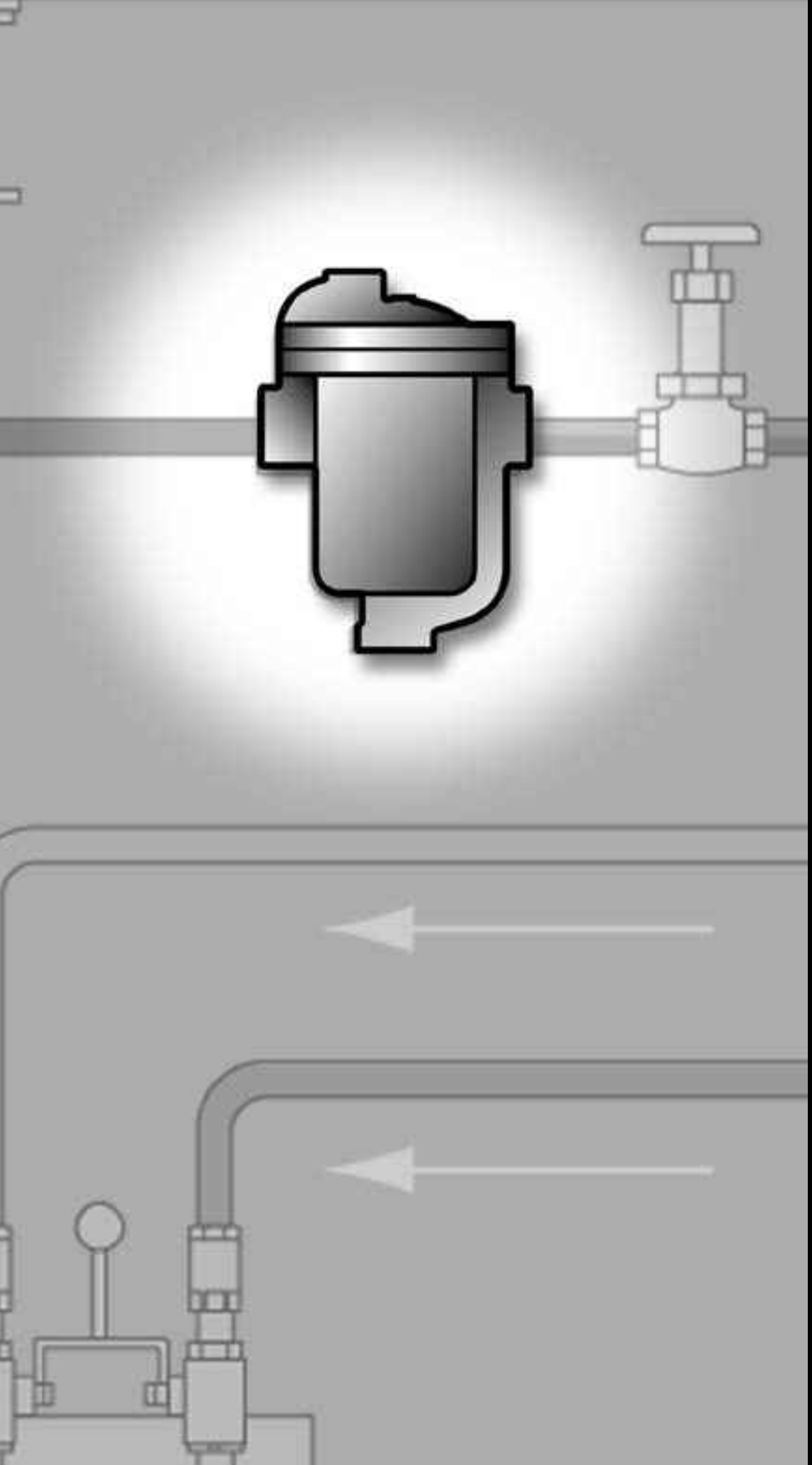


Steam Trapping and Steam Tracing Equipment

Armstrong

Armstrong®

Armstrong® Steam Traps

Pay less money for energy— and more attention to the environment.

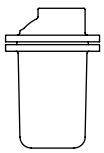
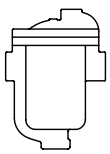
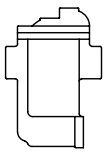
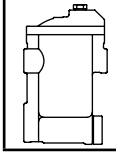
It's pretty obvious, really. An efficient steam trap wastes less energy, which means you burn less fuel and reduce emissions. The results are energy savings and a cleaner, healthier environment. By helping companies manage energy, Armstrong steam traps are also helping protect the world we all share.

As a steam trap wears, it loses efficiency and begins to waste energy. But Armstrong inverted bucket traps last years longer than other traps. They operate more efficiently longer because the inverted bucket is the most reliable steam trap operating principle known.

Clearly, the longer an efficient trap lasts, the more it reduces energy wasted, fuel burned and pollutants released into the air. It's an all-around positive situation that lets the environment win, too. Bringing energy down to earth in your facility could begin with a renewed focus on your steam system, especially your steam traps. Said another way: Zeroing in on your steam traps is an easy way to pay less money for energy—and more attention to the environment.

Companies around the world are beginning to realize that rather than being separate challenges, energy and the environment are and have always been a single mission. And that quality management in one area will surely impact the other.

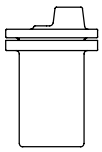
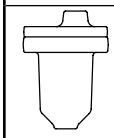
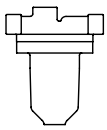
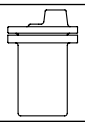
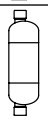
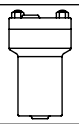
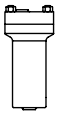
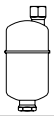
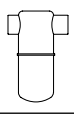
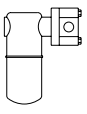
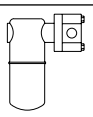
Armstrong Steam Trap ID Charts

Illustration	Type	Flow Direction	Connection Type	Max. Allow. Press. psig	TMA °F	Body Material	Model	Max. Oper. Press. psig	Connection Size							Located on Page
									1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	
	**Series 200** Inverted Bucket Capacities to **20 000** lb/hr	↑	Screwed	250	450	ASTM A48 Class 30 Cast Iron	**211** **212** **213** **214** **215** **216**	250 250 250 250 250 250	• • •	• •	• • •	• •	• •	• •		76
	**Series 800** Inverted Bucket Capacities to **20 000 lb/hr**	→	Screwed	250	450	ASTM A48 Class 30 Cast Iron	**800** **811** **812** **813** **814** **815** **816**	150 250 250 250 250 250 250	• • •	• • • •	• • • •	• •	• •	• •	• •	78 80
	**Series 880** Inverted Bucket Capacities to **4 400** lb/hr	→	Screwed	250	450	ASTM A48 Class 30 Cast Iron	**880** **881** **882** **883**	150 250 250 250	• • •	• • • •	• • • •	• •				82
	**Series 970** Inverted Bucket Capacities to **4 400** lb/hr	→	Screwed Socketweld Flanged †	600	650	ASTM A216 WCB Stainless Steel	**971** **973**	600 600	•	• •	• •					84

† Operating pressure and temperature may be limited depending on the class of flange selected.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

Armstrong Steam Trap ID Charts

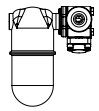
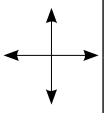
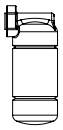
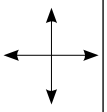
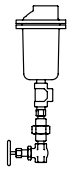
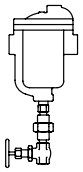
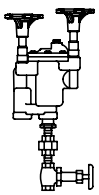
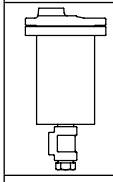
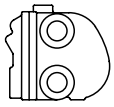
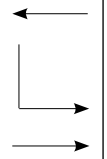
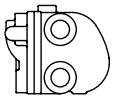
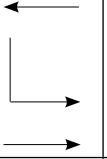
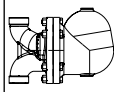
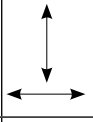
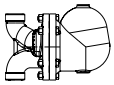
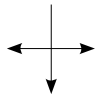
Illustration	Type	Flow Direction	Connection Type	Max. Allow. Press. psig	TMA °F	Body Material	Model	Max. Oper. Press. psig	Connection Size 3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	Located on Page
	**Series 300** Inverted Bucket Capacities to **20 000** lb/hr	→	Screwed Socketweld Flanged †	★★ 700 600 1 080 1 130 965 1 050	★★ 700	ASTM A105 Forged Steel	**310** **312** **313** **314** **315** **316**	400 600 650 650 650 650		• • • 	• • • 	 • • • •	 • •	 • •	 •	86
	**Series 411G** Inverted Bucket Capacities to **1 300** lb/hr	↑	Screwed Socketweld Flanged †	★★ 1 000	★★ 700	ASTM A105 Forged Steel	**411G**	1 000		•	•					88
	**Series 521** Inverted Bucket Capacities to **1 300** lb/hr	→	Screwed Socketweld Flanged †	★★ 1 000	★★ 700	Body ASTM A105 Forged Steel Cap ASTM A216 WCB	**521**	1 000		•	•					90
	**Series 400** Inverted Bucket Capacities to **20 000** lb/hr	↑	Screwed Socketweld Flanged †	★★ 1 050 1 080 1 350	★★ 850	ASTM A182 F22 Forged Steel	**413** **415** **416**	1 000 1 000 1 000		•	•	• •	 •	• •	 •	92
	**Series 401-SH** Inverted Bucket Capacities to **770** lb/hr	↑	Screwed Socketweld Flanged †	1 000	800	Carbon Steel ASTM A106 Gr. B	**401-SH**	1 000		•	•					94
	**Series 501-SH** Inverted Bucket Capacities to **950** lb/hr	↑	Screwed Socketweld Flanged †	1 540	850	316L Stainless Steel ASTM A312	**501-SH**	1 540		•	•					94
	**Series 5000** Inverted Bucket Capacities to **5 150** lb/hr	↑	Socketweld Flanged †	★★ 1 730 ★★ 2 070	★★ 900	ASTM A182 F22 Forged Steel	**5133G** **5155G**	1 500 1 800		•	• •	• •	 •			96
	**Series 6000** Inverted Bucket Capacities to **6 500** lb/hr	↑	Socketweld Flanged †	★★ 3 090	★★ 900	ASTM A182 F22 Forged Steel	**6155G**	2 700					•	•		98
	**Series 1000** Inverted Bucket Capacities to **4 400** lb/hr	↑	Screwed Socketweld	400 400 650 450	800 800 600 800	304L Stainless Steel	**1010** **1011** **1022** **1013**	150 400 650 450		• •	• • •	 •	 	 	 	100
	**Series 1800** Inverted Bucket Capacities to **1 802** lb/hr	→	Screwed Socketweld	400 650	800 600	304L Stainless Steel	**1810** **1811** **1822**	200 400 650	• 	• • •	 • •	 •	 	 	 	102
	**Series 2000** Inverted Bucket Capacities to **1 300** lb/hr	↔	Screwed Socketweld	400 650	800 600	304L Stainless Steel	**2010** **2011** **2022**	200 400 650	 	• • •	• • •	• •	 	 	 	104
	**1811N and 2011N** Inverted Bucket non-metallic seat Capacities to **900** lb/hr	↔	Screwed Socketweld	400	800	304L Stainless Steel	**1811N** **2011N**	200 200		• •	• •	 •	 	 	 	108

★★See tables on pages 86, 89 and 91 for complete temperature/pressure rating information.

† Operating pressure and temperature may be limited depending on the class of flange selected.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

Armstrong® Steam Trap ID Charts

Illustration	Type	Flow Direction	Connection Type	Max. Allow. Press. psig	TMA °F	Body Material	Model	Max. Oper. Press. psig	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	Located on Page
	**Series 4000** Inverted Bucket Capacities to **1 300** lb/hr		Screwed NPT Socketweld Flanged	400	800	ASTM-A 240 Grade 304L	**4011**	400	•	•	•				110
				650	600		**4022**	650	•	•	•				
	**Series IB4500** Inverted Bucket Superheat Capacities to **1 300** lb/hr		Screwed Socket Weld Flanged	1000	800	ASTM A351 Grade CF8M	**IB4500**	1000		•	•				112
	**Series 20-DC** Automatic Differential Condensate Controllers Capacities to **20 000** lb/hr		Screwed	250	450	ASTM A48 Class 30 Cast Iron	**21-DC** **22-DC** **23-DC** **24-DC** **25-DC** **26-DC**	250 250 250 250 250 250	• 	 • 	 • 	 • 	 • 	 •	114
	**Series 80-DC** Automatic Differential Condensate Controllers Capacities to **20 000** lb/hr		Screwed	250	450	ASTM A48 Class 30 Cast Iron	**81-DC** **82-DC** **83-DC** **84-DC** **85-DC** **86-DC**	250 250 250 250 250 250	 	• • 	 • 	 • 	 	 • •	116
	**Series TVS 80-DC** Automatic Differential Condensate Controllers Capacities to **4 400** lb/hr		Screwed	250	450	ASTM A48 Class 30 Cast Iron	**TVS 81-DC** **TVS 82-DC** **TVS 83-DC**	250 250 250	• •	• • •	 •	 	 	 	118
	**Series 30-DC** Automatic Differential Condensate Controllers Capacities to **20 000** lb/hr		Screwed	1 080 1 130 1 015 1 100	700	ASTM A105 Forged Steel	**33-DC** **34-DC** **35-DC** **36-DC**	650 650 650 650			• 	 • 	 • 	 •	120
	**Series B & BI** F&T Capacities to **8 900** lb/hr		Screwed	125 175	353 377	ASTM A48 Class 30 Cast Iron	**B2, BI2** **B3, BI3** **B4, BI4** **B5** **B6** **B8**	30 30 30 30 30 30	•▲ 	 •▲ 	 •▲ 	 • 	 • 	 •	124
	**Series A & AI** F&T Capacities to **8 900** lb/hr		Screwed	175	377	ASTM A48 Class 30 Cast Iron	**AI2** **A3, AI3** **A4, AI4** **A5** **A6** **A8**	175 175 175 175 175 175	• •▲ 	 • •▲ 	 • • 	 • • 	 • •	 •	126
	**Series AIC** F&T Capacities to **60 000** lb/hr		Screwed Flanged	580	572	ASTM A395 Ductile Iron	**AICV** **AICFH**	465					•	•	130
	**Series ICS** F&T Capacities to **60 000** lb/hr		Screwed Socketweld Flanged †	580	572	Carbon Steel	**ICS**	465	•	•	•	•	•	•	132

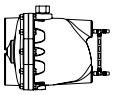
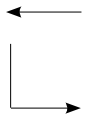
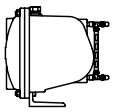
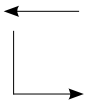
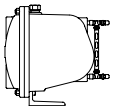
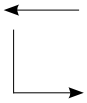
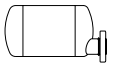
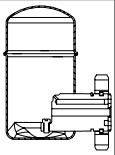
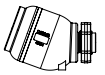
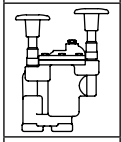
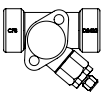
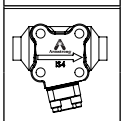
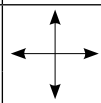
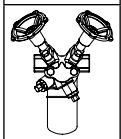
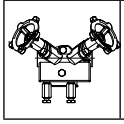
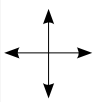
† Operating pressure and temperature may be limited depending on the class of flange selected.

▲Series AI and BI for in-line connection.

† Operating pressure and temperature may be limited depending on the class of flange selected.

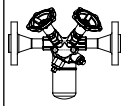
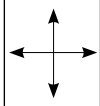
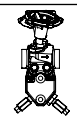
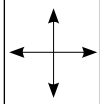
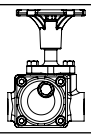
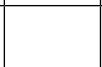
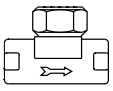
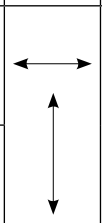
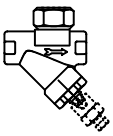
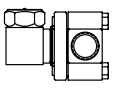
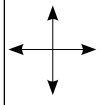
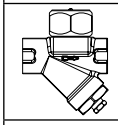
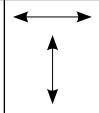
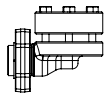
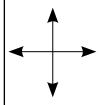
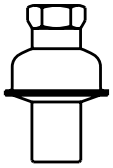
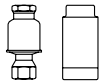
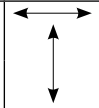
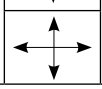
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

Steam Trap ID Charts

Illustration	Type	Flow Direction	Connection Type	Max. Allow. Press. psig	TMA °F	Body Material	Model	Max. Oper. Press. psig	Connection Size								Located on Page
									1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	
	**Series JD & KD** F&T Capacities to **142 000** lb/hr		Screwed Flanged	300	650	ASTM A395 Ductile Iron	**15-JD** **20-JD** **30-JD** **75-JD** **125-JD** **175-JD** **250-JD** **300-JD** **30-KD** **50-KD** **300-KD**	15 20 30 75 125 175 250 300 30 50 300						• • • • • • • • • 	 • •	 •	134
	**Series L & M** F&T Capacities to **208 000** lb/hr		Screwed Flanged † (screw on)	250	450	ASTM A48 Class 30 Cast Iron	**L8** **L10** **M12**	250 250 250						•	•	•	136
	**Series LS & MS** F&T Capacities to **280 000** lb/hr		Screwed Socketweld Flanged †	450	650	ASTM A216 WCB Carbon Steel	**LS8** **LS10** **MS12**	450 450 450						•	•	•	138
	**Series FT-4000** F&T Capacities to **1 080** lb/hr		Screwed Socketweld	485	600	ASTM A240 Grade 304L	**FT-4075** **FT-4150** **FT-4225** **FT-4300** **FT-4465**	75 150 225 300 465	• • • • •	• • • • •	• • • • •						140
	**Series FF-4000** F&T Capacities to **1 050** lb/hr		Screwed Socketweld	600	800	ASTM A240 Grade 304L	**FF-4250** **FF-4450**	250 450	• •	• •							142
	**Model FF-4700/4900**		Screwed Socket Weld Flanged	1245 1245	900 900	ASTM A351 Grade CF8M	**FF-4700** **FF-4900**	900 1245		•	•						143
	**TVS 800** Trap Valve Station Capacities to **4 400** lb/hr		Screwed	250	450	ASTM A48 Class 30 Cast Iron	**TVS 811** **TVS 812** **TVS 813**	250 250 250	• •	• • •	 •						144
	**Universal Connector**		Screwed Socketweld Flanged	650	600	Stainless Steel	**Standard** **IS-2**	650	•	•	•						148
	**IS-4**		Screwed Socketweld Flanged	1245 1100	900 800	ASTM A351 Gr. CF8M	**IS-4** **IS-4BD**	1245 1100		•	•						149
	**TVS 4000** Trap Valve Station		Screwed Socketweld	650	600	ASTM A351 Gr. CF8M	**TVS 4000**	650	•	•							150
	**TVS 4000F** Trap Valve Station		Flanged †	650	600	ASTM A351 Gr. CF8M	**TVS 4000F**	650		•	•						150

† Operating pressure and temperature may be limited depending on the class of flange selected.

Armstrong® Steam Trap ID Charts

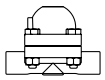
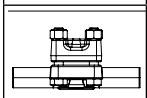
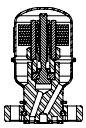
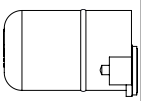
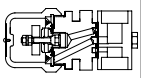
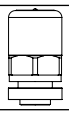
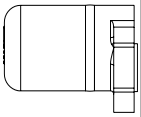
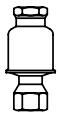
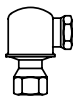
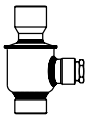
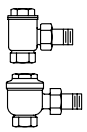
Illustration	Type	Flow Direction	Connection Type	Max. Allow. Press. psig	TMA °F	Body Material	Model	Max. Oper. Press. psig	Connection Size								Located on Page
									1/4"	3/8"	1/2"	3/4"	1"	2"	2-1/2"	3"	
	**TVS 5000** Trap Valve Station		Screwed Socketweld Flanged †	650	600	ASTM A350 LF2	**TVS 5000**	650	•	•							156
	**TVS 6000UD**		Screwed Socketweld Buttweld Flanged	650	600	ASTM A350 LF2	**TVS 6000UD**	650			•	•	•				158
	**TVS 1100** Trap Valve Station		Screwed Socketweld Flanged †	580	662	ASTM A105 Carbon Steel	**TVS 1100**	319			•	•					160
	**Series CD-33** Disc Capacities to **2 428** lb/hr		Screwed	915	752	ASTM A743 Gr. CA40	**CD-33** **CD-33L**	600			•	•	•				162
	**Series CD-33S** Disc w/Integral Strainer Capacities to **2 428** lb/hr						**CD-33S** **CD-33SL**				•	•	•				162
	**Series CD-3300** Disc Capacities to **800** lb/hr		Screwed Socketweld	720	750	Stainless Steel	**CD-3300**	450			•	•	•				165
	**Series CD-72SR** Controlled Disc Capacities to **3 900** lb/hr		Screwed NPT BSPT Socketweld Flanged †	1 010	750	ASTM A105N/ A350 LF2 Cl.1	**CD-72S/ SL**	600			•	•	•				166
	**Series CD-4080**		Screwed Socketweld Flanged	1245	900	ASTM A351 Gr. CF8M	**CD-4080**	1245				•	•				168
	**Series WMT** Thermostatic Wafer Cold Water Start-Up Capacities to **1 000** lb/hr		Screwed	250	400	304L Stainless Steel	**WMT-1**	250	•	•	•						172
	**Model TC-300** Cold Water Start-Up Capacities to **1 000** lb/hr		Screwed Socketweld Flanged †	465	662	ASTM A15 Carbon Steel	**TC-300**	250			•	•	•				173
	**Series WT** Thermostatic Wafer Cold Water Start-Up Capacities to **1 600** lb/hr		Screwed	400	650	304L Stainless Steel	**WT-1**	400			•	•					174
			Screwed Socketweld	600	750	C1018 Carbon Steel	**WT-3**	600			•	•					
				400	650	304L Stainless Steel	**WT-2000**	400			•	•	•				

*L = low pressure

*H = high pressure

† Operating pressure and temperature may be limited depending on the class of flange selected.

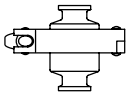
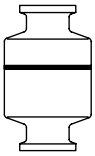
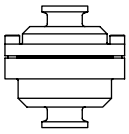
Steam Trap ID Charts

Illustration	Type	Flow Direction	Connection Type	Max. Allow. Press. psig	TMA °F	Body Material	Model	Max. Oper. Press. psig	Connection Size 1/2"	Connection Size 3/4"	Connection Size 1"	Located on Page
	**Model SH** Bimetallic	↔	Screwed NPT BSPT Socketweld Flanged †	580	662	ASTM A105	**SH-300**	319	●	●	●	176
 Cold Water Start-Up Capacities to **1 600** lb/hr		↕	Screwed NPT BSPT Socketweld Buttweld Flanged †	900	900	Stainless Steel	**SH-900**	L=650* H=900*	●	●		
			Buttweld Flanged †								●	
	**Model SH-1600**	↔	Socketweld Buttweld Flanged	1750	970	ASTM A-182 F22 Class 3	**SH-1600**	1750	●	●	●	178
	**Model SH-2000** Cold Water Start-Up Capacities to **4 800** lb/hr	✥	Screwed Socketweld	400	800	Stainless Steel	**SH-2000**	400	●	●	●	179
	**Model SH-2500** Cold Water Start-Up Capacities to **6 000** lb/hr	✥	Screwed Socketweld	650	600	ASTM A351 Gr. CF8M	**SH-2500**	650	●	●	●	180
	**Model AB-3000** Bimetallic Capacities to **4 000** lb/hr	✥	Screwed Socketweld Flanged †	319	650	ASTM - A240 304L	**AB-3000**	319	●	●	●	181
	**Model AB-3500**	✥	Screwed Socketweld Flanged †	465	500	ASTM A-351 Gr. CF8	**AB-3500**	319	●	●	●	182
	**Model SH-4000** Cold Water Start-Up Capacities to **6 000** lb/hr	✥	Screwed Socketweld	1 245	900	Stainless Steel	**SH-4000**	1 245		●	●	183
	**Series TT** Thermostatic Bellows	↔	Screwed	300	450	304L Stainless Steel	**TTF-1**	300	●	●		184
		↳					**TTF-1R**		●	●		
 Capacities to **3 450** lb/hr		✥	Screwed Socketweld				**TT-2000**		●	●	●	
	**TAVB** Thermostatic Bellows w/Integral Vacuum Breaker	↑	Straight-Thru Screwed	300	365	304L Stainless Steel	**TAVB-2** **TAVB-3**	150	●	●		186
	**Series TS-2/TS-3** Radiator	↓	Threaded	50	300	Bronze	**TS-2**	50	●	●		187
Capacities to **1 600** lb/hr		↳		65	315		**TS-3**	65	●	●	●	

† Operating pressure and temperature may be limited depending on the class of flange selected.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

Armstrong®

Illustration	Type	Flow Direction	Connection Type	Max. Allow. Press. psig	TMA °F	Body Material	Model	Max. Oper. Press. psig	Connection Size			Located on Page
									1/2"	3/4"	1"	
	**Series TC** Thermostatic Clean Steam Clamped Capacities to **3 450** lb/hr		Sanitary	120	350	Stainless Steel	**TC-C**	100	•	•	•	188
	**Series TC** Thermostatic Clean Steam Sealed Capacities to **3 775** lb/hr		Sanitary	150	366	Stainless Steel	**TC-S**	120	•	•	•	
			Threaded						•	•		
			Tube End						•	•		
	**Series TC** Thermostatic Clean Steam Repairable Capacities to **3 775** lb/hr		Sanitary	120	356	Stainless Steel	**TC-R**	100	•	•	•	
			Threaded						•	•		
			Tube End						•	•		

Notes

Armstrong® The Inverted Bucket Steam Trap

Energy Efficient Because It's So Reliable

The inverted bucket is the most reliable steam trap operating principle known. The heart of its simple design is a unique leverage system that multiplies the force provided by the bucket to open the valve against pressure. Since the bucket is open at the bottom, it resists damage from water hammer, and wear points are heavily reinforced for long life.

The inverted bucket has only two moving parts—the valve lever assembly and the bucket. That means no fixed points, no complicated linkages. Nothing to stick, bind or clog.

Wear and corrosion resistance

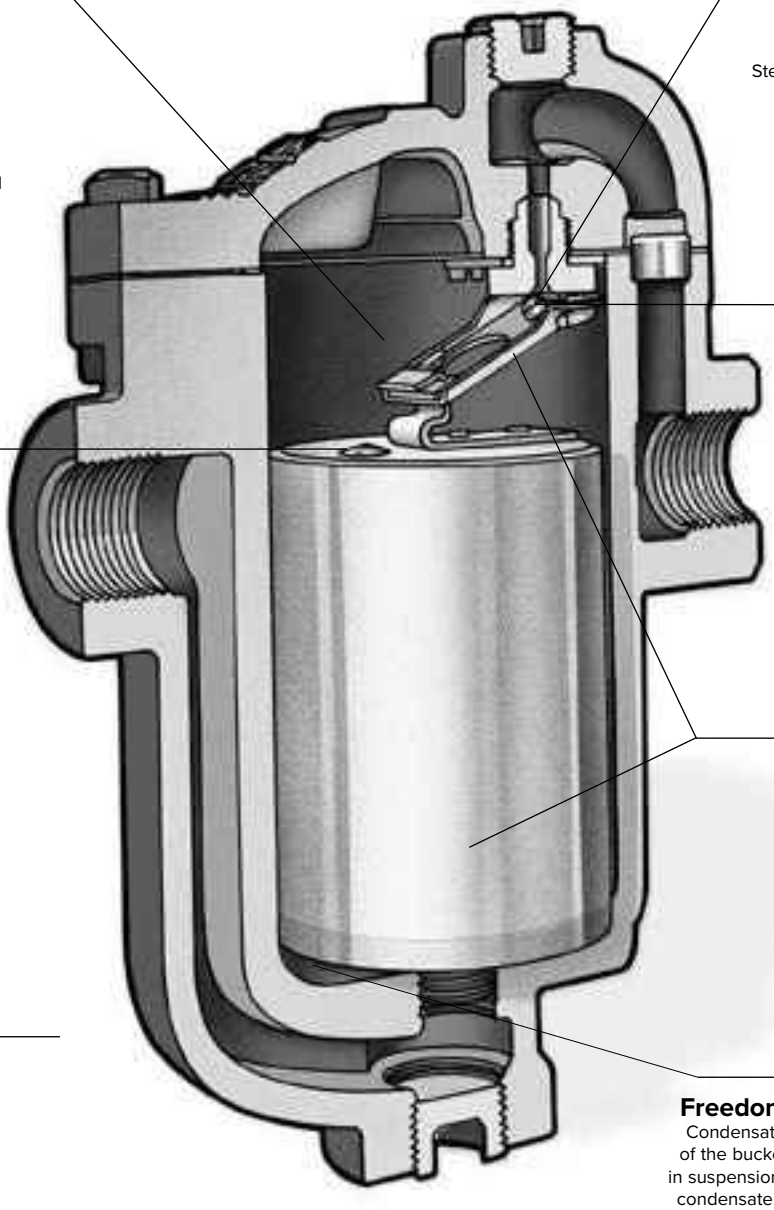
Free-floating guided lever valve mechanism is "frictionless," and all wear points are heavily reinforced. All working parts are stainless steel. Valve and seat are stainless steel, individually ground and lapped together in matched sets.

Continuous air and CO_2 venting

Vent in top of bucket provides continuous automatic air and CO_2 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.

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.



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.

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.

Resistance to damage from water hammer

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

Inverted Bucket Steam Trap

Conserves Energy Even in the Presence of Wear

Armstrong inverted bucket steam traps open and close based on the difference in density between condensate and steam—the inverted bucket principle. They open and close gently, minimizing wear. This simple fact means that inverted buckets are subject to less wear than some other types of traps.

In fact, as an Armstrong inverted bucket trap wears, its tight seal actually improves. The ball valve and seat of the Armstrong trap provide essentially line contact—resulting in a tight seal because the entire closing force is concentrated on one narrow seating ring.

An Armstrong inverted bucket trap continues to operate efficiently with use. Gradual wear slightly increases the diameter of the seat and alters the shape and diameter of the ball valve. But, as this occurs, a tight seal is still preserved—the ball merely seats itself deeper.

Corrosion-Resistant Parts

The stainless steel valve and seat of the Armstrong inverted bucket steam trap are individually ground and lapped together in matched sets. All other working parts are wear- and corrosion-resistant stainless steel.

Venting of Air and CO_2

The Armstrong inverted bucket provides continuous automatic air and CO_2 venting with no cooling lag or threat of air binding.

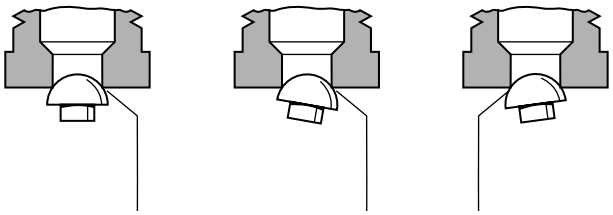
Operation Against Back Pressure

The Armstrong inverted bucket has excellent performance against back pressure. It has no adverse effect on inverted bucket operation other than to reduce its capacity by the low differential. The bucket simply requires less force to pull the valve open and cycle the trap.

Freedom From Dirt Problems

Armstrong designed its inverted bucket to be virtually free of dirt problems. The valve and seat are at the top of the trap, far away from the larger particles of dirt, which fall to the bottom. Here the up-and-down action of the bucket pulverizes them. Since the valve of an inverted bucket is either fully closed or open, dirt particles pass freely. And the swift flow of condensate from under the bucket's edge creates a unique self-scrubbing action that sweeps dirt out of the trap.

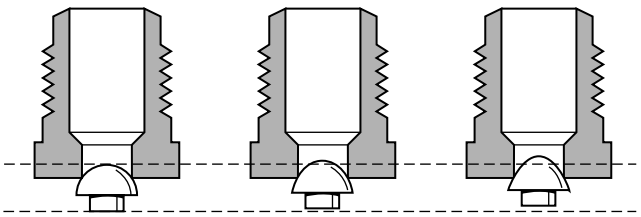
Armstrong IB Valve Seating/Ball Valve



Line Contact—Single Seat

Infinite Number of Center Lines and Seating Circumferences

IB Valve Wear Characteristics



Armstrong IB ball valve continues to seat itself deeper, providing a tight seal even in the presence of wear.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

How to Use the IB Trap Summary Capacity Chart

This catalog should be utilized as a guide for the installation and operation of steam trapping equipment by experienced personnel. Selection or installation should always be accompanied by competent technical assistance or advice. Armstrong and its local representatives are available for consultation and technical assistance. We encourage you to contact your Armstrong Representative for complete details.

The summary capacity chart plots actual trap capacity vs. inlet pressure on a log-log grid. The trap capacities become **straight lines** on this grid. The **small numbers** along the pressure axis identify the subdivisions; for example, between the large 10 and 100, the numbers 2, 3, 5, and 7 represent 20, 30, 50 and 70 psig.

The summary chart combines many trap families into one chart by presenting only a portion of the capacity line for each orifice size. For charts that give capacity over a wide range of pressures, see the specific trap model pages.

Individual capacity charts for various traps are given throughout this catalog. Those charts show capacity lines for each orifice, with pressures usually from 1 psig up to the maximum rated pressure of that orifice.

To select an inverted bucket steam trap using the summary capacity chart, you must know the condensate load, safety factor, inlet pressure and outlet pressure. Remember, the object is to select a trap that can 1) operate at the maximum inlet pressure, and 2) handle the capacity at the minimum differential pressure. Consider the following typical problems.

Example 1. Constant pressure, condensing rate.
Given:
Maximum inlet pressure . . . . . .70 psig
Normal operating differential pressure . . . . . 60 psig
Required capacity = 300 lb/hr condensate load
times 3:1 safety factor, or . . . . . 900 lb/hr

Enter the chart at the 60 psig line and go up to 900 lb/hr capacity. This is directly on the 5/32" orifice line for models 211, 811 and 881 (and other traps). Now follow this line to the right, to the vertical drop at 70 psig. This means the orifice will work, in these traps, up to a maximum differential of 70 psig. Assuming a cast iron trap is suitable, the 5/32" orifice in a Model 211, 811 or 881 trap will meet all the operating requirements.

Example 2. Constant condensing rate but with possible reduced inlet pressure.
Given:
Maximum inlet pressure . . . . . .100 psig
Minimum inlet pressure. . . . . .40 psig
Required capacity = 400 lb/hr condensate load
times 3:1 safety factor, or . . . . . .1 200 lb/hr

Consider the maximum operating pressure first. Enter the chart at the 100 psig line and find the first capacity line above 1 200 lb/hr. This is the 5/32" orifice in a Model 212, 812 or 882, and it has a capacity of 1 800 lb/hr at 100 psig. Now extend this straight line to the left until it intersects the 40 psig pressure line. At 40 psig, read a capacity of 1 300 lb/hr. (You could also refer to the individual capacity charts for Models 212, 812 or 882.) Assuming cast iron is suitable, this is the desired trap selection to meet the requirements of opening at the maximum pressure, and also having the needed capacity at the minimum pressure.

This example points out how the capacity is influenced by the trap size. Example 1 also used the same orifice size, but in a physically smaller trap. In the larger trap the same diameter orifice not only has a higher capacity, it will work at higher pressures.

Example 3. Constant condensing rate but high back pressure.
Given:
Inlet pressure . . . . . .100 psig
Normal outlet (back) pressure . . . . . 50 psig
Required capacity = 1 800 lb/hr condensate load
times 3:1 safety factor, or . . . . . 5 400 lb/hr

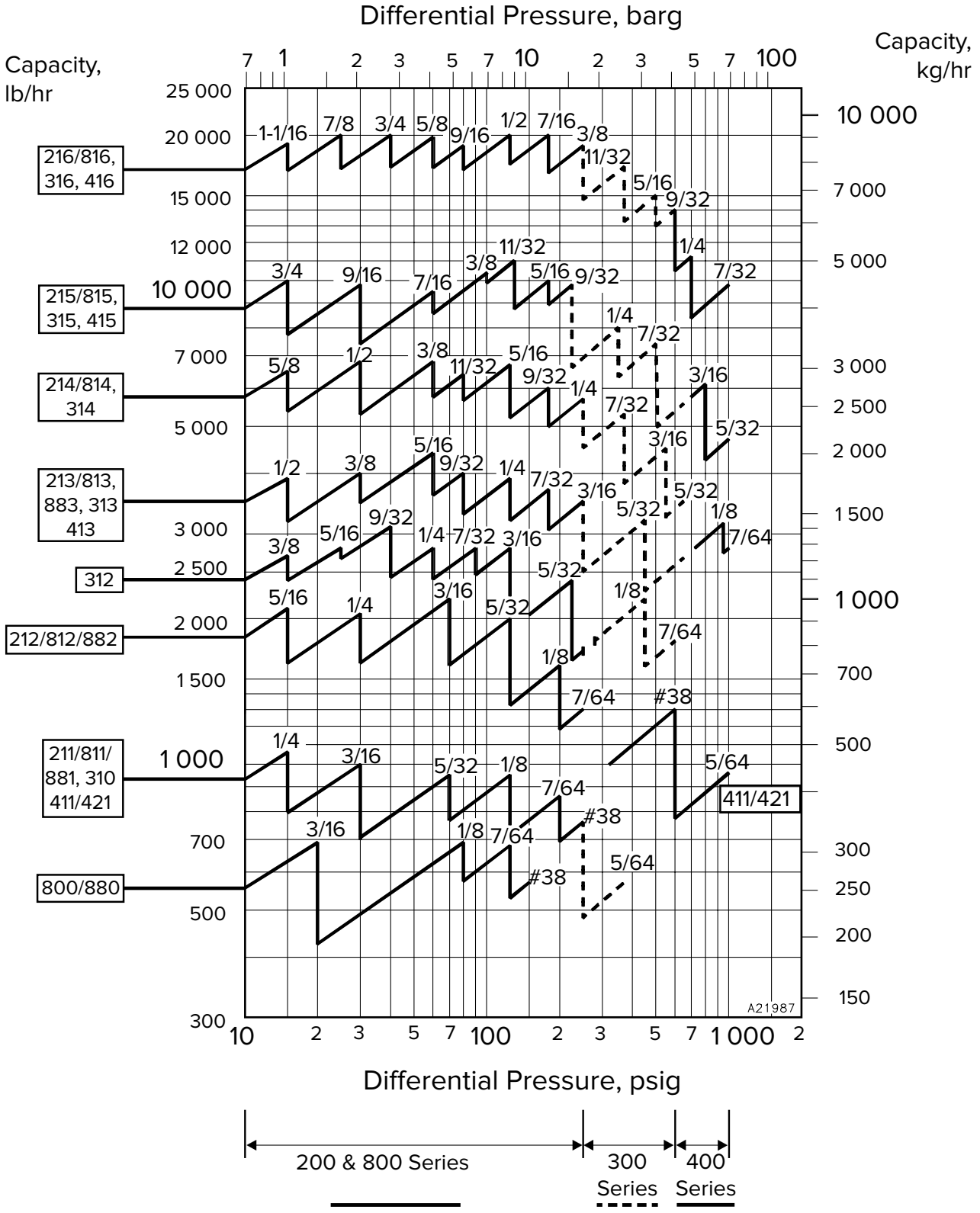
Traditional method:
Since the differential pressure is only 50 psig, enter the chart at 50 psig and go up to a capacity of 5 400 lb/hr. This is just under the capacity lines for Models 214 and 814. However, the 5/16" orifice is the largest orifice that will operate at 100 psig inlet pressure. (Remember that the back pressure may not always be there!) Extend the capacity line for the 5/16" orifice to the left, and read a capacity of 4 800 lb/hr at 50 psig. Since this is too low, go up to the 215/815 capacity lines and repeat the process. The selection will end up being a Model 215 or 815 with a 3/8" orifice.*

About this chart ...
The Armstrong capacity chart shows continuous discharge capacities of Armstrong traps under actual operating conditions, as determined by many hundreds of tests made over the years. In these tests, **hot condensate** was used, at or near the steam temperature corresponding to the test pressure. The choking effect of flash steam in the orifice and the back pressure created by this flash steam were therefore automatically taken into account. The test setups were similar to an actual installation hookup, so that pipe friction in both inlet and discharge lines was reflected in the results.

* This method is conservative. While it will always select a workable trap, it may select a larger trap than necessary. Consult Armstrong Application Engineering for further information about the effects of back pressure.

IB Trap Summary Capacity Chart

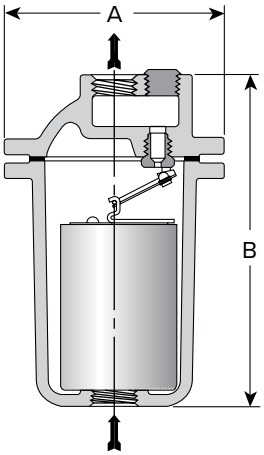
Summary Capacity Chart



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_2 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				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)	

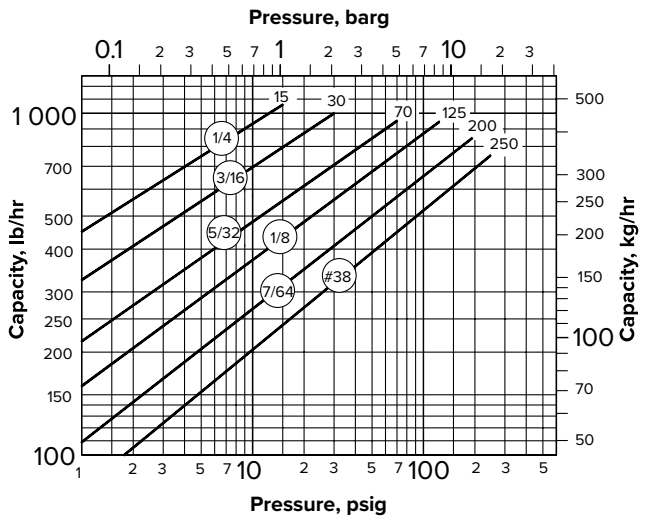
200 Series Inverted Bucket Steam Traps

Cast Iron for Vertical Installation

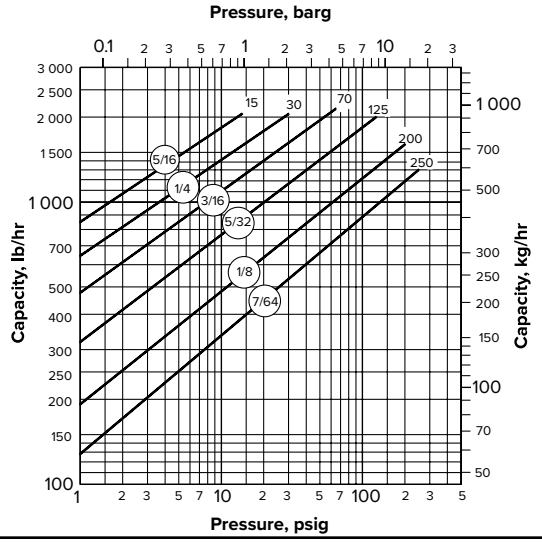
For Pressures to 250 psig (17 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)

Armstrong®

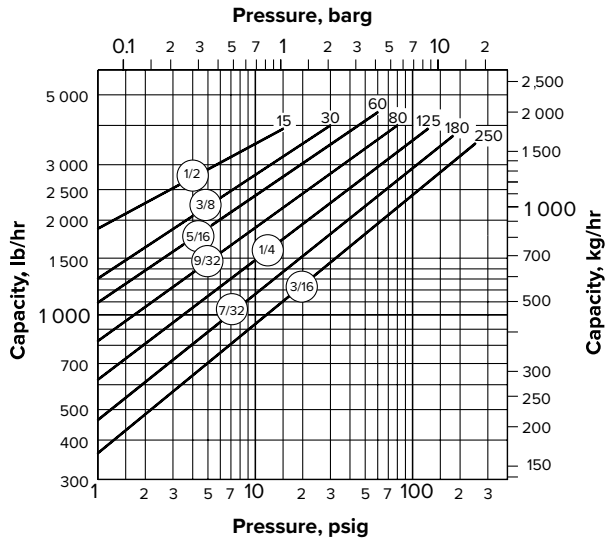
Model 211 Capacity



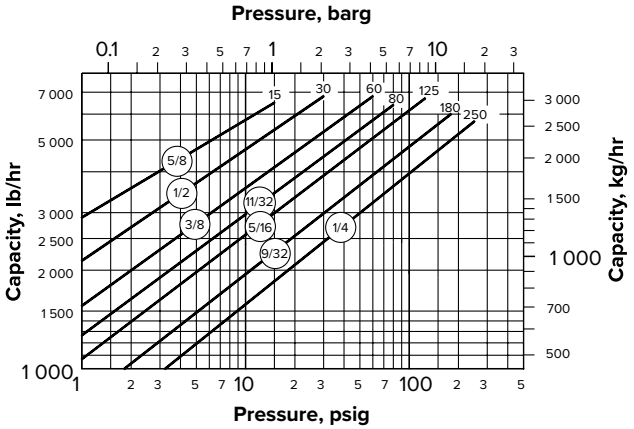
Model 212 Capacity



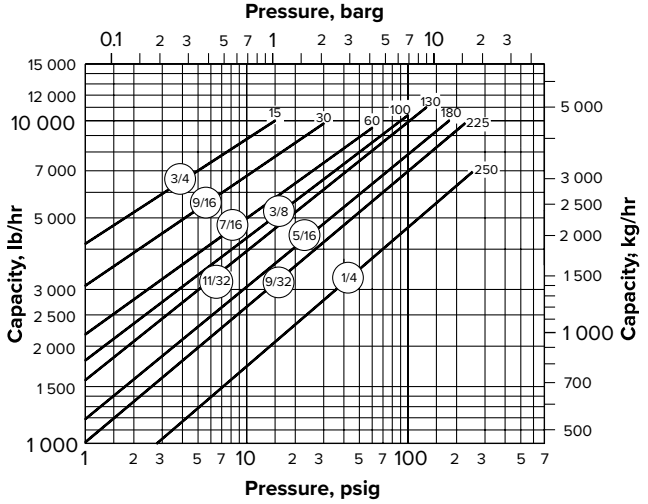
Model 213 Capacity



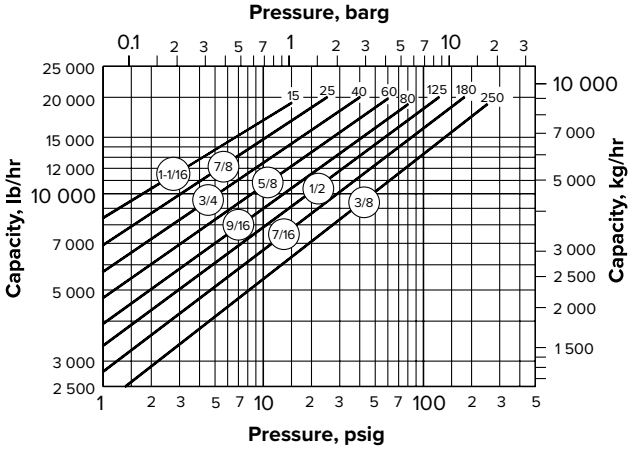
Model 214 Capacity



Model 215 Capacity



Model 216 Capacity



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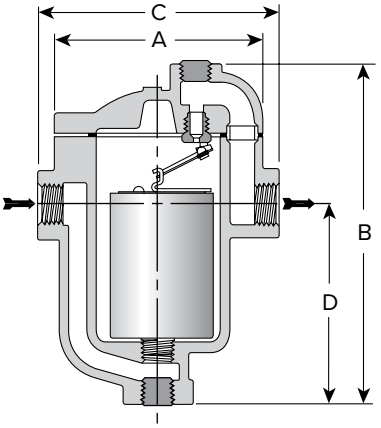
800-813 Series Inverted Bucket Steam Trap

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_2 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)	

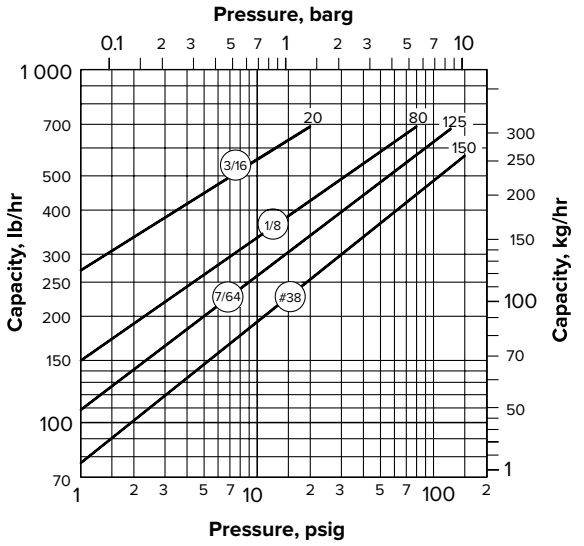
*Cannot be furnished with both thermic vent bucket and check valve.

