

spirax sarco

IBV Series C, Z, C-LF2 Inverted Bucket Vertical Steam Trap

Description

The IBV series inverted bucket steam trap is manufactured in three different body and cover materials. C Series (carbon steel), Z Series (alloy steel), and C-LF2 series (carbon steel, A350 LF2), with internal components being made of stainless steel. It is 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. The standard version is supplied with bolted support brackets.

On the cover of the IBV there is a 3/8" NPT hole, threaded and plugged.

Available types

Series C	Carbon steel body and cover
Series Z	Alloy steel body and cover
Series C-LF2	Carbon steel body and cover with a material specification of A350 LF2 for low temperature applications down to -50°F (-46°C). Available upon request

Standards

This steam trap is designed following the ASME VIII Directive and complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** 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.

Optional extras

On request the IBV steam trap can be equipped with the following:

An inbuilt stainless steel check valve

Please note that this option is only available for units that have a ΔP maximum differential pressure of 580 psi (40 bar) and above - See the IBV product nomenclature and selection guide on page 6 for clarification.

A Stellite plug and seat.

Sizes and pipe connections

Please note that all standard flanges (as noted below) will be slip-on type. Weld-neck type flanges can be supplied to special order and must be specified at the time of order placement.

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

Socket weld, according to ASME B 16.11, screwed NPT optional

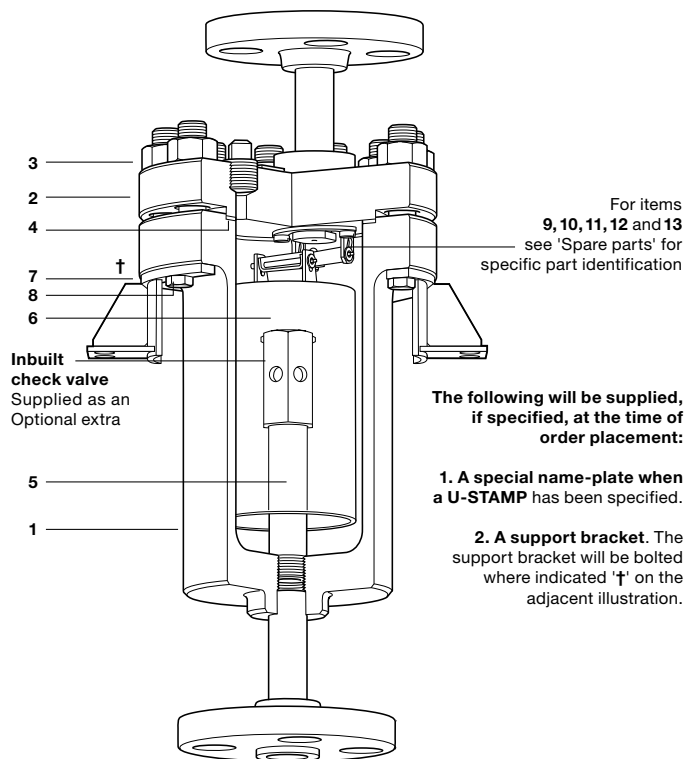
1/2", 3/4", 1", 1 1/2", 2" and 3"

Flanged ASME B 16.5 ASME class 150, 300, 600, 900 and 1500*

Optional: DN15, DN20, DN25, DN40, DN50 and DN80

Flanged EN 1092 PN16, PN25, PN40, PN63, PN100 and PN160*

Note: that the flanged **ASME class 1500** and **EN 1092 PN160** units are **limited to a body rating of ASME class 900**.



