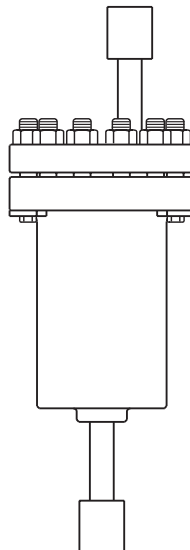
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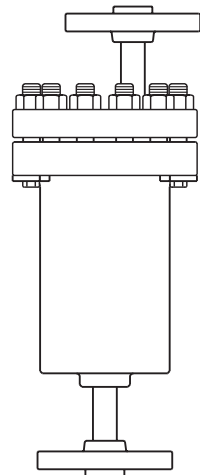
1. Safety information
2. General product information
3. Operation
4. Installation
5. Commissioning
6. Maintenance
7. Spare parts



Socket weld



Screwed



Flanged





# 1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

## 1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application.

The products listed below comply with the requirements of the Pressure Equipment Directive (PED) and carry the  mark when so required. It should be noted that products rated as 'SEP' are required by the Directive not to carry the  mark.

The products fall within the following Pressure Equipment Directive categories:

IBV size		Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
½" and ¾"	DN15 and DN20	2	1		
1"	DN25	3	2		
1½" and 2"	DN40 and DN50	3	2		
3"	DN80	4	3		

- i) The product has been specifically designed for use on steam, air or water/condensate which are in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

## 1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

## 1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

## 1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

## 1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

## 1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk? Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

## 1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

## 1.8 Temperature

Allow time for temperature to normalise after isolation to avoid the danger of burns.

## 1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

## 1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

## 1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

## 1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

### **1.13 Residual hazards**

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures of 538 °C (1000 °F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

### **1.14 Freezing**

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

### **1.15 Disposal**

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

### **1.16 Returning products**

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

## 2. General product information

### 2.1 Description

The IBV series inverted bucket vertical steam traps are suitable for use with saturated and superheated steam and in high pressure and high temperature applications. The IBV is fully automatic and has been designed in such a way that there is minimal friction from mechanism movement; valve closure is immediate, without any steam loss and the discharge action is positive with no equivocal phases.

#### Available types

<b>Series C</b>	<b>Carbon steel</b> body and cover	<b>See</b> TI-P067-10
<b>Series C-LF2</b>	<b>Carbon steel</b> body and cover with a material specification of <b>A350 LF2</b> for low temperature applications down to <b>-46 °C</b>	<b>See</b> TI-P067-13
<b>Series Z</b>	<b>Alloy steel</b> body and cover	<b>See</b> TI-P067-15

#### Optional extras


**Note:** The IBV steam trap may have been supplied with the following:

An **inbuilt stainless steel check valve**

**Please note** that this option is only available for units that have a  $\Delta P$  maximum differential pressure of 40 bar and above.

A **Stellite plug and seat**.

#### Standards

These steam traps are designed following the ASME VIII Mechanical Design Code and comply with the requirements of the Pressure Equipment Directive (PED) and carry the  mark when so required.

#### Certification

The product is available with material certification to EN 10204 3.1.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

**Note:** For product specific technical information see the noted TI sheet in 'Available types'.



Fig. 1 Typical flanged IBV

## 2.2 Sizes and pipe connections

Please note that all standard flanges (as noted below) are slip-on type. Weld-neck type flanges may have been supplied to special order.

1/2", 3/4", 1", 1 1/2", 2" and 3"

Screwed BSP or NPT

Socket weld, according to ASME B 16.11

1/2", 3/4", 1", 1 1/2", 2" and 3"

Flanged ASME B 16.5 ASME Class 150, 300, 600 and 900 (1500 available to special request Series C only)

DN15, DN20, DN25, DN40, DN50 and DN80

Flanged EN 1092 PN16, PN25, PN40, PN63 and PN100

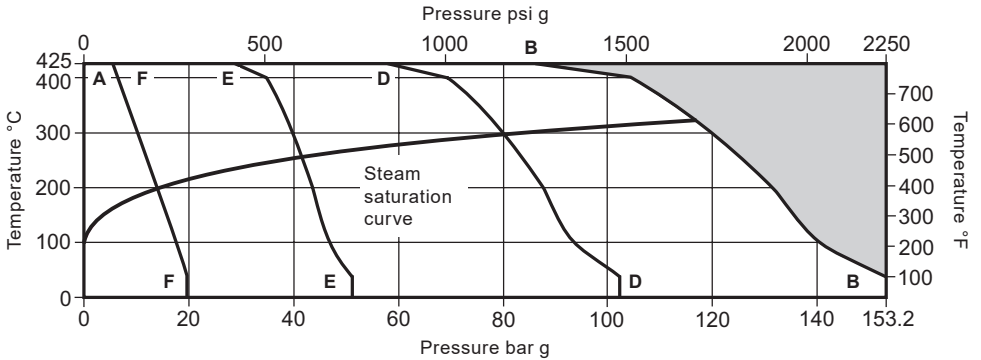
**Note:** that the flanged **ASME Class 1500** units are **limited to a body rating of ASME Class 900**.