800-813 Series Inverted Bucket Steam Trap

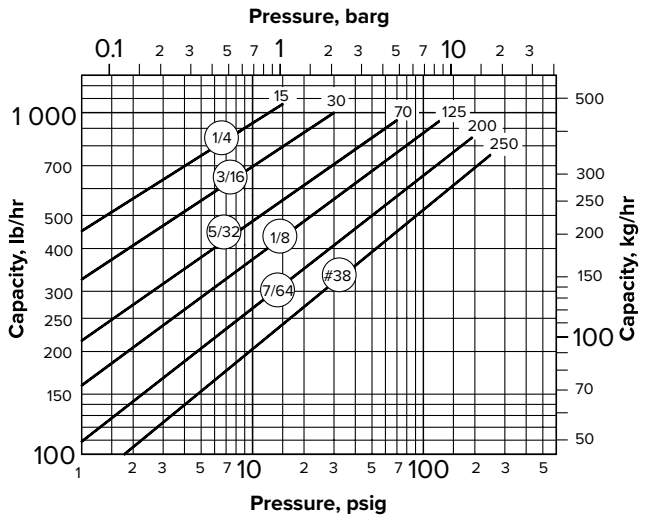
Cast Iron for Horizontal Installation

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

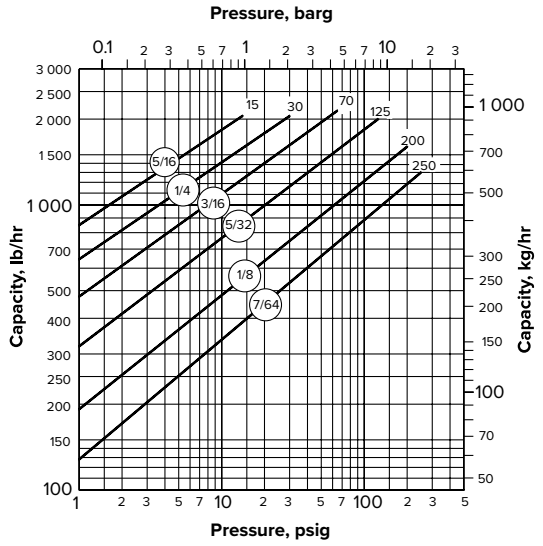
Model 800 Capacity



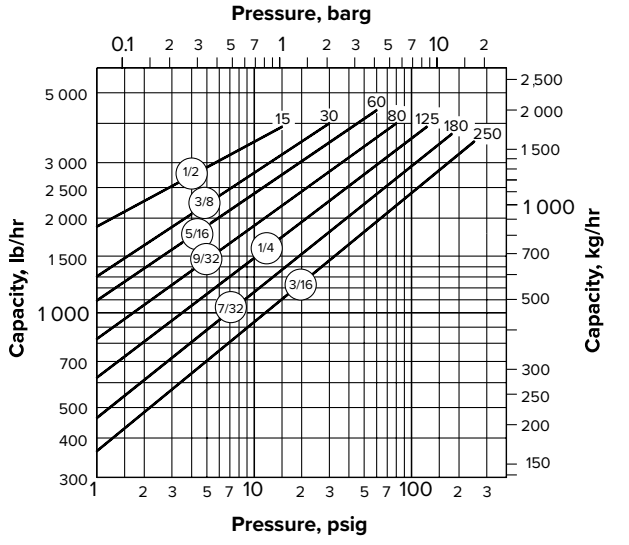
Model 811 Capacity



Model 812 Capacity



Model 813 Capacity



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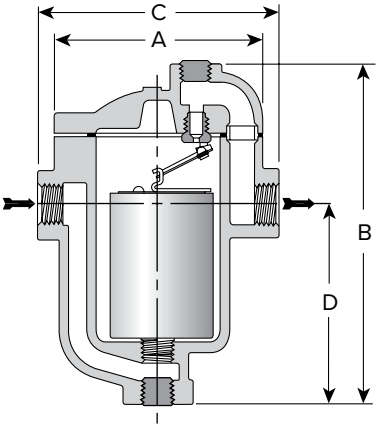
814-816 Series Inverted Bucket Steam Trap

Cast Iron for Horizontal Installation

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



Description

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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_2 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:	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

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

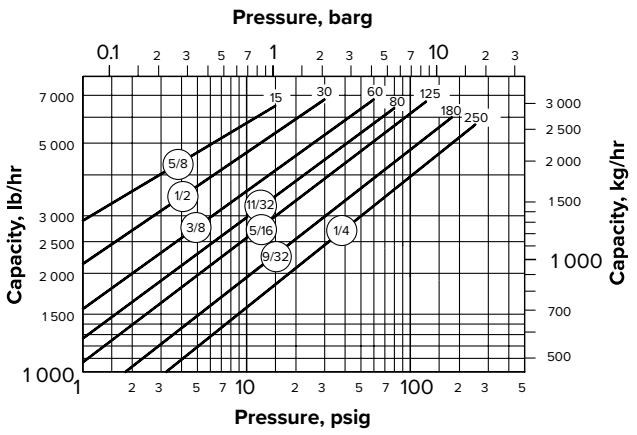
Model No.	814		815		816	
	in	mm	in	mm	in	mm
Pipe Connections	1, 1-1/4	25, 32	1, 1-1/4, 1-1/2, 2	25, 32, 40, 50	2, 2-1/2	50, 65
Test Plug	1	25	1-1/2	40	2	50
"A" (Flange Diameter)	8	203	9	229	11-1/2	292
"B" (Height)	13-5/8	346	16-1/4	413	21-5/16	541
"C" (Face-to-Face)	9	229	10-1/4	260	13	330
"D" (Bottom to ℄ 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)	

814-816 Series Inverted Bucket Steam Trap

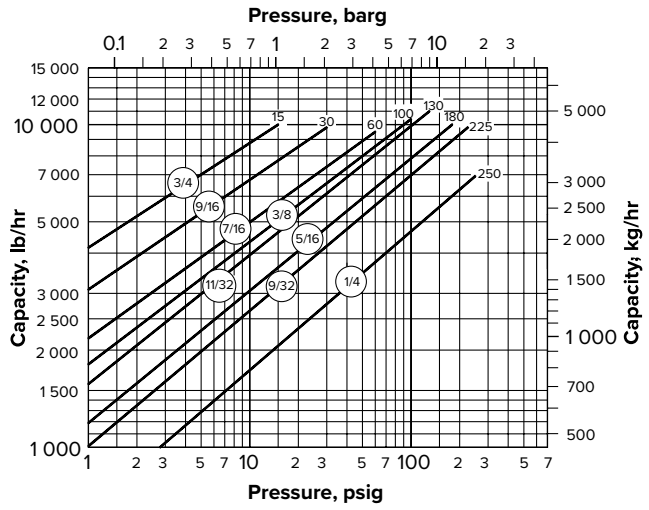
Cast Iron for Horizontal Installation

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

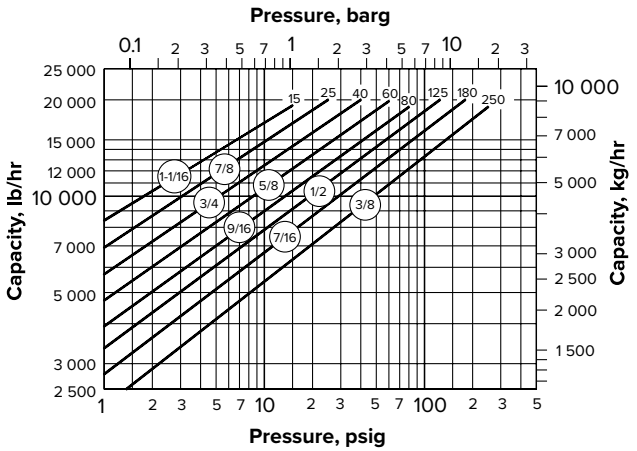
Model 814 Capacity



Model 815 Capacity



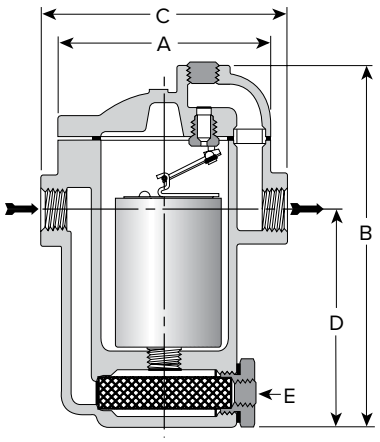
Model 816 Capacity



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_2 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:	ASTM A48 Class 30
Internals:	All stainless steel—304
Valve and seat:	Stainless steel—17-4PH
Test plug:	Carbon steel
Strainer:	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 ℄ 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)	

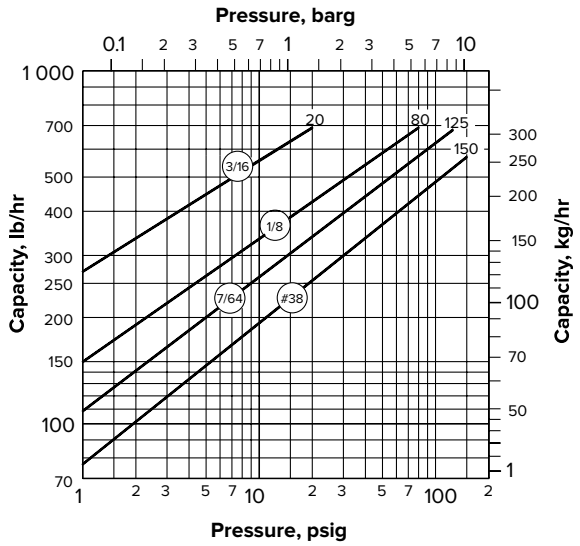
*Cannot be furnished with both thermic vent bucket and check valve.

880 Series Inverted Bucket Steam Traps

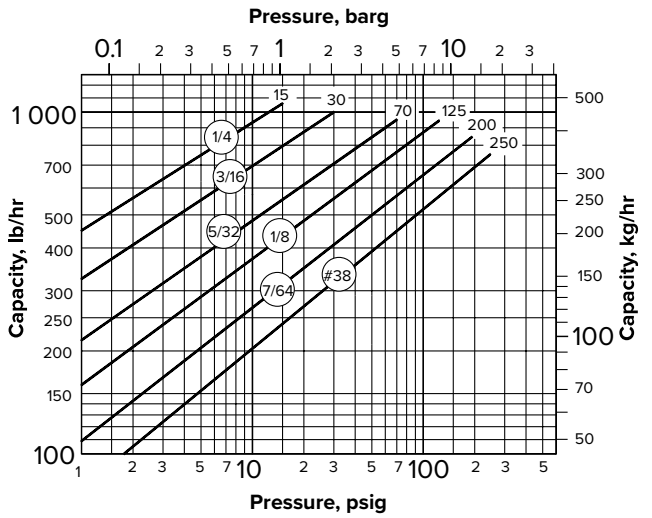
Cast Iron for Horizontal Installation With Integral Strainer

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

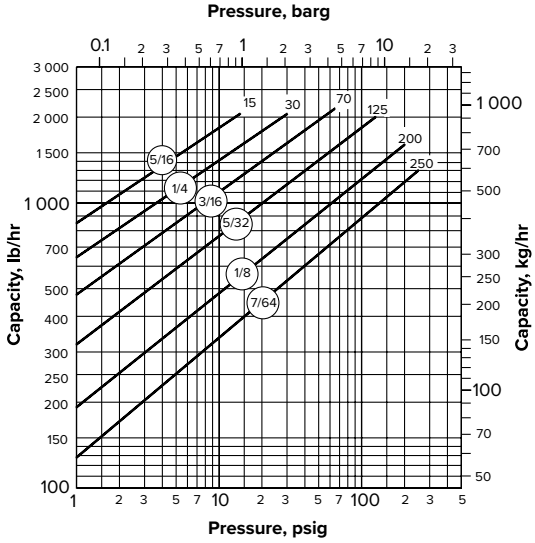
Model 880 Capacity



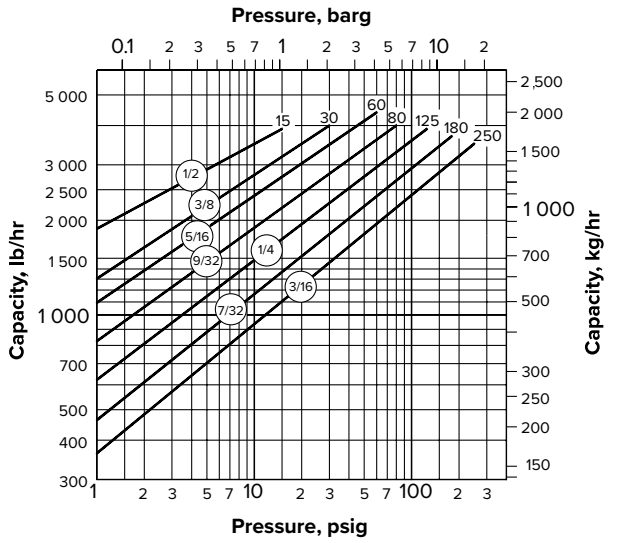
Model 881 Capacity



Model 882 Capacity



Model 883 Capacity

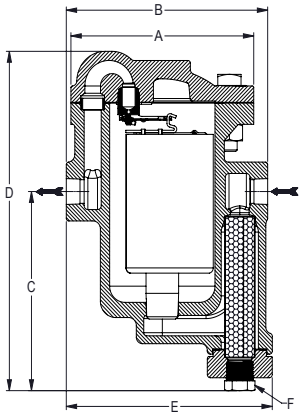


Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

970 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 vertical 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 CO2 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) 750 psig @ 100°F (51.7 barg @ 38°C)
Maximum operating pressure:	600 psig (41 barg)

Connections

Screwed NPT and BSPT
Socketweld
Flanged

Note: For Integral Flanged connections option see 990F Series

Materials

Body:	ASTM A216 WCB
Internals:	All stainless steel—304
Valve and seat:	< 500psig (34.5barg): Hardened chrome steel 17-4PH > 500psig (34.5barg): Titanium
Strainer:	Stainless steel—304
Cap:	ASTM A351 Gr. CF8M Stainless Steel

Options

- Stainless steel internal check valve
- Thermic vent bucket (973 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 971-CD2989: 973-CD2990.

970 Series Traps

Model No.	971		973	
	in	mm	in	mm
Pipe Connections	1/2, 3/4, 1	15, 20, 25	3/4, 1	20, 25
“A” (Flange Diameter)	4.7	119	7.4	188
“B” (Face - Face, SCR or SW)	6.0	152	8.1	206
“C” (Center to Bottom Height)	5.4	138	7.5	190
“D” (Total Height)	9.0	229	12.9	328
“E” (Total Length)	5.7	145	8.3	211
“F” (Blowdown Connection)	3/8 NPT		3/4 NPT	
Weight, SCR or SW lb (kg)	15 (6.8)		44 (20.0)	

*Consult factory for flanged connections

Shading indicates products that are CE Marked according to the PED (2014/68/UE). All other models comply with Article 4.3 of the same directive.

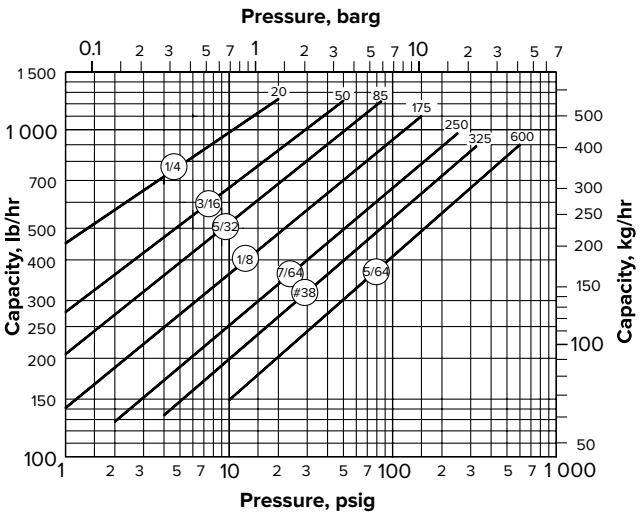
*Face-to-face, other flanges on request. Also available with ANSI raised face, flat face or ring joint flanges.

970 Series Inverted Bucket Steam Traps

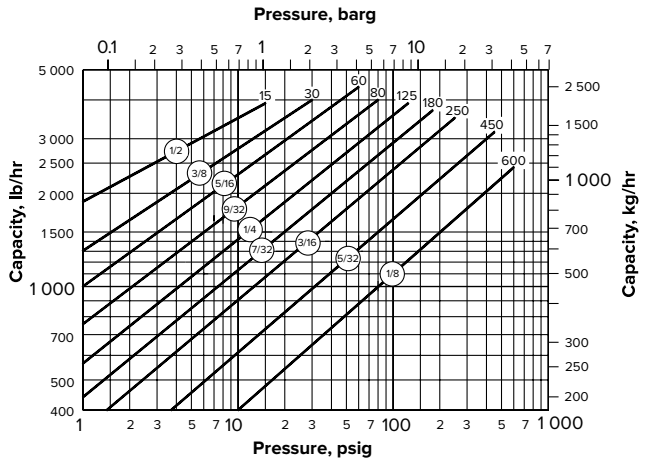
Cast Steel for Horizontal Installation With Integral Strainer

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

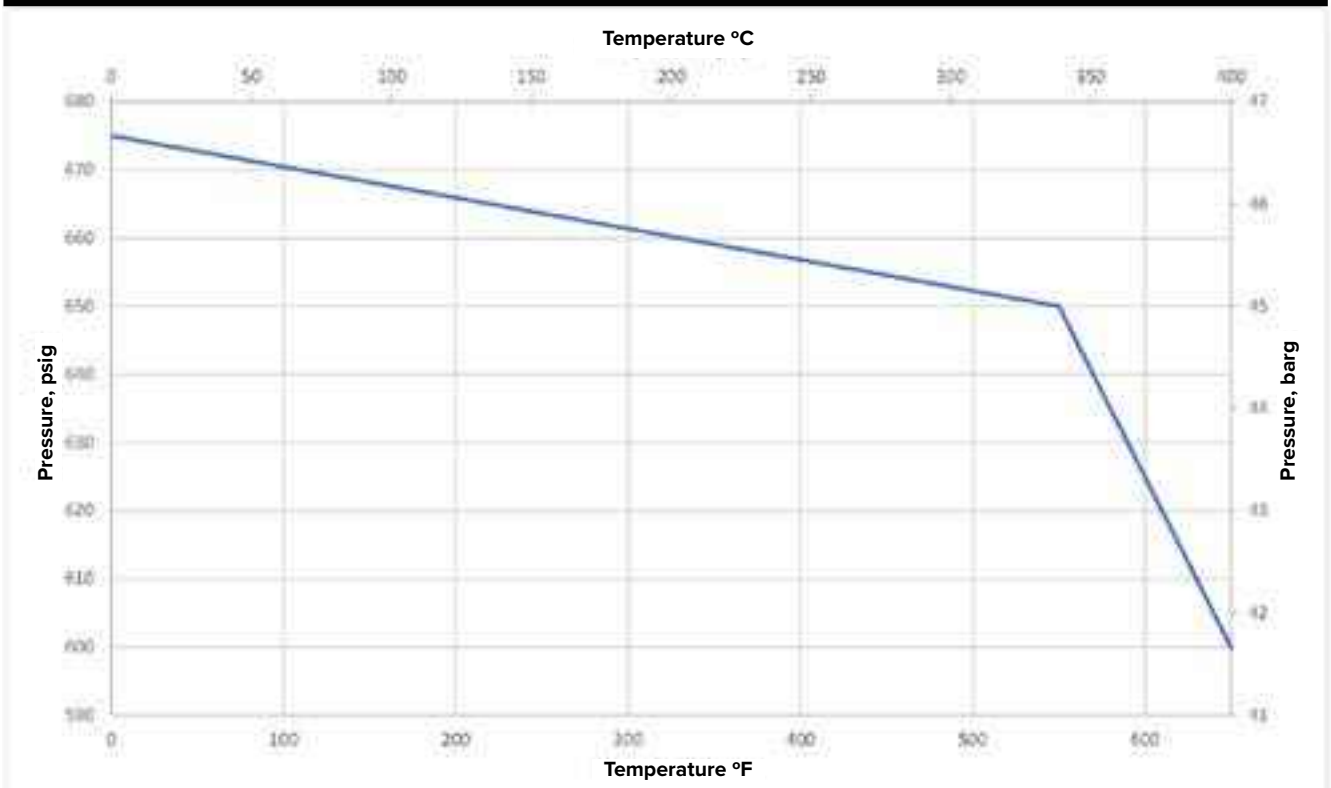
Model 971 Capacity



Model 973 Capacity



970 Series Allowable Pressure/Temperature



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_2 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

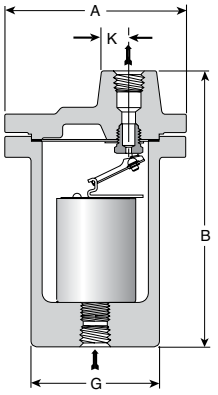
See page 187 for dimensional information for flanged and socketweld connections.

Materials

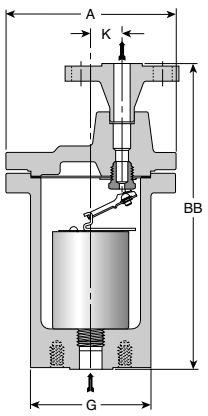
Body:	ASTM A105 Models 312, 313, 316 are also available with cast 316 stainless steel bodies and all stainless steel internals
Internals:	All stainless steel—304 (Models 314, 315 and 316 have cast iron bucket weights)
Valve and seat:	Stainless steel—17-4PH or Titanium

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	°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 for up-to-date information.

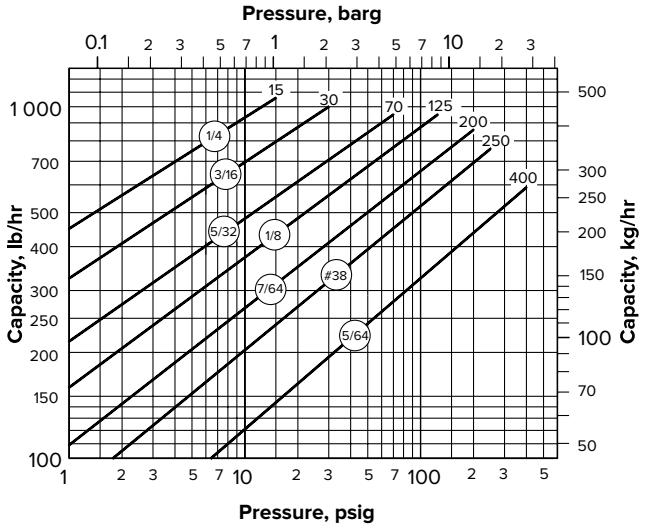
300 Series Inverted Bucket Steam Trap

Forged Carbon Steel for Vertical Installation

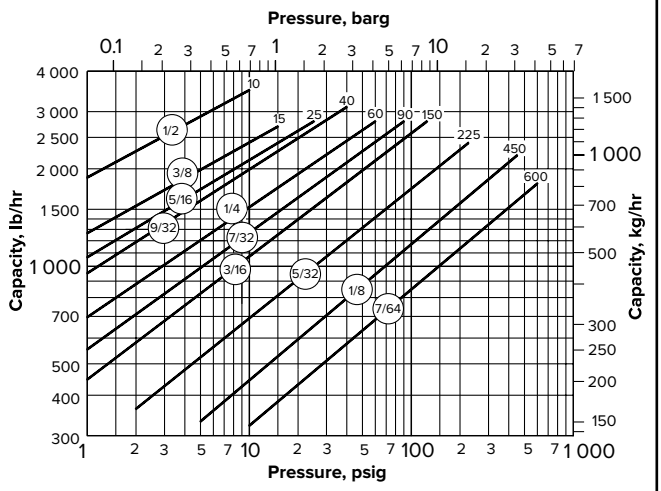
For Pressures to 650 psig (45 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)

Armstrong®

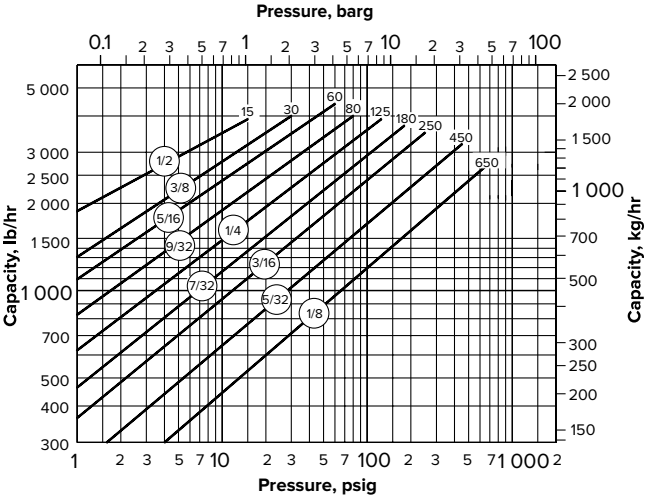
Model 310 Capacity



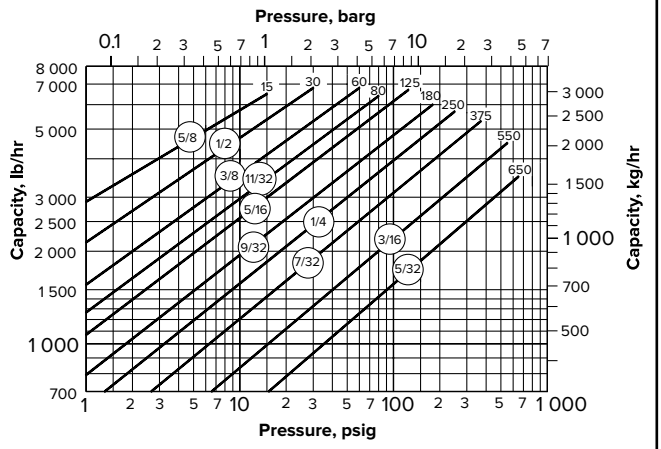
Model 312 Capacity



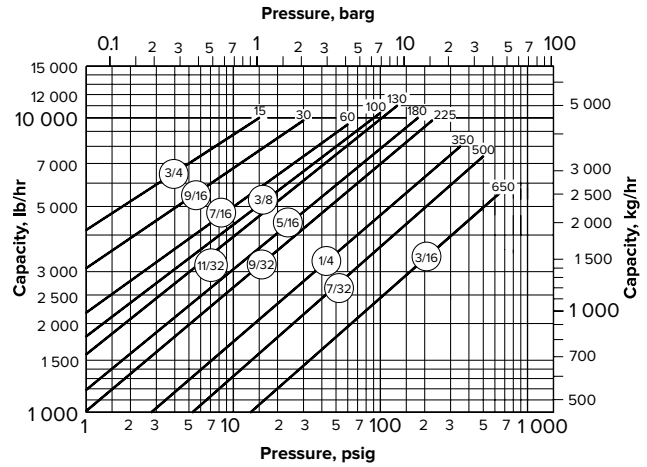
Model 313 Capacity



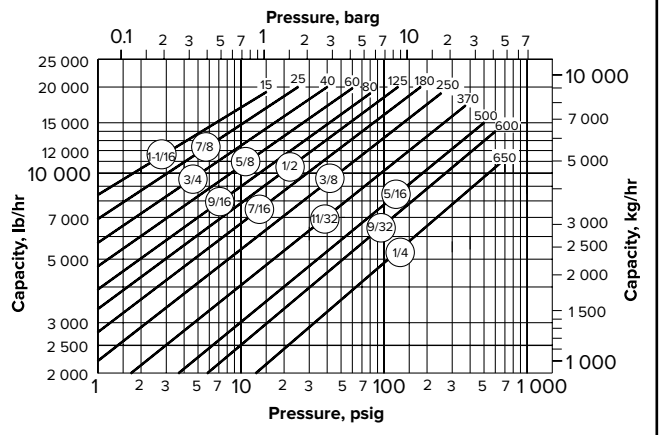
Model 314 Capacity



Model 315 Capacity



Model 316 Capacity

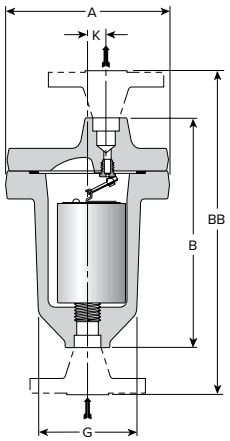


Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

411G Series Inverted Bucket Steam Traps

Forged Carbon Steel for Vertical and Horizontal Installation

For Pressures to 1 000 psig (69 barg)...Capacities to 1 300 lb/hr (590 kg/hr)



Model 411G Trap

Description

Armstrong Model 411G vertical installation offers smaller capacities at higher pressures.

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.

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

411G Bottom Inlet, Top Outlet Traps
Add suffix "CV" to trap number for internal check valve.

Model No. Screwed or SW **Model No. Flanged**	**411G** **411G-FW**	
Pipe Connections	**in**	**mm**
	1/2, 3/4	15, 20
"A" (Diameter)	6-5/16	160
"B" (Height, Screwed or SW)	8-13/16	224
"G" (Body OD)	4-1/16	103
"K" (℄ Outlet to ℄ Inlet)	3/4	19.0
Number of Bolts	8	
Weight Scr. or SW lb (kg)	25 (11.3)	
Weight, Flanged lb (kg)	35 (15.9)	

Consult factory for "BB" dimensions.

Connections

Screwed NPT and BSPT
Socketweld
Flanged

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

Materials

Body:	ASTM A105
411G cap:	ASTM A105
Internals:	All stainless steel—304
Valve and seat:	Titanium

Options

Stainless steel internal check valve

Specifications

Inverted bucket steam trap, type ... in forged carbon 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

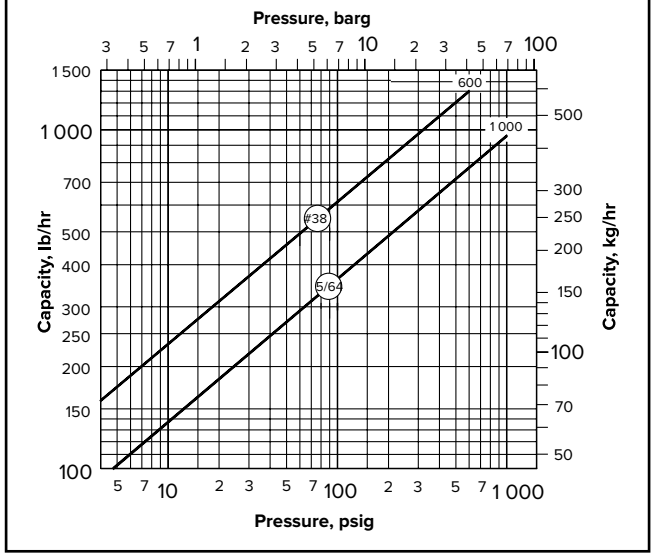
For a fully detailed certified drawing, refer to CD #1105.

411G Series Inverted Bucket Steam Traps

Forged Carbon Steel for Vertical and Horizontal Installation

For Pressures to 1 000 psig (69 barg)...Capacities to 1 300 lb/hr (590 kg/hr)

Model 411G Capacity



Pressure-Temperature Rating for Forged Steel Traps

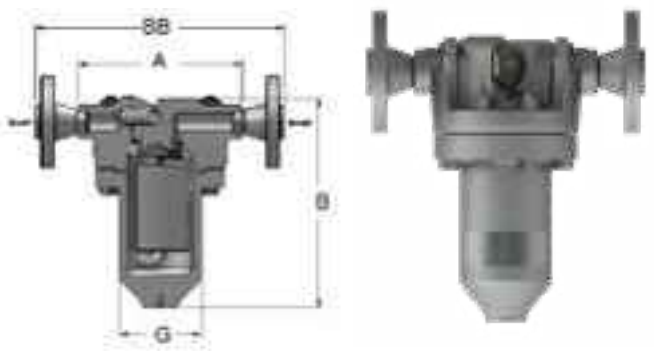
Model No.	Max. Oper. Pressure, Sat. Steam		Maximum Allowable Pressure (Vessel Design) of Pressure-Containing Parts at Indicated Temperature							
			°F	°C	°F	°C	°F	°C	°F	°C
			-20/+650	-28/+343	700	371	750	399	800	427
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
411G	1 000	69	1 000	69	1 000	69	950	65.5	840	58

NOTE: 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.

521 Series Inverted Bucket Steam Traps

Forged Carbon Steel for Horizontal Installation

For Pressures to 1 000 psig (69 barg)...Capacities to 1 300 lb/hr (590 kg/hr)



Model 521 Trap

521 Side Inlet, Side Outlet Traps		
Model No. Screwed or SW Model No. Flanged	521 521-FW	
Pipe Connections	in	mm
	1/2, 3/4	15, 20
"A"	8	203
"B" (Height, Screwed or SW)	10-5/16	263
"G" (Body OD)	4	102
Number of Bolts	8	
Weight Scr. or SW lb (kg)	30 (13.4)	

Consult factory for "BB" dimensions.

Description

Armstrong Model 521 horizontal installation offers smaller capacities at higher pressures.

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. Inverted bucket traps drain continuously to prevent condensate backup. They are also resistant to water hammer. Model 521 adds the convenience and savings of in-line repairability and is designed to meet today's energy-management requirements efficiently and economically over a long, trouble-free service life. Model 521 also has an integral strainer to protect from dirt and scale

Connections

Screwed NPT and BSPT
Socketweld
Flanged

Materials

Body:	ASTM A105N
Cap:	ASTM A105N
Internals:	All stainless steel—304
Valve and seat:	Titanium
Strainer Screen	Stainless Steel
Bolt/Nut	ASTM A193 Gr B7 / ASTM A194 Gr 2H

Specifications

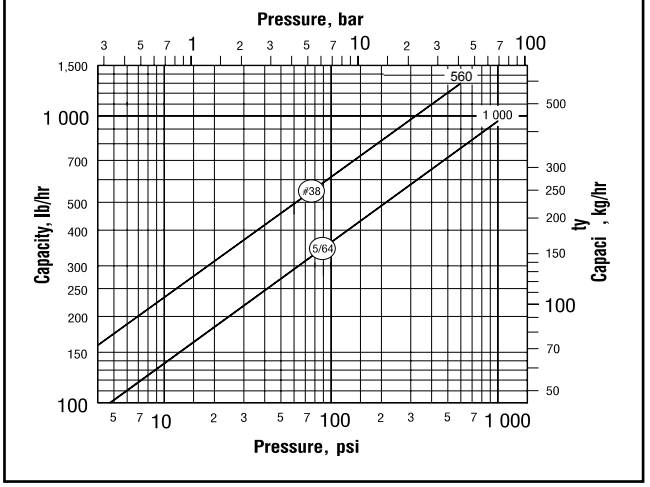
Inverted bucket steam trap with integral strainer, type ... in forged carbon steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, with the discharge orifice at the top of the trap.

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

Model 521 Capacity



NOTE: #38 orifice in Model 521 is limited to 560 psig (39 barg).

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
			-20/+650	-28/+343	700	371	750	399	800	427
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
521	1 000	69	1 000	69	1 000	69	950	65.5	840	58

NOTE: Maximum operating pressure to be marked on nameplate will be determined by actual orifice used. Traps with flanges may have different pressure-temperature ratings.

Notes

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_2 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

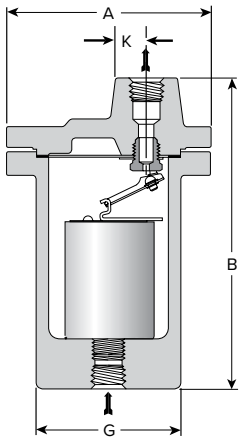
Inverted bucket steam trap, type ... in forged chrome-moly steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, with the discharge orifice at the top of the trap.

How to Order

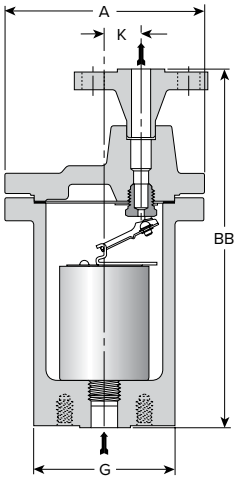
Specify:

- 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	
Pipe Connections	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
"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)	

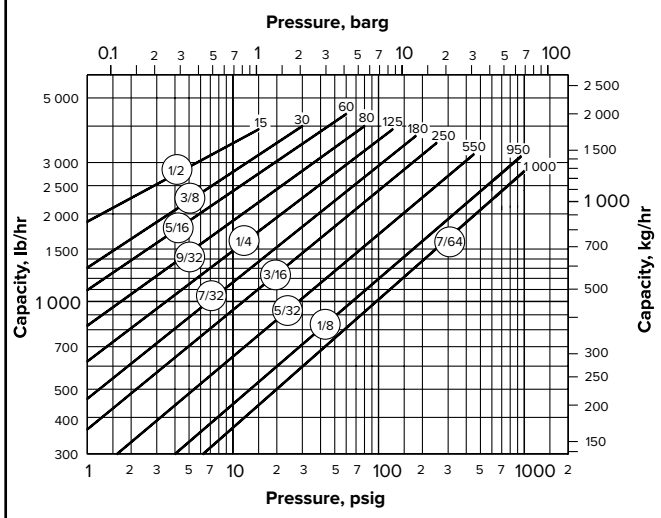
400 Series Inverted Bucket Steam Trap

Forged Chrome-moly Steel for Vertical Installation

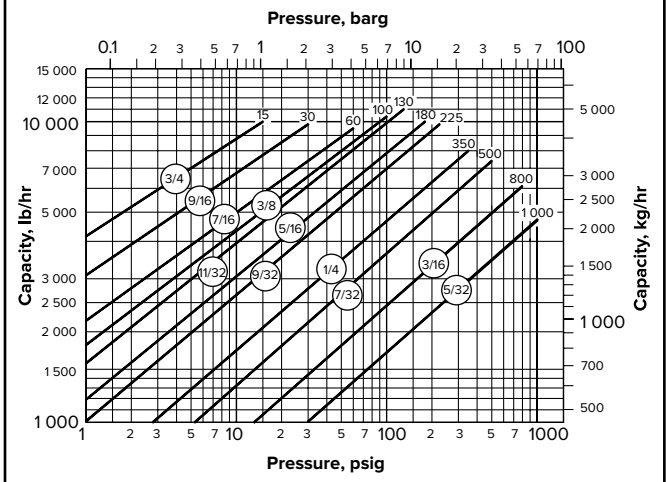
For Pressures to 1 000 psig (69 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)

Armstrong®

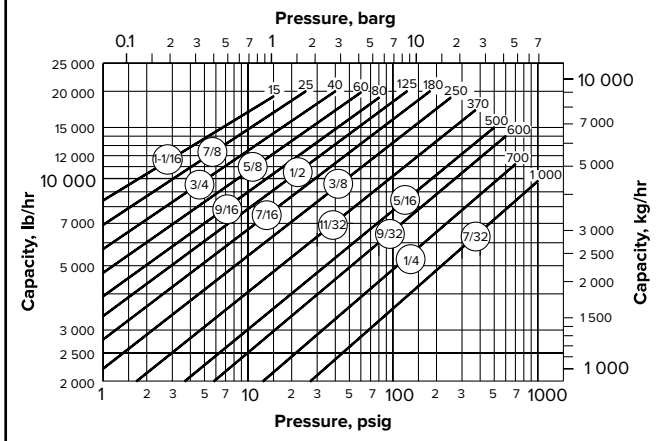
Model 413 Capacity



Model 415 Capacity



Model 416 Capacity



Pressure-Temperature Rating for Forged Steel Traps

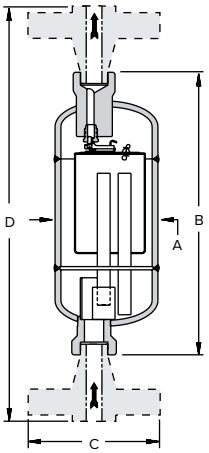
Model No	Max. Oper. Pressure, Sat. Steam		Maximum Allowable Pressure (Vessel Design) of Pressure-Containing Parts at Indicated Temperature											
			°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C
			-20/+650	-28/+343	700	371	750	399	800	427	850	454	900	482
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	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.

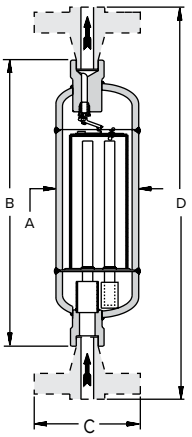
401-SH/501-SH Series Inverted Bucket Superheat Steam Trap

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	Carbon steel ASTM A106 Gr. B Sch. 80 pipe
Model 501-SH	Stainless steel 316L ASTM A312 Sch. 80 pipe
Internals:	Stainless steel—304
Valve and seat:	Titanium
Connections:	
Model 401-SH	Stainless steel—304
Model 501-SH	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.

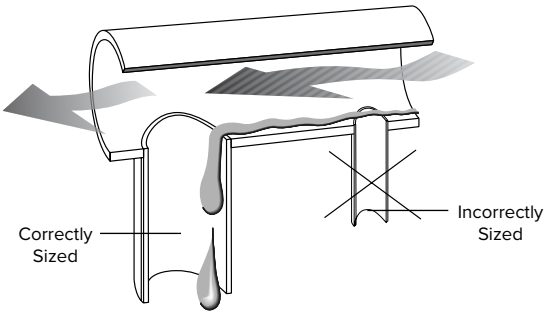
401-SH/501-SH Series Inverted Bucket Superheat Steam Trap

Carbon Steel or Stainless Steel for Vertical Installation

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

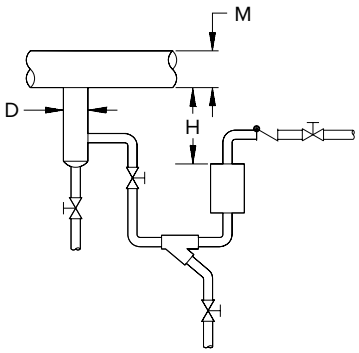
Installation Recommendations

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.