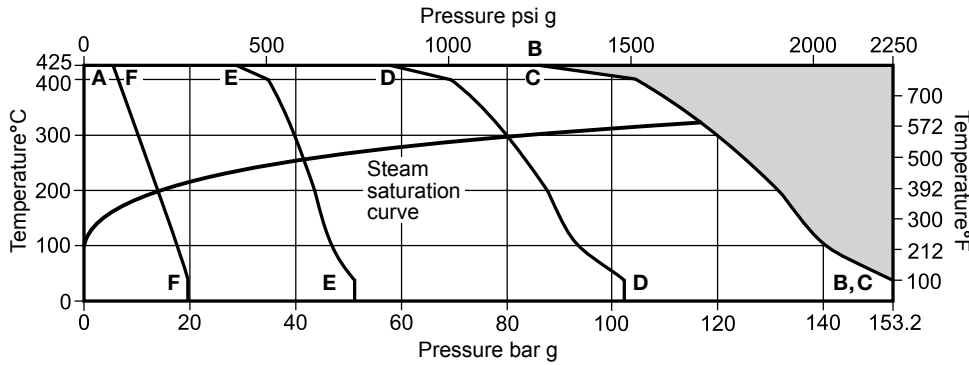
No.	Part	Material	
1	Body	C: Carbon steel	U STAMP ASME SA266 CL.2 PED ASTM ASME A266 CL.2
		Z: Alloy steel	U STAMP ASME SA182 F22 CL.3 PED ASTM A182 F22 CL.3
		C-LF2: Carbon steel	U STAMP ASME SA350 LF2 PED ASTM ASME A350 LF2
2	Cover	C: Carbon steel	ASTM A105
		Z: Alloy steel	ASTM A182 F11
		C-LF2: Carbon steel	ASTM A350 LF2
3	Cover bolts	C: Carbon steel	A193 B7
		NACE version (external only)	ASTM A479 XM-19
		Z: Alloy steel	A193 B16
		NACE version (external only)	ASTM A479 XM-19
		C-LF2: Carbon steel	A193 B8
		NACE version (external only)	ASTM A479 XM-19
4	Cover gasket	Reinforced graphite	
5	Channelling pipe	Stainless steel	
6	Bucket	Stainless steel	AISI 316
7	Bracket	Carbon steel	A516 Gr. 70
8	Bracket screw	Stainless steel	AISI 316
9	Lever pin	Stainless steel	AISI 316
10	Split pin	Stainless steel	AISI 316
11	Valve seat	Stainless steel	400 Series
12	Valve head	Stainless steel	400 Series
13	Valve lever	Stainless steel	AISI 316

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

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Pressure / temperature limits (ISO 6552) - C Series Screwed, Socket weld and Flanged ASME



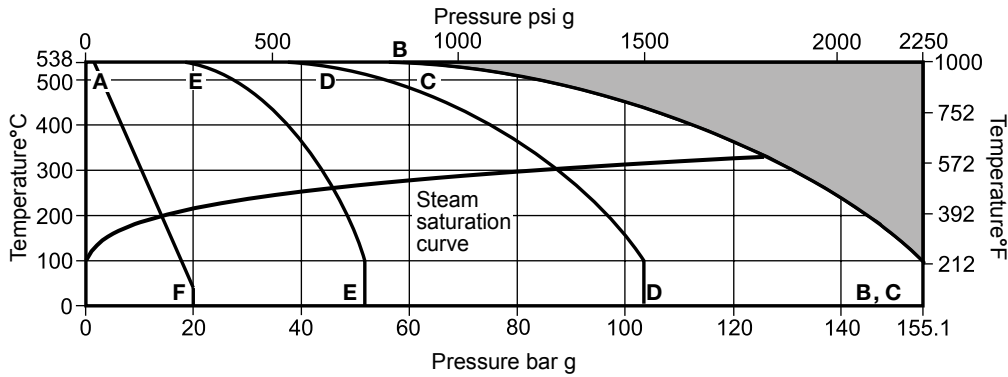
The product must not be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