## 2.3 IBV Pressure/temperature limits (ISO 6552)

<b>Series C</b>	<b>Screwed</b>						<b>Section 2.4,</b> pages 8 and 9
	<b>Socket weld</b>						
	<b>Flanged ASME</b>						
		Class 900	Class 600	Class 300	Class 150		
<b>Series C-LF2</b>	<b>Flanged EN1092-1</b>						<b>Section 2.5,</b> pages 10 and 11
	PN100	PN63	PN40	PN25	PN16		
	<b>Screwed</b>						<b>Section 2.6,</b> pages 12 and 13
	<b>Socket weld</b>						
<b>Flanged ASME</b>							
	Class 900	Class 600	Class 300	Class 150			
<b>Series Z</b>	<b>Flanged EN1092-1</b>						<b>Section 2.7,</b> pages 14 and 15
	PN100	PN63	PN40	PN25	PN16		
	<b>Screwed</b>						<b>Section 2.8,</b> pages 16 and 17
	<b>Socket weld</b>						
<b>Flanged ASME</b>							
	Class 900	Class 600	Class 300	Class 150			
<b>Series Z</b>	<b>Flanged EN1092-1</b>						<b>Section 2.9,</b> pages 18 and 19
	PN100	PN63	PN40	PN25	PN16		
	<b>Screwed</b>						<b>Section 2.8,</b> pages 16 and 17
	<b>Socket weld</b>						
<b>Flanged ASME</b>							
	Class 900	Class 600	Class 300	Class 150			

## 2.4 IBV Series C Pressure/temperature limits (ISO 6552)

### Screwed, Socket weld and Flanged ASME



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

\* Please note that the PMO (PS) is limited to the maximum  $\Delta P$  of the selected IBV.

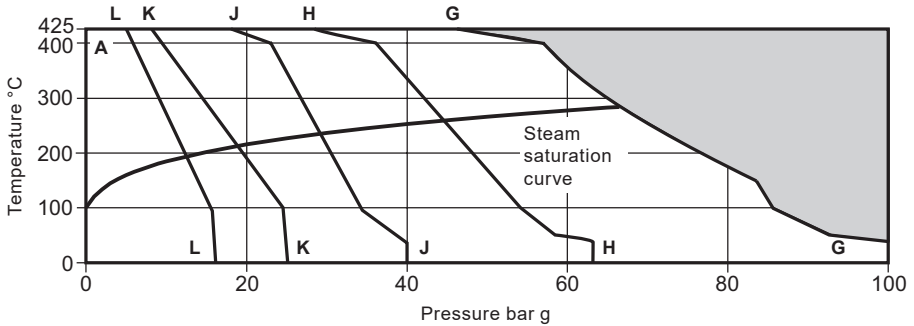
		Body design conditions	ASME Class 900
A-B-B	Screwed and Socket weld ASME Class 900	PMA - Maximum allowable pressure	153.2 bar g @ 38 °C      2 220 psi g @ 100
		TMA - Maximum allowable temperature	425 °C @ 86.3 bar g      800 @ 1235 psi g
		Minimum allowable temperature	-29 °C      -20 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	116.3 bar g @ 323 °C      1 688 psi g @ 613 °F
		TMO (TS) - Maximum operating temperature for saturated steam service	323 °C @ 116.3 bar g      613 °F @ 1 688 psi g
		Designed for a maximum cold hydraulic test pressure of:	229.8 bar g      3 330 psi g



<b>A-D-D</b>	<b>ASME Class 600</b>	PMA - Maximum allowable pressure	102.1 bar g @ 38 °C	1 480 @ 100 °F
		TMA - Maximum allowable temperature	425 @ 57.5 bar g	800 @ 825
		Minimum allowable temperature	-29 °C	-20 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	79.9 bar g @ 295 °C	1 159 psi g @ 564 °F
		TMO (TS) - Maximum operating temperature for saturated steam service	295 °C @ 79.9 bar g	564 °F @ 1 159 psi g
		Designed for a maximum cold hydraulic test pressure of:	153.1 bar g	2 175 psi g
<b>A-E-E</b>	<b>ASME Class 300</b>	PMA - Maximum allowable pressure	51.1 bar g @ 38 °C	740 psi g @ 100
		TMA - Maximum allowable temperature	425 °C @ 28.8 bar g	800 °F @ 410 psi g
		Minimum allowable temperature	-29 °C	-20 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	41.7 bar g @ 254 °C	605 psi g @ 489 °F
		TMO (TS) - Maximum operating temperature for saturated steam service	254 °C @ 41.7 bar g	489 °F @ 605 psi g
		Designed for a maximum cold hydraulic test pressure of:	76.6 bar g	1110 psi g
<b>A-F-F</b>	<b>ASME Class 150</b>	PMA - Maximum allowable pressure	19.6 bar g @ 38 °C	285 psi g @ 100 °F
		TMA - Maximum allowable temperature	425 °C @ 5.5 bar g	800 °F @ 80 psi g
		Minimum allowable temperature	-29 °C	-20 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	13.8 bar g @ 197 °C	200 psi g @ 387 °F
		TMO (TS) - Maximum operating temperature for saturated steam service	197 °C @ 13.8 bar g	387 °F @ 200 psi g
		Designed for a maximum cold hydraulic test pressure of:	29.4 bar g	427 psi g

