



# CONDENSED DISTRIBUTOR CATALOG

STEAM • AIR • HOT WATER

## What They Are...How to Use Them

The heat quantities and temperature/pressure relationships referred to in this section are taken from the Properties of Saturated Steam table.

## Definitions of Terms Used

**Saturated Steam** is pure steam at the temperature that corresponds to the boiling temperature of water at the existing pressure.

### Absolute and Gauge Pressures

Absolute pressure is pressure in pounds per square inch (psia) above a perfect vacuum. Gauge pressure is pressure in pounds per square inch above atmospheric pressure, which is 14.7 pounds per square inch absolute. Gauge pressure (psig) plus 14.7 equals absolute pressure. Or, absolute pressure minus 14.7 equals gauge pressure.

### Pressure/Temperature Relationship

(Columns 1, 2 and 3). For every pressure of pure steam there is a corresponding temperature. Example: The temperature of 250 psig pure steam is always 406°F.

### Heat of Saturated Liquid (Column 4).

This is the amount of heat required to raise the temperature of a pound of water from 32°F to the boiling point at the pressure and temperature shown. It is expressed in British thermal units (Btu).

### Latent Heat or Heat of Vaporization

(Column 5). The amount of heat (expressed in Btu) required to change a pound of boiling water to a pound of steam. This same amount of heat is released when a pound of steam is condensed back into a pound of water. This heat quantity is different for every pressure/temperature combination, as shown in the steam table.

**Total Heat of Steam** (Column 6). The sum of the Heat of the Liquid (Column 4) and Latent Heat (Column 5) in Btu. It is the total heat in steam above 32°F.

### Specific Volume of Liquid (Column 7).

The volume per unit of mass in cubic feet per pound.

### Specific Volume of Steam (Column 8).

The volume per unit of mass in cubic feet per pound.

## How the Table Is Used

In addition to determining pressure/

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temperature relationships, you can compute the amount of steam that will be condensed by any heating unit of known Btu output. Conversely, the table can be used to determine Btu output if steam condensing rate is

known. In the application portion of this section, there are several references to the use of the steam table.

**Table CG-1. Properties of Saturated Steam**

(Abstracted from Keenan and Keyes, THERMODYNAMIC PROPERTIES OF STEAM, by permission of John Wiley & Sons, Inc.)

	Col. 1 Gauge Pressure	Col. 2 Absolute Pressure (psia)	Col. 3 Steam Temp. (°F)	Col. 4 Heat of Sat. Liquid (Btu/lb)	Col. 5 Latent Heat (Btu/lb)	Col. 6 Total Heat of Steam (Btu/lb)	Col. 7 Specific Volume of Sat. Liquid (cu ft/lb)	Col. 8 Specific Volume of Sat. Steam (cu ft/lb)
Inches of Vacuum	29.743	0.08854	32.00	0.00	1075.8	1075.8	0.016022	3306.00
	29.515	0.2	53.14	21.21	1063.8	1085.0	0.016027	1526.00
	27.886	1.0	101.74	69.70	1036.3	1106.0	0.016136	333.60
	19.742	5.0	162.24	130.13	1001.0	1131.0	0.016407	73.52
	9.562	10.0	193.21	161.17	982.1	1143.3	0.016590	38.42
	7.536	11.0	197.75	165.73	979.3	1145.0	0.016620	35.14
	5.490	12.0	201.96	169.96	976.6	1146.6	0.016647	32.40
	3.454	13.0	205.88	173.91	974.2	1148.1	0.016674	30.06
	1.418	14.0	209.56	177.61	971.9	1149.5	0.016699	28.04
	0.0	14.696	212.00	180.07	970.3	1150.4	0.016715	26.80
PSIG	1.3	16.0	216.32	184.42	967.6	1152.0	0.016746	24.75
	2.3	17.0	219.44	187.56	965.5	1153.1	0.016768	23.39
	5.3	20.0	227.96	196.16	960.1	1156.3	0.016830	20.09
	10.3	25.0	240.07	208.42	952.1	1160.6	0.016922	16.30
	15.3	30.0	250.33	218.82	945.3	1164.1	0.017004	13.75
	20.3	35.0	259.28	227.91	939.2	1167.1	0.017078	11.90
	25.3	40.0	267.25	236.03	933.7	1169.7	0.017146	10.50
	30.3	45.0	274.44	243.36	928.6	1172.0	0.017209	9.40
	40.3	55.0	287.07	256.30	919.6	1175.9	0.017325	7.79
	50.3	65.0	297.97	267.50	911.6	1179.1	0.017429	6.66
	60.3	75.0	307.60	277.43	904.5	1181.9	0.017524	5.82
	70.3	85.0	316.25	286.39	897.8	1184.2	0.017613	5.17
	80.3	95.0	324.12	294.56	891.7	1186.2	0.017696	4.65
	90.3	105.0	331.36	302.10	886.0	1188.1	0.017775	4.23
	100.0	114.7	337.90	308.80	880.0	1188.8	0.017850	3.88
	110.3	125.0	344.33	315.68	875.4	1191.1	0.017922	3.59
	120.3	135.0	350.21	321.85	870.6	1192.4	0.017991	3.33
	125.3	140.0	353.02	324.82	868.2	1193.0	0.018024	3.22
	130.3	145.0	355.76	327.70	865.8	1193.5	0.018057	3.11
	140.3	155.0	360.50	333.24	861.3	1194.6	0.018121	2.92
	150.3	165.0	365.99	338.53	857.1	1195.6	0.018183	2.75
	160.3	175.0	370.75	343.57	852.8	1196.5	0.018244	2.60
	180.3	195.0	379.67	353.10	844.9	1198.0	0.018360	2.34
	200.3	215.0	387.89	361.91	837.4	1199.3	0.018470	2.13
	225.3	240.0	397.37	372.12	828.5	1200.6	0.018602	1.92
	250.3	265.0	406.11	381.60	820.1	1201.7	0.018728	1.74
		300.0	417.33	393.84	809.0	1202.8	0.018896	1.54
		400.0	444.59	424.00	780.5	1204.5	0.019340	1.16
		450.0	456.28	437.20	767.4	1204.6	0.019547	1.03
		500.0	467.01	449.40	755.0	1204.4	0.019748	0.93
		600.0	486.21	471.60	731.6	1203.2	0.02013	0.77
		900.0	531.98	526.60	668.8	1195.4	0.02123	0.50
		1200.0	567.22	571.70	611.7	1183.4	0.02232	0.36
		1500.0	596.23	611.60	556.3	1167.9	0.02346	0.28
		1700.0	613.15	636.30	519.6	1155.9	0.02428	0.24
		2000.0	635.82	671.70	463.4	1135.1	0.02565	0.19
		2500.0	668.13	730.60	360.5	1091.1	0.02860	0.13
		2700.0	679.55	756.20	312.1	1068.3	0.03027	0.11
		3206.2	705.40	902.70	0.0	902.7	0.05053	0.05

# Steam Tables

## Flash Steam (Secondary)

**What is flash steam?** When hot condensate or boiler water, under pressure, is released to a lower pressure, part of it is re-evaporated, becoming what is known as flash steam.

**Why is it important?** This flash steam is important because it contains heat units that can be used for economical plant operation—and which are otherwise wasted.

**How is it formed?** When water is heated at atmospheric pressure, its temperature rises until it reaches 212°F, the highest temperature at which water can exist at this pressure. Additional heat does not raise the temperature, but converts the water to steam.

The heat absorbed by the water in raising its temperature to boiling point is called “sensible heat” or heat of saturated liquid. The heat required to convert water at boiling point to steam at the same temperature is called “latent heat.” The unit of heat in common use is the Btu, which is the amount of heat required to raise the temperature of one pound of water 1°F at atmospheric pressure.

If water is heated under pressure, however, the boiling point is higher than 212°F, so the sensible heat required is greater. The higher the pressure, the higher the boiling temperature and the higher the heat content. If pressure is reduced, a certain amount of sensible heat is released. This excess heat will be absorbed in the form of latent heat, causing part of the water to “flash” into steam.

Condensate at steam temperature and under 100 psig pressure has a heat content of 308.8 Btu per pound. (See Column 4 in Steam Table.) If this condensate is discharged to atmospheric pressure (0 psig), its heat content instantly drops to 180 Btu per pound. The surplus of 128.8 Btu re-evaporates or flashes a portion of the condensate. The percentage that will flash to steam can be computed using the formula:

$$\% \text{ flash steam} = \frac{SH - SL}{H} \times 100$$

SH = Sensible heat in the condensate at the higher pressure before discharge.

SL = Sensible heat in the condensate at the lower pressure to which discharge takes place.

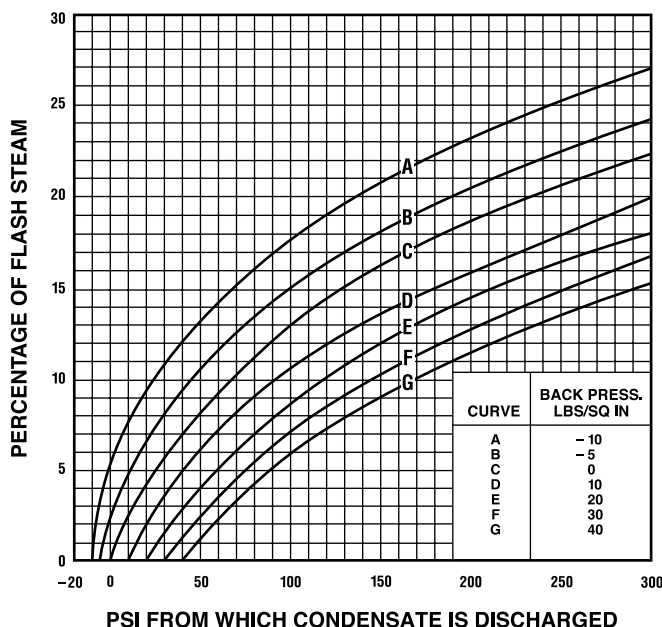
H = Latent heat in the steam at the lower pressure to which the condensate has been discharged.

$$\% \text{ flash steam} = \frac{308.8 - 180}{970.3} \times 100 = 13.3\%$$

Chart CG-3 shows the amount of secondary steam that will be formed when discharging condensate to different pressures.

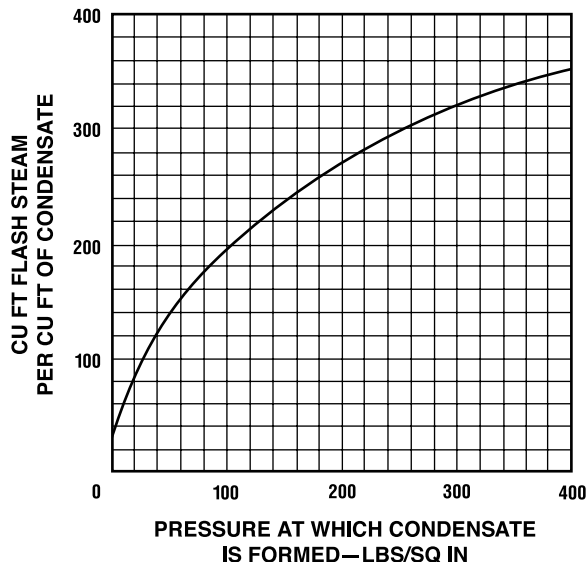
**Chart CG-3.**

Percentage of flash steam formed when discharging condensate to reduced pressure.



**Chart CG-4.**

Volume of flash steam formed when one cubic foot of condensate is discharged to atmospheric pressure.

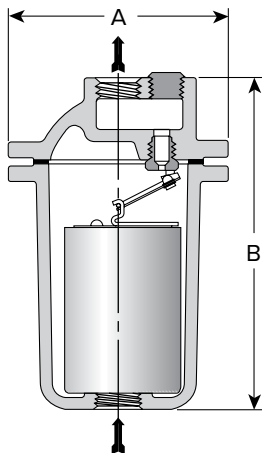




# 200 Series Inverted Bucket Steam Traps

## Cast Iron for Vertical Installation

For Pressures to 250 psig (17 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)



### Description

The most reliable steam trap known—the inverted bucket—provides efficient condensate drainage of virtually all types of steam-using equipment. Put the inverted bucket to work in a tough cast iron package, and you have the best of both worlds. Because they operate efficiently for longer periods of time, Armstrong cast iron inverted buckets add solid energy savings to lower replacement/labor costs.

A unique leverage system multiplies the force provided by the bucket to open the valve against system pressure. The mechanism is free-floating, and has no fixed pivots to create wear or friction.

Because the mechanism is located at the top of the trap, no dirt can collect on the orifice. Small particles of dirt are held in suspension until discharged by the full differential purging action when the bucket sinks, pulling the valve off the seat.

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and CO<sub>2</sub> venting at steam temperature.

Inverted bucket traps drain continuously, although discharging intermittently, allowing no condensate backup. They are also resistant to water hammer.

### Maximum Operating Conditions

Maximum allowable pressure (vessel design): 250 psig @ 450°F (17 barg @ 232°C)  
Maximum operating pressure: Model 211-216: 250 psig (17 barg)

### Connections

Screwed NPT and BSPT

### Materials

Body: ASTM A48 Class 30  
Internals: All stainless steel—304  
Valve and seat: Stainless steel—17-4PH  
Test plug: Carbon steel

### Options

- Stainless steel internal check valve
- Thermic vent bucket
- Scrub wire

### Specification

Inverted bucket steam trap, type ... in cast iron, with continuous air venting at steam temperature, free floating stainless steel mechanism, and discharge orifice at the top of the trap.

### How to Order

- Specify:
- Model number
  - Size and type of pipe connection
  - Maximum working pressure that will be encountered or orifice size
  - Any options required

For a fully detailed certified drawing, refer to CD #1001.

#### 200 Series, Bottom Inlet, Top Outlet Traps

Add suffix "CV" to model number for internal check valve, "T" for thermic vent bucket.

Model No.	211		212		213		214		215		216	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2	15	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1, 1-1/4	25, 32	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50
Test Plug	1/8	3	3/8	10	1/2	15	1/2	15	3/4	20	1	25
"A" (Flange Diameter)	4-1/4	108	5-1/4	133	6-3/8	162	7-1/2	190	8-1/2	216	10-3/16	259
"B" (Height)	6-7/16	164	8-5/8	218	11-1/2	292	12-3/8	314	14-3/16	360	18	457
Number of Bolts	6		8		6		8		8		12	
Weight lb (kg)	6 (2.7)		11-1/2 (5.2)		20-1/4 (9.2)		33 (15.0)		44-3/4 (20.3)		77-1/2 (35.2)	

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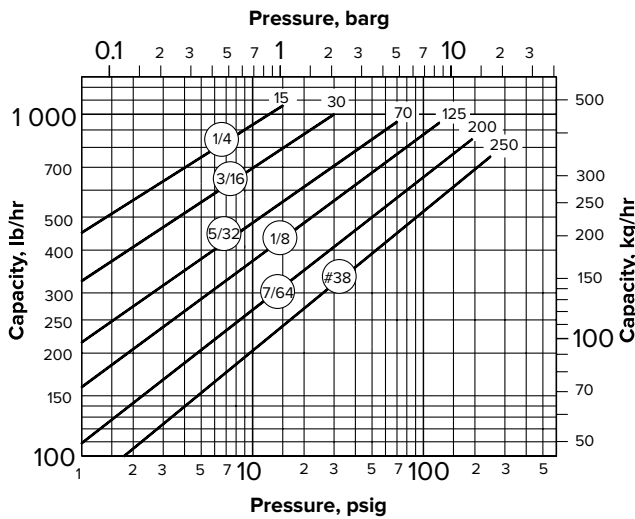
# 200 Series Inverted Bucket Steam Traps

## Cast Iron for Vertical Installation

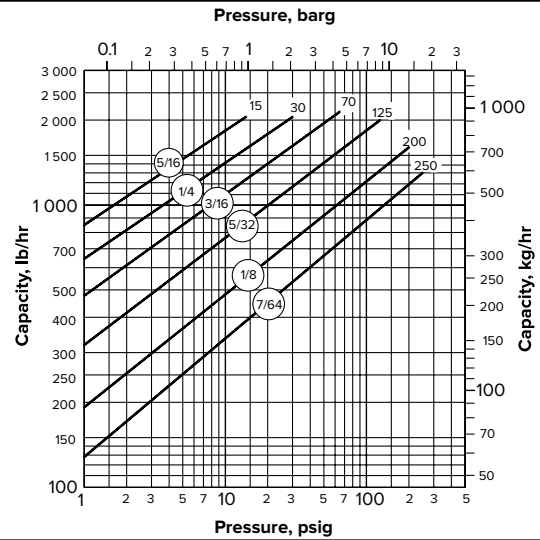
For Pressures to 250 psig (17 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)



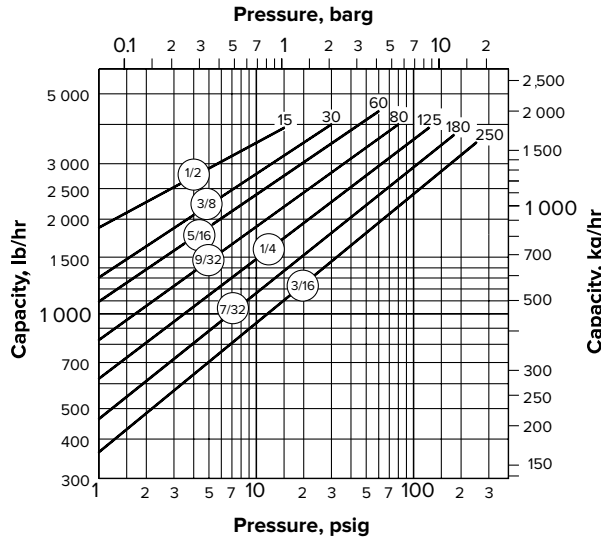
**Model 211 Capacity**



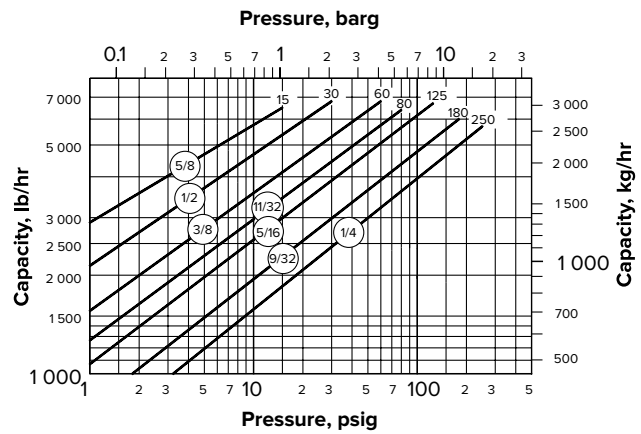
**Model 212 Capacity**



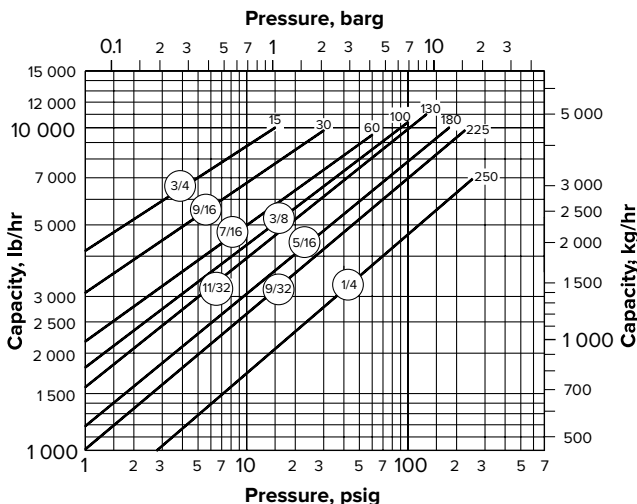
**Model 213 Capacity**



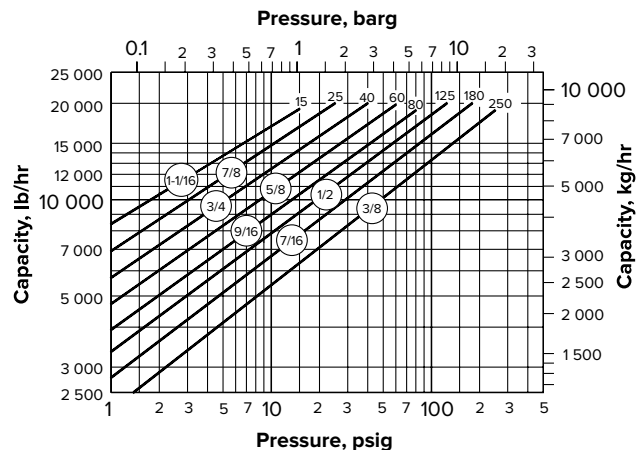
**Model 214 Capacity**



**Model 215 Capacity**



**Model 216 Capacity**



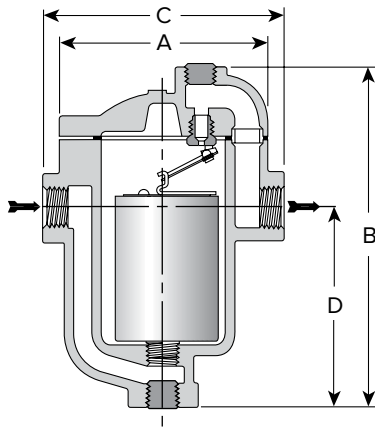
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# 800-813 Series Inverted Bucket Steam Trap

## Cast Iron for Horizontal Installation

For Pressures to 250 psig (17 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)



## Description

The most reliable steam trap known—the inverted bucket—provides efficient condensate drainage of virtually all types of steam-using equipment. Put the inverted bucket to work in a tough cast iron package, and you have the best of both worlds. Because they operate efficiently for longer periods of time, Armstrong cast iron inverted buckets add solid energy savings to lower replacement/labor costs. All Armstrong cast iron inverted bucket steam traps are repairable for even bigger maintenance savings.

A unique leverage system multiplies the force provided by the bucket to open the valve against system pressure. The mechanism is free-floating, and has no fixed pivots to create wear or friction.

Because the mechanism is located at the top of the trap, no dirt can collect on the orifice. Small particles of dirt are held in suspension until discharged by the full differential purging action when the bucket sinks, pulling the valve off the seat.

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and CO<sub>2</sub> venting at steam temperature.

Inverted bucket traps drain continuously, although discharging intermittently, allowing no condensate backup. They are also resistant to water hammer.

## Maximum Operating Conditions

Maximum allowable pressure  
(vessel design): 250 psig @ 450°F (17 barg @ 232°C)  
Maximum operating pressure: Model 800: 150 psig (10 barg)  
Model 811-813: 250 psig (17 barg)

## Connections

Screwed NPT and BSPT

## Materials

Body: ASTM A48 Class 30  
Internals: All stainless steel—304  
Valve and seat: Stainless steel—17-4PH  
Test plug: Carbon steel

## Options

- Stainless steel internal check valve
- Thermic vent bucket
- Stainless steel pop drain
- Probe connection
- Thermo drain
- Scrub wire

## Specification

Inverted bucket steam trap, type ... in cast iron, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and discharge orifice at the top of the trap.

## How to Order

- Specify:
- Model number
  - Size and type of pipe connection
  - Maximum working pressure that will be encountered or orifice size
  - Any options required

**800-813 Series Side Inlet, Side Outlet Traps.** Add suffix "CV" to model number for internal check valve, "T" for thermic vent bucket.

Model No.	800*		811		812		813	
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1/2, 3/4	15, 20	3/4, 1	20, 25
Test Plug	1/4	6	1/4	6	1/2	15	3/4	20
"A" (Flange Diameter)	3-3/4	95.2	3-3/4	95.2	5-5/8	143	7	178
"B" (Height)	5-7/16	138	6-7/8	175	9-1/16	230	11-3/4	298
"C" (Face-to-Face)	5	127	5	127	6-1/2	165	7-3/4	197
"D" (Bottom to C Inlet)	2-3/4	70	4-1/4	108	5-3/8	137	7-1/32	179
Number of Bolts	6							
Weight lb (kg)	5 (2.3)		6 (2.7)		15 (6.8)		27-1/2 (12.5)	

\*Cannot be furnished with both thermic vent bucket and check valve.

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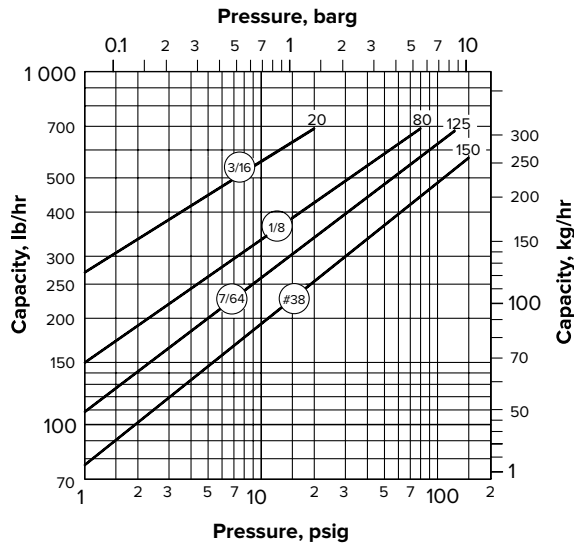
# 800-813 Series Inverted Bucket Steam Trap

Cast Iron for Horizontal Installation

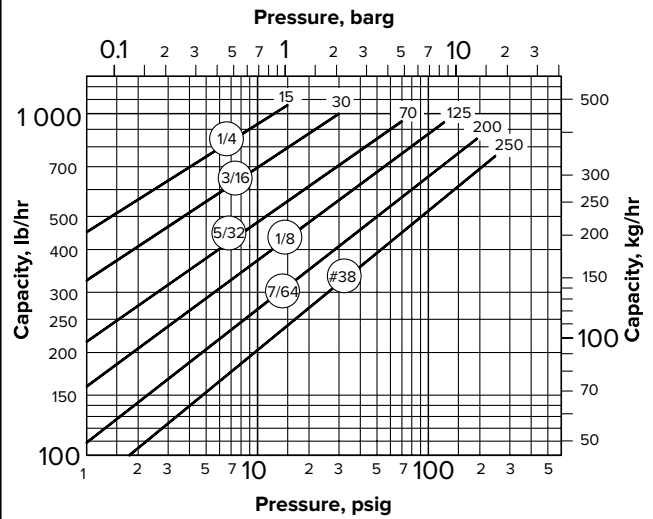
For Pressures to 250 psig (17 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)



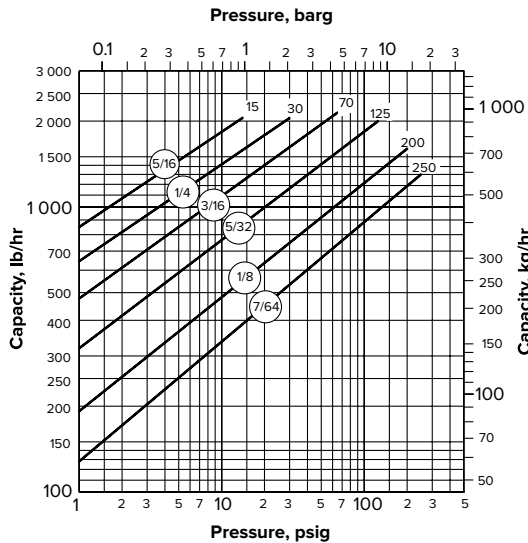
**Model 800 Capacity**



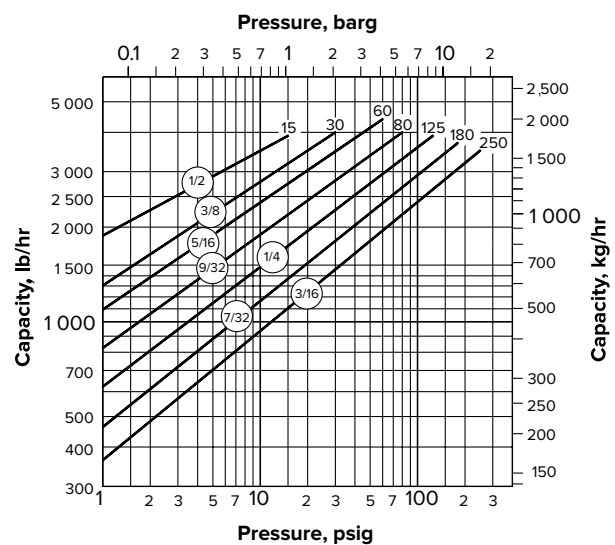
**Model 811 Capacity**



**Model 812 Capacity**



**Model 813 Capacity**

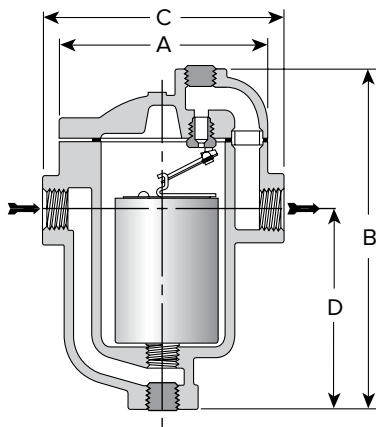




# 814-816 Series Inverted Bucket Steam Trap

## Cast Iron for Horizontal Installation

For Pressures to 250 psig (17 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)



### Description

The most reliable steam trap known—the inverted bucket—provides efficient condensate drainage of virtually all types of steam-using equipment. Put the inverted bucket to work in a tough cast iron package, and you have the best of both worlds. Because they operate efficiently for longer periods of time, Armstrong cast iron inverted buckets add solid energy savings to lower replacement/labor costs. All Armstrong cast iron inverted bucket steam traps are repairable for even bigger maintenance savings.

A unique leverage system multiplies the force provided by the bucket to open the valve against system pressure. The mechanism is free-floating, and has no fixed pivots to create wear or friction.

Because the mechanism is located at the top of the trap, no dirt can collect on the orifice. Small particles of dirt are held in suspension until discharged by the full differential purging action when the bucket sinks, pulling the valve off the seat.

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and CO<sub>2</sub> venting at steam temperature.

Inverted bucket traps drain continuously, although discharging intermittently, allowing no condensate backup. They are also resistant to water hammer.

### Maximum Operating Conditions

Maximum allowable pressure

(vessel design): 250 psig @ 450°F (17 barg @ 232°C)

Maximum operating pressure: Model 814-816: 250 psig (17 barg)

### Connections

Screwed NPT and BSPT

### Materials

Body:

Internals:

Valve and seat:

Test plug:

ASTM A48 Class 30

All stainless steel—304

Stainless Steel—17-4PH

Carbon steel

### Options

- Stainless steel internal check valve
- Thermic vent bucket
- Stainless steel pop drain
- Probe connection
- Thermo drain
- Scrub wire

### Specification

Inverted bucket steam trap, type ... in cast iron, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and discharge orifice at the top of the trap.

### How to Order

Specify:

- Model number
- Size and type of pipe connection
- Maximum working pressure that will be encountered or orifice size
- Any options required

**814-816 Series Side Inlet, Side Outlet Traps.** Add suffix "CV" to model number for internal check valve, "T" for thermic vent bucket.

Model No.	814		815		816	
	in	mm	in	mm	in	mm
Pipe Connections	1, 1-1/4	25, 32	1, 1-1/4, 1-1/2, 2	25, 32, 40, 50	2, 2-1/2	50, 65
Test Plug	1	25	1-1/2	40	2	50
"A" (Flange Diameter)	8	203	9	229	11-1/2	292
"B" (Height)	13-5/8	346	16-1/4	413	21-5/16	541
"C" (Face-to-Face)	9	229	10-1/4	260	13	330
"D" (Bottom to $\varnothing$ Inlet)	7-13/16	198	8-1/16	205	11	279
Number of Bolts	8					
Weight lb (kg)	44 (20.0)		71 (32.2)		131 (59.4)	

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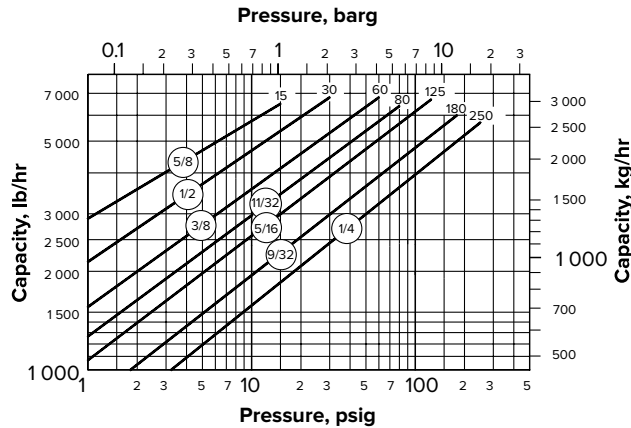
# 814-816 Series Inverted Bucket Steam Trap

Cast Iron for Horizontal Installation

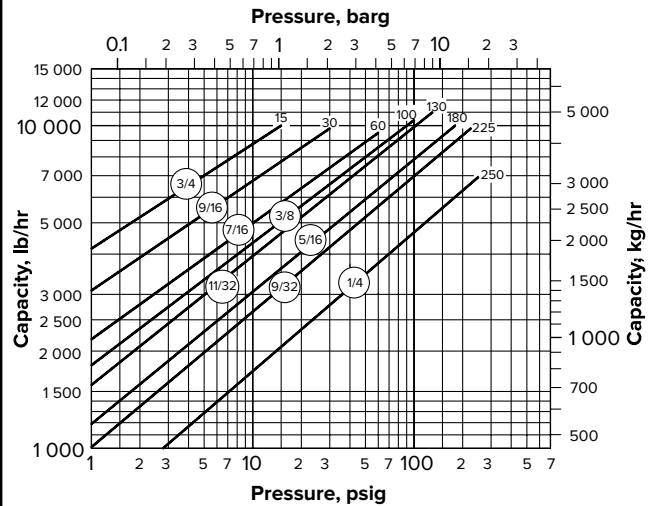
For Pressures to 250 psig (17 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)



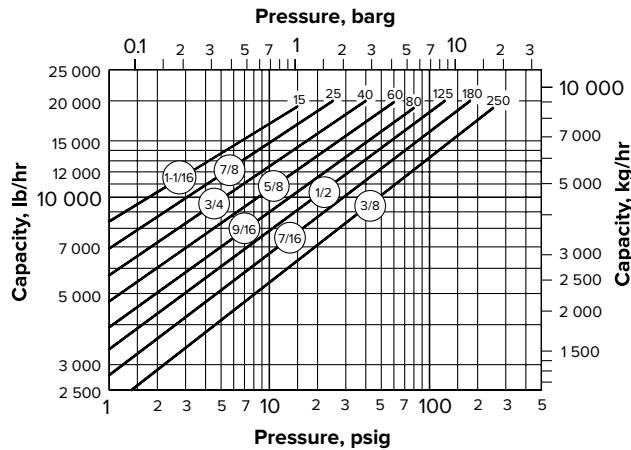
**Model 814 Capacity**



**Model 815 Capacity**



**Model 816 Capacity**



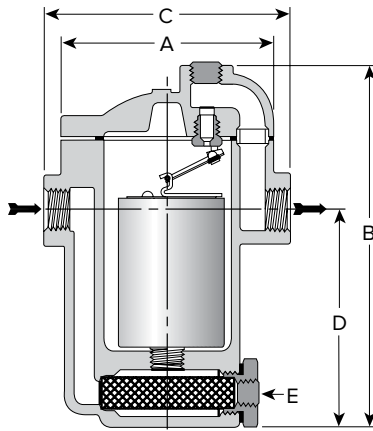
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# 880 Series Inverted Bucket Steam Traps

Cast Iron for Horizontal Installation With Integral Strainer

For Pressures to 250 psig (17 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)



## Description

The most reliable steam trap known—the inverted bucket—provides efficient condensate drainage of virtually all types of steam-using equipment. Put the inverted bucket to work in a tough cast iron package with an integral strainer, and you have the best of both worlds. Because they operate efficiently for longer periods of time, Armstrong cast iron inverted buckets add solid energy savings to lower replacement/labor costs. All Armstrong cast iron inverted bucket steam traps are repairable for even bigger maintenance savings.

A unique leverage system multiplies the force provided by the bucket to open the valve against system pressure. The mechanism is free-floating, and has no fixed pivots to create wear or friction.

Because the mechanism is located at the top of the trap, no dirt can collect on the orifice. Small particles of dirt are held in suspension until discharged by the full differential purging action when the bucket sinks, pulling the valve off the seat.

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and CO<sub>2</sub> venting at steam temperature.

Inverted bucket traps drain continuously, although discharging intermittently, allowing no condensate backup. They are also resistant to water hammer.

## Maximum Operating Conditions

Maximum allowable pressure

(vessel design): 250 psig @ 450°F (17 barg @ 232°C)

Maximum operating pressure: Model 880: 150 psig (10 barg)  
Model 881-883: 250 psig (17 barg)

## Connections

Screwed NPT and BSPT

## Materials

Body:

Internals:

Valve and seat:

Test plug:

Strainer:

ASTM A48 Class 30

All stainless steel—304

Stainless steel—17-4PH

Carbon steel

Stainless steel—304

## Options

- Stainless steel internal check valve
- Thermic vent bucket
- Scrub wire

## Specification

Inverted bucket steam trap, type ... in cast iron with integral strainer, with continuous air venting at steam temperature, with free-floating stainless steel mechanism, and discharge orifice at the top of the trap.

## How to Order

Specify:

- Model number
- Size and type of pipe connection
- Maximum working pressure that will be encountered or orifice size
- Any options required

**880 Series Side Inlet, Side Outlet Traps With Integral Strainers.** Add suffix "CV" to model number for internal check valve, "T" for thermic vent bucket.

Model No.	880*		881		882		883	
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1/2, 3/4	15, 20	3/4, 1, 1-1/4	20, 25, 32
Test Plug	1/4	6	1/4	6	1/2	15	3/4	20
"A" (Flange Diameter)	3-3/4	95.2	3-3/4	95.2	5-5/8	142.9	7	177.8
"B" (Height)	6-1/16	154	7-1/16	179	9-3/8	244	12-3/8	314
"C" (Face-to-Face)	5	127	5	127	6-1/2	165	7-7/8	200
"D" (Bottom to $\varnothing$ Inlet)	3-7/16	87.3	4-7/16	113	5-3/4	146	7-3/8	187
"E" (Blowdown Connection)	3/8	9	3/8	9	3/8	9	1/2	15
Number of Bolts	6							
Weight lb (kg)	5-1/2 (2.5)		6 (2.7)		15-1/2 (7.0)		31 (14.1)	

\*Cannot be furnished with both thermic vent bucket and check valve.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

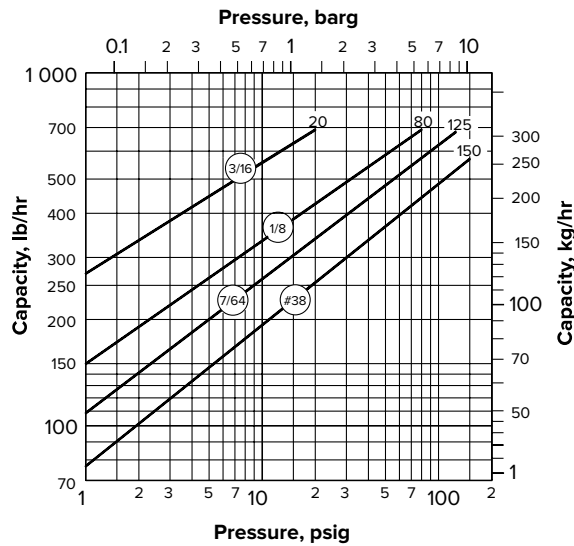
# 880 Series Inverted Bucket Steam Traps

Cast Iron for Horizontal Installation With Integral Strainer

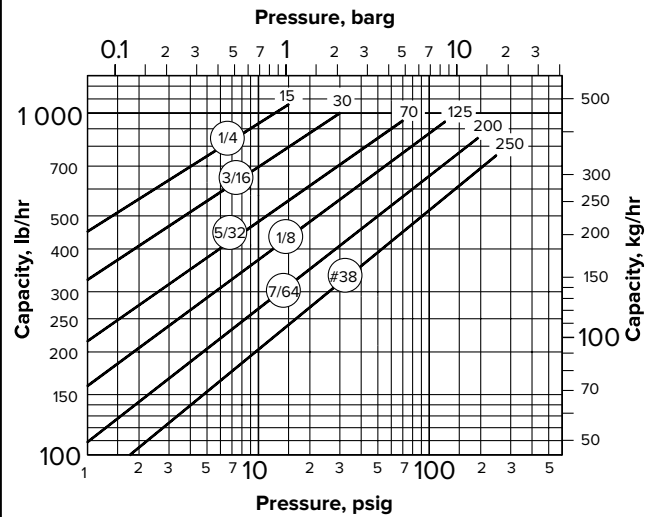
For Pressures to 250 psig (17 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)



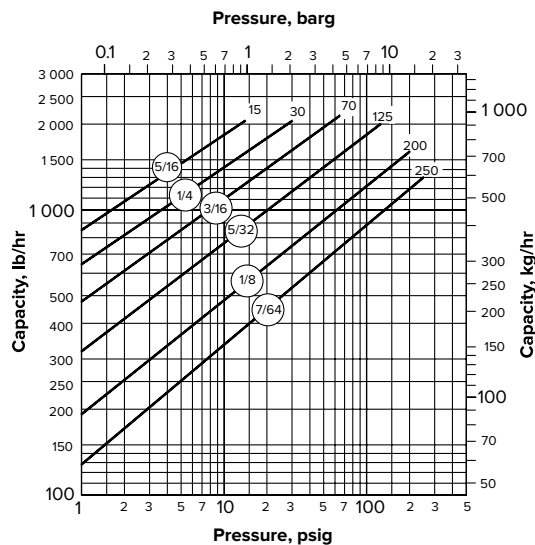
**Model 880 Capacity**



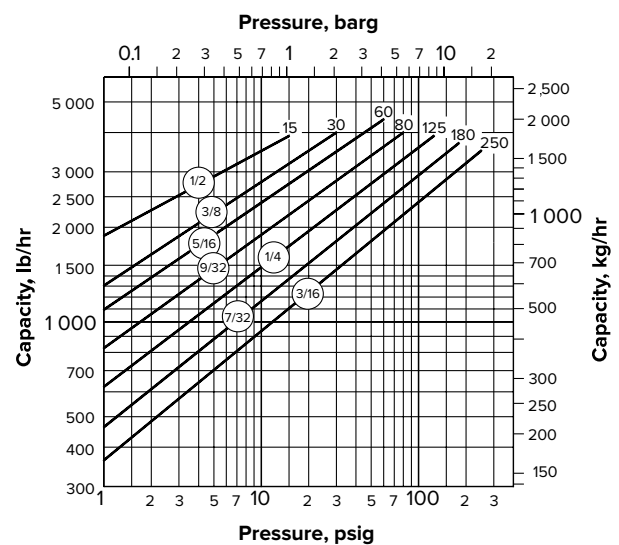
**Model 881 Capacity**



**Model 882 Capacity**



**Model 883 Capacity**



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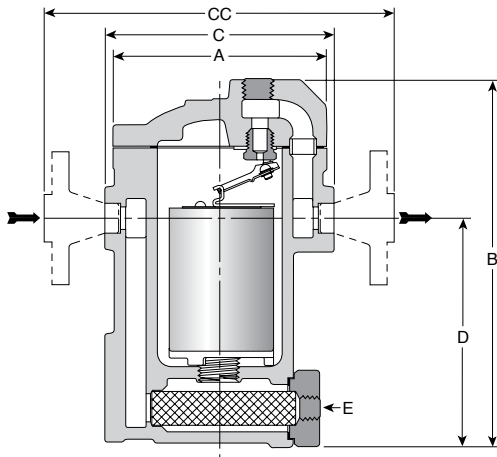
[armstronginternational.com](http://armstronginternational.com)



# 980 Series Inverted Bucket Steam Traps

## Cast Steel for Horizontal Installation With Integral Strainer

For Pressures to 600 psig (41 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)



### Description

Armstrong offers two sizes of cast steel traps with in-line horizontal pipe connections and integral strainers with a choice of screwed, socketweld or flanged connections.

A unique leverage system multiplies the force provided by the bucket to open the valve against system pressure. The mechanism is free-floating, and has no fixed pivots to create wear or friction.

Because the mechanism is located at the top of the trap, no dirt can collect on the orifice. Small particles of dirt are held in suspension until discharged by the full differential purging action when the bucket sinks, pulling the valve off the seat.

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and CO<sub>2</sub> venting at steam temperature.

Inverted bucket traps drain continuously, although discharging intermittently, allowing no condensate backup. They are also resistant to water hammer.

### Maximum Operating Conditions

Maximum allowable pressure  
(vessel design): 600 psig @ 650°F (41 barg @ 343°C)  
Maximum operating pressure: 600 psig (41 barg)

### Connections

Screwed NPT and BSPT  
Socketweld  
Flanged

See page 187 for dimensional information for flanged and socketweld connections.

### Materials

Body: ASTM A216 WCB  
Internals: All stainless steel—304  
Valve and seat: Stainless steel—17-4PH  
Strainer: Stainless steel—304  
Test plug: Carbon steel

### Options

- Stainless steel internal check valve
- Thermic vent bucket (983 only) maximum operating pressure 250 psig (17 barg)
- Scrub wire

### Specification

Inverted bucket steam trap, type ... in cast steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, integral strainer, and discharge orifice at the top of the trap.

### How to Order

Specify:

- Model number
- Size and type of pipe connection. When flanges are required, specify type of flange in detail
- Maximum working pressure that will be encountered or orifice size
- Any options required

For a fully detailed certified drawing, refer to CD #1007.

980 Series Traps				
Model No.	981		983	
	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	3/4, 1	20, 25
Test Plug	1/2	15	3/4	20
"A" (Flange Diameter)	4-1/2	114	7-1/4	184
"B" (Height)	8-5/8	219	12-5/16	313
"C" (Face-to-Face, Scr or SW)	5-3/8	137	7-3/4	197
"CC" (Face-to-Face, Class 600 ANSI Flanges*)				
1/2" (15 mm) connection	9-3/8	238	—	—
3/4" (20 mm) connection	9-1/2	241	11-3/4	298
1" (25 mm) connection	—	—	12-1/8	308
"D" (Bottom to $\varnothing$ Inlet)	4-13/16	122	7-9/16	192
"E" (Blowdown Connection)	3/8	9	3/4	20
Weight, Scr or SW lb (kg)	11-1/2 (5.2)		43 (19.5)	
Weight, 600 Class Flanges lb (kg) 1/2" connection	18 (8.2)		50 (22.7)	

\*Face-to-face, other flanges on request. Also available with ANSI raised face, flat face or ring joint flanges.



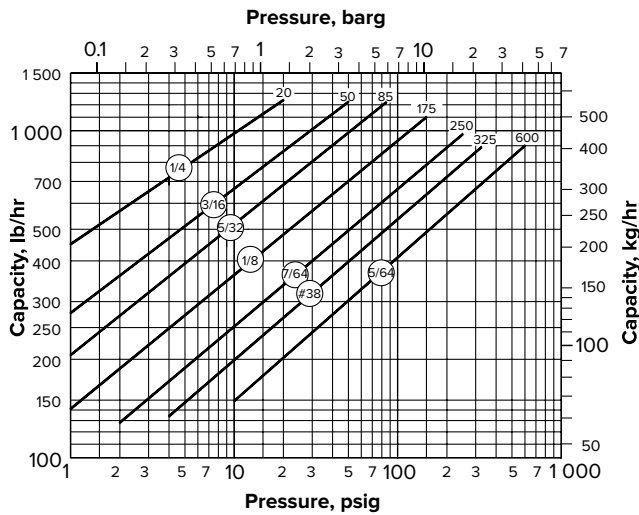
# 980 Series Inverted Bucket Steam Traps

Cast Steel for Horizontal Installation With Integral Strainer

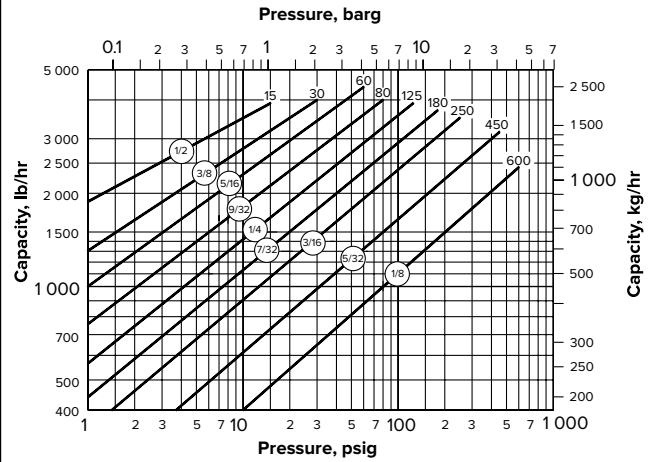
For Pressures to 600 psig (41 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)



Model 981 Capacity



Model 983 Capacity



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# 300 Series Inverted Bucket Steam Trap

## Forged Carbon Steel for Vertical Installation

For Pressures to 650 psig (45 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)

### Description

Armstrong offers its 300 Series forged carbon steel traps for vertical installation with a choice of screwed, socketweld or flanged connections.

A unique leverage system multiplies the force provided by the bucket to open the valve against system pressure. The mechanism is free-floating, and has no fixed pivots to create wear or friction.

Because the mechanism is located at the top of the trap, no dirt can collect on the orifice. Small particles of dirt are held in suspension until discharged by the full differential purging action when the bucket sinks, pulling the valve off the seat.

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and CO<sub>2</sub> venting at steam temperature.

Inverted bucket traps drain continuously, allowing no condensate backup. They are also resistant to water hammer.

#### For Superheat Service:

1. Don't oversize the orifice; a restricted orifice may be advisable.
2. Specify an internal check valve.
3. Provide a drip leg of adequate diameter and length.
4. Provide a generous length (2'-3') of inlet piping, with the trap below the main.
5. Don't insulate the trap or the inlet piping.

### Connections

Screwed NPT and BSPT  
Socketweld  
Flanged

See page 187 for dimensional information for flanged and socketweld connections.

### Materials

Body:

ASTM A105

Models 312, 313, 316 are also available with cast 316 stainless steel bodies and all stainless steel internals

Internals:

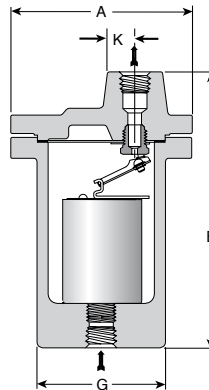
All stainless steel—304 (Models 314, 315 and 316 have cast iron bucket weights)

Valve and seat:

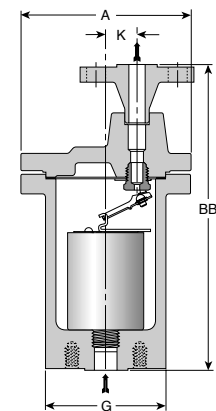
Stainless steel—17-4PH or Titanium

### Options

- Stainless steel internal check valve
- Thermic vent bucket 250 psig (17 barg) maximum
- Scrub wire



Series 300 Trap



Series 300-FW Trap

### Specification

Inverted bucket steam trap, type ... in forged carbon steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and discharge orifice at the top of the trap.

### How to Order

Specify:

- Model number
- Size and type of pipe connection. When flanges are required, specify type of flange in detail
- Maximum working pressure that will be encountered or orifice size
- Any options required

#### Pressure-Temperature Rating for Forged Steel Traps

Model No.	Max. Oper. Pressure, Sat. Steam		Maximum Allowable Pressure (Vessel Design) of Pressure-Containing Parts at Indicated Temperature							
			°F		°C		°F		°C	
			-20/+650	-28/+343	700	371	750	399	800	427
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
310	400	27.5	770	48	770	48	730	50	600	41
312	600	41	600	41	600	41	560	38.5	500	34.5
313	650	45	1 080	74	1 080	74	970	67	780	54
314	650	45	1 130	78	1 120	77	990	68	810	56
315	650	45	1 015	70	965	66.5	860	59	690	47.5
316	650	45	1 100	76	1 050	72	940	65	760	52

NOTES: Maximum operating pressure to be marked on nameplate will be determined by actual orifice used. Maximum allowable pressures shown in boldface will be marked on nameplate, unless otherwise requested. Traps with flanges may have different pressure-temperature ratings.

#### 300 Series Bottom Inlet, Top Outlet Traps. Add suffix "CV" to trap number for internal check valve.

Model No. Screwed or SW Model No. Flanged	310 310-FW		312 312-FW		313 313-FW		314 314-FW		315 315-FW		316 316-FW	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1/2, 3/4, 1	15, 20, 25	1, 1-1/4	25, 32	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50
"A" (Diameter)	4-5/8	117	6-3/4	171	8	203	8-5/8	219	9-3/4	248	11-7/8	302
"B" (Height, Screwed or SW)	7-15/16	202	10-3/16	259	11-1/2	292	13-11/16	348	15	381	17-1/8	435
"BB"	12-1/16*	306*	12-5/16	313	13-7/8	352	16-1/16	408	17-9/16	446	19-11/16	500
"G" (Body OD)	3-1/16	78	4-3/4	121	5-1/8	130	5-3/4	146	6-5/8	168	8-3/8	213
"K" (¢ Outlet to ¢ Inlet)	9/16	14.3	1-1/4	31.7	1-7/16	36.5	1-7/16	36.5	1-3/4	44.4	2-1/8	54.0
Number of Bolts	6				8				9		10	
Weight Scr. or SW lb (kg)	10 (4.5)		30 (13.6)		50 (22.7)		70 (31.8)		98 (44.5)		179 (81.2)	
Weight, Flanged lb (kg)	12 (5.4)		32 (14.5)		51 (23.1)		73 (33.1)		103 (46.7)		184 (83.5)	

\*"BB" dimensions shown are for 3/4" conn., Class 600 flanged No. 310-FW. Consult factory for dimensions of models with other connection sizes and/or flanges.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

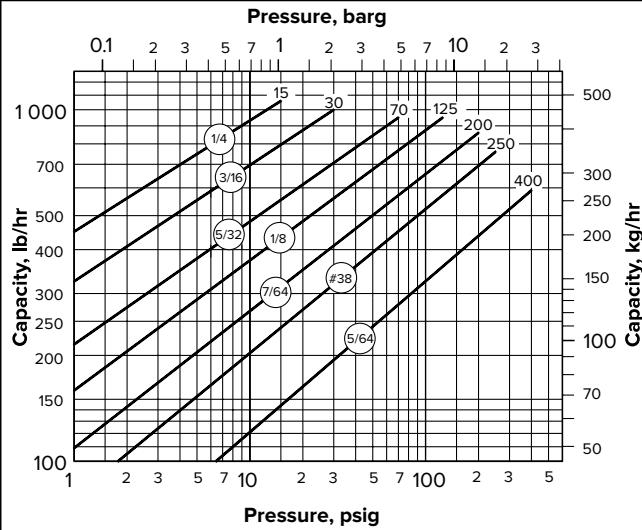
# 300 Series Inverted Bucket Steam Trap

Forged Carbon Steel for Vertical Installation

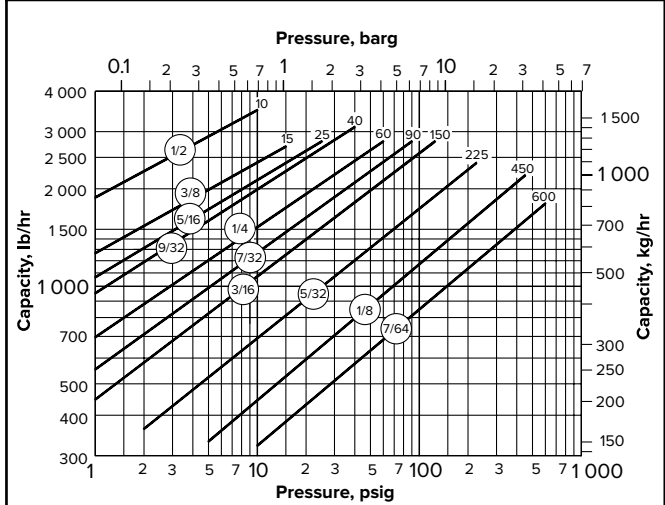
For Pressures to 650 psig (45 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)



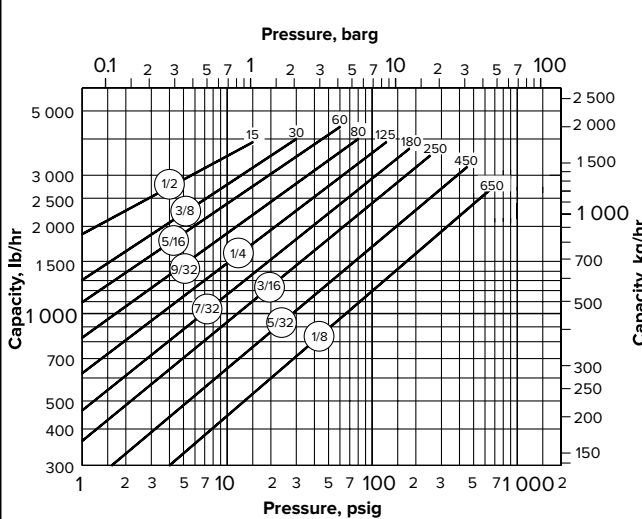
**Model 310 Capacity**



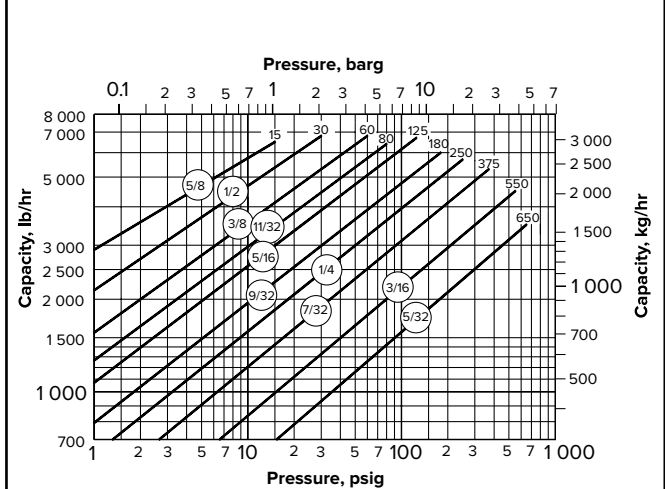
**Model 312 Capacity**



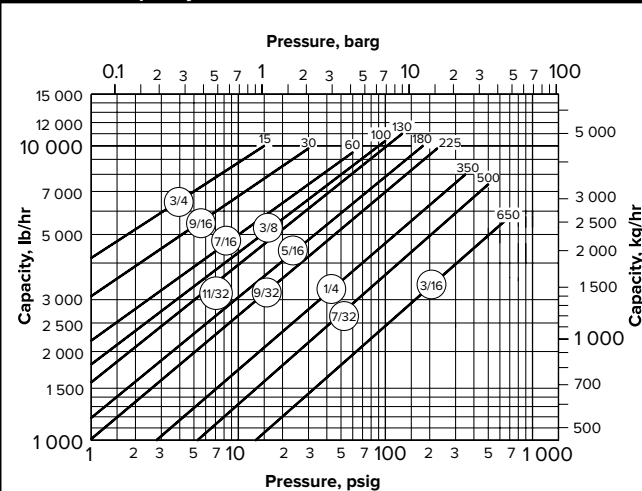
**Model 313 Capacity**



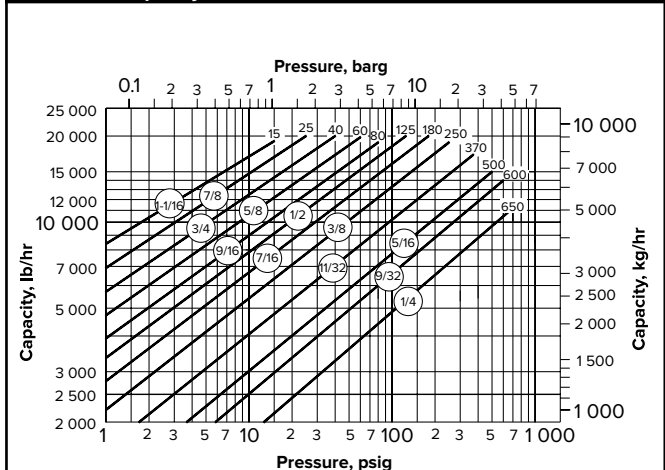
**Model 314 Capacity**



**Model 315 Capacity**



**Model 316 Capacity**



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# 400 Series Inverted Bucket Steam Trap

## Forged Chrome-moly Steel for Vertical Installation

For Pressures to 1 000 psig (69 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)

### Description

Armstrong offers its 400 Series forged chrome-moly steel traps for vertical installation with a choice of screwed, socketweld or flanged connections.

A unique leverage system multiplies the force provided by the bucket to open the valve against system pressure. The mechanism is free-floating and has no fixed pivots to create wear or friction.

Because the mechanism is located at the top of the trap, no dirt can collect on the orifice. Small particles of dirt are held in suspension until discharged by the full differential purging action when the bucket sinks, pulling the valve off the seat.

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket. This provides continuous automatic air and CO<sub>2</sub> venting at steam temperature.

Inverted bucket traps drain continuously to prevent condensate backup. They are also resistant to water hammer.

**Operation on Superheat.** A normally operating bucket trap is filled with saturated steam and condensate. Superheated steam can enter only as fast as the steam inside can condense. As a result, the temperature of the trap is at (or slightly below) saturated steam temperature, regardless of the degree of superheat.

**Trap Selection.** The pressure-containing parts of the steam trap should safely withstand the maximum pressure and temperature conditions of the system. For example, a trap is required for a 900 psig (62 barg) main at 900°F (482°C). The normal operating temperature of the trap will be about 532°F (278°C). A Model 415 trap should be selected, even though several smaller traps are capable of handling the working pressure.

#### For Superheat Service:

1. Don't oversize the orifice; a restricted orifice may be advisable.
2. Specify an internal check valve.
3. Provide a drip leg of adequate diameter and length.
4. Provide a generous length (2'-3') of inlet piping, with the trap below the main.
5. Don't insulate the trap or the inlet piping.

### Connections

Screwed NPT and BSPT  
Socketweld  
Flanged

See page 187 for dimensional information for socketweld connections.

### Materials

Body:

ASTM A182 F22 Class 3

Models 413 and 415 are available with cast 316 stainless steel bodies and all stainless steel internals

Internals:

All stainless steel—304

Valve and seat:

Stainless steel—17-4PH or Titanium

### Options

Stainless steel internal check valve

### Specification

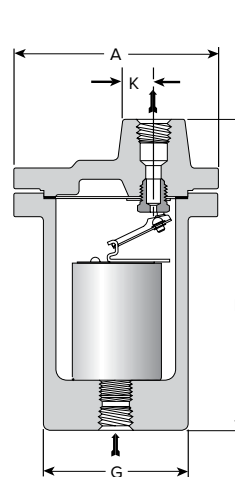
Inverted bucket steam trap, type ... in forged chrome-moly steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, with the discharge orifice at the top of the trap.

### How to Order

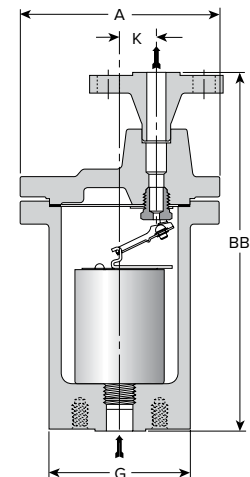
Specify:

- Model number
- Size and type of pipe connection. When flanges are required, specify type of flange in detail
- Maximum working pressure that will be encountered or orifice size
- Any options required

For a fully detailed certified drawing, refer to CD #1002.



Series 400 Trap



Series 400-FW Trap

#### 400 Series, Bottom Inlet, Top Outlet Traps. Add suffix "CV" to trap number for internal check valve.

Model No. Screwed or SW Model No. Flanged	413 413-FW		415 415-FW		416 416-FW	
	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50
"A" (Diameter)	8-5/8	219	10-3/4	273	12-1/2	317
"B" (Height, Screwed or SW)	12-3/16	310	14-15/16	379	17-5/8	448
"BB"	14-7/8	378	18-1/16	459	21-1/2	546
"G" (Body OD)	5-3/8	137	6-7/8	175	8-1/2	216
"K" (¢ Outlet to ¢ Inlet)	1-7/16	36.5	1-3/4	44.4	2-1/8	54.0
Number of Bolts	8		9		12	
Weight Scr. or SW lb (kg)	65 (29.5)		126 (57.2)		205 (93.0)	
Weight, Flanged lb (kg)	70 (31.8)		132 (59.9)		211 (95.7)	

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



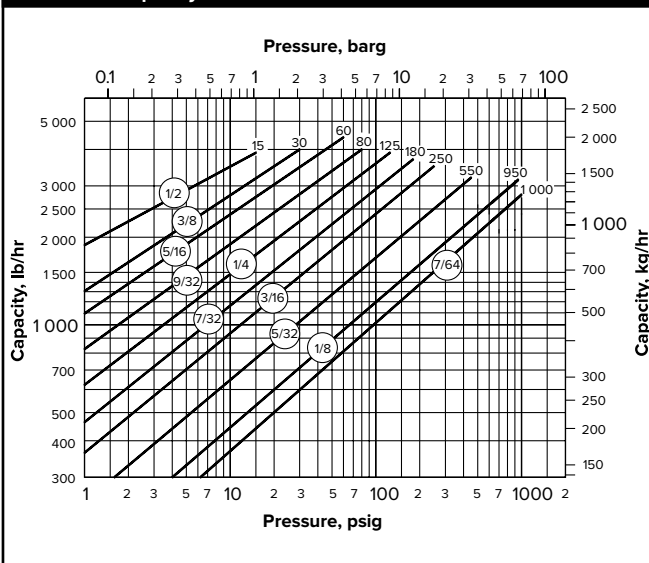
# 400 Series Inverted Bucket Steam Trap

## Forged Chrome-moly Steel for Vertical Installation

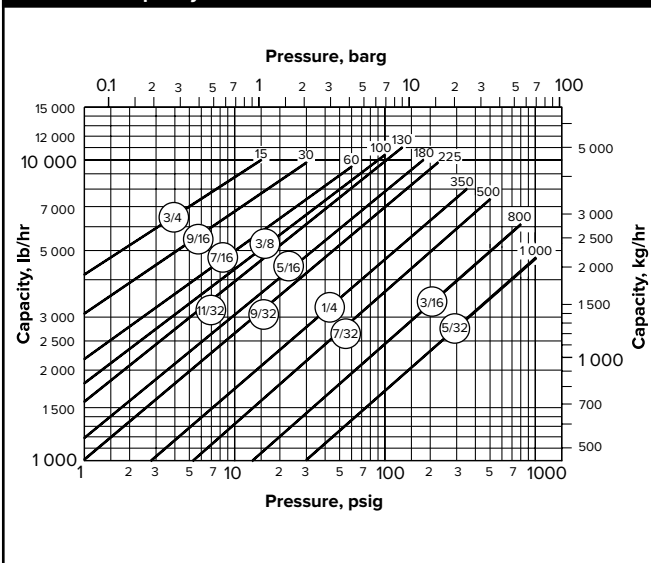
For Pressures to 1 000 psig (69 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)



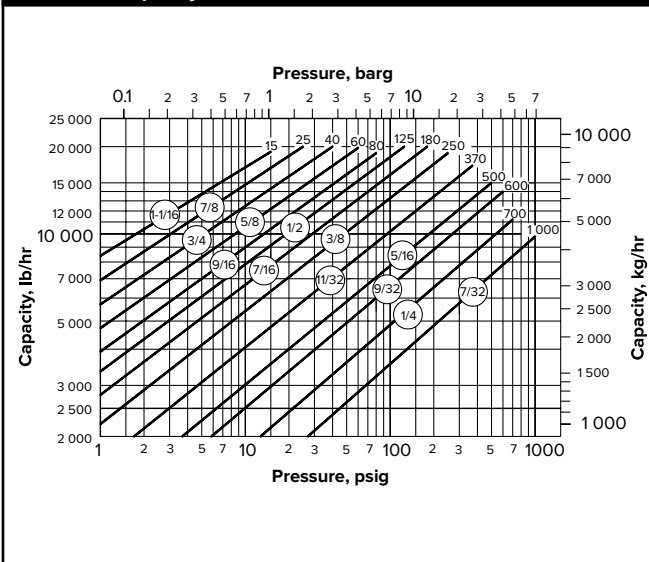
**Model 413 Capacity**



**Model 415 Capacity**



**Model 416 Capacity**



**Pressure-Temperature Rating for Forged Steel Traps**

Model No	Max. Oper. Pressure, Sat. Steam		Maximum Allowable Pressure (Vessel Design) of Pressure-Containing Parts at Indicated Temperature											
			°F		°C		°F		°C		°F		°C	
			-20/+650	-28/+343	700	371	750	399	800	427	850	454	900	482
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
413	1 000	69	1 200	83	1 200	83	1 200	83	1 200	83	1 050	72	780	54
415	1 000	69	1 100	76	1 100	76	1 100	76	1 100	76	1 080	74.5	965	66.5
416	1 000	69	1 700	117	1 700	117	1 700	117	1 660	114	1 350	93	990	68

NOTES: Maximum operating pressure to be marked on nameplate will be determined by actual orifice used.

Maximum allowable pressures shown in boldface will be marked on nameplate, unless otherwise requested.

Traps with flanges may have different pressure-temperature ratings.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

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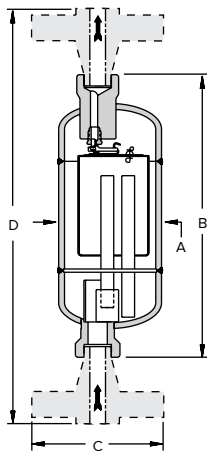
[armstronginternational.com](http://armstronginternational.com)



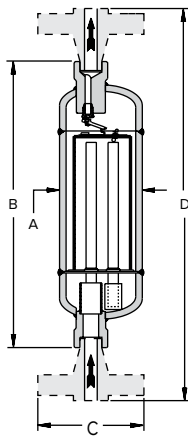
# 401-SH/501-SH Series Inverted Bucket Superheat Steam Trap

Carbon Steel or Stainless Steel for Vertical Installation

For Pressures to 1 540 psig (105 barg)...Capacities to 950 lb/hr (432 kg/hr)



Model 401-SH



Model 501-SH



## Description

Armstrong's 401-SH/501-SH Series inverted bucket steam trap line is made for overcoming the difficult combination of superheat and high pressure/low load service.

To survive this most severe steam service, Armstrong created an inverted bucket trap with a unique accumulation chamber. The chamber collects sufficient condensate to ensure full discharge cycles. A cup in the chamber floats up and down on the steam inlet tube, sealing it off as the condensate level rises. At the same time as the chamber collects condensate, steam continues to flow under the bucket, making sure that the discharge valve closes tightly until the condensate rises into the trap body and the bucket falls down. The operation is on/off, no throttling or dribbling.

Furthermore, it combines all the advantages of an inverted bucket steam trap:

- High resistance to wear, corrosion and water hammer with no gaskets.
- A unique leverage system multiplies the force provided by the bucket, to open the valve against system pressure.
- The mechanism is located at the top. No dirt can collect on the orifice. Small particles of dirt will be held in suspension until discharged by the full differential purging action.
- The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small hole in the bucket.
- Inverted bucket traps require no adjustment. They do not allow condensate backup and are resistant to water hammer.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model 401-SH: 1 000 psig @ 800°F (69 barg @ 427°C)

Model 501-SH: 1 540 psig @ 850°F (105 barg @ 454°C)

Maximum operating pressure:

Model 401-SH: 1 000 psig

Model 501-SH: 1 540 psig

## Connections

Screwed NPT and BSPT (401-SH only)

Socketweld

Flanged

See page 187 for dimensional information for flanged and socketweld connections.

## Materials

Body:

Model 401-SH

Model 501-SH

Internals:

Valve and seat:

Connections:

Model 401-SH

Model 501-SH

Carbon steel ASTM A106 Gr. B Sch. 80 pipe  
Stainless steel 316L ASTM A312 Sch. 80 pipe  
Stainless steel—304

Titanium

Stainless steel—304

Stainless steel—316L

## Specification

Inverted bucket steam trap, type ... in carbon steel (stainless steel), with accumulation chamber, continuous air venting at steam temperature, stainless steel leverage system, with the discharge orifice at the top of the trap.

## How to Order

Specify:

- Model number
- Size and type of pipe connection. When flanges are required, specify type of flange in detail
- Maximum working pressure that will be encountered or orifice size

For a fully detailed certified drawing, refer to:

401-SH CD #1011

501-SH CD #1012

401-SH and 501-SH Series Steam Traps						
Model	401-SH		501-SH			
	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2	15	3/4	20
"A" Diameter (NPT, BSPT or SW)	4	100	4	100	4	100
"B" Height (NPT, BSPT or SW)	11	275	13-9/16	344	13-9/16	344
"C" Diameter (Flanged)*	4-5/8	117	4-3/4	121	5-1/8	130
"D" Height (Flanged)*	15-1/8	384	18-3/16	462	18-11/16	475
Weight NPT, BSPT or SW lb (kg)	12 (5.5)		15 (7)			
Weight Flanged lb (kg)	15 (6.7)		29 (13)			

\*401-SH 600 lb RF shown. 501-SH 900/1500 lb RF shown.

# 401-SH/501-SH Series Inverted Bucket Superheat Steam Trap

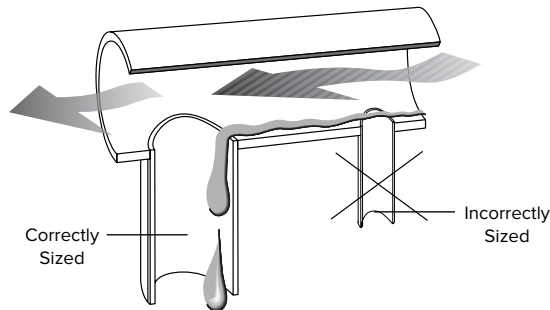
Carbon Steel or Stainless Steel for Vertical Installation

For Pressures to 1 540 psig (105 barg)...Capacities to 950 lb/hr (432 kg/hr)



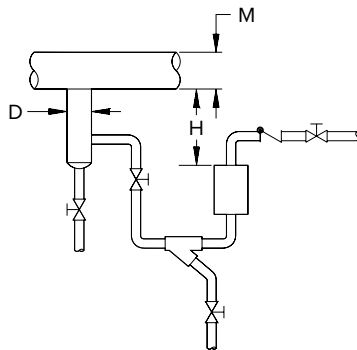
## Installation Recommendations

What little condensate there is on superheat and high pressure/low load service usually forms in drip legs and in the traps themselves. Therefore proper piping and drip legs of adequate size and diameter are essential for the successful operation of the Armstrong superheat trap.



### Drip Leg Sizing

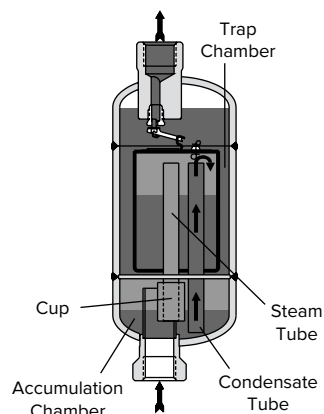
The properly sized drip leg will capture condensate. Too small a drip leg can actually cause a venturi "piccolo" effect where pressure drop pulls condensate out of the drip leg and trap.



Trap Draining Drip Leg on Steam Main

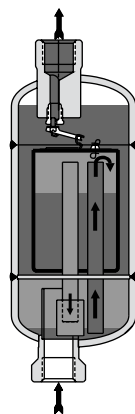
### KEY

□ Air    ■ Steam    ■ Condensate



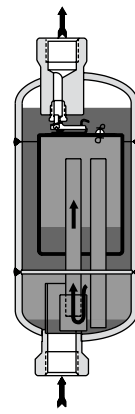
### Cycling—Discharge Valve Wide Open

With the steam feed tube to the trap chamber sealed, condensate flows through the condensate feed tube (from accumulation chamber) into the trap chamber. This sinks the inverted bucket, which opens the discharge valve, cycling the trap.



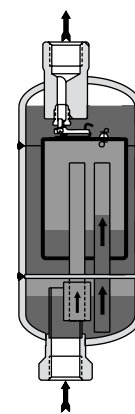
### Cycle Ending

As the level of condensate in the accumulation chamber falls, the cup sealing the steam feed tube moves downward, opening a passage for steam to flow into trap chamber.



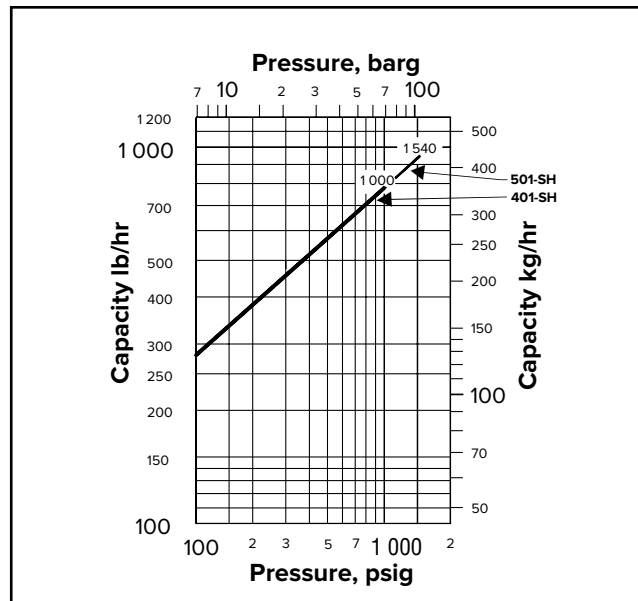
### Trap Closed

As steam begins to flow through the accumulation chamber and up the steam feed tube under the inverted bucket in the trap chamber, the discharge valve closes tightly.



### Cycle About to Repeat

As the level of condensate rises in the accumulation chamber, the cup floats up until it again seals the steam feed tube, and the cycle repeats.



## Recommended Steam Main and Branch Line Drip Leg Tracing

M Steam Main Size		D Drip Leg Diameter		H Drip Leg Length Minimum			
				Supervised Warm-Up		Automatic Warm-Up	
in	mm	in	mm	in	mm	in	mm
1/2	15	1/2	15	10	250	28	710
3/4	20	3/4	20	10	250	28	710
1	25	1	25	10	250	28	710
2	50	2	50	10	250	28	710
3	75	3	75	10	250	28	710
4	100	4	100	10	250	28	710
6	150	4	100	10	250	28	710
8	200	4	100	12	300	28	710
10	250	6	150	15	380	28	710
12	300	6	150	18	450	28	710
14	350	8	200	21	530	28	710
16	400	8	200	24	600	28	710
18	450	10	250	27	685	28	710
20	500	10	250	30	760	30	760
24	600	12	300	36	910	36	910

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

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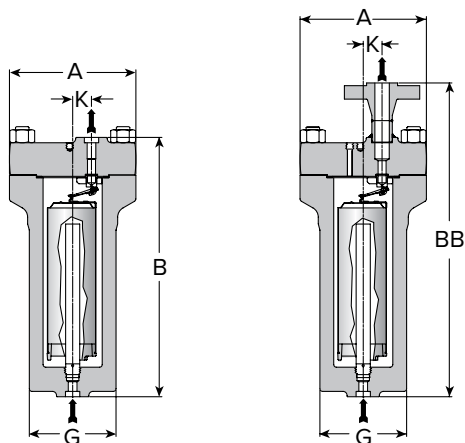
[armstronginternational.com](http://armstronginternational.com)



# 5000 Series Inverted Bucket Steam Trap

**Forged Chrome-moly Steel for Vertical Installation**

For Pressures to 1 800 psig (124 barg)...Capacities to 5 150 lb/hr (2 336 kg/hr)



Series 5133G-5155G Traps      Series 5133G-FW & 5155G-FW Traps



## Description

Armstrong offers its 5000 Series forged chrome-moly steel traps for vertical installation with a choice of screwed, socketweld or flanged connections.

A unique leverage system multiplies the force provided by the bucket to open the valve against system pressure. The mechanism is free-floating and has no fixed pivots to create wear or friction.

Because the mechanism is located at the top of the trap, no dirt can collect on the orifice. Small particles of dirt are held in suspension until discharged by the full differential purging action when the bucket sinks, pulling the valve off the seat.

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket. This provides continuous automatic air and CO<sub>2</sub> venting at steam temperature.

Inverted bucket traps drain continuously, although discharging intermittently, to prevent condensate backup. They are also resistant to water hammer.

**Operation on Superheat.** A normally operating bucket trap is filled with saturated steam and condensate. Superheated steam can enter only as fast as the steam inside can condense. As a result, the temperature of the trap is at (or slightly below) saturated steam temperature, regardless of the degree of superheat.

**Trap Selection.** The pressure-containing parts of the steam trap should safely withstand the maximum pressure and temperature conditions of the system. For example, a trap is required for a 1 000 psig (68 barg) main at 950°F (510°C). The normal operating temperature of the trap will be about 546°F (286°C). A Model 5133G trap should be selected, even though several smaller traps are capable of handling the working pressure.

## For Superheat Service:

1. Don't oversize the orifice; a restricted orifice may be advisable.
2. Specify an internal check valve.
3. Provide a drip leg of adequate diameter and length.
4. Provide a generous length (2'-3') of inlet piping, with the trap below the main.
5. Don't insulate the trap or the inlet piping.

## Connections

Screwed NPT and BSPT  
Socketweld  
Flanged

See page 187 for dimensional information for flanged and socketweld connections.

## Materials

Body: ASTM A182 F22 Class 3  
Internals: All stainless steel—304  
Valve and seat: Titanium

## Options

- Stainless steel internal check valve

**For a fully detailed certified drawing, refer to:**

**5133 CD #1069**

**5155 CD #1096**

## 5000 Series Bottom Inlet, Top Outlet Traps

Add suffix "CV" to trap number for internal check valve.

Model No. Screwed or SW Model No. Flanged	5133G 5133G-FW		5155G 5155G-FW	
	in	mm	in	mm
Pipe Connections	1/2, 3/4, 1	15, 20, 25	3/4, 1, 1-1/4	20, 25, 32
"A" (Diameter)	8-1/2	216	10-3/8	264
"B" (Height, Screwed or SW)	14-1/4	362	16-7/32	412
"BB"	18-7/8*	479*	20-7/8*	530*
"G" (Body OD)	5-3/4	146	7-5/8	194
"K" (⌀ Outlet to ⌀ Inlet)	1-5/16	33.3	1-3/4	44.4
Number of Bolts	8		10	
Weight Scr. or SW lb (kg)	113 (44.5)		171 (77.6)	
Weight, Flanged lb (kg)	120 (47.6)		185 (83.9)	

\*"BB" dimensions shown are for 1" conn. Class 1500 flanged No. 5133G-FW and 1-1/4" conn. Class 1500 flanged No. 5155G-FW. Consult factory for dimensions of models with other connection sizes and/or flanges.

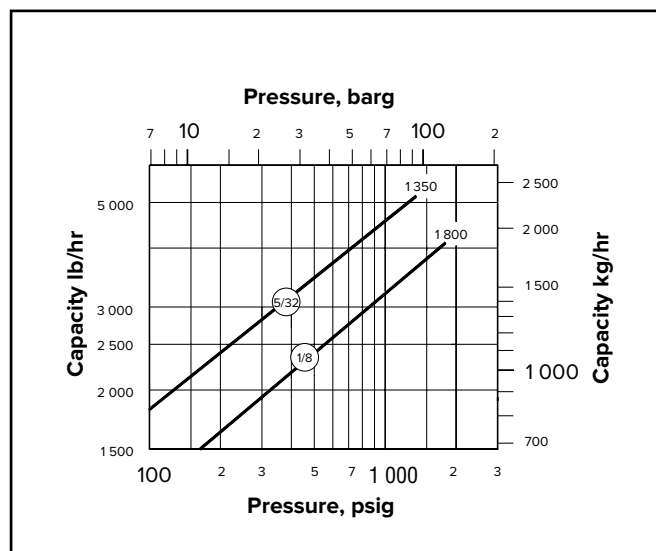
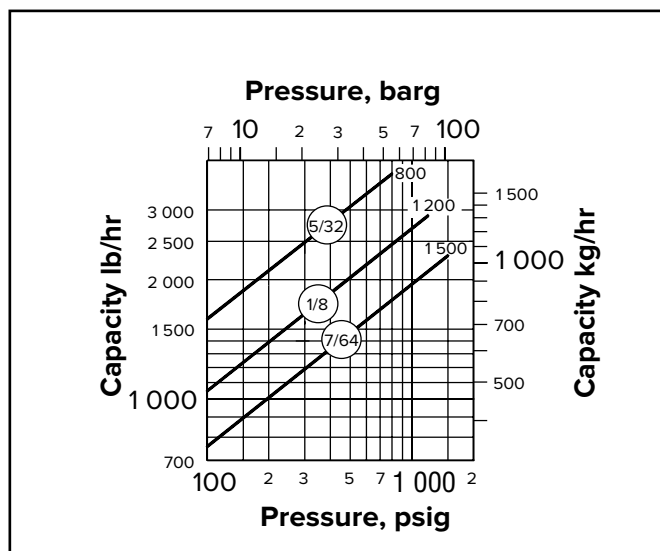
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# 5000 Series Inverted Bucket Steam Trap

## Forged Chrome-moly Steel for Vertical Installation

For Pressures to 1 800 psig (124 barg)...Capacities to 5 150 lb/hr (2 336 kg/hr)



### Pressure-Temperature Rating for Forged Steel Traps

Model No.	Max. Oper. Pressure, Sat. Steam		Maximum Allowable Pressure (Vessel Design) of Pressure-Containing Parts at Indicated Temperature															
			°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C
			-20/+650	-28/+343	700	371	750	399	800	427	850	454	900	482	950	510	1 000	538
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
5133G	1 500	103	2 120	146	2 120	146	2 120	146	2 120	146	1 990	137	1 730	119	1 350	93	930	64
5155G	1 800	124	2 520	174	2 520	174	2 520	174	2 520	174	2 370	163	2 070	143	1 610	111	1 110	76.5

NOTES: Maximum operating pressure to be marked on nameplate will be determined by actual orifice used.

Maximum allowable pressures shown in boldface will be marked on nameplate, unless otherwise requested. Traps with flanges may have different pressure-temperature ratings.

## Options

Internal Check Valves are spring loaded stainless steel and screw into an extended inlet tube having a pipe coupling at the top to save fittings, labor and money. Internal check valves may result in slightly reduced capacities.

Screwed Connections are available in all sizes for pressures of 900 psig or less. Traps for pressures of 900 psig or higher are available with socketweld or flanged connections.

## Specification

Inverted bucket steam trap, type ... in forged chrome-moly steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, with the discharge orifice at the top of the trap.

## How to Order

Specify:

- Model number
- Size and type of pipe connection. When flanges are required, specify type of flange in detail
- Maximum working pressure that will be encountered or orifice size
- Any options required



## Armstrong® 2000 Series Stainless Steel Traps

The Armstrong stainless steel traps—Series 1000 and Series 2000—have high resistance to damage from freeze-ups. They also offer high resistance to wear and corrosion for longer service reliability, and they provide continuous air venting.

Armstrong stainless steel traps provide maximum ease and economy of installation, inspection or replacement. What's more, an Armstrong stainless steel trap is the ideal solution for trapping applications such as tracer lines, steam mains, and heating and processing applications.

### Wear and corrosion resistance

Free-floating guided lever valve mechanism is "frictionless," and all wear points are heavily reinforced. All working parts are stainless steel. Valve and seat are stainless steel, individually ground and lapped together in matched sets.

### 360° universal 304 stainless steel connector

Provides quick, easy in-line renewability along with all the proven advantages of an inverted bucket operation. Also available with optional IS-2 integral strainer connector with 20 x 20 mesh stainless steel strainer.

### Virtually no steam loss

Steam does not reach the water-sealed discharge valve.

### Purging action

Snap opening of the valve creates a momentary pressure drop and turbulence in the unit drained. This breaks up films of condensate and air and speeds their flow to the trap.

### Sealed, tamperproof 304-L stainless steel package

Able to withstand freeze-ups without damage.

### Excellent operation against back pressure

Since trap operation is governed by the difference in density of steam and water, back pressure in the return line has no effect on the ability of the trap to open for condensate and close against steam.

### Resistance to damage from water hammer

Open bucket or float will not collapse as a result of water hammer.

### Continuous air and CO<sub>2</sub> venting

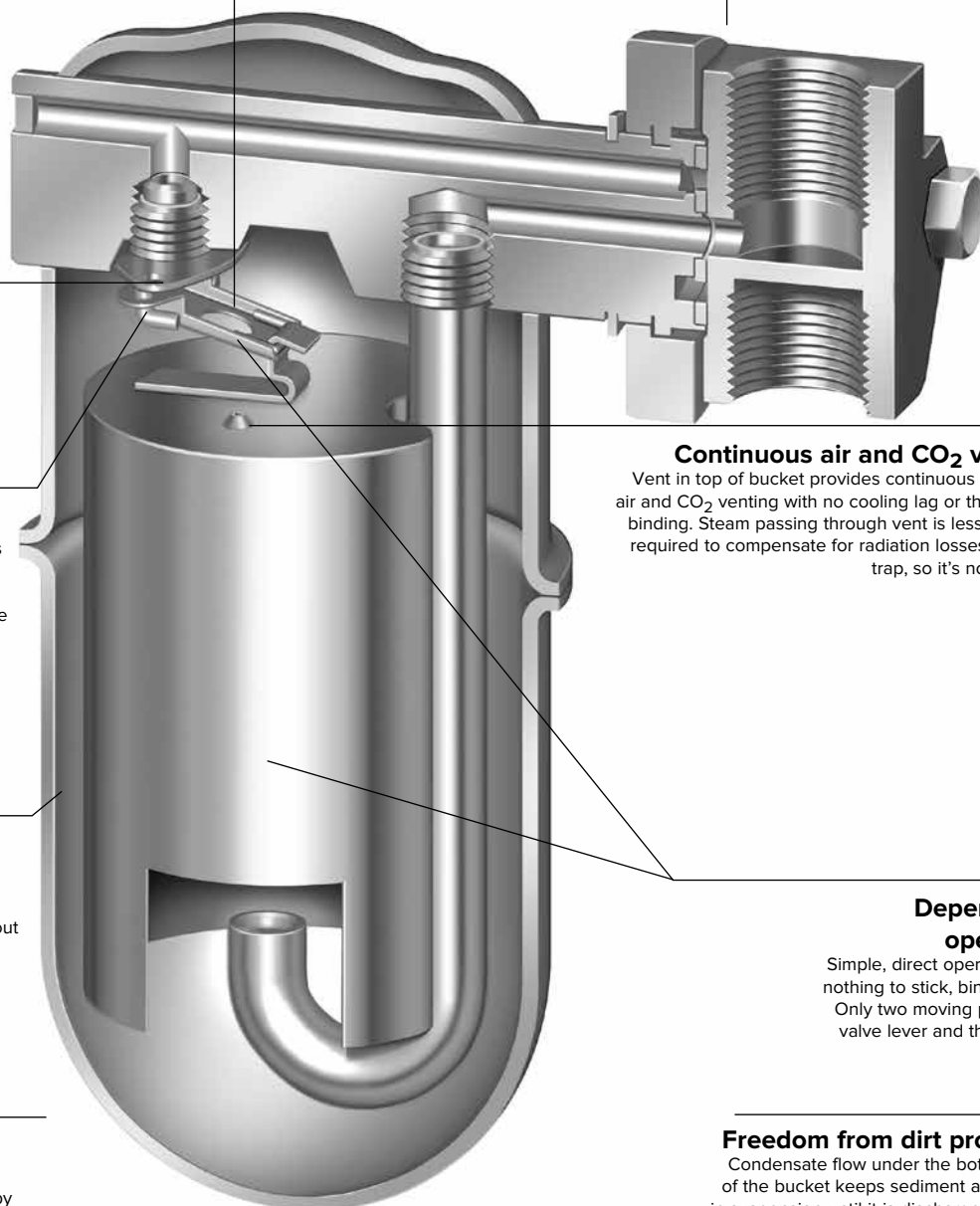
Vent in top of bucket provides continuous automatic air and CO<sub>2</sub> venting with no cooling lag or threat of air binding. Steam passing through vent is less than that required to compensate for radiation losses from the trap, so it's not wasted.

### Dependable operation

Simple, direct operation with nothing to stick, bind or clog. Only two moving parts—the valve lever and the bucket.

### Freedom from dirt problems

Condensate flow under the bottom edge of the bucket keeps sediment and sludge in suspension until it is discharged with the condensate. Valve orifice opens wide and closes tightly. No buildup of dirt or close clearances to be affected by scale.



# 2000 Series Stainless Steel Traps

## For Pressures to 650 (45 barg) psig... Capacities to 1 300 lbs/hr (590 kg/hr)

With the Series 2000 360° universal connector, you can install inverted bucket efficiency and long service life in any piping configuration with little or no repiping. You get the reliability of the inverted bucket operating principle, plus all the benefits of all-stainless steel construction:

- A sealed, tamperproof package
- A compact, lightweight trap
- The ability to withstand freeze-ups without damage
- Exceptional corrosion resistance
- A three-year guarantee against defective materials or workmanship

Series 2000 steam traps combine savings in three important areas: energy, installation and replacement. The 360° universal connector provides quick, easy in-line renewability along with all the proven advantages of an inverted bucket operation. Choice of NPT or BSPT screwed connections, or socketweld connections.

Also available with IS-2 integral strainer connector.



Available with  
Standard Connector

Material: 304 stainless steel



Available with  
IS-2 Integral Strainer Connector  
(shown with optional blowdown valve)

Material: 304 stainless steel



Available with  
IS-4 Connector

Material: ASTM A351 Gr. CF8M





# 1000 Series Inverted Bucket Steam Trap

## All Stainless Steel for Vertical Installation

For Pressures to 650 psig (45 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)

### Description

Armstrong 1000 Series stainless steel inverted bucket steam traps normally last three to four times longer than conventional traps used in identical services. Heat-treated stainless steel valves and seats are of the same design, material and workmanship as those used in traps for pressures up to 900 psig and temperatures to 900°F. More compact than cast iron or carbon steel equivalents, 1000 Series traps are ideal for trapping applications such as tracer lines, steam mains and heating/process applications.

The 1000 Series are guaranteed for three years.

### Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model 1010, 1011:	400 psig @ 800°F (28 barg @ 427°C)
Model 1022:	650 psig @ 600°F (45 barg @ 316°C)
	627 psig @ 700°F (43 barg @ 371°C)
	604 psig @ 800°F (41.6 barg @ 427°C)
Model 1013:	450 psig @ 800°F (31 barg @ 427°C)

Maximum operating pressure:

Model 1010:	150 psig (10 barg)
Model 1011:	400 psig (28 barg)
Model 1022:	650 psig (45 barg)
Model 1013:	450 psig (31 barg)

### Connections

Screwed NPT and BSPT

Socketweld

### Materials

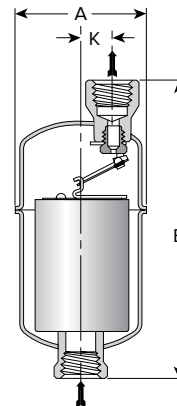
Body:	ASTM A240 Grade 304L
Internals:	All stainless steel—304
Valve and seat:	Stainless steel—17-4PH or Titanium

### Options

- Stainless steel internal check valve
- Thermic vent bucket 250 psig (17 barg) maximum;  
for Model 1022 15 psig (1 barg) maximum
- Wiggle wire
- 316 stainless steel valve and seat

### Specification

Inverted bucket steam trap, type ... in all stainless steel, freeze resistant, without gaskets, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and orifice at the top of the trap.



Model 1010 Trap

### How to Order

Specify:

- Model number
- Size and type of pipe connection
- Maximum working pressure that will be encountered or orifice size
- Any options required

1000 Series Traps								
Model No.	1010		1011		1022		1013	
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4	15, 20	3/4	20	1	25
"A" (Diameter)	2-3/4	69.9	2-3/4	68.9	3-7/8	100	4-1/2	114
"B" (Height)	6-1/16	168	7-1/4	184	8-13/16	224	11-3/8	289
"K" (℄ Inlet to ℄ Outlet)	9/16	14.3	9/16	14.3	3/4	18	1-3/16	30.2
Weight lb (kg)	1-1/2 (0.7)		1-3/4 (0.8)		4 (2)		7-1/2 (3.4)	

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

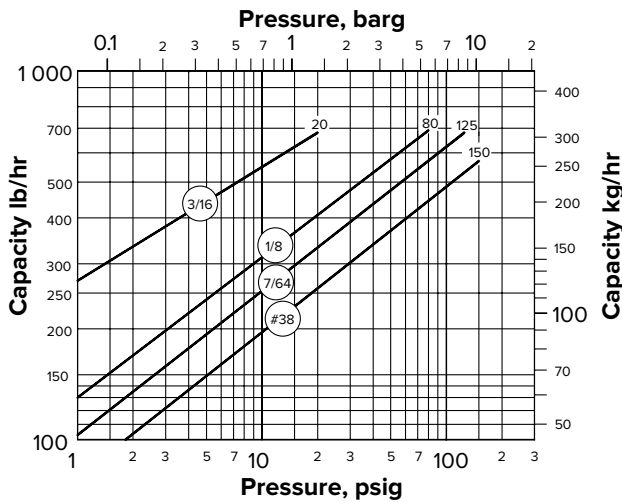
# 1000 Series Inverted Bucket Steam Trap

All Stainless Steel for Vertical Installation

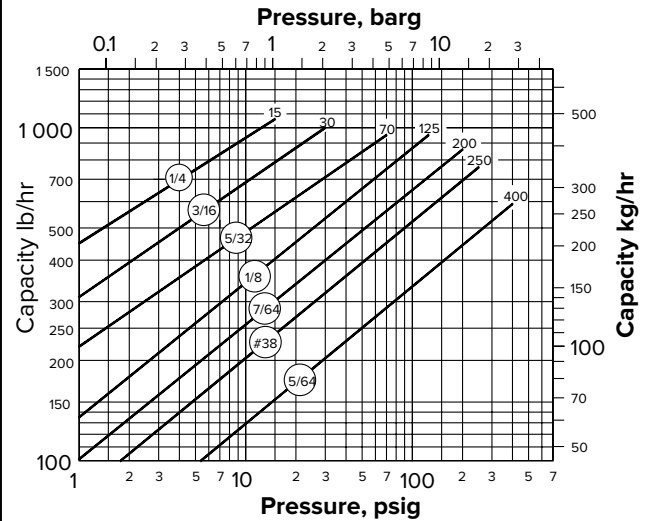
For Pressures to 650 psig (45 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)



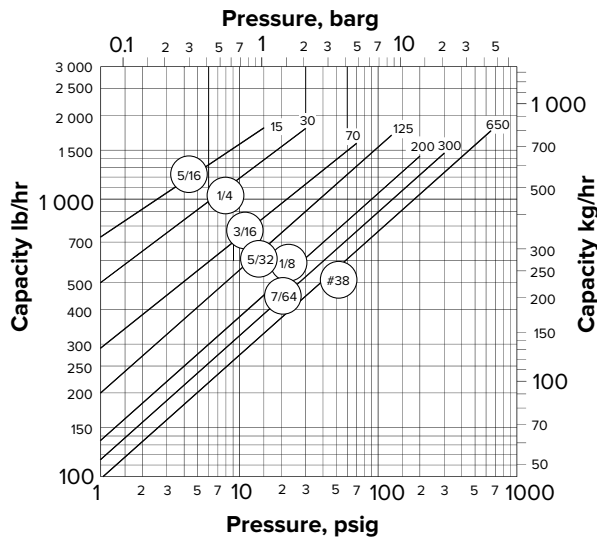
**Model 1010 Capacity**



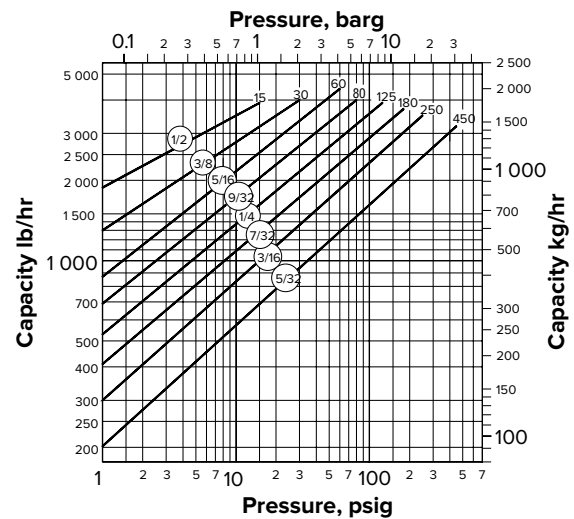
**Model 1011 Capacity**



**Model 1022 Capacity**



**Model 1013 Capacity**





# 2000 Series Inverted Bucket Steam Trap

All Stainless Steel With 360° Connector/IS-2/TVS-4000

For Pressures to 650 psig (45 barg)...Capacities to 1 300 lb/hr (590 kg/hr)

## Description

With the 2000 Series' 360° universal connector, you can install inverted bucket efficiency and long service life in any piping configuration with little or no repiping. You get the reliability of the inverted bucket operating principle, plus all the benefits of all-stainless steel construction:

- A sealed, tamperproof package
- A compact, lightweight trap
- The ability to withstand freeze-ups without damage
- Exceptional corrosion resistance
- A three-year guarantee against defective materials, defective workmanship.

2000 Series steam traps combine savings in three important areas: energy, installation and replacement. The 360° universal connector provides quick, easy in-line replacement along with all the proven advantages of inverted bucket operation.

Also available with optional IS-2 integral strainer connector.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model 2010, 2011:	400 psig @ 800°F (28 barg @ 427°C)
Model 2022:	650 psig @ 600°F (45 barg @ 315°C)
	627 psig @ 700°F (43 barg @ 371°C)
	600 psig @ 800°F (41 barg @ 427°C)

Maximum operating pressure:

Model 2010:	200 psig (14 barg)
Model 2011:	400 psig (28 barg)
Model 2022:	650 psig (45 barg)

## Connections

Screwed NPT and BSPT  
Socketweld  
Flanged (consult factory)

## Materials

Body:	ASTM-A 240 Grade 304L
Internals:	All stainless steel—304
Valve and seat:	Stainless steel—17-4PH or Titanium
Connector body (std & IS-2):	Stainless steel—304
Flange	ASTM A105 Zinc plated

## Options

- Insu-Pak™ insulation for Models 2010/2011
- Stainless steel pop drain for Models 2011/2022
- Probe connection for Models 2011/2022
- Strainer blowdown valve for IS-2 connector
- Wiggle wire
- 316 stainless steel valve and seat

## 360° Connector Styles

- Standard connector
- IS-2 connector with integral strainer
- IS-2 connector with integral strainer with blowdown valve

## Specification

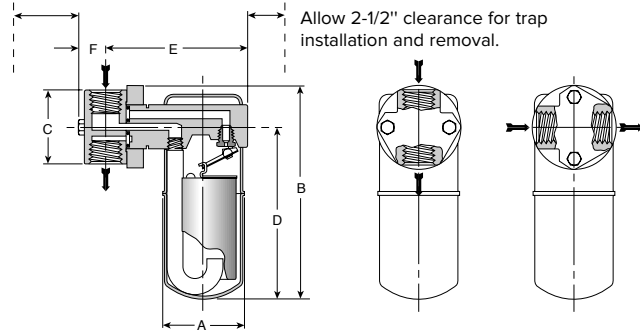
Inverted bucket steam trap, type ... in all stainless steel, freeze resistant, with 360° universal connector, having continuous air venting at steam temperature, free-floating stainless steel mechanism, and orifice at the top of the trap.

## How to Order

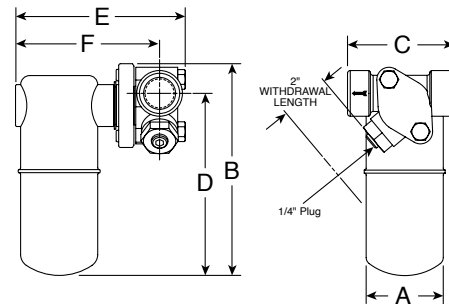
Specify:

- Model number
- Size and type of pipe connection
- Type of 360° connector (with or without strainer)
- Maximum working pressure that will be encountered or orifice size
- Any options required

Allow 2-1/2" clearance for bolt installation and removal.



Model 2011 Trap With Standard Connector



Series 2010-2022 With IS-2 Connector

Model No.	2010		2011		2022		
2000 Series Traps With Standard Connector							
Pipe Connections	in	mm	in	mm	in	mm	
	3/8, 1/2, 3/4	10, 15, 20	3/8, 1/2, 3/4	10, 15, 20	3/8, 1/2, 3/4	10, 15, 20	
	"A" (Diameter)	2-11/16	68	2-11/16	68	3-7/8	98
	"B" (Height)	6	152	6-15/16	176	8-11/16	221
	"C" (Face to Face)	2-3/8	60	2-3/8	60	2-3/8	60
	"D" (Bottom to $\varnothing$ )	4-19/32	117	5-9/16	141	7-3/8	187
	"E" ( $\varnothing$ to Outside)	4-9/16	115	4-9/16	115	5-3/4	146
	"F" ( $\varnothing$ to Bolt)	1	25	1	25	1	25
	Weight lb (kg)	4-1/4 (1.9)		4-1/2 (2.0)		7 (3)	

## 2000 Series Traps With IS-2 Integral Strainer Connector

Model No.	2010				2011				2022			
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1	25	1/2, 3/4	15, 20	1	25	1/2, 3/4	15, 20	1	25
"A" (Diameter)	2-11/16	68	2-11/16	68	2-11/16	68	2-11/16	68	3-7/8	98	3-7/8	98
"B" (Height)*	6	152	6	152	6-15/16	176	6-15/16	176	8-11/16	221	8-11/16	221
"C" (Face to Face)	3-1/2	89	4	102	3-1/2	89	4	102	3-1/2	89	4	102
"D" (Bottom to $\varnothing$ )*	5	127	5	127	6	152	6	152	7-3/4	197	7-3/4	197
"E" (Outside to Bolt)	5-1/2	140	5-11/16	144	5-1/2	140	5-11/16	144	6-11/16	170	6-7/8	175
"F" ( $\varnothing$ to Outside)	4-5/8	117	4-13/16	122	4-5/8	117	4-13/16	122	5-13/16	148	6	152
Weight lb (kg)	4-3/4 (2.2)		5-1/4 (2.4)		5 (2.3)		5-1/2 (2.5)		7 (3)			

\*Add 1/2" (15 mm) to "B" and "D" dimensions when optional probe connection is required.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

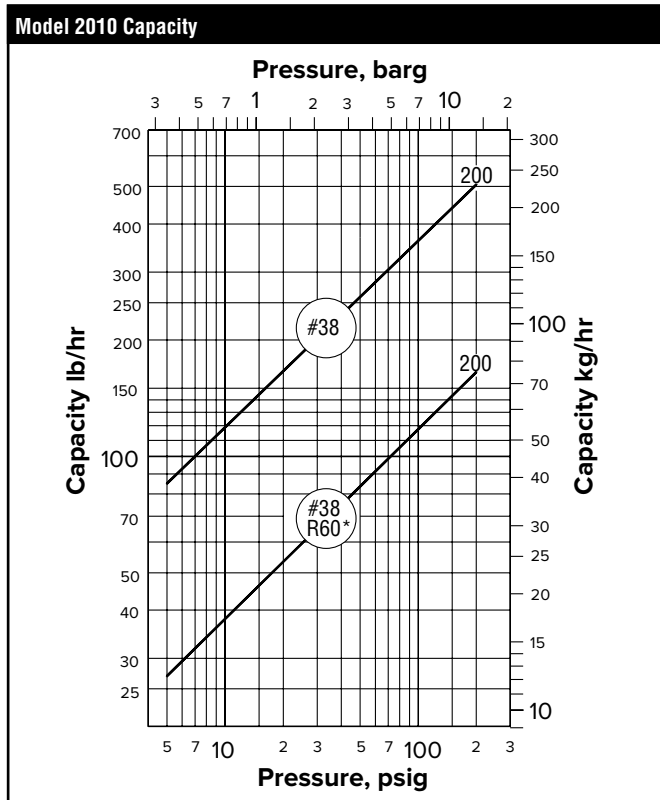
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# 2000 Series Inverted Bucket Steam Trap

All Stainless Steel With 360° Connector/IS-2/TVS-4000

For Pressures to 650 psig (45 barg)...Capacities to 1 300 lb/hr (590 kg/hr)



\*NOTE: Because the orifice is located at the top, inverted bucket steam traps handle dirt and scale better than other types of traps. However, in applications where extremely dirty conditions exist, care should be exercised in the use of all types of restricted-orifice, reduced-capacity traps.

## Connectors

Besides the inverted bucket traps, the standard connector, IS-2 connector, and TVS-4000 connector with integral strainer can also be used on thermostatic, thermostatic wafer and disc traps.



CD-3300 Disc Trap  
With IS-2 Integral Strainer  
Connector

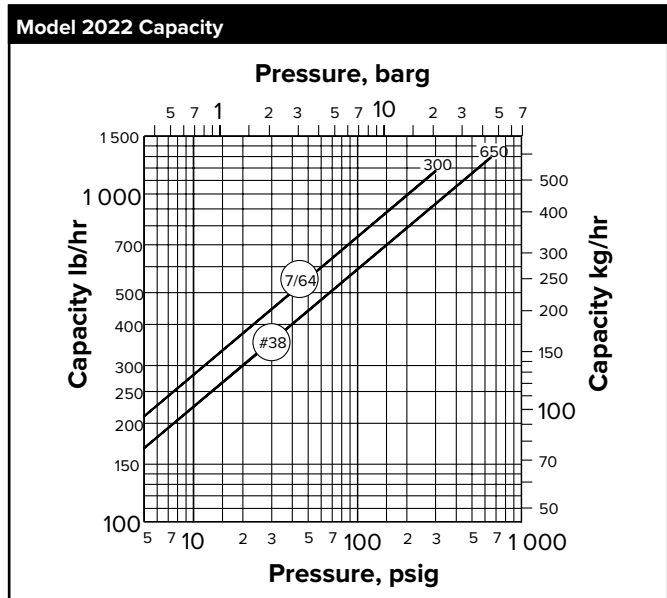
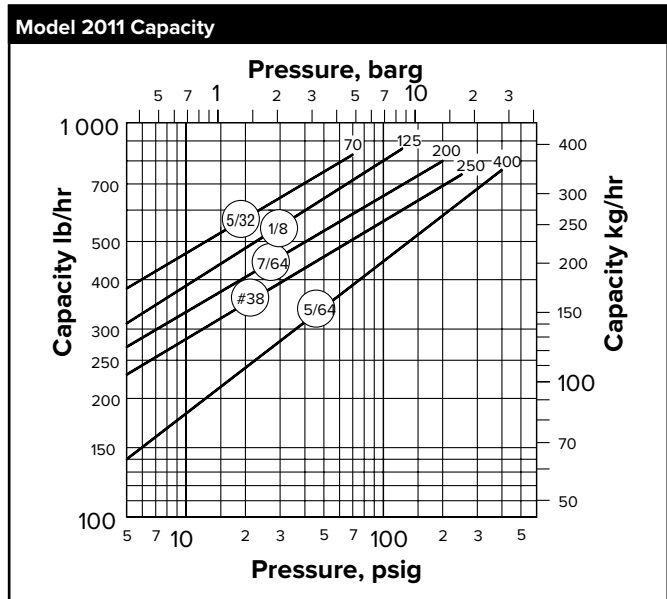
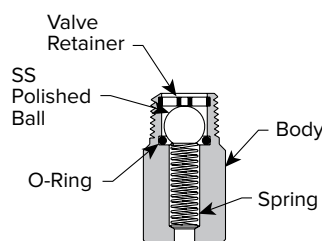
## Options

### Pop Drain for Freeze Protection

In general, a properly selected and installed Armstrong trap will not freeze as long as steam is coming to the trap. If the steam supply is shut off, a pop drain should be used to automatically drain the trap. Stainless steel pop drain available for Models 2011 and 2022.

### Maximum Operating Conditions

Pressure: 600 psig (41 barg)  
Temperature: 350°F (177°C)



### Insu-Pak

Now you can insulate the in-line traps in your plant without complicating regular trap maintenance. Insu-Pak, a simple reusable insulation package, cuts the time and cost of in-field installation because it goes on in a snap. And it comes off just as easily. The Insu-Pak can prevent trap freeze-up when used with a properly designed condensate manifold. Designed for use with Model 2010 and Model 2011 traps.



Probe connections are available for trap monitoring for Models 2011 and 2022.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

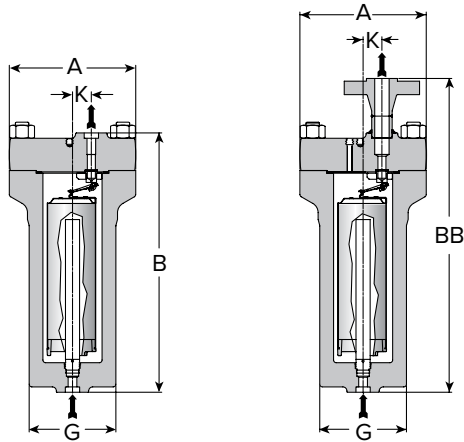




# 6000 Series Inverted Bucket Steam Trap

## Forged Chrome-moly Steel for Vertical Installation

For Pressures to 2 700 psig (186 barg)...Capacities to 6 500 lb/hr (2 948 kg/hr)



Model 6155G Traps

Model 6155G-FW Traps

## Description

Armstrong offers its 6000 Series forged chrome-moly steel traps for vertical installation with a choice of socketweld or flanged connections.

A unique leverage system multiplies the force provided by the bucket to open the valve against system pressure. The mechanism is free-floating and has no fixed pivots to create wear or friction.

Because the mechanism is located at the top of the trap, no dirt can collect on the orifice. Small particles of dirt are held in suspension until discharged by the full differential purging action when the bucket sinks, pulling the valve off the seat.

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket. This provides continuous automatic air and CO<sub>2</sub> venting at steam temperature.

Inverted bucket traps drain continuously, although discharging intermittently, to prevent condensate backup. They are also resistant to water hammer.

**Operation on Superheat.** A normally operating bucket trap is filled with saturated steam and condensate. Superheated steam can enter only as fast as the steam inside can condense. As a result, the temperature of the trap is at (or slightly below) saturated steam temperature, regardless of the degree of superheat.

**Trap Selection.** The pressure-containing parts of the steam trap should safely withstand the maximum pressure and temperature conditions of the system. For example, a trap is required for a 1 500 psig (102 barg) main at 1 000°F (538°C). The normal operating temperature of the trap will be about 596°F (299°C). A Model 6155G trap should be selected, even though several smaller traps are capable of handling the working pressure.

### For Superheat Service:

1. Don't oversize the orifice; a restricted orifice may be advisable.
2. Specify an internal check valve.
3. Provide a drip leg of adequate diameter and length.
4. Provide a generous length (2'-3') of inlet piping, with the trap below the main.
5. Don't insulate the trap or the inlet piping.

## 6000 Series Bottom Inlet, Top Outlet Traps

Add suffix "CV" to trap number for internal check valve.

Model No. Screwed or SW Model No. Flanged	6155G 6155G-FW	
	in	mm
Pipe Connections	1, 1-1/4	25, 32
"A" (Diameter)	11-3/4	298
"B" (Height, Screwed or SW)	24-1/8	613
"BB"	29-11/16*	724*
"G" (Body OD)	8-3/8	213
"K" (C Outlet to C Inlet)	1-3/4	44.4
Number of Bolts	10	
Weight Scr. or SW lb (kg)	325 (147.4)	
Weight, Flanged lb (kg)	340 (154.2)	

\*"BB" dimensions shown are for Class 2500 flanged No. 6155G-FW traps. Consult factory for dimensions of models with other connection sizes and/or flanges.

## Connections

Socketweld

Flanged

See page 187 for dimensions information for flanged and socketweld connections.