*** Please note that the PMO is limited to the maximum ΔP of the selected IBV.**

A-B-B and Socket weld	Body design conditions	ASME class 900
	PMA - Maximum allowable pressure	2222 psi g @ 100°F (153.2 bar g @ 38°C)
	TMA - Maximum allowable temperature	797°F @ 1251 psi g (425°C @ 86.3 bar g)
	Minimum allowable temperature	-20°F (-29°C)
	* PMO - Maximum operating pressure for saturated steam service	1687 psi g (116.3 bar g)
A-C-C ASME class 900	TMO - Maximum operating temperature	797°F @ 1251 psi g (425°C @ 86.3 bar g)
	Minimum operating temperature	32°F (0°C)
	Designed for a maximum cold hydraulic test pressure of:	3333 psi g (229.8 bar g)
	Body design conditions	ASME class 600
	PMA - Maximum allowable pressure	1453 psi g @ 100°F (100.2 bar g @ 38°C)
A-D-D ASME class 600	TMA - Maximum allowable temperature	797°F @ 834 psi g (425°C @ 57.5 bar g)
	Minimum allowable temperature	-20°F (-29°C)
	* PMO - Maximum operating pressure for saturated steam service	1159 psi g (79.9 bar g)
	TMO - Maximum operating temperature	797°F @ 834 psi g (425°C @ 57.5 bar g)
	Minimum operating temperature	32°F (0°C)
A-E-E ASME class 300	Designed for a maximum cold hydraulic test pressure of:	2175 psi g (150 bar g)
	Body design conditions	ASME class 300
	PMA - Maximum allowable pressure	741 psi g @ 100°F (51.1 bar g @ 38°C)
	TMA - Maximum allowable temperature	797°F @ 418 psi g (425°C @ 28.8 bar g)
	Minimum allowable temperature	-20°F (-29°C)
A-F-F ASME class 150	* PMO - Maximum operating pressure for saturated steam service	605 psi g (41.7 bar g)
	TMO - Maximum operating temperature	797°F @ 418 psi g (425°C @ 28.8 bar g)
	Minimum operating temperature	32°F (0°C)
	Designed for a maximum cold hydraulic test pressure of:	1111 psi g (76.6 bar g)
	A-F-F ASME class 150	Body design conditions
PMA - Maximum allowable pressure		284 psi g @ 100°F (19.6 bar g @ 38°C)
TMA - Maximum allowable temperature		797°F @ 80 psi g (425°C @ 5.5 bar g)
Minimum allowable temperature		-20°F (-29°C)
* PMO - Maximum operating pressure for saturated steam service		203 psi g (14 bar g)
A-F-F ASME class 150	TMO - Maximum operating temperature	797°F @ 80 psi g (425°C @ 5.5 bar g)
	Minimum operating temperature	32°F (0°C)
	Designed for a maximum cold hydraulic test pressure of:	426 psi g (29.4 bar g)

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Pressure / temperature limits (ISO 6552) - Z Series Screwed, Socket weld and Flanged ASME



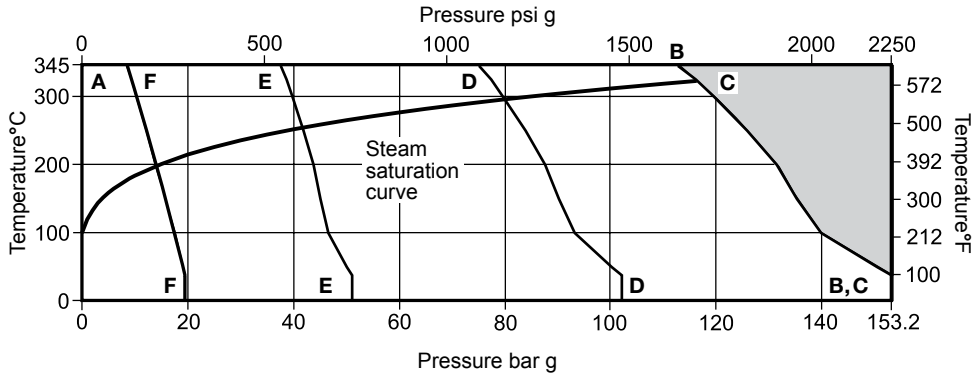
The product must not be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