## 2.5 IBV Series C Pressure/temperature limits (ISO 6552)

### Flanged EN1092-1



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

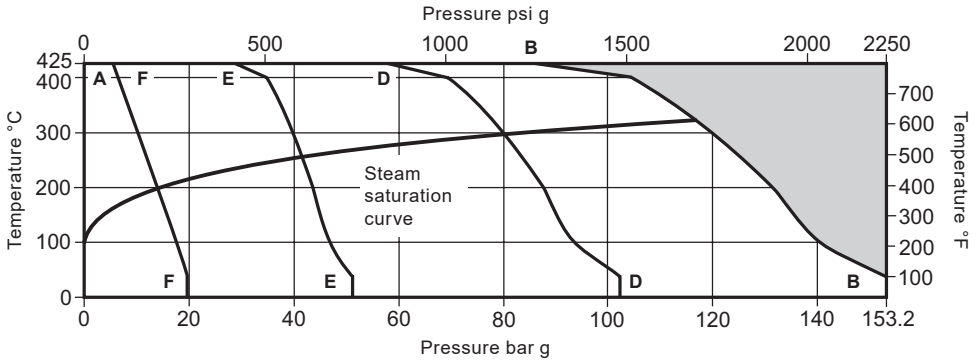
\* **Please note** that the PMO (PS) is limited to the maximum  $\Delta P$  of the selected IBV.

		Body design conditions	PN100
A-G-G	PN100	PMA - Maximum allowable pressure	100 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 44.9 bar g
		Minimum allowable temperature	-29 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	66 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	283 °C @ 44.9 bar g
		Designed for a maximum cold hydraulic test pressure of:	143 bar g
A-H-H	PN63	PMA - Maximum allowable pressure	63 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 28.3 bar g
		Minimum allowable temperature	-29 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	44 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	257 °C @ 28.3 bar g
		Designed for a maximum cold hydraulic test pressure of:	90 bar g

<b>A-J-J</b>	<b>PN40</b>	PMA - Maximum allowable pressure	40 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 17.9 bar g
		Minimum allowable temperature	-29 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	29 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	234 °C @ 17.5 bar g
		Designed for a maximum cold hydraulic test pressure of:	57.2 bar g
<b>A-K-K</b>	<b>PN25</b>	PMA - Maximum allowable pressure	25 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 11.2 bar g
		Minimum allowable temperature	-29 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	19 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	212 °C @ 11.2 bar g
		Designed for a maximum cold hydraulic test pressure of:	35.7 bar g
<b>A-L-L</b>	<b>PN16</b>	PMA - Maximum allowable pressure	16 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 7.1 bar g
		Minimum allowable temperature	-29 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	12 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	191 °C @ 7.1 bar g
		Designed for a maximum cold hydraulic test pressure of:	22.8 bar g

## 2.6 IBV Series C-LF2 Pressure/temperature limits (ISO 6552)

### Screwed, Socket weld and Flanged ASME



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

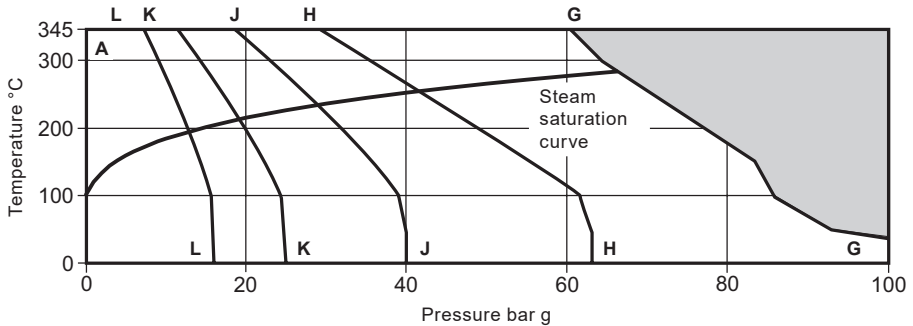
\* **Please note** that the PMO (PS) is limited to the maximum  $\Delta P$  of the selected IBV.

		Body design conditions	ASME Class 900
A-B-B	Screwed and Socket weld ASME Class 900	PMA - Maximum allowable pressure	153.2 bar g @ 38 °C    2222 psi g @ 100 °F
		TMA - Maximum allowable temperature	425 bar g @ 86.3 °C    800 °F @ 1 235 psi g
		Minimum allowable temperature	-46 °C    -50 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	116.3 bar g    1687 psi g
		TMO (TS) - Maximum operating temperature for saturated steam service	323 °C @ 112.7 bar g    613 °F @ 1635 psi g
		Designed for a maximum cold hydraulic test pressure of:	229.8 bar g    3330 psi g