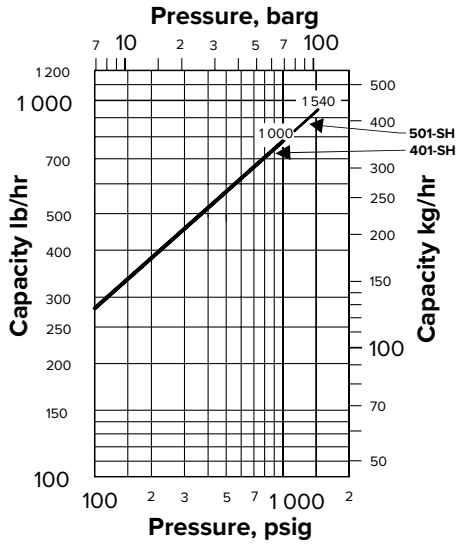
Drip Leg Sizing

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

Model 401/501 Capacity

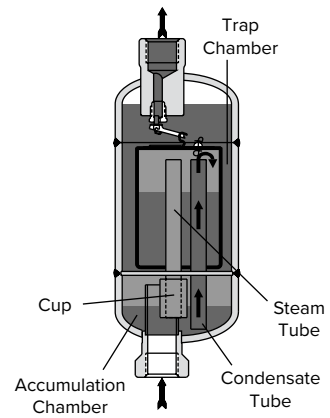


Recommended Steam Main and Branch Line Drip Leg Tracing

M		D		H Drip Leg Length Minimum			
Steam Main Size		Drip Leg Diameter		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

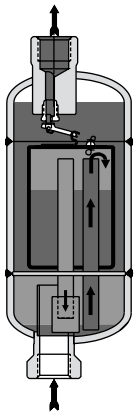
KEY

Air | Steam | Condensate



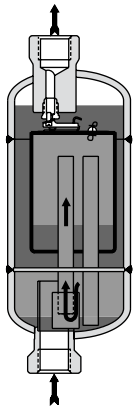
Cycling—Discharge Valve Wide Open

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.



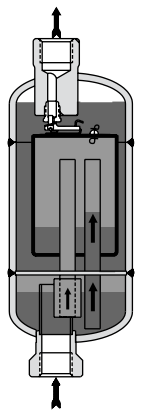
Cycle Ending

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

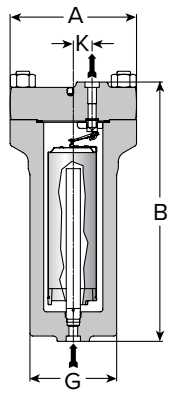
As the level of condensate rises in the accumulation chamber, the cup floats up until it again seals the steam feed tube, and the cycle repeats.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

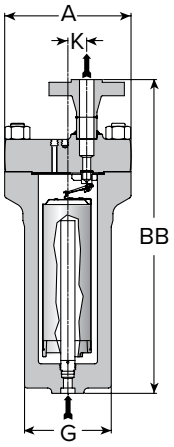
5000 Series Inverted Bucket Steam Trap

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_2 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	
Pipe Connections	in	mm	in	mm
	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)	

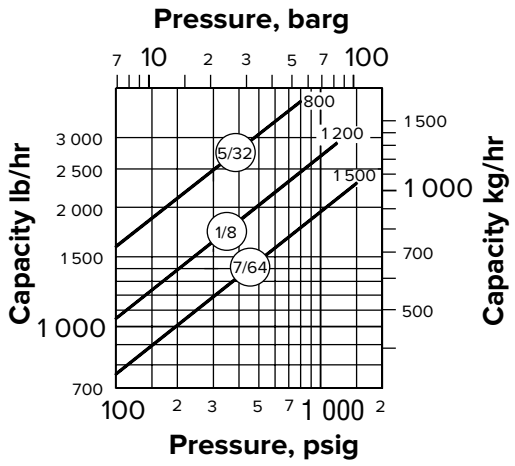
*"BB" dimensions shown are for 1" conn. Class 1500 flanged No. 5133G-FW and 1-1/4" conn. Class 1500 flanged No. 5155G-FW. Consult factory for dimensions of models with other connection sizes and/or flanges.

5000 Series Inverted Bucket Steam Trap

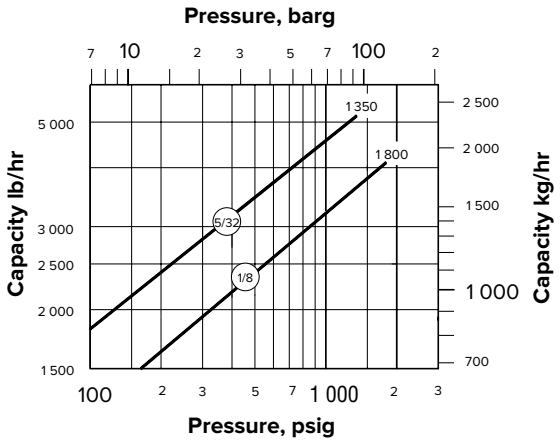
Forged Chrome-moly Steel for Vertical Installation

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

Model 5133G Capacity



Model 5155G 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	°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

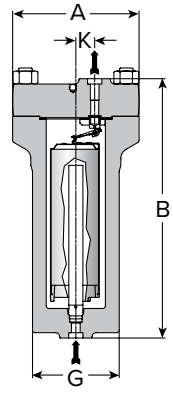
Specify:

- 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

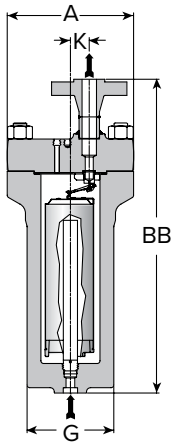
6000 Series Inverted Bucket Steam Trap

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

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**	
Pipe Connections	**in**	**mm**
	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" (℄ Outlet to ℄ 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.

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_2 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.

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

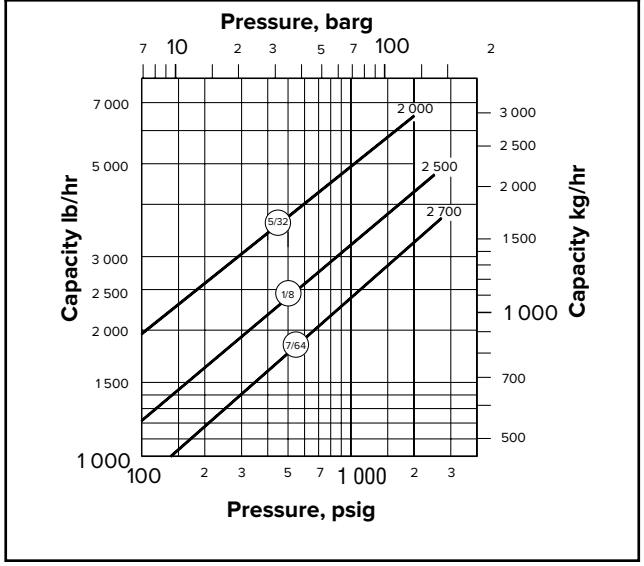
For Pressures to 2 700 psig (186 barg)...Capacities to 6 500 lb/hr (2 948 kg/hr)

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	°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
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	114

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.

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

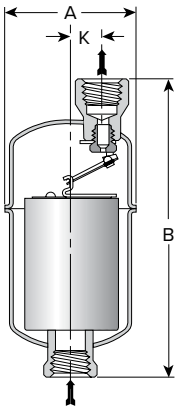
Body:	ASTM A240 Grade 304L
Internals:	All stainless steel—304
Valve and seat:	Stainless steel—17-4PH or Titanium

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	
Pipe Connections	in	mm	in	mm	in	mm	in	mm
	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)	

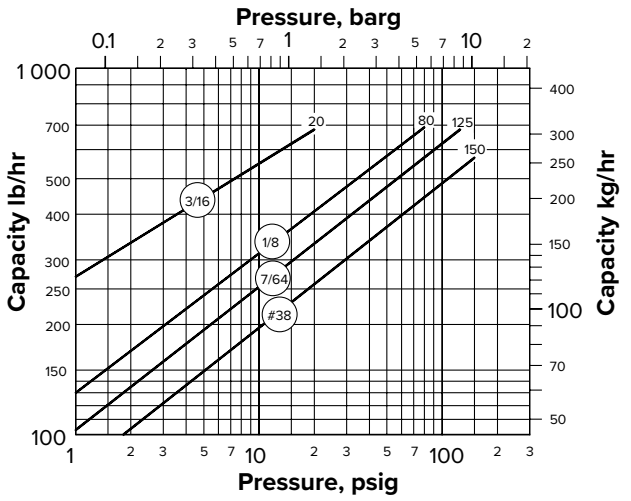
1000 Series Inverted Bucket Steam Trap

All Stainless Steel for Vertical Installation

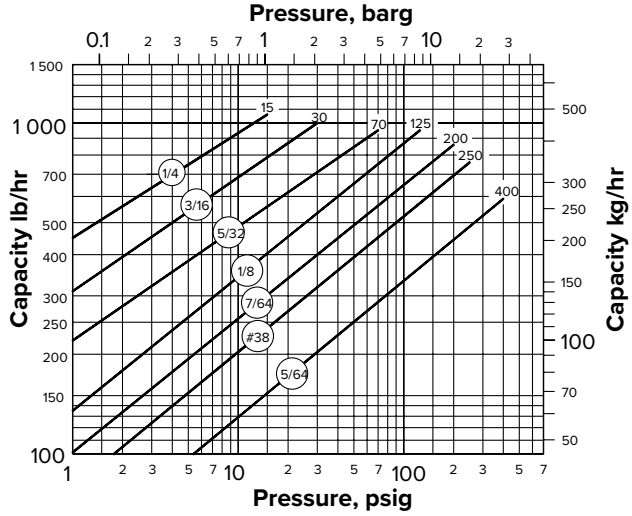
For Pressures to 650 psig (45 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)

Armstrong®

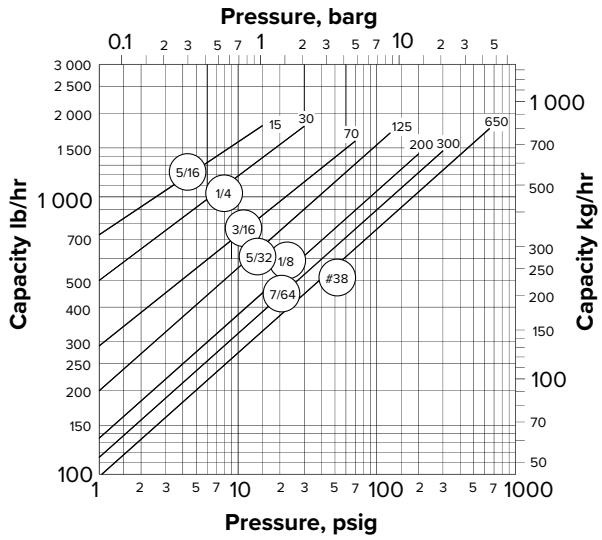
Model 1010 Capacity



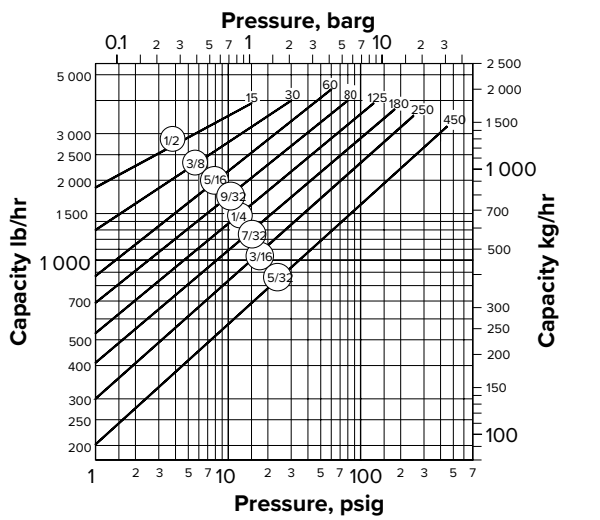
Model 1011 Capacity



Model 1022 Capacity



Model 1013 Capacity

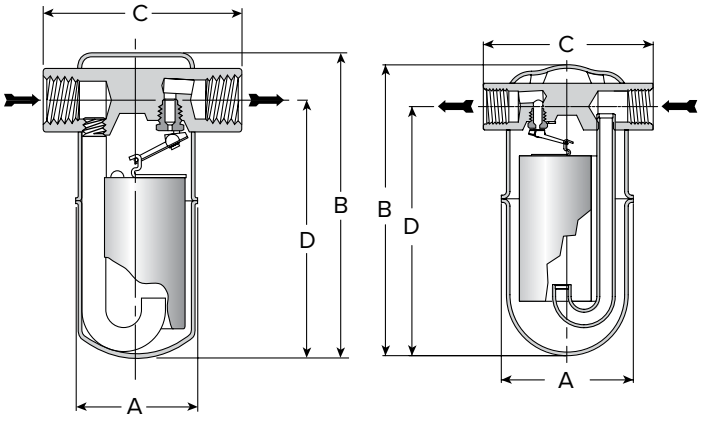


Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

1800 Series Inverted Bucket Steam Trap

All Stainless Steel for Horizontal Installation

For Pressures to 650 psig (45 barg)...Capacities to 1 802 lb/hr (817 kg/hr)



Model 1811 Trap **Model 1822 Trap**

Description

A quick and easy "in-line" replacement for other types of side inlet/side outlet traps, the Armstrong 1800 Series brings together all the benefits of energy-efficient inverted bucket operation. Side inlet/outlet all-welded construction means an inverted bucket trap that will operate efficiently on applications such as tracer lines, drips, heating, processing and similar applications.

With the 1800 Series you get freeze-resistant, all-stainless steel construction, with a three-year guarantee, plus all the benefits of inverted bucket operation:

Long, trouble-free service life
- Excellent purging action
- Continuous air venting
- Ease and flexibility of in-line installation

Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model 1810, 1811:	400 psig @ 800°F (28 barg @ 427°C)
Model 1822:	650 psig @ 600°F (45 barg @ 315°C)
	627 psig @ 700°F (43 barg @ 371°C)
	604 psig @ 800°F (41.6 barg @ 427°C)

Maximum operating pressure:

Model 1810:	200 psig (14 barg)
Model 1811:	400 psig (28 barg)
Model 1822:	650 psig (45 barg)

Connections

Screwed NPT and BSPT
Socketweld
Flanged (consult factory)

Materials

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

Options

- Insu-Pak™ insulation for Models 1810/1811
- Stainless steel pop drain for Models 1811/1822
- Probe connection for Models 1811/1822
- Restricted orifice
- 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.

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

1800 Series Traps

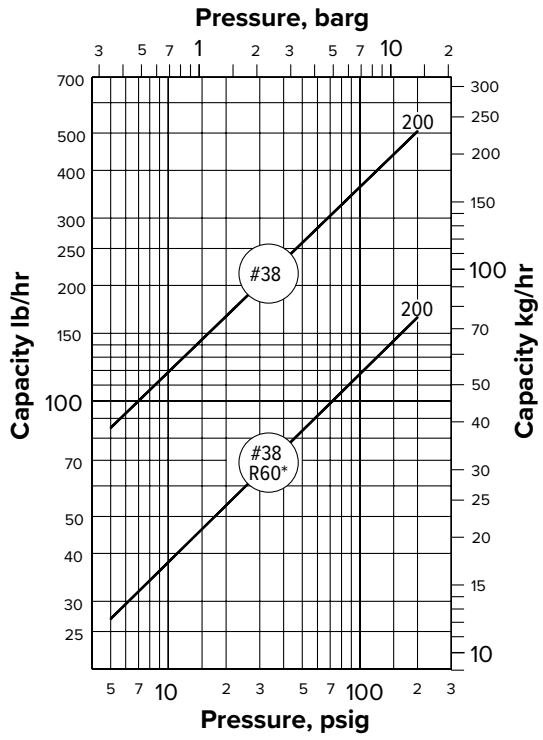
Model No.	1810		1811				1822			
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm
	3/8, 1/2	10, 15	1/2	15	3/4	20	1/2, 3/4	15, 20	1	25
"A" (Diameter)	2-11/16	68	2-11/16	68	2-11/16	68	3-7/8	99	3-7/8	99
"B" (Height)	5-5/16	135	6-5/16	160	6-9/16	167	8-1/2	218	8-1/2	218
"C" (Face to Face)	4-5/16	110	4-5/16	110	4-5/16	110	5	127	5	127
"D" (Bottom to ℄ Inlet)	4-7/16	113	5-7/16	138	5-9/16	141	7-3/8	187	7-1/8	181
Weight lb (kg)	1-3/4 (0.8)		2 (0.9)		2-3/8 (1.1)		7 (3)			

1800 Series Inverted Bucket Steam Trap

All Stainless Steel for Horizontal Installation

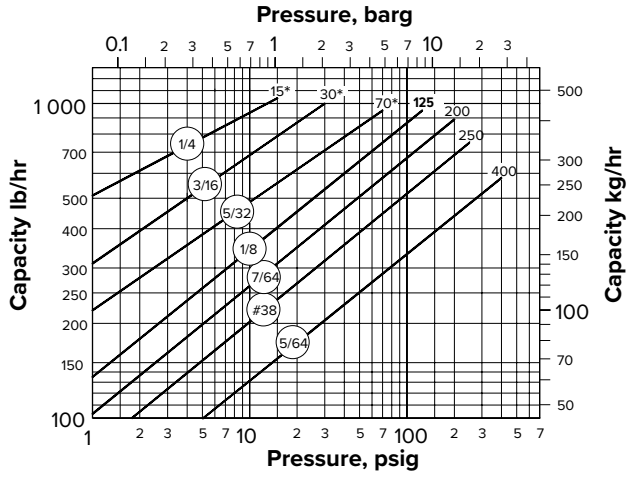
For Pressures to 650 psig (45 barg)...Capacities to 1 802 lb/hr (817 kg/hr)

Model 1810 Capacity



*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.

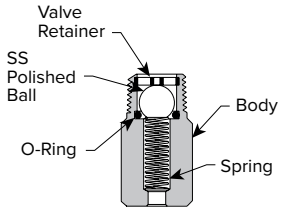
Model 1811 Capacity



*Orifices available only with 3/4" connections.

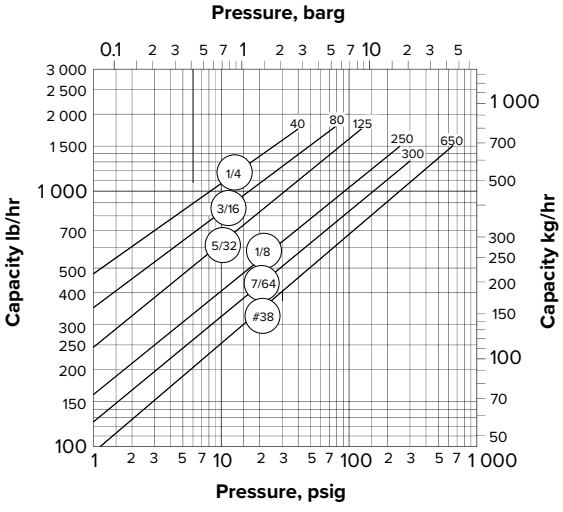
Options

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 1811 and 1822.



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

Model 1822 Capacity



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. Insu-Pak can prevent trap freeze-up when used with a properly designed condensate manifold. Designed for use with Model 1810 and Model 1811 traps.

Probe connections are available for trap monitoring on Models 1811 and 1822.

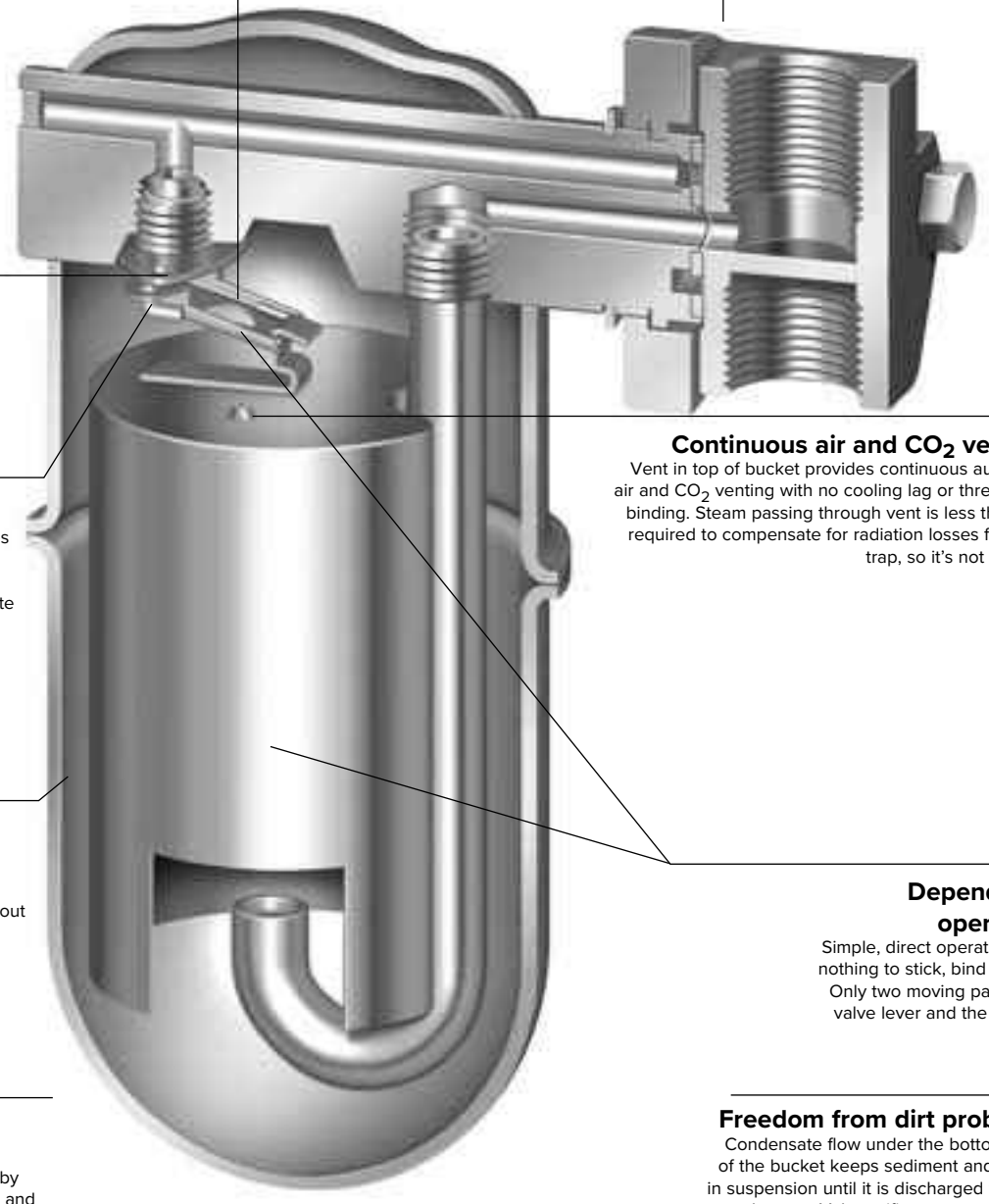
Armstrong® 2000 Series Stainless Steel Traps

The Armstrong Series 2000 stainless steel traps 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.

Continuous air and CO_2 venting
Vent in top of bucket provides continuous automatic air and CO_2 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.

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.

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

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.

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.

Resistance to damage from water hammer
Open bucket or float will not collapse as a result of water hammer.

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.

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

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

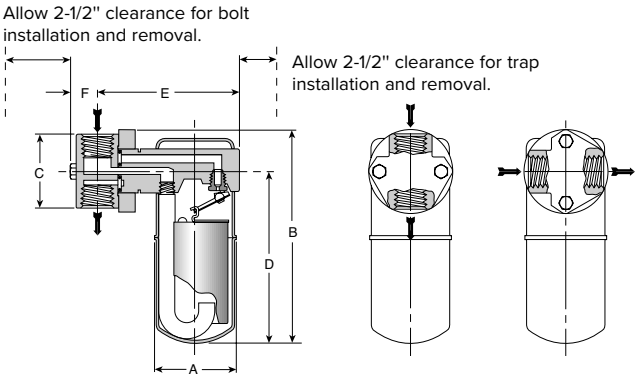
Specification

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.

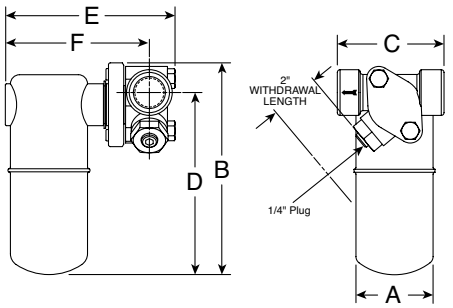
How to Order

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



Model 2011 Trap With Standard Connector



Series 2010-2022 With IS-2 Connector

Model No.	2010		2011		2022	
2000 Series Traps With Standard Connector						
	in	mm	in	mm	in	mm
Pipe Connections	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 ℄)	4-19/32	117	5-9/16	141	7-3/8	187
"E" (℄ to Outside)	4-9/16	115	4-9/16	115	5-3/4	146
"F" (℄ 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			
Pipe Connections	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	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 ℄)*	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" (℄ 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.

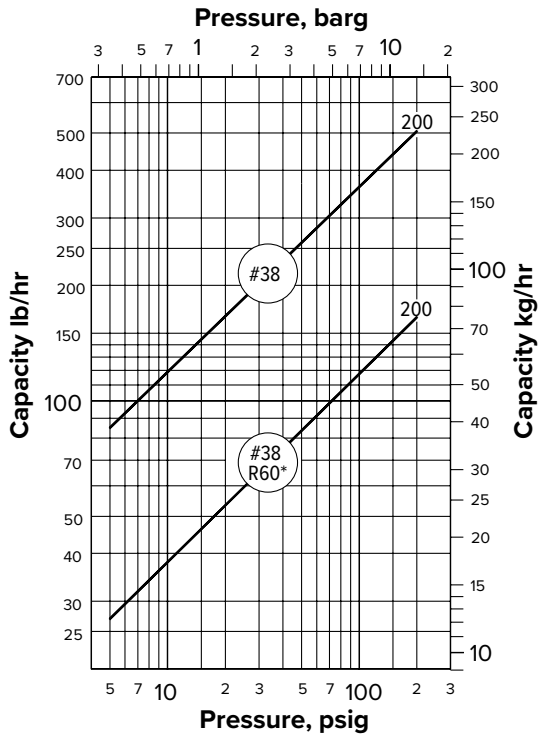
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

2000 Series Inverted Bucket Steam Trap

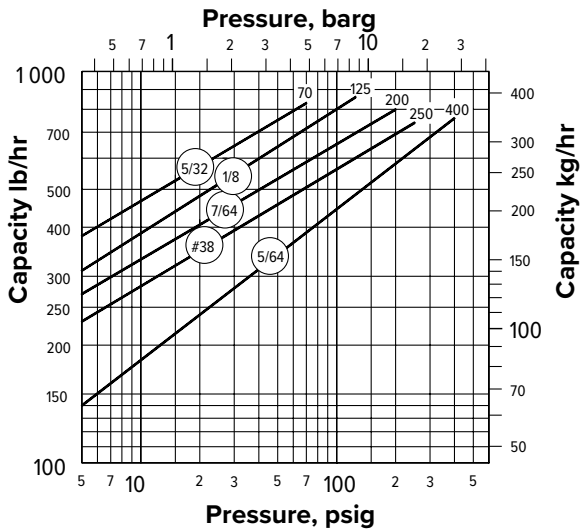
All Stainless Steel With 360° Connector/IS-2/TVS-4000

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

Model 2010 Capacity

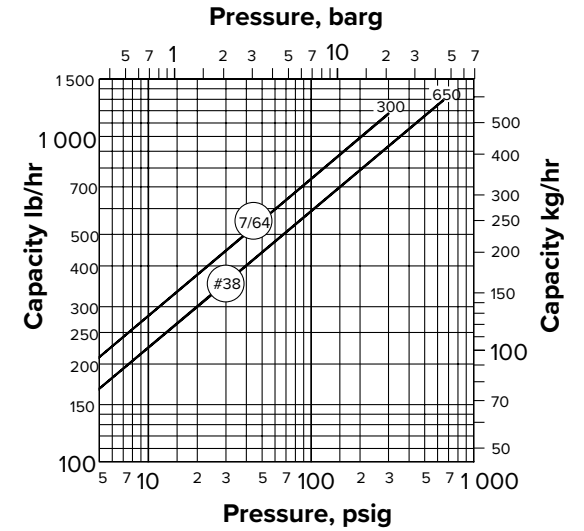


Model 2011 Capacity



*NOTE: Because the orientation 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.

Model 2022 Capacity



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.

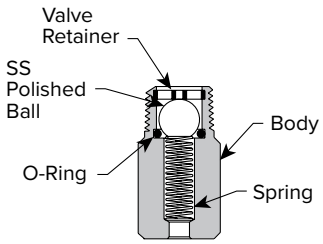
CD-3300 Disc Trap With IS-2 Integral Strainer Connector

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 for up-to-date information.

1811N and 2011N Inverted Bucket Steam Trap

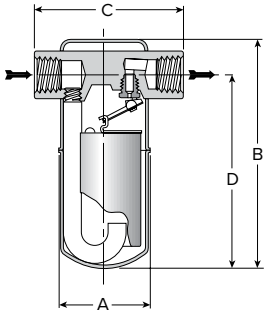
All stainless steel, non-metallic seat for tracer service

For pressure to 200 psig (14 barg)... capabilities to 900 lbs/hr (410 kg/hr)

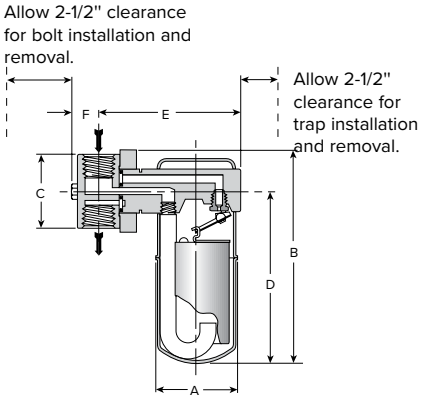
Description

With the 2000N Series' 360° universal connector or the in-line 1800N Series inverted bucket, copper oxide plugging problems can be eliminated. High pressure steam and condensate will dissolve copper tracing without proper amine treatment. The copper in solution precipitates out as copper oxide when it flashes through the steam trap orifice, depositing and eventually plugging the opening. The non-metallic seat eliminates the electrolytic attraction between the dissimilar metals. The copper oxide stays in suspension and flushes away with the condensate return. In addition, you get the reliability and energy efficiency of the inverted bucket design with the benefits of all-stainless steel construction.

- A sealed, tamperproof package
- A compact, lightweight trap
- Ability to withstand freeze-ups without mechanical failure
- Exceptional corrosion resistance
- A three-year guarantee against defective materials and workmanship



Model 1811N Trap



Model 2011N Trap With Standard Connector

Maximum Operating Conditions

Maximum allowable pressure
Model 1811N 400 psig @ 800°F (28 barg @ 427°C)
Model 2011N 400 psig @ 800°F (28 barg @ 427°C)

Maximum operating pressure:
Model 1811N 200 psig @ 450°F (14 barg @ 232°C)
Model 2011N 200 psig @ 450°F (14 barg @ 232°C)

Materials

Body:	ASTM A240 Grade 304L
Internals:	All stainless steel
Valve:	Stainless steel—17-4PH
Seat:	Non-metallic

2011N 360° Universal, 2-bolt, Connector Styles

- Standard 2-bolt connector
- IS-2 connector including integral strainer with optional blowdown valve
- TVS 4000 Trap Valve Station

1811N Connections

- 1/2" or 3/4", NPT or SW

Specification

Inverted bucket steam trap. Stainless steel construction, stainless steel valve with non-metallic seats, freeze resistant, continuous air venting.

How to order

- Specify model
- Select connection size or type of connector
- Maximum working pressure or orifice size

1811N Dimensions and Weight

Model No.	1811N			
Pipe Connections	in	mm	in	mm
	1/2	15	3/4	20
"A" (Diameter)	2-11/16	68	2-11/16	68
"B" (Height)	6-5/16	160	6-9/16	167
"C" (Face to Face)	4-5/16	110	4-5/16	110
"D" (Bottom to ℄ Inlet)	5-7/16	138	5-9/16	141
Weight lb (kg)	2 (0.9)		2-3/8 (1.1)	

2011N Dimensions and Weight

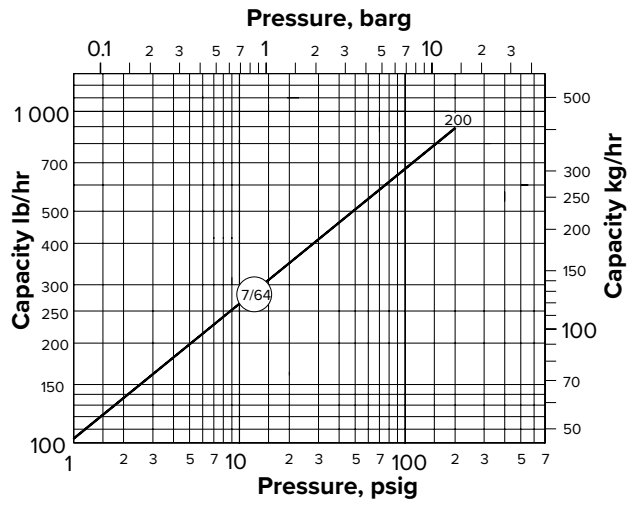
Model No.	2011	
Pipe Connections	in	mm
	3/8, 1/2, 3/4	10, 15, 20
"A" (Diameter)	2-11/16	68
"B" (Height)	6-15/16	176
"C" (Face to Face)	2-3/8	60
"D" (Bottom to ℄)	5-9/16	141
"E" (℄ to Outside)	4-9/16	115
"F" (℄ to Bolt)	1	25
Weight lb (kg)	4-1/2 (2.0)	

1811N and 2011N Inverted Bucket Steam Trap

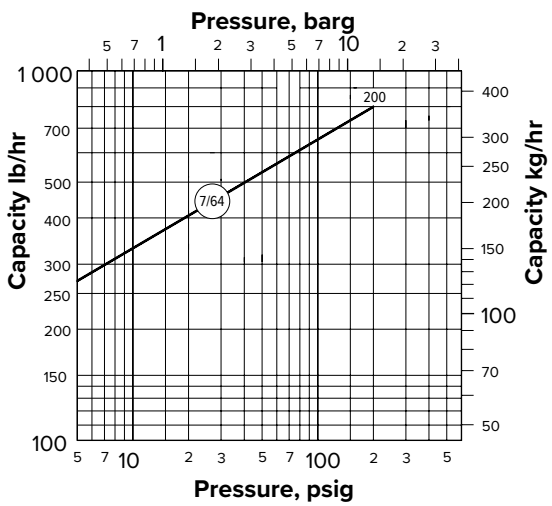
All stainless steel, non-metallic seat for tracer service

For pressure to 200 psig (14 barg)... capabilities to 900 lbs/hr (410 kg/hr)

Model 1811N Capacity



Model 2011N Capacity



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

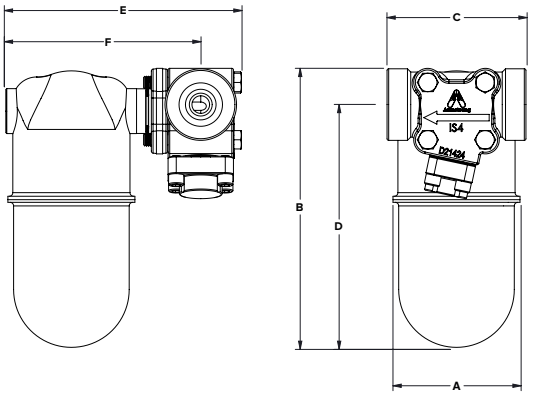
Specification

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			
Pipe Connections	in	mm	in	mm	in	mm	in	mm
	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 ℄)*	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" (℄ 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)			

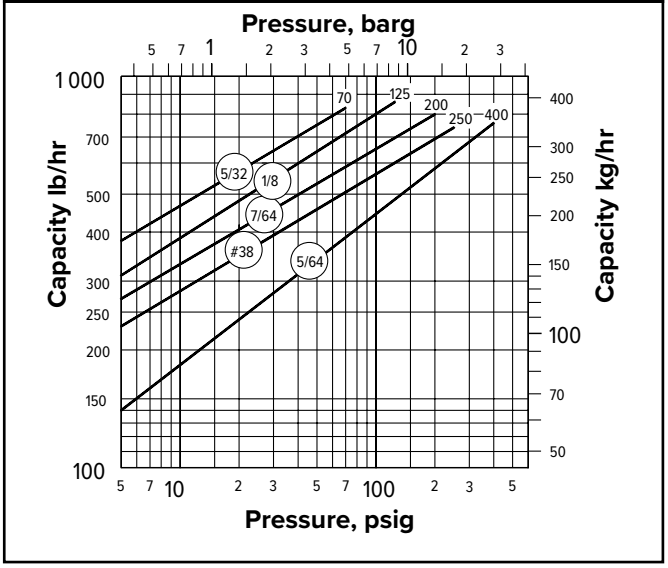
*Add 1/2" (15 mm) to "B" and "D" dimensions when optional probe connection is required.

4000 Series Inverted Bucket Steam Trap

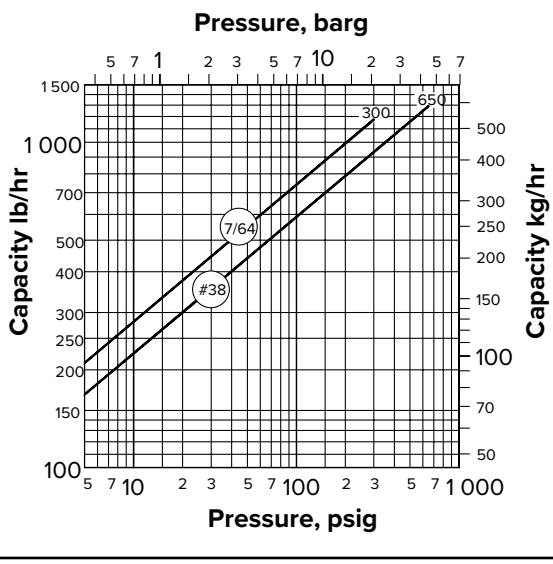
All Stainless Steel With IS-4 4-Bolt Connector

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

Model IB4011 Capacity

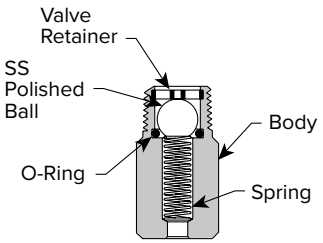


Model IB4022 Capacity



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.



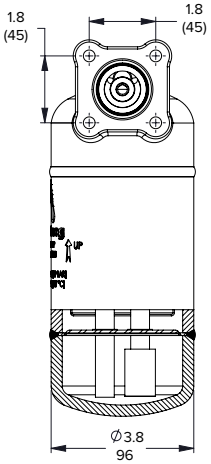
Maximum Operating Conditions

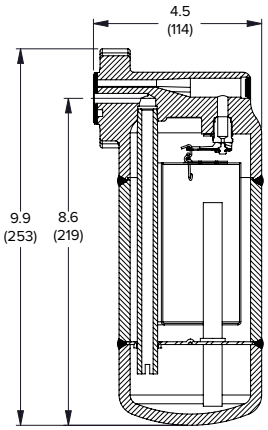
Pressure:	600 psig (41 barg)
Temperature:	350°F (177°C)

IB4500 Series Inverted Bucket Superheat Steam Trap

All Stainless Steel and Compatible with IS-4 4-Bolt Connector

For Pressures to 1 000 psig (68.9 barg)...Capacities to 1 300 lb/hr (590 kg/hr)





Description

Armstrong's IB4500 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.
- 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.
- No maintenance required as this is a sealed trap
- Compatible with IS4 connectors

Maximum Operating Conditions

Maximum allowable pressure (vessel design):
1,000 psig @ 800°F (68.9 barg @ 427°C)

Maximum operating pressure:
1,000 psig (68.9 barg)

Connector's Connection

NPT
BSPT
Socket Weld
Flanged

Consult factory for flanged conenction

Materials

Body/Shell/Cap: ASTM A351 Gr. CF8M
Valve: Titanium
Seat: Titanium
Internals: Stainless Steel

Specification

Inverted bucket steam trap, type ... in stainless steel, compatible with 4-bolt connector, 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 Superheat Service

- Don't oversize the orifice. A restricted orifice may be advisable.
- Proivde a drip leg of adequate diameter and length.
- Provide a generouse length of 2 - 3 ft (600 - 900 mm) with the trap below the main.
- Don't insulate the trap or the inlet piping.

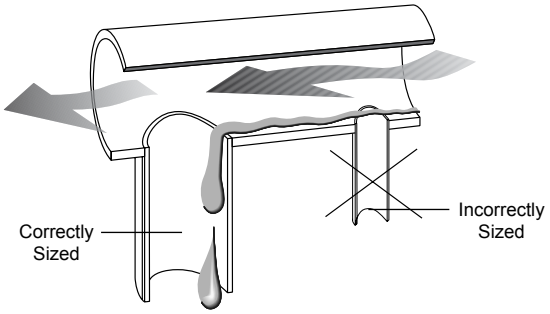
IB4500 Series Inverted Bucket Superheat Steam Trap

All Stainless Steel and Compatible with IS-4 4-Bolt Connector

For Pressures to 1 000 psig (68.9 barg)...Capacities to 1 300 lb/hr (590 kg/hr)

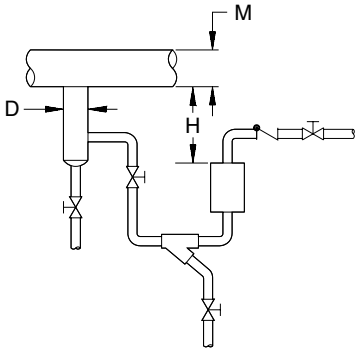
Installation Recommendations

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.



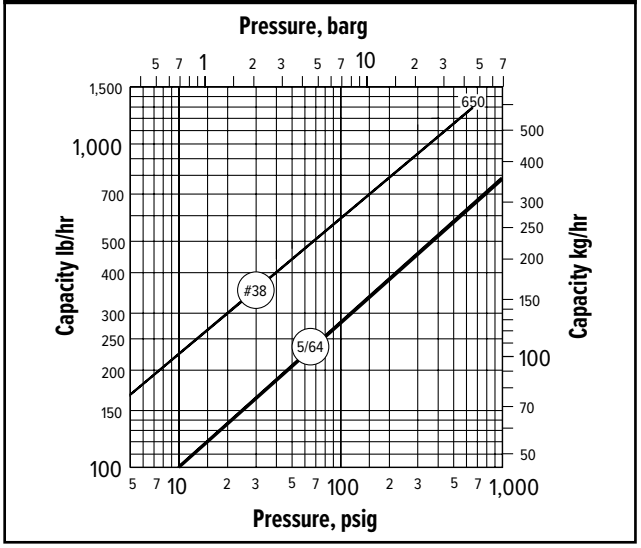
Drip Leg Sizing

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

Model IB4500 Capacity

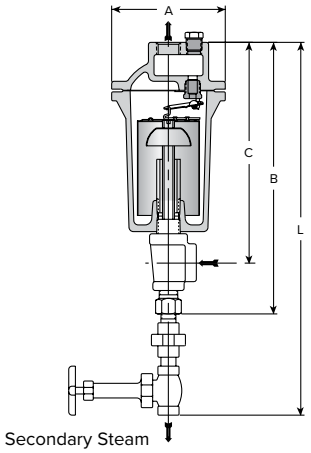


Recommended Steam Main and Branch Line Drip Leg Sizing

M		D		H Drip Leg Length Minimum			
Steam Main Size		Drip Leg Diameter		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

20-DC Series Automatic Differential Condensate Controllers

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



Description

Armstrong automatic differential condensate controllers (DC) are designed to function on applications where condensate must be lifted from a drain point or in gravity drainage applications where increased velocity will aid in condensate drainage.

When lifting from the drain point, often referred to as syphon drainage, the reduction in pressure that occurs when the condensate is elevated causes a portion of it to flash back into steam.

Ordinary steam traps, unable to differentiate between flash steam and live steam, close and impede drainage. Increased velocity with gravity drainage will aid in drawing the condensate and air to the DC. This increased velocity is caused by an internal steam by-pass, controlled by a manual metering valve, so the condensate controller will automatically vent the by-pass or secondary steam. This is then directed to the condensate return line or collected for use in other heat exchangers.

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

Body:	ASTM A48 Class 30
Internals:	All stainless steel—304
Valve and seat:	Stainless steel—17-4PH
Fittings metering valve:	Metering valve—Bronze with stainless steel trim. Fittings 250# malleable iron

Specification

Automatic differential condensate controller, type ... in cast iron.

How to Order

- Specify model number
- Specify size and type of pipe connection
- Specify maximum working pressure that will be encountered or orifice size
- Specify any options required

For a fully detailed certified drawing, refer to CD #1008.