*** Please note that the PMO is limited to the maximum ΔP of the selected IBV.**

A-B-B and Socket weld	Screwed	Body design conditions	ASME class 900	
		PMA - Maximum allowable pressure	2249 psi g @ 122°F	(155.1 bar g @ 50°C)
		TMA - Maximum allowable temperature	1000°F @ 802 psi g	(538°C @ 55.3 bar g)
		Minimum allowable temperature	-20°F	(-29°C)
A-C-C ASME class 900		* PMO - Maximum operating pressure for saturated steam service	1792 psi g	(123.6 bar g)
		TMO - Maximum operating temperature	1000°F @ 802 psi g	(538°C @ 55.3 bar g)
		Minimum operating temperature	32°F	(0°C)
		Designed for a maximum cold hydraulic test pressure of:	3375 psi g	(232.7 bar g)
A-D-D ASME class 600		Body design conditions	ASME class 600	
		PMA - Maximum allowable pressure	1500 psi g @ 122°F	(103.4 bar g @ 50°C)
		TMA - Maximum allowable temperature	1000°F @ 535 psi g	(538°C @ 36.9 bar g)
		Minimum allowable temperature	-20°F	(-29°C)
		* PMO - Maximum operating pressure for saturated steam service	1241 psi g	(85.6 bar g)
		TMO - Maximum operating temperature	1000°F @ 535 psi g	(538°C @ 36.9 bar g)
A-E-E ASME class 300		Minimum operating temperature	32°F	(0°C)
		Designed for a maximum cold hydraulic test pressure of:	2249 psi g	(155.1 bar g)
		Body design conditions	ASME class 300	
		PMA - Maximum allowable pressure	750 psi g @ 122°F	(51.7 bar g @ 50°C)
		TMA - Maximum allowable temperature	1000°F @ 267 psi g	(538°C @ 18.4 bar g)
		Minimum allowable temperature	-20°F	(-29°C)
A-F-F ASME class 150		* PMO - Maximum operating pressure for saturated steam service	661 psi g	(45.6 bar g)
		TMO - Maximum operating temperature	1000°F @ 267 psi g	(538°C @ 18.4 bar g)
		Minimum operating temperature	32°F	(0°C)
		Designed for a maximum cold hydraulic test pressure of:	1124 psi g	(77.5 bar g)
		Body design conditions	ASME class 150	
		PMA - Maximum allowable pressure	284 psi g @ 122°F	(19.6 bar g @ 50°C)
	TMA - Maximum allowable temperature	1000°F @ 20 psi g	(538°C @ 1.4 bar g)	
	Minimum allowable temperature	-20°F	(-29°C)	
	* PMO - Maximum operating pressure for saturated steam service	203 psi g	(14 bar g)	
	TMO - Maximum operating temperature	1000°F @ 80 psi g	(538°C @ 5.5 bar g)	
	Minimum operating temperature	32°F	(0°C)	
	Designed for a maximum cold hydraulic test pressure of:	426 psi g	(29.4 bar g)	

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Pressure / temperature limits (ISO 6552) - C-LF2 Series 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 ΔP of the selected IBV.

A-B-B and Socket weld	Body design conditions	ASME class 900
	PMA - Maximum allowable pressure	2222 psi g @ 100°F (153.2 bar g @ 38°C)
	TMA - Maximum allowable temperature	653°F @ 1635 psi g (345°C @ 112.7 bar g)
	Minimum allowable temperature	-50°F (-46°C)
	* PMO - Maximum operating pressure for saturated steam service	1687 psi g (116.3 bar g)
	TMO - Maximum operating temperature	653°F @ 1635 psi g (345°C @ 112.7 bar g)
A-C-C ASME class 900	Minimum operating temperature	32°F (0°C)
	Designed for a maximum cold hydraulic test pressure of:	3333 psi g (229.8 bar g)
	Body design conditions	ASME class 600
	PMA - Maximum allowable pressure	1453 psi g @ 100°F (100.2 bar g @ 38°C)
	TMA - Maximum allowable temperature	653°F @ 1089 psi g (345°C @ 75.1 bar g)
	Minimum allowable temperature	-50°F (-46°C)
A-D-D ASME class 600	* PMO - Maximum operating pressure for saturated steam service	1159 psi g (79.9 bar g)
	TMO - Maximum operating temperature	653°F @ 1089 psi g (345°C @ 75.1 bar g)
	Minimum operating temperature	32°F (0°C)
	Designed for a maximum cold hydraulic test pressure of:	2175 psi g (150 bar g)
	Body design conditions	ASME class 300
	PMA - Maximum allowable pressure	741 psi g @ 100°F (51.1 bar g @ 38°C)
A-E-E ASME class 300	TMA - Maximum allowable temperature	653°F @ 545 psi g (345°C @ 37.6 bar g)
	Minimum allowable temperature	-50°F (-46°C)
	* PMO - Maximum operating pressure for saturated steam service	605 psi g (41.7 bar g)
	TMO - Maximum operating temperature	653°F @ 545 psi g (345°C @ 37.6 bar g)
	Minimum operating temperature	32°F (0°C)
	Designed for a maximum cold hydraulic test pressure of:	1111 psi g (76.6 bar g)
A-F-F ASME class 150	Body design conditions	ASME class 150
	PMA - Maximum allowable pressure	284 psi g @ 100°F (19.6 bar g @ 38°C)
	TMA - Maximum allowable temperature	653°F @ 122 psi g (345°C @ 8.4 bar g)
	Minimum allowable temperature	-50°F (-46°C)
	* PMO - Maximum operating pressure for saturated steam service	203 psi g (14 bar g)
	TMO - Maximum operating temperature	653°F @ 122 psi g (345°C @ 8.4 bar g)
Minimum operating temperature	32°F (0°C)	
Designed for a maximum cold hydraulic test pressure of:	426 psi g (29.4 bar g)	

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IBV Series Capacities

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (lbs/hr) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

- a) The hourly amount of condensate to be discharged, inclusive of the safety factor: x 1.5 for continuous use, x 2 to x 3 for intermittent use.
- b) The effective differential pressure.