<b>A-D-D</b>	<b>ASME Class 600</b>	PMA - Maximum allowable pressure	102.1 bar g @ 38 °C	1 480 psi g @ 100 °F
		TMA - Maximum allowable temperature	425 °C @ 57.5 bar g	800 °F @ 825 psi g
		Minimum allowable temperature	-46 °C	-50 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	79.9 bar g	1 159 psi g
		TMO (TS) - Maximum operating temperature for saturated steam service	295 °C @ 75.1 bar g	564 °F @ 1 089 psi g
		Designed for a maximum cold hydraulic test pressure of:	153.1 bar g	2 220 psi g
<b>A-E-E</b>	<b>ASME Class 300</b>	PMA - Maximum allowable pressure	51.1 bar g @ 38 °C	741 psi g @ 100 °F
		TMA - Maximum allowable temperature	425 °C @ 28.8 bar g	800 °F @ 410 psi g
		Minimum allowable temperature	-46 °C	-50 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	41.7 bar g	605 psi g
		TMO (TS) - Maximum operating temperature for saturated steam service	254 °C @ 37.6 bar g	489 °F @ 545 psi g
		Designed for a maximum cold hydraulic test pressure of:	76.6 bar g	1 110 psi g
<b>A-F-F</b>	<b>ASME Class 150</b>	PMA - Maximum allowable pressure	19.6 bar g @ 38 °C	284 psi g @ 100 °F
		TMA - Maximum allowable temperature	425 °C @ 5.5 bar g	800 °F @ 80 psi g
		Minimum allowable temperature	-46 °C	-50 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	14 bar g	203 psi g
		TMO (TS) - Maximum operating temperature for saturated steam service	197 °C @ 8.4 bar g	387 °F @ 122 psi g
		Designed for a maximum cold hydraulic test pressure of:	29.4 bar g	427 psi g

## 2.7 IBV Series C-LF2 Pressure/temperature limits (ISO 6552)

### Screwed, Socket weld and Flanged EN1092-1



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

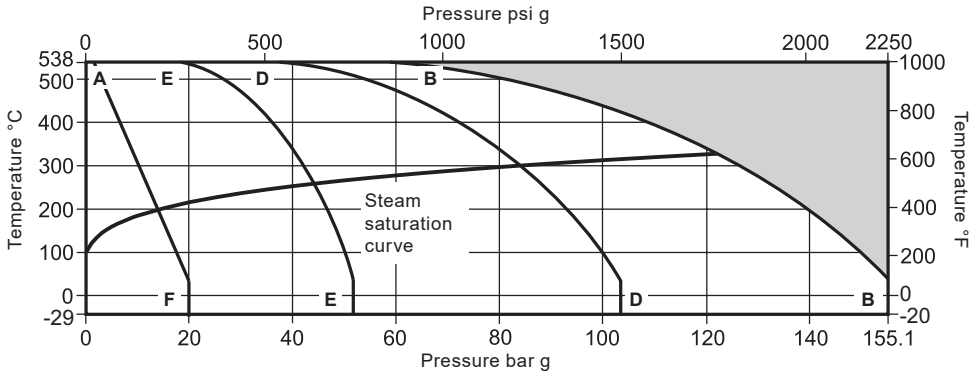
\* **Please note** that the PMO (PS) is limited to the maximum  $\Delta P$  of the selected IBV.

		Body design conditions	PN100
A-G-G	PN100	PMA - Maximum allowable pressure	100 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 44.9 bar g
		Minimum allowable temperature	-46 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	66 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	283 °C @ 60.4 bar g
		Designed for a maximum cold hydraulic test pressure of:	143 bar g
A-H-H	PN63	PMA - Maximum allowable pressure	63 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 28.3 bar g
		Minimum allowable temperature	-46 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	44 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	257 °C @ 29.4 bar g
		Designed for a maximum cold hydraulic test pressure of:	90 bar g

<b>A-J-J</b>	<b>PN40</b>	PMA - Maximum allowable pressure	40 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 17.9 bar g
		Minimum allowable temperature	-46 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	29 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	234 °C @ 18.6 bar g
		Designed for a maximum cold hydraulic test pressure of:	57.2 bar g
<b>A-K-K</b>	<b>PN25</b>	PMA - Maximum allowable pressure	25 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 11.2 bar g
		Minimum allowable temperature	-46 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	19 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	212 °C @ 11.6 bar g
		Designed for a maximum cold hydraulic test pressure of:	35.7 bar g
<b>A-L-L</b>	<b>PN16</b>	PMA - Maximum allowable pressure	16 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 7.1 bar g
		Minimum allowable temperature	-46 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	12 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	191 °C @ 7.4 bar g
		Designed for a maximum cold hydraulic test pressure of:	22.8 bar g

## 2.8 IBV Series Z Pressure/temperature limits (ISO 6552)

### Screwed, Socket weld and Flanged ASME



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

\* Please note that the PMO is limited to the maximum  $\Delta P$  of the selected IBV.