20-DC Series Differential Condensate Controllers

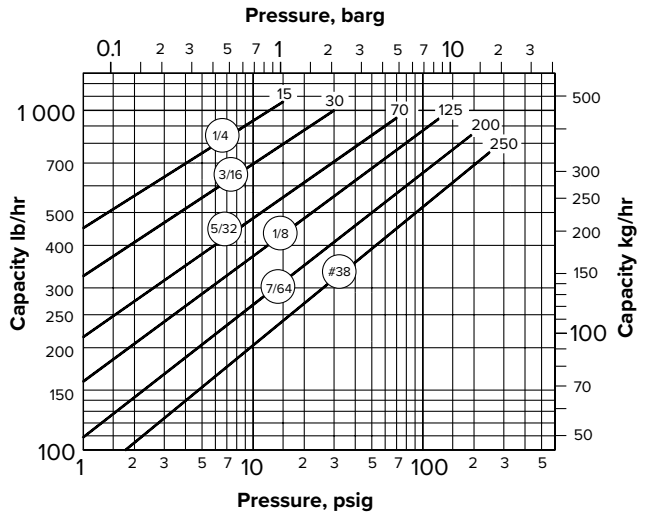
Model No.	21-DC		22-DC		23-DC		24-DC		25-DC		26-DC	
Inlet & Outlet Connections	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	15	3/4	20	1	25	1-1/4	32	1-1/2	40	2	50
Secondary Steam Connection	3/8	10	1/2	15	1/2	15	3/4	20	1	25	1	25
“A” (Diameter)	4-1/4	108	5-1/4	133	6-3/8	162	7-1/2	190	8-1/2	216	10-3/16	259
“B” (Height)	9-3/4	248	12-1/4	311	15-1/2	394	18	457	20-1/4	514	23-1/2	597
“C”	7-3/4	197	9-1/2	241	12-3/4	324	15	381	16-3/4	425	19-3/4	502
“L”	14-7/8	378	18-1/8	460	21-3/8	543	23-7/8	606	26-3/4	679	31	787
Weight lb (kg)	7 (3.2)		14 (6.4)		24 (10.9)		38 (17.2)		53 (24.0)		86 (39.0)	

20-DC Series Automatic Differential Condensate Controllers

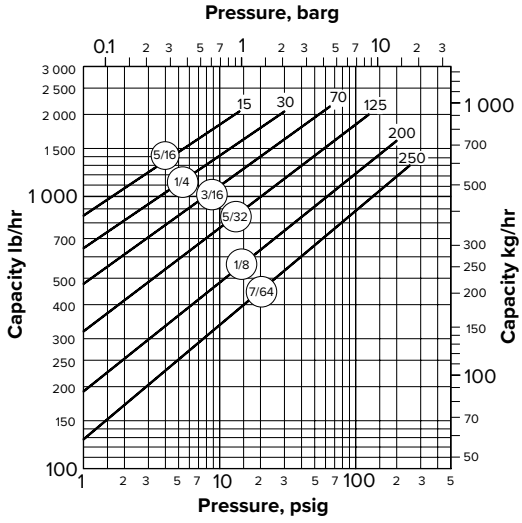
For Pressures to 250 psig (17 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)

Armstrong®

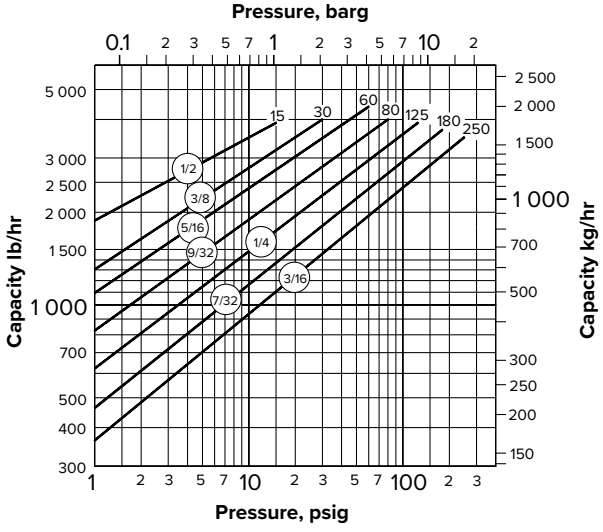
Model 21-DC Capacity



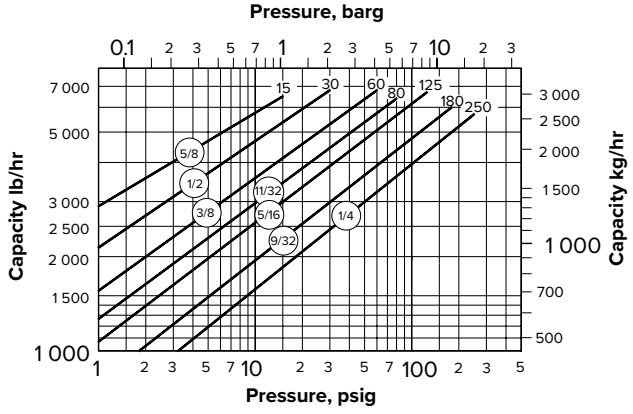
Model 22-DC Capacity



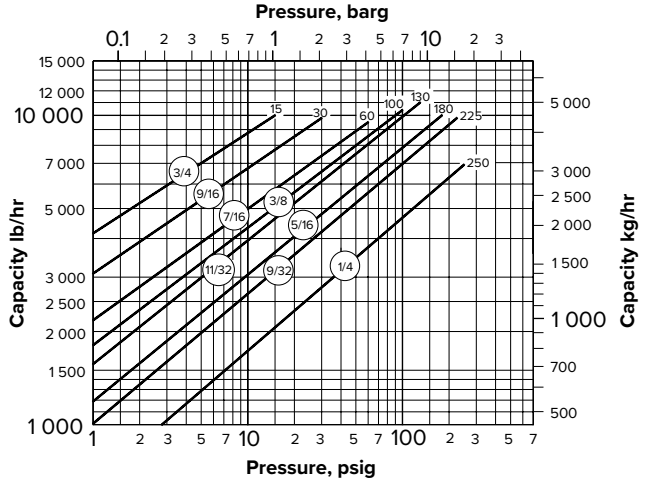
Model 23-DC Capacity



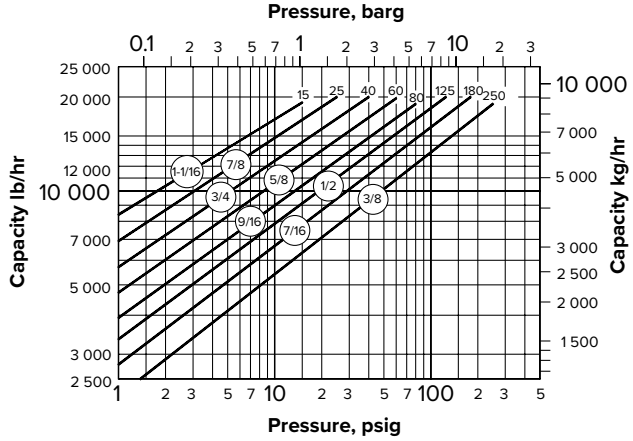
Model 24-DC Capacity



Model 25-DC Capacity



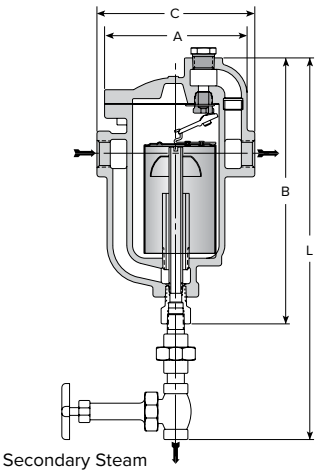
Model 26-DC Capacity



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

80-DC Series Automatic Differential Condensate Controllers

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



Description

Armstrong automatic differential condensate controllers (DC) are designed to function on applications where condensate must be lifted from a drain point or in gravity drainage applications where increased velocity will aid in condensate drainage.

When lifting from the drain point, often referred to as syphon drainage, the reduction in pressure that occurs when the condensate is elevated causes a portion of it to flash back into steam.

Ordinary steam traps, unable to differentiate between flash steam and live steam, close and impede drainage. Increased velocity with gravity drainage will aid in drawing the condensate and air to the DC. This increased velocity is caused by an internal steam by-pass, controlled by a manual metering valve, so the condensate controller will automatically vent the by-pass or secondary steam. This is then directed to the condensate return line or collected for use in other heat exchangers.

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

Body:	ASTM A48 Class 30
Internals:	All stainless steel—304
Valve and seat:	Stainless steel—17-4PH
Fittings metering valve:	Metering valve—Bronze with stainless steel trim. Fittings 250# malleable iron.

Specification

Automatic differential condensate controller, type ... in cast iron.

How to Order

- Specify model number
- Specify size and type of pipe connection
- Specify maximum working pressure that will be encountered or orifice size
- Specify any options required

For a fully detailed certified drawing, refer to CD #1008.

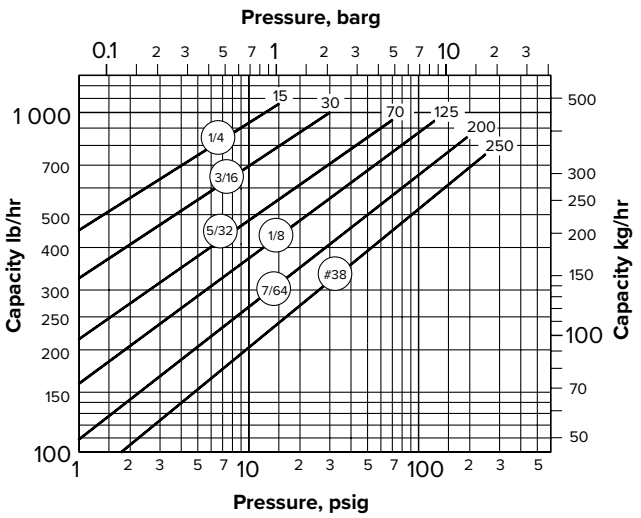
80-DC Series Differential Condensate Controllers

Model No.	81-DC		82-DC		83-DC		84-DC		85-DC		86-DC	
Inlet & Outlet Connections	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	3/4	20	3/4	20	1	25	1-1/4	32	1-1/2, 2	50	2	50
Secondary Steam Conn.	3/8	10	1/2	15	1/2	15	3/4	20	1	25	1-1/2	40
“A” (Diameter)	3-3/4	95	5-5/8	143	7	178	8	203	9	229	11-1/2	292
“B” (Height)	8	203	10-1/2	267	13	330	15	381	17-1/2	445	23	584
“C”	5	127	16-5/8	422	7-3/4	197	9	229	10-1/4	260	13	330
“L”	13-1/4	337	17-1/2	445	18-3/4	476	21-3/4	552	24	610	32	813
Weight lb (kg)	7-1/2 (3.4)		17-1/2 (7.9)		30-1/2 (13.7)		47 (21.3)		75 (34)		139 (63)	

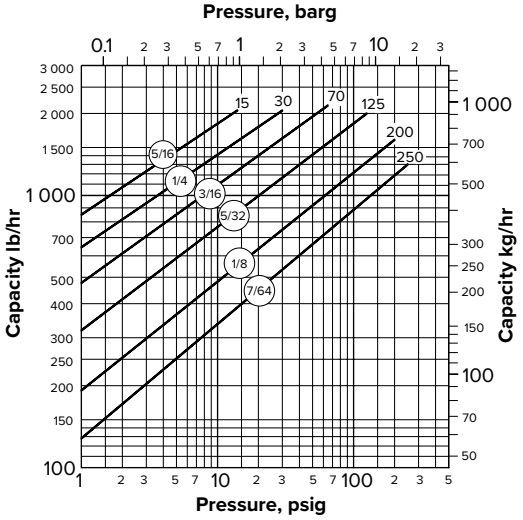
80-DC Series Automatic Differential Condensate Controllers

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

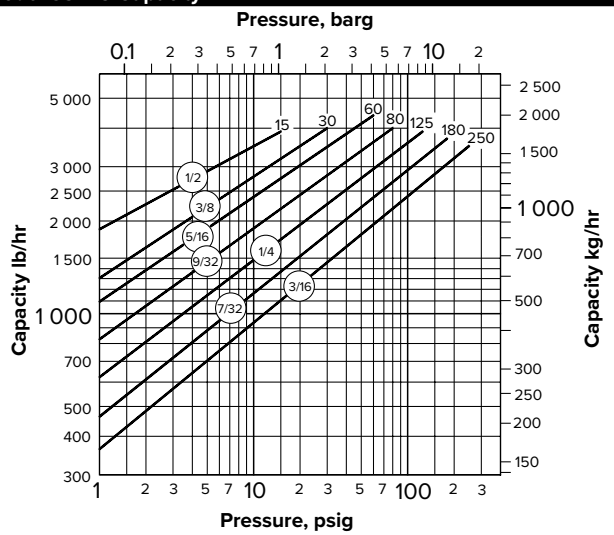
Model 81-DC Capacity



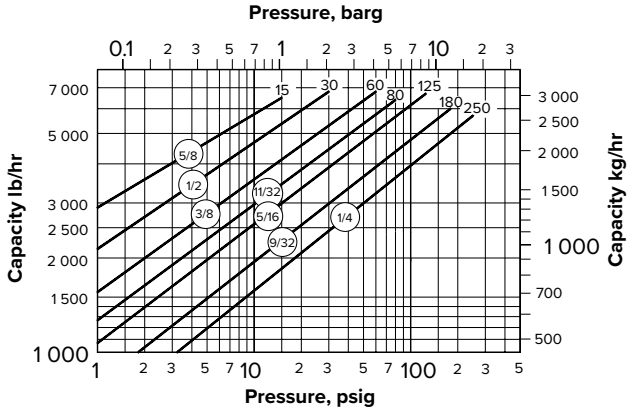
Model 82-DC Capacity



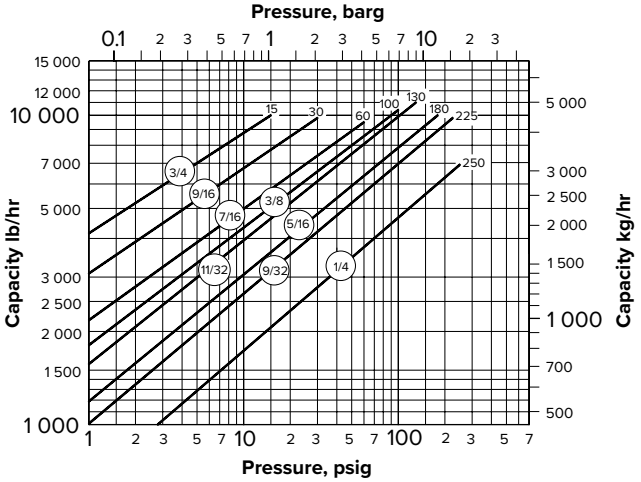
Model 83-DC Capacity



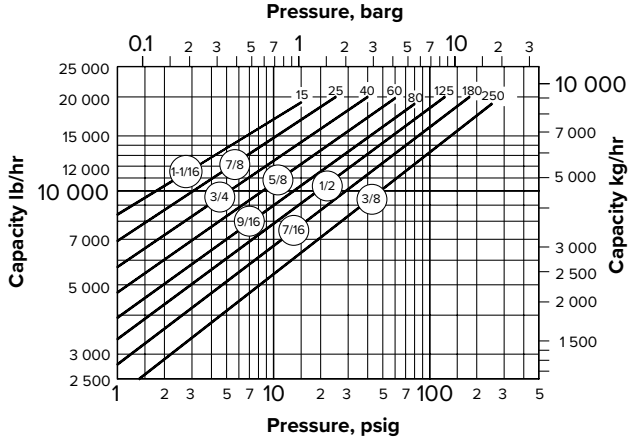
Model 84-DC Capacity



Model 85-DC Capacity



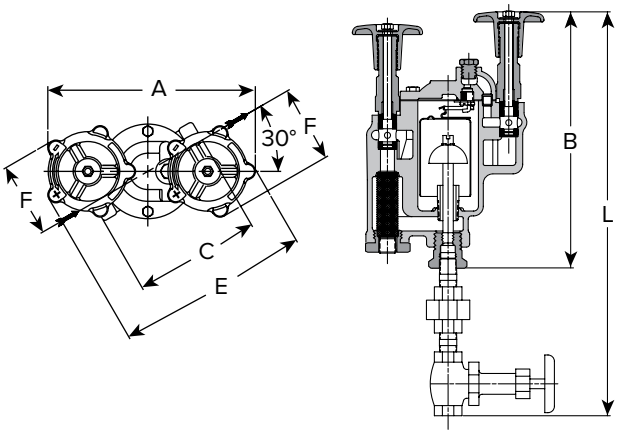
Model 86-DC Capacity



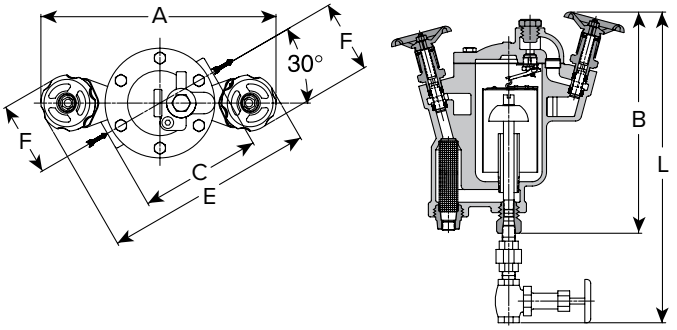
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

TVS 80-DC Series Automatic Differential Condensate Controllers

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



TVS 81-DC



TVS 82-DC & TVS 83-DC

Description

Armstrong automatic differential condensate controllers (DC) are designed to function on applications where condensate must be lifted from a drain point or in gravity drainage applications where increased velocity will aid in condensate drainage.

When lifting from the drain point, often referred to as syphon drainage, the reduction in pressure that occurs when the condensate is elevated causes a portion of it to flash back into steam.

Ordinary steam traps, unable to differentiate between flash steam and live steam, close and impede drainage. Increased velocity with gravity drainage will aid in drawing the condensate and air to the DC. This increased velocity is caused by an internal steam by-pass, controlled by a manual metering valve, so the condensate controller will automatically vent the by-pass or secondary steam. This is then directed to the condensate return line or collected for use in other heat exchangers.

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

Body:	ASTM A48 Class 30
Internals:	All stainless steel—304
Valve and seat:	Stainless steel—17-4PH
Fittings metering valve:	Metering valve—Bronze with stainless steel trim. Fittings 250# malleable iron.
Handwheel:	Ductile iron
TVS 80 Series	
Piston valve internals:	Stainless steel and graphite

Specification

Automatic differential condensate controller, type TVS in cast iron complete with integral piston valves on the inlet, and outlet with strainer.

How to Order

- Specify model number
- Specify size and type of pipe connection
- Specify maximum working pressure that will be encountered or orifice size
- Specify any options required

For a fully detailed certified drawing, refer to:

TVS 81-DC	**CD #1088**
TVS 82-DC and TVS 83-DC	**CD #1089**

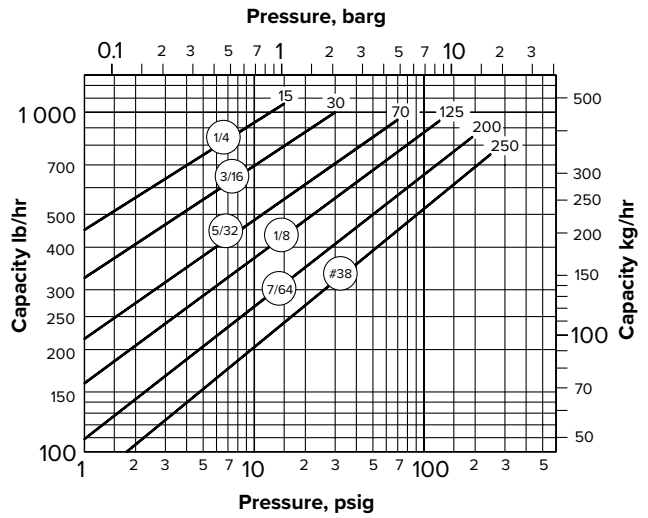
TVS 80-DC Series

Model No.	TVS 81-DC		TVS 82-DC		TVS 83-DC	
Inlet & Outlet Connections	in	mm	in	mm	in	mm
	1/2, 3/4	15, 20	1/2, 3/4	15, 20	3/4, 1	20, 25
Secondary Steam Connections	3/8	9	1/2	15	1/2	15
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	11	279	12-5/8	320	15-1/8	384
“C” Face to Face	5	127	6-1/2	165	7-3/4	197
“E”	7-5/8	194	13	330	14-3/8	365
“F”	3	76	4-1/2	114	4-7/8	124
“L”	16-3/4	425	18-3/8	467	20-3/4	527
Number of Bolts	6	6	6	6	6	6
Weight lb (kg)	13-1/2	6	27-1/2	12.5	50	23
Maximum Allowable Pressure (Vessel Design)	250 psig @ 450°F (17 barg @ 232°C)					
Maximum Operating Pressure psig (barg)	250 (17)					

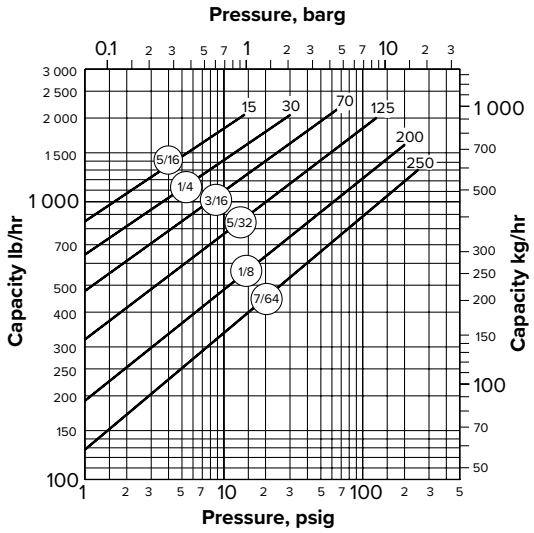
TVS 80-DC Series Automatic Differential Condensate Controllers

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

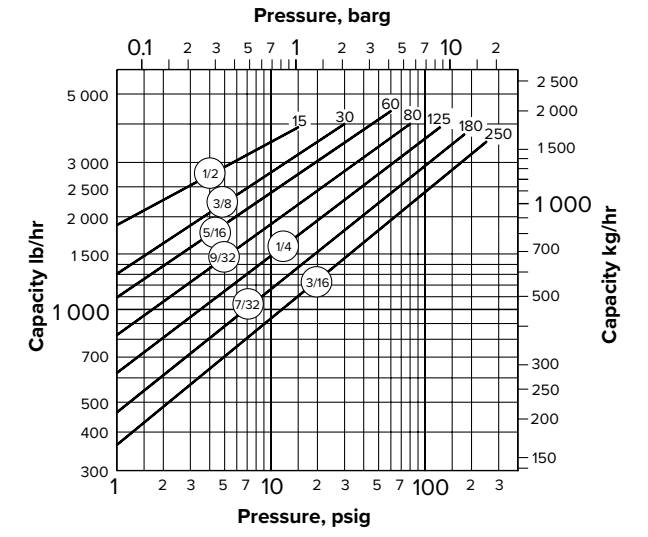
Model TVS 81-DC Capacity



Model TVS 82-DC Capacity



Model TVS 83-DC Capacity



30-DC Series Automatic Differential Condensate Controllers

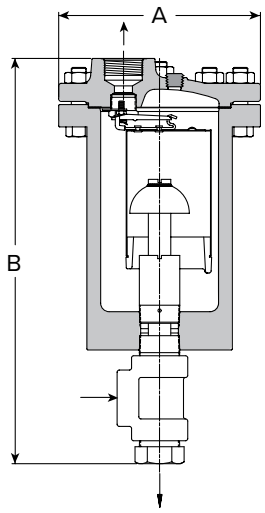
For Pressures to 650 psig (45 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)

Description

Armstrong automatic differential condensate controllers (DC) are designed to function on applications where condensate must be lifted from a drain point or in gravity drainage applications where increased velocity will aid in condensate drainage.

When lifting from the drain point, often referred to as syphon drainage, the reduction in pressure that occurs when the condensate is elevated causes a portion of it to flash back into steam.

Ordinary steam traps, unable to differentiate between flash steam and live steam, close and impede drainage. Increased velocity with gravity drainage will aid in drawing the condensate and air to the DC. This increased velocity is caused by an internal steam by-pass, controlled by a manual metering valve, so the condensate controller will automatically vent the by-pass or secondary steam. This is then directed to the condensate return line or collected for use in other heat exchangers.



Connections

Screwed NPT and BSPT

Materials

Body:	ASTM A105
Internals:	All stainless steel—304
Valve and seat:	Stainless steel—17-4PH
Fittings:	3000# Carbon steel

Specification

Automatic differential condensate controller, type ... in carbon steel.

How to Order

- Specify model number
- Specify size and type of pipe connection
- Specify maximum working pressure that will be encountered or orifice size
- Specify any options required

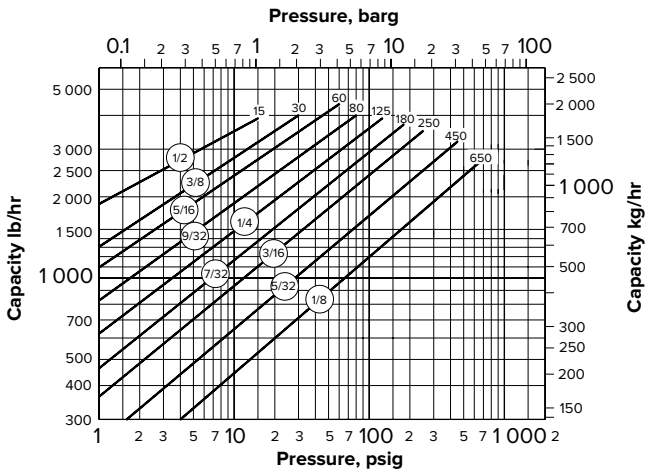
30-DC Series Differential Condensate Controllers

Model No.	33-DC		34-DC		35-DC		36-DC	
Inlet & Outlet Connections	in	mm	in	mm	in	mm	in	mm
	1	25	1-1/4	32	1-1/2	40	2	50
Secondary Steam Conn.	1/2	15	3/4	20	1	25	1	25
“A” (Diameter)	8	203	8-5/8	219	9-3/4	248	11-7/8	302
“B” (Height)	16-9/16	420	19-1/4	489	21-7/16	544	23-7/8	607
Weight lb (kg)	53 (24)		73 (33)		102 (46)		184 (83)	
Maximum Operating Pressure, Sat. Steam, psig (barg)	650 (44)							
Maximum Allowable Pressure (Vessel Design)	1 080 psig @ 650°F (74 barg @ 343°C)		1 130 psig @ 650°F (78 barg @ 343°C)		1 015 psig @ 650°F (70 barg @ 343°C)		1 100 psig @ 650°F (76 barg @ 343°C)	

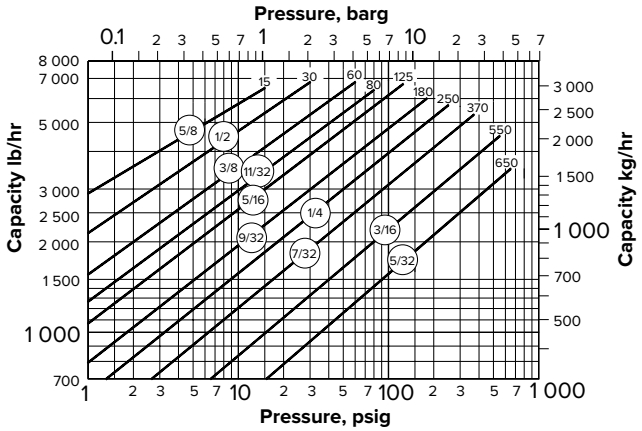
30-DC Series Automatic Differential Condensate Controllers

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

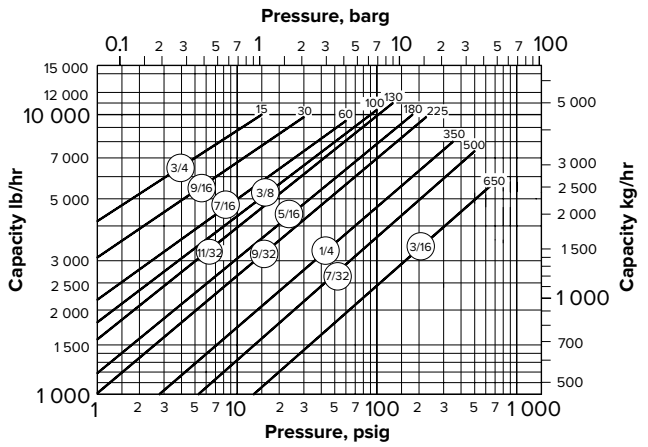
Model 33-DC Capacity



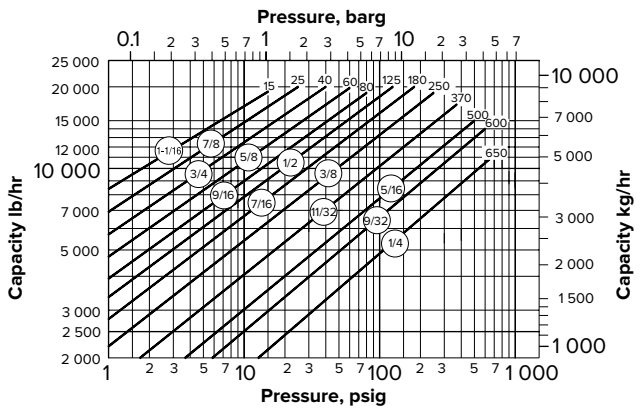
Model 34-DC Capacity



Model 35-DC Capacity



Model 36-DC Capacity



Armstrong® Float & Thermostatic Steam Trap

The More Your Steam Pressure Varies, the More You Need Armstrong F&T Traps

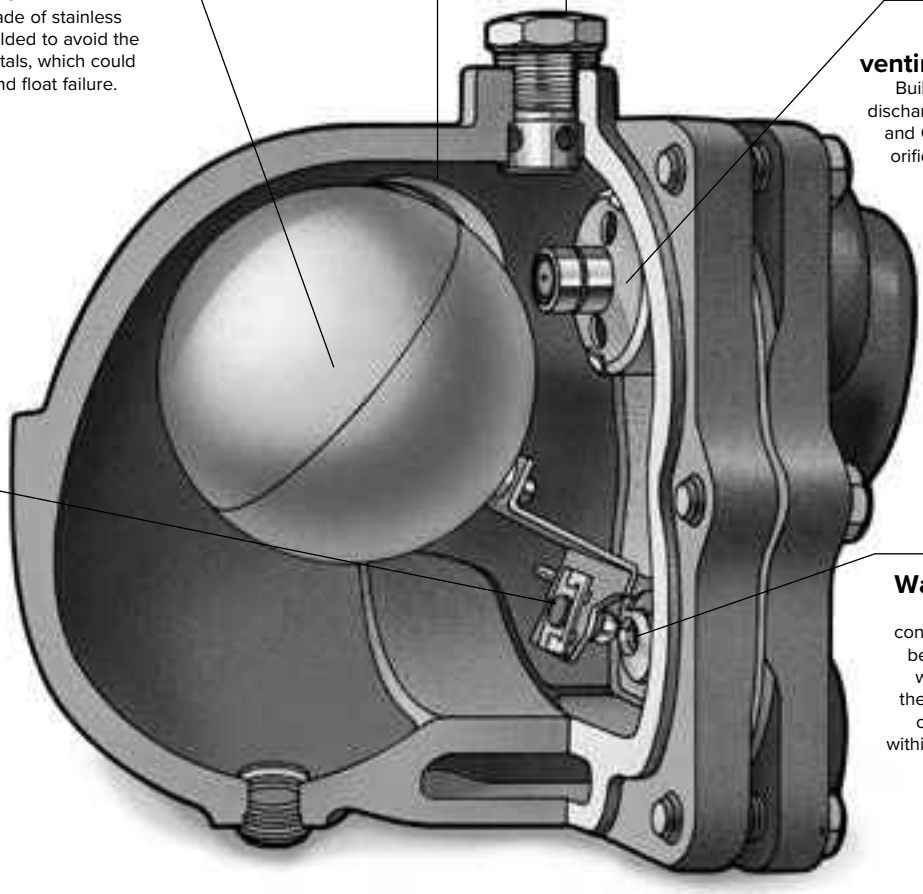
When steam pressure may vary from maximum steam supply pressure to vacuum, Armstrong F&Ts are your most energy-efficient choice. Our line of F&Ts brings Armstrong performance, dependability and long life to trapping services requiring continuous drainage with high air venting capacity. Thanks to separate orifices for condensate and air, they provide continuous condensate drainage and air venting—even under conditions of zero pressure.

All the benefits detailed below have been designed into Armstrong F&Ts through long experience in the manufacture of pressure float-type drain traps. They assure you of optimum operating efficiency for long periods with minimum trouble.

No water seal at inlet
Inlet high on body and condensate discharge valve in the bottom of the body prevent formation of a water seal that could block flow of air to vent under very low pressure conditions.

Optional integral vacuum breakers
Provide maximum protection against freezing and water hammer in condensing equipment under modulated control. They also eliminate another fitting being installed in the line.

Corrosion resistance
Entire float mechanism is made of stainless steel. The float is Heliarc welded to avoid the introduction of dissimilar metals, which could lead to galvanic corrosion and float failure.



High-capacity venting of air and $C0_2$
Built-in thermostatic air vent discharges large volumes of air and $C0_2$ through its separate orifice—even under very low pressure conditions.

Long life and dependable service
Valve is stainless steel in all sizes. Seat is heat treated in 1-1/2" pipe size and larger. Rugged float mechanism is built to resist wear, and the stainless steel float provides exceptionally high collapsing pressure and resistance to hydraulic shock.

Water sealed valve
Steam cannot reach condensate discharge valve because it is always under water. Balanced pressure thermostatic air vent closes on steam at any pressure within the operating range of the trap.

Operation against back pressure
Trap operation is governed solely by the condensate level in the trap. Back pressure in the return line will not render the trap inoperative as long as there is any pressure differential to force condensate through the discharge valve.

Continuous drainage
No pressure fluctuations due to intermittent condensate drainage. Condensate is discharged at very close to steam temperature. No priming needed.

Float & Thermostatic Steam Trap

Built as Tough as the Jobs They Do

Armstrong float and thermostatic traps are unique in their super heavy duty construction. Armstrong uses high quality ASTM A48 Class 30 cast iron or ASTM A216 WCB cast steel—normally found in pressure vessels rated to 250 psig or 465 psig. Internal mechanisms are made from stainless steel and are heavily reinforced. No brass cotter pins here. Valves and seats are stainless steel, hardened, ground and lapped to withstand the erosive forces of flashing condensate.

Why go to all this trouble on traps normally recommended for low-pressure, modulating service? The answer is in the word modulating. Modulating pressures mean widely varying loads, thermal cycling and high air and non-condensable gas loads.

In other words, tough service. Inferior, lightweight construction is a mistake waiting to happen. Trap failures on modulating pressure may lead to water hammer, corrosion and even heat exchanger damage.

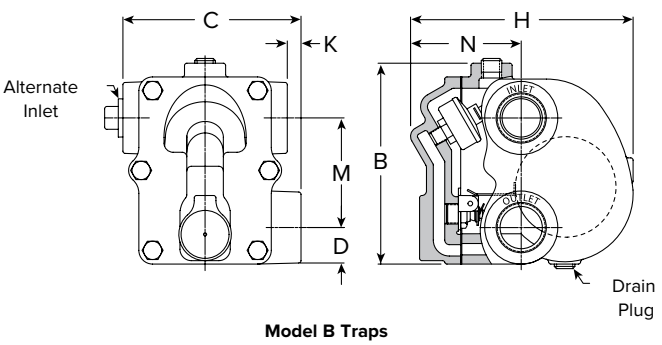
Armstrong's published capacities are based on actual measurements of traps handling hot, flashing condensate. Competitive F&Ts may utilize theoretical calculated capacities. Armstrong uses its own steam lab to give you actual capacity—especially important on high-capacity traps such as those in our ultra-capacity line. Not only does Armstrong offer super heavy duty construction for long life and reliability, but we also supply the data to back up performance. Here's a simple, easy-to-remember summary: The more your pressure varies, the more you need Armstrong F&Ts.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

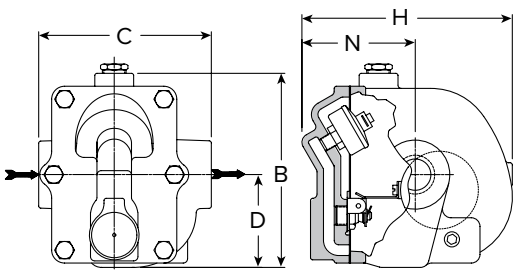
B and BI Series Float & Thermostatic Steam Trap

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 Traps



Model BI Traps

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	*2 = 1/2" *3 = 3/4" 4 = 1" 5 = 1-1/4" 6 = 1-1/2" 8 = 2"	VB = Vacuum Breaker
	BI = In-line Connection	2 = 1/2" 3 = 3/4" 4 = 1"	

*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 ℄)	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" (℄ to ℄)	2-3/4	69.8	3	76.2	3	76.2	4-3/16	106	6	152	—	—
"N" (Top to ℄)	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)	

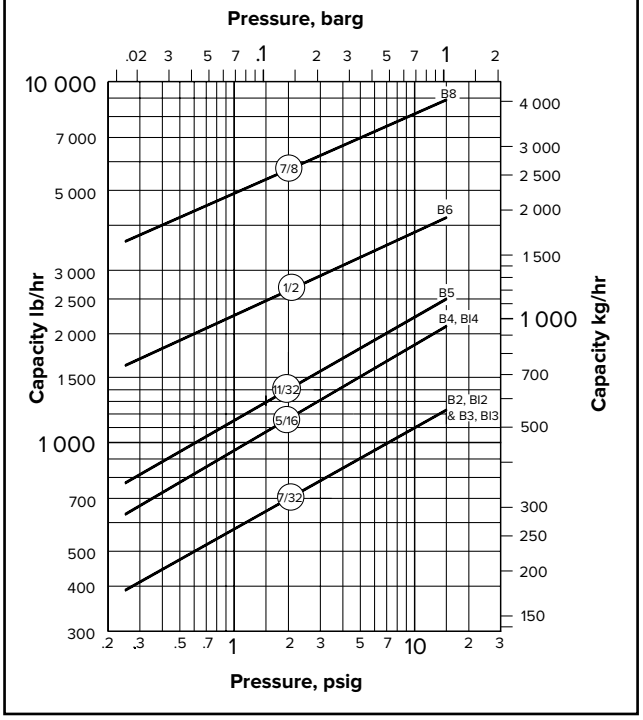
NOTE: Cast iron traps should not be used in systems where excessive hydraulic or thermal shock are present.

B and BI Series Float & Thermostatic Steam Trap

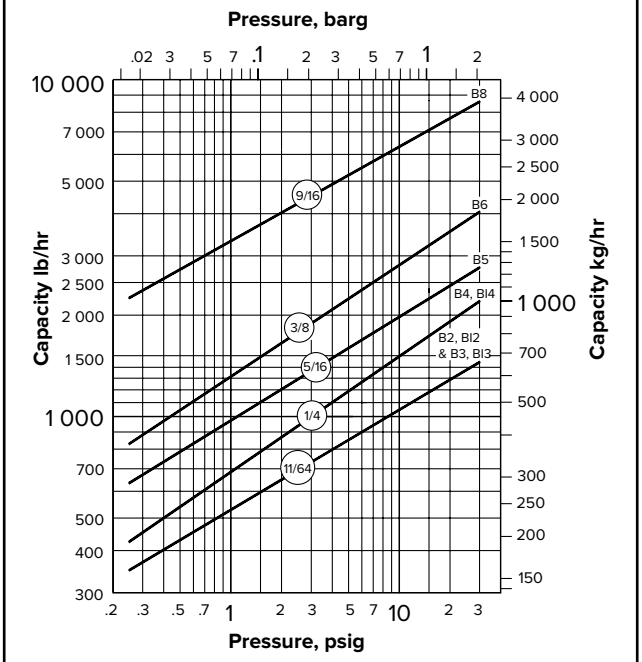
Cast Iron for Horizontal Installation, With Thermostatic Air Vent

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

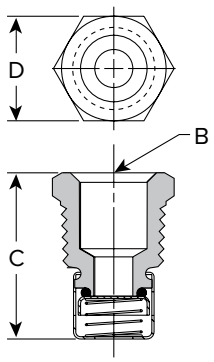
Vacuum Breakers 3/8" (10 mm) and 1/2" (15 mm) NPT

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

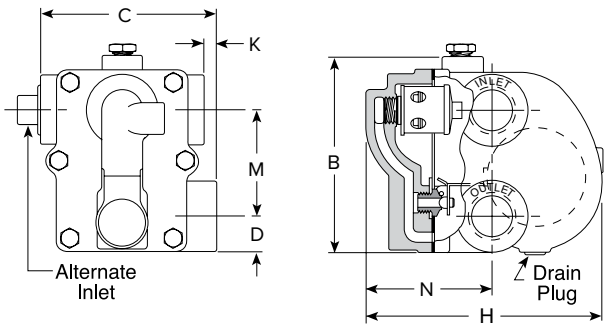
Size	in	mm	in	mm
	1/2 NPT	15 3/8	NPT	10
"B" Pipe Connections	3/8 NPT	10	1/4 NPT	6
"C" Height	1-1/4	32	1-3/32	28
"D" Width	7/8 Hex	22 Hex	11/16 Hex	17 Hex



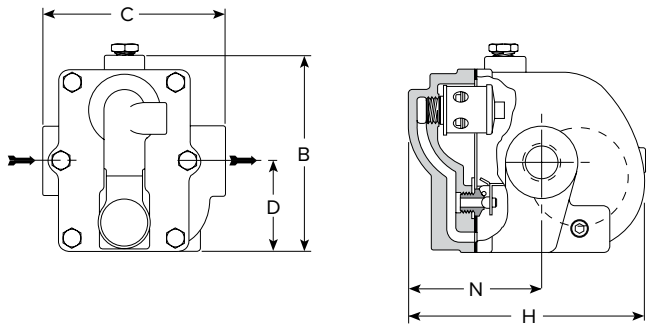
A & AI Series Float & Thermostatic Steam Trap

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	3 = 3/4" 4 = 1" 5 = 1-1/4" 6 = 1-1/2" 8 = 2"	VB = Vacuum Breaker
	AI = In-line Connection	2 = 1/2" 3 = 3/4" 4 = 1"	

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 ℄)	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" (℄ to ℄)	3	76.2	3	76.2	3	76.2	4-3/16	106	6	152	—	—
"N" (Top to ℄)	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)	

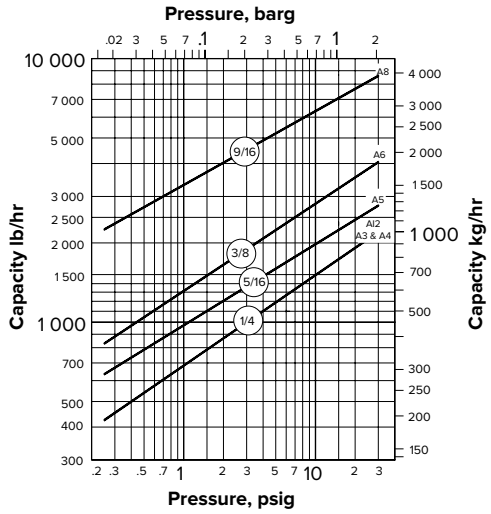
NOTE: Cast iron traps should not be used in systems where excessive hydraulic or thermal shock are present.

A & AI Series Float & Thermostatic Steam Trap

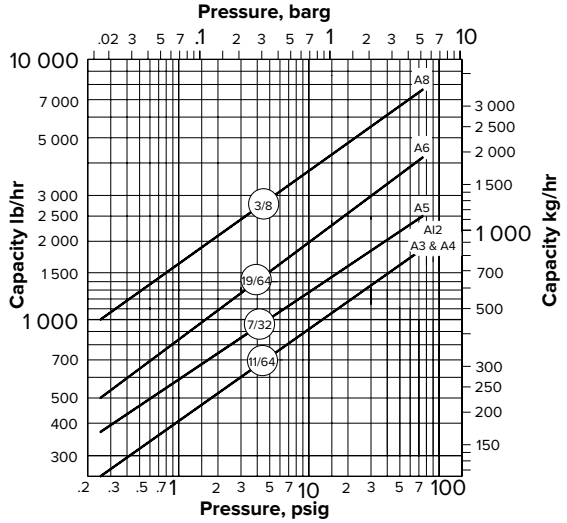
Cast Iron for Horizontal Installation, With Thermostatic Air Vent

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

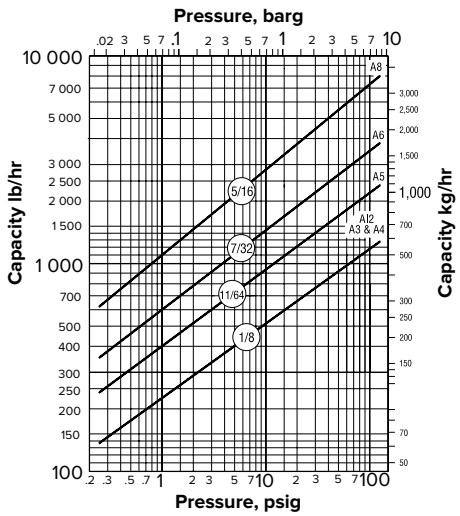
Model A & AI Series Capacity—30 psig



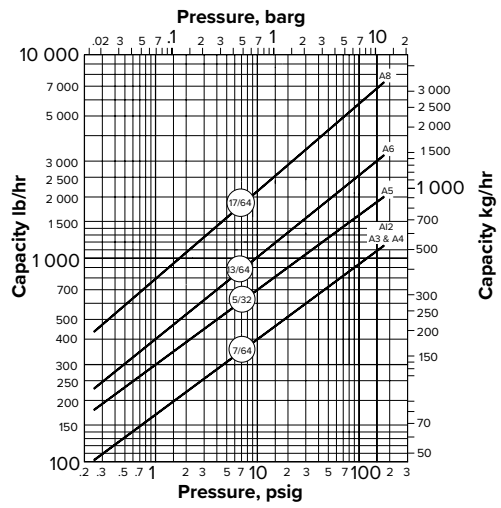
Model A & AI Series Capacity—75 psig



Model A & AI Series Capacity—125 psig



Model A & AI Series Capacity—175 psig

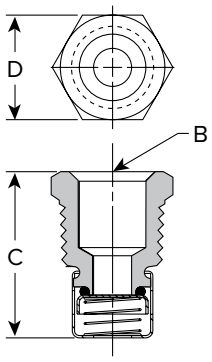


Options

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
	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

Float & Thermostatic Replacement Cap

Description

Float & Thermostatic Replacement Cap Assembly
These Float and Thermostatic (F&T) Repair Cap Assemblies are designed to repair certain Spirax-Sarco FT-Series Steam Traps, as well as models of several other manufacturers. The cap assembly consists of a cap, mechanism, float, thermostatic air vent, gasket and bolts. The kit is completely assembled and ready to install.

Maximum Operating Conditions

Please refer to original steam trap manufacturer operation conditions. This replacement cap will meet the conditions of those models listed below.

Materials

Cap: Cast Iron ASTM A48 CL.30A
Gasket: Graphoil GHN
Thermostatic Bellows: Brass
Mechanical Assembly and Float: T304SS
Valve: 17-4PH H900
Seat: T303 SS

Features

This product gives you the performance and long life that you expect from an Armstrong steam trap while making it simple to install into the existing trap body. The F&T style trap is perfect for heating service where continuous drainage with high air-venting capacity is required. The proper replacement cap assembly for the F&T steam trap depends on the connection size, manufacturer model number and the maximum operating pressure.