Working example:

Condensate discharge = 1000 lbs/hr (500 kg/h)
 Effective differential pressure = 450 psi (30 bar)
 Upstream pressure = 650 psig (45 bar g)
 Backpressure = 220 psig (15 bar g)

The unit of choice would have a ΔP max. differential pressure of 1000 psi which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 6.

IBV Series Inverted Bucket Vertical Steam Trap Capacity Chart

3" IBV Trap		Capacity in lbs/h																
Orifice	ΔP psi >	15	30	45	60	75	90	100	120	150	220	290	450	580	800	1000	1300	1600
6		14112	19691	24255	27122	29547	31532											
10		9856	13781	17199	19735	21830	23704	25402	26989	29768								
15		7695	10981	13517	16141	18279	19999	21366	22734	24586	28114							
20		6372	9305	11290	13517	15435	17133	18390	19602	21389	24696	27518						
40		3837	5535	7387	9294	11091	12414	13451	14200	15435	18081	20330	24255	27673				
55		3109	4520	5777	7166	8379	9173	9702	10319	11179	12899	14553	16538	18302	21322			
70		2492	3726	4895	5810	6593	7177	7762	8291	9151	10760	12017	13671	15215	17155	19051		
90		2062	3076	3991	4917	5733	6196	6747	7232	8269	9900	10915	12348	13693	14399	15170	16383	
110		1577	2392	3197	3782	4388	4807	5116	5424	5954	7056	7960	9592	10805	11731	12370	13362	14266
1½" & 2" IBV Trap		Capacity in lbs/h																
Orifice	ΔP psi >	15	30	45	60	75	90	100	120	150	220	290	450	580	800	1000	1300	1600
6		9856	13781	17199	19735	21830	23704											
10		6372	9305	11290	13517	15435	17133	18390	19602	21389								
15		4895	7299	9327	11532	13120	14707	15942	16868	18302	21940							
20		3837	5535	7387	9294	11091	12414	13451	14200	15435	18081	20330						
40		2492	3726	4895	5810	6593	7177	7762	8291	9151	10760	12017	13671	15214				
55		2062	3076	3991	4917	5733	6196	6747	7232	8269	9900	10915	12348	13693	14399			
70		1577	2392	3197	3782	4388	4807	5116	5424	5954	7056	7960	9592	10805	11731	12370		
90		1069	1621	2183	2690	3032	3296	3550	3771	4190	4895	5292	6218	6813	7651	8423	9614	
110		915	1334	1731	2150	2426	2624	2778	2955	3285	3859	4300	4741	5160	5865	6637	7806	8974
1" IBV Trap		Capacity in lbs/h																
Orifice	ΔP psi >	15	30	45	60	75	90	100	120	150	220	290	450	580	800	1000	1300	1600
6		3837	5535	7387	9294	11091	12414											
10		2492	3726	4895	5810	6593	7177	7762	8291	9151								
15		2062	3076	3991	4917	5733	6196	6747	7232	8269	9900							
20		1577	2392	3197	3782	4388	4807	5116	5424	5954	7056	7960						
40		1069	1621	2183	2690	3032	3296	3550	3771	4190	4895	5292	6218	6813				
55		915	1334	1731	2150	2426	2624	2778	2955	3285	3859	4300	4741	5160	5865			
70		657	915	1191	1378	1550	1674	1806	1954	2205	2646	3087	3638	4101	4432	4906		
90		430	584	743	904	1047	1138	1235	1310	1451	1676	1918	2315	2668	2911	3109	3462	
110		291	426	547	646	712	781	849	897	992	1213	1411	1720	1951	2101	2238	2408	2646
½" & ¾" IBV Trap		Capacity in lbs/h																
Orifice	ΔP psi >	15	30	45	60	75	90	100	120	150	220	290	450	580	800	1000	1300	1600
6		2492	3726	4895	5810	6593	7177											
10		1577	2392	3197	3782	4388	4807	5116	5424	5954								
15		1069	1621	2183	2690	3032	3296	3550	3771	4190	4895							
20		915	1334	1731	2150	2426	2624	2778	2955	3285	3859	4300						
40		657	915	1191	1378	1550	1674	1806	1954	2205	2646	3087	3638	4101				
55		430	584	743	904	1047	1138	1235	1310	1451	1676	1918	2315	2668	2911			
70		291	426	547	646	712	781	849	897	992	1213	1411	1720	1951	2101	2238		
90		212	293	379	459	512	553	589	626	677	761	836	970	1103	1244	1369	1566	
110		176	232	300	335	366	386	404	417	441	485	531	604	684	805	953	1160	1433