## Materials

Body:

ASTM A182 F22 Class 3

Internals:

All stainless steel—304

Valve and seat:

Titanium

## Options

- Stainless steel internal check valve

Screwed connections are available in all sizes for pressures of 900 psig or less. Traps for pressures of 900 psig or higher are available with socketweld or flanged connections.

## Specification

Inverted bucket steam trap, type ... 6155G in forged chrome-moly steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, with the discharge orifice at the top of the trap.

## How to Order

Specify:

- Model number
- Size and type of pipe connection. When flanges are required, specify type of flange in detail
- Maximum working pressure that will be encountered or orifice size
- Any options required

For a fully detailed certified drawing, refer to CD #1092.

# 6000 Series Inverted Bucket Steam Trap

## Forged Chrome-moly Steel for Vertical Installation

For Pressures to 2 700 psig (186 barg)...Capacities to 6 500 lb/hr (2 948 kg/hr)

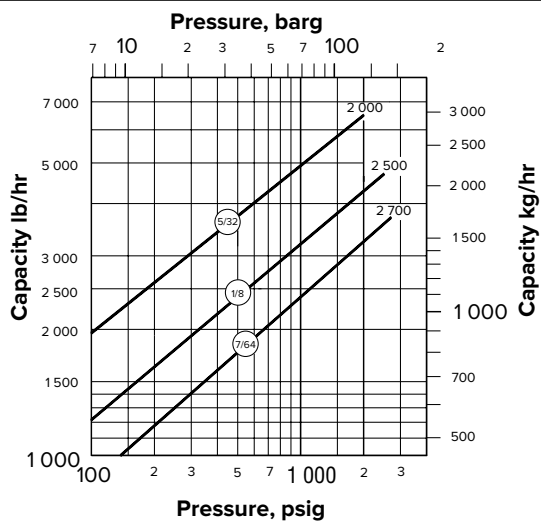


Pressure-Temperature Rating for Forged Steel Traps																	
Model No.	Max. Oper. Pressure, Sat. Steam		Maximum Allowable Pressure (Vessel Design) of Pressure-Containing Parts at Indicated Temperature														
			°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
	psig	barg	-20/+650	-28/+343	700	371	750	399	800	427	850	454	900	482	950	510	1 000
			psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig
6155G	2 700	186	3 500	241	3 500	241	3 500	241	3 500	241	3 500	241	3 090	213	2 410	166	1 650

NOTES: Maximum operating pressure to be marked on nameplate will be determined by actual orifice used.

Maximum allowable pressures shown in boldface will be marked on nameplate, unless otherwise requested. Traps with flanges may have different pressure-temperature ratings.

Model 6155G Capacity



## Options

Internal Check Valves are spring loaded stainless steel and screw into an extended inlet tube having a pipe coupling at the top to save fittings, labor and money. Internal check valves may result in slightly reduced capacities.



# 4000 Series Inverted Bucket Steam Trap

## All Stainless Steel With IS-4 4-Bolt Connector

For Pressures to 650 psig (45 barg)...Capacities to 1 300 lb/hr (590 kg/hr)

### Description

With the 4000 Series IS-4 connector, you can install 4-bolt compatible inverted bucket efficiency and long service life in any piping configuration with little or no repiping. You get the reliability of the inverted bucket operating principle, plus all the benefits of all-stainless steel construction:

- A sealed, tamperproof package
- A compact, lightweight trap
- The ability to withstand freeze-ups without damage
- Exceptional corrosion resistance
- A three-year guarantee against defective materials, defective workmanship.

4000 Series steam traps combine savings in three important areas: energy, installation and replacement. The 4-bolt connector provides quick, easy in-line replacement along with all the proven advantages of inverted bucket operation.

### Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model IB4011:	400 psig @ 800°F (28 barg @ 427°C)
Model IB4022:	650 psig @ 600°F (45 barg @ 315°C)
	627 psig @ 700°F (43 barg @ 371°C)
	600 psig @ 800°F (41 barg @ 427°C)

Maximum operating pressure:

Model IB4011:	400 psig (28 barg)
Model IB4022:	650 psig (45 barg)

### Connections

Screwed NPT

Socketweld

Flanged (consult factory)

### Materials

Body:

ASTM-A 240 Grade 304L

Internals:

All stainless steel—304

Valve and seat:

Stainless steel—17-4PH or Titanium

Connector body:

ASTM A351 Gr. CF8M

### Options

- Stainless steel pop drain for Models 4011/4022
- Probe connection for Models 4011/4022
- Wiggle wire
- 316 stainless steel valve and seat

### Connector Styles

- Standard with strainer
- With strainer blowdown valve
- With block/bleed valves

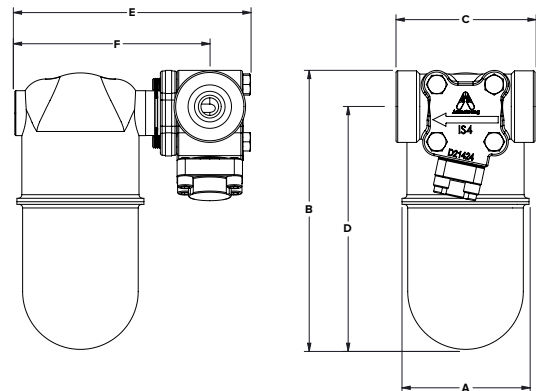
### Specification

Inverted bucket steam trap, type ... in all stainless steel, freeze resistant, with 360° universal connector, having continuous air venting at steam temperature, free-floating stainless steel mechanism, and orifice at the top of the trap.

### How to Order

Specify:

- Model number
- Size and type of pipe connection
- Maximum working pressure that will be encountered or orifice size
- Any options required



Model IB4022 Trap With IS-4 Connector

#### 4000 Series Traps With Standard IS-4 Connector

Model No.	IB4011				IB4022			
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	3/4	20	1	25	3/4	20	1	25
"A" (Diameter)	2-11/16	68	2-11/16	68	3-7/8	98	3-7/8	98
"B" (Height)*	6-15/16	176	6-15/16	176	8-11/16	221	8-11/16	221
"C" (Face to Face)	4-1/4	108	4-1/4	108	4-1/4	108	4-1/4	108
"D" (Bottom to $\varnothing$ )*	6	152	6	152	7-3/4	197	7-3/4	197
"E" (Outside to Bolt)	6-1/8	156	6-1/8	156	7-5/16	186	7-5/16	186
"F" ( $\varnothing$ to Outside)	4-15/16	125	4-15/16	125	6-1/8	156	6 -1/8	156
Weight lb (kg)	7-3/4 (3.5)				10-3/4 (4.9)			

\*Add 1/2" (15 mm) to "B" and "D" dimensions when optional probe connection is required.

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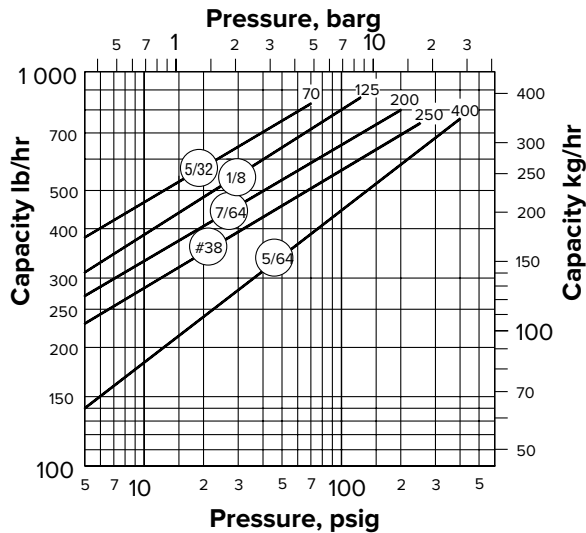
# 4000 Series Inverted Bucket Steam Trap

All Stainless Steel With IS-4 4-Bolt Connector

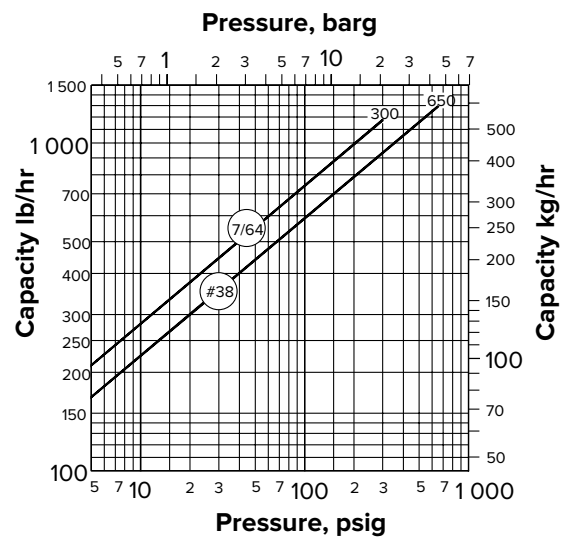
For Pressures to 650 psig (45 barg)...Capacities to 1 300 lb/hr (590 kg/hr)



Model IB4011 Capacity



Model IB4022 Capacity



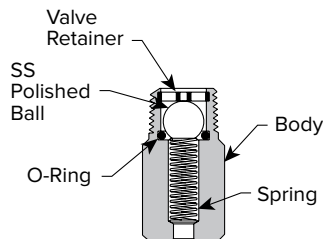
## Options

### Pop Drain for Freeze Protection

In general, a properly selected and installed Armstrong trap will not freeze as long as steam is coming to the trap. If the steam supply is shut off, a pop drain should be used to automatically drain the trap. Stainless steel pop drain available for Models 4011 and 4022.

### Maximum Operating Conditions

Pressure: 600 psig (41 barg)  
Temperature: 350°F (177°C)

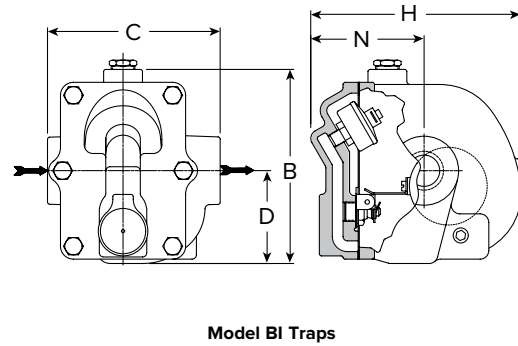
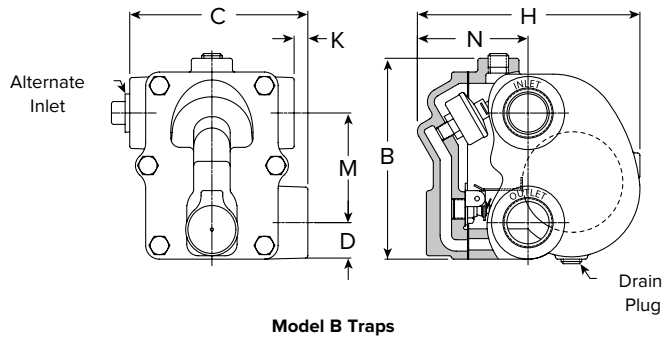




# B and BI Series Float & Thermostatic Steam Trap

Cast Iron for Horizontal Installation, With Thermostatic Air Vent

For Pressures From Vacuum to 30 psig (2 barg)...Capacities to 8 900 lb/hr (4 037 kg/hr)



## Description

**Armstrong B and BI Series F&T traps** combine high standards of performance and long life with economy for heating service where continuous drainage with high air-venting capacity is required.

Because of the wide use of vacuum returns in systems of this type, the thermostatic air vent element is charged to give it the capability of compensated response to the pressure-temperature curve of steam at any pressure from less than 20" (500 mm) Hg vacuum to 30 psig (2 barg) gauge. B and BI Series F&T traps will vent air at slightly below steam temperature throughout this entire range of operation.

All B Series traps, except the 1/2" (15 mm) and 3/4" (20 mm), have inlet connections on both sides of the body to provide flexibility in piping. The BI Series F&T traps in sizes 1/2", 3/4" and 1" feature the convenience of in-line connections with the same internals as the B Series.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model B2-B3: 125 psig @ 353°F (8.5 barg @ 178°C)  
Model B4-B8: 175 psig @ 377°F (12 barg @ 191°C)

Maximum operating pressure:

15B, BI: 15 psig (1 barg) saturated steam  
30B, BI: 30 psig (2 barg) saturated steam

**NOTE:** Cast iron traps should not be used in systems where excessive hydraulic or thermal shock are present.

## Connections

Screwed NPT and BSPT

## Materials

Body and cap: ASTM A48 Class 30  
Internals: All stainless steel—304  
Valve: Stainless steel—303 or 17-4PH  
Seat: Stainless steel—303 (ASTM A582)  
Stainless steel—17-4PH in 1-1/2" and 2"  
Thermostatic air vent: Stainless steel and bronze with phosphor bronze bellows, caged in stainless steel

## Options

Integral vacuum breaker. Add suffix VB to model number.

**CAUTION:** Do not use a conventional vacuum breaker open to the atmosphere in any system that incorporates a mechanical return system that carries pressure less than atmospheric pressure. This includes all return systems designated as vacuum returns, variable vacuum returns or subatmospheric returns. If a vacuum breaker must be installed in such a system, it should be of the type that is loaded to open only when the vacuum reaches a calibrated level well in excess of the design characteristics of the system.

## Specification

Float and thermostatic steam trap, type ... in cast iron, with thermostatic air vent.

## How to Order

Pressure	Model	Connection Size	Option
15	B	2	VB
15 30	B = Standard Connection BI = In-line Connection	*2 = 1/2" *3 = 3/4" 4 = 1" 5 = 1-1/4" 6 = 1-1/2" 8 = 2"  2 = 1/2" 3 = 3/4" 4 = 1"	VB = Vacuum Breaker

\*No alternate inlet available.

B and BI Series Traps												
Trap Series	B Model										BI Model	
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2, 3/4	15, 20	1	25	1-1/4	32	1-1/2	40	2	50	1/2, 3/4, 1	15, 20, 25
“B” (Height)	4-7/8	124	5-1/2	140	5-1/2	140	7-7/16	189	9-5/8	244	5-5/8	143
“C” (Face to Face)	3-7/8	98	4-7/8	124	4-5/8	117	5-3/4	146	7-5/8	194	5	127
“D” (Bottom to C)	7/8	22.2	1	25.4	1-7/32	31.0	1-7/16	36.5	1-11/16	42.9	2-11/16	68
“H” (Width)	5-3/8	137	6	152	7-3/4	197	8-7/16	214	11-5/8	295	6-5/8	168
“K” (Connection Offset)	1/8	3.2	3/8	9.5	—	—	—	—	—	—	—	—
“M” (C to C)	2-3/4	69.8	3	76.2	3	76.2	4-3/16	106	6	152	—	—
“N” (Top to C)	2-9/16	65.1	3	76.2	3-3/8	85.7	3-3/4	95.2	5	127	3-9/32	83
Weight lb (kg)	6 (2.7)		8-1/2 (3.9)		11 (5.0)		19 (8.6)		40 (18.1)		9-3/4 (4.4)	

NOTE: Cast iron traps should not be used in systems where excessive hydraulic or thermal shock are present.

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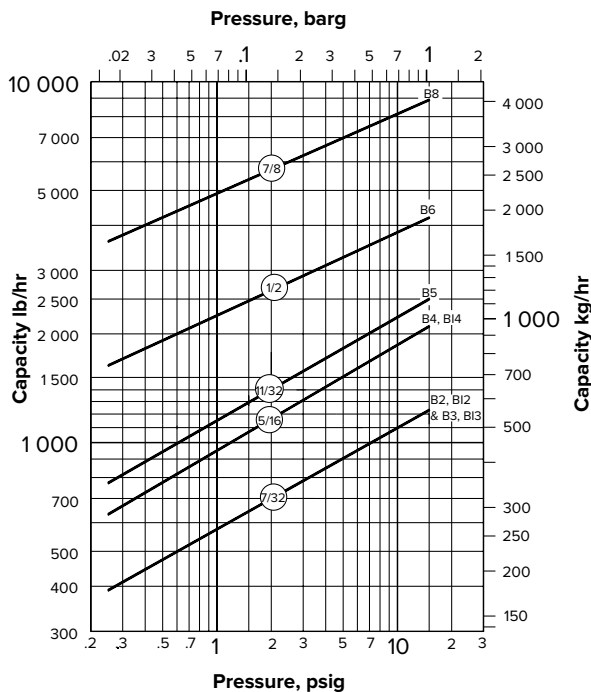
# B and BI Series Float & Thermostatic Steam Trap

Cast Iron for Horizontal Installation, With Thermostatic Air Vent

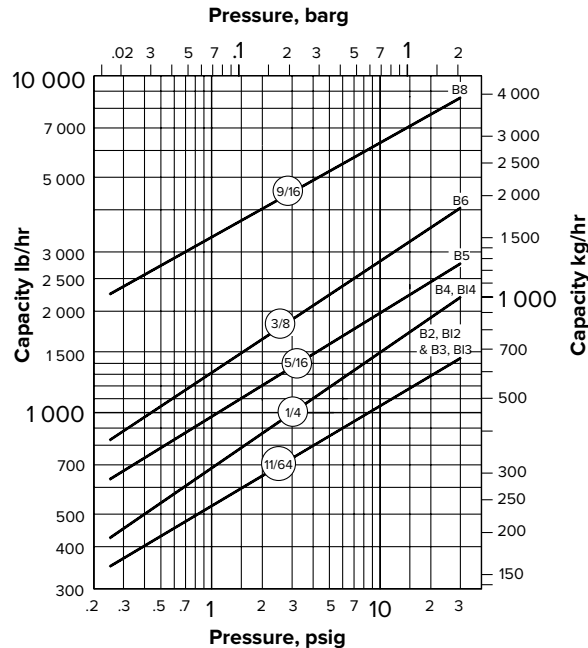
For Pressures From Vacuum to 30 psig (2 barg)...Capacities to 8 900 lb/hr (4 037 kg/hr)



**Model B & BI Series Capacity—15 psig**



**Model B & BI Series Capacity—30 psig**



## Options

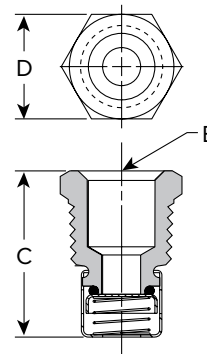
### Vacuum Breakers 3/8" (10 mm) and 1/2" (15 mm) NPT

Many times, condensate will be retained ahead of steam traps because of the presence of a vacuum. To break a vacuum, air must be introduced into the system by means of a vacuum breaker.

For maximum protection against freezing and water hammer in condensing equipment under modulated control, vacuum breakers are recommended. Armstrong B and BI Series F&T traps are available with integral vacuum breakers. Maximum pressure is 150 psig (10 barg).

### Vacuum Breakers

Size	in	mm	in	mm
	1/2 NPT	15 3/8	NPT	10
"B" Pipe Connections	3/8 NPT	10	1/4 NPT	6
"C" Height	1-1/4	32	1-3/32	28
"D" Width	7/8 Hex	22 Hex	11/16 Hex	17 Hex

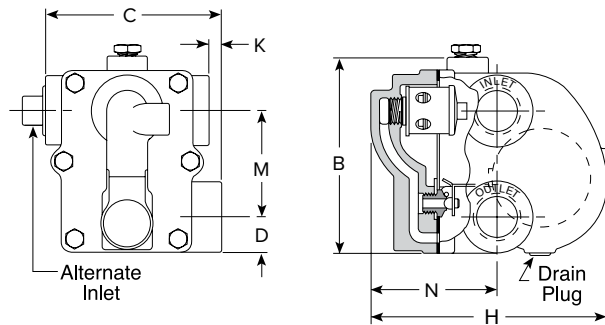




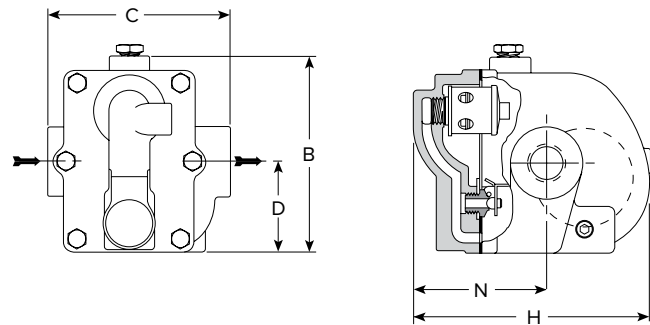
# A & AI Series Float & Thermostatic Steam Trap

Cast Iron for Horizontal Installation, With Thermostatic Air Vent

For Pressures to 175 psig (12 barg)...Capacities to 8 600 lb/hr (3 900 kg/hr)



Model A Traps



Model AI Traps

## Description

**Armstrong A & AI Series F&T** traps are for industrial service from 0 to 175 psig and feature a balanced pressure phosphor-bronze type bellows caged in stainless steel. Armstrong A & AI Series F&T traps are designed for service on heat exchange equipment where there is a need to vent air and non-condensable gases quickly.

The **AI Series F&T** traps feature the convenience of in-line connections with the same rugged internals found in the A Series.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):

175 psig @ 377°F (12 barg @ 191°C)

Maximum operating pressure:

Model 30-A, AI:	30 psig (2 barg) saturated steam
Model 75-A, AI:	75 psig (5 barg) saturated steam
Model 125-A, AI:	125 psig (8.5 barg) saturated steam
Model 175-A, AI:	175 psig (12 barg) saturated steam

**NOTE:** Cast iron traps should not be used in systems where excessive hydraulic or thermal shock are present.

## Connections

Screwed NPT and BSPT

## Materials

Body and cap:	ASTM A48 Class 30
Internals:	All stainless steel—304
Valve:	Stainless steel—17-4PH
Seat:	Stainless steel—303 (ASTM A582)
	Stainless steel—17-4PH in 1-1/2" and 2"
Thermostatic air vent:	Stainless steel and bronze with phosphor bronze bellows, caged in stainless steel

## Options

Integral vacuum breaker. Add suffix VB to model number.

**CAUTION:** Do not use a conventional vacuum breaker open to the atmosphere in any system that incorporates a mechanical return system that carries pressure less than atmospheric pressure. This includes all return systems designated as vacuum returns, variable vacuum returns or subatmospheric returns. If a vacuum breaker must be installed in such a system, it should be of the type that is loaded to open only when the vacuum reaches a calibrated level well in excess of the design characteristics of the system.

## Specification

Float and thermostatic steam trap, type ... in cast iron, with thermostatic air vent.

## How to Order

Pressure	Model	Connection Size	Option
75	AI	2	VB
30 75 125 175	A = Standard Connection  AI = In-line Connection	3 = 3/4" 4 = 1" 5 = 1-1/4" 6 = 1-1/2" 8 = 2"  2 = 1/2" 3 = 3/4" 4 = 1"	VB = Vacuum Breaker

A & AI Series Traps												
Trap Series	Model A										Model AI	
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	3/4	20	1	25	1-1/4	32	1-1/2	40	2	50	1/2, 3/4, 1	15, 20, 25
"B" (Height)	5-1/8	130	5-1/8	130	5-13/16	148	7-7/16	189	9-3/4	248	5-1/2	140
"C" (Face to Face)	4-7/8	124	4-7/8	124	4-5/8	117	5-3/4	146	7-5/8	194	5	127
"D" (Bottom to $\varnothing$ )	1	25.4	1	25.4	1-7/32	31.0	1-13/32	35.7	1-11/16	42.9	2-9/16	65.1
"H" (Width)	6-7/16	164	6-7/8	164	8-1/8	206	8-7/16	214	11-5/8	295	6-1/2	165
"K" (Connection Offset)	3/8	95.2	3/8	95.2	—	—	—	—	—	—	—	—
"M" ( $\varnothing$ to $\varnothing$ )	3	76.2	3	76.2	3	76.2	4-3/16	106	6	152	—	—
"N" (Top to $\varnothing$ )	3-3/8	85.7	3-3/8	85.7	3-3/4	95.2	3-3/4	95.2	5	127	3-11/16	93.7
Weight lb (kg)	9-1/2 (4.3)		8-1/4 (3.7)		11 (5.0)		18-3/4 (8.5)		40 (18.1)		9-3/4 (4.4)	

NOTE: Cast iron traps should not be used in systems where excessive hydraulic or thermal shock are present.

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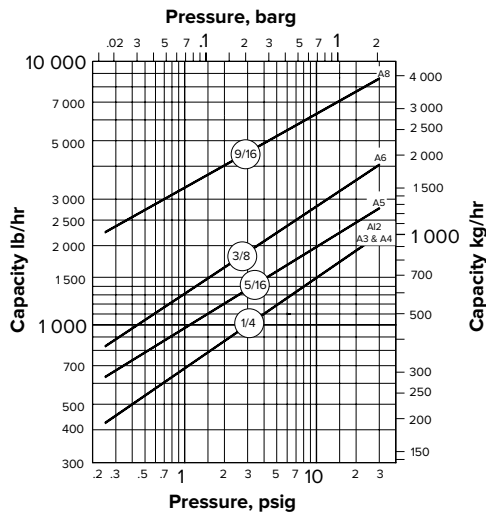
# A & AI Series Float & Thermostatic Steam Trap

Cast Iron for Horizontal Installation, With Thermostatic Air Vent

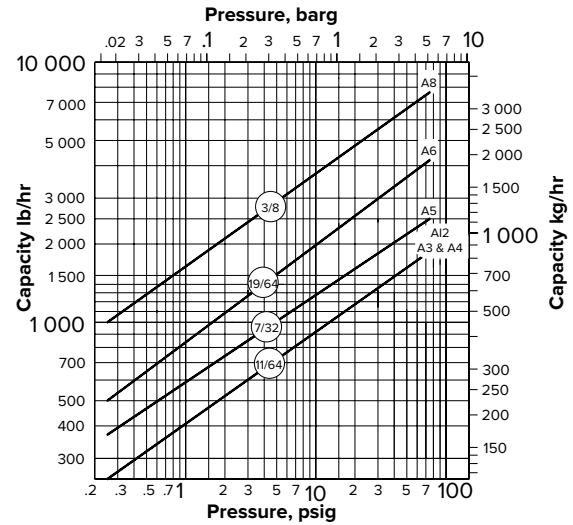
For Pressures to 175 psig (12 barg)...Capacities to 8 600 lb/hr (3 900 kg/hr)



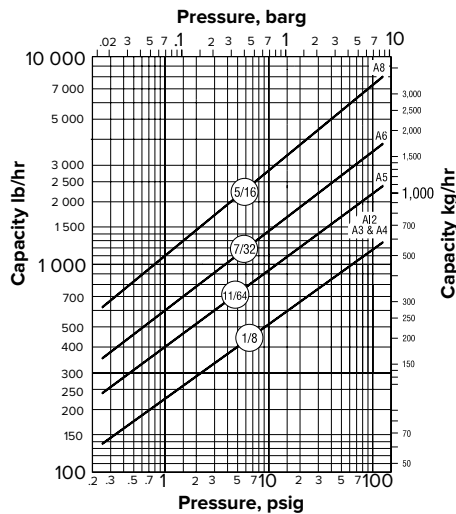
**Model A & AI Series Capacity—30 psig**



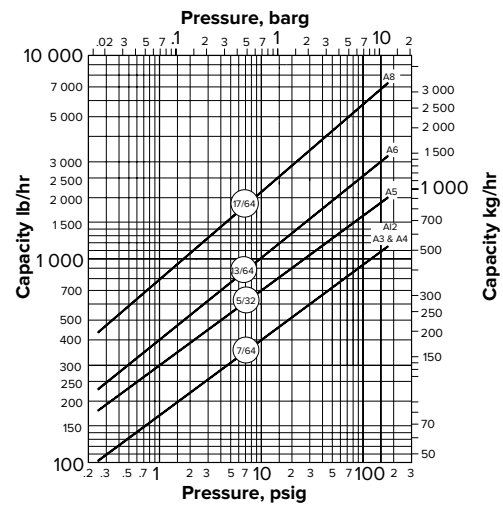
**Model A & AI Series Capacity—75 psig**



**Model A & AI Series Capacity—125 psig**



**Model A & AI Series Capacity—175 psig**



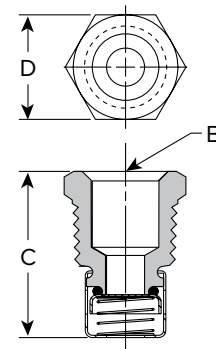
## Options

### Vacuum Breaker—3/8" (10 mm) and 1/2" (15 mm) NPT

Many times, condensate will be retained ahead of steam traps because of the presence of a vacuum. To break a vacuum, air must be introduced into the system by means of a vacuum breaker.

For maximum protection against freezing and water hammer in condensing equipment under modulated control, vacuum breakers are recommended. Armstrong A and AI Series F&T Traps are available with integral vacuum breakers. Maximum service pressure is 150 psig (10 barg).

Vacuum Breaker				
Size	in	mm	in	mm
"B" Pipe Connections	1/2 NPT	15	3/8 NPT	10
"C" Height	1-1/4	32	1-3/32	28
"D" Width	7/8 Hex	22 Hex	11/16 Hex	17 Hex



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# AIC Series Float & Thermostatic Steam Trap

Ductile Iron for Horizontal & Vertical Installation with Thermostatic Air Vent

For Pressures to 465 psig (32 barg)...Capacities to 60 075 lb/hr (27 250 kg/hr)



## Description

Armstrong AIC Series F&T traps are designed for industrial service up to 465 psig (32 barg). They feature all the benefits of Armstrong F&T traps, such as operation against back pressure, continuous drainage, high-capacity venting of air and CO<sub>2</sub>, long life and dependable service and enjoys the convenience of in-line connections.

Armstrong AIC Series F&T traps are the perfect solution for applications where there is a need to vent air and non-condensable gases quickly under varying loads.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design): 580 psig @ 572°F  
40 barg @ 300°C  
Maximum Allowable Pressure: 580 psig (40 barg)  
Maximum Allowable Temperature: 572°F (300°C)  
Maximum Operating Pressure: 465 psig (32 barg)

\* May be derated depending on flange rating and type.

Note: Caution should be used when Float and Thermostatic steam traps are applied in systems where freezing or excessive hydraulic shock can occur.

## Connections

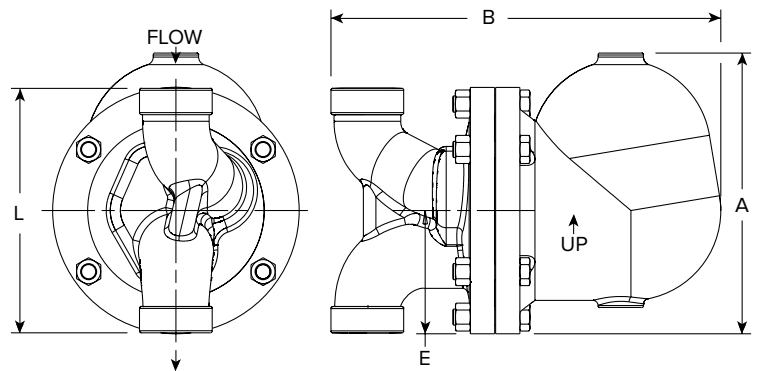
Screwed NPT and BSPT  
Flanged ANSI and DIN

## Materials

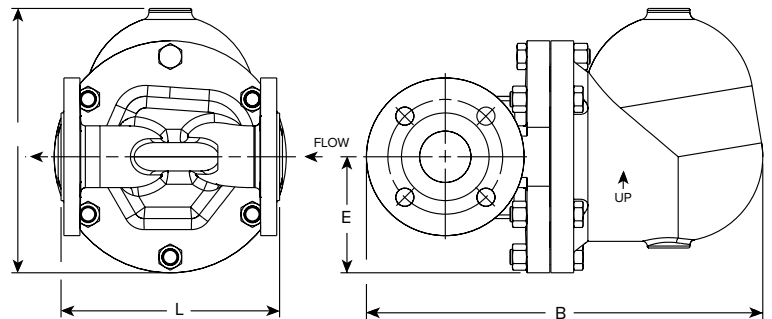
Body & Cap Ductile Iron  
EN1563 EN-GJS-400-18U (ASTM A395)  
Gasket Graphite  
Seat Stainless Steel 17-4PH  
Internals Stainless Steel  
Valve Stainless Steel 17-4PH  
Thermostatic Air Vent Hastelloy Wafer

## Options

Integral vacuum breaker (Maximum pressure is 150 psig (10 barg)).  
Add suffix VB to model number.



Model AICV



Model AICFH

## Flow Direction

Right to Left (Horizontal).  
Top to Bottom (Vertical).

## How to Order

Pressure	Model	Flow	Connection	Option
100	AIC	H	6	VB
100 200 465HP	AIC = Screwed Connection  AICF = Flanged Connection	H = Horizontal V = Vertical	6 = 1-1/2" 8 = 2"  6 = DN40 8 = DN50	VB = Vacuum Breaker (limited to 150 psig/ 10 barg)

## Available Connections and Face-To-Face Dimensions

Pipe Connections	1 1/2" DN40		2" DN50	
	in	mm	in	mm
"A" Height	10-15/16	278	10-15/16	278
"B" (Length Screwed)	12-27/32	326	13-1/8	333
"B" (Length Flanged)	16-1/8	410	16-27/64	417
"L" (Face-to-face Screwed)	10-5/8	270	11-13/16	300
"L" (Face-to-face Flanged PN40 ANSI CL150)	9-1/16	230	9-1/16	230
"L" (Face-to-face Flanged ANSI CL300)	9-3/32	231	9-1/4	235
"E" (Bottom to $\varnothing$ of inlet)	4-13/16	122	4-13/16	122
Vacuum Breaker (optional)	1/2"	DN15	1/2"	DN15
Weight screwed lb (kg)	70-1/2 lb (32 kg)		70-1/2 lb (32 kg)	
Weight flanged lb (kg)	75 lb (34 kg)		75 lb (34 kg)	

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

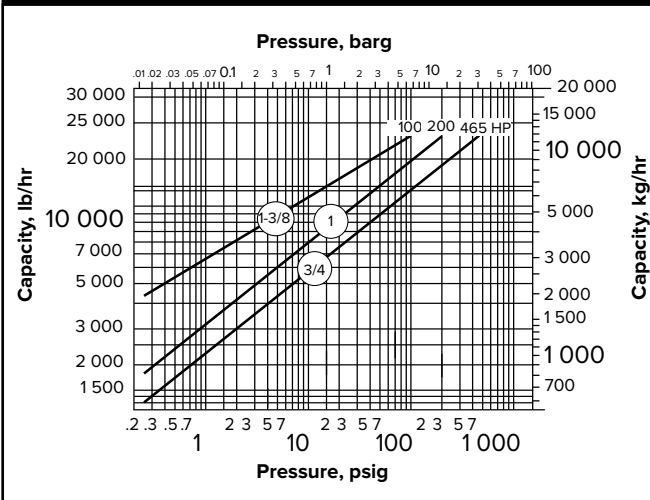
# AIC Series Float & Thermostatic Steam Trap

Ductile Iron for Horizontal & Vertical Installation with Thermostatic Air Vent

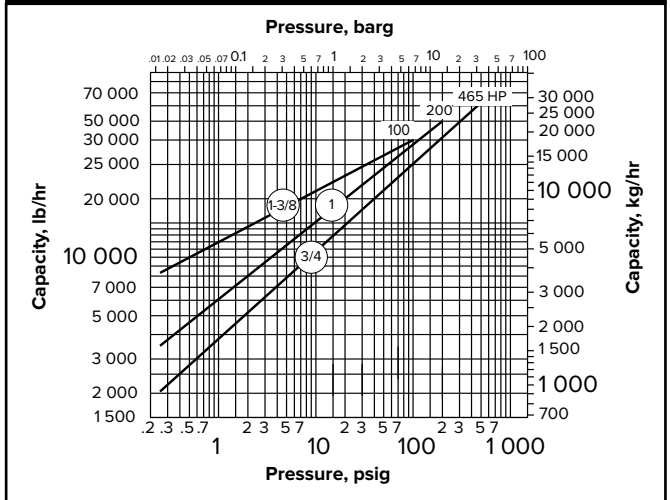
For Pressures to 465 psig (32 barg)...Capacities to 60 075 lb/hr (27 250 kg/hr)



Model AIC 1 1/2" Capacity



Model AIC 2" Capacity



## Options

### Vacuum Breaker 1/2" NPT (DN15)

Many times, condensate will be retained ahead of steam traps because of the presence of a vacuum. To break a vacuum, air must be introduced into the system by means of a vacuum breaker.

For maximum protection against freezing and water hammer in condensing equipment under modulated control, vacuum breakers are recommended. Armstrong AIC Series F&T Traps are available with integral vacuum breakers. Maximum service pressure is 150 psig (10 barg).

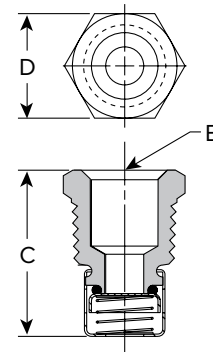
### Vacuum Breaker

Size	in	mm	Max. allow. pres.
"B" Pipe Connections	1/2 NPT	DN15	150 psig (10 barg)
"C" Height	1-1/4	32	
"D" Width	7/8 Hex	22 Hex	

**CAUTION:** Do not use a conventional vacuum breaker open to the atmosphere in any system that incorporates a mechanical return system that carries pressure less than atmospheric pressure. This includes all return systems designated as vacuum returns, variable vacuum returns or subatmospheric returns. If a vacuum breaker must be installed in such a system, it should be of the type that is loaded to open only when the vacuum reaches a calibrated level well in excess of the design characteristics of the system.

## Specification

The steam trap shall be an Armstrong model AIC (AICF) float & thermostatic type. Cap and body shall be EN1563 EN-GJS-400-15U (ASTM A395) Ductile Iron. Inline connections shall be integral to the cap as well as the internal mechanism. The valve and seat mechanism and float shall be stainless steel and repairable without disturbing the piping. The thermostatic Air Vent shall be a balanced pressure Hastelloy wafer with chrome steel seat. Maximum allowable back pressure should be 99% of the inlet pressure.

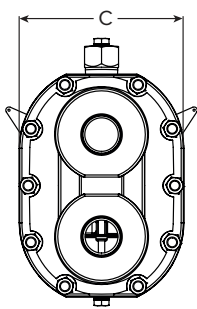




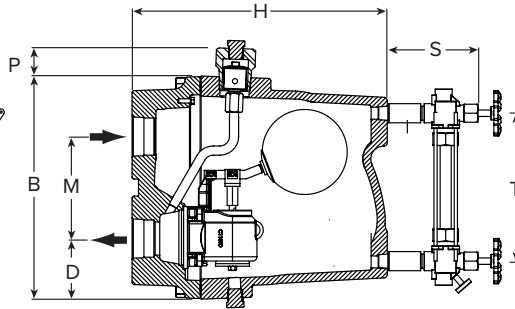
# JD & KD Series Ultra-Capacity Float & Thermostatic Steam Trap

Ductile Iron for Horizontal Installation, With Thermostatic Air Vent

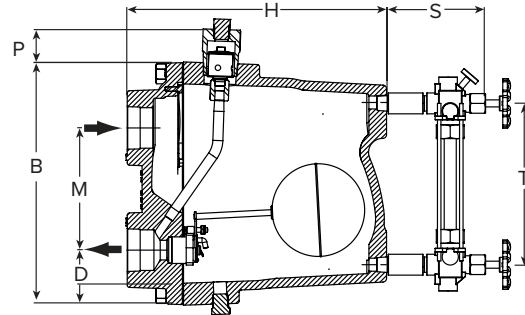
For Pressures to 300 psig (21 barg)...Capacities to 142 000 lb/hr (64 400 kg/hr)



Series JD & KD Cap



Series KD, F&T shown



Series JD, F&T shown

## Description

The simple, yet rugged, ductile iron construction of the JD & KD Series Ultra-Capacity F&T steam traps offers long, trouble-free service. All floats, valves and seats, and lever mechanisms are constructed of stainless steel.

The integral thermostatic air vent is a balanced-pressure phosphor bronze bellows caged in stainless steel. It is designed especially for heavy-duty industrial applications where highly efficient, uninterrupted service is essential. This balanced-pressure-type air vent will respond to the pressure-temperature curve of steam at any pressure from zero to 300 psig (21 barg). Thus—up to 300 psig (21 barg)—air is vented at slightly below steam temperature.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model JD:	300 psig @ 650°F (21 barg @ 343°C)
Model KD:	300 psig @ 650°F (21 barg @ 343°C)

Maximum operating pressure:

Model 15-JD:	15 psig (1 barg) saturated steam
Model 20-JD:	20 psig (1.4 barg) saturated steam
Model 30-JD:	30 psig (2 barg) saturated steam
Model 75-JD:	75 psig (5 barg) saturated steam
Model 125-JD:	125 psig (8.5 barg) saturated steam
Model 175-JD:	175 psig (12 barg) saturated steam
Model 250-JD:	250 psig (17 barg) saturated steam
Model 300-JD:	300 psig (21 barg) saturated steam
Model 30-KD:	30 psig (2 barg) saturated steam
Model 50-KD:	50 psig (3.5 barg) saturated steam
Model 300-KD:	300 psig (21 barg) saturated steam

Maximum operating temperature bellows: 422°F (217°C)

## Connections

Screwed NPT and BSPT  
Flanged (screw on)

## Materials

Body and cap:	ASTM A395 ductile iron
Internals:	All stainless steel
Valve(s) and seat(s):	Stainless steel
Drain plug:	Carbon steel
Thermostatic air vent:	Stainless steel and bronze with phosphor bronze bellows, caged in stainless steel

## Options

- Integral vacuum breaker 150 psig (10 barg) maximum. Add suffix VB to model number
- No internal thermostatic air vent for liquid drainer service. Add suffix LD to model number
- Integral flash release for syphon drainage service. Add suffix CC to model number
- Flanged
- Armored gauge glass 310 psig @ 400°F (21 barg @ 204°C)

## Specification

Float and thermostatic steam trap, type ... in ductile iron, with thermostatic air vent.

For a fully detailed certified drawing, refer to CD #1302.

## How to Order

Pressure	Model	Connection Size	Option
75	JD	8	VB
15	JD	8 = 2"	VB = Vacuum Breaker LD = Liquid Drainer CC = Condensate Controller FLG = Specify type and class of flange GG = Gauge Glass
20			
30			
75			
125			
175			
250			
300			
30	KD	8 = 2"	
50	KD	10 = 2-1/2"	
300	KD	10 = 2-1/2", 12 = 3"	

## Special Configurations

**Condensate controller with flash release for syphon drainage.**

The condensate controller (CC) configuration was developed especially to meet very large capacity needs in applications where condensate must be lifted from the drain point to the trap. Under such conditions—often referred to as syphon drainage—the reduction in pressure that occurs when the condensate is elevated causes a portion of the condensate to flash into steam. Ordinary traps, unable to differentiate between flash steam and live steam, close and impede drainage.

The JD & KD Series condensate controllers (CC) are equipped with a fixed, restricted orifice near the top of the body to bleed off the flash steam (and all air present). This permits the trap to function properly on flashing condensate.

**Liquid drainer with back vent for exceptionally high-capacity drainage of liquid from gas under pressure.** The liquid drainer (LD) configuration was developed to meet very large capacity needs in draining water and other liquids from air or other gases under pressure. To prevent air or gas binding, the access port in the top of the body serves as a back vent connection to the equipment being drained. For capacity data, consult Armstrong International or your Armstrong Representative.

JD and KD Series Traps				
Trap Series	JD		KD	
	in	mm	in	mm
Pipe Connection	2	50	2, 2-1/2, 3	50, 65, 80
"B" (Height)	13-1/16	332	13-1/16	332
"C" (Width)	9-11/16	246	9-11/16	246
"D" (Bottom to $\varnothing$ )	2-15/16	75	3-9/16	90
"H" (Length)	13-11/16	348	14-11/16	373
"M" ( $\varnothing$ to $\varnothing$ )	6-5/8	168	6	152
"P" (Trap Top to Bellows Cap Top)	1-13/16	46	1-13/16	46
"S" (Gauge Glass width)	4-1/2	114	4-1/2	114
"T" (Gauge Glass height)	8-3/4	222	8-3/4	222
Weight lb (kg)	80 (39)		100 (45)	

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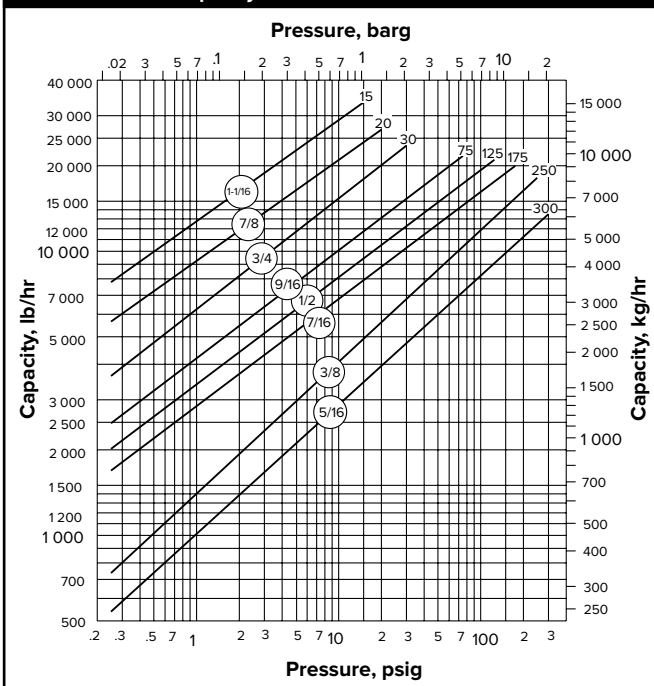
# JD & KD Series Ultra-Capacity Float & Thermostatic Steam Trap

Ductile Iron for Horizontal Installation, With Thermostatic Air Vent

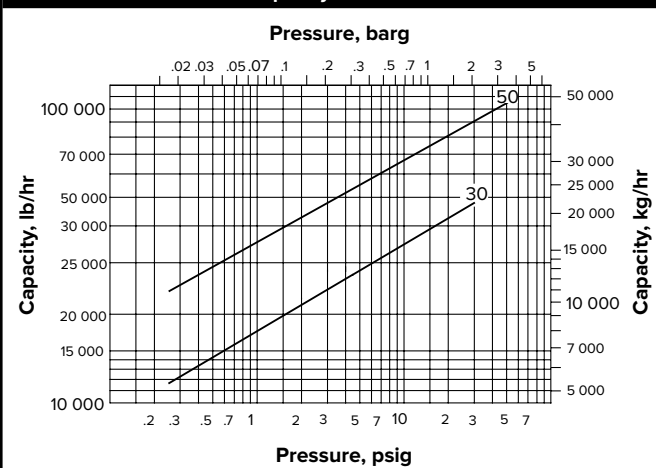
For Pressures to 300 psig (21 barg)...Capacities to 142 000 lb/hr (64 400 kg/hr)



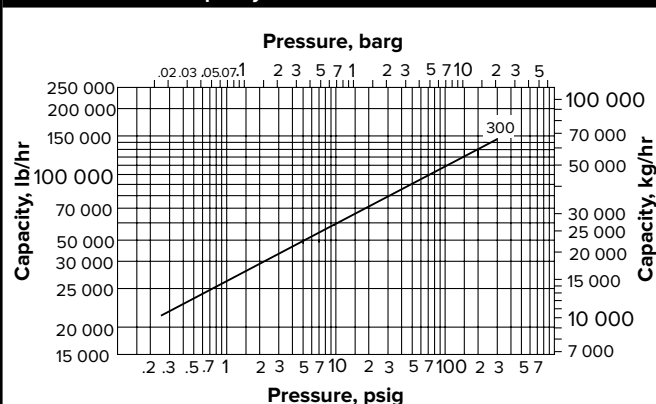
**Model JD Series Capacity**



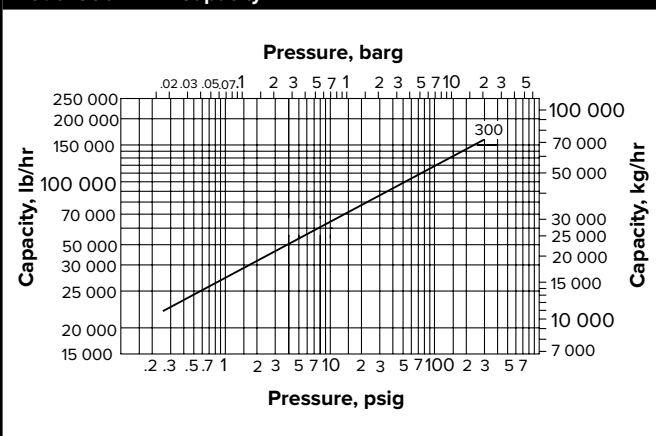
**Model 30-KD8/50-KD10 Capacity**



**Model 300-KD10 Capacity**



**Model 300-KD12 Capacity**



## Options

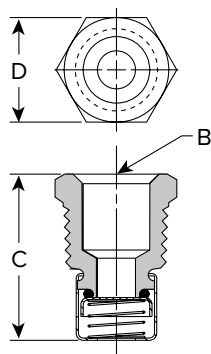
### Vacuum Breaker—1/2" (15 mm) NPT

Many times, condensate will be retained ahead of steam traps because of the presence of a vacuum. To break a vacuum, air must be introduced into the system by means of a vacuum breaker.

For maximum protection against freezing and water hammer in heating coils under modulated control, for example, vacuum breakers are recommended in conjunction with freeze protection devices.

### Vacuum Breaker

Size	in	mm	Max. allow. pres.
"B" Pipe Connections	1/2 NPT	15	150 psig (10 barg)
"C" Height	3/8 NPT	10	
"D" Width	1-1/4	32	
	7/8 Hex	22 Hex	



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North America • Latin America • India • Europe / Middle East / Africa • China • Pacific Rim

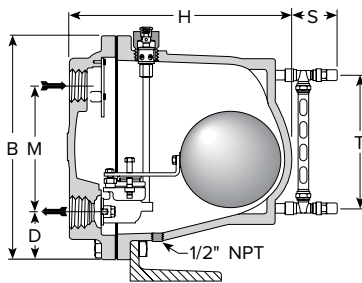
[armstronginternational.com](http://armstronginternational.com)



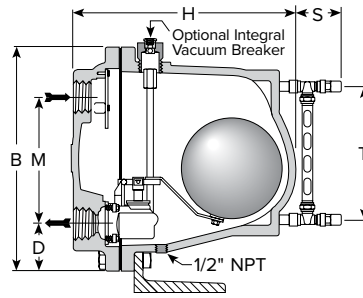
# L & M Series Ultra-Capacity Float & Thermostatic Steam Trap

Cast Iron for Horizontal Installation, With Thermostatic Air Vent

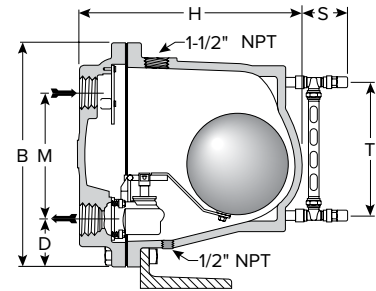
For Pressures to 250 psig (17 barg)...Capacities to 208 000 lb/hr (94 348 kg/hr)



Series L, F&T shown



Series M, CC shown



Series M, LD shown

## Description

The simple yet rugged cast iron construction of the L & M Series Ultra-Capacity F&T steam traps offers long, trouble-free service. All floats, valves and seats, and lever mechanisms are constructed of stainless steel.

The integral thermostatic air vent is a balanced-pressure phosphor bronze bellows caged in stainless steel. It is designed especially for heavy-duty industrial applications where highly efficient, uninterrupted service is essential. This balanced pressure type air vent will respond to the pressure-temperature curve of steam at any pressure from zero to 250 psig (17 barg). Thus—up to 250 psig (17 barg)—air is vented at slightly below steam temperature.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model L:	250 psig @ 450°F (17 barg @ 232°C)
Model M:	250 psig @ 450°F (17 barg @ 232°C)

Maximum operating pressure:

Model 30-L:	30 psig (2 barg) saturated steam
Model 100-L:	100 psig (7 barg) saturated steam
Model 150-L:	150 psig (10 barg) saturated steam
Model 250-L:	250 psig (17 barg) saturated steam
Model 250-M:	250 psig (17 barg) saturated steam

Maximum operating temperature bellows: 422°F (217°C)

## Connections

Screwed NPT and BSPT

Flanged (screw on)

## Materials

Body and cap:	ASTM A48 Class 30
Internals:	All stainless steel—304
Valve(s) and seat(s):	Stainless steel
Drain plug:	Carbon steel
Thermostatic air vent:	Stainless steel and bronze with phosphor bronze bellows, caged in stainless steel

## Options

- Integral vacuum breaker 150 psig (10 barg) maximum. Add suffix VB to model number
- No internal thermostatic air vent for liquid drainer service. Add suffix LD to model number
- Integral flash release for syphon drainage service. Add suffix CC to model number
- Armored gauge glass 310 psig @ 400°F (21 barg @ 204°C)
- L and M Series available with floor mounting bracket. Consult factory.

## Specification

Float & thermostatic steam trap, type ... in cast iron, with thermostatic air vent.

For a fully detailed certified drawing, refer to CD #1010.

## How to Order

Pressure	Model	Connection Size	Option	
250	M	12	GG	
30	L	8 = 2" 10 = 2-1/2"	VB = Vacuum Breaker LD = Liquid Drainer CC = Condensate Controller G/G = Gauge Glass FLG = Specify type and class of flange	
100				
150				
250	M	12 = 3"		
250				

## Special Configurations

**Condensate controller with flash release for syphon drainage and/or cascade service.** The condensate controller (CC) configuration was developed especially to meet very large capacity needs in applications where condensate must be lifted from the drain point to the trap. Under such conditions—often referred to as syphon drainage—the reduction in pressure that occurs when condensate is elevated causes a portion of the condensate to flash into steam. Ordinary traps, unable to differentiate between flash steam and live steam, close and impede drainage.

The L & M Series condensate controllers (CC) are equipped with a fixed, restricted orifice near the top of the body to bleed off the flash steam (and all air present). This permits the trap to function properly on condensate.

**Liquid drainer with back vent for exceptionally high capacity drainage of liquid from gas under pressure.** The liquid drainer (LD) configuration was developed to meet very large capacity needs in draining water and other liquids from air or other gases under pressure. To prevent air or gas binding, the access port in the top of the body serves as a back vent connection to the equipment being drained. For capacity data, see pages 501 and 520 or consult your Armstrong Representative.

L and M Series Traps				
Trap Series	L		M	
	in		mm	
Pipe Connection	2, 2-1/2		3	
"B" (Height)	20-1/4		514	
"C" (Width)	14-3/4		375	
"D" (Bottom to C)	4-3/16		106	
"H" (Length)	19-3/4		502	
"M" (C to C)	11-5/16		287	
"S" (Gauge Glass Width)	3-3/4		95.2	
"T" (Gauge Glass Height)	12		305	
Weight lb (kg)	196 (88.9)			

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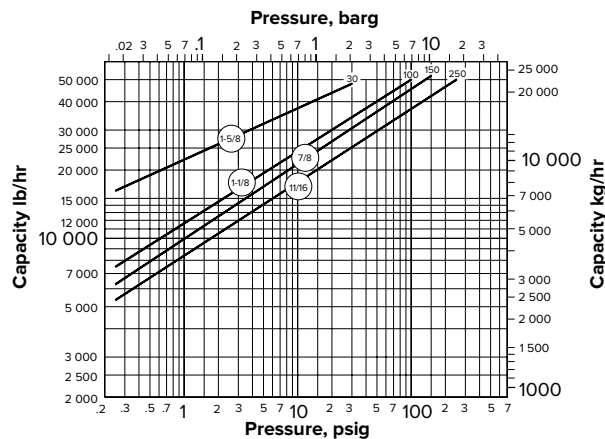
# L & M Series Ultra-Capacity Float & Thermostatic Steam Trap

Cast Iron for Horizontal Installation, With Thermostatic Air Vent

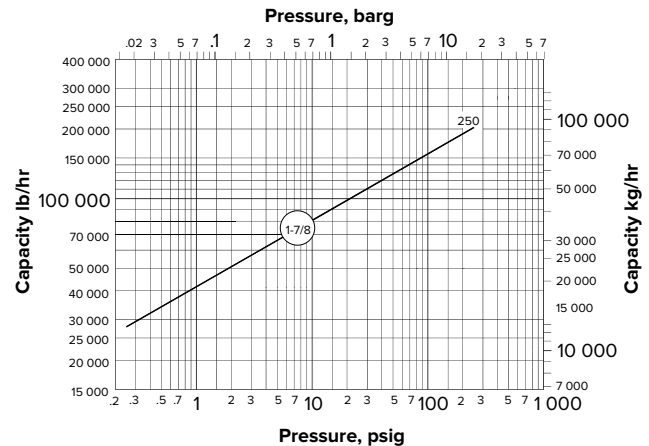
For Pressures to 250 psig (17 barg)...Capacities to 208 000 lb/hr (94 348 kg/hr)



Model L Series Capacity



Model M Series Capacity



## Installation Notes

Under conditions where the load may approach the maximum capacity of the trap, it is recommended that the size of the discharge line be increased one size as close to the trap cap as is practical. When L and M Series units are used in severe service conditions or at pressures exceeding 30 psig, use an anchoring bracket or other supportive measures to minimize stress on piping.

Ultra-Capacity L and M Series units **MUST BE WARMED UP** in the proper sequence and gradually. Recommended warm-up rate—not to exceed 100°F/8 minutes.

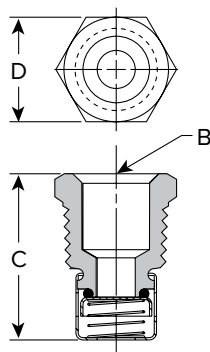
See your Armstrong Representative.

### Vacuum Breaker—1/2" (15 mm) NPT

Many times, condensate will be retained ahead of steam traps because of the presence of a vacuum. To break a vacuum, air must be introduced into the system by means of a vacuum breaker.

For maximum protection against freezing and water hammer in heating coils under modulated control, for example, vacuum breakers are recommended in conjunction with freeze protection devices.

Vacuum Breaker			
Size	in	mm	Max. allow. pres.
"B" Pipe Connections	1/2 NPT	15	150 psig (10 barg)
"C" Height	3/8 NPT	10	
"D" Width	1-1/4	32	
	7/8 Hex	22 Hex	



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.





# FT-4000 Series Float and Thermostatic Steam Trap

## All Stainless Steel

For Pressures to 465 psig (32 barg)... Capacities to 1 080 lb/hr (490 kg/hr)

### Description

With the FT-4000 Series, you can install a float and thermostatic trap in any piping configuration with little or no repiping. You get the reliability of the float and thermostatic operating principle, plus all the benefits of all-stainless steel construction.

- A sealed, tamperproof package
- A compact, lightweight trap
- Exceptional corrosion resistance
- A one-year guarantee against defective materials and workmanship

FT-4000 Series Float & Thermostatic steam traps combine savings in three important areas: energy, installation and replacement. Mounting the FT-4000 on universal connectors with integral strainers provides quick, easy in-line replacement with added protection from dirt and scale.

### Maximum Operating Conditions

Maximum allowable pressure (vessel design):

485 psig @ 600°F (33 barg @ 315°C)

Maximum operating pressure:

Model FT-4075:	75 psig (5 barg) saturated steam
Model FT-4150:	150 psig (10 barg) saturated steam
Model FT-4225:	225 psig (16 barg) saturated steam
Model FT-4300:	300 psig (21 barg) saturated steam
Model FT-4465:	465 psig (32 barg) saturated steam

### Materials

Body:	ASTM A240 Grade 304L
Internals:	All stainless steel—304
Valve and seat:	Stainless steel
Thermostatic air vent:	Wafer type-stainless steel with Hastelloy element
Flange	ASTM A105 Zinc plated

### Specification

Steam trap shall be float and thermostatic type having stainless steel construction, stainless steel valve, seat and float, for use on an IS-2 connector with integral strainer or TVS 4000 trap valve station. Integral thermostatic element shall be wafer type constructed of Hastelloy and stainless steel. Thermostatic element shall be capable of withstanding 45°F (25°C) of superheat and be resistant to water hammer damage.

### How to order

- Specify model number
- Select 360° connector style (IS-2 or TVS 4000)
- Specify maximum working pressure that will be encountered or orifice size
- Specify any options required

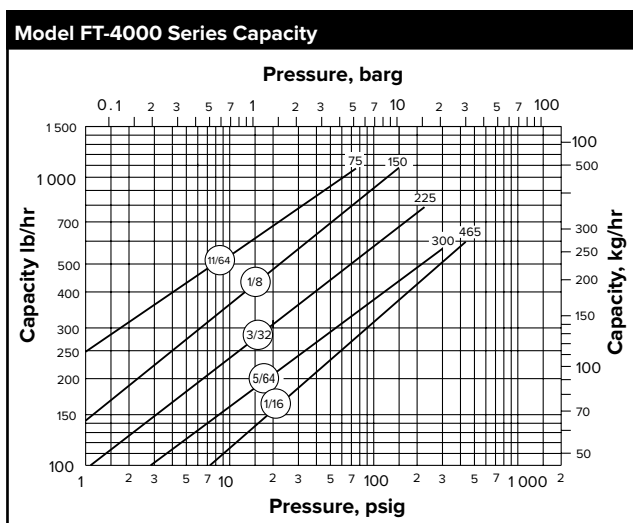
For a fully detailed certified drawing, refer to CD #1298 and CD #1299.



TVS 4000 Trap Valve Station With FT-4000 Float and Thermostatic Trap



IS-2 Connector With FT-4000 Float and Thermostatic Trap

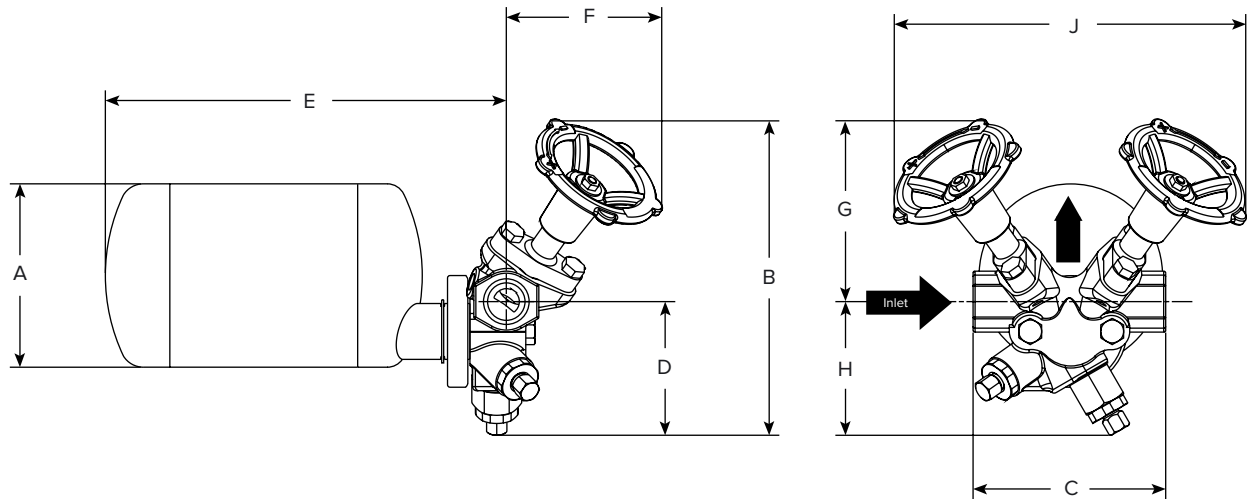


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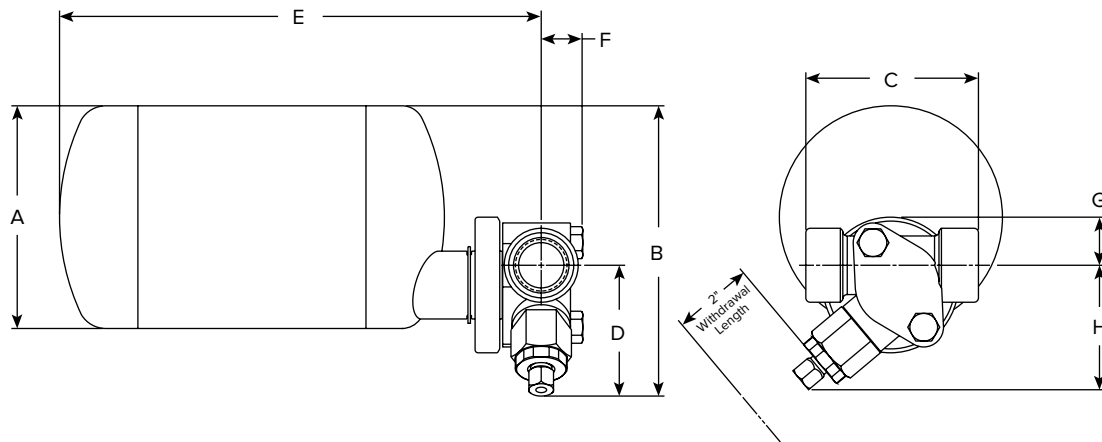
# FT-4000 Series Float and Thermostatic Steam Trap

## All Stainless Steel

For Pressures to 465 psig (32 barg)... Capacities to 1 080 lb/hr (490 kg/hr)



Series FT-4000 With TVS 4000 Trap Valve Station



Series FT-4000 With IS-2 Connector With Integral Strainer and Optional Blowdown Valve

FT-4000 Series Float and Thermostatic Steam Trap						
Trap Series	FT-4000					
Model	IS-2 Connector With Integral Strainer				TVS 4000 Connector	
	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1	25	1/2, 3/4	15, 20
"A" Trap Diameter	4-1/2	114	4-1/2	114	4-1/2	114
"B" Total Height	5-7/8	149	5-7/8	149	7-7/8	198
"C" Face-to-Face	3-1/2	89	4	101	4-3/4	120
"D" Connection $\varnothing$ to Bottom	2-5/8	67	2-5/8	67	3-1/4	83
"E" Connection $\varnothing$ to Outside of Trap	10	255	10-1/4	259	9-7/8	250
"F" Connection $\varnothing$ to Front of Connector	7/8	22	7/8	22	3-7/8	98
"G" Connection $\varnothing$ to Top	1	25	1	25	4-1/2	114
"H" Connection $\varnothing$ to Bottom of Connector	2-1/2	64	2-1/2	64	3-1/4	83
"J" Width across Handwheels (valve open)	N/A				8-11/16	221
Test Port Connection	N/A				1/4 NPT	6
Maximum Operating Pressure (saturated steam)	465 psig (32 barg)					
Maximum Allowable Pressure (vessel design)	485 psig @ 600°F (33 barg @ 315°C)					
Trap Only Weight, lb (kg)	6-1/4 (2.8)					
Trap and Connector Weight, lb (kg)	8-3/4 (4)				12-3/4 (5.8)	

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# ICS Series Float & Thermostatic Steam Traps

Carbon Steel for Horizontal or Vertical Installation, With Thermostatic Air Vent

For Pressures to 465 psig (32 barg)... Capacities to 60 000 lb/hr (27 215 kg/hr)

## Description

Armstrong ICS Series F&T traps are for industrial service from 0 to 465 psig (32 barg). The simple yet rugged construction of the ICS series carbon steel float and thermostatic trap is designed to assure long, trouble-free service.

## Materials

Body: ASTM A352 LCB  
Internals: All stainless steel  
Valve(s) and Seat(s): Stainless Steel  
Thermostatic Air Vent: Wafer type stainless steel with Hastelloy element

## Connections

Flanged ASME B16.5 Class 150 - 300  
Socketweld  
NPT

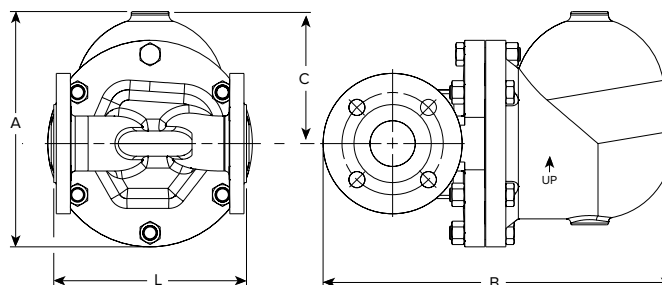
## Options

Integral vacuum breaker. Add suffix VB to model number.  
Condensate controller. Add suffix CC to model number.



Flow			
	in	mm	Flow Direction
Horizontal	1/2, 3/4, 1	15, 20, 25	Left-to-Right
Horizontal	1-1/2, 2	40, 50	Right-to-Left
Vertical	All	All	Down

**Note:** For vertical applications and dimensions, please consult factory.



### Face-to-Face Dimensions - NPT and Socketweld

Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	15	3/4	20	1	25	1-1/2	40	2	50
"A" Height	7-11/16	196	7-11/16	196	8-5/16	211	11-5/16	288	11-5/16	288
"B" Length	10-15/16	278	11	279	12-3/8	314	14-3/4	374	14-15/16	380
"C" Cap $\varnothing$ to Top	4-15/16	126	4-15/16	126	5-3/16	131	6-9/16	166	6-9/16	166
"L" Face-to-Face	7-1/4	184	7	178	7-3/8	188	10-1/2	266	10-3/4	273
Weight lb (kg)	21 (10)		21 (10)		28 (13)		76 (35)		76 (35)	
Maximum Allowable Pressure (Vessel Design)	580 psig @ 650°F (40 barg @ 343°C)									
Maximum Operating Pressure	465 psig (32 barg)									

### Face-to-Face Dimensions - ASME B 16.5 Class 150#

Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	15	3/4	20	1	25	1-1/2	40	2	50
"A" Height	7-11/16	196	7-11/16	196	8-5/16	211	11-5/16	288	11-5/16	288
"B" Length	11-7/8	301	12-1/16	306	13-9/16	344	15-11/16	399	16-3/16	412
"C" Cap ⌀ to Top	4-15/16	126	4-15/16	126	5-3/16	131	6-9/16	166	6-9/16	166
"L" Face-to-Face	8	203	8-1/16	205	8-3/16	208	12-5/8	321	12-1/4	312
Weight lb (kg)	23 (11)		25 (11)		33 (15)		83 (38)		84 (38)	
Maximum Allowable Pressure (Vessel Design)	200 psig @ 400°F (13.6 barg @ 205°C)									
Maximum Operating Pressure	200 psig (13.6 barg)									

### Face-to-Face Dimensions - ASME B 16.5 Class 300#

Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	15	3/4	20	1	25	1-1/2	40	2	50
"A" Height	7-11/16	196	7-11/16	196	8-5/16	211	11-5/16	288	11-5/16	288
"B" Length	11-15/16	304	12-5/16	314	13-13/16	352	16-5/16	414	16-1/2	419
"C" Cap $\varnothing$ to Top	4-15/16	126	4-15/16	126	5-3/16	131	6-9/16	166	6-9/16	166
"L" Face-to-Face	8-1/4	209	8-1/4	209	8-3/8	212	12-7/8	327	12-5/8	320
Weight lb (kg)	24 (11)		26 (12)		35 (16)		88 (40)		88(40)	
Maximum Allowable Pressure (Vessel Design)	585 psig @ 500°F (40.4 barg @ 260°C)									
Maximum Operating Pressure	465 psig (32 barg)									

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

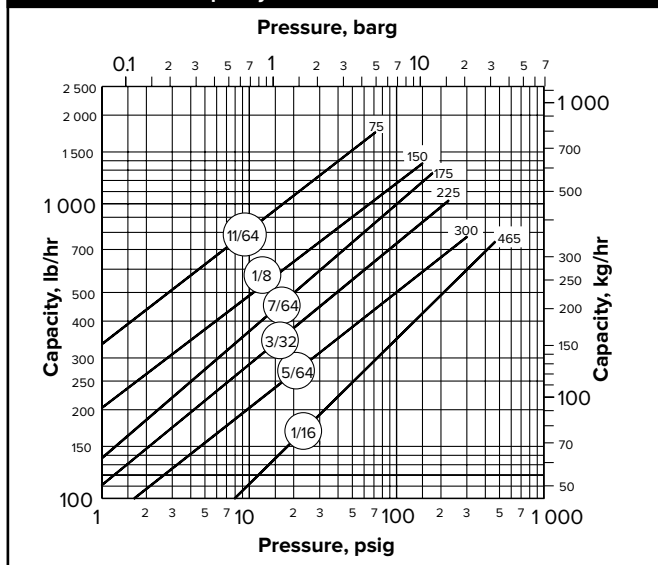
# ICS Series Float & Thermostatic Steam Traps

Carbon Steel for Horizontal or Vertical Installation, With Thermostatic Air Vent

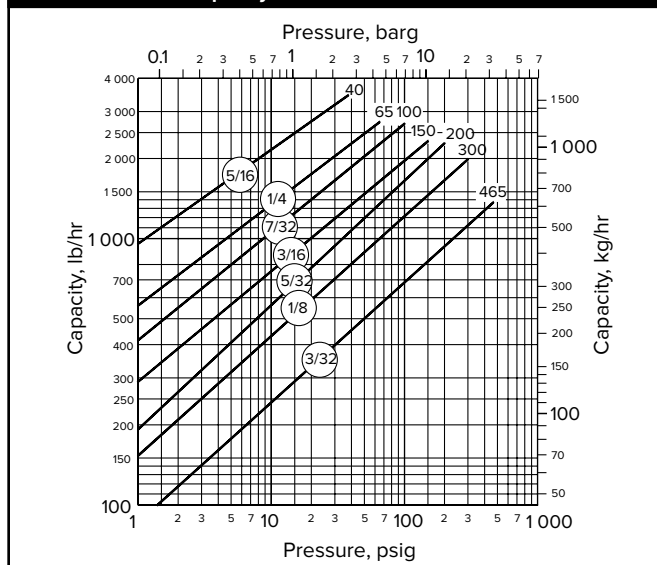
For Pressures to 465 psig (32 barg)... Capacities to 60 000 lb/hr (27 215 kg/hr)



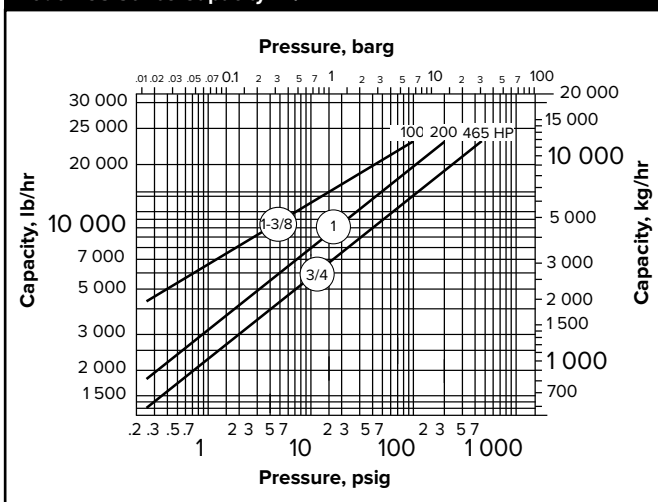
Model ICS Series Capacity 1/2" & 3/4"



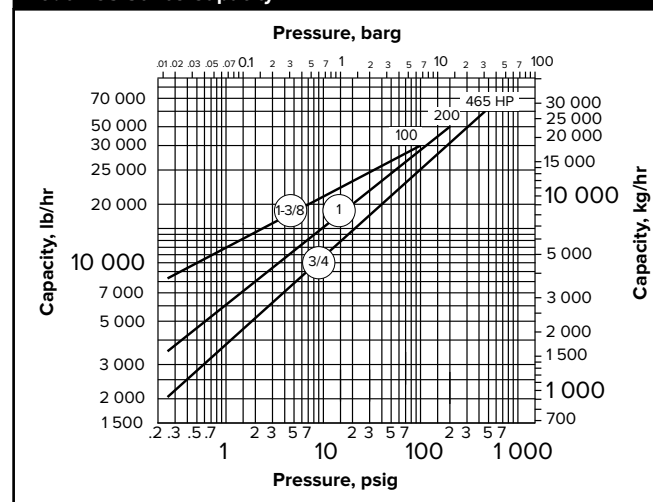
Model ICS Series Capacity 1"



Model ICS Series Capacity 1 1/2"

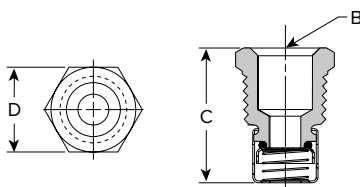


Model ICS Series Capacity 2"



Pressure	Model	Connection Size	Flow Direction	Connection Type
300	ICS	8	R**	NPT
(*)	ICS	2 = 1/2" 3 = 3/4" 4 = 1"  6 = 1-1/2" 8 = 2"	L = Left to Right V = Vertical  R = Right to Left V = Vertical	NPT SW 150RF 300RF

(\*) Refer to capacity charts to determine orifice.  
(\*\*) Refer to previous page for flow information.



## Options

### Vacuum Breaker 1/2" NPT (DN15)

Many times, condensate will be retained ahead of steam traps because of the presence of a vacuum. To break a vacuum, air must be introduced into the system by means of a vacuum breaker.

For maximum protection against freezing and water hammer in condensing equipment under modulated control, vacuum breakers are recommended. Armstrong ICS Series F&T Traps are available with integral vacuum breakers. Maximum service pressure is 150 psig (10 barg).

Vacuum Breaker			
Size	in	mm	Max. allow. pres.
	1/2 NPT	DN15	
"B" Pipe Connections	3/8 NPT	DN10	150 psig at 366°F (10 barg at 184°C)
"C" Height	1-1/4	32	
"D" Width	7/8 Hex	22 Hex	

**CAUTION:** Do not use a conventional vacuum breaker open to the atmosphere in any system that incorporates a mechanical return system that carries pressure less than atmospheric pressure. This includes all return systems designated as vacuum returns, variable vacuum returns or subatmospheric returns. If a vacuum breaker must be installed in such a system, it should be of the type that is loaded to open only when the vacuum reaches a calibrated level well in excess of the design characteristics of the system.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

North America • Latin America • India • Europe / Middle East / Africa • China • Pacific Rim

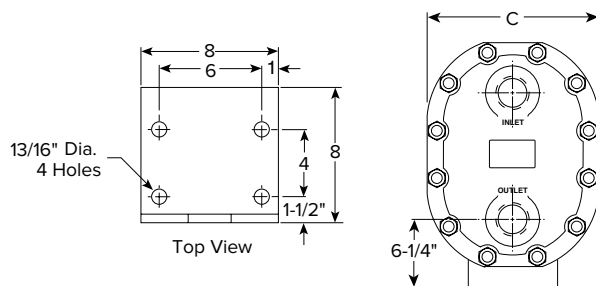
[armstronginternational.com](http://armstronginternational.com)



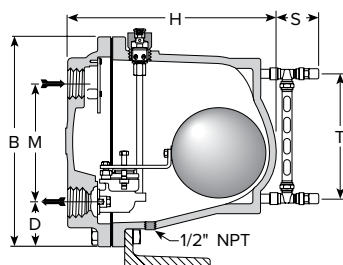
# LS & MS Series Ultra-Capacity Float & Thermostatic Steam Trap

Cast Steel for Horizontal Installation, With Thermostatic Air Vent

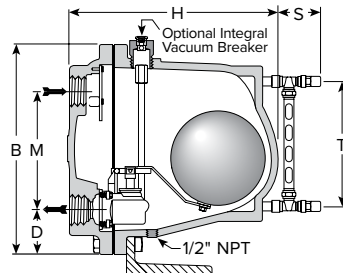
For Pressures to 450 psig (31 barg)...Capacities to 280 000 lb/hr (127 000 kg/hr)



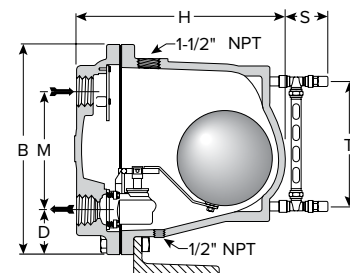
LS and MS Floor Mounting Bracket



Series LS, F&T shown



Series MS, CC shown



Series MS, LD shown

## Description

The simple yet rugged cast steel construction of the LS & MS Series Ultra-Capacity F&T steam traps offers long, trouble-free service. All floats, valves and seats, and lever mechanisms are constructed of stainless steel.

The integral thermostatic air vent is a balanced-pressure phosphor bronze bellows caged in stainless steel. It is designed especially for heavy-duty industrial applications where highly efficient, uninterrupted service is essential. This balanced-pressure air vent will respond to the pressure-temperature curve of steam at any pressure from zero to 250 psig (17 barg). Thus—up to 250 psig (17 barg)—air is vented at slightly below steam temperature.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model LS:	450 psig @ 650°F (31 barg @ 343°C)
Model MS:	450 psig @ 650°F (31 barg @ 343°C)

Maximum operating pressure:

Model 30-LS:	30 psig (2 barg) saturated steam
Model 100-LS:	100 psig (7 barg) saturated steam
Model 150-LS:	150 psig (10 barg) saturated steam
Model 250-LS:	250 psig (17 barg) saturated steam
Model 250-MS:	250 psig (17 barg) saturated steam
Model 450-LS:	450 psig (31 barg) saturated steam
Model 450-MS:	450 psig (31 barg) saturated steam

Maximum operating temperature bellows: 422°F (217°C)

**NOTE:** For pressures above 250 psig (17 barg), the thermostatic vent should be removed and only a CC or LD version should be used.

## Connections

- Screwed NPT and BSPT
- Flanged (weld neck)
- Socketweld

## Materials

Body and cap:	ASTM A216 WCB
Internals:	All stainless steel—304
Valve(s) and seat(s):	Stainless steel
Drain plug:	Carbon steel
Thermostatic air vent:	Stainless steel and bronze with phosphor bronze bellows, caged in stainless steel

## Options

- Integral vacuum breaker 150 psig (10 barg) maximum. Add suffix VB to model number.
- No internal thermostatic air vent for liquid drainer service. Add suffix LD to model number.
- Integral flash release for syphon drainage service. Add suffix CC to model number.
- Armored gauge glass 310 psig @ 400°F (21 barg @ 204°C)
- LS and MS Series available with floor mounting bracket. Consult factory.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

## LS & MS Series Traps

Trap Series	LS & MS	
	in	mm
Pipe Connection	2, 2-1/2, 3"	50, 65, 80*
"B" (Height)	20	508
"C" (Width)	15-1/4	387
"D" (Bottom to C)	4-3/16	106
"H" (Length)	20-1/4	508
"M" (C to C)	11-5/16	287
"S" (Gauge Glass Width)	4-5/8	95.2
"T" (Gauge Glass Height)	12	305
Weight lb (kg)	290 (131.5)	

\*MS Series 3" (80 mm) only.

## Specification

Float and thermostatic steam trap, type ... in cast steel, with thermostatic air vent.

For a fully detailed certified drawing, refer to CD #1010.

## How to Order

Pressure	Model	Connection Size	Option
100	LS	10	VB
30	LS	8 = 2" 10 = 2-1/2"	VB = Vacuum Breaker LD = Liquid Drainer CC = Condensate Controller G/G = Gauge Glass FLG = Specify type and class of flange
100			
150			
250			
450*			
250	MS	12 = 3"	
450*			

\* Orifice only available for CC and LD versions.

## Special Configurations

**Condensate controller with flash release for syphon drainage and/or cascade service.** The condensate controller (CC) configuration was developed especially to meet very large capacity needs in applications where condensate must be lifted from the drain point to the trap. Under such conditions—often referred to as syphon drainage—the reduction in pressure that occurs when condensate is elevated causes a portion of the condensate to flash into steam. Ordinary traps, unable to differentiate between flash steam and live steam, close and impede drainage.

The LS & MS Series condensate controllers (CC) are equipped with a fixed, restricted orifice near the top of the body to bleed off the flash steam (and all air present). This permits the trap to function properly on condensate.

**Liquid drainer with back vent for exceptionally high capacity drainage of liquid from gas under pressure.** The liquid drainer (LD) configuration was developed to meet very large capacity needs in draining water and other liquids from air or other gases under pressure. To prevent air or gas binding, the access port in the top of the body serves as a back vent connection to the equipment being drained. For capacity data, see pages 501 and 520 or consult your Armstrong Representative.

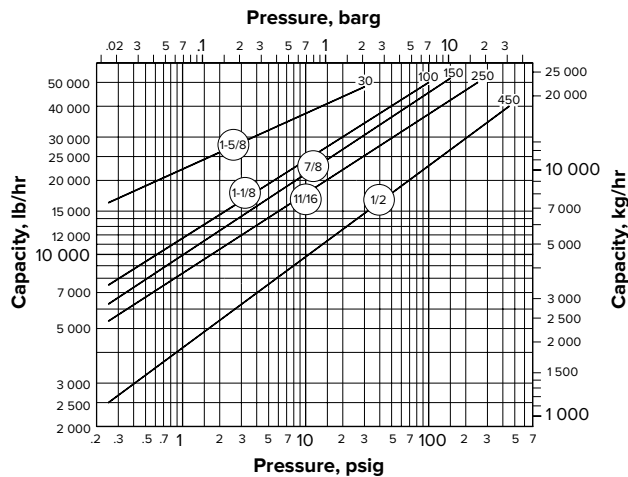
# LS & MS Series Ultra-Capacity Float & Thermostatic Steam Trap

Cast Steel for Horizontal Installation, With Thermostatic Air Vent

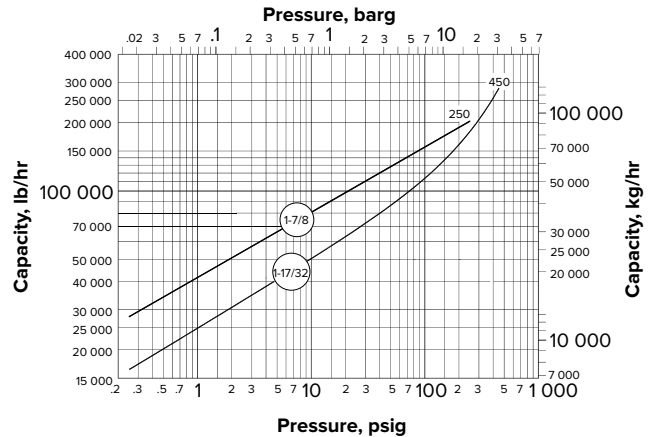
For Pressures to 450 psig (31 barg)...Capacities to 280 000 lb/hr (127 000 kg/hr)



Model LS Series Capacity



Model MS Series Capacity



## Installation Notes

Under conditions where the load may approach the maximum capacity of the trap, it is recommended that the size of the discharge line be increased one size as close to the trap cap as is practical.

When LS and MS Series units are used in severe service conditions or at pressures exceeding 30 psig, use an anchoring bracket or other supportive measures to minimize stress on piping.

Ultra-Capacity LS and MS Series units **MUST BE WARMED UP** in the proper sequence and gradually. Recommended warm-up rate not to exceed 100°F/8 minutes.

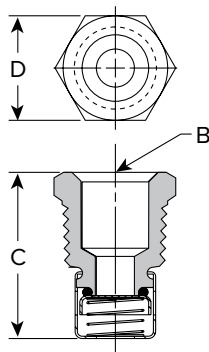
See your Armstrong Representative.

### Vacuum Breaker—1/2" (15 mm) NPT

Many times, condensate will be retained ahead of steam traps because of the presence of a vacuum. To break a vacuum, air must be introduced into the system by means of a vacuum breaker.

For maximum protection against freezing and water hammer in heating coils under modulated control, for example, vacuum breakers are recommended in conjunction with freeze protection devices.

Vacuum Breaker			
Size	in	mm	Max. allow. pres.
"B" Pipe Connections	1/2 NPT	15	150 psig (10 barg)
"C" Height	3/8 NPT	10	
"D" Width	1-1/4	32	
	7/8 Hex	22 Hex	



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



## Armstrong® TVS 800 Series Cast Iron Trap Valve Station

Put the principle of the inverted bucket to work in a tough cast iron package and you have the best of both worlds—energy efficiency and long-lasting reliability. Add the advantages of valves integrated into one compact trap/valve casting, and you extend the benefits into installation, trap testing and maintenance.

All the components are concentrated in a single, accessible package and can be dealt with in-line. And if you have existing Armstrong cast iron traps in-line, identical face-to-face dimensions will make retrofitting with the patented\* Armstrong Trap Valve Station (TVS) a snap. You'll also reduce your inventory requirements. So you'll eliminate what you're paying just to keep parts on hand.

Integral isolation valves

Rugged cast iron package

### Reduced costs

TVS saves on these fronts: energy, installation and maintenance.

### Integration of trap and valves

Inverted bucket long life and energy efficiency, plus the savings and convenience of components merged into one space-saving package.

### A full range of options

TVS will accommodate a test valve, strainer, internal check valve, thermic vent bucket, AIM® and SteamEye®—remote steam trap monitoring system for steam traps.

### Easy, in-line repairability

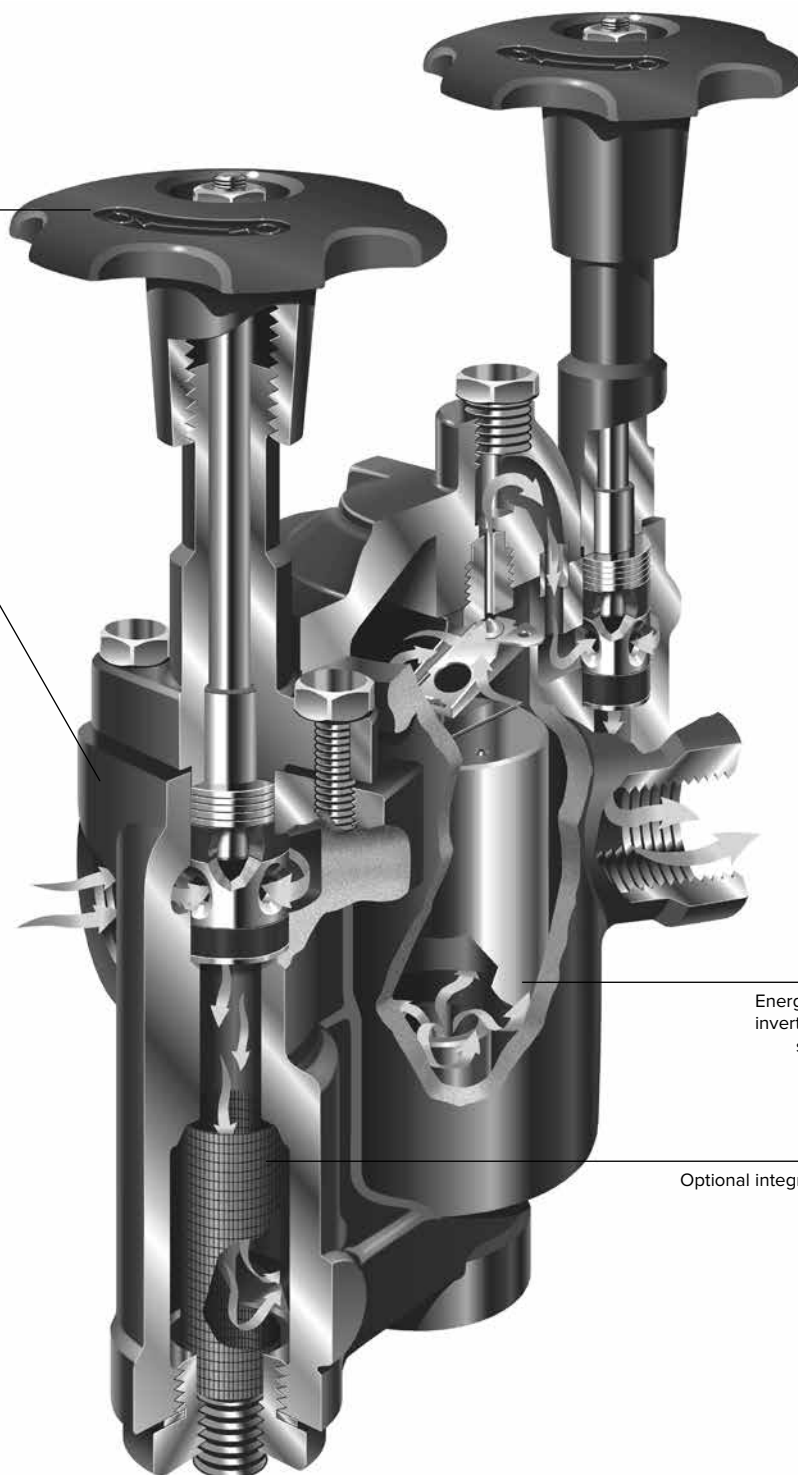
### Elimination of potential leak points

### Reduced design time

Permits combining products with exact face-to-face dimensions.

Energy-efficient  
inverted bucket  
steam trap

Optional integral strainer



\*U.S. Patent 5,947,145

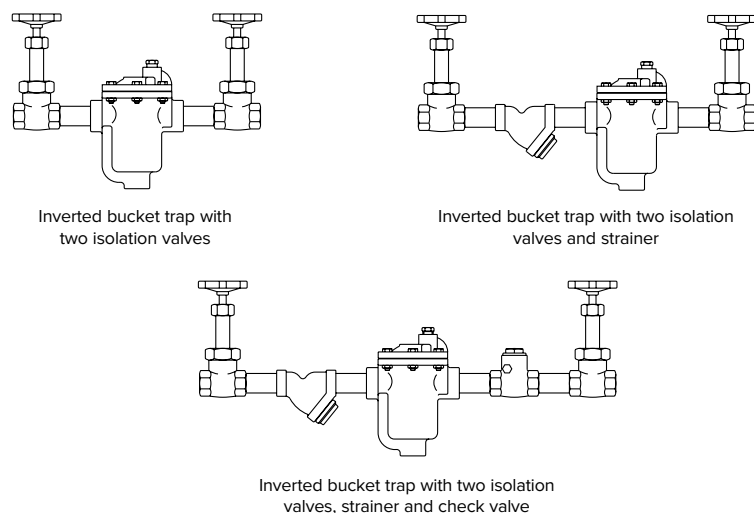
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# TVS 800 Series Cast Iron Trap Valve Station

**TVS makes a long story...short.**

Typical Installation



Trap Valve Station



## The Innovation Is Integration

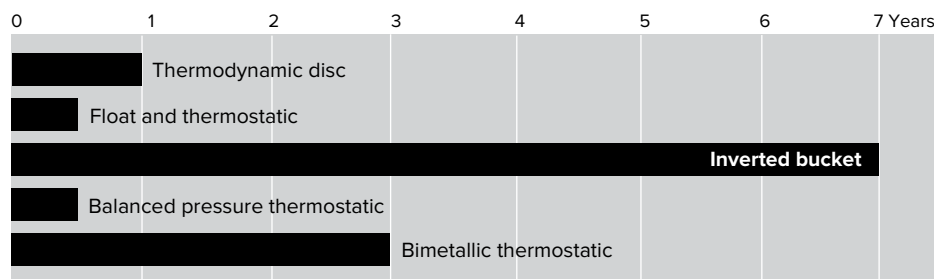
The Armstrong TVS makes what used to be long, complicated steam installation stories simple and compact. It shortens installations by integrating components—specifically an inverted bucket steam trap with two or more valves.

For example, here's an old description for a typical installation: valve-nipple-strainer-nipple-trap-nipple-valve. It's a long tale, even for this simple piping arrangement.

The Trap Valve Station rewrites this steam story: pipe-TVS-pipe. In other words, the TVS makes it all one, delivering the functions of multiple components in a dramatically smaller unit. It integrates two high-value products in a package of revolutionary versatility.

Look above to see how the Armstrong cast iron Trap Valve Station has rewritten these typical steam installations.

## Average Service Life for Different Trap Types 200 psig (14 barg)



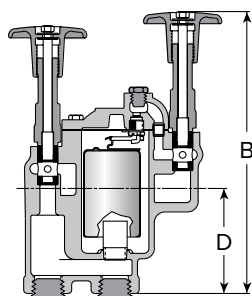
Above data from ICI Engineer January 1993 special issue with permission from ICI Engineering.



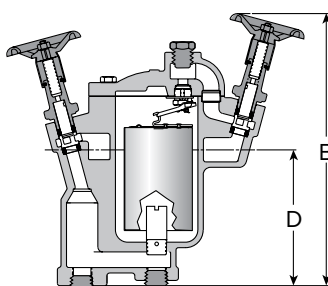
# TVS 800 Series Trap Valve Station

Cast Iron for Horizontal Installation, With Integral Piston Valves

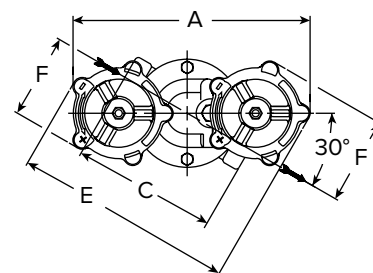
For Pressures to 250 psig (17 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)



Model TVS 811



Series TVS 812/813



Series TVS 811/812/813 - Top View

Same principle. Different package. Now the energy-saving performance and reliability of the inverted bucket steam trap are available in a versatile new package.

You'll still enjoy all the familiar benefits. And the same efficient condensate drainage from virtually every kind of steam-using equipment. But what you'll find new are all the benefits of a piston valve integrated into the same space-saving package.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design): 250 psig @ 450°F (17 barg @ 232°C)  
Maximum operating pressure: 250 psig (17 barg)

## Connections

Screwed NPT and BSPT

## Materials

Cap and body: ASTM A48 Class 30  
Internals: All stainless steel—304  
Valve and seat: Stainless steel—17-4PH  
Handwheel: Ductile iron  
Internals: Stainless steel  
Valve sealing rings: Graphite and stainless steel  
Blowdown valve: Stainless steel

## Options

- Stainless steel internal check valve
- Thermic vent bucket
- Stainless steel pop drain
- Integral strainer
- Scrub wire
- Probe connection
- Blowdown valve (TVS 811 and TVS 812 only)

## Specification

Inverted bucket steam trap, type ... in cast iron, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and discharge orifice at the top of the trap. Integral upstream and downstream shutoff piston style valves in same dimensional space as standard bucket trap.

## How to Order

Specify:

- Model number
- Size and type of pipe connection
- Maximum working pressure that will be encountered or orifice size
- Any options required

For a fully detailed certified drawing, refer to:

TVS 811 CD #1099  
TVS 812/813 CD #1100

## TVS 800 Series Trap Valve Station

Model No.	TVS 811		TVS 812		TVS 813	
	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4	15, 20	3/4, 1	20, 25
Test Plug	1/4	6	1/2	15	3/4	20
"A" Width Across Handwheels	8-1/4	210	13-3/4	349	15-1/8	384
"B" Outlet Valve Open	10-1/4	260	11-3/4	298	14-1/4	362
"C" Face to Face	5	127	6-1/2	165	7-3/4	197
"D" Connection $\varnothing$ to Bottom	3-11/16	94	4-3/4	121	7-1/4	184
"E"	7-5/8	194	13	330	14-3/8	365
"F"	3	76	4-1/2	114	4-7/8	124
Number of Bolts	6	6	6	6	6	6
Weight lb (kg)	12 (5.4)		25 (11.3)		47 (24)	

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

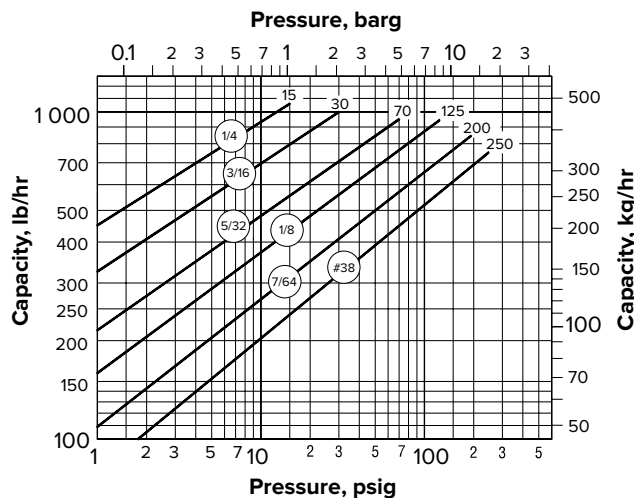
# TVS 800 Series Trap Valve Station

Cast Iron for Horizontal Installation, With Integral Piston Valves

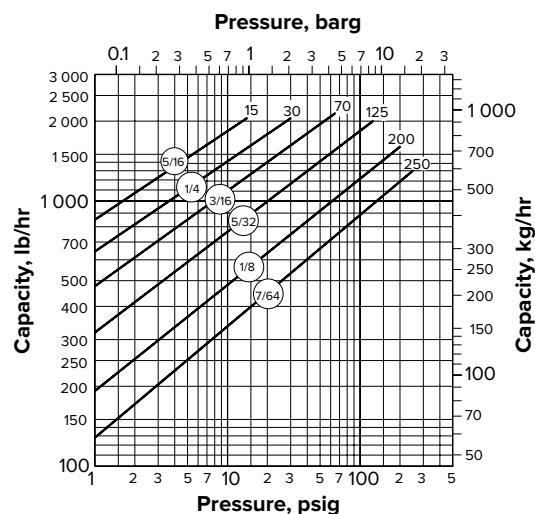
For Pressures to 250 psig (17 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)



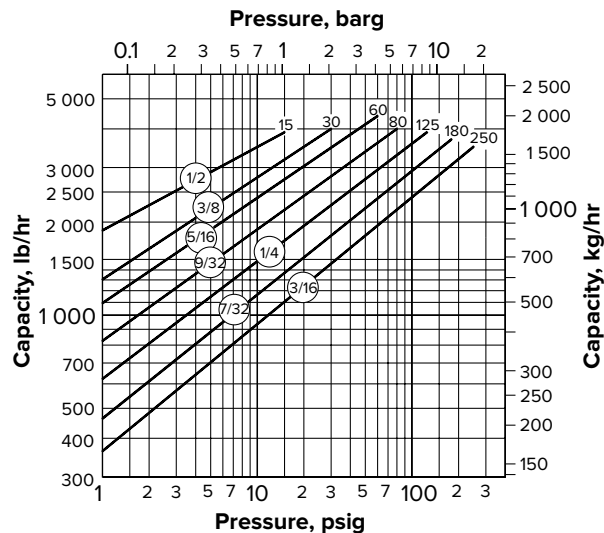
**Model TVS 811 Capacity**



**Model TVS 812 Capacity**



**Model TVS 813 Capacity**



## Options

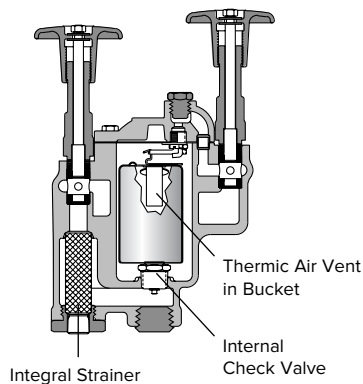
**Internal Check Valves** are spring-loaded stainless steel and screw directly into the trap inlet or into an extended inlet tube having a pipe coupling at the top to save fittings, labor and money.

**Thermic Vent Buckets** have a bimetal controlled auxiliary air vent for discharging large amounts of air on start-up.

**Integral Strainer** is made from 20 x 20 stainless steel screen.

**Probe Connections** are available for trap monitoring.

**Blowdown Valve** for clearing strainers of dirt and debris.



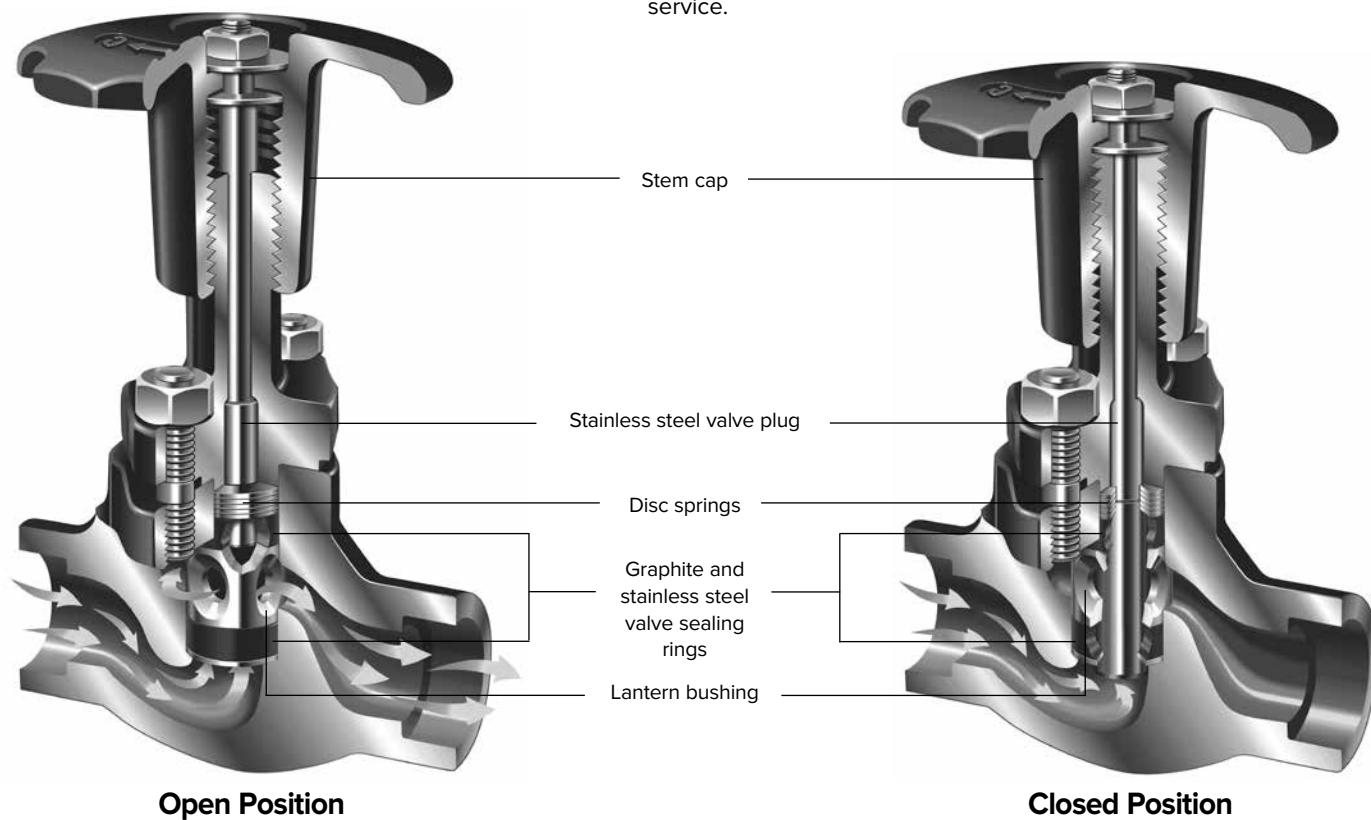
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# Armstrong® TVS 4000 Series Stainless Steel Trap Valve Station

## The Piston Valve

Armstrong Steam Distribution Manifolds (MSD/SMSD) and TVS 4000 Trap Valve Stations incorporate advanced piston sealing technology for safer, longer lasting steam isolation service.



Open Position

Closed Position

- **Dual sealing action.** The piston valve is a seatless valve that includes two graphite and stainless steel valve sealing rings that seal the stem and function as a seat. This combination provides long-term protection against leaks to the atmosphere and downstream piping.
- **Self-cleaning action.** Stainless steel piston slides without rotating between the two valve sealing rings, preventing dirt from damaging the surfaces.
- **Sealing integrity.** Flexible disc springs automatically provide leak tightness by exerting pressure, which keeps the upper and lower valve sealing rings compressed at all times. Sealing tightness is ensured by the compression of the sealing rings against the piston and valve body. This

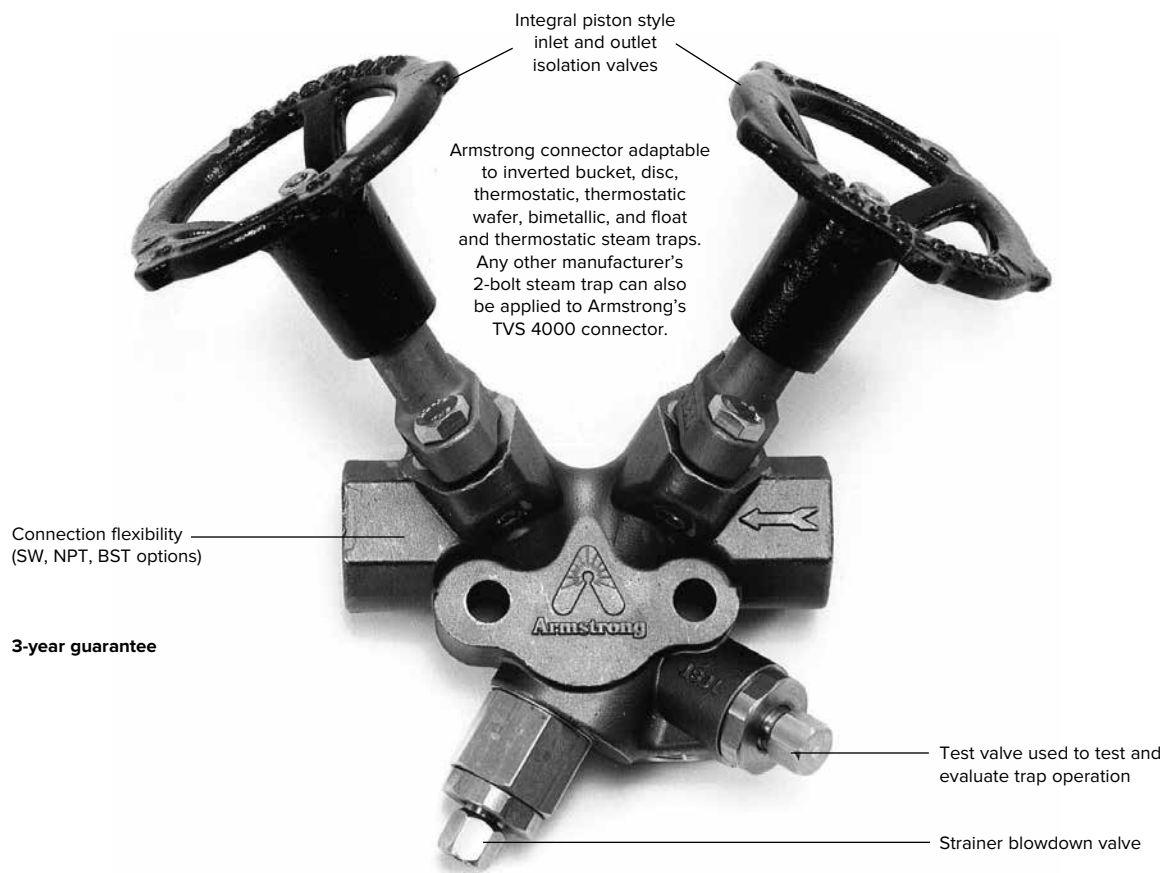
combination of disc springs and dual valve seal rings protects against expansion and contraction due to heating and cooling. This ensures dependable operation, even after years of service.

- **Protected valve stem.** The valve stem and sealing surfaces are completely protected from dirt and corrosion by the stem cap, whether in an open or closed position.
- **In-line repairability.** All sealing valve components may be easily replaced in-line.
- **Long-term operation.** Piston valve design ensures actuation even after many years without operation.

U.S. Patent 6,467,503

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# TVS 4000 Series Stainless Steel Trap Valve Station



## Description

Same principle. Different package with two piston-style isolation valves, test valve and integral stainless steel strainer with blowdown valve. What you'll find new are all the benefits of a piston valve integrated into the same space-saving package.

## Maximum Operating Conditions

Maximum allowable pressure:  
650 psig @ 600°F (45 barg @ 315°C)

## Materials—TVS 4000 Connector

Connector:	ASTM A351 Gr. CF8M
Strainer screen:	Stainless steel
Test valve:	Stainless steel
Blowdown valve:	Stainless steel

## Isolation Valve Components

All wetted parts:	Stainless steel
Valve sealing rings:	Graphite and stainless steel
Handwheel:	Ductile iron

## Weight

6-1/2 lb (2.9 kg)

## How to Order

Model	Connection	Type of Connection Inlet/Outlet	Flow Direction	Trap Type
TVS 4000	1/2" 3/4"	NPT SW BSPT Flanged*	R = Right to Left L = Left to Right	Inverted Bucket Disc Thermostatic wafer Bimetallic Float and Thermostatic

\*Consult factory.

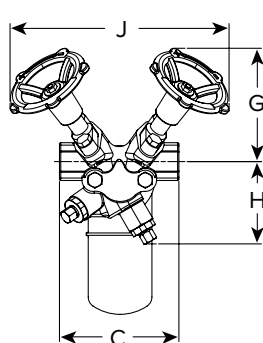
U.S. Patent 6,467,503

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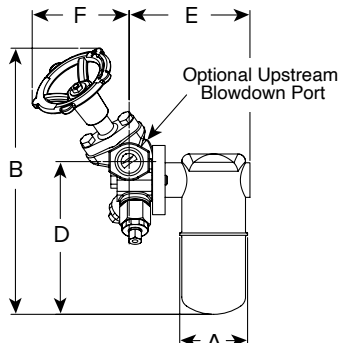


# TVS 4000 Series Stainless Steel Trap Valve Station

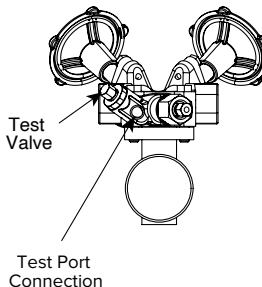
For Pressures to 650 psig (45 barg)...Capacities to 1 300 lb/hr (590 kg/hr) (Using 2000 Series Inverted Bucket Steam Traps)



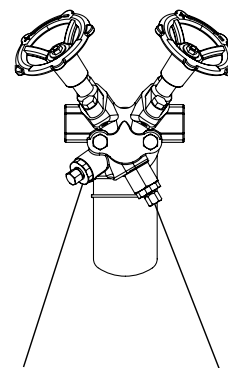
**Model TVS 4000 With 2000 Series SS Trap**  
Front View



**Model TVS 4000 With 2000 Series SS Trap**  
Side View



**Model TVS 4000 With 2000 Series SS Trap**  
Bottom View



**Test Valve**  
Used to test and evaluate trap operation

**Strainer Blowdown Valve**

Same principle. Different package with two piston-style isolation valves, test valve and integral stainless steel strainer with blowdown valve. Now the energy-saving performance and reliability of the inverted bucket steam trap are available in a versatile new package. You'll still enjoy all the familiar benefits. And the same efficient condensate drainage from virtually every kind of steam-using equipment. What you'll find new are all the benefits of a piston valve integrated into the same space-saving package.