Specifications

Float & Thermostatic Replacement Cap			
Connection Size	**Model**	**Max. Operating Pressure**	**Use Armstrong Repair Cap Part #**
3/4" - 1"	FT-15	15 psig (1.03 barg)	D114713
	FT-30	30 psig (2.06 barg)	D114714
	FT-75	75 psig (5.17 barg)	D114717
	FT-125	125 psig (8.62 barg)	D114718
1-1/4"	FT-15	15 psig (1.03 barg)	D114715
	FT-30	30 psig (2.06 barg)	D114716

Compatible trap models (see chart above for operating pressure and connection sizes):
- Spirax-Sarco FT-Series
- Barnes & Jones – FT2000 Series
- Hoffman – FT H Series
- Erwel – F Series
- Watts – WFT Series
- Nicholson – FTN Series
- Watson McDaniel – WFT Series
- Tunstall – TA-FT Series

How to Order

Specify the following:
- Manufacturer / Model Number
- Max. Operation Pressure
- Connection Size

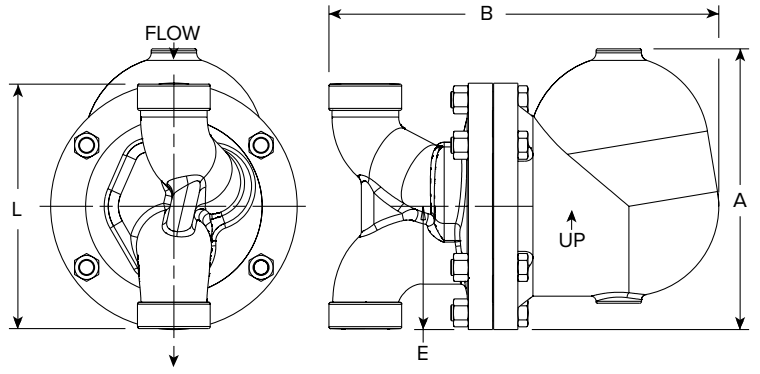
Refer to the Part Numbers in above Table

Notes

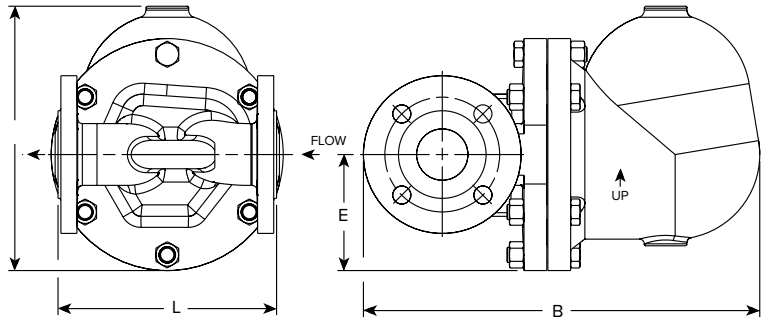
AIC Series Float & Thermostatic Steam Trap

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 AICV



Model AICFH

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_2, 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.

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

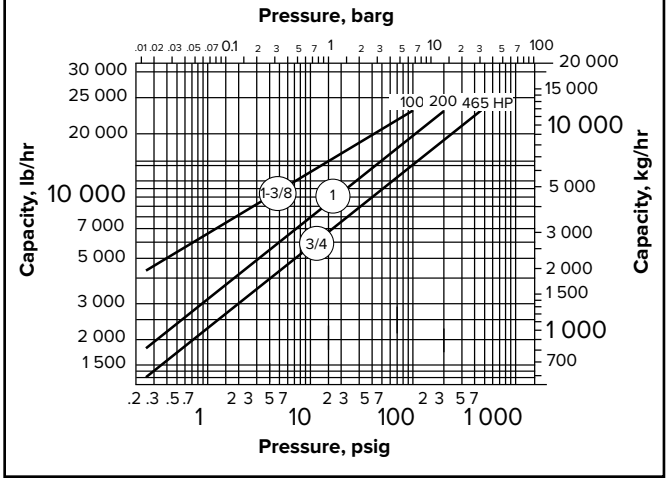
Pipe Connections	1 1/2" DN40		2" DN50	
	in	mm	in	mm
"A" Height	10-15/16	278	10-15/16	278
"B" (Length Screwed)	12-27/32	326	13-1/8	333
"B" (Length Flanged)	16-1/8	410	16-27/64	417
"L" (Face-to-face Screwed)	10-5/8	270	11-13/16	300
"L" (Face-to-face Flanged PN40 ANSI CL150)	9-1/16	230	9-1/16	230
"L" (Face-to-face Flanged ANSI CL300)	9-3/32	231	9-1/4	235
"E" (Bottom to ℄ 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)	

AIC Series Float & Thermostatic Steam Trap

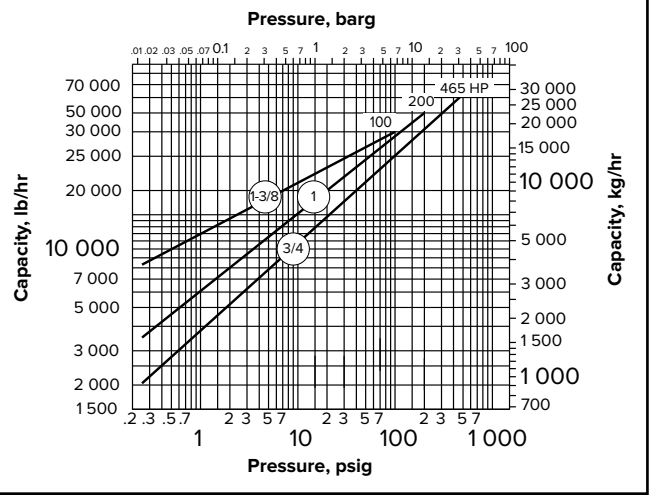
Ductile Iron for Horizontal & Vertical Installation with Thermostatic Air Vent

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.

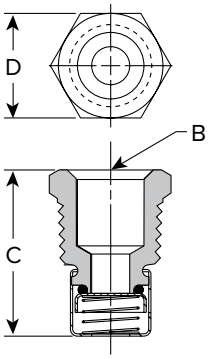
For maximum protection against freezing and water hammer in condensing equipment under modulated control, vacuum breakers are recommended. Armstrong AIC Series F&T Traps are available with integral vacuum breakers. Maximum service pressure is 150 psig (10 barg).

Vacuum Breaker			
Size	in	mm	Max. allow. pres.
	1/2 NPT	DN15	150 psig (10 barg)
"B" Pipe Connections	3/8 NPT	DN10	
"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.



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

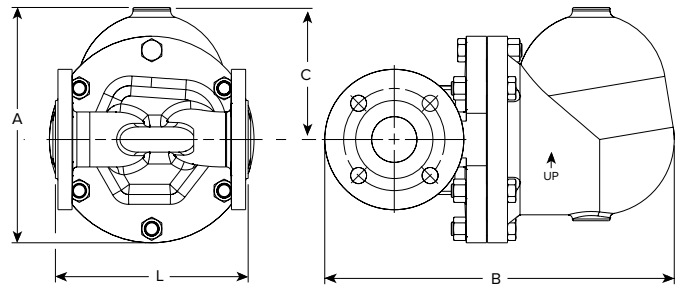
Flanged	ASME B16.5 Class 150 - 300
Socketweld	
NPT	

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 ℄ 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 ℄ 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 for up-to-date information.

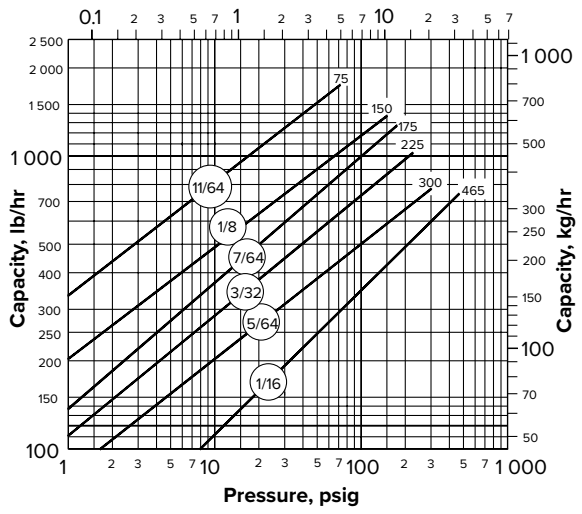
ICS Series Float & Thermostatic Steam Traps

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

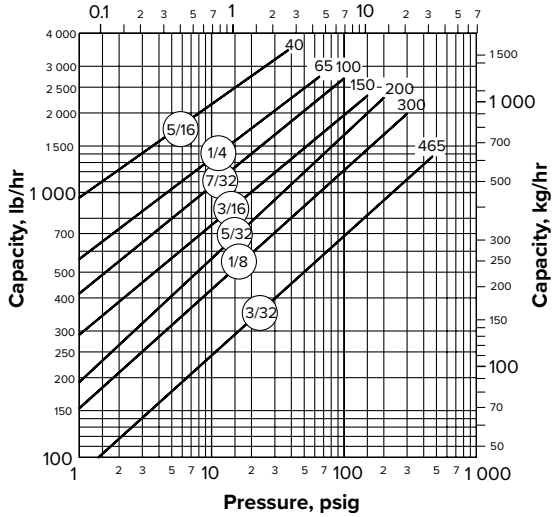
For Pressures to 465 psig (32 barg)... Capacities to 60 000 lb/hr (27 215 kg/hr)

Armstrong®

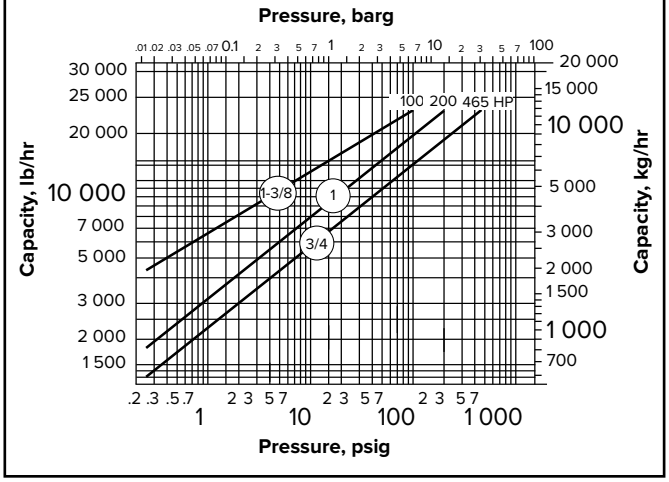
Model ICS Series Capacity 1/2" & 3/4"



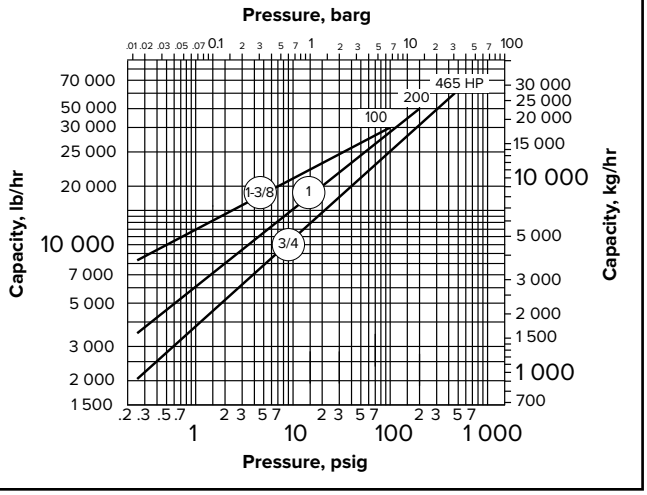
Model ICS Series Capacity 1"



Model ICS Series Capacity 1 1/2"

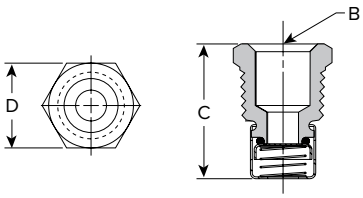


Model ICS Series Capacity 2"



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	150 psig at 366°F (10 barg at 184°C)
"B" Pipe Connections	3/8 NPT	DN10	
"C" Height	1-1/4	32	
"D" Width	7/8 Hex	22 Hex	

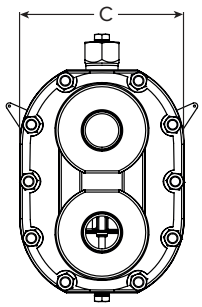
CAUTION: Do not use a conventional vacuum breaker open to the atmosphere in any system that incorporates a mechanical return system that carries pressure less than atmospheric pressure. This includes all return systems designated as vacuum returns, variable vacuum returns or subatmospheric returns. If 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 for up-to-date information.

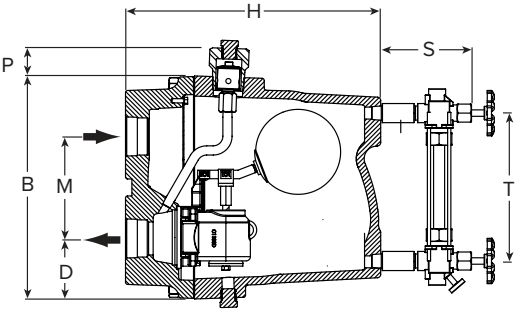
JD & KD Series Ultra-Capacity Float & Thermostatic Steam Trap

Ductile Iron for Horizontal Installation, With Thermostatic Air Vent

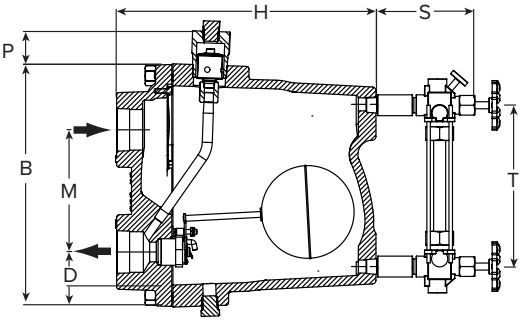
For Pressures to 300 psig (21 barg)...Capacities to 142 000 lb/hr (64 400 kg/hr)



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 (1.3 barg) saturated steam
Model 30-JD:	30 psig (2 barg) saturated steam
Model 75-JD:	75 psig (5.1 barg) saturated steam
Model 125-JD:	1 25 psig (8.6 barg) saturated steam
Model 175-JD:	175 psig (12 barg) saturated steam
Model 250-JD:	250 psig (17.2 barg) saturated steam
Model 300-JD:	300 psig (20.6 barg) saturated steam
Model 30-KD:	30 psig (2 barg) saturated steam
Model 50-KD:	50 psig (3.4 barg) saturated steam
Model 300-KD:	300 psig (20.6 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 20 30 75 125 175 250 300	JD	8 = 2"	VB = Vacuum Breaker LD = Liquid Drainer CC = Condensate Controller FLG = Specify type and class of flange GG = Gauge Glass
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	
Pipe Connection	in	mm	in	mm
	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 ℄)	2-15/16	75	3-9/16	90
"H" (Length)	13-11/16	348	14-11/16	373
"M" (℄ to ℄)	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)	

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

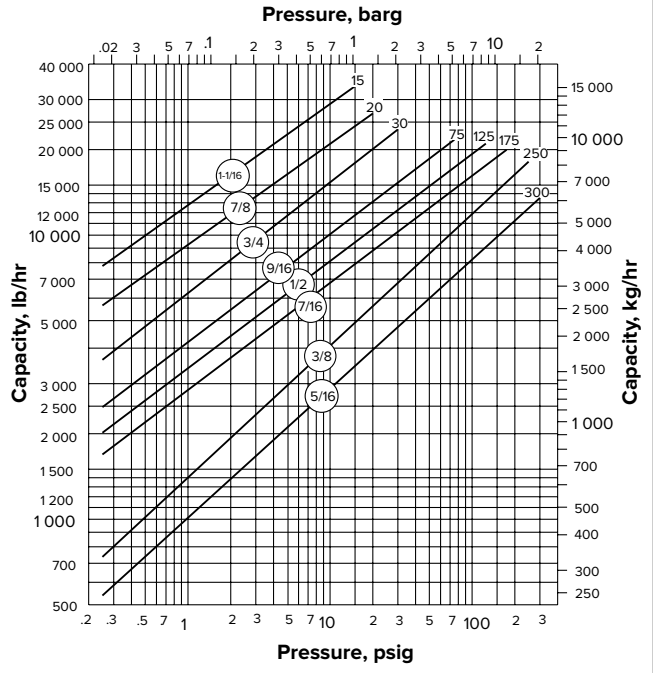
JD & KD Series Ultra-Capacity Float & Thermostatic Steam Trap

Ductile Iron for Horizontal Installation, With Thermostatic Air Vent

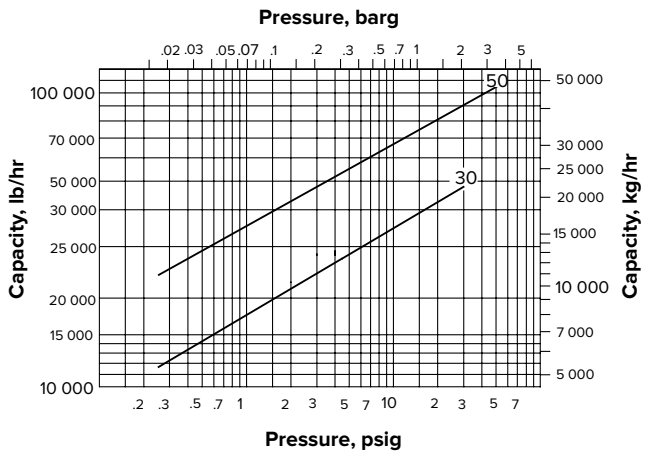
For Pressures to 300 psig (21 barg)...Capacities to 142 000 lb/hr (64 400 kg/hr)

Armstrong®

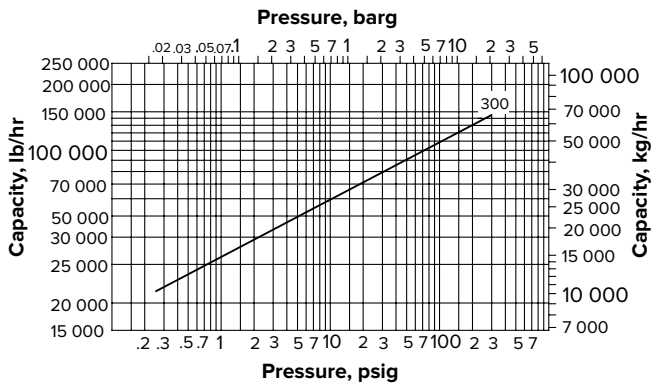
Model JD Series Capacity



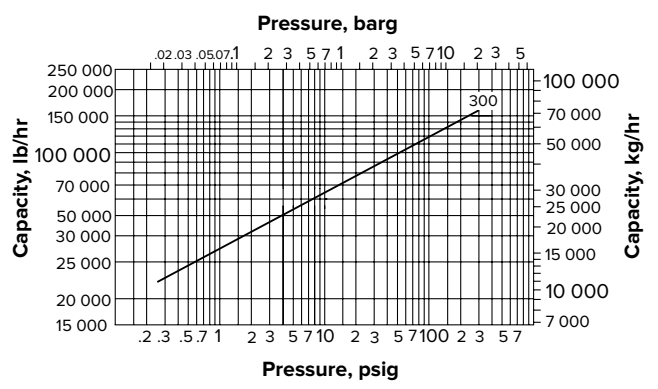
Model 30-KD8/50-KD10 Capacity



Model 300-KD10 Capacity



Model 300-KD12 Capacity



Options

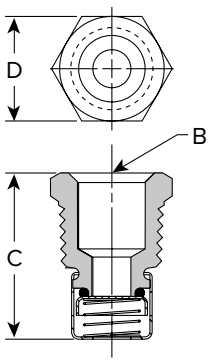
Vacuum Breaker—1/2" (15 mm) NPT

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

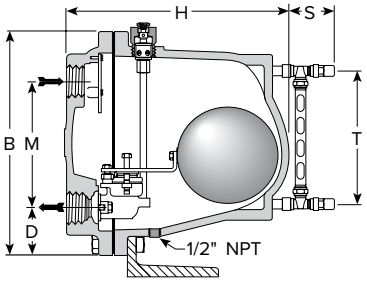
Size	in	mm	Max. allow. pres.
	1/2 NPT	15	150 psig (10 barg)
"B" Pipe Connections	3/8 NPT	10	
"C" Height	1-1/4	32	
"D" Width	7/8 Hex	22 Hex	



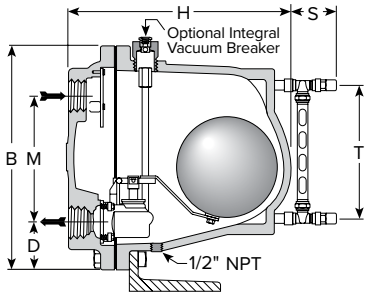
L & M Series Ultra-Capacity Float & Thermostatic Steam Trap

Cast Iron for Horizontal Installation, With Thermostatic Air Vent

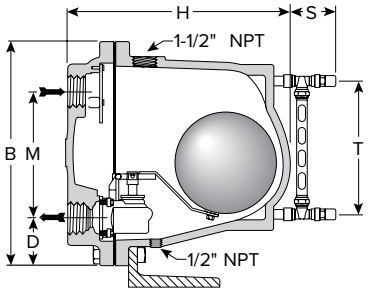
For Pressures to 250 psig (17 barg)...Capacities to 208 000 lb/hr (94 348 kg/hr)



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**
30 100 150 250	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
250	M	12 = 3"	

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

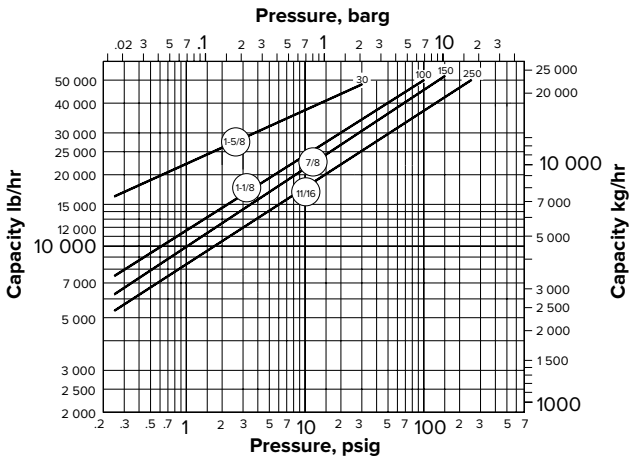
Trap Series	L	M	L	M
Pipe Connection	in		mm	
	2, 2-1/2	3	50, 65	80
"B" (Height)	20-1/4		514	
"C" (Width)	14-3/4		375	
"D"(Bottom to ℄)	4-3/16		106	
"H" (Length)	19-3/4		502	
"M" (℄ to ℄)	11-5/16		287	
"S" (Gauge Glass Width)	3-3/4		95.2	
"T" (Gauge Glass Height)	12		305	
Weight lb (kg)	196 (88.9)			

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

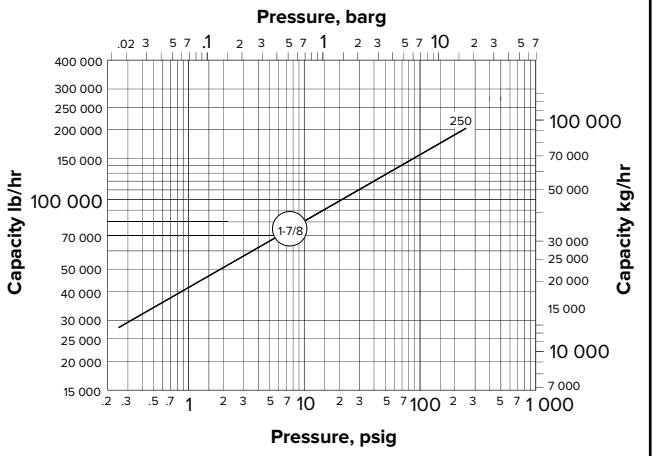
Cast Iron for Horizontal Installation, With Thermostatic Air Vent

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.

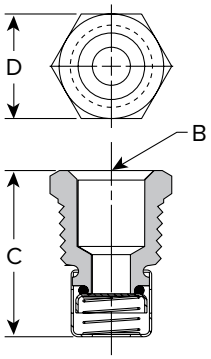
See your Armstrong Representative.

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.

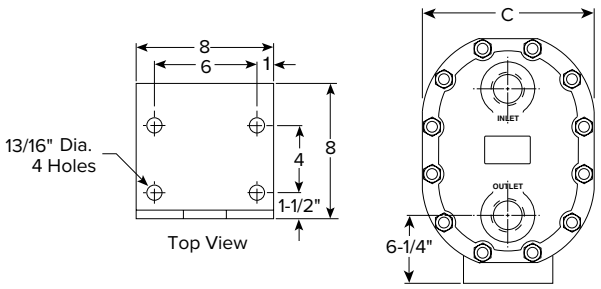
Vacuum Breaker			
Size	in	mm	Max. allow. pres.
	1/2 NPT	15	150 psig (10 barg)
"B" Pipe Connections	3/8 NPT	10	
"C" Height	1-1/4	32	
"D" Width	7/8 Hex	22 Hex	



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

Cast Steel for Horizontal Installation, With Thermostatic Air Vent

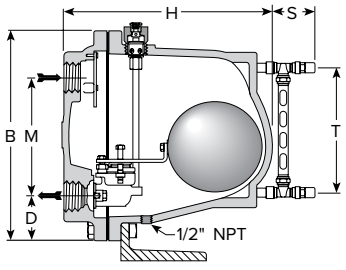
For Pressures to 450 psig (31 barg)...Capacities to 280 000 lb/hr (127 000 kg/hr)



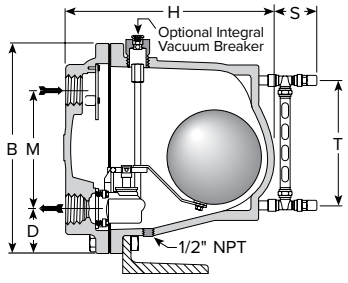
LS and MS Floor Mounting Bracket

LS & MS Series Traps		
Trap Series	**LS & MS**	
Pipe Connection	in	mm
	2, 2-1/2, 3*	50, 65, 80*
"B" (Height)	20	508
"C" (Width)	15-1/4	387
"D" (Bottom to ℄)	4-3/16	106
"H" (Length)	20-1/4	508
"M" (℄ to ℄)	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)	

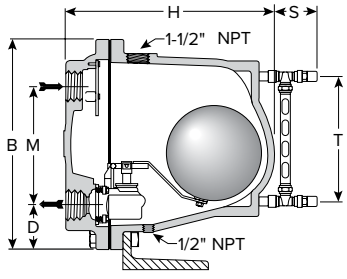
*MS Series 3" (80 mm) only.



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
- Socketweld
- Flanged (weld neck)

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.

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**
30 100 150 250 450*	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
250 450*	MS	12 = 3"	

* 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.

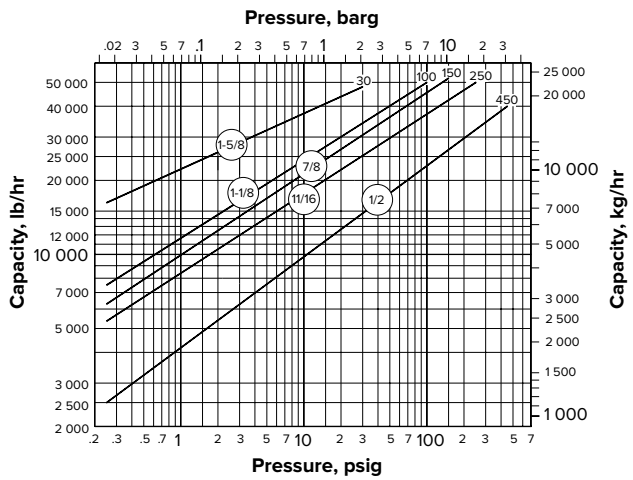
Liquid drainer with back vent for exceptionally high capacity drainage of liquid from gas under pressure. The liquid drainer (LD) configuration was developed to meet very large capacity needs in draining water and other liquids from air or other gases under pressure. To prevent air or gas binding, the 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

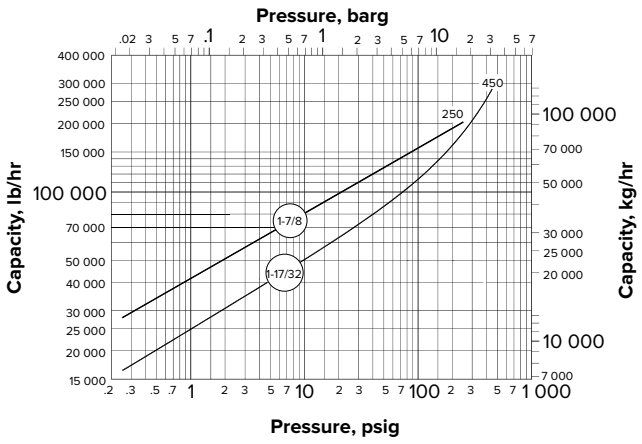
Cast Steel for Horizontal Installation, With Thermostatic Air Vent

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.

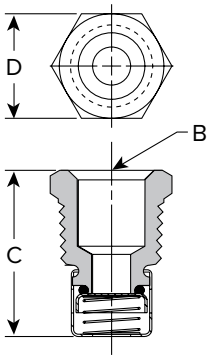
Vacuum Breaker—1/2" (15 mm) NPT

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



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit 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

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

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.

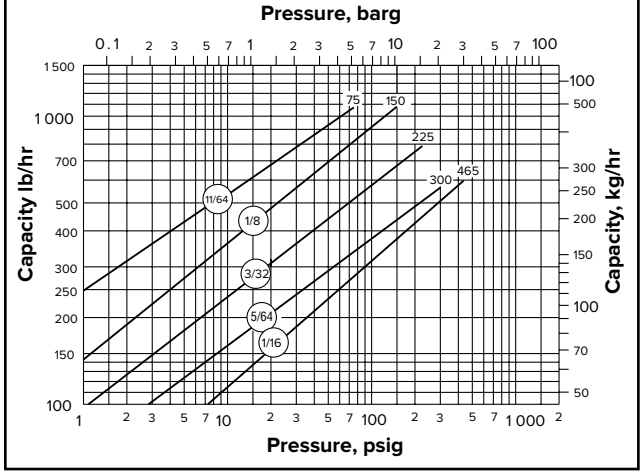
How to order

- 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.

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

Model FT-4000 Series Capacity

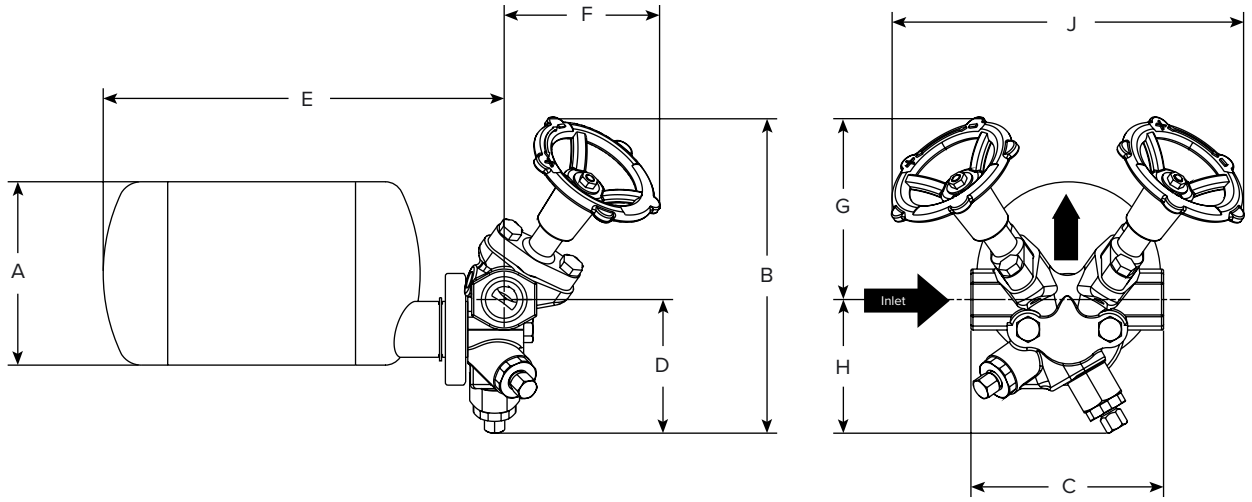


Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

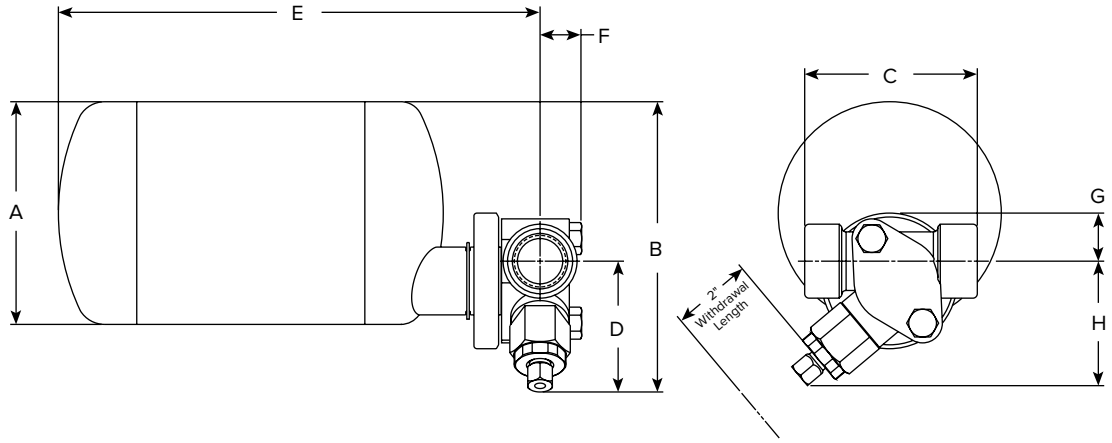
FT-4000 Series Float and Thermostatic Steam Trap

All Stainless Steel

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



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 ℄ to Bottom	2-5/8	67	2-5/8	67	3-1/4	83
"E" Connection ℄ to Outside of Trap	10	255	10-1/4	259	9-7/8	250
"F" Connection ℄ to Front of Connector	7/8	22	7/8	22	3-7/8	98
"G" Connection ℄ to Top	1	25	1	25	4-1/2	114
"H" Connection ℄ 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 for up-to-date information.

FF-4000 Series Float and Thermostatic Steam Trap with freely floating ball - All Stainless Steel

For Pressures to 250 psig (17 barg)... Capacities to 1 050 lb/hr (476 kg/hr)

Description

With the FF-4000 Series' 360° universal connector, you can install the float and thermostatic trap to fit any piping configuration. You get the reliability of the freely floating ball and thermostatic design plus all the benefits of all-stainless steel construction.

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

FF-4000 Series Float and Thermostatic steam traps combine savings in three important areas: energy, installation and replacement. Mounting the FF-4000 on universal connectors provide quick and easy in-line replacement.

FF-4250 with TVS-4000

Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model FF-4250	270 psig @ 650°F (20.7 barg @ 343°C)
Model FF-4450	600 psig @ 800°F (41.4 barg @ 427°C)

Maximum operating pressure:

Model FF-4250	250 psig @ 650°F (17 barg @ 343°C)
Model FF-4450	450 psig @ 800°F (31 barg @ 427°C)

Materials

Body:	ASTM A240 Grade 304L
Internals:	All stainless steel-304
Ball seat:	Stainless Steel
Float:	Stainless Steel
Air Vent:	Bimetal

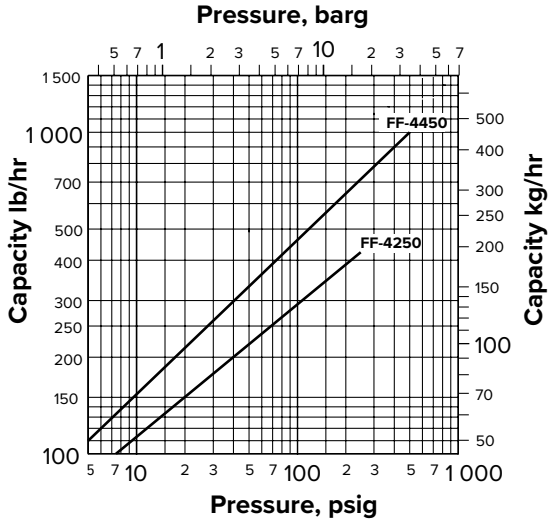
360° Universal Connector Styles

- Standard 2-bolt connector
- IS-2 connector with integral strainer and optional blowdown valve
- Trap Valve Station

How to order

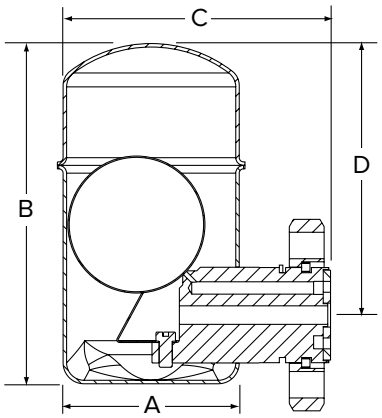
- Specify model number
- Size and type of pipe connection, style of 360° universal connector.

FF-4000 Series Capacities



FF-4000 Series

Model No.	FF-4250		FF-4450	
Pipe Connection	1/2, 3/4	15, 20	1/2, 3/4	15, 20
	in	mm	in	mm
"A" Diameter	2-11/16	68	3-7/8	98
"B" Height	4-7/8	124	6-3/16	157
"C" Outside to Flange"D"	3-7/8	98	4-15/16	125
"D" C Flange to Top	4	102	4-15/16	125
Trap Only Weight, lb (kg)	2 (0.9)		4 (1.8)	



FF-4700/4900 High Pressure Float and Thermostatic Steam Trap with Freely Floating Ball

For Pressures to 1245 psig (85.8 barg)... Capacities to 315 lb/hr (142 kg/hr)

Description

With models FF-4700 and FF-4900, you can install the float and thermostatic stainless steel trap on the IS-4 4-bolt connector to fit any piping configuration. You get the reliability of the freely floating ball and thermostatic design plus all the benefits of all-stainless steel construction.

- A sealed, tamperproof package
- A compact, lightweight trap
- Exceptional corrosion resistance

Models FF-4700 and FF-4900 Float and Thermostatic steam traps combine savings in three important areas: energy, installation and replacement. Mounting the FF-4700 and
FF-4900 on an IS-4 4-bolt connectors provide quick and easy in-line replacement.

FF-4700 with IS-4 Connector

Maximum Allowable Conditions

Maximum allowable pressure (vessel design):

Model FF-4700 1245 psig @ 900°F (85.8 barg @ 482°C)

Model FF-4900 1245 psig @ 900°F (85.8 barg @ 482°C)

Maximum Operating Pressure

Model FF-4700 900 psig (62.0 barg)

Model FF-4900 1245 psig (85.8 barg)

Materials

Body: ASTM A351 Gr. CF8M

Ball seat: Stainless Steel

Float: Titanium

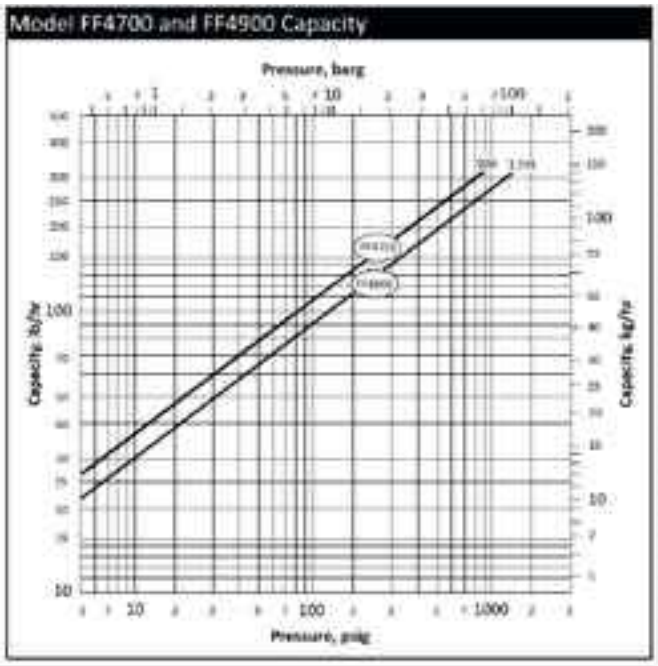
Air Vent: Bimetal

360° Universal Connector Styles

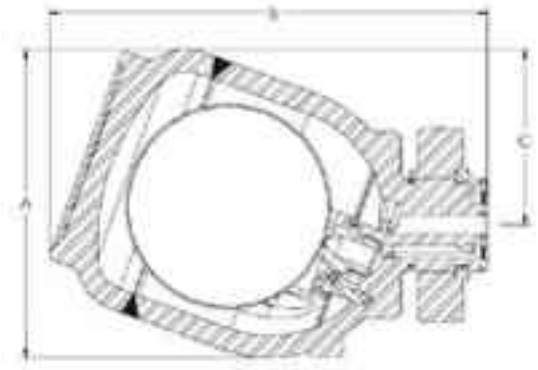
- IS-4 connector with optional blowdown valve. Connectors available in ¾" or 1". In SW, NPT or Flange.

How to order

- Specify model number
- Connection size and type of pipe connection for IS-4 connector



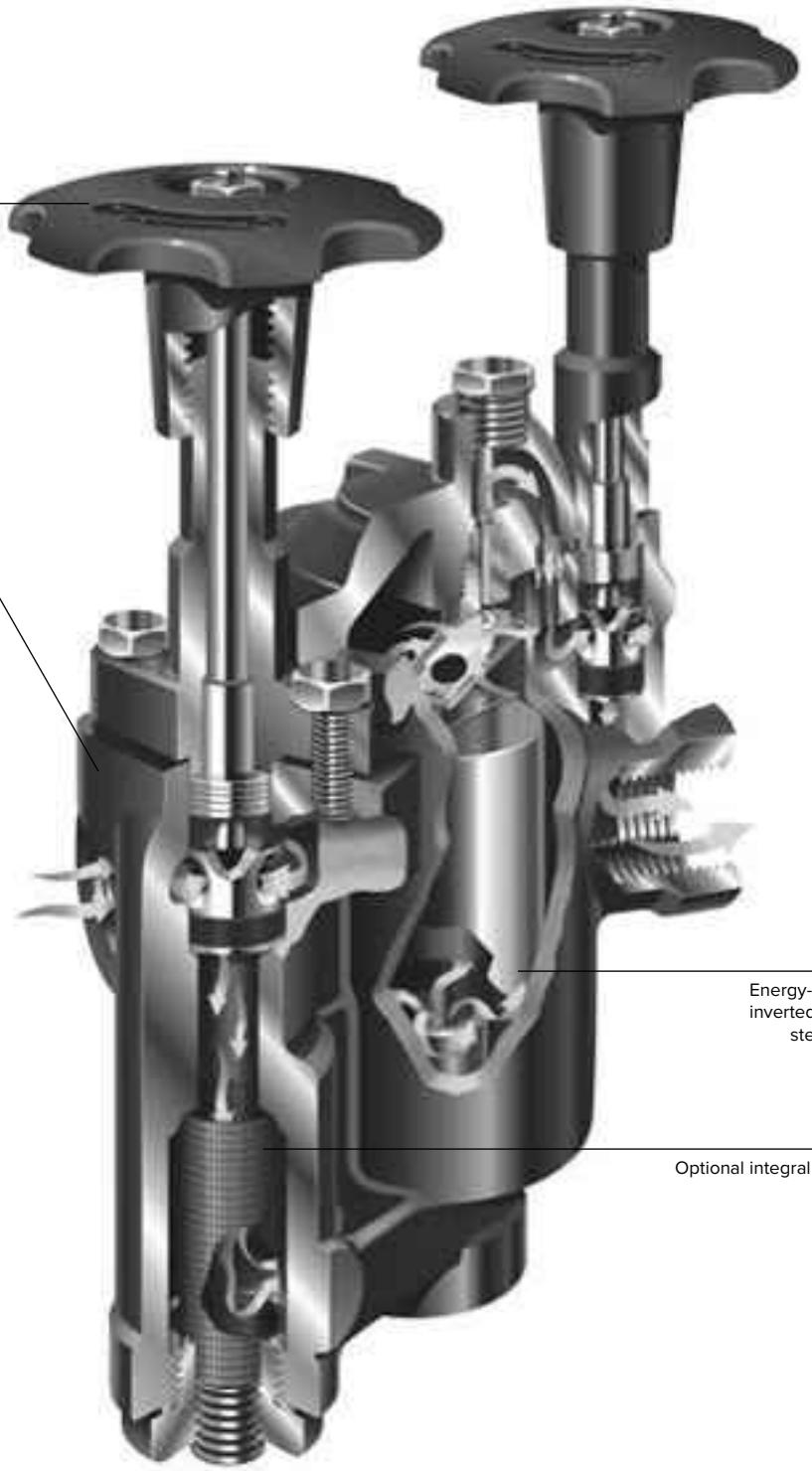
FF-4700 and FF-4900 - High Pressure		
Model No.	FF-4700 and FF-4900	
Pipe Connection	3/4, 1	20, 25
	in	mm
"A" Height	4-1/2	115
"B" Length	6-1/2	165
"C" Flange to Top	2-916	65
Trap Only weight, lb (kg)	7.6 (3.5)	



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.



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

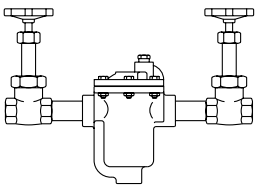
Reduced design time
Permits combining products with exact face-to-face dimensions.

*U.S. Patent 5,947,145

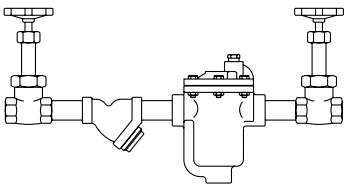
TVS 800 Series Cast Iron Trap Valve Station

TVS makes a long story...short.

