



Armstrong®

**HYDROCARBON & CHEMICAL
PROCESSING SOLUTIONS**

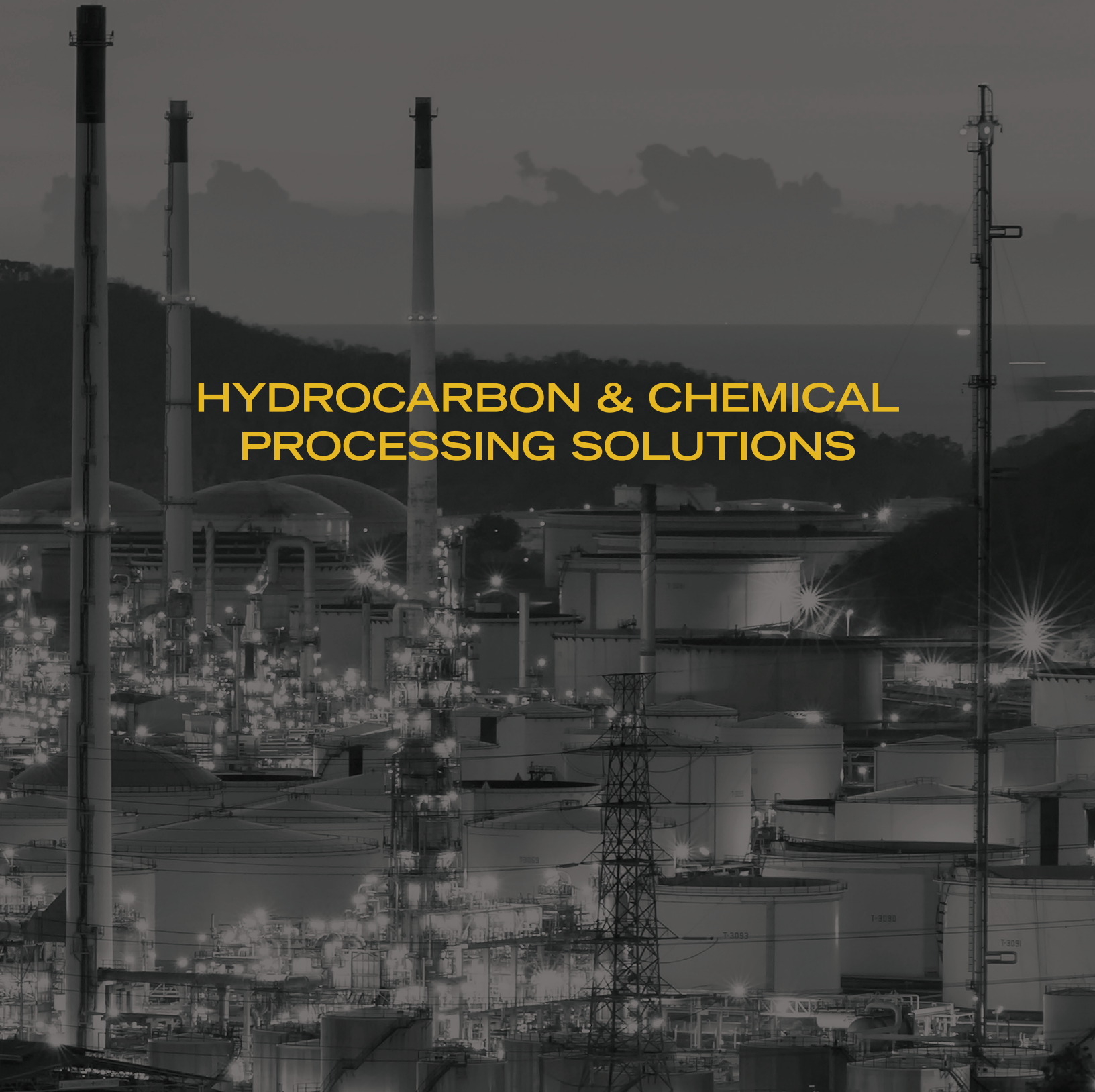


Table of Contents

Armstrong Packaged Piping Solutions.....	3 - 4
Steam Distribution Manifolds (MSD/SMSD) & Cost Comparison Worksheet.....	5 - 7
Condensate Collection Assembly (CCA) & Cost Comparison Worksheet.....	8 - 12
The Proof is in the Piston.....	13
Trap Valve Station TVS-4000.....	14 - 19
Trap Valve Station TVS-5000.....	20
Cost Comparison Worksheet.....	21
IS-2 Universal Stainless Steel Connector; Standard 360° Stainless Steel Connector	22
2000 Series Inverted Bucket Steam Trap.....	23 - 24
1811N & 2011N Inverted Bucket Steam Trap.....	25 - 26
1800 Series Inverted Bucket Steam Trap.....	27 - 28
1000 Series Inverted Bucket Steam Trap.....	29 - 30
SH-2000 & SH-2500 Bimetallic Steam Trap.....	31 - 32
WT Series Thermostatic Wafer Steam Trap.....	33 - 34
FT-4000 Series Float and Thermostatic Steam Trap.....	35 - 36
FF-4000 Series Free Float and Thermostatic Steam Trap.....	37
CD-3300 Series Disc Steam Trap.....	38
IS-4 Universal Stainless Steel Connector.....	39
SH-4000 Bimetallic Steam Trap Steam Trap	40
4000 Series Inverted Bucket Steam Trap.....	41 - 42
980 Series Inverted Bucket Steam Trap	43 - 44
300 Series Inverted Bucket Steam Trap	45 - 46
400 Series Inverted Bucket Steam Trap	47 - 48
411G/421 Series Inverted Bucket Steam Trap.....	49 - 50
EM Inverted Bucket Steam Trap	51 - 52
CS Series Float and Thermostatic Steam Trap.....	53 - 54
LS and MS Series Ultra Capacity Float and Thermostatic Steam Traps	55 - 56
CD-72S Series Disc Trap.....	57
SH-300 Bimetallic Steam Trap	58
SH-900 and SH-1500 Bimetallic Steam Trap	59 - 60
MT Series Thermostatic Wafer Steam Trap	61
PT-300 Series Horizontal Steel, Low Profile Pump Trap.....	62 - 63
PT-300LL Light Liquid Pump Trap.....	64
PT-516 High Capacity Pump Trap.....	65 - 67
DoubleDuty® 6 Steam Trap/Pump Combination	68 - 69
DoubleDuty® 12 Steam Trap/Pump Combination.....	70 - 71
Free Floating Guided Lever Drain Trap.....	72 - 73
Free Floating Lever Dual Gravity Drain Traps.....	74 - 75
Fixed Pivot and Snap Action Drain Traps.....	76 - 77
High Leverage Spring-Loaded Ball Float Drain Traps.....	78 - 79
Ultra-Capacity Drain Traps.....	80
Free Floating Lever Air/Gas Vents – All Stainless Steel.....	81 - 82
High Leverage Ball Float Type Air Relief Traps	83 - 84
Free Floating Lever Air/Gas Vents - Forged Steel.....	85 - 86
Tank Heaters	87
Steamix® Hose Stations	88 - 90
Strainers.....	91 - 98
AIM® Wireless Monitoring.....	99 - 102
SteamStar® Best Practice Steam System Measurement.....	103

Solutions for the Hydrocarbon and Chemical Processing Industries

With more than 100 years of experience, a global manufacturing footprint, and the right mix of products and technical expertise, Armstrong International is uniquely positioned to help you design, build, and maintain hydrocarbon and chemical processing facilities that reach best practice standards in steam tracing and condensate removal. By harnessing our extensive industry knowledge, and by truly understanding the many rigorous demands facing HPI and CPI customers around the world, Armstrong is the clear choice to be your single-source partner for a wide range of steam system applications and service solutions.

Consider our vast industry experience and complete product offering and you'll see why customers around the world turn to Armstrong International to help them operate more efficiently and reduce the cost of operation.

The power of world-class energy expertise zeroed in on your industry.

A longtime player in the global HPI-CPI sector, Armstrong has proven again and again that we understand the specific challenges facing this industry. For more than a century, we have provided utility system optimization solutions for our global HPI-CPI partners. More than taking a passing interest in the HPI-CPI industry, we have actively participated in its growth and evolution with products and services that help set new energy efficiency and environmental compliance standards.

Armstrong International offers a wide variety of products for steam, air, and hot water. Add our broad knowledge and application support, and you begin to understand the kind of contribution we can make. What's more, our range of service options gives us the flexibility to meet you where you are, adapting solutions to meet individual needs and site-specific requirements.

Simply put, we have a real-life view of the HPI and CPI industries' economic realities and take a seasoned, practical approach to their solution.

Product and service solutions tailored to meet your project-specific needs.

With 100-plus years of product knowledge, and proven industry-specific application expertise, Armstrong International doesn't just offer solutions; we offer the right solution for your specific need, including:

Packaged Piping Solutions

- Steam Distribution Manifolds
- Condensate Collection Assemblies
- Trap Valve Stations
- ASME Pump Trap Assemblies

Condensate Management Services

- Condensate removal for improved heat transfer
- Condensate retrieval for fuel, water and chemical savings
- Sense, locate and detect condensate contaminants to save energy and to protect boilers

Trap Management Services

- Steam Trap Surveys
- Steam Trap Monitoring/Reporting
- Steam Trap Turnkey Installation

Packaged Piping Solutions Simplify Your Steam 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, and Trap Valve Stations bring all components together to reduce installation costs and provide a compact, easily accessible, centrally located assembly.

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.

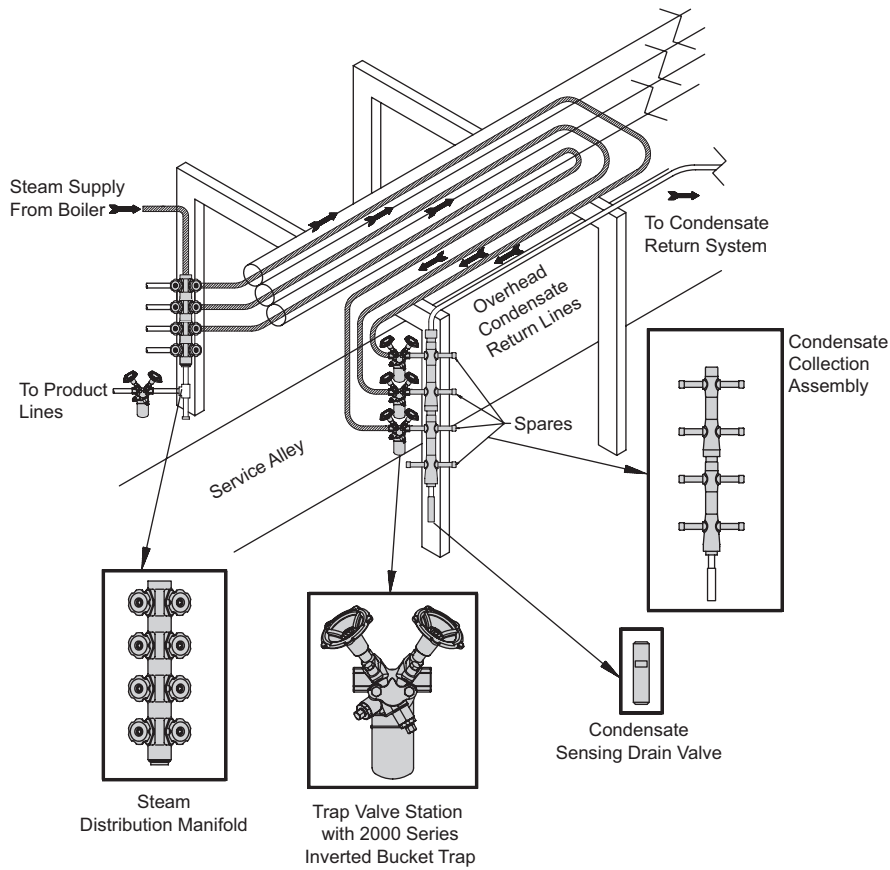
Trap Valve Station with Integrated Valves Reduces Piping Costs and Saves Space

The Trap Valve Station is a connector that packages two piston-style isolation valves, test valve and stainless steel strainer with blowdown valve into one connector. This connector can accommodate a choice of inverted bucket, disc, thermostatic wafer, thermostatic bimetallic or float and thermostatic style Armstrong steam traps. Any other manufacturer's 2-bolt steam trap can also be applied to the Armstrong Trap Valve Station.

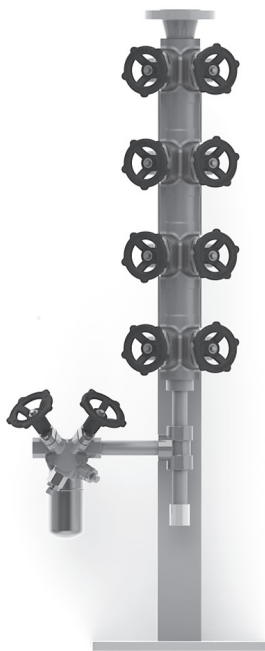
Whatever your condensate collection or steam distribution needs, Armstrong has the manifold for savings over the long term.

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

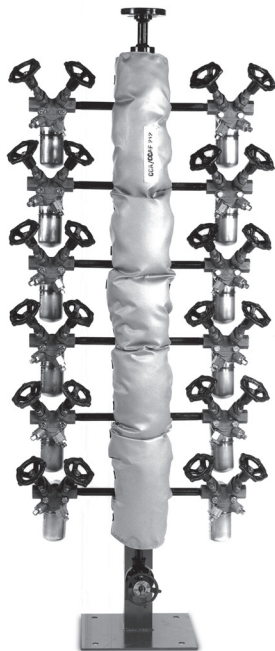
Armstrong Packaged Solutions



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.



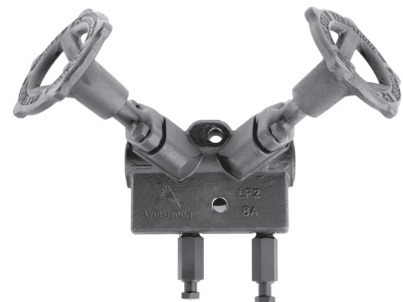
Steam Distribution Manifold



Condensate Collection Assembly



TVS 4000 Trap Valve Station



TVS 5000 Trap Valve Station

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Steam Distribution Manifold (MSD/SMSD) with Piston Sealing Technology

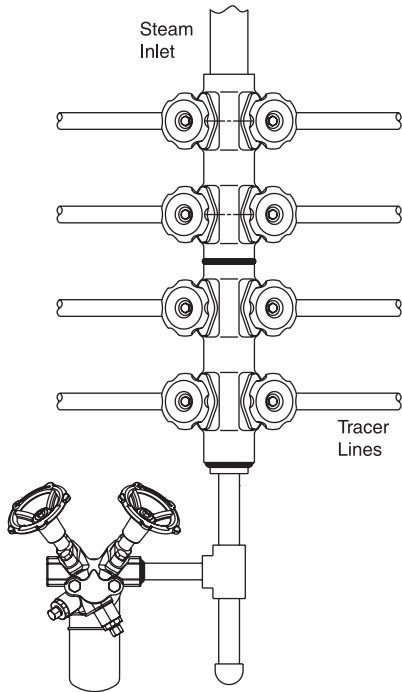
As Steam Distribution Assemblies (MSD/SMSD), the manifolds place all steam supply valves in one location. Standardizing components and centralizing their location simplifies installation while providing cost savings. You also save because routine maintenance is faster. Insulation can also be provided...and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

Cost Savings

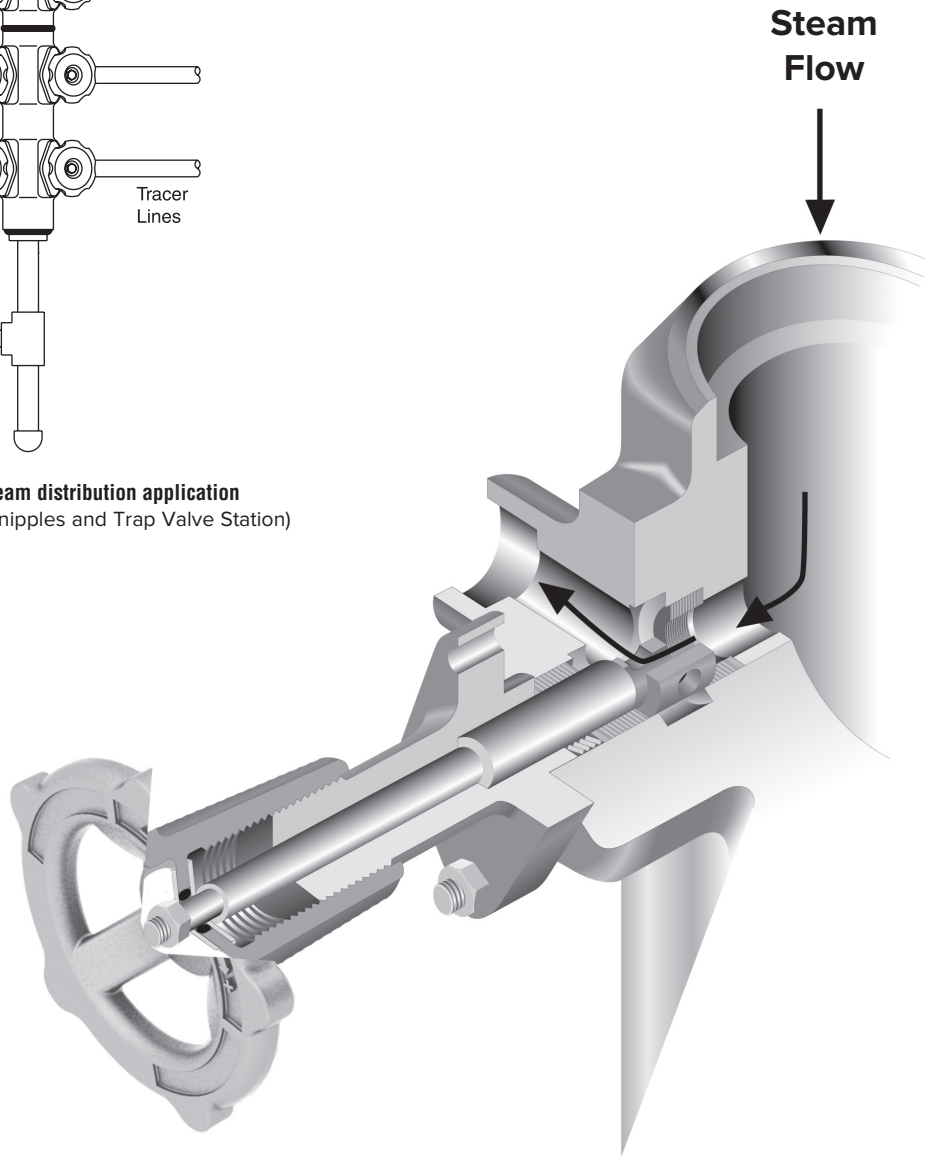
- Reduced design specification costs
- Prefabrication vs. field assembly for easy installation
- Reduced shipping and field handling costs
- Lower long-term maintenance and operating costs

Design Flexibility

- Dimensional consistency
- Space savings
- Insulation package available
- Consult factory for Glycol and compressed air applications



Typical SMSD steam distribution application
(shown with optional nipples and Trap Valve Station)



See page 13 for piston valve details

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Steam Distribution Manifold (MSD/SMSD)

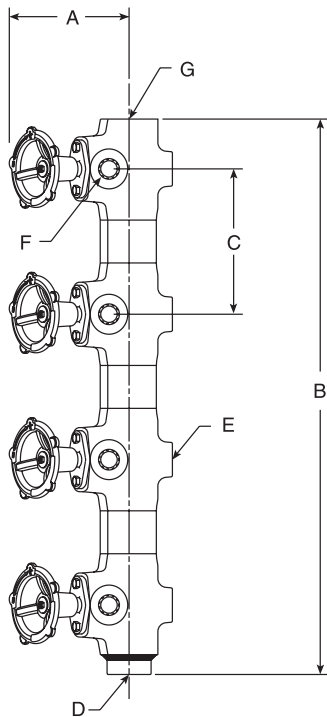
MSD/SMSD Physical Data												
Model No.	MSD Series						SMSD Series					
	MSD-04		MSD-08		MSD-12		SMSD-04		SMSD-08		SMSD-12	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
"A" (Open Position)	8	203	8	203	8	203	8	203	8	203	8	203
"B" Height	11-1/2	292	24-1/4	615	37-1/8	943	10-1/4	260	19-3/4	501	29-1/4	743
"C" \varnothing to \varnothing	6-3/8	162	6-3/8	162	6-3/8	162	4-3/4	120	4-3/4	120	4-3/4	120
"D" Blowdown Connection**	3/4 SW	20	3/4 SW	20	3/4 SW	20	3/4 SW	20	3/4 SW	20	3/4 SW	20
"E" Number of Holes for Mounting (M14)	2	2	4	4	6	6	2	2	4	4	6	6
"G" Inlet	1-1/2 SW	40	1-1/2 SW	40	1-1/2 SW	40	1-1/2 SW	40	1-1/2 SW	40	1-1/2 SW	40
"F" Outlet*	1/2	15	1/2	15	1/2	15	1/2	15	1/2	15	1/2	15
Weight, lb (kg)	20 (10)		46 (21)		67 (30)		20 (9)		40 (18)		59 (27)	
Maximum Operating Pressure	464 psi (32 bar) @ 752°F (400°C) Ratings Limited by Accessories											

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

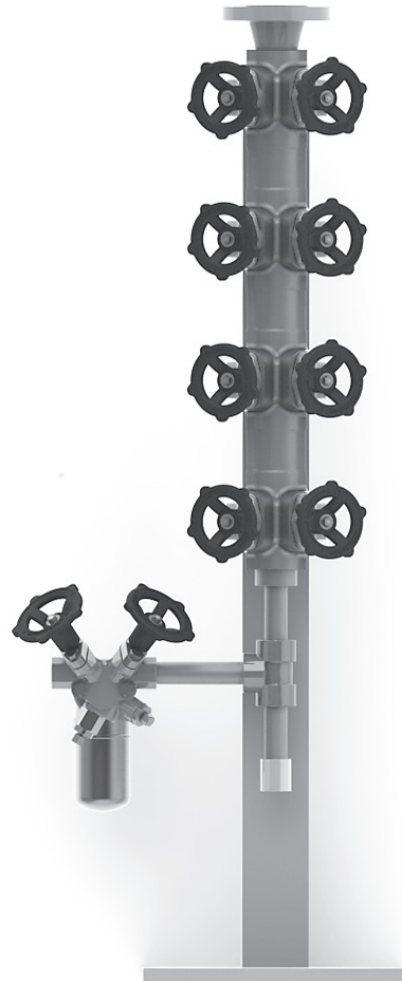
**Standard European blowdown connection is 1-1/2" SW.