## Materials—TVS 4000 Connector

Connector:	ASTM A351 Gr. CF8M
Strainer screen:	Stainless steel
Screen retainer:	Stainless steel
Gasket:	Stainless steel
Retainer unit:	Stainless steel
Test valve:	Stainless steel
Blowdown valve:	Stainless steel

## Isolation Valve Components

Handwheel:	Ductile iron
Nut:	Stainless steel
Stem, washers:	Stainless steel
Bonnet:	ASTM A351 Gr. CF8M
Bonnet, bolts:	DIN 933, Gr. A2 Class 70 per DIN 267
Valve plug:	Stainless steel
Disc springs:	Stainless steel
Valve sealing rings:	Graphite and stainless steel
Lantern bushing:	Stainless steel
Valve washers:	Stainless steel

## Materials—Series 2000 Traps

Body:	ASTM A240 Gr. 304L
Internals:	All stainless steel—304
Valve and seat:	Stainless steel—17-4PH

## TVS 4000 Series With 2000 Series Inverted Bucket Steam Trap

Model No.	2010		2011		2022	
	in	mm	in	mm	in	mm
Pipe Connections	3/8, 1/2, 3/4	10, 15, 20	1/2, 3/4	15, 20	1/2, 3/4	15, 20
"A" Trap Diameter	2-11/16	68	2-11/16	68	3-7/8	98
"B" Height (Valve Open)	8	203	10-1/2	268	12-1/2	318
"C" Face to Face	4-3/4	120	4-3/4	120	4-3/4	120
"D" Connection $\varnothing$ to Bottom	4-3/4	120	6	154	8	203
"E" Connection $\varnothing$ to Outside of Trap	4-1/2	114	4-13/16	122	5-7/8	149
"F" Connection $\varnothing$ to Front of Handwheel (Valve Open)	3-1/2	89	3-7/8	98	3-7/8	98
"G" Connection $\varnothing$ to Top of Handwheel (Valve Open)	3-1/4	83	4-1/2	114	4-1/2	114
"H" Connection $\varnothing$ to Bottom of Connector	1-7/8	47	3-1/4	83	3-1/4	83
"J" Width Across Handwheels (Valve Open)	9-1/4	235	8-3/4	222	8-3/4	222
Test Port Connection	1/4 NPT	6	1/4 NPT	6	1/4 NPT	6
Weight lb (kg)	9	4	9-1/2	4.3	12	5.4
Maximum Operating Pressure (Trap)	200 psig (14 barg)		400 psig (28 barg)		650 psig (45 barg)	
Maximum Allowable Pressure (Trap)	400 psig (28 barg) @ 750°F (399°C)				650 psig @ 600°F (45 barg @ 315°C)	

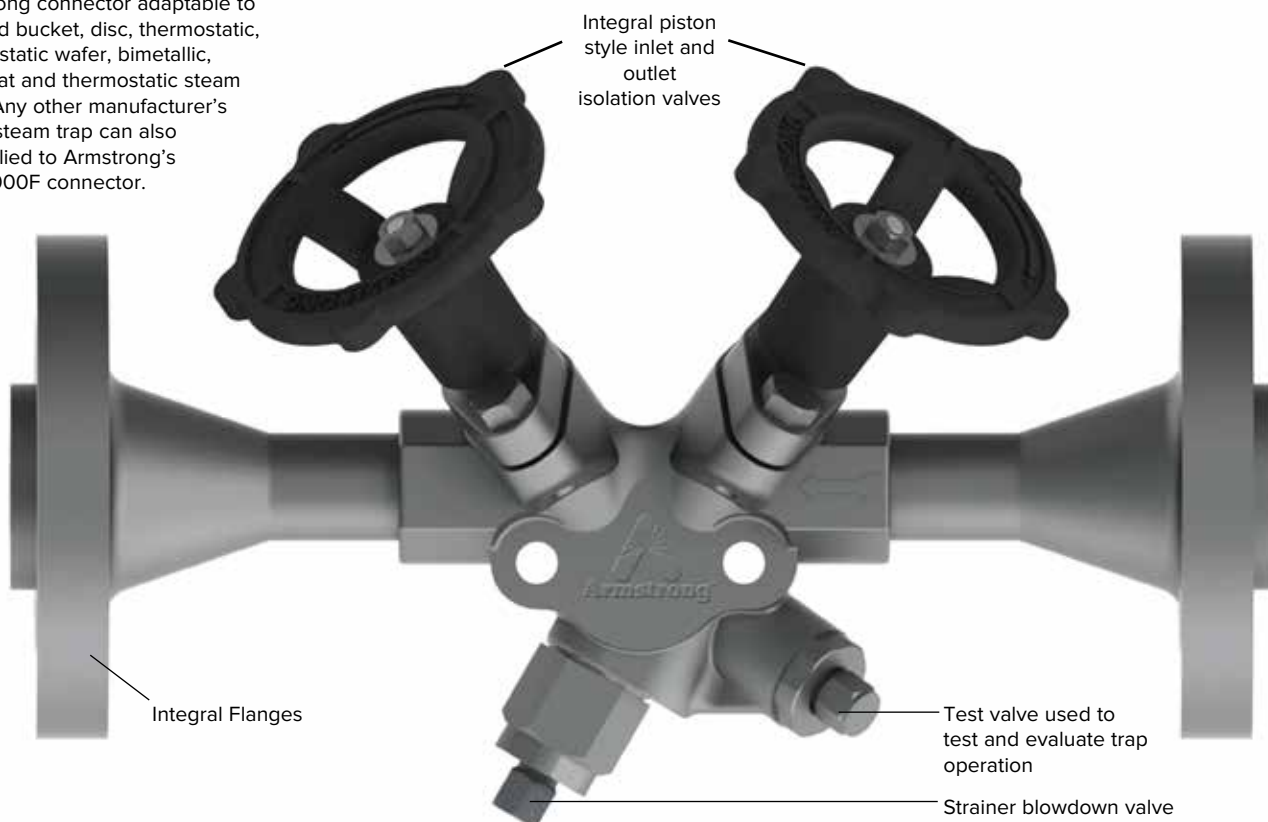
U.S. Patent 6,467,503

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# TVS 4000 Series Stainless Steel Trap Valve Station

For Pressures to 650 psig (45 barg)...Capacities to 1 300 lb/hr (590 kg/hr) (Using 2000 Series Inverted Bucket Steam Traps)

Armstrong connector adaptable to inverted bucket, disc, thermostatic, thermostatic wafer, bimetallic, and float and thermostatic steam traps. Any other manufacturer's 2-bolt steam trap can also be applied to Armstrong's TVS 4000F connector.



## Description

A complete package featuring two piston-style isolation valves, test valve and integral stainless steel strainer with blowdown valve. You'll realize all the benefits of a piston valve integrated into the same space-saving package.

## Maximum Operating Conditions

Maximum allowable pressure:  
650 psig @ 600°F (45 barg @ 315°C)

## Materials—TVS 4000F Connector

Connector.....ASTM A351 Gr. CF8M  
Strainer screen.....Stainless steel  
Test valve .....Stainless steel  
Blowdown valve .....Stainless steel

## Isolation Valve Components

All wetted parts.....Stainless steel  
Valve sealing rings.....Graphite and stainless steel  
Handwheel.....Ductile iron

## Weight

14 lb (6.4 kg)

## How to Order

Model	Connection	Type of Connection Inlet/Outlet	Flow Direction	Trap Type
TVS 4000F	3/4"	Flanged ASME B16.5 Class 150, 300, 600	R = Right to Left L = Left to Right	Inverted Bucket • Disc • Thermostatic wafer Bimetallic • Float and Thermostatic
	1"	Flanged ASME B16.5 Class 150, 300		

U.S. Patent 6,467,503

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## Features

- **Reduced costs.** TVS saves on these fronts: reduced leak points, installation and maintenance time.
- **A full range of features.** TVS has test and strainer blowdown valves. When installed with Armstrong Model 2011 and 2022 steam traps, it will also accommodate the Armstrong pop drain as well as TrapAlert and SteamEye —remote steam trap monitoring and testing devices.
- **Reduced design time.** Permits combining products with exact face-to-face dimensions.
- **Three-year guarantee.** The TVS 4000F is guaranteed for three years.
- **Easy, in-line repairability with maximum safety.** TVS allows isolation at point of service with upstream/downstream depressurization.
- **Installation versatility.** The connector design makes the TVS adaptable to any manufacturer's 2-bolt steam trap and piping configuration.
- **Simplified trap testing.** TVS enhances your capability to check trap operation and offers a built-in method to block and bleed traps.
- **Integral Flanges.** The body and connections are of one piece construction, free of welds and other potential leak paths.

# **Armstrong® Universal Stainless Steel Connector**

## **IS-2 Stainless Steel Connector with Integral Strainer Provides:**

- A full line stainless steel strainer in the connector eliminates leak points and reduces installation time
- A strainer that is not discarded when the trap is replaced
- Easy strainer screen replacement
- Optional blowdown valve
- Accommodates Armstrong's inverted bucket, disc, thermostatic, thermostatic wafer, bimetallic, and float and thermostatic traps. Any manufacturer's 2-bolt steam trap can also be applied to Armstrong's IS-2 connector.

## **Maximum Operating Conditions**

Maximum allowable pressure:  
650 psig @ 600°F (45 barg @ 315°C)

## **Connector Styles**

- IS-2 connector with integral strainer
- IS-2 connector with integral strainer with blowdown valve

## **Connection Sizes**

- 1/2", 3/4", 1"

## **Connection Types**

Screwed NPT and BSPT  
Socketweld  
Flanged (consult factory)

## **Materials**

Connector Body: All stainless steel—304  
Strainer: 20 x 20 Mesh 304 stainless steel

## **Weight**

2 lbs (0.91 kg)

## **How to Order IS-2 Connector with Integral Strainer**

Specify:

- Connection style
- Connection size
- Connection type
- Inlet flow direction
  - Left to Right
  - Right to Left



## **Standard 360° Stainless Steel Connector Provides:**

- A compact, lightweight assembly
- Standardization, reducing inventory
- A compact design, simplifying piping
- Accommodates Armstrong's inverted bucket, disc, thermostatic, thermostatic wafer and bimetallic steam traps. Any manufacturer's 2-bolt steam trap can also be applied to Armstrong's standard connector.

## **Maximum Operating Conditions**

Maximum allowable pressure:  
650 psig @ 600°F (45 barg @ 315°C)

## **Connector Styles**

- Standard 360°

## **Connection Sizes**

- 3/8", 1/2", 3/4"

## **Connection Types**

Screwed NPT and BSPT  
Socketweld  
Flanged (consult factory)

## **Weight**

1-1/2 lbs (0.70 kg)

## **How to Order Standard 360° Stainless Steel Connector**

Specify:

- Connection size
- Connection type



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# Universal Stainless Steel Connector - IS-4

## Description

With the IS-4 universal connector, you can install a 4-bolt compatible steam trap to fit most piping configurations and applications. The IS-4 combines the integrity of an all welded installation with the versatility of a quick change steam trap replacement.

The IS-4 works with Armstrong Intelligent Monitoring (AIM™) to bring intelligence to wireless technology by applying smart devices to monitor critical plant applications in real time.

- Class 900 design
- All stainless steel construction
- Integral strainer
- Exceptional corrosion resistance
- Recessed gasket surface
- Three-year guarantee against defects in materials and workmanship (connector only)

## Maximum Operating Conditions

Maximum allowable pressure (connector design):

IS-4 1 245 psig @ 900°F (85.8 barg @ 482°C)

IS-4BD 1 100 psig @ 800°F (75.8 barg @ 426°C)

## Materials and Weights

Body ASTM A351 Gr. CF8M

Screen Stainless steel

Screen retainer ASTM A351 Gr. CF8M

Retainer bolts ASTM A193 Gr. B16

Weights:

IS-4 4.75 lbs (2.15 kg)

IS-4BD 9.9 lbs (4.5 kg)

## 4-Bolt Connector Steam Traps Available

- SH4000 Series
- IB4022
- IB4011

## Specification

All stainless steel in-line universal connector with integral strainer able to accept steam traps compatible with the 4-bolt technology. Up to Class 900 service.



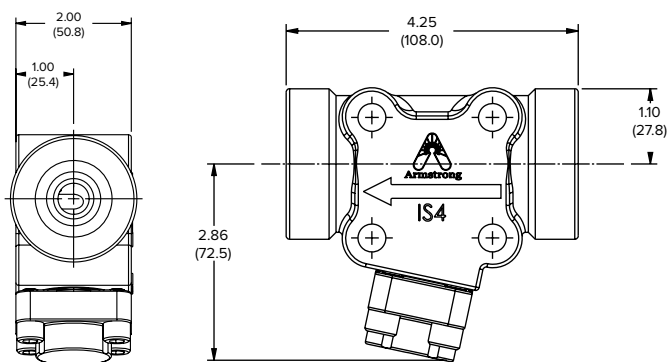
**IS-4**

## How to order

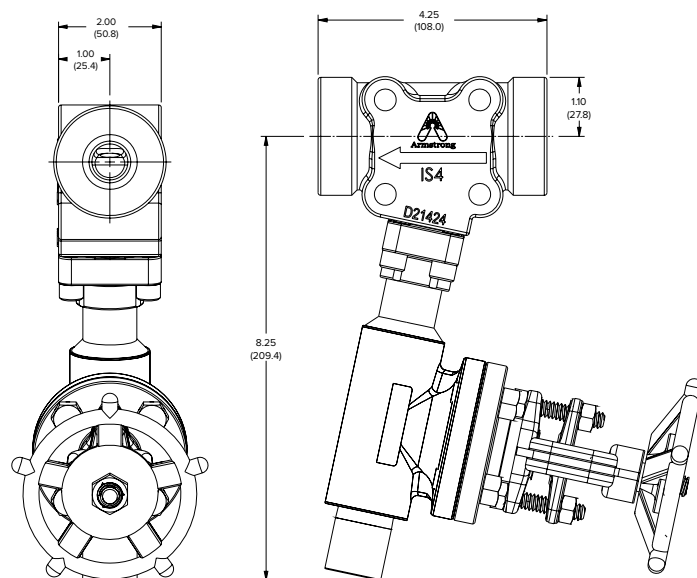
IS-4	3FL	900	DBB	DBB
Model	Connection Size/Type	Flanges	Inlet Configuration	Outlet Configuration
IS-4 or IS-4BD	<b>3NPT</b> =3/4(20)NPTF <b>3SW</b> =3/4(20)Socketweld <b>3FL</b> =3/4(20)Flanged <b>4NPT</b> =1(25)NPTF <b>4SW</b> =1(25)Socketweld <b>4FL</b> =1(25)Flanged	Class 600 Class 900	None <b>SB</b> =Single Block <b>DBB</b> =Double Block & Bleed	None <b>SB</b> =Single Block <b>DBB</b> =Double Block & Bleed

## Notes:

1. Right to left flow only available.
2. IS-4BD includes Class 800 forged steel gate valve for blowdown service.
3. Connection Size/Type based on the system condensate supply and return requirements.
4. All connections for SB or DBB will be socketweld.
5. Flanges available in Class 600 and 900.
6. For Block & Bleed dimensions: Consult Factory



**IS-4**

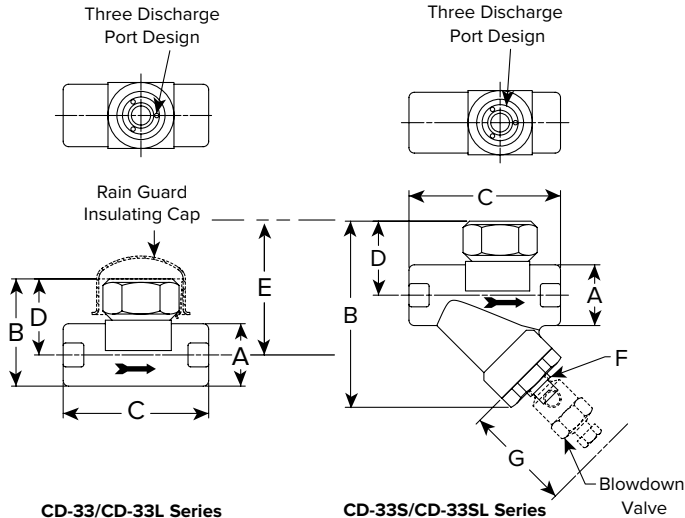


**IS-4BD**



# CD-33 Series Disc Trap

For Steam Service up to 600 psig (42 barg)...Capacities to 2 500 lb/hr (1 134 kg/hr)



CD-33/CD-33L Series

CD-33S/CD-33SL Series  
With Integral Strainer

The Armstrong CD-33 is a disc style trap designed to control the trap's cycle rate. By reducing the cycle rate, the Armstrong CD-33 will have a longer service life than typical disc traps. This enhanced performance will ensure that maintenance time is minimized and steam costs are greatly reduced.

The CD-33 is designed with three discharge ports, which offer stable disc operation to extend trap operating life. The capacities of the Armstrong CD-33 have been engineered specifically for the following applications: large steam main drips, process equipment, and HVAC heating equipment on constant pressure. The CD-33L trap is designed for the low capacity applications of steam main drips and steam tracing lines. By ensuring that the capacities are designed to suit the application, and are not oversized, the CD-33 Series will last longer than other disc traps with excessive capacity ratings.

## Advantages

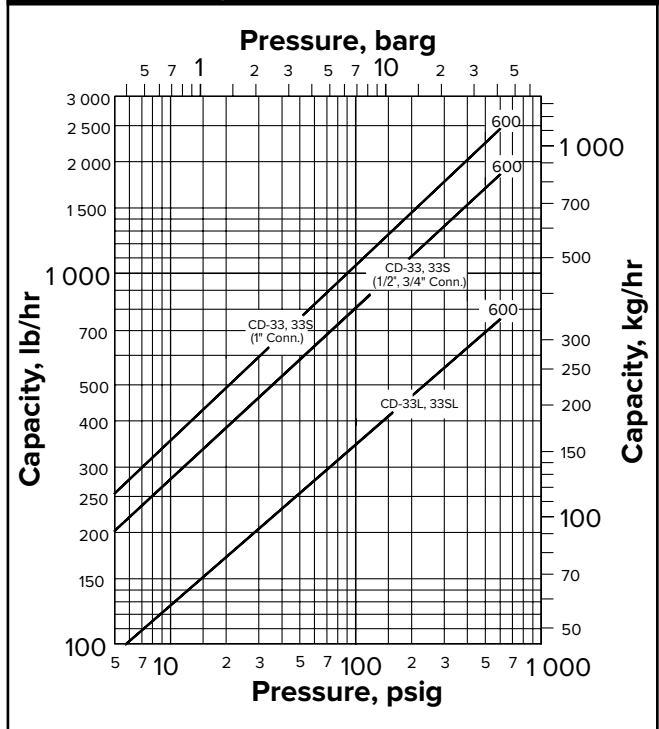
- Three discharge port design
- Minimal wear with controlled cycling
- Freeze-resistant
- Hardened seat and disc

## Specification

Steam trap shall be stainless steel thermodynamic type, integral seat design with hardened disc and seating surfaces, and electroless nickel plated finish. When required, trap shall be supplied with an integral Y strainer, integral blowdown valve or rain guard insulating cap. Maximum allowable pressure (vessel design) shall be 915 psig @ 752°F (63 barg @ 400°C). Maximum operating pressure shall be 600 psig @ 752°F (41 barg @ 400°C).

List of Materials	
Name of Part	Material
Body	ASTM A743 Gr. CA40
Cap	ASTM A743 Gr. CA40
Disc	ASTM A276 Gr. 420
Strainer Screen	30 x 30 Mesh T-304 Stainless Steel
Screen Retainer	ASTM A743 Gr. CA40
Blowdown Plug (CD-33S only)	Carbon Steel
Options	
Blowdown Valve	Stainless Steel
Rain Guard Insulating Cap (1/2", 3/4" Sizes Only)	Stainless Steel

Model CD-33 Capacity



CD-33 Series Disc Trap

Model No.	CD-33				CD-33S (w/strainer)				CD-33L (low capacity)		CD-33SL (w/strainer) (low capacity)	
Pipe Connection Size	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2, 3/4	15, 20	1	25	1/2, 3/4	15, 20	1	25	3/8, 1/2, 3/4	10, 15, 20	1/2, 3/4	15, 20
"A"	1-7/16	37	1-3/4	44	1-7/16	37	1-3/4	44	1-7/16	36	1-7/16	36
"B" Height	2-1/2	63	3-1/8	79	4-1/4	108	4-3/4	121	2-1/2	63	4-1/4	108
"C" Length	3-5/16	84	3-15/16	100	3-1/2	89	4-1/8	105	3-5/16	84	3-1/2	89
"D" $\varnothing$ to Top of Cap	1-3/4	44	2-1/4	57	1-3/4	44	2-1/4	57	1-3/4	44	1-3/4	44
"E" Withdrawal Distance Rain Guard Insulating Cap	–	–	–	–	3	76	3	76	–	–	3	76
"F" Blowdown Connection Size	–	–	–	–	1/4 NPT	6	1/4 NPT	6	–	–	1/4 NPT	6
"G" Withdrawal Distance Blowdown Valve	–	–	–	–	3-1/2	89	3-1/2	89	–	–	3-1/2	89
Weight, lb (kg)	1.4 (0.64)		2.5 (1.1)		2.2 (1.0)		3.25 (1.5)		1.41 (0.64)		2.2 (1.0)	
Maximum Allowable Pressure (Vessel Design)	915 psig @ 752°F (63 barg @ 400°C)											
Minimum Operating Pressure, psig (barg)	3.5 psig (0.24 barg)											
Maximum Operating Pressure, psig (barg)	600 psig @ 486°F (41 barg @ 252°C)											

Maximum Back Pressure as Percent of Inlet Pressure, 80%

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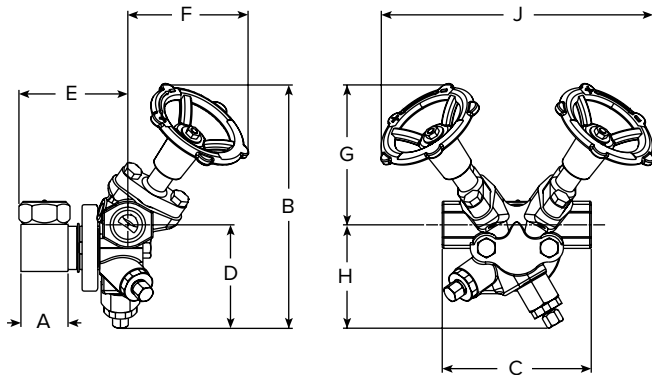
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# CD-3300 Series Disc Steam Traps

**All Stainless With 360° Connector/IS-2/TVS-4000**

For Steam Pressures to 450 psig (31 barg)...Capacities to 800 lb/hr (363 kg/hr)



CD-3300 With TVS-4000 Trap Valve Station

The Armstrong CD-3300 is a three discharge port design, which provides stable disc operation to extend operating life.

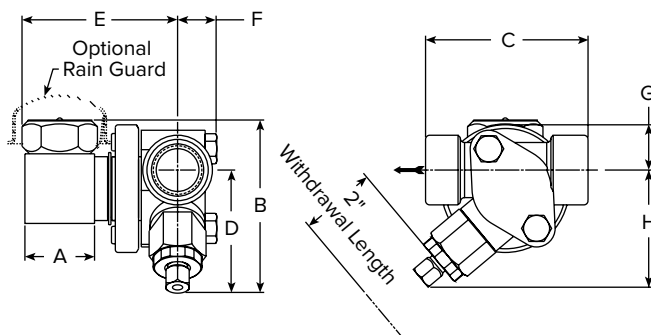
The CD-3300 is piped in-line by a 360° universal connector, which allows you to install the trap in virtually any piping configuration. Armstrong's unique standard connector or its IS-2 connector with integral strainer makes the CD-3300 easy to install, easy to renew. You save on labor time and cost because the connector simplifies piping and remains in-line.

## Materials

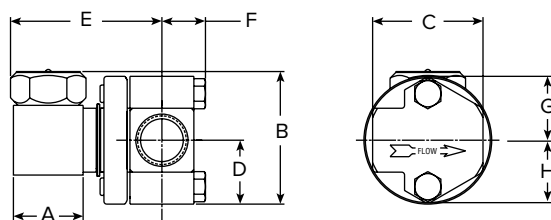
Trap cap:	ASTM A743 CA40
Trap disc:	ASTM A276 Gr. 420
Trap body:	ASTM A276 Gr. 420
Flange	ASTM A105 Zinc plated
Standard connector:	Stainless steel—304
IS-2 connector with integral strainer:	ASTM A351 Gr. CF8
	20 x 20 mesh 304 SS Screen

## Options

Rain guard insulating cap  
Blowdown valve—IS-2 connector only

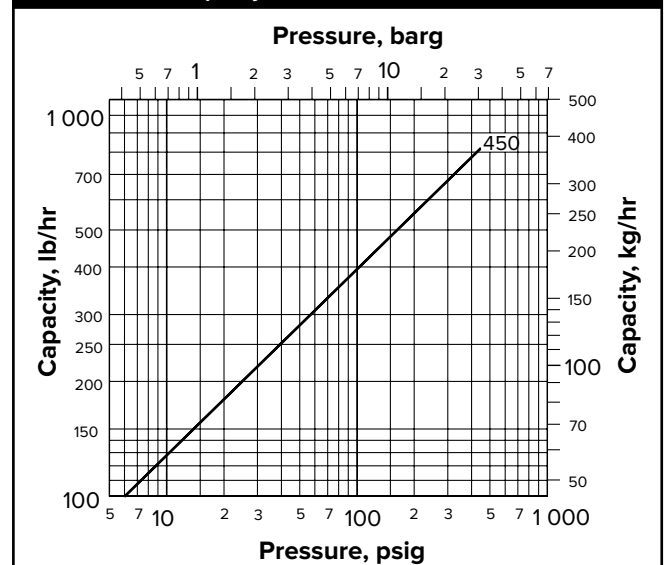


CD-3300 With IS-2 Connector With Integral Strainer and Blowdown Valve



CD-3300 With Standard Connector

## CD-3300 Series Capacity



## CD-3300 Series Disc Traps

Model	CD-3300							
	Standard Connector		IS-2 Connector With Integral Strainer				TVS 4000 Connector	
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4	15, 20	1	25	1/2, 3/4	15, 20
"A" Trap Diameter	1-1/2	38	1-1/2	38	1-1/2	38	1-1/2	38
"B" Total Height	2-7/8	73	3-3/4	94	3-3/4	94	7-13/16	198
"C" Face-to-Face	2-3/8	60	3-1/2	89	4	101	4-3/4	120
"D" Connection $\varnothing$ to Bottom	1-3/8	35	2-5/8	67	2-5/8	67	3-1/4	83
"E" Connection $\varnothing$ to Outside of Trap	3-3/8	86	3-3/8	86	3-9/16	90	3-9/16	90
"F" Connection $\varnothing$ to Front of Connector	13/16	20	7/8	22	7/8	22	3-7/8	98
"G" Connection $\varnothing$ to Top	1-3/8	46	1	25	1	25	4-1/2	114
"H" Connection $\varnothing$ to Bottom of Connector	1-3/8	46	2-1/2	64	2-1/2	64	3-1/4	83
"J" Width Across Handwheels (Valve Open)	—	—	—	—	—	—	8-11/16	221
Test Port Connection	—	—	—	—	—	—	1/4 NPT	6
Trap Only Weight, lb (kg)	2 (0.91)							
Trap and Connector Weight, lb (kg)	3.6	1.6	3.9	1.8	4.2	2	8-1/2	3.8
Maximum Operating Pressure	450 psig @ 456°F (31 barg @ 236°C)							
Maximum Allowable Pressure (Vessel Design)	720 psig @ 750°F (50 barg @ 400°C)							

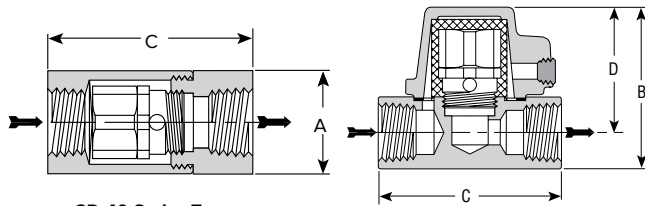
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# CD-40 and CD-60 Series Controlled Disc Steam Trap

Carbon Steel

For Pressures to 600 psig (41 barg)...Capacities to 2 850 lb/hr (1 295 kg/hr)



CD-40 Series Trap

CD-63 Model Shown

## Description

Armstrong CD-40 and CD-60 Series controlled disc traps contain a replaceable capsule, making it possible to renew a worn trap by simply replacing the capsule. A heating chamber in the shell ensures consistent operation. This steam jacket provides a relatively constant temperature in the control chamber regardless of ambient conditions. Cycling rate is controlled and does not increase when the trap is exposed to cold winds, rain or snow. CD-40 Series traps are also available with optional integral .045 perforated stainless steel strainer screens. CD-60 Series traps contain integral strainers with ratios of open area to inside area of pipe that equal or exceed those of most separate "Y" type strainers.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model CD-40	600 psig @ 500°F (41 barg @ 260°C)
Model CD-60	600 psig @ 750°F (41 barg @ 399°C)

Maximum operating pressure: 600 psig (41 barg) at saturated steam temperature

Minimum operating pressure: 10 psig (0.7 barg)

## Connections

Model CD-40 and CD-60	Screwed NPT and BSPT
Model CD-60	Socketweld

## Materials Model CD-40

Body:	Carbon steel—C-1215
Control chamber:	Hardened 440 stainless steel
Disc:	Hardened 440 stainless steel
Capsule body:	Hardened 440 stainless steel
Strainer screen (option):	Stainless steel

## Materials Model CD-60

Body:	ASTM A216 WCB
Cap:	ASTM A216 WCB
Control chamber:	Hardened 440 stainless steel
Disc:	Hardened 440 stainless steel
Capsule body:	Hardened 440 stainless steel
Strainer screen:	20 x 20 mesh stainless steel

## Option

CD-40 Series integral strainer screen (.045 perforated stainless steel)

## Specification

Controlled disc steam trap, type ... in carbon steel. CD-60 includes integral strainer. Maximum allowable pressure 600 psig.

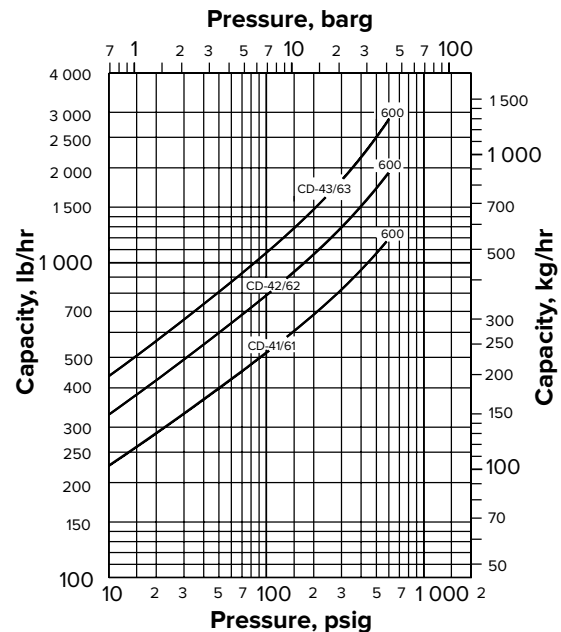
## How to Order

- Specify model number
- Specify size and type of pipe connection
- Specify any options required

For a fully detailed certified drawing, refer to CD #1020.



## Models CD-41/61, 42/62 & 43/63 Capacity



Capacities given are continuous discharge capacities in pounds and kilograms of hot condensate per hour at pressure differential indicated with condensate temperatures approximately 25°F (14°C) below steam temperatures.

NOTE: CD traps can operate with minimum of 2 psig (.15 barg) inlet pressure and a maximum of 80% back pressure. However, for best results, inlet pressure should not drop below 10 psig (.70 barg) and back pressure should not exceed 50% of inlet pressure.

## CD-40 and CD-60 Series Controlled Disc Traps

Model No.	CD-41*				CD-42*		CD-43*			CD-61				CD-62		CD-63	
Pipe Connections	in	mm	in	mm	in	mm	in	mm		in	mm	in	mm	in	mm	in	mm
	3/8	10	1/2	15	3/4	20	1	25		3/8	10	1/2	15	3/4	20	1	25
"A" (Diameter)	1-1/4	31.7	1-1/4	31.7	1-5/8	41.3	2-3/8	60.3		—	—	—	—	—	—	—	—
"B" (Height)	—	—	—	—	—	—	—	—		2-3/4	66.7	2-3/4	66.7	3-1/2	87.3	4-1/4	108
"C" (Length)	3	76.2	3-13/32	86.5	3-15/16	100.0	4-5/8	117.5		3-1/2	88.9	3-1/2	88.9	4-5/8	117	4-3/4	122
"D" (℄ to Top of Cap)	—	—	—	—	—	—	—	—		2-1/8	50.8	2-1/8	50.8	2-3/4	68.3	3-5/16	84.1
Weight lb (kg)	3/4 (0.3)		3/4 (0.3)		1-3/4 (0.8)		4-1/4 (1.9)			2-3/4 (1.2)		2-1/2 (1.1)		4-3/4 (2.2)		6-3/4 (3.1)	

\*Optional integral strainer available.

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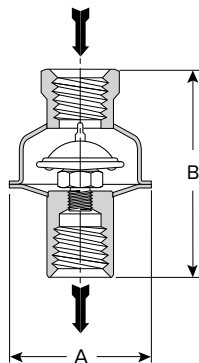
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# Thermostatic Wafer Steam Trap

## Stainless Steel

For Pressures to 250 psig (17 barg)...Cold Water Start-Up Capacities to 1 000 lb/hr (453 kg/hr)



Model WMT-1 Trap

### Description

The WMT thermostatic wafer traps are designed to last longer than other oversized, all-purpose thermostatic and thermodynamic steam traps.

A water seal prevents loss of steam through the orifice of the WMT Series.

Adjusts automatically to flow rates, including large start-up loads, at all pressures within its range.

### Specification

Thermostatic wafer steam trap, type WMT stainless steel.

### How to Order

- Specify model number
- Specify size and type of pipe connection. When flanges are required, specify type of flange in detail

For a fully detailed certified drawing, refer to CD #1017 (WMT-1).

Model WMT-Series Thermostatic Wafer Trap Capacity							
Differential Pressure*		Cold Water Start-Up 70°F (21°C)		Hot Water Start-Up 212°F (100°C)		Operating Condensate 50°F (0°C) Below Saturation	
psig	barg	lb/hr	kg/hr	lb/hr	kg/hr	**lb/hr	**kg/hr
5	0.35	120	54	100	45	10	4.5
10	0.70	150	68	170	77	13	5.9
20	1.4	320	145	250	113	18	8.2
30	2	390	177	300	136	20	9.1
40	3	420	191	350	159	24	10.9
50	3.5	490	222	400	181	26	11.8
75	5	570	259	480	218	30	13.6
100	7	650	295	580	263	35	15.9
150	10.5	700	318	700	318	40	18.1
200	14	900	408	800	363	46	20.9
250	17	1 000	454	950	431	50	22.7

\*Capacities based on differential pressure with no back pressure.

\*\*Capacities will vary with the degree of subcooling. When greater capacities are required, the trap will automatically adjust to the load, up to the maximum (cold water) capacity shown, by increasing the amount of subcooling.

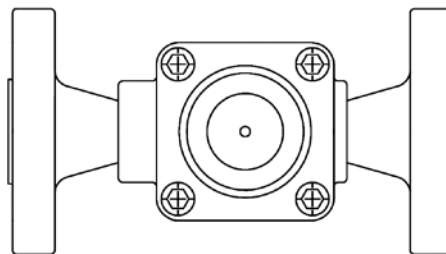
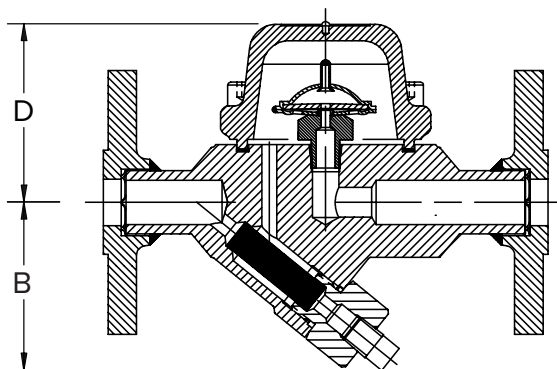
WMT Thermostatic Wafer Steam Trap				
Model No.	WMT-1			
Pipe Connections	in	mm	in	mm
	1/4, 3/8	6, 10	1/2	15
"A" (Diameter)	2-1/4	57	2-1/4	57
"B" (Height)	3-5/16	84	3-5/16	84
Weight lb (kg)	1-1/4 (0.6)		1-1/4 (0.6)	

Model	WMT-1
Connections	Screwed NPT and BSPT
Material	
Cap and body	ASTM A240 Grade 304L
Capsule	All stainless steel—304
Maximum Operating Conditions	
Maximum allowable pressure (vessel design)	250 psig @ 400°F (17 barg @ 204°C)
Maximum operating pressure	250 psig (17 barg)

# TC-300 Series Thermostatic Wafer Steam Trap

## Carbon Steel

For Pressures to 250 psig (17 barg)...Cold Water Start-Up Capacities to 1 000 lb/hr (453 kg/hr)



### Description

The TC-300 is sized precisely to handle the extremely low condensate load found in most instrument steam tracer lines. The TC-300 traps are designed to last longer than other oversized, all-purpose thermostatic and thermodynamic steam traps.

This steam trap adjusts automatically to flow rates, including large start-up loads, at all pressures within its range.

### How to Order

Specify: Model Number, Size and type of pipe connection. When flanges are required, specify type of flange in detail.

TC-300 Series Thermostatic Wafer Steam Trap Capacity							
Differential Pressure*		Cold Water Start-Up 70°F (21°C)		Hot Water Start-Up 212°F (100°C)		Operating Condensate 50°F (10°C) Below Saturation	
psig	barg	lb/hr	kg/hr	lb/hr	kg/hr	**lb/hr	**kg/hr
5	0.35	120	54	100	45	10	4.5
10	0.70	150	68	170	77	13	5.9
20	1.4	320	145	250	113	18	8.2
30	2	390	177	300	136	20	9.1
40	3	420	191	350	159	24	10.9
50	3.5	490	222	400	181	26	11.8
75	5	570	259	480	218	30	13.6
100	7	650	295	580	263	35	15.9
150	10.5	700	318	700	318	40	18.1
200	14	900	408	800	363	46	20.9
250	17	1 000	454	950	431	50	22.7

\* Capacities based on differential pressure with no back pressure.

\*\* Capacities will vary with the degree of subcooling. When greater capacities are required, the trap will automatically adjust to the load, up to the maximum (cold water) capacity shown, by increasing the amount of subcooling.

TC-300 Trap		
Pipe Connections	in	mm
	1/2, 3/4, 1	15 – 20 – 25
"B" Height (Screwed & SW)	4-19/32	117
"A" Height (flanged PN40*)	4-19/32	117
"C" Face-to-Face (Screwed & SW)	3-1/2 – 3-1/2 – N/A	90 – 90 – N/A
"CC" Face-to-Face (Flanged PN40*)	5-29/32 – 5-29/32 – 6-19/64	150 – 150 – 160
"D" CL to Top	2-3/8	60
Weight in kg (Screwed & SW)	4-1/4	1,9
Weight in kg (Flanged PN40)	9-1/2 – 9-1/2 – 10	4,3 – 4,5 – 4,7

TC-300 Traps	
Model	TC-300
Connections	Screwed BSPT and NPT Socketwelded Flanged DIN and ANSI
Material	
Cap and Body	ASTM-A-105
Capsule	All Stainless Steel – 304
Maximum Operating Conditions	
Maximum allowable pressure (vessel design)*	465 psig @ 662°F (32 barg @ 350 °C)
Maximum operating pressure	250 psig @ 400°F (17 barg @ 207 °C)

† May be derated depending on flange rating and type.



# WT Series Thermostatic Wafer Steam Trap

## Stainless Steel or Carbon Steel

For Pressures to 600 psig (41 barg)...Cold Water Start-Up Capacities to 1 600 lb/hr (726 kg/hr)

### Description

Armstrong offers three thermostatic wafer steam traps. The WT-1 is ideal for low-capacity steam tracers and features an exclusive non-welded wafer design and internal strainer screen two to three times larger than that of other thermostatic traps in a sealed stainless steel body. Choice of NPT or BSPT screwed connections, or socketweld connections.

The WT-2000 does not have an internal strainer, but is equipped with a special 360° connector to expand piping options and simplify installation. Choice of NPT or BSPT screwed connections, or socketweld connections. Also available with optional IS-2 stainless steel connector with integral strainer.

Armstrong's WT-3 is a carbon steel thermostatic wafer trap for superheated drip service. It features an exclusive non-welded wafer design, which eliminates problems associated with weld stress. The WT-3 has no thin-walled enclosures such as bellows or welded diaphragms. It is also resistant to water hammer. Choice of NPT or BSPT screwed connections, or socketweld connections.

**NOTE:** Since the normal operation of all suppressed temperature-discharge (subcooling) steam traps is to back up condensate, they should not be used on drip legs for saturated steam service, heating or process equipment. Exercise care in the maintenance of any thermostatic wafer trap with a small discharge area susceptible to clogging.

### Specification

Thermostatic wafer steam trap, type ... in stainless steel or carbon steel.

### How to Order

Specify:

- Model number
- Size and type of pipe connection, or connector style
- Any options required

For a fully detailed certified drawing, refer to CD #1017.

### Model WT Series Wafer Trap Capacity

Differential Pressure*		Cold Water Start-Up 70°F (21°C)		Hot Water Start-Up 212°F (100°C)		Operating Condensate 50°F (10°C) Below Saturation	
psig	barg	lb/hr	kg/hr	lb/hr	kg/hr	**lb/hr	**kg/hr
5	0.35	120	54	100	45	10	4.5
10	0.70	150	68	170	77	13	5.9
20	1.4	320	145	250	113	18	8.2
30	2	390	177	300	136	20	9.1
40	3	420	191	350	159	24	10.9
50	3.5	490	222	400	181	26	11.8
75	5	570	259	480	218	30	13.6
100	7	650	295	580	263	35	15.9
150	10.5	700	318	700	318	40	18.1
200	14	900	408	800	363	46	20.9
250	17	1 000	454	950	431	50	22.7
300	21	1 050	476	1 025	465	56	25.4
350	24	1 150	522	1 200	544	63	28.6
400	28	1 300	590	1 250	567	70	31.8

\*Capacities based on differential pressure with no back pressure.

\*\*Capacities will vary with the degree of subcooling. When greater capacities are required, the trap will automatically adjust to the load, up to the maximum (cold water) capacity shown, by increasing the amount of subcooling.

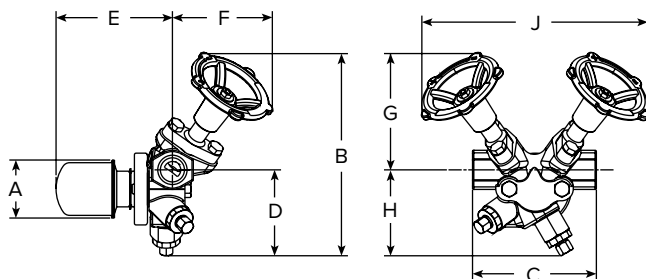
Model	WT-1 All Stainless Steel	WT-2000 Stainless Steel w/360° Connector	WT-3 Carbon Steel
Design	Welded		
Connections	Screwed (NPT and BSPT) Socketweld	Screwed (NPT and BSPT), Socketweld and Flanged	Screwed (NPT and BSPT) Socketweld
Material			
Body	ASTM A240—304L		Carbon steel C-1018
Cap			
Capsule wafer	Hastelloy		
Capsule body	Stainless steel—303		
Capsule cap			
Flange	—	ASTM A105 Zinc plated	—
Connector			
Standard	—	Stainless steel—304	—
IS-2 w/integral strainer	—	Stainless steel—304 w/20x20 mesh 304 SS screen	—
TVS 4000	—	ASTM A351 Gr. CF8M with screen, test valve and blowdown valve—stainless steel	—
Maximum Operating Conditions			
Maximum allowable pressure (vessel design)	400 psig @ 650°F (28 barg @ 343°C)		600 psig @ 750°F (41 barg @ 399°C)
Maximum operating pressure	400 psig (28 barg)		600 psig (41 barg)
Option WT-2000			
Blowdown Valve IS-2 Connector and TVS-4000 Only			

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

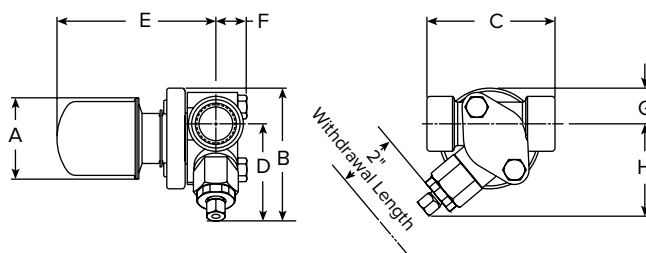
# WT Series Thermostatic Wafer Steam Trap

**Stainless Steel or Carbon Steel**

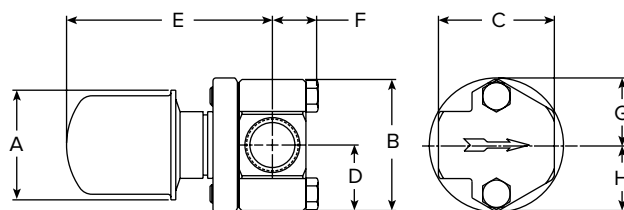
For Pressures to 600 psig (41 barg)...Cold Water Start-Up Capacities to 1 600 lb/hr (726 kg/hr/hr (726 kg/hr)



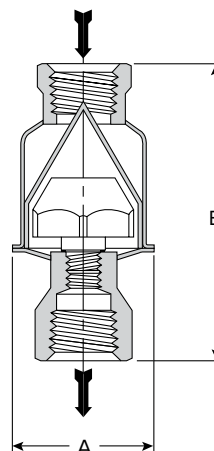
Series WT-2000 With TVS 4000 Trap Valve Station



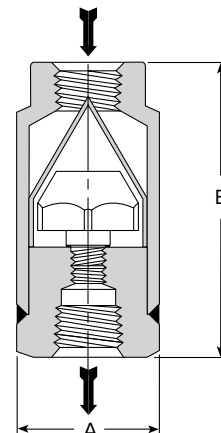
Series WT-2000 With Integral Strainer and Blowdown Valve



Series WT-2000 With Standard Connector



Model WT-1 Trap



Model WT-3 Trap

## Connectors

The WT-2000 can be connected to the standard connector, the IS-2 with integral strainer, or TVS 4000. WT-2000 can be used on thermostatic, thermostatic wafer and disc traps.



## WT-1 Series Traps

Model No.	WT-1			
	in	mm	in	mm
Pipe Connections	1/2	15	3/4	20
"A" (Diameter)	2-1/4	57	2-1/4	57
"B" (Height)	4-1/2	114	4-11/16	119
Weight, lb (kg)	1 (0.5)		1-1/4 (0.6)	

## WT-3 Series Traps

Model No.	WT-3	
	in	mm
Pipe Connections	1/2, 3/4	15, 20
"A" (Diameter)	2-1/4	57
"B" (Height)	4-5/8	118
Weight, lb (kg)	3 (1.4)	

## WT-2000 Series Traps

Model No.	WT-2000							
	Standard Connector		IS-2 Connector With Integral Strainer				TVS 4000 Connector	
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	3/8, 1/2, 3/4	10, 15, 20	1/2, 3/4	15, 20	1	25	1/2, 3/4	15, 20
"A" Trap Diameter	2-1/4	57	2-1/4	57	2-1/4	57	2-1/4	57
"B" Total Height	2-11/16	68	3-5/8	92	3-5/8	92	7-13/16	198
"C" Face-to-Face	2-3/8	60	3-1/2	89	4	101	4-3/4	120
"D" Connection $\varnothing$ to Bottom	1-3/8	46	2-5/8	67	2-5/8	67	3-1/4	83
"E" Connection $\varnothing$ to Outside of Trap	4-1/4	107	4-3/4	120	4-15/16	125	4-1/2	115
"F" Connection $\varnothing$ to Front of Connector	13/16	20	7/8	22	7/8	22	3-7/8	98
"G" Connection $\varnothing$ to Top	1-3/8	46	1	25	1	25	4-1/2	114
"H" Connection $\varnothing$ to Bottom of Connector	1-3/8	46	2-1/2	64	2-1/2	64	3-1/4	83
"J" Width Across Handwheels (valve open)	—	—	—	—	—	—	8-11/16	221
Test Port Connection	—	—	—	—	—	—	1/4 NPT	6
Trap Only Weight, lb (kg)	1-1/2 (0.70)							
Trap and Connector Weight, lb (kg)	3.2 (7)		3.4 (7.5)				8 (3.6)	

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

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# TT Series Thermostatic Steam Traps

## All Stainless Steel

For Pressures to 300 psig (20 barg)...Capacities to 3 450 lb/hr (1 568 kg/hr)



### Description

The balanced pressure bellows thermostatic steam trap has a sealed, stainless-steel body that is lightweight, compact and highly resistant to corrosion. The cage, bellows, valve and seat are all assembled into a precisely calibrated operating unit that ensures positive opening and closing action at slightly below steam temperature. The unique, stainless-steel construction is smaller and much lighter than comparable cast iron, brass or steel traps. TTF-1 is available with straight-thru or right angle connections. TT-2000 with the 360° universal stainless steel connector comes with either a standard connector or the IS-2 connector with integral strainer.

**NOTE:** Also can be used as a thermostatic air vent (Reference TTF Series Thermostatic Air Vents page 464).

### Specification

Thermostatic steam trap, type ... in stainless steel.

### How to Order

Specify:

- Model number
- Size and type of pipe connection
- Connector type (TT-2000)

### Connections

3/8", 1/2", 3/4" (10 mm, 15 mm, 20 mm)

1" (25 mm) IS-2 connector only

Socketweld

### Materials

Body:

304L stainless steel

Bellows:

Stainless steel and bronze with phosphor-bronze bellows, caged in stainless steel

Flange

ASTM A105 Zinc plated

Connector:

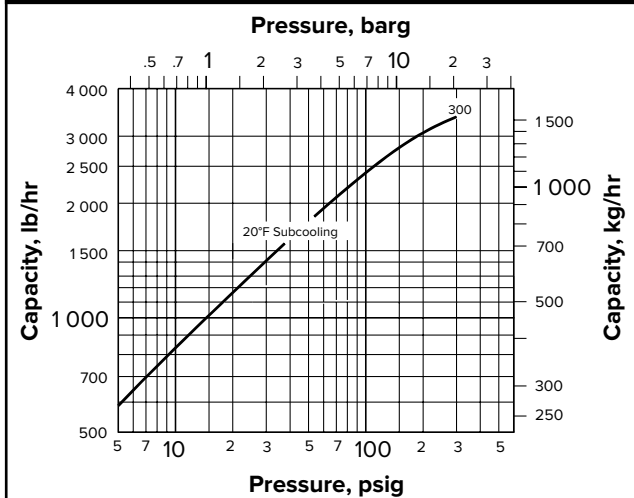
304 stainless steel (TT-2000)

For a fully detailed certified drawing, refer to:

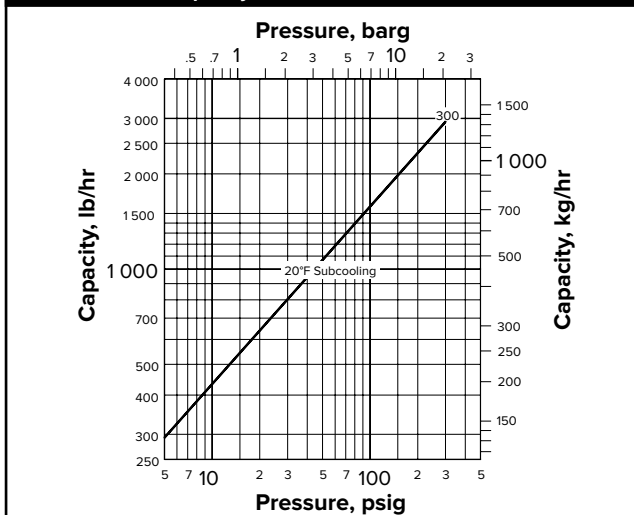
Standard Connector CD #1018

IS-2 Connector CD #1117

### TTF Series Capacity



### Model TT-2000 Capacity



Model	TTF-1	TTF-1R	TT-2000
Design	Welded		
Connections	Screwed (NPT and BSPT)		Screwed (NPT and BSPT), Socketweld and Flanged
Material			
Body	ASTM A240 - 304L		
Valve	Bronze		
Seat	Stainless steel		
Thermostatic air vent	Standard stainless steel & bronze w/phosphor bronze bellows caged in stainless steel		
Optional: All stainless steel thermostatic air vent			
Connector			
Standard	—	—	Stainless steel - 304
IS-2 w/integral strainer	—	—	Stainless steel - 304 w/20x20 mesh 304 SS screen
TVS 4000	ASTM A351 Gr. CF8M with screen, test valve, and blowdown valve—stainless steel		
Maximum Operating Conditions			
Maximum allowable pressure (vessel design)	300 psig @ 450°F (20 barg @ 232°C)		
Maximum operating pressure	300 psig (20 barg)		
Maximum operating temperature bellows	422°F (217°C)		

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

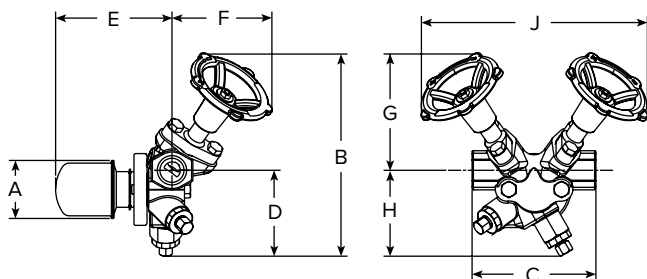
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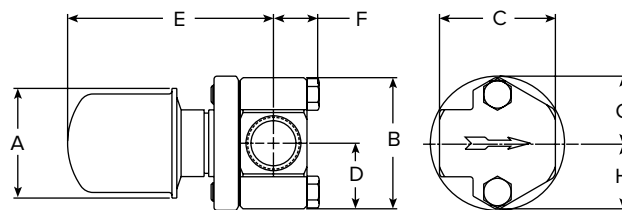
# TT Series Thermostatic Steam Traps

## All Stainless Steel

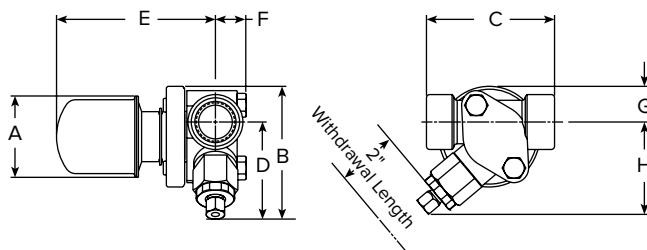
For Pressures to 300 psig (20 barg)...Capacities to 3 450 lb/hr (1 568 kg/hr)



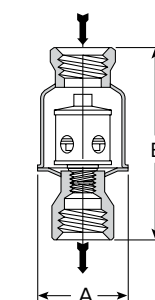
Series TT-2000 With TVS 4000 Trap Valve Station



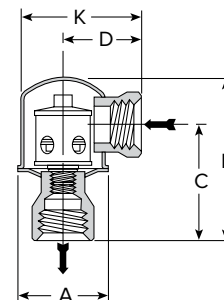
Series TT-2000 With Standard Connector



Series TT-2000 With Integral Strainer and Blowdown Valve



Series TTF-1 Trap



Series TTF-1R Trap

### TT-2000 Series Steam Trap

Model No.	TT-2000							
	Standard Connector		IS-2 Connector With Integral Strainer				TVS 4000 Connector	
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	3/8, 1/2, 3/4	10, 15, 20	1/2, 3/4	15, 20	1	25	1/2, 3/4, 1	5, 20
"A" Trap Diameter	2-1/4	57	2-1/4	57	2-1/4	57	2-1/4	57
"B" Total Height	2-11/16	68	3-5/8	92	3-5/8	92	7-13/16	198
"C" Face-to-Face	2-3/8	60	3-1/2	89	4	101	4-3/4	120
"D" Connection $\varnothing$ to Bottom	1-3/8	46	2-5/8	67	2-5/8	67	3-1/4	83
"E" Connection $\varnothing$ to Outside of Trap	4-1/4	107	4-3/4	120	4-15/16	125	4-1/2	115
"F" Connection $\varnothing$ to Front of Connector	13/16	20	7/8	22	7/8	22	3-7/8	98
"G" Connection $\varnothing$ to Top	1-3/8	46	1	25	1	25	4-1/2	114
"H" Connection $\varnothing$ to Bottom of Connector	1-3/8	46	2-1/2	64	2-1/2	64	3-1/4	83
"J" Width Across Handwheels (valve open)	—	—	—	—	—	—	8-11/16	221
Test Port Connection	—	—	—	—	—	—	1/4 NPT	6
Trap Only Weight, lb (kg)	1-1/2 (0.70)							
Trap and Connector Weight, lb (kg)	3.2 (7)		3.4 (7.5)				8 (3.6)	

### TTF-1 Series Steam Trap

Model No.	TTF-1 Straight-Thru Connection				TTF-1R Right-Angle Connection			
	in	mm	in	mm	in	mm	in	mm
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2	15	3/4	20	1/2	15	3/4	20
"A" Trap Diameter	2-1/4	57	2-1/4	57	2-1/4	57	2-1/4	57
"B" Total Height	4-1/2	114	4-11/16	119	3-3/4	97	3-15/16	100
"C" Face-to-Face	—	—	—	—	2-5/8	67	2-13/16	71
"D" Connection $\varnothing$ to Bottom	—	—	—	—	1-15/16	49	1-7/8	48
"K" Inlet to Outside of Trap	—	—	—	—	3-1/16	78	3	76
Trap Only Weight, lb (kg)	3/4 (0.4)		1 (0.5)		3/4 (0.4)		1 (0.5)	

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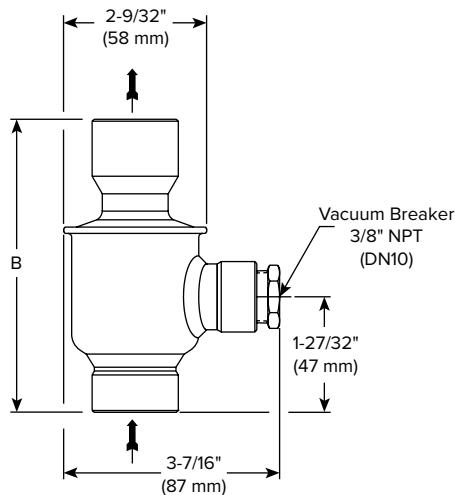
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# Stainless Steel Thermostatic Air Vent/Vacuum Breaker

For Pressures to 150 psig (10 barg)...Capacities to 55 scfm



TAVB-3 shown



The Armstrong TAVB is a combination thermostatic air vent/vacuum breaker that is ideally suited for steam-filled vessels with modulating controls. The TAVB will vent air and other non-condensables from vessels such as shell and tube heat exchangers, jacketed kettles and steam coils during their operation. It will also break the vacuum that forms during steam control modulation.

This balanced pressure air vent responds to the pressure-temperature curve of steam, and the soft-seated vacuum breaker responds to 2" H<sub>2</sub>O of vacuum.

## Features

- Maximum allowable pressure: 300 psig (20 barg)
- Maximum allowable temperature: 365°F (185°C)
- Maximum working pressure: 150 psig (10 barg)
- All stainless steel welded construction
- NPT connections

Armstrong thermostatic air vents should be installed at the highest point on a steam chamber, with the air vent located above the chamber. This will minimize the possibility of any liquid carryover, and air can be vented to atmosphere without a drain line.

For a fully detailed certified drawing, refer to CD #1260.

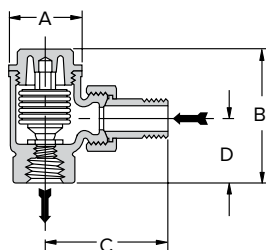
Physical Data					
Model No.		TAVB-2		TAVB-3	
		in	mm	in	mm
Pipe Connections	Thermostatic Air Vent	1/2	15	3/4	20
	Vacuum Breaker	3/8	9.5	3/8	9.5
“A” (Diameter)		2-1/4	57	2-1/4	57
“B” (Height)		4-5/8	117	4-11/16	119
“C” (Ç Inlet to Face of Vacuum Breaker)		2-1/8	54	2-1/8	54
Weight lb (kg)		1 (0.45)		1-1/4 (0.57)	
Maximum Allowable Pressure (Vessel Design)		300 psig @ 365°F (20 barg @ 185°C)			
Maximum Operating Pressure		150 psig (10 barg)			
Discharge Orifice Size		3/16"			

List of Materials	
Name of Part	Material
Body	304-L Stainless steel
Connections	304 Stainless steel
Balanced Pressure Thermostatic Air Vent	Stainless steel and bronze with phosphor-bronze bellows, entire unit caged in stainless steel
Gasket	Copper clad non-asbestos
Vacuum Breaker Body	303 Stainless steel
Valve	Stainless steel
Spring	302 Stainless steel
"O" Ring	EPDM
Screen	Stainless steel

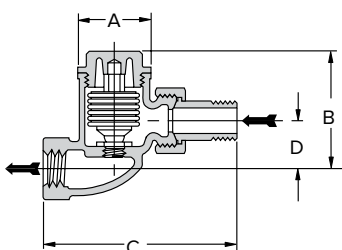
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# TS-2/TS-3 Radiator Traps

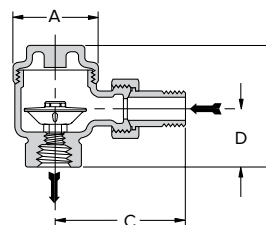
For Pressures to 65 psig (4.5 barg)...Capacities to 1 600 lb/hr (726 kg)



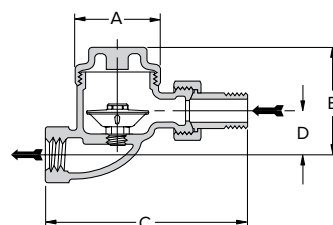
**TS-2 Trap Angle Type**



**TS-2 Trap Straight Type**



**TS-3 Trap Angle Type**



**TS-3 Trap Straight Type**

Armstrong Series TS radiator traps are offered in both angle and straight patterns. The TS-2 has a balanced pressure thermostatic element with a high quality multiple-convolution bellows. It's ideal for draining equipment such as steam radiators and convectors, small heat exchangers, unit heaters and steam air vents. The TS-2 comes with a strong, cast bronze body and a stainless seat. The valve and seat are renewable in-line.

The TS-3 is a heavy duty, wafer type trap for the drainage of all types of steam radiators and convectors. Its wafer design is well suited to systems prone to water hammer, which may damage conventional bellows type units. The TS-3 is repairable in-line and has an all-stainless steel wafer element.

## Materials

Cap:	Bronze, ASTM B62
Body:	Bronze, ASTM B62
Union nipple:	Brass, ASTM B584
Valve:	
Model TS-2:	Brass
Model TS-3:	Stainless steel
Valve seat:	Stainless steel
Element:	
Model TS-2:	Phosphor-bronze bellows
Model TS-3:	T-316 SS Wafer w/T-304 SS Housing

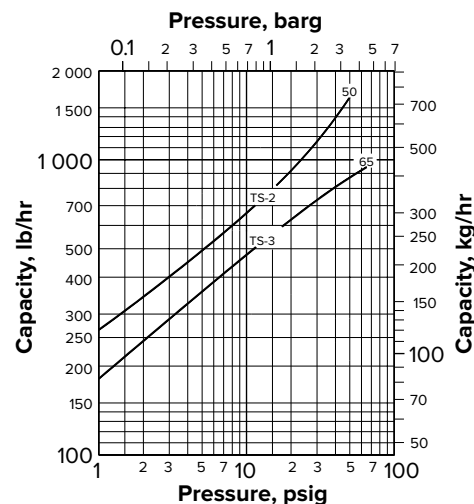
For a fully detailed certified drawing, refer to:

**TS-2 CDY #1045**

**TS-3 CDY #1046**



**Model TS-2/TS-3 Capacity**



## TS Series Radiator Traps Physical Data

Model	TS-2								TS-3											
Pattern	Angle				Straight				Angle						Straight					
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	15	3/4	20	1/2	15	3/4	20	1/2	15	3/4	20	1	25	1/2	15	3/4	20	1	25
"A" Diameter	1-5/8	41	1-5/8	41	1-5/8	41	1-5/8	41	2	50	2	50	2-3/8	86	2	50	2	50	2-3/8	86
"B" Height	2-15/16	75	3	76	2-11/16	68	2-7/8	73	2-7/8	73	3-5/8	92	3-7/8	98	2-5/8	61	3-3/8	86	3-1/2	89
"C"	2-9/16	65	2-7/8	73	4	102	4-1/2	114	3-1/8	79	3-1/2	89	4-1/8	105	4-7/8	124	5-1/4	133	6-1/2	165
"D"	1-3/8	35	1-5/8	41	1-1/8	28	1-5/16	33	1-3/8	35	1-5/8	41	2	50	1-1/8	28	1-3/8	35	1-5/8	41
Weight, lb (kg)	1-1/2 (0.68)		1-3/4 (0.79)		1-1/2 (0.68)		2 (0.91)		1-1/2 (0.68)		2 (0.91)		2-1/2 (1.1)		1-1/2 (0.68)		2-1/4 (1)		3 (1.4)	
Maximum Allowable Pressure (Vessel Design)	50 psig @ 300°F (3.4 barg @ 149°C)								65 psig @ 315°F (4.5 barg @ 157°C)											
Pressure, psig (barg)	50 (3.4)								65 (4.5)											
Vacuum Ratings	25" Mercury								10" Mercury											



# TC Series Clean Steam Thermostatic Traps

## For Clean Steam Systems

For Pressures to 120 psig (8 barg)...Capacities to 3 775 lb/hr (1 712 kg/hr)

Armstrong offers a complete range of T-316L stainless steel clean steam thermostatic traps to handle the special requirements of clean steam systems. Different body configurations allow for choice of piping and ease of cleaning.

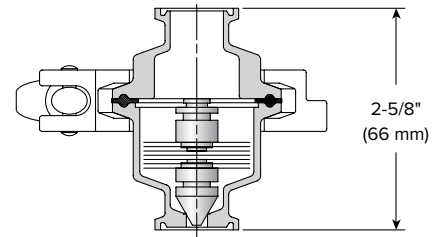
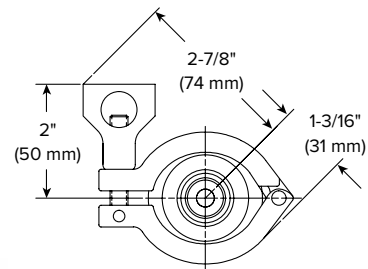
The thermostatic design is free-draining and can operate close to steam temperature at any given pressure.

### Features

- Constructed of 316L stainless steel for corrosion resistance
- Highly polished for cleanability
- Self-draining to minimize contamination
- Compact and lightweight
- Easy to install
- Provide easy disassembly for cleaning

### Typical Applications

- Fermentors
- Sterilizers/autoclaves
- Process piping
- Block and bleed
- Bioreactors
- CIP/SIP systems
- Equipment sterilization
- Sterile barriers



### How to Order:

Specify:

- Model number
- Pipe connection size
- End connection type

**Example:**

TC-C, 1/2" sanitary end connections.

For a fully detailed certified drawing, refer to:

TC-C CD #1161

TC-R CD #1162

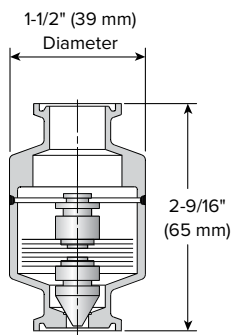
TC-S CD #1163

#### Model TC-C Clamp

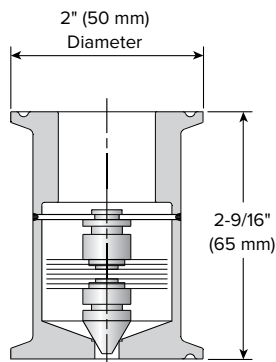
##### With Sanitary Body Clamp

1/2" (15 mm), 3/4" (20 mm), 1" (25 mm)

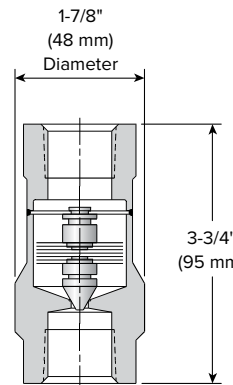
Sanitary End Connections



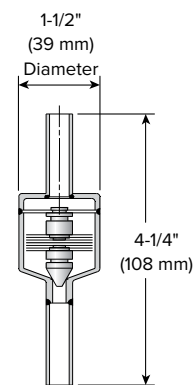
**Model TC-S Sealed**  
1/2" (15 mm), 3/4" (20 mm)  
Sanitary End Connections



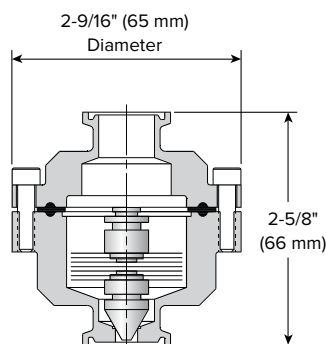
**Model TC-S Sealed**  
1" (25 mm)  
1-1/2" (40 mm)  
Sanitary End Connections



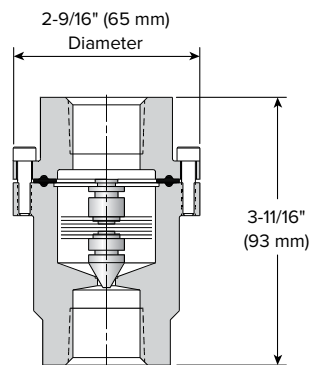
**Model TC-S Sealed**  
1/2" (15 mm), 3/4" (20 mm)  
Threaded End Connections



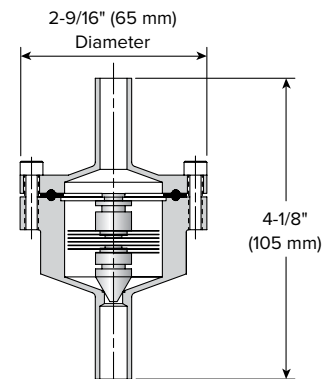
**Model TC-S Sealed**  
1/2" (15 mm), 3/4" (20 mm)  
Tube End Connections



**Model TC-R Repairable**  
**With Bolted Body and Cap**  
1/2" (15 mm), 3/4" (20 mm),  
1" (25 mm), 1-1/2" (40 mm)  
Sanitary End Connections



**Model TC-R Repairable**  
**With Bolted Body and Cap**  
1/2" (15 mm), 3/4" (20 mm)  
Threaded End Connections



**Model TC-R Repairable**  
**With Bolted Body and Cap**  
1/2" (15 mm), 3/4" (20 mm)  
Tube End Connections

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# TC Series Clean Steam Thermostatic Traps

## For Clean Steam Systems

For Pressures to 120 psig (8 barg)...Capacities to 3 775 lb/hr (1 712 kg/hr)



### Materials

Model	TC-C Clamp	TC-R Repairable	TC-S Sealed
Cap and body	ASTM A479 316L		
Bellows	316L Stainless Steel		
Body gasket	Viton®		—
Retainer	Stainless Steel		
Clamp	Stainless Steel	—	—
Screws	—	Stainless Steel	—
Finish	180 grit electro polish to 20 µin Ra or below inside, and 150 grit electro polish to 30 µin Ra or below on outside		Mechanical finish to 63 µin Ra interior and 32 µin Ra exterior

NOTE: µin = microinches

### Physical Data

Model	TC-C Clamp	TC-R Repairable	TC-S Sealed
Maximum Allowable Pressure (Vessel Design)	120 psig (8.3 barg)		150 psig (10 barg)
Maximum Allowable Temperature	350°F (177°C)		366°F (186°C)
Maximum Operating Pressure	100 psig (7 barg)		120 psig (8.3 barg)
Weight lb (kg)	1-1/4 (0.57)	1-1/2 (0.68)	3/4 (0.34)

TC Series Clean Steam Trap Capacities					
psig	barg	10°F (5.6°C) Subcool		20°F (11.2°C) Subcool	
		lb/hr	kg/hr	lb/hr	kg/hr
5	0.35	180	82	320	145
10	0.70	360	163	645	293
20	1.4	676	307	1 108	503
30	2.1	1 009	458	1 563	709
40	2.8	1 236	561	1 830	830
50	3.5	1 542	699	2 016	915
60	4.1	1 845	837	2 505	1 136
70	4.8	2 037	924	2 668	1 210
80	5.5	2 360	1 071	2 990	1 356
90	6.2	2 460	1 116	3 237	1 468
100	6.9	2 547	1 155	3 450	1 565
110	7.6	2 610	1 184	3 640	1 651
120	8.3	2 660	1 206	3 775	1 712

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# SH Series Superheat Traps

## Bimetallic Steam Traps For Superheat Conditions

For Pressures to 1 800 psig (124 barg)...Cold Water Capacities to 6 500 lb/hr (2 950 kg/hr)

### Description

Armstrong's SH Series Bimetallic Steam Traps for superheat or low load conditions are the ideal traps for applications where other trap styles are not suitable for long life.

The Armstrong SH Series bimetallic traps also have the ability to handle the large start-up loads associated with superheat applications. The unique bimetallic element allows for shut-off before superheat reaches the trap, thus preventing steam loss. The SH-900/1500 series utilizes titanium valves and seats to ensure extremely long service life in the harsh environment of superheated steam systems.

### Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model SH-300:	580 psig @ 662°F (40 barg @ 350°C)
Model SH-900L and H:	900 psig @ 900°F (62 barg @ 482°C)
Model SH-1500:	1 800 psig @ 1 050°F (124 barg @ 565°C)

Maximum operating pressure:

Model SH-300:	319 psig (22 barg)
Model SH-900L:	650 psig (45 barg)
Model SH-900H:	900 psig (62 barg)
Model SH-1500:	1 800 psig (124 barg)

Suggested minimum operating pressure:

Model SH-300:	Not applicable
Model SH-900L and H:	200 psig (14 barg)
Model SH-1500:	600 psig (41 barg)

### Connections

Model SH-300:	Screwed BSPT and NPT, socketweld, flanged DIN or ANSI (welded)
Model SH-900:	Socketweld, flanged, buttweld, screwed, NPT, BSPT
Model SH-1500:	Socketweld, flanged, buttweld

### Materials

#### Model SH-300

Body and cap:	ASTM A105 ASTM A350-LF2
Valve and seat:	Chrome Steel - 440C
Elements:	Nickel plated
Strainer:	Stainless steel screen

#### Model SH-900

Body and cap:	ASTM A351 Gr. CF8M
Valve and seat:	Titanium
Elements:	Ni-Cr and stainless steel
Strainer:	Stainless steel screen

#### Model SH-1500

Body and cap:	ASTM 217 Gr. C12A
Valve and seat:	Titanium
Elements:	Ni-Cr and stainless steel
Strainer:	Stainless steel screen

### Specification

Steam trap shall be a bimetallic style. The trap shall be investment cast chrome-moly steel (Model SH-1500) with integral stainless steel strainer, in-line repairable. The mechanism shall consist of a stacked nickel-chrome bimetal operator, with titanium valve and seat. The steam trap shall be capable of operation on low load and superheat applications throughout its pressure/temperature range.

Bimetallic style steam traps in carbon steel (Model SH-300) or stainless steel (Model SH-900) with integral stainless steel strainer, in-line repairable. The mechanism shall consist of a stacked nickel-chrome bimetal operator (SH-300 nickel plated) with titanium valve and seat (SH-300 chrome steel valve and seat). The steam trap shall be capable of operation on low-load applications throughout its pressure/temperature range.

### How to Order

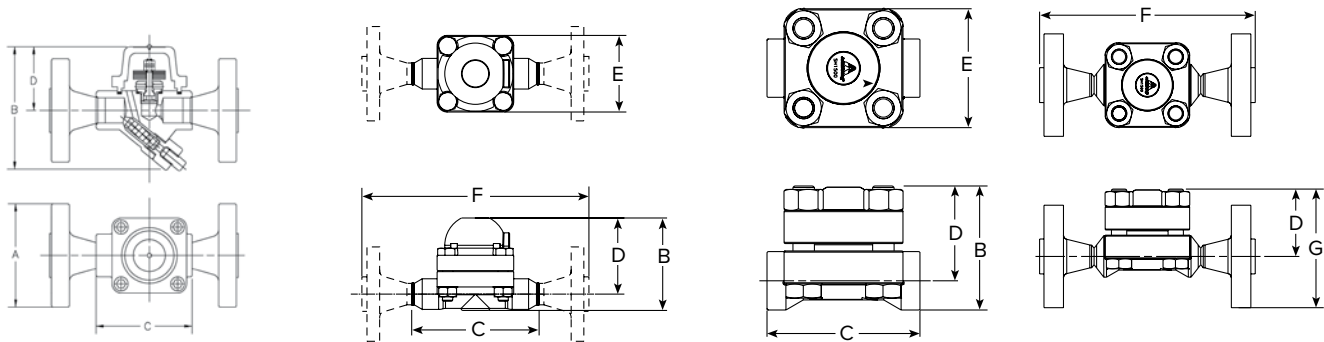
- Specify model number
- Specify maximum operating pressure
- Specify size and type of pipe connection. When flanges are required, specify type of flange in detail



# SH Series Superheat Traps

## Bimetallic Steam Traps For Superheat Conditions

For Pressures to 1 800 psig (124 barg)...Cold Water Capacities to 6 500 lb/hr (2 950 kg/hr)



Model SH-300

Model SH-900

Model SH-1500

### SH Series Dimensions and Weights

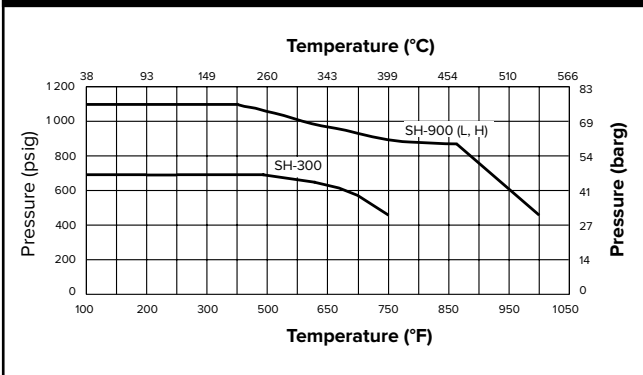
Model	SH-300		SH-900		SH-1500	
Pipe Connections	in	mm	in	mm	in	mm
"B" Height	4-1/2	115	4-1/2	115	5	127
"C" Face-to-Face	3-1/2	90	6-1/4	158	6-1/4	158
"D" $\varnothing$ to Top	2-5/16	59	3-3/4	95	3-13/16	97
"E" Width	—	—	3-3/4	95	4-7/8	124
**"F"	—	—	11	279	12	305
**"G"	—	—	—	—	6-3/8	162
Weight, lb (kg)	4.1 (1.9)		10 (4.4)		15 (6.8)	

\*\*"F" dimensions for SH-900 are for 3/4" connection, class 600 flanged. "F" and "G" dimensions for SH-1500 are for 3/4" connection, class 1500 flanged. Consult factory for dimensions of models with other connection sizes and/or flanges.

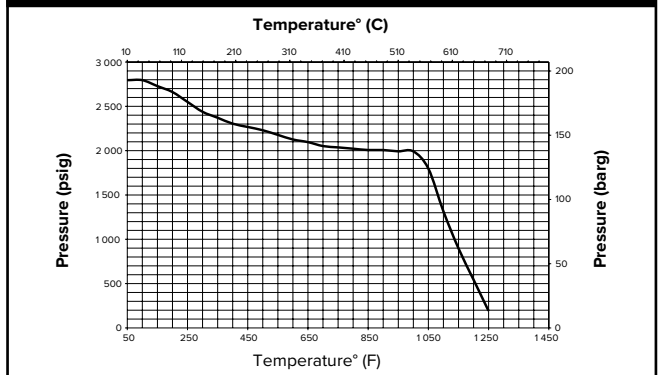
\*\* SH-900 1" butt weld.

\*\*\*SH-300 1" only available as flanged connections.

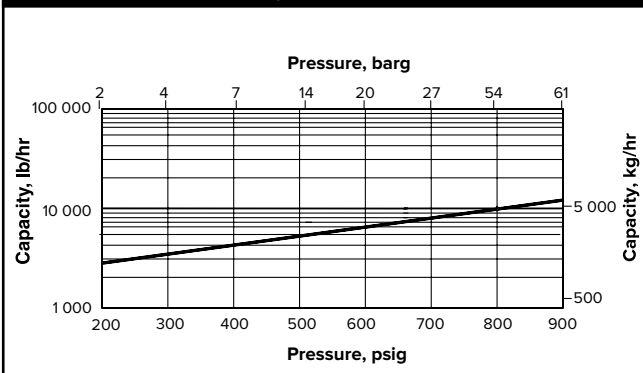
### SH-300/SH-900 Allowable Pressure/Temperature



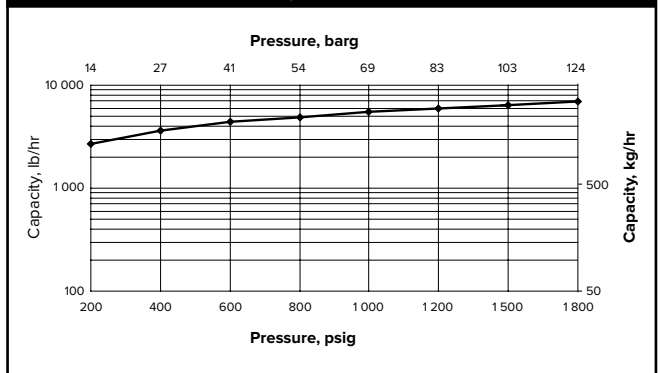
### SH-1500 Allowable Pressure/Temperature



### SH-900 Cold Water Capacity



### SH-1500 Cold Water Capacity



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.





# SH-2000 Bimetallic Steam Traps

## All Stainless Steel

For pressures to 400 psig (28 barg)...Cold Water Capacities to 4 800 lb/hr (2 175 kg/hr)

### Description

SH Series Superheat Steam Traps operate by the effect that rising temperature has on the thermostatic bimetallic elements.

The effect of rising temperature on bimetallic elements operates the Armstrong SH-2000 bimetallic steam trap. It adjusts to changing conditions because the curving of the bimetallic elements, caused by increasing temperature, compensates for increasing pressure.

At start-up, the valve is wide open, which allows a large volume of non-condensables and cold condensate to be removed from the system. When the system reaches steam temperature, the elements become sufficiently hot to pull on the trap's valve stem, closing the valve.

The valve remains closed until the bimetallic elements cool, thus allowing the valve to crack open, venting the condensate and non-condensables, and then close again when steam temperature is reached.

The Armstrong SH-2000 has a sealed, stainless steel body that is lightweight, compact and highly resistant to corrosion. It is adaptable to an Armstrong 360° Universal Connector or a Trap Valve Station (TVS). This makes it easy to install and replace, as the trap can be removed while the connector remains in-line. That means savings in labor cost and ultimate flexibility—because inverted bucket, thermostatic, thermostatic wafer, disc, and float and thermostatic steam traps can all be installed on the same connector.



### Maximum Operating Conditions

Maximum allowable pressure (vessel design):

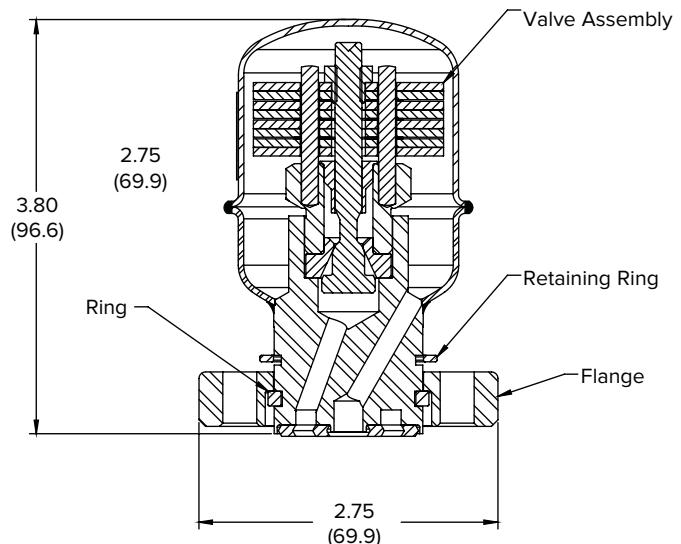
400 psig @ 800°F (28 barg @ 427°C)

Maximum operating pressure: 400 psig (28 barg)

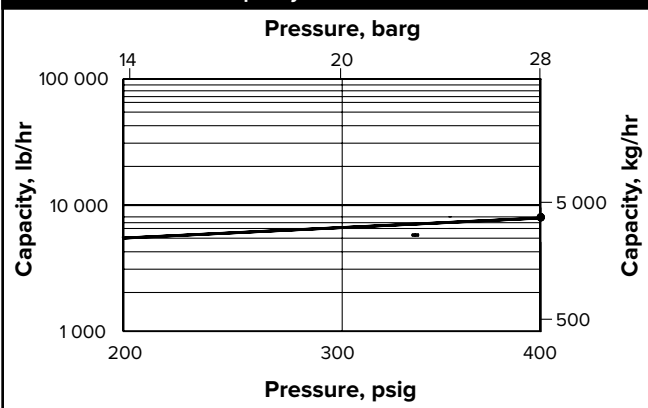
Suggested minimum operating pressure: 200 psig (14 barg)

### Materials

Body:	Stainless Steel
Valve & Seat Elements:	Titanium, Ni-Cr and Stainless Steel
Ring:	Stainless Steel
Cap Assembly:	Stainless Steel
Flange:	ASTM A105 Zinc plated
Retainer Ring:	Carbon Steel
Spiral Wound Gasket:	Stainless Steel
Label:	Aluminum



### SH-2000 Cold Water Capacity



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# SH-2500 Bimetallic Steam Traps

## All Stainless Steel

For Pressures to 650 psig (45 barg)...Capacities to 6 000 lb/hr (2 722 kg/hr)



### Description

Armstrong's SH-2500 Bimetallic Steam Trap is the ideal design for applications involving superheated steam.

During start-up, the bimetallic mechanism is fully open and allows large volumes of non-condensable gases and condensate to be removed from the system. As the system reaches saturated steam conditions, the mechanism begins to close preventing any live steam loss. The superheat during normal operating steam conditions keep the valve closed to ensure long service life.

In the event that operating conditions change and condensate forms at the steam trap inlet, the cooling effect allows the bimetallic mechanism to open and discharge any accumulation. The valve quickly closes once normal operating conditions return.

The SH-2500 consists of an investment cast, stainless steel body that is compact and highly resistant to harsh, corrosive environments. The integral mounting flange is compatible with the Armstrong IS-2, TVS-4000, std connector making for labor savings and easy steam trap replacement.

### Maximum Operating Conditions

Maximum allowable pressure (vessel design):

650 psig @ 600°F (45 barg @ 316°C)

Maximum operating pressure:

SH-2500 650 psig @ 600°F (45 barg @ 316°C)

Suggested minimum operating pressure:

SH-2500 200 psig (14 barg)

### Materials and Weight

Body: ASTM A351 Gr. CF8M

Valve & Seat Elements: Titanium

Ni-Cr

Stainless Steel

Spiral Wound Gasket: Stainless Steel

Bolts: ASTM A193 B7

Weight: 2.8 lbs (1.3 kg)

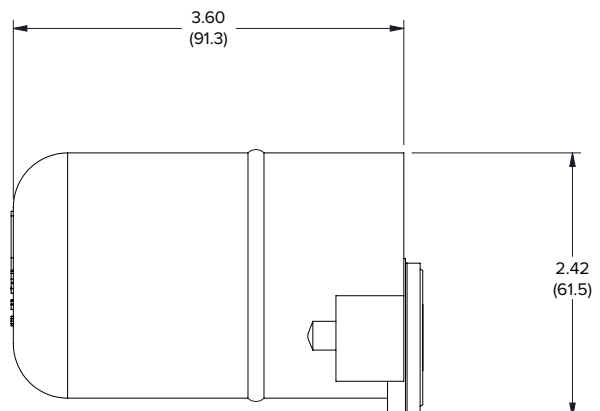
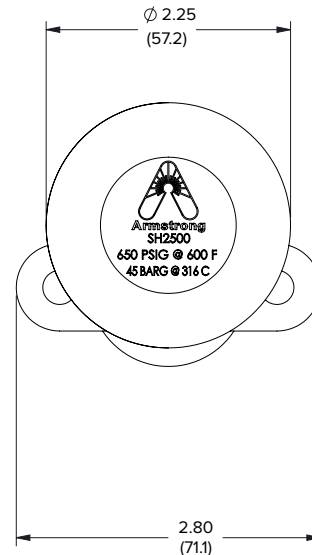
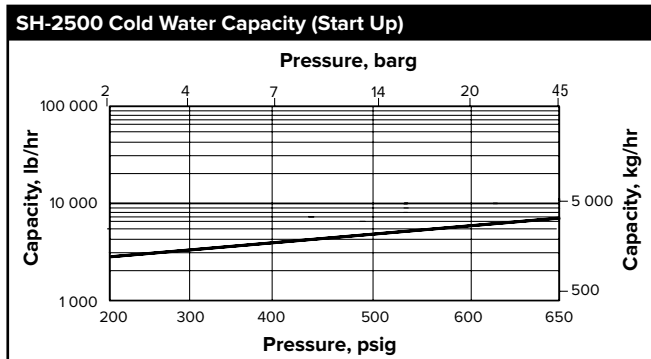
### Specification

Steam traps shall be a bimetallic style designed for superheated steam applications. The steam trap body shall be tamperproof, investment cast stainless steel A351 Gr. CF8M. The mechanism shall consist of a stacked nickel-chrome bimetal operator with titanium valve and seat. The gaskets shall be captured stainless steel spiral wound. The steam trap shall be compatible with the 2-bolt universal connector technology.

### How to Order

Specify model number

Maximum working pressure and temperature



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# AB-3000 Series Bimetallic Steam Traps

## All Stainless Steel

For Pressures to 319 psig (22 barg)...Capacities to 4 630 lb/hr (2 100 kg/hr)

### Description

Armstrong's AB-3000 Bimetallic Steam Trap operates by the effect that rising temperature has on bimetallic elements. It adjusts itself to changing conditions, as the increasing pressure on the valve is compensated by the curving of the bimetallic elements caused by the increasing temperature.

Armstrong's AB-3000 has a sealed, stainless steel body that is lightweight, compact and highly resistant to corrosion. The AB-3000 is repairable (body and cap can be unscrewed). It is piped through the Armstrong 360° Universal Connector or Trap Valve Station (TVS). This makes it easy to install and replace, as the trap can be removed while the connector remains in-line. The result is savings in labor cost and increasing in flexibility, as other trap types (Inverted Bucket, Thermostatic and Thermodynamic) can be installed on the same connector.

### Maximum operating conditions

Maximum allowable pressure

(vessel design): 406 psig @ 650°F (28 barg @ 343°C)

Maximum operating pressure: 319 psig (22 barg)

Maximum back pressure: 99% of inlet pressure

### Connections

Screwed BSPT and NPT

Socketweld

### Materials

Body:	ASTM - A240 304L
Standard connector:	Stainless steel – 304
Valve:	Chrome steel – 440F
Seat:	303 Stainless steel
Elements:	Nickel plated
Strainer:	304 Stainless steel

### Specification

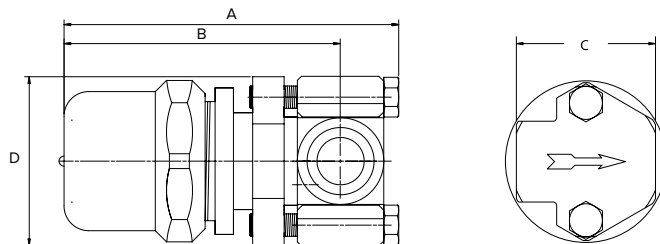
Bimetallic repairable steam trap, type AB-3000 in stainless steel, with integral strainer. Piped through 360° Universal Connector or Trap Valve Station (TVS). Maximum allowable back pressure 99% of inlet pressure.

### How to order

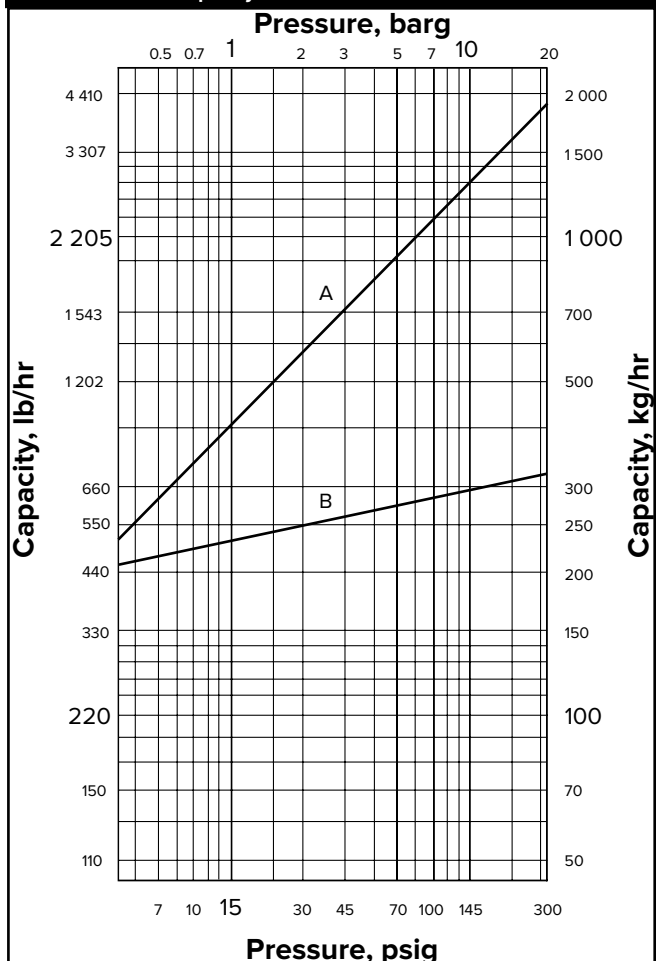
Specify:

- Size and type of pipe connection.
- Maximum working pressure that will be encountered
- Maximum condensate load

Model AB-3000 Trap		
	in	mm
Pipe Connections	3/8, 1/2, 3/4, 1	10, 15, 20, 25
"A" Length w/ Connector	5-7/16	138
"B" C to Top of Cap	4-1/2	115
"C" Face-to-Face (screwed & SW)	2-3/8, 2-3/8, N/A	60, 60, N/A
"D" Trap Diameter	2-3/16	70
Weight lb (kg) (screwed & SW)	4 (2)	



Model AB-3000 Capacity



A = Cold Water  
B = Hot Condensate

# SH-4000 Series Bimetallic Steam Traps

## All Stainless Steel

For Pressures to 1 245 psig (86 barg)...Capacities to 6 000 lb/hr (2 722 kg/hr)



### Description

Armstrong's SH-4000 Series Bimetallic Steam Trap is the ideal design for applications involving superheated steam.

During start-up, the bimetallic mechanism is fully open and allows large volumes of non-condensable gases and condensate to be removed from the system. As the system reaches saturated steam conditions, the mechanism begins to close preventing any live steam loss. The superheat during normal operating steam conditions keep the valve closed to ensure long service life.

In the event that operating conditions change and condensate forms at the steam trap inlet, the cooling effect allows the bimetallic mechanism to open and discharge any accumulation. The valve quickly closes once normal operating conditions return.

The SH-4000 consists of an investment cast, stainless steel body that is compact and highly resistant to harsh, corrosive environments. The integral mounting flange is compatible with the Armstrong IS-4, 4-bolt, Class 900, connector making for labor savings and easy steam trap replacement.

### Maximum Operating Conditions

Maximum allowable pressure (vessel design):  
1 245 psig @ 900°F (86 barg @ 482°C)

Maximum operating pressure:

SH-4009L 650 psig @ 900°F (45 barg @ 482°C)  
SH-4009H 900 psig @ 900°F (62 barg @ 482°C)  
SH-4015 1 245 psig @ 900°F (86 barg @ 482°C)

Suggested minimum operating pressure:

SH-4009L and SH-4009H 200 psig (14 barg)  
SH-4015 650 psig (45 barg)

### Materials and Weight

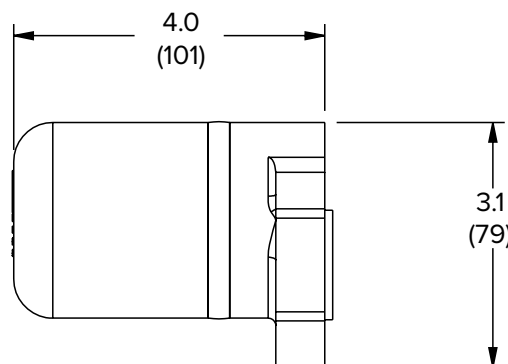
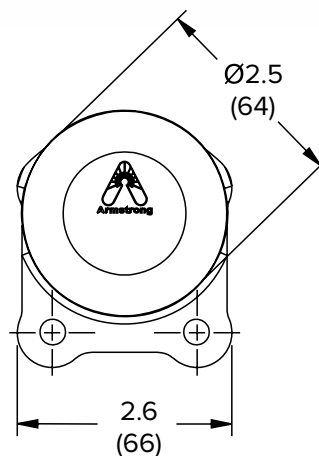
Body: ASTM A351 Gr. CF8M  
Valve & Seat Elements: Titanium  
Ni-Cr  
Stainless Steel  
Spiral Wound Gasket: Stainless Steel  
Bolts: ASTM A193 B7  
Weight: 3.75 lbs (1.7 kg)

### Specification

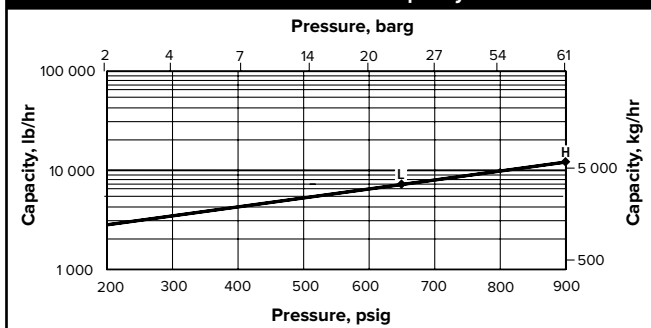
Steam traps shall be a bimetallic style designed for superheated steam applications. The steam trap body shall be tamperproof, investment cast stainless steel A351 Gr. CF8M. The mechanism shall consist of a stacked nickel-chrome bimetal operator with titanium valve and seat. The gaskets shall be captured stainless steel spiral wound. The steam trap shall be compatible with the 4-bolt universal connector technology.

### How to Order

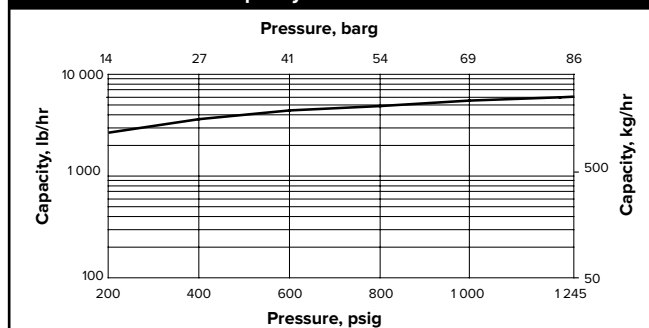
Specify model number  
Maximum working pressure and temperature



SH-4009L and SH-4009H Cold Water Capacity



SH-4015 Cold Water Capacity



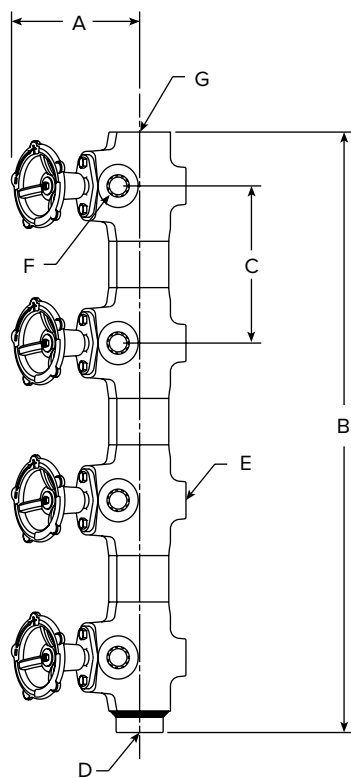
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# Steam Distribution Manifold (MSD/SMSD)

Physical Data												
Model	MSD Series						SMSD Series					
	MSD-04		MSD-08		MSD-12		SMSD-04		SMSD-08		SMSD-12	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
"A" (Open Position)	8	203	8	203	8	203	8	203	8	203	8	203
"B" Height	11-1/2	292	24-1/4	615	37-1/8	943	10-1/4	260	19-3/4	501	29-1/4	743
"C" $\varnothing$ to $\varnothing$	6-3/8	162	6-3/8	162	6-3/8	162	4-3/4	120	4-3/4	120	4-3/4	120
"D" Blowdown Connection	3/4 SW	20	3/4 SW	20	3/4 SW	20	3/4 SW	20	3/4 SW	20	3/4 SW	20
"E" Number of Holes for Mounting (M14)	2	2	4	4	6	6	2	2	4	4	6	6
"G" Inlet	1-1/2 SW	40	1-1/2 SW	40	1-1/2 SW	40	1-1/2 SW	40	1-1/2 SW	40	1-1/2 SW	40
"F" Outlet*	1/2	15	1/2	15	1/2	15	1/2	15	1/2	15	1/2	15
Weight, lb (kg)	21 (10)		46 (21)		67 (30)		20 (9)		40 (18)		59 (27)	
Maximum Operating Pressure	464 psig (32 barg) @ 752°F (400°C)											

\*3/4" (20 mm) available – contact factory.

List of Materials	
Name	Material
Manifold Body	ASTM A105N/A-350 LF2 Forged Steel
Handwheel	Ductile iron
Bonnet	ASTM A351 Gr. CF8M
Spring Washer	Stainless steel
Bonnet, Bolts	DIN 933, Gr. 8.8 per DIN 267
Piston & Stem	Stainless steel—17-4PH
Valve Sealing Rings	Expanded graphite & stainless steel



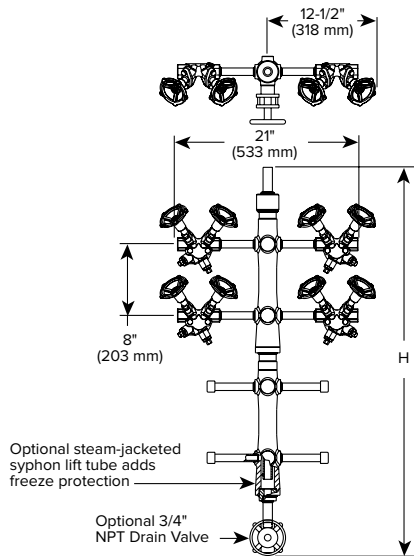
**Steam Distribution Manifold**



**Steam Distribution Manifold  
With TVS 4000, Inverted Bucket Drip Trap and Optional  
Stand**

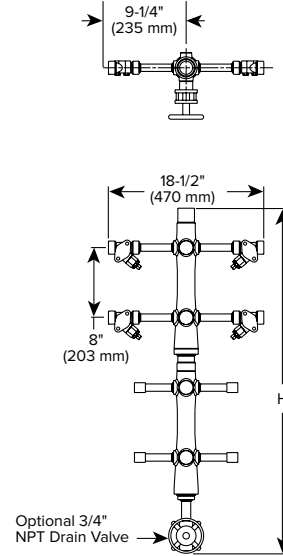
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# Pre-Assembled...Condensate Collection Assembly (CCA)



**CCAF Condensate Collection Assembly with TVS 4000 Trap Valve Station, Optional Freeze Protection and Drain Valve.**

Available with Armstrong's inverted bucket, disc, thermostatic, thermostatic wafer or bimetallic steam traps. Any manufacturer's 2-bolt steam trap can also be applied to Armstrong's trap connectors.



**CCA Condensate Collection Assembly With IS-2 Connectors with Strainer, Blowdown Valve and Optional Drain Valve**

Available with Armstrong's inverted bucket, disc, thermostatic, thermostatic wafer or bimetallic steam traps. Any manufacturer's 2-bolt steam trap can also be applied to Armstrong's trap connectors.

Physical Data										
Model	CCA-204		CCA-206		CCA-208		CCA-210		CCA-212	
"H"	in	mm	in	mm	in	mm	in	mm	in	mm
	23-1/8	587	31-1/8	790	39-1/8	994	47-1/8	1197	55-1/8	1400
Maximum Allowable Pressure	604 psig @ 800°F (42 barg @ 427°C)									

Physical Data										
Model	CCAF-204		CCAF-206		CCAF-208		CCAF-210		CCAF-212	
"H"	in	mm	in	mm	in	mm	in	mm	in	mm
	27-5/16	694	35-5/16	897	43-5/16	1100	51-5/16	1303	59-5/16	1506
Maximum Allowable Pressure	604 psig @ 800°F (42 barg @ 427°C)									

## How to Order Manifold Packages

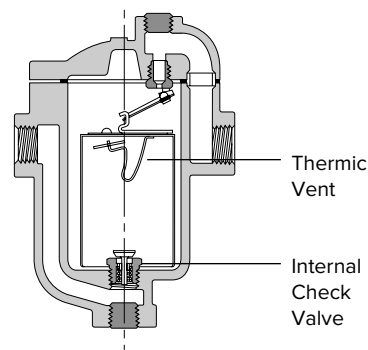
CCA		208	2NPT	6PE	3DVN	TVS 4000 SCH80	
Manifold Model	Number of Take-offs Per Manifold	Connection Size Take-offs, NPS in (mm)		Connection Size Top, NPS in (mm)	Connection Bottom, NPS in (mm)	Trap Valve Station	
<b>MSD</b> Steam Distribution Manifold	04 08 12	2NPT = 1/2 (15) NPTF <sup>1</sup> 2SW = 1/2 (15) SW <sup>1</sup> 3NPT = 3/4 (20) NPTF 3SW = 3/4 (20) Socketweld		6SW = 1-1/2 (40) SW <sup>1</sup> 6FW150 = 1-1/2 (40) 150# RF Flange 6FW300 = 1-1/2 (40) 300# RF Flange 8FW150 = 2 (50) 150# RF Flange 8FW300 = 2 (50) 300# RF Flange	3SW = 3/4 (20) SW <sup>1</sup> 3NPT = 3/4 (20) NPTF 3WD = 3/4 (20) Welded Dripleg <sup>2</sup> 3TD = 3/4 (20) Threaded Dripleg <sup>2</sup>	TVS 4000 IS2 with BD IS2 Standard None	
<b>SMSD</b> Small Steam Distribution Manifold				6PE = 1-1/2 (40) Plain End <sup>1</sup> 6FW150 = 1-1/2 (40) 150# RF Flange	3NPT = 3/4 (20) NPTM <sup>1</sup> 3DVN = 3/4 (20) Drain Valve NPTM/ NPTM		
<b>CCA</b> Condensate Collection Assembly	204 206 208			3PE = 3/4 (20) Plain end <sup>1</sup> 3NPT = 3/4 (20) NPTM 3FW150 = 3/4 (20) 150# Flange	3DVS = 3/4 (20) Drain Valve SW/ NPTM		
<b>CCAF</b> Condensate Collection Assembly Freeze Protection	210 212						

1. Armstrong stocks manifold cores (less nipples, drain valves and trap stations) in these connections.
2. Must pick this bottom connection to use trap station (TVS 4000 only choice) and trap on MSD and SMSD.
3. Nipples connecting manifold to trap station can be Schedule 80 (standard) or schedule 160 (optional).

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

## Thermic Vent Buckets

Whenever steam is turned on and off, air will accumulate in the piping and steam equipment. A trap equipped with a thermic bucket will discharge this air 50 to 100 times faster than a standard bucket, reducing warm-up time. Thermic vent buckets are suitable for pressures up to 130 psig (9 barg). A large vent hole in the bucket can also solve air venting problems upon start-up.

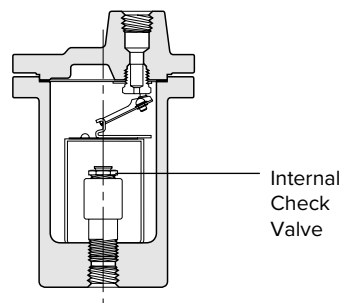


## Internal Check Valves—1/2" (15 mm) Thru 2" (50 mm) NPT

Almost all Armstrong inverted bucket steam traps can be equipped with internal check valves. A check valve is needed between the trap and the equipment being drained in the following cases:

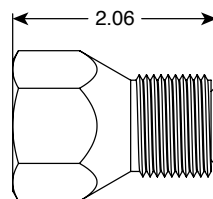
- When the trap is installed above the unit drained
- When sudden pressure drops may occur in the steam supply to the unit
- Whenever a back pressure exists in the condensate return line

Armstrong spring-loaded, stainless-steel internal check valves can be screwed directly into the trap inlet or into an extended inlet tube having a pipe coupling at the top.



## "In-Line" Check Valve—1/2" (15 mm) and 3/4" (20 mm) NPT

On 1800 and 2000 Series stainless-steel traps, an internal check valve cannot be installed. Armstrong's CVI "in-line" check valve will solve the problem.

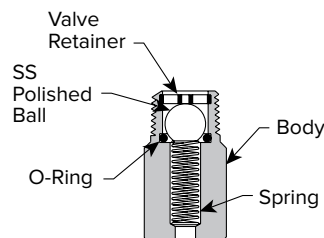


## Pop Drain for Freeze Protection—1/2" (15 mm) NPT

In general, a properly selected and installed Armstrong trap will not freeze as long as steam is coming to the trap. If the steam supply is shut off, a pop drain should be used to automatically drain the trap.

### Maximum Operating Conditions

Pressure: 600 psig (41 barg)  
Temperature: 350°F (177°C)



# Steam Trap Options

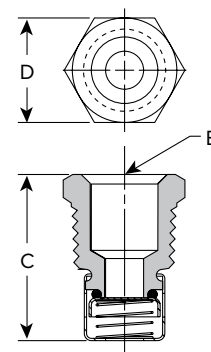
## Vacuum Breaker—3/8" (10 mm) and 1/2" (15 mm)

### NPT

Many times, condensate will be retained ahead of steam traps because of the presence of a vacuum. To break a vacuum, air must be introduced into the system by means of a vacuum breaker.

For maximum protection against freezing and water hammer in heating coils under modulated control, for example, vacuum breakers are recommended in conjunction with freeze protection devices.

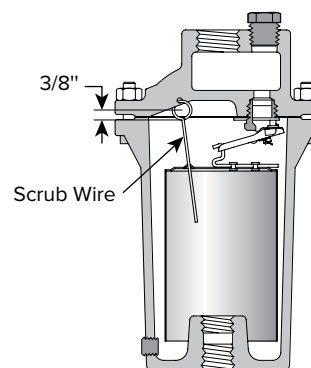
Vacuum Breaker				
Size	in	mm	in	mm
"B" Pipe Connections	1/2 NPT	15	3/8 NPT	10
"C" Height	1-1/4	32	1-3/32	28
"D" Width	7/8 Hex	22 Hex	11/16 Hex	17 Hex



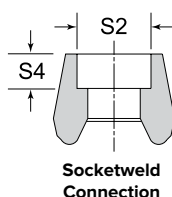
## Dirt Problems

Whenever dirt plugs the bucket vent, Armstrong recommends the use of a scrubbing wire which, on each cycle, keeps the bucket vent hole open.

In normal conditions, the inverted bucket trap is not sensitive to dirt problems (because of its orifice at the top of the trap), unlike most other traps, which should be installed normally with a strainer (see Armstrong "Y" Type Strainers page 445).



Socketweld Dimensions					
Pipe Size		S-2		S-4 Min.	
in	mm	in	mm	in	mm
1/2	15	0.855	22	3/8	10
3/4	20	1.065	27	1/2	13
1	25	1.330	34	1/2	13
1-1/4	32	1.675	43	1/2	13
1-1/2	40	1.915	49	1/2	13
2	50	2.406	61	5/8	16
2-1/2	65	2.906	74	5/8	16
3	80	3.535	90	5/8	16



## Flanged Connections

Flanged traps are furnished with the following ANSI B16.5 flanges as standard. Flange facings comply with ANSI B16.5.

Pressure Class Rating	Inlet Connection	Outlet Connection
150 and 300	1/16" Raised Face	1/16" Raised Face
600 and Higher	1/4" Raised Face	1/4" Raised Face

Other types of flanged connections (such as large male and female ring joint, large or small tongue and groove, etc.) can be furnished. Flange requirements for both inlet and outlet must be specified.





## Sizing and Selection—

# Armstrong® PT-100/200/300/3500/400/DD-4/DD-6/PT-6F Series

The Armstrong non-electric pump trap is sized based on actual condensate load (lb/hr or kg/hr) being pumped. The following steps are used to size the pump.

1. Determine the total condensate load to be pumped in lb/hr or kg/hr. See table on page 217 for conversion factors.
2. Determine the total back pressure the pump will operate against. Total back pressure is the sum of the following:
  - Vertical lift expressed in psig. See conversion formula below to convert lift to psig
  - Existing pressure in condensate return line or D.A. tank
  - Frictional loss from pipe, valves and fittings
3. Determine type of motive gas to be used (steam, air or other inert gas) and pressure available.

### Example:

- Condensate load = 7 100 lb/hr (3 221 kg/hr).
- Total back pressure = 25 psig (1.5 barg)  
(25 foot vertical lift = 10.8 psig, 14 psig in condensate return line).
- Motive pressure is steam at 50 psig (3.5 barg).

### Solution: Model PT-3508

Find 25 psig total lift or back pressure in column two of Low Profile Pump Trap Capacities table on page 217. Then find 50 psig motive pressure in column one. Move across the capacity table until you reach a model number with the correct capacity. A PT-3508 has been highlighted on page 217 for this example.

Either a closed reservoir pipe or a vented receiver is required for proper condensate storage during the pump-down cycle of the pumping trap.

### For vented/open system receiver sizing:

- Determine the pressure from where the condensate is being discharged.
- Determine condensate load.

Reference Percentage of Flash Steam chart on page 221 to find the pressure that corresponds with the discharge condensate pressure. For this example, use 15 psig.

Follow 15 psig on the horizontal axis where it intersects the curve. Move left from the intersecting lines to the vertical axis for the percentage of flash steam that is created. For this example it will be 3% (see shaded area on Percentage of Flash Steam chart).

Multiply 3% by the condensate load. Using example above  
 $7\ 100\ \text{lb/hr} \times 0.03 = 213\ \text{lb/hr flash steam}.$

Using the Vented Receiver Sizing table on page 221, find the amount of flash steam in column one. Follow the table across to determine the size of the vented receiver. (See shaded area on Inlet Reservoir Pipe Sizing table—page 221 for this example.)

### For closed reservoir piping:

1. Determine condensate load (using example above 7 100 lb/hr).

Reference the inlet reservoir pipe sizing for closed systems on page 221. Find 7 100 lb/hr in column one. Move horizontally across to find proper pipe size. (Note length or diameter may be slightly enlarged when capacity falls between given condensate loads in column one.) Selection is shaded.

### Metric Conversion Formulas

**Convert lb/hr to kg/hr—By dividing by 2.2046** Example:  $1\ 800\ \text{lb/hr} \div 2\ 2046 = 816\ \text{kg/hr}$

**Convert psig to barg—By dividing by 14.5** Example:  $15\ \text{psig} \div 14.5 = 1.03\ \text{barg}$

**Convert psig to kg/cm<sup>2</sup>—By dividing by 14.22** Example:  $15\ \text{psig} \div 14.22 = 1.05\ \text{kg/cm}^2$

# Sizing and Selection—

## PT-100/200/300/3500/400/DD-4/DD-6/PT-6F Series

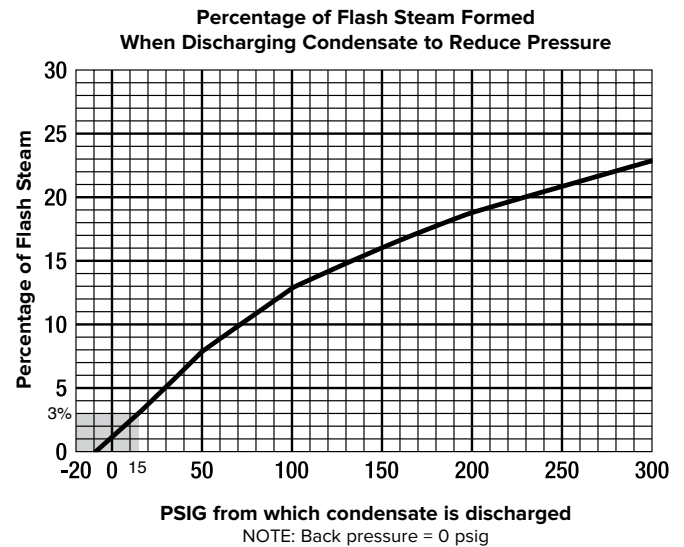


Inlet Reservoir Pipe Sizing for Closed Systems													
Condensate Load		Reservoir Pipe Diameter											
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
lb/hr	kg/hr	2	50	3	75	4	100	6	150	8	200	10	250
up to		Length of Pipe											
		ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
500	227	4	1.2	2-1/2	0.7	1-1/2	0.4						
1 000	453	4-1/2	1.4	2	0.6	1-1/2	0.4						
1 500	680	7	2.1	3	0.9	2	0.6						
2 000	907	9	2.7	4	1.2	2-1/2	0.7						
2 500	1 134	11	3.4	5	1.5	3	0.9	1-3/4	0.5				
3 000	1 360	13-1/2	4.1	6	1.8	3-1/2	1.1	2	0.6				
4 000	1 814	18	5.5	8-1/2	2.6	5	1.5	2-1/2	0.7				
5 000	2 268			10	3.0	6	1.8	3	0.9	1-1/2	0.4		
6 000	2 722			12	3.7	7	2.1	3-1/2	1.1	2	0.6		
7 000	3 175			14-1/2	4.4	8-1/2	2.6	4	1.2	2	0.6		
8 000	3 629			16-1/2	5.0	9-1/2	2.9	4-1/2	1.4	2-1/2	0.7	1-1/2	0.4
9 000	4 082					11	3.4	5	1.5	3	0.9	2	0.6
10 000	4 536					12	3.7	5-1/2	1.7	3	0.9	2	0.6
11 000	4 990					13	4.0	6	1.8	3-1/2	1.1	2	0.6
12 000	5 443					14	4.3	6-1/2	2.0	4	1.2	2-1/2	0.7

NOTE: When draining condensate from a single piece of equipment in a closed system, to achieve maximum energy efficiency a reservoir should be installed horizontally above and ahead of the pump trap. Sufficient reservoir volume is required above the filling head level to hold condensate during the pump trap discharge cycle. The chart above shows the minimum reservoir sizing, based on the condensate load, to prevent equipment flooding during the pump trap discharge cycle.