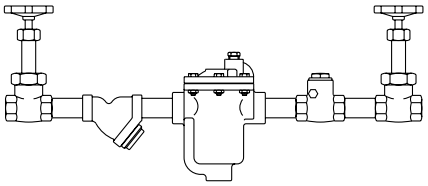
Typical Installation



Inverted bucket trap with two isolation valves



Inverted bucket trap with two isolation valves and strainer



Inverted bucket trap with two isolation valves, strainer and check valve

Trap Valve Station

The Innovation Is Integration

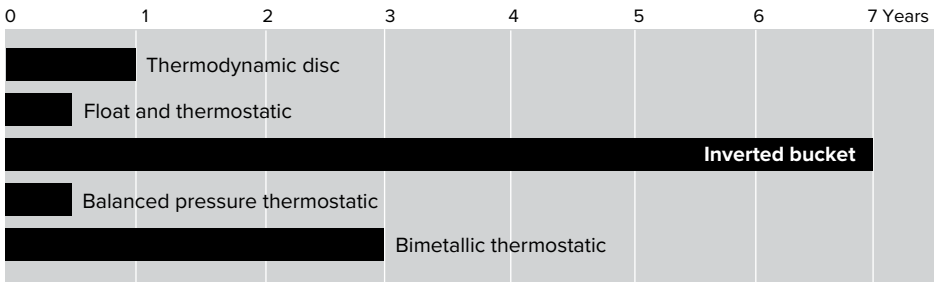
The Armstrong TVS makes what used to be long, complicated steam installation stories simple and compact. It shortens installations by integrating components—specifically an inverted bucket steam trap with two or more valves.

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)

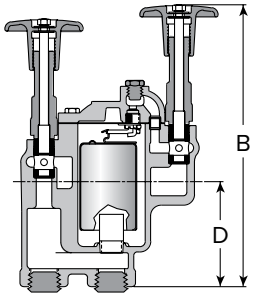


Above data from ICI Engineer January 1993 special issue with permission from ICI Engineering.

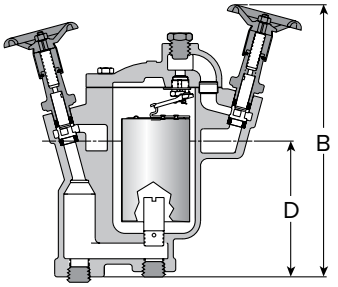
TVS 800 Series Trap Valve Station

Cast Iron for Horizontal Installation, With Integral Piston Valves

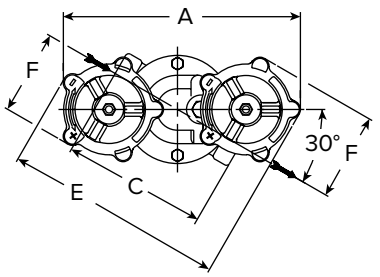
For Pressures to 250 psig (17 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)



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

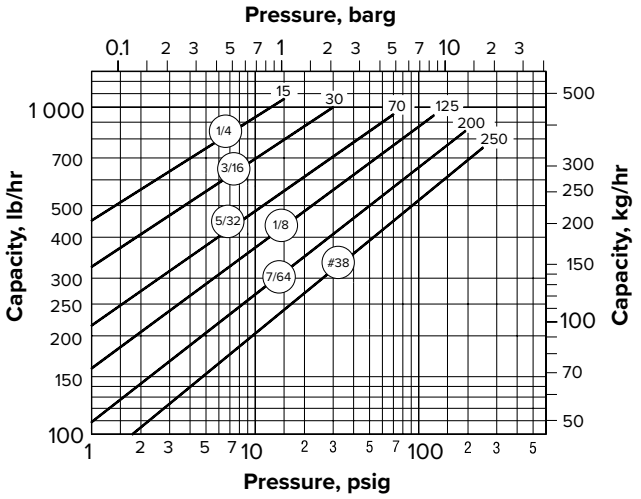
TVS 800 Series Trap Valve Station						
Model No.	**TVS 811**		**TVS 812**		**TVS 813**	
Pipe Connections	**in**	**mm**	**in**	**mm**	**in**	**mm**
	1/2, 3/4	15, 20	1/2, 3/4	15, 20	3/4, 1	20, 25
Test Plug	1/4	6	1/2	15	3/4	20
"A" Width Across Handwheels	8-1/4	210	13-3/4	349	15-1/8	384
"B" Outlet Valve 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 ℄ 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)	

TVS 800 Series Trap Valve Station

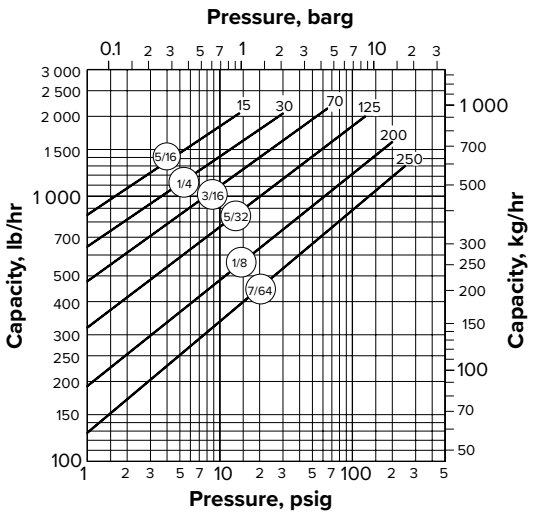
Cast Iron for Horizontal Installation, With Integral Piston Valves

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

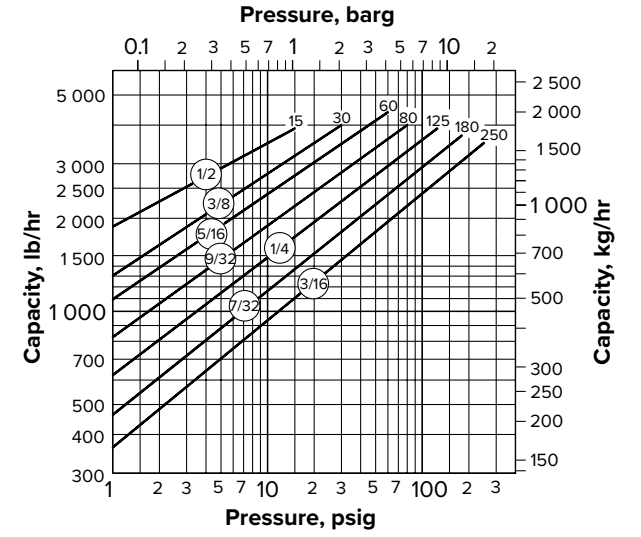
Model TVS 811 Capacity



Model TVS 812 Capacity



Model TVS 813 Capacity



Options

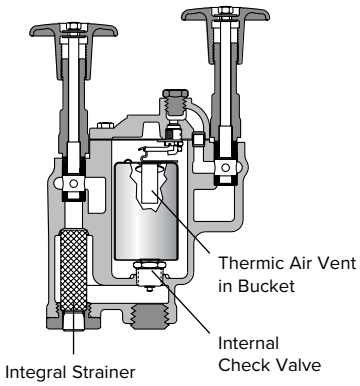
Internal Check Valves are spring-loaded stainless steel and screw directly into the trap inlet or into an extended inlet tube having a pipe coupling at the top to save fittings, labor and money.

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.



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

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)

IS-4

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.

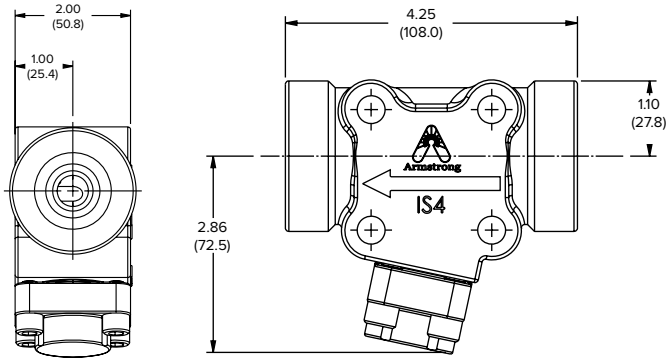
How to order

IS-4	3FL	900	DBB	DBB

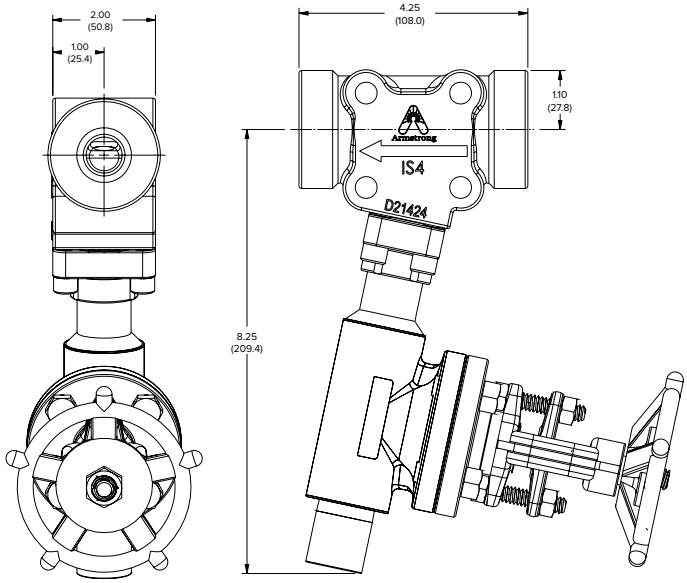
Model	Connection Size/Type	Flanges	Inlet Configuration	Outlet Configuration
IS-4 or IS-4BD	**3NPT**=3/4(20)NPTF **3SW**=3/4(20)Socketweld **3FL**=3/4(20)Flanged **4NPT**=1(25)NPTF **4SW**=1(25)Socketweld **4FL**=1(25)Flanged	Class 600 Class 900	None **SB**=Single Block **DBB**=Double Block & Bleed	None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

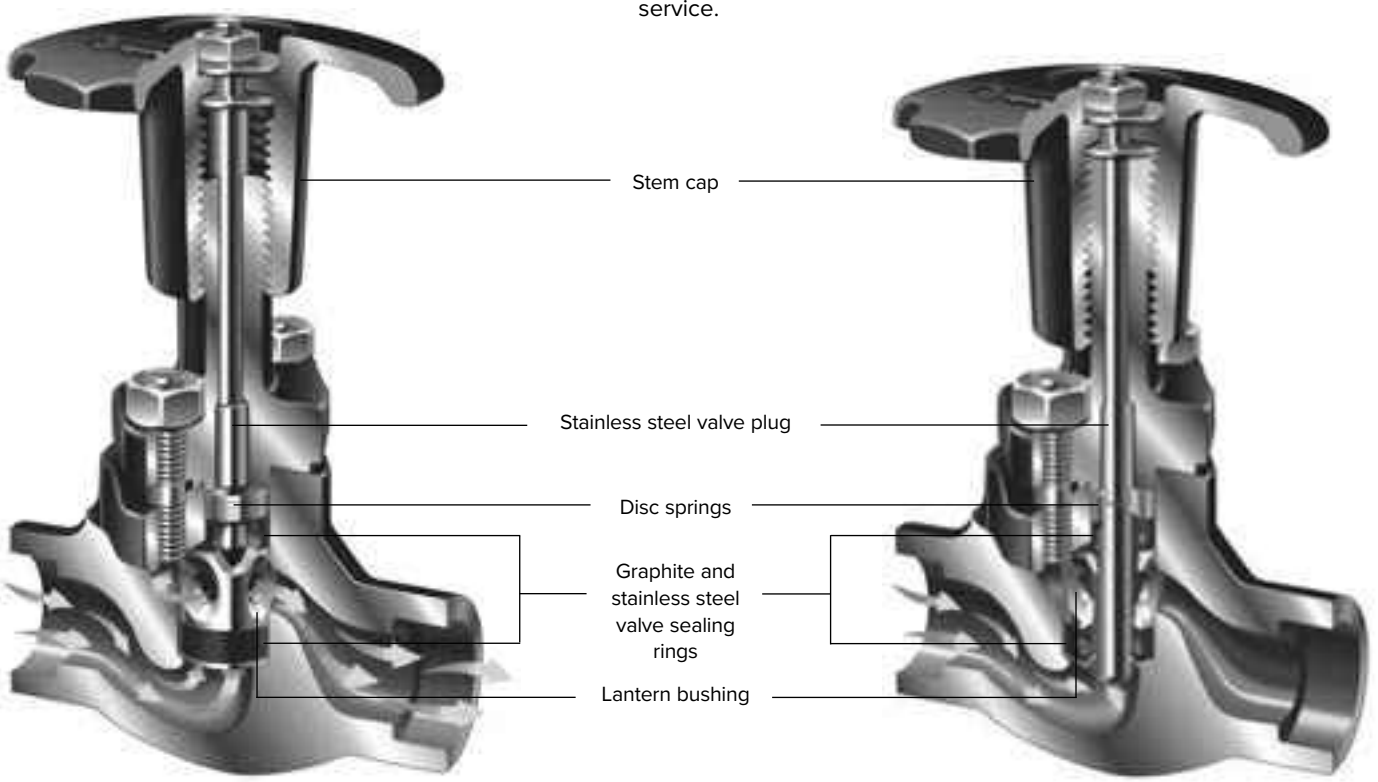


IS-4BD

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.

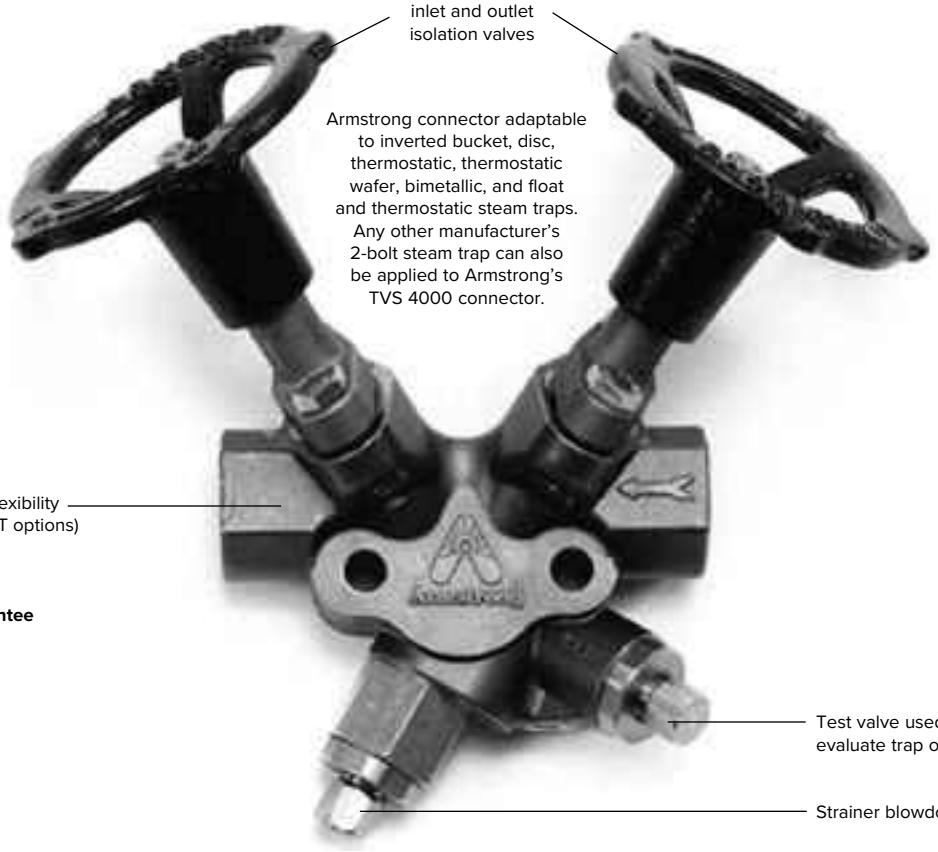


Open Position **Closed Position**

- **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

TVS 4000 Series Stainless Steel Trap Valve Station



3-year guarantee

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 or CF8M

Weight

6-1/2 lb (2.9 kg)

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 AIM® 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 4000 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.

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

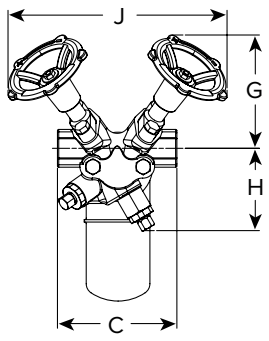
*Consult factory.

U.S. Patent 6,467,503

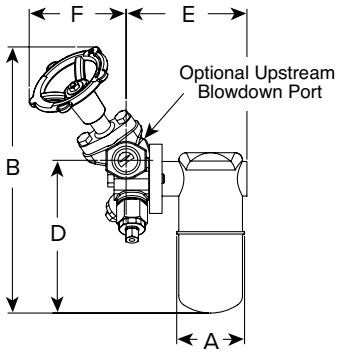
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

TVS 4000 Series Stainless Steel Trap Valve Station

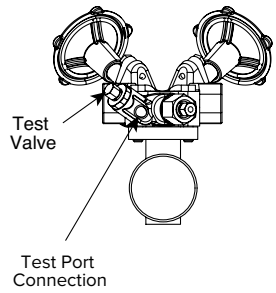
For Pressures to 650 psig (45 barg)...Capacities to 1 300 lb/hr (590 kg/hr) (Using 2000 Series Inverted Bucket Steam Traps)



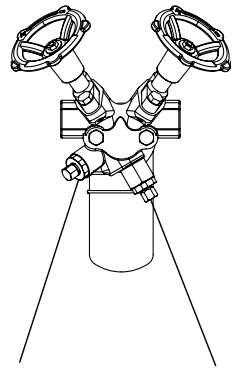
Model TVS 4000 With 2000 Series SS Trap
Front View



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

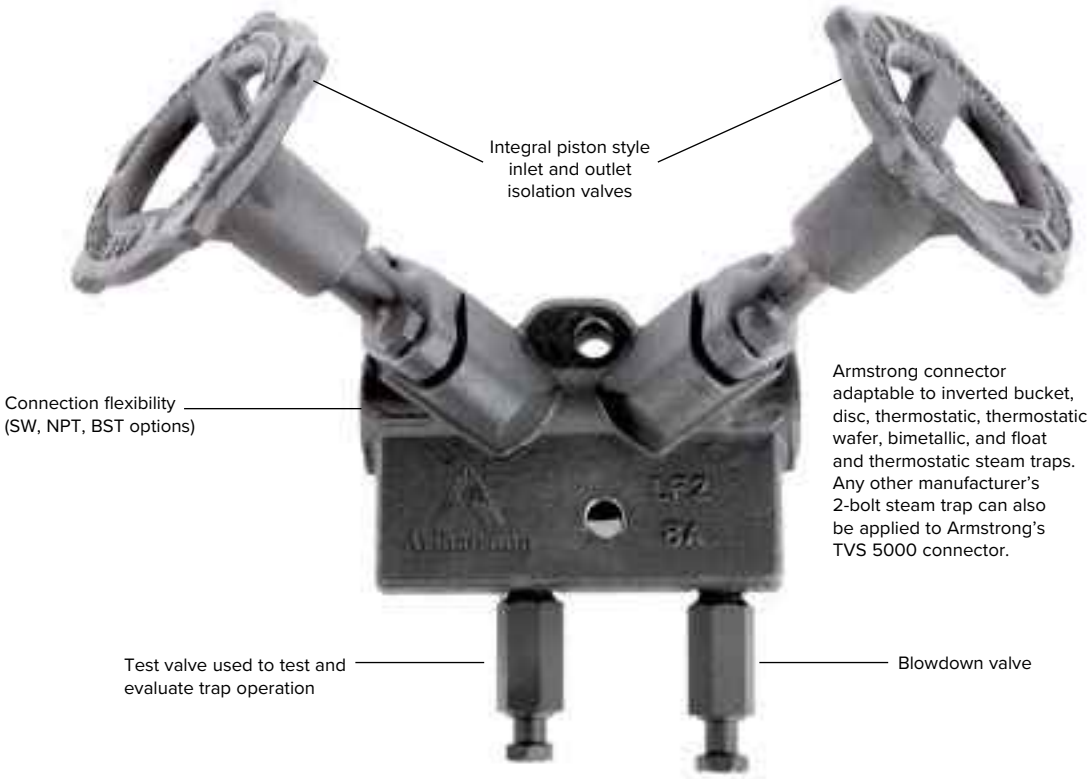
Body:	ASTM A240 Gr. 304L
Internals:	All stainless steel—304
Valve and seat:	Stainless steel—17-4PH

TVS 4000 Series With 2000 Series Inverted Bucket Steam Trap

Model No.	2010		2011		2022	
Pipe Connections	in	mm	in	mm	in	mm
	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 ℄ to Bottom	4-3/4	120	6	154	8	203
"E" Connection ℄ to Outside of Trap	4-1/2	114	4-13/16	122	5-7/8	149
"F" Connection ℄ to Front of Handwheel (Valve Open)	3-1/2	89	3-7/8	98	3-7/8	98
"G" Connection ℄ to Top of Handwheel (Valve Open)	3-1/4	83	4-1/2	114	4-1/2	114
"H" Connection ℄ 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

Armstrong® TVS 5000 Trap Valve Station



Description
Armstrong's TVS 5000 is designed as a one piece body equipped with a piston valve(s) combined with a removable steam trap mounted with a connecting flange.

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

Materials—TVS 5000 Connector
Connector: ASTM A350 LF2
Test valve: ASTM A582 T303
Blowdown valve: ASTM A582 T303

Isolation Valve Components
Valve sealing rings: Graphite and stainless steel
Bonnet: ASTM A350 LF2
Bolts: DIN 933
Valve plug: ASTM A564
Lantern bushings: ASTM A582 T304
Valve washer: ASTM A582 T304
Disc springs: AISI T301
Nut: AISI T304
Handwheel: Ductile iron A536

Weight
11.71 lb (5.3 kg)

Features
- **Reduced costs.** TVS saves on these fronts: reduced leak points, installation and maintenance time.
- **Reduced design time.** Permits combining products with exact face-to-face dimensions.
- **Easy, in-line repairability with maximum safety.** TVS allows isolation at point of service with upstream/downstream depressurization.
- **Simplified trap testing.** TVS enhances your capability to check trap operation and offers a built-in method to block and bleed traps.

How to Order

Model	Connection	Type of Connection Inlet/Outlet	Flow Direction	Trap Type
TVS 5000	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.

TVS 6000UD Forged Steel Trap Valve Station

Compact double isolation and bleed concept (Up and Downstream) with 360° Connector

For pressures up to 650 psig (45 barg)...Capacities to 1300 lb/hr (590 kg/h)
Using 2000 Series IB Steam Traps

Description

This original concept has been developed to meet new demanding requirements regarding safety when operating steam equipments such as steam traps, in various industrial environments. TVS 6000UD is a compact double isolation and bleed concept (up and downstream) with a 360° connector.

TVS 6000UD provides double isolation inlet and outlet piston valves, bleed of inlet/outlet valves, a test valve, a strainer and a blowdown valve at trap inlet all merged together in a single compact 2-bolts universal connector. The TVS 6000UD's design ensures increased safety while saving space, time and cost.

This TVS 6000UD is covered by a three-year-warranty. The TVS 6000UD can be fitted with steam traps of different technologies (thermodynamic, thermostatic, float and thermostatic or free float. Please refer to specific steam trap capacity charts).

Connections

Screwed BSPT and NPT
Socketweld and Buttweld
Flanged EN1092-1 PN40 or ASME B16.5

Materials – TVS 6000UD Connector

Connector:	ASTM A350 LF2
Test valve:	ASTM A582 T303 – Nitronic 60
Blowdown valve:	ASTM A582 T303 – Nitronic 60
Depressurising valve:	ASTM A582 T303 – Nitronic 60
Flanges:	P250GJ (other material on request)

Isolation Valve Components

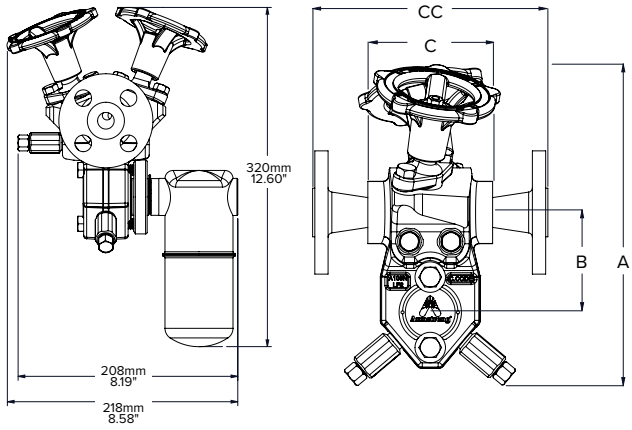
Valve Sealing Rings:	Graphite and Stainless Steel
Bonnet	ASTM A350 LF2
Bonnet Bolting	DIN933 8.8
Stem and washers	ASTM A564 17-4 H900
Lantern bushings :	ASTM A582 T304
Valve washer :	ASTM A582 T304
Disc springs :	AISI T301
Nut :	AISI T304
Handwheel :	Ductile Iron

Flow Direction

Left to Right (L/R)
Right to Left (R/L)

Table ST-158-1. TVS 6000UD Compact double isolation and bleed

	in	mm	in	mm	in	mm
Connection Size	1/2	15	3/4	20	1	25
"A" valve closed	9	230	9	230	9	230
"A" valve open	9 13/16	250	9 13/16	250	9 13/16	250
"B"	2 13/16	72	2 13/16	72	2 13/16	72
"C" Face-to-Face (screwed, SW & BW)	3 15/16	100	3 15/16	100	3 15/16	100
"CC" Face-to-Face (flanged EN1092-1 PN40)	5 7/8	150	5 7/8	150	6 1/4	160
"CC" Face-to-Face (flanged ASME B16.5 #150)	6 11/16	170	6 3/4	172	7	179
"CC" Face-to-Face (flanged ASME B16.5 #300)	7	179	7 1/8	182	7 1/2	192
Weight in lb (kg) (screwed, SW & BW)	11.4 (5.2)		11.4 (5.2)		11.4 (5.2)	
Weight in lb (kg) (flanged EN1092-1 PN40)	15.2 (6.9)		16.5 (7.5)		17.4 (7.9)	
Maximum Allowable Pressure †	45 barg @ 315 °C		653 psig @ 599 °F			
Maximum Hydrotest Temperature	599 °F / 315 °C					
Maximum Hydrotest Pressure	986 psig / 68 barg					



† May be derated depending on flange rating and type.

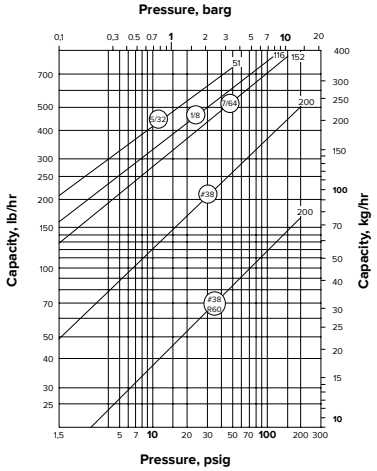
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

TVS 6000UD Forged Steel Trap Valve Station

Compact double isolation and bleed concept (Up and Downstream) with 360° Connector

For pressures up to 650 psig (45 barg)...Capacities to 1300 lb/hr (590 kg/h)
Using 2000 Series IB Steam Traps

Table ST-159-1. Model 2010 Capacity



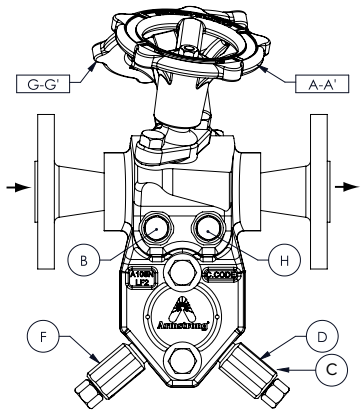
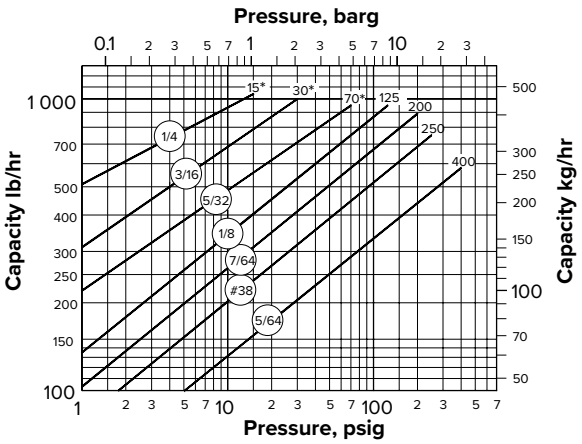
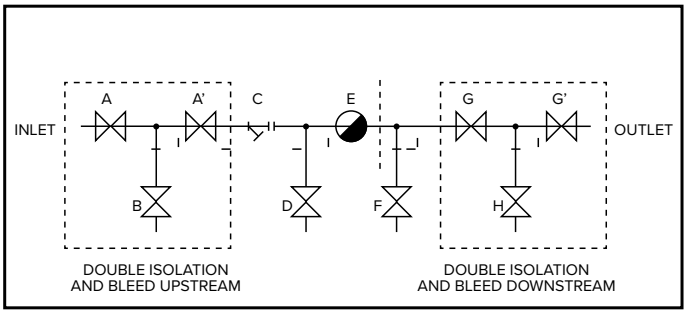


Table ST-159-2. Model 2011 Capacity



TVS 6000UD - L/R version



UPSTREAM
A : INLET FIRST ISOLATION VALVE
A' : INLET SECOND ISOLATION VALVE
B : BLEED INLET
C : STRAINER
D : DEPRESSURIZING VALVE
E : STEAM TRAP CONNECTION

DOWNSTREAM
F : TEST VALVE
G : OUTLET FIRST ISOLATION VALVE
G' : OUTLET SECOND ISOLATION VALVE
H : BLEED OUTLET

Table ST-159-3. Model 2022 Capacity

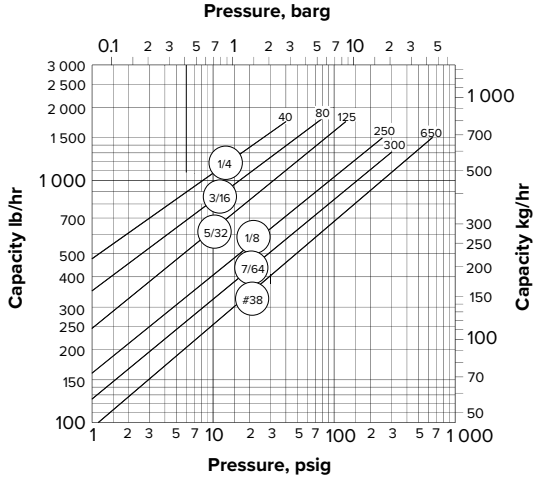


Table ST-159-4. How to Order

Model	Connection	Type of Connection	Flow Direction
TVS 6000UD	DN15 DN20 DN25	Flanges EN1092-1 & PN Class	L/R = Left to Right R/L = Right to Left
	1/2" 3/4" 1"	BSPT, NPT, SW, BW, Flanges ASME B16.5 & Class RF	

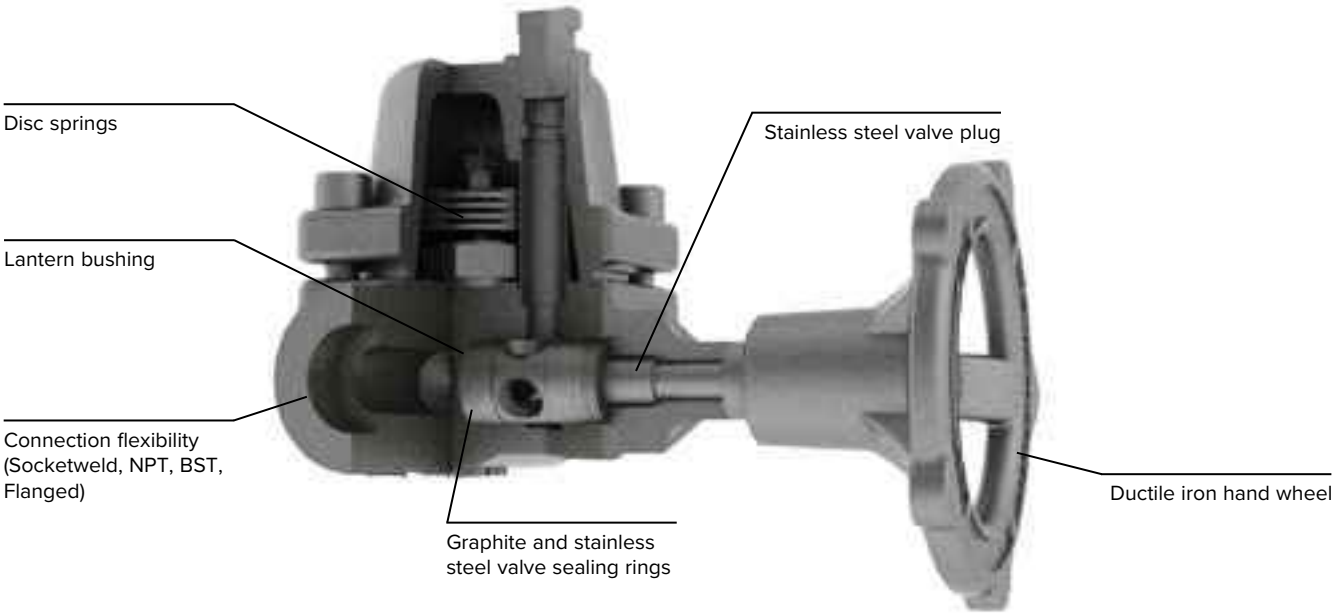
* Capacities to be reduced by 5% for pressure below 5 bar (tested with Armstrong steam traps).

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

TVS 1100 Series Carbon Steel Trap Valve Station

For pressure to 319 psig/22 barg, and cold water capacities to 4 630 lb/hr/2 100 kg/hr

The Armstrong TVS 1100 Series bimetallic steam trap with integral isolation valve incorporates advanced piston sealing technology and a compact design for safer, longer lasting steam isolation service.



- **Single valve operation.** Eliminates the need for ancillary isolation valve, reducing the number of potential leak points, and providing a compact, space-saving design.
- **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.
- **Integral strainer.** Eliminates dirt and particulate from steam during operation.
- **Bimetallic air vent capsule.** Easily removes air and condensate during start-up.
- **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.
- **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.

TVS 1100 Features versus Conventional Designs

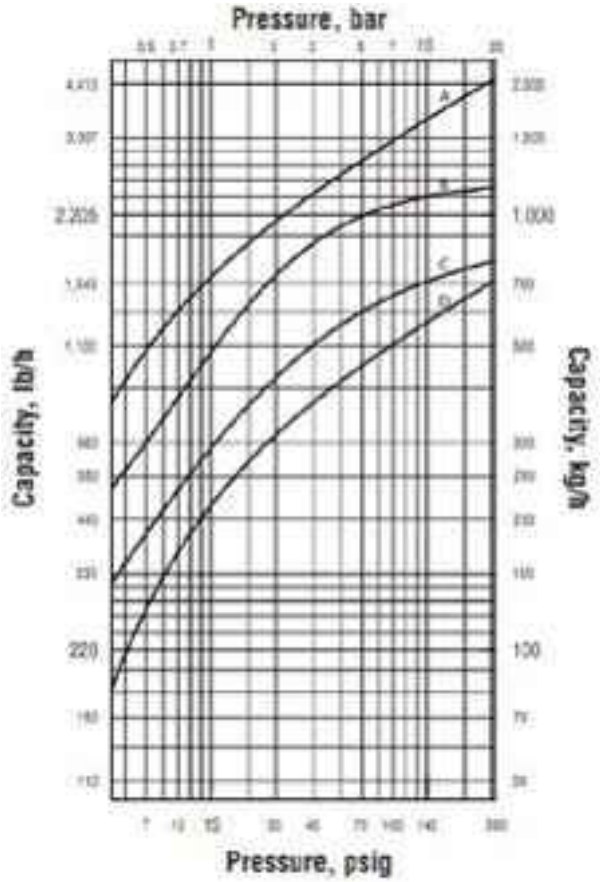
	Armstrong TVS 1100 Series	Conventional Designs
Design	Compact	Bulky, Multiple Leak Points
Module Length	6.2” (160 mm)	15.7” (400 mm)
Module Height	4.01” (102 mm)	6.3” (160 mm)
No. of Leakage Points	2	4
Isolation Valve	Zero Leakage Piston Valve	Normal Globe/Ball Valve
Strainer	Standard Feature	Not available - which leads to element failure due to dirt
Mechanism	Bimetallic/Thermostatic/Thermodynamic	Thermostatic
Repairable	Yes	No

TVS 1100 Series Carbon Steel Trap Valve Station

For pressure to 319 psig/22 barg, and cold water capacities to 4 630 lb/hr/2 100 kg/hr

Description

The Armstrong TVS 1100 features an integral piston-style isolation valve, stainless steel strainer and bimetallic steam trap. The space-saving design of the TVS 1100 greatly reduces the number of potential leak points, cuts installation time and expense, and provides years of dependable steam isolation service.



Maximum Operating Conditions

Maximum allowable pressure (Vessel design)
580 psig @ 662°F/40 barg @ 350°C
Maximum operating pressure 319 psig/22 barg
Maximum back pressure 99% of inlet pressure

Materials

Body and cap:	ASTM A105
Valve:	Stainless steel—17-4PH
Seat:	Stainless steel-304
Bimetallic elements:	Nickel-plated

Isolation Valve Components

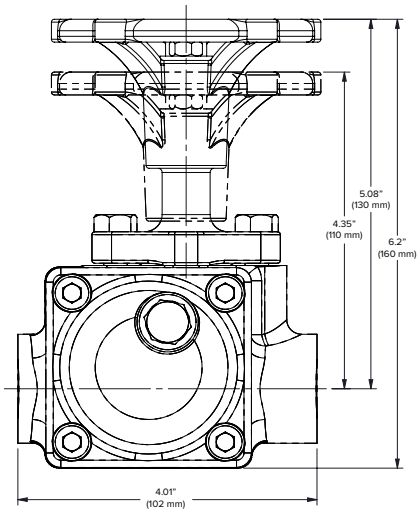
Handwheel	Ductile Iron
Nut	Stainless steel
Stem, washers;	Stainless steel
Bonnet:	ASTM A350 Gr LF2
Bonnet, bolts:	Carbon steel
Valve plug:	Stainless steel
Disc spring:	Stainless steel
Valve sealing rings:	Graphite and stainless steel
Lantern bushing:	Stainless steel
Valve washers:	Stainless steel

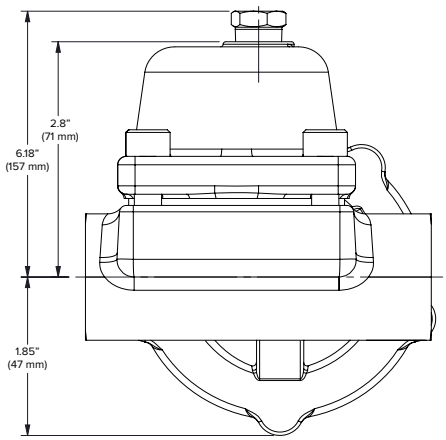
How to Order:

Model	Connection	Type of Connection Inlet/Outlet
TVS 1100	1/2" 3/4"	NPT SW BSPT Flanged*

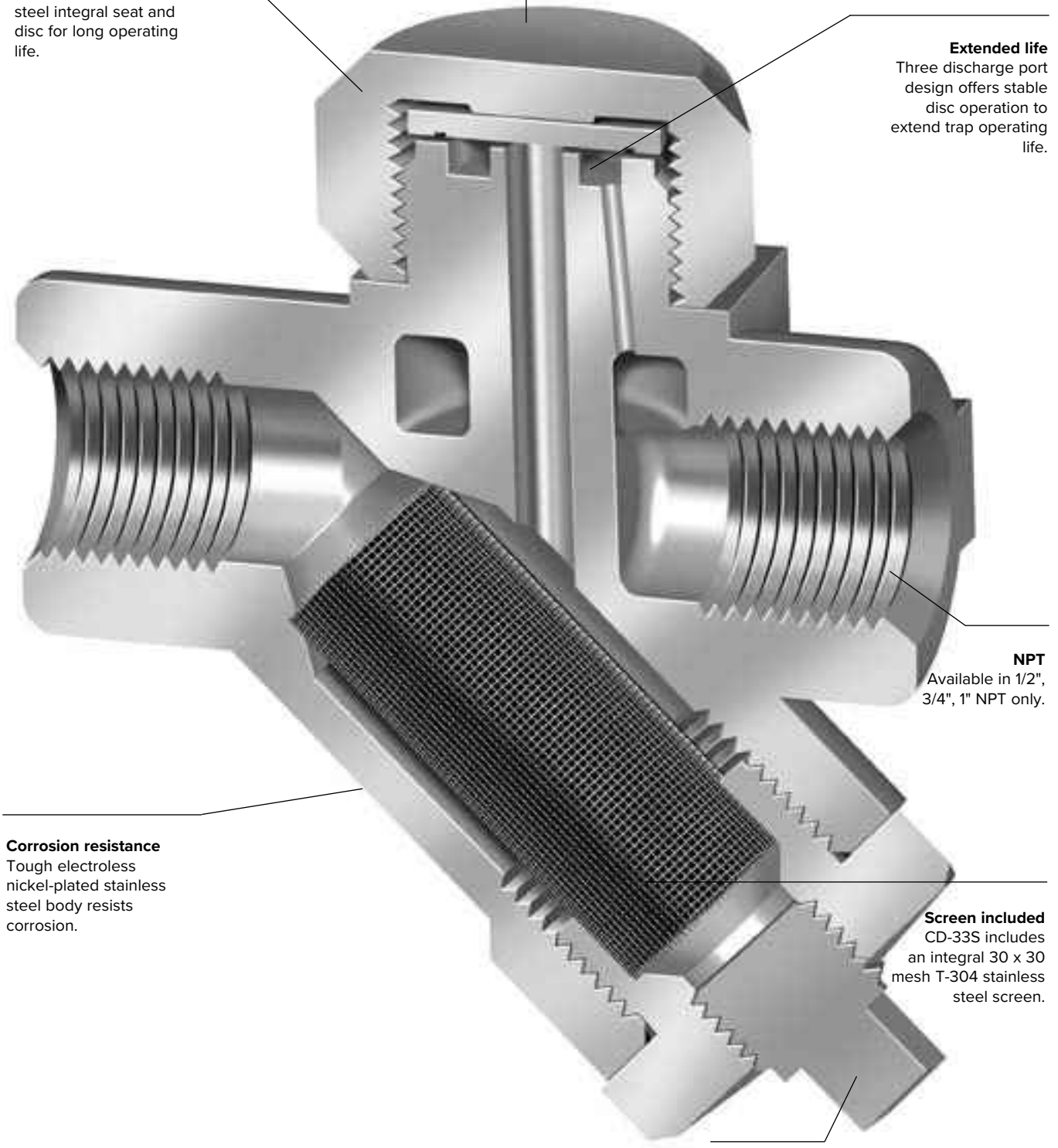
*Consult factory.

Dimensions:





CD-33/CD-33S Disc Trap



Adapts to outdoors
Optional rain guard insulating cap available to prevent excessive radiant heat loss in outside applications.

Durable
Hardened stainless steel integral seat and disc for long operating life.

Extended life
Three discharge port design offers stable disc operation to extend trap operating life.

NPT
Available in 1/2", 3/4", 1" NPT only.

Corrosion resistance
Tough electroless nickel-plated stainless steel body resists corrosion.

Screen included
CD-33S includes an integral 30 x 30 mesh T-304 stainless steel screen.

Blowdown choice
Blowdown plug standard. Blowdown valve available as an option.

CD-33/CD-33S Disc Trap

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 (low capacity) 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

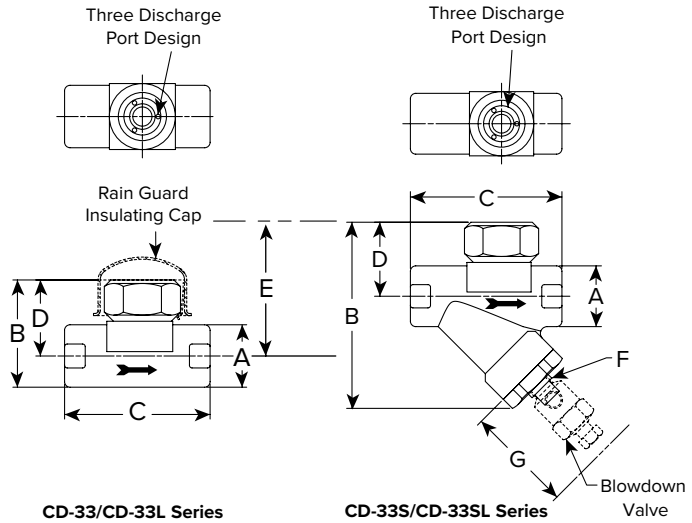
- Three discharge port design
- Minimal wear with controlled cycling
- Freeze-resistant
- Hardened seat and disc

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 (42 barg @ 400°C).

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

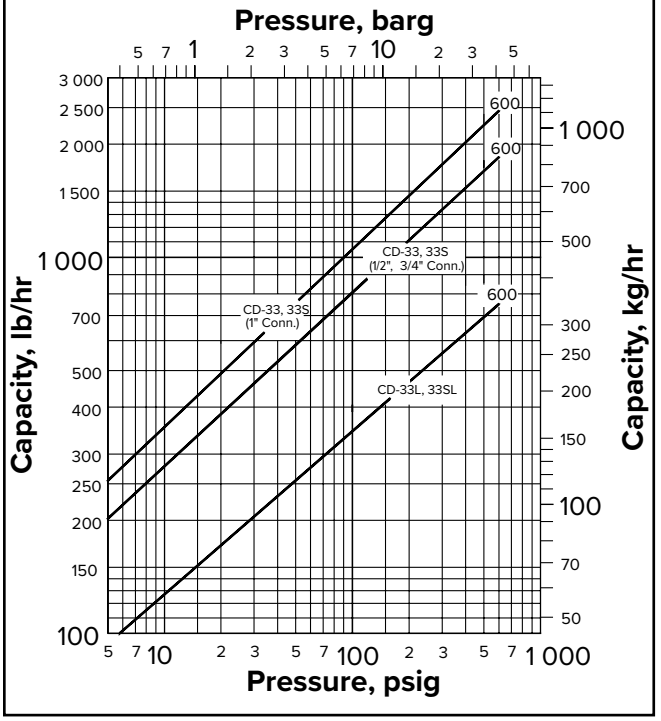
- Three discharge port design
- Minimal wear with controlled cycling
- Freeze-resistant
- Hardened seat and disc

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 @ 486F (41 barg @ 252C).