All MSD and SMSD models are CE Marked according to the PED (97/23/EC). For TVS and Traps, please check specific page

MSD/SMSD List of Materials	
Name	Material
Manifold Body	ASTM A105 forged steel
	A350-LF2 forged steel
Handwheel	Ductile Iron
Bonnet	AS7M A105 forged steel
Spring Washer	Stainless steel
Bonnet, Bolts	EN150 898-1, Gr. 8.8
Piston & Stem	Stainless steel
Valve Sealing Rings	Expanded graphite & stainless steel



Steam Distribution Manifold



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

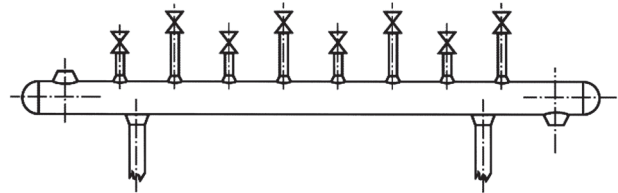
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Cost Comparison Worksheet

Standard Field Fabricated Tracer Line Steam Supply Manifold

Standard Steam Supply Installation Figure 1	Custom Steam Supply Installation	Description	Unit Cost	Total Cost
Quantity	Quantity			
Tubular Elements				
1		3" Sch. 80, 8 feet pipe		
2		3" Caps		
1		1-1/2" Branch Welding Fitting		
1		3/4" Branch Welding Fitting		
8		1/2" Branch Welding Fitting		
8		1/2" Sch. 80 Nipples		
Valves				
8		1/2" Gate or Globe		
Welding				
16		1/2" Nipple Ends		
2		3" Caps		
8		1/2" Branch Welding Fitting		
1		3/4" Branch Welding Fitting		
1		1-1/2" Branch Welding Fitting		
Support				
		Sold Steel or Concrete		
Labor				

Figure 1



Overall length approximately 100 inches (2540 mm)

— hrs. — hrs. Approximate Assembly Time

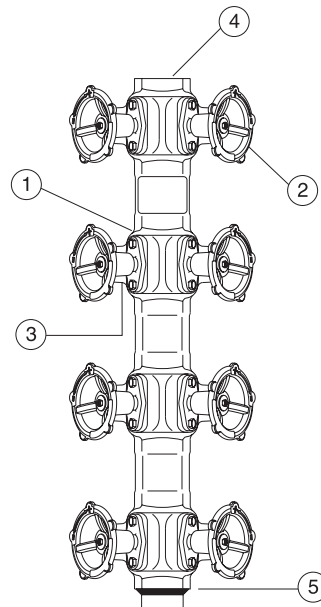
Grand Total Cost _____

Steam Distribution Manifold (SMSD) For Tracer Lines

SMSD Assembly Components

- ① Forged steel body
- ② Integral piston style valve
- ③ 1/2" NPT / SW outlet connection
- ④ 1/2" SW inlet connection
- ⑤ Mounting connections on back of manifold

Qty.	Unit Cost	Total Cost
_____	_____	\$ _____



Typical SMSD-8 8 Station Configuration

Overall length approximately 19 inches (483 mm)

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.

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

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 A105 forged steel
 A350-LF2 forged steel

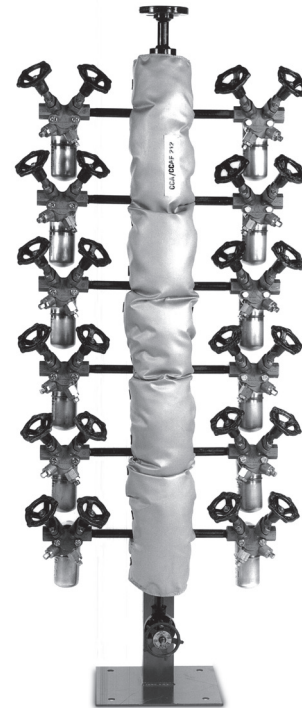
Removable Insulation Package

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

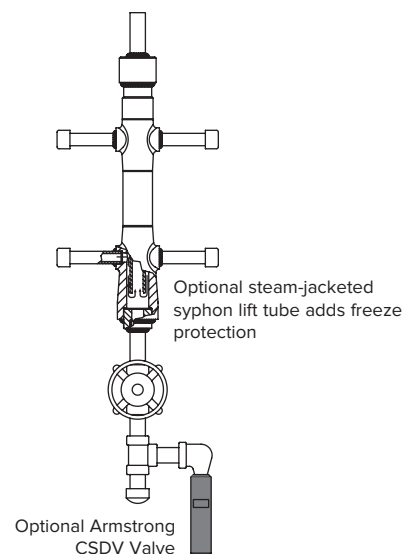
- Inexpensive
- Quick to install
- Removable for maintenance
- Reusable after maintenance
- Weatherproof
- Formed to cover all manifold elements
- Strong, durable cover
- Available to fit all manifold sizes

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.

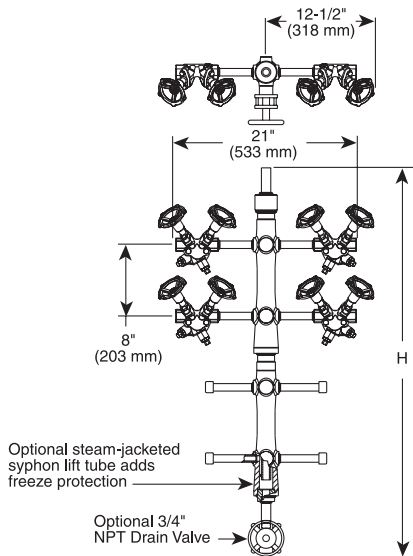


CCAF 212 Condensate Collection Assembly
(Shown with Trap Valve Station with 2000 Series Inverted Bucket all stainless steel steam traps with optional removable insulation package including nipples, drain valve and stand.)

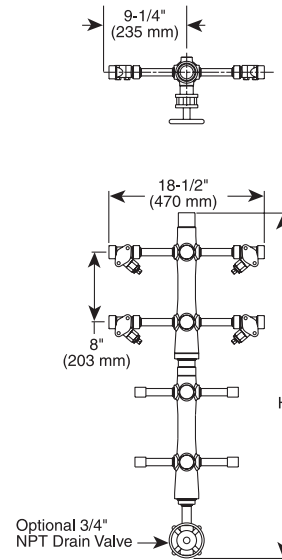


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Condensate Collection Assembly (CCA)



CCAF Condensate Collection Assembly with 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.

CCA Physical Data										
Model	CCA-204		CCA-206		CCA-208		CCA-210		CCA-212	
"H"	in	mm	in	mm	in	mm	in	mm	in	mm
	23-1/3	587	31-1/8	790	39-1/8	994	47-1/8	1,197	55-1/8	1,400
Maximum Allowable Pressure	604 psi @ 800°F (42 bar @ 427°C) Ratings Limited by Accessories									

CCAF 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	600 psi @ 800°F (41 bar @ 427°C) Ratings Limited by Accessories									

All CCA models can be CE Marked according to the PED (97/23/EC). For TVS and traps, please check specific page.

How to Order Manifold Packages

Manifold Model	Number of Take-offs per Manifold (2 per level)	Model Name	Connection Size Take-offs, NPS in (mm)	Connection Size Top NPS in (mm)	Connection Size Bottom NPS in (mm)	Trap Valve Station ³
MSD Steam Distribution Manifold	04	4	2NPT = 1/2 (15) NPTF ¹ 2SW = 1/2 (15) SW ¹ 3NPT = 3/4 (20) NPTF 3SW = 3/4 (20) NPTF	6SW = 1-1/2 (40) SW ¹ 6FW150 = 1-1/2 (40) 150# RF Flange 6FW300 = 1-1/2 (40) 300# RF Flange	3SW = 3/4 (20) SW ¹ 3NPT = 3/4 (20) NPTF 3WD = 3/4 (20) Welding Dripleg ² 3TD = 3/4 (20) Threaded Dripleg ²	TVS-4000 TVS-5000 IS-2 w/BD IS-2 Standard None
SMSD Short Steam Distribution Manifold	08 12	8 12		8FW150 = 2 (50) 150# RF Flange 8FW300 = 2 (50) 300# RF Flange		
CCA Condensate Collection Assembly	204 206 208	4 6 8		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	
CCAF Condensate Collection Freeze Assembly	210 212	10 12	3PE = 3/4 (20) Plain End ¹ 3NPT = 3/4 (20) NPTM 3FW150 = 3/4 (20) 150# Flange 3FW300 = 3/4 (20) 300# Flange	3DVS = 3/4 (20) Drain Valve SW/ NPTM		

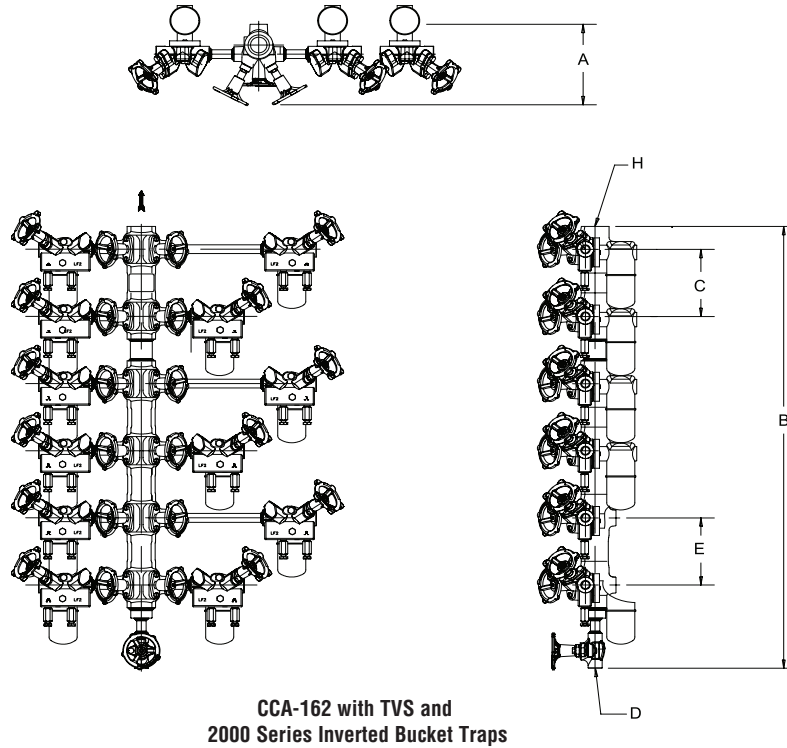
¹Armstrong stocks manifold cores (less nipples, drain valves, and trap stations) in these connections.

²Must pick this bottom connection to use trap station (TVS-4000 is standard) and trap on MSD and SMSD.

³Nipples connecting manifold to trap station can be Schedule 80 (standard) or Schedule 160 (optional).

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CCA Condensate Collection Assembly



CCA-162 with TVS and 2000 Series Inverted Bucket Traps

Options

Top Outlet:

- Socketweld
- Flanged DIN or ANSI
- Gate valve 1 1/2" SW or Flanged
- Armstrong RP-2000 double sealed valve 1-1/2" SW or Flanged

Drain:

- 1/2" or 3/4" SW reducer
- TCMS piston valve
- Drain valve

Insulation:

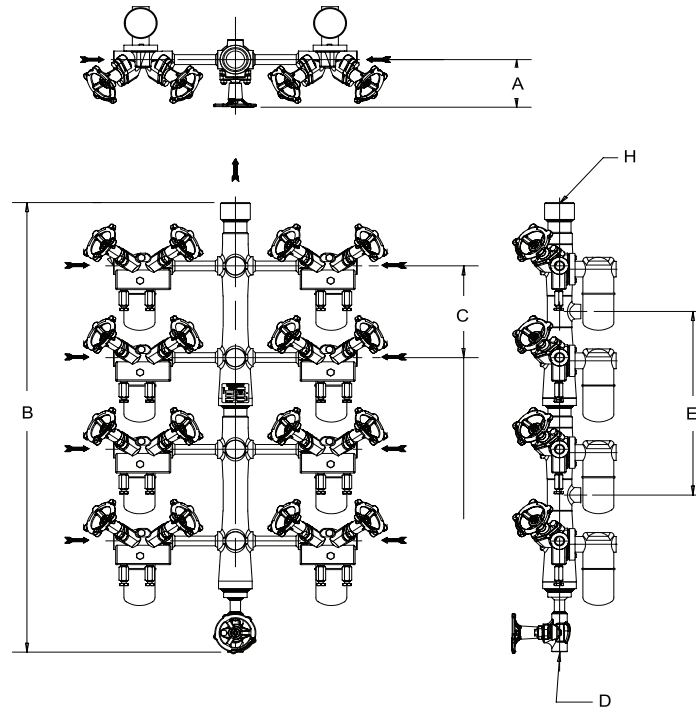
- Armstrong Insulation Jacket
- Modular or 1 piece versions
- Insulation jackets could be installed without removing the handwheels

CCA-160 Condensate Collection Assembly Dimensions and Weights							
Model No.	CCA-162-04		CCA-162-08		CCA-162-12		
	in	mm	in	mm	in	mm	
Number of Tracers	4		8		12		
"A" Valve Open	7-5/8	195	7-5/8	195	7-5/8	195	
"B" Height	16-7/16	418	29-3/16	742	41-7/8	1,065	
"C" C_L Inlet to Inlet	6-7/16	162	6-7/16	162	6-7/16	162	
"D" Connection Blowdown	1/2 SW	15	1/2 SW	15	1/2 SW	15	
"E" Mounting Holes (C_L to C_L)	162" (4,115 mm)						
"H" Outlet Connection	1-1/2 SW	40	1-1/2 SW	40	1-1/2 SW	40	
Weight - without traps, lb (kg)	53 (24)		101 (46)		150 (68)		
Maximum Operating Pressure	2010 Trap 200 psig (14 bar)						
	2011 Trap 400 psig (28 bar)						
	2022 Trap 600 psig (41 bar)						

All CCA-160 models are CE Marked according to the PED (97/23/EC) depending on the connection type rating. For TVS and traps, please check the specific page.

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CCA Condensate Collection Assembly



CCA-203-08 with TVS and
2000 Series Inverted Bucket Traps

Options

Top Outlet:

- Socketweld
- Flanged ANSI
- Gate valve 1-1/2" SW or Flanged
- Armstrong RP-2000 double sealed valve
1-1/2" SW or Flanged

Drain:

- 1/2" or 3/4" SW reducer
- TCMS piston valve
- Drain valve

Insulation:

- Armstrong Insulation Jacket
- Modular or 1 piece versions
- Insulation jackets could be installed without removing the handwheels

CCA-203 Condensate Collection Assembly Dimensions and Weights

Model No.	CCA-203-04		CCA-203-06		CCA-203-08		CCA-203-10		CCA-203-12	
	in	mm	in	mm	in	mm	in	mm	in	mm
Number of Tracers	4		6		8		10		12	
"A" Valve Open	4-11/16	120	4-11/16	120	4-11/16	120	4-11/16	120	4-11/16	120
"B" Height	23-3/16	590	31-7/16	797	39-3/16	996	47-3/16	1,199	55-3/16	1,404
"C" \varnothing Inlet to Inlet	8	203	8	203	8	203	8	203	8	203
"D" Connection Blowdown	1/2 SW	15	1/2 SW	15	1/2 SW	15	1/2 SW	15	1/2 SW	15
"E" Mounting Holes (\varnothing to \varnothing)	203" (5,156 mm)									
"H" Outlet Connection	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
Weight - without traps, lb (kg)	64 (29)		95 (43)		122 (55)		153 (69)		182 (82)	
Maximum Operating Pressure	2010 Trap 200 psig (14 bar)									
	2011 Trap 400 psig (28 bar)									
	2022 Trap 600 psig (41 bar)									

All CCA models are CE Marked according to the PED (97/23/EC) depending on the connection type rating. For TVS and traps, please check specific page.

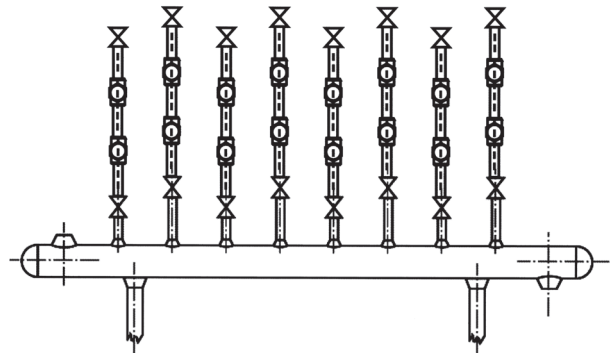
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Cost Comparison Worksheet

Standard Field Fabricated Condensate Collection Manifold

Standard Cond. Coll. Installation Figure 1	Custom Cond. Coll. Installation	Description	Unit Cost	Total Cost
Quantity	Quantity			
Tubular Elements				
1		3" Sch. 80, 8 feet pipe		
2		3" Caps		
1		1-1/2" Branch Welding Fitting		
1		3/4" Branch Welding Fitting		
8		1/2" Branch Welding Fitting		
32		1/2" Sch. 80 Nipples		
Valves				
16		1/2" SW Gate or Globe		
8		1/2" Steam Traps		
8		1/2" Line Strainers		
Welding				
64		1/2" Nipple Ends		
2		3" Caps		
8		1/2" Branch Welding Fitting		
1		3/4" Branch Welding Fitting		
1		1-1/2" Branch Welding Fitting		
Support				
Sold Steel or Concrete				
Labor				

Figure 1

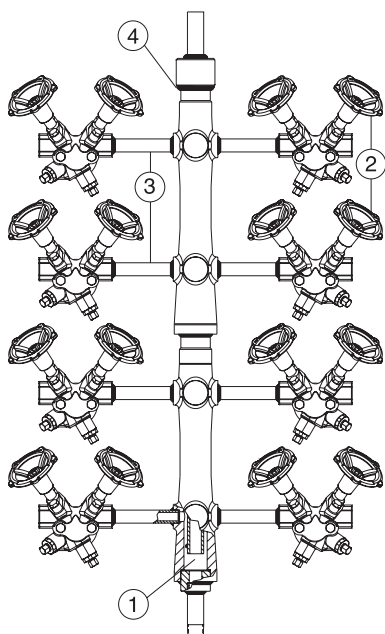


Overall length approximately 100 inches (2540 mm)

— hrs. — hrs. Approximate Assembly Time

Grand Total Cost _____

Condensate Collection Manifold (CCA)



Typical CCA-08 8 Station

CCA Assembly Components

- ① Forged steel body
- ② (8) Trap Valve Stations. Steam traps that can be connected to the TVS include Armstrong inverted bucket, disc, thermostatic, thermostatic wafer or bimetallic steam traps or any other manufacturer's 2-bolt steam trap
- ③ (8) 1/2" Sch. 80 nipples
- ④ Welding / assembly

Qty.	Unit Cost	Total Cost
_____	_____	_____
		\$ _____

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.

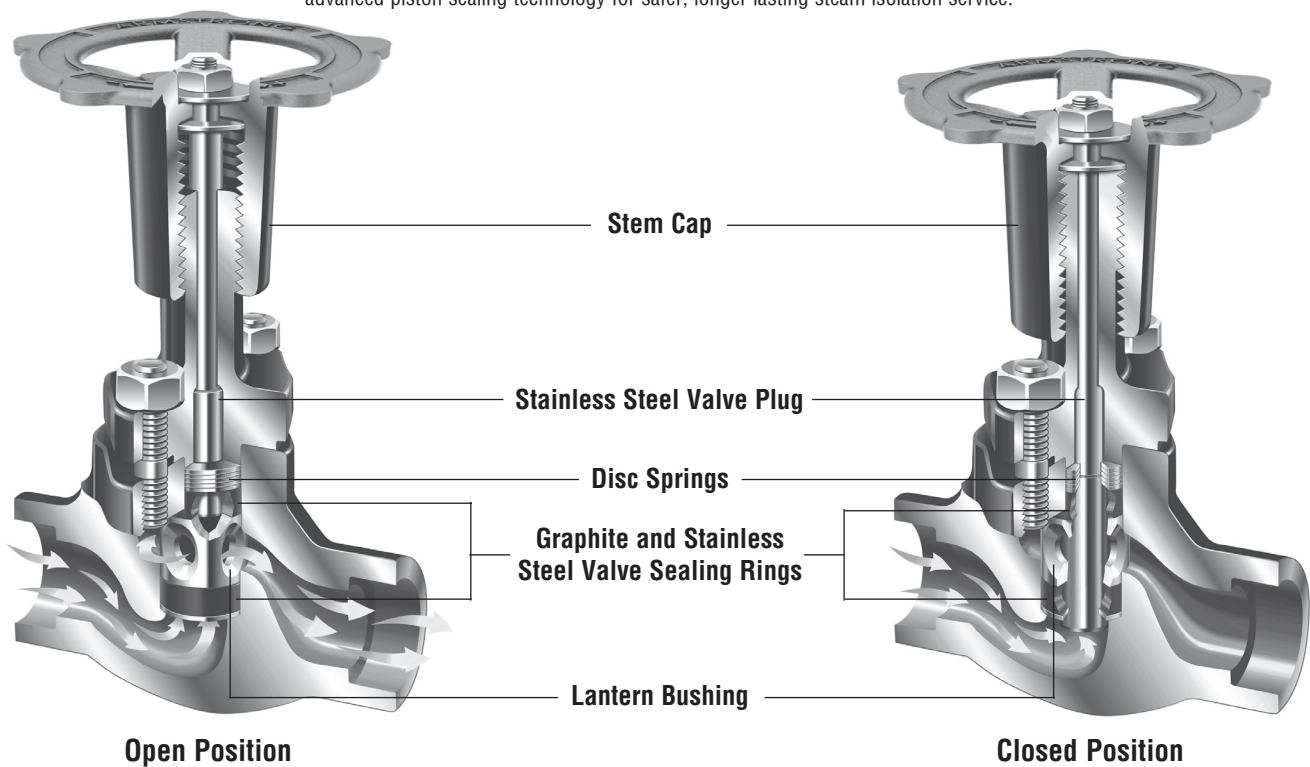
All types of valves—plug valves, gate valves, piston valves and even ball valves—have been summoned for duty in steam service. Due to its excellent sealing characteristics in steam service, and because it has no gland packing, the piston valve is frequently selected for steam systems.