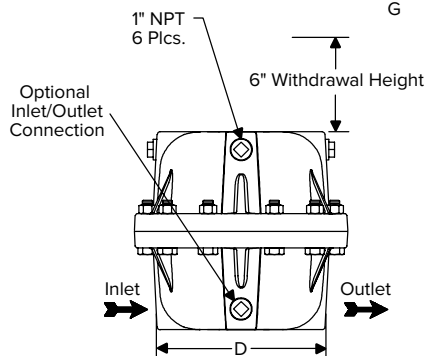
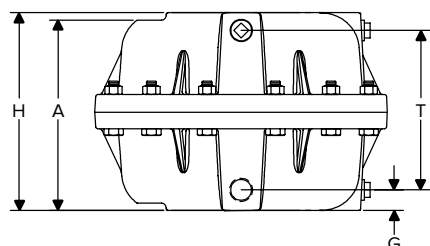
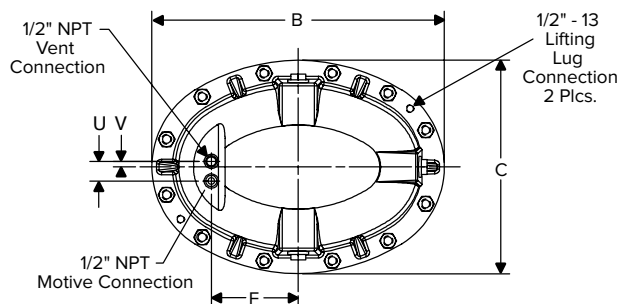
Vented Receiver Sizing for Open Systems							
Flash Steam		Receiver Diameter		Receiver Length		Vent Line Diameter	
lb/hr	kg/hr	in	mm	in	mm	in	mm
up to							
75	34	4	102			1-1/2	40
150	68	6	152			2	50
300	136	9	229	36	914	2-1/2	65
600	272	10	254			3	75
900	408	12	300			4	100
1 200	544	16	405			6	150
2 000	907	20	508			8	200

NOTE: When draining from single or multiple pieces of equipment in an open system, a vented receiver should be installed horizontally above and ahead of the pump trap. In addition to sufficient holding volume of the condensate above the fill head of the pump trap to hold the condensate during the pump trap cycle, the receiver must also be sized to allow enough area for flash steam and condensate separation. An overflow could also be added when required. The minimum recommended water seal is 12" (300 mm). This table shows proper receiver tank sizing based on flash steam present. See the chart at right to calculate the percentage of flash steam at a given pressure drop.





# Armstrong® PT-104 Series Mini Pump Trap



The patented Armstrong PT-104 Mini Pump Trap is the smallest non-electric solution that can move condensate or other liquids from lower to higher points and from lower to higher pressures. Condensate can be returned at temperatures well above the 200°F (93°C) limit of conventional electric centrifugal pumps without the headaches of leaking seals or cavitation problems. The PT-104 Mini Pump Trap is the small solution for a big problem.

## Features

- Economical non-electric operation. Uses inexpensive steam, air or inert gas.
- Low-maintenance operation. No leaking seals, impeller or motor problems means lower maintenance. No NPSH issues.
- Space-saving size. Low-profile body fits in tight spaces while allowing minimal fill head.
- Lower installation costs. Single trade required for installation and maintenance.
- Peace of mind. Standard unit is intrinsically safe.
- Cast iron durability. Rugged construction material means long service life.
- Corrosion resistance. Internals are all stainless steel for corrosion resistance and long life.
- Heavy-duty springs. Springs are made from long-lasting Inconel X-750.
- Efficiency. A closed loop means no motive or flash steam is lost. All valuable Btu's are captured and returned to the system.
- Safety. The pump can be used in flooded pits without fear of electrocution or circuit breaker defaults.

For a fully detailed certified drawing, refer to CDF #1028.

PT-104 Mini Pump Trap Physical Data		
Symbol	in	mm
"A"	12	305
"B"	18-1/2	470
"C"	13-1/2	343
"D"	10-3/4	272
"F"	5-1/2	140
"G"	1-5/16	33
"H"	12-1/2	317
"U"	1-1/4	32
"V"	3/8	9
"T"	10-1/16	256
Weight lb (kg)	140 (64)	
Bronze Check Valves lb (kg)	4 (2)	
Stainless Steel Check Valve lb (kg)		
Maximum Operating Pressure	100 psig (7 barg)	
Maximum Allowable Pressure (vessel design)	150 psig @ 450°F (10 barg @ 232°C)	

PT-104 Mini Pump Trap Connection Sizes			
Connection	Type	in	mm
Inlet	NPT	1	25
Outlet		1	25
Vent		1/2	15
Motive Pressure		1/2	15
Optional Gauge Glass		1	25
Optional Cycle Counter/Pressure Gauge		1	25

PT-104 Mini Pump Trap Materials	
Name of Part	Material
Body and Cap	Cast iron ASTM A48 Cl.30
Vent/Inlet Valves	Stainless steel
Mechanism Assembly	Stainless steel
Spring	Inconel X-750
Gasket	Graphoil
Bolts	SA 449
Nuts	ASTM A194 Gr.2H
Plug	Cast iron

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# PT-104 Series Mini Pump Trap

## Options

Use of external check valves required for operation of pumping trap.

- Inlet Swing Check Valve
  - NPT Bronze ASTM B 62
  - Teflon® Disc
  - Class 150 (Minimum)
- Outlet
  - Stainless Steel Check Valve
  - Class 150 (Minimum)
- In-line Check Valves
  - Stainless Steel Non-Slam Check Valves
- Bronze Gauge Glass Assembly
- Steel Gauge Glass Assembly
- Removable Insulation Jacket
- Digital Cycle Counter

### Capacity Conversion Factors for Other Filling Heads

Filling Head				
in	0	6	12	* 24 or greater
mm	0	150	305	* 620 or greater
PT-104 Mini Pump Trap	0.7	1.0	1.2	* Consult factory

NOTE: Fill head measured from drain to top of cap. See figures on page 234.

### PT-104 Mini Pump Trap Capacities

Motive Pressure		Total Lift or Back Pressure		Filling Head 6" (152 mm) Liquid Specific Gravity 0.9 - 1.0			
				Steam		Air	
psig	barg	psig	barg	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0	5	0.34	1125	510	2 100	952
25	1.7			1300	590	2 200	998
50	3.5			1550	703	2 275	1 032
75	5.0			1650	748	2 300	1 043
100	7.0			1400	635	2 350	1 066
25	1.7	15	1.0	650	295	1 900	862
50	3.5			700	317	2 050	930
75	5.0			750	340	2 100	952
100	7.0			800	363	2 150	975
35	2.5	25	1.5	400	181	1 800	816
50	3.5			450	204	1 935	878
75	5.0			500	227	2 050	930
100	7.0			550	249	2 075	941
50	3.5	40	2.75	250	113	1 620	735
75	5.0			300	136	1 850	823
100	7.0			350	159	1 950	884

NOTE: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump case. See figures on page 234.



# PT-200 Series Low Profile Cast Iron Pump Trap



The Armstrong PT-200 Series Low Profile Pump Trap is a low maintenance, non-electric solution to move condensate or other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned well above the 200°F (93°C) limit of conventional electric condensate pumps without the headaches of leaking seals or cavitation problems.

## Features

- Economical non-electric operation. Uses inexpensive steam, air or inert gas.
- Low-maintenance operation. No leaking seals, impeller or motor problems means lower maintenance. No NPSH issues.
- Space-saving size. Low-profile body fits in tight spaces while allowing minimal fill head.
- Lower installation costs. Single trade required for installation and maintenance.
- Peace of mind. Standard unit is intrinsically safe.
- Cast iron durability. Rugged construction material means long service life.
- Corrosion resistance. Internals are all stainless steel for corrosion resistance and long life.
- Heavy-duty springs. Springs are made from long-lasting Inconel X-750.
- Efficiency. A closed loop means no motive or flash steam is lost. All valuable Btu's are captured and returned to the system.
- Safety. The pump can be used in flooded pits without fear of electrocution or circuit breaker defaults.
- Externally removable/replaceable seats. Seats can be replaced or cleaned without removing the mechanism assembly.

## Options

Use of external check valves required for operation of pumping trap.

- Inlet Swing Check Valve
  - NPT Bronze ASTM B 62
  - Teflon® Disc
  - Class 150 (Minimum)
- Outlet
  - Stainless Steel Check Valve
  - Class 150 (Minimum)
- In-line Check Valves
  - Stainless Steel Non-Slam Check Valves
- Bronze Gauge Glass Assembly
- Steel Gauge Glass Assembly
- Removable Insulation Jacket
- Digital Cycle Counter

For a fully detailed certified drawing, refer to CDF #1000.



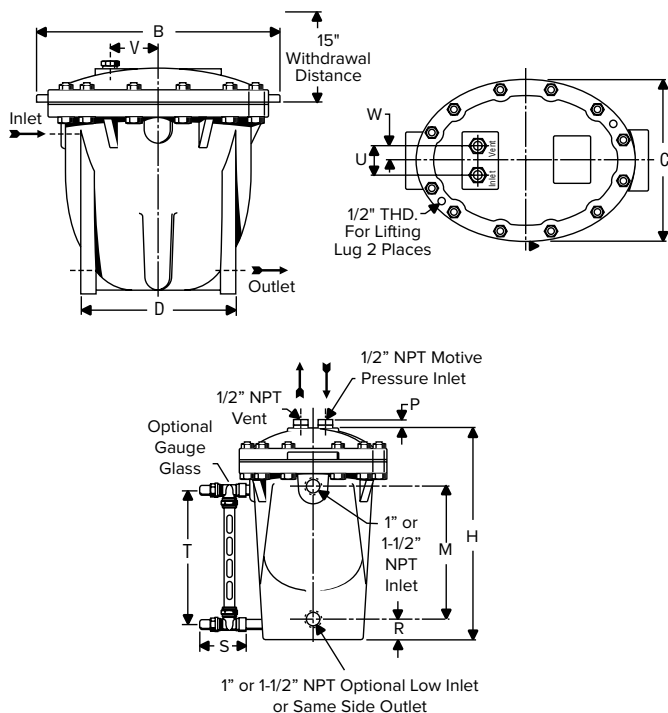
## PT-200 Pumping Trap Materials

Name of Part	Series PT-200
Body and Cap	Cast iron ASTM A48 Cl. 30
Cap Gasket	Graphoil
Bolts	SA-449 Steel
Nuts	Alloy steel ASTM A194 Gr. 2H
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Valve Assembly Washers	Zinc plated steel
Plug	Steel
Mechanism Assembly	Stainless steel
Springs	Inconel X-750

## PT-200 Pumping Trap Connection Sizes

Model	Cast Iron			
	PT-204		PT-206	
	in	mm	in	mm
Inlet Connection	1	25	1-1/2	40
Outlet Connection	1	25	1-1/2	40
Optional Low Inlet or Same Side Outlet Connection	1	25	1-1/2	40
Motive Pressure Connection	1/2	15	1/2	15
Vent Connection	1/2	15	1/2	15
Gauge Glass Connection	1/2	15	1/2	15

# PT-200 Series Low Profile Cast Iron Pump Trap



**PT-200 Pumping Trap Physical Data**

	<b>PT-204 PT-206</b>	
	<b>in</b>	<b>mm</b>
"B"	20-7/16	519
"C"	13-1/2	342
"D"	12-15/16	328
"H"	19	482
"M"	11-35/64	293
"P"	23/32	18
"R"	2-1/32	51
"S"	4-3/8	111
"T"	12	305
"U"	2-1/4	57
"V"	4-1/8	104
"W"	1-1/8	28
Weight lb (kg)	210 (96)	
Number of Body/Cap Bolts	12	
Check Valve Conn. in (mm)	1 (25)	1-1/2 (40)
Bronze Check Valves lb (kg)	4 (2)	9 (4)
Stainless Steel Check Valves lb (kg)	4 (2)	9 (4)

Maximum Allowable Pressure (Vessel Design) 150 psig @ 450°F (10 barg @ 232°C)

Maximum Operating Pressure 125 psig (9 barg)

**PT-200 Capacity Conversion Factors for Other Fill Heads**

Fill Head		in	mm	in	mm	in	mm	in	mm
		0	0	6	152	12	305	24	610
Model	PT-204	0.7		1		1.1		1.3	
	PT-206	0.7		1		1.1		1.3	

NOTE: Fill head is measured from drain point to top of cap. See figures on page 234.

**PT-200 Pumping Trap Capacities**

Motive Pressure		Total Lift or Back Pressure		PT-204 (6" Fill Head) 1" x 1"				PT-206 (6" Fill Head) 1-1/2" x 1-1/2"			
				Steam Motive		Air Motive		Steam Motive		Air Motive	
				lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0	5	0.34	1800	816	2100	953	2700	1225	3000	1361
25	1.7			2025	919	2300	1043	3200	1451	3500	1588
50	3.5			2100	953	2500	1134	3400	1542	3600	1633
75	5			2200	998	2700	1225	3500	1588	3700	1678
100	7			2300	1043	*	*	3600	1633	*	*
125	8.5			2400	1089	*	*	3700	1678	*	*
25	1.7	15	1	1500	680	2000	907	2400	1088	2700	1225
50	3.5			2000	907	2250	1021	3200	1451	3400	1542
75	5			2100	953	2500	1134	3300	1497	3500	1588
100	7			2110	957	*	*	3350	1520	*	*
125	8.5			2125	964	*	*	3400	1542	*	*
35	2.5	25	1.5	1500	680	1700	771	2100	953	2300	1043
50	3.5			1700	771	2000	907	2400	1089	2600	1179
75	5			1900	862	2300	1043	2700	1225	2900	1315
100	7			2000	907	*	*	2800	1270	*	*
125	8.5			2100	953	*	*	2900	1315	*	*
50	3.5	40	2.75	1400	635	1700	771	1500	680	2000	907
60	4			1500	680	2000	907	2000	907	2300	1043
75	5			1700	771	2200	998	2300	1043	2500	1134
100	7			1800	816	*	*	2400	1089	*	*
125	8.5			1920	871	*	*	2500	1134	*	*
70	4.5	60	4	1100	499	2000	907	1150	522	2000	907
75	5			1300	590	2300	1043	1325	601	2300	1043
100	7			1600	726	*	*	1900	862	*	*
125	8.5			1720	780	*	*	2000	907	*	*

NOTES: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump cap. See figures on page 234. Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1.0 barg) above discharge (outlet) pressure. This ensures longevity of economical (bronze) check valves and reduces both venting time and temperature differential (on steam). If a higher differential is used, stainless steel check valves are recommended.

\*Consult factory.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# **Armstrong® PT-400 Series Vertical Steel Pump Trap**



The Armstrong PT-400 Series Vertical Pump Trap is the low maintenance, non-electric solution to move condensate or other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned at temperatures well above the 200°F (93°C) limit of conventional electric condensate pumps without the headaches of leaking seals or cavitation problems.

## Features

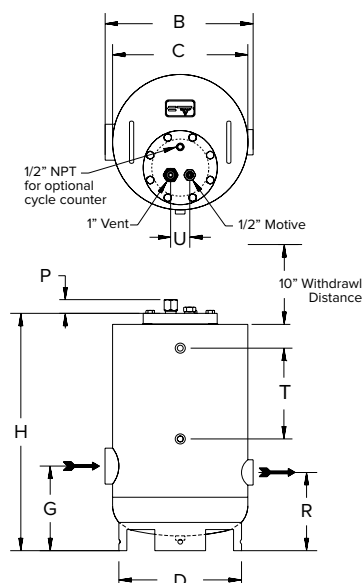
- Economical non-electric operation. Uses inexpensive steam, air or inert gas.
- Low-maintenance operation. No leaking seals, impeller or motor problems means lower maintenance. No NPSH issues.
- Lower installation costs. Single trade required for installation and maintenance.
- Peace of mind. Standard unit is intrinsically safe.
- Durable construction. ASME code-stamped carbon steel body vessel.
- Corrosion resistance. Internals are all stainless steel for corrosion resistance and long life.
- Heavy-duty springs. Springs are made from long-lasting Inconel X-750.
- Efficiency. A closed loop means no motive or flash steam is lost. All valuable Btu's are captured and returned to the system.
- Safety. The pump can be used in flooded pits without fear of electrocution or circuit breaker defaults.
- Externally removable/replaceable seats. Seats can be replaced or cleaned without removing the mechanism assembly.

## Options

Use of external check valves required for operation of pumping trap.

- Inlet Swing Check Valve
  - NPT Bronze ASTM B 62
  - Teflon® Disc
  - Class 150 (Minimum)
- Outlet
  - Stainless Steel Check Valve
  - Class 150 (Minimum)
- In-line Check Valves
  - Stainless Steel Non-Slam Check Valves
- Bronze Gauge Glass Assembly
- Steel Gauge Glass Assembly
- Removable Insulation Jacket
- Digital Cycle Counter

**For a fully detailed certified drawing, refer to CDF #1004.**



**PT-400 Pumping Trap Physical Data**

Model Number	PT-404, PT-406, PT-408 and PT-412			
	in	mm		
"B"	17-1/2	445		
"C"	16	406		
"D"	14-1/2	368		
"G"	10	254		
"H"	28	711		
"P"	1-5/8	41		
"R"	9-1/4	235		
"T"	12	305		
"U"	2-1/4	57		
Weight, lb (kg)	166 (75)			
Number of Body/Cap Bolts	8			
Model Number	PT-404	PT-406	PT-408	PT-412
Check Valve Conn., in (mm)	1 (25)	1-1/2 (40)	2 (50)	3 (75)
Bronze Check Valves, lb (kg)	4 (2)	9 (4)	16 (7)	29 (13)
Stainless Steel Check Valves, lb (kg)	4 (2)	9 (4)	15 (7)	38 (17)

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# PT-400 Series Vertical Steel Pump Trap

PT-400 Pumping Trap Connection Sizes								
Model	Vertical Steel							
	PT-404		PT-406		PT-408		PT-412	
	in	mm	in	mm	in	mm	in	mm
Inlet Connection	1	25	1-1/2	40	2	50	3	80
Outlet Connection	1	25	1-1/2	40	2	50	2	50
Motive Pressure Connection	1/2	15	1/2	15	1/2	15	1/2	15
Vent Connection	1	25	1	25	1	25	1	25
Gauge Glass Connection	1/2	15	1/2	15	1/2	15	1/2	15

NOTES: Optional flanged connections available. Consult factory. Inlet/outlet socketweld connections available. Consult factory.

PT-400 Pumping Trap Capacities																			
Motive Pressure		Total Lift or Back Pressure		PT-404 (12" Fill Head) 1" x 1"				PT-406 (12" Fill Head) 1-1/2" x 1-1/2"				PT-408 (12" Fill Head) 2" x 2"				PT-412 (12" Fill Head) 3" x 2"			
				Steam Motive		Air Motive		Steam Motive		Air Motive		Steam Motive		Air Motive		Steam Motive		Air Motive	
psig	barg	psig	barg	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0	5	0.34	1900	862	2 250	1021	3 100	1406	3 350	1520	4 500	2 041	4 850	2 200	7 500	3 402	8 100	3 674
25	1.7			2 500	1134	2 650	1202	4 600	2 086	4 875	2 211	6 600	2 994	7 000	3 175	11 000	4 990	11 650	5 284
50	3.5			3 100	1406	3 225	1463	4 900	2 222	5 100	2 313	7 100	3 220	7 375	3 345	11 700	5 307	12 150	5 511
75	5			3 400	1542	3 500	1588	5 200	2 359	5 300	2 404	7 200	3 266	7 400	3 357	12 000	5 443	12 350	5 602
100	7			3 500	1588	*	*	5 400	2 449	*	*	7 300	3 311	*	*	12 100	5 488	*	*
125	8.5			3 600	1633	*	*	5 500	2 495	*	*	7 400	3 357	*	*	12 200	5 534	*	*
25	1.7	15	1	2 200	999	2 525	1145	3 500	1588	4 025	1826	5 400	2 449	6 200	2 812	7 200	3 266	8 275	3 753
50	3.5			2 600	1179	2 800	1270	4 100	1860	4 425	2 007	6 300	2 857	6 800	3 084	10 400	4 717	11 250	5 103
75	5			2 800	1270	2 950	1338	4 400	1996	4 750	2 155	6 500	2 948	6 900	3 130	10 800	4 899	11 450	5 194
100	7			3 100	1406	*	*	4 800	2 177	*	*	6 700	3 039	*	*	11 000	4 990	*	*
125	8.5			3 200	1451	*	*	4 900	2 222	*	*	6 800	3 084	*	*	11 200	5 080	*	*
35	2.5	25	1.5	2 000	907	2 350	1066	2 900	1315	3 425	1554	4 200	1905	4 950	2 245	6 900	3 130	8 150	3 697
50	3.5			2 400	1088	2 675	1213	4 000	1814	4 500	2 041	5 800	2 631	6 400	2 903	9 700	4 400	10 850	4 921
75	5			2 600	1179	2 800	1270	4 300	1950	4 550	2 064	6 000	2 721	6 500	2 948	10 000	4 536	10 900	4 944
100	7			2 800	1270	*	*	4 700	2 132	*	*	6 100	2 767	*	*	10 200	4 626	*	*
125	8.5			2 900	1315	*	*	4 800	2 171	*	*	6 400	2 903	*	*	10 400	4 717	*	*
50	3.5	40	2.75	1900	862	2 350	1066	3 300	1451	4 050	1837	4 350	1973	5 350	2 427	5 800	2 631	7 125	3 232
60	4			2 200	999	2 600	1179	3 600	1633	4 250	1927	5 100	2 313	6 000	2 722	6 900	3 130	8 150	3 697
75	5			2 400	1088	2 675	1213	4 000	1814	4 475	2 030	5 700	2 585	6 375	2 892	7 600	3 447	8 500	3 856
100	7			2 500	1135	*	*	4 200	1905	*	*	6 000	2 721	*	*	8 100	3 674	*	*
125	8.5			2 700	1225	*	*	4 500	2 041	*	*	6 200	2 612	*	*	8 500	3 856	*	*
70	4.5	60	4	1800	816	2 400	1088	3 200	1451	4 300	1950	3 800	1724	5 050	2 291	5 000	2 268	6 650	3 016
75	5			2 000	907	2 450	1111	3 500	1588	4 650	2 109	4 100	1859	5 175	2 347	5 400	2 450	6 900	3 130
100	7			2 300	1233	*	*	3 700	1678	*	*	4 500	2 041	*	*	6 000	2 722	*	*
125	8.5			2 400	1088	*	*	3 800	1724	*	*	4 800	2 177	*	*	6 400	2 903	*	*

NOTES: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump cap. See figures on page 234. Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1 barg) above discharge (outlet) pressure. This ensures longevity of economical (bronze) check valves and reduces both venting time and temperature differential (on steam). If a higher differential is used, stainless steel check valves are recommended.

\*Consult factory.

PT-400 Series Pumping Trap Materials	
Name of Part	Series PT-400*
Body and Cap	Fabricated steel 150 psig ASME Sec. VIII design "U" stamped
Cap Gasket	Graphoil
Bolts	SA-449 steel
Nuts	None
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Valve Assembly Washers	Zinc-plated steel
Plug	Steel
Mechanism Assembly	Stainless steel
Springs	Inconel X-750

\*Series PT-400 is available in all stainless steel. Consult factory.

PT-400 Capacity Conversion Factors for Other Fill Heads											
Fill Head		in	mm	in	mm	in	mm	in	mm	in	mm
		0	0	6	152	12	305	24	610	36	914
Model	PT-404	0.7		0.85		1.0		1.3		1.4	
	PT-406	0.7		0.85		1.0		1.2		1.35	
	PT-408	0.7		0.85		1.0		1.2		1.35	
	PT-412	0.7		0.85		1.0		1.08		1.2	

NOTES: Fill head is measured from drain point to top of cap. See figures on page 234.





# PT-3500 Series Low Profile Pump Trap



The Armstrong PT-3500 Series Low Profile Pump Trap is the low maintenance, non-electric solution to move condensate or other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned at temperatures well above the 200°F (93°C) limit of conventional electric pumps without the headaches of leaking seals or cavitation problems.

## Features

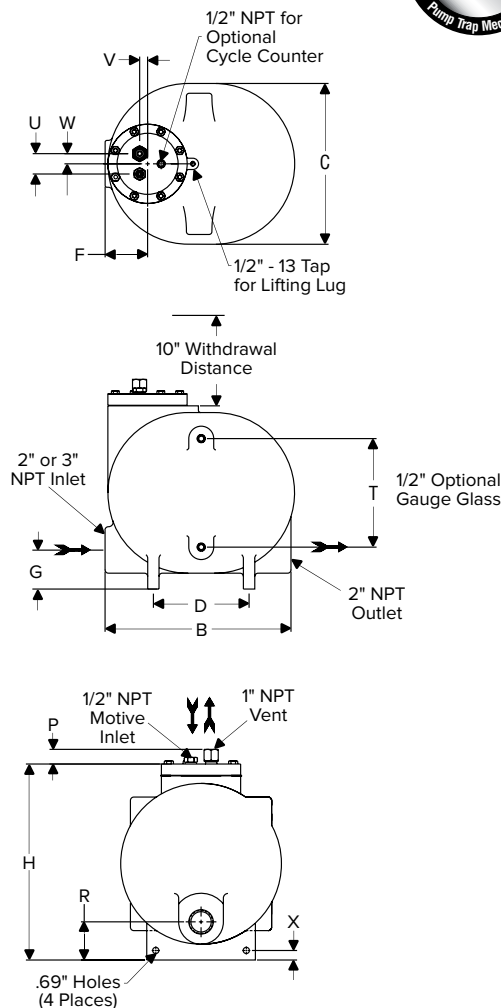
- Economical non-electric operation. Uses inexpensive steam, air or inert gas.
- Low-maintenance operation. No leaking seals, impeller or motor problems means lower maintenance. No NPSH issues.
- Space-saving size. Low-profile body fits in tight spaces while allowing minimal fill head.
- Lower installation costs. Single trade required for installation and maintenance.
- Peace of mind. Standard unit is intrinsically safe.
- Cast iron durability. Rugged construction material means long service life.
- Corrosion resistance. Internals are all stainless steel for corrosion resistance and long life.
- Heavy-duty springs. Springs are made from long-lasting Inconel X-750.
- Efficiency. A closed loop means no motive or flash steam is lost. All valuable Btu's are captured and returned to the system.
- Safety. The pump can be used in flooded pits without fear of electrocution or circuit breaker defaults.
- Externally removable/replaceable seats. Seats can be replaced or cleaned without removing the mechanism assembly.

## Options

Use of external check valves required for operation of pumping trap.

- Inlet Swing Check Valve
  - NPT Bronze ASTM B 62
  - Teflon® Disc
  - Class 150 (Minimum)
- Outlet
  - Stainless Steel Check Valve
  - Class 150 (Minimum)
- In-line Check Valves
  - Stainless Steel Non-Slam Check Valves
- Bronze Gauge Glass Assembly
- Steel Gauge Glass Assembly
- Removable Insulation Jacket
- Digital Cycle Counter

For a fully detailed certified drawing, refer to CDF #1041.



PT-3500 Series Pump Trap Physical Data			
		PT-3508 and PT-3512	
		in	mm
"B"		20-1/4	514
"C"		17-3/4	451
"D"		10-9/16	268
"F"		4-3/4	120
"G"		4-5/16	110
"H"		21-11/16	550
"P"		1-5/8	41
"R"		4-5/16	110
"T"		12	305
"U"		2-1/4	27
"V"		7/8	22
"W"		1-1/4	32
"X"		1-1/16	27
Weight		PT-3508	PT-3512
Pump Trap Weight	lb (kg)	244 (111)	243 (110)
Bronze Check Valve		16 (7)	29 (13)
Stainless Check Valve		15 (7)	38 (17)

Maximum Operating Pressure: 125 psig (9 barg)

Maximum Allowable Pressure: Cast iron 150 psig @ 450°F (10 barg @ 232°C)

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# PT-3500 Series Low Profile Pump Trap

PT-3500 Series Low Profile Pump Trap Capacities											
Operating Inlet Pressure		Total Lift or Back Pressure		Filling Head 12" (305 mm) Liquid Specific Gravity 0.9 - 1.0							
				PT-3508 2" x 2"				PT-3512 3" x 2"			
				Steam		Air		Steam		Air	
psig	barg	psig	barg	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0	5	0.34	6 100	2 767	8 100	3 674	8 300	3 765	10 300	4 627
25	1.7			8 700	3 946	9 300	4 818	12 100	5 489	12 950	5 874
50	3.5			8 900	4 037	9 675	4 389	13 400	6 078	14 000	6 350
75	5			9 200	4 173	9 800	4 452	13 700	6 214	14 300	6 486
100	7			9 400	4 264	*	*	14 000	6 350	*	*
125	8.5			9 900	4 491	*	*	14 400	6 532	*	*
25	1.7	15	1	6 300	2 858	8 200	3 719	8 100	3 674	9 800	4 445
50	3.5			8 200	3 719	10 400	4 717	11 600	5 262	12 600	5 715
75	5			9 200	4 173	11 100	5 035	12 500	5 670	13 300	6 033
100	7			9 600	4 354	*	*	12 600	5 715	*	*
125	8.5			9 800	4 445	*	*	13 400	6 078	*	*
35	2.5	25	1.5	6 100	2 767	7 900	3 583	7 600	3 447	9 900	4 491
50	3.5			7 100	3 221	9 600	4 355	10 000	4 536	10 650	4 831
75	5			8 600	3 901	10 800	4 899	11 200	5 080	12 200	5 534
100	7			8 700	3 946	*	*	11 450	5 194	*	*
125	8.5			9 100	4 128	*	*	11 600	5 262	*	*
50	3.5	40	2.75	5 000	2 268	6 500	2 948	6 200	2 812	8 500	3 856
60	4			5 900	2 676	7 400	3 357	7 700	3 493	9 400	4 264
75	5			6 650	3 016	8 300	3 765	8 700	3 946	10 600	4 800
100	7			7 200	3 266	*	*	9 100	4 128	*	*
125	8.5			7 800	3 538	*	*	9 400	4 264	*	*
75	5	60	4	4 500	2 042	6 300	2 858	5 900	2 676	8 700	3 946
100	7			5 500	2 495	*	*	6 500	2 948	*	*
125	8.5			5 700	2 586	*	*	6 900	3 130	*	*

NOTES: Published capacities based on use of external check valves supplied by Armstrong. Although motive pressures are shown at high pressure differential (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1.0 barg) above discharge (outlet) pressure. This ensures longevity of economical (brass) check valves and reduces both venting time and temperature differential (on steam). Shading indicates sizing example shown on page 220.

\*Consult factory.

PT-3500 Capacity Conversion Factors for Other Fill Heads													
Fill Head		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
		0	0	6	152	12	305	18	457	24	610	36	914
Model	PT-3508	0.7		0.85		1.0		1.1		1.2		1.35	
	PT-3512	0.7		0.85		1.0		1.04		1.08		1.2	

NOTE: Fill head measured from drain point to top of cap. See figures on page 234.

PT-3500 Series Low Profile Pump Trap Materials	
Name of Part	Material
Body	Cast iron - ASTM A48 class 30
Cap	Carbon steel SA-516-70
Cap Gasket	Graphoil
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Valve Assembly Washers	Zinc-plated steel
Plug	Steel
Mechanism Assembly and Float	Stainless steel
Springs	Inconel X-750

PT-3500 Series Low Profile Pump Trap Connection Sizes				
Model Number	PT-3508		PT-3512	
	in	mm	in	mm
Inlet Connection	2	50	3	75
Outlet Connection	2	50	2	50
Motive Pressure Connection	1/2	15	1/2	15
Vent Connection	1	25	1	25
Gauge Glass Connection	1/2	15	1/2	15

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



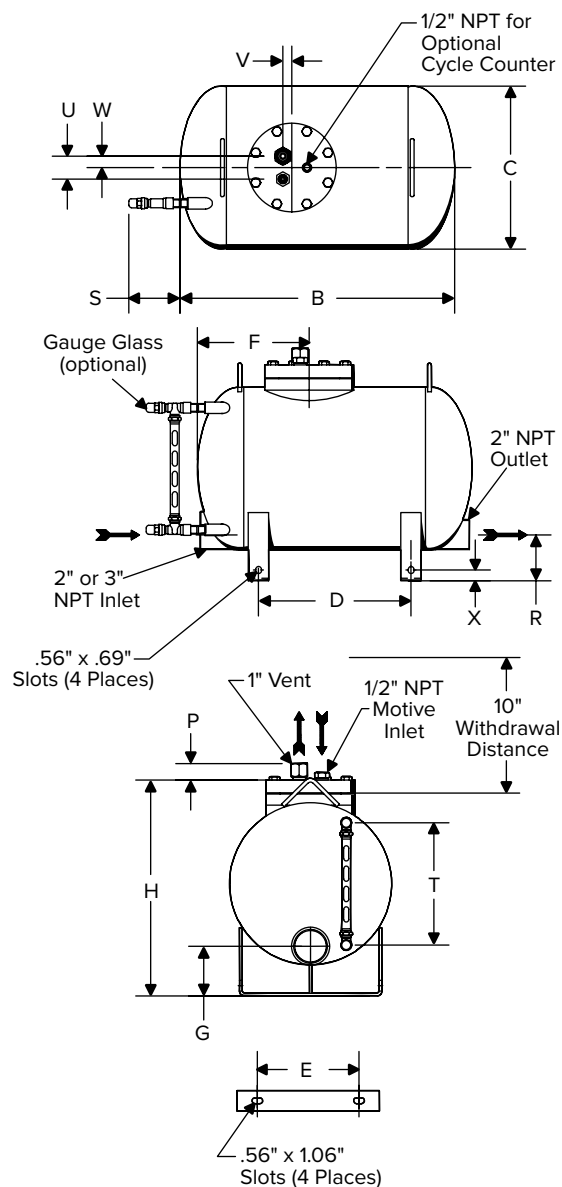
# PT-300 Series Horizontal Steel, Low Profile Pump Trap



The Armstrong PT-300 Series Horizontal, Low Profile Pump Trap is the low maintenance non-electric solution to move condensate or other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned at temperatures well above the 200°F (93°C) limit of conventional electric condensate pumps without the headaches of leaking seals or cavitation problems.

## Features

- Economical non-electric operation. Uses inexpensive steam, air or inert gas.
- Low-maintenance operation. No leaking seals, impeller or motor problems means lower maintenance. No NPSH issues.
- Space-saving size. Low-profile body fits in tight spaces while allowing minimal fill head.
- Lower installation costs. Single trade required for installation and maintenance.
- Peace of mind. Standard unit is intrinsically safe.
- Durable construction. ASME code-stamped carbon steel body vessel.
- Corrosion resistance. Internals are all stainless steel for corrosion resistance and long life.
- Heavy-duty springs. Springs are made from long-lasting Inconel X-750.
- Efficiency. A closed loop means no motive or flash steam is lost. All valuable Btu's are captured and returned to the system.
- Safety. The pump can be used in flooded pits without fear of electrocution or circuit breaker defaults.
- Externally removable/replaceable seats. Seats can be replaced or cleaned without removing the mechanism assembly.



PT-300 Pumping Trap Physical Data		
Model Number	PT-308 PT-312	
	in	mm
"B"	27	686
"C"	16	406
"D"	13	381
"E"	10	254
"F"	11	279
"G"	5-7/16	138
"H"	21-3/16	538
"P"	1-5/8	41
"R"	4-13/16	122
"S"	5-1/32	128
"T"	12	305
"U"	2-1/4	57
"V"	7/8	22
"W"	1-1/4	32
"X"	1-1/16	27
Face to Face	27-1/2*	698
Weight lb (kg)	154 (70)	
Number of Body/Cap Bolts	8	
Check Valve Conn. in (mm)	2 (50)	3 (75)
Bronze Check Valves lb (kg)	16 (7)	29 (13)
Stainless Steel Check Valves lb (kg)	15 (7)	38 (17)

Maximum Allowable Pressure (Vessel Design): 150 psig @ 650°F (10 barg @ 343°C)  
Maximum Operating Pressure: 125 psig (9 barg)  
\*Tolerance +/- 1/2"

For a fully detailed certified drawing, refer to CDF #1001.

# PT-300 Series Horizontal Steel, Low Profile Pump Trap



PT-300 Pumping Trap Materials	
Name of Part	Series PT-300*
Body and Cap	Fabricated steel 150 psig ASME Sec. VIII design "U" stamped
Cap Gasket	Graphoil
Bolts	SA-449 steel
Nuts	None
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Valve Assembly Washers	Zinc plated steel
Plug	Steel
Mechanism Assembly	Stainless steel
Springs	Inconel X-750

NOTES: Optional flanged or socketweld connections available. Consult factory.

\*Series PT-300 is available in all stainless steel. Consult factory.

PT-300 Pumping Trap Connection Sizes				
Model	Horizontal Steel			
	PT-308		PT-312	
	in	mm	in	mm
Inlet Connection	2	50	3	80
Outlet Connection	2	50	2	50
Motive Pressure Connection	1/2	15	1/2	15
Vent Connection	1	25	1	25
Optional Gauge Glass Connection	1/2	15	1/2	15

PT-300 Pumping Trap Capacities											
Motive Pressure		Total Lift or Back Pressure		PT-308 (12" Fill Head) 2" x 2"				PT-312 (12" Fill Head) 3" x 2"			
				Steam Motive		Air Motive		Steam Motive		Air Motive	
psig	barg	psig	barg	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0	5	0.34	6 900	3 130	9 200	4 173	9 000	4 082	12 300	5 579
25	1.7			10 200	4 622	10 900	4 944	13 200	5 987	14 200	6 441
50	3.5			10 600	4 808	11 100	5 035	15 100	6 849	15 800	7 167
75	5			10 800	4 898	11 300	5 126	15 300	6 940	16 100	7 303
100	7			11 200	5 080	*	*	15 500	7 031	*	*
125	8.5			11 600	5 261	*	*	16 600	7 530	*	*
25	1.7	15	1	7 000	3 175	10 100	4 581	9 000	4 082	11 200	5 080
50	3.5			9 600	4 354	10 900	4 944	12 800	5 806	13 800	6 260
75	5			10 750	4 876	11 100	5 035	14 200	6 441	15 000	6 804
100	7			10 900	4 944	*	*	14 300	6 486	*	*
125	8.5			11 300	5 125	*	*	15 100	6 849	*	*
35	2.5	25	1.5	7 100	3 221	9 200	4 173	8 100	3 674	11 500	5 216
50	3.5			8 300	3 765	10 200	4 627	10 200	4 627	12 750	5 783
75	5			10 100	4 581	11 000	4 989	12 500	5 670	13 500	6 123
100	7			10 200	4 627	*	*	12 700	5 761	*	*
125	8.5			10 300	4 672	*	*	13 000	5 897	*	*
50	3.5	40	2.75	5 700	2 585	7 600	3 447	6 600	2 994	9 800	4 445
60	4			6 600	2 994	8 800	3 992	8 400	3 810	10 500	4 763
75	5			7 600	3 447	10 100	4 581	9 800	4 445	12 700	5 761
100	7			8 400	3 810	*	*	10 100	4 581	*	*
125	8.5			9 400	4 264	*	*	10 300	4 672	*	*
70	4.5	60	4	4 500	2 041	7 000	3 175	6 000	2 722	10 200	4 627
75	5			4 700	2 132	7 100	3 221	6 400	2 903	10 400	4 717
100	7			6 400	2 903	*	*	7 100	3 221	*	*
125	8.5			6 600	2 994	*	*	7 400	3 357	*	*

NOTES: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump cap. See figures on page 234. Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1 barg) above discharge (outlet) pressure. This ensures longevity of economical (brass) check valves and reduces both venting time and temperature differential (on steam). If a higher differential is used, stainless steel check valves are recommended.

\*Consult factory.

PT-300 Capacity Conversion Factors for Other Fill Heads											
Fill Head		in	mm	in	mm	in	mm	in	mm	in	mm
		0	0	6	152	12	305	24	610	36	914
Model	PT-308	0.7		0.85		1.0		1.2		1.3	
	PT-312	0.7		0.85		1.0		1.08		1.2	

NOTES: Fill head is measured from drain point to top of cap. See figures on page 234.

## Options

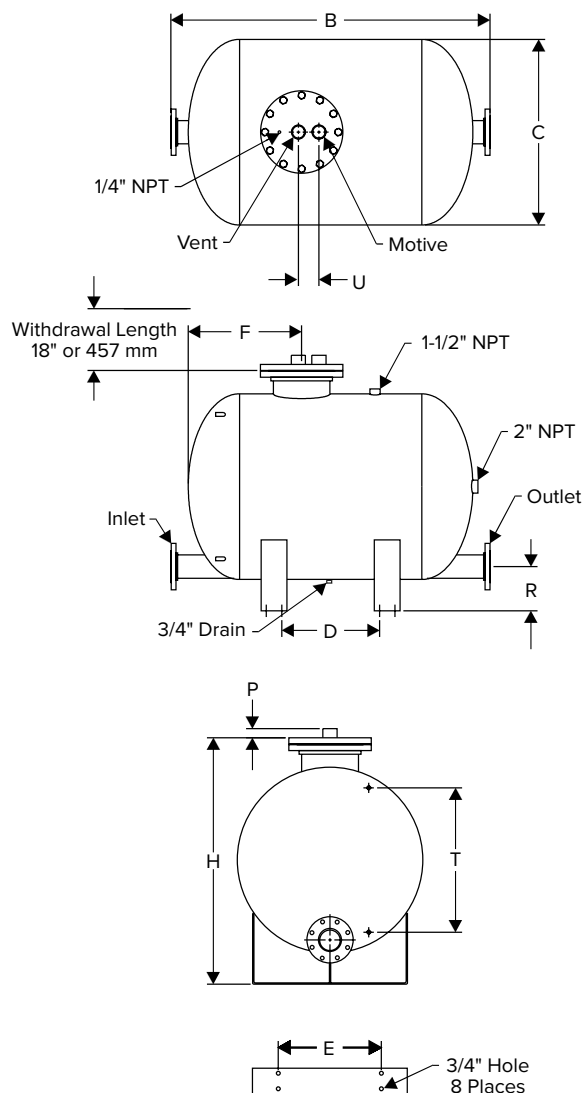
Use of external check valves required for operation of pumping trap.

- Inlet Swing Check Valve
  - NPT Bronze ASTM B 62
  - Teflon® Disc
  - Class 150 (Minimum)
- Outlet
  - Stainless Steel Check Valve
  - Class 150 (Minimum)
- In-line Check Valves
  - Stainless Steel Non-Slam Check Valves
- Bronze Gauge Glass Assembly
- Steel Gauge Glass Assembly
- Removable Insulation Jacket
- Digital Cycle Counter

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# PT-516 High Capacity Pump Trap



Effective recovery and return of hot condensate are essential to overall plant efficiency while conserving energy. Large amounts of condensate provide the best opportunities to save energy.

The Armstrong PT-516 High Capacity Pump Trap is the low maintenance, non-electric solution to moving large amounts of condensate and other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned at temperatures well above the 200°F (93°C) limit of conventional electric pumps without the headaches of leaking seals or cavitation.

## Features

- Economical non-electric operation. Uses inexpensive steam air or inert gas.
- Low-maintenance operation. No leaking seals, impeller or motor problems means lower maintenance. No NPSH issues.
- Lower installation costs. Single trade required for installation and maintenance.
- Peace of mind. Standard unit is intrinsically safe—explosion-proof.
- Durable construction. ASME code-stamped carbon steel body vessel.
- Corrosion resistance. Internals are all stainless steel for corrosion resistance and long life.
- Heavy-duty springs. Springs are made from long-lasting Inconel X-750.
- Efficiency. A closed loop means no motive or flash steam is lost. All valuable Btu's are captured and returned to the system.
- Safety. The pump can be used in flooded pits without fear of electrocution or circuit breaker defaults.
- Externally removable/replaceable seats. Seats can be replaced or cleaned without removing the mechanism assembly.

For a fully detailed certified drawing, refer to FH1367.

PT-516 High Capacity Pump Trap Physical Data		
	in	mm
Inlet Connection	4 150# ANSI Flg.	100 150# ANSI Flg.
Outlet Connection	4 150# ANSI Flg.	100 150# ANSI Flg.
Motive Connection	2 NPT	50 NPT
Vent Connection	2 NPT	50 NPT
Gauge Glass Conn.	1/2 NPT	15 NPT
"B"	62	1 574
"C"	36	914
"D"	19-1/16	484
"E"	20	508
"F"	22	559
"H"	48	1 219
"P"	1-3/4	44
"R"	8-3/4	222
"T"	28	711
"U"	4	100
Weight	807	366
Number of Bolts	12	12

Maximum Operating Pressure on standard unit: 150 psig (10 barg).

For higher pressure, consult factory.

Maximum Allowable Pressure (standard vessel design): 150 psig @ 500°F (10 barg @ 277°C).

300 psig (21 barg) vessel available upon request.

## PT-516 Capacity Conversion Factors for Other Fill Heads

Fill Head	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
PT-516	0	0	6	152	12	305	16	406	24	610	36	914
	0.7		0.75		0.8		0.85		1.0		1.08	

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# PT-516 High Capacity Pump Trap

## Typical Applications

- Low pressure heating systems
- Process heat exchanger or coils with modulating steam control
- Remote installations (tracing, tank farms or remote coils)
- Systems under vacuum
- Hazardous (explosion proof) areas
- Caustic environments
- Sumps or submersed areas

PT-516 High-Capacity Pump Trap Materials	
Name of Part	Description
Cap, Body, Bolting	Fabricated steel 150 psig ASME Sec. VIII design "U" stamp coded
Cap Gasket	Stainless steel spiral wound
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Mechanism Assembly: Frame, Float and Spring	Stainless steel

NOTES: 300 psig ASME vessel available upon request. PT-516 available in all stainless steel. Consult factory.

## Armstrong PT-516 Pump Trap Sizing and Selection

PT-516 Pump Trap Capacities															
Motive Pressure		Total Lift or Back Pressure		4" x 4" Connections 24" Fill Head					Motive Pressure	Total Lift or Back Pressure		4" x 4" Connections 24" Fill Head			
				Steam Motive		Air Motive						Steam Motive		Air Motive	
psig	barg	psig	barg	lb/hr	kg/hr	lb/hr	kg/hr	psig	barg	psig	barg	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0	5	0.34	28 962	13 137	57 619	26 136	35	2.5	25	1.5	29 212	13 251	46 238	20 973
25	1.7			37 162	16 857	61 911	28 083	50	3.5			33 413	15 156	50 962	23 116
35	2.5			42 563	19 307	64 738	29 365	60	4			35 672	16 181	53 376	24 211
50	3.5			48 288	21 903	67 735	30 725	70	4.5			37 646	17 076	55 418	25 138
60	4			51 214	23 231	69 267	31 420	75	5			38 548	17 485	56 313	25 544
70	4.5			53 688	24 138	70 562	32 007	100	7			42 454	19 257	60 141	27 280
75	5			54 796	24 855	71 142	32 270	125	8.5			45 649	20 706	*	*
100	7			59 414	26 950	73 559	33 366	150	10.34			*	*	*	*
125	8.5	15	1	62 995	28 575	*	*	50	3.5	40	2.75	26 210	11 889	41 244	18 708
150	10.34			65 922	29 902	*	*	60	4			27 353	12 407	44 028	19 971
25	1.7			36 720	16 656	50 783	23 035	70	4.5			28 319	12 846	46 382	21 039
35	2.5			40 611	18 421	54 293	24 627	75	5			28 752	13 042	47 435	21 517
50	3.5			45 196	20 501	58 013	26 315	100	7			30 555	13 860	51 828	24 022
60	4			47 740	21 655	59 915	27 177	125	8.5			31 954	14 494	*	*
70	4.5			50 005	22 682	61 523	27 907	150	10.34			33 097	15 013	*	*
75	5			51 054	23 159	62 243	28 233	70	4.5			25 973	11 781	32 026	14 527
100	7	55 675	25 254	65 243	29 594	75	5	26 373	11 963	33 514	15 202				
125	8.5	59 552	27 013	*	*	100	7	28 042	12 720	40 951	18 575				
150	10.34	62 923	28 542	*	*	125	8.5	29 336	13 307	*	*				
						150	10.34	30 394	13 787	*	*				
						70	4.5	23 892	10 837	34 893	15 827				
						75	5	24 231	10 991	*	*				
						100	7	24 570	11 145	*	*				
						125	8.5								
						150	10.34								

NOTES: Published capacities above are based on actual steam testing using a minimum 200°F condensate. Published capacities are based on the use of external check valves supplied by Armstrong.

\*Consult factory.

## Options

External check valves required for use of pumping trap.

- Inlet/Outlet Check Valve  
CS/SS Wafer Style or All Stainless Steel Wafer Style
- Bronze Gauge Glass Assembly
- Removable Insulation Jacket
- Digital Cycle Counter



# Reservoir Sizing — DD-12/PT-12F/PT-516 Series High Capacity

Either a closed reservoir pipe or a vented receiver is required for proper condensate storage during the pump-down cycle of the pumping trap. Refer to the tables for sizing.

## For Closed Reservoir Piping

1. Determine condensate load.

Example 30 000 lb/hr:

- Reference the Inlet Reservoir Pipe table top right. Find the 30 000 lb/hr condensate load in column one. Move across the columns to find the proper pipe sizing.

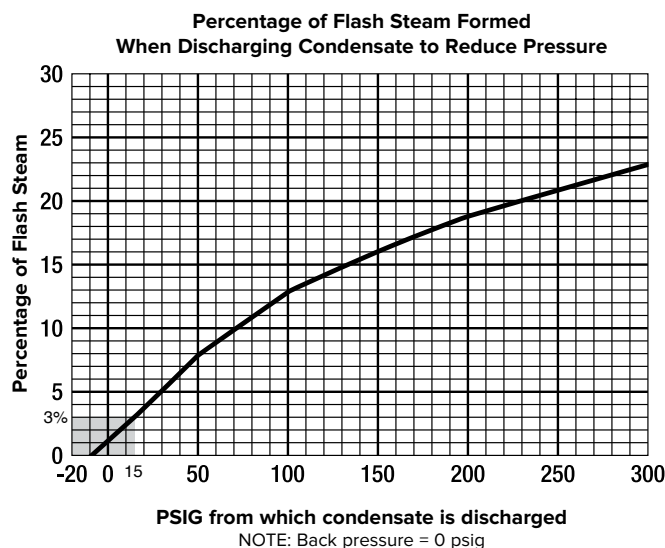
## For Vented Receiver Sizing

1. Determine the pressure from where the condensate is being discharged.

2. Determine condensate load.

- Reference the chart below to find the pressure that corresponds with the discharge condensate pressure. For this example, use 15 psig.
- Follow 15 psig to where it intersects the “0” psig curve. Move to the left from intersecting lines for the percentage of flash that will be created. For this example, it will be 3%.
- Multiply the 3% by the condensate load. For this example, it is 30 000 lb/hr. Thus,  $30\,000 \times .03 = 900$  lb/hr of flash steam.

Using the Vented Receiver table bottom right, find the amount of flash steam in column one. Follow the table across to determine the sizing of the vented receiver.



### Inlet Reservoir Pipe Sizing for Closed Systems

Condensate Load lb/hr	Reservoir Pipe Diameter (in)					
	8	10	12	16	20	24
up to	Length of Pipe (feet)					
10 000	6-1/2	6	5	3	2	
20 000	12	11-1/2	10	7	4	
30 000		12	10-1/2	9	6	4
40 000		17	14	12	8	6
50 000			16	13	9	6
60 000				15	11	8
70 000					15	10

NOTE: When BP/MP is less than 50%, the reservoir diameters above can be reduced by 1/2" (15 mm). When draining condensate from a single piece of equipment in a **closed system**, to achieve maximum energy efficiency (see Closed System figure on page 234) a reservoir should be installed horizontally above and ahead of the pump trap. Sufficient reservoir volume is required above the filling head level to hold condensate during the pump trap discharge cycle. The table above shows the minimum reservoir sizing, based on the condensate load, to prevent equipment flooding during the pump trap discharge cycle.

### Vented Receiver for an Open System

Flash Steam lb/hr	Receiver Diameter (in)	Receiver Length (in)	Vent Line Diameter (in)
up to			
1 000	16	60	6
2 000	20	60	8
3 000	24	60	8
4 000	26	60	10
5 000	28	60	10
6 000	30	72	12
7 000	32	72	12
8 000	36	72	14

NOTE: When draining from single or multiple pieces of equipment in an open system, a vented receiver should be installed horizontally above and ahead of the pump trap (see Open System figure on page 234). In addition to sufficient holding volume of the condensate above the fill head of the pump trap to hold the condensate during the pump trap cycle, the receiver must also be sized to allow enough area for flash steam and condensate separation. An overflow could also be added when required. The minimum recommended water seal is 12" (305 mm). The table above shows proper receiver tank sizing based on flash steam present. See chart left to calculate the percentage (%) of flash steam at a given pressure drop.

# PT-300LL/PT-400LL Light Liquid Pump Traps

## Features

- Economical non-electric operation. Uses inexpensive steam or inert gas.
- Low-maintenance operation. No leaking seals, impeller or motor problems means lower maintenance. No NPSH issues.
- Lower installation costs. Single trade required for installation and maintenance.
- Peace of mind. Standard unit is intrinsically safe.
- Durable construction. ASME code-stamped carbon steel body vessel.
- Corrosion resistance. Internals are all stainless steel for corrosion resistance and long life.
- Heavy-duty springs. Springs are made from long-lasting Inconel X-750.
- Efficiency. A closed loop means no motive or flash steam is lost. All valuable Btu's are captured and returned to the system.
- Safety. The pump can be used in flooded pits without fear of electrocution or circuit breaker defaults.
- Externally removable/replaceable seats. Seats can be replaced or cleaned without removing the mechanism assembly.
- Specific gravity range. Pumps can accommodate specific gravity down to 0.65.

## Typical Applications

- Hydrocarbon knockout drum/separator
- Flare header drain
- Applications where the specific gravity of the liquid could be as low as 0.65
- Applications where hydrocarbons may be present

## Technical Data

### Back Pressure

- Maximum back pressure for the PT-300LL or PT-400LL is 60 psig (4.1 barg)

### Motive Pressure

- Maximum motive pressure (Nitrogen or Inert Gas) is 100 psig (6.9 barg)

**NOTE:** To determine the lb/hr of liquid being pumped, use the following formula:

$$\text{lb/hr of liquid} = \text{capacities} \times \text{specific gravity of liquid}$$

To size the Light Liquid Pumps, use the sizing charts on pages 215 and 219.

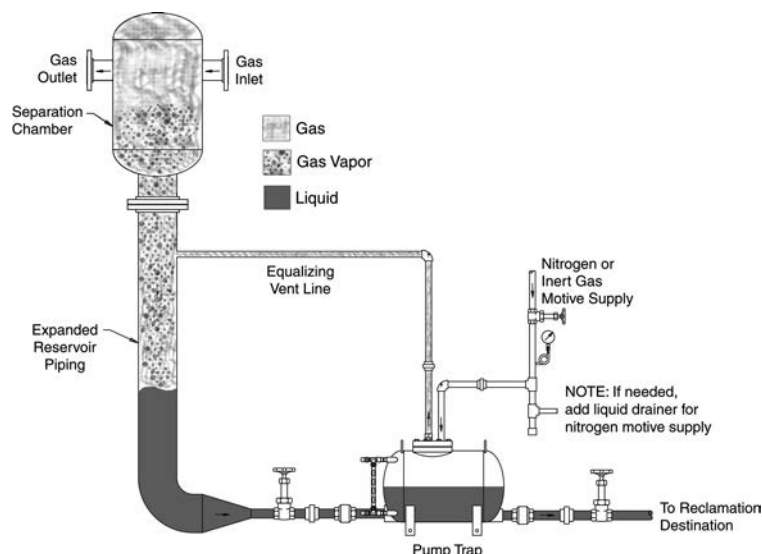
Consult Armstrong for engineered pre-piped receiver packages.



**PT-300LL Light Liquid Pump Trap**



**PT-400LL Light Liquid Pump Trap**



## Hydrocarbon Knockout Drum Separator

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.





# Double Duty® 4

## Steam Trap/Pump Combination

### Description

Armstrong's Double Duty® Series steam trap/pump combination offers a low profile solution to draining heat exchangers in various applications.

The Double Duty® 4 is a low profile pump that offers you the versatility of combining a pump within a steam trap to aide in condensate drainage from a heat exchanger under all operating conditions.

### Features

- Economical. non-electric operation
- Low-maintenance operation. No leaking seals, impeller or motor problems. No NPSH issues.
- Space-saving size. Low-profile body fits in tight spaces while allowing minimal fill head.
- Lower installation costs. Single trade installation.
- Peace of mind. Intrinsically safe.
- Ductile iron durability. Rugged construction material means long service life.
- Efficiency. A closed loop means no motive or flash steam is lost. All valuable Btu's are captured and returned to the system.
- Safety. The trap/pump can be used in pits or sumps without fear of electrocution or circuit breaker defaults.

### Maximum Operating Conditions

Maximum allowable pressure

DD-4 72 psig @ 320°F (5 barg @ 160°C)

Maximum operating pressure:

DD-4 72 psig @ 320°F (5 barg @ 160°C)

### Materials

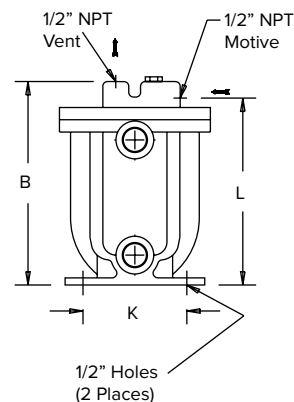
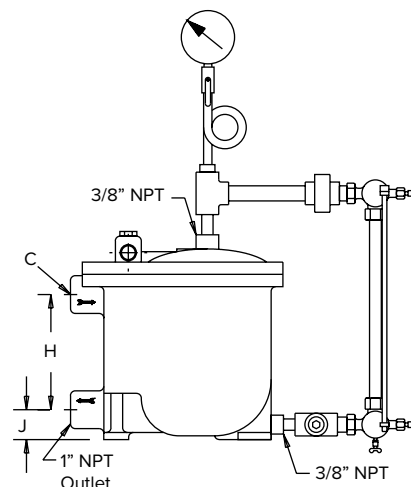
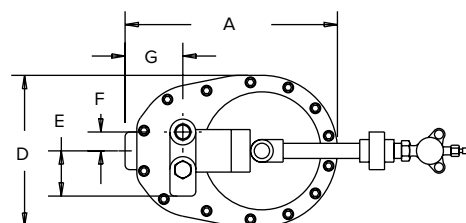
Body:	Ductile iron
Mechanism:	All stainless steel
Springs:	304 Stainless steel
Float:	All stainless steel

For a fully detailed certified drawing, refer to CD-2030.

Double Duty® 4 Physical Data		
	in	mm
"A"	11-3/16	284
"B"	10-13/16	274
"C"	1	25
"D"	8	203
"E"	2-7/16	61
"F"	1	25
"G"	3	76
"H"	6-1/8	155
"J"	1-5/8	41
"K"	5-1/2	140
"L"	9-15/16	251
Weight lb (kg)	37 (17)	



Double Duty® 4



# Double Duty® 4

## Steam Trap/Pump Combination



Double Duty® 4 Pump Capacities					
Motive		Back Pressure		Capacity	
psig	barg	psig	barg	lb/hr	kg/hr
15	1	5	0.34	220	100
25	1.7			300	136
50	3.5			348	158
70	4.5			350	159
25	1.7	15	1	220	100
50	3.5			345	156
70	4.5			348	158
35	2.5	25	1.5	220	100
50	3.5			325	147
70	4.5			348	158
50	3.5	40	2.75	220	100
60	4			300	136
70	4.5			335	152
70	4.5	60	4	220	100

NOTE: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump case.

Capacity Conversion Factors for Other Filling Heads			
Filling Head			
in	0	2	6
mm	0	50	152
Double Duty DD-4	.65	1.0	1.10

NOTE: Fill head measured from drain to top of cap.

Double Duty® 4 Trap Capacities			
Differential Pressure		Capacity	
psig	barg	lb/hr	kg/hr
5	0.34	1 342	610
10	0.7	1 980	900
20	1.4	2 860	1 300
30	2.1	3 410	1 550
40	3	3 795	1 725
50	3.4	4 070	1 850
60	4.1	4 235	1 925
70	4.8	4 400	2 000



# Double Duty® 6

## Steam Trap/Pump Combination

### Description

Armstrong's Double Duty® Series steam trap/pump combination offers a low profile solution to draining heat exchangers in various applications.

The Double Duty® 6 is an ASME code stamped carbon steel vessel. The Double Duty® 6 offers you the versatility of combining a pump within a steam trap to aide in condensate drainage under all operating conditions.

### Features

- Economical. non-electric operation
- Low-maintenance operation. No leaking seals, impeller or motor problems. No NPSH issues.
- Space-saving size. Low-profile body fits in tight spaces while allowing minimal fill head.
- Lower installation costs. Single trade installation.
- Peace of mind. Intrinsically safe.
- ASME Carbon Steel durability. Rugged construction material means long service life.
- Efficiency. A closed loop means no motive or flash steam is lost. All valuable Btu's are captured and returned to the system.
- Safety. The trap/pump can be used in pits or sumps without fear of electrocution or circuit breaker defaults.

### Maximum Operating Conditions

Maximum allowable pressure

DD-6 200 psig @ 400°F (14 barg @ 204°C)

Maximum operating pressure:

DD-6 200 psig @ 400°F (14 barg @ 204°C)

### Materials

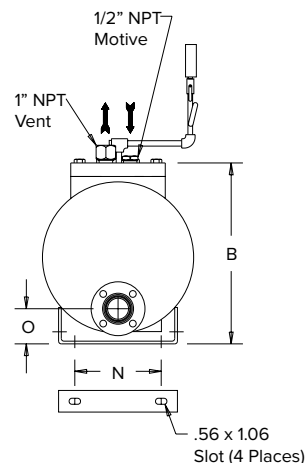
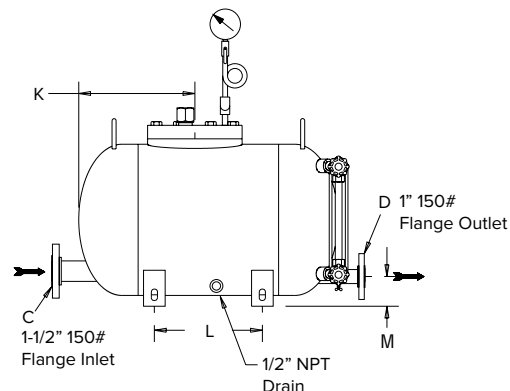
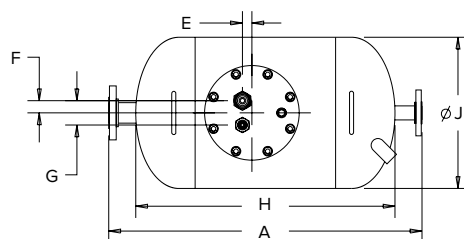
Body: ASME Code Stamped Carbon Steel  
 Springs: Inconel X-750  
 Internals: All stainless steel

For a fully detailed certified drawing, refer to CD2035.

Double Duty® 6 Physical Data		
	in	mm
"A"	29	737
"B"	16-11/16	424
"C"	1-1/2	38
"D"	1	25
"E"	7/8	22
"F"	1-1/8	28
"G"	2-1/4	57
"H"	24	610
"J"	14	356
"K"	10-13/16	275
"L"	10	254
"M"	2-13/16	71
"N"	8	203
"O"	3-3/16	81
Weight lb (kg)	140 (64)	



Double Duty® 6



# Double Duty® 6

## Steam Trap/Pump Combination



Double Duty® 6 Pump Capacities					
Motive		Back Pressure		Capacity	
psig	barg	psig	barg	lb/hr	kg/hr
15	1	5	0.34	2 400	1 089
25	1.7			3 000	1 361
50	3.5			4 000	1 814
75	5			4 500	2 041
100	7			4 600	2 087
125	8.5			4 700	2 132
150	10.34			4 800	2 177
175	12			4 800	2 177
200	14			4 600	2 087
25	1.7	15	1	2 000	907
50	3.5			2 800	1 270
75	5			3 400	1 542
100	7			3 600	1 633
125	8.5			3 700	1 678
150	10.34			3 800	1 724
175	12			3 600	1 633
200	14			3 500	1 588
35	2.5	25	1.5	1 800	816
50	3.5			2 300	1 043
75	5			2 900	1 315
100	7			3 000	1 361
125	8.5			3 000	1 361
150	10.34			2 900	1 315
175	12			2 500	1 134
200	14			2 300	1 043
50	3.5	40	2.75	1 400	635
75	5			2 000	907
100	7			2 400	1 089
125	8.5			2 500	1 134
150	10.34			2 500	1 134
175	12			1 800	816
200	14			1 700	771
75	5	60	4	1 500	680
100	7			1 800	816
125	8.5			2 000	907
150	10.34			1 700	771
175	12			1 500	680
200	14			1 400	635

NOTE: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump case.

Double Duty® 6 Trap Capacities			
Differential Pressure		Capacity	
psig	barg	lb/hr	kg/hr
2	0.14	9 500	4 309
5	0.34	12 400	5 625
10	0.7	15 000	6 804
25	1.5	20 400	9 253
50	3.5	22 500	10 206
75	5.2	22 500	10 206
100	6.9	22 500	10 206
150	10.3	22 500	10 206
200	13.8	22 500	10 206

Capacity Conversion Factors for Other Filling Heads				
Filling Head				
in	0	6	12	* 24 or greater
mm	0	150	305	* 620 or greater
Double Duty DD-6	0.7	1.0	1.08	* Consult factory

NOTE: Fill head measured from drain to top of cap.



# Double Duty® 12

## Steam Trap/Pump Combination

### Description

Armstrong's Double Duty-12 steam trap/pump combination offers a unique solution for draining condensate from heat exchangers and coils in various applications.

The Double Duty-12 is an ASME code stamped carbon steel vessel which offers you the versatility of combining a pump mechanism within a steam trap to assist in condensate drainage under all operating conditions.

### Features

- ASME Section VIII "U" stamped vessel
- Inconel X-750 springs for long service life
- All stainless steel internals
- Easy access to the steam trap mechanism without removing cap assembly
- Externally removable vent and motive seats
- Separate pump and trap mechanisms

### Maximum Operating Conditions

Maximum allowable pressure: 200 psig @ 400°F (14 barg @ 204°C)

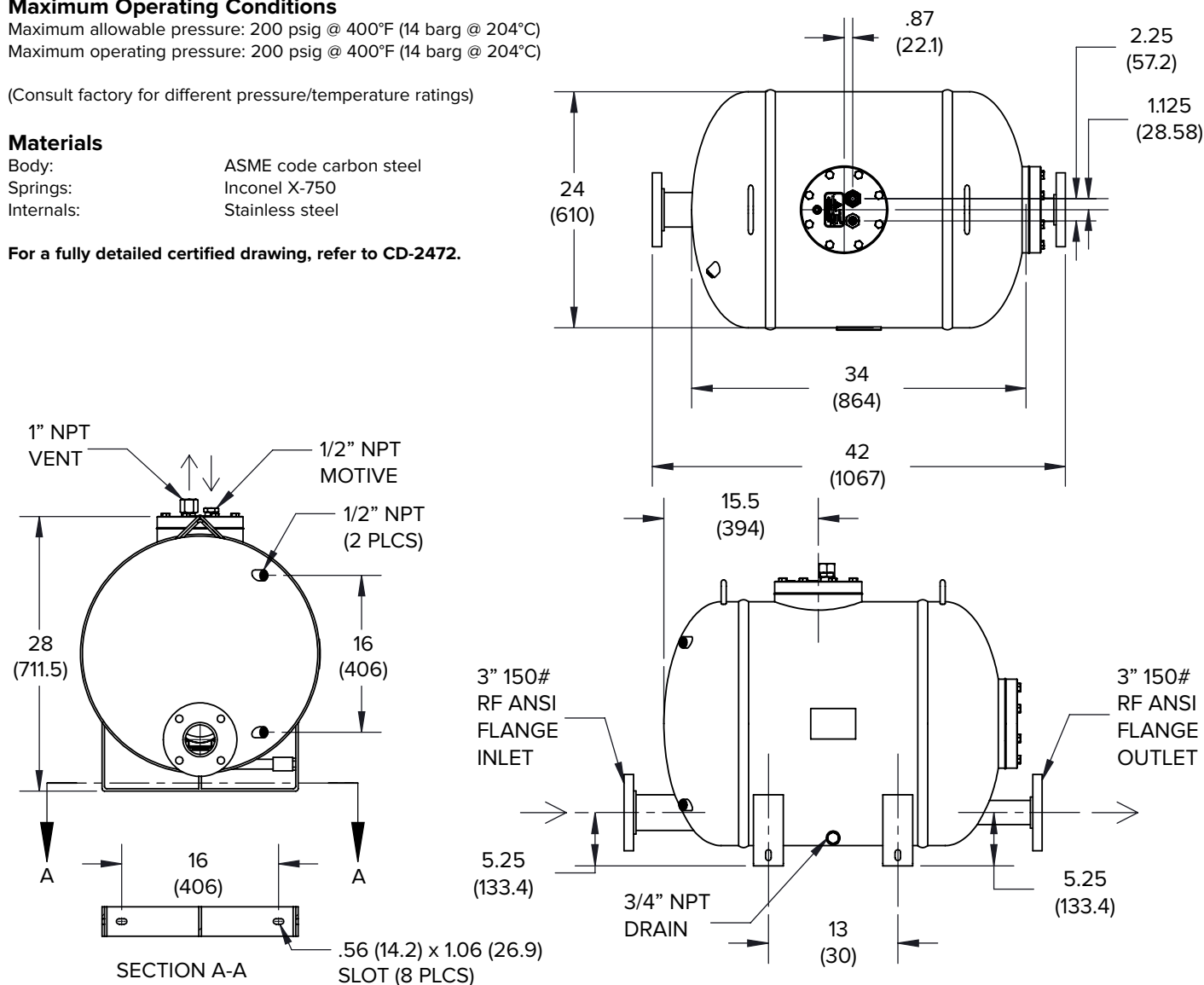
Maximum operating pressure: 200 psig @ 400°F (14 barg @ 204°C)

(Consult factory for different pressure/temperature ratings)

### Materials

Body:	ASME code carbon steel
Springs:	Inconel X-750
Internals:	Stainless steel

For a fully detailed certified drawing, refer to CD-2472.



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# Double Duty® 12

## Steam Trap/Pump Combination



**Double Duty® 12 Pump Capacities**

Motive		Back Pressure		Capacity	
psig	barg	psig	barg	lb/hr	kg/hr
15	1	5	0.34	9 800	4 445
25	1.7			12 900	5 581
50	3.5			16 500	7 484
75	5			18 200	8 255
100	7			18 900	8 573
125	8.5			19 300	8 754
150	10.34			19 800	8 981
175	12			19 900	9 026
200	14			19 900	9 026
25	1.7	15	1	8 500	3 856
50	3.5			12 900	5 851
75	5			14 800	6 713
100	7			16 000	7 257
125	8.5			16 400	7 439
150	10.34			17 200	7 802
175	12			17 300	7 847
200	14			17 300	7 847
35	2.5	25	1.5	7 200	3 266
50	3.5			10 300	4 672
75	5			12 300	5 579
100	7			13 700	6 214
125	8.5			13 700	6 214
150	10.34			14 700	6 668
175	12			14 800	6 713
200	14			15 000	6 804
50	3.5	40	2.75	6 700	3 039
75	5			9 500	4 309
100	7			10 600	4 808
125	8.5			10 900	4 944
150	10.34			11 300	5 126
175	12			11 300	5 126
200	14			11 400	5 171
75	5	60	4	6 900	3 130
100	7			8 300	3 765
125	8.5			8 300	3 765
150	10.34			8 400	3 810
175	12			8 400	3 810
200	14			8 600	3 901
100	7	80	5.5	6 400	2 903
125	8.5			6 400	2 903
150	10.34			7 200	3 266
175	12			7 200	3 266
200	14			7 300	3 311

**Capacity Conversion Factors for Other Filling Heads**

Filling Head					
in	0	6	12	24	* 24 or greater
mm	0	150	305	610	* 620 or greater
Double Duty DD-12	.7	.85	1	1.08	* Consult Factory

**Double Duty® 12 Trap Capacities**

Differential Pressure		Capacity	
psig	barg	lb/hr	kg/hr
2	.14	21 500	9 752
5	.34	28 700	13 018
10	.7	35 900	16 284
25	1.5	52 100	23 632
50	3.5	59 600	27 034
75	5.2	72 000	32 659
100	6.9	81 000	36 741
150	10.3	93 000	42 184

NOTE: Fill head measured from drain to top of cap.  
Weight in lb/kg: 348 (158)

NOTE: Published capacities are based on the use of external check valves supplied by Armstrong.



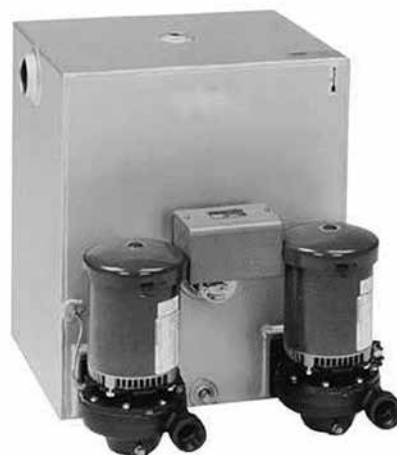
# FHC / FHS Series Electric Condensate Pumps

Armstrong FHC (cast iron) and FHS (steel) electric condensate pumps are offered as packaged units, pre-assembled, wired and factory tested.

## Features

- Heavy duty, ballbearing, close-coupled pump motors with stainless steel shaft. 3450 RPM for greater efficiency and more economical operation.
- Level controls with two-pole, drip proof case, stainless steel float and float rod, doublebreak silver-to-silver contacts. Float travel adjustment is easy, visible and accessible.
- Pump mounting design provides efficient operation and extended life by venting air and flushing seal area.
- Offers a wide range of pressures and GPM. Unique design for easy maintenance.
- Pumps made of durable cast iron for extended life; efficient design provides maximum capacity with minimum motor load.
- The ultimate in ceramic technology for extended life. The seal runs on the brass impeller hub with the motor shaft actually outside the pump body. Therefore, the shaft is not exposed to corrosion by condensate. Recommended for temperatures up to 250°F (120°C).

For control panel information and optional items, please refer to page 258.



Please visit our web site, [armstronginternational.com](http://armstronginternational.com), for detail information regarding dimensions and weights.

### For a fully detailed certified drawing, refer to:

FHC-112	CDF1092	FHS-4028G	CD2243
FHC-122	CDF1093	FHS-112	CDF1089
FHC-212	CD2244	FHS-122	CD2241
FHC-222	CDF1095	FHS-212	CD2242
		FHS-222	CDF1091
		FHS-230	CDF1091

Specifications - FHC Cast Iron Receiver Condensate Pumps								
Model No.		Pump GPM	Standard Motor Voltage*	Maximum Pump Discharge, psig	Pump Discharge Nozzle Size	Pump HP	Receiver Size Gallons	sq ft EDR
Simplex	Duplex							
FHC-112	FHC-212	12	115V/1Ph 3500 RPM	20	3/4"	1/3	15	8 000
FHC-122	FHC-222	22				1/2	24	15 000

Specifications - FHS Carbon Steel Receiver Condensate Pumps								
Model No.		Pump GPM	Standard Motor Voltage*	Maximum Pump Discharge, psig	Pump Discharge Nozzle Size	Pump HP	Receiver Size Gallons	sq ft EDR
Simplex	Duplex							
FHS-4028G	—	12	115V/1Ph 3500 RPM	20	3/4"	1/3	8	8 000
FHS-112	FHS-212					1/3	15	
FHS-122	FHS-222	22				1/2	30	15 000
—	FHS-230	30				3/4		20 000

\*Can be field wired to 230V/1Ph/60Hz

Additional units for larger capacities and higher pressures available upon request.  
Pumps have cast iron bodies.

# FHC / FHS Series Electric Condensate Pumps

## Sizing Condensate Pumps

### Step 1—Determine the condensing rate of the system:

**Where:** C = Condensing Rate in lb/hr  
F<sub>1</sub> = Conversion to GPM = 500  
F<sub>2</sub> = Conversion to EDR = .0005

**Formula:**  $C \div F_1 = \text{GPM}$   
 $\text{GPM} \div F_2 = \text{sq. ft. EDR}$

**Example:** 2000 lb/hr  $\div$  500 = 4 GPM  
4 GPM  $\div$  0.0005 = 8 000 sq. ft. EDR

### Step 2—Apply a 3:1 safety factor by multiplying by 3

**Example:** 4 GPM x safety factor of 3 = 12 GPM  
Select a pump with a 12 GPM rating with  
a sq. ft. EDR of 8 000

### Step 3—Determine system back pressure

The total back pressure is determined by vertical lift, system pressure on the discharge side of the pump, plus frictional loss through pipe, valves and fittings.

Vertical lift, 2.31 ft. = 1 psig + system pressure (psig) + frictional loss (psig) = total system back pressure.

Select a pump that has a maximum discharge pressure greater than the total system back pressure calculated for the system.

## Special Notes:

- Floor mounted condensate receivers have a maximum operating temperature rating of 200°F. Higher temperature applications will require that the receiver be elevated to achieve proper net positive suction head (NPSH).
- Duplex units are typically sized for system redundancy, using a mechanical alternator for less wear on each pump.
- For systems that require vacuum pumps, control panels, high performance motors and special condensate receivers, consult the factory for engineering and pricing assistance.
- Condensate receivers are typically sized for one to three minutes of storage capacity.
- The condensate receiver that is mounted to the pump must always remain vented to the atmosphere.

NPSH is critical to the proper operation of an electric condensate pump. NPSH is the measure of how close the suction passage of the pump is to boiling. NPSH can be calculated by the following formula:  $\text{NPSH} = H_s + H_p - H_v - H_f$

### Where:

H<sub>s</sub> = static head of the liquid at the pump suction  
H<sub>v</sub> = vapor pressure of the liquid at the pump suction

H<sub>p</sub> = absolute pressure above the static head of the liquid  
H<sub>f</sub> = friction loss in the suction piping





# Rescue Cap® Non-Electric Steam/Air Powered Pump Retrofit Assembly



Do you experience maintenance problems with non-electric steam/air powered pumps?

Are you dumping valuable condensate because of frequent maintenance?

Do you experience spring failures?

Do you have to remove the complete cap assembly to view, clean or replace the motive or vent valve?

## Externally replaceable valve and seat assembly

Maintenance is a snap with stainless steel valves that can be cleaned or replaced without cap removal.

## Wear and corrosion resistance

Mechanism frame assembly is constructed of rugged investment-cast stainless steel components.

## Long life and dependable service

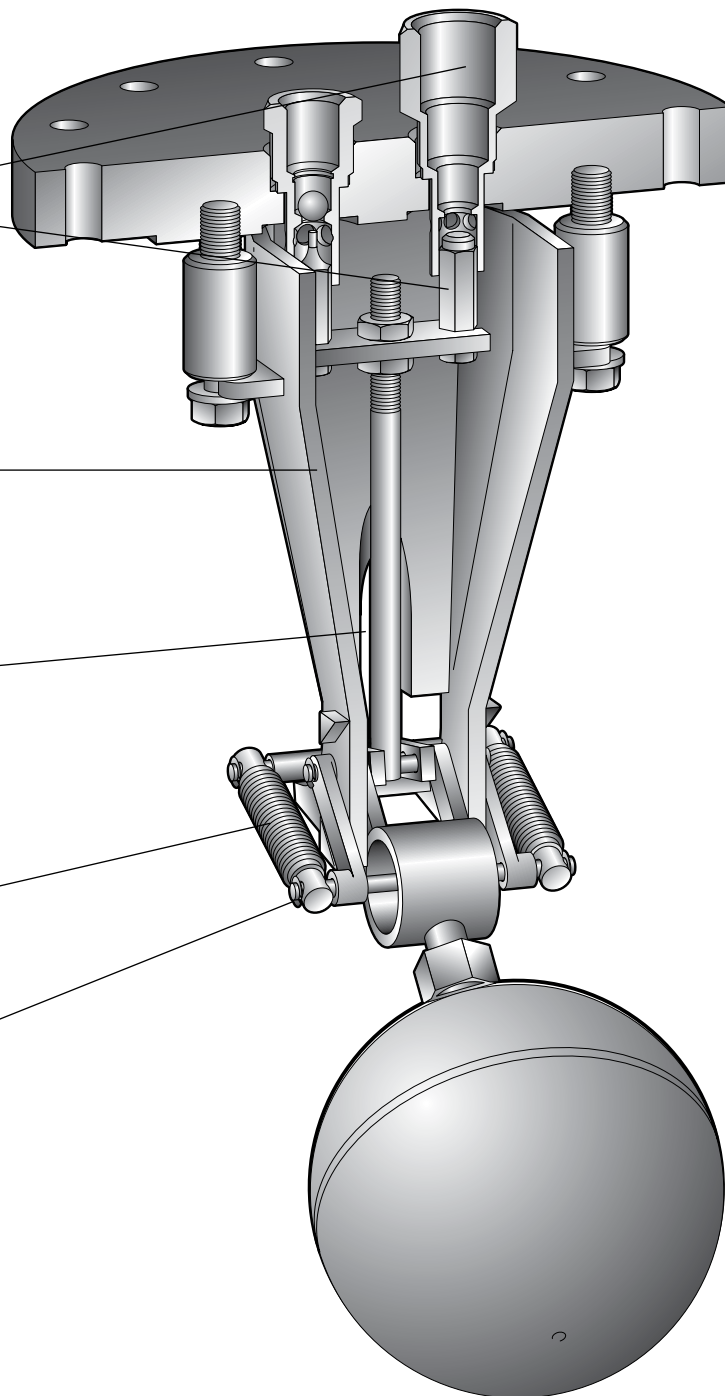
Simple float/spring operation and rugged all stainless steel construction allow for long, trouble-free service life.

## Stress chloride corrosion resistance

Inconel X-750 springs have higher resistance to the stress that causes lower-grade stainless steel springs to fail.

## Bushings

Reduce friction and wear on pivot points

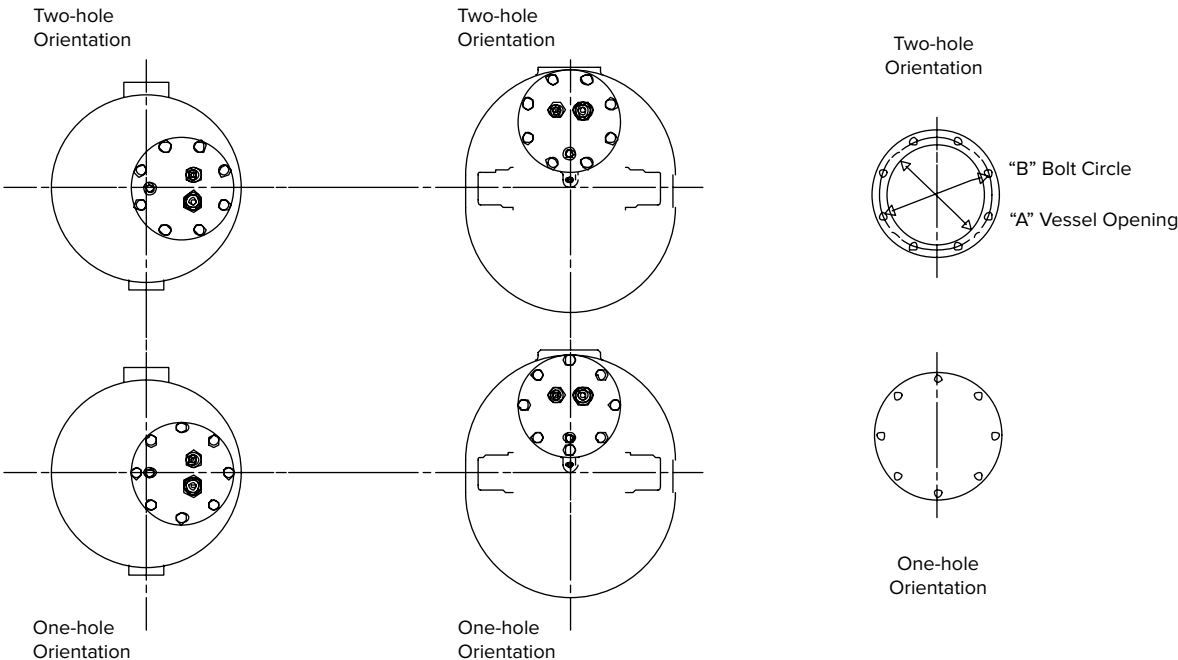


# Rescue Cap® Non-Electric Steam/Air Powered Pump Retrofit Assembly



Armstrong's non-electric steam/air powered pump retrofit cap and mechanism assembly fits most competitive models. To ensure proper fit, please provide the following information:

- Manufacturer's name: \_\_\_\_\_
- Manufacturer's model number: \_\_\_\_\_
- Number of bolt holes in cap: \_\_\_\_\_
- Bolt circle dimension "B": \_\_\_\_\_
- Inside diameter of vessel opening "A": \_\_\_\_\_
- Bolt hole orientation (one hole or two holes): \_\_\_\_\_

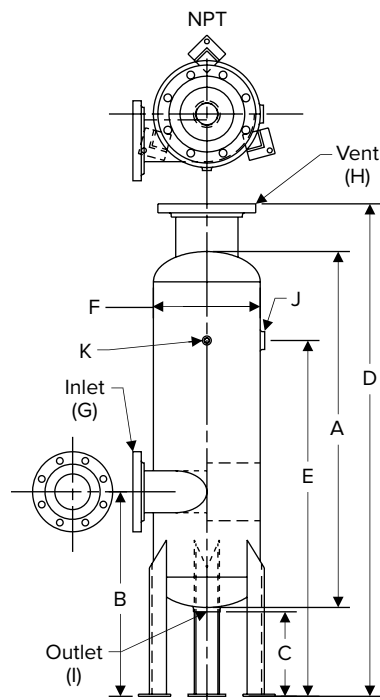


Rescue Cap® Non-Electric Steam/Air Powered Pump Retrofit Assembly							
Illustration	Fits Competitors' Mechanical Pumps Listed Below						
	Spirax Sarco Models PTC & PTF PPC & PPF	Watson McDaniel Models PMPC & PMP	Spence & Nicholson Condensate Commanders	KADANT Johnson Corporation	ITT Hoffman PCS	Yarway Series 65 Steel	Clark Reliance

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# Armstrong® Vertical Flash Tanks (VAFT)



## Features

- ASME coded and stamped vessels
- Standard pressure rating 150 psig (other pressure ratings available upon request)
- Standard models are designed and sized to cover a wide range of applications and loads
- Flash vessels are designed to provide low velocity flash steam with no water carryover
- Quick payback for flash recovery investment
- Special tanks available upon request

For a fully detailed certified drawing, refer to CDF #1023.

## Flash Steam Savings Analysis

### Part I: Determining the amount of flash steam produced

- A. Condensate Load      A = \_\_\_\_\_ lb/hr.
- B. Annual hours of operation      B = \_\_\_\_\_ hrs/yr.
- C. Steam Cost      C = \_\_\_\_\_ \$/1 000 lbs.
- D. Flash steam percentage from chart (on page 264)      D = \_\_\_\_\_ %
- E. Flash steam produced:  
 $D \times A = \text{flash steam produced}$       E = \_\_\_\_\_ lb/hr.

### Part II: Determining dollar value of the flash steam

- F. Annual flash steam savings:  

$$\frac{F = E \times B \times C}{1\,000}$$
      F = \_\_\_\_\_ \$/yr.

### Physical Data—Standard Design Model VAFT

Model No.	AFT-6		AFT-8		AFT-12		AFT-16	
	in	mm	in	mm	in	mm	in	mm
A	36	914	36	914	40	1 016	48	1 219
B	21	533	21	533	23	584	26	660
C	9-1/2	241	9-1/2	241	9-1/2	241	9-1/2	241
D	51	1 295	52	1 321	55-3/8	1 407	63-1/2	1 613
E	36	914	36	914	40	1 016	48	1 219
F	6	150	8	203	12	305	16	406
G	2	50	3	80	4	102	6	150
H	2-1/2	65	4	102	6	150	6	150
I	1-1/2	40	1-1/2	40	2	50	2	50
J	3/4	20	1	25	1-1/2	40	2	50
K	1/2	15	1/2	15	1/2	15	1/2	15

NOTE: Connections "G" and "H" are 150 lb. flanges. All others are NPT. All flash tanks are ASME coded for 150 psig (10 barg). Special sizes available upon request.

### Capacities—Standard Design Model VAFT

Model No.	Maximum Condensate Load		Maximum Flash Load	
	lb/hr	kg/hr	lb/hr	kg/hr
AFT-6	2 000	907	500	227
AFT-8	5 000	2 268	1 000	454
AFT-12	10 000	4 536	2 000	907
AFT-16	20 000	9 072	3 000	1 361

# Armstrong Exhaust Head - AEH Series

## Description

Armstrong's AEH series carbon steel exhaust heads should be used when there is a risk of water carryover up an atmospheric vent pipe. The internal knock-out plate and stainless steel mesh screening effectively contains water carry-over and discharges it through the bottom drain leaving dry flash steam to vent through the top of the vessel.

## Connections

Flanged ASME B16.5 CL 150  
 Drain FNPT

## How To Order

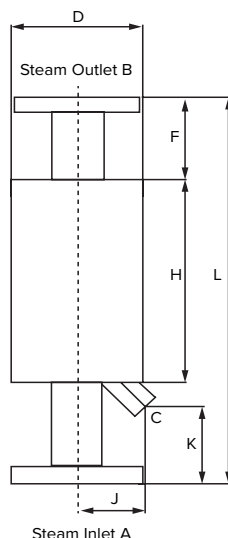
Exhaust heads are typically sized to match existing vent line connections. Choose the Armstrong model below which best fits your application.

(Note: 1. Excessive carryover could be caused by leaking steam traps or undersized vents. 2. Not for use on Safety Relief Valves.)



Materials	
Part Name	AEH Series
Body	Carbon Steel
Baffle Plate	Carbon Steel
Screens	304 Stainless Steel
Flange	Carbon Steel
Connection Pipe	Carbon Steel

Dimensions									
Model	Connection Size			D	H	L	F	K	J
	Steam Inlet A In (mm)	Steam Outlet B In (mm)	Drain C In (mm)	In (mm)	In (mm)	In (mm)	In (mm)	In (mm)	In (mm)
AEH20592-2	2 (50)	2 (50)	3/4 (19)	6-1/4 (159)	9-13/16 (250)	18-1/2 (470)	4 (100)	3-5/8 (92)	3-1/4 (82)
AEH20592-3	3 (80)	3 (80)	3/4 (19)	8-5/8 (219)	11-13/16 (300)	21-5/8 (550)		4-13/16 (122)	4-1/8 (105)
AEH20592-4	4 (100)	4 (100)	1 (25)	10-3/4 (273)	13-3/4 (350)	24-13/16 (630)		5-11/16 (145)	5-3/16 (132)
AEH20592-6	6 (150)	6 (150)	1-1/2 (38)	12-13/16 (325)	15-3/4 (400)	27-9/16 (700)		6-1/2 (165)	6-1/4 (158)
AEH20592-8	8 (200)	8 (200)	2 (50)	16-3/4 (426)	17-3/4 (450)	30-11/16 (780)		7-3/8 (188)	8 (204)
AEH20592-10	10 (250)	10 (250)	2 (50)	20 (508)	19-11/16 (500)	33-7/16 (850)		8-3/16 (208)	9-3/8 (238)



## For Steam, Air and Non-Corrosive Gases

The GD-30 is a compact, high performance direct acting valve. Economical to buy and use, it's ideal for those low to moderate flow applications where accuracy of +/-10% is acceptable. The GD-30 is well suited for laundry and dry cleaning equipment, hospital equipment, tire molds, humidifiers, small heaters and applications in food processing. It provides tight shutoff for dead-end service on steam. Turndown ratio is 10:1 and ANSI Class IV Shutoff.

For a fully detailed certified drawing, refer to:

**GD-30 (bronze only) CDY #1038**

**GD-30S (stainless steel) CDY #1089**

### GD-30/30S Specifications

Model Number	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Spring Color	Minimum Differential psig (barg)	Application	Maximum Temp. °F (°C)	Materials		
							Body	Valve/Seat	Bellows
GD-30	15 - 250 (1 - 17)	3 - 15 (.21 - 1.0) 7 - 80 (.48 - 5.5) 50 - 140 (3.4 - 9.6)	Yellow Blue Green	7 (.48)	Steam, Air, Non-Corrosive Gases	410 (210)	Cast Bronze ASTM B584	Stainless Steel AISI 440/304	Phosphor Bronze ASTM B103*
GD-30S	15 - 300 (1 - 20)				Steam, Air, Non-Corrosive Gases	430 (220)	Stainless Steel AISI 316		Stainless Steel AISI 316L

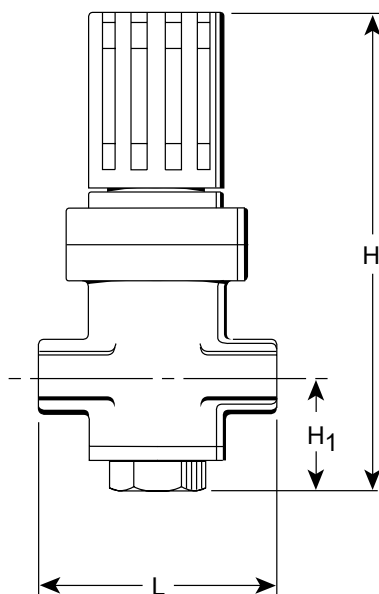
\*Stainless steel optional

### GD-30/30S Dimensions and Weights

Symbol	Connection Size									
	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	15	3/4	20	1	25	1-1/2*	40	2*	50
L	3-1/8	80	3-3/8	85	3-3/4	95	5-1/2	140	5-7/8	150
H <sub>1</sub>	2	47	2	47	2	47	3	77	3	77
H	7-1/2	191	7-1/2	191	7-1/2	191	12-1/8	307 1	2-1/8	307
Weight lb (kg)	4-1/4 (1.9)		4-1/4 (1.9)		4-1/2 (2.0)		21-3/8 (9.7)		22 (10)	
C <sub>v</sub>	1.3		1.5		2.5		5.6		8.5	

NOTE: GD-30 capacities cannot be determined with a formula—consult capacity tables. Reference note under formula key on page 275.

\*GD-30S available in 1/2", 3/4", and 1" only.



## GD-30 Capacities—Steam

	lb/hr								kg/hr						
	Inlet	Outlet	Connection Size						Inlet	Outlet	Connection Size				
			in								mm				
	psig		1/2	3/4	1	1-1/2	2		barg		15	20	25	40	50
	C <sub>v</sub> Factor		1.3	1.5	2.5	5.6	8.5		C <sub>v</sub> Factor		1.3	1.5	2.5	5.6	8.5
GD-30S Only	15	7	49	56	92	198	297	1.0	.5	22	25	42	90	135	
	20	13	53	61	105	216	331	1.4	.9	24	28	48	98	150	
		7	42	55	63	180	264		.5	19	25	35	82	120	
	30	23	62	71	112	242	408	2.0	1.6	28	32	51	110	185	
		15	53	60	101	209	309		1.0	24	27	46	95	140	
		3	33	40	60	139	216		.2	15	18	27	63	98	
	40	32	99	121	187	407	617	2.8	2.2	45	55	85	185	280	
		20	79	97	159	330	517		1.4	36	44	72	150	235	
		4	40	55	77	159	264		.3	18	25	35	72	120	
	50	40	130	143	242	539	837	3.4	2.8	59	65	110	245	380	
		20	99	115	187	407	628		1.4	45	52	85	185	285	
		5	48	62	88	193	297		.3	22	28	40	88	135	
	60	48	137	154	265	584	899	4.0	3.3	62	70	120	265	408	
		40	150	165	289	617	969		2.8	68	75	131	280	440	
		18	90	104	170	374	584		1.2	41	47	77	170	265	
		6	55	73	99	220	331		.4	25	33	45	100	150	
	80	64	176	205	342	738	1168	5.5	4.4	80	93	155	335	530	
		54	187	225	353	782	1201		3.7	85	102	160	355	545	
		23	121	137	220	489	749		1.6	55	62	100	222	340	
		8	60	77	108	231	363		.5	27	35	49	105	165	
	100	80	203	242	397	863	1355	6.9	5.5	92	110	180	392	615	
		66	225	262	437	958	1465		4.5	102	119	198	435	665	
		40	198	231	375	837	1278		2.8	90	105	170	380	580	
		10	68	79	132	297	473		.7	31	36	60	135	215	
	120	96	231	276	452	991	1520	8.3	6.6	105	125	205	450	690	
		70	276	311	518	1168	1818		4.8	125	141	235	530	825	
		45	240	267	450	980	1509		3.1	109	121	204	445	685	
		12	110	121	198	462	705		.8	50	55	90	210	320	
	150	120	287	333	551	1212	1862	10.3	8.3	130	151	250	550	845	
		85	364	421	705	1531	2369		5.9	165	191	320	695	1075	
		55	298	353	595	1278	2005		3.8	135	160	270	580	910	
		15	132	165	254	562	848		1.0	60	75	115	255	385	
	180	140	408	485	794	1719	2677	12.4	9.7	185	220	360	780	1215	
		115	430	507	860	1829	2832		8.0	195	230	390	830	1285	
		70	386	430	739	1619	2501		4.8	175	195	335	735	1135	
		18	165	187	309	683	1035		1.2	75	85	140	310	470	
	200	140	461	518	871	1983	3063	13.8	9.7	209	235	395	900	1390	
		115	474	540	904	2005	3085		8.0	215	245	410	910	1400	
		80	430	496	827	1818	2810		5.5	195	225	375	825	1275	
		20	209	242	386	848	1300		1.4	95	110	175	385	590	
225	140	485	573	948	2060	3195	15.5	9.7	220	260	430	935	1450		
	115	496	584	961	2071	3207		8.0	225	265	436	940	1455		
	85	463	540	904	1983	3063		5.9	210	245	410	900	1390		
	23	254	298	496	1079	1675		1.6	115	135	225	490	760		
250	140	525	606	1014	2226	3438	17.2	9.7	238	275	460	1010	1560		
	120	551	584	1038	2248	3471		8.3	250	265	471	1020	1575		
	70	463	529	893	1939	2997		4.8	210	240	405	880	1360		
	25	276	320	529	1146	1796		1.7	125	145	240	520	815		
275	140	529	613	1023	—	—	18.9	9.7	240	278	464	—	—		
	120	529	613	1023	—	—		8.3	240	278	464	—	—		
	70	470	542	902	—	—		4.8	213	246	409	—	—		
	28	295	344	562	—	—		1.9	134	156	255	—	—		
300	140	529	613	1023	—	—	20.0	9.7	240	278	464	—	—		
	100	529	613	1023	—	—		6.9	240	278	464	—	—		
	70	478	551	926	—	—		4.8	217	250	420	—	—		
	30	309	359	595	—	—		2.7	140	163	270	—	—		

NOTE: For air capacities scfm, multiply steam capacities (lb/hr) by 0.36. For air capacities m3/hr, multiply steam capacities (kg/hr) by 1.35.  
Maximum pressure reduction ratio 10:1.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

### For Steam, Air and Non-Corrosive Gas Service

The GD-45 is a compact, high-performance, direct-acting valve. Inexpensive to buy and use, it is ideal for those moderate flow applications that do not justify the higher cost of pilot-controlled valves.

The GD-45 is well-suited for laundry and dry-cleaning equipment, hospital equipment, tire molds, humidifiers, small heaters, and applications in food processing. It provides tight, quick, easy installation.

#### Quick, easy installation

- Lightweight and compact
- Piping supports the valve of ductile iron for greater durability and higher inlet pressure
- Screwed connections
- No external sensing lines or parts needed
- Maximum turndown ratio 10:1
- ANSI Class IV Shutt off

#### Simple selection

- 1/2", 3/4" and 1"
- Match pipe size normally
- Three pressure range springs (for best control when ranges overlap, use smaller range spring)

#### Long life/easy maintenance

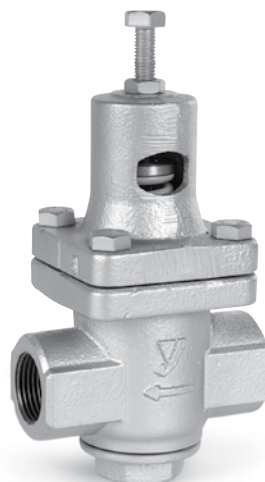
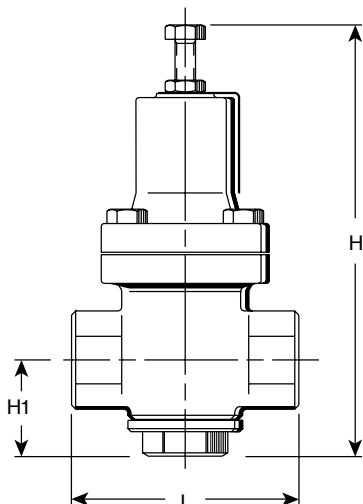
- Highly resilient phosphor-bronze bellows
- Hardened stainless-steel working parts
- Integral strainer (removable for cleaning) for protection from wear or dirt
- Teflon gaskets used at all joints for improved leakage prevention

For a fully detailed certified drawing, refer to CDY #1090.

GD-45 Specifications							
Service	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Minimum Differential psig (barg)	Maximum Temperature °F (°C)	Materials		
					Body	Valve/Seat	Bellows
Steam, Air Non-Corrosive Gases	15 - 300 (1 - 20)	3 - 15 (.21 - 1.0) Yellow	7 (.48)	450 (232)	ASTM A536 Ductile Iron	Hardened Stainless Steel AISI 420	Phosphor Bronze ASTM B103
		7 - 80 (.48 - 5.5) Blue					
		50 - 140 (3.4 - 9.6) Green					

GD-45 Dimensions and Weights						
Symbol	Connection Size					
	in	mm	in	mm	in	mm
	1/2	15	3/4	20	1	25
L	4-3/8	111	4-3/8	111	4-3/8	111
H <sub>i</sub>	1-7/8	47	1-7/8	47	1-7/8	47
H	8-1/2	216	8-1/2	216	8-1/2	216
Wt, lb (kg)	7 (3.2)					
Cv	1.3		1.5		2.5	

NOTE: GD-45 capacities cannot be determined with a formula—consult capacity tables. Reference note under formula key on page 275.



## GD-45 Capacities—Steam

lb/hr						kg/hr				
Inlet	Outlet	Connection Size				Inlet	Outlet	Connection Size		
		in						mm		
psig		1/2	3/4	1		barg		15	20	25
C <sub>v</sub> Factor		1.3	1.5	2.5		C <sub>v</sub> Factor		1.3	1.5	2.5
15	7	49	56	92	1.0	.5	22	25	42	
20	13	53	61	105	1.4	.9	24	28	48	
	7	42	55	63		.5	19	25	35	
30	23	62	71	112	2.0	1.6	28	32	51	
	15	53	60	101		1.0	24	27	46	
	3	33	40	60		.2	15	18	27	
40	32	99	121	187	2.8	2.2	45	55	85	
	20	79	97	159		1.4	36	44	72	
	4	40	55	77		.3	18	25	35	
50	40	130	143	242	3.4	2.8	59	65	110	
	20	99	115	187		1.4	45	52	85	
	5	48	62	88		.3	22	28	40	
60	48	137	154	265	4.0	3.3	62	70	120	
	40	150	165	289		2.8	68	75	131	
	18	90	104	170		1.2	41	47	77	
	6	55	73	99		.4	25	33	45	
80	64	176	205	342	5.5	4.4	80	93	155	
	54	187	225	353		3.7	85	102	160	
	23	121	137	220		1.6	55	62	100	
	8	60	77	108		.5	27	35	49	
100	80	203	242	397	6.9	5.5	92	110	180	
	66	225	262	437		4.5	102	119	198	
	40	198	231	375		2.8	90	105	170	
	10	68	79	132		.7	31	36	60	
120	96	231	276	452	8.3	6.6	105	125	205	
	70	276	311	518		4.8	125	141	235	
	45	240	267	450		3.1	109	121	204	
	12	110	121	198		.8	50	55	90	
150	120	287	333	551	10.3	8.3	130	151	250	
	85	364	421	705		5.9	165	191	320	
	55	298	353	595		3.8	135	160	270	
	15	132	165	254		1.0	60	75	115	
180	140	408	485	794	12.4	9.7	185	220	360	
	115	430	507	860		8.0	195	230	390	
	70	386	430	739		4.8	175	195	335	
	18	165	187	309		1.2	75	85	140	
200	140	461	518	871	13.8	9.7	209	235	395	
	115	474	540	904		8.0	215	245	410	
	80	430	496	827		5.5	195	225	375	
	20	209	242	386		1.4	95	110	175	
225	140	485	573	948	15.5	9.7	220	260	430	
	115	496	584	961		8.0	225	265	436	
	85	463	540	904		5.9	210	245	410	
	23	254	298	496		1.6	115	135	225	
250	140	525	606	1 014	17.2	9.7	238	275	460	
	120	551	584	1 038		8.3	250	265	471	
	70	463	529	893		4.8	210	240	405	
	25	276	320	529		1.7	125	145	240	
300	140	528	616	1 023	20	9.7	240	280	465	
	120	551	627	1 038		8.3	250	285	477	
	70	484	550	913		4.8	220	250	415	
	30	319	352	583		2.0	145	160	265	

NOTE: For air capacities scfm, multiply steam capacities (lb/hr) by 0.36. For air capacities m<sup>3</sup>/hr, multiply steam capacities (kg/hr) by 1.35. Maximum pressure reduction ratio 10:1.



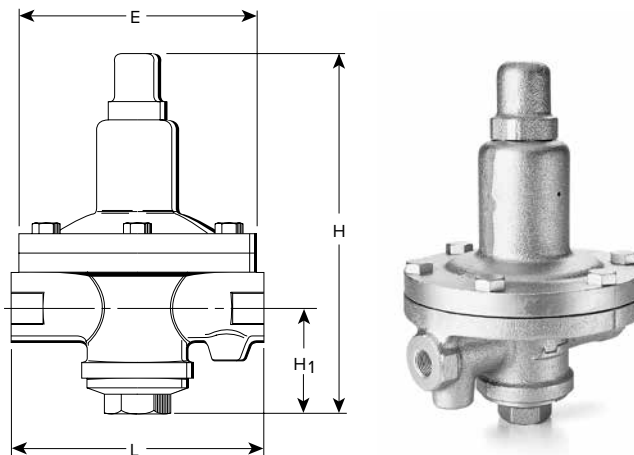


# GD-6N (Steam), GD-6 (Liquid, Gas)

## For Steam, Air and Water

The GD-6N and GD-6 are compact, direct acting diaphragm valves ideal for low-flow applications, including laundry/dry cleaning equipment, hospital equipment, tire/plastic molds and food processing. Lightweight and compact, the valves require no external sensing lines or additional parts. External adjusting screw with locking nut and cover make for quick, easy setting and adjustment. Tight shutoff for dead-end service. Removable stainless steel diaphragm, hardened stainless steel working parts (6N), integral removable strainer (6N) and in-line renewable valve and seat. Available in 3/8", 1/2", 3/4" and 1" sizes with a choice of two set pressure spring ranges.

For a fully detailed certified drawing, refer to CDY #1040.



GD-6N/GD-6 Specifications										
Model	Application	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Spring Color	Minimum Differential psig (barg)	Maximum Temperature °F (°C)	Materials			
							Body	Main Valve	Valve Seat	Diaphragm
GD-6N	Steam	15 - 150 (1 - 10)	3 - 15 (.21 - 1.0)	Yellow Stripe	7 (.48)	450 (232)	Cast Iron ASTM A278	Stainless Steel AISI 304	Stainless Steel AISI 420	Stainless Steel AISI 304
GD-6	Liquid Gas		15 - 60 (1 - 4)	Yellow/Blue Stripe		175 (79)		Brass (w/Disc) ASTM B16	Bronze ASTM B584	

GD-6N Capacities—Steam											
lb/hr						kg/hr					
Inlet	Outlet	Connection Size				Inlet	Outlet	Connection Size			
		in						mm			
psig		3/8	1/2	3/4	1	barg		10	15	20	25
15	3 - 8	18	25	51	76	1.0	.2 - .6	8.2	11.3	23.1	34.5
20	13	12	17	34	51	1.4	.9	5.4	7.7	15.4	23.1
	3 - 10	21	30	59	89		.2 - .7	9.5	13.6	26.8	40.4
25	18	14	20	41	61	1.7	1.2	6.4	9.1	18.6	27.7
	15	19	28	55	83		1.0	8.6	12.7	24.9	37.6
30	3 - 12	24	34	68	102	2.1	.2 - .8	10.9	15.4	30.8	46.3
	23	16	23	47	71		1.6	7.3	10.4	21.3	32.2
40	20	21	30	59	89	2.8	1.4	9.5	13.6	26.8	40.4
	3 - 15	27	38	76	115		.2 - 1	12.2	17.2	34.5	52.2
50	32	21	30	60	90	3.4	2.2	9.5	13.6	27.2	40.8
	25	28	40	79	119		1.7	12.7	18.1	35.8	54.0
60	4 - 20	33	47	94	140	4.1	.3 - 1.4	15.0	21.3	42.6	63.5
	40	25	36	73	109		2.8	11.3	16.3	33.1	49.4
75	32	33	47	94	141	5.2	2.2	15.0	21.3	42.6	64.0
	5 - 25	39	55	111	166		.3 - 1.7	17.7	24.9	50.3	75.3
100	48	30	43	55	128	6.9	3.3	13.6	19.5	24.9	58.1
	40	37	53	107	160		2.8	16.8	24.0	48.5	72.6
125	6 - 30	45	64	128	192	8.6	.4 - 2.1	20.4	29.0	58.1	87.1
	60	37	52	104	156		4.1	16.8	23.6	47.2	70.8
150	48	47	67	135	202	10.3	3.3	21.3	30.4	61.2	91.6
	7 - 37	54	77	153	230		.5 - 2.6	24.5	34.9	69.4	104.3
175	65	61	87	173	260	12.0	4.5	27.7	39.5	78.5	117.9
	10 - 50	69	98	196	294		.7 - 3.4	31.3	44.5	88.9	133.4
200	13 - 60	84	119	239	358	13.8	8.6	38.1	54.0	108.4	162.4
	150	99	142	283	425		1 - 4.1	44.9	64.4	128.4	192.8

NOTE: For air capacities scfm, multiply steam capacities (lb/hr) by 0.36.  
For air capacities m3/hr, multiply steam capacities (kg/hr) by 1.35.  
Maximum pressure reduction ratio 10:1.  
ANSI Class IV Shutoff.

GD-6N/GD-6 Dimensions and Weights								
Symbol	Connection Size							
	in	mm	in	mm	in	mm	in	mm
	3/8	10	1/2	15	3/4	20	1	25
L	6-1/2	165	6-1/2	165	7-1/4	185	7-1/4	185
H	9-1/2	237	9-1/2	237	10-1/4	261	10-1/4	261
H <sub>1</sub>	2-1/4	57	2-1/4	57	3	76	3	76
E	6-1/8	155	6-1/8	155	7	175	7	175
Wt lb (kg)	12 (5.5)		12 (5.5)		18 (8.2)		18 (8.2)	
C <sub>v</sub>	.35		.5		1.0		1.5	

GD-6 Capacities—Water									
gpm					l/min				
ΔP	Connection Size				ΔP	Connection Size			
	in					mm			
psig	3/8	1/2	3/4	1	barg	10	15	20	25
5	.8	1.1	2.2	3.4	.35	3.0	4.2	8.3	12.9
10	1.1	1.6	3.2	4.7	.7	4.2	6.0	12.1	17.8
15	1.4	1.9	3.9	5.8	1.0	5.3	7.2	14.8	22.0
25	1.8	2.5	5.0	7.5	1.7	6.8	9.5	18.9	28.4
50	2.5	3.5	7.1	10.6	3.5	9.5	13.2	26.9	40.1
75	3.0	4.3	8.7	13.0	5.2	11.4	16.3	32.9	49.2
100	3.5	5.0	10.0	15.0	6.9	13.2	18.9	37.9	56.8
125	3.9	5.6	11.2	16.8	8.6	14.8	21.2	42.4	63.6
147	4.2	6.1	12.1	18.2	10.0	15.9	23.1	45.8	68.9

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# GD-6N (Steam), GD-6 (Liquid, Gas)

## For Air and Non-Corrosive Gases

The GD-10/10F is a lightweight direct acting diaphragm valve used primarily for pneumatic tool air supply and non-hazardous gas regulation. Screwed connections make it easy to support in position without external sensing lines or other parts. Zinc or aluminum bodies eliminate rust and scale. Plug, seat and diaphragm are renewable in-line, and you can make quick adjustments externally with locking handle. Quarter-inch pressure gauge connection is standard, and all units are capable of tight shutoff for dead-end service.