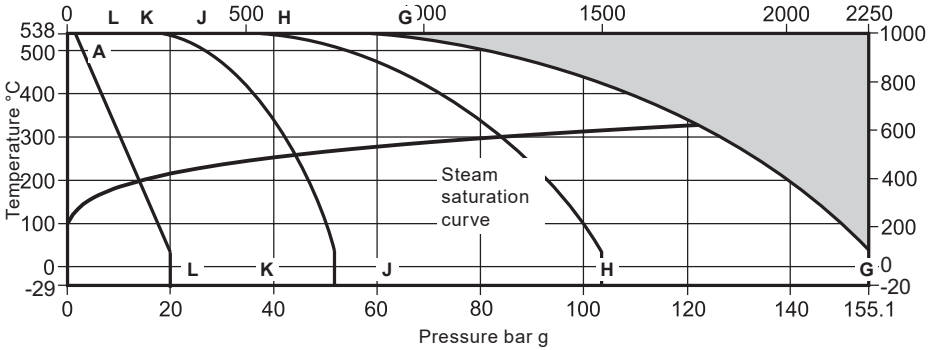
		Body design conditions	ASME Class 900	
A-B-B	Screwed and Socket weld ASME Class 900	PMA - Maximum allowable pressure	155.1 bar g @ 38 °C	2250 psi g @ 100 °F
		TMA - Maximum allowable temperature	538 °C @ 55.3 bar g	1000 °F @ 800 psi g
		Minimum allowable temperature	-29 °C      -20 °F	
		* PMO - Maximum operating pressure for saturated steam service	123 bar g @ 327 °C	1793 psi g
		TMO - Maximum operating temperature for saturated steam service	327 °C @ 123 bar g	622 °F @ 802 psi g
		Designed for a maximum cold hydraulic test pressure of:	232.6 bar g	3375 psi g



<b>A-D-D</b>	<b>ASME Class 600</b>	PMA - Maximum allowable pressure	103.4 bar g @ 38 °C	1 500 psi g @ 100 °F
		TMA - Maximum allowable temperature	538 °C @ 36.9 bar g	1 000 °F @ 535 psi g
		Minimum allowable temperature	-29 °C	-20 °F
		* PMO - Maximum operating pressure for saturated steam service	85.6 bar g @ 300 °C	1 241 psi g
		TMO - Maximum operating temperature for saturated steam service	300 °C @ 85.6 bar g	573 °F @ 535 psi g
		Designed for a maximum cold hydraulic test pressure of:	155.1 bar g	2 250 psi g
<b>A-E-E</b>	<b>ASME Class 300</b>	PMA - Maximum allowable pressure	51.7 bar g @ 38 °C	750 psi g @ 100 °F
		TMA - Maximum allowable temperature	538 °C @ 18.4 bar g	1 000 °F @ 265 psi g
		Minimum allowable temperature	-29 °C	-20 °F
		* PMO - Maximum operating pressure for saturated steam service	45.6 bar g @ 259 °C	661 psi g
		TMO - Maximum operating temperature for saturated steam service	259 °C @ 45.6 bar g	499 °F @ 267 psi g
		Designed for a maximum cold hydraulic test pressure of:	77.5 bar g	1 125 psi g
<b>A-F-F</b>	<b>ASME Class 150</b>	PMA - Maximum allowable pressure	19.6 bar g @ 38 °C	290 psi g @ 100 °F
		TMA - Maximum allowable temperature	538 °C @ 1.4 bar g	1 000 °F @ 20 psi g
		Minimum allowable temperature	-29 °C	-20 °F
		* PMO - Maximum operating pressure for saturated steam service	13.8 bar g @ 197 °C	200 psi g
		TMO - Maximum operating temperature for saturated steam service	197 °C @ 5.5 bar g	387 °F @ 80 psi g
		Designed for a maximum cold hydraulic test pressure of:	29.7 bar g	435 psi g

## 2.9 IBV Series Z Pressure/temperature limits (ISO 6552)

### Flanged EN1092-1



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

\* **Please note** that the PMO is limited to the maximum  $\Delta P$  of the selected IBV.

		Body design conditions	PN100
A-G-G	PN100	PMA - Maximum allowable pressure	100 bar g @ 50 °C
		TMA - Maximum allowable temperature	538 °C @ 37.1 bar g
		Minimum allowable temperature	-29 °C
		* PMO - Maximum operating pressure for saturated steam service	99.4 bar g @ 311 °C
		TMO - Maximum operating temperature for saturated steam service	63 bar g @ 279 °C
		Designed for a maximum cold hydraulic test pressure of:	143 bar g
A-H-H	PN63	PMA - Maximum allowable pressure	63 bar g @ 50 °C
		TMA - Maximum allowable temperature	538 °C @ 23.4 bar g
		Minimum allowable temperature	-29 °C
		* PMO - Maximum operating pressure for saturated steam service	63 bar g @ 279 °C
		TMO - Maximum operating temperature for saturated steam service	279 °C @ 63 bar g
		Designed for a maximum cold hydraulic test pressure of:	90 bar g