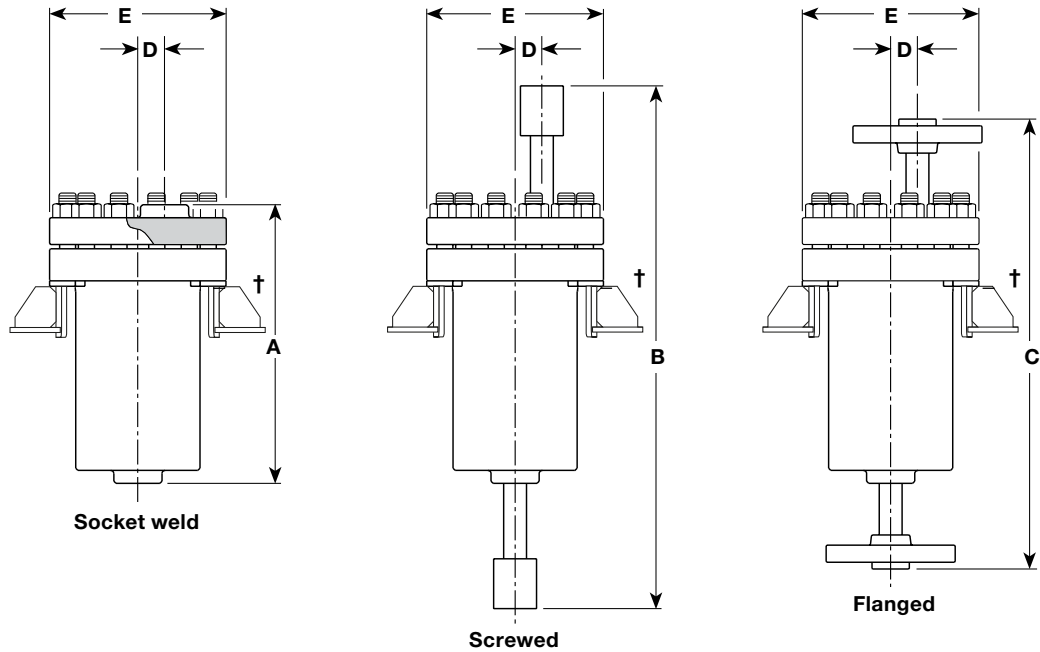
Dimensions/weights (approximate) in inches (mm) and lbs (kg)

IBV size	Dimensions					Weights - Flanged ASME Class						
	A	B	C	D	E	NPT (BSP)	Socket Weld	150	300	600	900	1500
½" (DN15)	10.2 (260)	19.2 (488)	16.5 (420)	1.0 (25)	6.5 (165)	44 (20)	40 (18)	44 (20)	44 (20)	44 (20)	48 (22)	48 (22)
¾" (DN20)	10.2 (260)	19.2 (488)	16.5 (420)	1.0 (25)	6.5 (165)	57 (26)	53 (24)	57 (26)	62 (28)	62 (28)	66 (30)	66 (30)
1" (DN25)	13.6 (345)	24.3 (616)	20.9 (530)	1.5 (40)	8.3 (210)	92 (42)	86 (39)	92 (42)	97 (44)	97 (44)	106 (48)	106 (48)
1½" (DN40)	16.2 (411)	30.5 (774)	25.6 (650)	1.5 (40)	10.4 (265)	150 (68)	143 (65)	154 (70)	158 (72)	158 (72)	172 (78)	172 (78)
2" (DN50)	16.2 (411)	30.8 (782)	25.6 (650)	1.5 (40)	10.4 (265)	150 (68)	143 (65)	158 (72)	163 (74)	167 (76)	194 (88)	194 (88)
3" (DN80)	20.9 (532)	40.4 (1026)	33.5 (850)	1.4 (36)	12.0 (305)	275 (125)	264 (120)	290 (132)	299 (136)	304 (138)	334 (152)	356 (162)

The following will be supplied, if specified, at the time of order placement:

1. A special name-plate when a U-STAMP has been specified.

2. A support bracket. The support bracket will be bolted where indicated '†' on the adjacent illustration.



IBV product nomenclature and selection guide:

Please note that other units are available on request to suit the specifics of a particular process application.