GD-10 available in sizes 1/4" - 2." Highly efficient Model AF-10 air filters with zinc or aluminum bodies are used to remove liquids and solid particles from compressed air. The AF-10 is available in sizes 1/4" - 1"

**For a fully detailed certified drawing, refer to list below.**

**GD-10 CDY #1003**

**GD-10F CDY #1002**

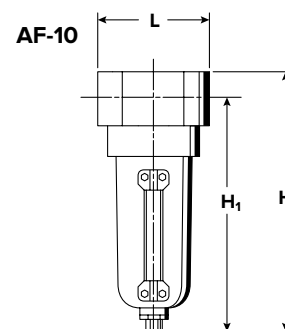
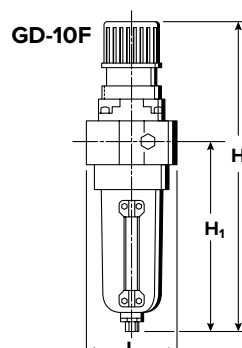
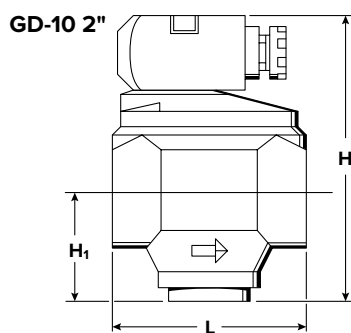
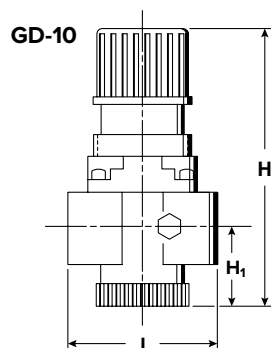
**AF-10 CDY #1004**

## GD-10/GD-10F/AF-10 Specifications

Model	Application	Inlet Pres. psig (barg)	Reduced Pressure psig (barg)	Min. Differ. psig (barg)	Max. Temp. °F (°C)	Materials				
						Body in (mm)	Bowl	Main Valve in (mm)	Valve Plug in (mm)	Diaphragm
GD-10	Air and Other Non-Corrosive Gases	15 - 300 (1 - 20)	5 - 125 (.34 - 8.6)	7 (.48)	175 (79)	Zinc 1/4, 3/8, 1/2, 3/4 (6, 9, 15, 20) Aluminum 1 - 2 (25 - 50)	—	Zinc 1/4, 3/8, 1/2, 3/4 (6, 9, 15, 20) Aluminum 1 - 2 (25 - 50)	Brass 1/4, 3/8, 1/2, 3/4 (6, 9, 15, 20) Nylon 1 - 2 (25 - 50)	Nitrile
GD-10F		15 - 250 (1 - 17)	5 - 125 (.34 - 8.6)	7 (.48)		Zinc			Brass	Nitrile
AF-10		0 - 250 (0 - 17)	—	—		Zinc 1/4, 3/8, 1/2, 3/4 (6, 9, 15, 20) Aluminum 1 (25)	—	—	—	—

## GD-10 Dimensions and Weights

Symbol	Connection Size											
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	1/4	8	3/8	10	1/2	15	3/4	20	1, 1-1/4, 1-1/2	25, 32, 40	2	50
L	2-5/8	67	2-5/8	67	2-5/8	67	3-1/2	98	4-1/4	108	6	152
H	5-3/8	136	5-3/8	136	5-3/8	136	5-7/8	149	7-1/8	181	9-3/4	248
H <sub>i</sub>	1-1/2	38	1-1/2	38	1-1/2	38	1-1/2	38	2-3/8	60	3-9/16	90
Wt, lb (kg)	1-1/2 (.7)		1-1/2 (.7)		1-1/2 (.7)		2 (.9)		3 (1.4)		10 (4.5)	
C <sub>v</sub>	1.4						2.6		5.8		43	





# Armstrong® GD-10, GD-10F, AF-10

## GD-10/GD-10F Capacities—Air

scfm						m³/hr					
Inlet	Outlet	Connection Size				Inlet	Outlet	Connection Size			
		in						mm			
psig		1/4, 3/8, 1/2	3/4	1", 1-1/4, 1-1/2	2**	barg		8, 10, 15	20	25*, 32, 40	50**
15	8	19	35	78	580	1.0	0.6	32	60	133	985
30	23	24	44	98	727	2.0	1.6	40	75	167	1 235
	15	33	61	136	1 011		1.0	56	104	232	1 718
	5 - 7	38	70	157	1 166		.34 - 48	64	120	267	1 981
40	33	26	49	109	810	2.8	2.3	45	83	186	1 377
	20	42	77	173	1 280		1.4	71	131	293	2 174
	5 - 12	46	86	192	1 427		.34 - .83	79	147	327	2 424
50	40	34	63	141	1 046	3.4	2.8	58	107	240	1 777
	30	46	86	191	1 416		2.1	78	145	324	2 405
	5 - 17	55	102	228	1 687		.34 - 1.17	93	173	387	2 867
75	60	49	91	203	1 503	5.2	4.1	83	154	344	2 553
	45	66	123	273	2 026		3.1	112	208	464	3 442
	7 - 30	76	141	316	2 339		.48 - 2.1	129	240	536	3 975
100	80	64	118	264	1 958	6.9	5.5	108	201	449	3 327
	60	86	159	355	2 634		4.1	146	271	604	4 475
	10 - 42	97	181	403	2 991		.69 - 2.9	165	307	686	5 082
125	100	79	146	326	2 413	8.6	6.9	134	248	553	4 101
	75	106	196	437	3 241		5.2	179	333	743	5 507
	13 - 55	119	220	491	3 643		.89 - 3.8	202	374	835	6 190
150	120	93	173	387	2 868	10.3	8.3	159	295	657	4 873
	85	129	240	535	3 967		5.9	219	408	909	6 741
	15 - 67	140	260	579	4 295		1.03 - 4.6	238	441	984	7 298
175	125	126	235	524	3 884	12.1	8.6	215	399	890	6 599
	100	149	276	617	4 573		6.9	253	470	1 048	7 769
	18 - 80	161	299	667	4 947		1.24 - 5.5	274	508	1 134	8 405
200	125	161	298	666	4 934	13.8	8.6	273	507	1 131	8 383
	20 - 92	182	339	755	5 599		1.38 - 6.3	310	575	1 283	9 513
250 <sup>†</sup>	25 - 125	225	417	931	6 903	17.2 <sup>†</sup>	1.7 - 8.6	382	709	1 582	11 729
300	30 - 125	267	496	1 107	8 207	20.0	2.1 - 8.6	454	843	1 881	13 944
350**	35 - 125	—	—	—	9 511	24.1**	2.4 - 8.6	—	—	—	16 159
425**	43 - 125	—	—	—	11 467	29.3**	3.0 - 8.6	—	—	—	19 482

\* GD-10F not available above 3/4" (20 mm).

\*\* 2" (50 mm) GD-10 valve maximum inlet pressure is 425 psig (30 barg).

† GD-10F has a maximum inlet pressure of 250 psig (17 barg).

## GD-10F Dimensions and Weights

Symbol	Connection Size							
	in	mm	in	mm	in	mm	in	mm
	1/4	8	3/8	10	1/2	15	3/4	20
L	2-3/4	70	2-3/4	70	2-3/4	70	3-7/8	98
H	9-3/8	238	9-3/8	238	9-3/8	238	10-7/8	276
H <sub>i</sub>	5-3/4	146	5-3/4	146	5-3/4	146	6-3/8	162
Wt, lb (kg)	2-1/2 (1.2)		2-1/2 (1.2)		4-1/2 (2.0)		4-1/2 (2.0)	
C <sub>v</sub>	1.4						2.6	

## AF-10 Dimensions and Weights

Symbol	Connection Size									
	in	mm	in	mm	in	mm	in	mm	in	mm
	1/4	8	3/8	10	1/2	15	3/4	20	1	25
L	2-3/4	70	2-3/4	70	2-3/4	70	3-7/8	98	4-3/4	121
H	6-3/8	162	6-3/8	162	6-3/8	162	7	178	11-3/8	289
H <sub>i</sub>	5-3/4	146	5-3/4	146	5-3/4	146	6-3/8	162	10	254
Wt, lb (kg)	2 (.9)					3 (1.4)				



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# GD-24

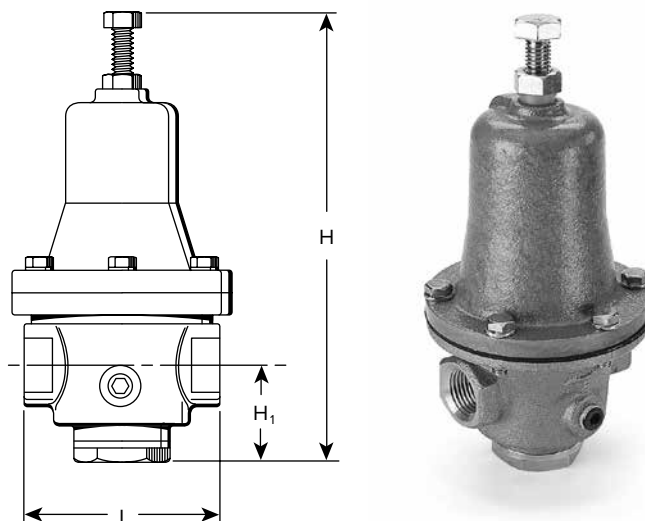


## For Non-Potable Water Service Only

An industrial-grade valve for non-potable water systems, the GD-24 is lightweight, compact and economical. Comes with screwed connections and will mount in any position. Requires no external sensing lines. Bronze body and high temperature diaphragm suitable for hot or cold process water service. Valve, seat and diaphragm are renewable in line. External adjusting screw with lock. Six sizes, 1/2" through 2". ANSI Class IV shutoff.

**Illegal for potable water service per SDWA section 1417 (As Amended).**

**For a fully detailed certified drawing, refer to CDY #1023.**



GD-24 Specifications								
Application	Maximum Pressure psig (barg)	Reduced Pressure Range psig (barg)	Minimum Differential psig (barg)	Maximum Temperature °F (°C)	Materials			
					Body	Main Valve	Valve Seat	Diaphragm
Hot or Cold Water	20 - 230 (1.3 - 16)	7 - 80 (.48 - 5.5)	7 (.48)	175* (79)	Cast Bronze ASTM 584		Stainless Steel AISI 304	NBR**

\*With Viton® diaphragm maximum temperature is 210°F (99°C).

\*\*Viton optional.

GD-24 Capacities—Water														
gpm								l/min						
ΔP	Connection Size							ΔP	Connection Size					
	in								mm					
DP (psig)	1/2	3/4	1	1-1/4	1-1/2	2		DP (barg)	15	20	25	32	40	50
7	4	5	8	11	19	26	0.5	15	20	30	40	70	100	
10	5	6	9	13	22	32	0.7	18	24	36	48	84	120	
15	6	8	12	15	27	39	1.0	22	29	44	59	103	147	
25	8*	10	15	20	35	50	1.7	30*	38	57	76	132	189	
50	11	14*	21	28	49	71	3.4	40	53*	80	107	187	268	
75	13	17	26*	35	61*	87	5.2	49	66	98*	131	231*	328	
100	15	20	30	40*	70	100*	6.9	57	76	114	151*	265	378*	
125	17	22	34	45	78	112	8.6	63	85	127	169	296	423	
150	18	24	37	49	86	122	10.3	70	93	139	185	325	464	
175	20	26	40	53	93	132	12.0	75	100	150	200	351	501	
200	21	28	42	57	99	141	13.8	80	107	161	214	375	535	

\*At flows greater than this, velocities will exceed 10 ft/sec and pipe erosion could occur.

NOTE: Maximum pressure reduction ratio 10:1.

GD-24 Dimensions and Weights												
Symbol	Connection Size											
	in											
	1/2	15	3/4	20	1	25	1-1/4	32	1-1/2	40	2	50
L	3-1/4	83	3-1/2	89	4	102	4-3/4	121	6	152	7-1/4	184
H <sub>1</sub>	1-3/4	45	2	51	2-1/2	64	3-1/4	83	3-1/2	89	4-1/2	115
H	7-3/4	197	8-1/2	216	9-5/8	245	11-1/4	286	13-1/2	343	16	407
Wt, lb (kg)	4	(1.8)	5-1/4	(2.4)	7-1/4	(3.3)	10-3/8	(4.7)	18	(8.2)	31-1/2	(14.3)
C <sub>v</sub>	1.5		2		3		4		7		10	

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

## For Air, Water, Non-Corrosive and Non-Viscous Liquids

The GD-200/200H offers high capacity and highly accurate control with a large, cupped diaphragm for a long stroke. Compact and rugged, the GD-200's composition valve and stainless steel seat mean high performance over a long service life. Well suited to non-viscous liquid pressure reduction, the valve is widely applied in domestic water

applications, construction equipment, irrigation, tank car loading and industrial or commercial air conditioning. Upstream variations do not affect balanced pressure valve, and composition disc assures tight shutoff. Turndown ratio is 10:1, and sizes range from 2" through 6". ANSI Class IV Shutoff.

### GD-200/200H Specifications

Model Number	Pressure			Spring Color	Application	Max. Temp. °F (°C)	Min. Diff. psig (barg)	Materials				
	Inlet psig (barg)	Reduced psig (barg)						Body	Main Valve	Valve Seat	Diaphragm	Connection
		2" - 3" (50 - 80 mm)	4" - 6" (100 - 150 mm)									
GD-200	150 (10)	7 - 36 (.48 - 2.5) 37 - 100 (2.5 - 6.9)	7 - 36 (.48 - 2.5) 37 - 72 (2.5 - 5.0)	Yellow	Liquid Gas	175 (79)**	7 (.48)	Ductile Iron ASTM A536	NBR	Stainless Steel AISI 304	NBR***	ANSI 150 lb. Fig.
GD-200H	300 (20)	*72 - 130 (4.9 - 8.8)	*72 - 108 (4.9 - 7.3)	Black								ANSI 300 lb. Fig.

\*This spring range for GD-200H only.

\*\*With Viton® diaphragm maximum temperature is 210°F (99°C).

\*\*\*Viton optional.

### GD-200/200H Capacities—Air

scfm									m3/hr							
Inlet	Outlet	Connection Size							Inlet	Outlet	Connection Size					
		in									mm					
psig		2	2-1/2	3	4	5	6		barg		50	65	80	100	125	150
15	8	216	377	485	917	1 011	1 456		1.03	0.55	366	641	824	1 557	1 718	2 473
20	13	235	412	530	1 000	1 103	1 589	1.38	0.90	400	700	900	1 699	1 874	2 699	
	7	305	534	686	1 296	1 429	2 058		0.48	518	907	1 166	2 202	2 428	3 497	
25	18	254	444	570	1 077	1 188	1 711	1.72	1.24	431	754	969	1 831	2 019	2 907	
	7	374	655	842	1 591	1 755	2 527		0.48	636	1 113	1 431	2 703	2 981	4 293	
30	23	270	473	609	1 149	1 268	1 826	2.07	1.59	459	804	1 034	1 953	2 154	3 102	
	7	440	770	990	1 870	2 063	2 970		0.48	748	1 308	1 682	3 178	3 505	5 047	
40	32	321	561	722	1 363	1 503	2 165	2.76	2.21	545	954	1 226	2 316	2 554	3 678	
	20	476	833	1 071	2 024	2 232	3 214		1.38	459	804	1 034	1 953	2 154	3 102	
	7 - 12	531	929	1 194	2 256	2 488	3 583		.48 - .83	902	1 578	2 029	3 833	4 227	6 087	
50	40	389	681	875	1 654	1 824	2 626	3.45	2.76	661	1 157	1 487	2 810	3 099	4 462	
	30	527	922	1 185	2 239	2 469	3 555		2.07	809	1 416	1 820	3 438	3 792	5 461	
	7 - 17	628	1 099	1 413	2 668	2 943	4 238		.48 - 1.17	1 067	1 867	2 400	4 534	5 000	7 200	
60	48	457	800	1 029	1 943	2 143	3 086	4.14	3.31	777	1 360	1 748	3 302	3 642	5 244	
	35	628	1 099	1 413	2 669	2 944	4 239		2.41	895	1 566	2 014	3 803	4 195	6 041	
	7 - 22	725	1 269	1 631	3 081	3 398	4 893		.48 - 1.5	1 232	2 155	2 771	5 234	5 773	8 313	
75	60	559	979	1 258	2 377	2 621	3 775	5.17	4.14	950	1 663	2 138	4 038	4 453	6 413	
	45	754	1 319	1 696	3 204	3 534	5 089		3.10	1 067	1 867	2 401	4 535	5 001	7 202	
	7 - 30	870	1 523	1 959	3 699	4 080	5 876		.48 - 2.1	1 479	2 588	3 328	6 285	6 932	9 983	
100	80	729	1 275	1 640	—	—	—	6.89	5.52	1 238	2 167	2 786	—	—	—	
	60	980	1 715	2 205	4 166	4 594	6 616		4.14	1 281	2 241	2 882	5 444	6 004	8 646	
	10 - 42	1 113	1 948	2 504	4 730	5 217	7 513		.69 - 2.9	1 891	3 309	4 255	8 037	8 864	12 765	
125	100	898	1 572	2 021	—	—	—	8.62	6.89	1 526	2 670	3 433	—	—	—	
	70	1 206	2 111	2 714	5 317	5 864	8 444		5.17	1 665	2 914	3 747	7 077	7 806	11 241	
	13 - 55	1 356	2 372	3 050	5 762	6 355	9 151		.89 - 3.8	2 303	4 031	5 182	9 789	10 796	15 547	
150	100	1 331	2 329	2 995	—	—	—	10.34	6.89	2 261	3 957	5 088	—	—	—	
	80	1 517	2 655	3 414	—	—	—		5.52	2 049	3 586	4 610	—	—	—	
	15 - 67	1 598	2 797	3 596	6 793	7 492	10 788		1.03 - 4.6	2 715	4 752	6 110	11 541	12 729	18 329	
180	100	1 772	3 100	3 986	—	—	—	12.41	6.89	3 010	5 268	6 773	—	—	—	
	90	1 848	3 235	4 159	—	—	—		6.21	2 578	4 512	5 801	—	—	—	
	18 - 80	1 889	3 306	4 251	8 030	8 856	12 753		1.24 - 5.5	3 210	5 618	7 223	13 643	15 047	21 668	
200	100	2 044	3 577	4 598	—	—	—	13.79	6.89	3 472	6 077	7 813	—	—	—	
	20 - 92	2 083	3 646	4 688	8 855	9 766	14 063		1.38 - 6.3	3 540	6 195	7 965	15 044	16 593	23 894	
250	25 - 100	2 569	4 495	5 779	10 917	12 041	17 338	17.24	1.72 - 6.9	4 364	7 637	9 819	18 548	20 457	29 458	
300	25 - 100	3 054	5 344	6 871	12 979	14 315	20 613	20.00	1.72 - 6.9	5 188	9 080	11 674	22 051	24 321	35 022	

NOTE: Maximum pressure reduction ratio 10:1.

NOTES: Available in sizes below 2" upon request. Differential valve (GD-21) available upon request.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# GD-200/200H



## GD-200/200H Capacities—Water

gpm								l/min						
ΔP	Connection Size							ΔP	Connection Size					
	in								mm					
DP (psig)	2	2-1/2	3	4	5	6		DP (barg)	50	65	80	100	125	150
7	42	74	95	180	198	286	0.5	160	280	361	681	751	1 082	
10	51	89	114	215	237	342	0.7	192	335	431	814	898	1 293	
15	62	108	139	263	290	418	1.0	235	411	528	997	1 100	1 583	
20	72	125	161	304	335	483	1.4	271	474	609	1 151	1 270	1 828	
25	80	140*	180	340	375	540	1.7	303	530*	681	1 287	1 420	2 044	
35	95*	166	213*	402*	444	639	2.4	360*	627	806*	1 520*	1 680	2 419	
50	113	198	255	481	530*	764	3.4	428	749	964	1 820	2 006*	2 891	
75	139	242	312	589	650	900*	5.2	525	918	1 180	2 229	2 459	3 407*	
100	160	280	360	680	750	1 080	6.9	606	1 060	1 363	2 574	2 839	4 088	
125	179	313	402	760	839	1 207	8.6	677	1 185	1 524	2 878	3 174	4 571	
150	196	343	441	833	919	1 323	10.0	742	1 298	1 669	3 153	3 477	5 007	

\*At flows greater than this, velocities will exceed 10 ft/sec and pipe erosion could occur.

NOTE: Minimum flow is 1.3 gpm (4.9 l/min).

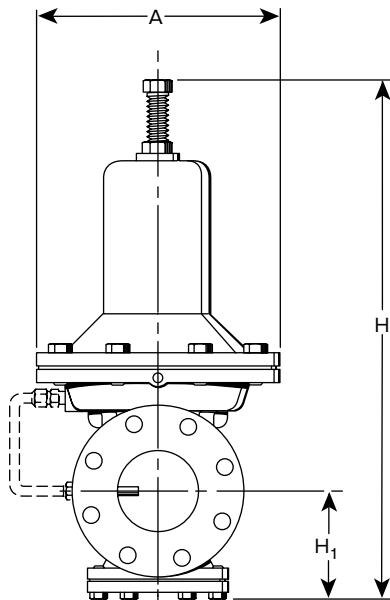
## GD-200/200H Dimensions and Weights

Size		GD-200 Face-to-Face		GD-200H Face-to-Face		A		H		H <sub>1</sub>		C <sub>v</sub>	Weight	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm		lb	kg
2	50	7-5/8	195	7-7/8	200	6	152	16-1/4	415	3-1/8	81	16	43	19.2
2-1/2	65	10-5/8	270	10-7/8	277	7	178	21-1/2	550	4-1/16	105	28	88	40.0
3	80	10-5/8	270	11-1/8	283	7-1/2	191	22-9/16	577	4-9/16	120	36	97	43.7
4	100	12-1/8	308	12-3/4	342	9	229	25-1/6	637	5-1/4	135	68	154	70.0
5	125	15	380	15-7/8	403	10	254	33	839	6-1/2	169	75	317	144.0
6	150	15-3/4	400	16-5/8	422	11	280	35-9/16	908	7-1/2	194	108	381	173.0

For a fully detailed certified drawing, refer to:

GD-200 CD #2106

GD-200H CD #2107



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

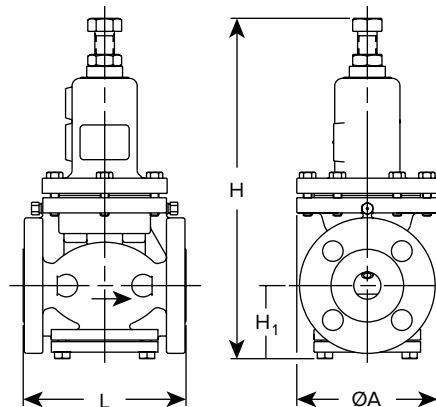
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## For Water, Non-Corrosive and Non-Viscous Liquids

The GD-20R offers high capacity and highly accurate control with a large, cupped diaphragm for a long stroke. Compact and rugged, the GD-20R's composition valve and stainless steel seat mean high performance over a long service life. It is mainly used in heating and cooling equipment, and automatically regulates the pressure according to load fluctuations. It can be used in by-pass systems to prevent pump shutoff and to maintain a constant fluid pressure in the line. Turndown ratio is 10:1, and sizes range from 1/2" through 6".

For a fully detailed certified drawing, refer to CDY #1100.



### GD-20R Capacities—Water

gpm										l/min									
ΔP	Connection Size									ΔP	Connection Size								
DP (psig)	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	DP (barg)	15	20	25	32	40	50	65	80	100
7	4	7	11	22	29	37	61	86	127	0.5	15	27	40	85	110	140	230	325	481
10	5	9	13	27	35	44	73	103	152	0.7	18	32	48	102	132	168	275	389	575
15	6	10	15	33	43	54	89	126	186	1.0	22	40	59	125	161	205	337	476	704
25	8*	14*	20	43*	55*	70	115	163	240	1.7	30*	53*	76	162*	208*	265	435	615	908
50	11	19	28*	60	78	99*	163*	230*	339	3.4	40	72	106*	228	294	374*	617*	870*	1285
75	13	23	35	74	95	121	199	281	416*	5.2	49	89	131	279	361	459	754	1065	1575*
100	15	27	40	85	110	140	230	325	480	6.9	57	102	151	322	416	530	871	1230	1817

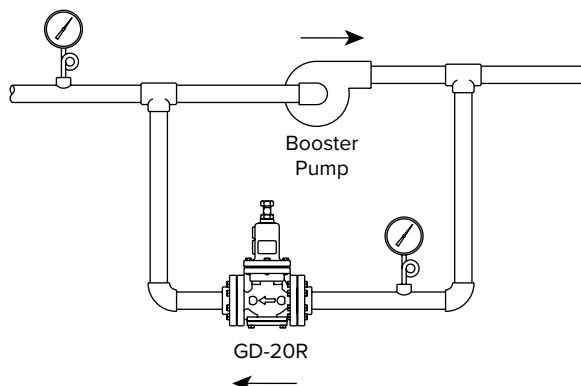
\*At flows greater than this, velocities will exceed 10 ft/sec and pipe erosion could occur.

### GD-20R Dimensions and Weights

Symbol	Connection Size																					
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	15	3/4	20	1	25	1-1/4	32	1-1/2	40	2	50	2-1/2	65	3	80	4	100	5	125	6	150
L	5-11/16	145	5-15/16	150	5-15/16	150	7-11/16	195	7-11/16	195	7-11/16	195	10-5/8	270	10-5/8	270	12-1/8	308	15-1/8	384	15-15/16	404
H	11-5/8	296	11-5/8	296	12-1/2	317	15-9/16	395	15-9/16	395	16-5/16	415	21-7/8	555	22-15/16	582	25-3/8	645	33-7/16	849	36-1/8	918
H <sub>1</sub>	2-1/4	57	2-1/4	57	2-5/8	67	3	76	3	76	3-3/16	81	4-5/16	110	4-15/16	125	5-5/8	143	7-1/16	179	8-1/16	204
Wt., lb (kg)	18 (8)		18 (8)		22 (10)		37 (17)		37 (17)		42 (19)		88 (40)		96 (44)		156 (71)		320 (145)		386 (175)	
C <sub>v</sub>	1.5		2.7		4		8		11		14		23		32		48		75		108	

### GD-20R Specifications

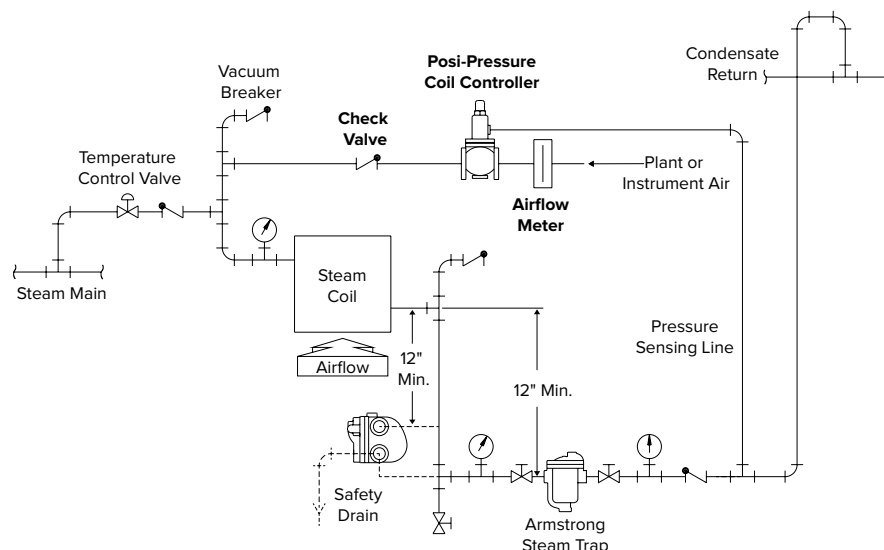
Pressure	Set Pressure		Spring Color	Application	Max. Temp. °F (°C)	Min. Diff. psig (barg)	Materials			
	1/2" - 3" (15 - 80 mm)	4" - 6" (100 - 150 mm)					Main Valve	Valve Seat	Diaphragm	Connection
150 (10)	7 - 36 (.48 - 2.5) 37 - 100 (2.5 - 6.9)	7 - 36 (.48 - 2.5) 37 - 72 (2.5 - 5.0)	Yellow Black	Liquid	175 (79)	7 (.48)	NBR	Stainless Steel AISI 304	NBR	ANSI 150 lb. Flanged



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# Armstrong Posi-Pressure Control System

A Revolutionary Way to Provide Positive Condensate Drainage for Heat Exchange Equipment



**Posi-Pressure Control System Suggested Installation**



Posi-Pressure Control System Kit, consisting of controller, check valve, airflow meter

## Forget About Flooded Heat Exchangers

The major cause of flooded heat exchangers is a lack of sufficient pressure differential across the steam trap under modulated steam conditions. With Armstrong's Posi-Pressure Control System, there is always a minimum preset differential pressure between the heat exchanger and the condensate return system. Even if the pressure in the condensate return changes, the Posi-Pressure Controller automatically adjusts to maintain the preset differential.

## Forget About Water Hammer

When heat exchangers flood, steam and cold condensate frequently come in contact with each other. When this happens, the steam rapidly condenses, causing water hammer. This water hammer condition can cause damage to heat exchangers, piping and fittings. By eliminating heat exchanger flooding, the Posi-Pressure Control System will solve the problem.

## Forget About Frozen Steam Coils

Most steam coils freeze because they are flooded with condensate. Costly—bulky—and high maintenance face and by-pass coil systems were created to solve this problem by maintaining a positive differential steam pressure. Now, with Armstrong's Posi-Pressure Control System, simple and inexpensive modulated control systems can do the same job. However, we must caution that proper steam coil design, steam trapping and venting practices are also required for freeze protection. If assistance is needed, Armstrong's Representatives are trained to analyze your total steam system and offer you solutions to your problems.

## How Does the Posi-Pressure Control System Work?

A normal steam system may modulate into a vacuum to control temperature. A vacuum breaker is often installed to prevent this condition. Once the vacuum breaker opens, temperature control is accomplished by mixing the air with the steam. The steam/air mixture results in a lower temperature. However,

even a vacuum breaker will not work if condensate has to be elevated to an overhead return, or if the return system is pressurized.

The Posi-Pressure Control System acts as a vacuum breaker. Instead of introducing air at atmospheric pressure, the controller injects air at an elevated pressure into the heat exchanger. The user presets the level of elevated air pressure at the time of installation. Rather than a specific pressure, the controller maintains a specific differential pressure across the steam trap. Even if a steam trap fails or other causes change the condensate return pressure, the controller will sense this difference and maintain the preset differential.

## How Much Air Will Be Used?

The Posi-Pressure Control System uses very little air. The amount depends upon the size of the steam trap selected. Air usage can vary from as little as 10 SCFH to 90 SCFH or more on large systems. To put this in perspective, a 27 SCFH parcel of air amounts to a 3-foot cube in one hour! Once the initial air is introduced, only the leakage through the large vent bucket in the steam trap must be added. This air volume is so low that it is practically undetectable in a deaerator.

## Are There Any Other Advantages?

Yes! It is generally recommended that float and thermostatic traps be used on modulated steam systems because they drain better when there is no motive pressure other than the static head of condensate. With a positive pressure always being maintained by the Posi-Pressure Control System, an inverted bucket steam trap with its inherent longer life expectancy can, and must, be used. Since air is injected at a positive pressure, carbon dioxide (the real cause of corrosion) is diluted and swept clear of the heat exchanger.

**For a fully detailed certified drawing, refer to CDY #1041.**

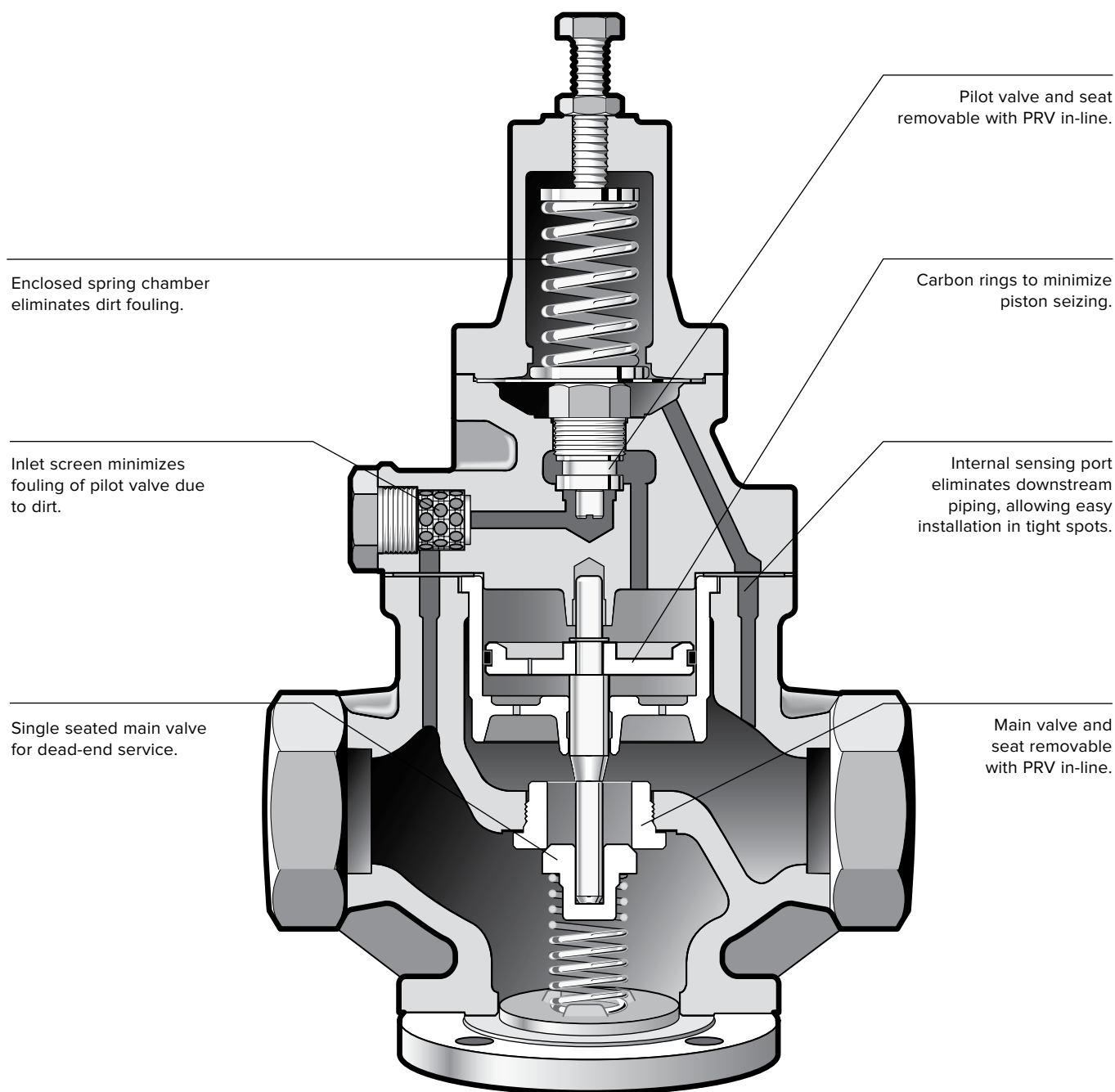
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



### For Steam, Air and Non-Corrosive Gas Service

This type of PRV incorporates two valves—a pilot and main valve—in one unit. The pilot valve has a design similar to the direct acting valve. The discharge pressure from the pilot valve is transmitted on top of a piston which opens the main valve. This design makes use of inlet pressure in opening a

larger main valve than could otherwise be opened directly. As a result, there is a greater capacity per line size and greater accuracy ( $\pm 5\%$ ) than with the direct acting valve.



# GP-1000



## For Steam, Air and Non-Corrosive Gas

The GP-1000 Series valves are pilot-controlled for accurate regulation of pressure under wide-ranging flow. Internal pilot design eliminates external components and piping.

Internally piloted GP Series valves are capable of larger capacity and greater accuracy than direct acting valves.

Completely supported by piping, lightweight GP Series valves install easily with NPT or flanged connections. A stainless steel diaphragm, hardened stainless steel working parts and integral removable strainer team up to provide

high performance over a long, trouble-free service life. Valves are equipped with a single seated main valve, piston valve rings for longer life and an external adjusting screw with locking nut. All working parts are renewable in-line. ANSI Class IV Shutoff.

For a fully detailed certified drawing, refer to list below.

**GP-1000 NPT** **CD #2104**  
**GP-1000 Flanged** **CD #2105**  
**GP-1000 SS/AS** **CDY #1081**

GP-1000											
Model Number	Pressure		Spring Color	Application	Maximum Temp. °F (°C)	Minimum Diff. psig (barg)	Body	Main Valve/ Valve Seat	Pilot Valve/ Seat	Piston/Cylinder	Diaphragm
	Inlet psig (barg)	Reduced psig (barg)									
NPT GP-1000	15 - 250 (1 - 17)	7 - 125 (.48 - 8.6)	Black	Steam	450 (232)	7 (.48)	Ductile Iron ASTM A536	Stainless Steel AISI 420	Stainless Steel AISI 403/420	Stainless Steel AISI 420/Stainless Steel AISI 403	Stainless Steel AISI 301
150 ANSI GP-1000		125 - 200 (8.6 - 13.8)	Green								
NPT GP-1000A	15 - 150 (1 - 10)	7 - 125 (.48 - 8.6)	Black	Air & Gas	175 (80)			Stainless Steel AISI 420/ Brass w/NBR	Bronze/Bronze ASTM C36000		
150 ANSI GP-1000A	15 - 150 (1 - 10)	7 - 125 (.48 - 8.6)									
GP-1000SS* GP-1000AS*	15 - 150 (1 - 10)	7 - 125 (.48 - 8.6)				Steam	450 (232)			Stainless Steel AISI 304	Stainless Steel AISI 420

NOTES: Sizes 2" (50 mm) and below are NPT connections. Sizes 2" (50 mm) and larger are flanged connections.

Turndown ratio for GP-1000 20:1.

\*GP-1000SS/GP-1000AS are available in 1/2" - 2" only and are flanged with NPT companion flanges.

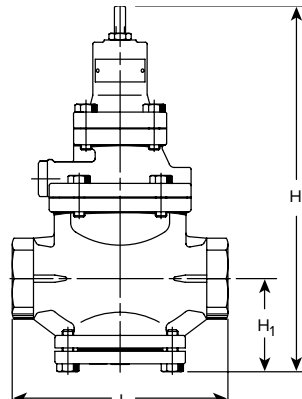
GP-1000, GP-1000A, GP-1000SS, GP-1000AS Dimensions and Weights																	
Symbol	Connection Size																
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
	1/2	15	3/4	20	1	25	1-1/4	32	1-1/2	40	2*	50	2-1/2	65	3	80	4
L	5-7/8	150	6-1/8	155	6-5/16	160	7-1/2	190	7-1/2	190	8-11/16	220	9-5/8	245	11-3/8	290	13
H	11-1/4	285	11-1/4	285	11-7/8	300	12-3/4	323	12-3/4	323	13-5/8	347	14	357	15-7/8	404	17-3/4
H <sub>1</sub>	2-1/2	64	2-1/2	64	2-5/8	67	3-1/4	82	3-1/4	82	3-11/16	93	4	100	4-13/16	122	5-9/16
Wt, lb (kg)	15-1/2 (7)		15-1/2 (7)		19 (8.5)		25-1/2 (12)		27-1/2 (12.5)		40 (18)		66 (30)		77 (35)		116 (53)
C <sub>v</sub>	1		2.3		4		6.5		9		16		25		36		64

NOTES: GP-1000 is 1/2"-2" (20-50 mm) NPT, 2"- 4" (50-100 mm) ANSI 150 lb flanged.

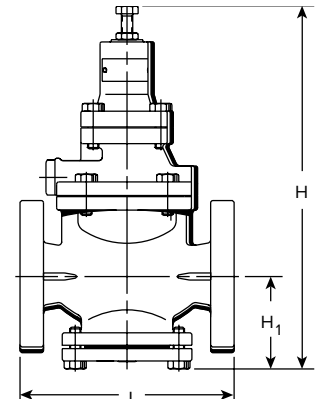
\* "L" Dimension for 2" 150# flange is 8-11/16" (220 mm).



GP-1000



GP-1000 NPT 1/2" - 2"



GP-1000 150 FL 2" - 4"

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

## For Steam Service

The GP-2000 is a high performance, externally piloted reducing valve for large capacity requirements. Typical use is on intermittent service, including applications such as heat exchangers, steam coils, rotating dryers, process equipment and heating systems. With a 20:1 rangeability and high  $C_v$ , the GP-2000 is reliable and accurate (+/-1% of pressure set point from 5% to 100% of flow) over a long, trouble-free service life. Hardened stainless steel working parts

are renewable in-line. Single seated for dead-end service. Available with both NPT (1/2" - 2") and flanged connections in 1/2" - 6" sizes. ANSI Class IV Shutoff.

For a fully detailed certified drawing, refer to:

**GP-2000** **CDY #1008**

**GP-2000 Flanged** **CDY #1007**

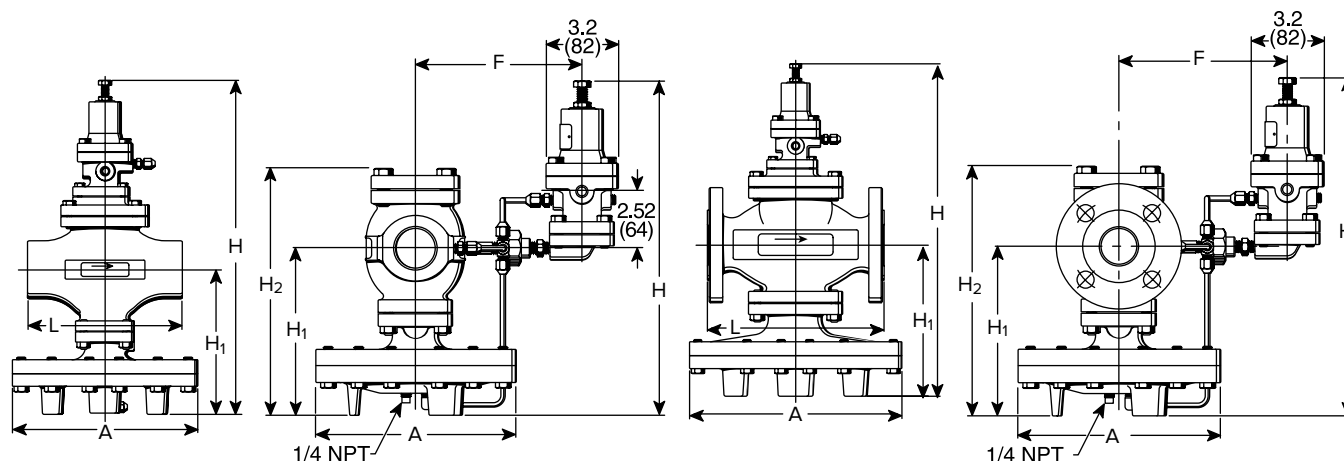
GP-2000 Specifications										
Application	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Spring Color	Maximum Temperature °F (°C)	Minimum Differential psig (barg)	Materials				
						Body	Main Valve/Seat	Pilot Valve/Seat	Diaphragm	Color
Steam	NPT 15 - 300 (1 - 20)	*1.5 - 3 (.10 - .21)	Yellow Yellow Green	450 (232)	7 (.48)	Ductile Iron ASTM A536	Stainless Steel AISI 420		Stainless Steel AISI 301	Dark Gray
	15 - 185 (1 - 13) 150 lb. Flanged	3 - 21 (.21 - 1.4)								
	15 - 300 (1 - 20) 300 lb. Flanged	15 - 200 (1 - 13.8)								

\*NOTE: When using this spring range, remove one (1) pilot diaphragm. Capacities are reduced by 1/2 of capacity chart when this spring is being used.

GP-2000 Dimensions and Weights																											
Size		Face-to-Face “L”						A		F		H Integral		H Remote		H <sub>1</sub>		H <sub>2</sub>		Weight						C <sub>v</sub>	
		NPT		150#		300#														NPT		150#		300#			
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	lb	kg		
1/2	15	5-15/16	150	—	—	—	—	7-15/16	200	6-7/8	176	15-3/4	398	14-1/4	362	6-3/4	170	9-5/8	244	34	14	36	15	42	19	5.0	
3/4	20	5-15/16	150	—	—	—	—	7-15/16	200	6-7/8	176	15-3/4	398	14-1/4	362	6-3/4	170	9-5/8	244	34	14	36	15	42	19	7.2	
1	25	6-5/16	160	5-3/4	147	—	—	8-15/16	226	7-1/16	179	15-15/16	404	14-7/16	367	6-15/16	175	10	254	44	19	48	20	54	23	10.9	
1-1/4	32	7-1/8	180	6-1/2	166	—	—	8-15/16	226	7-7/16	188	17-1/8	434	15-1/8	384	7-5/8	192	11-1/8	283	51	22	53	22	59	25	14.3	
1-1/2	40	7-1/8	180	7-7/16	189	—	—	8-15/16	226	7-7/16	188	17-1/8	434	15-1/8	384	7-5/8	192	11-1/8	283	51	22	55	23	61	26	18.8	
2	50	9-1/8	230	8-9/16	217	9-1/8	232	10-15/16	276	7-11/16	195	19-5/8	498	16	406	8-1/2	216	12-5/8	321	75	33	81	36	84	36	32	
2-1/2	65	—	—	10-15/16	278	11-1/2	292	13-13/16	352	8-5/16	211	21-3/4	552	17-5/16	440	9-13/16	251	14-3/4	375	—	—	142	65	150	65	60	
3	80	—	—	11-3/4	298	12-7/16	315	13-13/16	352	8-3/4	222	22-5/8	575	17-15/16	456	10-7/16	264	15-3/4	400	—	—	155	69	166	72	78	
4	100	—	—	13-1/2	343	14-1/8	359	15-13/16	401	9-7/16	239	25-15/16	658	20-1/8	511	12-5/8	321	19-1/4	489	—	—	247	112	264	119	120	
6	150	—	—	18-1/8	460	19	483	19-3/4	502	—	—	31-3/4	806	—	—	16-1/4	414	26-1/2	673	—	—	507	230	553	252	220	

\*50% reduced port available for sizes 1/2" - 4". The C<sub>v</sub> value should be divided by 2 to get reduced port C<sub>v</sub>.

For capacities see page 305.



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# GP-2000L



## For Steam Service

The GP-2000L is a high performance, externally piloted reducing valve for large capacity and low inlet pressure requirements. The GP-2000L is reliable and accurate (+/-1% of pressure set point from 5% to 100% of flow) over a long, trouble-free service life. Hardened stainless steel working

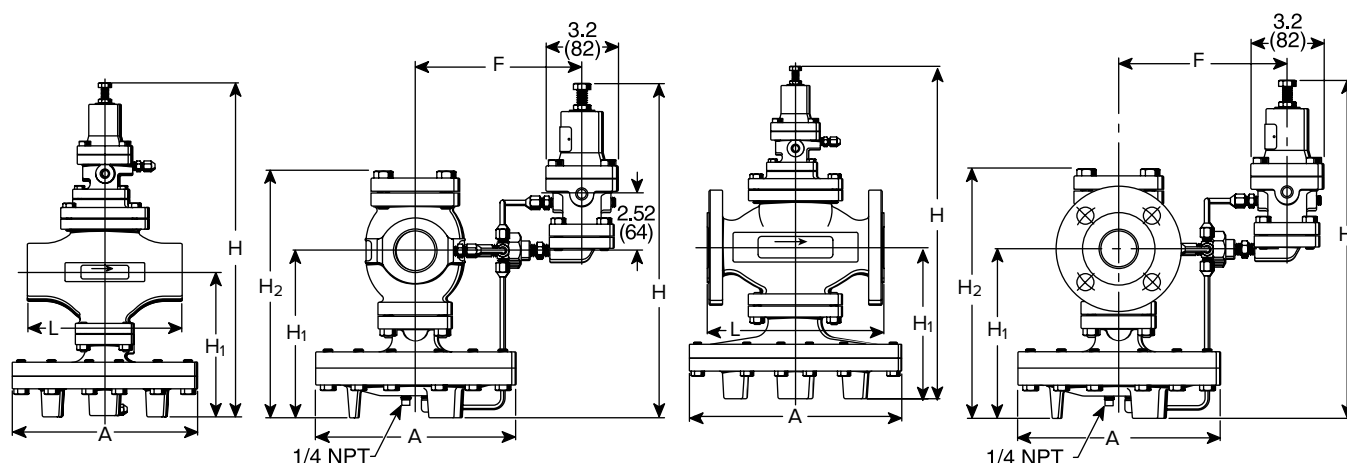
parts are renewable in-line. Single seated for dead-end service. Available with both NPT (1/2" - 2") and flanged connections in 1/2" - 4" sizes. ANSI Class IV Shutoff.

GP-2000L Specifications										
Application	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Spring Color	Maximum Temperature °F (C)	Minimum Differential psig (barg)	Materials				
						Body	Main Valve/ Seat	Pilot Valve/ Seat	Diaphragm	Color
Steam	5 - 15 (.3 - 1)	2 - 12 (.13 - .8)	Yellow	450 (232)	3 (.21)	Ductile Iron ASTM A536	Stainless Steel AISI 420		Stainless Steel AISI 301	Dark Gray

GP-2000L Dimensions and Weights																											
Size		Face-to-Face "L"						A		F		H Integral		H Remote		H <sub>1</sub>		H <sub>2</sub>		Weight						C <sub>V</sub>	
		NPT		150#		300#														NPT	150#		300#				
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	lb	kg		
1/2	15	5-15/16	150	—	—	—	—	7-15/16	200	6-7/8	176	15-3/4	398	14-1/4	362	6-3/4	170	9-5/8	244	34	14	36	15	42	19	5.0	
3/4	20	5-15/16	150	—	—	—	—	7-15/16	200	6-7/8	176	15-3/4	398	14-1/4	362	6-3/4	170	9-5/8	244	34	14	36	15	42	19	7.2	
1	25	6-5/16	160	5-3/4	147	—	—	8-15/16	226	7-1/16	179	15-15/16	404	14-7/16	367	6-15/16	175	10	254	44	19	48	20	54	23	10.9	
1-1/4	32	7-1/8	180	6-1/2	166	—	—	8-15/16	226	7-7/16	188	17-1/8	434	15-1/8	384	7-5/8	192	11-1/8	283	51	22	53	22	59	25	14.3	
1-1/2	40	7-1/8	180	7-7/16	189	—	—	8-15/16	226	7-7/16	188	17-1/8	434	15-1/8	384	7-5/8	192	11-1/8	283	51	22	55	23	61	26	18.8	
2	50	9-1/8	230	8-9/16	217	9-1/8	232	10-15/16	276	7-11/16	195	19-5/8	498	16	406	8-1/2	216	12-5/8	321	75	33	81	36	84	36	32	
2-1/2	65	—	—	10-15/16	278	11-1/2	292	13-13/16	352	8-5/16	211	21-3/4	552	17-5/16	440	9-13/16	251	14-3/4	375	—	—	142	65	150	65	60	
3	80	—	—	11-3/4	298	12-7/16	315	13-13/16	352	8-3/4	222	22-5/8	575	17-15/16	456	10-7/16	264	15-3/4	400	—	—	155	69	166	72	78	
4	100	—	—	13-1/2	343	14-1/8	359	15-13/16	401	9-7/16	239	25-15/16	658	20-1/8	511	12-5/8	321	19-1/4	489	—	—	247	112	264	119	120	

\*50% reduced port available for sizes 1/2" - 4". The C<sub>V</sub> value should be divided by 2 to get reduced port C<sub>V</sub>.

For capacities see page 315.



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

## For Steam Service

The GP-2000 is a high performance, externally piloted reducing valve for large capacity requirements. Typical use is on intermittent service, including applications such as heat exchangers, steam coils, rotating dryers, process equipment and heating systems. With a 20:1 rangeability and high  $C_v$ , the GP-2000 is reliable and accurate (+/-1% of pressure set point from 5% to 100% of flow) over a long, trouble-free service life. Hardened stainless steel working parts

are renewable in-line. Single seated for dead-end service. Available with both NPT (1/2" - 2") and flanged connections in 1/2" - 6" sizes. ANSI Class IV Shutoff.

For a fully detailed certified drawing, refer to:

**GP-2000** **CDY #1008**

**GP-2000 Flanged** **CDY #1007**

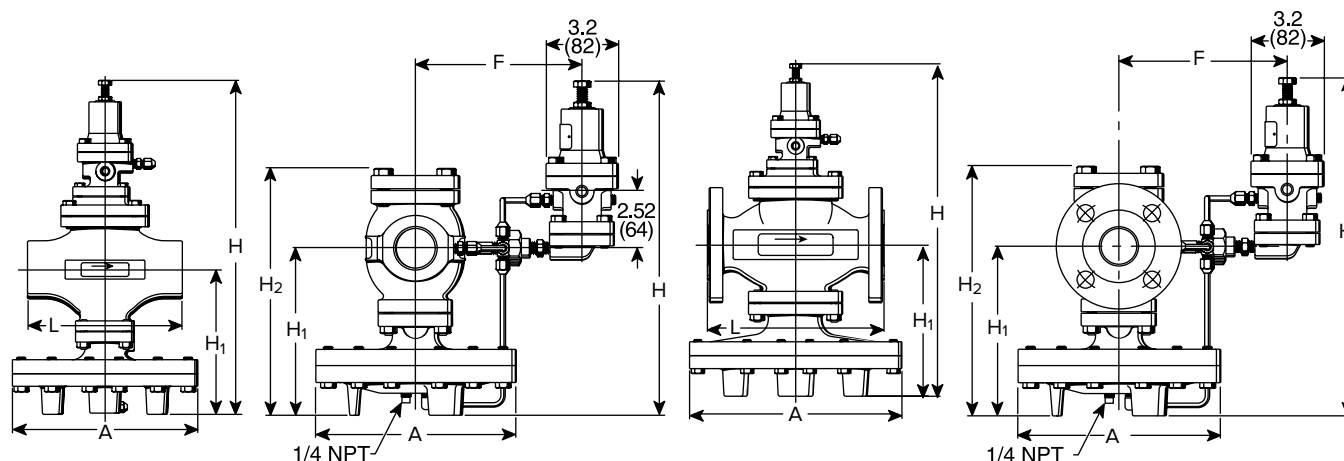
GP-2000 Specifications										
Application	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Spring Color	Maximum Temperature °F (°C)	Minimum Differential psig (barg)	Materials				
						Body	Main Valve/Seat	Pilot Valve/Seat	Diaphragm	Color
Steam	NPT 15 - 300 (1 - 20)	*1.5 - 3 (.10 - .21)	Yellow Yellow Green	450 (232)	7 (.48)	Ductile Iron ASTM A536	Stainless Steel AISI 420		Stainless Steel AISI 301	Dark Gray
	15 - 185 (1 - 13) 150 lb. Flanged	3 - 21 (.21 - 1.4)								
	15 - 300 (1 - 20) 300 lb. Flanged	15 - 200 (1 - 13.8)								

\*NOTE: When using this spring range, remove one (1) pilot diaphragm. Capacities are reduced by 1/2 of capacity chart when this spring is being used.

GP-2000 Dimensions and Weights																											
Size		Face-to-Face “L”						A		F		H Integral		H Remote		H <sub>1</sub>		H <sub>2</sub>		Weight						C <sub>v</sub>	
		NPT		150#		300#														NPT		150#		300#			
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	lb	kg		
1/2	15	5-15/16	150	–	–	–	–	7-15/16	200	6-7/8	176	15-3/4	398	14-1/4	362	6-3/4	170	9-5/8	244	34	14	36	15	42	19	5.0	
3/4	20	5-15/16	150	–	–	–	–	7-15/16	200	6-7/8	176	15-3/4	398	14-1/4	362	6-3/4	170	9-5/8	244	34	14	36	15	42	19	7.2	
1	25	6-5/16	160	5-3/4	147	–	–	8-15/16	226	7-1/16	179	15-15/16	404	14-7/16	367	6-15/16	175	10	254	44	19	48	20	54	23	10.9	
1-1/4	32	7-1/8	180	6-1/2	166	–	–	8-15/16	226	7-7/16	188	17-1/8	434	15-1/8	384	7-5/8	192	11-1/8	283	51	22	53	22	59	25	14.3	
1-1/2	40	7-1/8	180	7-7/16	189	–	–	8-15/16	226	7-7/16	188	17-1/8	434	15-1/8	384	7-5/8	192	11-1/8	283	51	22	55	23	61	26	18.8	
2	50	9-1/8	230	8-9/16	217	9-1/8	232	10-15/16	276	7-11/16	195	19-5/8	498	16	406	8-1/2	216	12-5/8	321	75	33	81	36	84	36	32	
2-1/2	65	–	–	10-15/16	278	11-1/2	292	13-13/16	352	8-5/16	211	21-3/4	552	17-5/16	440	9-13/16	251	14-3/4	375	–	–	142	65	150	65	60	
3	80	–	–	11-3/4	298	12-7/16	315	13-13/16	352	8-3/4	222	22-5/8	575	17-15/16	456	10-7/16	264	15-3/4	400	–	–	155	69	166	72	78	
4	100	–	–	13-1/2	343	14-1/8	359	15-13/16	401	9-7/16	239	25-15/16	658	20-1/8	511	12-5/8	321	19-1/4	489	–	–	247	112	264	119	120	
6	150	–	–	18-1/8	460	19	483	19-3/4	502	–	–	31-3/4	806	–	–	16-1/4	414	26-1/2	673	–	–	507	230	553	252	220	

\*50% reduced port available for sizes 1/2" - 4". The C<sub>v</sub> value should be divided by 2 to get reduced port C<sub>v</sub>.

For capacities see page 305.



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# GP-2000L



## For Steam Service

The GP-2000L is a high performance, externally piloted reducing valve for large capacity and low inlet pressure requirements. The GP-2000L is reliable and accurate (+/-1% of pressure set point from 5% to 100% of flow) over a long, trouble-free service life. Hardened stainless steel working

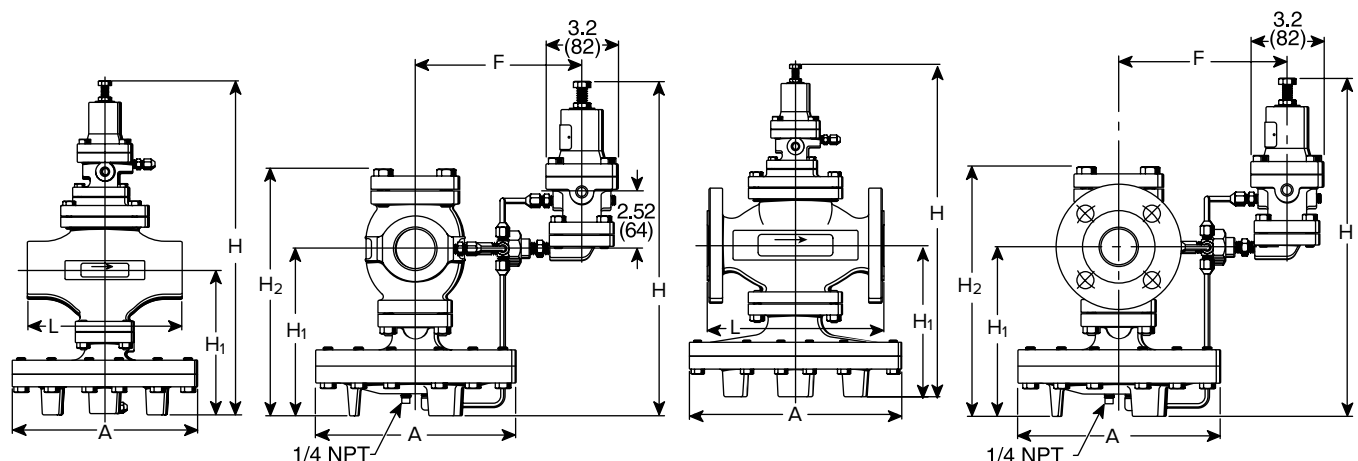
parts are renewable in-line. Single seated for dead-end service. Available with both NPT (1/2" - 2") and flanged connections in 1/2" - 4" sizes. ANSI Class IV Shutoff.

GP-2000L Specifications										
Application	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Spring Color	Maximum Temperature °F (C)	Minimum Differential psig (barg)	Materials				
						Body	Main Valve/Seat	Pilot Valve/Seat	Diaphragm	Color
Steam	5 - 15 (.3 - 1)	2 - 12 (.13 - .8)	Yellow	450 (232)	3 (.21)	Ductile Iron ASTM A536	Stainless Steel AISI 420		Stainless Steel AISI 301	Dark Gray

GP-2000L Dimensions and Weights																											
Size		Face-to-Face “L”						A		F		H Integral		H Remote		H <sub>1</sub>		H <sub>2</sub>		Weight						C <sub>v</sub> *	
		NPT		150#		300#														NPT		150#		300#			
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	lb	kg		
1/2	15	5-15/16	150	–	–	–	–	7-15/16	200	6-7/8	176	15-3/4	398	14-1/4	362	6-3/4	170	9-5/8	244	34	14	36	15	42	19	5.0	
3/4	20	5-15/16	150	–	–	–	–	7-15/16	200	6-7/8	176	15-3/4	398	14-1/4	362	6-3/4	170	9-5/8	244	34	14	36	15	42	19	7.2	
1	25	6-5/16	160	5-3/4	147	–	–	8-15/16	226	7-1/16	179	15-15/16	404	14-7/16	367	6-15/16	175	10	254	44	19	48	20	54	23	10.9	
1-1/4	32	7-1/8	180	6-1/2	166	–	–	8-15/16	226	7-7/16	188	17-1/8	434	15-1/8	384	7-5/8	192	11-1/8	283	51	22	53	22	59	25	14.3	
1-1/2	40	7-1/8	180	7-7/16	189	–	–	8-15/16	226	7-7/16	188	17-1/8	434	15-1/8	384	7-5/8	192	11-1/8	283	51	22	55	23	61	26	18.8	
2	50	9-1/8	230	8-9/16	217	9-1/8	232	10-15/16	276	7-11/16	195	19-5/8	498	16	406	8-1/2	216	12-5/8	321	75	33	81	36	84	36	32	
2-1/2	65	–	–	10-15/16	278	11-1/2	292	13-13/16	352	8-5/16	211	21-3/4	552	17-5/16	440	9-13/16	251	14-3/4	375	–	–	142	65	150	65	60	
3	80	–	–	11-3/4	298	12-7/16	315	13-13/16	352	8-3/4	222	22-5/8	575	17-15/16	456	10-7/16	264	15-3/4	400	–	–	155	69	166	72	78	
4	100	–	–	13-1/2	343	14-1/8	359	15-13/16	401	9-7/16	239	25-15/16	658	20-1/8	511	12-5/8	321	19-1/4	489	–	–	247	112	264	119	120	

\*50% reduced port available for sizes 1/2" - 4". The C<sub>V</sub> value should be divided by 2 to get reduced port C<sub>V</sub>.

For capacities see page 315.



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# Armstrong® GP-2000CS Carbon Steel Body

## For Steam Service

The GP-2000CS is a high performance, externally piloted reducing valve for large capacity requirements. Typical use is on intermittent service, including applications such as heat exchangers, steam coils, rotating dryers, process equipment and heating systems. With a 20:1 rangeability and high  $C_v$ , the GP-2000CS is reliable and accurate (+/-1% of pressure set point from 5% to 100% of flow) over a long, trouble-free service life. Stellite stainless steel working

parts are renewable in-line. Single seated for dead-end service. Available with both NPT (1/2" - 2") and flanged connections in 2" - 4" sizes.

**For a fully detailed certified drawing, refer to:**

**GP-2000** **CDY #1008**

**GP-2000 Flanged** **CDY #1007**

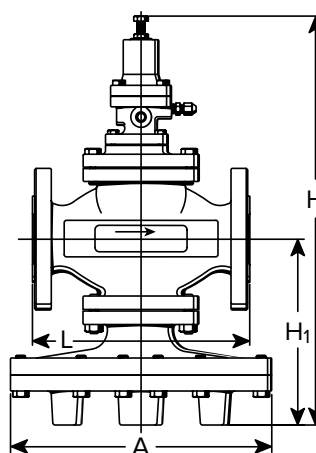
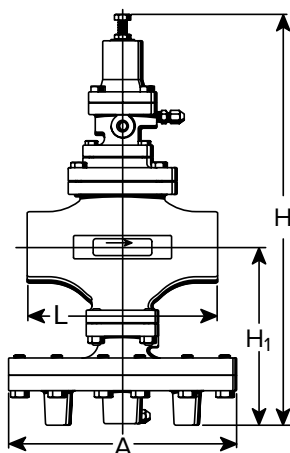
### GP-2000GP-2000CS Specifications

Application	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Spring Color	Maximum Temperature °F (°C)	Minimum Differential psig (barg)	Materials				
						Body	Main Valve/Seat	Pilot Valve/Seat	Diaphragm	Color
Steam	NPT 15 - 450 (1 - 31)	3 - 21 (.21 - 1.4)	Yellow	600°F (315°C)	7 (.48)	Carbon Steel WCB ASTM216 A216M-08	Stainless Steel 304 Stainless Steel Stellite	420 Stainless Steel	Stainless Steel AISI 301	Silver
	150 lb Flanged 15 - 140 (1 - 9.6)	15 - 200 (1 - 13.6)	Green							
	300 lb Flanged 15 - 450 (1 - 31)	190 - 300 (13.1 - 20.6)	Brown							

### GP-2000CS Dimensions and Weights

Size		L						A		F		H Integral		H <sub>1</sub>		H <sub>2</sub>		Weight						C <sub>v</sub>
		NPT		150#		300#												NPT		150#		300#		
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	lb	kg	
1/2	15	5-15/16	150	—	—	—	—	7-15/16	200	6-7/8	176	15-3/4	398	6-3/4	170	9-5/8	244	35	16	—	—	—	—	5.0
3/4	20	5-15/16	150	—	—	—	—	7-15/16	200	6-7/8	176	15-3/4	398	6-3/4	170	9-5/8	244	35	16	—	—	—	—	7.2
1	25	6-5/16	160	—	—	—	—	8-15/16	226	7-1/16	179	15-15/16	404	6-15/16	175	10	254	49	22	—	—	—	—	10.9
1-1/4	32	7-1/8	180	—	—	—	—	8-15/16	226	7-7/16	188	17-1/8	434	7-5/8	192	11-1/8	283	53	24	—	—	—	—	14.3
1-1/2	40	7-1/8	180	—	—	—	—	8-15/16	226	7-7/16	188	17-1/8	434	7-5/8	192	11-1/8	283	53	24	—	—	—	—	18.8
2	50	9-1/8	230	8-9/16	217	9-1/8	232	10-15/16	276	7-11/16	195	19-5/8	498	8-1/2	216	12-5/8	321	62	37	88	40	92	42	32
2-1/2	65	—	—	10-15/16	278	11-1/2	292	13-13/16	352	8-5/16	211	21-3/4	552	9-13/16	251	14-3/4	375	—	—	159	72	168	76	60
3	80	—	—	11-3/4	298	12-7/16	315	13-13/16	352	8-3/4	222	22-5/8	575	10-7/16	264	15-3/4	400	—	—	174	79	185	84	78
4	100	—	—	13-1/2	343	14-1/8	359	15-13/16	401	9-7/16	239	25-15/16	658	12-5/8	321	19-1/4	489	—	—	276	125	293	133	120

For capacities see page 305.



# GP-2000K-1/GP-2000K-3/GP-2000K-6

## Air Loaded Valves for Steam

A high performance externally air piloted pressure reducing valve, the GP-2000K-1/GP-2000K-3/GP-2000K-6 is an ideal choice when set point changes are frequent and access to the PRV is difficult. The valve comes totally assembled and requires no field installation except downstream sensing line and air line connection. High Cv, 20:1 turndown ratio and accurate control  $\pm 1\%$  of pressure set point from 5% to 100% of flow. A rugged ductile iron body, hardened stainless steel working parts, double stainless steel diaphragms and in-line repairability add up to reliability on the job. Single seated for dead-end service.

For a fully detailed certified drawing, refer to:

**GP-2000K** **CDY #1014**

**GP-2000K Flanged** **CDY #1015**

### GP-2000K-1, GP-2000K-3, GP-2000K-6 Weights

Size		Weight, lb (kg) <sup>†</sup>						C <sub>v</sub>
		NPT		150#		300#		
in	mm	lb	kg	lb	kg	lb	kg	
1/2	15	34	16	36	15	42	19	5.0
3/4	20	34	16	36	15	42	19	7.2
1	25	44	20	48	20	54	23	10.9
1-1/4	32	51	23	53	22	59	25	14.3
1-1/2	40	51	23	55	23	61	26	18.8
2	50	75	34	81	36	84	36	32
2-1/2	65	—	—	142	65	150	65	60
3	80	—	—	155	69	166	72	78
4	100	—	—	247	112	264	119	120
6	150	—	—	507	230	553	252	250

<sup>†</sup>50% reduced port available for sizes 1/2" - 4". The CV value should be divided by 2 to get reduced port CV.

<sup>†</sup> For GP-2000K-3 and GP-2000K-6 weights, add 7-1/4 lb. (3.3 kg).

### GP-2000K-1, GP-2000K-3, GP-2000K-6 Specifications

Application	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Max. Temp. °F (°C)	Minimum Differential psig (barg)	Materials				
					Body	Main Valve/ Seat	Pilot Valve/ Seat	Diaphragm	Color
Steam	NPT 15 - 300 (1 - 20)	K-1 7 - 125 (.48 - 8.6) K-3 30 - 200 (2 - 13.8) K-6 45 - 200 (3.1 - 13.8)	450 (232)	7 (.48)	Ductile Iron ASTM A536	Stainless Steel AISI 420		Stainless Steel AISI 301	Dark Gray
	150 lb Flanged 15 - 185 (1 - 13)								
	300 lb Flanged 15 - 300 (1 - 20)								

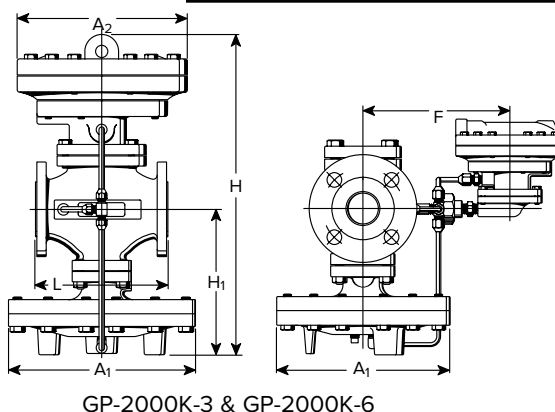
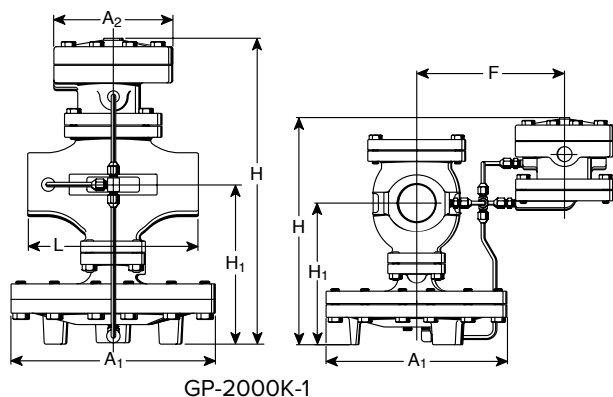
### GP-2000K-1, GP-2000K-3, GP-2000K-6 Dimensions

Size		Face-to-Face "L"						A <sub>1</sub>		F		H Integral		H Remote		H <sub>1</sub>		**A <sub>2</sub>	
		NPT		150#		300#													
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1/2	15	5-15/16	150	—	—	—	—	7-15/16	200	6-7/8	175	13-3/16	335	11-13/16	300	6-3/4	170	3-1/4	82
3/4	20	5-15/16	150	—	—	—	—	7-15/16	200	6-7/8	175	13-3/16	335	11-13/16	300	6-3/4	170	3-1/4	82
1	25	6-5/16	160	5-3/4	147	—	—	8-15/16	226	7-1/16	179	13-7/16	341	12	305	6-15/16	175	3-1/4	82
1-1/4	32	7-1/8	180	6-1/2	166	—	—	8-15/16	226	7-7/16	188	14-5/8	371	12-11/16	322	7-5/8	192	3-1/4	82
1-1/2	40	7-1/8	180	7-7/16	189	—	—	8-15/16	226	7-7/16	188	14-5/8	371	12-11/16	322	7-5/8	192	3-1/4	82
2	50	9-1/8	230	8-9/16	217	9-1/8	232	10-15/16	276	7-11/16	195	17-1/8	435	13-1/4	337	8-1/2	216	3-1/4	82
2-1/2	65	—	—	10-15/16	278	11-1/2	292	13-13/16	352	8-5/16	211	19-1/4	489	15-3/8	391	9-13/16	251	3-1/4	82
3	80	—	—	11-3/4	298	12-7/16	316	13-13/16	352	8-3/4	222	20-1/8	512	16-3/8	416	10-7/16	264	3-1/4	82
4	100	—	—	13-1/2	343	14-1/8	359	15-13/16	401	9-7/16	239	23-7/16	595	19-7/8	505	12-5/8	321	3-1/4	82
6	150	—	—	18-1/8	460	19	483	19-3/4	502	—	—	29-3/8	746	—	—	27-1/4	692	3-1/4	82

\*For GP-2000K-3 and GP-2000K-6 add 1-1/4" (18 mm) to "H" dimension.

\*\*For GP-2000K-3 and GP-2000K-6, A<sub>2</sub> dimension = 6-13/16" (172 mm).

For capacities see page 305.  
For air loading chart see page 301.



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



## Air Loaded Valves for Steam

The GD-2000K is an ideal choice when set point changes are frequent, access to the valve is difficult and steam quality is poor. The GD-2000K comes with either NPT or flanged connections for quick, easy installation. It also comes with a durable ductile iron body and features double stainless steel diaphragms and hardened stainless working parts,

renewable in-line. High Cv and 10:1 turndown ratio. Single seated for dead-end service.

**For a fully detailed certified drawing, refer to:**

**GD-2000K NPT CDY #1020**

**GD-2000K Flanged CDY #1021**

### GD-2000K Specifications

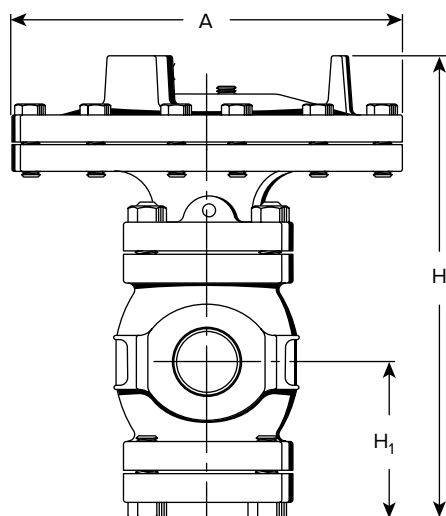
Application	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Maximum Temperature °F (°C)	Minimum Differential psig (barg)	Materials			
					Body	Main Valve/Seat	Diaphragm	Color
Steam	NPT 15 - 300 (1 - 20)	7 - 200 (.48 - 13.8)	450 (232)	7 (.48)	Ductile Iron ASTM A536	Stainless Steel AISI 420	Stainless Steel AISI 301	Dark Gray
	150 lb Flanged 15 - 185 (1 - 13)							
	300 lb Flanged 15 - 300 (1 - 20)							

### GD-2000K Dimensions and Weights

Size		Face-to-Face						H <sub>1</sub>		H		A		Weight						C <sub>v</sub> *
		NPT		150#		300#								NPT		150#		300#		
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	lb	kg	
1/2	15	5-15/16	150	—	—	—	—	2-7/8	74	9-5/8	244	7-15/16	200	27	13	—	—	—	—	
3/4	20	5-15/16	150	—	—	—	—	2-7/8	74	9-5/8	244	7-15/16	200	27	13	—	—	—	—	
1	25	6-5/16	160	—	—	—	—	3-1/16	76	10	251	8-15/16	226	35	17	—	—	—	—	
1-1/4	32	7-1/8	180	—	—	—	—	3-1/2	90	11-1/8	282	8-15/16	226	43	20	—	—	—	—	
1-1/2	40	7-1/8	180	—	—	—	—	3-1/2	90	11-1/8	282	8-15/16	226	43	20	—	—	—	—	
2	50	9-1/8	230	8-9/16	217	9-1/8	232	4-1/2	114	12-5/8	319	10-15/16	276	66	31	72	34	73	34	
2-1/2	65	—	—	10-15/16	278	11-1/2	292	4-3/4	122	14-3/4	373	13-13/16	352	—	—	135	62	136	62	
3	80	—	—	11-3/4	298	12-7/16	315	5-1/2	140	15-3/4	399	13-13/16	352	—	—	146	67	152	69	
4	100	—	—	13-1/2	343	14-1/8	359	6-1/2	167	19-1/4	488	15-13/16	401	—	—	230	105	240	109	

\*50% reduced port available for sizes 1/2" - 4". The Cv value should be divided by 2 to get reduced port Cv.

**For capacities see page 305.  
For air loading chart see page 301.**



GD-2000K

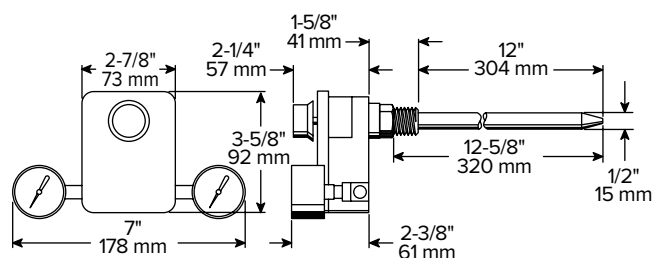


## Pneumatic Temperature Pilot

A compact pneumatic temperature pilot with broad temperature ranges, the OBK-2000 can be remotely located away from the regulator valve, an advantage not available with a conventional capillary system.

Typical applications include instantaneous or storage tank water heaters, air make-up units and manufacturing process operations such as parts washing, die casting and plastic molding.

Capable of reverse-acting (heating) or direct-acting (cooling) operation, the OBK-2000 features a simple design with fewer moving parts for trouble-free operation. Other features include supply and control pressure gauges, a rugged cast brass housing, and precise and rapid response to temperature changes. Brass and stainless steel wells are available.



OBK-2000

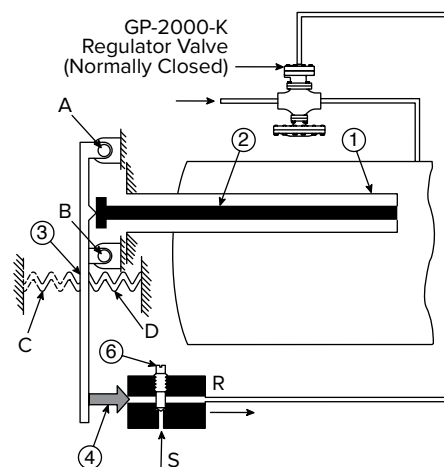
OBK-2000 Materials	
Name of Part	Material
Body	Brass
O-rings	Silicone Rubber/Buna "N"
Valve	Phos. Bronze
Valve Seat	Phos. Bronze

NOTE: Thermal wells available. 304 stainless steel or brass are standard materials. Other materials available upon request.

## Reverse-Acting Operation—For Heating

During operation, a temperature change in the medium being controlled creates a change in the length of the sensitivity tube. An increase in temperature lengthens the sensitivity tube (1) and moves the invar rod (2) from the lever (3). The lever pivots at point B and is moved so the exhaust valve (4) is opened by the spring at (D). This lever action decreases the supply air at point (S) in the control line at point (R) and closes the regulator valve. A decrease in temperature shortens the sensitivity tube at point (1) and moves the invar rod against the lever point (3). The lever at this point moves against the spring at point (D) to close the exhaust valve at point (4). This lever action increases the pressure in the control line at point (R) and opens the valve.

The sensitivity adjustment screw at point (6) regulates the rate of flow of the supply air to the controller to a change in temperature. Turning the screw clockwise increases the sensitivity by reducing the flow and increasing the response time. Turning the screw counterclockwise decreases the sensitivity by increasing flow and reducing the response time. Valve closes on air failure, making it fail-safe.



Positions A and C show pivot point A and spring C when controller is direct acting.

OBK-2000 Specifications	
Dial adjustment range—°F (°C)	Standard—50 to 350 (10 to 177)
Maximum supply pressure (air) @ room temperature—psig (barg)	25 (2)
Air consumption (maximum)—SCIM (cm/s)	800 (218 - 3)
Maximum operating pressure—psig (barg)	250 (17)
Maximum operating temperature—°F (°C)	400 (204)
Temperature response—°F (°C)	0.5 (0.3)
Mounting—in (mm)	1/2 (15)
Air connections—in (mm)	1/8 (3)
Shipping weight—lb (kg)	4 (1.8)
Sensitivity (adjustable)—psig (barg)	1/4 to 2-1/4 (0.02 to 0.16)
Maximum pressure on wells	
Stainless steel—psig (barg)	1 125 (79)
Brass—psig (barg)	525 (36)

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

## For Steam Back Pressure Regulation

The GP-2000R is a high performance externally piloted throttling back pressure valve for large capacity applications. Typical applications would include those systems utilizing flash steam for low pressure heating or processes. The GP-2000R valves will function to maintain a constant upstream pressure. This valve is not a safety valve and should not be used for that purpose.

For a fully detailed certified drawing, refer to:

**GP-2000R Threaded** **CDY #1018**

**GP-2000R Flanged** **CDY #1019**

GP-2000R Specifications									
Application	Inlet Pressure psig (barg)	Relieving Pressure psig (barg)	Spring Color	Maximum Temperature °F (°C)	Minimum Differential psig (barg)	Materials			
						Body	Main Valve/ Seat	Pilot Valve/ Seat	Diaphragm Color
Steam	NPT 3 - 200 (.21 - 13.8)	3 - 21 (.21 - 1.4)	Yellow	450 (232)	3 (.21)*	Ductile Iron ASTM A536	Stainless Steel AISI 420	Stainless Steel AISI 301	Dark Gray
	150 lb Flanged 3 - 185 (.21 - 13)	14 - 157 (1.0 - 11.0)	Green						
	300 lb Flanged 3 - 200 (.21 - 13.8)	143 - 200 (10 - 13.8)	Brown						

\*If used for a 3-15 psig set point, outlet pressure must be 0 psig.

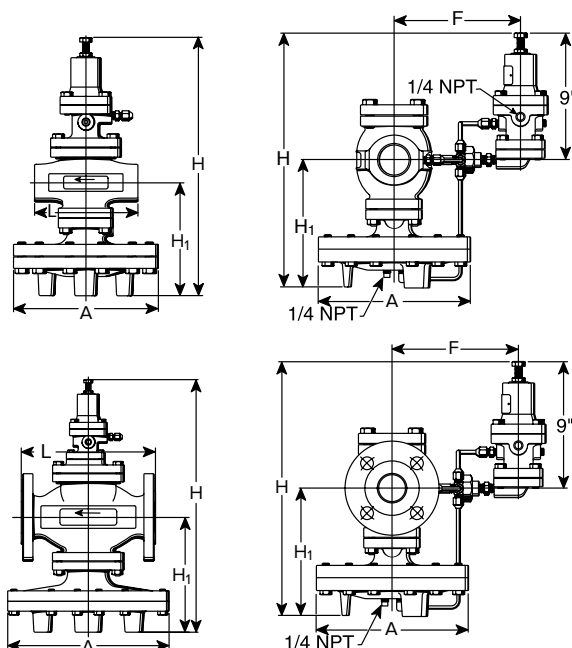
GP-2000R Dimensions																	
Size		Face-to-Face “L”						A		F		H Integral		H Remote		H <sub>1</sub>	
		NPT		150#		300#											
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1/2	15	5-15/16	150	—	—	—	—	7-15/16	200	6-7/8	176	15-3/4	398	14-1/4	362	6-3/4	170
3/4	20	5-15/16	150	—	—	—	—	7-15/16	200	6-7/8	176	15-3/4	398	14-1/4	362	6-3/4	170
1	25	6-5/16	160	5-3/4	147	—	—	8-15/16	226	7-1/16	179	15-15/16	404	14-7/16	367	6-15/16	175
1-1/4	32	7-1/8	180	6-1/2	166	—	—	8-15/16	226	7-7/16	188	17-1/8	434	15-1/8	384	7-5/8	192
1-1/2	40	7-1/8	180	7-7/16	189	—	—	8-15/16	226	7-7/16	188	17-1/8	434	15-1/8	384	7-5/8	192
2	50	9-1/8	230	8-9/16	217	9-1/8	232	10-15/16	276	7-11/16	195	19-5/8	498	16	406	8-1/2	216
2-1/2	65	—	—	10-15/16	278	11-1/2	292	13-13/16	352	8-5/16	211	21-3/4	552	17-5/16	440	9-13/16	251
3	80	—	—	11-3/4	298	12-7/16	316	13-13/16	352	8-3/4	222	22-5/8	575	17-15/16	456	10-7/16	264
4	100	—	—	13-1/2	343	14-1/8	359	15-13/16	401	9-7/16	239	25-15/16	658	20-1/8	511	12-5/8	321
6	150	—	—	18-1/8	460	19	483	19-3/4	502	—	—	31-3/4	806	—	—	26-1/2	673

For capacities see page 305.

GP-2000R Weights								
Size		Weight						C <sub>V</sub> *
		NPT		150#		300#		
in	mm	lb	kg	lb	kg	lb	kg	
1/2	15	34	14	36	15	42	19	5
3/4	20	34	14	36	15	42	19	7.2
1	25	44	19	48	20	54	23	10.9
1-1/4	32	51	22	53	22	59	25	14.3
1-1/2	40	51	22	55	23	61	26	18.8
2	50	75	33	81	36	84	38	32
2-1/2	65	—	—	142	65	150	68	60
3	80	—	—	155	69	166	75	78
4	100	—	—	247	112	264	120	120
6	150	—	—	509	231	555	253	250

\*50% reduced port available for sizes 1/2" - 4".

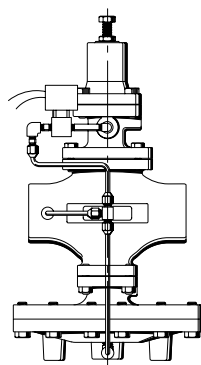
The C<sub>V</sub> value should be divided by 2 to get reduced port C<sub>V</sub>.



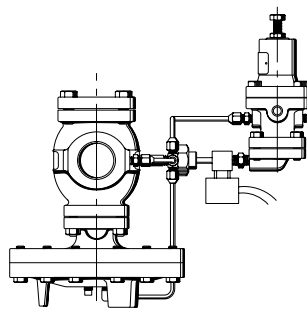
# GP-2000 On/Off—For Steam Service

## External Pilot Solenoid Operated Valves

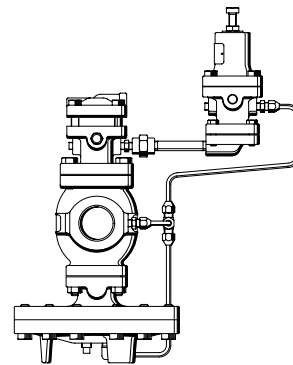
The GP-2000 On/Off option allows for remote shutoff of pressure reducing valves. Automatic shutoff during power failures and shutoff based on set points of pressure, temperature or liquid levels of process fluids. This option is available as an accessory item or may be factory installed on any of the GP-2000 Series valves. The GP-2000 On/Off is designed for a maximum pressure of 150 psig and a maximum temperature of 366°F NEMA IV standard, coil: class H 110V standard. Available with normally open or normally closed solenoids.



GP-2000, GP-2000CS, GP-2000R  
with On/Off



GP-2000 Remote Mount  
with On/Off



GP-2000W1P

## Non-Electric Gradient Monitoring Option (Between Water and Steam Pressure)

The GP-2000W1P provides a safe and dependable shutdown of steam when the water pressure falls or drops rapidly on a constant pressure, steam-to-water exchanger. Unlike a solenoid option that shuts the steam down when the water pressure drops below a pre-set point, the GP-2000W1P always maintains a constant steam pressure until water pressure drops to within 3 psig above the steam pressure. Lower water pressure will cause the steam pressure to fall, thereby maintaining a minimum 3 psig difference. This will allow the exchanger to produce hot water even when water pressure is low, and ensures that steam pressure will stay functional as long as water pressure is above 15 psig.

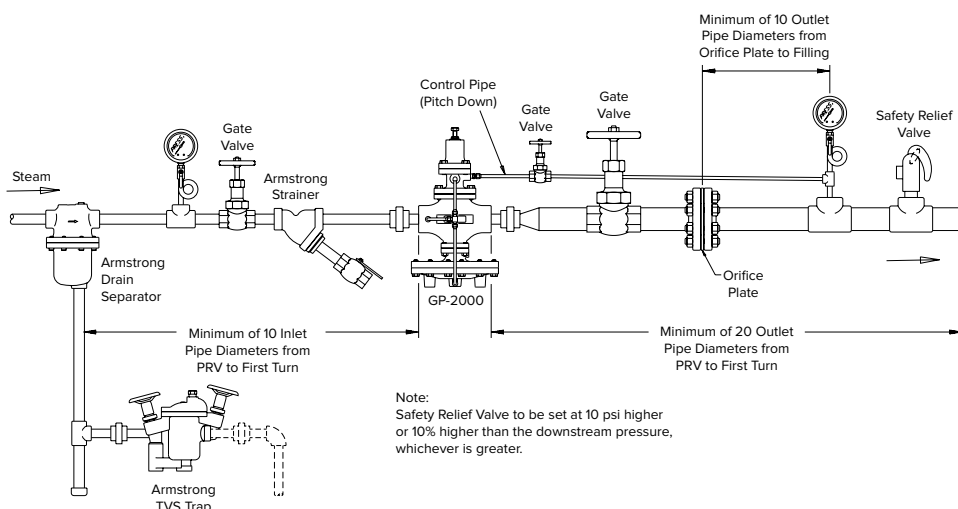
## Noise Treatment

OSHA has established limits on the length of time any employee may be exposed to various sound levels. A sound level of 85 DbA or less is the acceptable standard for noise levels through a PRV in most applications. Certain facilities may require much less. Please consult Armstrong PRV Sizing Software or contact the local Armstrong factory representative for DbA levels for each application.

For DbA levels above 85 you can offer a 2" thick insulation cover for thermal conductivity and noise attenuation, a muffling orifice plate to reduce the noise through the PRV, or a combination of both.

A muffling orifice plate consists of a 1/4" thick stainless steel plate installed between mating ANSI flanges. The orifice plate is installed in the enlarged piping downstream of the pressure regulator. Each orifice plate is engineered for specific applications to maximize noise reduction without reducing regulator capacity.

Orifice plates for GP-2000 only.



Insulation Cover



Muffling Orifice Plate

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

## For Steam, Air and Non-Corrosive Liquids

The Armstrong OB-30/31 is a direct acting temperature regulator that requires no external source for operation. Simple and compact, the unit is suitable for a wide variety of heating/cooling applications. Installing, adjusting or maintaining the OB-30/31 is quick and easy because interchangeable capillaries mount in any position and disconnect by simply loosening the union nut. No stem

packing so there's no leakage. Single composition seat for tight shutoff. The OB-30/31 comes in 1/2", 3/4" or 1" sizes and is available with a choice of five temperature ranges and three capillary lengths.

**For a fully detailed certified drawing, refer to CDY #1036.**

### OB-30/31 Specifications

Model	Application	Service	Max. Inlet Pressure psig (barg)	Maximum Diff. psig (barg)	Temperature Ranges °F (°C)	Max. Temp. °F (°C)	Temperature Accuracy °F (°C)	Capillary Lengths feet (meters)
OB-30	Heating	Steam, Water	Steam 150 (10)	140 (9.6)	32 - 95 (0 - 35) 77 - 158 (25 - 70) 104 - 212 (40 - 100) 140 - 266 (60 - 130) 158 - 302 (70 - 150)	366 (185)	±7 (±3) From Set Point	*6-1/2 (2) 9-1/2 (3) 16-1/2 (5)
OB-31	Cooling	Water, Non-Corrosive Liquids	Liquid 250 (17)					

\*Standard length.

NOTES: Capillary can withstand a maximum of 72°F (40°C) above rated range. If desired set temperature is in temperature range overlap, select lower range.

### OB-30/31 Materials

Body Material	Seat Type & Material	Valve Material	Capillary Material	Bulb Material	Thermal Well Material
Bronze ASTM B584	Single Seat 304 Stainless Steel	Teflon	304 Stainless Steel Armor Shielded Capillary	Copper-Nickel Plated	*304 Stainless Steel or Brass

\*Other materials available upon request.

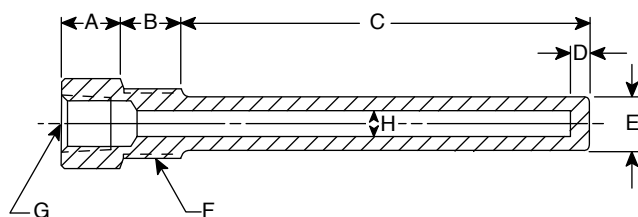
### OB-30/31 Dimensions and Weights

Size		L		H <sub>1</sub>		H		T		K		R		Weight		C <sub>v</sub>
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	
1/2	15	3	80	5-1/8	130	12-1/2	315	3/8	10	8	200	1/2	15	6	2.8	3.7
3/4	20	3-1/8	85	5-1/8	130	12-1/2	315	3/8	10	8	200	1/2	15	6	2.8	4.6
1	25	3-1/2	95	5-1/8	130	12-1/2	315	3/8	10	8	200	1/2	15	6-1/2	3.0	5.8

### Thermal Well Dimensions

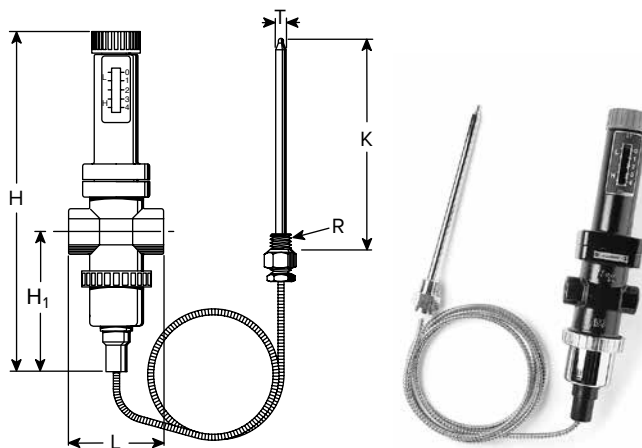
Model	A		B		C		D		E		F		G		H	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
OB-30/31	3/4	20	1	25	7-1/2	204	1/4	7	.765	20	3/4	20	1/2	15	.380	10
OB-2000/2000PT	1	25	3/4	20	7-3/4	197	1/4	7	.89	23	1	25	3/4	20	.630	16
OBK-2000	1	25	3/4	20	12-1/2	318	1/4	7	.765	20	3/4	20	1/2	15	.515	13

### OB-30/31, OBK-2000 and OB-2000/2000PT Thermal Well



Standard Material: 304 stainless steel or brass. Other materials available upon request.

NOTE: When inserting sensor into thermal well, for best results, it is recommended that heat transfer medium be applied to sensor before installation.



OB-30 Capacities—Steam									
lb/hr					kg/hr				
Inlet	Outlet	Connection Size			Inlet	Outlet	Connection Size		
		in					mm		
psig		1/2	3/4	1	barg		15	20	25
C <sub>v</sub> Factors		3.7	4.6	5.8	C <sub>v</sub> Factors		3.7	4.6	5.8
5	3	67	83	105	.35	.20	30	38	48
	2	81	100	127		.14	37	45	58
	0	101	126	159		0	46	57	72
10	8	75	94	118	.7	.55	34	43	54
	6	104	130	164		.41	47	59	75
	4	125	155	196		.28	57	70	89
	0	154	191	241		0	70	87	110
15	12	101	125	158	1.0	.83	46	57	72
	9	139	172	218		.62	63	78	99
	6	165	205	259		.41	75	93	118
	0-5	200	249	314		0-.35	91	113	143
20	15	139	173	218	1.38	1.0	63	79	99
	10	181	235	296		.7	82	107	135
	5	221	275	347		.35	100	125	158
	0-2	234	290	367		0-.14	106	132	167
25	20	149	186	234	1.72	1.38	68	85	106
	15	204	254	320		1.0	93	115	145
	10	241	300	378		.7	110	136	172
	0-5	268	333	420		0-.35	122	151	191
30	25	159	198	250	2.0	1.72	72	90	114
	15	258	322	406		1.0	117	146	185
	0-7	302	375	473		0-.48	137	170	215
40	30	244	304	384	2.76	2.0	111	138	175
	20	328	408	515		1.38	149	185	234
	0-12	369	459	579		0-.83	168	209	263
50	40	268	333	420	3.45	2.76	122	151	191
	30	383	451	569		2.0	174	205	259
	0-17	437	543	685		0-1.2	199	247	311
60	50	290	360	454	4.0	3.45	132	164	206
	40	395	491	619		2.76	180	223	281
	0-22	504	627	791		0-1.5	229	285	360
70	60	310	385	486	4.83	4.0	141	175	221
	50	328	424	665		3.45	149	193	302
	40	502	624	787		2.76	228	284	358
	0-27	572	711	897		0-1.9	260	323	408
80	70	329	409	616	5.52	4.83	150	186	280
	60	452	562	708		4.0	205	255	322
	50	537	668	842		3.45	244	304	383
	0-32	640	795	1003		0-2.2	291	361	456
90	80	346	431	543	6.0	5.52	157	196	247
	70	478	694	749		4.83	217	315	340
	60	570	708	893		4.0	259	322	406
	50	639	795	1002		3.45	290	361	455
	0-37	707	879	1109		0-2.6	321	400	504
100	90	363	452	570	6.9	6.0	165	205	259
	80	502	625	788		5.52	228	284	358
	70	600	747	942		4.83	273	340	428
	60	676	840	1060		4.0	307	382	482
	0-42	776	963	1215		0-2.9	353	438	552
125	110	489	608	767	8.62	7.59	222	276	349
	100	619	770	971		6.9	281	350	441
	80	798	992	1250		5.52	363	451	568
	70	863	1073	1353		4.83	392	488	615
	0-55	944	1174	1480		0-3.8	429	534	673
150	130	611	759	958	10.0	8.97	278	345	435
	120	736	915	1154		8.28	335	416	525
	100	918	1141	1439		6.9	417	519	654
	0-63	1113	1384	1745		0-4.3	506	629	793

NOTE: Where it is not possible to calculate pressure drop, 35% - 40% of gauge supply pressure can be used as a reasonable approximation.

## Temperature Regulator Selection Example

### Parameters:

Fluid.....Steam  
 Maximum inlet pressure .....100 psig  
 Outlet pressure .....90 psig  
 Maximum flow rate.....500 lbs/hr  
 Temperature required.....150°F  
 Distance from regulator to sensing point .....5'

### To Locate Proper Model:

Enter inlet column at.....100 psig  
 Move to outlet pressure of.....90 psig  
 Locate capacity of 570 lbs/hr under  
 connection size.....1"  
 Find capillary temperature range .....77-158°F  
 Select capillary length.....6-1/2'

### Application Will Require:

**OB-30, 1" with 77-158°F Temp. Range,  
 Capillary Length 6-1/2'**

OB-30/31 Capacities—Water							
gpm				l/min			
Δ P	Connection Size			Δ P	Connection Size		
	in				mm		
psig	1/2	3/4	1	barg	15	20	25
5	8.1	10.1	12.3	.35	30	38	47
10	11.9	14.3	18.5	.70	45	55	70
15	14.3	17.6	22.0	1.00	55	67	83
20	16.7	20.7	26.4	1.40	63	78	100
25	18.5	22.0	28.2	1.80	70	83	107
30	20.3	25.6	31.7	2.00	77	97	120
50	26.4	33.5	41.4	3.50	100	127	157
75	32.6	39.6	49.3	5.20	123	150	187
100	37.9	46.2	57.2	7.00	143	175	217
125	42.2	52.0	65.6	8.70	160	197	248
150	46.3	57.25	70.5	10.00	175	217	267

### Capillary Temperature Ranges

Temperature Ranges °F (°C)	
32 - 95 (0 - 35)	
77 - 158 (25 - 70)	
104 - 212 (40 - 100)	
140 - 266 (60 - 130)	
158 - 302 (70 - 150)	

NOTE: If desired set temperature is in temperature range overlap, select lower range.

## For Steam

Armstrong's OB-2000 is a high performance externally piloted temperature regulator for large capacity applications such as heat exchangers, steam coils, steam dryers, plating tanks and parts washers. It is self-actuated and requires no external energy source. Capillary units mount in any position and can be easily disconnected and interchanged, offering

easy installation and maximum application flexibility. Available in sizes 1/2" through 6" with six temperature ranges and three capillary lengths.

For a fully detailed certified drawing, refer to CDY #1013.

### OB-2000L Specifications

Application	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Temperature Ranges °F (°C)	Temperature Accuracy °F (°C)	Capillary Lengths feet (meters)
Steam	NPT 10 - 300 (.69 - 20) 150 lb Flanged 10 - 185 (.69 - 13) 300 lb Flanged 10 - 300 (.69 - 20)	7 (.48)	18 - 59 (-8 - 15) 50 - 97 (10 - 36) 86 - 144 (30 - 62) 131 - 201 (55 - 94) 176 - 260 (80 - 127) 239 - 361 (115 - 183)	±2 (±1) From Set Point	*6-1/2 (2) 9-1/2 (3) 16-1/2 (5)

\*Standard length.

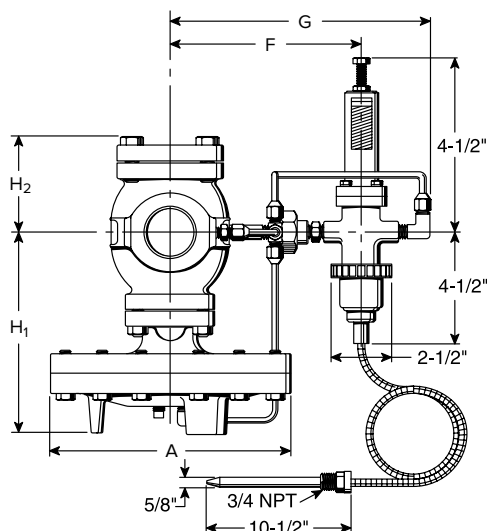
Note: If desired set temperature is in temperature range overlap, select lower range.

### OB-2000 Dimensions and Weights

Size		Face-to-Face						H <sub>1</sub>		H <sub>2</sub>		A		F		G		Weight						C <sub>v</sub>
		NPT		150#		300#												NPT		150#		300#		
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	lb	kg			
1/2	15	5-15/16	150	—	—	—	—	6-3/4	170	2-15/16	74	7-15/16	200	6-5/8	169	8-3/4	222	31	15	33	15	39	18	5.0
3/4	20	5-15/16	150	—	—	—	—	6-3/4	170	2-15/16	74	7-15/16	200	6-5/8	169	8-3/4	222	31	15	33	15	39	18	7.2
1	25	6-15/16	160	5-3/4	147	—	—	6-15/16	175	3-1/16	76	8-15/16	226	6-7/8	174	8-7/8	226	39	19	41	20	47	21	10.9
1-1/4	32	7-1/8	180	6-1/2	166	—	—	7-5/8	192	3-9/16	90	8-5/16	226	7-1/8	182	9-1/4	235	47	22	49	23	54	24	14.3
1-1/2	40	7-1/8	180	7-7/16	189	—	—	7-5/8	192	3-9/16	90	8-15/16	226	7-1/8	182	9-1/4	235	47	22	49	23	54	24	18.8
2	50	9-1/8	230	8-9/16	217	9-1/8	232	8-1/2	216	4-1/16	103	10-15/16	276	7-7/16	189	9-1/2	242	71	33	77	36	78	36	32
2-1/2	65	—	—	10-15/16	278	11-1/2	292	9-13/16	251	4-7/8	122	13-13/16	352	8-1/8	206	10-1/8	259	—	—	138	63	140	64	60
3	80	—	—	11-3/4	298	12-7/16	315	10-7/16	264	5-3/8	135	13-13/16	352	8-9/16	217	10-5/8	270	—	—	149	69	155	71	78
4	100	—	—	13-1/2	343	14-1/8	359	12-5/8	321	6-9/16	167	15-13/16	401	9-1/4	234	11-1/4	287	—	—	234	107	243	110	120

NOTE: For 6" (150 mm) consult factory.

\*50% reduced port available for sizes 1/2" - 4". The C<sub>v</sub> value should be divided by 2 to get reduced port C<sub>v</sub>.



## For Steam

## OB-2000 Sensor and Accessory Specifications

Capillary Material	Capillary Temperature Ranges °F (°C)	Bulb Material	Bulb Connection	Thermal Well Material	Thermal Well Connection
Copper Capillary Tube With 304 Stainless Steel Armor Shield	18 - 59 (-8 - 15) 50 - 97 (10 - 36) 86 - 144 (30 - 62) 131 - 201 (55 - 94) 176 - 260 (80 - 127) 239 - 361 (115 - 183)	Nickel Plated Copper Bulb	3/4" (20 mm) NPT	Brass* 304 Stainless Steel*	1" (25 mm) NPT

\*Standard. Other material available upon request. See page 310 for dimensions of well.

NOTE: Capillary can withstand a maximum of 36°F (20°C) above rated range.

NOTE: If desired set temperature is in temperature range overlap, select lower range.

## OB-2000 Materials

OB-2000	Body Material	Seat Type & Material	Valve Material	Connection	Maximum Temperature °F (°C)
Main Valve	Ductile Iron ASTM A536	Single Seat Stainless Steel AISI 420	Stainless Steel AISI 420	NPT 150 lb Flanged 300 lb Flanged	450 (232)
Temperature Pilot Valve	Bronze ASTM B584			1/4" (6 mm) NPT	

## Valve Sizing

## Proper valve selection requires the following information

- Steam capacity required for application
- Supply pressure of steam
- Allowable pressure drop across valve\*

\*Where it is not possible to calculate pressure drop, 35% - 40% of gauge supply pressure can be used as a reasonable approximation.

## Temperature Regulator Selection Example

## Parameters:

Fluid ..... Steam  
 Maximum inlet pressure ..... 100 psig  
 Outlet pressure ..... 75 psig  
 Maximum flow rate ..... 1 500 lbs/hr  
 Temperature required ..... 180°F  
 Distance from regulator to sensing point ..... 5'

## To Locate Proper Model (refer to chart on page 317):

Enter inlet column at ..... 100 psig  
 Move to outlet pressure of ..... 75 psig  
 Locate capacity of  
 1 500 lbs/hr under ..... 1" connection size  
 Find capillary temp. range ..... 131-201°F  
 Select capillary length ..... 6-1/2'

## Application Will Require:

**OB-2000, 1" with 131-201°F Temp. Range,  
 Capillary Length 6-1/2'**



## For Steam

Armstrong's OB-2000L is a high performance externally piloted temperature regulator for large capacity and low pressure applications. It is self-actuated and requires no external energy source. Capillary units mount in any position and can be easily disconnected and interchanged, offering easy installation and maximum application flexibility.

Available in sizes 1/2" through 4" with six temperature ranges and three capillary lengths.

**For a fully detailed certified drawing, refer to CDY #2232.**

OB-2000L Specifications					
Application	Inlet Pressure psig (barg)	Reduced Pressure psig (barg)	Temperature Ranges °F (°C)	Temperature Accuracy °F (°C)	Capillary Lengths feet (meters)
Steam	5 - 15 (.3 - 1)	3 (.21)	18 - 59 (-8 - 15) 50 - 97 (10 - 36) 86 - 144 (30 - 62) 131 - 201 (55 - 94) 176 - 260 (80 - 127) 239 - 361 (115 - 183)	±2 (±1) From Set Point	*6-1/2 (2) 9-1/2 (3) 16-1/2 (5)

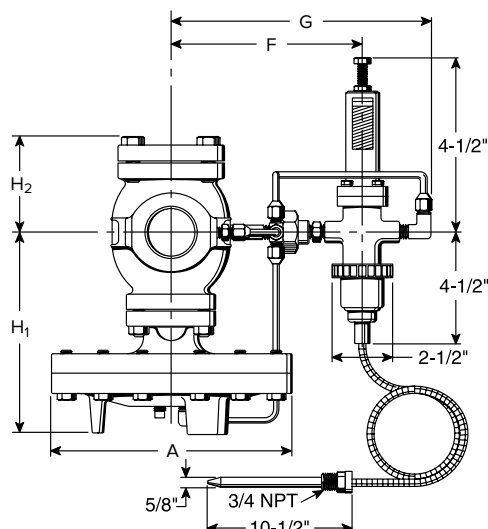
\*Standard length.

Note: If desired set temperature is in temperature range overlap, select lower range.

OB-2000L Dimensions and Weights																				
Size		Face-to-Face “L”				H <sub>1</sub>		H <sub>2</sub>		A		F		G		Weight				C <sub>V</sub>
		NPT		150#												NPT		150#		
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	
1/2	15	5-15/16	150	—	—	6-3/4	170	2-15/16	74	7-15/16	200	6-5/8	169	8-3/4	222	31	15	33	15	6.5
3/4	20	5-15/16	150	—	—	6-3/4	170	2-15/16	74	7-15/16	200	6-5/8	169	8-3/4	222	31	15	33	15	9
1	25	6-5/16	160	5-3/4	147	6-15/16	175	3-1/16	76	8-15/16	226	6-7/8	174	8-7/8	226	39	19	41	20	12
1-1/4	32	7-1/8	180	6-1/2	166	7-5/8	192	3-9/16	90	8-15/16	226	7-1/8	182	9-1/4	235	47	22	49	23	19
1-1/2	40	7-1/8	180	7-7/16	189	7-5/8	192	3-9/16	90	8-15/16	226	7-1/8	182	9-1/4	235	47	22	49	23	22
2	50	9-1/8	230	8-9/16	217	8-1/2	216	4-1/16	103	10-15/16	276	7-7/16	189	9-1/2	242	71	33	77	36	38
2-1/2	65	—	—	10-15/16	278	9-13/16	251	4-7/8	122	13-13/16	352	8-1/8	206	10-1/8	259	—	—	138	63	66
3	80	—	—	11-3/4	298	10-7/16	264	5-3/8	135	13-13/16	352	8-9/16	217	10-5/8	270	—	—	149	69	78
4	100	—	—	13-1/2	343	12-5/8	321	6-9/16	167	15-13/16	401	9-1/4	234	11-1/4	287	—	—	234	107	116

\*50% reduced port available for sizes 1/2" - 4". The C<sub>V</sub> value should be divided by 2 to get reduced port C<sub>V</sub>.

**For capacities see page 315.**



# OB-2000L



## For Steam

OB-2000L Sensor and Accessory Specifications					
Capillary Material	Capillary Temperature Ranges °F (°C)	Bulb Material	Bulb Connection	Thermal Well Material	Thermal Well Connection
Copper Capillary Tube With 304 Stainless Steel Armor Shield	18 - 59 (-8 - 15) 50 - 97 (10 - 36) 86 - 144 (30 - 62) 131 - 201 (55 - 94) 176 - 260 (80 - 127) 239 - 361 (115 - 183)	Nickel Plated Copper Bulb	3/4" (20 mm) NPT	Brass* 304 Stainless Steel*	1" (25 mm) NPT

\*Standard. Other material available upon request. See page 310 for dimensions of well.

NOTE: Capillary can withstand a maximum of 36°F (20°C) above rated range.

NOTE: If desired set temperature is in temperature range overlap, select lower range.

OB-2000L Materials					
OB-2000	Body Material	Seat Type & Material	Valve Material	Connection	Maximum Temperature °F (°C)
Main Valve	Ductile Iron ASTM A536	Single Seat Stainless Steel AISI 420	Stainless Steel AISI 420	NPT 150 lb Flanged 300 lb Flanged	450 (232)
Temperature Pilot Valve	Bronze ASTM B584			1/4" (6 mm) NPT	

## GP-2000L, OB-2000L

### Capacities for Steam Service

GP-2000L and OB-2000L Steam Capacities																					
lb/hr											kg/hr										
Inlet	Outlet	Connection Size									Inlet	Outlet	Connection Size								
		in											mm								
psig		1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	barg		15	20	25	32	40	50	65	80	100
5	2	218	277	316	495	594	1100	1782	1881	3135	0.34	0.14	99	126	143	225	269	499	808	853	1422
10	7	161	223	297	471	545	942	1635	1933	2874	0.69	0.48	73	101	135	214	247	427	742	877	1304
	3	356	435	475	812	920	1518	2574	2772	4598		0.21	161	197	215	368	417	689	1168	1257	2086
15	12	178	246	328	519	601	1038	1803	2131	3169	1.03	0.83	81	112	149	235	273	471	818	966	1437
	8	261	362	483	764	885	1528	2654	3137	4665		0.55	119	164	219	347	401	693	1204	1423	2116
	3	416	482	594	970	1168	1694	3069	3366	5643		0.21	189	219	269	440	530	768	1392	1527	2560

Note: For reduced port capacity, please divide capacity by 2.

## For Steam Service

The OB-2000PT is a diaphragm-operated externally piloted pressure/temperature combination regulator. It is used in applications where maximum pressure should be limited and the temperature of the heated medium is controlled using a single seated main valve. Temperature pilot and capillary unit disconnect, making repairs or temperature range changes

quick and easy. Available in sizes 1/2" through 6" and with a choice of four spring ranges, six temperature ranges and three capillary lengths.

**For a fully detailed certified drawing, refer to CDY #1006.**

OB-2000PT Specifications						
Application	Inlet Pressure psig (barg)	Minimum Differ. Pressure psig (barg)	Reduced Pressure & Spring Color psig (barg)	Temperature Ranges °F (°C)	Temperature Accuracy °F (°C)	Capillary Lengths feet (meters)
Steam	NPT 15 - 300 (1 - 20)	7 (.48)	1.5 - 3 (.10 - .21) Yellow 3 - 21 (.21 - 1.4) Yellow 15 - 200 (1.0 - 13.8) Green	18 - 59 (-8 - 15) 50 - 97 (10 - 36) 86 - 144 (30 - 62) 131 - 201 (55 - 94) 176 - 260 (80 - 127) 239 - 361 (115 - 183)	±2 (±1) From Set Point	6-1/2 (2)* 9-1/2 (3) 16-1/2 (5)
	150 lb Flanged 15 - 185 (1 - 13)					
	300 lb Flanged 15 - 300 (1 - 20)					

\*Standard length.

OB-2000PT Sensor and Accessory Specifications					
Capillary Material	Capillary Temperature Ranges °F (°C)	Bulb Material	Bulb Connection	Thermal Well Material	Thermal Well Connection
Copper Capillary Tube With 304 Stainless Steel Armor Shield	18 - 59 (-8 - 15) 50 - 97 (10 - 36) 86 - 144 (30 - 62) 131 - 201 (55 - 94) 176 - 260 (80 - 127) 239 - 361 (115 - 183)	Nickel Plated Copper Bulb	3/4" (20 mm) NPT	Brass* 304 Stainless Steel*	1" (25 mm) NPT

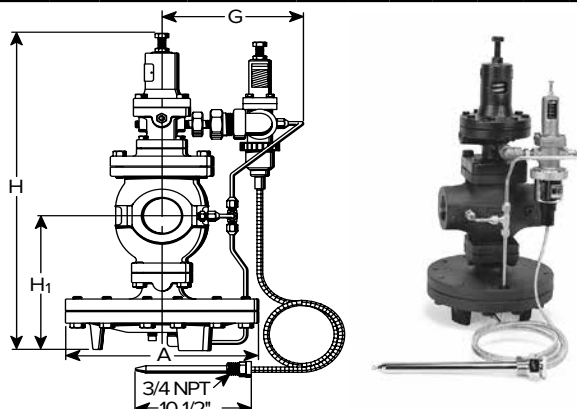
\*Standard. Other material available upon request. See page 310 for dimensions of well.

NOTES: Capillary can withstand a maximum of 36°F (20°C) above rated range. If desired set temperature is in temperature range overlap, select lower range.

OB-2000PT Dimensions and Weights																							
Size		Face-to-Face						H		H <sub>1</sub>		A		G		Weights						C <sub>v</sub>	
		NPT		150#		300#										NPT		150#		300#			
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	lb	kg		
1/2	15	5-15/16	150	—	—	—	—	15-3/4	398	6-3/4	170	7-15/16	200	6-1/2	166	47	22	49	23	55	25	5.0	
3/4	20	5-15/16	150	—	—	—	—	15-3/4	398	6-3/4	170	7-15/16	200	6-1/2	166	47	22	49	23	55	25	7.2	
1	25	6-15/16	160	5-3/4	147	—	—	15-15/16	404	6-15/16	175	8-15/16	226	7	178	57	26	59	28	64	29	10.9	
1-1/4	32	7-1/8	180	6-1/2	166	—	—	17-1/8	434	7-5/8	192	8-15/16	226	7-1/4	185	67	31	69	31	74	34	14.3	
1-1/2	40	7-1/8	180	7-7/16	189	—	—	17-1/8	434	7-5/8	192	8-15/16	226	7-1/4	185	67	31	69	31	75	34	18.8	
2	50	9-1/8	230	8-9/16	217	9-1/8	232	19-5/8	498	8-1/2	216	10-15/16	276	6-1/2	166	89	41	94	43	100	46	32	
2-1/2	65	—	—	10-15/16	278	11-1/2	292	21-3/4	552	9-13/16	251	13-13/16	352	6-1/2	166	—	—	158	72	167	76	60	
3	80	—	—	11-3/4	298	12-7/16	315	22-5/8	575	10-7/16	264	13-13/16	352	6-1/2	166	—	—	171	78	183	83	78	
4	100	—	—	13-1/2	343	14-1/8	359	25-15/16	658	12-5/8	321	15-13/16	401	6-1/2	166	—	—	263	120	281	128	120	

Note: For 6" (150 mm) consult factory.