<b>A-J-J</b>	<b>PN40</b>	PMA - Maximum allowable pressure	40 bar g @ 50 °C
		TMA - Maximum allowable temperature	538 °C @ 14.8 bar g
		Minimum allowable temperature	-29 °C
		* PMO - Maximum operating pressure for saturated steam service	40 bar g @ 251 °C
		TMO - Maximum operating temperature for saturated steam service	251 °C @ 40 bar g
		Designed for a maximum cold hydraulic test pressure of:	57.2 bar g
<b>A-K-K</b>	<b>PN25</b>	PMA - Maximum allowable pressure	25 bar g @ 50 °C
		Minimum allowable temperature	-29 °C
		* PMO - Maximum operating pressure for saturated steam service	25 bar g @ 226 °C
		TMO - Maximum operating temperature for saturated steam service	226 °C @ 25 bar g
		Designed for a maximum cold hydraulic test pressure of:	35.7 bar g
<b>A-L-L</b>	<b>PN16</b>	PMA - Maximum allowable pressure	16 bar g @ 50 °C
		TMA - Maximum allowable temperature	538 °C @ 5.9 bar g
		Minimum allowable temperature	-29 °C
		* PMO - Maximum operating pressure for saturated steam service	16 bar g @ 204 °C
		TMO - Maximum operating temperature for saturated steam service	204 °C @ 16 bar g
		Designed for a maximum cold hydraulic test pressure of:	22.8 bar g

## 3. Operation

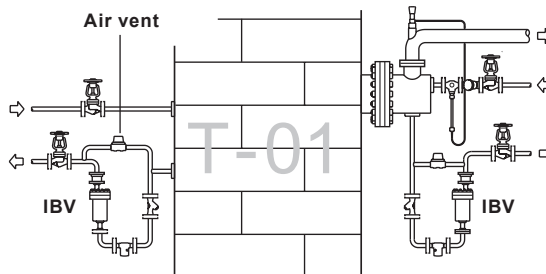
Under most conditions the trap will discharge condensate with a 'blast' type action. Under low load and/or low pressure applications the discharge may tend to 'dribble'.  
Condensate is discharged at steam temperature so due care must be given to the site of the discharge.

## 4. Installation

**Note: Before actioning any installation observe the 'Safety information' in Section 1.**

Referring to the installation and maintenance instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation:

1. Check materials, pressure and temperature and their maximum values.  
If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure that a safety device is included in the system to prevent over-pressurisation.
2. Determine the correct installation situation and the direction of fluid flow.
3. Remove protective covers from all connections.
4. The trap must be installed with the body upright so that the bucket is rising and falling vertically. The inlet should be at the bottom with the trap installed below the drain point so that a water seal can be maintained around the open end of the bucket. When superheat conditions exist the trap body may need to be primed with water prior to steam being turned on to avoid steam blowing through the trap. Inverted bucket steam traps do not permit rapid release of air. On process applications, in particular, this can lead to slow warm-up times and waterlogging of the steam space. A separate external air vent is therefore required in parallel to vent air efficiently. Any bypass should be positioned above the trap. If it is below, and is leaking or left open, the waterseal could be blown away leading to steam wastage. Where inverted bucket traps are fitted in exposed conditions the possibility of freezing damage can be reduced by thermal insulation.



**Note:** If the trap is to discharge to atmosphere ensure it is to a safe place, the discharging fluid may be at a temperature of 100 °C.

**Fig. 2 Typical application**

## 5. Commissioning

After installation or maintenance ensure that the system is fully functioning. Carry out tests on any alarms or protective devices.

## 6. Maintenance

**Note:** Before actioning any maintenance observe the 'Safety information' in Section 1.

**General note** - On the cover of the IBV there is a 3/8" hole, threaded and plugged, to eliminate any water discharge after being hydraulically tested before leaving the factory. This hole can be reopened on site for the customer to perform periodic hydro testing.

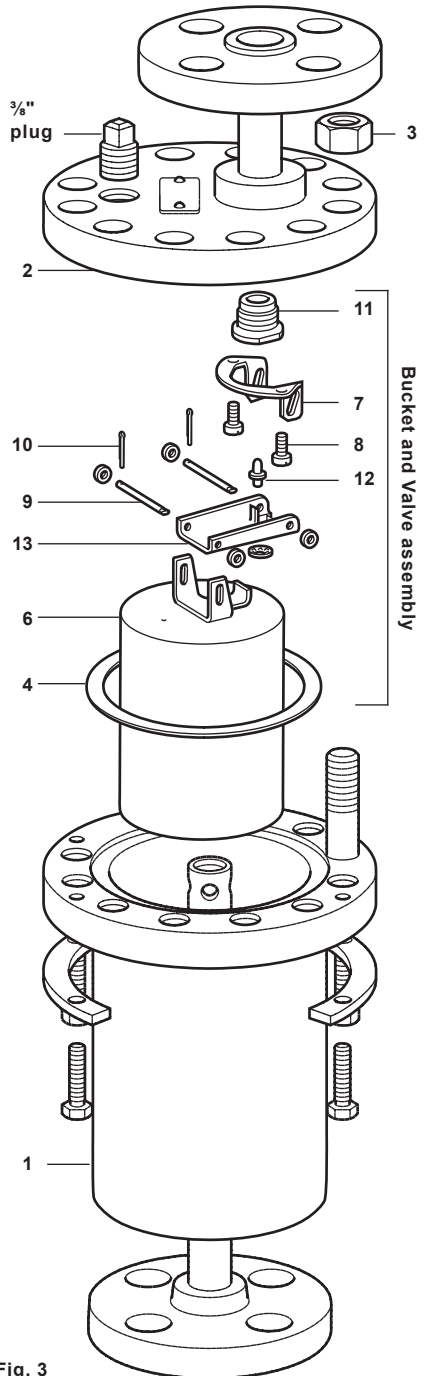
Safety note: The body/cover gasket contains a thin stainless steel support ring which may cause physical injury if not handled and disposed of carefully.