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 Trap Valve Stations (TVS) incorporate advanced piston sealing technology for safer, longer lasting steam isolation service.

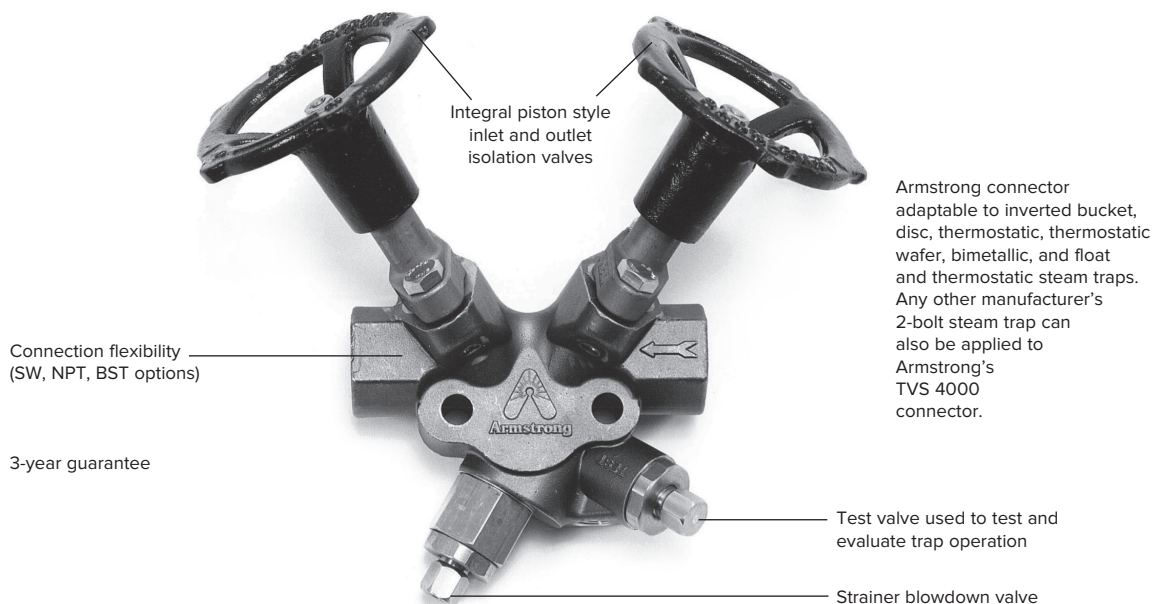


- **Dual sealing action.** The piston valve is a seatless valve that includes two graphite and stainless steel valve sealing rings that seal the stem and function as a seat. This combination provides long-term protection against leaks to the atmosphere and downstream piping.
- **Self-cleaning action.**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

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

TVS 4000 Trap Valve Station



Description

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

Maximum Operating Conditions

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

Materials—TVS 4000 Connector

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

Isolation Valve Components

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

Weight

6-1/2 lb (2.9 kg)

Features

- Reduces installation and maintenance costs, and leak points.
- Incorporates integral test and strainer blowdown valves.
- Accommodates the AIM™ continuous monitoring technology
- Reduces engineering design time
- Three year warranty
- Easy, in-line, repairability with maximum safety. Positive isolation.
- Installation versatility. The 2-bolt feature accepts any manufacturer's steam trap
- Simplified steam trap testing and replacement.

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

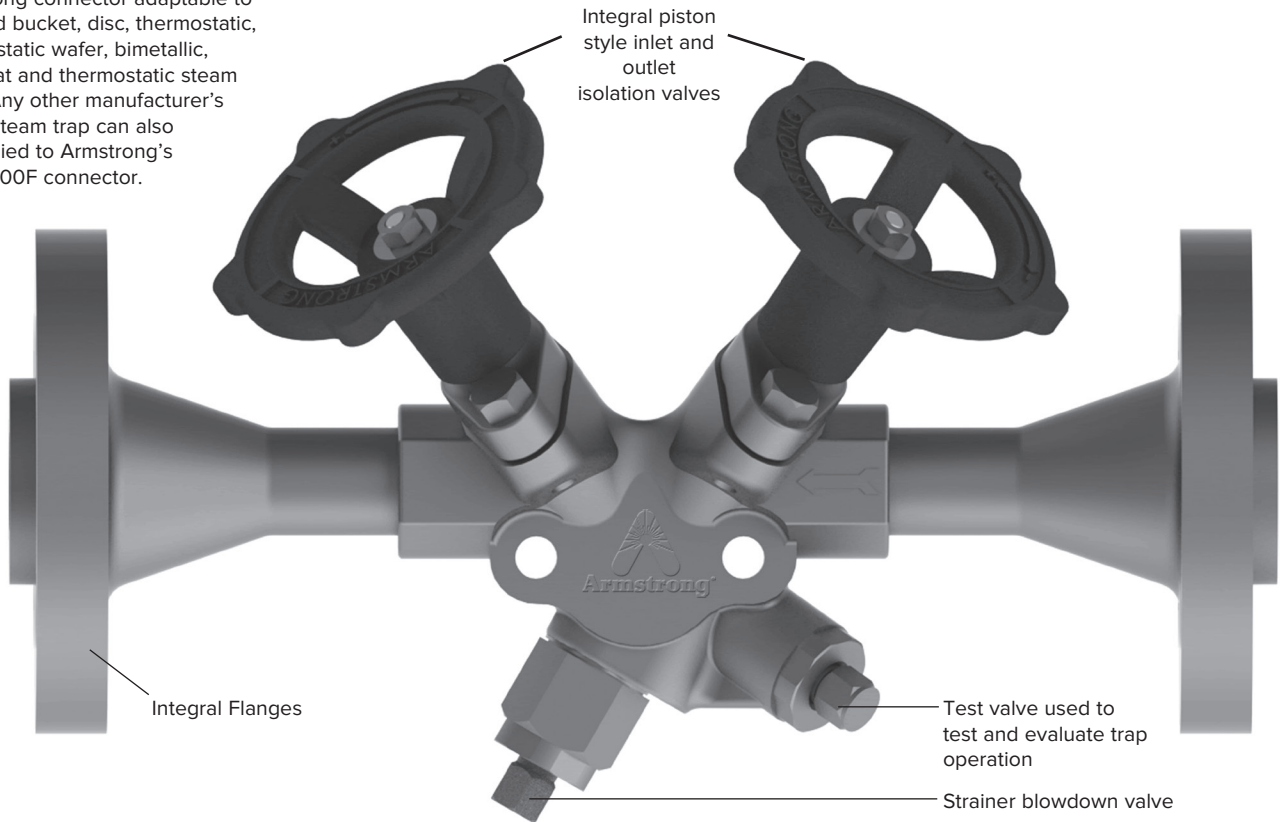
*Consult factory.

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 4000F Series Stainless Steel Trap Valve Station

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



Description

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

Maximum Operating Conditions

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

Materials—TVS 4000F Connector

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

Isolation Valve Components

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

Weight

14 lb (6.4 kg)

How to Order

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

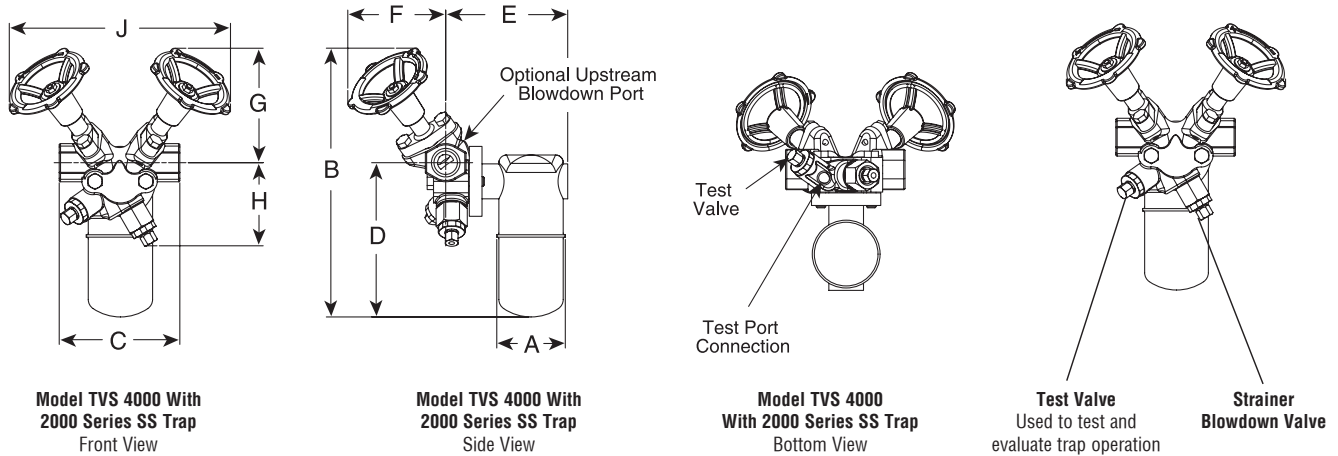
Features

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

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 bar)...Capacities to 1,300 lb/hr (590 kg/hr) (Using 2000 Series Inverted Bucket Steam Traps)



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. 8.8 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:	Hardened chrome steel—17-4PH

For a fully detailed certified drawing, refer to CD #1232.

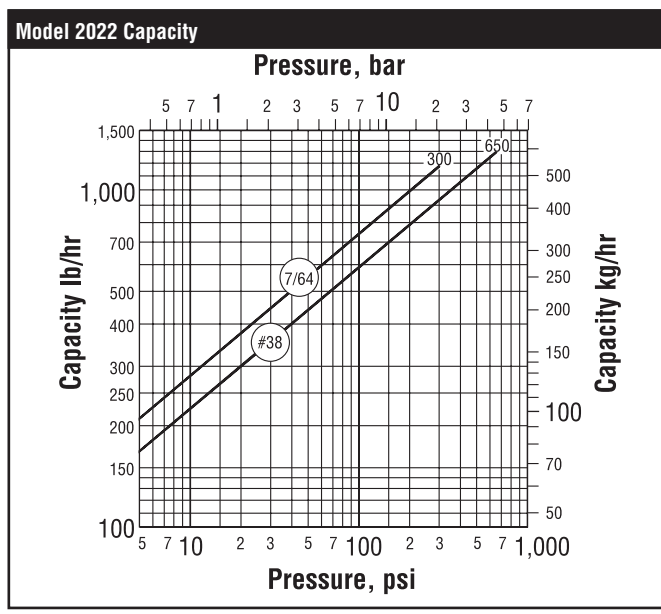
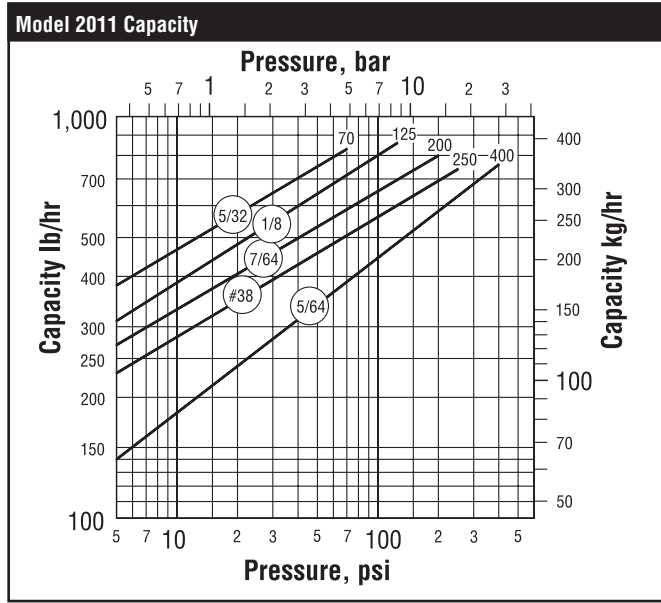
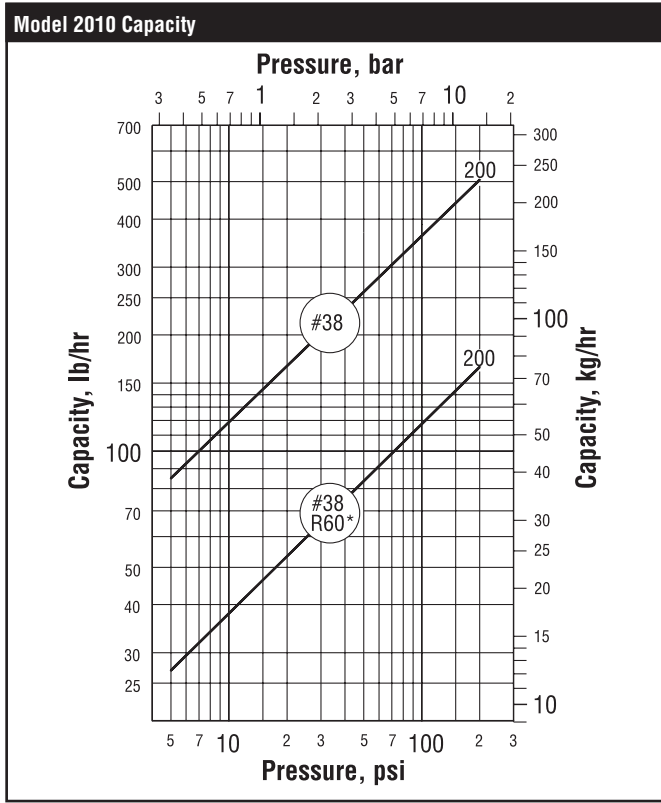
TVS 4000 Series With 2000 Series Inverted Bucket Steam Trap						
Model No.	2010		2011		2022	
	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4	15, 20	1/2, 3/4	15, 20
"A" Trap Diameter	2-11/16	68	2-11/16	68	3-7/8	98
"B" Height (Valve Open)	8	203	10-1/2	268	12-1/2	318
"C" Face to Face	4-3/4	120	4-3/4	120	4-3/4	120
"D" Connection \varnothing to Bottom	4-3/4	120	6	154	8	203
"E" Connection \varnothing to Outside of Trap	4-1/2	114	4-13/16	122	5-7/8	149
"F" Connection \varnothing to Front of Handwheel (Valve Open)	3-1/2	89	3-7/8	98	3-7/8	98
"G" Connection \varnothing to Top of Handwheel (Valve Open)	3-1/4	83	4-1/2	114	4-1/2	114
"H" Connection \varnothing to Bottom of Connector	1-7/8	47	3-1/4	83	3-1/4	83
"J" Width Across Handwheels (Valve Open)	9-1/4	235	8-3/4	222	8-3/4	222
Test Port Connection	1/4 NPT	6	1/4 NPT	6	1/4 NPT	6
Weight lb (kg)	9	4	9-1/2	4.3	12	5.4
Maximum Operating Pressure (Trap)	200 psi (14 bar)		400 psi (28 bar)		650 psig (45 bar)	
Maximum Allowable Pressure (Trap)	400 psi (28 bar) @ 750°F (399°C)				650 psig @ 600°F (45 bar @ 315°C)	

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 bar)...Capacities to 1,300 lb/hr (590 kg/hr) (Using 2000 Series Inverted Bucket Steam Traps)



*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

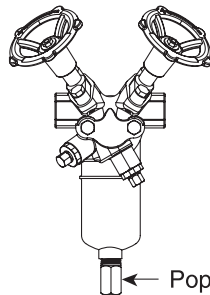
Insu-Pak™

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 bar) for Models 2011 and 2022.



← Pop Drain

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

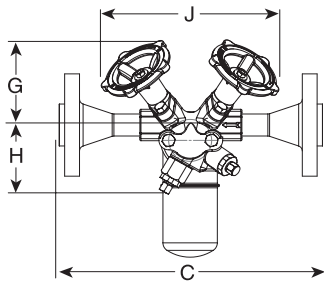
*Consult factory.

U.S. Patent 6,467,503

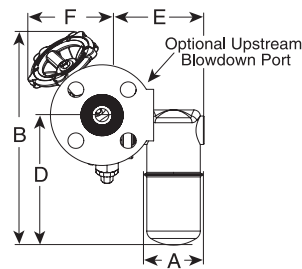
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

TVS 4000F Series Stainless Steel Trap Valve Station

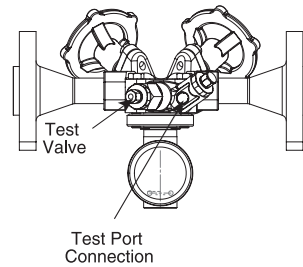
For Pressures to 650 psig (45 bar)...Capacities to 1,300 lb/hr (590 kg/hr) (Using 2000 Series Inverted Bucket Steam Traps)



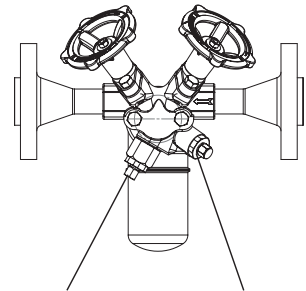
Model TVS 4000F with 2000 Series SS Trap
Front View



Model TVS 4000F with 2000 Series SS Trap
Side View



Model TVS 4000F with 2000 Series SS Trap
Bottom View



Strainer Blowdown Valve
Test Valve
Used to test and evaluate trap operation

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 4000F 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. 8.8 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	Hardened chrome steel—17-4PH

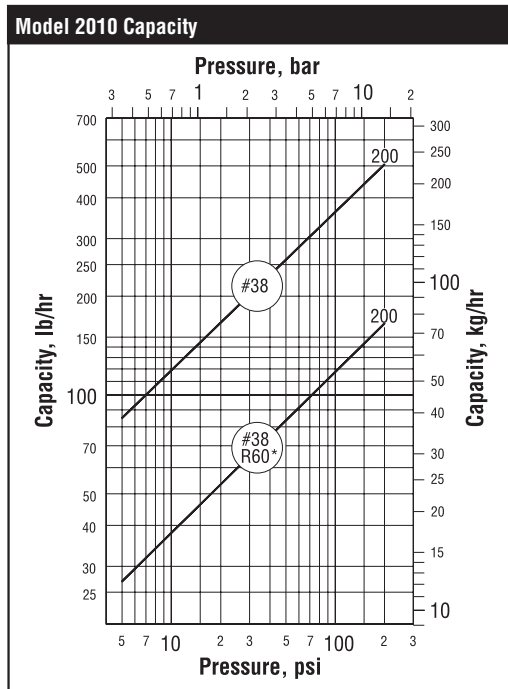
For a fully detailed certified drawing, refer to CD #1232.

TVS 4000 Series With 2000 Series Inverted Bucket Steam Trap						
Model No.	2010		2011		2022	
	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	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	12	305	12	305	12	305
"D" Connection \varnothing to Bottom	4-3/4	120	6	154	8	203
"E" Connection \varnothing to Outside of Trap	4-1/2	114	4-13/16	122	5-7/8	149
"F" Connection \varnothing to Front of Handwheel (Valve Open)	3-1/2	89	3-7/8	98	3-7/8	98
"G" Connection \varnothing to Top of Handwheel (Valve Open)	3-1/4	83	4-1/2	114	4-1/2	114
"H" Connection \varnothing to Bottom of Connector	1-7/8	47	3-1/4	83	3-1/4	83
"J" Width Across Handwheels (Valve Open)	9-1/4	235	8-3/4	222	8-3/4	222
Test Port Connection	1/4 NPT	6	1/4 NPT	6	1/4 NPT	6
Weight lb (kg)	16	7.3	16.5	7.5	19	8.6
Maximum Operating Pressure (Trap)	200 psi (14 bar)		400 psi (28 bar)		650 psig (45 bar)	
Maximum Allowable Pressure (Trap)	400 psi (28 bar) @ 800°F (427°C)				650 psig @ 600°F (45 bar @ 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 4000F Series Stainless Steel Trap Valve Station

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



Specification

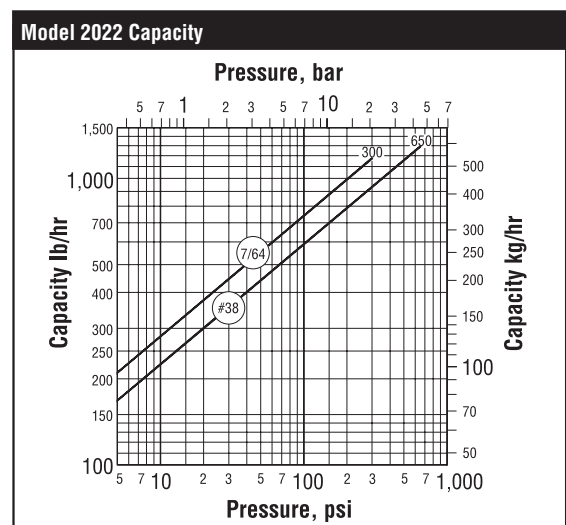
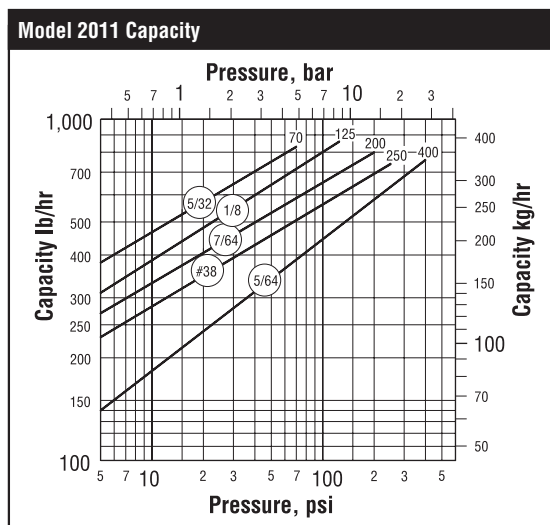
The TVS (Trap Valve Station) connector body shall be of ASTM A351 Gr. CF8M stainless steel. The body and connections of the assembly shall be of single piece construction, free of welds and other potential leak paths, except for integral valves. All other wetted parts shall be of stainless steel except the valve sealing rings which shall be a mixture of graphite and stainless steel. The Assembly shall have [150# 300# or 600# RF] end connections as specified, and a 12" [305mm] face to face dimension.