OB-2000PT Materials			
OB-2000PT	Body Material	Valve & Seat Material	Maximum Temperature °F (°C)
Main Valve	Ductile Iron ASTM A536	Stainless Steel AISI 420	450 (232)
Temperature Pilot Valve	Bronze ASTM B584		
Pressure Pilot	Ductile Iron ASTM A536		



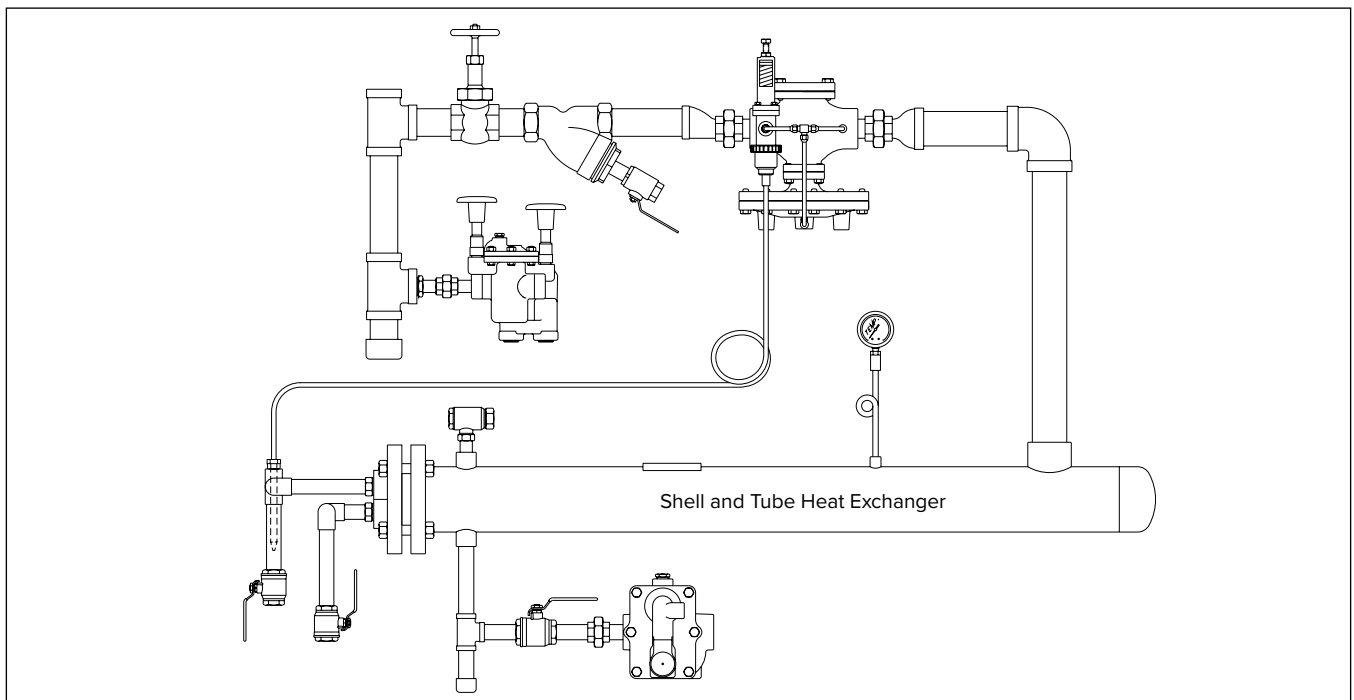
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

## For Steam Service

### Points to Remember When Installing

- Drain condensate at inlet of pressure/temperature regulator with inverted bucket steam trap.
- Protect temperature regulating valve from dirt and scale by installing strainer with 100 mesh screen at inlet of valve.
- Install shutoff valves on either side of the regulating valve along with a by-pass line for maintenance purposes.
- Install vacuum breaker after the outlet of equipment and before the steam trap.
- Install sensor so it is fully immersed in the fluid being heated.
- If temperature well is used, apply heat transfer medium to sensor before insertion into well.
- Place thermometer into system in close proximity to temperature sensor for accurate valve adjustment.
- If possible, do not elevate condensate after steam trap.
- Determine pressure setting before temperature setting (OB-2000PT only).

## Typical Installation—OB-30, OB-2000



## Load Calculations

### Heating oil with steam

$$\text{lb/hr steam} = \frac{\text{GPM}}{4} \times \Delta T \times 1.1$$

### Heating water with steam

$$\text{lb/hr steam} = \frac{\text{GPM}}{2} \times \Delta T \times 1.1$$

### Heating air with steam

$$\text{lb/hr steam} = \frac{\text{CFM}}{900} \times \Delta T \times 1.1$$

### Jacketed kettles or tanks

$$\text{lb/hr steam} = \frac{\text{Gal} \times \text{SG} \times \text{Cp} \times \Delta T \times 8.3}{\text{Lat} \times T}$$

## Where:

- GPM = Gallons per minute  
 $\Delta T$  = Temperature rise (°F)  
CFM = Cubic feet per minute  
Cp = Specific heat of liquids (Btu/lb-°F)  
T = Time (hours)  
Lat = Latent heat of steam (Btu/lb)  
Gal = Gallons of liquid to be heated  
SG = Specific gravity  
1.1 = Safety factor

# **Armstrong® Python® - 1500 Series Control Valves**

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Control valves are a key component in any pressure or temperature control application. With the increasing cost of fuel, delivering media in the most efficient way increases productivity by delivering the required pressure or temperature while avoiding excessive consumption. Precision control also provides repeatability and safety for any process.

## Features

- Series 1500 valves are globe two-way single seated design valves, which deliver accurate and efficient control for most steam and liquid applications
- Body with top entry trim and bolted bonnet facilitates easy access to all internal parts for in-line inspection, maintenance, and trim replacement
- Carbon steel and stainless steel materials
- 2 Packings: Carbon filled PTFE chevron seals and grafoil
- Electric actuators for on/off and modulating characteristics
- Equal percentage and Linear characteristic trims for accurate control
- Pressure balanced configuration for improved shut off and high pressure applications
- Metal to metal seats rated for Class IV shut off
- Optional PTFE soft seat for Class VI shut off
- 17-4 PH h900 and Stellite plugs and seat for long service and better resistance
- 50:1 Rangeability
- Two pneumatic actuators per valve size
- 6-spring actuator design allows lower hysteresis and higher performance
- Pneumatic actuators tested to over 4 million cycles
- Live spring loaded teflon packing for long service and less maintenance

## Accessories

### Positioners

- Pneumatic
- Electro-Pneumatic
- Digital

### Controllers

- Pneumatic
- Electric

### Transmitters

### Temperature sensors



Python® Series  
1500 Control  
Valve - Threaded  
Connection



Python® Series  
1500 Control  
Valve - Flanged  
Connection

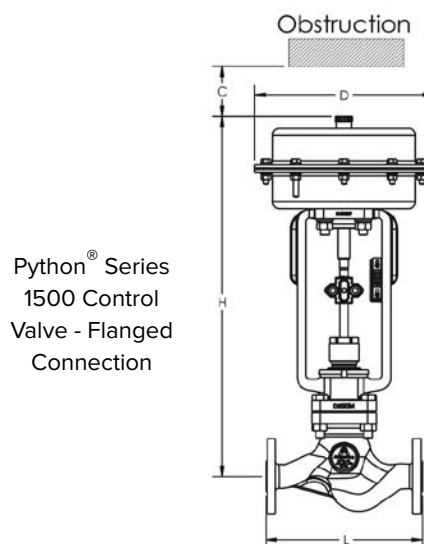
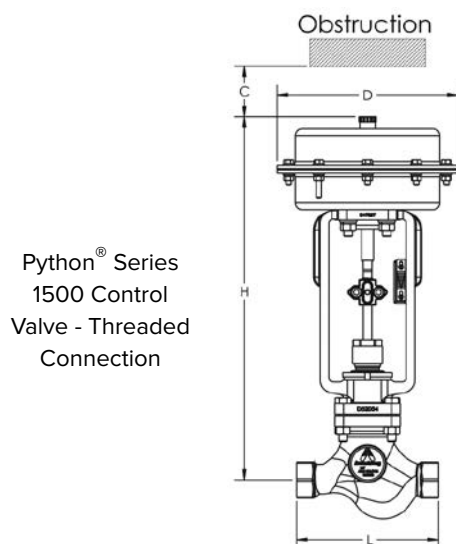
# Python® - 1500 Series Control Valves

List of Materials	
Valve Body	Carbon Steel A216 Gr. WCB Stainless Steel CF8M
Bonnet	
Valve/Valve Seat	17-4 PH h900 / Standard Stellite / Option PTFE Soft Seat / Option - 388F (198C) Max.
Valve Spindle	ANSI SS 431
Gland Packing	Carbon Filled V-Teflon - option 1 (450°F (232°C) Max.) Grafoil - option 2 (800°F (427°C) Max.)
Yoke	Ductile Iron
Actuator Spring	SiCr Spring Steel
Actuator Diaphragm	Nitrile Reinforced with Nylon Fiber
Cage Material	ASTM A743 Gr CB30
Sealing Ring Material	Carbon Filled V-Teflon

Technical Data		
Flow Characteristic		Equal Percentage and Linear
Leakage		ANSI Class IV (Metal to Metal) ANSI Class VI (PTFE Soft Seat)
Rangeability		50:1
Travel	1/2" to 1-1/2"	13/16" (20 mm)
	2"	1-3/16" (30 mm)
	2-1/2" to 4"	1-9/16" (40 mm)

## Dimensions and Weights - 174 cm<sup>2</sup> Actuator and Valve

Size		Face-to-Face "L"						"C"		"D"		"H"		Weight					
in	mm	NPT		150#		300#		in	mm	in	mm	in	mm	NPT		150#		300#	
		in	mm	in	mm	in	mm							lb	kg	lb	kg	lb	kg
1/2	15	6-1/2	165	7-1/4	184	7-1/2	190	5-7/8	150	8-1/4	210	16-3/4	426	29	13	29	13	29	13
3/4	20	6-1/2	165	7-1/4	184	7-5/8	194	5-7/8	150	8-1/4	210	16-3/4	426	29	13	29	13	31	14
1	25	7-3/4	197	7-1/4	184	7-3/4	197	5-7/8	150	8-1/4	210	16-3/4	426	33	15	35	16	37	17
1-1/4	32	9-1/4	235	8	203	8-1/2	216	5-7/8	150	8-1/4	210	17-3/4	451	35	16	37	17	42	19
1-1/2	40	9-1/4	235	8-3/4	222	9-1/4	235	5-7/8	150	8-1/4	210	17-3/4	451	37	17	40	18	46	21





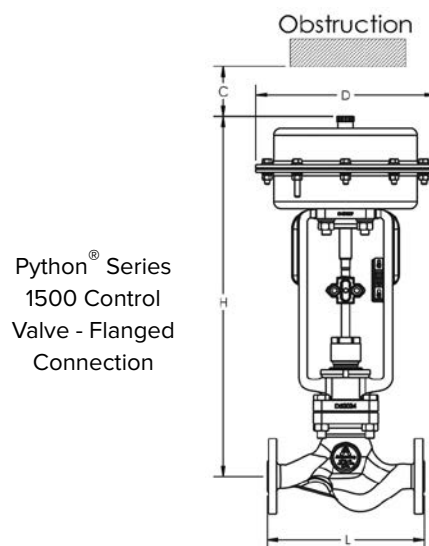
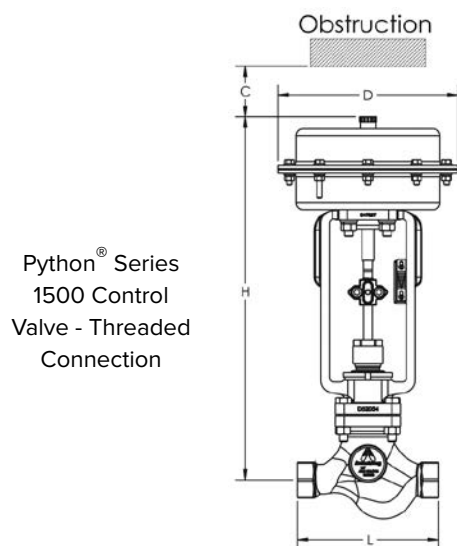
# Armstrong® Python® - 1500 Series Control Valves

## Dimensions & Weight -348 cm<sup>2</sup> Actuator and Valve

Size		Face-to-Face “L”						“C”		“D”		“H”		Weight					
in	mm	NPT		150#		300#								NPT		150#		300#	
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	lb	kg
1/2	15	6-1/2	165	7-1/4	184	7-1/2	190	5-7/8	150	11	280	18-3/4	477	46	21	46	21	46	21
3/4	20	6-1/2	165	7-1/4	184	7-5/8	194	5-7/8	150	11	280	18-3/4	477	46	21	46	21	49	22
1	25	7-3/4	197	7-1/4	184	7-3/4	197	5-7/8	150	11	280	18-3/4	477	51	23	53	24	55	25
1-1/4	32	9-1/4	235	8	203	8-1/2	216	5-7/8	150	11	280	19-3/4	502	53	24	55	25	60	27
1-1/2	40	9-1/4	235	8-3/4	222	9-1/4	235	5-7/8	150	11	280	19-3/4	502	55	25	53	26	64	29
2	50	10-1/2	267	10	254	10-1/2	267	5-7/8	150	11	280	19-7/8	504	71	32	77	35	82	37
2-1/2	65	-	-	10-13/16	276	11-1/2	292	5-7/8	150	11	280	23-7/16	595	-	-	129	59	132	60
3	80	-	-	11-3/4	298	12-1/2	322	5-7/8	150	11	280	23-13/16	605	-	-	150	68	158	72
4	100	-	-	13-13/16	352	14-1/2	374	5-7/8	150	11	280	25	635	-	-	204	93	222	101

## Dimensions & Weight -700 cm<sup>2</sup> Actuator and Valve

Size		Face-to-Face “L”				“C”		“D”		“H”		Weight			
in	mm	150#		300#								150#		300#	
		in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg		
2	50	10	254	10-1/2	267	5-7/8	150	16	400	24-1/8	613	141	64	147	67
2-1/2	65	10-13/16	276	11-1/2	292	5-7/8	150	16	400	26-7/16	671	189	86	192	87
3	80	11-3/4	298	12-1/2	322	5-7/8	150	16	400	26-13/16	681	210	95	218	99
4	100	13-13/16	352	14-1/2	374	5-7/8	150	16	400	27-15/16	708	264	120	282	128



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

## Description

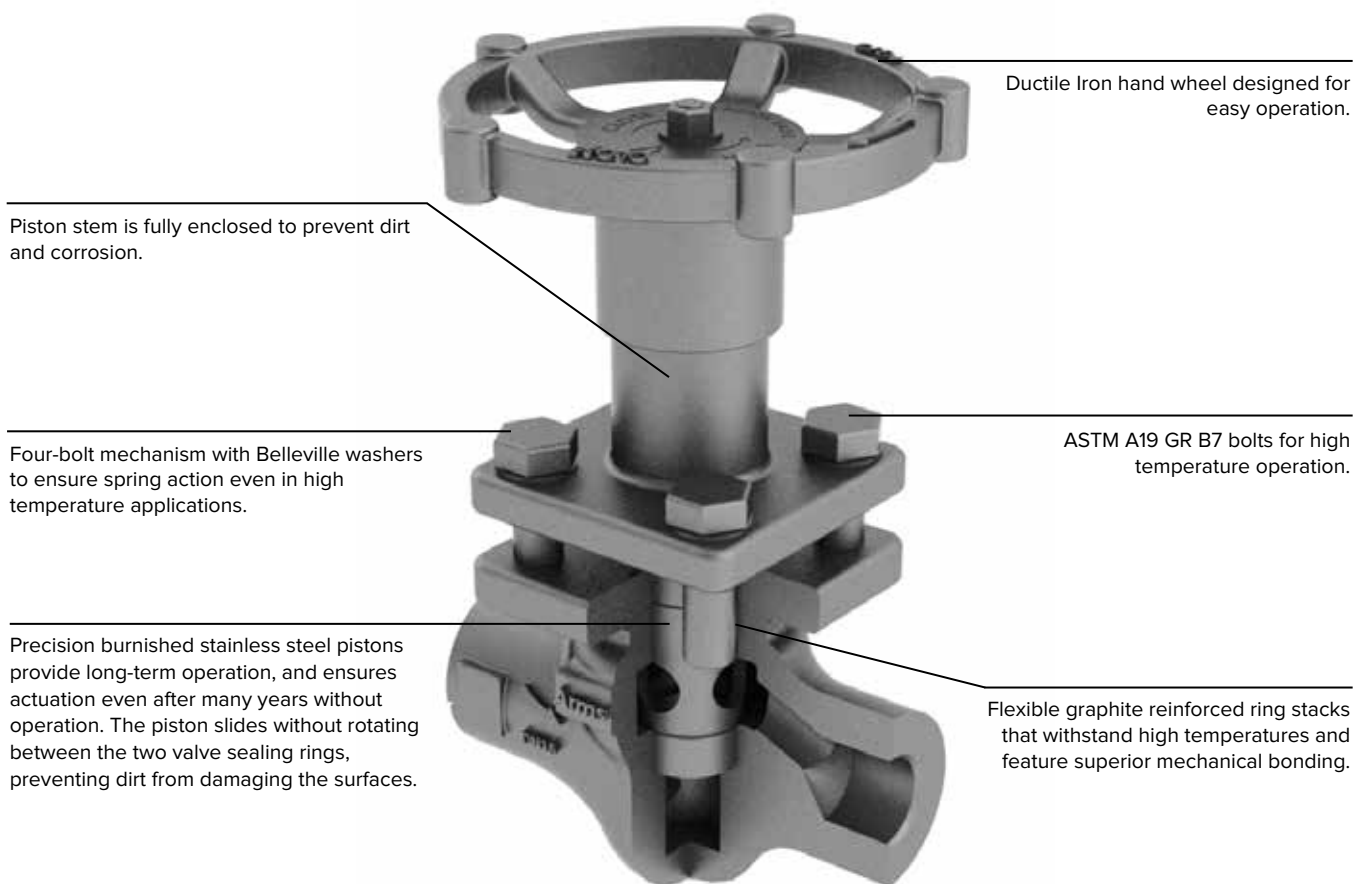
Armstrong Piston Valves are full port forged steel isolation valves with a maximum operating pressure of 136 Barg/1 973 psig and a maximum operating temperature of 427°C/800°F. The burnished piston and metal reinforced graphite rings provide leak-proof shut off and allow Armstrong Piston Valves to be operated at higher temperatures, while also extending operating life.

Armstrong Piston Valves are available in Socket Weld, BSPT, and NPT end connections. Flanged ends can be supplied upon request.

Armstrong Piston Valves are ideal for saturated and superheated steam, and hot water applications.

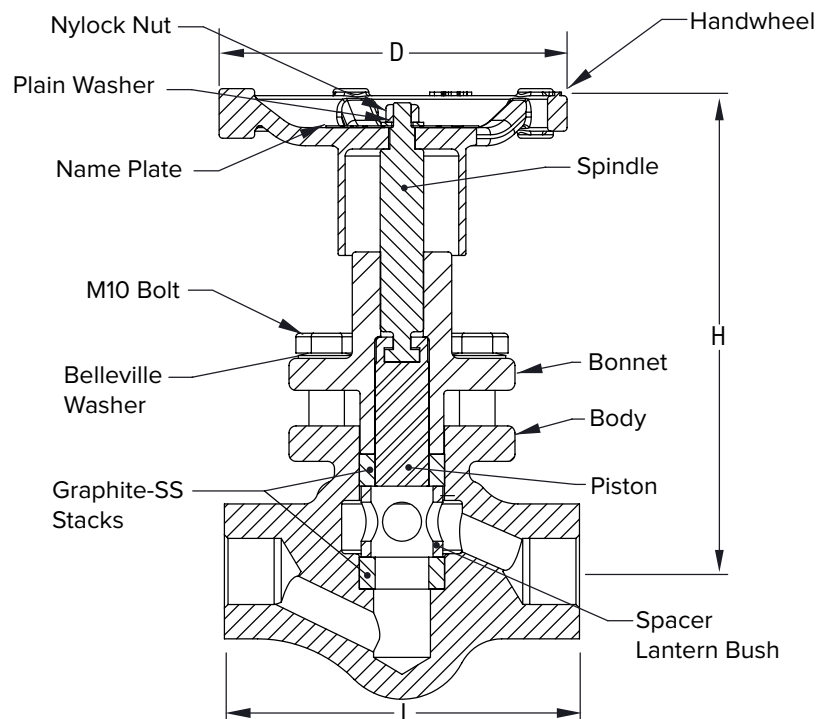
## Armstrong Piston Valves Feature:

- Leak-proof isolation
- Sizes from 15mm/1/2" NB to 40mm/1-1/2" NB
- Choice of socket weld, screwed or flanged end connections
- Compatible with API, ASME, IBR, and DIN standards
- Resistant to cavitation
- All sealing valve components may be easily replaced in-line
- Long-term operation. Piston valve design ensures actuation even after many years without operation
- Fire-proof performance





# Piston Valves



**Forged Piston Valves ANSI Class 800 (API602 & ASME B16.34)**

NB/DN	Body Material	L		H		D		Minimum Thread	Bolting Type	Approximate Weight	
		mm	in	mm	in	mm	in			kg	lbs
15	A105/LF2	100	3.9	134	5.3	93	3.7	14	4B - SE/SW	1.9	4.2
20	A105/LF2	120	4.7	138.5	5.5	93	3.7	14	4B - SE/SW	3.4	7.5
25	A105/LF2	135	5.3	183	7.2	112	4.4	18	4B - SE/SW	4.8	10.6
40	A105/LF2	185	7.3	226	8.9	112	4.4	19	4B - SE/SW	11.5	25.4

**Design Features Forged Steel Piston Valves Class 800 (Sizes 15, 20, 25, 40NB)**

End Connections *	Maximum Pressure at Temperature				Maximum Temperature at Operating Pressure				Hydro Test Pressure at Ambient Temperature
	barg	°C	psig	°F	°C	barg	°F	psig	
Socketweld ends	136.20	≤38	1 975.41	100	427	75.84	801	1 099.97	204.30

\* Other end connections may have restricted pressure and temperature ratings due to applicable standards.

## Design features of Armstrong Piston Valves:

### Material of Construction - Body

- Forged Steel (ASTM A105, ASTM A350 LF2)

### Material of Construction – Graphite Ring Stack

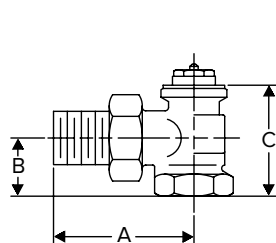
- Flexible Graphite and SS 316

## Design Standards

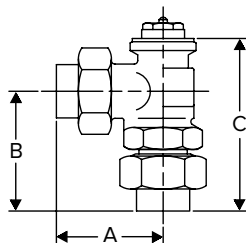
- ASME (B16.34, B16.10, B16.5)
- API (600, 602)
- IBR 1950
- DIN (3202, 10226-1)
- Inspection and testing (API 598)
- Leak test (ANSI/FCI 70-2)
- Fire test (API SPEC 6FA : 1999)



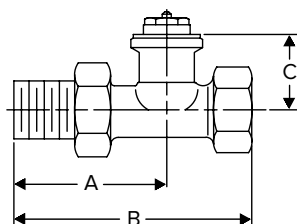
# Armstrong® RV-4 Thermostatic Radiator Valves



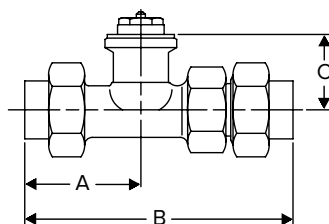
**RV-4 Angle**



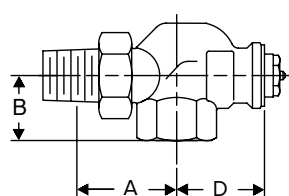
**RV-4 Angle Solder**



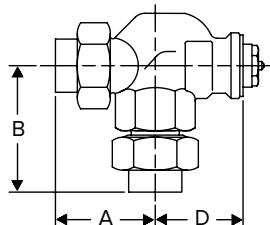
**RV-4 Straight**



**RV-4 Straight Solder**



**RV-4 Reversed Angle**



**RV-4 Reversed Angle Solder**



## For Hot Water and Low Pressure Steam

Armstrong's thermostatic radiator valves are offered in straight, angle and reversed angle patterns. Thermostatic operators provide accurate and automatic control of space temperature. They are ideal for hot water and low pressure steam heated convectors, radiators, thermostatically controlled hydronic or low pressure heat exchangers. Five styles of thermostatic operators are available with liquid, liquid remote or low density wax sensors.

For a fully detailed certified drawing, refer to:

**RV-4 Angle** CDY #1049  
**RV-4 Straight** CDY #1050  
**RV-4 Reversed Angle** CDY #1051

### Physical Data—Valve Bodies

Pattern	Angle								Straight								Reversed Angle							
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Pipe Conn. FPT x MPT	1/2	15	3/4	20	1	25	1-1/4	32	1/2	15	3/4	20	1	25	1-1/4	32	1/2	15	3/4	20	1	25		
"A"	2-5/16	59	2-5/8	66	2-15/16	59	3-7/16	65	2-15/16	59	2-1/2	64	3-1/8	73	3-9/16	90	2-3/8	60	2-5/8	66	3	76		
"B"	1	25	1-1/8	28	1-5/16	33	1-9/16	39	3-3/4	95	4-3/16	106	4-15/16	78	6	150	1-1/16	27	1-3/4	44	1-5/16	33		
"C"	1-15/16	49	2-1/16	52	2-3/8	60	2-3/4	70	1-1/8	28	1-1/8	28	1-1/8	28	1-3/8	35	—	—	—	—	—	—		
"D"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1-9/16	40	1-3/8	35	1-1/2	38		
Weight, lb (kg)	3/4 (0.34)				1-1/2 (0.68)				1-3/4 (0.79)				3/4 (0.34)				1 (0.45)				1-1/2 (0.68)			

### Physical Data—Solder Valve Bodies

Pattern	Angle				Straight				Reversed Angle			
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Pipe Connection Solder	1/2	15	3/4	20	1/2	15	3/4	20	1/2	15	3/4	20
"A"	1-7/8	47	2-1/4	57	1-7/8	47	2-5/32	55	1-3/4	44	2-1/4	57
"B"	2-5/32	55	2-1/2	64	4-7/16	113	5-1/4	133	2-3/16	56	3-1/8	79
"C"	3	76	3-1/2	89	1-1/4	32	1-5/32	29	—	—	—	—
"D"	—	—	—	—	—	—	—	—	1-1/2	38	1-1/2	38
Weight, lb (kg)	3/4 (0.34)				1 (0.45)				1-1/4 (0.56)			

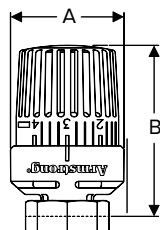
### Pressure/Temperatures

Model	"A" Insert (Standard On All Valves)	"S" Insert (Provides Longer Life on Steam Service)
Maximum Steam, psig (barg)	15 (1)	
Maximum Temp. °F (°C)	250 (121)	
Max. Diff.—Water, psig (barg)	15 (1)	
Max. Static Pressure, psig (barg)	150 (10)	

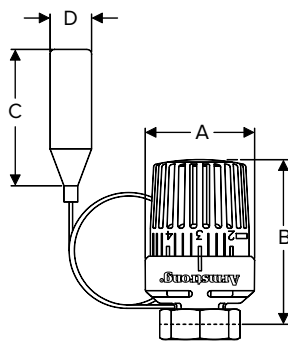
NOTE: Normally closed insert available.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

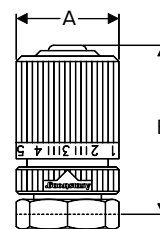
# Thermostatic Operators



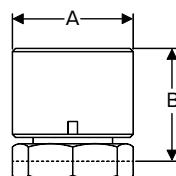
**LV-4 Operator Liquid Sensor**



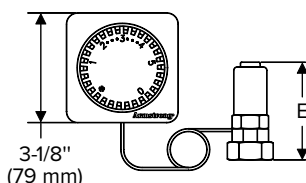
**LV-4 Operator Remote Sensor**



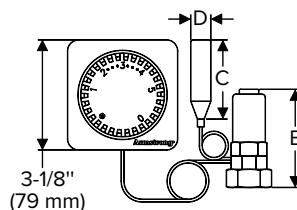
**WV-4 Operator  
Low Density Wax Sensor**



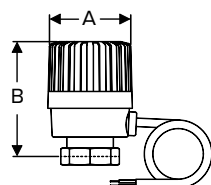
**MV-3  
Operator\***



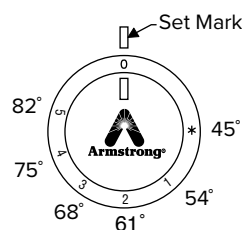
**LV-4W Operator (Wall Mount)**



**LV-4W w/Remote Sensor**



**EV-4 Electric Operator  
24 VAC N.C. or N.O.**



## Thermostatic Radiator Valve In-Service Repair Tool for Valve Repair Without Interrupting Operation

Failures of thermostatic radiator valves are frequently caused by solid matter suspended in the heating medium, such as weld or solder beads, dirt particles, etc. This results in the loss of the shut-off function of the valve through damage to the sealing surface of the valve and seat.

The use of an Armstrong In-Service Repair Tool provides a quick and easy way to remove the valve insert from an Armstrong radiator valve. Valve repair can then be accomplished without draining the heating system or interrupting its operation.



The LV-4 can be easily adjusted to a comfortable temperature. The temperature to scale relationship is shown to the left. The lowest setting provides freeze protection at approximately 45°F with a high setting of 82°F. Temperature settings on all LV-4 Operators may be limited or locked.

For a fully detailed certified drawing, refer to:

<b>LV-4 Operator Liquid Sensor</b>	<b>CDY #1053</b>
<b>LV-4 Operator Remote Sensor</b>	<b>CDY #1054</b>
<b>MV-3 Operator</b>	<b>CDY #1058</b>
<b>LV-4W Operator (Wall Mount)</b>	<b>CDY #1055</b>
<b>LV-4W w/Remote Sensor</b>	<b>CDY #1056</b>
<b>EV-4 Electric Operator</b>	<b>CDY #1057</b>
<b>WV-4 Operator Low Density Wax Sensor</b>	<b>CDY #1062</b>

### Specifications—Valve Bodies and Operators

Name of Part	Material	
Valve Body	Brass (nickel plated)	
Main Valve	"A" insert - Brass	"S" insert
Main Valve Seat	"A" insert - EPDM	chrome nickel plated
Operator Body	Luron	
O-rings	EPDM	

### Physical Data—Thermostatic Operators

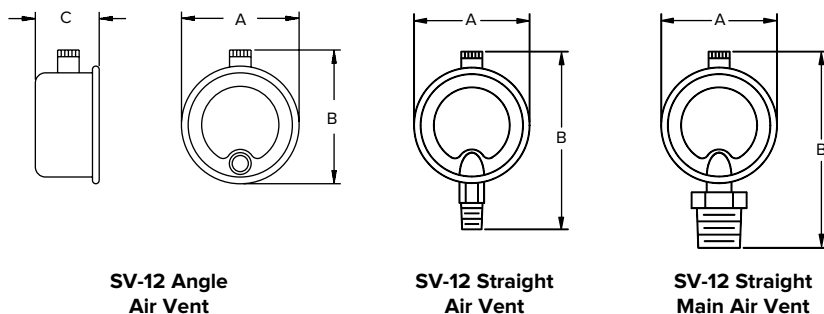
Type	LV-4 Operator w/Liquid Sensor		LV-4 Operator w/Liquid Remote Sensor		WV-4 Operator w/ Low Density Wax Sensor		MV-3 Operator*		LV-4W Operator (Wall Mount)		LV-4W Operator w/Remote Sensor		EV-4 Electric Operator	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
"A"	2-1/8	54	2-1/8	54	1-7/16	37	1-1/2	38	—	—	—	—	2	50
"B"	3-5/16	84	3-5/16	84	2-9/16	65	1-1/2	38	—	—	—	—	2-3/4	70
"C"	—	—	2-7/8	73	—	—	—	—	—	—	2-7/8	28	—	—
"D"	—	—	3/4	20	—	—	—	—	—	—	3/4	20	—	—
"E"	—	—	—	—	—	—	—	—	3	76	3	76	—	—
Remote Operator	—	—	—	—	—	—	—	—	3-1/8 x 3-1/8	79 x 79	3-1/8 x 3-1/8	79 x 79	—	—
Capillary Length, ft (m)	—		6-1/2 or 16-1/2 (2 or 5)		—		—		—		6-1/2 or 16-1/2 (2 or 5)		—	
Weight, lb (kg)	1/3 (0.15)		1/2 or 3/4 (0.23 or 0.34)		1/4 (0.11)		1/8 (0.05)		3/4 (0.34)		1 or 1-1/4 (0.45 or 0.57)		3/4 (0.34)	

\*For on-off service—not thermostatic.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# Armstrong® SV-12 Steam Radiator Air Vent



## For Steam Service

A vent port size for every room location with the largest size for the coldest rooms and the smallest size for the “too hot” rooms. SV-12 air vents are easy to install on any steam radiator.

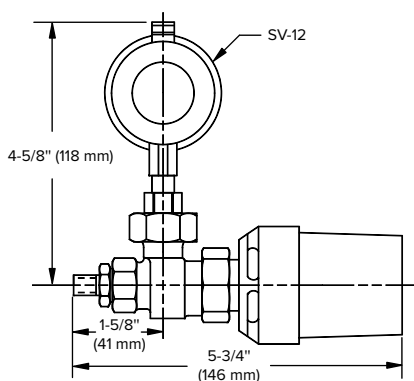
For a fully detailed certified drawing, refer to CDY #1042.



Materials	
Name of Part	Material
Body	Nickel plated brass
Float	Polypropylene
Valve Seat	Brass
Bimetal Thermostatic Element	Stainless steel

Physical Data						
Pattern	Angle Connection		Straight Connection		Straight Main Connection	
Pipe Connection Size	in	mm	in	mm	in	mm
	1/8	3	1/8, 1/4	3, 6	1/2, 3/4	15, 20
“A”	2-3/16	56	2-3/16	56	2-3/16	56
“B”	2-5/16	59	3-1/4	83	3-1/2	89
“C”	1-3/16	30	1-3/16	30	1-3/16	30
Max. Operating Pressure, psig (barg)	15 (1)					
Vent Port Designation and Port Size	4 = .040"                      6 = .0935"				1 = .1850"  Only one vent port will be provided	
	5 = .070"                      C = .1285"					
	D = .1850"					
	Each air vent is provided with all five of the above vent ports					

## RV-4 One Pipe Steam Radiator Valve



RV-4 One Pipe Steam Radiator Valve

Specifications		
Name of Part	Material	
Valve Body	Brass (nickel plated)	
Main Valve	“A” insert - Brass	“S” insert chrome nickel plated
Main Valve Seat	“A” insert - EPDM	
Operator Body	Luron	
O-rings	EPDM	

Pressure/Temperatures		
Model	“A” Insert (Standard On All Valves)	“S” Insert (Provides Longer Life on Steam Service)
Maximum Steam, psig (barg)	15 (1)	
Maximum Temp. °F (°C)	250 (121)	
Max. Diff.—Water, psig (barg)	15 (1)	
Max. Static Pressure, psig (barg)	150 (10)	

NOTE: Normally closed insert available.

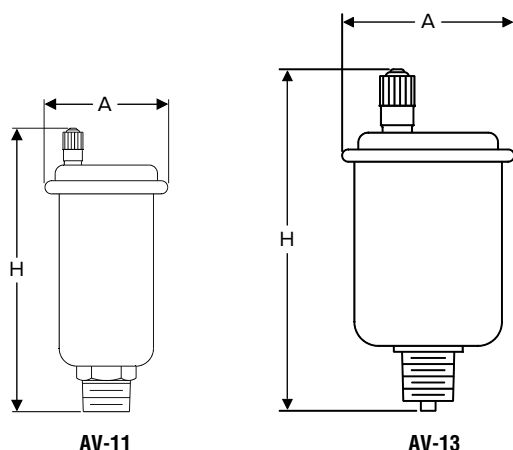
## For Steam Service

The Armstrong RV-4 One Pipe Radiator Valve is a state-of-the-art thermostatic radiator valve for low pressure steam service. The valve provides accurate and automatic control of space temperature in individual rooms through automatic air venting.

For a fully detailed certified drawing, refer to CDY #1052.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# AV-11/AV-13 Air Vent



## For Hot or Cold Water and Non-viscous Liquids

Air vent models AV-11 and AV-13 are compact float-type valves for the removal of air and other gases from hydronic heating and cooling systems, liquid chilling operations and other light liquid services.

For a fully detailed certified drawing, refer to:

**AV-11 CDY #1047**

**AV-13 CDY #1048**

Specifications								
Model	Application	Working Pressure		Maximum Temperature		Connection	Hydraulic Test Body	
		psig	barg	°F	°C		psig	barg
AV-11	Hot or Cold Water	1 - 50	0.06 - 3.4	210	99	NPT Screwed	200	14
AV-13		1 - 150	0.06 - 10.3				350	24

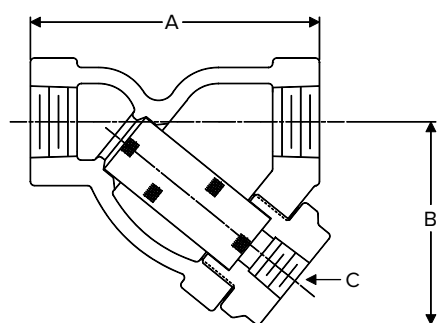
Capacities							
AV-11				AV-13			
ΔP		Capacities		ΔP		Capacities	
psig	barg	cfm	m³/hr	psig	barg	cfm	m³/hr
3.5	0.24	0.5	0.84	16	1.1	1	1.7
10	0.69	1.0	1.7	48	3.3	2	3.4
24	1.7	1.5	2.5	84	5.8	3	5.1
35	2.4	1.9	3.2	120	8.3	4	6.8
50	3.4	2.0	3.4	150	10	4.9	8.3

Physical Data				
Model	AV-11		AV-13	
	in	mm	in	mm
Connection Size	1/8 v	3	1/2 Female 3/4 Male	15 Female 20 Male
"A"	1-3/4	44	2-1/8	54
"H"	3-3/8	86	4-5/8	118
Weight, lb (kg)	1/4 (0.11)		1/2 (0.23)	

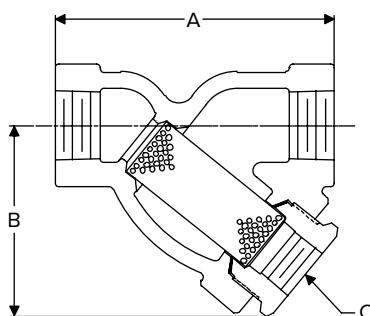
Materials		
Valve	Float	Disc
Brass	Polypropylene	Nitrile



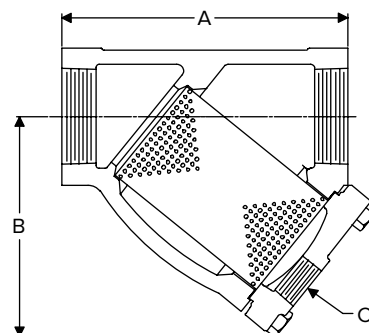
# Cast Iron 250 lb Screwed 1/2" - 3"



CA1SC 1/2", 3/4", 1", 1-1/2", 2"



CA1SC 1-1/4"

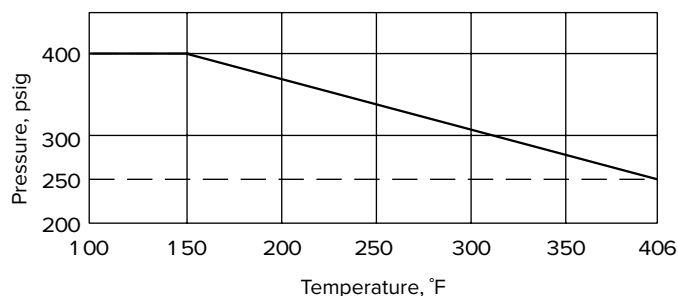


A1SC 2-1/2", 3"

For a fully detailed certified drawing, refer to:  
CA1SC 1/2", 3/4", 1", 1-1/4", 1-1/2", 2"  
A1SC 2-1/2", 3"

CD #1111  
CD #1043

## Pressure/Temperature Rating



## Materials: 250 lb Screwed 1/2" - 3" (15 - 80 mm)

Connections Size		Body	Standard Screen	Screen Retainer	Gasket	Bolting	
in	mm						
1/2, 3/4	15, 20	ASTM A48 Class 30 Cast Iron	304 SS .045" perforated†	ASTM A48 Class 30 Cast Iron	Spiral Wound	N/A	
1, 1-1/2, 2	25, 40, 50				Soft Steel		
1-1/4	32		304 SS .045" perforated†		Non-asbestos	Cap Screws ASTM A193 Gr. B7	
2-1/2, 3	65, 80						

†NOTE: Other screen materials available. See page 435.

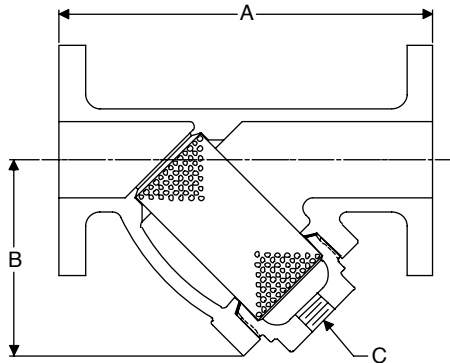
## Physical Data: 250 lb Screwed 1/2" - 3" (15 - 80 mm)

Size		Ordering Code, Standard Screen	Weight		Dimensions						Maximum Pressure				Screen Retainer Type	Connections
					A		B		C		Saturated Steam		150°F (66°C) non-shock			
in	mm		lb	kg	in	mm	in	mm	in	mm	psig	barg	psig	barg		
1/2	15	CA1SC	3	1.4	4-1/4	108	3	76	3/8	9.5	250	17	400	28	Threaded	ANSI B1.20.1 Screwed
3/4	20															
1	25		4-1/2	2	5	127	3-3/4	95	1/2	15						
1-1/4	32		7	3	5-1/2	140	3-7/8	98								
1-1/2	40		10	4.5	6-5/16	160	4-7/16	113								
2	50		15	6.8	7-1/2	191	5-7/16	138								
2-1/2	65	A1SC	24-1/2	11	8-1/2	216	6-7/16	164	3/4	20					Bolted	
3	80		45-1/2	21	10-1/2	267	8	203	1-1/4	32						

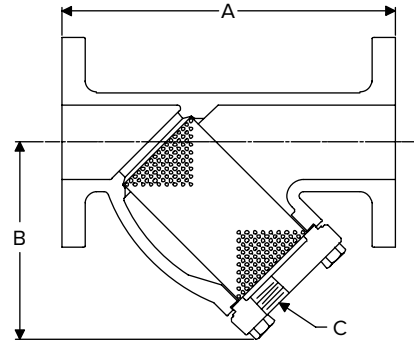
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# Cast Iron

## Class 125 Flanged 2"- 6" and Class 250 Flanged 2" - 6"



2" Class 125 or 250 Flanged



2-1/2" - 6" Class 125 Flanged, 2-1/2" - 6" Class 250 Flanged

For a fully detailed certified drawing, refer to list below:

2" Class 125 or 250 Flanged	CD #1044
2-1/2" - 6" Class 125 Flanged	CD #1045
2-1/2" - 6" Class 250 Flanged	CD #1046



Materials: Class 125 Flanged 2" - 6" (50 - 150 mm) and Class 250 Flanged 2" - 6" (50 - 150 mm)						
Connection Size		Body	Screen Retainer	Gasket	Bolting	Standard Screen
in	mm					
2	50	ASTM A48 Class 30 Cast Iron		Soft Steel	N/A	304 SS .045" perforated†
2-1/2, 3, 4, 6	65, 80, 100, 150			Non-asbestos	Cap Screws ASTM A193	

\*NOTE: Other screen materials available. See page 435.

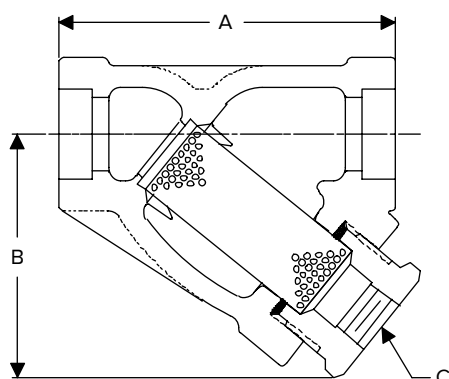
Physical Data: Class 125 Flanged 2" - 6" (50 - 150 mm) and Class 250 Flanged 2" - 6" ( 50 - 150 mm)																	
Size		Ordering Code, Standard Screen	Weight		Dimensions						Maximum Pressure				Screen Retainer Type	Conn.	
					A		B		C		Saturated Steam		150°F (66°C) non-shock				
in	mm		lb	kg	in	mm	in	mm	in	mm	psig	barg	psig	barg			
2	50		A1FL125	22	10	9-3/4	248	5-1/8	130	1/2	15	125	8.6	175	12	Threaded	Class 125 ANSI B16.1 Flat Faced
2-1/2	65			36	16	11-1/16	281	6-7/16	164	3/4	20					Bolted	
3	80	49		22	12-1/4	311	7-1/4	184	1-1/4	32							
4	100	83		38	14-7/8	378	9-1/2	241	1-1/4	32							
6	150	187		85	20-7/16	519	13-7/8	353	1-1/2	40							
2	50	A1FL250	25	11	10-1/4	260	5-1/8	130	1/2	15	250	17	400	28	Threaded	Class 250 ANSI B16.1 1/16" RF	
2-1/2	65		42	19	11-11/16	297	6-7/16	164	3/4	20					Bolted		
3	80		70	32	14-1/8	283	8-1/2	216	1-1/4	32							
4	100		125	57	17-1/8	435	10-3/4	273	1-1/4	32							
6	150		294	133	23-1/2	597	15-3/4	400	1-1/2	40							

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

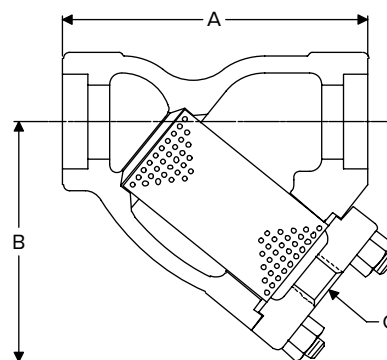


# Cast Carbon Steel (WCB)

## 600 lb and 900 lb Screwed or Socketweld 1/2" - 3"



900 lb—B1SC/B1SW 1/2", 3/4", 1"



600 lb—B1SC/B1SW 1-1/4", 1-1/2", 2", 3"

For a fully detailed certified drawing, refer to:

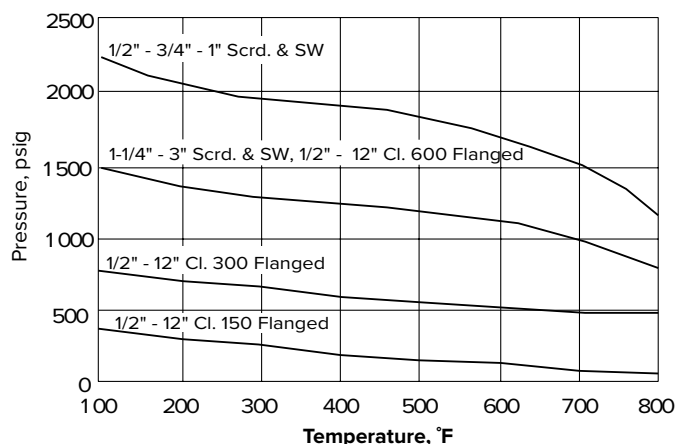
900 lb—B1SC/B1SW 1/2", 3/4", 1"

CD #1047

600 lb—B1SC/B1SW 1-1/4", 1-1/2", 2", 3"

CD #1048

### Pressure/Temperature Rating



### Materials: 600 lb and 900 lb Screwed or Socketweld 1/2" - 3" (15 - 80 mm)

Connection Size		Body	Screen Retainer	Gasket	Bolting	Standard Screen
in	mm					
1/2, 3/4	15, 20	ASTM A216 Gr. WCB	ASTM A108 Gr. 1045	Soft Steel	N/A	304 SS .045" perforated <sup>1</sup>
1	25		ASTM A108 Gr. 1040			
1-1/4, 1-1/2, 2	32, 40, 50		ASTM A216 Gr. WCB	304 SS Spiral Wound Non-asbestos	Studs ASTM A193 Gr. B7 Nuts ASTM A194 Gr. 2H	
3	80			Non-asbestos	Cap Screws ASTM A193 Gr. B7	

<sup>1</sup>NOTE: Other screen materials available. See page 435.

### Physical Data: 600 lb and 900 lb Screwed or Socketweld 1/2" - 3" (15 - 80 mm)

Size		Ordering Code Standard Screen		Weight		Dimensions						Maximum Pressure				Screen Retainer Type	Connections
						A		B		C		Saturated Steam		100°F (38°C) non-shock			
in	mm	Scr'd	SW	lb	kg	in	mm	in	mm	in	mm	psig	barg	psig	barg		
1/2	15	B1SC	B1SW	2-1/2	1	3-3/4	95	2-11/16	68	3/8	9.5	1 635	113	2 220	153	Threaded	ANSI B1.20.1 Screwed
3/4	20			3-1/2	1.6	4-3/16	106	2-15/16	75	1/2	15						
1	25			6	2.7	5	127	3-1/2	89								
1-1/4	32			9	4	5-1/2	140	4-3/16	106			1 135	78	1 480	102	Bolted	ANSI B16.11 Socketweld
1-1/2	40			11	5	6-5/16	160	4-13/16	122								
2	50			19	9	7-3/4	197	5-5/8	143								
3	80			46	21	11-3/8	289	8-3/16	208	1-1/4	32						

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

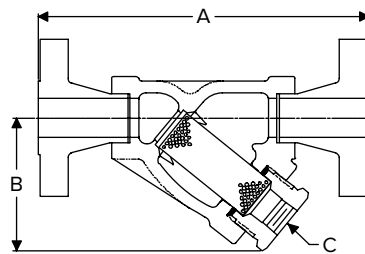
North America • Latin America • India • Europe / Middle East / Africa • China • Pacific Rim

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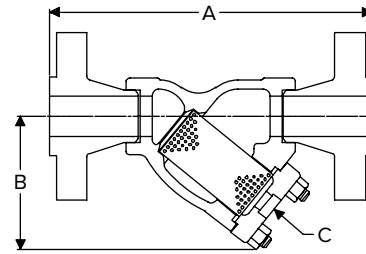


# Cast Carbon Steel (WCB)

## Class 150, 300 Flanged, and 600 Flanged 1/2" - 1-1/2"



B1FL 1/2", 3/4", 1"



B1FL 1-1/4", 1-1/2"

For a fully detailed certified drawing, refer to:

B1FL 1/2", 3/4", 1" CD #1050

B1FL 1-1/4", 1-1/2" CD #1051

Materials: Class 150, 300, and 600 Flanged 1/2" - 1-1/2" (15 - 40 mm)

Connection Size		Body	Screen Retainer	Gasket	Bolting	Standard Screen
in	mm					
1/2, 3/4	15, 20	ASTM A216 Gr. WCB	ASTM A108 Gr. 1045	Soft Steel	N/A	304 SS .045" perforated <sup>†</sup>
1	25		ASTM A216 Gr. WCB	304 SS Spiral Wound Non-asbestos	Studs ASTM A193 Gr. B7 Nuts ASTM A194 Gr. 2H	
1-1/4, 1-1/2	32, 40					

<sup>†</sup>NOTE: Other screen materials available. See page 435.

Physical Data: Class 150, 300, and 600 Flanged 1/2" - 1-1/2" (15 - 40 mm)

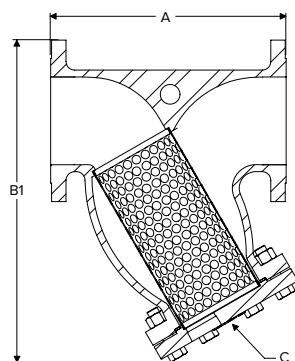
Size		Ordering Code, Standard Screen	Weight		Dimensions						Maximum Pressure				Screen Retainer Type	Flanges
					A		B		C		Saturated Steam		100°F (38°C) non-shock			
in	mm		lb	kg	in	mm	in	mm	in	mm	psig	barg	psig	barg		
1/2	15	B1FL 150	5	2.3	6-7/8	175	2-11/16	68	3/8	9.5	205	14	285	20	Threaded	Class 150 ANSI B16.5 1/16" RF
3/4	20		10	4.5	7-3/8	187	2-15/16	75	1/2	15						
1	25		10-1/2	4.8	8-1/2	216	3-1/2	89								
1-1/4	32		15	7	9	229	4-3/16	106								
1-1/2	40		20	9	10-1/4	260	4-13/16	122								
1/2	15	B1FL 300	6-1/2	3	7-1/4	184	2-11/16	68	3/8	9.5	605	42	740	51	Threaded	Class 300 ANSI B16.5 1/16" RF
3/4	20		12	5	7-3/4	197	2-15/16	75	1/2	15						
1	25		13-1/2	6	8-7/8	226	3-1/2	89								
1-1/4	32		17-1/2	8	9-5/8	244	4-3/16	106								
1-1/2	40		26	12	10-3/4	273	4-13/16	122								
1/2	15	B1FL 600	11	5	7-11/16	195	2-11/16	68	3/8	9.5	1135	78	1480	102	Threaded	Class 600 ANSI B16.5 1/4" RF
3/4	20		12	5.4	8-1/4	210	2-15/16	75	1/2	15						
1	25		13-1/2	6	9-3/8	238	3-1/2	89								
1-1/4	32		18-1/2	8.5	10-1/4	260	4-3/16	106								
1-1/2	40		28	13	11-5/16	287	4-13/16	122								

NOTE: For pressure/temperature ratings, see page 438.

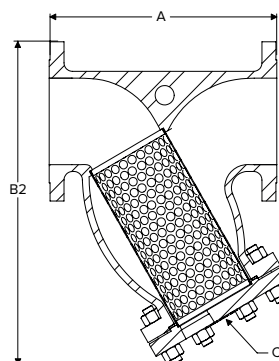


# Cast Carbon Steel (WCB)

## Class 150, 300 Flanged, and 600 Flanged 2" - 12"



YCS-B 2"-12" (Bolts)



YCS-B 2"-12" (Studs)

Materials: Class 150, 300, and 600 Flanged 2" - 12" (50 - 300 mm)

Connection Size		Body	Screen Retainer	Gasket	Bolting (B <sub>1</sub> ) / Studs (B <sub>2</sub> )	Standard Screen
in	mm					
2 - 12	50 - 300	ASTM A216 Gr. WCB	ASTM A105N	304 SS Spiral Wound Graphite	Bolts / Studs ASTM A193 Gr. B7 Nuts ASTM A194 2H Zinc Plated	304 SS .045" perforated*

\*NOTE: Other screen materials available. See page 435.

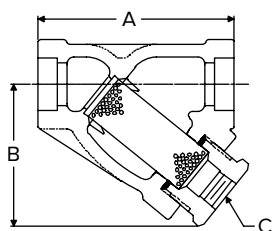
Physical Data: Class 150, 300, and 600 Flanged 2" - 12" (50 - 300 mm)

Size		Weight		Dimensions								Maximum Pressure				Screen Retainer Type	Flanges
				A		B <sub>1</sub> (bolts)		B <sub>2</sub> (studs)		C		Saturated Steam		100°F (38°C) non-shock			
in	mm	lb	kg	in	mm	in	mm	in	mm	in	mm	psig	barg	psig	barg		
2	50	40	18	8	203	8-3/32	205	8-19/32	218	1/2	15	205	14	285	20	Bolted	Class 150 ANSI B16.5 1/16" RF
3	80	55	25	9-1/2	241	9-19/32	245	9-29/32	252	1	25						
4	100	104	47	11-1/2	292	11-19/32	294	11-15/16	303	1-1/2	40						
6	150	173	78	16	406	16-13/32	417	17	432	2	50						
8	200	299	135	19-1/2	495	20-13/16	529	21-1/4	540								
10	250	458	208	24-1/2	622	24-19/32	625	25-1/8	638								
12	300	767	348	27-1/2	699	29	736	29-19/32	752								
2	50	45	21	10-1/2	267	8-7/32	207	8-1/2	216	1/2	15	605	42	740	51	Bolted	Class 300 ANSI B16.5 1/16" RF
3	80	77	35	12-1/2	318	10-3/32	256	10-13/32	264	1	25						
4	100	135	61	14	356	11-13/16	300	12-7/32	310	1-1/2	40						
6	150	254	115	17-1/2	445	16-23/32	424	17-1/8	435	2	50						
8	200	446	202	22	559	21-13/32	543	21-7/8	555								
10	250	650	295	24-1/2	622	25-7/32	639	25-10/16	651								
12	300	981	445	28	711	29-13/16	757	30-11/32	771								
2	50	64	29	11-1/2	292	9-3/32	230	9-13/32	239	1/2	15	1135	78	1480	102	Bolted	Class 600 ANSI B16.5 1/4" RF
3	80	106	48	14	356	11-7/32	284	11-23/32	298	1	25						
4	100	211	96	17	432	13-1/2	342	14	356	1-1/2	40						
6	150	453	205	22	559	19-7/32	487	19-23/32	501	2	50						
8	200	721	327	26	660	23	585	24-1/4	603								
10	250	1227	556	31	787	27-13/16	707	28-15/32	723								
12	300	1663	754	33	838	32-29/32	835	33-10/16	854								

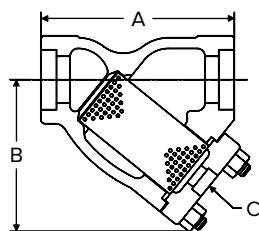
NOTE: For pressure/temperature ratings, see page 438.

# Cast Chrome Moly Steel (WC6)

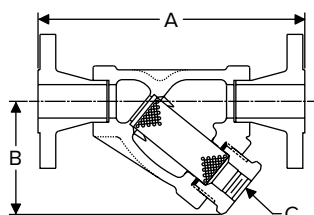
## 1 500 lb Screwed, Socketweld and Cl. 1 500 Flanged 1/2"- 2" Armstrong®



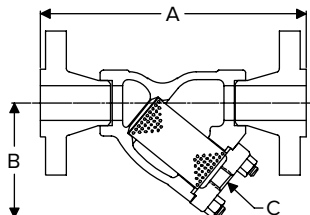
C1SC/C1SW 1/2", 3/4", 1"



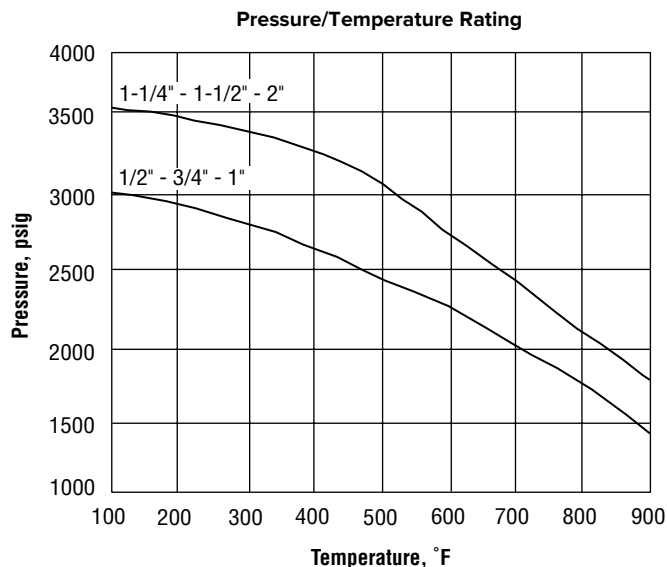
C1SC/C1SW 1-1/4", 1-1/2", 2"



C1FL 1/2", 3/4", 1"



C1FL 1-1/4", 1-1/2", 2"



For a fully detailed certified drawing, refer to list below:

C1SC/C1SW 1/2", 3/4", 1"	CD #1055
C1SC/C1SW 1-1/4", 1-1/2", 2"	CD #1056
C1FL 1/2", 3/4", 1"	CD #1057
C1FL 1-1/4", 1-1/2", 2"	CD #1058

### Materials: 1 500 lb Screwed, Socketweld and Cl. 1 500 lb Flanged 1/2" - 2" (15 - 50 mm)

Connection Size		Body	Screen Retainer	Gasket	Bolting	Standard Screen
in	mm					
1/2, 3/4, 1	15, 20, 25	ASTM A217 Gr. WC6	ASTM A276	Soft Steel	N/A	304 SS .045" perforated†
1-1/4, 1-1/2, 2	32, 40, 50		ASTM A217 Gr. WC6	316L SS Spiral Wound Non-asbestos	Studs ASTM A193 Gr. B16 Nuts ASTM A194 Gr. 2H	

†NOTE: Other screen materials available. See page 435.

### Physical Data: 1 500 lb Screwed, Socketweld and Cl. 1 500 lb Flanged 1/2" - 2" (15 - 50 mm)

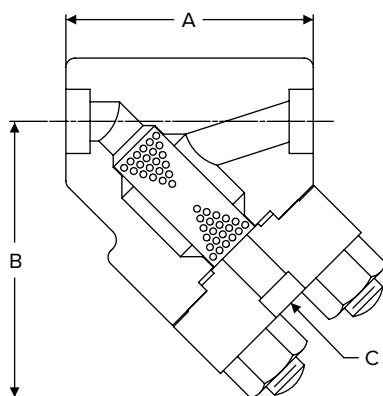
Size		Ordering Code Standard Screen		Weight		Dimensions						Maximum Pressure				Screen Retainer Type	Connections
						A		B		C		Saturated Steam		100°F (38°C) non-shock			
in	mm	Scr'd	SW	lb	kg	in	mm	in	mm	in	mm	psig	barg	psig	barg		
1/2	15	C1SC	C1SW	2-1/2	1.1	3-3/4	95	2-11/16	68	3/8	9.5	2 090	144	3 000	207	Threaded	ANSI B1.20.1 Screwed
3/4	20	C1SC	C1SW	3-1/2	1.6	4-3/16	106	2-15/16	75	1/2	15						
1	25	C1SC	C1SW	5-1/2	2.5	5	127	3-1/2	89	1/2	15						
1-1/4	32	C1SC	C1SW*	17	8	6-3/4	171	6	152	3/4	20	2 515	173	3 600	248	Bolted	ANSI B16.11 Socketweld
1-1/2	40	C1SC	C1SW*	17	8	6-3/4	171	6	152	3/4	20						
2	50	C1SC	C1SW*	25	11	8-1/4	210	7-7/16	189	1	25						
1/2	15	C1FL1500		12	5	8-1/4	210	2-11/16	68	3/8	9.5	2 090	144	3 000	207	Threaded	Class 1500 ANSI B16.5 1/4" RF
3/4	20	C1FL1500		15-1/2	7	9-3/8	238	2-15/16	75	1/2	15						
1	25	C1FL1500		22-1/2	10	10-1/4	260	3-1/2	89	1/2	15						
1-1/4	32	C1FL1500*		37	17	12-1/8	308	6	152	3/4	20	2 515	173	3 600	248	Bolted	
1-1/2	40	C1FL1500*		45	20	12-7/8	327	6	152	3/4	20						
2	50	C1FL1500*		78	35	15-5/8	397	7-7/16	189	1	25						

\*Socketweld Blowdown Connections.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

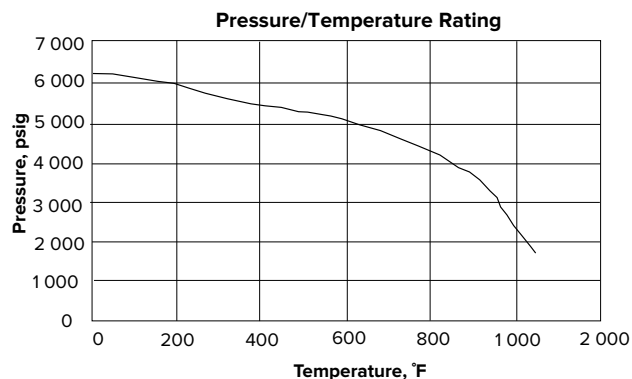


# Forged Steel (F22) 2 500 lb Socketweld 1/2" - 2"



D1SW 1/2" - 2"

For a fully detailed certified drawing, refer to CD #1059.



## Materials: 2 500 lb Socketweld 1/2" - 2" (15 - 50 mm)

Connection Size		Body	Screen Retainer	Gasket	Bolting	Standard Screen
in	mm					
1/2, 3/4, 1, 1-1/4, 1-1/2, 2	15, 20, 25, 32, 40, 50	ASTM A182 Gr. F22	ASTM A182 Gr. F22	347 SS Spiral Wound Non-asbestos	Studs ASTM A193 Gr. B16 Nuts ASTM A194 Gr. 2H	304 SS .045" perforated*

\*NOTE: Other screen materials available. See page 435.

## Physical Data: 2 500 lb Socketweld 1/2" - 2" (15 - 50 mm)

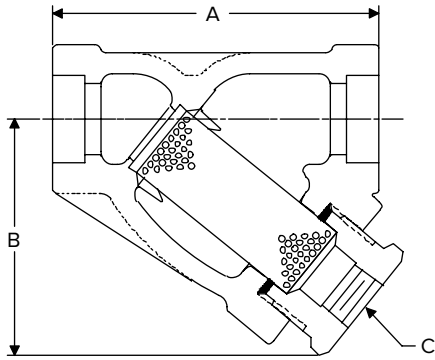
Size		Ordering Code, Standard Screen	Weight		Dimensions						Maximum Pressure				Screen Retainer Type	Connections
					A		B		C*		Saturated Steam		100°F (38°C) non-shock			
in	mm		lb	kg	in	mm	in	mm	in	mm	psig	barg	psig	barg		
1/2	15	D1SW	26	12	5-1/8	130	5-5/8	143	1/2	15	2 500	172	6 000	414	Bolted	ANSI B16.11 Socketweld
3/4	20															
1	25															
1-1/4	32															
1-1/2	40															
2	50		56	25	6-5/8	168	7-3/8	187								

\*Socketweld blowdown connections for 1/2" (15 mm) pipe.

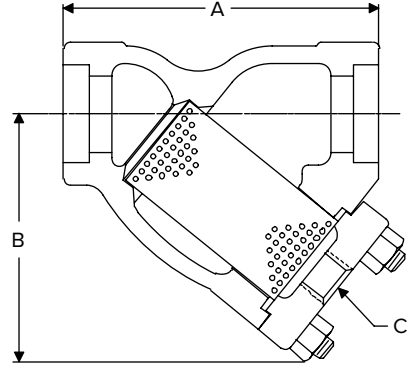
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# Cast Stainless Steel (CF8M)

## 1 500 lb and 600 lb Screwed, Socketweld 1/2" - 3"

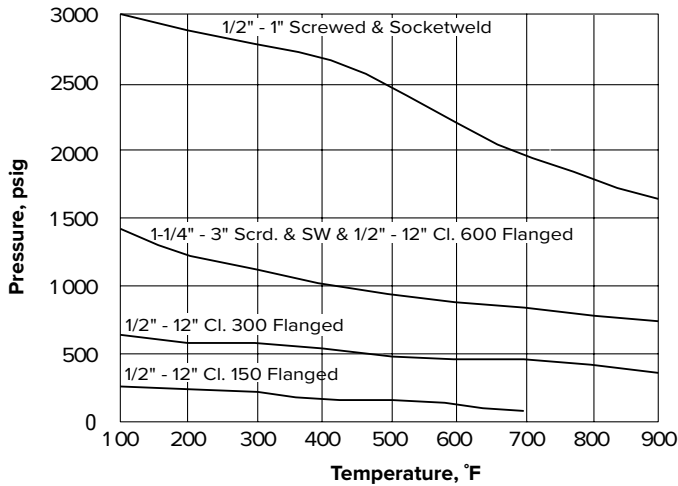


1500 Lb. E7SC/E7SW 1/2", 3/4", 1"



600 Lb. E7SC/E7SW 1-1/4", 1-1/2", 2", 3"

Pressure/Temperature Rating



For a fully detailed certified drawing, refer to:  
E7SC/E7SW 1/2", 3/4", 1" CD #1060

E7SC/E7SW 1-1/4", 1-1/2", 2", 3" CD #1061



### Materials: 1 500 lb and 600 lb Screwed or Socketweld 1/2" - 3" (15 - 80 mm)

Connection Size		Body	Screen Retainer	Gasket	Bolting	Standard Screen
in	mm					
1/2, 3/4, 1	15, 20, 25	ASTM A351 Gr. CF8M	ASTM A276	316 SS Flat	N/A	316 SS .045" perforated*
1-1/4, 1-1/2, 2	32, 40, 50		ASTM A351 Gr. CF8M	304 SS Spiral Wound Non-asbestos	Studs ASTM A193 Gr. B7 Nuts ASTM A194 Gr. 2H	
3	80			Non-asbestos	Cap Screws ASTM A193 Gr. B7	

\*NOTE: Other screen materials available. See page 435.

### Physical Data: 1 500 lb and 600 lb Screwed or Socketweld 1/2" - 3" (15 - 80 mm)

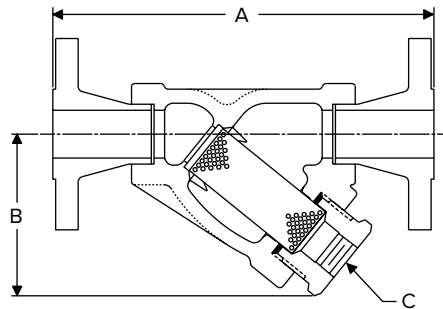
Size		Ordering Code Standard Screen		Weight		Dimensions						Maximum Pressure				Screen Retainer Type	Connections
						A		B		C		Saturated Steam		100°F (38°C) non-shock			
in	mm	Scr'd	SW	lb	kg	in	mm	in	mm	in	mm	psig	barg	psig	barg		
1/2	15	1500# E7SC	1500# E7SW	2-1/2	1.1	3-3/4	95	2-11/16	68	3/8	9.5	2 090	144	3 000	207	Threaded	ANSI B1.20.1 Screwed
3/4	20			3-1/2	1.6	4-3/16	106	2-15/16	75	1/2	15						
1	25			6	3	5	127	3-1/2	89								
1-1/4	32	600# E7SC	600# E7SW	9	4	5-1/2	140	4-3/16	106			1/2	15	935	64	1 440	99
1-1/2	40			11	5	6-5/16	160	4-13/16	122								
2	50			19	9	7-3/4	197	5-5/8	143								
3	80			50	23	11-3/8	289	8-3/16	208	1-1/4	32						

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

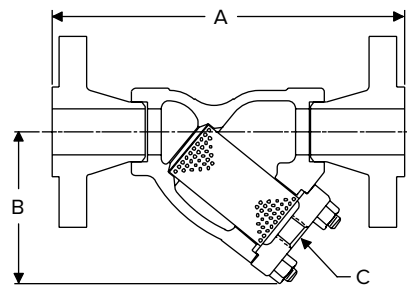


# Cast Stainless Steel (CF8M)

## Cl. 150, 300, and 600 Flanged 1/2" - 1-1/2"



E7FL 1/2", 3/4", 1"



E7FL 1-1/2"

For a fully detailed certified drawing, refer to list below:

E7FL 1/2", 3/4", 1"

CD #1071

E7FL 1-1/2"

CD #1063

**Materials: Class 150, 300, and 600 Flanged 1/2" - 1-1/2" (15 - 40 mm)**

Connection Size		Body	Screen Retainer	Gasket	Bolting	Standard Screen
in	mm					
1/2, 3/4, 1	15, 20, 25	ASTM A351 Gr. CF8M	ASTM A276	316 SS Flat	N/A	316 SS .045" perforated <sup>1</sup>
1-1/2	40		ASTM A351 Gr. CF8M	304 SS Spiral Wound Non-asbestos	Studs ASTM A193 Gr. B7 Nuts ASTM A194 Gr. 2H	

<sup>1</sup>NOTE: Other screen materials available. See page 435.

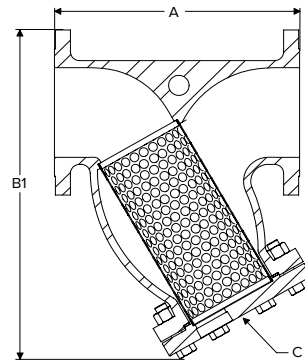
**Physical Data: Class 150, 300, and 600 Flanged 1/2" - 1-1/2" (15 - 40 mm)**

Size		Ordering Code, Standard Screen	Weight		Dimensions						Maximum Pressure				Screen Retainer Type	Flanges
					A		B		C		Saturated Steam		100°F (38°C) non-shock			
in	mm		lb	kg	in	mm	in	mm	in	mm	psig	barg	psig	barg		
1/2	15	E7FL 150	5	2.3	6-7/8	175	2-11/16	68	3/8	9.5	200	14	275	19	Threaded	ANSI B16.5 1/16" RF
3/4	20		10	4.5	7-3/8	187	2-15/16	75	1/2	15						
1	25		11	5	8-3/8	213	3-1/2	89								
1-1/2	40		20	9	10-1/8	257	4-13/16	122								
1/2	15	E7FL 300	6-1/2	3	7-1/4	184	2-11/16	68	3/8	9.5	495	34	720	50	Threaded	ANSI B16.5 1/16" RF
3/4	20		9-1/2	4.3	7-3/4	197	2-15/16	75	1/2	15						
1	25		13-1/2	6	8-7/8	226	3-1/2	89								
1-1/2	40		22	10	10-3/4	273	4-13/16	122								
1/2	15	E7FL 600	8-1/2	4	7-11/16	195	2-11/16	68	3/8	9.5	935	64	1 440	99	Threaded	ANSI B16.5 1/4" RF
3/4	20		9-1/2	4.3	8-1/4	210	2-15/16	75	1/2	15						
1	25		13-1/2	6	9-3/8	238	3-1/2	89								
1-1/2	40		27	12	11-5/16	287	4-13/16	122								

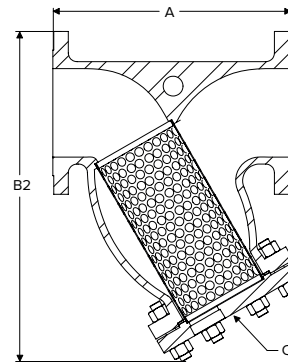
NOTE: For pressure/temperature ratings, see page 443.

# Cast Stainless Steel (CF8M)

## Class 150, 300 Flanged, and 600 Flanged 2" - 12"



YSS-E 2"-12" (Bolts)



YSS-E 2"-12" (Studs)

Materials: Class 150, 300, and 600 Flanged 2" - 12" (50 - 300 mm)						
Connection Size		Body	Screen Retainer	Gasket	Bolting (B <sub>1</sub> ) / Studs (B <sub>2</sub> )	Standard Screen
in	mm					
2 - 12	50 - 300	ASTM A351 Gr. CF8M	ASTM A182 Gr. F316	304 SS Spiral Wound Graphite	Bolts ASTM A193 Gr. B7 Zinc Plated Nuts ASTM A194 2H Zinc Plated Studs ASTM A193 B8M Nuts ASTM A194 8M	316 SS .045" perforated <sup>†</sup>

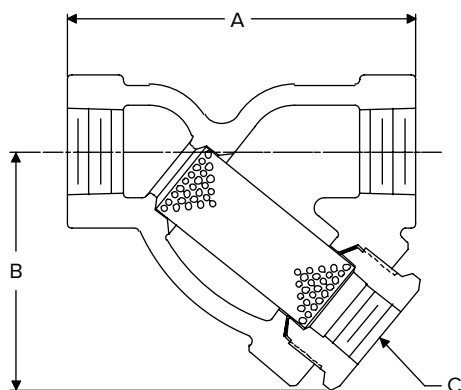
<sup>†</sup>NOTE: Other screen materials available. See page 435.

Physical Data: Class 150, 300, and 600 Flanged 2 " - 12" (50 - 300 mm)																	
Size		Weight		Dimensions								Maximum Pressure				Screen Retainer Type	Flanges
				A		B <sub>1</sub> (bolts)		B <sub>2</sub> (studs)		C		Saturated Steam		100°F (38°C) non-shock			
in	mm	lb	kg	in	mm	in	mm	in	mm	in	mm	psig	barg	psig	barg		
2	50	40	18	8	203	8-3/32	205	8-19/32	218	1/2	15	200	14	275	19	Bolted	Class 150 ANSI B16.5 1/16" RF
3	80	55	25	9-1/2	241	9-19/32	245	9-29/32	252	1	25						
4	100	104	47	11-1/2	292	11-19/32	294	11-15/16	303	1-1/2	40						
6	150	173	78	16	406	16-13/32	417	17	432	2	50						
8	200	299	135	19-1/2	495	20-13/16	529	21-1/4	540								
10	250	458	208	24-1/2	622	24-19/32	625	25-1/8	638								
12	300	767	348	27-1/2	699	29	736	29-19/32	752								
2	50	45	21	10-1/2	267	8-7/32	207	8-1/2	216	1/2	15	495	34	720	50	Bolted	Class 300 ANSI B16.5 1/16" RF
3	80	77	35	12-1/2	318	10-3/32	256	10-13/32	264	1	25						
4	100	135	61	14	356	11-13/16	300	12-7/32	310	1-1/2	40						
6	150	254	115	17-1/2	445	16-23/32	424	17-1/8	435	2	50						
8	200	446	202	22	559	21-13/32	543	21-7/8	555								
10	250	650	295	24-1/2	622	25-7/32	639	25-10/16	651								
12	300	981	445	28	711	29-13/16	757	30-11/32	771								
2	50	64	29	11-1/2	292	9-3/32	230	9-13/32	239	1/2	15	935	64	1 440	99	Bolted	Class 600 ANSI B16.5 1/4" RF
3	80	106	48	14	356	11-7/32	284	11-23/32	298	1	25						
4	100	211	96	17	432	13-1/2	342	14	356	1-1/2	40						
6	150	453	205	22	559	19-7/32	487	19-23/32	501	2	50						
8	200	721	327	26	660	23	585	24-1/4	603								
10	250	1 227	556	31	787	27-13/16	707	28-15/32	723								
12	300	1 663	754	33	838	32-29/32	835	33-10/16	854								

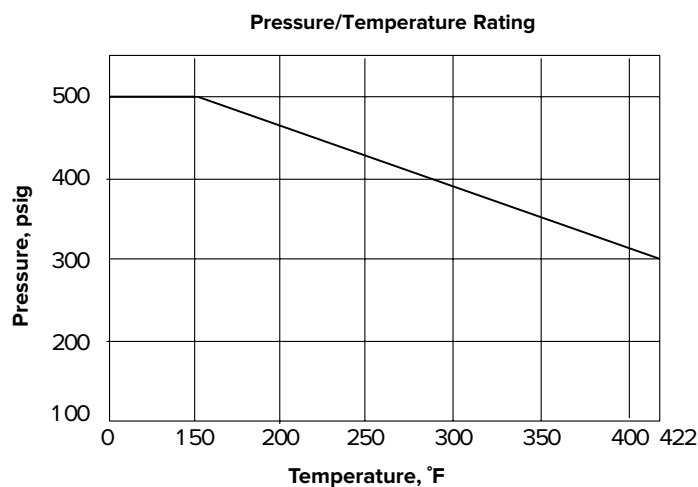
NOTE: For pressure/temperature ratings, see page 443.



# Cast Bronze 300 lb Screwed 1/2" - 2"



F4SC 1/2" - 2"



For a fully detailed certified drawing, refer to CD #1064.



## Materials: 300 lb Screwed 1/2" - 2" (15 - 50 mm)

Connection Size		Body	Screen Retainer	Gasket	Bolting	Standard Screen
in	mm					
1/2, 3/4, 1, 1-1/4, 1-1/2, 2	15, 20, 25, 32, 40, 50	ASTM B62	Brass C	Copper	N/A	Brass .045" perforated*

\*NOTE: Other screen materials available. See page 435.

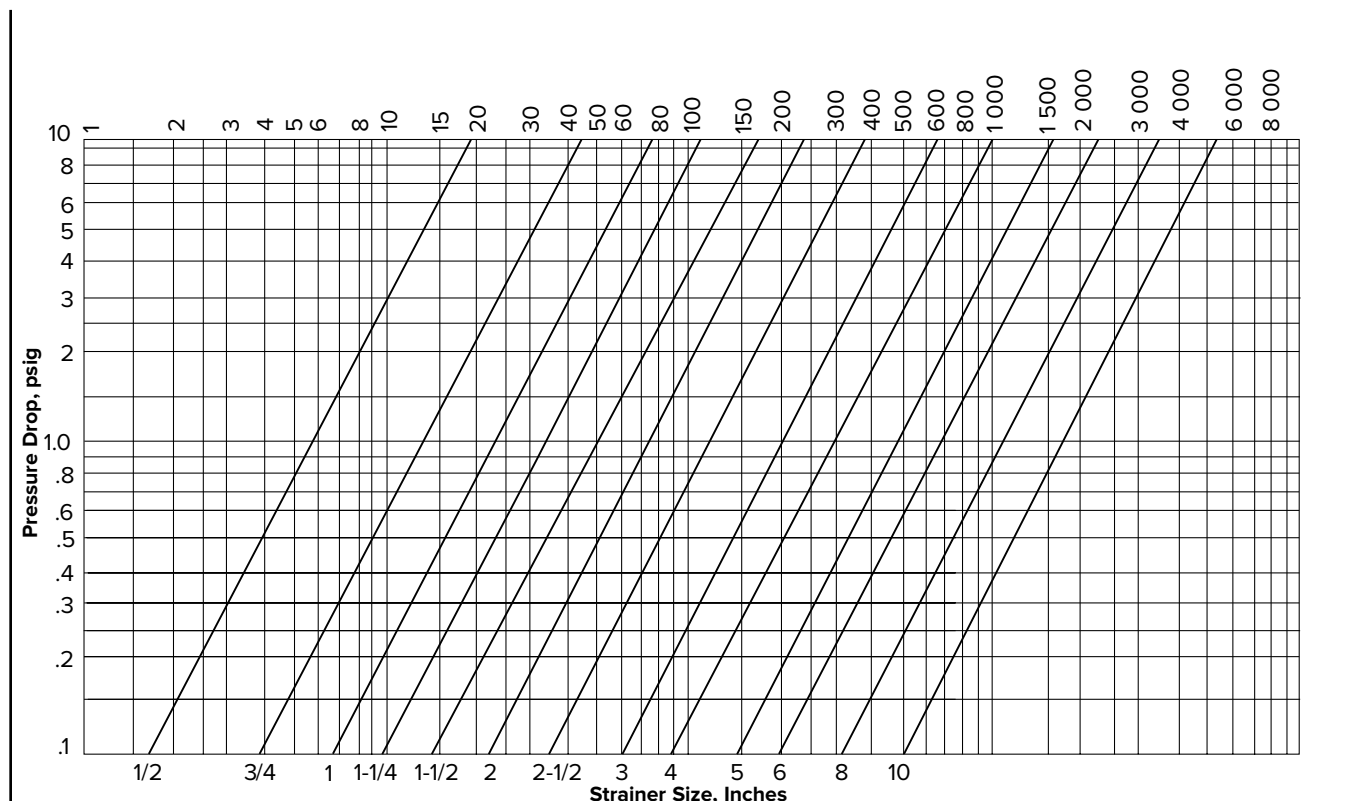
## Physical Data: 300 lb Screwed 1/2" - 2" (15 - 50 mm)

Size		Ordering Code, Standard Screen	Weight		Dimensions						Maximum Pressure				Screen Retainer Type	Connections
					A		B		C		Saturated Steam		150°F (66°C) non-shock			
in	mm		lb	kg	in	mm	in	mm	in	mm	psig	barg	psig	barg		
1/2	15	F4SC	1-1/2	0.68	3-1/2	89	2-1/2	64	3/8	9.5	300	21	500	34	Threaded	ANSI B1.20.1 Screwed
3/4	20		2	0.91	4	102	2-7/8	73	1/2	15						
1	25		3-1/2	1.6	4-3/4	121	3-5/16	84								
1-1/4	32		5	2.3	5-1/4	133	4	102								
1-1/2	40		7-1/2	3.4	6	152	4-3/8	111								
2	50		12	5.4	7	178	5-1/2	140								

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# Water Flow Capacities



## Armstrong Y-Type Strainers—Master Selection Table

Master Selection Table							
Material	Connections	Sizes		Pressure - Temperature Ratings		Pressure - Temperature Ratings	
		in	mm	Standard		Metric	
				Steam, Non-Shock	Cold, Non-Shock	Steam, Non-Shock	Cold, Non-Shock
<b>Cast Iron</b> <b>ASTM A48</b> <b>Class 30</b>	Screwed - 250 lb	1/2 - 3	15 - 80	250 psig @ 406°F	400 psig @ 150°F	17 barg @ 208°C	28 barg @ 66°C
	Class 125 Flanged	2 - 6	50 - 150	125 psig @ 353°F	175 psig @ 150°F	8.6 barg @ 178°C	12 barg @ 66°C
	Class 250 Flanged	2 - 6	50 - 150	250 psig @ 406°F	400 psig @ 150°F	17 barg @ 208°C	28 barg @ 66°C
<b>Cast Carbon Steel</b> <b>ASTM A216 Gr. WCB</b>	Screwed & Socketweld - 900 lb	1/2 - 1	15 - 25	1 635 psig @ 609°F	2 200 psig @ 100°F	113 barg @ 321°C	153 barg @ 38°C
	Screwed & Socketweld - 600 lb	1-1/4 - 3	32 - 80	1 135 psig @ 562°F	1 480 psig @ 100°F	78 barg @ 294°C	102 barg @ 38°C
	Class 150 Flanged	1/2 - 12	15 - 150	205 psig @ 390°F	285 psig @ 100°F	14 barg @ 199°C	20 barg @ 38°C
	Class 300 Flanged	1/2 - 12	15 - 150	605 psig @ 490°F	740 psig @ 100°F	42 barg @ 254°C	51 barg @ 38°C
<b>Cast Chrome Moly Steel</b> <b>ASTM A217 Gr. WC6</b>	Class 600 Flanged	1/2 - 12	15 - 100	1 135 psig @ 562°F	1 480 psig @ 100°F	78 barg @ 294°C	102 barg @ 38°C
	Screwed & Socketweld - 1 500 lb	1/2 - 1	15 - 25	2 090 psig @ 643°F	3 000 psig @ 100°F	144 barg @ 339°C	207 barg @ 38°C
	Screwed & Socketweld - 1 500 lb	1-1/4 - 2	32 - 50	2 515 psig @ 670°F	3 600 psig @ 100°F	173 barg @ 354°C	248 barg @ 38°C
	Class 1 500 Flanged	1/2 - 1	15 - 25	2 090 psig @ 643°F	3 000 psig @ 100°F	144 barg @ 339°C	207 barg @ 38°C
<b>Forged Steel</b> <b>ASTM A182 Gr. F22</b>	Class 1 500 Flanged	1-1/4 - 2	32 - 50	2 515 psig @ 670°F	3 600 psig @ 100°F	173 barg @ 354°C	248 barg @ 38°C
	Socketweld - 2 500 lb	1/2 - 2	15 - 50	2 500 psig @ 1 025°F	6 000 psig @ 100°F	172 barg @ 552°C	414 barg @ 38°C
<b>Cast SS</b> <b>ASTM A351 Gr. CF8M</b>	Screwed & Socketweld - 1 500 lb	1/2 - 1	15 - 25	2 090 psig @ 643°F	3 000 psig @ 100°F	144 barg @ 339°C	207 barg @ 38°C
	Screwed & Socketweld - 600 lb	1-1/4 - 3	32 - 80	935 psig @ 538°F	1 400 psig @ 100°F	64 barg @ 281°C	97 barg @ 38°C
	Class 150 Flanged	1/2 - 12	15 - 150	200 psig @ 388°F	275 psig @ 100°F	14 barg @ 198°C	19 barg @ 38°C
	Class 300 Flanged	1/2 - 12	15 - 150	495 psig @ 467°F	720 psig @ 100°F	34 barg @ 242°C	50 barg @ 38°C
	Class 600 Flanged	1/2 - 12	15 - 100	935 psig @ 540°F	1 440 psig @ 100°F	64 barg @ 282°C	99 barg @ 38°C
<b>Cast Bronze</b> <b>ASTM B62</b>	Screwed - 300 lb	1/2 - 2	15 - 50	300 psig @ 422°F	500 psig @ 150°F	21 barg @ 217°C	34 barg @ 66°C

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# 1-AVC See-Thru Air Vent

For Pressures to 150 psig (7 barg) or Specific Gravity Down to 0.80

## A See-Thru Body—So You'll Know When It's Working

Now, you can literally see what you've been missing—the early warning signs of a system problem. Since you'll know the operating condition of the air vent, you won't have to waste time and money scheduling maintenance that isn't needed. In other words, you will be able to react to a condition before it becomes a problem.

A simple ball float mechanism requiring no electricity to operate, the new Armstrong 1-AVC discharges automatically only when air/gas are present. That means no liquid loss as with manual venting.

## An Inside Look

See-thru body means you can observe changing conditions as they occur. See a problem in the making—instead of having to deal with it after the fact.

## Efficient Operation

Simple ball float mechanism discharges only when air is present so it doesn't waste liquid.

## Positive Seating

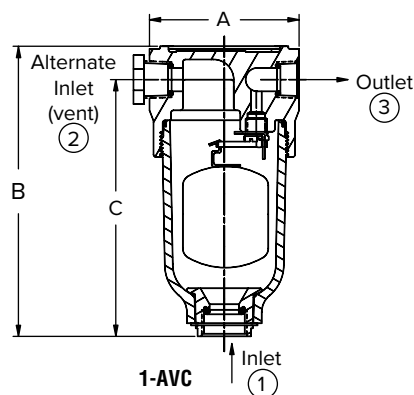
Free-floating valve mechanism assures positive seating so it prevents liquid loss. There are no fixed pivots to wear or create friction, and wear points are heavily reinforced for long life.

## Reduced Maintenance

Stainless steel internals mean corrosion resistance and reduced maintenance.

## Corrosion Resistance

Long-lasting polycarbonate body and reinforced nylon cap resist corrosion and provide long, trouble-free service life.



## How to Order

Inlet ①	Alternate Inlet ②	Outlet ③
3/4"	1/2"	1/2"
1/2" or 3/4"	1/2" or 3/4"	1/2"

**NOTE:** The Armstrong 1-AVC should not be used in an environment where there are high levels of ketones or chlorinated or aromatic hydrocarbons.

For a fully detailed certified drawing, contact Armstrong.

List of Materials	
Name of Part	Material
Cap	Reinforced Nylon*
Body	Polycarbonate
O-Rings (Body Cap and Fitting)	Nitrile Elastomer Compound
Float Lever and Screws	Stainless Steel
Valve & Seat	Stainless Steel
Fitting & Pipe Plug	Reinforced Nylon
Retainer Ring	Zinc Plated Steel

\*UV sensitive.

Physical Data		
	in	mm
Inlet Connection	1/2, 3/4	15, 20
Outlet Connection	1/2	15
"A" Face-to-Face	3-1/2	89
"B" Height	6-3/4	171
"C" Bottom to �	6 1	52
Maximum Allowable Pressure (Vessel Design)	150 psig @ 150°F (10 barg @ 65°C)	
Maximum Operating Pressure	150 psig (10 barg)	
Specific Gravity Range	1.00 to 0.80	
Weight, lb (kg)	1 (.45)	

Model 1-AVC Capacity				
Differential Pressure		Orifice Size	scfm	m³/hr
psig	barg			
15	1.0	1/8"	4.3	7.3
30	2.0		6.5	11.0
50	3.5		9.5	16.1
75	5.0		13.1	22.2
100	7.0		16.9	28.7
125	8.5		20.5	34.8
150	10.5		24.2	41.3

NOTE: Discharge of air through an orifice in scfm (standard cubic feet of free air per minute) at a standard atmospheric pressure of 14.7 psig (1 barg) and 70°F (21°C).

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# 1-AVCW See-Thru Air Vent for Ozone Applications

For Pressures to 150 psig (10 barg) or Specific Gravity Down to 0.80



## What Is Ozone?

Ozone is a gas that forms naturally during thunderstorms when lightning converts normal oxygen molecules ( $O_2$ ) into ozone ( $O_3$ ). The fresh, sweet smell in the air after a storm is the smell of ozone. The unstable ozone molecule reacts rapidly with most substances and is an extremely strong natural oxidant.

## How Is Commercial Ozone Produced?

Ozone can be formed by exposing air to ultraviolet light; however, the most common method of generating ozone is by passing air through an electrical discharge. Because ozone has strong oxidizing properties, its production requires corrosion-resistant equipment.

## How Is Ozone Used in Water Filtration and Purification?

Because ozone is such an effective oxidant, it kills viruses, bacteria, mold, mildew, fungus and germs. Passing ozone through water achieves high purification rates without any chemical residue. Oxygen is the only by-product.

## Typical Customer Applications:

- Purifying standing ground water in Third World countries.
- Conditioning water for poultry and livestock.
- Purifying water in the bottled water industry.
- Filtering and purifying water for process applications.

## A See-Thru Body Shows You It's Working

Now, you can literally see what you've been missing. The Armstrong 1-AVCW See-Thru Air Vent lets you easily check its operating condition. You won't have to waste time and money scheduling maintenance that isn't needed, and you can quickly react to a condition before it becomes a problem.

## Efficient Operation

Simple ball-float mechanism doesn't need electricity to operate. The air vent automatically discharges only when air or gas is present. No liquid is lost, as with manual venting.

## Positive Seating

Free-floating valve mechanism ensures positive seating and prevents liquid loss. There are no fixed pivots to wear or create friction. Wear points are heavily reinforced for long life.

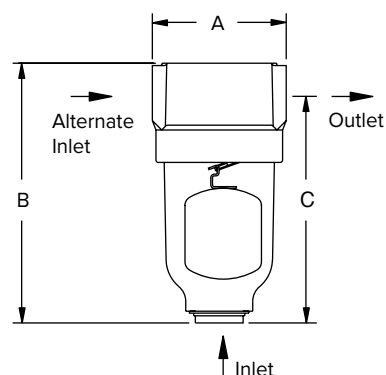
## Corrosion Resistance

Long-lasting polycarbonate cap and body provides trouble-free operation. T316 stainless steel internal parts resist corrosion and reduce maintenance.

## Compare—and Save the Difference

Seeing really is believing—especially when you compare the Armstrong 1-AVCW See-Thru Air Vent with manual venting. Measure the time and money you can save with a more efficient, easier-to-maintain system. For more information or technical assistance, contact your local Armstrong Representative.

**NOTE: The Armstrong 1-AVCW should not be used in an environment where there are high levels of ketones or chlorinated or aromatic hydrocarbons.**



1-AVCW

## List of Materials

Name of Part	Material
Cap	Polycarbonate
Body	Polycarbonate
O-Rings (Body Cap and Fitting)	Aflas
Float Lever and Screws	T316 Stainless Steel
Valve & Seat	T316 Stainless Steel
Fitting	Polycarbonate
Retainer Ring	Zinc Plated Steel

## Physical Data

	in	mm
Inlet Connection (In Body)	3/4	20
Inlet Connection (Alternate)	1/2	15
Outlet Connection	1/2	15
"A" Face-to-Face	3-1/2	89
"B" Height	6-13/16	172
"C" Bottom to $\varnothing$	6	152
Maximum Allowable Pressure (Vessel Design)	150 psig @ 150°F (10 barg @ 66°C)	
Maximum Operating Pressure	150 psig (10 barg)	
Specific Gravity Range	1.00 to 0.80	
Weight, lb (kg)	1 (.5)	

## Model 1-AVCW Capacity

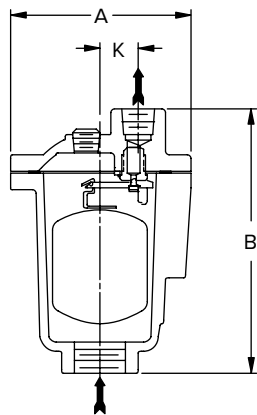
Differential Pressure		Orifice Size	scfm	m <sup>3</sup> /hr
psig	barg			
15	1.0	1/8"	4.3	7.3
30	2.0		6.5	11.0
50	3.5		9.5	16.1
75	5.0		13.1	22.2
100	7.0		16.9	28.7
125	8.5		20.5	34.8
150	10.5		24.2	41.3

**NOTE:** Discharge of air through an orifice in scfm (standard cubic feet of free air per minute) at a standard atmospheric pressure of 14.7 psig (1 barg) and 70°F (21°C).

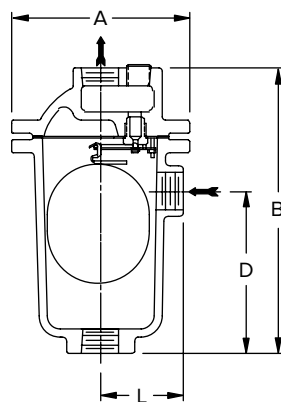


# Free Floating Lever Air/Gas Vents—Cast Iron

For Pressures to 300 psig (21 barg) or Specific Gravity Down to 0.40



**Model 1-AV**



**Model 2-AV, 3-AV and 6-AV**



Armstrong free floating lever Air/Gas Vents use the same bodies, caps, lever mechanisms, valves and seats of Armstrong inverted bucket steam traps that have been proven in years of service.

Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for vent size and weight. The hemispherical valve, seat and leverage are identical in design, materials and workmanship to those for saturated steam service up to 1 000 psig, with the exception of the addition of a guidepost to assure a positive, leaktight valve closing under all conditions.

**1-AV**—A cast iron air vent that uses a positive-closing free floating lever to ensure leaktight closing under all conditions. This vent is good for low capacity air/gas venting up to 300 psig.

**For a fully detailed certified drawing, refer to CD #1070.**

**2-AV, 3-AV and 6-AV**—Cast iron vents using the same proven free floating lever mechanisms used in Armstrong steam traps. For applications where high air/gas venting capacity is required up to 250 psig.

**For a fully detailed certified drawing, refer to CD #1034.**

Physical Data								
Model No.	Cast Iron							
	1-AV**		2-AV		3-AV		6-AV	
Pipe Connections	in	mm	in	mm	in	mm	in	mm
	1/2*, 3/4*	15, 20	1/2, 3/4	15, 20	3/4, 1	20, 25	1-1/2, 2	40, 50
"A"	3-3/4	89	5-1/4	133	6-3/8	162	10-3/16	259
"B"	5-1/2	140	8-3/4	222	11-1/2	292	18	457
"D"	-	-	5-1/8	130	7	188	9-3/8	238
"K"	13/16	21	-	-	-	-	-	-
"L"	-	-	2-7/16	62	2-7/8	73	4-5/8	-
Weight, lb (kg)	4 (1.8)		12 (5.5)		21 (9.5)		78 (35.5)	
Max. Allowable Pressure (Vessel Design)	300 psig @ 200°F (21 barg @ 93°C ) 250 psig @ 450°F (17 barg @ 232°C)		250 psig @ 450°F (17 barg @ 232°C)					

\*Outlet connection 1/4" (7 mm). \*\*1-AV available with side connection if specified on order. On models 2-AV, 3-AV and 6-AV, pipe size of side connections is same as that of inlet and outlet connections. Some floats are oil filled. Consult factory for details.

List of Materials							
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket	Bolts	Nuts
1-AV	Stainless Steel			ASTM A48 Class 30 Cast Iron	Non-asbestos	ASTM A193 Gr. B7	ASTM A563 Gr. A
2-AV						SAE Gr. 2	
3-AV							
6-AV							

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# Free Floating Lever Air/Gas Vents—Cast Iron

For Pressures to 300 psig (21 barg) or Specific Gravity Down to 0.40

1-AV Maximum Operating Pressures		
Minimum Specific Gravity	0.80	
Orifice Size (in)	Maximum Operating Pressure	
	psig	barg
1/8	146	10
7/64	173	12
#38	219	15
5/64	300	21

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

2-AV Maximum Operating Pressures																						
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60		0.55		0.50	
Float wt., oz (g)	7.7 (217)		7.3 (206)		6.9 (195)		6.5 (184)		6.1 (174)		5.7 (163)		5.4 (152)		5.0 (141)		4.6 (130)		4.2 (119)		3.8 (109)	
Orifice Size (in)	Maximum Operating Pressure																					
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
5/16	27	1.8	25	1.8	24	1.7	23	1.6	22	1.5	20	1.4	19	1.3	18	1.2	16	1.1	15	1.0	14	0.9
1/4	44	3.0	42	2.9	40	2.7	38	2.6	35	2.4	33	2.3	31	2.1	29	2.0	27	1.8	24	1.7	22	1.5
3/16	97	6.7	92	6.4	88	6.0	83	5.7	78	5.4	73	5.0	68	4.7	64	4.4	59	4.1	54	3.7	49	3.4
5/32	167	12	159	11	151	10.4	142	9.8	134	9.3	126	8.7	118	8.1	110	7.6	101	7.0	93	6.4	85	5.8
1/8	250	17	250	17	250	17	244	17	230	16	216	15	202	14	187	13	173	12	159	11	145	10.0
7/64	250	17	250	17	250	17	250	17	250	17	250	17	250	17	240	17	222	15	204	14	186	13
#38	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	231	16
5/64	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17

3-AV Maximum Operating Pressures																				
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60			
Float wt., oz (g)	14.9 (423)		14.2 (402)		13.4 (381)		12.7 (360)		12.0 (339)		11.2 (318)		10.5 (296)		9.7 (275)		9.0 (254)			
Orifice Size (in)	Maximum Operating Pressure																			
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg		
1/2	21	1.5	20	1.4	19	1.3	18	1.3	17	1.2	16	1.1	15	1.0	14	1.0	13	0.9		
3/8	45	3.1	43	3.0	41	2.8	38	2.7	36	2.5	34	2.3	32	2.2	30	2.0	27	1.9		
5/16	72	5.0	69	4.7	65	4.5	61	4.2	58	4.0	54	3.8	51	3.5	47	3.3	44	3.0		
9/32	96	6.6	91	6.3	87	6.0	82	5.6	77	5.3	72	5.0	68	4.7	63	4.3	58	4.0		
1/4	144	9.9	137	9.4	130	8.9	123	8.5	116	8.0	109	7.5	102	7.0	94	6.5	87	6.0		
7/32	206	14	196	13	186	13	176	12	165	11	155	10.7	145	10.0	135	9.3	125	8.6		
3/16	250	17	250	17	250	17	250	17	249	17	234	16	218	15	203	14	188	13		
5/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17		

6-AV Maximum Operating Pressures																												
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60		0.55		0.50		0.45		0.40			
Float wt., oz (g)	73.5 (2 084)		69.8 (1 979)		66.2 (1 875)		62.5 (1 771)		58.8 (1 667)		55.1 (1 563)		51.5 (1 459)		47.8 (1 354)		44.1 (1 250)		40.4 (1 146)		36.8 (1 042)		33.1 (938)		29.4 (833)			
Orifice Size (in)	Maximum Operating Pressure																											
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg		
1-1/16	22	1.5	21	1.5	20	1.4	19	1.3	18	1.2	17	1.2	16	1.1	14	1.0	13	0.9	12	0.8	11	0.8	10	0.70	9	0.62		
7/8	35	2.4	33	2.3	31	2.2	30	2.0	28	1.9	26	1.8	24	1.7	23	1.6	21	1.5	19	1.3	18	1.2	16	1.1	14	1		
3/4	50	3.5	48	3.3	45	3.1	43	3.0	40	2.8	38	2.6	35	2.4	33	2.3	30	2.1	28	1.9	25	1.8	23	1.6	20	1.4		
5/8	77	5.3	73	5.0	69	4.8	66	4.5	62	4.3	58	4.0	54	3.7	50	3.5	46	3.2	43	2.9	39	2.7	35	2.4	31	2.2		
9/16	102	7.0	97	6.7	92	6.3	87	6.0	82	5.6	77	5.3	72	4.9	67	4.6	62	4.2	57	3.9	51	3.6	46	3.2	41	3.9		
1/2	148	10.2	140	9.7	133	9.2	126	8.7	119	8.2	111	7.7	104	7.2	97	6.7	89	6.2	82	5.6	75	5.1	67	4.6	60	4.1		
7/16	210	14	200	14	189	13	179	12	168	12	158	11	148	10.2	137	9.5	127	8.7	116	8.0	106	7.3	96	6.6	85	5.9		
3/8	250	17	250	17	250	17	250	17	250	17	249	17	233	16	216	15	200	14	184	13	167	12	151	10.4	134	9.3		
11/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	245	17	223	15	201	14	179	12		
5/16	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	230	16		
9/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17		
1/4	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17		

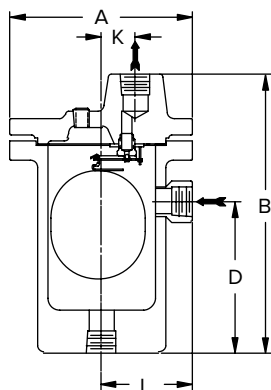
\*If specific gravity falls between those shown, use next lowest: e.g., if actual gravity is 0.73, use 0.70 specific gravity data.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# Free Floating Lever Air/Gas Vents—Forged Steel

For Pressures to 1 000 psig (69 barg) or Specific Gravity Down to 0.40



Model 32-AV, 33-AV and 36-AV



**32-AV, 33-AV and 36-AV**—Forged steel vents using the same proven free floating lever mechanisms used in Armstrong steam traps.

For applications where high air/gas venting capacity is required up to 1 000 psig. Available with screwed, socketweld or flanged connections.

**For a fully detailed certified drawing, refer to CD #1035.**

List of Materials						
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket	Bolting
32-AV	Stainless Steel			ASTM A105 Forged Steel	Non-asbestos	Bolts ASTM A193 Gr. B7 Nuts ASTM A194 Gr. 2H
33-AV						
36-AV						

Physical Data						
Model No.	Forged Steel					
	32-AV <sup>†</sup>		33-AV <sup>†</sup>		36-AV <sup>†</sup>	
Pipe Connections	1/2, 3/4, 1	15, 20, 25	3/4, 1	20, 25	1-1/2, 2	40, 50
"A"	6-3/4	171	8	203	11-7/8	301
"B"	10-3/16	259	11-9/16	294	17-1/8	435
"D"	5-9/16	141	6-1/16	154	9	229
"K"	1-1/4	32	1-7/16	37	2-1/8	54
"L"	3-3/8	86	3-7/8	98	6-1/16	154
Approx. Wt. lb (kg)	31 (14)		49 (22)		163 (74)	
Max. Allow. Pressure (Vessel Design)	600 psig @ 100°F (41 barg @ 38°C) 500 psig @ 750°F (34 barg @ 399°C)		1 000 psig @ 100°F (69 barg @ 38°C) 600 psig @ 750°F (41 barg @ 399°C)			

<sup>†</sup>Available in Type 316 SS. Consult factory. Pipe size of side connections if provided is same as that of inlet and outlet connections. Some floats are oil filled. Consult factory for details.

# Free Floating Lever Air/Gas Vents—Forged Steel

For Pressures to 1 000 psig (69 barg) or Specific Gravity Down to 0.40

## High-Temperature Service

Maximum allowable working pressures of floats decrease at temperatures above 100°F. Allow for approximately:

- 10% decrease at 200°F
- 15% decrease at 300°F
- 20% decrease at 400°F

The float is not always the limiting factor, however. Consult with Armstrong Application Engineering if you have a high-temperature application that also requires maximum operating pressures.

## Sour Gas Service

Forged steel and stainless steel traps can be modified to resist hydrogen sulfide stress corrosion. These modifications involve annealing the float, which will reduce the maximum working pressure of the float to about half of its normal value. Consult Armstrong Application Engineering for allowable working pressures.

**Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.**

32-AV Maximum Operating Pressures																
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65	
Float wt., oz (g)	11.8 (335)		11.2 (318)		10.6 (301)		10.0 (285)		9.4 (268)		8.9 (251)		8.3 (234)		7.7 (218)	
Orifice Size (in)	Maximum Operating Pressure															
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
5/16	41	2.8	39	2.7	37	2.6	35	2.4	33	2.3	31	2.1	29	2.0	27	1.9
1/4	68	4.7	64	4.4	61	4.2	58	4.0	54	3.7	51	3.5	47	3.3	44	3.0
3/16	149	10.3	142	9.8	134	9.3	127	8.8	120	8.2	112	7.7	105	7.2	97	6.7
5/32	257	18	244	17	231	16	219	15	206	14	193	13	180	12	168	12
1/8	439	30	417	29	396	27	374	26	352	24	330	23	309	21	287	20
7/64	562	39	534	37	506	35	478	33	450	31	423	29	395	27	367	25
#38	600	41	600	41	600	41	595	41	561	39	526	36	491	34	457	31
5/64	600	41	600	41	600	41	600	41	600	41	600	41	600	41	600	41

33-AV Maximum Operating Pressures																		
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60	
Float wt., oz (g)	14.9 (423)		14.2 (402)		13.4 (381)		12.7 (360)		12.0 (339)		11.2 (318)		10.5 (296)		9.7 (275)		9.0 (254)	
Orifice Size (in)	Maximum Operating Pressure																	
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1/2	21	1.5	20	1.4	19	1.3	18	1.3	17	1.2	16	1.1	15	1.0	14	1.0	13	0.9
3/8	45	3.1	43	3.0	41	2.8	38	2.7	36	2.5	34	2.3	32	2.2	30	2.0	27	1.9
5/16	72	5.0	69	4.7	65	4.5	61	4.2	58	4.0	54	3.8	51	3.5	47	3.3	44	3.0
9/32	96	6.6	91	6.3	87	6.0	82	5.6	77	5.3	72	5.0	68	4.7	63	4.3	58	4.0
1/4	144	9.9	137	9.4	130	8.9	123	8.5	116	8.0	109	7.5	102	7.0	94	6.5	87	6.0
7/32	206	14	196	13	186	13	176	12	165	11	155	10.7	145	10.0	135	9.3	125	8.6
3/16	309	21	294	20	279	19	264	18	249	17	234	16	218	15	203	14	188	13
5/32	484	33	460	32	437	30	413	28	389	27	365	25	342	24	318	22	294	20
1/8	900	62	900	62	883	61	835	58	787	54	739	51	691	48	643	44	595	41
7/64	900	62	900	62	900	62	900	62	900	62	900	62	883	61	822	57	760	52

36-AV Maximum Operating Pressures																												
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60		0.55		0.50		0.45		0.40			
Float wt., oz (g)	73.5 (2 084)		69.8 (1 979)		66.2 (1 875)		62.5 (1 771)		58.8 (1 667)		55.1 (1 563)		51.5 (1 459)		47.8 (1 354)		44.1 (1 250)		40.4 (1 146)		36.8 (1 042)		33.1 (938)		29.4 (833)			
Orifice Size (in)	Maximum Operating Pressure																											
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg		
1-1/16	22	1.5	21	1.5	20	1.4	19	1.3	18	1.2	17	1.2	16	1.1	14	1.0	13	0.9	12	0.8	11	0.8	10	0.70	9	0.62		
7/8	35	2.4	33	2.3	31	2.2	30	2.0	28	1.9	26	1.8	24	1.7	23	1.6	21	1.5	19	1.3	18	1.2	16	1.1	14	1		
3/4	50	3.5	48	3.3	45	3.1	43	3.0	40	2.8	38	2.6	35	2.4	33	2.3	30	2.1	28	1.9	25	1.8	23	1.6	20	1.4		
5/8	77	5.3	73	5.0	69	4.8	66	4.5	62	4.3	58	4.0	54	3.7	50	3.5	46	3.2	43	2.9	39	2.7	35	2.4	31	2.2		
9/16	102	7.0	97	6.7	92	6.3	87	6.0	82	5.6	77	5.3	72	4.9	67	4.6	62	4.2	57	3.9	51	3.6	46	3.2	41	3.9		
1/2	148	10.2	140	9.7	133	9.2	126	8.7	119	8.2	111	7.7	104	7.2	97	6.7	89	6.2	82	5.6	75	5.1	67	4.6	60	4.1		
7/16	210	14	200	14	189	13	179	12	168	12	158	11	148	10.2	137	9.5	127	8.7	116	8.0	106	7.3	96	6.6	85	5.9		
3/8	331	23	315	22	299	21	282	19	266	18	249	17	233	16	216	15	200	14	184	13	167	12	151	10.4	134	9.3		
11/32	441	30	419	29	398	27	376	26	354	24	332	23	310	21	288	20	266	18	245	17	223	15	201	14	179	12		
5/16	567	39	539	37	511	35	483	33	455	31	427	29	399	27	371	26	342	24	313	23	285	17	257	17	230	16		
9/32	743	51	706	49	669	46	633	44	596	41	559	39	522	36	485	33	449	31	412	29	375	17	338	17	301	17		
1/4	1000	69	1000	69	979	67	925	64	871	60	817	56	763	53	710	49	656	45	602	42	548	17	494	17	440	17		
7/32	1000	69	1000	69	1000	69	1000	69	1000	69	1000	69	1000	69	1000	69	926	64	850	42	774	17	698	17	622	17		
3/16	1000	69	1000	69	1000	69	1000	69	1000	69	1000	69	1000	69	1000	69	1000	69	250	17	250	17	250	17	250	17		

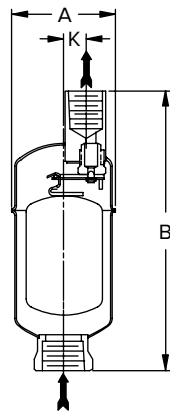
\*If specific gravity falls between those shown, use next lowest: e.g., if actual gravity is 0.73, use 0.70 specific gravity data.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

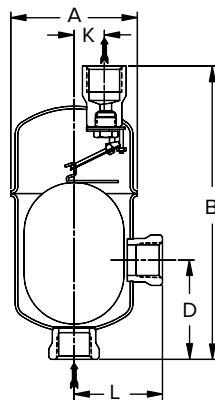


# Free Floating Lever Air/Gas Vents—All Stainless Steel

For Pressures to 600 psig (41 barg) or Specific Gravity Down to 0.50



**Model 11-AV**



**Model 22-AV and 13-AV**



The Armstrong stainless steel free floating lever air vents have been developed to provide positive venting of air/gases under pressure.

The body and cap and all working parts of the No. 11-AV, 22-AV and 13-AV are made of high strength, corrosion resistant stainless steel. Body and caps are welded together to form a permanently sealed, tamperproof unit with no gaskets. Elliptical floats and high leverage provide up to 115 SCFM capacity for these compact air/gas vents. Lever action is guided to assure proper seating of the valve under all operating conditions.

**11-AV, 22-AV and 13-AV**—All stainless steel construction where exposure to either internal or external corrosion is a problem. These air/gas vents have the same proven free floating mechanisms used in other Armstrong steam traps. Pressures to 600 psig @ 100°F (41 barg @ 38°C).

**For a fully detailed certified drawing, refer to list below:**

**11-AV CD #1066**

**13-AV and 22-AV CD #1086**

Physical Data						
Model No.	11-AV		22-AV		13-AV	
Pipe Connections	1/2, 3/4**	15, 20**	3/4	20	1	25
"A"	2-3/4	70	3-7/8	99	4-1/2	114
"B"	7-1/4	184	8-13/16	224	11-3/8	289
"D"	—	—	3-3/8	86	6-1/8	156
"K"	9/16	14	7/8	22	1-3/16	30
"L"	—	—	2-5/8	67	3-1/4	83
Weight, lb (kg)			5 (2.3)		7-1/2 (3.4)	
Max. Allow. Pressure (Vessel Design)	500 psig @ 100°F (34 barg @ 38°C) 440 psig @ 500°F (30 barg @ 260°C)		600 psig @ 100°F (41 barg @ 38°C) 475 psig @ 500°F (33 barg @ 260°C)		570 psig @ 100°F (39 barg @ 38°C) 490 psig @ 500°F (34 barg @ 260°C)	

\*\* 1/2" (15 mm) outlet.