**6.1** Before undertaking any maintenance on the trap it must be isolated from both the supply line and return line and any pressure allowed to safely normalise to atmosphere. The trap should then be allowed to cool. When reassembling, ensure that all joint faces are clean.

**For 'How to fit the valve and seat assembly',  
see page 22**

## 6.2 How to fit the valve and seat assembly:

- Disconnect the outlet connection and after undoing the cover bolts (3) remove the cover (2) and valve seat (11) together with bucket assembly from the body (1).
- Unhook the bucket (6) from the valve lever (13).
- Remove the bracket (7) by undoing the two screws (8).
- Remove the valve seat (11). The valve seat is spherically ground so that a seal is made at the sealing face. When fitting a new valve seat, it is extremely important to ensure that the joint faces are clean, and STAG jointing compound should be applied to the threaded portion.
- Screw in a new valve seat (11), to the recommended torque (see Table 1).
- Fit a new bracket and valve lever (7 + 13), using new screws (8) supplied. Tighten these after checking that the valve head (12) is properly aligned to the valve seat orifice (11).
- Hook the bucket (6) onto the valve lever (13).
- Using a new gasket (4), refit the cover to the recommended torque, see Table 1 and reconnect the outlet to the pipework.





## 6.3 How to fit the check valve assembly:

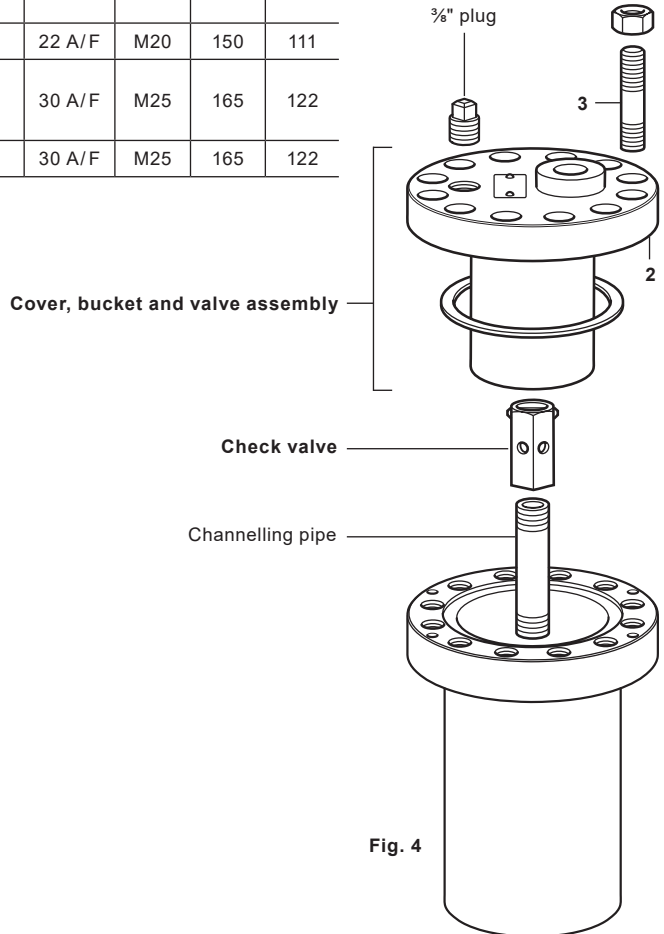
- Remove the cover (2) together with the bucket and valve assembly.
- Remove the check valve and adaptor (where fitted).