The TVS shall incorporate within the connector body an inlet and outlet flange, inlet and outlet valves, test valve, strainer and strainer blow down valve, which can also serve as a bleed valve. The integral inlet and outlet valves shall be of piston style using graphite and stainless steel valve sealing rings and stainless steel lantern bushing. The test valve shall be a full port needle style valve of stainless steel. The blow down valve shall also be a needle style of stainless steel. The integral strainer shall be a full line size "Y" type.

The TVS shall be able to accommodate stainless steel inverted bucket steam traps, disc traps or thermostatic traps by using two bolts to fasten the steam trap of choice to the TVS connector block.

The TVS shall be able to perform the functions of isolation of inlet and outlet of the steam trap, test the trap through a full port valve, provide a full line strainer ahead of the trap and provide a blow down valve on the strainer. The blow down valve can also function as a bleed valve to depressurize the steam trap prior to removal of the steam trap from the connector.

*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™

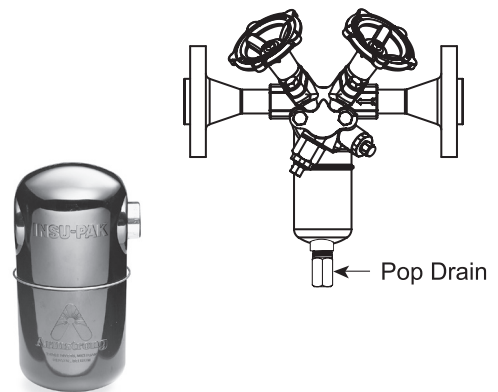
Now you can insulate the in-line traps in your plant without complicating regular trap maintenance. Insu-Pak, a simple reusable insulation package, cuts the time and cost of in-field installation because it goes on in a snap. And it comes off just as easily. The Insu-Pak can prevent trap freeze-up when 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 bar) for Models 2011 and 2022.

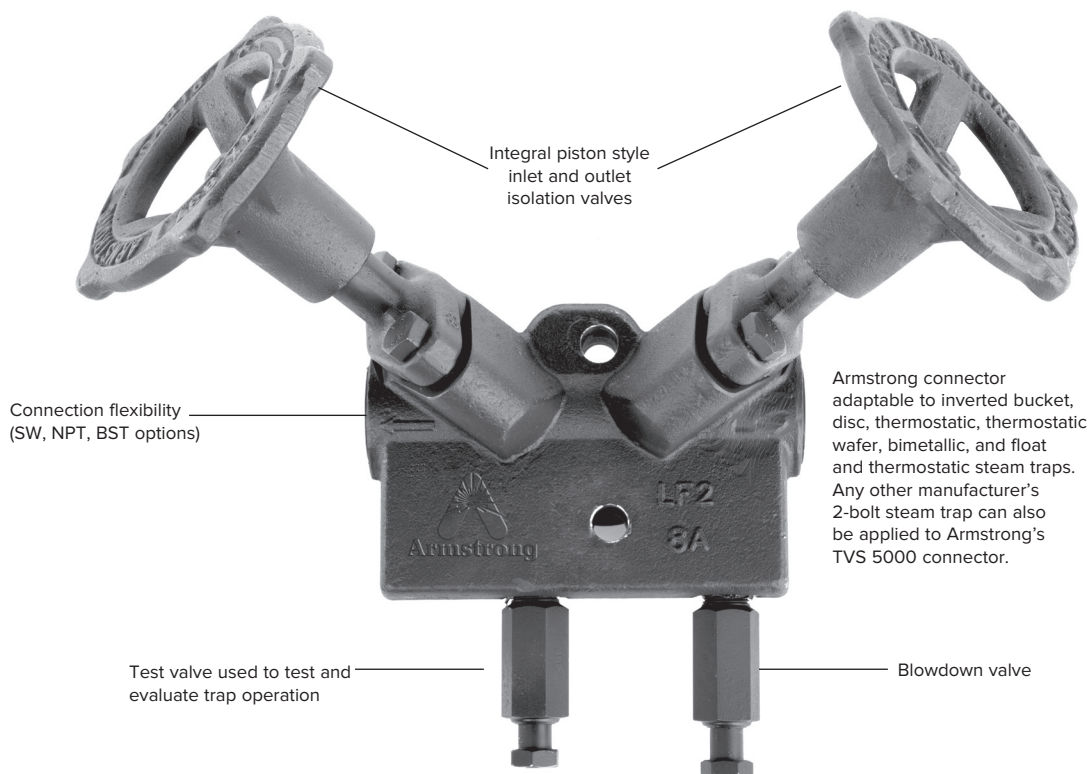
Probe Connections are available for trap monitoring on Models 2011 and 2022.

Test Port Plug is available.



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

TVS 5000 Trap Valve Station



Armstrong connector adaptable to inverted bucket, disc, thermostatic, thermostatic wafer, bimetallic, and float and thermostatic steam traps. Any other manufacturer's 2-bolt steam trap can also be applied to Armstrong's TVS 5000 connector.

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 bar @ 315°C)

Materials—TVS 5000 Connector

Connector: ASTM A350 LF2
Test valve: Stainless steel
Blowdown valve: Stainless steel

Isolation Valve Components

Valve sealing rings: Graphite and stainless steel
Bonnet: ASTM A350 LF2
Bolts: EN ISO 898.1,Gr.8.8
Valve plug: Stainless steel
Lantern bushings: Stainless steel
Valve washer: Stainless steel
Disc springs: Stainless steel
Nut: Stainless steel
Handwheel: Ductile iron

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 reparability 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.

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

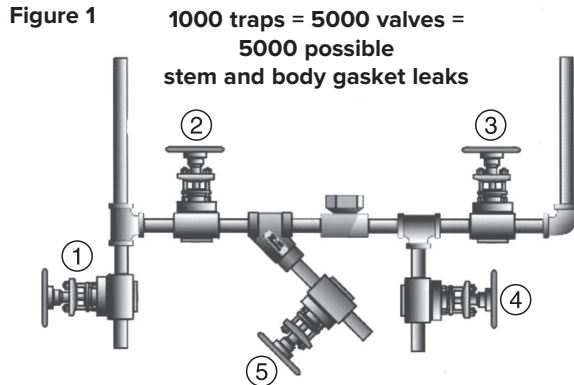
Cost Comparison Worksheet

Single Trap Installation - Standard Field Fabricated Installation

Standard Trap Installation Figure 1	Custom Standard Trap Installation	Description	Unit Cost	Total Cost
Quantity	Quantity			
Assembly Parts and Labor				
5		1/2" 600# Rated Globe or Gate		
8		1/2" Sch. 80 Nipples		
2		1/2" Line "Tee"		
1		1/2" Elbow		
1		1/2" Line Strainer		
1		1/2" Steam Trap		
16		1/2" Welds		

____ hrs. ____ hrs. Approximate Assembly Time

Grand Total Cost _____



Overall length greater than 30 inches (762 cm)

Valve Functions

- ① Trap inlet line start-up blowdown valve (visual)
- ② Trap inlet isolation valve
- ③ Trap outlet isolation valve
- ④ Return line blowdown and test valve (visual)
- ⑤ Strainer blowdown valve (visual)

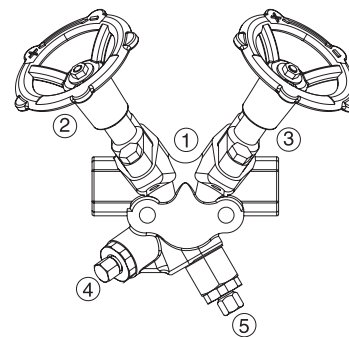
Gate and globe valves have exposed rising stems which can corrode and gather dirt which tears stem packing and causes steam leaks.

Armstrong Compact Trap Valve Station

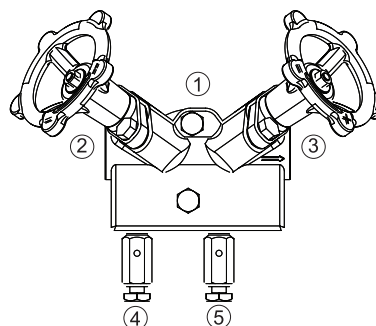
TVS Assembly Components

- ① Trap valve station
- ② Trap inlet piston style isolation valve
- ③ Trap outlet piston style isolation valve
- ④ Full port needle style test valve
- ⑤ Strainer with blowdown valve

* Adaptable to Armstrong 2000 series inverted bucket, disc, thermostatic, thermostatic wafer, bimetallic or float and thermostatic steam traps or any other manufacturer's 2-bolt steam trap.



TVS-4000 Trap Valve Station



TVS-5000 Trap Valve Station

Piston valve has enclosed non-rotating rising stem which protects the stem from corrosion and dirt.

Qty.	Unit Cost	Total Cost
_____	_____	TVS 4000
		\$ _____

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 bar @ 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

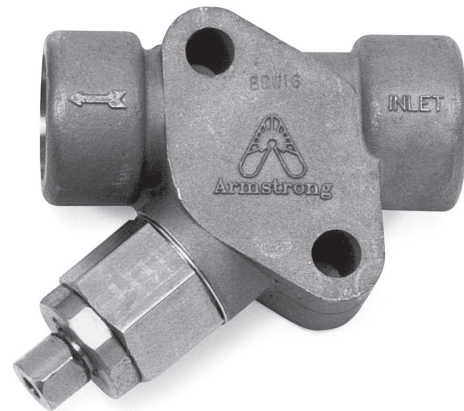
Connector Body: All stainless steel
Strainer: 20 x 20 Mesh stainless steel
Retainer: Stainless steel

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 bar @ 315°C)

Connector Styles

- Standard 360°

Connection Sizes

- 1/2", 3/4"

Connection Types

Screwed NPT and BSPT
Socketweld
Flanged (consult factory)

Material

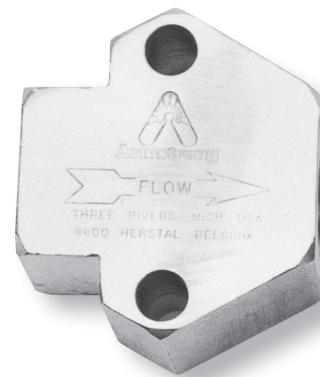
Connector Body: Stainless steel

Weight

1-1/2 lbs (0.70 kg)

How to Order Standard 360° Stainless Steel Connector Specify:

- Connection size
- Connection type



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

For Pressures to 650 psig (45 bar)...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, tamper proof package
- A compact, lightweight trap
- The ability to withstand freeze-ups without damage
- Exceptional corrosion resistance
- A five-year guarantee against defective materials, defective workmanship
- Up to 400 psi saturated steam

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 2011:	400 psig @ 800°F (28 bar @ 427°C)
Model 2022:	650 psig @ 600°F (45 bar @ 315°C)
	627 psig @ 700°F (43 bar @ 371°C)
	604 psig @ 800°F (41.6 bar @ 427°C)

Maximum operating pressure:

Model 2011:	400 psig (28 bar)
Model 2022:	650 psig (45 bar)

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
Connector body (std & IS-2):	Stainless steel—304

Options

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

360° Connector Styles

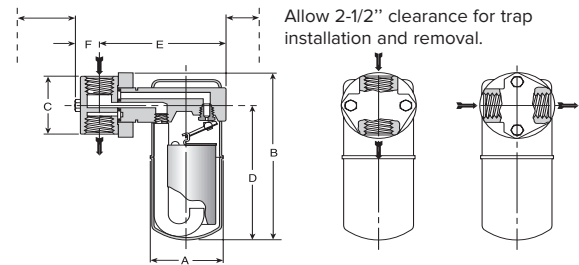
- Standard connector
- IS-2 connector with integral strainer
- IS-2 connector with integral strainer with blowdown valve

How to Order

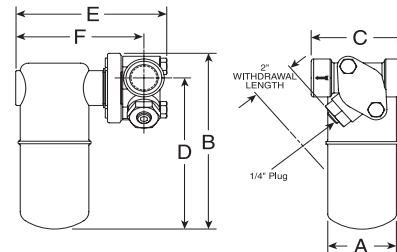
Specify:

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

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



Model 2011 Trap With Standard Connector



Model 2022 With IS-2 Connector

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

2000 Series Traps With IS-2 Integral Strainer Connector								
Model No.	2011				2022			
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1	25	1/2, 3/4	15, 20	1	25
"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)	3-1/2	89	4	102	3-1/2	89	4	102
"D" (Bottom to ϕ)	6	152	6	152	7-3/4	197	7-3/4	197
"E" (Outside to Bolt)	5-1/2	140	5-11/16	144	6-11/16	170	6-7/8	175
"F" (ϕ to Outside)	4-5/8	117	4-13/16	122	5-13/16	148	6	152
Weight lb (kg)	4-1/2 (2.0)		5-1/2 (2.5)		7 (3)			

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

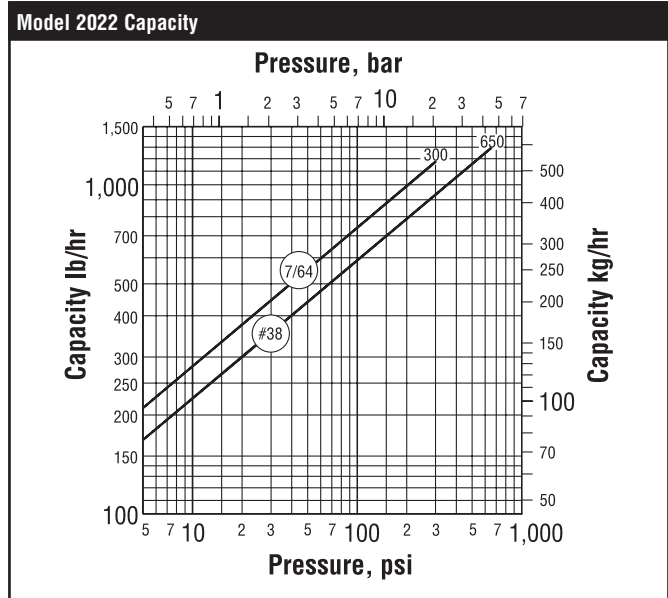
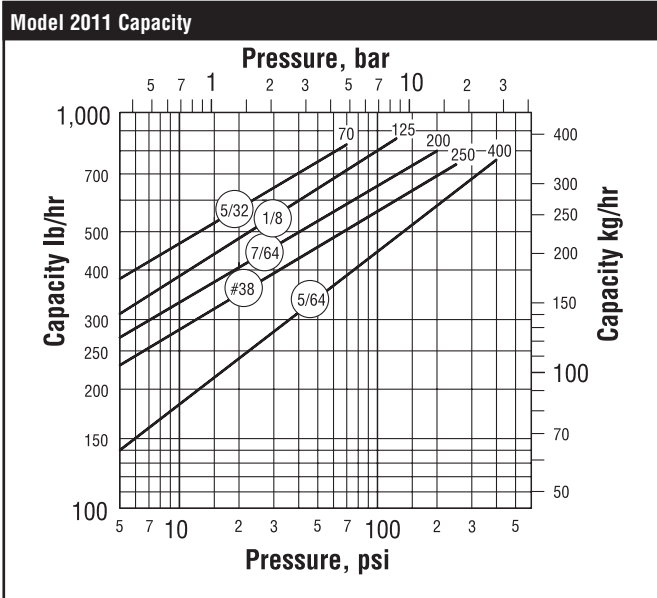
All models comply with the article 3.3 of the PED (97/23/EC).

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

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



Connectors



TVS 4000 Trap Valve Station with 2011 Inverted Bucket Steam Trap



TVS 5000 Trap Valve Station with 2011 Inverted Bucket Steam Trap



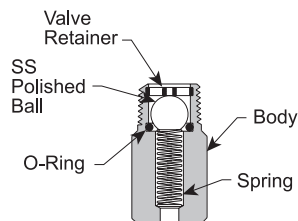
IS-2 Connector with 2011 Inverted Bucket Steam Trap



Standard Connector with 2011 Inverted Bucket Steam Trap

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 bar)
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 the Model 2011 trap.

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 bar)... 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

Maximum Operating Conditions

Maximum allowable pressure

Model 1811N 400 psig @ 800°F (28 bar @ 427°C)

Model 2011N 400 psig @ 800°F (28 bar @ 427°C)

Maximum operating pressure:

Model 1811N 200 psig @ 450°F (14 bar @ 232°C)

Model 2011N 200 psig @ 450°F (14 bar @ 232°C)

Materials

Body: ASTM A240 Grade 304L

Internals: All stainless steel

Valve: Hardened chrome 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

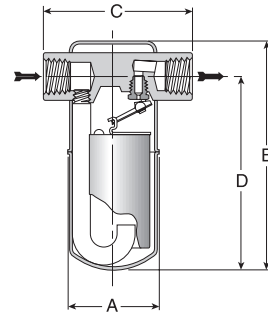
- 1/2" or 3/4", NPT or SW

Specification

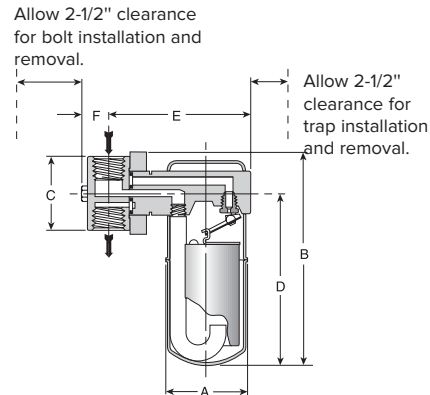
Inverted bucket steam trap. Stainless steel construction, stainless steel valve with non-metallic seats, freeze resistant, continuous air venting.

How to order

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



Model 1811N Trap



Model 2011N Trap With Standard Connector

1811N Dimensions and Weight

Model No.	1811N			
	in	mm	in	mm
Pipe Connections	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 \varnothing Inlet)	5-7/16	138	5-9/16	141
Weight lb (kg)	2 (0.9)		2-3/8 (1.1)	

2011N Dimensions and Weight

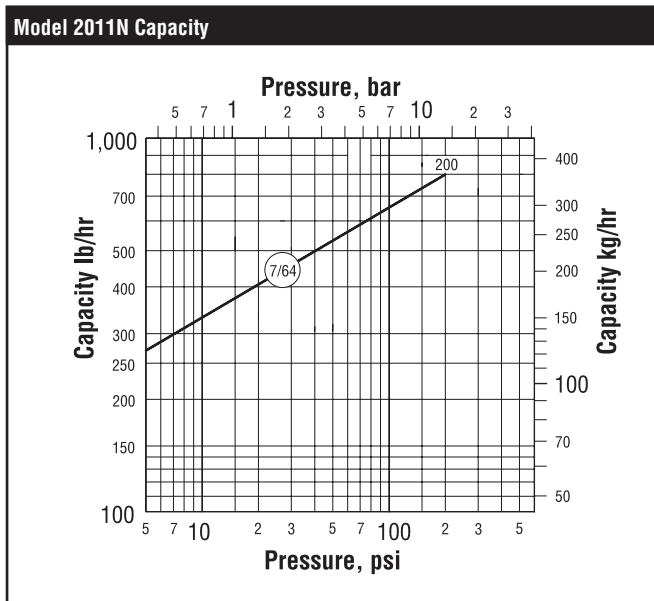
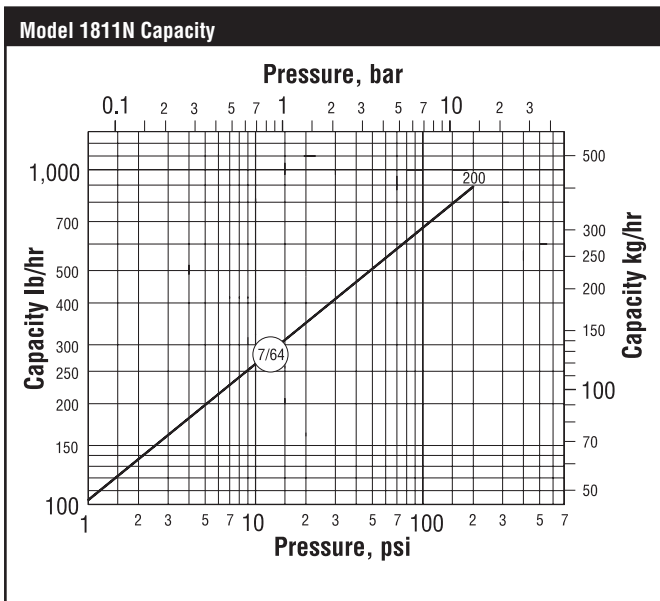
Model No.	2011	
	in	mm
Pipe Connections	1/2, 3/4	15, 20
"A" (Diameter)	2-11/16	68
"B" (Height)	6-15/16	176
"C" (Face to Face)	2-3/8	60
"D" (Bottom to \varnothing)	5-9/16	141
"E" (\varnothing to Outside)	4-9/16	115
"F" (\varnothing to Bolt)	1	25
Weight lb (kg)	4-1/2 (2.0)	

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 bar)... capabilities to 900 lbs/hr (410 kg/hr)

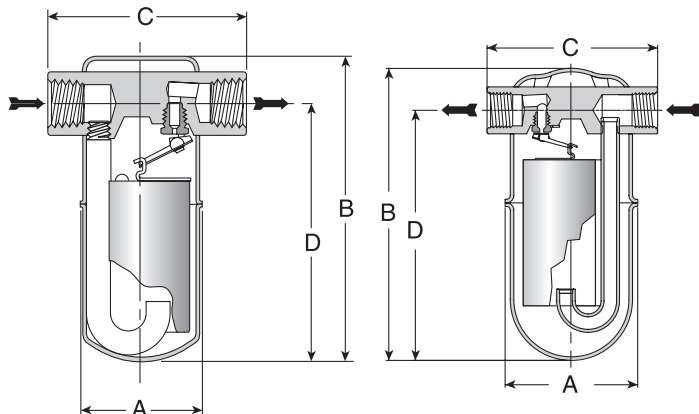


Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

1800 Series Inverted Bucket Steam Trap

All Stainless Steel for Horizontal Installation

For Pressures to 650 psig (45 bar)...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 1811:	400 psig @ 800°F (28 bar @ 427°C)
Model 1822:	650 psig @ 600°F (45 bar @ 315°C) 627 psig @ 700°F (43 bar @ 371°C) 604 psig @ 800°F (41.6 bar @ 427°C)

Maximum operating pressure:

Model 1811:	400 psig (28 bar)
Model 1822:	650 psig @ 600°F (45 bar @ 316°C)

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

Options

- Insu-Pak™ insulation for Model 1811
- Stainless steel pop drain for Models 1811/1822
- Probe connection for Models 1811/1822
- Restricted orifice
- Wiggle wire

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.	1811				1822			
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2	15	3/4	20	1/2, 3/4	15, 20	1	25
“A” (Diameter)	2-11/16	68	2-11/16	68	3-7/8	99	3-7/8	99
“B” (Height)	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	5	127	5	127
“D” (Bottom to \varnothing Inlet)	5-7/16	138	5-9/16	141	7-3/8	187	7-1/8	181
Weight lb (kg)	2 (0.9)		2-3/8 (1.1)		7 (3)			

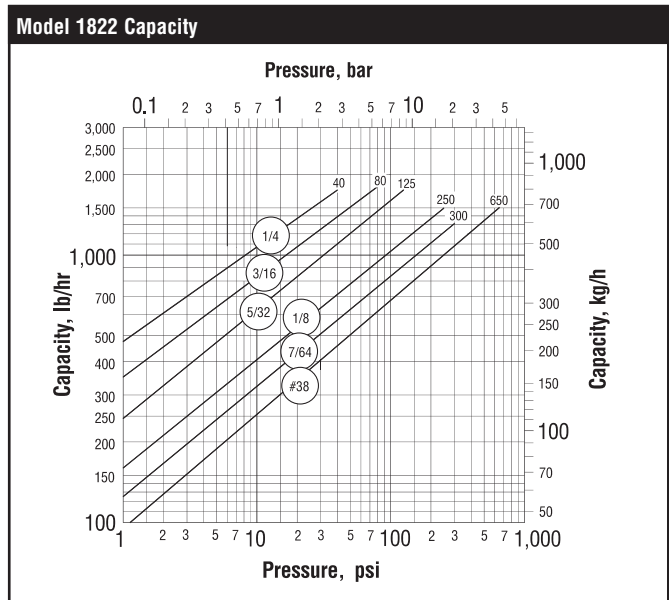
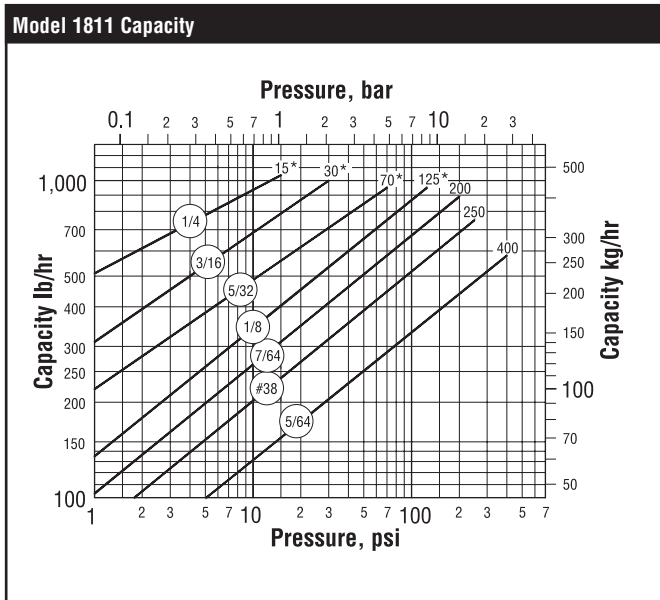
All models comply with the article 3.3 of the PED (97/23/EC).

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

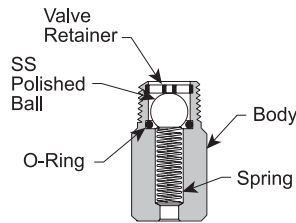
For Pressures to 650 psig (45 bar)...Capacities to 1,802 lb/hr (817 kg/hr)



*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 bar)
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. 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.

1000 Series Inverted Bucket Steam Trap

All Stainless Steel for Vertical Installation

For Pressures to 650 psig (45 bar)...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 is guaranteed for three years.

Maximum Operating Conditions

Maximum allowable pressure (vessel design):

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

Maximum operating pressure:

Model 1010:	150 psig (10 bar)
Model 1011:	400 psig (28 bar)
Model 1022:	650 psig @ 600°F (45 bar @ 316°C)
Model 1013:	450 psig (31 bar)

Connections

Screwed NPT and BSPT
Socketweld
Flanged

Materials

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

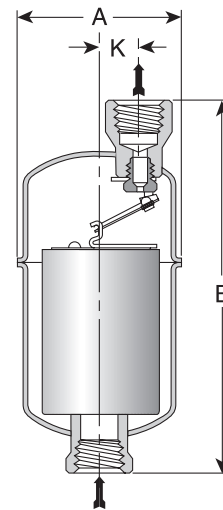
Options

- Stainless steel internal check valve
- Thermic vent bucket 250 psig (17 bar) maximum; for Model 1022 15 psig (1 bar) maximum
- Wiggle wire

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 1010 Trap

1000 Series Traps								
Model No.	1010		1011		1022		1013*	
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4	15, 20	1/2, 3/4	15, 20	1/2, 3/4	15, 20
"A" (Diameter)	2-3/4	70	2-3/4	70	3-7/8	98	4-1/2	114
"B" (Height)	6-1/16	154	7-1/4	184	8-13/16	224	11-3/8	289
"K" (C _L Inlet to C _L Outlet)	9/16	14.3	9/16	14.3	3/4	19	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)	

*Model 1013 only available with screwed connections.

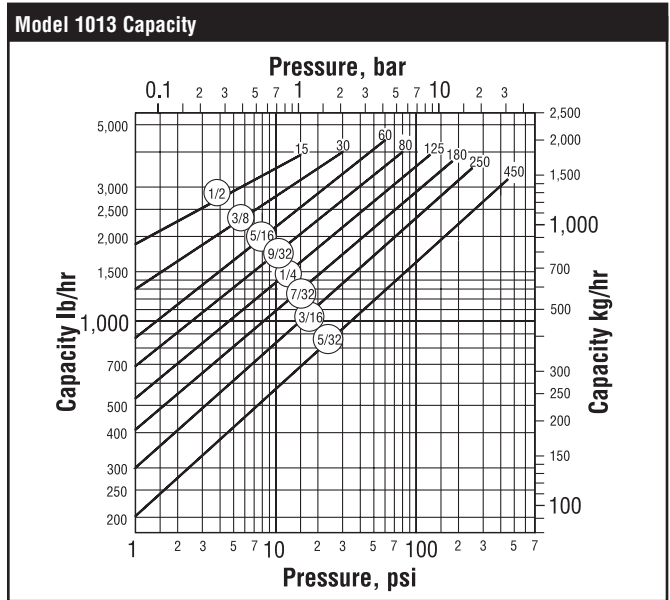
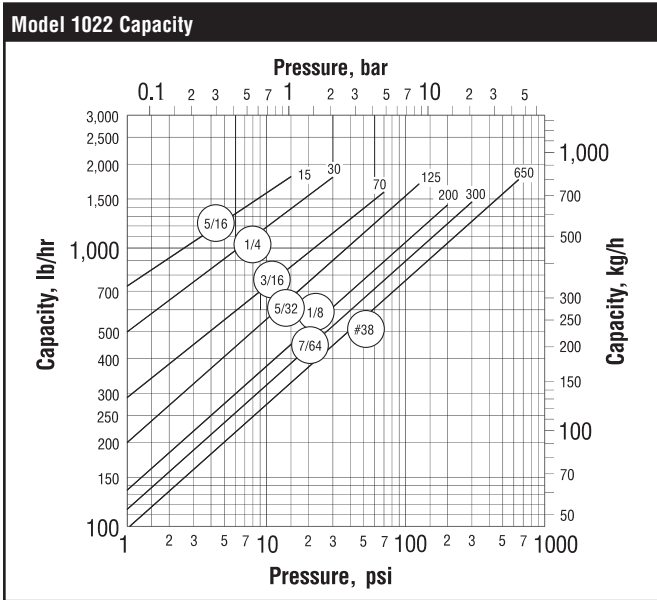
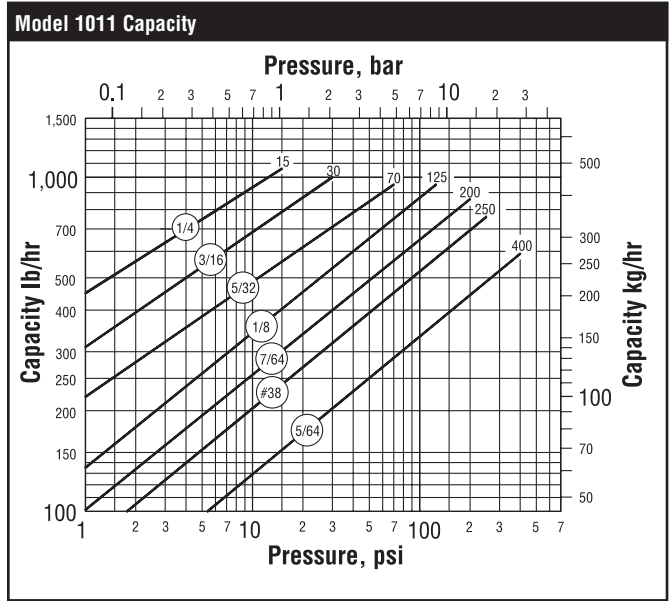
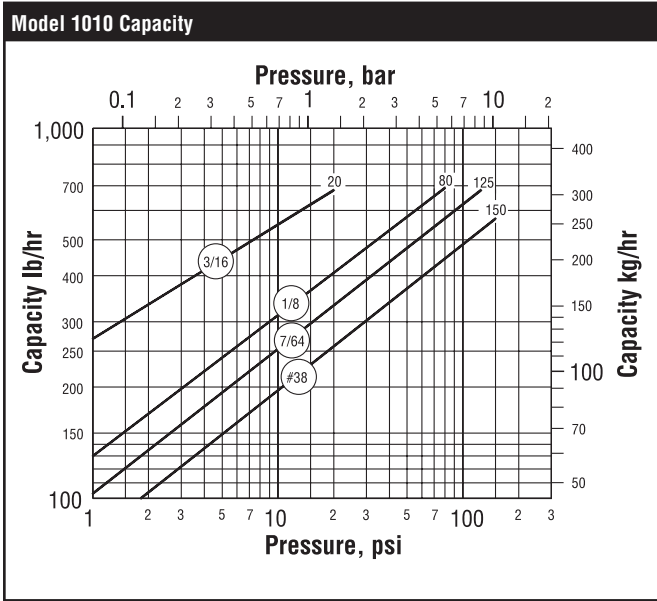
Shade indicates products that are CE marked according to the PED (97/23/EC). All other models comply with article 3.3 of the same directive.

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

1000 Series Inverted Bucket Steam Trap

All Stainless Steel for Vertical Installation

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



NOTE: #38 orifice in Model U-1022 is limited to 450 psi (31 bar).

SH-2000 Bimetallic Steam Traps

All Stainless Steel

For pressures to 400 psig (28 bar)...Cold Water Capacities to 4800 lb/hr (2175 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.



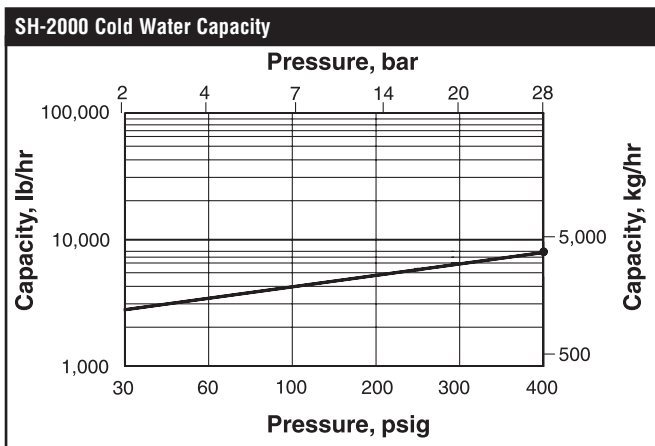
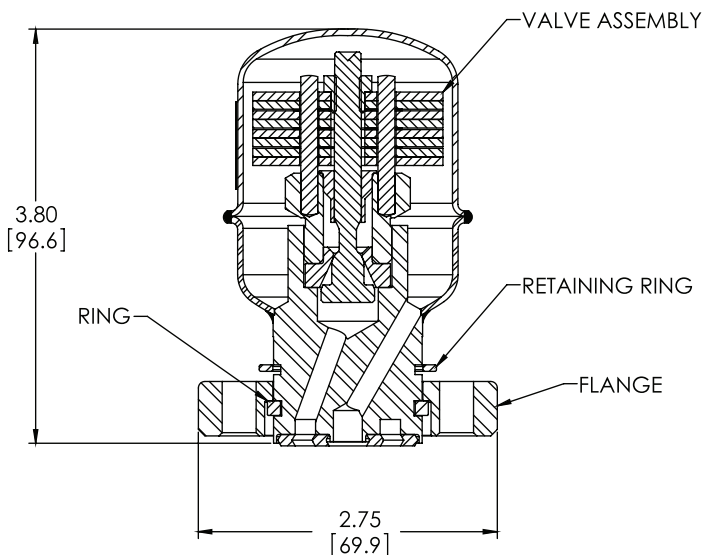
Maximum Operating Conditions

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

Maximum operating pressure: 400 psi (28 bar)

Materials

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



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

SH-2500 Bimetallic Steam Traps

All Stainless Steel

For Pressures to 650 psig (45 bar)...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 bar @ 315°C)

Maximum operating pressure:
SH-2500 650 psig @ 600°F (45 bar @ 315°C)

Materials and Weight

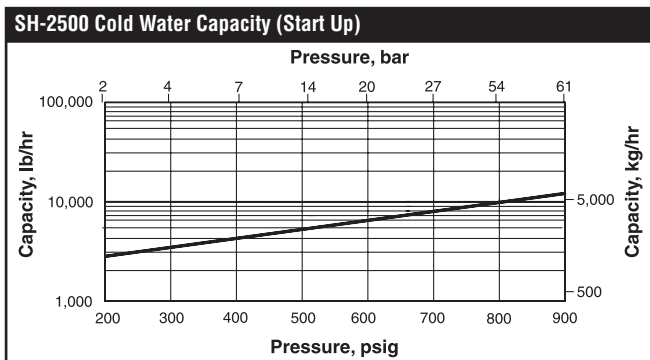
Body: ASTM A351 Gr. CF8M
Valve & Seat Elements: Titanium
Ni-Cr
Stainless Steel
Spiral Wound Gasket: Stainless Steel
Bolts: ASTM A193 B7
Weight: 2.8 lbs (1.3 kg)

Specification

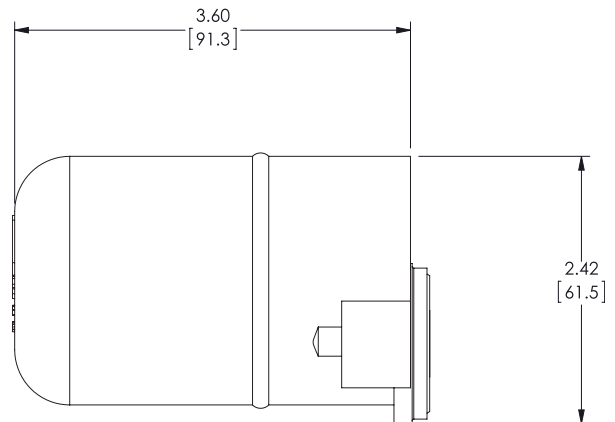
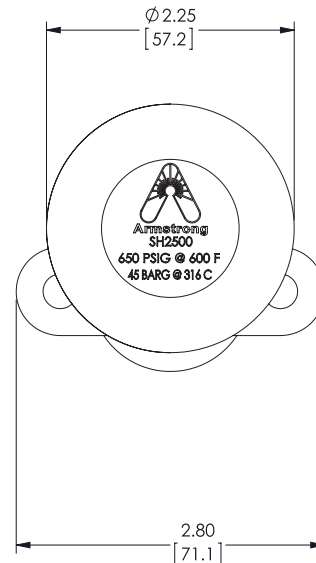
Steam traps shall be a bimetallic style designed for superheated steam applications. The steam trap body shall be tamperproof, investment cast stainless steel A351 Gr. CF8M. The mechanism shall consist of a stacked nickel-chrome bimetal operator with titanium valve and seat. The gaskets shall be captured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



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.

WT Series Thermostatic Wafer Steam Trap

Stainless Steel or Carbon Steel

For Pressures to 600 psig (41 bar)...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 (28°C) Below Saturation	
psi	bar	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.

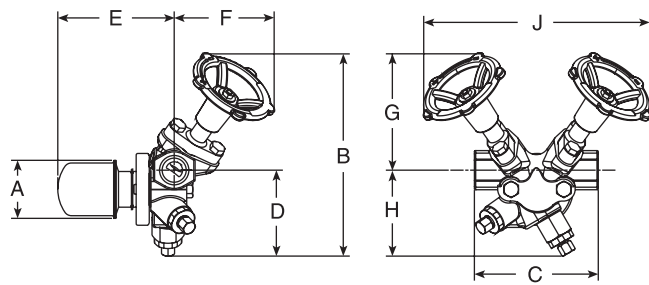
Model	WT-1 All Stainless Steel	WT-2000 Stainless Steel w/360° Connector	WT-3 Carbon Steel
Design		Welded	
Connections	Screwed (NPT and BSPT) Socketweld	Screwed (NPT and BSPT), Socketweld and Flanged	Screwed (NPT and BSPT) Socketweld
Material			
Body	ASTM A240—304L		Carbon steel C-1018
Cap			
Capsule wafer	Hastelloy		
Capsule body	Stainless steel—303		
Capsule cap			
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 bar @ 343°C)		600 psig @ 750°F (41 bar @ 399°C)
Maximum operating pressure	400 psig (28 bar)		600 psig (41 bar)
Option WT-2000			
Blowdown Valve IS-2 Connector and TVS-4000 Only			

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

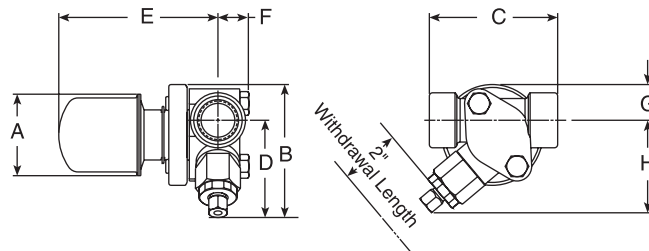
WT Series Thermostatic Wafer Steam Trap

Stainless Steel or Carbon Steel

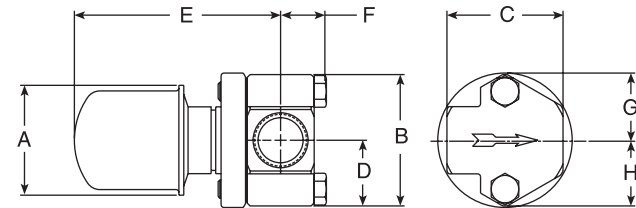
For Pressures to 600 psig (41 bar)...Cold Water Start-Up Capacities to 1,600 lb/hr (726 kg/hr)



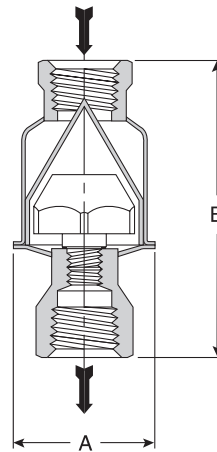
Series WT-2000 With TVS 4000 Trap Valve Station



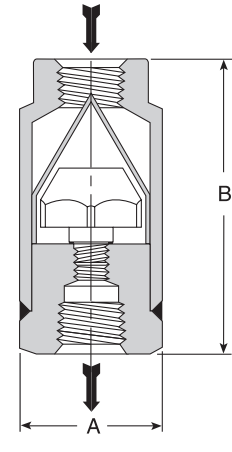
Series WT-2000 With Integral Strainer and Blowdown Valve



Series WT-2000 With Standard Connector



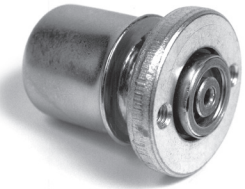
Model WT-1 Trap



Model WT-3 Trap

Connectors

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



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

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FT-4000 Series Float and Thermostatic Steam Trap

All Stainless Steel

For Pressures to 465 psig (32 bar)... 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 bar @ 315°C)

Maximum operating pressure:

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

Specification

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

How to order

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

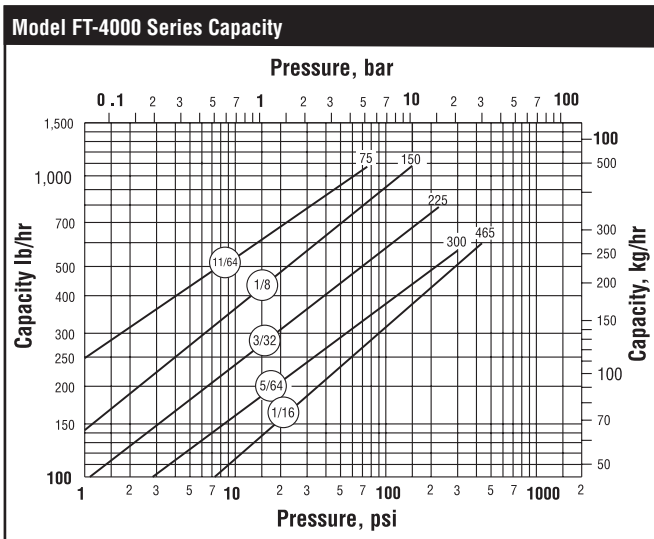
For a fully detailed certified drawing, refer to CD #1298 and CD #1299.