List of Materials				
Model No.	Valve & Seat	Leverage System	Float	Body & Cap
11-AV	Hardened chrome steel—17-4PH	303/304 Stainless Steel	304 Stainless Steel	Sealed Stainless Steel 304-L
22-AV				
13-AV				

\*Type 316 SS valve and seat available. Consult factory.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# Free Floating Lever Air/Gas Vents—All Stainless Steel

For Pressures to 600 psig (41 barg) or Specific Gravity Down to 0.50



Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

11-AV Maximum Operating Pressures				
Minimum Specific Gravity	0.75		0.50	
Float wt., oz (g)	2.90 (82) Standard		2.08 (59) Special	
Orifice Size (in)	Maximum Operating Pressure			
	psig	barg	psig	barg
1/8	178	12	118	8
#38	267	18	177	12
5/64	400	28	311	21

22-AV Maximum Operating Pressure																						
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60		0.55		0.50	
Float wt., oz (g)	10.0 (282)		9.5 (268)		9.0 (254)		8.5 (240)		8.0 (226)		7.5 (212)		5.4 (152)		5.0 (141)		4.6 (130)		4.2 (119)		3.8 (109)	
Orifice Size (in)	Maximum Operating Pressure																					
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
5/16	35	2.4	33	2.3	31	2.2	30	2.0	28	1.9	26	1.8	19	1.3	18	1.2	16	1.1	15	1.0	14	0.9
1/4	57	3.9	54	3.7	51	3.5	49	3.4	46	3.2	43	3.0	31	2.1	29	2.0	27	1.8	24	1.7	22	1.5
3/16	126	8.7	120	8.2	113	7.8	107	7.4	101	7.0	95	6.5	68	4.7	64	4.4	59	4.1	54	3.7	49	3.4
5/32	217	14.9	206	14.2	195	13.5	185	12.7	174	12.0	163	11.2	118	8.1	110	7.6	101	7.0	93	6.4	85	5.8
1/8	371	25.6	352	24.3	334	23.0	316	21.8	297	20.5	279	19.2	202	13.9	187	12.9	173	12.0	159	11.0	145	10.0
7/64	474	32.7	451	31.1	427	29.5	404	27.9	380	26.2	357	24.6	258	17.8	240	16.5	222	15.3	204	14.0	186	12.8
#38	590	40.7	561	38.7	532	36.7	503	34.7	473	32.7	444	30.6	321	22.1	298	20.6	276	19.0	253	17.5	231	15.9
5/64	600	41.4	600	41.4	600	41.4	600	41.4	600	41.4	600	41.4	473	32.6	440	30.3	407	28.1	374	25.8	341	23.5

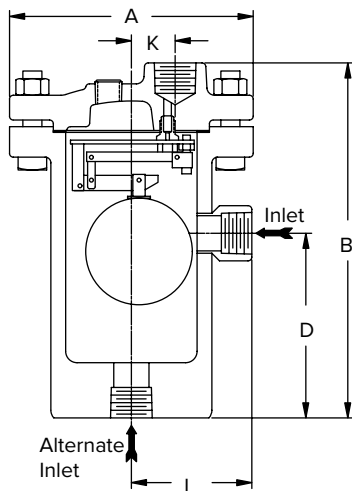
13-AV Maximum Operating Pressures																			
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60		
Float wt., oz (g)	14.9 (423)		14.2 (402)		13.4 (381)		12.7 (360)		12.0 (339)		11.2 (318)		10.5 (296)		9.7 (275)		9.0 (254)		
Orifice Size (in)	Maximum Operating Pressure																		
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	
1/2	21	1.5	20	1.4	19	1.3	18	1.3	17	1.2	16	1.1	15	1.0	14	1.0	13	0.9	
3/8	45	3.1	43	3.0	41	2.8	38	2.7	36	2.5	34	2.3	32	2.2	30	2.0	27	1.9	
5/16	72	5.0	69	4.7	65	4.5	61	4.2	58	4.0	54	3.8	51	3.5	47	3.3	44	3.0	
9/32	96	6.6	91	6.3	87	6.0	82	5.6	77	5.3	72	5.0	68	4.7	63	4.3	58	4.0	
1/4	144	9.9	137	9.4	130	8.9	123	8.5	116	8.0	109	7.5	102	7.0	94	6.5	87	6.0	
7/32	206	14	196	13	186	13	176	12	165	11	155	10.7	145	10.0	135	9.3	125	8.6	
3/16	309	21	294	20	279	19	264	18	249	17	234	16	218	15	203	14	188	13	
5/32	484	33	460	32	437	30	413	28	389	27	365	25	342	24	318	22	294	20	
1/8	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	
7/64	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	

\*If specific gravity falls between those shown, use next lowest: e.g., if actual gravity is 0.73, use 0.70 specific gravity data.



# High Leverage Ball Float Type Air Relief Traps

For Low Flows at Pressures to 2 700 (186 barg) or Specific Gravity Down to 0.49



The Armstrong High Leverage Series of Air Relief traps were developed especially for venting gases from low specific gravity fluids at high pressures. They use standard Armstrong forged steel bodies with very high leverage air relief mechanisms. Available with screwed, socketweld or flanged connections.

**NOTE:** Models 2313-HLAR, 2316-HLAR, 2413-HLAR and 2415-HLAR are also available with cast T-316 stainless steel body and all-stainless steel internals. Consult factory.

## Sour Gas Service

Forged steel and stainless steel traps can be modified to resist hydrogen sulfide stress corrosion. These modifications involve annealing the float, which will reduce the maximum working pressure of the float to about half its normal value. Consult Armstrong Application Engineering for allowable working pressures.

## Physical Data—High Leverage Ball Float Type Air Relief Traps

Model No.	2313-HLAR <sup>†</sup>		2315-HLAR		2316-HLAR		2413-HLAR <sup>†</sup>		2415-HLAR		2416-HLAR		25133G-HLAR		25155G-HLAR		26155G-HLAR	
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50	1/2, 3/4, 1	15, 20, 25	3/4, 1, 1-1/4	20, 25, 32	1, 1-1/4	25, 32
"A"	8	203	9-3/4	248	11-7/8	302	8-5/8	219	10-3/4	273	12-1/2	318	8-1/2	216	10-3/8	263	11-3/4	298
"B"	11-9/16	294	15-1/16	383	17-1/8	435	11-7/8	302	15	381	17-3/4	451	14-1/4	362	16-7/32	412	24-1/8	613
"D"	6-1/16	154	7-13/16	198	9	229	5-3/8	137	7-1/4	184	9	229	3	75	4	102	5	127
"G"	5-1/8	130	6-7/8	175	8-3/8	213	5-3/8	137	6-7/8	175	8-5/8	219	5-3/4	146	7-3/8	187	8-3/8	213
"K"	1-7/16	37	1-3/4	44	2-1/8	54	1-7/16	37	1-3/4	44	2-1/8	54	1-5/16	33	1-3/4	44	1-3/4	44
"L"	3-7/8	98	4-11/16	119	5-3/4	146	4	102	4-13/16	122	5-13/16	148	—	—	—	—	—	—
Weight, lbs (kg)	46 (21)		98 (44)		160 (73)		69 (31)		130 (59)		210 (95)		113 (51)		171 (78)		325 (147)	
Maximum Allowable Pressure (Vessel Design)	1 000 psig @ 100°F (69 barg @ 38°C) 600 psig @ 750°F (41 barg @ 400°C)						1 500 psig @ 100°F (103 barg @ 38°C) 900 psig @ 850°F (62 barg @ 454°C)		1 800 psig @ 100°F (125 barg @ 38°C) 900 psig @ 900°F (62 barg @ 482°C)		2 120 psig @ 100°F (146 barg @ 38°C) 1 700 psig @ 900°F (117 barg @ 482°C)		2 520 psig @ 100°F (174 barg @ 38°C) 2 1 000 psig @ 900°F (138 barg @ 482°C)		3 700 psig @ 100°F (255 barg @ 38°C) 3 000 psig @ 900°F (207 barg @ 482°C)			

†Available with cast 316 stainless steel body and all stainless steel internals. Consult factory.

## List of Materials

Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket
2313-HLAR 2315-HLAR 2316-HLAR	Stainless Steel			ASTM A105 Forged Steel	Compressed Asbestos-free
2413-HLAR 2415-HLAR 2416-HLAR				ASTM A182	
25133G-HLAR 25155G-HLAR 26155G-HLAR				Grade F22 Forged Steel	
					Spiral Wound Stainless Steel non-asbestos

## 2315-HLAR Maximum Operating Pressures

Specific Gravity	1.00 – 0.61		0.60 – 0.51	
Float Weight, oz (g)	9.0 (255)		7.1 (201)	
Orifice	Maximum Operating Pressure			
	psig	barg	psig	barg
3/16	825	56	600	41
5/32	1 000	69		
1/8				
3/32				

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

## 2313-HLAR Maximum Operating Pressures

Specific Gravity	1.00 - 0.69		0.68 - 0.54	
Float Weight, oz (g)	6.75 (191)		4.75 (135)	
Orifice size (in)	Maximum Operating Pressure			
	psig	barg	psig	barg
	1 000	69	475	33
1/8				
7/64				
3/32				
5/64				
1/16				

## 2316-HLAR Maximum Operating Pressures

Specific Gravity	1.00 – 0.70		0.69 – 0.55	
Float Weight, oz (g)	22 (624)		15.5 (439)	
Orifice	Maximum Operating Pressure			
	psig	barg	psig	barg
	1 000	69	475	33
3/32				

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# High Leverage Ball Float Type Air Relief Traps

For Low Flows at Pressures to 2 700 (186 barg) or Specific Gravity Down to 0.49



Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

2413-HLAR Maximum Operating Pressures						
Specific Gravity	1.00 – 0.90	0.89 – 0.69	0.68 – 0.54			
Float Weight, oz (g)	9.375 (266)	6.75 (191)	4.75 (135)			
Orifice size (in)	Maximum Operating Pressure					
	psig	barg	psig	barg	psig	barg
1/8	1 500	103	1 000	69	475	33
7/64						
3/32						
5/64						
1/16						

2416-HLAR Maximum Operating Pressures				
Specific Gravity	1.00 – 0.70	0.69 – 0.55		
Float Weight, oz (g)	22 (624)	15.5 (439)		
Orifice	Maximum Operating Pressure			
	psig	barg	psig	barg
7/32	1 400	96	475	33
3/16				
5/32				
1/8				
3/32				

2415-HLAR Maximum Operating Pressures						
Specific Gravity	1.00 – 0.85		0.84 – 0.61		0.60 – 0.51	
Float weight, oz (g)	13.75 (390)		9.0 (255)		7.1 (201)	
Orifice	Maximum Operating Pressure					
	psig	barg	psig	barg	psig	barg
3/16	1 200	83	825	56	600	41
5/32	1 725	119	1 150	80		
1/8	1 800	124	1 200	83		
3/32						

25133G HLAR Maximum Operating Pressures								
Specific gravity	1.00 – 0.98	0.97 – 0.90	0.89 – 0.69	0.68 – 0.54				
Float weight, oz (g)	10.5 (298)	9.375 (266)	6.75 (191)	4.75 (135)				
Orifice	Maximum Operating Pressure							
	psig	barg	psig	barg	psig	barg	psig	barg
7/64	2 125	146	1 500	103	1 000	69	475	33
3/32								
5/64								
1/16								

25155G HLAR Maximum Operating Pressures								
Specific gravity	1.00 – 0.95		0.94 – 0.86		0.85 – 0.63		0.62 – 0.52	
Float weight, oz (g)	15.4 (437)		13.75 (390)		9.25 (262)		7.1 (201)	
Orifice	Maximum Operating Pressure							
	psig	barg	psig	barg	psig	barg	psig	barg
3/16	1 350	93	1 200	83	825	58	600	41
5/32	1 925	132	1 725	119	1 200	82		
1/8	2 500	172	2 000	138	1 200	83		
3/32								

26155G HLAR Maximum Operating Pressures								
Specific gravity	1.00 – 0.95		0.94 – 0.86		0.85 – 0.63		0.62 – 0.52	
Float weight, oz (g)	15.4 (437)		13.75 (390)		9.25 (262)		7.1 (201)	
Orifice	Maximum Operating Pressure							
	psig	barg	psig	barg	psig	barg	psig	barg
3/16	1 350	93	1 200	83	825	58	600	41
5/32	1 925	132	1 725	119	1 200	82		
1/8	2 700	186	2 000	138	1 200	83		
3/32								

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# 1-LDC See-Thru Liquid Drainer

For Loads to 1 500 lb/hr (690 kg/hr)...Pressures to 150 psig (10 barg)

Now, you can literally see what you've been missing—the early warning signs of a drain trap or system problem. Since you'll know the operating condition of a drain trap, you won't waste time and money scheduling maintenance that isn't needed. In other words, you'll be able to react to a condition before it becomes a problem.

A free floating mechanism needs no electricity to operate, the 1-LDC discharges automatically only when liquid is present. That means no air loss as with timed devices that open even when liquid is not present. Moisture in a compressed air system causes problems. Getting the water out—automatically, reliably—builds greater efficiency into your system.

## List of Materials

Table LD-6.	
Name of Part	Material
Cap and Fitting	Reinforced Nylon*
Body	Polycarbonate
O-Rings (Cap, Body and Fitting)	Nitrile Elastomer Compound
Float, Lever and Screws	Stainless Steel
Valve & Seat	Stainless Steel
Retainer Ring	Zinc-Plated Steel

\*UV sensitive

## Maximum Operation Pressures and Capacities

Table LD-7.		1.0				0.95			
Specific Gravity									
Orifice Size	Maximum Operating Pressure	Capacity		Maximum Operating Pressure		Capacity		Maximum Operating Pressure	
		psig	barg	lb/hr	kg/hr	psig	barg	lb/hr	kg/hr
1/8	121	8.3	1 500	690	109	7.6	1 400	640	
#38	150	10.0	1 100	510	150	10.0	1 100	490	

Capacities given are continuous discharge capacities in lb/hr or kg/hr of liquid at pressure differential indicated.

## Physical Data

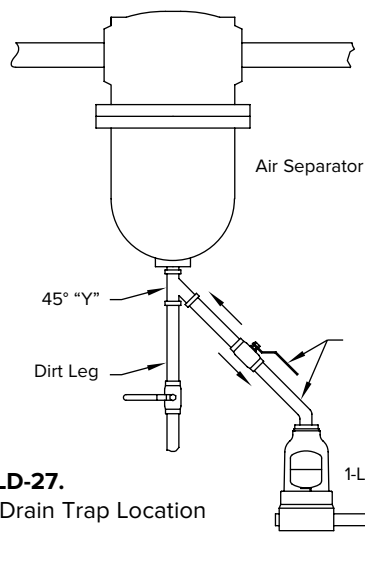
Table LD-8.		
Inlet Connections	in	mm
Outlet Connection	1/2, 3/4	15, 20
Alternate Inlet or Vent Connection	1/2, 3/4	15, 20
"A"	3-1/2	89
"B"	6-7/8	175
"C"	6-3/32	155
Weight lbs (kg)	1 (0.45)	
Maximum Allowable Pressure (Vessel Design)	150 psig @ 150°F (10 barg @ 65°C)	
Maximum Operating Pressure psig (barg)	150 (10)	

## How to Order

Body Inlet ①	Cap Inlet ②	Cap Outlet ③
3/4"	1/2"	1/2"
1/2" or 3/4"	1/2" or 3/4"	1/2"

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

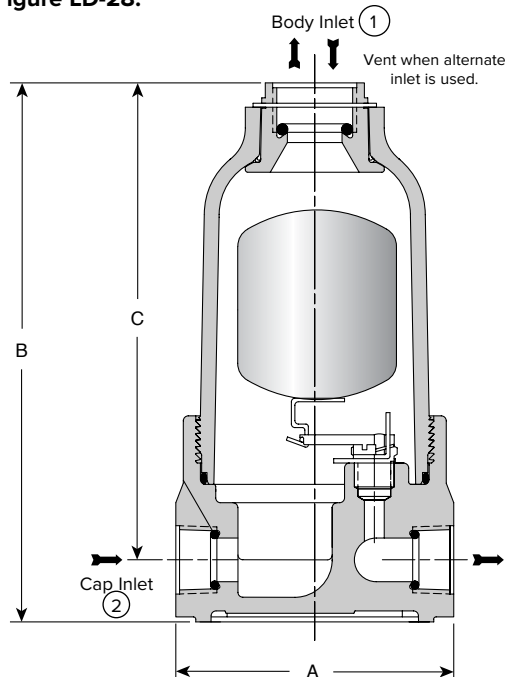
For a fully detailed certified drawing, contact Armstrong.



**Figure LD-27.**  
Typical Drain Trap Location

Drain traps dispose of water that collects in many places in a compressed air system. Each drain trap arrangement must be considered individually.

**Figure LD-28.**



# 1-LDCW See-Thru Air Liquid Drainer for Ozone Applications

For Pressures to 150 psig (10 barg) or Specific Gravity 1.0

## What Is Ozone?

Ozone is a gas that forms naturally during thunderstorms when lightning converts normal oxygen molecules ( $O_2$ ) into ozone ( $O_3$ ). The fresh, sweet smell in the air after a storm is the smell of ozone. The unstable ozone molecule reacts rapidly with most substances and is an extremely strong natural oxidant.

## How Is Commercial Ozone Produced?

Ozone can be formed by exposing air to ultraviolet light; however, the most common method of generating ozone is by passing air through an electrical discharge. Because ozone has strong oxidizing properties, its production requires corrosion-resistant equipment.

## How Is Ozone Used in Water Filtration and Purification?

Because ozone is such an effective oxidant, it kills viruses, bacteria, mold, mildew, fungus and germs. Passing ozone through water achieves high purification rates without any chemical residue. Oxygen is the only by-product.

## Typical Customer Applications:

- Purifying standing ground water in Third World countries.
- Conditioning water for poultry and livestock.
- Purifying water in the bottled water industry.
- Filtering and purifying water for process applications.

## A See-Thru Body Shows You It's Working

Now, you can literally see what you've been missing. The Armstrong 1-LDCW See-Thru Liquid Drainer lets you easily check its operating condition. You won't have to waste time and money scheduling maintenance that isn't needed, and you can quickly react to a condition before it becomes a problem.

## Efficient Operation

Simple ball-float mechanism doesn't need electricity to operate. The liquid drainer automatically discharges liquid when it is present. No air or gas is lost, as with manual draining.

## Positive Seating

Free-floating valve mechanism ensures positive seating and prevents liquid loss. There are no fixed pivots to wear or create friction. Wear points are heavily reinforced for long life.

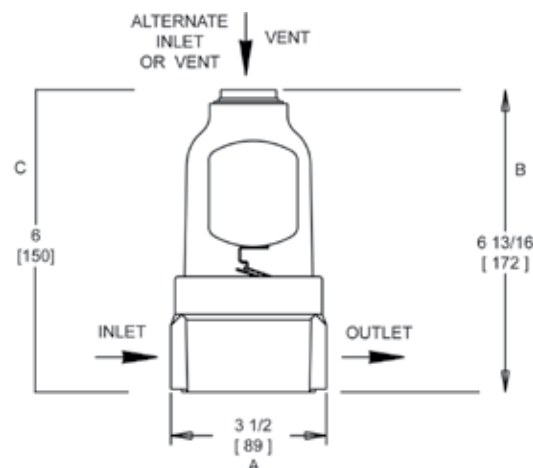
## Corrosion Resistance

Long-lasting polycarbonate cap and body provides trouble-free operation. T316 stainless steel internal parts resist corrosion and reduce maintenance.

## Compare—and Save the Difference

Seeing really is believing—especially when you compare the Armstrong 1-LDCW See-Thru Air Liquid Drainer with manual drainage. Measure the time and money you can save with a more efficient, easier-to-maintain system. For more information or technical assistance, contact your local Armstrong Representative.

**NOTE: The Armstrong 1-LDCW should not be used in an environment where there are high levels of ketones or chlorinated or aromatic hydrocarbons.**



1-LDCW

### List of Materials

Name of Part	Material
Cap	Polycarbonate
Body	Polycarbonate
O-Rings (Body Cap and Fitting)	Aflas
Float Lever and Screws	T316 Stainless Steel
Valve & Seat	T316 Stainless Steel
Fitting	Polycarbonate
Retainer Ring	Zinc Plated Steel

### Physical Data

	in	mm
Inlet Connection (In Body)	3/4	20
Inlet Connection (Alternate)	1/2	15
Outlet Connection	1/2	15
"A" Face-to-Face	3-1/2	89
"B" Height	6-13/16	172
"C" Bottom to C	6	152
Maximum Allowable Pressure (Vessel Design)	150 psig @ 150°F (10 barg @ 66°F)	
Maximum Operating Pressure	150 psig (10 barg)	
Specific Gravity Range	1.00 to 0.80	
Weight, lb (kg)	1 (.5)	



# Inverted Bucket Drain Traps (BVSW Model)

For Loads to 7 000 lb/hr (3 175 kg/hr)...Pressures to 650 psig (45 barg)

Armstrong inverted bucket drain traps are designed for systems where heavy oil and dirt may be encountered. The enlarged bucket vent equipped with a scrub wire (BVSW) keeps the drain trap operating under dirty conditions.

## List of Materials

Table LD-9.				
BVSW Model No.	Body & Cap	Valve & Seat	Bucket & Leverage System	Gasket
800, 811, 812, 813, 880, 881, 882, 883, 211, 212, 213	Cast Iron ASTM A48 Class 30	Stainless Steel		Compressed Asbestos-free
312, 313	Forged Steel ASTM A105			
981, 983	Cast Steel ASTM A216 Grade WCB			



## Physical Data

Table LD-10. Orifices, Maximum Operating Pressure (See Chart LD-12, page LD-30, for cold water capacities at various pressures.)												
Model No.	800 BVSW 880 BVSW		811 BVSW 881 BVSW 211 BVSW		812 BVSW 882 BVSW 212 BVSW		312 BVSW*		813 BVSW 883 BVSW 213 BVSW 313 BVSW* 983 BVSW*		981 BVSW*	
Orifice Size												
in	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1/4	—	—	—	—	—	—	—	—	125	8.5	—	—
7/32	—	—	—	—	—	—	—	—	180	12.5	—	—
3/16	—	—	—	—	—	—	—	—	250	17	50	3.5
5/32	—	—	—	—	125	8.5	—	—	450	31	85	6
1/8	80	5.5	125	8.5	200	14	—	—	600	41	170	11
7/64	125	8.5	200	14	250	17	600	41	—	—	250	17
#38	150	10.5	250	17	—	—	—	—	—	—	330	22.5

NOTE: Larger capacity models available. Consult your local Armstrong Representative or the Armstrong factory.

\* Use steel traps for pressures above 250 psig (17 barg).

Table LD-11. Armstrong 800 Series Drain Traps								
Model No.	800 BVSW		811 BVSW		812 BVSW		813 BVSW	
Pipe Connections	in	mm	in	mm	in	mm	in	mm
	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1/2, 3/4	15, 20	3/4, 1	20, 25
Test Plug	1/4	6	1/4	6	1/2	15	3/4	20
"A"	3-3/4	95	3-3/4	95	5-5/8	143	7	178
"B"	5-7/16	138	6-7/8	175	9-1/16	230	11-3/4	298
"C"	5	127	5	127	6-1/2	165	7-3/4	197
"D"	2-3/4	70	4-1/4	108	5-3/8	137	7-1/32	179
Number of Bolts	6		6		6		6	
Weight lbs (kg)	5 (2.3)		6 (2.7)		15 (6.8)		27-1/2 (13)	
Maximum Allowable Pressure (Vessel Design)	250 psig @ 450°F (17 barg @ 232°C)							
Max. Operating Pressure psig (barg)	150 (10.5)		250 (17)					

NOTE: Larger capacity models available. Consult your local Armstrong Representative or the Armstrong factory.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# Inverted Bucket Drain Traps (BVSW Model)

For Loads to 7 000 lb/hr (3 175 kg/hr)...Pressures to 650 psig (45 barg)



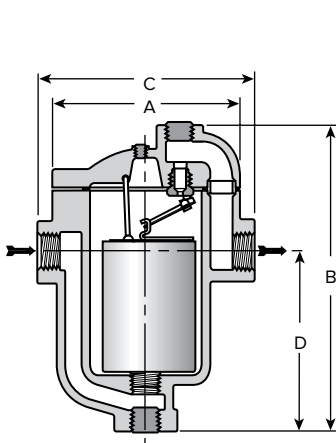
## Physical Data

Table LD-12. Armstrong 880-980 Series Drain Traps With Integral Strainers (See pages LD-29 and LD-30 for capacity.)												
Model No.	Cast Iron								Cast Steel			
	880 BVSW		881 BVSW		882 BVSW		883 BVSW		981 BVSW		983 BVSW	
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1/2, 3/4	15, 20	3/4, 1, 1-1/4	20, 25, 32	1/2, 3/4	15, 20	3/4, 1	20, 25
Test Plug	1/4	6	1/4	6	1/2	15	3/4	20	1/2	15	3/4	20
"A"	3-3/4	95	3-3/4	95	5-5/8	143	7	178	4-1/2	114	7-1/4	184
"B"	6-1/16	154	7-1/16	179	9-3/8	244	12-3/8	314	8-5/8	219	12-15/32	313
"C"	5	127	5	127	6-1/2	165	7-7/8	200	5-3/8	137	7-3/4	197
"D"	3-7/16	87.3	4-7/16	113	5-3/4	146	7-3/8	187	4-13/16	122	7-9/16	192
Number of Bolts	6		6		6		6		6		6	
Weight lbs (kg)	5-1/2 (2.5)		6 (2.7)		15-1/2 (7)		31 (14)		11-1/2 (5)		43 (20)	
Maximum Allowable Pressure (Vessel Design)	250 psig @ 450°F (17 barg @ 232°C)								600 psig @ 650°F (41 barg @ 343°C)			
Max. Oper. Pressure psig (barg)	150 (10.5)		250 (17)						330 (22.5)		600 (41)	

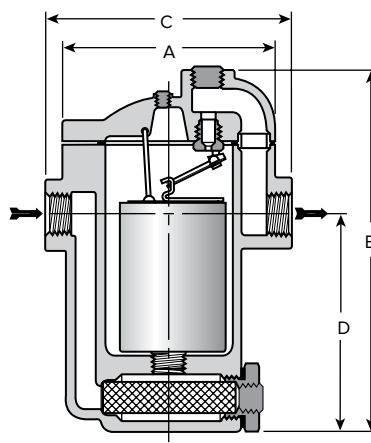
NOTE: Larger capacity models available. Consult your local Armstrong Representative or the Armstrong factory.

Table LD-13. Armstrong 200-300 Series Drain Traps (See pages LD-29 and LD-30 for capacity.)										
Model No.	Cast Iron						Forged Steel			
	211 BVSW		212 BVSW		213 BVSW		312 BVSW		313 BVSW	
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	15	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1/2, 3/4, 1	15, 20, 25	1/2, 3/4, 1	15, 20, 25
Test Plug	1/8	3	3/8	10	1/2	15	—	—	—	—
“A”	4-1/4	108	5-1/4	133	6-3/8	162	6-3/4	171	8	203
“B”	6-3/8	162	8-3/4	222	10-3/4	273	10-3/16	259	11-1/2	292
“G”	—	—	—	—	—	—	4-3/4	121	5-1/8	130
“K” (℄ Outlet to ℄ Inlet)	—	—	—	—	—	—	1-1/4	31.7	1-7/16	36.5
Number of Bolts	6		8		6		6		8	
Weight lbs (kg)	6 (2.7)		11-1/2 (5.2)		20-1/4 (9.2)		30 (14)		50 (23)	
Maximum Allowable Pressure (Vessel Design)	250 psig @ 450°F (17 barg @ 232°C)						600 psig @ 650°F (41 barg @ 343°C)		1 080 psig @ 650°F (75 barg @ 343°C)	
Max. Oper. Pressure psig (barg)	250 (17)						600 (41)		650 (45)	

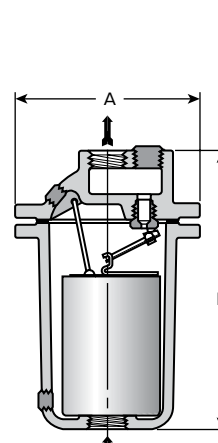
NOTE: Larger capacity models available. Consult your local Armstrong Representative or the Armstrong factory.



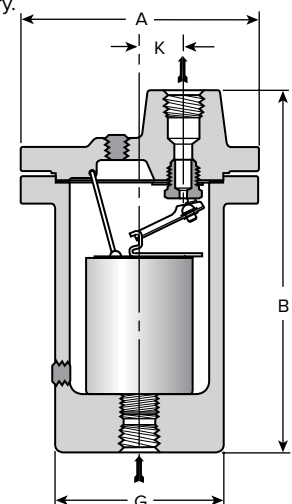
**Figure LD-29.**  
Series 800



**Figure LD-30.**  
Series 880 & 980



**Figure LD-31.**  
Series 200



**Figure LD-32.**  
Series 300

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# Free Floating Lever Drain Traps

For Loads to 9 500 lb/hr (4 309 kg/hr)...Pressures to 570 psig (39 barg)

Armstrong's stainless steel, free floating lever drain traps use the same bodies, caps, lever mechanisms, valves and seats of Armstrong inverted bucket steam traps that have been proven in years of service. Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for drain trap size and weight.

The hemispherical valve, seat and leverage of the 11-LD, 22-LD and 13-LD stainless steel traps are identical in design, materials and workmanship to those for saturated steam service up to 570 psig (39 barg) with the exception of the addition of a guidepost to assure a positive, leaktight valve closing under all conditions.

## List of Materials

Table LD-17.

Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket
11-LD 22-LD 13-LD	Stainless Steel			Sealed Stainless Steel, 304L	—

For information on special materials, consult the Armstrong Application Engineering Department.

For a fully detailed certified drawing, refer to list below:

11-LD CD #1066

13-LD and 22-LD CD #1086

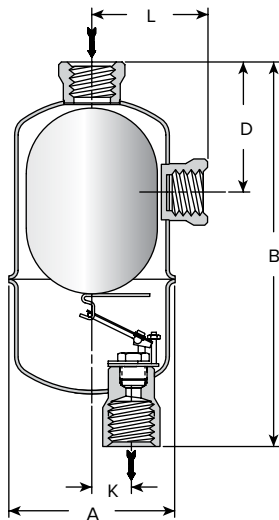


Figure LD-34.

No. 22-LD and 13-LD stainless steel guided lever liquid drain trap with sealed, tamperproof construction.



## Physical Data

Table LD-18. Armstrong Guided Lever Liquid Drain Traps

Model No.	Stainless Steel					
	11-LD**		22-LD		13-LD	
Pipe Connections	in	mm	in	mm	in	mm
	3/4*	20*	3/4	20	1	25
"A"	2-3/4	70	3-15/16	100	4-1/2	114
"B"	7-1/4	184	8-13/16	224	11-3/8	289
"D"	—	—	3	76	6-1/8	156
"K"	9/16	14	7/8	22	1-3/16	30
"L"	—	—	2-5/8	67	3-9/32	83
Approx. Wt. lbs (kg)	1-3/4 (0.79)		3-1/4 (1.5)		7-1/2 (3.4)	
Max. Allowable Pressure (Vessel Design)	500 psig @ 100°F (35 barg @ 38°C) 440 psig @ 500°F (30 barg @ 260°C)		600 psig @ 100°F (41 barg @ 38°C) 475 psig @ 500°F (33 barg @ 260°C)		570 psig @ 100°F (39 barg @ 38°C) 490 psig @ 500°F (34 barg @ 260°C)	

**Note:** Vessel design pressure may exceed float collapse pressure in some cases.

Pipe size of vent connection is same as that of inlet and outlet connections.

\*1/2" (15 mm) outlet. \*\*No side connection.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# Free Floating Lever Drain Traps

For Loads to 9 500 lb/hr (4 309 kg/hr)...Pressures to 570 psig (39 barg)

Armstrong's forged steel, free floating lever drain traps use the same bodies, caps, lever mechanisms, valves and seats of Armstrong inverted bucket steam traps that have been proven in years of service. Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for drain trap size and weight.

The hemispherical valve, seat and leverage of the 32-LD, 33-LD and 36-LD forged steel traps are identical in design, materials and workmanship to those for saturated steam service up to 1 000 psig (69 barg) with the exception of the addition of a guidepost to assure a positive, leaktight valve closing under all conditions.

## List of Materials

Table LD-21.

Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket
32-LD 33-LD 36-LD	Stainless Steel			Forged Steel ASTM A105	Compressed Asbestos-free

For information on special materials, consult the Armstrong Application Engineering Department.

For a fully detailed certified drawing, refer to CD #1035.

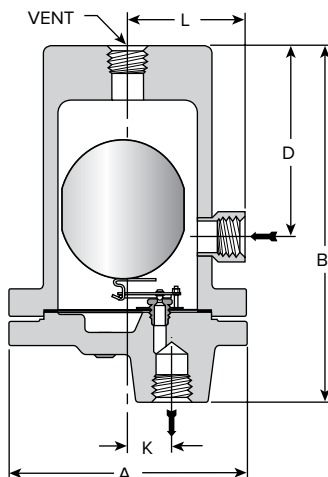


Figure LD-37.

No. 32-LD, 33-LD and 36-LD forged steel guided lever drain trap. Socketweld or flanged connections are also available.



## Physical Data

Table LD-22. Armstrong Guided Lever Liquid Drain Traps

Model No.	Forged Steel					
	32-LD <sup>†</sup>		33-LD <sup>†</sup>		36-LD <sup>†</sup>	
Pipe Connections	in	mm	in	mm	in	mm
	1/2, 3/4, 1	15, 20, 25	1/2, 3/4, 1	15, 20, 25	1-1/2, 2	40, 50
"A"	6-3/4	171	8	203	11-7/8	302
"B"	10-3/16	259	11-9/16	294	17-1/8	435 B
"D"	5-9/16	141	6-1/16	154	9	229
"K"	1-1/4	32	1-7/16	37	2-1/8	54
"L"	3-3/8	86	3-9/16	90	6-1/16	154
Approx. Wt. lbs (kg)	31 (14)		49 (22)		163 (74)	
Max. Allowable Pressure (Vessel Design)	600 psig @ 100°F (41 barg @ 38°C) 500 psig @ 750°F (35 barg @ 400°C)		1 000 psig @ 100°F (69 barg @ 38°C) 600 psig @ 750°F (41 barg @ 400°C)			

**Note:** Vessel design pressure may exceed float collapse pressure in some cases.

Pipe size of vent connection is same as that of inlet and outlet connections.

<sup>†</sup>Available in Type 316 stainless steel. Consult factory.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# 180 Series Free Floating Lever Drain Traps

## All Stainless Steel for Horizontal Installation

For pressures to 400 psig (28 barg) . . . Capacities to 2 000 lb/hr (907 kg/hr)

Armstrong's stainless steel, free floating lever drain traps use the same bodies, caps, lever mechanisms, valves and seats as Armstrong inverted bucket steam traps that have been proven in years of service. Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for drain trap size and weight.

The hemispherical valve, seat and leverage of the 180-LD and 181-LD stainless steel traps are identical in design, materials and workmanship to those for saturated steam service up to 570 psig (39 barg), except that the 180 Series traps have a guidepost to ensure a positive, leak-tight valve closing under all conditions. The 180 Series is designed for situations where mounting a drainer close to the floor is critical. A back vent connection is required.

**For a fully detailed certified drawing, refer to list below:**  
**180-LD CD #1276**

## List of Materials

Table LD-19.

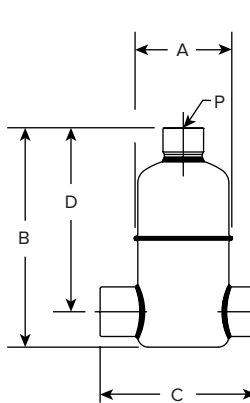
Model No.	Valve & Seat	Leverage System	Float	Body & Cap
180-LD 181-LD		Stainless Steel		Sealed Stainless Steel 304L

## Physical Data

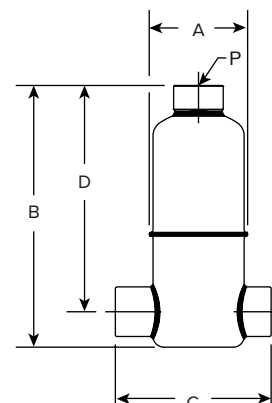
Table LD-20. Armstrong 180 Series Free Floating Lever Drain Traps

Model No.	180-LD		181-LD	
Pipe Connections	in	mm	in	mm
	1/2	15	3/4	20
"A" (Diameter)	2-11/16	68	2-11/16	68
"B" (Height)	6	152	7-1/4	184
"C" (Face to Face)	4-5/16	110	4-5/16	110
"D" (Bottom to C Inlet)	5-1/8	130	6-9/32	160
"P"	1/2	15	3/4	20
Weight, lb (kg)	1-3/4 (0.8)		2-3/8 (1.1)	
Max. Allowable Pressure (Vessel Design)	500 psig @ 100°F (35 barg @ 38°C) 440 psig @ 500°F (30 barg @ 260°C)			

**Note:** Vessel design pressure may exceed float collapse pressure in some cases. Pipe size of vent is same as that of inlet and outlet connections.



**Figure LD-35.**  
Model 180-LD



**Figure LD-36.**  
Model 181-LD

Chart LD-13. Model 180-LD Capacity

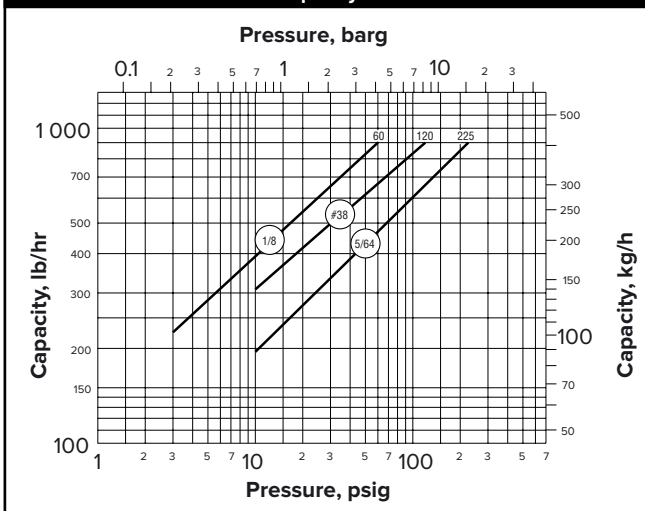
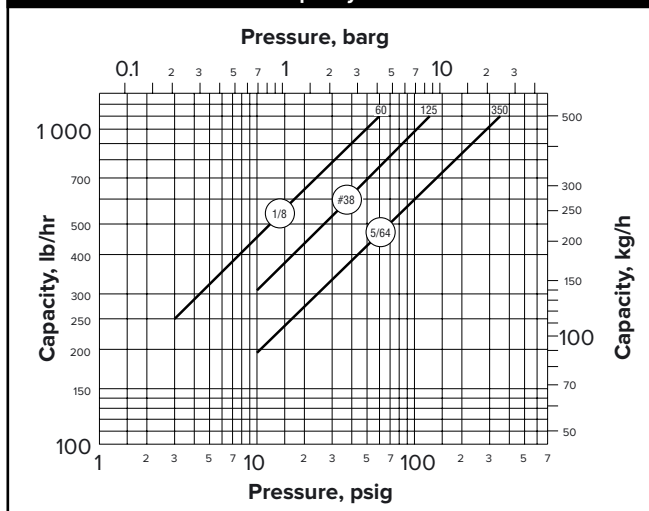


Chart LD-14. Model 181-LD Capacity



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# Armstrong® DS Series Drain Separators

Condensate in steam and air piping reduce thermal efficiency, cause water hammer, corrode equipment such as valves and pipes, and cause other problems.

Armstrong drain separators separate condensate efficiently by using the centrifugal force of steam or air created by introducing it into a specifically shaped path. Because of the simple structure of the drain separators, pressure loss is minimized, enabling clean, dry steam or air to be fed to equipment.

With correct sizing and proper drainage, the separators are designed to eliminate 98% of all entrained liquids and particles that are 10 microns and larger in size.

## Features

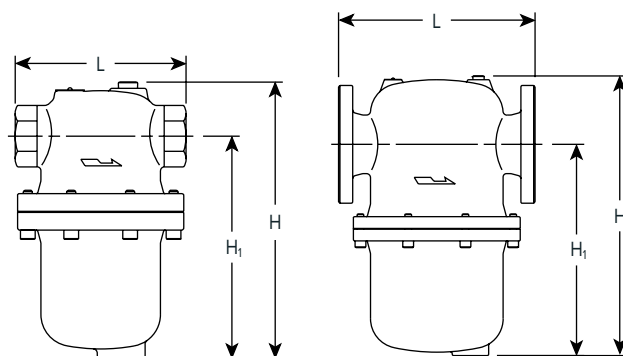
- A cyclone structure maximizes liquid separation efficiency
- Pressure loss is extremely low
- No moving parts means no breakdowns

## Operating Principle

When steam or air flow enters the drain separator, centrifugal force is generated in the fluid because of the device's internal structural design. The fluid drains along the wall because of the difference in specific gravity with steam or air, eventually striking the baffle. The baffle guides the fluid to the drain outlet and to the trap, which drains it. As a result, both small dirt particles and condensate are separated and removed from the system through the bottom drain.

For fully certified drawings refer to:

**DS-1 / DS-2**      **CDY1102**  
**DS-3**              **CD2126**  
**DS-4**              **CD2127**



**DS-1 / DS-3 / DS-4**

**DS-2 / DS-3 / DS-4**

DS Series Specifications					
Model	Application	Maximum Pressure psig (barg)	Maximum Temp. °F (°C)	Materials	
				Body	Nozzle
DS-1	Steam Air	NPT 300 (20)	430 (221)	Ductile Iron ASTM A536	Cast Iron ASTM A48
DS-2		150 lb. Flanged 185 (13)			
		300 lb. Flanged 300 (20)			
DS-3 DS-4		NPT 300 (20)	650 (343)	SS304 (DS-3)	Carbon Steel (DS-4)
		150 lb. Flanged 150 (10)	450 (232)		
			300 lb. Flanged 500 (34)	650 (343)	

DS Series Dimension and Weights																				
Model	Size		Face-to-Face "L"						H		H'		Drain		Weight					
			NPT		150#		300#								NPT		150#		300#	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	lb	kg
DS-1	1/2	15	5-15/16	150	—	—	—	—	9-9/16	243	7-5/8	193	3/4	20	16	7.3	—	—	—	—
	3/4	20	5-15/16	150	—	—	—	—	9-9/16	243	7-5/8	193	3/4	20	16	7.3	—	—	—	—
	1	25	5-15/16	150	—	—	—	—	9-9/16	243	7-5/8	193	3/4	20	16	7.3	—	—	—	—
	1-1/4	32	7-1/2	190	—	—	—	—	11-1/8	243	8-3/8	213	1	25	28	12.7	—	—	—	—
	1-1/2	40	7-1/2	190	—	—	—	—	11-1/8	243	8-3/8	213	1	25	28	12.7	—	—	—	—
	2	50	8-5/8	219	—	—	—	—	13-15/32	243	10-1/4	260	1	25	45	20.5	—	—	—	—
DS-2	2-1/2	65	—	—	11-1/2	292	11-15/16	303	16-15/32	418	12-3/8	314	1	25	—	—	45	20.5	77	35
	3	80	—	—	13-1/2	343	14-1/64	356	19	484	14-1/2	361	1-1/4	32	—	—	77	35	99	45
	4	100	—	—	15-13/16	402	16-7/16	418	23-3/8	594	17-1/2	445	1-1/4	32	—	—	99	45	143	65
DS-3	1/2	15	5-1/2	140	9	229	9	229	16	356	9	229	1	25	28	12.7	30	13.6	32	14.5
	3/4	20	5-1/2	140	9	229	9	229	16	356	9	229	1	25	28	12.7	30	13.6	32	14.5
	1	25	6-3/8	162	10-1/2	267	10-1/2	267	16	356	10-1/2	267	1	25	30	13.6	33	15	35	15.9
	1-1/4	32	6-3/8	162	10-1/2	267	10-1/2	267	16	356	10-1/2	267	1	25	32	14.5	35	15.9	37	16.8
	1-1/2	40	7-5/8	194	11-1/2	292	11-1/2	292	19	483	12-1/2	318	1	25	46	20.9	50	22.7	56	25.4
	2	50	7-7/8	200	11-1/2	292	11-1/2	292	19	483	12-1/2	318	1	25	51	23.1	55	24.9	59	26.8
	2-1/2	65	—	—	16	406	16	406	22	559	15	381	1	25	—	—	100	45.4	110	49.9
DS-4	3	80	—	—	18	457	18	457	26	660	18	457	1	25	—	—	140	63.5	150	68
	4	100	—	—	20	508	20	508	31	787	22	559	1-1/2	40	—	—	195	88.4	220	99.8
	6	150	—	—	24	610	24	610	41	1041	30	762	1-1/2	40	—	—	350	159	380	172
	8	200	—	—	28	711	28	711	50	1270	37	940	2	50	—	—	475	215	610	278
	10	250	—	—	34	864	34	864	70	1778	55	1397	2	50	—	—	780	354	1180	535
	12	300	—	—	38	965	38	965	75	1905	58	1473	2-1/2	65	—	—	940	426	1510	685

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# DS Series Drain Separators

## Capacities for Steam Service

DS-1/DS-2 Series Steam Capacities (lb/hr)									
Size	5 psig	10 psig	25 psig	50 psig	100 psig	150 psig	200 psig	250 psig	300 psig
1/2"	34	43	69	113	200	287	374	461	548
3/4"	60	75	121	198	351	503	656	809	962
1"	98	122	197	320	568	816	1 063	1 311	1 559
1-1/4"	169	212	340	555	983	1 412	1 840	2 269	2 698
1-1/2"	230	288	463	755	1 338	1 922	2 505	3 088	3 672
2"	379	475	763	1 244	2 206	3 167	4 129	5 090	6 052
2-1/2"	541	678	1 089	1 775	3 147	4 519	5 891	7 263	8 635
3"	835	1 046	1 682	2 741	4 860	6 978	9 096	11 215	13 333
4"	1 437	1 802	2 896	4 720	8 368	12 016	15 664	19 312	22 960

DS-1/DS-2 Series Steam Capacities (kg/hr)									
Size	0.34 barg	0.69 barg	1.7 barg	3.4 barg	6.9 barg	10.3 barg	13.8 barg	17.2 barg	20.7 barg
1/2"	16	20	31	51	91	130	170	209	249
3/4"	27	34	55	90	159	228	298	367	436
1"	44	55	89	145	258	370	482	595	707
1-1/4"	77	96	154	252	446	640	835	1 029	1 224
1-1/2"	104	131	210	342	607	872	1 136	1 401	1 665
2"	172	215	346	564	1 001	1 437	1 873	2 309	2 745
2-1/2"	245	307	494	805	1 428	2 050	2 672	3 294	3 917
3"	379	475	763	1 243	2 204	3 165	4 126	5 087	6 048
4"	652	817	1 314	2 141	3 796	5 450	7 105	8 760	10 414

DS-3/DS-4 Series Steam Capacities (lb/hr)									
Size	5 psig	10 psig	25 psig	50 psig	100 psig	150 psig	200 psig	250 psig	300 psig
1"	190	225	295	390	550	675	780	860	1 000
1-1/4"	320	345	460	620	860	1 050	1 125	1 140	1 160
1-1/2"	460	500	680	880	1 225	1 550	1 800	2 000	2 250
2"	790	910	1 050	1 550	2 200	2 700	3 150	3 700	4 000
2-1/2"	1 075	1 120	1 585	2 400	3 400	4 300	5 000	5 375	6 400
3"	1 950	2 300	2 950	3 750	5 250	6 600	7 600	9 000	10 000
4"	3 250	3 800	4 975	6 100	9 000	11 100	13 000	11 500	11 650
5"	4 975	5 850	7 650	9 250	11 400	11 700	12 000	23 000	25 000
6"	7 700	8 990	10 100	10 450	21 500	26 500	31 000	36 000	39 000
8"	10 750	11 450	12 000	23 750	34 000	43 000	51 000	58 000	66 000
10"	20 000	22 500	29 500	37 000	54 500	68 000	78 000	90 000	100 000
12"	29 500	34 000	44 000	54 000	81 000	100 000	105 000	112 000	114 000

DS-3/DS-4 Series Steam Capacities (kg/hr)									
Size	0.34 barg	0.69 barg	1.7 barg	3.4 barg	6.9 barg	10.3 barg	13.8 barg	17.2 barg	20.7 barg
1"	86	102	134	177	249	306	354	390	454
1-1/4"	145	156	209	281	390	476	510	517	526
1-1/2"	209	227	308	399	556	703	816	907	1 021
2"	358	413	476	703	998	1 225	1 429	1 678	1 814
2-1/2"	488	508	719	1 089	1 542	1 950	2 268	2 438	2 903
3"	885	1 043	1 338	1 701	2 381	2 994	3 447	4 082	4 536
4"	1 474	1 724	2 257	2 767	4 082	5 035	5 897	5 216	5 284
5"	2 257	2 654	3 470	4 196	5 171	5 307	5 443	10 433	11 340
6"	3 943	4 078	4 581	4 740	9 752	12 020	14 061	16 329	17 690
8"	4 876	5 194	5 443	10 773	15 422	19 504	23 133	26 308	29 937
10"	9 072	10 206	13 381	16 783	24 721	30 844	35 380	40 823	45 359
12"	13 381	15 422	19 958	24 494	36 741	45 359	47 627	50 802	51 710

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# **Armstrong® Stainless Steel Sump Ejector**

Armstrong Condensate Management Group offers a stainless steel sump ejector for use in draining unwanted water from steam pits, steam tunnels or enclosed spaces. The stainless steel sump ejector uses a snap-acting Inconel X-750 spring-assisted mechanism, which engages a steam motive valve, turning the pump on or off as the float rises and falls. The all stainless steel design will ensure long life in the rather harsh environment of a steam pit.

The stainless steel sump ejector is designed to eliminate maintenance headaches and safety issues surrounding steam pits, tunnels and enclosed spaces.

## Features

- All stainless steel construction and design guard against corrosion
- True steam-on, steam-off operation
- Heavy duty Inconel X-750 springs provide a long, trouble-free service life
- The small, compact and unique cast stainless steel design is unlike anything on the market today

For a fully detailed certified drawing, refer to list below.

3/4" CDF #1052

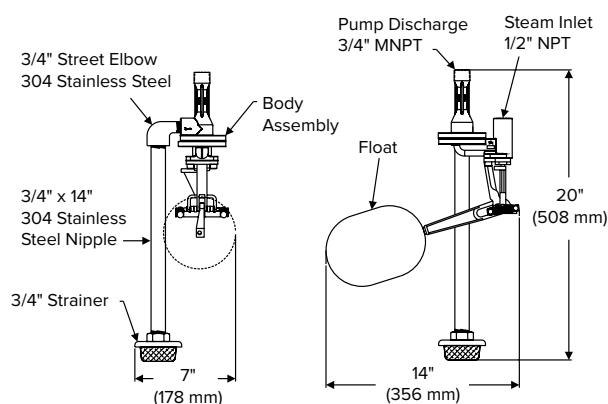
1-1/2" CDF #1065



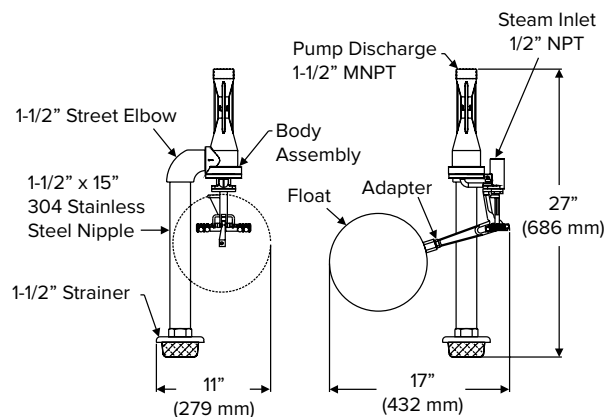
## Stainless Steel Sump Ejector Materials

Name of Part	Material
Mechanism	ASTM A351 CF8M
Springs	Inconel X-750
Spring Ends	304 Stainless Steel
Clevis Pins	304 Stainless Steel
Body	ASTM A351 CF8M
Nozzle	308 Stainless Steel
Seal Retainer	308 Stainless Steel
Motive Ball	440-C Stainless Steel
Motive Valve	316 Stainless Steel
Rod Seal	PTFE
Seal Spring	Hastelloy C-276
Rod Wiper	Nitrile
O-Ring	EPDM
Bolts	18-8 Stainless Steel
Strainer Body	Glass Filled Nylon
Strainer Mesh	Stainless Steel
Fittings	304 Stainless Steel
Pipe	304 Stainless Steel

# Stainless Steel Sump Ejector



**3/4" Model**



**1-1/2" Model**

## 3/4" Stainless Steel Sump Ejector Capacities in gallons per minute (gpm)

Discharge Head (ft)	Water Temperature 60°F						Water Temperature 100°F						Water Temperature 140°F					
	Motive Steam Pressure (psig)						Motive Steam Pressure (psig)						Motive Steam Pressure (psig)					
	40	60	80	100	120	150	40	60	80	100	120	150	60	80	100	120	150	
0	6.0	9.3	11.6	12.2	12.8	12.9	6.0	9.0	9.2	8.6	8.0	8.0	5.5	5.3	5.4	5.5	5.5	
5	4.0	7.3	9.9	11.1	11.9	12.4	3.0	7.1	8.2	8.1	7.8	7.8	4.5	4.5	5.3	5.4	5.4	
10	2.0	5.2	8.3	10.0	11.0	11.9	—	5.2	7.2	7.7	7.6	7.6	3.5	3.5	5.2	5.2	5.2	
15	—	3.2	6.6	8.9	10.0	11.5	—	3.3	6.2	7.2	7.3	7.4	—	—	5.1	5.1	5.1	
20	—	—	5.0	7.8	9.2	11.0	—	—	5.2	6.7	7.1	7.3	—	—	5.0	4.9	4.9	
25	—	—	—	6.7	8.3	10.5	—	—	—	6.2	6.8	7.1	—	—	4.9	4.8	4.8	
30	—	—	—	5.6	7.4	10.0	—	—	—	5.7	6.6	6.9	—	—	4.8	4.6	4.6	
35	—	—	—	—	6.5	9.5	—	—	—	—	6.4	6.7	—	—	—	4.5	4.5	
40	—	—	—	—	5.6	9.1	—	—	—	—	6.1	6.6	—	—	—	4.3	4.3	
45	—	—	—	—	—	8.6	—	—	—	—	—	6.4	—	—	—	—	4.2	
50	—	—	—	—	—	8.1	—	—	—	—	—	6.2	—	—	—	—	4.0	

Note: Maximum operating pressure is 175 psig (12 barg). No increase in capacity with motive pressure over 150 psig (10 barg).

## 1-1/2" Stainless Steel Sump Ejector Capacities in gallons per minute (gpm)

Discharge Head (ft)	Water Temperature 60°F						Water Temperature 100°F						Water Temperature 140°F					
	Motive Steam Pressure (psig)						Motive Steam Pressure (psig)						Motive Steam Pressure (psig)					
	60	80	100	120	150	175	60	80	100	120	150	175	60	80	100	120	150	175
5	23.0	34.0	42.2	48.4	56.8	55.8	23.2	34.1	42.2	49.9	55.3	56.0	26.3	36.1	46.3	46.2	41.1	41.0
10	—	28.4	38.0	43.2	51.0	51.2	—	28.9	37.2	44.5	52.1	54.8	—	28.9	38.2	43.5	41.1	40.9
15	—	—	35.0	37.9	46.5	50.4	—	—	31.3	39.3	48.9	53.1	—	—	30.7	38.1	41.1	40.9
20	—	—	26.1	33.5	44.4	49.5	—	—	—	35.0	44.7	51.4	—	—	23.6	33.4	41.2	40.8
25	—	—	—	29.0	39.5	48.0	—	—	—	30.9	40.3	47.2	—	—	—	—	41.4	40.5
30	—	—	—	—	35.2	43.5	—	—	—	—	36.5	43.9	—	—	—	—	—	—
35	—	—	—	—	31.1	38.8	—	—	—	—	32.3	39.1	—	—	—	—	—	—
40	—	—	—	—	—	34.3	—	—	—	—	—	35.7	—	—	—	—	—	—



# Armstrong® Armstrong MS-6 Noiseless Heater

The use of hot water is indispensable in food processing, cleaning, and plating operations. Although the simplest and most efficient way to provide the water is by direct steam sparging, such a format often results in vibration and noise caused by steam blowing into the water tank. These problems can be greatly reduced by mounting an MS-6 noiseless heater at the end of the pipe.

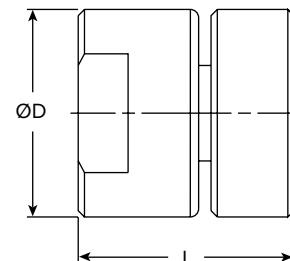
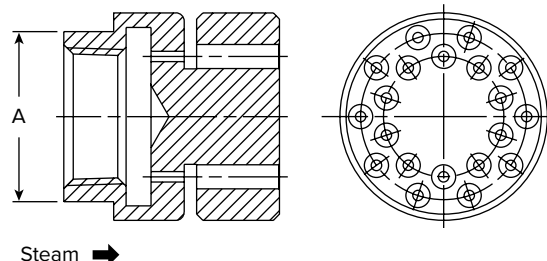
## Features

- Stainless steel construction for greater durability
- Mounting is simple and economical
- Maintenance free

Formula for Calculating Steam Load to Heat Water in Tank

$$\text{lbs/hr} = \frac{\text{Gal} \times \Delta T \times 8.3}{\text{Lat} \times T}$$

Gal = Gallons of water to be heated  
 $\Delta T$  = Temperature rise °F  
 Lat = Latent heat of steam (Btu/lb)  
 T = Time in hours



Specifications	
Fluid	Steam
Pressure Range	7 - 100 psig (0.5 - 7 barg)
Silencing Limit Temperature	190°F (90°C)
Material	304 Stainless Steel
Connection	NPT

Dimensions and Weights												
Connection Size	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	15	3/4	20	1	25	1-1/4	32	1-1/2	40	2	50
"L"	1-15/16	49	1-15/16	49	2-1/16	52	2-3/16	55	2-5/16	59	2-9/16	65
"D"	1-3/8	35	1-1/4	45	2	50	2-3/8	60	2-3/4	70	4-1/8	105
"A"	1-3/16	30	1-7/16	36	1-5/8	41	2	50	2-3/8	60	3-9/16	90
Weight, lb (kg)	0.55 (0.25)		0.88 (0.40)		1.15 (0.52)		1.70 (0.77)		2.54 (1.15)		6.59 (2.99)	

Capacities - Steam, lb/hr (kg/hr)												
Inlet, psig (barg)	Connection Size											
	1/2"		3/4"		1"		1-1/4"		1-1/2"		2"	
	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
7 (0.50)	54	25	129	58	157	71	190	86	291	132	362	164
10 (0.70)	65	30	147	67	179	81	222	101	323	147	413	187
15 (1.00)	84	38	177	80	214	97	276	125	376	171	498	226
20 (1.38)	103	46	208	94	250	113	330	150	430	195	582	264
30 (2.00)	140	63	269	122	321	146	439	199	536	243	751	341
40 (2.76)	177	80	330	149	392	178	547	248	643	292	921	418
50 (3.45)	214	97	390	177	463	210	655	297	749	340	1090	494
60 (4.14)	251	114	451	205	534	242	764	346	856	388	1259	571
70 (4.83)	289	131	512	232	605	275	872	395	963	437	1428	648
80 (5.52)	326	148	573	260	676	307	980	445	1069	485	1597	725
90 (6.20)	363	165	634	288	748	339	1088	494	1176	533	1767	801
100 (6.90)	400	181	695	315	819	371	1197	543	1282	582	1936	878

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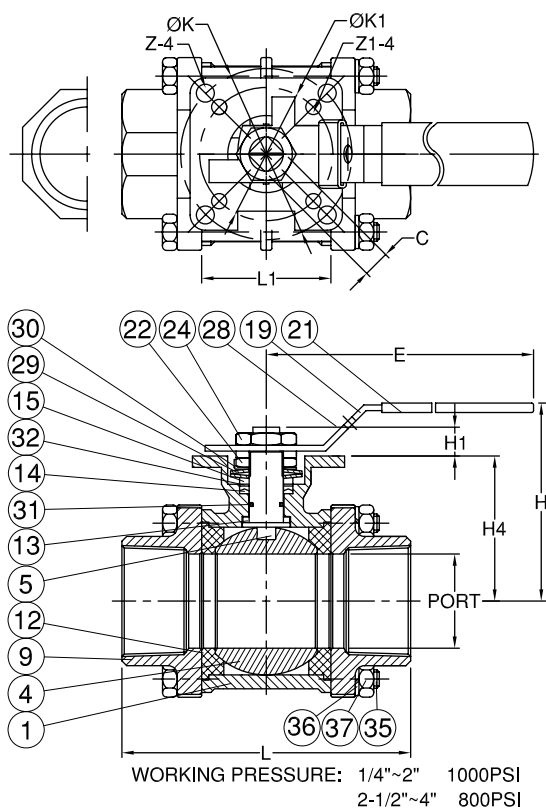


# Valves

## BF3S10SPBN

Ball valve, 3-piece full bore design, suitable for air, gas, water and low pressure steam,

- Body, ball & stem: 316 stainless steel
- Seats: RPTFE
- End Connections: Screwed BSP or socket weld
- Maximum pressure rating: 7,000 kpa (1,000 psi)
- Maximum temperature rating: 204 degrees C
- Sizes: 8mm to 50mm



### MATERIALS LIST

NO.	PART NAME	MATERIAL
1	BODY	ASTM A351 Gr.CF8M
4	BALL	ASTM A351 Gr.CF8M
5	STEM	SS316
9	END CAP	ASTM A351 Gr.CF8M
12	SEAT	RTFE.
13	THRUST WASHER	RTFE.
14	STEM PACKING	RTFE.
15	GLAND BUSH	SS304
19	HANDLE	SS304
21	HANDLE COVER	VINYL GRIP
22	STEM NUT	SS304
24	HANDLE NUT	SS304
28	LOCKING PAD	SS304
29	BELLEVILLE WASHER	SS304-CSP
30	TAB WASHER	SS304
31	O-RING	VITON
32	PACKING FOLLWER	PTFE.+25%G.F.
35	BODY BOLT	SS304
36	BOLT WASHER	SS304
37	BOLT NUT	SS304

### DIMENSIONS

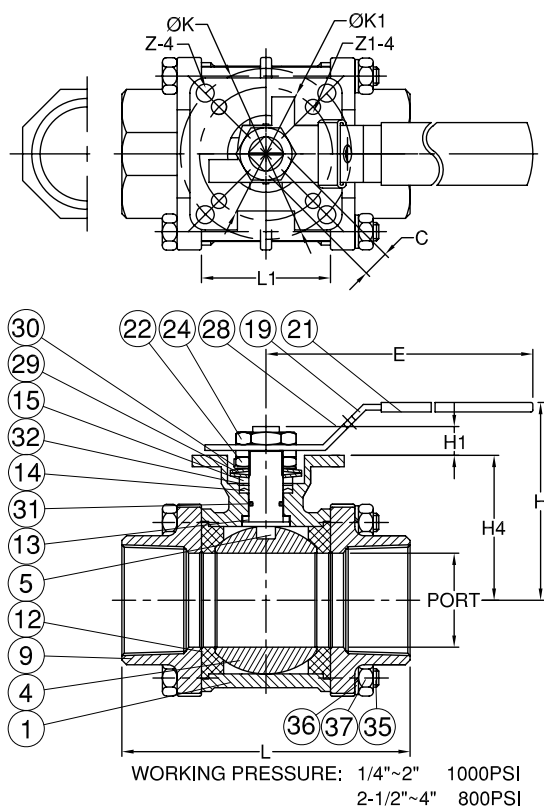
unit:mm

	SIZE	PORT	L	E	H	H1	H4	C	ØK	ØK1	Z-4	Z1-4	L1	
	DN8	1/4"	11.5	63.5	112.0	73.0	8.5	37.0	9.0	50.0	36.0	7.0	6.0	22.5
	DN10	3/8"	12.5	63.5	112.0	73.0	8.5	37.0	9.0	50.0	36.0	7.0	6.0	22.5
	DN15	1/2"	15.0	63.5	112.0	73.0	8.5	37.0	9.0	50.0	36.0	7.0	6.0	22.5
	DN20	3/4"	20.0	72.5	112.0	80.8	8.5	45.0	9.0	50.0	36.0	7.0	6.0	27.5
	DN25	1"	25.0	81.0	136.0	90.5	11.4	53.5	9.0	50.0	36.0	7.0	6.0	34.0
	DN32	1-1/4"	32.0	94.5	185.0	98.7	11.4	59.0	9.0	50.0	36.0	7.0	6.0	42.5
	DN40	1-1/2"	38.0	108.0	197.9	115.3	14.0	74.8	14.0	70.0	50.0	9.0	7.0	52.0
	DN50	2"	50.0	121.5	197.9	124.0	13.7	83.5	14.0	70.0	50.0	9.0	7.0	63.5
	DN65	2-1/2"	65.0	157.5	267.0	155.0	18.0	108.8	17.0	102.0	70.0	11.0	9.0	85.5
	DN80	3"	80.0	190.0	267.0	208.5	18.0	118.3	17.0	102.0	70.0	11.0	9.0	102.0
	DN100	4"	100.0	225.0	322.0	216.7	18.0	153.8	17.0	102.0	70.0	11.0	9.0	128.5

## BF3S10S50BN

Ball valve, 3-piece full bore design, suitable for steam, water, air, gas and many chemicals.

- Body, ball & stem: 316 stainless steel
- Seats: graphite impregnated PTFE
- End Connections: Screwed BSP or socket weld
- Direct mount ISO mounting pad suitable for mounting of pneumatic or electric actuators.
- Spring return ("dead man") man handle also available
- Maximum pressure rating 7,000 kpa (1,000 psi)
- Maximum temperature rating 230 degrees C
- Sizes: 8mm to 50mm



### MATERIALS LIST

NO.	PART NAME	MATERIAL
1	BODY	ASTM A351 Gr.CF8M
4	BALL	ASTM A351 Gr.CF8M
5	STEM	SS316
9	END CAP	ASTM A351 Gr.CF8M
12	SEAT	50% S.S. Filled PTFE
13	THRUST WASHER	RTFE.
14	STEM PACKING	RTFE.
15	GLAND BUSH	SS304
19	HANDLE	SS304
21	HANDLE COVER	VINYL GRIP
22	STEM NUT	SS304
24	HANDLE NUT	SS304
28	LOCKING PAD	SS304
29	BELLEVILLE WASHER	SS304-CSP
30	TAB WASHER	SS304
31	O-RING	VITON
32	PACKING FOLLWER	PTFE.+25%G.F.
35	BODY BOLT	SS304
36	BOLT WASHER	SS304
37	BOLT NUT	SS304

### DIMENSIONS

unit:mm

SIZE	PORT	L	E	H	H1	H4	C	ØK	ØK1	Z-4	Z1-4	L1	
DN8	1/4"	11.5	63.5	112.0	73.0	8.5	37.0	9.0	50.0	36.0	7.0	6.0	22.5
DN10	3/8"	12.5	63.5	112.0	73.0	8.5	37.0	9.0	50.0	36.0	7.0	6.0	22.5
DN15	1/2"	15.0	63.5	112.0	73.0	8.5	37.0	9.0	50.0	36.0	7.0	6.0	22.5
DN20	3/4"	20.0	72.5	112.0	80.8	8.5	45.0	9.0	50.0	36.0	7.0	6.0	27.5
DN25	1"	25.0	81.0	136.0	90.5	11.4	53.5	11.0	50.0	36.0	7.0	6.0	34.0
DN32	1-1/4"	32.0	94.5	185.0	98.7	11.4	59.0	11.0	50.0	36.0	7.0	6.0	42.5
DN40	1-1/2"	38.0	108.0	197.9	115.3	14.0	74.8	14.0	70.0	50.0	9.0	7.0	52.0
DN50	2"	50.0	121.5	197.9	124.0	13.7	83.5	14.0	70.0	50.0	9.0	7.0	63.5
DN65	2-1/2"	65.0	157.5	267.0	155.0	18.0	108.8	17.0	102.0	70.0	11.0	9.0	85.5
DN80	3"	80.0	190.0	267.0	208.5	18.0	118.3	17.0	102.0	70.0	11.0	9.0	102.0
DN100	4"	100.0	225.0	322.0	216.7	18.0	153.8	17.0	102.0	70.0	11.0	9.0	128.5

## BF3S20SRN(B)F

Ball valve, 3-piece full bore design, firesafe and antistatic

To API 607, BS5146, suitable for flammable fluid and gases,

Water, air, gas and many chemicals.

- Body, ball & stem: 316 stainless steel
- Seats: RPTFE
- Body seals and gland packing: Graphite
- End Connections: Screwed BSP, NPT or socket weld
- Spring return ("dead man") man handle also available
- Maximum pressure rating 14,000 kpa (2,000 psi)
- Maximum temperature rating 204 degrees C
- Sizes: 8mm to 50mm



AF-35 SIZE: 1/4"-2" FIRE-SAFE API 607

3-PIECE FULL PORT and STANDARD PORT BALL VALVE  
SCREWED ENDS, BUTT WELDED END, SOCKET WELDED END  
ISO 5211 MOUNTING PAD  
DIN 3202-MS (SCREWED ENDS/SOCKET WELDED ENDS)

-S13 (BUTT WELDED ENDS)

PRESSURE 2000 PSIG CLASS 800 1/4" D.G.

STAINLESS STEEL: 316 BODY, with 316 SS TRIM

CARBON STEEL: WCB BODY, with 316 SS TRIM

Remark: 1/4" - 1/2" FULL BORE - NOT Direct Mounting

1/4" - 3/4" REDUCED BORE - NOT Direct Mounting

STANDARDS APPLICABLE

ASME B16.34-STEEL VALVES FLANGED, THREADED, AND WELDING END

ASME B1.20.1-PIPE THREADS, GENERAL PURPOSE

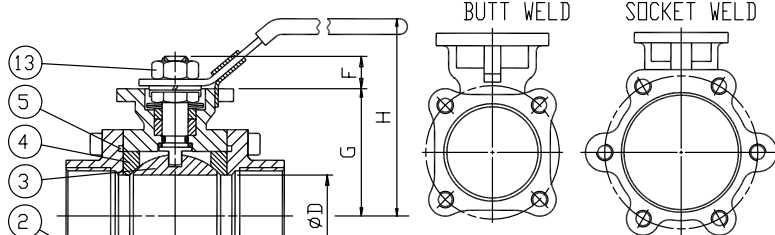
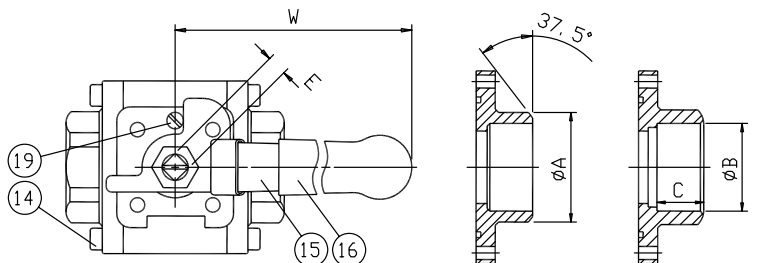
ASME B16.10-FACE TO FACE/END TO END DIMENSIONS OF VALVES

API 598-VALVE INSPECTION AND TESTING

MSS SP72-BALL VALVES WITH FLANGED OR BUTT WELDING ENDS FOR GENERAL SERVICES

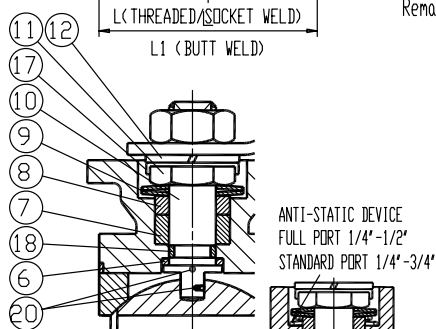
MSS SP25-STANDARD MARKING SYSTEM FOR VALVES FITTINGS, FLANGES AND UNIONS

ITEM	DESCRIPTION	STAINLESS STEEL	CARBON STEEL	QTY
1	BODY	ASTM A351 CF8M	ASTM A216 WCB	1
2	END CAP	ASTM A351 CF8M	ASTM A216 WCB	2
3	BALL	ASTM A351 CF8M/316	ASTM A351 CF8M/316/304	1
4	SEAT		RPTFE	2
5-1	GASKET		GRAPHITE	2
5-2			PTFE	2
6-1	THRUST WASHER		GRAPHITE	1
6-2			PTFE	1
7	STEM PACKING		GRAPHITE	1
8	GLAND	AISI 304		1
9	BELLEVILLE WASHER	AISI 301		2
10	STEM	ASTM A276 316		1
11	PACKING NUT	AISI 304		1
12	SPRING WASHER	AISI 304		1
13	HANDLE NUT	AISI 304		1
14	BOLT	ASTM A193 B8	ASTM A193 B7	8-12
15	HANDLE	AISI 304	ZINC PLATED STEEL	1
16	HANDLE GRIP		VINYL PLASTISOL	1
17	LOCK SADDLE		AISI 304	1
18	O-RING		VITON	1
19	STOPPER NUT	AISI 304	CARBON STEEL	1
20	ANTI-STATIC DEVICE		AISI 304	1-2



FULL PORT 1/4"-1 1/2"  
STANDARD PORT 1/2"-2"

Remark: 1/4" - 1/2" FULL BORE - NOT Direct Mounting  
1/4" - 3/4" REDUCED BORE - NOT Direct Mounting



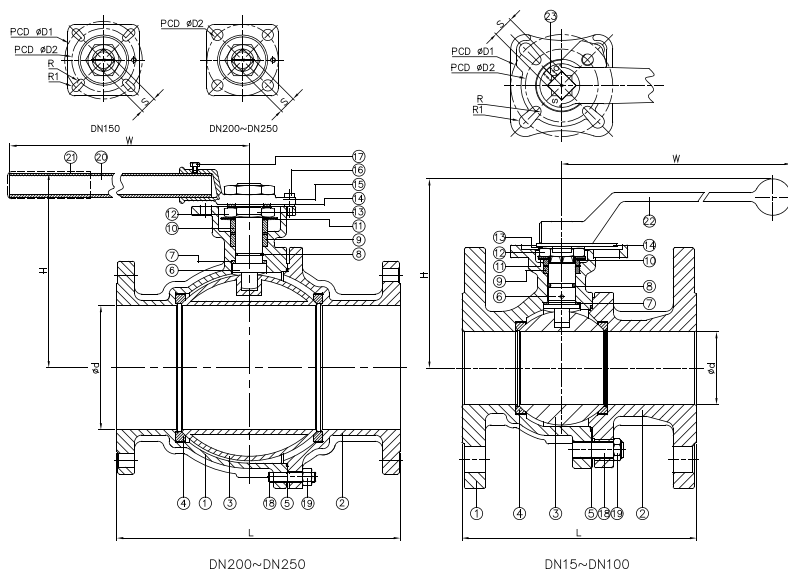
ANTI-STATIC DEVICE  
FULL PORT 1/4"-1/2"  
STANDARD PORT 1/4"-3/4"

SIZE		ØD		L		L1		E		F		G		H		W		ØA		ØB		C		ISO 5211 (F)	Weights KG
IN	DN	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM		
1/4"	8	0.43	11.0	2.55	65.0	2.75	70.0											0.54	13.8	0.56	14.2			F04	1.1
3/8"	10							0.35	9.0	0.31	8.0	1.47	37.5	2.75	70.0	5.51	140.0	0.68	17.3	0.69	17.6				1.1
1/2"	15	0.55	14.0	2.95	75.0	2.95	75.0											0.85	21.7	0.86	21.8	0.51	13.0		1.1
3/4"	20	0.80	20.5	3.14	80.0	3.54	90.0	0.43	11.0	0.43	11.0	1.96	52.0	3.54	90.0	7.08	180.0	1.07	27.2	1.07	27.2			F04-F05	1.6
1"	25	0.98	25.0	3.54	90.0	3.93	100.0					2.36	60.0	3.93	100.0			1.34	34.0	1.33	33.9	0.59	15.0		2.2
1 1/4"	32	1.24	31.5	4.33	110.0	4.33	110.0					2.83	72.0	4.40	112.0			1.68	42.7	1.68	42.7				3.3
1 1/2"	40	1.45	37.0	4.72	120.0	4.92	125.0	0.55	14.0	0.67	17.0	2.99	76.0	4.52	115.0	8.46	215.0	1.91	48.6	1.92	48.8	0.63	16.0	F07	4.6
2"	50	1.96	50.0	5.51	140.0	5.90	150.0					3.66	93.0	5.23	133.0			2.38	60.5	2.41	61.2	0.67	17.0		7.3

## BF2C15SRRF / BF2C15SXRF

Ball valve, 2-piece, split body, full bore design, firesafe and  
Antistatic to API 607, BS5146, suitable for flammable fluid and gases,  
Water, air, gas and non corrosive chemicals.

- Body: Carbon Steel ASTM A 216 Gr WCB
- Ball & stem: 316 stainless steel
- Seats: RPTFE, TFM 1600 High Temp
- Body seals and gland packing: Graphite
- End Connections: Flanged ANSI 150 RF
- Maximum pressure rating 1,950 kpa
- Maximum temperature rating 204 degrees C
- Sizes: 15mm to 150mm



ITEM	PARTS	MATERIAL	
1	BODY	ASTM A351-CF8M	ASTM A216-WCB
2	CAP		
3	BALL	SOLID: ASTM A351-CF8M / HOLLOW: ASTM A240-316	
4	SEAT	TFM1600 / RTFE	
5	SEAL	GRAPHITE	
6	STEM	ASTM A276-316	
7	THRUST WASHER	CTFE	
8	O-RING	VITON	
9	PACKING	GRAPHITE	
10	GLAND RING	AISI 304	
11	BELLEVILLE WASHER	AISI 301	
12	STEM NUT	AISI 304	
13	LOCKING WASHER		
14	FLAT WASHER		
15	HANDLE HEAD		
16	STOP PIN		
17	BOLT	AISI 301	
18	STUD		
19	NUT		
20	STEEL TUBE	PVC	
21	HANDLE SLEEVE		
22	HANDLE	AISI 301	
23	SOCKET SET SCREW		

- ABOVE MENTIONED MATERIALS APPLY TO FIRE SAFE DESIGN  
- ISO 15848 DESIGN SHOULD REPLACE WITH PTFE SEAL & PACKING

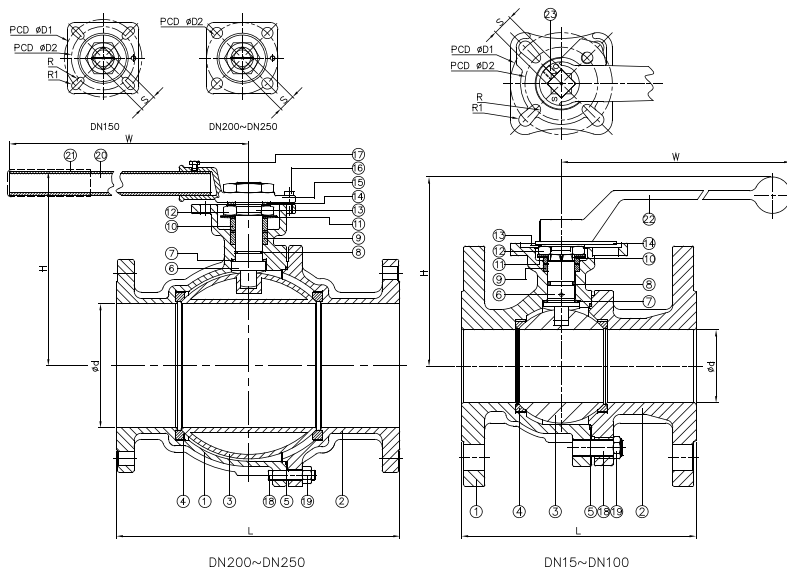
DN	d	CLASS 150			CLASS 300			D1	D2	R	R1	S	Torque(N-M)
		L	H	W	L	H	W						
15	15	108	85	190	140	84.5	197.5	42	36	2.75	2.75	9	5.2
20	20	117	89.5	190	152	94.5	197.5	42	36	2.75	2.75	9	8
25	24	127.5	94.2	190	165	99.5	197.5	50	42	2.75	3.5	11	12.5
32	30	140.5	97.9	190	178	105	197.5	50	42	2.75	3.5	11	12
40	38	165	120.9	235	190	124.5	247.5	70	50	3.5	4.5	14	24.5
50	50	178	129.9	235	216	129	247.5	70	50	3.5	4.5	14	32
65	64	190.5	156.3	325	241	154.5	340	102	70	4.5	5.5	17	38
80	76	203	163.3	325	282	165.5	340	102	70	4.5	5.5	17	45
100	98	229	190.9	325	305	188	340	125	102	5.5	6.5	22	55
125	125	356	232	743	-	-	-	125	102	5.5	6.5	27	160
150	150	394	230	743	403	253	743	125	102	5.5	6.5	27	250
200	200	457	312	840	-	-	-	-	140	8.5	-	36	470
250	250	533	350	1040	-	-	-	-	140	8.5	-	36	750

unit:mm

## BF2S15SRRF / BF2S15SXRF

Ball valve, 2-piece, split body, full bore design, firesafe and  
Antistatic to API 607, BS5146, suitable for flammable fluid and gases,  
Water, air, gas and many chemicals.

- Body: 316 Stainless Steel ASTM A351 CF8M
- Ball & stem: 316 stainless steel
- Seats: RPTFE, TFM 1600 High Temp
- Body seals and gland packing: Graphite
- End Connections: Flanged ANSI 150 RF
- Maximum pressure rating 1,950 kpa
- Maximum temperature rating 260 degrees C



ITEM	PARTS	MATERIAL	
1	BODY	ASTM A351-CF8M	ASTM A216-WCB
2	CAP		
3	BALL	SOLID: ASTM A351-CF8M / HOLLOW: ASTM A240-316	
4	SEAT	TFM1600 / RTFE	
5	SEAL	GRAPHITE	
6	STEM	ASTM A276-316	
7	THRUST WASHER	CTFE	
8	O-RING	VITON	
9	PACKING	GRAPHITE	
10	GLAND RING	AISI 304	
11	BELLEVILLE WASHER	AISI 301	
12	STEM NUT	AISI 304	
13	LOCKING WASHER		
14	FLAT WASHER		
15	HANDLE HEAD		
16	STOP PIN		
17	BOLT	PVC	
18	STUD		
19	NUT		
20	STEEL TUBE	AISI 301	
21	HANDLE SLEEVE		
22	HANDLE		
23	SOCKET SET SCREW		

- ABOVE MENTIONED MATERIALS APPLY TO FIRE SAFE DESIGN  
- ISO 15848 DESIGN SHOULD REPLACE WITH PTFE SEAL & PACKING

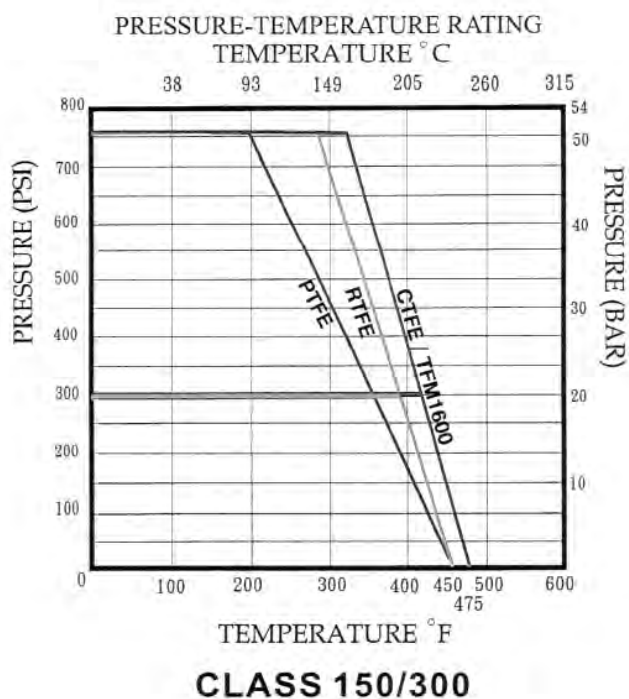
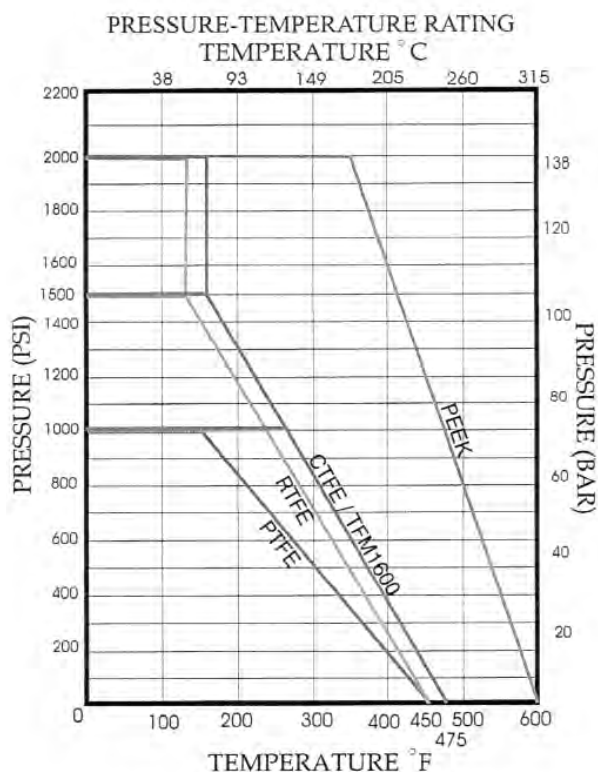
DN	d	CLASS 150				CLASS 300				D1	D2	R	R1	S	Torque(N-M)
		L	H	W		L	H	W							
15	15	108	85	190		140	84.5	197.5		42	36	2.75	2.75	9	5.2
20	20	117	89.5	190		152	94.5	197.5		42	36	2.75	2.75	9	8
25	24	127.5	94.2	190		165	99.5	197.5		50	42	2.75	3.5	11	12.5
32	30	140.5	97.9	190		178	105	197.5		50	42	2.75	3.5	11	12
40	38	165	120.9	235		190	124.5	247.5		70	50	3.5	4.5	14	24.5
50	50	178	129.9	235		216	129	247.5		70	50	3.5	4.5	14	32
65	64	190.5	156.3	325		241	154.5	340		102	70	4.5	5.5	17	38
80	76	203	163.3	325		282	165.5	340		102	70	4.5	5.5	17	45
100	98	229	190.9	325		305	188	340		125	102	5.5	6.5	22	55
125	125	356	232	743		-	-	-		125	102	5.5	6.5	27	160
150	150	394	230	743		403	253	743		125	102	5.5	6.5	27	250
200	200	457	312	840		-	-	-		-	140	8.5	-	36	470
250	250	533	350	1040		-	-	-		-	140	8.5	-	36	750

unit:mm



### VALVE SEAT MATERIAL SELECTION GUIDE

Material	Description	Color
PTFE	The material is the basic seat material used in most ball valves. Its chemical compatibility is excellent for almost all media service applications.	White
RTFE	15% Glass Reinforced TFE. This material is offered as the standard seal in most HAUTIMA valves. Chemical resistance is compatible to virgin TFE with improved cycle life and greater pressure-temperature rating than PTFE.	Off white
CTFE	25% Carbon with 75% TFE. This material offers a wide temperature range with better cycle life than RTFE.	Black
TFM	TFM is chemically modified PTFE that fills the gap between conventional PTFE and melt-processable PFA. According to ASTM D 4894 and ISO Draft WDT 539-1.5, TFM is classified as a PTFE. Compared to conventional PTFE, TFM has lower permeability and much lower deformation under pressure (cold flow) at room and elevated temperature. Also they can be used at higher pressures.	White
PEEK	Polyether-ether-ketone-high temperature semirigid elastomer. Best suited for high pressure and temperature service. Also offers very good corrosion resistance.	Grey
DELIN	Delrin is capable of handling extremely high pressure. Must not used for oxygen service.	Creamy white
Cavity Filler	Designed to reduce the possibility of contamination by entrapment of process fluids in the void normally found behind the ball and the valve body in conventionally designed ball valves. Ideal for application where cross contamination is a concern, such as paints and dyes.	White



### Description

Exclusively designed Armstrong bellows sealed globe valve has a sealing combination featured by using double walls stainless steel bellows as the stem seal elements and graphite packing as seal accessory to prevent leakage. The finely polished planar sealing between the valve and the seat ensures a long-term reliable operation whenever the stem is moving or not. Therefore, it can display remarkable sealing characteristics at any applications.

Armstrong bellows sealed globe valves can be widely applied in the water, steam, oil and other non-corrosion systems in petrochemical, electricity, metallurgy, electronics, textile and other industries.

### Connections

Screwed (NPT/BSPT), socket weld, flanged (HG20592 RF, other flanges available, please consult factory).



### Design Features

Model	BD16	BD25	BCS16	BCS25	BCS40
Max. Allowable Pressure	2.5MPa@ 20℃	4.0MPa@ 20℃	2.5MPa@ 20℃	4.0MPa@ 20℃	6.4MPa @20℃
Max. Operating Pressure	1.6MPa	2.5MPa	1.6MPa	2.5MPa	4.0MPa
Max. Allowable Temperature	350℃	350℃	350℃	350℃	350℃
Min. Operating Temperature	-10℃	-10℃	-30℃	-30℃	-30℃

### Pressure-Temperature Ratings

Model	≤120℃	150℃	200℃	250℃	300℃	350℃
BD16	1.6MPa	1.52MPa	1.44MPa	1.28MPa	1.12MPa	0.88MPa
BD25	2.5MPa	2.43MPa	2.25MPa	2.18MPa	2.00MPa	1.75MPa
BCS16	1.6MPa	1.57MPa	1.52MPa	1.44MPa	1.28MPa	1.12MPa
BCS25	2.5MPa	2.45MPa	2.38MPa	2.25MPa	2.00MPa	1.75MPa
BCS40	4.0MPa	3.92MPa	3.80MPa	3.60MPa	3.20MPa	2.80MPa

### Bellows Sealed Globe Valves

Model	Body Material	Norm. Pressure (MPa)	Size	Connection Type
BD16	Ductile Iron	1.6	DN15~DN300	Flanged
BD25	Ductile Iron	2.5		
BCS16	Carbon Steel	1.6	DN15~DN50	Flanged
BCS25	Carbon Steel	2.5		
BCS40	Carbon Steel	4.0	DN15~DN50	Screwed, SW
			DN15~DN300	Flanged

#### • Long-term Operation

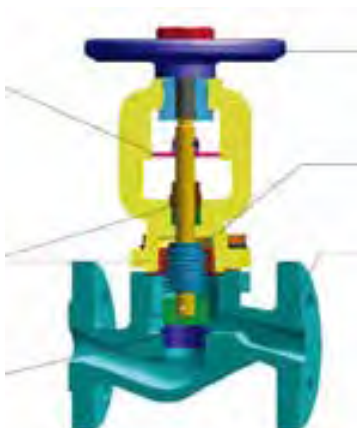
Its compact yet rugged construction and anti-twist device on the bellows offers long, corrosion resistant service.

#### • Double bellows sealing

It combines double walls stainless steel bellows seal with graphite packing seal.

#### • Planar sealing

The planar sealing between the valve and the seat ensures reliable sealing and operation.



#### • Easy to Operate

Non-rising handwheel travels less and makes responses quicker; free opening/closing in narrow space; on/off position indicator makes operation easier.

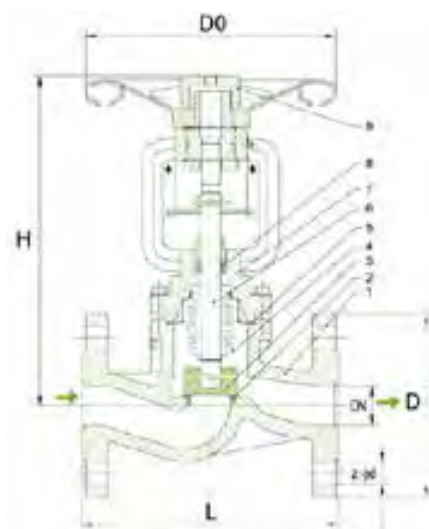
#### • Maintenance-free

Being the key component, double wall bellows seal keeps you free from valve leakage and maintenance.

#### • Wide Applications

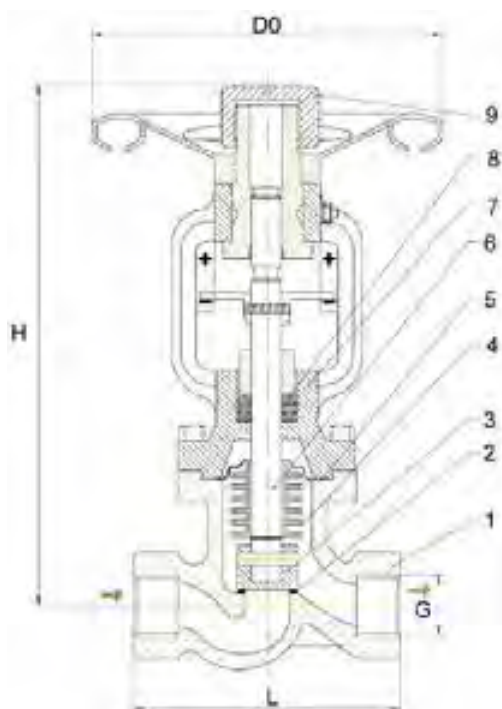
It can be widely used under different pressures, temperatures or vibrating conditions, which makes it ideal for many applications.





**Fig. 1 Bellows Sealed Globe Valve (Flanged)**

Globe Valve Physical Data (mm)						
Model	DN	D0 (φ)	D (φ)	H	L	z-φd
Ductile Iron BD16/BD25	15	125	95	200	130	4-φ14
	20	125	105	200	150	4-φ14
	25	125	115	210	160	4-φ14
	32	150	140	220	180	4-φ18
	40	150	150	235	200	4-φ18
	50	150	165	235	230	4-φ18
	65	250	185	350	290	4-φ18/8-φ18
	80	250	200	360	310	8-φ18
	100	300	220/235	390	350	8-φ18/8-φ22
	125	300	250/270	500	400	8-φ18/8-φ26
	150	420	285/300	530	480	8-φ22/8-φ26
	200	420	340/360	590	600	12-φ22/12-φ26
	250	520	405/425	765	650	12-φ26/12-φ30
	300	520	460/485	810	750	12-φ26/16-φ30
Carbon Steel BCS16/BCS25/BCS40	15	125	95	200	130	4-φ14
	20	125	105	205	150	4-φ14
	25	125	115	215	160	4-φ14
	32	150	140	235	180	4-φ18
	40	150	150	235	200	4-φ18
	50	150	165	235	230	4-φ18
Carbon Steel BCS40	65	250	185	355	290	8-φ18
	80	250	200	360	310	8-φ18
	100	300	235	390	350	8-φ22
	125	300	270	465	400	8-φ26
	150	425	300	505	480	8-φ26
	200	425	375	600	600	12-φ30
	250	520	450	780	740	12-φ33
	300	520	515	805	850	16-φ33



**Fig. 2 Bellows Sealed Globe Valve (Screwed)**

Globe Valve Physical Data for Screwed Connections (mm)					
Model	DN	D0 (φ)	H	L	G
Carbon Steel BCS40	15	Φ100	180	90	1/2"
	20	Φ100	180	100	3/4"
	25	φ100	192	120	1"
	32	φ120	212	140	1-1/4"
	40	φ120	220	170	1-1/2"
	50	φ120	235	200	2"

List of Materials			
Part No.	Part Name	BD16/BD25	BCS16/BCS25/BCS40
1	Body	ASTM A395 Ductile Iron	ASTM A216 WCB Cast Steel
2	Seat	Stainless Steel	Stainless Steel
3	Valve	Stainless Steel	Stainless Steel
4	Bellows	304 Stainless Steel	304 Stainless Steel
5	Gasket	Stainless Steel+Expanded Graphite	Stainless Steel+Expanded Graphite
6	Stem	420 Stainless Steel	420 Stainless Steel
7	Cap	ASTM A395 Ductile Iron	ASTM A216 WCB Cast Steel
8	Gland Packing	Expanded Graphite	Expanded Graphite
9	Handwheel	Carbon Steel	Carbon Steel

Performance Parameters															
Name of Parameter	Size Model	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300
		15	20	25	32	40	50	65	80	100	125	150	200	250	300
Flow Coefficient (Kv)	BD16/BD25	5	11	14	20	33	52	74	118	200	285	400	720	1130	1590
	BCS16/BCS25/BCS40	5	11	14	20	33	52	74	118	200	285	400	720	-	-
Valve Stem	BD16/BD25	8	10	12	14	15	18	25	28	35	45	58	65	80	94
Stroke (mm)	BCS16/BCS25/BCS40	8	10	12	14	15	18	25	28	35	45	58	65	-	-
Weight (kg)	BD16	4.5	5	6	9	10	14	23	29	33	71	113	170	275	383
	BD25	4.5	5	6	9	10	14	26	32	38	75	118	176	290	400
	BCS16/ BCS25	4.5	5	6	9	10	14	-	-	-	-	-	-	-	-
	BCS40	6	7	9	12	17	24	33	44	60	89	98	190	318	433
	BCS40(Screwed)	1.5	2	3	5	7	8	-	-	-	-	-	-	-	-

#### Lift Type Worm Drive Device

The worm drive device featuring high reduction ratio is able to transmit power and perform steadily. It can be widely installed on large sized globe valves serving as valve opening assisting device.

BA series worm drives are optional. See the following table for details.



Worm Drive Device Dimensions and Weights (mm)							
Model	Worm Drive Model	Globe Valve Size	A (φ)	B	C	D (φ)	Weight (kg) *
BD16	BA-1	DN150	460	680	960	285	167
		DN200	460	740	1000	340	224
		DN250	460	765	1260	405	329
	BA-2	DN300	460	857	1330	460	437
BD25	BA-1	DN150	460	680	960	300	167
		DN200	460	740	1000	360	224
		DN250	460	765	1260	425	329
	BA-2	DN300	460	857	1330	485	437
BCS40	BA-1	DN150	460	680	1095	425	152
		DN200	460	740	1170	425	234

**Note:** The weight consists of the weight of globe valve and the worm drive device.

#### Please indicate when ordering

- Model
- Max. Operating Pressure
- Max. Temperature
- Nom. Pressure
- Connection Type
- Options

*All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.*

### BL301NV

Butterfly valve, wafer design.

Suitable for hot water, air, gas and many chemicals

- **Body:** Cast Iron
- **Disc:** 316 Stainless steel
- **Seat:** Viton
- **End Connections:** wafer design to suit ANSI 150, AS2129 Table E / D
- **Maximum pressure rating** 1,000 kpa
- **Maximum temperature rating** 220 degrees C
- **Sizes:** 50mm to 200mm



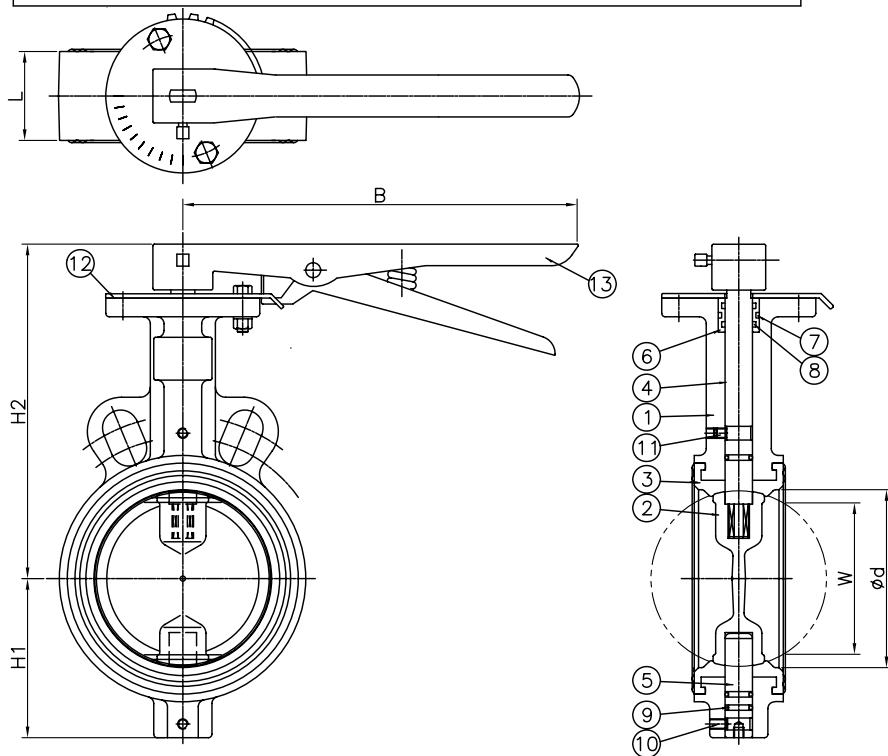
DIMENSIONS									UNIT: mm
NOMINAL DIAMETER	ød	L	FLANGE		H1	H2	B	W	WEIGHT (KG)
			øC	n-øh					
40(1.5")	40	33			60	155	205	27	2.2
50(2")	50	43			61	158	205	28	2.7
65(2.5")	67	46			73	169	205	51	3.4
80(3")	79	46			80	180	205	67	3.8
100(4")	101	52			93	194	265	89	4.9
125(5")	124	56			113	207	265	113	6.8
150(6")	147	56			126	220	265	139	8.6
200(8")	197	56			157	275	350	191	13.1

FLANGE RATING : MULTI-DRILLING(5K,10K,PN10,PN16,150LB)

P.NO.	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	FC200	1	
2	DISC	SCS13	1	
3	SEAT RING	EPDM	1	
4	MAIN STEM	SUS410	1	
5	STUB STEM	SUS410	1	
6	O-RING HOLDER	ACETAL	1	
7	O-RING	EPDM	2	
8	O-RING	EPDM	1	
9	O-RING	EPDM	3	
10	STOP BOLT	SS400	1	
11	BOLT/O-RING/BOLT	SS400/NBR/SUS304	1SET	
12	INDICATOR	SS400	1	GALVANIZED
13	LEVER	ASS'Y	1	

### NOTES

1. "W" DIMENSION IS THE MINIMUM ALLOWABLE FLANGE INSIDE DIAMETER OR PIPE INSIDE DIAMETER AT THE CENTERED BODY FACE WHEN IN THE OPEN POSITION
2. HYDROSTATIC TEST  
-BODY : 15 BAR  
-SEAT : 11 BAR
3. FACE TO FACE : ISO 5752



### BL302NV

Butterfly valve, lugged design.

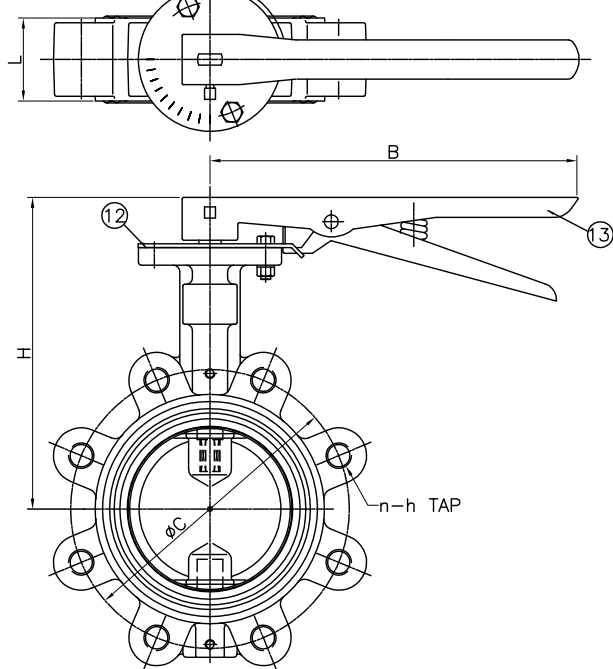
Suitable for hot water, air, gas and many chemicals

- **Body:** Cast Iron
- **Disc:** 316 Stainless steel
- **Seat:** Viton
- **End Connections:** lugged design to suit ANSI 150
- **Maximum pressure rating** 1,000 kpa
- **Maximum temperature rating** 220 degrees C
- **Sizes:** 50mm to 200mm



D I M E N S I O N S							UNIT: mm
NOMINAL DIAMETER	ød	L	FLANGE		H	B	W
			øC	n-h			
40(1.5")	40	33	98.4	4-1/2"	155	205	27
50(2")	50	43	120.7	4-5/8"	158	205	28
65(2.5")	67	46	139.7	4-5/8"	169	205	51
80(3")	79	46	152.4	4-5/8"	180	205	67
100(4")	101	52	190.5	8-5/8"	194	265	89
125(5")	124	56	215.9	8-3/4"	207	265	113
150(6")	147	56	241.3	8-3/4"	220	265	139
200(8")	197	60	298.5	8-3/4"	275	350	191

FLANGE RATING : ANSI #150



P.NO	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	FC200	1	
2	DISC	SCS14	1	CF8M
3	SEAT RING	VITON	1	
4	MAIN STEM	SUS410	1	
5	STUB STEM	SUS410	1	
6	O-RING HOLDER	ACETAL	1	
7	O-RING	EPDM	2	
8	O-RING	EPDM	1	
9	O-RING	EPDM	1	
10	STOP BOLT	SS400	1	
11	BOLT/O-RING/BOLT	SS400/NBR/SUS304	1SET	
12	INDICATOR	SS400	1	GALVANIZED
13	LEVER	ASS'Y	1	

### N O T E S

1. "W" DIMENSION IS THE MINIMUM ALLOWABLE FLANGE INSIDE DIAMETER OR PIPE INSIDE DIAMETER AT THE CENTERED BODY FACE WHEN IN THE OPEN POSITION
2. HYDROSTATIC TEST  
-BODY : 15 BAR  
-SEAT : 11 BAR
3. FACE TO FACE : ISO 5752

### BLWCI15SP

Butterfly valve, wafer design.

Suitable for hot water, air, gas and many chemicals

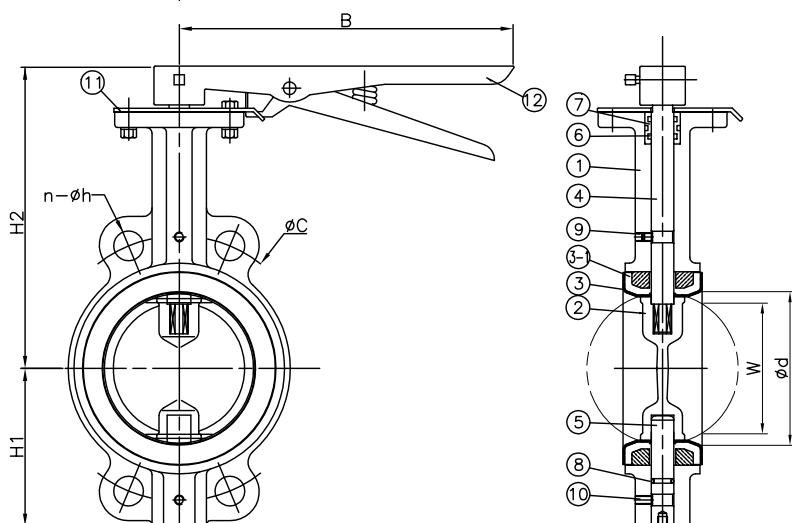
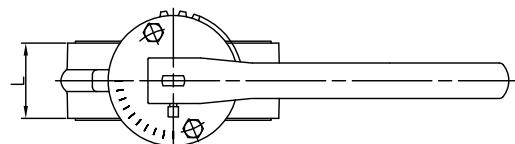
- **Body:** Cast Iron
- **Disc:** 316 Stainless steel
- **Seat:** PTFE
- **End Connections:** wafer design to suit ANSI 150, AS2129 Table E / D
- **Maximum pressure rating** 1,000 kpa
- **Maximum temperature rating** 204 degrees C
- **Sizes:** 50mm to 200mm

D I M E N S I O N S								UNIT: mm
NOMINAL DIAMETER	$\phi d$	L	FLANGE		H1	H2	B	W
			$\phi C$	n- $\phi h$				
50(2")	50	43			61	158	205	28
80(3")	79	46			80	180	205	67

FLANGE RATING : MULTI-DRILLING(5K,10K,PN10,PN16,150LB)

D I M E N S I O N S								UNIT: mm
NOMINAL DIAMETER	$\phi d$	L	FLANGE		H1	H2	B	W
			$\phi C$	n- $\phi h$				
100(4")	102	52	190.5	8-19	110	212	205	91
150(6")	154	56	241.3	8-22	155	263	265	143

FLANGE RATING : ANSI #150



P.NO	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	FC200	1	
2	DISC	SCS14	1	CF8M
3	SEAT	PTFE	1	
3-1	BACKUP SEAT	EPDM	1	
4	MAIN STEM	SUS410	1	
5	STUB STEM	SUS410	1	
6	O-RING HOLDER	ACETAL	1	
7	O-RING	EPDM	3	
8	O-RING	EPDM	1	
9	STOP BOLT	SS400	1	
10	BOLT/O-RING/BOLT	SS400/NBR/SUS304	1SET	
11	INDICATOR	SS400	1	GALVANIZED
12	LEVER	ASS'Y	1	

### NOTES

- "W" DIMENSION IS THE MINIMUM ALLOWABLE FLANGE INSIDE DIAMETER OR PIPE INSIDE DIAMETER AT THE CENTERED BODY FACE WHEN IN THE OPEN POSITION
- HYDROSTATIC TEST
  - BODY : 15 BAR
  - SEAT : 6 BAR
- FACE TO FACE : ISO 5752

## BLWS15SP

Butterfly valve, wafer design.

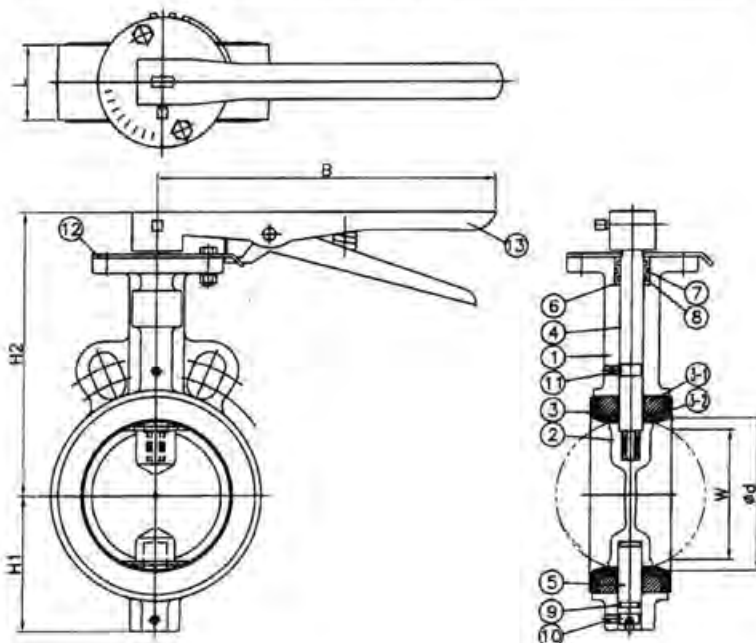
Suitable for hot water, air, gas and many chemicals

- Body: 316 Stainless steel
- Disc: 316 Stainless steel
- Seat: PTFE
- End Connections: wafer design to suit ANSI 150, AS2129 Table E / D
- Maximum pressure rating 600 kpa
- Maximum temperature rating 204 degrees C
- Sizes: 20mm to 200mm



DIMENSIONS									
UNIT: mm									
NOMINAL DIAMETER	ød	L	FLANGE		H1	H2	B	W	WEIGHT (KG)
			øC	n-øh					
50(2")	50	43			61	158	205	28	2.7
65(2.5")	67	46			73	169	205	51	3.4
80(3")	79	46			80	180	205	67	3.8
100(4")	101	52			93	194	265	89	4.9
125(5")	124	56			113	207	265	113	6.8
150(6")	147	58			126	220	265	139	8.6
200(8")	197	56			157	275	350	191	13.1

FLANGE RATING : MULTI-DRILLING(5K,10K,PN10,PN16,150LB)



P.NO	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	SCB14	1	CF8M
2	DISC	SCB14	1	CF8M
3	SEAT	PTFE	1	
3	BACKUP SEAT	EPDM	1	
3	BACKUP RING	PHENOLIC	1	
4	MAIN STEM	SUS316	1	
5	STUB STEM	SUS316	1	
6	O-RING HOLDER	ACETAL	1	
7	O-RING	EPDM	2	
8	O-RING	EPDM	1	
9	O-RING	EPDM	1	
10	STOP BOLT	SS400	2	
11	BOLT/O-RING/BOLT	SS400/NBR/SUS304	1SET	
12	INDICATOR	SS400	1	GALVANIZED
13	LEVER	ASS'Y	1	

### NOTES

1. "W" DIMENSION IS THE MINIMUM ALLOWABLE FLANGE INSIDE DIAMETER OR PIPE INSIDE DIAMETER AT THE CENTERED BODY FACE WHEN IN THE OPEN POSITION
2. HYDROSTATIC TEST  
-BODY : 15 BAR  
-SEAT : 6 BAR
3. FACE TO FACE : ISO 5752

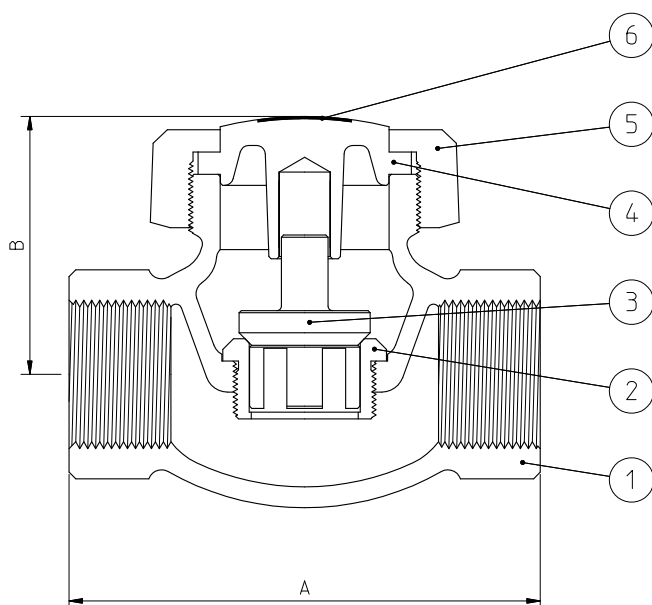


## CP460

Check valve, piston type, union cap.

Suitable for steam, water, air, gas and non corrosive chemicals

- **Body & cover: Bronze B61**
- **Disc & Seat: 410 Stainless steel**
- **End Connections: Screwed BSP**
- **Maximum pressure rating 4,000 kpa cold, 2,000 kpa steam**
- **Maximum temperature rating 215 degrees C**
- **Sizes: 15mm to 50mm**



HYDROSTATIC TEST	
BODY	900 PSI (62 BAR)
SEAT	600 PSI (41 BAR)

WORKING CONDITIONS		
SATURATED STEAM	300 PSI (21 BAR)	NON SHOCK
WATER, OIL	600 PSI (41 BAR)	

	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
A	75	90	106	122	135	165
B	46	52	60	69	77	94

MAXIMUM TEMPERATURE = 232 °C

6	01	IDENT. PLATE	ALUMINUM		
5	01	UNION BONNET RING	BRONZE	NBR6314/C92200	B62/C92200
4	01	BONNET	BRONZE	NBR6314/C83600	B62/C83600
3	01	DISC	ST. STEEL	NBR5601/4.10	A276/4.10
2	01	SEAT	ST. STEEL	NBR5601/4.10	A276/4.10
1	01	BODY	BRONZE	NBR6314/C83600	B62/C83600
POS.	QUANT.	DENOMINATION	MATERIAL	ABNT SPECIFICATION	ASTM SPECIFICATION

NOTE: THE DIMENSIONS ARE EXPRESSED IN MILLIMETERS.