Series	C=Carbon Steel	Z = Alloy steel	C-LF2=Low Temperature Alloy	Z
PMO @ Saturated steam temperature		1785 psig (123 bar g) = ASME class 900 body		
Alloy steel for the body rating		1,682 psig (116 bar g) = ASME class 900 body		123
ΔP maximum differential pressure measurements shown in psig & (bar g)		ΔP = 90 (6), 150 (10), 220 (15), 290 (20), 580 (40), 800 (55), 1000 (70), 1300 (90), 1600 (110)		110
Size		= ½", ¾", 1", 1½", 2", 3" or (DN15), (DN20), (DN25), (DN40), (DN50), (DN80)		3"
Connections		Screwed = BSP or NPT, optional		ASME class 300
		Socket weld = According to ASME B 16.11		
		Flanged ASME = ASME class 150, 300, 600, 900, 1500 (EN 1092) = (PN16), (PN25), (PN40), (PN63), (PN100), (PN160)		
Optional extras		Blank = Standard NACE = NACE compliancy Check valve CV = Please note that this option is only available for units that have a ΔP maximum differential pressure of 580 psi (40 bar) and above - See above.		

IBV product selection example: IBV - Z - 123 - 110 - 3" - ASME class 300 -

How to order

1 off Spirax Sarco IBV-Z-123-110-3"-Flanged ASME class 300 inverted bucket vertical steam trap having an alloy steel body and cover with stainless steel internals.

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Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions supplied with the product.

Installation note:

The trap must be installed below the drain point with the body upright in a vertical position, the cover at the top and the inlet connection at the bottom; this orientation will ensure that the bucket mechanism will rise and fall vertically without any friction. It is recommended that a strainer is installed upstream of the IBV to protect it from contamination.

To permit safe inspection for cleaning or maintenance purpose it is again recommended that suitable shut-off valves are installed upstream and downstream of the IBV application.

It needs to be appreciated that there is blast discharge with this device, consequently the downstream accessories, if any, should be installed at a minimum distance of 3 ft from the IBV.

Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product providing care is taken.

Spare parts

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

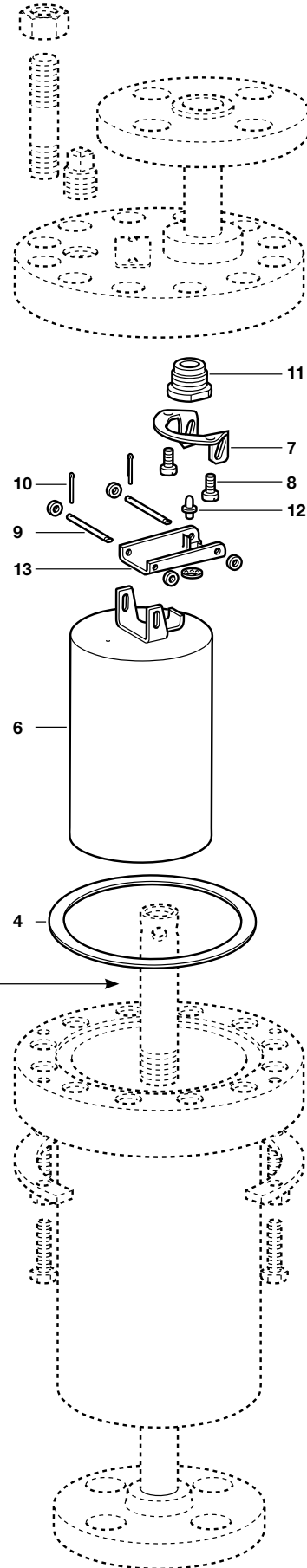
Available spares

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 - Z - 123 - 110 - 3" - Flanged ASME class 300 inverted bucket vertical steam trap.



Optional extra