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



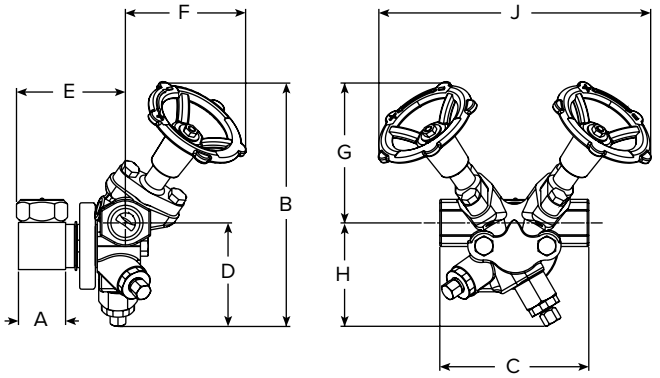
CD-33 Series Disc Trap												
Model No.	**CD-33**				**CD-33S (w/strainer)**				**CD-33L (low capacity)**		**CD-33SL (w/strainer) (low capacity)**	
Pipe Connection Size	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**
	1/2, 3/4	15, 20	1	25	1/2, 3/4	15, 20	1	25	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" ℄ 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%

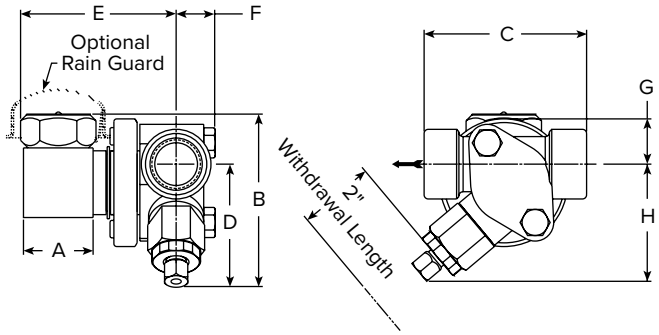
CD-3300 Series Disc Steam Traps

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

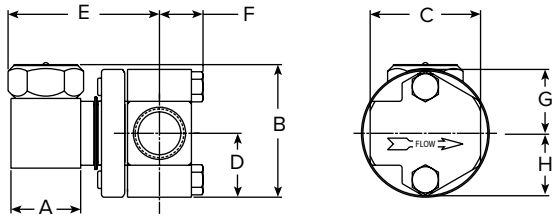
For Steam Pressures to 450 psig (31 barg)...Capacities to 800 lb/hr (363 kg/hr)



CD-3300 With TVS-4000 Trap Valve Station



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



CD-3300 With Standard Connector

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.

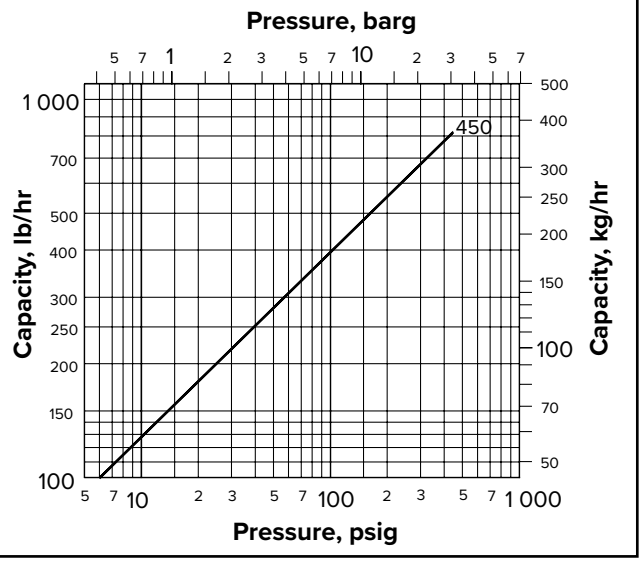
Materials

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 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 ℄ to Bottom	1-3/8	35	2-5/8	67	2-5/8	67	3-1/4	83
"E" Connection ℄ to Outside of Trap	3-3/8	86	3-3/8	86	3-9/16	90	3-9/16	90
"F" Connection ℄ to Front of Connector	13/16	20	7/8	22	7/8	22	3-7/8	98
"G" Connection ℄ to Top	1-3/8	46	1	25	1	25	4-1/2	114
"H" Connection ℄ 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)							

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

CD72SR Series Disc Traps

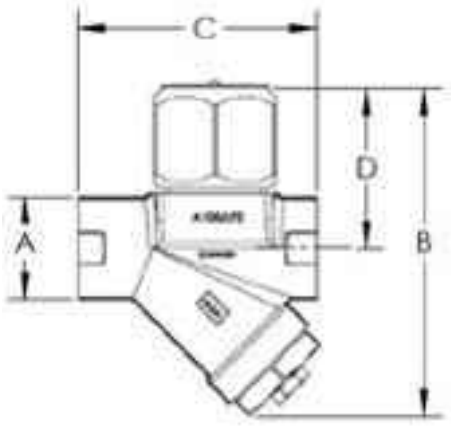
For Steam Service up to 1010 psig (69.6 barg) and Capacities from 935 lb/hr (435 Kg/hr)

Armstrong CD72SR is a disc styled trap designed to control the trap's cycle rate. The reduced cycle rate provides Armstrong CD72SR trap with a longer service life than typical disc traps. This enhanced performance ensures minimum maintenance time and reduced steam costs.

The capacity of Armstrong CD72SR has been engineered specifically for the following applications: large steam main drips, process equipments and HVAC heating equipments at constant pressure.

Advantages of CD72SR

- Minimum wear with controled cycling
- Freeze-resistant
- Hardened Seat and disc
- Weldable
- In-line repairable



Connections

Screwed BSPT and NPT Scoketweld
Flanged DIN or ANSI (Welded).
Consult factory for dimensions and weight

List of materials

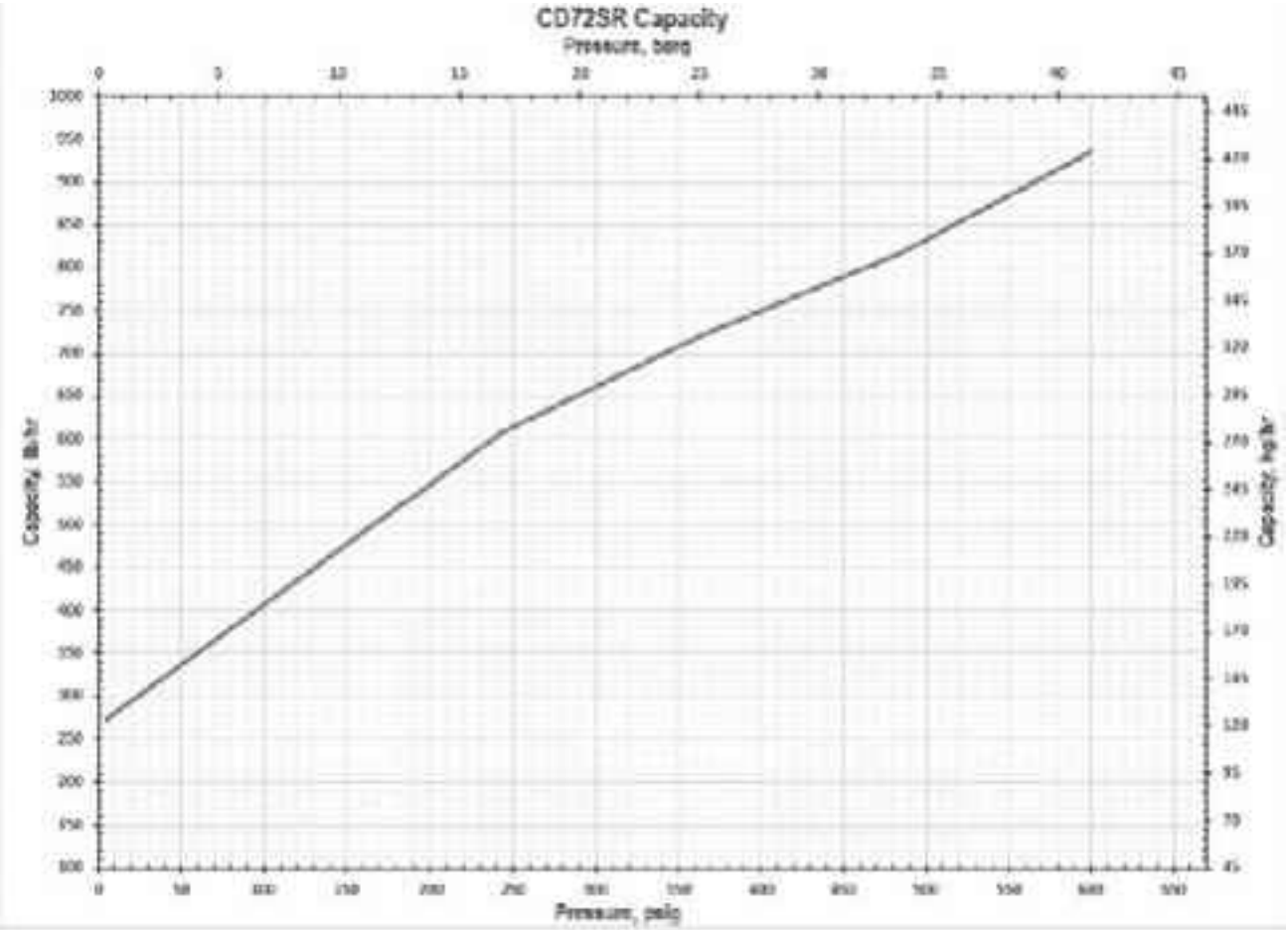
Name of Part	Material
	CD72SR
Body	Dual certified forged Steel ASTM A 105N / A350 LF2 Cl. 1
Cap	
Disc & Seat	ASTM A 564 TYP630, H900
Strainer Screen	Stainless steel TYP304, 30 x 30 Mesh
Screen Retainer	Dual certified forged Steel ASTM A 105N / A350 LF2 Cl. 1
Blowdown Plug	ASTM A350 Gr. LF2 CL.1

Dimensions and Weights

Model No.	CD72SR			
	1/2" and 3/4" (DN 15 DN20)		1" (DN25)	
	in	mm	in	mm
"A"	1.53	38.8	1.89	48.0
"B" Height	4.89	124.1	5.12	130.0
"C" Length	3.56	90.5	4.41	112.0
"D" ℄ to top of cap	2.38	60.5	2.58	65.6
Weight, lb (Kg)	3.31 (1.5)		4.59 (2.0)	
Max. allowable pressure (Vessel Design)	1010 psig @ 750°F (69.6 barg @ 399°C)			
Mln. operating pressure	3.5 psig (0.24 barg)			
Max. operating pressure	600 psig @ 486°F (41.4 barg @ 252°C)			

CD72SR CAPACITY CHART

Capacities given are in 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 temperature.



OTHER FACE TO FACE DIMENSIONS ARE AVAILABLE ON REQUEST

CD72SR	1/2"(DN15)				3/4"(DN20)				1"(DN25)			
			INDIA - IBR				INDIA - IBR				INDIA - IBR	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
150#	6.7	169	8.3	210	6.9	174	7.9	200	7.9	200	8.7	220
300#	7.0	179	8.8	224	7.2	183	8.7	220	8.4	213	9.4	240
600#	7.6	192	9.3	235	7.7	195	9.1	230	8.9	226	10	253
PN40	5.9	150	-	-	5.9	150	-	-	6.3	160	-	-

CD-4080 Series High Pressure Disc Steam Trap

For Pressures to 1245 psig (85.9 barg)... Capacities to 600lb/hr (272 kg/hr)

Description

The CD-4080 is a durable disc style steam trap designed for high-pressure use. The CD-4080 is engineered to meet the demanding conditions found in power plant applications. The CD-4080 is piped in-line by a 360° four bolt connector block which allows you to install the trap in virtually any piping configuration.

Advantages

- Compact
- Replaceable seat and disc
- Freeze-resistant
- Exceptional corrosion resistance

The CD-4080 disc steam trap combines savings in three important areas: energy, installation and replacement. Mounting the CD-4080 on an IS4 4-bolt connector provides quick and easy in-line replacement.

Maximum Operating Conditions

Maximum allowable pressure (vessel design):
1245 psig @ 900°F (85.9 barg @ 482°C)

Maximum operating pressure:
1245 psig (85.9 barg)
Minimum operating pressure:
150 psig (10.3 barg)

Materials of Construction

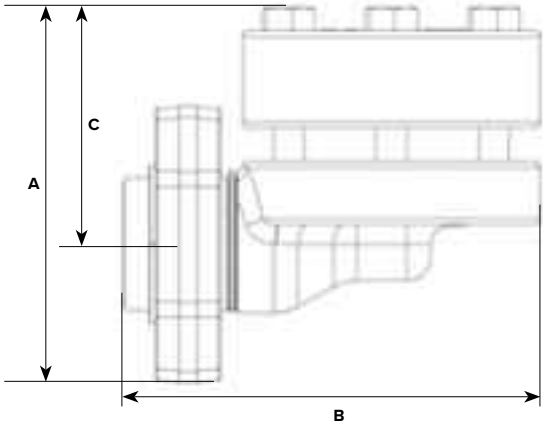
Body: ASTM A351 Gr. CF8M
Cap: ASTM A351 Gr. CF8M
Seat: ASTM A681 Type D2
Disc: ASTM A681 Type D2

360° Universal Connector Options

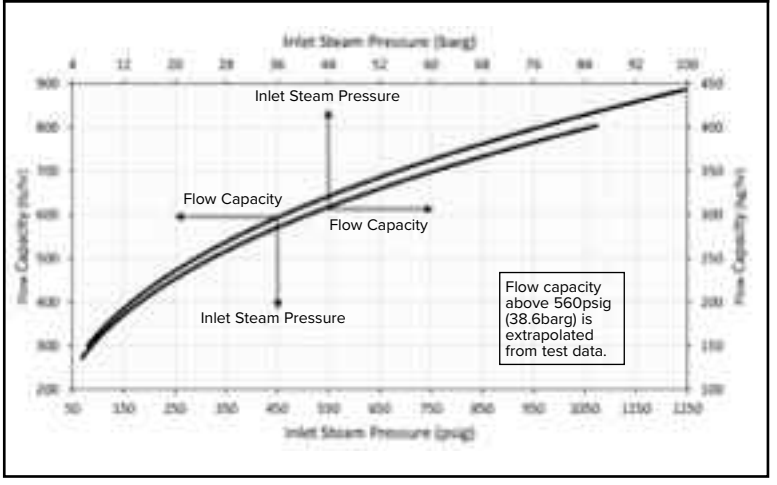
- Blowdown valve
- Connection sizes: ¾" or 1" NPS
- Connection types: SW, NPT or Flange

CD4080

Model No.	CD4080	
	in	mm
Pipe Connections	3/4, 1	20, 25
"A" (Height)	3.86	98.00
"B" (Length)	4.30	109.10
"C" (Flange to Top)	2.43	61.80
Trap Only Weight lb (kg)	5.2 (2.3)	



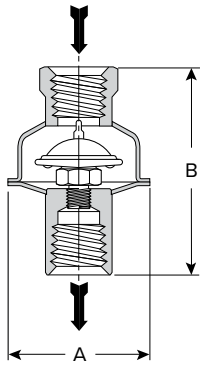
Model CD4080 Condensate Flow Capacity - SI & USCS Units



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

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)

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

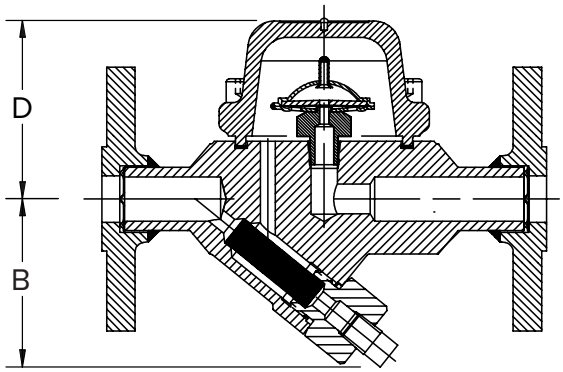
*Capacities based on differential pressure with no back pressure.

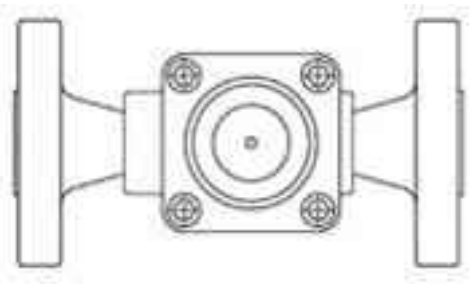
**Capacities will vary with the degree of subcooling. When greater capacities are required, the trap will automatically adjust to the load, up to the maximum (cold water) capacity shown, by increasing the amount of subcooling.

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.

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.

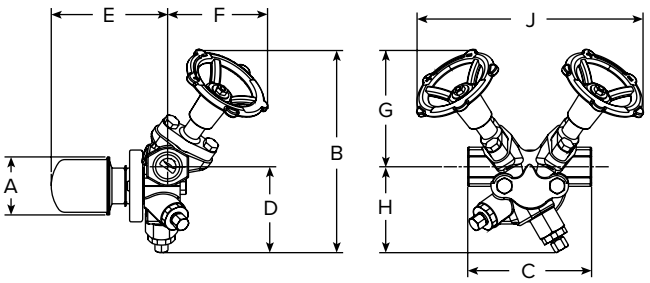
**Capacities will vary with the degree of subcooling. When greater capacities are required, the trap will automatically adjust to the load, up to the maximum (cold water) capacity shown, by increasing the amount of subcooling.

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			

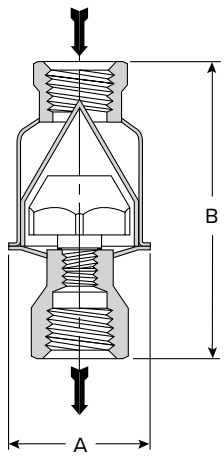
WT Series Thermostatic Wafer Steam Trap

Stainless Steel or Carbon Steel

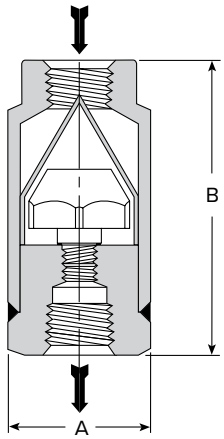
For Pressures to 600 psig (41 barg)...Cold Water Start-Up Capacities to 1 600 lb/hr (726 kg/hr)/hr (726 kg/hr)



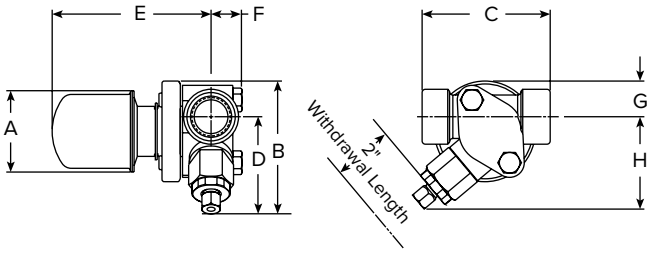
Series WT-2000 With TVS 4000 Trap Valve Station



Model WT-1 Trap



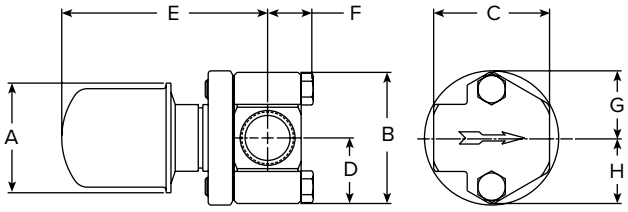
Model WT-3 Trap



Series WT-2000 With Integral Strainer and Blowdown Valve

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.



Series WT-2000 With Standard Connector

WT-1 Series Traps				
Model No.	**WT-1**			
Pipe Connections	**in**	**mm**	**in**	**mm**
	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**	
Pipe Connections	**in**	**mm**
	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**	
Pipe Connections	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**
	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 ℄ to Bottom	1-3/8	46	2-5/8	67	2-5/8	67	3-1/4	83
"E" Connection ℄ to Outside of Trap	4-1/4	107	4-3/4	120	4-15/16	125	4-1/2	115
"F" Connection ℄ to Front of Connector	13/16	20	7/8	22	7/8	22	3-7/8	98
"G" Connection ℄ to Top	1-3/8	46	1	25	1	25	4-1/2	114
"H" Connection ℄ 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 for up-to-date information.

SH Series Superheat Traps

Bimetallic Steam Traps For Superheat Conditions

For Pressures to 900 psig (62 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 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)

Maximum operating pressure:

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

Suggested minimum operating pressure:

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

Connections

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

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

Specification

Steam trap shall be a bimetallic style. The trap shall be investment cast chrome-moly steel 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.

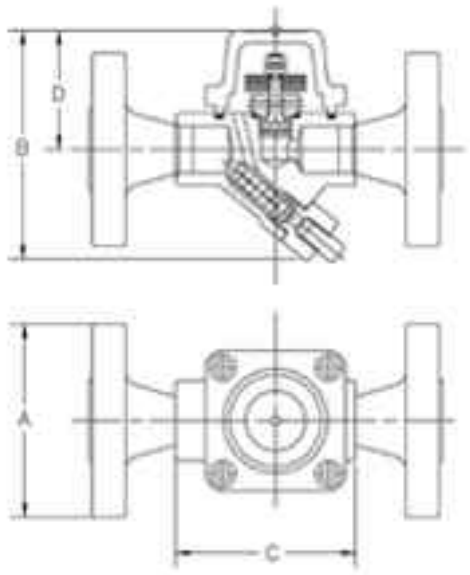
How to Order

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

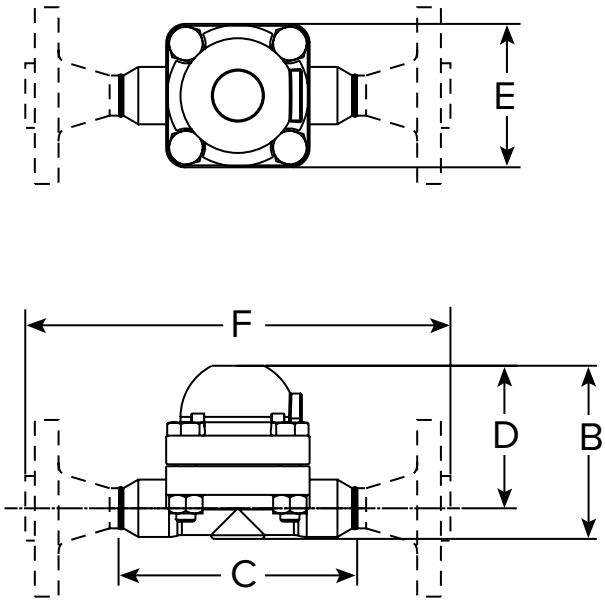
SH Series Superheat Traps

Bimetallic Steam Traps For Superheat Conditions

For Pressures to 900 psig (62 barg)...Cold Water Capacities to 6 500 lb/hr (2 950 kg/hr)



Model SH-300



Model SH-900

SH Series Dimensions and Weights

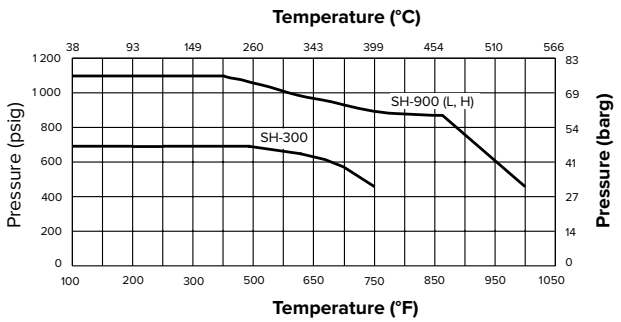
Model	SH-300		SH-900	
Pipe Connections	in	mm	in	mm
	1/2, 3/4, 1***	15, 20, 25	1/2, 3/4, 1**	15, 20, 25
"B" Height	4-1/2	115	4-1/2	115
"C" Face-to-Face	3-1/2	90	6-1/4	158
"D" ℄ to Top	2-5/16	59	3-3/4	95
"E" Width	—	—	3-3/4	95
**"F"	—	—	11	279
**"G"	—	—	—	—
Weight, lb (kg)	4.1 (1.9)		10 (4.4)	

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

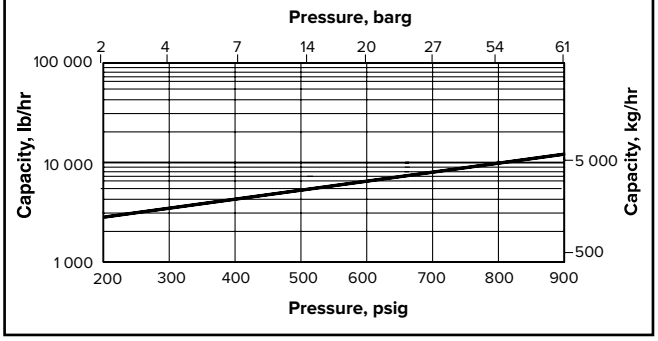
** SH-900 1" buttweld.

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

SH-300/SH-900 Allowable Pressure/Temperature



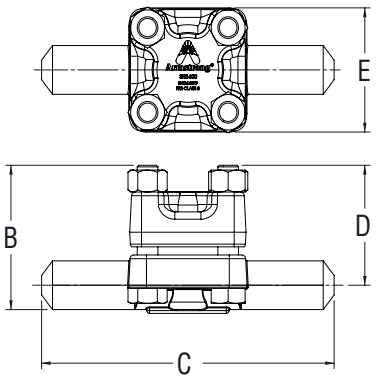
SH-900 Cold Water Capacity



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

SH-1600 Bimetallic Steam Trap for Superheat Conditions

For Pressures to 1 750 psig (120.6 barg)...Cold Water Capacities to 6 500 lb/hr (2 950 kg/hr)



Model SH-1600

Description

SH Series superheat steam traps operate by the effect that rising temperature has on the bimetallic elements.

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 trap reaches steam temperature, the bimetallic elements pull the valve into the seat closing the trap. The valve remains closed until the bimetallic elements cool, thus allowing the valve to crack open, vent the condensate and non-condensables, and then close again when steam temperature is reached.

The SH Series superheat steam traps adjust automatically to changing conditions. The SH-1600 series utilizes titanium valves and seats to ensure extremely long service life in the harsh environment of superheated steam systems.

Specifications

Steam trap shall be a bimetallic style. The trap shall be forged chrome-moly steel 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.

How to Order

- Specify model number.
- Specify maximum operating pressure.
- Specify size and type of pipe connections.
- When flanges are required specify type of flange.

Maximum operating conditions

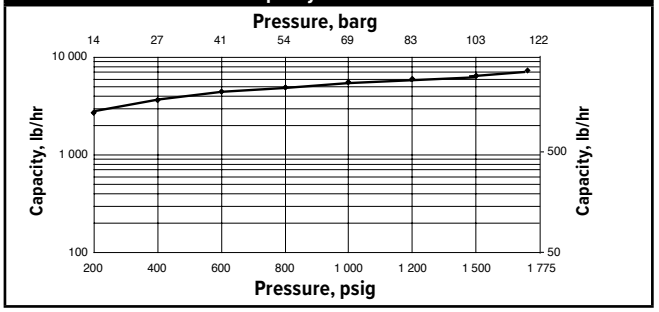
Maximum allowable pressure
(vessel design): 1 750 psig @ 970°F (120.6 barg @ 520°C)
Maximum operating pressure: 1 750 psig (120.6 barg)
Suggested minimum operating pressure: 600 psig (41 barg)

SH-1600

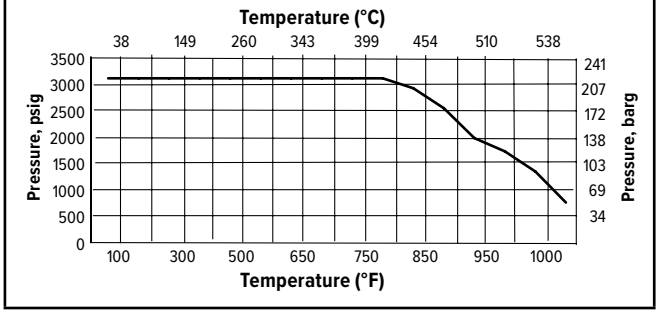
Model	SH-1600	
Pipe Connections	in	mm
	3/4, 1	20, 25
"B" (Height)	5-3/16	148
"C" (End-to-End) - Socket Weld	12-3/8	315
"C" (End-to-End) - Butt Weld	12-3/8	315
"D" (Centerline to Top)	4-13/16	123
"E" (Width)	5	127
Weight in lb(Kg) - SW/BW	33 (15.0)	

Consult the factory for weight and dimensions of flanged connections.

Model SH-1600 Cold Water Capacity



Model SH-1600 Pressure/Temperature Rating



SH-1600

Connections	Socketweld, Buttweld, Flanged
Material	
Body and Cap	ASTM A-182 F22 Class 3
Valve	Titanium
Seat	
Bimetallic Elements	Nickel-chrome and stainless steel
Screen	Stainless Steel
Bolts	ASTM A193 Gr. B16
Nuts	ASTM A194 Gr. 7

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.

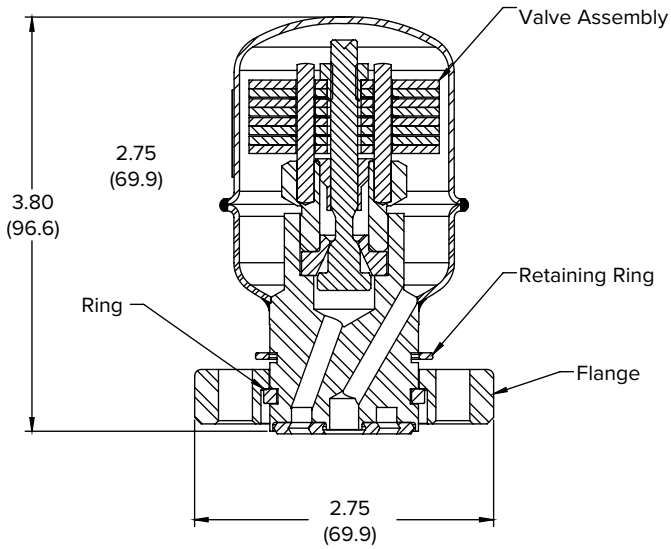
Maximum Operating Conditions

Maximum allowable pressure (vessel design):
400 psig @ 800°F (28 barg @ 427°C)

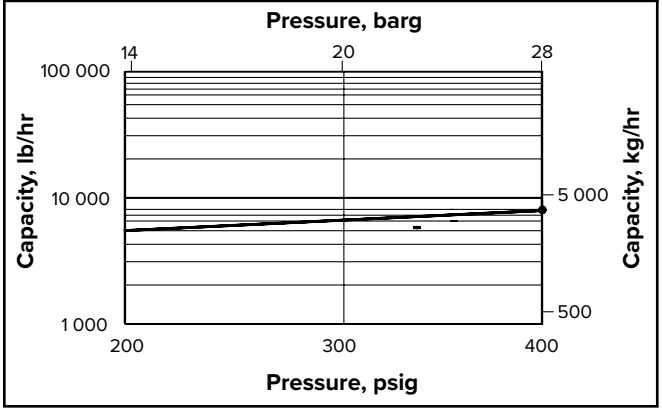
Maximum operating pressure: 400 psig (28 barg)
Suggested minimum operating pressure: 200 psig (14 barg)

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



SH-2500 Bimetallic Steam Trap

All Stainless Steel

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

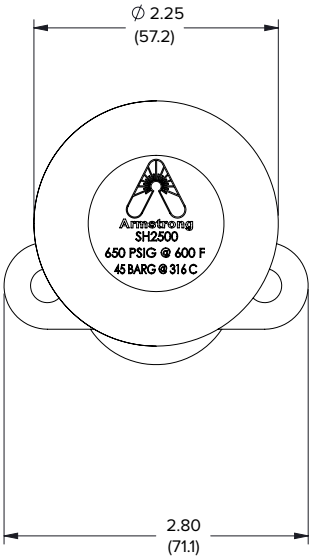
Description

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)

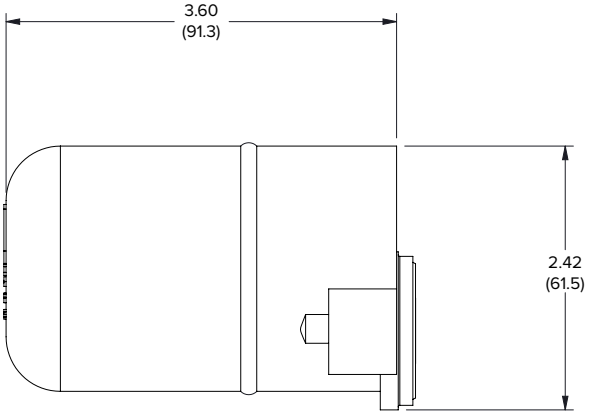
Suggested minimum operating pressure:
SH-2500 200 psig (14 barg)

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

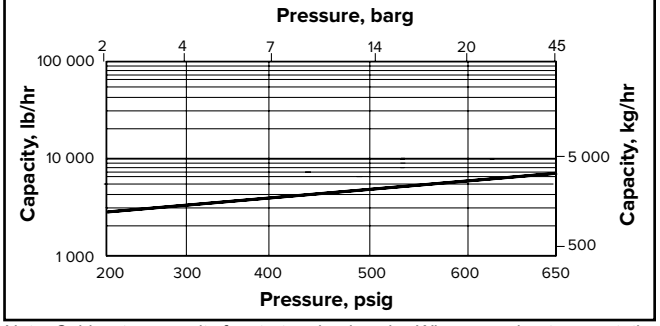
Steam traps shall be a bimetallic style designed for superheated steam applications. The steam trap body shall be tamperproof, investment cast stainless steel A351 Gr. CF8M. The mechanism shall consist of a stacked nickel-chrome bimetal operator with titanium valve and seat. The gaskets shall be captured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

SH-2500 Cold Water Capacity (Start Up)



Note: Cold water capacity for start-up loads only. When superheat present, there will be minimal condensate.

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.

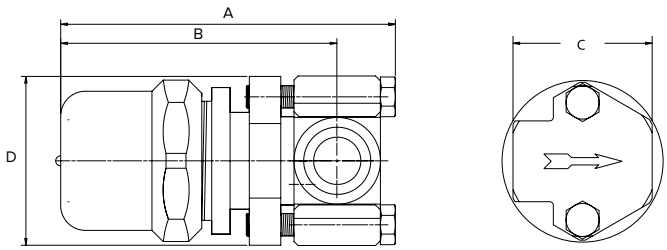
How to order

Specify:

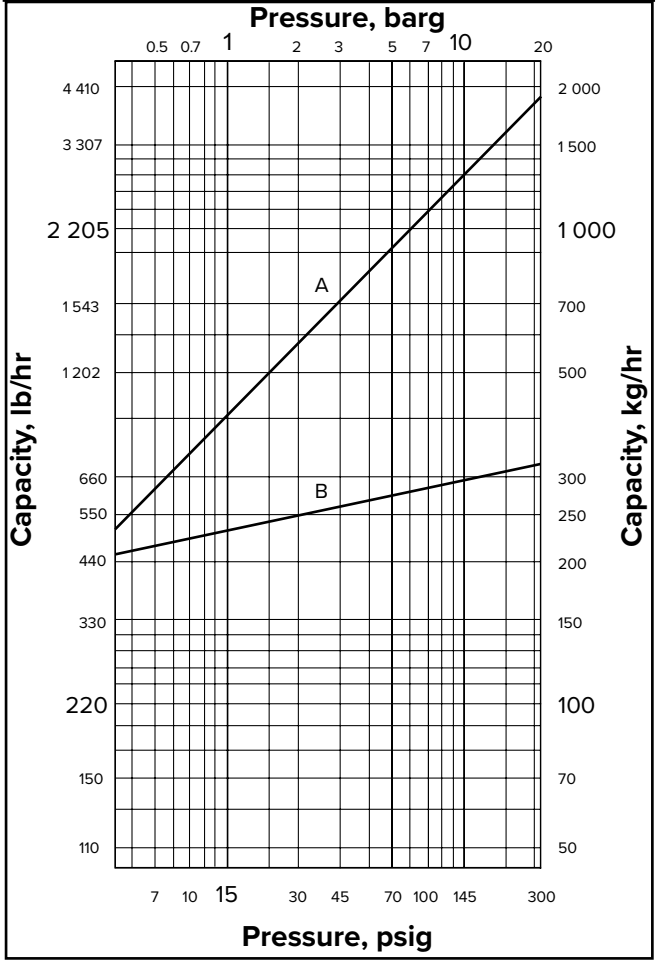
- Size and type of pipe connection.
- Maximum working pressure that will be encountered
- Maximum condensate load

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" ℄ 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)	



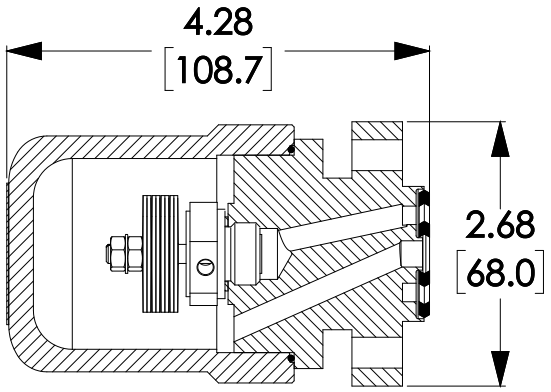
Model AB-3000 Capacity

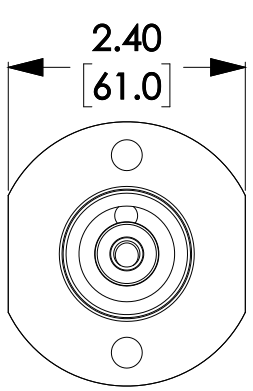


A = Cold Water
B = Hot Condensate

AB-3500 Bimetallic Steam Trap

For Pressures to 320 psig (22.0 barg)...Capacities to 3 200 lb/hr (1 450 kg/hr)





Description

Armstrong's AB-3500 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-3500 has a removable cap, stainless steel body that is lightweight, compact and highly resistant to corrosion. The AB-3500 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 an increase in flexibility, as other trap types (Inverted Bucket, Thermostatic and Thermodynamic) can be installed on the same connector.

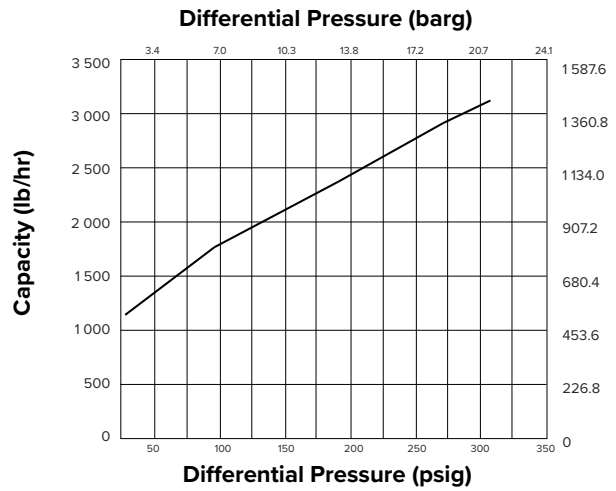
Maximum Operating Conditions

Maximum allowable pressure
(Vessel design): 465 Psig @ 500°F [32.0 barg @ 260°C]
Maximum operating pressure: 320 Psig [22.0 barg]

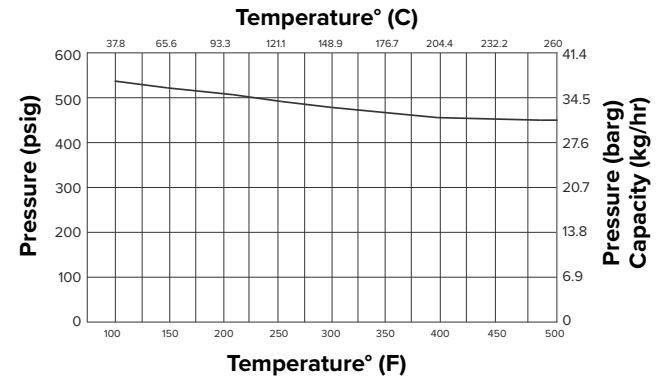
Connector's Connection

Screwed BSPT and NPT
Socket weld
Flanged DIN or ANSI (welded)

Model AB-3500 Cold Water Capacity



Model AB-3500 Pressure/Temperature Rating



Material	
Body and Cap	ASTM A-351 GR. CF8
IS-2 Connector	Stainless Steel - 304
Valve	Chrome Steel - 17-4 PH
Seat	304 Stainless Steel
Bimetallic Elements	Nickel Plated

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)

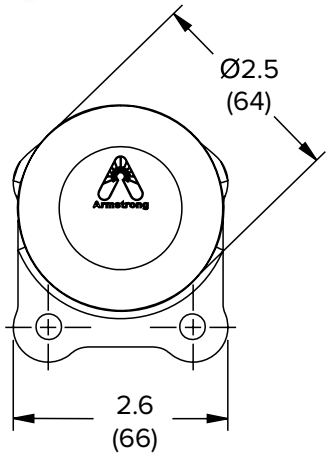
Description

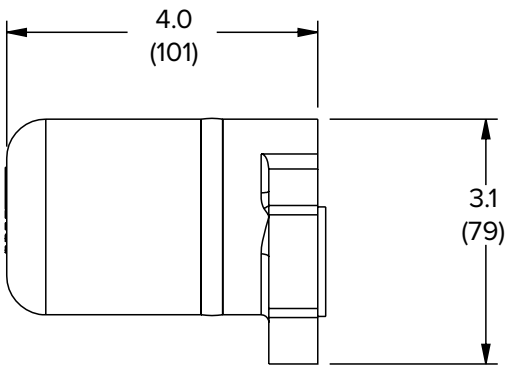
Armstrong's SH-4000 Series Bimetallic Steam Trap is the ideal design for applications involving superheated steam.

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)

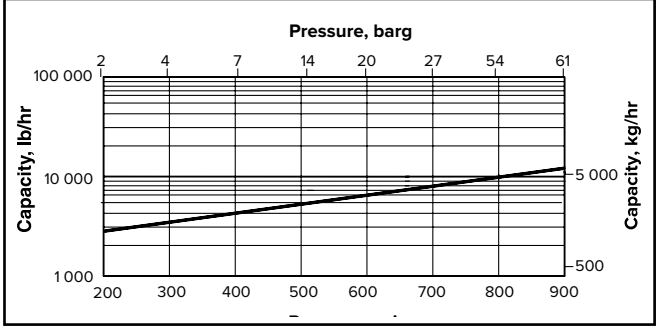
Specification

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.

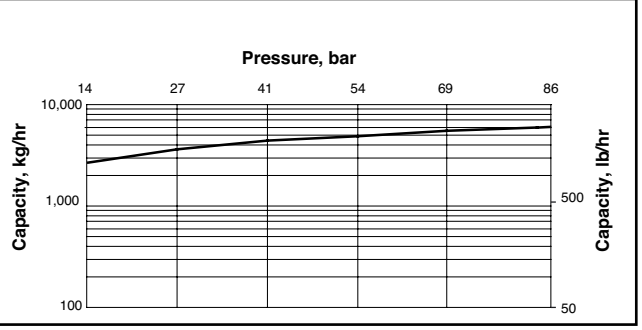
How to Order

Specify model number
Maximum working pressure and temperature

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



SH-4015 Cold Water Capacity



Note: Cold water capacity for start-up loads only. When superheat present, there will be minimal condensate.

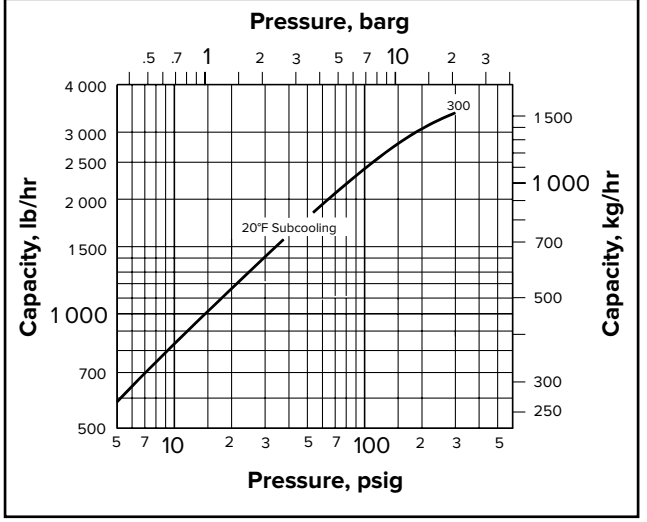
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

TT Series Thermostatic Steam Traps

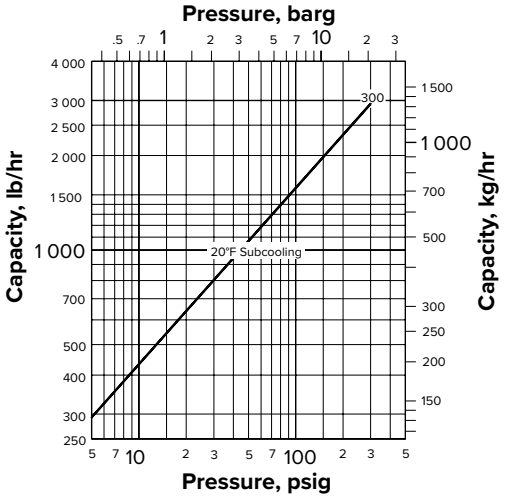
All Stainless Steel

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

TTF Series Capacity



Model TT-2000 Capacity



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**

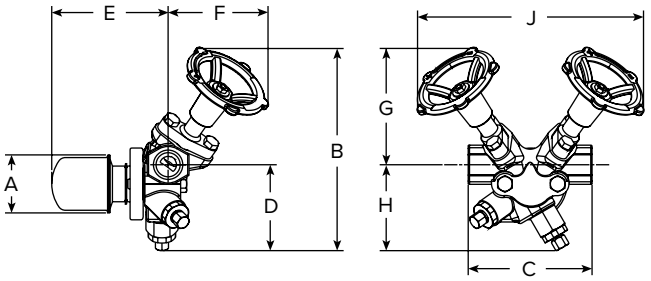
Model	TTF-1	TTF-1R	TT-2000
Design	Welded		
Connections	Screwed (NPT and BSPT)		Screwed (NPT and BSPT), Socketweld and Flanged
Material			
Body	ASTM A240 - 304L		
Valve	Bronze		
Seat	Stainless steel		
Thermostatic air vent	Standard stainless steel & bronze w/phosphor bronze bellows caged in stainless 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 for up-to-date information.