Fig. 3



**Table 1** Recommended tightening torques

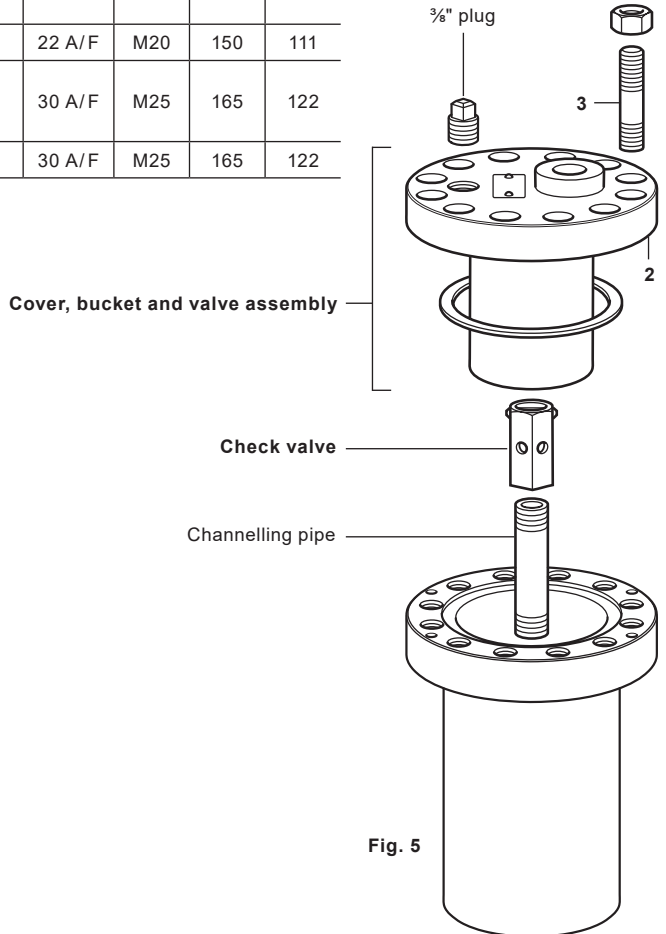
No.	Part	Size	or		Series C and C-LF2		
					N m	lbf ft	
3	Cover bolt	½" and ¾"	DN15 and DN20	24 A/F	M16	125	92
		1"	DN25	30 A/F	M20	247	182
		1½" and 2"	DN40 and DN50	32 A/F	M22	407	300
		3"	DN80	41 A/F	M27	724	534
11 See Fig. 6	Valve seat	½" and ¾"	DN15 and DN20	22 A/F	M20	150	111
		1"	DN25	22 A/F	M20	150	111
		1½" and 2"	DN40 and DN50	30 A/F	M25	165	122
		3"	DN80	30 A/F	M25	165	122

**Series Z**  
See page 24



**Table 1** Recommended tightening torques

No.	Part	Size	or		Series Z		
					N m	lbf ft	
3	Cover bolt	½" and ¾"	DN15 and DN20	24 A/F	M16	133	98
		1"	DN25	30 A/F	M20	263	194
		1½" and 2"	DN40 and DN50	32 A/F	M22	432	319
		3"	DN80	41 A/F	M27	770	568
11 See Fig. 6	Valve seat	½" and ¾"	DN15 and DN20	22 A/F	M20	150	111
		1"	DN25	22 A/F	M20	150	111
		1½" and 2"	DN40 and DN50	30 A/F	M25	165	122
		3"	DN80	30 A/F	M25	165	122





# 7. Spare parts

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

## Available spares

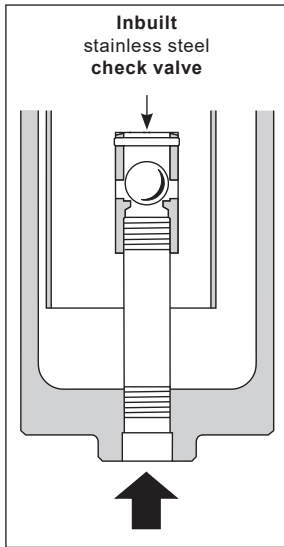
Valve assembly	4, 7, 8, 9, 10, 11, 12, 13
Bucket assembly	4, 6, 9, 10
Cover gasket (packet of 3)	4

## How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the type of trap, pressure rating and size and type of the connections.

**Example:** 1 - Valve assembly for a Spirax Sarco IBV-C-116-110-3"- Flanged ASME Class 600 inverted bucket vertical steam trap.

### Optional extra



**Please note** that this option is only available for units that have a  $\Delta P$  maximum differential pressure of 40 bar and above - See the product specific product name-plate along with the relevant Technical Information sheet, as noted on page 5, for clarification.

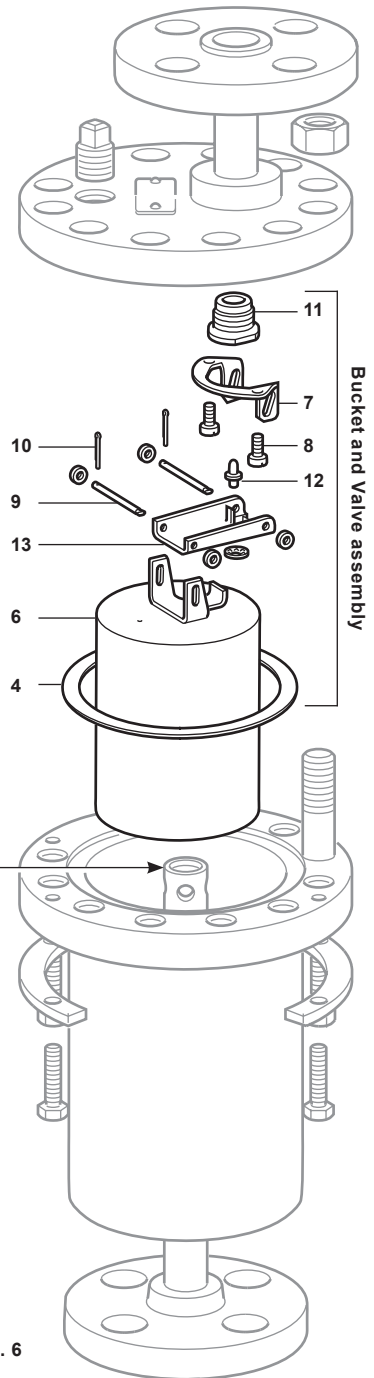


Fig. 6