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



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

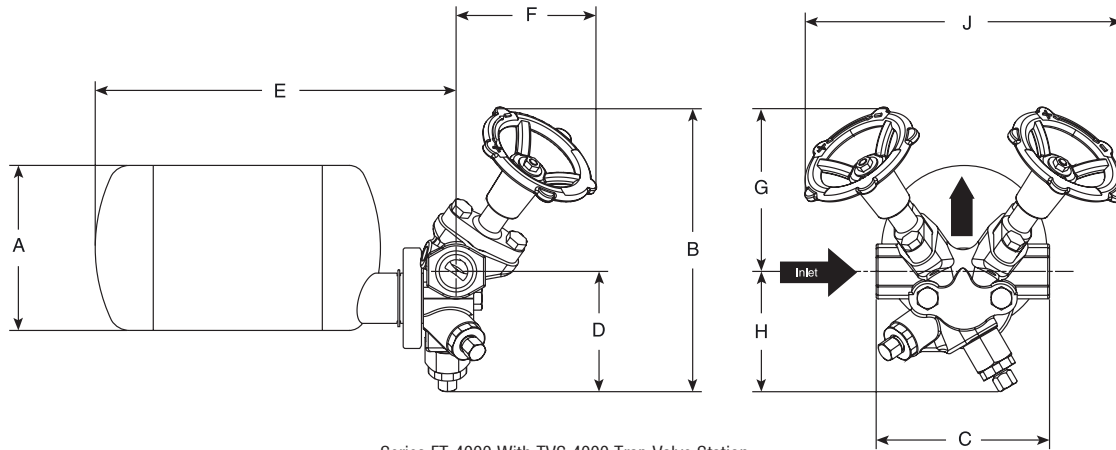


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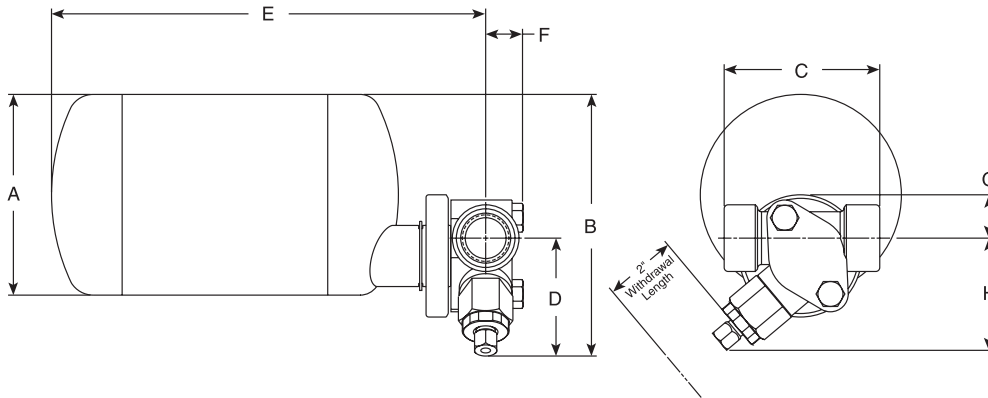
FT-4000 Series Float and Thermostatic Steam Trap

All Stainless Steel

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



Series FT-4000 With TVS 4000 Trap Valve Station



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

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

All Stainless Steel

For Pressures to 250 psig (17 bar)...Capacities to 1050 lb/hr (476 kg/hr)

Description

With the FF-4000 Series' 360° universal connector, you can install a free float and thermostatic trap to fit any piping configuration. You get the reliability of the free float 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 Free 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.

Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model FF-4250 300 psig @ 650°F (20.7 bar @ 343°C)

Model FF-4450 600 psig @ 600°F (41.4 bar @ 427°C)

Maximum operating pressure:

Model FF-4250 250 psig @ 650°F (17 bar @ 343°C)

Model FF-4450 450 psig @ 600°F (31 bar @ 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

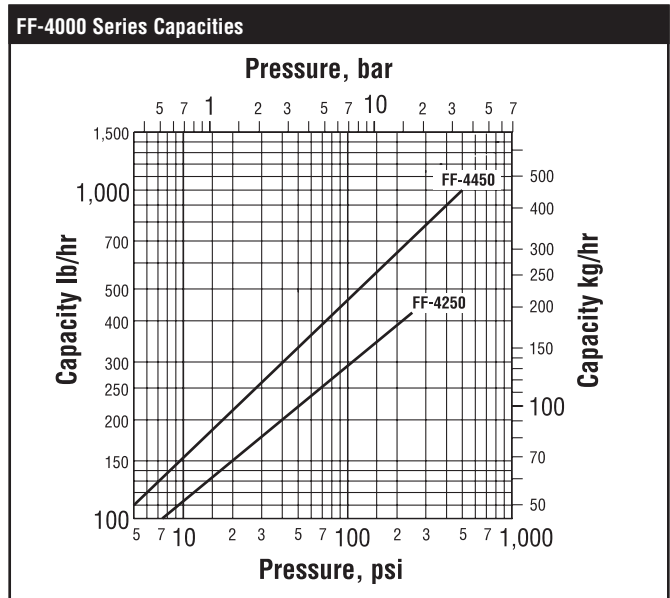
- Standard 2-bolt connector
- IS-2 connector with integral strainer and optional blowdown valve
- Trap Valve Station

How to order

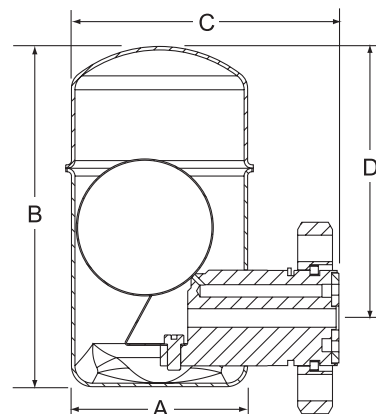
- Specify model number
- Size and type of pipe connection, style of 360° universal connector.



FF-4250 with TVS-4000



FF-4000 Series				
Model No.	FF-4250		FF-4450	
	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4	15, 20
"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 ₁ Flange to Top)	4	102	4-15/16	125
Trap Only Weight, lb (kg)	2 (0.9)		4 (1.8)	

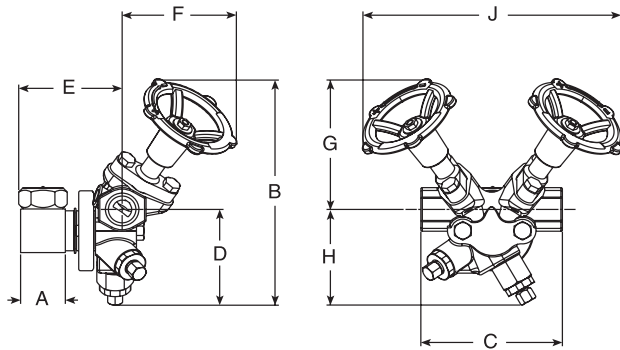


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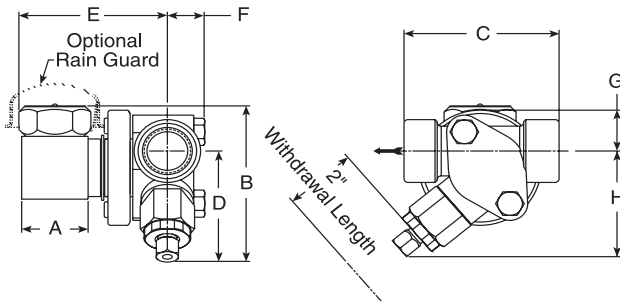
CD-3300 Series Disc Steam Traps

All Stainless With 360° Connector

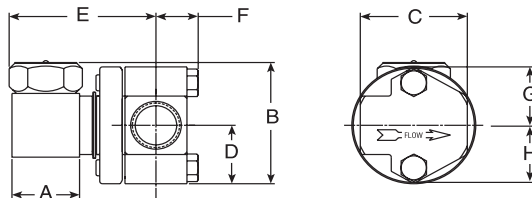
For Steam Pressures to 450 psig (31 bar)...Capacities to 800 lb/hr (363 kg/hr)



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.

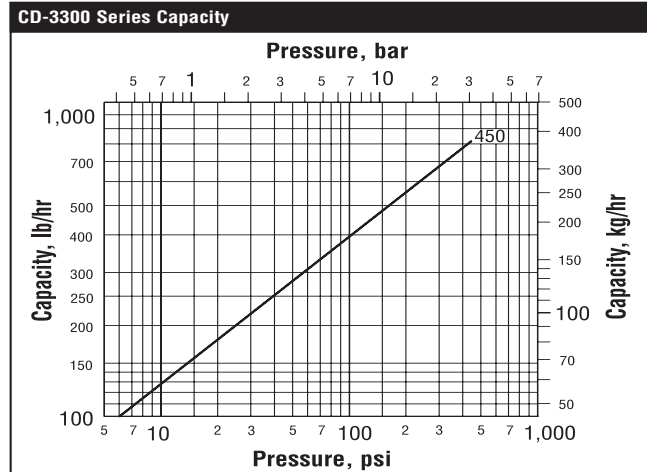
The CD-3300 is piped in-line by a 360° universal connector, which allows you to install the trap in virtually any piping configuration. Armstrong's unique standard connector or its IS-2 connector with integral strainer makes the CD-3300 easy to install, easy to renew. You save on labor time and cost 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
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 Disc Trap								
Model No.	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	1/2, 3/4	15, 20	1/2, 3/4	15, 20
"A" (Diameter)	1-1/2	38	1-1/2	38	1-1/2	38	1-1/2	38
"B" (Height)	2-7/8	73	3-3/4	94	3-3/4	94	7-1/3/16	198
"C" (Face-to-Face)	2-3/8	60	3-1/2	89	4	101	4-3/4	120
"D" (Connection \varnothing to Bottom)	1-3/8	35	2-5/8	67	2-5/8	67	3-1/4	83
"E" (Connection \varnothing to Outside of Trap)	3-3/8	86	3-3/8	86	3-9/16	90	3-9/16	90
"F" (Connection \varnothing to Front of Connector)	1-3/16	20	7/8	22	7/8	22	3-7/8	98
"G" (Connection \varnothing to Top)	1-3/8	35	1	25	1	25	4-1/2	114
"H" (Connection \varnothing to Bottom of Connector)	1-3/8	35	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	-	-	-	-	-	-	1/4NPT	6
Trap Only Weight, lb (kg)	2 (0.91)							
Trap and Connector Weight, lb (kg)	3-1/2 (1.6)		4 (1.8)		4-1/2 (2)		8-1/2 (3.8)	
Maximum Operating Pressure	450 psig @ 456°F (31 bar @ 236°C)							
Maximum Allowable Pressure (Vessel Design)	650 psig @ 600°F (45 bar @ 315°C)							

All sizes comply with the article 3.3 of the PED (97/23/EC).

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

Armstrong Universal Stainless Steel Connector - IS-4

Description

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

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

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

Maximum Operating Conditions

Maximum allowable pressure (connector design):

IS-4 1,245 psig @ 900°F (85.8 bar @ 482°C)
 IS-4BD 1,100 psig @ 800°F (75.8 bar @ 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:

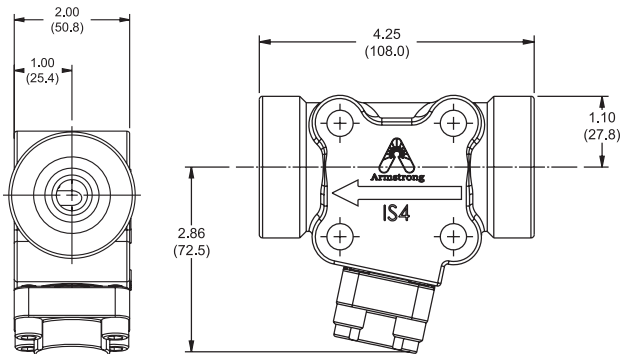
IS-4 4.75 lbs (2.15 kg)
 IS-4BD 9.9 lbs (4.5 kg)

4-Bolt Connector Steam Traps Available

- SH4000
- IB4022
- IB4011

Specification

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



IS-4



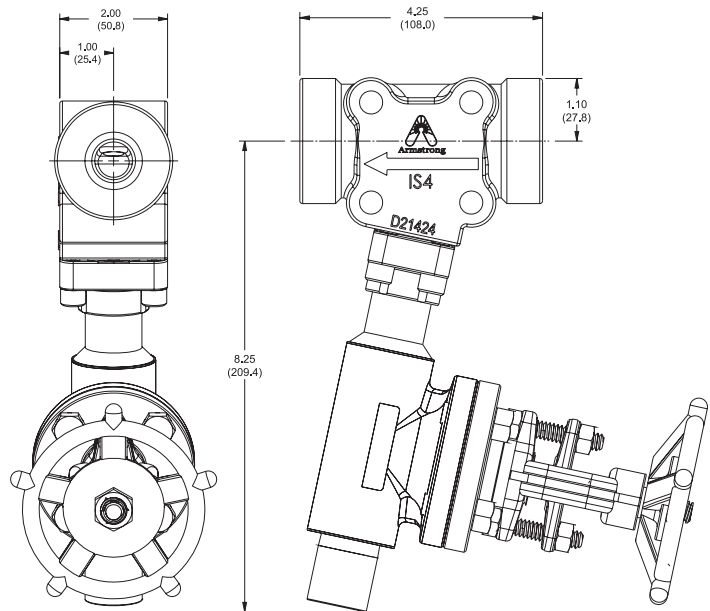
IS-4

How to order

IS-4	3FL	900	DBB	DBB
Model	Connection Size/Type	Flanges	Inlet Configuration	Outlet Configuration
IS-4 or IS-4BD	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-4BD

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

SH-4000 Bimetallic Steam Traps

All Stainless Steel

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

Description

Armstrong's SH-4000 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 bar @ 482°C)

Maximum operating pressure:

SH-4009L 650 psig @ 900°F (45 bar @ 482°C)

SH-4009H 900 psig @ 900°F (62 bar @ 482°C)

SH-4015 1,245 psig @ 900°F (86 bar @ 482°C)

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)

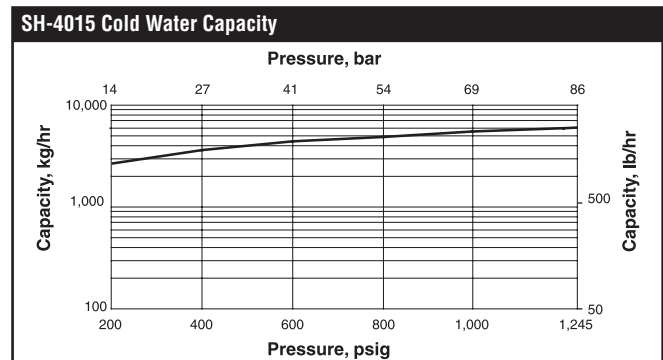
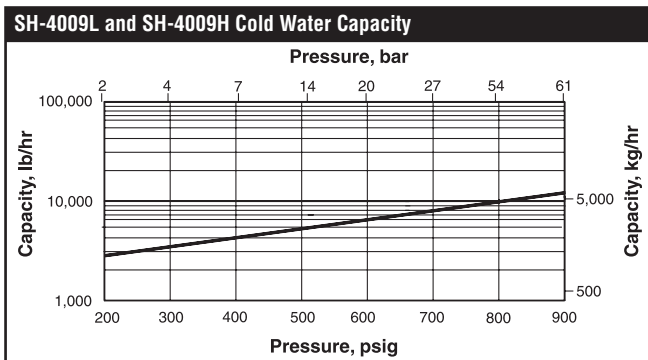
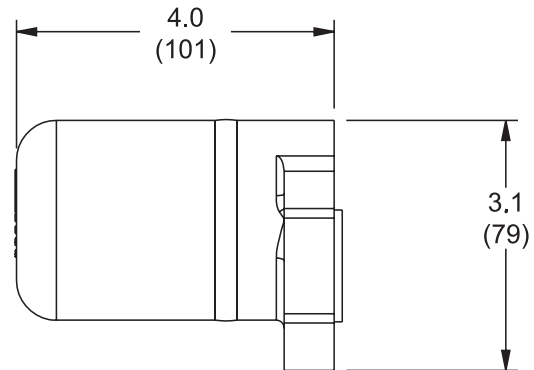
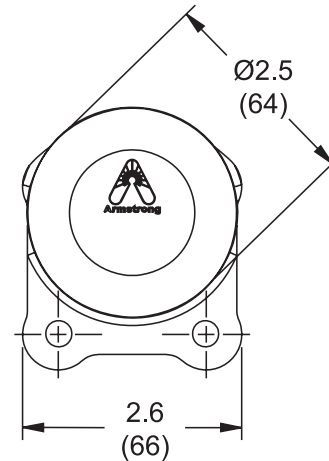
Specification

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



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.

4000 Series Inverted Bucket Steam Trap

All Stainless Steel With IS-4 4-Bolt Connector

For Pressures to 650 psig (45 bar)...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 bar @ 427°C)
Model IB4022:	650 psig @ 600°F (45 bar @ 315°C)
	627 psig @ 700°F (43 bar @ 371°C)
	600 psig @ 800°F (41 bar @ 427°C)

Maximum operating pressure:

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

Connections

Screwed NPT
Socketweld
Flanged (consult factory)

Materials

Body:	ASTM-A 240 Grade 304L
Internals:	All stainless steel—304
Valve and seat:	Hardened chrome 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

Connector Styles

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

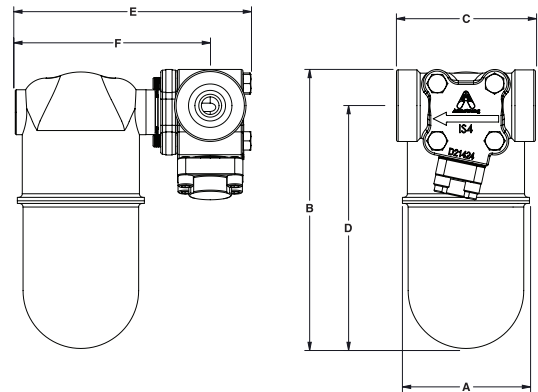
Specification

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

How to Order

Specify:

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



Model IB4022 Trap With IS-4 Connector

4000 Series Traps With Standard IS-4 Connector								
Model No.	IB4011				IB4022			
	in	mm	in	mm	in	mm	in	mm
Pipe Connections	3/4	20	1	25	3/4	20	1	25
"A" (Diameter)	2-11/16	68	2-11/16	68	3-7/8	98	3-7/8	98
"B" (Height)*	6-15/16	176	6-15/16	176	8-11/16	221	8-11/16	221
"C" (Face to Face)	4-1/4	108	4-1/4	108	4-1/4	108	4-1/4	108
"D" (Bottom to ϕ)*	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" (ϕ 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)			

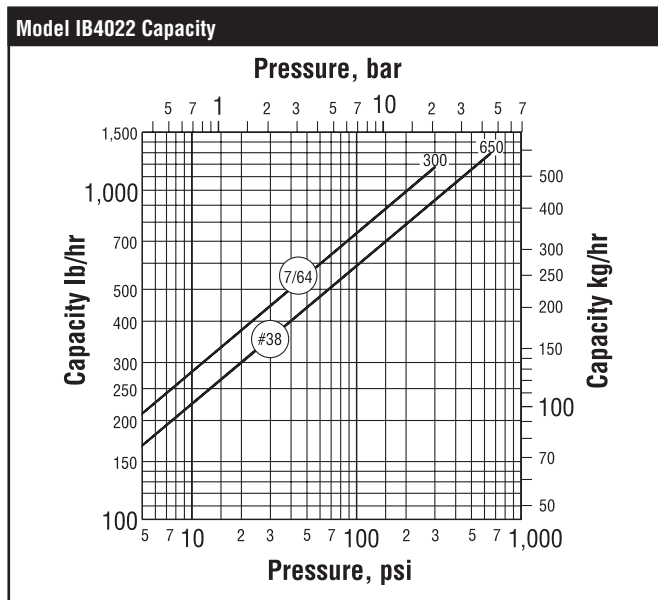
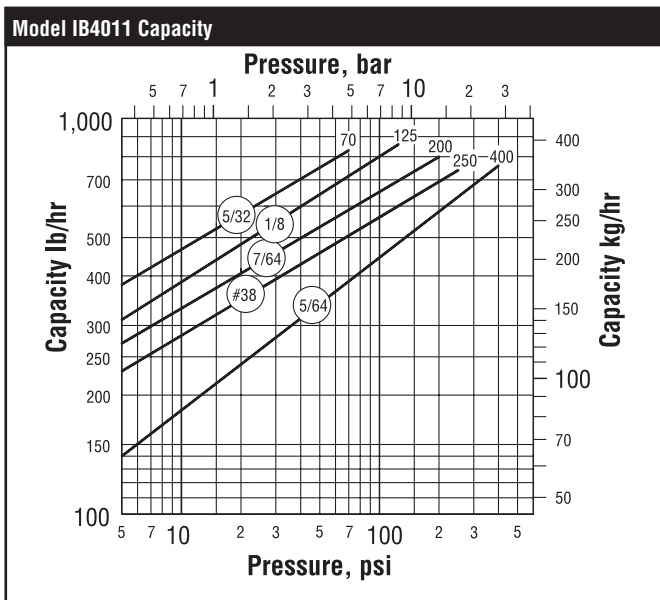
*Add 1/2" (15 mm) to "B" and "D" dimensions when optional probe connection is required.

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

4000 Series Inverted Bucket Steam Trap

All Stainless Steel With IS-4 Connector

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



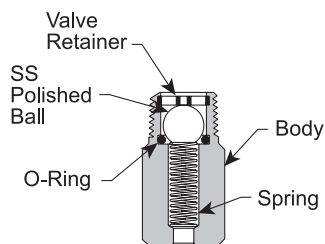
Options

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 bar)
 Temperature: 350°F (177°C)



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

980 Series Inverted Bucket Steam Trap

Cast Steel for Horizontal Installation With Integral Strainer

For pressures to 600 psig (41 bar)... capacities to 4,400 lbs/hr (2,000 kg/hr)

Description

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

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

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

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and 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 bar @ 343°C)

Maximum operating pressure:

600 psig (41 bar)

Connections

Screwed NPT and BSPT
Socketweld
Flanged

Materials

Trap Body: ASTM A216 WCB
Internals: All Stainless Steel - 304
Valve and Seat: Stainless Steel - 17-4PH
Strainer: Stainless Steel 304
Test Plug: Carbon Steel

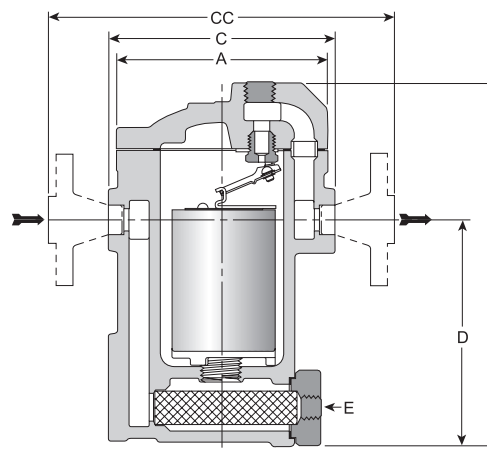
Options

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

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



980 Series Inverted Bucket Steam Trap

980 Series Traps				
Model No.	981		983	
	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	3/4, 1	20, 25
Test Plug	1/2	15	3/4	20
"A" (Flange Diameter)	4-1/2	114	7-1/4	184
"B" (Height)	8-5/8	219	12-5/16	313
"C" (Face-to-Face, Scr or SW)	5-3/8	137	7-3/4	197
"CC" (Face-to-Face, Class 600 ANSI Flanges*)	1/2" (15 mm) connection	235	-	-
	3/4" (20 mm) connection	238	11-3/4	298
	1" (25 mm) connection	-	12-1/8	308
"D" (Bottom to \varnothing Inlet)	4-13/16	122	7-9/16	192
"E" (Blowdown Connection)	3/8	9	3/4	20
Weight, Scr or SW lb (kg)	11-1/2 (5.2)		43 (19.5)	
Weight, 600 Class Flanges lb (kg) 1/2" connection	18 (8.2)		50 (22.7)	

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

Shade indicated products that are CE marked according to the PED (97/23EC).