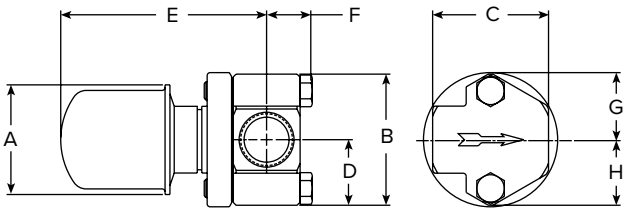
TT Series Thermostatic Steam Traps

All Stainless Steel

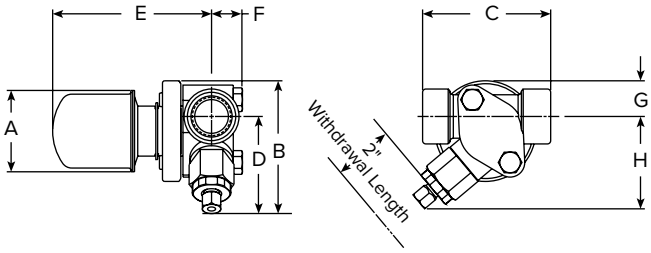
For Pressures to 300 psig (20 barg)...Capacities to 3 450 lb/hr (1 568 kg/hr)



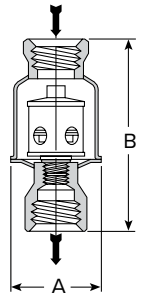
Series TT-2000 With TVS 4000 Trap Valve Station



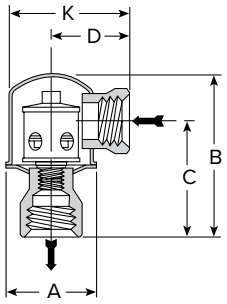
Series TT-2000 With Standard Connector



Series TT-2000 With Integral Strainer and Blowdown Valve



Series TTF-1 Trap



Series TTF-1R Trap

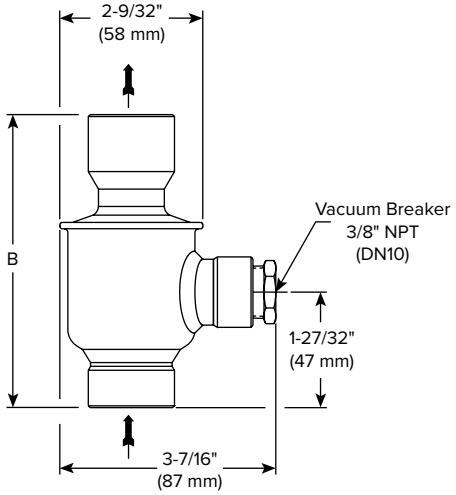
TT-2000 Series Steam Trap								
Model No.	TT-2000							
	Standard Connector		IS-2 Connector With Integral Strainer				TVS 4000 Connector	
Pipe Connections	in	mm	in	mm	in	mm	in	mm
	3/8, 1/2, 3/4	10, 15, 20	1/2, 3/4	15, 20	1	25	1/2, 3/4 1	5, 20
“A” Trap Diameter	2-1/4	57	2-1/4	57	2-1/4	57	2-1/4	57
“B” 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 ℄ to Bottom	1-3/8	46	2-5/8	67	2-5/8	67	3-1/4	83
“E” Connection ℄ to Outside of Trap	4-1/4	107	4-3/4	120	4-15/16	125	4-1/2	115
“F” Connection ℄ to Front of Connector	13/16	20	7/8	22	7/8	22	3-7/8	98
“G” Connection ℄ to Top	1-3/8	46	1	25	1	25	4-1/2	114
“H” Connection ℄ 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
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 ℄ 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)	

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

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_2O 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

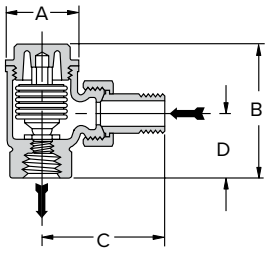
Model No.		TAVB-2		TAVB-3	
		in	mm	in	mm
Pipe Connections	Thermostatic Air Vent	1/2	15	3/4	20
	Vacuum Breaker	3/8	9.5	3/8	9.5
"A" (Diameter)		2-1/4	57	2-1/4	57
"B" (Height)		4-5/8	117	4-11/16	119
"C" (℄ Inlet to Face of Vacuum Breaker)		2-1/8	54	2-1/8	54
Weight lb (kg)		1 (0.45)		1-1/4 (0.57)	
Maximum 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

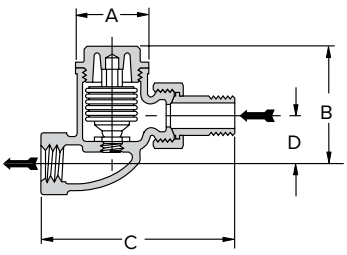
Name of Part	Material
Body	304-L Stainless steel
Connections	304 Stainless steel
Balanced Pressure Thermostatic Air Vent	Stainless steel and bronze with phosphor-bronze bellows, entire unit caged in stainless steel
Gasket	Copper clad non-asbestos
Vacuum Breaker Body	303 Stainless steel
Valve	Stainless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

TS-2/TS-3 Radiator Traps

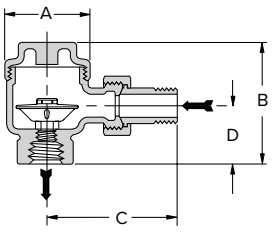
For Pressures to 65 psig (4.5 barg)...Capacities to 1 600 lb/hr (726 kg)



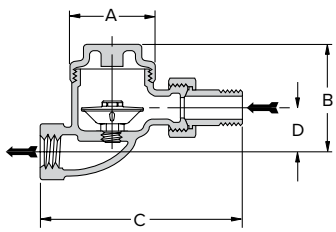
TS-2 Trap Angle Type



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.

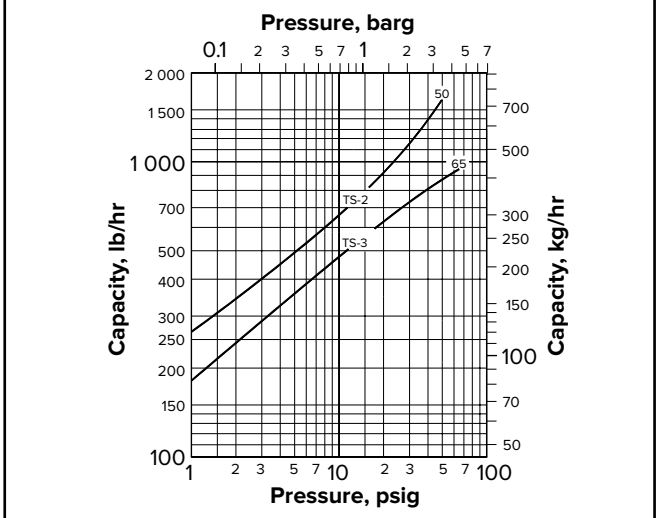
The TS-3 is a heavy duty, wafer type trap for the drainage of all types of steam radiators and convectors. Its wafer design is well suited to systems prone to water hammer, which may damage conventional bellows type units. The TS-3 is repairable in-line and has an all-stainless steel wafer element.

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											

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

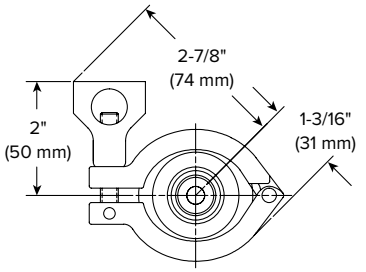
TC Series Clean Steam Thermostatic Traps

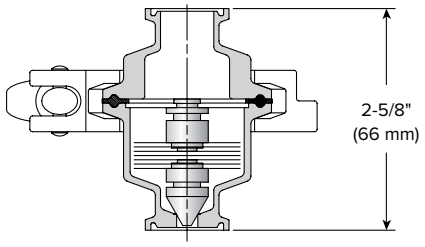
For Clean Steam Systems

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

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

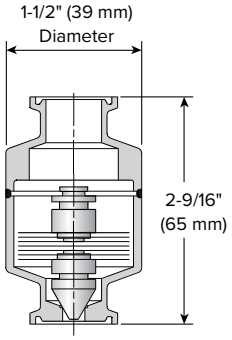
How to Order:

Specify:
- Model number
- Pipe connection size
- End connection type

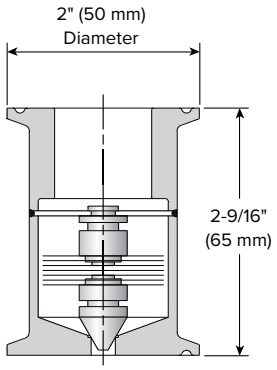
Example:
TC-C, 1/2" sanitary end connections.

For a fully detailed certified drawing, refer to:
TC-C CD #1161
TC-R CD #1162
TC-S CD #1163

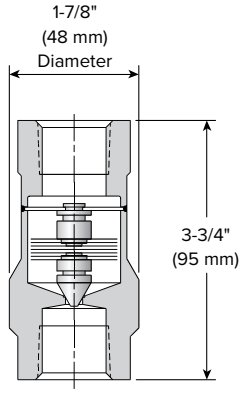
Model TC-C Clamp
With Sanitary Body Clamp
1/2" (15 mm), 3/4" (20 mm), 1" (25 mm)
Sanitary End Connections



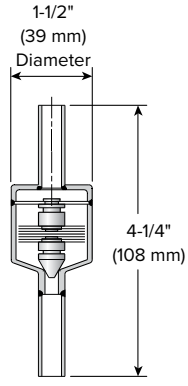
Model TC-S Sealed
1/2" (15 mm), 3/4" (20 mm)
Sanitary End Connections



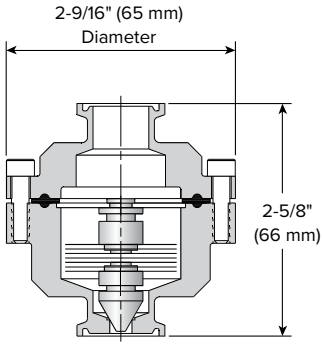
Model TC-S Sealed
1" (25 mm)
1-1/2" (40 mm)
Sanitary End Connections



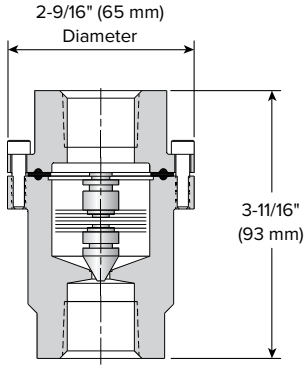
Model TC-S Sealed
1/2" (15 mm), 3/4" (20 mm)
Threaded End Connections



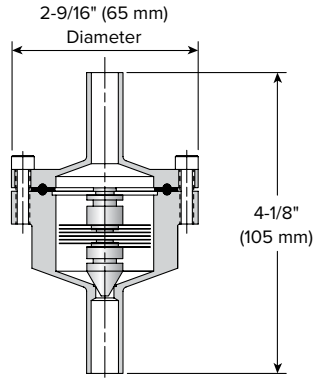
Model TC-S Sealed
1/2" (15 mm), 3/4" (20 mm)
Tube End Connections



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 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

Armstrong® Armstrong Simplifies Your Tracing Line Systems

Designed to simplify and supply all the components (steam traps, manifolds, valves, etc.) necessary for your drip and tracer line applications, Armstrong's new Steam Distribution and Condensate Collection Manifolds bring all components together to reduce installation costs and provide a compact, easily accessible, centrally located assembly.

Armstrong's manifold series includes four different configurations, a Steam Distribution (MSD/SMSD), and a Condensate Collection Assembly (CCA/CCAF). As an option, the condensate manifolds can offer freeze protection.

In either case, you will save the expensive headaches of trying to fabricate in-house. What's more, your manifold will be backed by the famous Armstrong quality—and a standard three-year limited warranty.

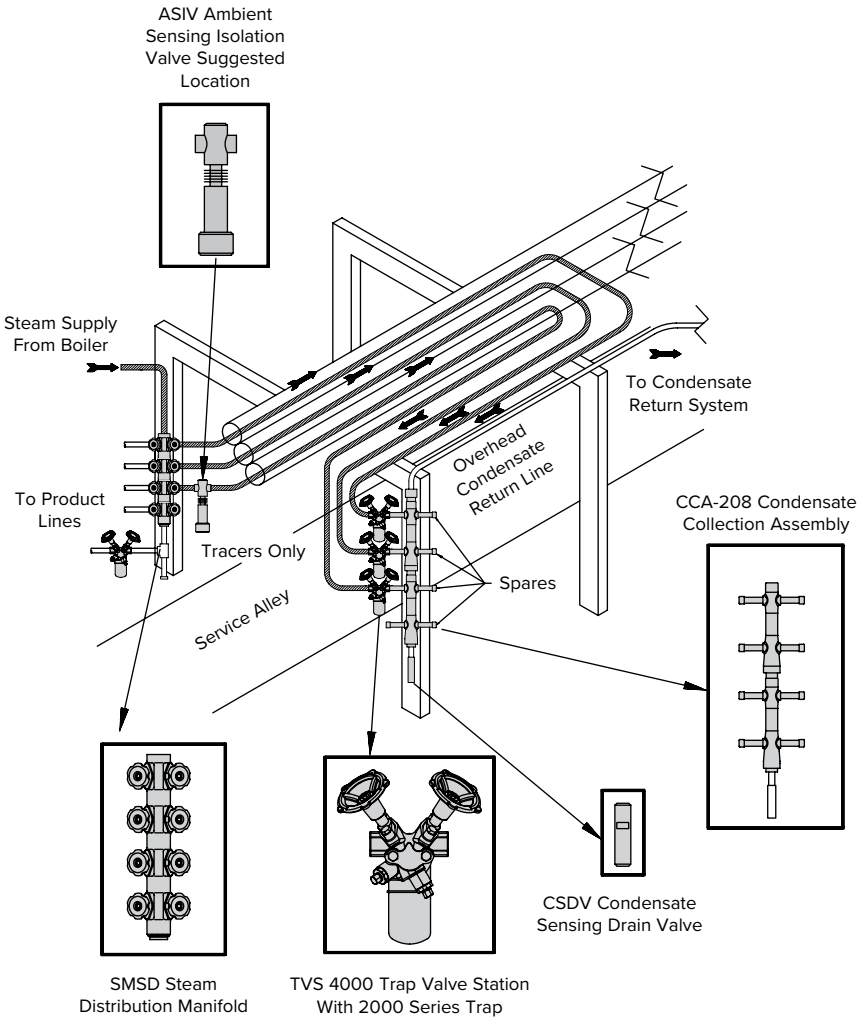
Steam Distribution Manifolds

As a Steam Distribution Assembly (MSD/SMSD), the manifold places all steam supply valves in one location. Standardizing components and centralizing their location simplifies installation, cutting costs from the beginning. You also save because routine maintenance is faster.

Condensate Collection Manifolds

To make industry's trapping and valving more efficient, Armstrong combines its stainless steel steam trap valve stations with manifolds into a package called the Condensate Collection Assembly (CCA). This prepackaged assembly offers many great benefits—cost savings in installation, design flexibility, and reduced purchasing time. CCAF would also include syphon tube freeze protection.

Whatever your condensate collection or steam distribution needs, Armstrong has the manifold for savings over the long term.



Shown are typical locations for Armstrong manifolds. The many manifolds in chemical/petrochemical plants consume valuable floor space and often block movement among the units. Operating costs are high, and installation requires expensive custom fabrication on site. Clearly, a prefabricated manifold permitting standardization of components offers substantial savings over conventional units. Shaded products are available from Armstrong. Call or consult your Armstrong Representative if additional product details are required.

The Proof Is in the Piston

Many of Armstrong's manifolds utilize the piston valve because of its years of excellent performance in steam systems all over the world. The proof of Armstrong's long service life for manifolds...is in the piston.

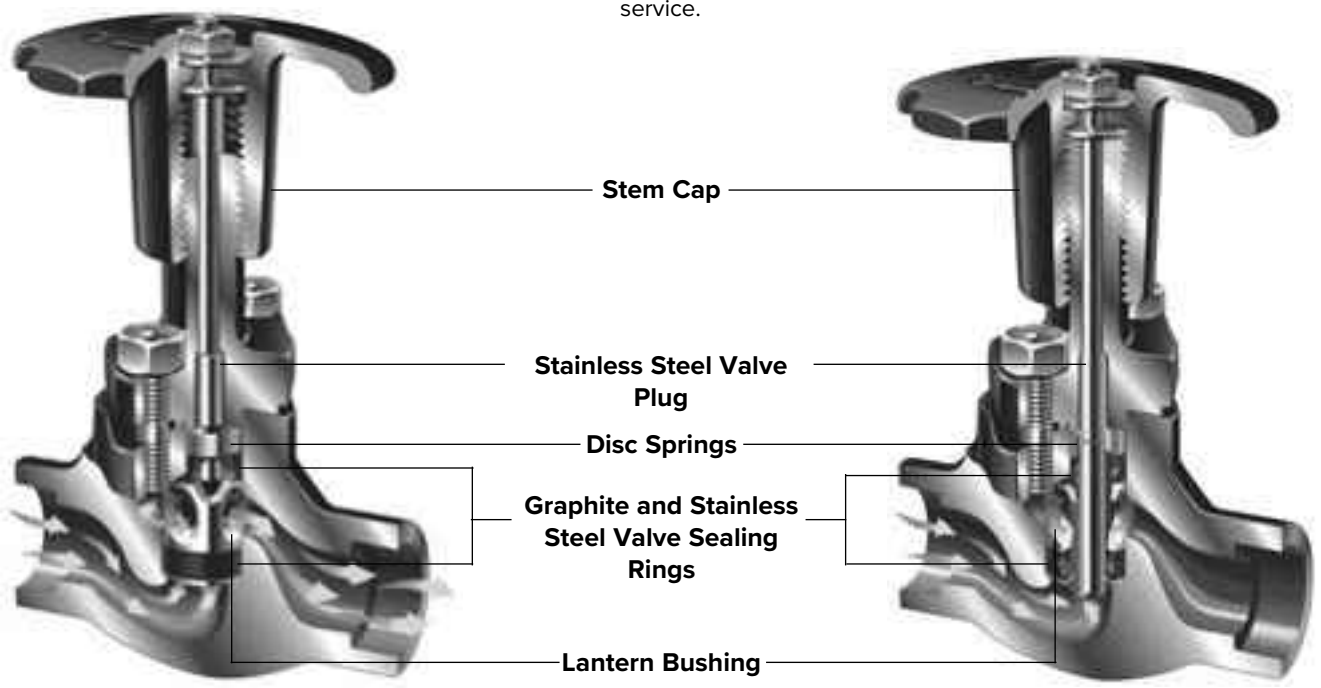
All types of valves—plug valves, gate valves, piston valves and even ball valves—have been summoned for duty in steam service. Due to its excellent sealing characteristics in steam service, and because it has no gland packing, the piston valve is frequently selected for steam systems.

People who have used it over the past 90 years can testify that leakage to atmosphere is extremely rare, even without any maintenance. The elastic contact between piston and valve sealing rings provides a perfect tightness, both in-line and to atmosphere.

Steam system valves, whatever their design, are used to isolate steam and condensate lines or when a faulty steam trap needs to be removed from the line. This means the valves stay in the open position for long periods and are nearly always in contact with the atmosphere. It is not surprising, therefore, that when the valves need to be closed, they can often prove difficult to operate. Our experience and the demands from end users for energy efficiency have led us to a sealing system designed especially for steam service.

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

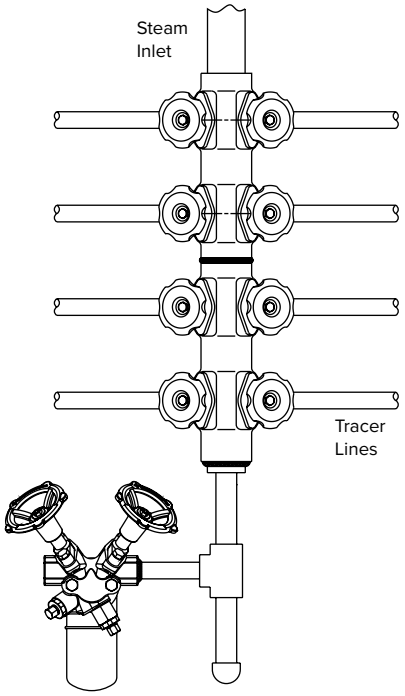
- **Dual sealing action.** The piston valve is a seatless valve that includes two graphite and stainless steel valve sealing rings that seal the stem and function as a seat. This combination provides long-term protection against leaks to the atmosphere and downstream piping.
- **Self-cleaning action.** 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.

Closed Position

- **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.

Armstrong® Steam Distribution Manifold (MSD/SMSD)

As Steam Distribution Assemblies (MSD/SMSD), the manifolds place all steam supply valves in one location. Standardizing components and centralizing their location simplifies installation while providing cost savings. You also save because routine maintenance is faster. Insulation can also be provided...and can be a major savings in most installations.



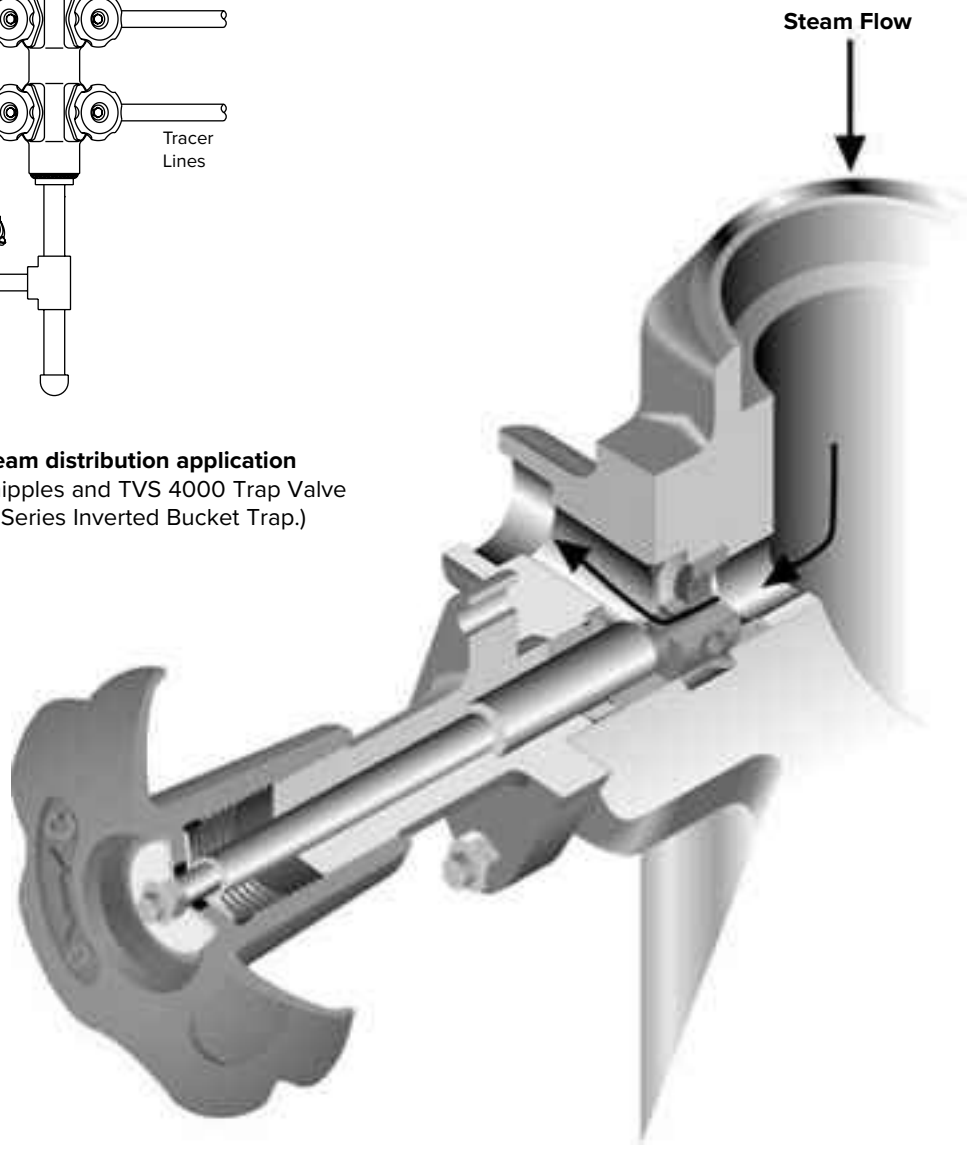
Typical SMSD steam distribution application
(shown with optional nipples and TVS 4000 Trap Valve Station with 2000 Series Inverted Bucket Trap.)

Cost Savings

- Reduced design specification costs
- Prefabrication vs. field assembly for easy installation
- Reduced shipping and field handling costs
- Lower long-term maintenance and operating costs
- 3-year guarantee

Design Flexibility

- Dimensional consistency
- Space savings
- Insulation package available
  SMSD may also be used on systems utilizing glycol, Dowtherm and other heat transfer liquids.

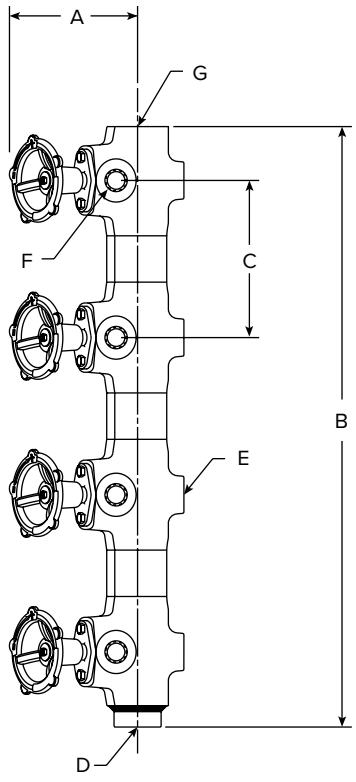


Steam Distribution Manifold (MSD/SMSD)

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" ℄ to ℄	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 for up-to-date information.

Armstrong® Pre-Assembled...Condensate Collection Assembly (CCA)

Armstrong combines its Trap Valve Stations (TVS) with manifolds into a package called the Condensate Collection Assembly (CCA). This prepackaged assembly offers many great benefits—cost savings in assembly, design flexibility and reduced purchasing and design time. The CCA with TVS 4000 Trap Valve Station and 2000 Series Inverted Bucket Traps is guaranteed for 3 years.

Cost Savings

This preassembled concept offers tremendous savings by reducing multiple component purchases that cause additional purchase order monitoring and shipping costs. Other savings include far less labor time required for field assembly.

This modular forged steel body design provides quick assembly/delivery, reducing overall project costs.

- Minimal welding vs complete manifold fabrication
- Eliminates multiple component purchases
- Reduced design specification costs
- Prefabrication vs. field assembly for easy installation
- Reduced shipping and field handling costs
- Lower long-term maintenance and operating costs
- 3-year guarantee

Design Flexibility

Armstrong can meet virtually any design parameter, including dimensional consistency, with your choice of socketweld or threaded connections. Armstrong inverted bucket, thermostatic, thermostatic wafer, bimetallic or disc steam traps can be provided or any other manufacturer's two-bolt steam trap can be used. If you require a specific piping arrangement, Armstrong can offer the flexibility to meet your specifications.

Materials

Manifold body: ASTM A105N/A-350 LF2 Forged Steel

Removable Insulation Package

A removable insulation package is available for all steam and condensate manifolds.

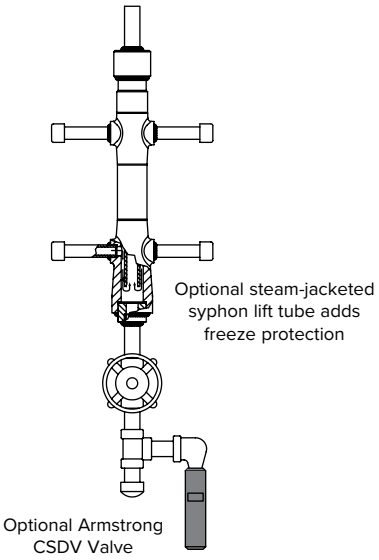
- Inexpensive
- Quick to install
- Removable for maintenance
- Reusable after maintenance
- Weatherproof
- Formed to cover all manifold elements
- Strong, durable cover
- Available to fit all manifold sizes

Freeze Protection Package (CCAF)–Optional

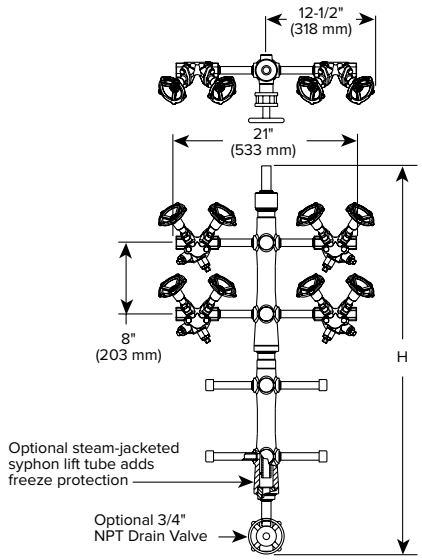
A manifold assembly for more efficient condensate return has another benefit—freeze protection. Armstrong's innovative manifold design actually serves as a heat station, heating one or more traps if the steam supply is interrupted or shut off to the traps. The protection is accomplished as long as one trap continues to discharge into the manifold. The manifold's internal syphon tube creates a water seal, which contains the flash steam from the discharge of the live trap. This allows radiant heat to protect shut-off traps from freezing.

An optional freeze protection valve package senses condensate temperature. When this device opens, it drains condensate from the manifold assembly, thus providing further freeze protection.

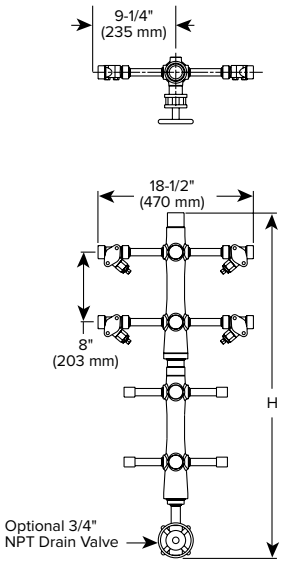
CCAF 212 Condensate Collection Assembly
(Shown with TVS 4000 Trap Valve Station with 2000 Series Inverted Bucket all stainless steel steam traps with optional removable insulation package including nipples, drain valve and stand.)



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	1 197	55-1/8	1 400
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	1 100	51-5/16	1 303	59-5/16	1 506
Maximum Allowable Pressure	604 psig @ 800°F (42 barg @ 427°C)									

How to Order Manifold Packages

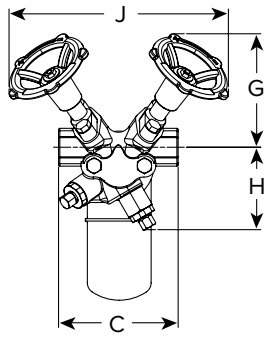
CCA	208	2NPT	6PE	3DVN	TVS 4000 SCH80
Manifold Model	**Number of Take-offs Per Manifold**	**Connection Size Take-offs, NPS in (mm)**	**Connection Size Top, NPS in (mm)**	**Connection Bottom, NPS in (mm)**	**Trap Valve Station**
MSD Steam Distribution Manifold	04 08 12	2NPT = 1/2 (15) NPTF[1] 2SW = 1/2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

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).

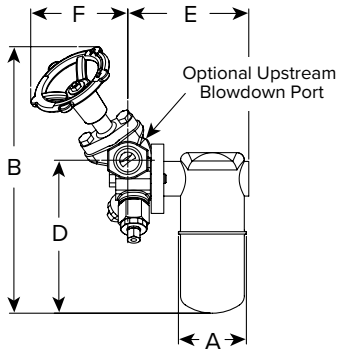
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

TVS 4000 Series Stainless Steel Trap Valve Station

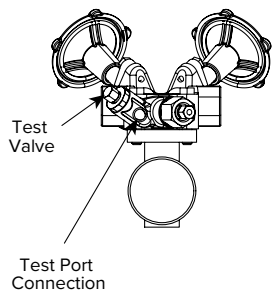
For Pressures to 650 psig (45 barg)...Capacities to 1 300 lb/hr (590 kg/hr) (Using 2000 Series Inverted Bucket Steam Traps)



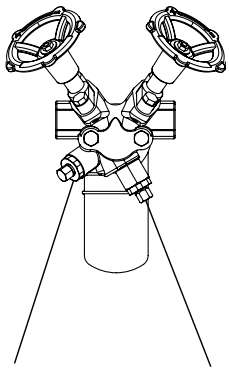
Model TVS 4000 With 2000 Series SS Trap
Front View



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:	DIN933, Gr. 8.8 per DIN267
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	
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" 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 ℄ to Bottom	4-3/4	120	6	154	8	203
"E" Connection ℄ to Outside of Trap	4-1/2	114	4-13/16	122	5-7/8	149
"F" Connection ℄ to Front of Handwheel (Valve Open)	3-1/2	89	3-7/8	98	3-7/8	98
"G" Connection ℄ to Top of Handwheel (Valve Open)	3-1/4	83	4-1/2	114	4-1/2	114
"H" Connection ℄ 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)	

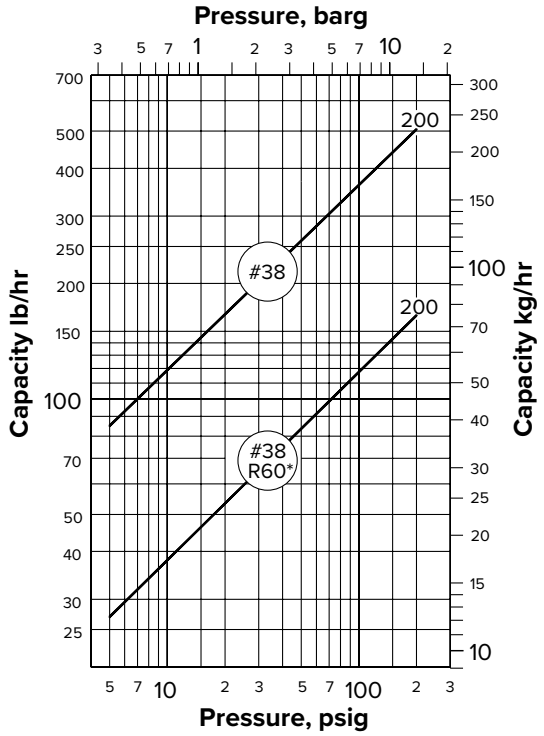
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

TVS 4000 Series Stainless Steel Trap Valve Station

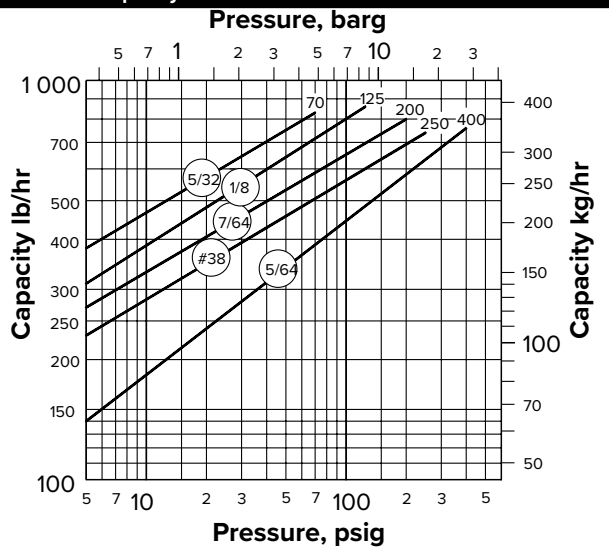
For Pressures to 650 psig (45 barg)...Capacities to 1 300 lb/hr (590 kg/hr) (Using 2000 Series Inverted Bucket Steam Traps)

Armstrong®

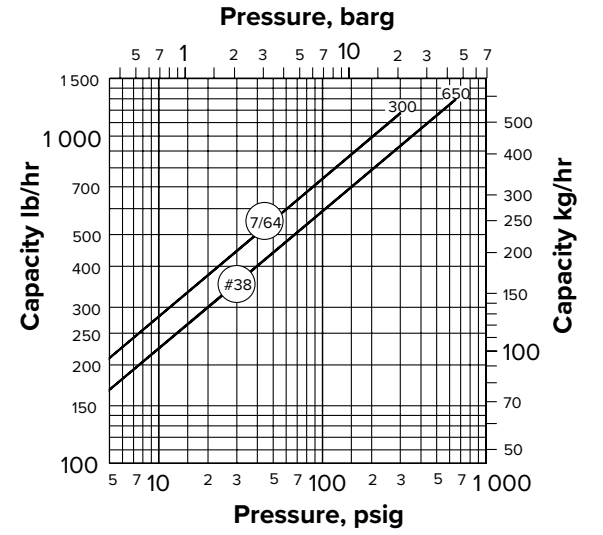
Model 2010 Capacity



Model 2011 Capacity



Model 2022 Capacity



*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.

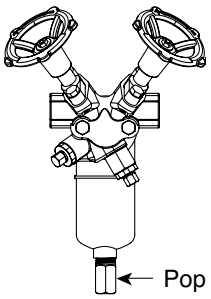
Options

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.

Pop Drain

Simple but effective against freeze-up. Properly installed and maintained at low points in your system, the simple, pressure-actuated pop drain opens for condensate drainage at 5 psig (0.35 barg) for Models 2011 and 2022.



Probe Connections are available for trap monitoring on Models 2011 and 2022.

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

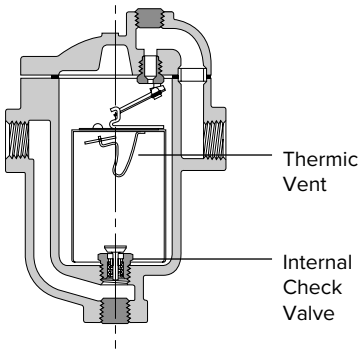
*Consult factory.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

Armstrong® Steam Trap Options

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.

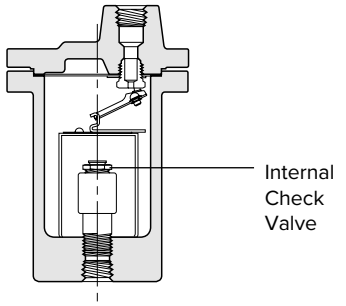


Internal Check Valves—1/2" (15 mm) Thru 2" (50 mm) NPT

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:

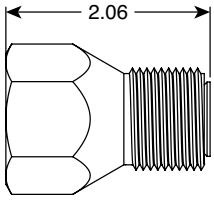
- When the trap is installed above the unit drained
- When sudden pressure drops may occur in the steam supply to the unit
- Whenever a back pressure exists in the condensate return line

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.

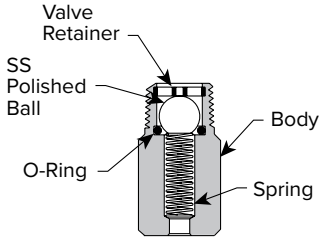


Pop Drain for Freeze Protection—1/2" (15 mm) NPT

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)

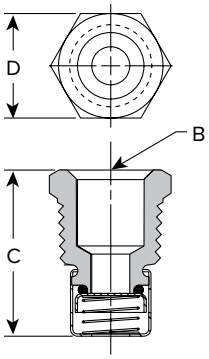


Steam Trap Options

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.

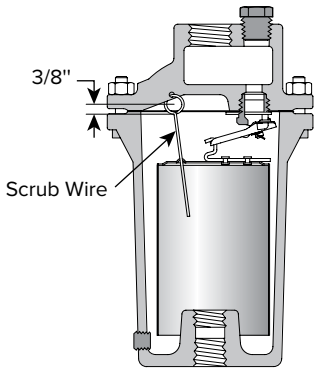


Vacuum Breaker				
Size	in	mm	in	mm
	1/2 NPT	15	3/8 NPT	10
"B" Pipe Connections	3/8 NPT	10	1/4 NPT	6
"C" Height	1-1/4	32	1-3/32	28
"D" Width	7/8 Hex	22 Hex	11/16 Hex	17 Hex

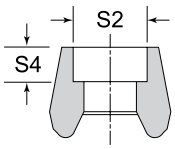
Dirt Problems

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



Socketweld Connection

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.

Armstrong® Armstrong Steam Harness

Description

A properly sized and engineered steam harness solution providing you with real-time monitoring and notification of up to 15 key thermal and operating parameters that can impact the reliability of your feed production and system performance. The Armstrong Steam Harness includes industry 1st critical components capable of measuring steam quality (% dryness fraction) and flow rate (no straight run requirement) in a compact footprint. Designed with best in class system knowledge and best practices piping, the steam harness is targeted towards improving steam quality and overall production efficiencies.

Maximum Operating Conditions

Designed to accept inlet steam pressures of up to 150 psig, deliver the required steam flow (lb/hr) and reduce pressures to the desired minimums based upon plant specifications for a given product/ formula.

Materials

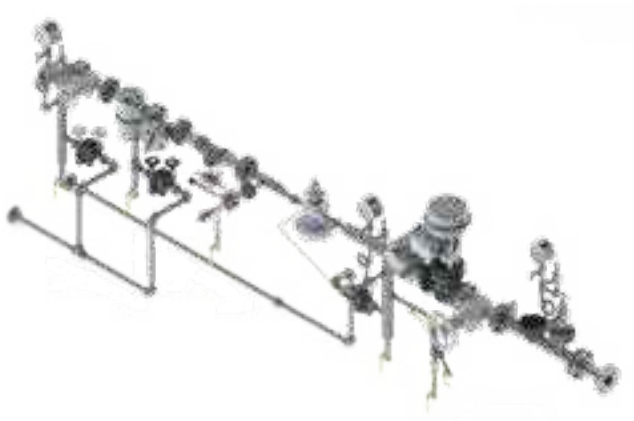
- Steam quality meter (Steam QM®-1)
- Steam flow meter (VERIS Accelabar®)
- PLC/HMI, Steam pressure & temperature transducers
- Pressure gauges
- Automatic on/off full port isolation valve with visual and electrical indication of position
- Carbon steel Phyton control valve with multilingual intelligent positioner
- Trap valve stations (TVS), Isolation valves
- T-design drain separator,
- Thermostatic steam trap
- Pressure reducing valve (PRV)
- Safety relief valve with stainless steel internals
- Manual butterfly valve

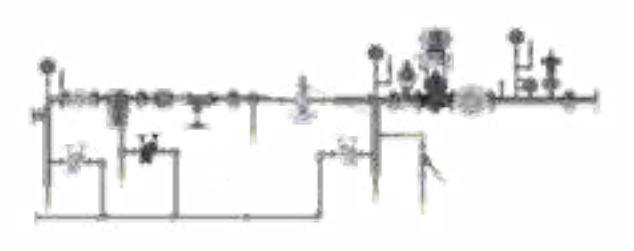
Features

- Properly sized for the thermal operating requirements of each application (Not a one-size fits all approach)
- Up to 15 K.O.P.'s (Key Operating Parameters) of the thermal system and production via a PLC/HMI
  - Steam Pressure upstream of Steam Harness
  - Steam Quality
  - Steam Quality [AVG] per tonne Feed
  - kg of water added by steam per tonne Feed
  - Steam consumption per hour
  - Steam consumption per tonne Feed
  - Accumulated Steam consumption (lb or kg)
  - Thermal Energy Input (MMBtu/h or kW)
  - Thermal Energy per tonne Feed (MMBtu or kWh)
  - Steam cost per hour (local currency/h)
  - Steam cost per tonne Feed (local currency)
  - Motor Amps per tonne Feed (amp/tonne Feed)
  - Motor Amps per steam flow
  - Reduced Steam Pressure for feed conditioning
  - Customization of Steam Harness Parameter per Formula
- Production rate (4-20mA electrical signal) from pellet mill or extruder is required for tonnage
- Real time monitoring and notifications of any steam related parameter and/or alarm condition
- Capable of communicating directly to facility BAS/DCS via Modbus TCP/IP
- 24/7 Steam Dryness Fraction monitoring/recording
- Accurate flow measurement with zero-straight run requirement delivering 50:1 turndown

Options

- Customizable to fit your specific site requirements without compromising the quality of the delivered steam
- Siemens PLC/HMI
- Float & Thermostatic steam traps
- Critical components pack (separator, steam quality meter, flow meter & data collection) available for optimized, value engineered applications





How to Order

- Can order based on standard p/n configurations
- Can order customized harness based upon site visit measurements of physical space available for proper installation and performanceOEM can order full, partial or components of harness

For questions regarding Turnkey installation of the Armstrong Steam Harness, contact Armstrong direct or your local Armstrong factory authorized representative.