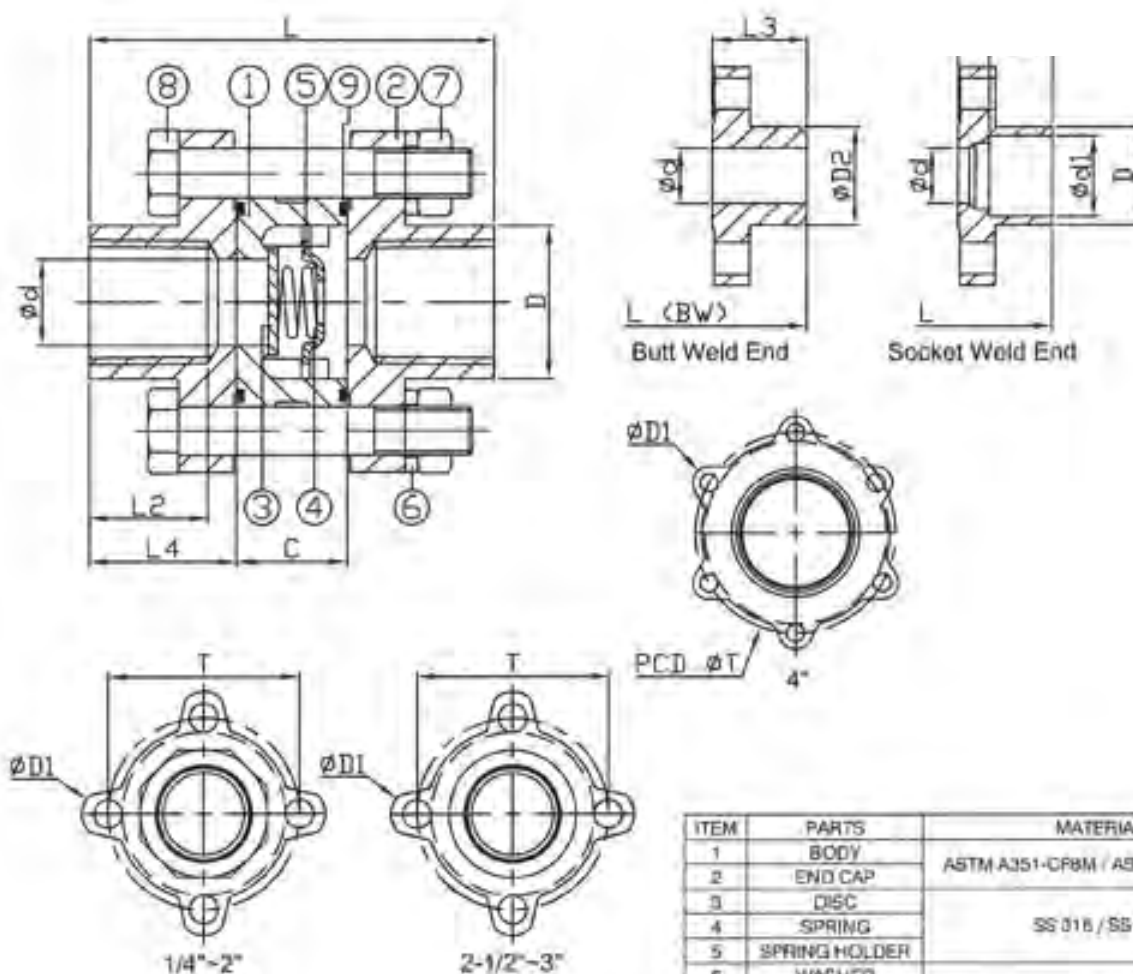


## CS3SS10B

Check valve, 3-piece, in-line spring loaded type.

Suitable for steam, water, air, gas and most chemicals

- Body, disc & seat: 316 stainless steel
- End Connections: Screwed BSP
- Maximum pressure rating 7,000 kpa cold
- Maximum temperature rating 185 degrees C
- Sizes: 15mm to 50mm



ITEM	PARTS	MATERIAL
1	BODY	ASTM A351-CF8M / ASTM A216-WCB
2	END CAP	
3	DISC	SS 316 / SS 304
4	SPRING	
5	SPRING HOLDER	SS 304
6	WASHER	
7	NUT	
8	BOLT	PTFE
9	SEAL	

DN	8	10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	Weight (kg)
8	10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	550	0.8
10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	550	600	1.2
15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	550	600	650	2.5
20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	550	600	650	700	4.0
25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	550	600	650	700	750	6.0
32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	550	600	650	700	750	800	10.0
40	50	65	80	100	125	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	16.0
50	65	80	100	125	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	25.0
65	80	100	125	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	40.0
80	100	125	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	60.0
100	125	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	100.0

## SIGHT CHECKER - SCK

### DESCRIPTION

Being installed after the steam trap, the sight checker is a device to be used for visually checking the conditions and leakage of steam traps.

SCK sight checker functions as both sight glass and check valve.

Connections are female screwed.

**USE:** Condensate pipes downstream steam traps.

### AVAILABLE MODELS:

SCK

**SIZES:** 1/2", 3/4" and DN 1"

**CONNECTIONS:** Female screwed ISO 7/1Rp(BS21).

**INSTALLATION:** Horizontal or vertical (bottom to top) installation.

See IMI, installation and maintenance instructions.

**CAUTION:** SCK should be fitted at least 1m from the trap in order to protect the glass from thermal pressure or shock.

PMO – Max. operating pressure 10 bar

TMO – Max. operating temperature 150 °C

How to order: i.e. SCK DN 1/2" BSP.

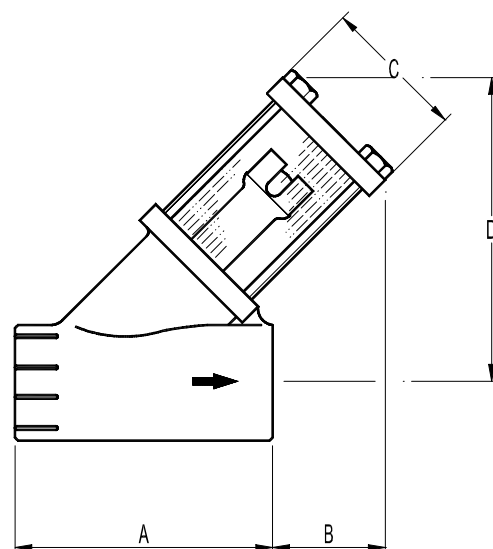
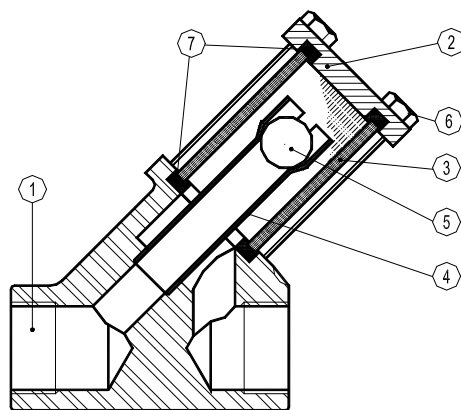
### DIMENSIONS (mm)

SIZE DN	A	B	C	D	WGT. Kgs
1/2"	80	36	45	95	0,9
3/4"	80	36	45	95	0,9
1"	90	40	56	110	1,3

### MATERIALS

POS.Nr.	DESIGNATION	MATERIAL
1	Body	Bronze B62 / ASTM B148-97
2	Cover	Brass EN12165 / CuZn39Pb2
3	* Sight tube	Borosilicate glass
4	Discharge tube	Copper
5	Ball check	Stainless steel
6	Bolts	Seel 8.8
7	* Gasket	Graphite

\*Available spare parts.



## WAFER-TYPE NON-RETURN VALVE

### RD40 DN15 – DN100

#### DESCRIPTION

The RD40 all stainless steel disc check valve has a compact design and was specially designed for use with steam and hot condensate.

Connections are flanged (wafer type)

#### MAIN FEATURES

Low pressure drop.

Simple and compact design.

Overall lengths according to DIN 3202 part 3-K4

#### OPTIONS:

Soft sealing :

EPDM (E), NBR (N), VITON (V), PTFE (T).

Inconel springs

#### USE :

Saturated steam, water and other gases (Group 2) compatible with the construction

#### AVAILABLE

##### MODELS :

RD 40

##### SIZES :

DN 15 to DN 100

##### CONNECTIONS :

Sandwiched between flanges as per EN 1092 or ANSI.

##### INSTALLATION :

Horizontal or vertical installation  
See IMI, installation and maintenance instructions.

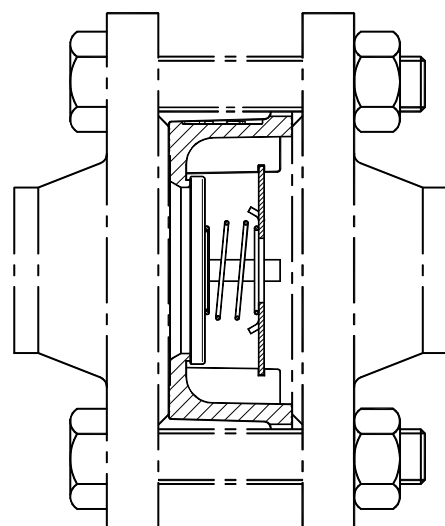
##### RATING :

PN 25 / PN 40

##### LIMIT OF

##### OPERATION:

As per EN 1092



Recommended limit of operation with soft seats (°C)			
EPDM (E)	NBR (N)	VITON (V)	PTFE (T)
130°	95°	180°	180°

CE MARKING (PED - European Directive 97/23/EC)		
PN 25	PN 40	Category
DN15 to DN40	DN15 to DN32	SEP - art. 3, paragraph3
DN50 to DN100	DN40 to DN80	Category 1 (CE Marked)
-	DN100	Category 2 (CE Marked)





## WAFER-TYPE NON-RETURN VALVE


### RD40 DN15 – DN100

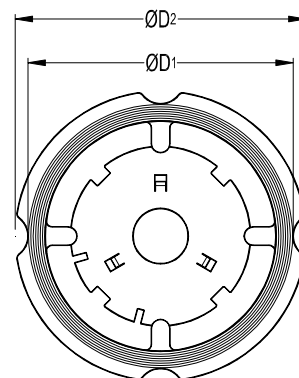
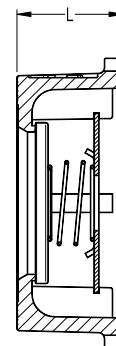
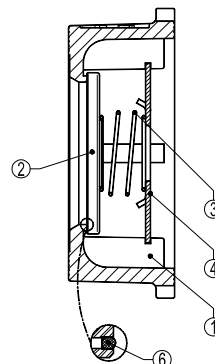
DIMENSIONS (mm)									
DN	15	20	25	32	40	50	65	80	100
D1	43	53	64	75	86	96	115	132	152
D2	50	60	70	81	91	105	126	141	167
L	17	20	23	28	32	40	46	50	60
Kgs	0,18	0,2	0,25	0,5	0,7	1,3	1,7	2,8	4,5

MATERIALS		
POS.	DESIGNATION	MATERIAL
1	Valve body	CF8M / 1.4408
2	*Disc	AISI316 / 1.4401
3	*Spring	AISI302 / 1.4300
4	Star	AISI316 / 1.4401
6	* Soft seal	See options

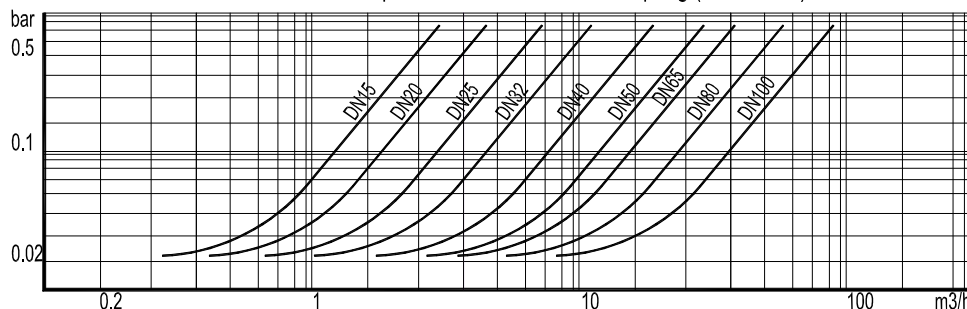
\*Available spare parts

Minimum opening pressures with standard spring in mbar									
DN	15	20	25	32	40	50	65	80	100
D.P. 	25	25	25	27	28	29	30	31	33
D.P. 	23	23	23	24	25	25	26	26	27
D.P. 	21	21	21	21	21	21	21	21	21
*D.P. 	2	2	2	3	4	4	5	5	6

\* Vertical installation without springs ( bottom to top ).  Flow direction.



Pressure drop, horizontal flow, standard spring (water - 20°)



To determine the pressure drop of other mediums the equivalent water flow volume has to be calculated:  $V_w = \sqrt{\frac{Q}{1000}} \times V$

Vw = Equivalent water flow volume in m³/h ; Q = Density in Kg/m³ ; V = Flow volume in m³/h

### WAFER-TYPE NON-RETURN VALVE

#### RD40 DN 125 – DN 200

##### DESCRIPTION

The RD40 disc check valve has a compact design and was specially designed for use with steam and hot condensate.

Connections are flanged (wafer type)

##### MAIN FEATURES

Low pressure drop.

Simple and compact design.

Overall lengths according to DIN 3202 part 3-K4

##### OPTIONS:

Soft sealing :

EPDM (E), NBR (N), VITON (V), PTFE (T).

Inconel springs

##### USE :

Saturated steam, water and other gases (Group 2) compatible with the construction

##### AVAILABLE

MODELS :

RD 40

SIZES :

DN 125 to DN 200

CONNECTIONS :

Sandwiched between flanges as per EN 1092 or ANSI.

##### INSTALLATION :

Horizontal or vertical installation .See IMI, installation and maintenance instructions.

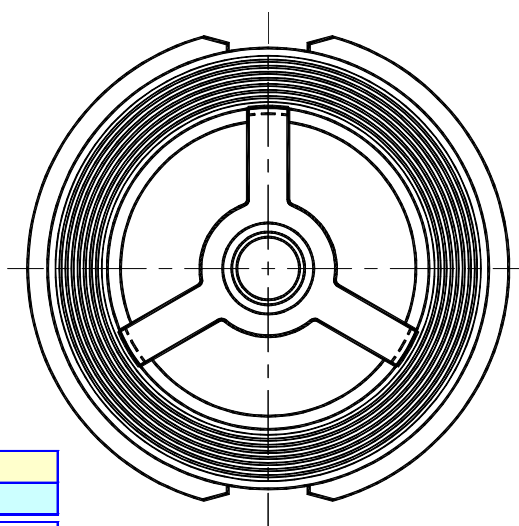
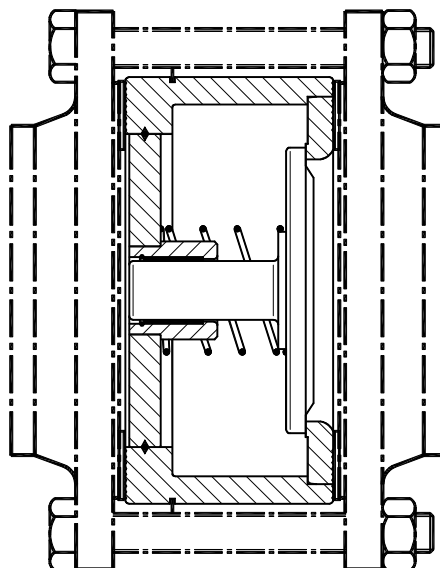
RATING :

PN 10 / PN 40

LIMIT OF

OPERATION:

As per EN 1092



##### Recommended limit of operation with soft seats ( °C)

EPDM (E)	NBR (N)	VITON (V)	PTFE (T)
130°	95°	180°	180°

##### CE MARKING (PED - European Directive 97/23/EC)

PN 10/16	PN 25	PN 40	Category
DN125 to DN200	DN125	/	Category 1 (CE marked)
/	DN150-DN200	DN125	Category 2 (CE marked)
/	/	DN150-DN200	Category 3 (CE marked)

## WAFER-TYPE NON-RETURN VALVE

### RD40 DN 125 – DN 200

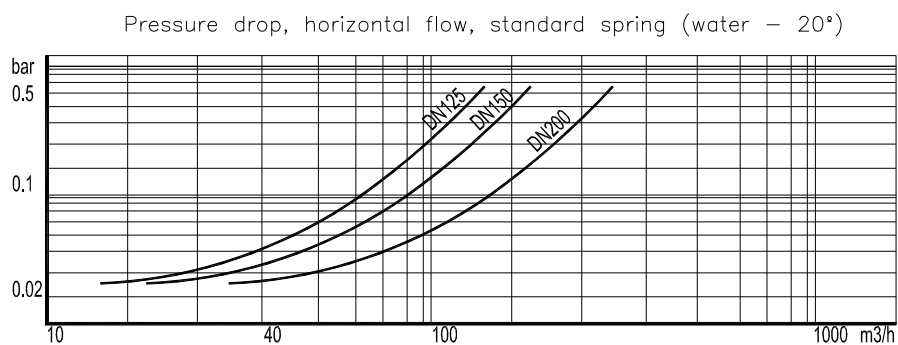
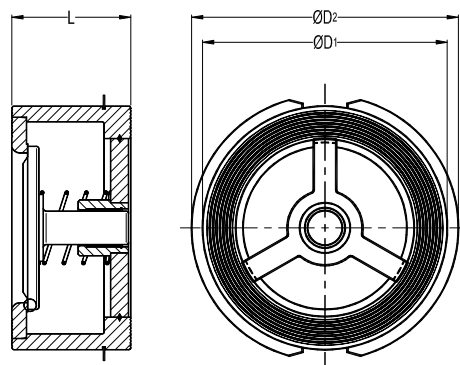
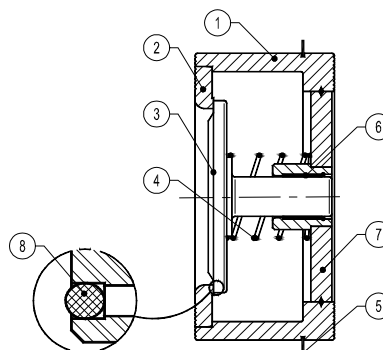
DIMENSIONS (mm)							
DN	D1 PN10/16	D2 PN25	D2 PN40	D2 ANSI150	D2 ANSI300	L	Weight Kgs
125	192	192	192	192	216	90	11
150	218	226	226	218	251	106	13,5
200	273	286	293	273	308	140	24

MATERIALS		
POS.	DESIGNATION	MATERIAL
1	Valve body	S355J2G3 / 1.0570
2	Seat	AISI316 / 1.4401
3	*Disc	AISI316 / 1.4401
4	*Spring	AISI302 / 1.4300
5	Centering ring	AISI304 / 1.4301
6	Bearing	Steel Fe Zn
7	Star	S355J2G3 / 1.0570
8	*Soft seal	See options

\*Available spare parts

Minimum opening pressures with standard spring in mbar				
DN		125	150	200
D.P.	▲	37	40	46
D.P.	→	22	25	28
D.P.	▼	7	10	10

Flow direction. →



To determine the pressure drop of other mediums the equivalent water flow volume has to be calculated:  $V_w = \sqrt{\frac{Q}{1000}} \times V$

V<sub>w</sub> = Equivalent water flow volume in m<sup>3</sup>/h ; Q = Density in Kg/m<sup>3</sup> ; V = Flow volume in m<sup>3</sup>/h

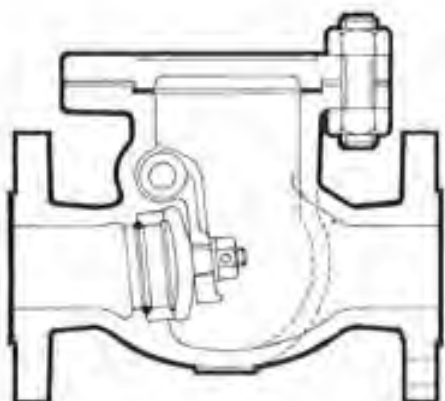


### CKBC1508R

Swing type, bolted cover, Class 150#.

Suitable for steam, water, air, gas and non corrosive chemicals

- Body & Cover: Cast Steel ASTM A216 Gr WCB
- Piston: 13% Chrome stainless steel
- Seat: Stellite #6
- End Connections: Flanged ANSI 150
- Maximum pressure rating: 1,171 at 260 deg C, 1,964 kpa at -29 to +35 deg C
- Sizes: 50mm to 200mm



PART	MATERIAL	A.S.T.M.
Cover nut	Steel	A194 Gr 2H
Cover	Cast steel	*A216 Gr WCB
Cover stud	Alloy steel	A193 Gr B7
Gasket	Soft steel	
Hinge pin	13% chrome steel	A479-410
Hinge plug bolt	Steel	A307B
Hinge plug gasket	Soft steel	
Hinge	Cast steel	*A216 Gr WCB
Hinge nut	Steel	A307B
Body seat ring	Stellite faced	A108 Gr 1020 + S1
Washer	Steel	
Split pin	Steel	A580-304
Disc	13% chrome steel	A217 CA15
Body	Cast steel	*A216 Gr WCB

\*Carbon content 0.25% max.

#### DIMENSIONS:

Nominal Size mm	50	65	80	100	150	200	250	300	350	400	450	500	600
A mm	203	216	241	292	356	495	622	699	787	864	978	978	1295
B mm	151	163	175	210	251	296	333	352	401	430	520	564	683
Approx Weight kg	17	22	31	50	92	136	195	285	420	500	640	780	1490

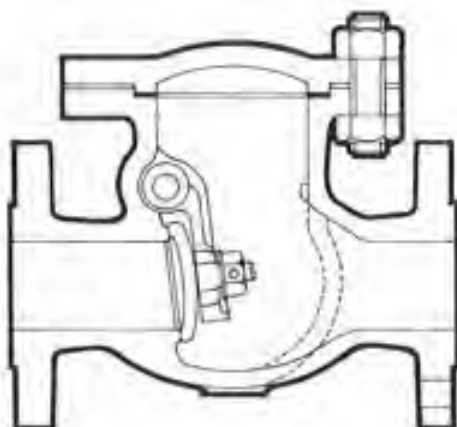


### CKBS1512R

Swing type, bolted cover, Class 150#.

Suitable for steam, water, air, gas and non corrosive chemicals

- Body & Cover: Stainless steel CF8M
- Disc: 316 stainless steel
- Seat: Stainless steel + Stellite #6
- End Connections: Flanged ANSI 150
- Maximum pressure rating: 1,171 at 260 deg C, 1,896 kpa at -29 to +35 deg C
- Sizes: 50mm to 200mm



PART	MATERIAL	A.S.T.M
Cover	Stainless Steel	A351-CF8M
Cover Nut	Stainless Steel	A194-B
Cover Bolt	Stainless Steel	A193-B8
Gasket	Teflon	
Rod Pin	Stainless Steel	A479-316
Plug Bolt	Stainless Steel	A479-316
Plug Gasket	Teflon	
Arm	Stainless Steel	A351-CF8M
Arm Nut	Stainless Steel	A194-B
Split Pin	Stainless Steel	A580-316
Washer	Stainless Steel	A240-316
Disc	Stainless Steel	A351-CF8M
Body	Stainless Steel	A351-CF8M

#### DIMENSIONS

Nominal Size mm	15	20	25	40	50	65	80	100	150	200	250	300
A mm	108	117	127	165	203	216	241	292	356	495	622	699
B mm	76	80	96	114	144	162	171	190	238	266	323	354
Approx. Weight kg	2	3	4	7	13	18	21	34	59	102	139	209

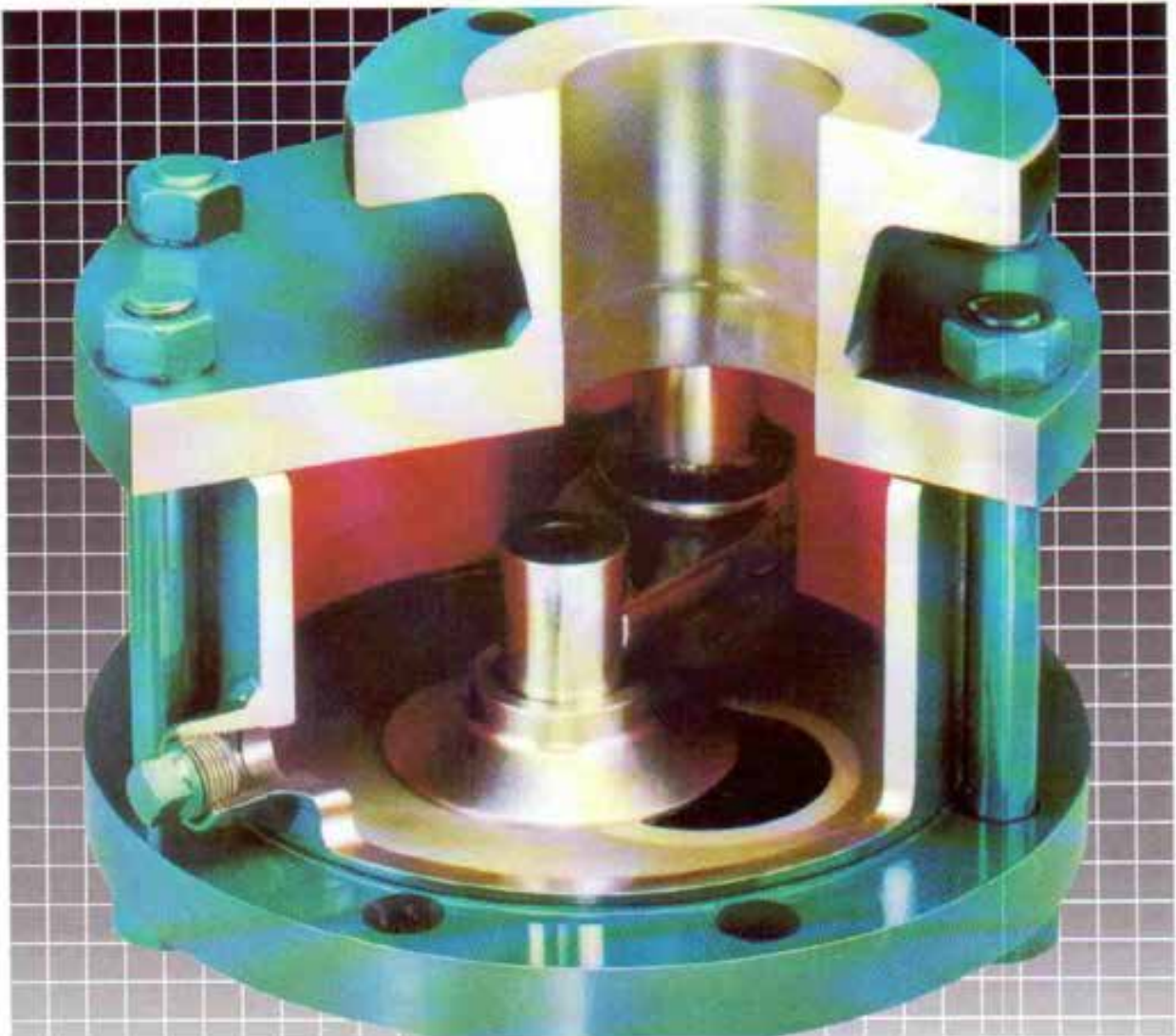




# **Everlasting®**

## **ROTATING DISC VALVES**

- Temperatures to 1500 +F • Pressures to 10,000 psig • Abrasives • Corrosives • Coking • Slurries
- High Cycling • Bi-Directional • Intrinsically Fire Safe



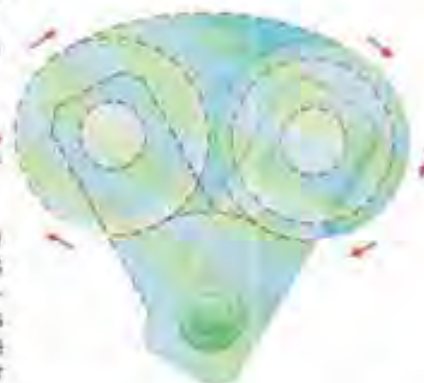
## OVER 80 YEARS OF FIELD PROVEN SERVICE – WITH APPLICATIONS WORLDWIDE.

**PROVEN CONCEPT** Starting in 1904 the unique rotating shearing disc concept was the standard for steam locomotive boiler blowdown. Following this the packaged boiler industry has also accepted the Everlasting quick opening valve where our reputation remains unchallenged. The valve handles boiler blowdown, scale, chemicals, high pressures, temperatures, and flashing condensate, they have an average life of 16 years.

Our slurry valves are installed throughout the world in processes that are abrasive, corrosive or fouling and that have high pressure, temperature or cycling. The unique self lapping metal to metal seat design provides repeated tight shutoff

in severe service, while sealing improves with use.

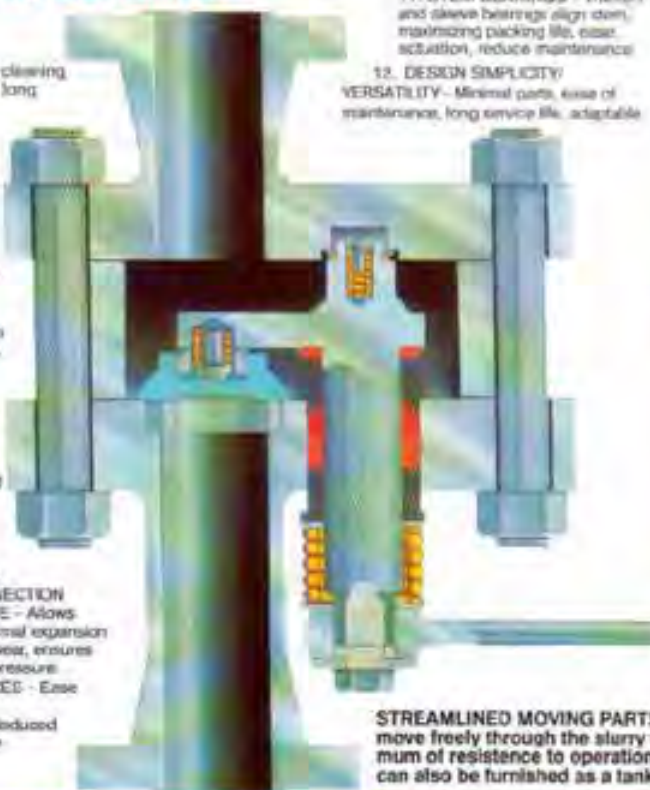
**PRINCIPAL OF OPERATION** The actuator moves the stem and lever arm a quarter turn which drives the disc. The entire sealing surface of the disc is constantly in contact with the seat or pad through force exerted by coiled springs. These springs allow the disc to move vertically. This compensates for thermal expansion and contraction of the valves components also overcoming the effect of any back pressure for which it was designed and prevents particles from lodging between the sealing surfaces. Differences in tangential disc to seat friction forces cause the disc to rotate on its seat



as the valve cycles, thereby shearing and wiping away any process material that may accumulate. No other valve is similar.

### FEATURES AND BENEFITS

1. **UNIQUE ROTATING/ SHEARING DISC** – Self lapping disc, enhances seat cleaning action, cuts through solids, long lasting tight shut-off
2. **METAL TO METAL SEATING** – Abrasion resistance, wide temperature range.
3. **WIDE BAND SEATING** – High pressure capability, better sealing than industry standards, force distributed over larger area, less trim wear.
4. **FULL PORT** – Abrasion resistance, no obstruction to flow, minimal pressure drop.
5. **ROTATING STEM** – Increased packing life, wide selection of actuators.
6. **SELF DRAINING BODY** – Reduced chance of jamming due to material entrainment, stagnation and degradation.
7. **BODY PURGE CONNECTIONS** – Ability to flush valve cavity and internals while in operation.
8. **SPRING LOADED CONNECTION BETWEEN DISC AND DRIVE** – Allows disc to compensate for thermal expansion or contraction, adjusts for wear, ensures tight shut-off, resists back pressure.
9. **FLAT SEATING SURFACES** – Ease of maintenance.
10. **REPAIRABLE SEAT** – Reduced inventory, less maintenance expense.



11. **STEM BEARINGS** – Thrust and sleeve bearings align stem, maximizing packing life, ease of actuation, reduce maintenance.

12. **DESIGN SIMPLICITY/ VERSATILITY** – Minimal parts, ease of maintenance, long service life, adaptable.



**THREE WAY, DIVERTING, OR CONVERGING.** This valve is shown in cast configuration suitable to 300 psig. Fabricated version is available for higher pressures and temperatures.

**STREAMLINED MOVING PARTS** are made to move freely through the slurry with a minimum of resistance to operation. This design can also be furnished as a tank bottom valve.



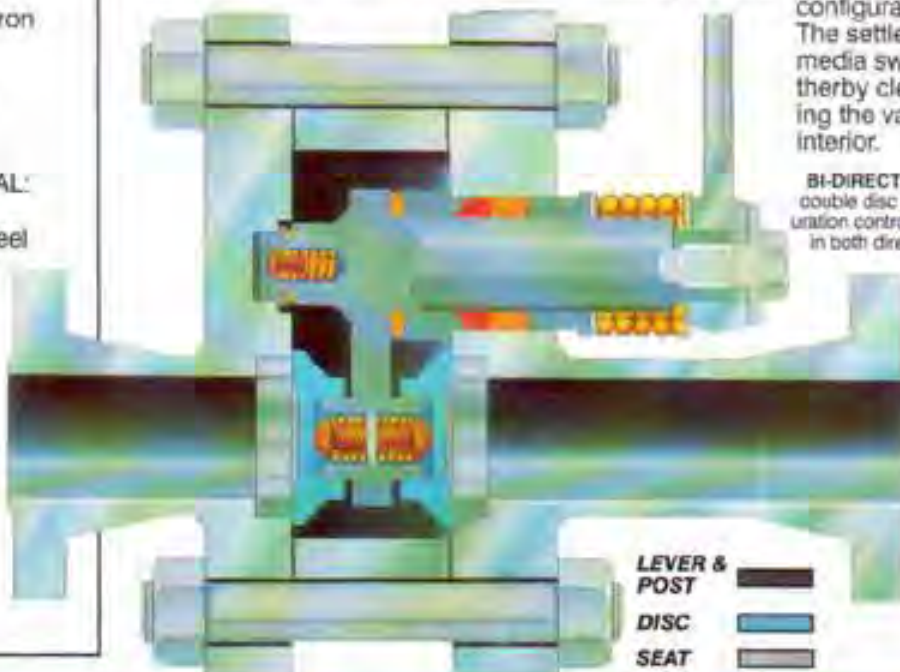
## DURABILITY AND PERFORMANCE FOR SHUT OFF AND ISOLATION APPLICATIONS

**SELF LAPPING, WEARS IN-NOT OUT** Rotation of the disc produces an action that in the process medium renews and polishes the metal seating surfaces with each operation. This concept is unique causing the Everlasting valve to wear in with use while all other valves are busy wearing out.

**TIGHT SEAL ASSURED** The wide seat and disc surfaces are routinely machine lapped during manufacture within several light bands of flatness. This produces a seal that is better than industry standards for SHUT OFF and ISOLATION valves. (Refer to graph). Precision lapping and factory cycling of the valve can reduce leak rates further.

### CONSTRUCTION

- **SIZES** ½" to 18"
- **END CONNECTIONS:**  
Screwed, flanged, socket and butt weld
- **BODY MATERIAL:**  
Cast Iron/Ductile Iron  
Carbon Steel  
Stainless Steel  
Weldable Alloys  
Packing Seals  
Grafoil or PTFE
- **DISC/SEAT MATERIAL:**  
Stellite #6  
440C Stainless Steel
- **BASIS OF DESIGN:**  
Vacuum to  
10,000 PSIG  
ANSI Classes  
150, 300, 600,  
900, 1500, 2500
- **TEMPERATURES:**  
-350 F to 1500+ F
- **ACTUATORS:**  
Manual Lever  
Manual Wheel  
Pneumatic  
Hydraulic  
Electric



**SELF CLEANING** The valve body openness provides space for the product to be freely displaced by the lever arm and disc with each cycle. Fines can not compact in small open

areas and possibly jam components as is the case with other valve concepts. Each time the valve opens to discharge product, a vortex is caused by the eccentric body to port

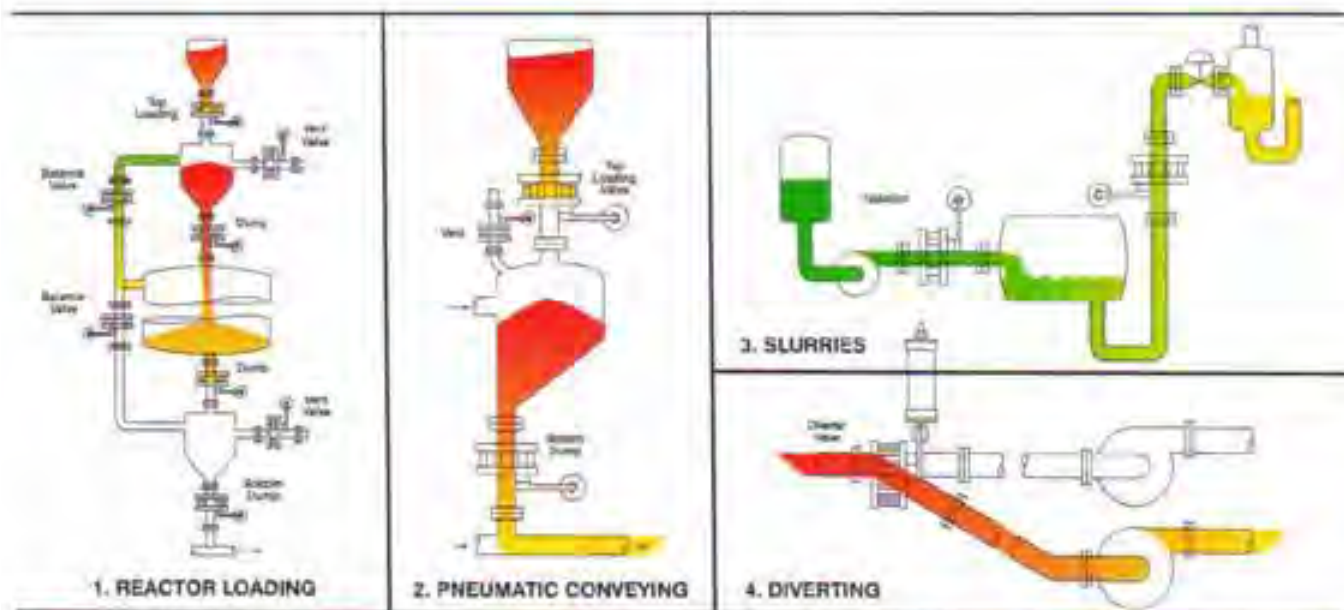
configuration. The settled media swirls; thereby cleaning the valve's interior.

**BI-DIRECTIONAL** double disc configuration controls flow in both directions.



## Everlasting Abrasive Service Valves

Everlasting PROCESS and BULK MATERIAL VALVES are used where existing valves or rotary feeders are repaired or replaced more than once a year. Sizes range from 1/2" to 18", vacuum to class 2500, temperatures +1500° F.



**T**heir open body concept is self cleaning and incorporates precision flat lapped hard metal seats and discs that move in non-wedging, non-binding fashion through abrasive materials whether they are dry powders or in a slurry. Differences in tangential disc to seat friction cause the disc to rotate a few degrees with each cycle. This rotation polishes the mating surfaces improving the valves seal with each operation. HERE ARE SOME APPLICATIONS

### 1. REACTOR LOADING

Everlasting valves are used to replace other valves or rotary feeders for reactors that can begin its process with positive pressure then drop to a negative pressure. Pressure Equalizing valves balance the loading or let-down hoppers so the reactor valves may cycle with zero differential. They also may cycle with a full differential. Pressure Equalizing valves are opened to either allow media to enter the loading hopper or the let-down hopper.

### 2. PNEUMATIC CONVEYING

Usually there are trains of two or more vessels that alternate continually to transport media. The vessel valves duty cycle

are often less than once a minute. The vent valve being smaller is exposed to higher than system velocities, it must resist erosion from the particulate laden atmosphere being discharged between vessel cycles. Everlastings unique totaling disc valves are being bought for more of these systems with each day.

### 3. SLURRIES

Everlastings eccentric body configuration tends to swirl the flowing media. This design was developed over 86 years ago to handle solids specifically. Other types of valves allow the media to accumulate in small clearances around the seats or between its sealing member and body causing them to jam.

In this real situation the vessel volume is 16,000 cubic feet maintained above 500 psig including mine tailings dissolved in acid that exceeds 400°F. The isolation valves are normally open and cycle closed after several months operation for change out of a modulating flash let-down valve without losing system pressure. When the isolation valves fail to seal it takes nearly a day to bleed the system and half a week to start-up. Production loss is worth a small

fortune, literally and so are yours. Space age metals and ceramics used alone could not overcome the attacks of corrosion, erosion, and agglomerating media. The Everlasting Process valves combined the latest materials and its unique design to solve this problem.

### 4. DIVERTING

The rotating disc concept is ideal for diverting flow to storage bins or silos and to isolate pumps for maintenance. Everlasting diverters remain operating for years in 65% coal and sludge slurries. Turn them around and they converge the process from separate sources into a single stream. There are no small spaces where fines can compact to jam its components. After the customer tested a dozen other manufacturers products in a simulated system the Everlasting Diverter design was selected for use in processing abrasive, corrosive, chemical waste.

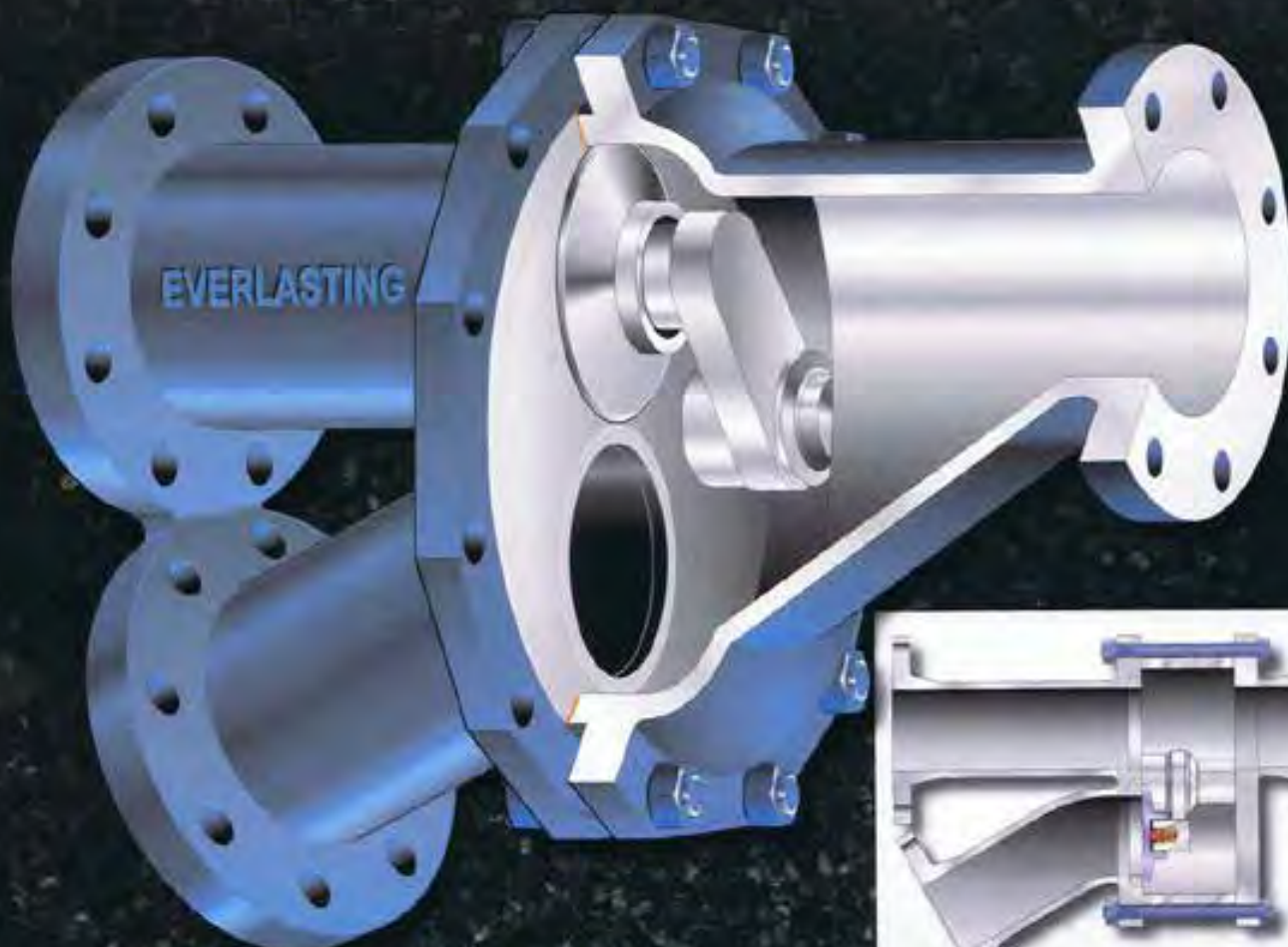
Whether your applications require carbon, stainless steel or space age materials, you can give your abrasives handling problem to the Everlasting 86 year old workaholic.





**Everlasting**  
VALVE COMPANY, INC.

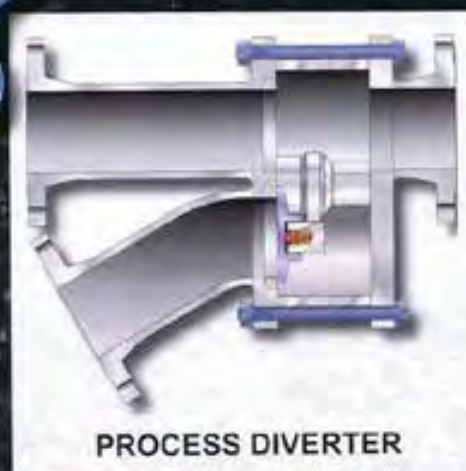
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## **DIVERTER VALVES**

**Switch on the fly, Dependably**

**For applications of erosive slurries or whenever abrasive solids are conveyed**



**PROCESS DIVERTER**



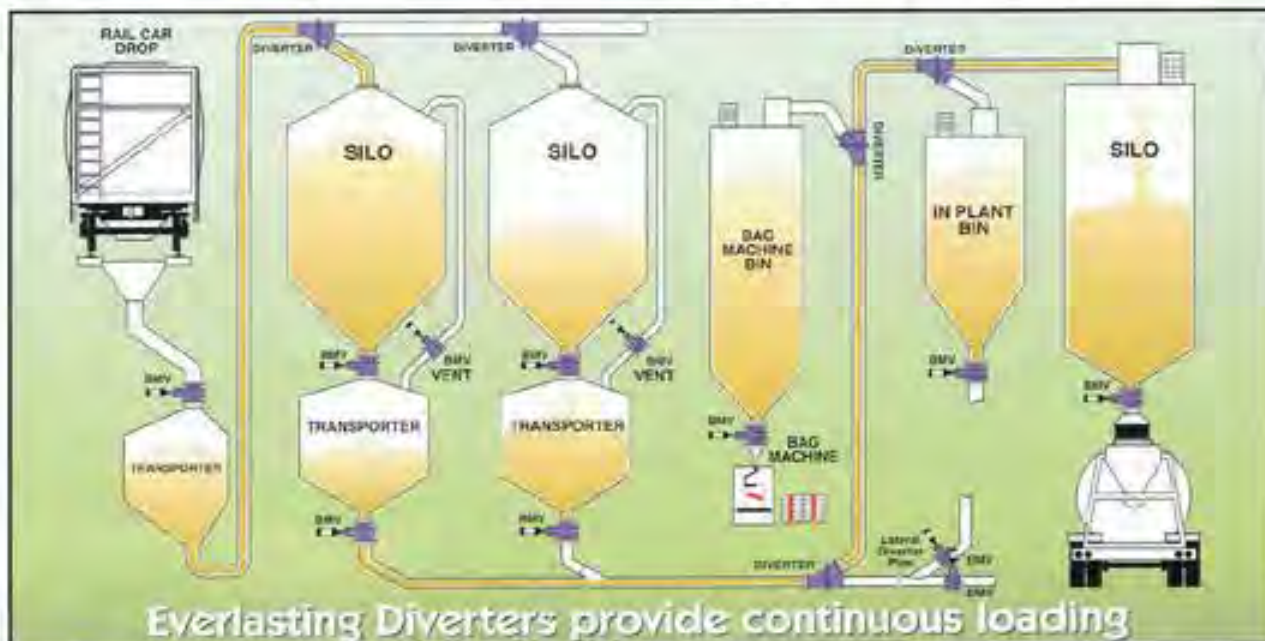
**Everlasting Valve Company, Inc.**



## The Everlasting Diverter that's built Switch lines on-the-fly

A major cement company produced 55 ton/hour, but to switch lines they had to stop the compressor then take 15 minutes to come back to pressure. Each time the lines were switched 13.75 tons of product was not conveyed. With Everlasting Diverters there is no time

lost. Are your down stream lines plugging, is the fringe bin full, do you have an off quality silo? How much are you losing with your present non-switch on the fly diverters? How much are your installed diverters costing you in parts, labor and lost production?



### Everlasting Diverters are Self-Cleaning, Self-Lapping and Long-Lasting

**SELF-CLEANING** Everlasting valves are designed with an open valve body that provides ample room for free flowing media to be displaced by the small volume disc and lever arm. The eccentric body to pipe connections cause the media to swirl in the open body. With the lateral piped to a vertical line media drops by gravity then is discharged through the straight leg with the next cycle. The closed port seat and disc surfaces are always shielded from harsh media.



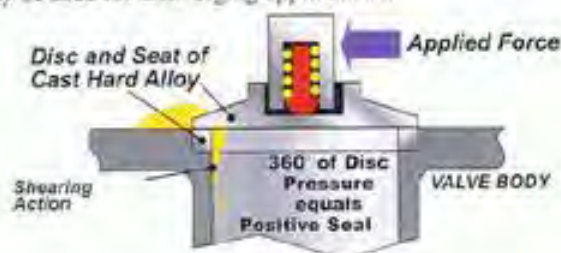
**SELF-LAPPING SEALING SURFACES** With each cycle the flat disc freely rotates around a spring loaded rivet internal to the disc drive. Disc rotation occurs as the center of friction under the disc seeks alignment with applied force. Scratches that may develop in the wide sealing surfaces are polished

away as the disc moves from one port to the other. This feature is unique to Everlasting Valve. No other valve is similar.



**Self-lapping  
Wears in  
Not out!**

**POSITIVE SHUT-OFF** Machine lapping of the sealing surfaces at the factory assures tight shut off. Leak rates are less than industry standard ANSI B.16.34; MSS-SP61 for metal seated valves. Each valve is tested to assure seat and body integrity. The spring loaded disc is held firmly against the path that it travels. Having sharp edges the seat and disc shear away any deposits from their sealing surfaces. Valve may be used for Converging applications.





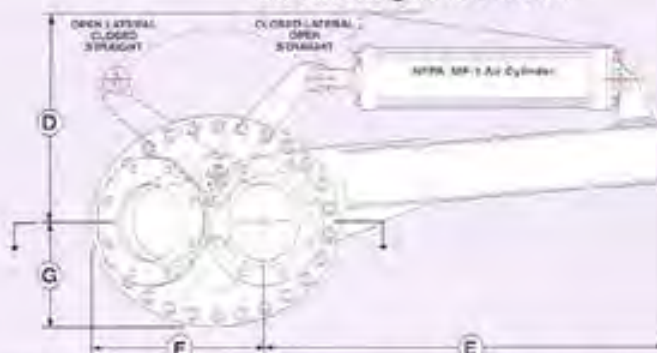
# to handle your most abrasive media

## Diverter dimensions specifications and options

Cast diverting valve cross section



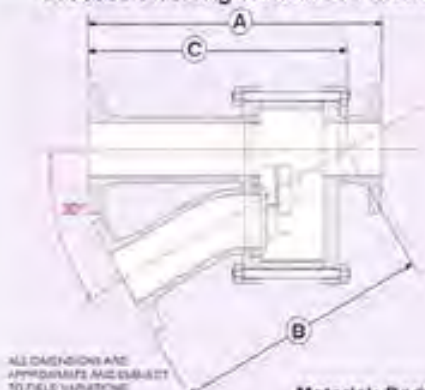
Cast diverting valve end view



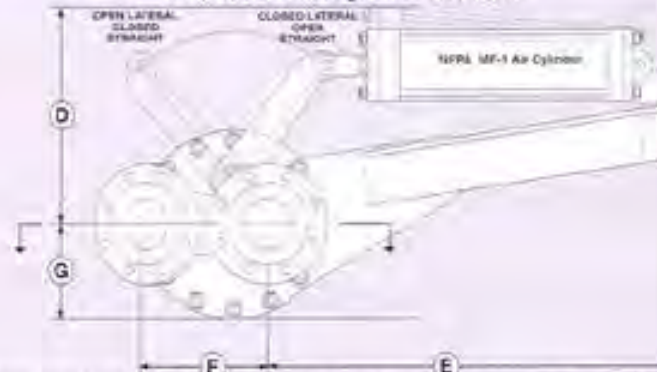
Material: Body cast iron, class 125 flanges, disc & seats hardened alloy 38RC to 59RC

Valve (mm)	A	B	C	D	E	F	G	Press/Temp Rating
4" (100)	22"	23 1/8"	23 1/8"	16 7/8"	31 1/8"	9 5/8"	6 1/8"	100 psi / 7 bar 450° F / 232° C
5" (125)	21 3/4"	19 3/8"	19 3/8"	17 1/2"	32 1/4"	12 7/8"	7 1/2"	
6" (150)	29"	23 1/8"	23 1/8"	21 1/4"	44"	12 7/8"	7 1/2"	
8" (200)	29 1/2"	25 1/4"	25 1/4"	20 1/2"	43 7/8"	19 1/8"	10 7/8"	
10" (250)	35 1/2"	30 3/8"	30 3/8"	23 1/8"	42 7/8"	21"	11 3/8"	
12" (300)	40"	35 3/8"	35 3/8"	23 7/8"	45 1/8"	22 1/4"	11 3/8"	

Process diverting valve cross section

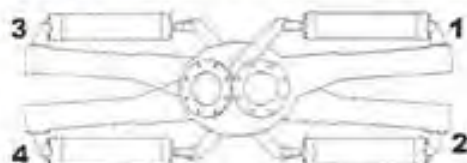


Process diverting valve end view



Material: Body Carbon steel / alloy ANSI, DIN flanges, disc & seats hardened alloy 38RC to 59RC

Valve (mm)	A	B	C	D	E	F	G	Press/Temp Rating
2" (50)	16 1/2"	12"	12"	10 7/8"	24 1/8"	6 3/8"	4 3/8"	ANSI B 16.34 CLASS 150
3" (80)	19 1/2"	15 1/4"	15 1/4"	16 1/8"	33"	9 5/8"	6 1/2"	
4" (100)	21"	18 1/2"	18 3/8"	16 1/8"	31 1/2"	9 5/8"	7"	
6" (150)	22 1/2"	23"	23 1/8"	21"	44 1/4"	13 3/8"	9 5/8"	
8" (200)	26 1/2"	26 3/4"	26 1/2"	21 3/4"	41 5/8"	17"	12"	
10" (250)	30"	31 5/8"	31 1/2"	24 1/4"	47 7/8"	20 1/8"	14 1/4"	



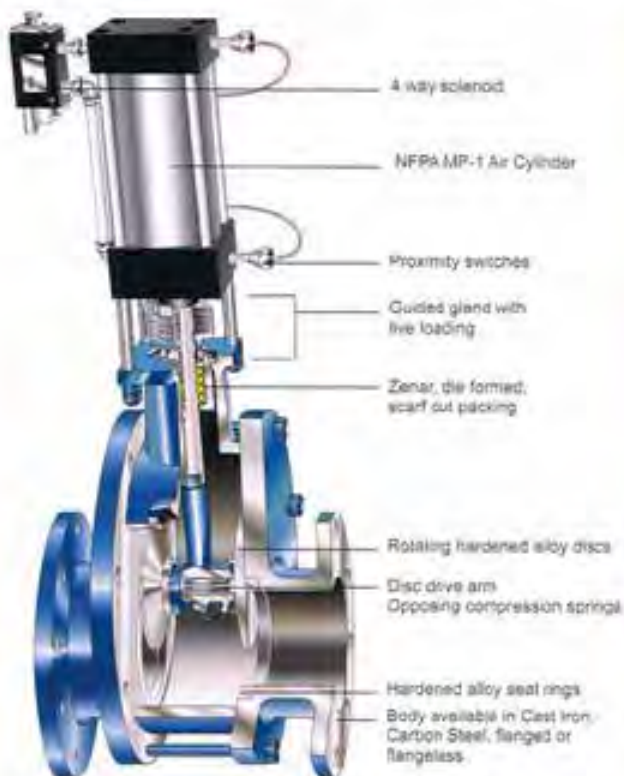
Actuator mounting positions code

ACTUATION	OPTIONS
Level, manual	Solenoid valve
Wheel, manual	Limit switches
Pneumatic cylinder	Fail Safe
Electric	4-way Proximity or mechanical Air reservoir type or SR

Process Diverter standard materials of construction are carbon steel or stainless steel, other alloys are selected to suit your application. Disc and seats are solid hardened alloys in the 38RC to 59RC range for long life in abrasive media. Diverters are designed to ANSI codes and Everlasting will fabricate the valve to meet your process conditions. Various end connection configurations are available including DIN flanges. Please refer to [www.everlastingvalveusa.com](http://www.everlastingvalveusa.com) to download a Request For Quote form (RFQ). Start saving time and money today.

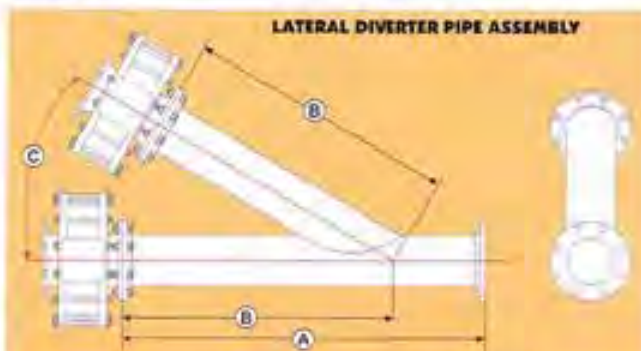
## Everlasting BMV series valves used in diverting lines

Everlasting Valve produces a complete line of Bulk Material Valves that when used in tandem with a fabricated lateral "Y" connection becomes a Diverter that can be used to divert, mix, or completely stop any media flow. The Everlasting BMV series uses the same proven and patented rotating disc and seat design that Everlasting is known for. Dynamic spring loaded stuffing box can be re-packed with valve in place.



### Everlasting Bulk Material Valve

The Everlasting Diverter and BMV are excellent in fly ash, Portland cement, kiln dust, alumina hydrate, alumina silica, calcined kaolin, sugar, titanium dioxide, ilmenite and rutile ores, pet coke, coal, catalyst and many other abrasives. Please request our booklet on the Everlasting Bulk Material Valves. Dimensions in this booklet are approximate and are used for estimating.



The following dimensions is to be used as a guide for shop fabrication:

Aspen (mm)	(C) Angle	(A) Straight	(B) Lateral / Intersect
3"	30°	30"	24"
(80)	45°	21"	15"
4"	30°	34"	28"
(100)	45°	24"	19"
5"	30°	44"	32"
(125)	45°	30"	20"
6"	30°	48"	36"
(150)	45°	40"	24"
8"	30°	60"	48"
(200)	45°	48"	30"
10"	30°	72"	64"
(250)	45°	54"	36"
12"	30°	84"	66"
(300)	45°	62"	42"





**Everlasting**  
VALVE COMPANY, INC.

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## Everlasting BMV Series



Sizes 2" to 12"; vacuum to 100 PSIG;  
Temperature to 550°F.

**For applications where abrasive solids are handled**



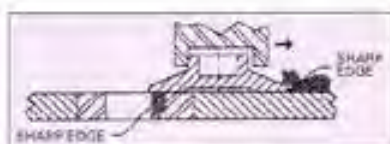
# The bulk material valve that's built to take Everlasting

## Self Cleaning Internals

Its open body configuration allows fines to move about freely preventing accumulation that causes binding of moving parts or damage to seats in other traditional designs. Media has room to be displaced by the discs with each cycle and the eccentric body to port design promotes settled product to swirl each time the valve opens, thereby cleaning it's interior.

## Sealing Surfaces Protected

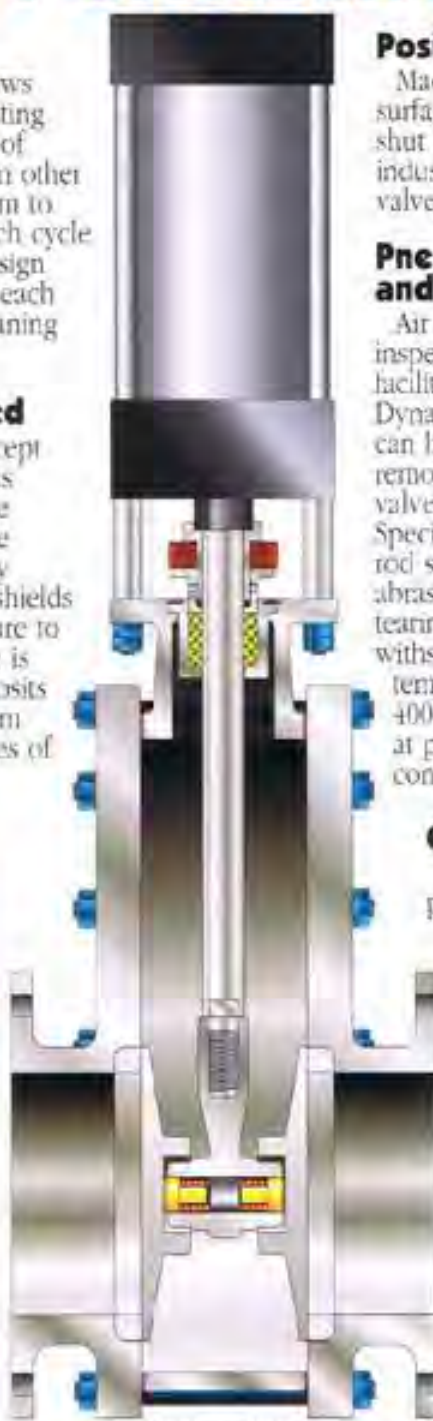
The Rotating Shearing Disc concept since being introduced in 1904 has proven itself in applications where media is abrasive and erosive. The spring loaded discs are held firmly against the path they travel, then shields their sealing surfaces from exposure to any harsh process while the valve is open. Valve is bi-directional. Deposits that may form will be sheared from the sealing surfaces by sharp edges of the seat rings and rotating discs.



*Shearing action clears disc face and its path of particulates.*

## Self Lapping Discs

They rotate as the center of the applied force and the centroid of friction force move toward alignment. High cycling is beneficial. Scratches that develop on the wide sealing surfaces are polished away as the valve is opened and closed, there is no similar valve.



*U.S. PATENT 5,816,111*

## Positive Shut Off

Machine lapping of the sealing surfaces at the factory assures tight shut off. Leak rates are less than industry standards for metal seated valves: ANSI B16.34, MSS-SP61.

## Pneumatic Actuator and Valve Are Separated

Air cylinder standoff allows easy inspection of sealing means and facilitates field packing. Dynamically loaded stuffing box can be field packed without removing the valve from line. Special cylinder rod seal resists abrasion and tearing, and withstands temperatures to 400°F (+204°C) at point of contact.



*Self lapping discs*

## Options

Air cylinder mounted proximity limit switches on single rod cylinder or mechanical style with double ended cylinder. Electric solenoid or manually operated cylinder air valve. All NEMA classifications can be furnished to meet your specifications.

Plant air or electric loss fail safe protection using an electro-pneumatic air reservoir system is available. Special bracketing of the air cylinder increases valve temperature rating to 750°F.

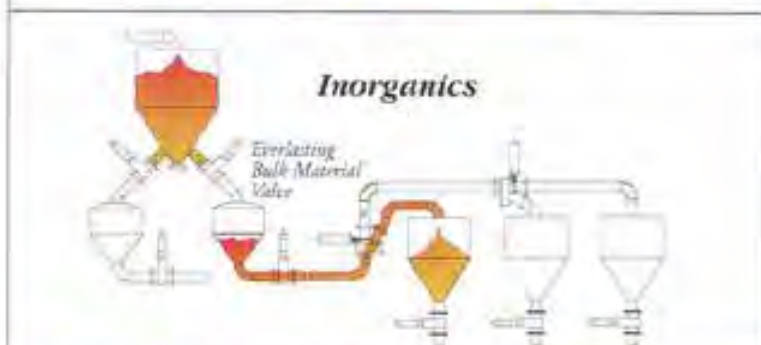
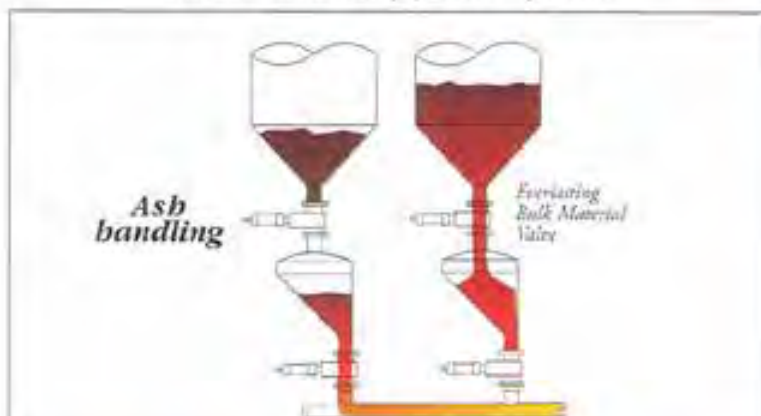
## The Everlasting bulk material valve.

A compact valve that performs where others require repairing or replacement more than once a year.



# most abrasive situations year after year

Ideally suited for dense phase pneumatic conveying and line isolation in dry powder systems.



## Everlasting solves plant problems.

### Ash Handling

**Problem:** Sealing members would erode and have to be replaced on a weekly basis.

**Solution:** Flapper style valves cycling once a minute wouldn't always close against large chunks of 600°F vitrified coal ash trapped between its sealing members. Their disc would erode needing replacement on a weekly basis. The **Everlasting BMV** (bulk material valve) was installed providing trouble-free service in this high temperature (see options), high cycling application.

### Inorganics

**Problem:** Production is moving granular abrasives with a bulk density of over 100 lbs/B3.

**Solution:** **Everlasting Valves** replaced transporter feed knife gate valves that developed internal and external leakage. Transporter outlets, now fitted with **Everlasting Valves**, replaced ball valves that suffered packing leaks. Our diverter valves have eliminated endless hours of maintenance in the finished product area that were previously spent repairing pinch valves. In each location the users enjoyed a fast pay back on their investment.

### Diverter Valves

The **Everlasting Diverter Valves** can be switched on the fly, and no lubrication is required. The designs of each style are based on the open body Rotating Disc technology proven since 1904 in our two-way valves. The disc and seats are solid hardened alloys in the 38RC to 59RC range this provides exceptionally long life in abrasive media. These valves have performed in titanium dioxide, fly ash, Portland cement, Alumina silica and calcified Kaolin, sugar, coal and other erosive particulate. Actuators include lever, handwheel, pneumatic cylinder, the valves are flanged, and pressure and temperature ranges vary with design type.

## Everlasting BMV series specifications

### Standard Design:

**Press Range:** Vacuum to 100 psig (7 bar)  
**Temp Range:** Cast Iron 450°F (+232°C)  
 Carbon Steel 550°F (+287°C)  
**Ends:** Flat Faced - 125# Drill  
**Operator:** Air Cylinder, Linear

### Options:

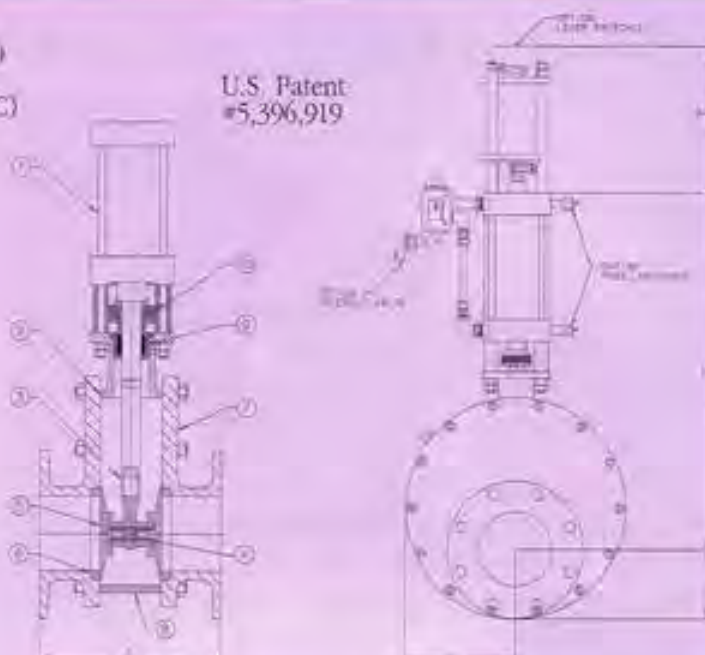
- Limit or Proximity Switches  
 \* Field mounted Limit Switches or Visual Indication require Double Ended Air Cylinder
- Solenoid Valve
- Manual Air Valve
- Fail-Safe Air Reservoir



• 750°F (+400°C)  
Design

**Process Valve**  
pressures from  
vacuum to  
10,000 psig,  
temperatures to  
+1,500°F,  
sizes 1/2" to 18"

U.S. Patent  
#5,396,919



Item No.	Nomenclature	Construction
1	Air Cylinders	Aluminum Body
2	Gaskets	Synthetic Fiber - Nitrile Binder
3	Disc Drive	Hardened Steel Alloy
4	Disc Springs	17-7 Stainless Steel
5	Discs	#40 Stainless Steel
6	Seats	#40 Stainless Steel
7	Body	Cast Iron or Carbon Steel
8	Distance Ring	Cast Iron or Carbon Steel
9	Stuffing Box	Brass - Zernite/Graphite Packing
10	Gland Springs	Electroless Nickel Plated

Size in. (mm)	A	H	H <sup>1</sup>	J	L	Wt. approx. lb (kg)
2* (50)	7 (179)	17.375 (440)	7 (178)	3 (76)	3.75 (95)	60 (27)
2.5 (65)	8.25 (210)	19.25 (489)	7.5 (190)	3.5 (89)	5 (127)	65 (30)
3 (80)	8.25 (210)	19.5 (495)	8 (203)	3.75 (95)	5 (127)	70 (32)
4 (100)	9.75 (248)	23 (584)	9 (229)	4.5 (114)	6.25 (159)	110 (50)
5 (125)	10.5 (267)	25.5 (648)	11 (280)	5 (127)	7.75 (196)	180 (82)
6 (150)	10.5 (267)	28.75 (730)	12 (305)	5.5 (140)	9 (229)	220 (100)
8 (200)	13.5 (343)	36 (915)	13.5 (343)	7 (178)	11.5 (292)	350 (160)
10** (250)	15 (381)	41.25 (1049)	13 (330)	8.25 (207)	13 (330)	480 (220)
12** (300)	15 (381)	47.875 (1216)	18 (457)	9 (229)	15.5 (394)	700 (320)

Inquire for other sizes. Dimensions are approximate, use for estimating. Consult factory for construction drawings.

\*Cast Iron only \*\*Carbon Steel only

### How to order Bulk Material Valve: Figure number example: 6" BAO-SVGO

Six inch Bulk Material Valve, cast iron construction, outside stuffing box, solenoid valve, GO proximity limit switches.  
 Materials of construction stated above are standard. Mechanical and field mounted limit switches require double-ended air cylinders.

Series	Body	Options	
<b>B</b> - BMV	<b>A</b> - Cast Iron <b>C</b> - Carbon Steel	<b>SV</b> - Solenoid Valve	<b>FS</b> - Fail-Safe Air Reservoir System
		<b>GO</b> - "GO" Proximity Switches	<b>HT</b> - High Temperature (750°F)
		<b>EX</b> - Mechanical Limit Switches (H <sup>1</sup> )	<b>SP</b> - Special Accessories or Design
		<b>MV</b> - Manual Air Valve	

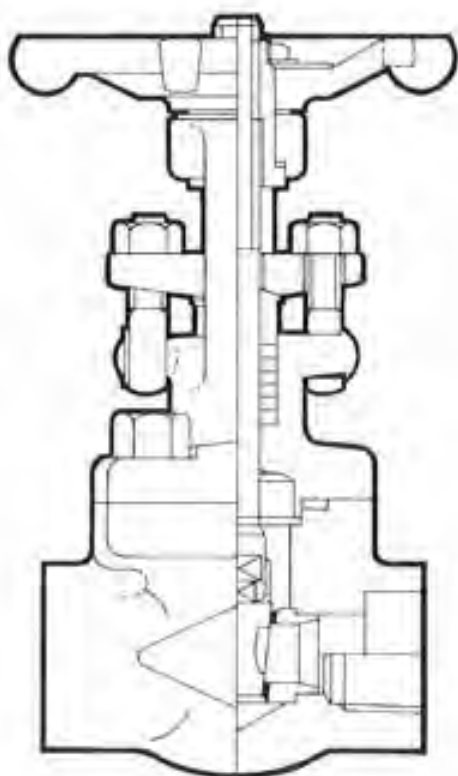


### GABF8008N(S)

Gate valve, OS&Y, bolted bonnet, Class 800#.

Suitable for steam, water, air, gas and non corrosive chemicals

- Body & bonnet: Forged Steel ASTM A105
- Wedge: 13% Chrome stainless steel
- Seat: ASTM A276-410 + Stellite #6
- End Connections: Screwed NPT or socket weld
- Maximum pressure rating: 5,512 at 454 deg C, 13,780 kpa at -29 to +35 deg C
- Sizes: 15mm to 50mm



PART	MATERIAL	A.S.T.M.
Handwheel nut	Carbon steel	A563A
Tooth washer	Carbon steel	
Name plate	Aluminium	
Hand wheel	Malleable iron	A197
Yoke sleeve	13Cr Stainless steel	A582-416
Thrust washer	13Cr Stainless steel	A276-410
Eye bolt	13Cr Stainless steel	A276-410
Gland nut	Carbon steel	A194-2H
Gland flange	Forged steel	*A105
Gland	13Cr Stainless steel	A276-410
Retaining washer	Carbon steel	A283 D
Gland packing	Non-asbestos	
Bonnet Bolt	Alloy steel	A193-B7
Bonnet	Forged steel	*A105
Gasket	304 Hoop-1eflon	
Stem	13Cr Stainless steel	A276-410
Seat ring	13Cr S/S + Stellite #6	A276-410
Wedge	13Cr Stainless steel	A217-CA15
Body	Forged steel	*A105

\*Carbon content 0.0025% max.

#### DIMENSIONS:

Nominal Size mm	8	10	15	20	25	40	50
A mm	76	76	76	86	102	117	133
B mm (open)	145	145	145	153	192	245	267
C mm	102	102	102	102	114	140	165
Approx. Weight kg	1.5	1.5	1.5	2.0	2.8	5.2	8.2

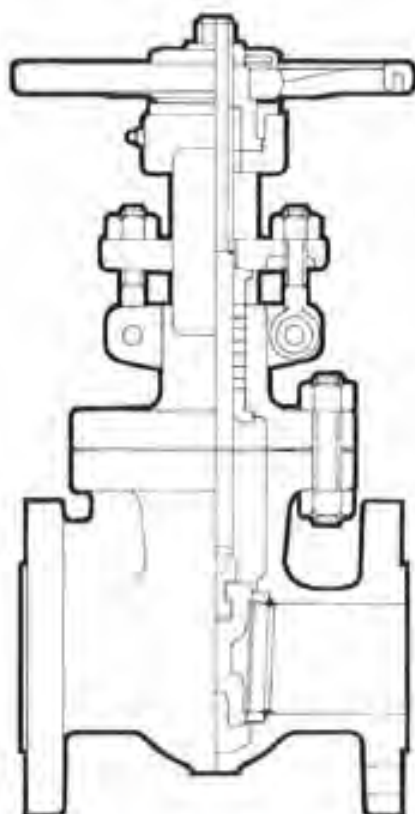


### GABC1508R

Gate valve, OS&Y, bolted bonnet, Class 150#.

Suitable for steam, water, air, gas and non corrosive chemicals

- Body & bonnet: Cast Steel ASTM A216 Gr WCB
- Wedge: 13% Chrome stainless steel
- Seat: ASTM A105 + Stellite #6
- End Connections: Flanged ANSI 150
- Maximum pressure rating: 1,171 at 260 deg C, 1,964 kpa at -29 to +35 deg C
- Sizes: 50mm to 200mm



PART	MATERIAL	A.S.T.M.
Handwheel nut	Malleable iron	A47 Gr 32510
Handwheel set screw	Steel	
Handwheel	Malleable iron	A197
Yoke sleeve ret. nut	Steel	A47 Gr 32510
Yoke sleeve	Austen duct. iron	A439 Type D2C
Lubricator	Steel	
Spindle	13% chrome steel	A479-410
Gland nut	Steel	A307B
Gland flange	Steel	A105
Gland follower	Steel chrome plated	A108 Gr 1020 + Cr
Gland eye bolt	Alloy steel	A307B
Gland hinge pin	Steel	A108 Gr 1020
Gland packing	JIC 3085	Non-Asbestos
Bonnet nut	Steel	A194 Gr 2H
Bonnet stud	Alloy steel	A193 Gr B7
Bonnet	Cast steel	*A216 Gr WCB
Gasket	Soft steel	
Back seat bush	13% chrome steel	A479-410
Body seat ring	Stellite faced	A108 Gr 1020 + St
Wedge	13% chrome steel	A217-CA15
Body	Cast steel	*A216 Gr WCB

\*Carbon content 0.25% max

#### DIMENSIONS

Nominal Size mm	50	65	80	100	150	200	250	300	350	400	450	500	600
A mm	178	191	203	229	267	292	330	356	381	407	432	457	508
B mm (open)	367	397	458	560	763	980	1166	1369	1515	1624	1900	2124	2502
C mm	200	200	224	250	315	335	400	450	500	560	630	710	800
Approx Weight kg	19	26	33	48	87	129	190	280	410	580	875	842	1380

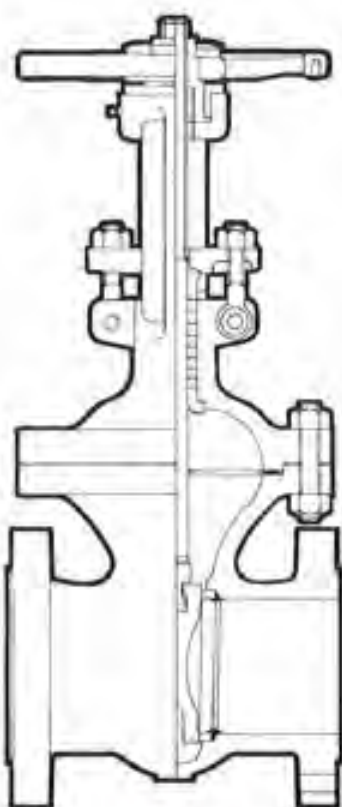


### GABC3008R

Gate valve, OS&Y, bolted bonnet, Class 300#.

Suitable for steam, water, air, gas and non corrosive chemicals

- Body & bonnet: Cast Steel ASTM A216 Gr WCB
- Wedge: 13% Chrome stainless steel
- Seat: ASTM A105 + Stellite #6
- End Connections: Flanged ANSI 300
- Maximum pressure rating: 1,860 at 454 deg C, 5,100 kpa at -29 to +35 deg C
- Sizes: 50mm to 200mm



PART	MATERIAL	A.S.T.M.
Handwheel nut	Malleable iron	A47 Gr 32510
Handwheel set screw	Steel	
Handwheel	Malleable iron	A197
Yoke sleeve ret. nut	Steel	A47 Gr 32510
Yoke sleeve	Austen, duct iron	A439 Type D2C
Lubricator	Steel	
Spindle	13% chrome steel	A479-410
Gland nut	Steel	A307B
Gland flange	Steel	A105
Gland follower	Steel chrome plated	A108 Gr 1020 +Cr
Gland eye bolt	Alloy steel	A307B
Gland hinge pin	Steel	A108 Gr 1020
Gland packing	JIC 3085	Non-Asbestos
Lantern Ring	13% chrome steel	A479 410
Bonnet nut	Steel	A194 Gr 2H
Bonnet stud	Alloy steel	A193 Gr B7
Bonnet	Cast steel	*A216 Gr WCB
Gasket	Soft steel	
Back seat bush	13% chrome steel	A479-410
Body seat ring	Stellite faced	A108 Gr 1020 + St
Wedge	13% chrome steel	A217 CA15
Body	Cast steel	*A216 Gr WCB

\*Carbon content 0.25% max.

#### DIMENSIONS

Nominal Size mm	50	65	80	100	150	200	250	300	350	400	450	500	600
A mm	216	241	283	305	403	419	457	502	762	838	914	991	1143
B mm (open)	405	440	500	592	816	1042	1227	1442	1588	1890	2040	2197	3078
C mm	200	200	224	250	355	400	450	500	560	620	710	800	900
Approx Weight kg	28	35	50	75	145	260	323	481	682	972	1260	1611	2470

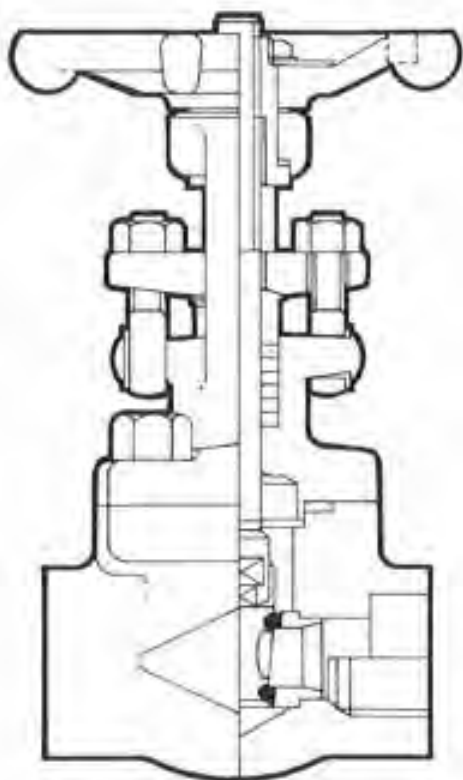


### GABS8008N(S)

Gate valve, OS&Y, bolted bonnet, Class 800#.

Suitable for steam, water, air, gas and most chemicals

- Body & bonnet: 316L Stainless steel
- Wedge: 316L Stainless steel
- Seat: Stainless steel + Stellite #6
- End Connections: Screwed NPT or socket weld
- Maximum pressure rating: 5,930 at 454 deg C, 11,032 kpa at -29 to +35 deg C
- Sizes: 15mm to 50mm



PART	MATERIAL	A.S.T.M.
Handwheel Nut	Carbon Steel	A563A
Tooth Washer	Carbon Steel	
Name Plate	Stainless Steel	
Hand Wheel	Malleable Iron	A197
Yoke Sleeve	13Cr Stainless Steel	A582-416
Thrust Washer	13Cr Stainless Steel	A276-410
Eye Bolt	Stainless Steel	A276-304
Gland Nut	Stainless Steel	A194-8
Gland Flange	Stainless Steel	A182-F304
Gland	Stainless Steel	A276-304
Retaining Washer	Stainless Steel	A276-304
Gland Packing	Gratol	
Bonnet Bolt	Stainless Steel	A193-B8
Bonnet	Stainless Steel	A182-F316L
Gasket	304 Hoop-Teflon	
Stem	Stainless Steel	A276-316
Seat Ring	S/S + Stellite #6	A276-316
Wedge	S/S + Stellite #6	A351-CF8M
Body	Stainless Steel	A182-F316L

#### DIMENSIONS

Nominal Size mm	8	10	15	20	25	40	50
A mm	76	76	76	86	102	117	133
B mm (open)	145	145	145	153	192	245	267
C mm	102	102	102	102	114	140	165
Approx. Weight kg	1.5	1.5	1.5	2.0	2.8	5.1	8.2



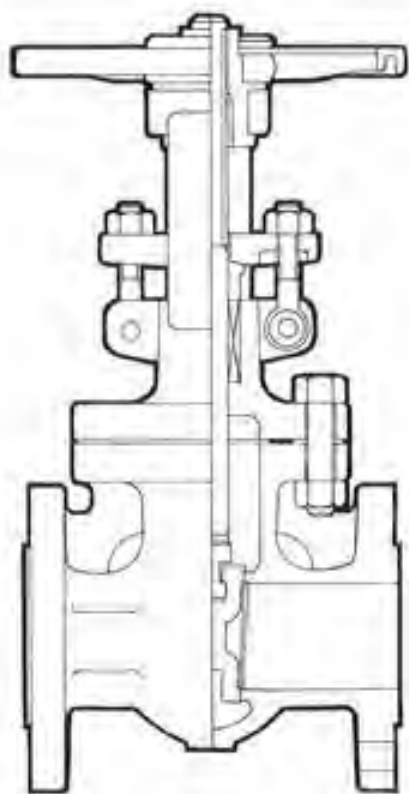


### GABS1512R

Gate valve, OS&Y, bolted bonnet, Class 150#.

Suitable for steam, water, air, gas and most chemicals

- Body & bonnet: Stainless steel CF8M
- Wedge: 316 stainless steel
- Seat: Stainless steel + Stellite #6
- End Connections: Flanged ANSI 150
- Maximum pressure rating: 1,171 at 260 deg C, 1,896 kpa at -29 to +38 deg C
- Sizes: 50mm to 200mm



PART	MATERIAL	A.S.T.M
Handle Nut	Steel chrome plated	A47-32510+Cr
Set Screw	Steel	
Hand Wheel	Malleable Iron	A197
Yoke Sleeve	Austen. duct. iron	A439-D2C
Thrust Washer	Stainless Steel	A479-410
Stem	Stainless Steel	A479-316
Hinge Bolt	Stainless Steel	A479-F304
Hinge Nut	Stainless Steel	A194-6
Gland Flange	Stainless Steel	A351-CF8
Packing Gland	Stainless Steel	A479-316
Hinge Pin	Stainless Steel	A479-304
Packing	Teflon	
Bonnet Bolt	Stainless Steel	A193-B8
Bonnet Nut	Stainless Steel	A194-6
Gasket	Teflon	
Bonnet	Stainless Steel	A351-CF8M
Wedge	Stainless Steel	A351-CF8M
Body	Stainless Steel	A351-CF8M

#### DIMENSIONS

Nominal Size mm	15	20	25	40	50	65	80	100	150	200	250	300
A mm	168	117	127	165	178	191	203	229	267	292	330	356
B mm (open)	190	196	232	283	332	381	424	529	730	934	1114	1314
C mm	100	100	120	140	160	180	200	250	315	355	355	450
Approx Weight kg	2	3	5	9	13	18	22	34	57	97	132	197



## ART "A" - GATE VALVE

Metal sealing with free disks (male/female disk) in the wedge of the gate.

Practically no maintenance is required for the special closing system (metal to metal), but a perfect airtight is not assured.

Pneumatic actuator, with reciprocating movement, is equipped with manual emergency knob.

The pneumatic gate valve can intercept liquid fluids and gases without solid suspensions (keep into account the closing system).

Standard: Connections with inner GAS ISO 228 female-female.

On request: NPT connections.

Control air 1/8" GAS connections.

**OPERATING TEMPERATURE:** from -20°C to +80°C.

**ACTUATOR PILOT PRESSURE:** Max 8 bar.

### VERSIONS AND SIZES

**GAS threaded connection**

DA: 3/4" - 1" - 1 1/4" - 1 1/2" - 2" - 2 1/2" - 3" - 4"

SANC: 3/4" - 1" - 1 1/4" - 1 1/2" - 2" - 2 1/2" - 3"

SANO: 3/4" - 1" - 1 1/4" - 1 1/2" - 2"

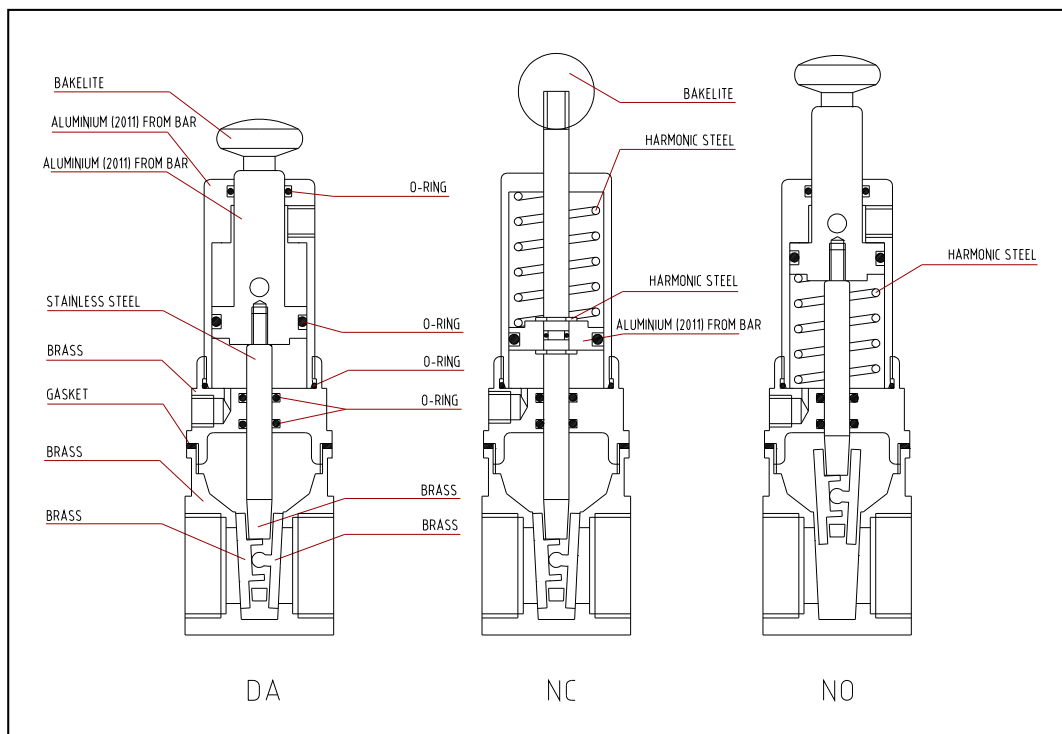
**NPT connection**

DA: 3/4" - 1" - 1 1/4" - 1 1/2" - 2" - 3"

SANC: 3/4" - 1" - 1 1/4" - 1 1/2" - 2" - 3"

SANO: 3/4" - 1" - 1 1/4" - 1 1/2" - 2"

**ANODIZING TREATMENT ON OUTSIDE DETAILS MADE IN ALUMINIUM**

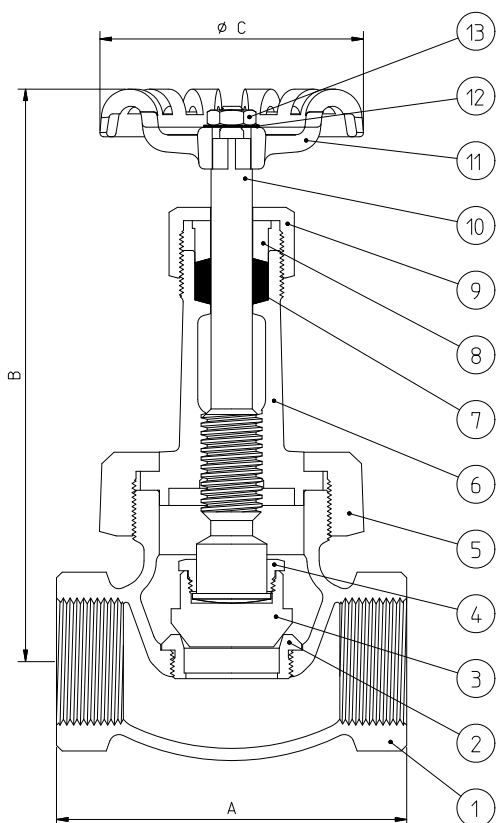


## GL012

Globe valve, union bonnet, Steam.

Suitable for steam, water, air, gas and most chemicals

- **Body & bonnet: Bronze B62**
- **Disc & Seat: Stainless steel ASTM A276-410**
- **End Connections: Screwed BSP**
- **Maximum pressure rating: 2,100 kpa at 217 deg C, 4,100 kpa at -29 to +38 deg C**
- **Sizes: 15mm to 50mm**



	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
A	75	90	106	122	135	165
B	145	162	175	206	232	261
ØC	67	72	82	92	102	122

HIDROSTATIC TEST		
BODY	900	PSI (62 BAR)
SEAT	600	PSI (41 BAR)

WORKING CONDITIONS		
SATURATED STEAM	300	PSI (21 BAR)
WATER, OIL	600	PSI (41 BAR)
NON SHOCK		

MAXIMUM TEMPERATURE = 232 °C

13	01	NUT	ST. STEEL	NBR5601/304	A276/304
12	01	IDENT. PLATE	ALUMINUM		
11	01	HANDWHEEL	ALUMINUM		B85/S12A
10	01	STEM	BRASS	NBR6188/C37700	B124/C37700
9	01	PACKING NUT	BRONZE	NBR6314/C83600	B62/C83600
8	01	GLAND	BRASS	NBR6188/C37700	B124/C37700
7	02	PACKING	PTFE		
6	01	BONNET	BRONZE	NBR6314/C83600	B62/C83600
5	01	UNION BONNET RING	BRONZE	NBR6314/C92200	B61/C92200
4	01	SUPPORT. WASHER	BRASS	NBR5023	B16/C36000
3	01	PLUG DISC	ST. STEEL	NBR5601/410	A276/410
2	01	SEAT	ST. STEEL	NBR5601/410	A276/410
1	01	BODY	BRONZE	NBR6314/C83600	B62/C83600
POS.	QUANT.	DENOMINATION	MATERIAL	ABNT SPECIFICATION	ASTM SPECIFICATION

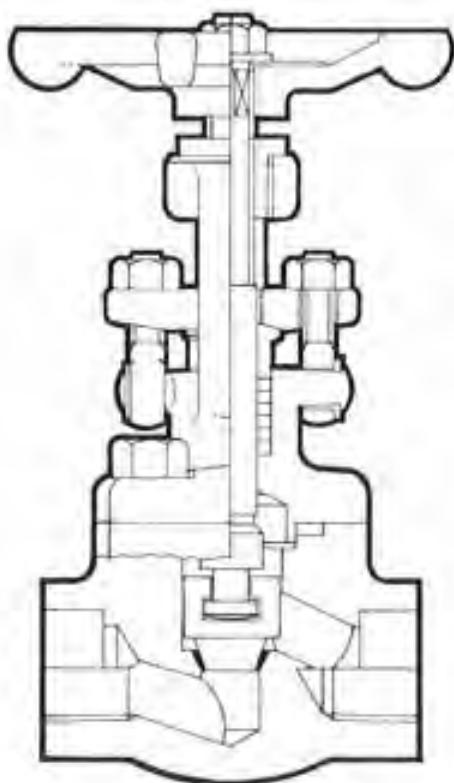
NOTE: THE DIMENSIONS ARE EXPRESSED IN MILLIMETERS.

### GLBF8008N(S)

Globe valve, OS&Y, bolted bonnet, Class 800#.

Suitable for steam, water, air, gas and non corrosive chemicals

- Body & bonnet: Forged Steel ASTM A105
- Disc: 13% Chrome stainless steel
- Seat: ASTM A276-410 + Stellite #6
- End Connections: Screwed NPT or socket weld
- Maximum pressure rating: 5,512 at 454 deg C, 13,780 kpa at -29 to +35 deg C
- Sizes: 15mm to 50mm



PART	MATERIAL	A.S.T.M.
Handwheel /n/	Carbon steel	A563A
Handwheel washer	Carbon steel	A283 D
Name plate	Aluminum	
Hand wheel	Malleable iron	A197
Yoke bush	13Cr Stainless steel	A582-416
Eye bolt	13Cr Stainless steel	A276-410
Gland nut	Carbon steel	A194-2H
Gland flange	Forged steel	*A105
Gland	13Cr Stainless steel	A276-410
Retaining washer	Carbon steel	A283 D
Gland packing	Non-asbestos	
Bonnet bolt	Alloy steel	A193-B7
Bonnet	Forged steel	*A105
Gasket	304 Hoop-tellon	
Stem	13Cr Stainless steel	A276-410
Disc	13Cr Stainless steel	A217-CA15
Seat	Stellite #6/Equiv.	
Body	Forged steel	*A105

\*Carbon content 0.25% max.

#### DIMENSIONS:

Nominal Size mm	8	10	15	20	25	40	50
A mm	76	76	76	86	102	152	172
B mm (open)	149	149	149	157	190	225	267
C mm	102	102	102	102	114	140	165
Approx. Weight kg	1.6	1.8	1.8	2.1	2.9	6.2	9.7

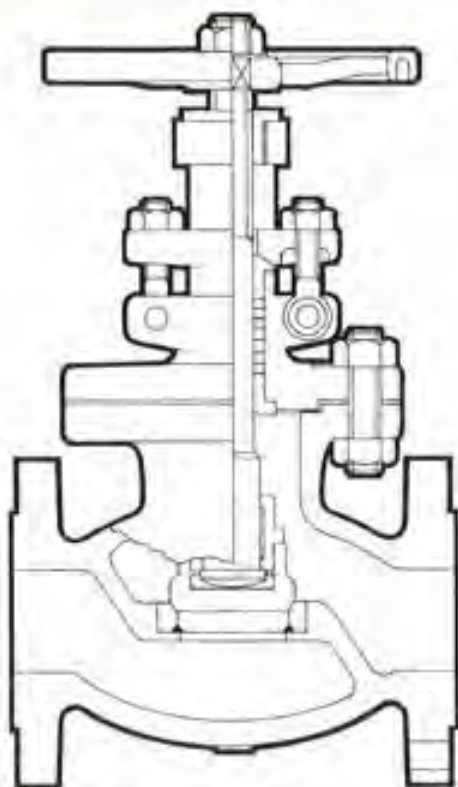


### GLBC1508R

Globe valve, OS&Y, bolted bonnet, Class 150#.

Suitable for steam, water, air, gas and non corrosive chemicals

- Body & bonnet: Cast Steel ASTM A216 Gr WCB
- Disc: 13% Chrome stainless steel
- Seat: ASTM A105 + Stellite #6
- End Connections: Flanged ANSI 150
- Maximum pressure rating: 1,171 at 260 deg C, 1,964 kpa at -29 to +35 deg C
- Sizes: 50mm to 300mm



PART	MATERIAL	A.S.T.M.
Handwheel nut	Steel	A307B
Washer	Steel	
Handwheel	Malleable iron	A197
Yoke Bush	Austen. duct iron	A439 Type D2C
Spindle	13% chrome steel	A479-410
Gland Nut	Steel	A307B
Gland flange	Steel	A105
Gland eye bolt	Alloy steel	A307B
Gland follower	Steel chrome plated	A108 Gr 1020 + Cr
Gland hinge pin	Steel	A108 Gr 1020
Gland packing	JIC 3085	Non-Asbestos
Bonnet nut	Steel	A194 Gr 2H
Bonnet	Cast steel	*A216 Gr WCB
Bonnet stud	Alloy steel	A193 Gr B7
Gasket	Soft steel	
Back seal bush	13% chrome steel	A479-410
Disc ret. nut	13% chrome steel	A479-410
Disc	13% chrome steel	A217 CA15
Body seat ring	Stellite faced	A108 Gr 1020 + St
Body	Cast steel	*A216 Gr WCB

\*Carbon content 0.25% max.

#### DIMENSIONS:

Nominal Size mm	50	65	80	100	150	200	250	300
A mm	203	216	241	292	406	495	622	699
B mm (open)	316	330	365	414	502	590	775	825
C mm	200	200	224	260	355	400	450	500
Approx. Weight kg	20	28	34	52	89	168	242	404



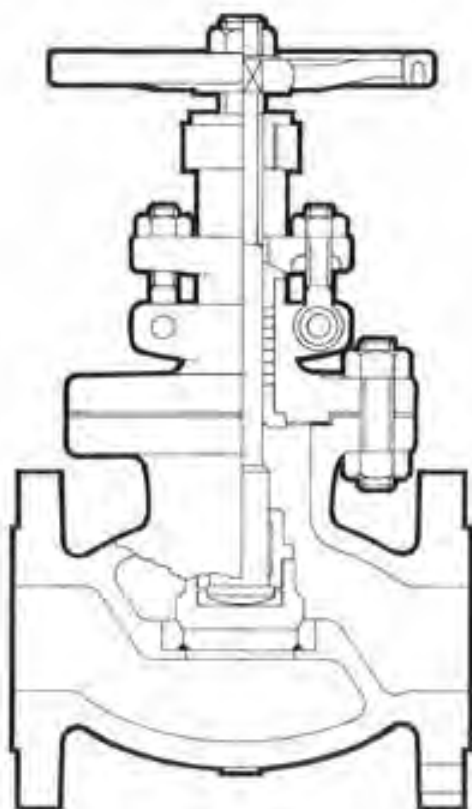


### GLBC3008R

Globe valve, OS&Y, bolted bonnet, Class 300#.

Suitable for steam, water, air, gas and non corrosive chemicals

- Body & bonnet: Cast Steel ASTM A216 Gr WCB
- Disc: 13% Chrome stainless steel
- Seat: ASTM A105 + Stellite #6
- End Connections: Flanged ANSI 300
- Maximum pressure rating: 1,860 at 454 deg C, 5,100 kpa at -29 to +35 deg C
- Sizes: 50mm to 300mm



PART	MATERIAL	A.S.T.M.
Handwheel nut	Steel	A307B
Washer	Steel	
Handwheel	Malleable iron	A197
Yoke bush	Austen. duct iron	A439 Type D2C
Spindle	13% chrome steel	A479-410
Gland Nut	Steel	A307B
Gland flange	Steel	A105
Gland eye bolt	Alloy steel	A307B
Gland follower	Steel chrome plated	A108 Gr 1020 + Cr
Gland hinge pin	Steel	A108 Gr 1020
Gland packing	JIC 3085	Non-Asbestos
Lantern Ring	13% chrome steel	A479-410
Bonnet nut	Steel	A194 Gr 2H
Bonnet	Cast steel	*A216 Gr WCB
Bonnet stud	Alloy steel	A193 Gr B7
Gasket	Soft steel	
Back seat bush	13% chrome steel	A479-410
Disc ret. nut	13% chrome steel	A479-410
Disc	13% chrome steel	A217 CA15
Body seat ring	Stellite faced	A108 Gr 1020 + Stl
Body	Cast steel	*A216 Gr WCB

\*Carbon content 0.25% max.

#### DIMENSIONS:

Nominal Size mm	50	65	80	100	150	200	250	300
A mm	267	292	318	356	445	559	622	711
B mm (open)	350	391	420	492	620	793	1145	1260
C mm	200	224	280	355	450	560	560	710
Approx. Weight kg	26	40	53	80	168	248	456	608

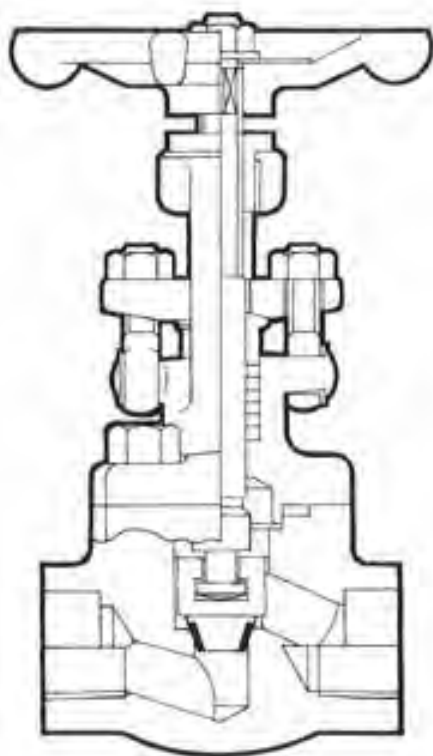


## GLBS8008N(S)

Globe valve, OS&Y, bolted bonnet, Class 800#.

Suitable for steam, water, air, gas and most chemicals

- Body & bonnet: 316L Stainless steel
- Disc: 316L Stainless steel
- Seat: Stainless steel + Stellite #6
- End Connections: Screwed NPT or socket weld
- Maximum pressure rating: 5,930 at 454 deg C, 11,032 kpa at -29 to +35 deg C
- Sizes: 15mm to 50mm



PART	MATERIAL	A.S.T.M
Handwheel Nut	Carbon Steel	A563-A
Handwheel Washer	Carbon Steel	A283-D
Name Plate	Stainless Plate	
Hand Wheel	Malleable Iron	A197
Yoke Bush	13Cr Stainless Steel	A582-416
Eye Bolt	Stainless Steel	A276-304
Gland Nut	Stainless Steel	A194-B
Gland Flange	Stainless Steel	A182-F304
Gland	Stainless Steel	A276-304
Retaining Washer	Stainless Steel	A276-304
Gland Packing	Graphite	
Bonnet Bolt	Stainless Steel	A193-B8
Bonnet	Stainless Steel	A182-F316L
Gasket	304 Hoop-Teflon	
Stem	Stainless Steel	A276-316
Disc	S/S + Stellite #6	A351-CF8M
Seat	Stainless Steel	A182-F316L
Body	Stainless Steel	A182-F316L

### DIMENSIONS

Nominal Size mm	8	10	15	20	25	40	50
A mm	76	76	76	88	102	152	172
B mm (open)	149	149	149	157	190	225	267
C mm	102	102	102	102	114	140	165
Approx Weight kg	1.8	1.8	1.8	2.1	2.9	6.2	9.7





## ART "DV" SHUTTER ANGLE VALVE FOR STEAM AND HIGH TEMPERATURE

Angle valve at 45° with flat shutter closing .

SEAL: PTFE.

Seal in PTFE **energized** with stainless steel spring on the stem.

Special gaskets for high temperature on the pneumatic side.

Perfect airtight. Long life even with high operating frequencies.

Pneumatic actuator with reciprocating piston movement.

It is equipped with a **NUT** which, turning the cylinder by 360°, allows the desired positioning of air side connection.

Connections with inner GAS ISO 228 thread female-female.

On request with NPT connections.

Control air 1/8" GAS connections.

### ALLOWABLE TEMPERATURES

Operating temperature: from -20°C to +200°C

**ACTUATOR PILOT PRESSURE.** Max 8 bar.

**For steam** please refer to the Differential pressure and Saturated Steam Charts.

### VERSIONS AND SIZES

DA: 1/2" - 3/4" - 1"

SANC: 1/2" - 3/4" - 1" - 1 1/4" - 1 1/2" - 2" - 2 1/2" - 3"

SANO: 1/2" - 3/4" - 1"

**ANODIZING TREATMENT ON OUTSIDE DETAILS**

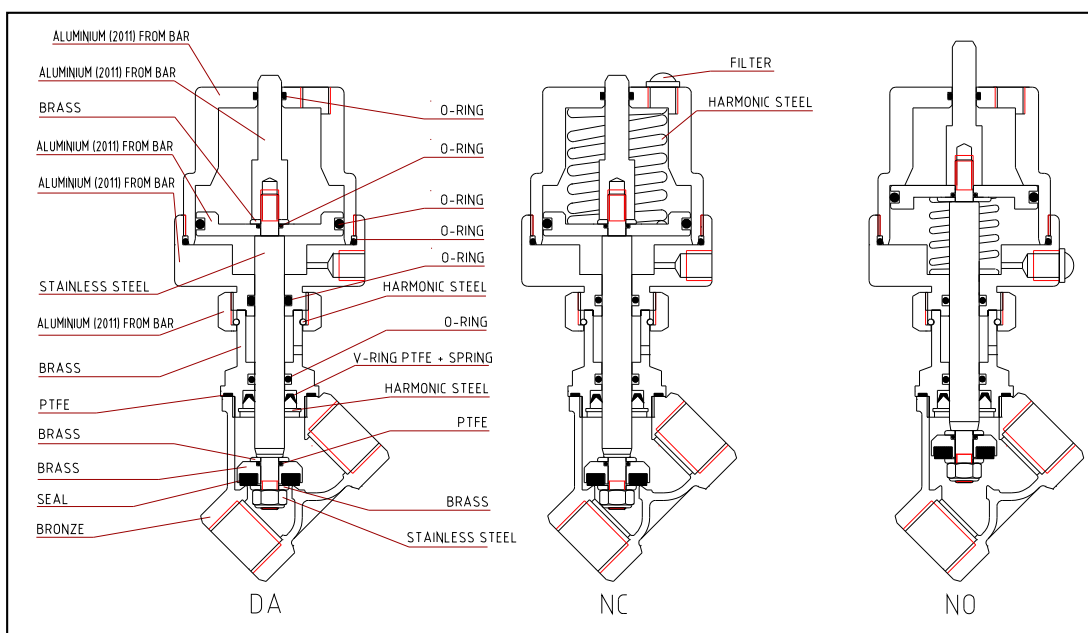
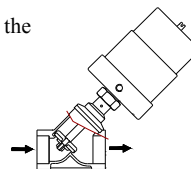
**MADE IN ALUMINIUM**



It is **not subject** to the "Water Hammer" if the fluid pass through the valve in the direction of the arrow printed on the body (under the actuator).  
With these conditions the tightness is guaranteed up to the pressures shown in the Differential Pressure Chart.

#### MINIMUM PRESSURE REQUIRED TO OPEN NC VERSION

G	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
BAR	4	4	5	5	5	5	5	5

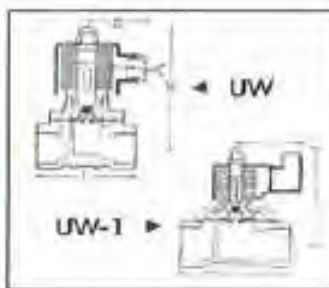


## UW

Solenoid valve, light pattern, normally closed.

Suitable for water, air, gas and oil

- Body & bonnet: Brass
- Diaphragm & Disc: NBR
- Coil: DIN
- Available voltages: 240vAC, 110vAC and 24vDC
- End Connections: Screwed BSP
- Maximum pressure rating: 1,000 kpa cold up to 25mm, 500 kpa 32mm to 50mm
- Sizes: 15mm to 50mm



MATERIAL	
PARTS	MATERIAL
Body	Large Brass (Cast Bronze)
Coil	Special Copper Wire (H)
Core	Stainless Steel
Tube	Stainless Steel
Spring	Stainless Steel
Plug	NBR, Viton, Silicon
Diaphragm	NBR, Viton, Silicon

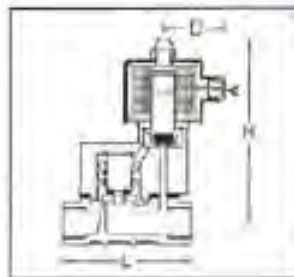
DN	MODEL	PIPE SIZE	Cv	ORIFICE	FLUID TEMP. °C	MAX. OPERATING PRESSURE DIFF. MPa/PSI*				DIMENSIONS (mm)			WEIGHT (kg)
						AIR	WATER	LIGHT OIL		L	H	D	
15	UW-15	1/2"	2.4	15 mm	-50 ~ +80	0.7	0.5	0.5		70	100	33	0.9
20	UW-20	3/4"	4.5	15 mm	-50 ~ +80	0.7	0.5	0.5		70	100	33	0.9
25	UW-25	1"	6.8	20 mm	-50 ~ +80	0.7	0.5	0.5		70	110	33	1.0
32	UW-32	1 1/4"	12	25 mm	-50 ~ +80	0.7	0.5	0.5		93	135	33	1.8
40	UW-40	1 1/2"	24	30 mm	-50 ~ +80	0.7	0.5	0.5		125	140	33	3.2
50	UW-50	2"	48	40 mm	-50 ~ +80	0.7	0.5	0.5		125	140	33	3.5

## SUS

Solenoid valve, stainless steel construction, heavy pattern.

Suitable for steam, water, air, gas and most chemicals

- Body & bonnet: 316 stainless steel
- Plug: PTFE
- Core needle, tube & Spring: Stainless steel
- Available voltages: 240vAC, 110vAC and 24vDC
- End Connections: Screwed BSP
- Maximum pressure rating: 1,500 kpa cold, 1,035 kpa steam



MATERIAL	
PARTS	MATERIAL
Body	CFRM
Coil	Special Copper Wire (H)
Core	Stainless Steel
Tube	Stainless Steel
Spring	Stainless Steel
Plug	PTFE
Core/Needle	PTFE
Piston	316

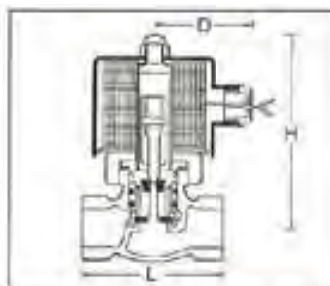
DN	MODEL	PIPE SIZE	Cv	ORIFICE	FLUID TEMP. °C	MAX. OPERATING PRESSURE DIFF. MPa/PSI*				DIMENSIONS (mm)			WEIGHT (kg)
						WATER	AIR	STEAM	LIGHT OIL	L	H	D	
15	SUS-15	1/2"	4.0	17 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	82	120	33	1.4
20	SUS-20	3/4"	6.0	17 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	82	120	33	1.6
25	SUS-25	1"	12	22 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	100	134	33	1.8
32	SUS-32	1 1/4"	18	30 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	125	155	33	2.8
40	SUS-40	1 1/2"	24	30 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	125	145	33	2.9
50	SUS-50	2"	48	50 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	168	173	33	5.6

## US

Solenoid valve, heavy pattern, normally closed.

Suitable for steam, water, air, gas and most non corrosive chemicals

- Body & bonnet: Bronze
- Plug: PTFE + 15% GF
- Core needle, tube & Spring: Stainless steel
- Available voltages: 240vAC, 110vAC and 24vDC
- End Connections: Screwed BSP
- Maximum pressure rating: 1,500 kpa cold, 1,035 kpa steam
- Sizes: 15mm to 50mm



MATERIAL	
PARTS	MATERIAL
Body	Cast Bronze
Coil	Special Copper Wire (H)
Core/Needle	Stainless Steel
Tube	Stainless Steel
Spring	Stainless Steel
Plug	PTFE + 15%GF
Core/Needle	PTFE
Piston	Brass

DN	MODEL	PIPE SIZE	Cv	ORIFICE	FLUID TEMP. °C	MAX. OPERATING PRESSURE DIFF. MPa/PSI*				DIMENSIONS (mm)			WEIGHT (kg)
						WATER	AIR	STEAM	HEAVY OIL	L	H	D	
15	US-15	1/2"	4.0	17 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	82	120	33	1.7
20	US-20	3/4"	6.0	17 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	82	120	33	1.7
25	US-25	1"	12	22 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	101	130	33	2.0
32	US-32	1 1/4"	18	30 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	110	144	33	3.1
40	US-40	1 1/2"	24	30 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	110	144	33	3.3
50	US-50	2"	48	50 mm	-50 ~ +150	0.5-10	0.5-10	0.5-10	0.5-10	163	173	33	7.2