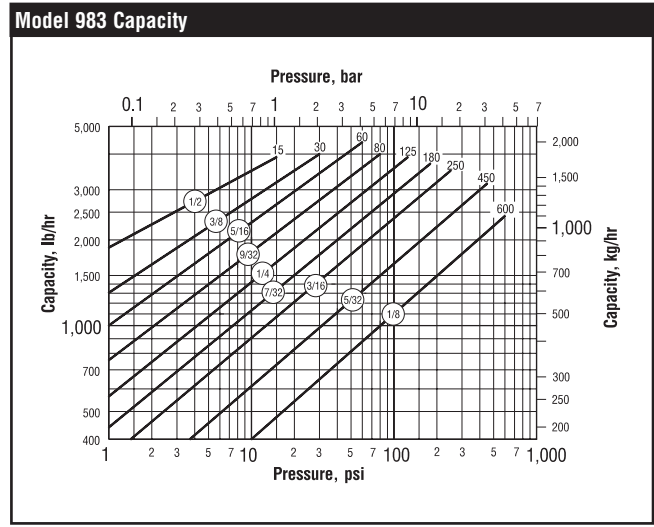
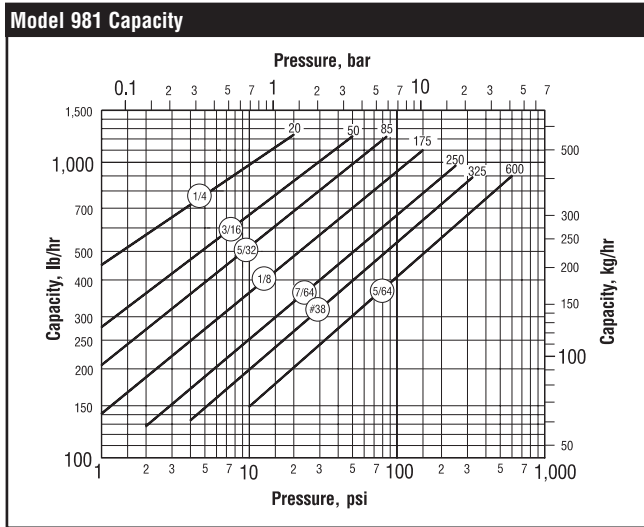
All other models comply with the Article 303 of the same directive.

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

980 Series Inverted Bucket Steam Trap

Cast Steel for Horizontal Installation With Integral Strainer

For pressures to 600 psig (41 bar)... capacities to 4,400 lbs/hr (2,000 kg/hr)



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 bar)...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 CO₂ 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 a burnished valve and seat and an extended inlet tube and 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

Materials

Body: ASTM A105

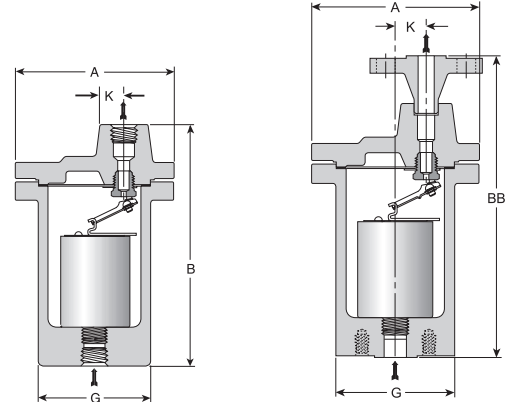
Models 312, 313, 316 are also available with cast 316 stainless steel bodies and all stainless steel internals

Internals: All stainless steel—304 (larger sizes have cast iron bucket weights)

Valve and seat: Stainless steel—17-4PH

Options

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



Series 300 Trap

Series 300-FW Trap

How to Order

Specify:

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

Pressure- Temperature Rating for Forged Steel Traps

Model No.	Max. Oper. Pressure, Sat. Steam	Maximum Allowable Pressure (Vessel Design) of Pressure Containing Parts at Indicated Temperature								
		°F		°C		°F		°C		
		-20/+650	-28/+343	700	371	750	399	800	427	
	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
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 shaded will be marked on nameplate, unless otherwise requested. Traps with flanges may have different pressure-temperature ratings.

300 Series Bottom Inlet, Top Outlet Traps

Model No. Screwed or SW Model No. Flanged	314 314-FW		315 315-FW		316 316-FW	
	in	mm	in	mm	in	mm
Pipe Connections	1, 1-1/4	25, 32	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50
"A" (Diameter)	8-5/8	219	9-3/4	248	11-7/8	302
"B" (Height, Screwed or SW)	13-11/13	348	15	381	17-1/8	435
"BB"	16-1/16	408	17-9/16	446	19-11/16	500
"G" (Body OD)	5-3/4	146	6-5/8	168	8-3/8	213
"K" (¢ Outlet to ¢ Inlet)	1-7/16	36.5	1-3/4	44.4	2-1/8	54
Number of Bolts	8		9		10	
Weight Scr. or SW, lb (kg)	70 (31.8)		98 (44.5)		179 (81.2)	
Weight, Flanged, lb (kg)	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.

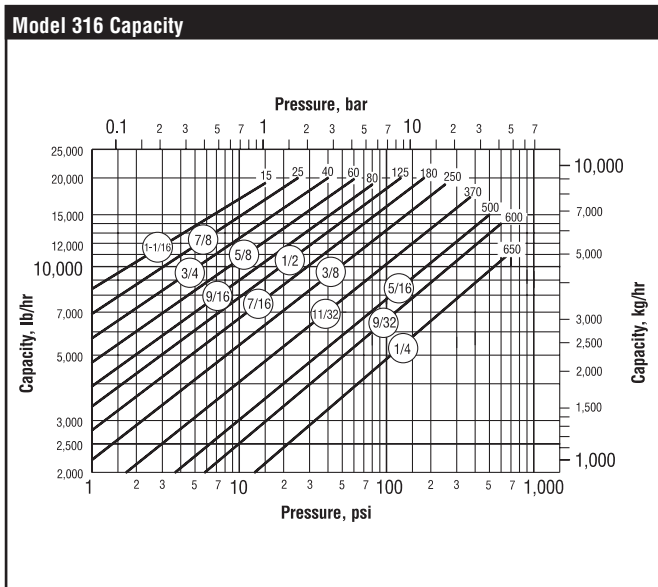
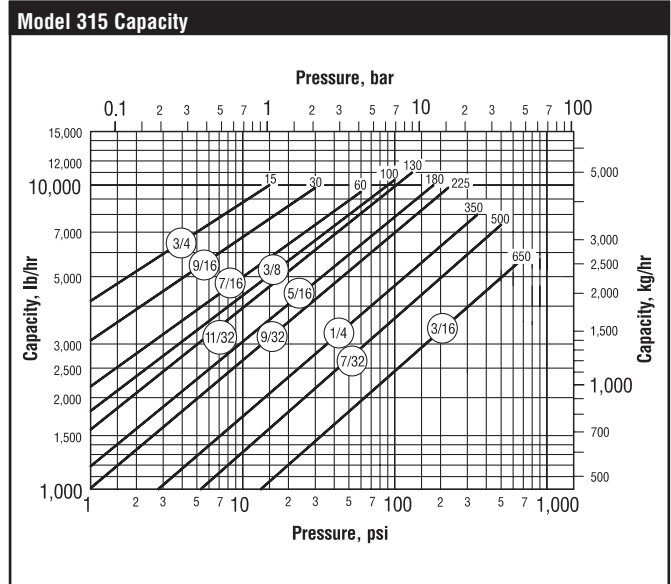
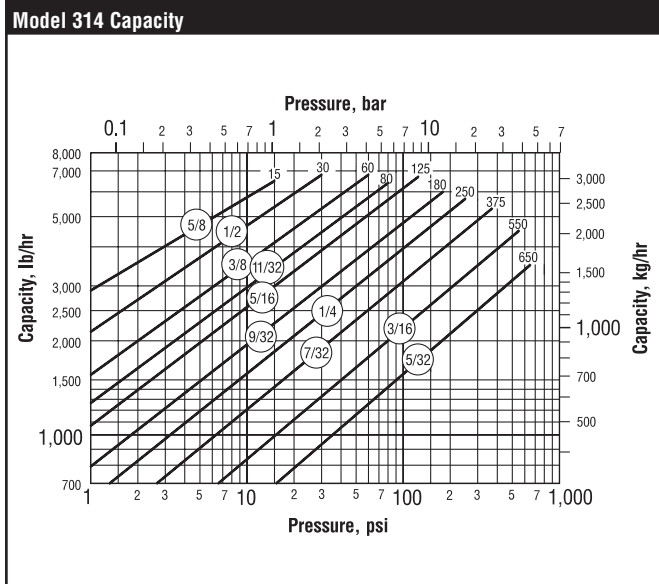
Products that are CE marked according to the PED (97/23/EC).

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 bar)...Capacities to 20,000 lb/hr (9,072 kg/hr)



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

400 Series Inverted Bucket Steam Trap

Forged Chrome-moly Steel for Vertical Installation

For Pressures to 1,000 psig (69 bar)...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 CO₂ 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 bar) 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 a burnished valve and seat and an extended inlet tube and 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

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

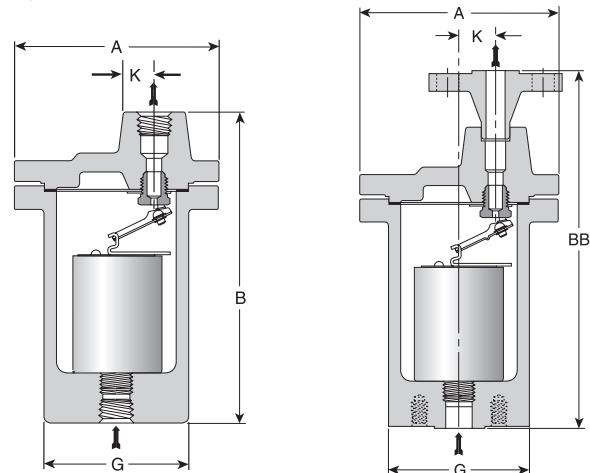
Options

Stainless steel internal check valve

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



Series 400 Trap

Series 400-FW Trap

400 Series, Bottom Inlet, Top Outlet Traps						
Model No. Screwed or SW Model No. Flanged	413 413-FW		415 413-FW		416 416-FW	
	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50
"A" (Diameter)	8-5/8	219	10-3/4	273	12-1/2	317
"B" (Height, Screwed or SW)	12-3/16	310	14-15/16	379	17-5/8	448
"BB"	14-7/8	378	18-1/16	459	21-1/2	546
"G" (Body OD)	5-3/8	137	6-7/8	175	8-1/2	216
"K" (Ø Outlet to Ø Inlet)	1-7/16	36.5	1-3/4	44.4	2-1/8	54
Number of Bolts	8		9		12	
Weight Scr. or SW lb (kg)	65 (29.5)		126 (57.2)		205 (93)	
Weight, flanged lb (kg)	70 (31.8)		132 (59.9)		211 (95.7)	

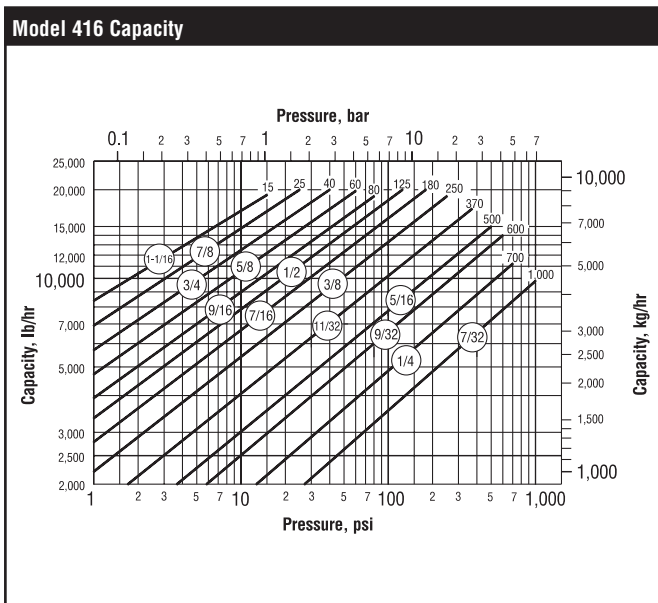
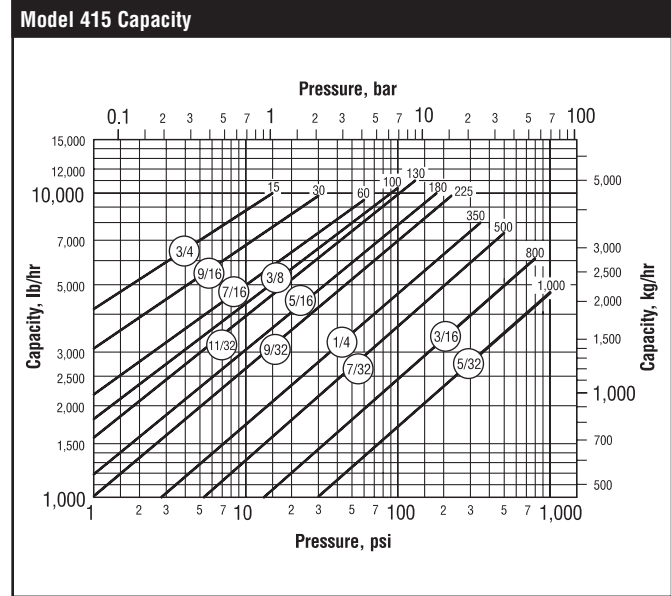
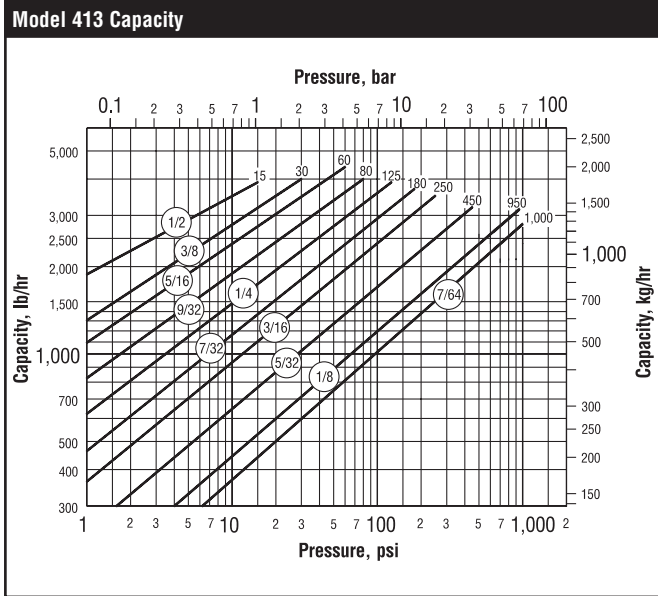
All models comply with article 3.3 of the PED (97/23/EC).

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

400 Series Inverted Bucket Steam Trap

Forged Chrome-moly Steel for Vertical Installation

For Pressures to 1,000 psig (69 bar)...Capacities to 20,000 lb/hr (9,072 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 as Indicated Temperature											
			°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	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar		
413	1,000	69	1,200	83	1,200	83	1,200	83	1,200	83	1,050	72	780	54
415	1,000	60	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

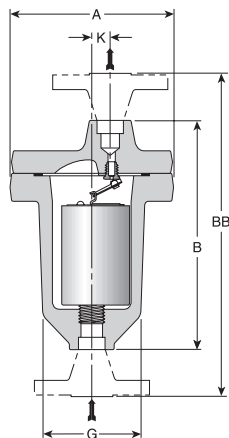
NOTES: Maximum operating pressure to be marked on nameplate will be determined by actual orifice used.
 Maximum allowable pressures shown in shade will be marked on nameplate, unless otherwise requested.
 Traps with flanges may have different pressure-temperature ratings.

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

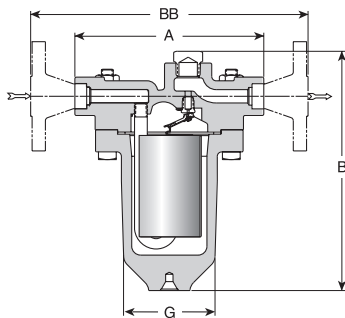
411G/421 Series Inverted Bucket Steam Traps

Forged Carbon Steel for Vertical and Horizontal Installation

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



Model 411G Trap



Model 421 Trap



Description

Armstrong Model 411G vertical installation and Model 421 horizontal installation offer 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 421 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.

Connections

Screwed NPT and BSPT
Socketweld
Flanged

Materials

Body: ASTM A105
411G cap: ASTM A105
421 cap: ASTM A216 WCB
Internals: All stainless steel—304
Valve and seat: Titanium

Options

Stainless steel internal check valve (411G only)

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

411G Bottom Inlet, Top Outlet Traps; 421 Side Inlet, Side Outlet Traps				
Model No. Screwed or SW Model No. Flanged	411G 411G-FW		421 421-FW	
	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4	15, 20
"A" (Diameter)	6-5/16	160	8	203
"B" (Height, Screwed or SW)	8-13/16	224	10-9/64	258
"BB"	13-15/16*	354*	11-3/4	298*
"G" (Body OD)	4-1/16	103	3-7/8	98
"K" (⌀ Outlet to ⌀ Inlet)	3/4	19	-	-
Number of Bolts	8		8	
Weight Scr. or SW lb (kg)	25 (11.3)		27-1/2 (12.6)	
Weight, flanged lb (kg)	35 (15.9)		36 (16.3)	

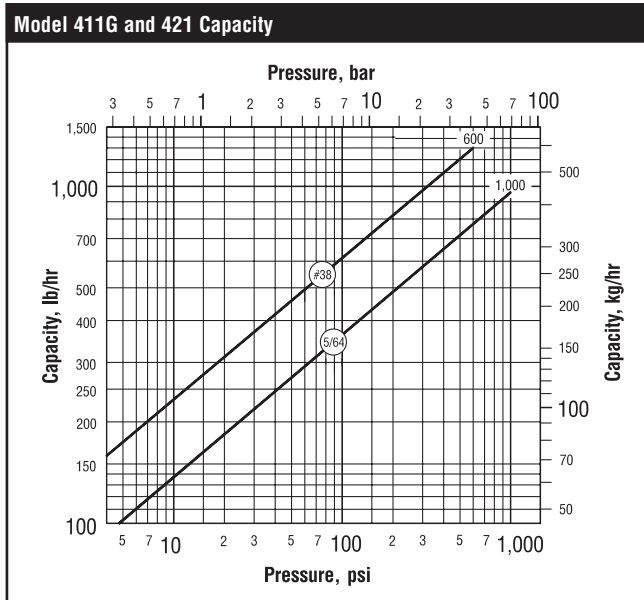
* "B" dimensions shown are for 3/4" conn., Class 900 flanged. Consult factory for dimensions of models with other connection sizes and/or flanges.
All models comply with article 3.3 of the PED (97/23/EC).

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

411G/421 Series Inverted Bucket Steam Traps

Forged Carbon Steel for Vertical and Horizontal Installation

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



NOTE: #38 orifice in Model 421 is limited to 560 psi (39 bar).

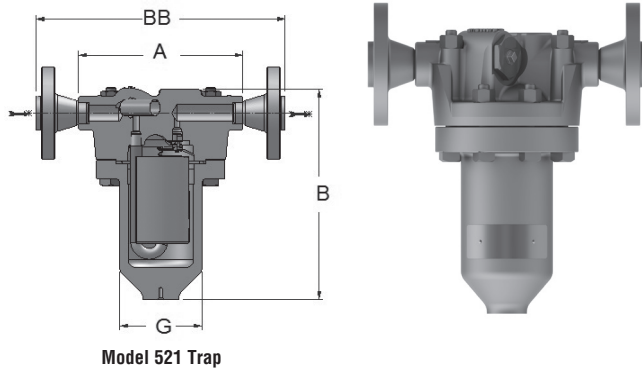
Pressure-Temperature Rating for Forged Steel Traps										
Model No.	Max. Oper. Pressure, Sat. Steam		Maximum Allowable Pressure (Vessel Design) of Pressure Containing Parts at Indicated Temperature							
			°F	°C	°F	°C	°F	°C	°F	°C
	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
411G/421	1,000	69	1,000	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 bar)...Capacities to 1,300 lb/hr (590 kg/hr)



Model 521 Trap

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 reparability 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

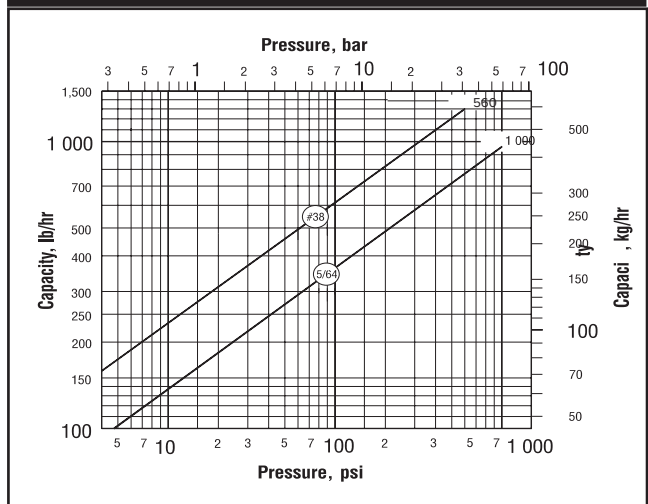
Specify:

- 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

521 Side Inlet, Side Outlet Traps
Add suffix "CV" to trap number for internal check valve.

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) Consult factory for "BB" dimensions.	30 (13.4)	

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		
		-20/+650	-28/+343	700	371	750	399	800	427	
	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.

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

EM Inverted Bucket Steam Trap

Forged Carbon Steel for Horizontal Installation

For Pressures to 454 psig (32 bar)... Capacities to 1058 lb/hr (480 kg/h)

Description

Armstrong's type EM forged steel inverted bucket steam trap combines the most reliable steam trap operating principle known in a body, which can be opened for Easy Maintenance.

- High resistance to wear, corrosion and water hammer.
- The free-floating guided lever valve mechanism is "frictionless" with all wear points heavily reinforced. All working parts are stainless steel; valve and seat are hardened chrome steel, individually ground and lapped.
- Freedom from dirt problems. Condensate flow under bottom edge of bucket keeps sediment and "sludge" in suspension until discharged by full differential purging action. Valve orifice opens wide - closes tight. There is no buildup of dirt, no close clearances to be affected by scale. Under normal conditions of reasonably "clean steam", a strainer is not necessary. However, this is left to the user's discretion.
- Air handling ability. Vent in bucket top provides continuous automatic air and CO₂ venting with no cooling leg and prevents air binding. Wiggle wire ensures clean vent hole at all times. Any steam passing through vent is condensed and discharged as liquid.
- No steam loss. Steam does not reach the water sealed valve.
- Inverted bucket traps require no adjustment and no live steam to operate.

Maximum operating conditions

Maximum allowable pressure (vessel design):	464 psi @ 482°F (32 bar @ 250°C)
Maximum operating pressure:	464 psi (32 bar)
Maximum back pressure:	99% of inlet pressure

Connections

Screwed BSPT and NPT
Socketweld
Flanged DIN or ANSI (welded)

Materials

Body:	Forged carbon steel
Internals:	All stainless steel – 304
Valve and seat:	Stainless steel – 17-4PH
Gasket:	Spiral wounded graphite
Bolts:	24 CrMo5



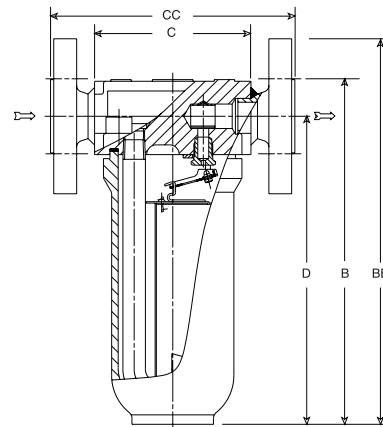
Options

- Bucket vent scrubbing wire for heavy dirt/oil conditions
- Probe connection (3/8") for use of TrapAlert™, the self-diagnostic steam traps
- For superheated steam we advise stellited valve and seat

How to order

Specify:

- Size and type of pipe connection
- Max. working pressure that will be encountered or orifice size
- Max. condensate load
- Any options required



Model EM Side Inlet, Side Outlet Trap

Pipe Connections	in	mm	in	mm	in	mm
"C" (Face to Face, screwed & SW)	3-5/8	92	3-5/8	92	-	-
"CC" (Face to Face, flanged*)	6	152	6	152	6-5/16	160
"D" (Bottom of C Inlet)	7-7/16	189	7-7/16	189	7-7/16	189
"B" Height, (screwed and SW)	8-1/4	210	8-1/4	210	-	-
"BB" (Height, flanged*)	9-1/4	235	9-7/16	240	9-5/5	245
Weight, screwed, lb (kg)	6.8 (3.1)		6.8 (3.1)		-	
Weight, flanged, lb (kg)	12 (5.5)		15.7 (7.1)		18 (8.1)	

* Other flange sizes, ratings and face-to-face dimensions are available on request.

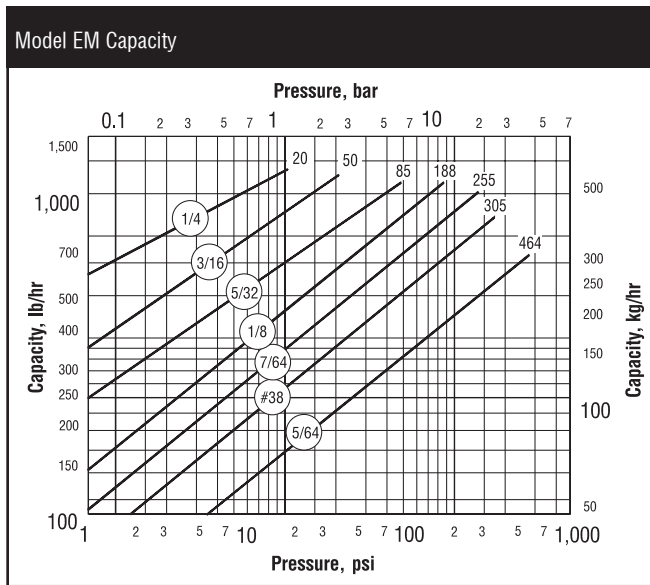
All models comply with the article 3.3 of the PED (97/23/EC).

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

EM Inverted Bucket Steam Trap

Forged Carbon Steel for Horizontal Installation

For Pressures to 454 psig (32 bar)... Capacities to 1058 lb/hr (480 kg/h)

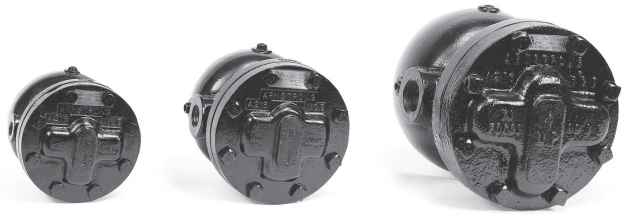
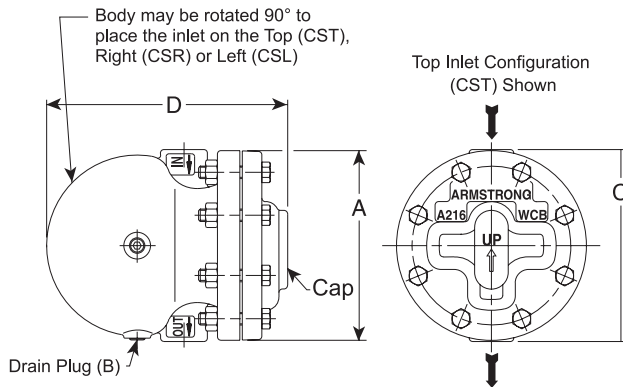


Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

CS Series Float & Thermostatic Steam Traps

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

For Pressures to 465 psig (32 bar)...Capacities to 13,281 lb/hr (6,024 kg/hr)



Carbon Steel Float & Thermostatic Steam Traps

The simple yet rugged construction of the CS Series Carbon Steel Float and Thermostatic Trap is designed to assure long, trouble-free service. The CS Series offers horizontal or vertical piping configurations from the same trap. Additionally, in-line repairability is very easy because the cap and mechanism detach quickly while the body stays in-line. For added versatility a full range of connection sizes are offered 1/2" through 2" in NPT, socketweld and flanged.

Benefits

- Horizontal or vertical piping arrangements are available from the same trap
- Inlet and outlet connections are in the body for easy in-line repairability
- More connection sizes available

Materials

Body and cap:	ASTM A216 WCB
Internals:	All stainless steel
Valve(s) and seat(s):	Stainless steel
Drain plug:	Carbon steel
Thermostatic air vent:	Wafer type stainless steel with Hastelloy element

Specification

Steam traps shall be float and thermostatic type having carbon steel cap and body, stainless steel valve and seat and stainless steel float. Piping connections shall be in the trap body and shall be capable of being horizontal with the inlet on either side or vertical with the inlet on top. Cap with mechanism shall be completely removable without disturbing the piping. Integral thermostatic element shall be wafer type constructed of Hastelloy and stainless steel. Thermostatic element shall be capable of withstanding 45°F (7.2°C) of superheat and resistant to water hammer damage.

For a fully detailed certified drawing, refer to CD #1123.

How to Order

Pressure	Model	Inlet Flow Direction	Connection Size	Connection Type
*	CS	T	2	NPT
*	CS = Carbon Steel	T = Vertical Top Inlet R = Horizontal Right Inlet L = Horizontal Left Inlet	2 = 1/2" 3 = 3/4" 4 = 1" 5 = 1-1/4" 6 = 1-1/2" 8 = 2"	NPT SW Flanged (Specify type and class of flange)

*Refer to capacity charts for maximum operating pressures.

CS Series Float & Thermostatic Steam Traps						
Model No.	Body Inlet Orientation					
	CST Top Inlet Connection CSL Left Inlet Connection CSR Right Inlet Connection					
Connections	in	mm	in	mm	in	mm
		1/2, 3/4	15, 20	1, 1-1/4	25, 32	1-1/2, 2
"A" Diameter of Flange	6-11/16	170	8-1/8	206	10-3/4	274
"B" Drain Plug (NPT or BSPT)	1/4	6	3/8	10	3/8	10
"C" Face to Face	6-3/4	172	8-3/8	212	11	280
"D" Overall Length	8-1/2	216	10	255	14-1/4	362
Weight NPT, BSPT & SW lb (kg)	28 (13)		45 (20)		100 (45)	
Maximum Allowable Pressure (Vessel Design)	600 psi @ 650°F* (41 bar @ 343°C)					
Maximum Operating Pressure	465 psi (32 bar)					

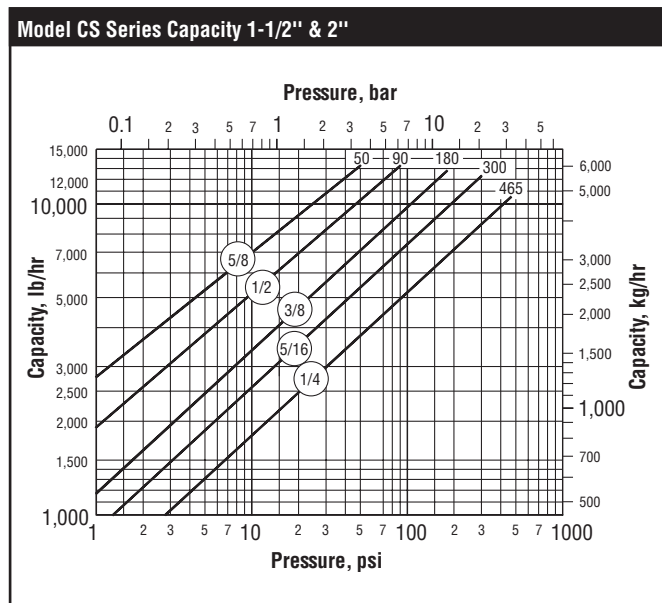
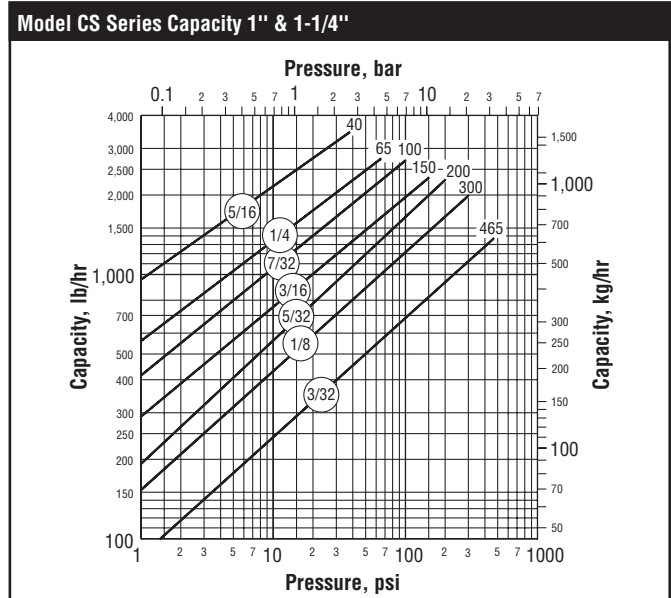
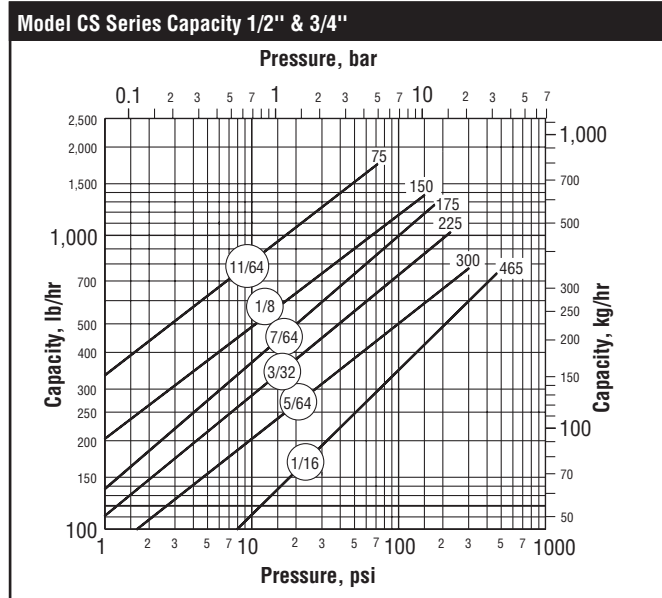
*Caution: Superheat in excess of 650°F (343°C) could damage the thermostatic air vent.

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

CS Series Float & Thermostatic Steam Traps

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

For Pressures to 465 psig (32 bar)...Capacities to 13,281 lb/hr (6,024 kg/hr)



When suitable, floats are chosen to maximize the operating pressure and/or the capacity. Therefore, please observe the following limits when conducting a hydrostatic test:

Model	Orifice Size	Maximum Hydrostatic Test	
		psi	bar
CS-2, CS-3	All	630	44
CS-4, CS-5	All	675	47
CS-6, CS-8	All	700	48

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 Installation, With Thermostatic Air Vent

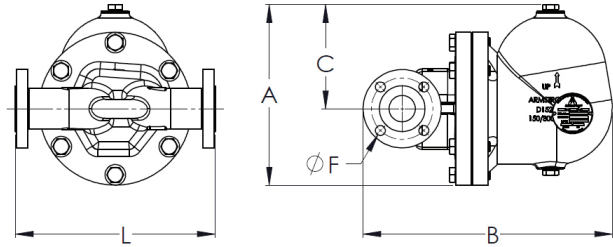
For Pressures to 465 psig (32.0 barg) Capacities to 60 000 lb/hr (27 215 kg/hr)

Description

Armstrong ICS Series F&T traps are designed for industrial service upto 465 psig (32.0 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 & Cap:	Carbon Steel ASTM A352 GR.LCB
Internals:	Stainless steel
Valve(s) and Seat(s):	Hardened Stainless Steel, 17-4PH
Thermostatic Air Vent:	Hastelloy Wafer
Bolting:	Low Alloy Steel, ASTM A193 GR.B7
Gasket:	Graphite



Connections

Flanged:	ASME B16.5 Class 150, Class 300
Screwed:	NPT BSPT
Socket Welded:	

Option

Integral Vacuum Breaker: Add suffix VB to model number (limited to 150 psig (10.3 barg)).
Liquid Drainer: Add suffix LD to model number



Flow			
	in	mm	Flow Direction
Horizontal	1/2, 3/4, 1	DN15, DN20, DN25	Left-to-Right
Horizontal	1-1/2, 2	DN40, DN50	Right-to-Left

Face-to-Face Dimensions - Screwed and Socketweld

Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	DN15	3/4	DN20	1	DN25	1-1/2	DN40	2	DN50
"A" Height	8.9	225	8.9	225	9.3	236	11.5	291	11.5	291
"B" Length	11.0	278	11.0	279	12.2	309	14.7	374	14.9	380
"C" Cap \varnothing to Top	5.4	138	5.4	138	5.6	143	6.9	176	6.9	176
"L" Face-to-Face	7.2	184	7.0	178	7.4	188	10.5	266	10.8	273
Weight lb (kg)	21 (9.5)		21 (9.5)		28 (12.7)		76 (34.5)		76 (34.5)	
Maximum Allowable Pressure (Vessel Design)	580 psig @ 650°F (40.0 barg @ 343°C)									
Maximum Operating Pressure	465 psig (32.0 barg)									

Face-to-Face Dimensions - ASME B16.5 Class 150#

Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	DN15	3/4	DN20	1	DN25	1-1/2	DN40	2	DN50
"A" Height	8.9	225	8.9	225	9.3	236	11.5	291	11.5	291
"B" Length	11.9	301	12.0	305	13.4	339	15.7	399	16.2	412
"C" Cap \varnothing to Top	5.4	138	5.4	138	5.6	143	6.9	176	6.9	176
"F" Bolt Hole Size	1/2" - 13 UNC		1/2" - 13 UNC		0.63	15.9	0.63	15.9	0.75	19.1
Number of Flange Holes	4									
"L" Face-to-Face	8.0	203	8.1	205	8.2	208	12.6	320	12.3	312
Weight lb (kg)	23 (10.4)		25 (11.3)		33 (14.9)		83 (37.7)		84 (38.1)	
Maximum Allowable Pressure (Vessel Design)	200 psig @ 400°F (13.8 barg @ 204°C)									
Maximum Operating Pressure	200 psig (13.8 barg)									

Face-to-Face Dimensions - ASME B16.5 Class 300#

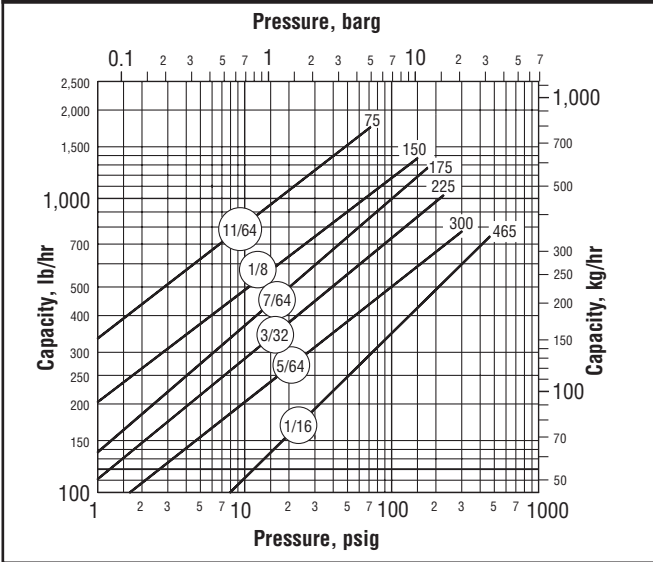
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	DN15	3/4	DN20	1	DN25	1-1/2	DN40	2	DN50
"A" Height	8.9	225	8.9	225	9.3	236	11.5	291	11.5	291
"B" Length	11.9	304	12.4	314	13.7	347	16.3	414	16.5	418
"C" Cap \varnothing to Top	5.4	138	5.4	138	5.6	143	6.9	176	6.9	176
"F" Bolt Hole Size	1/2" - 13 UNC		0.75	19.1	0.75	19.1	0.87	22.2	0.75	19.1
Number of Flange Holes	4					8				
"L" Face-to-Face	8.2	209	8.2	209	8.4	212	12.9	327	12.6	320
Weight lb (kg)	24 (10.8)		26 (11.8)		35 (15.9)		88 (39.9)		88 (39.9)	
Maximum Allowable Pressure (Vessel Design)	580 psig @ 500°F (40.0 barg @ 260°C)									
Maximum Operating Pressure	465 psig (32.0 barg)									

ICS Series Float & Thermostatic Steam Traps

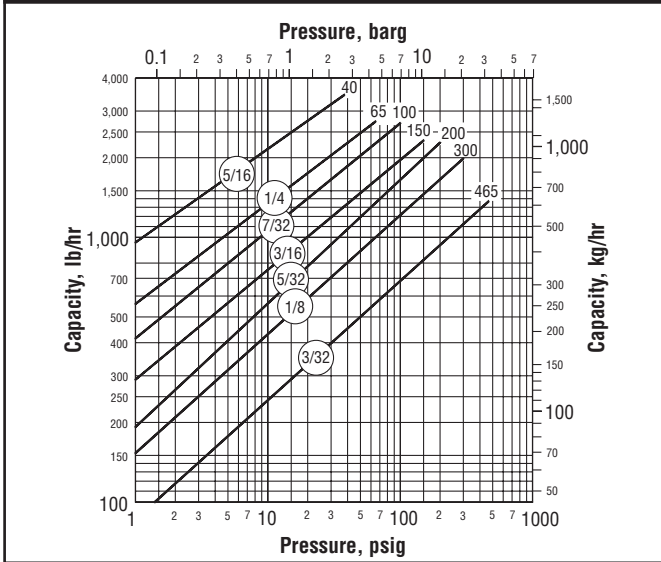
Carbon Steel for Horizontal Installation, With Thermostatic Air Vent

For Pressures to 465 psig (32.0 barg) Capacities to 60 000 lb/hr (27 215 kg/hr)

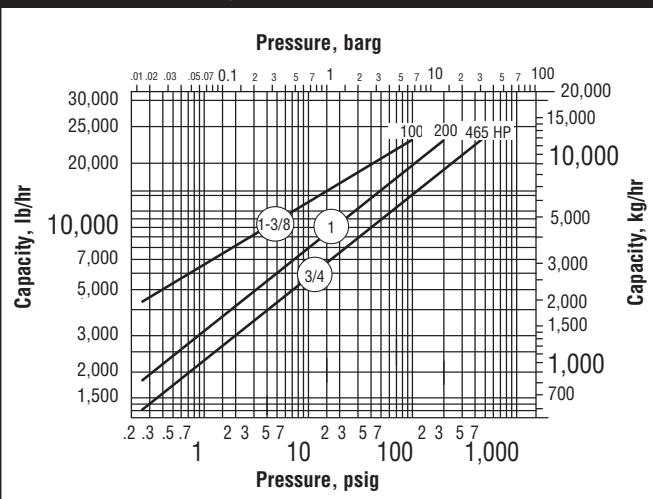
Model ICS Series Capacity 1/2" & 3/4"



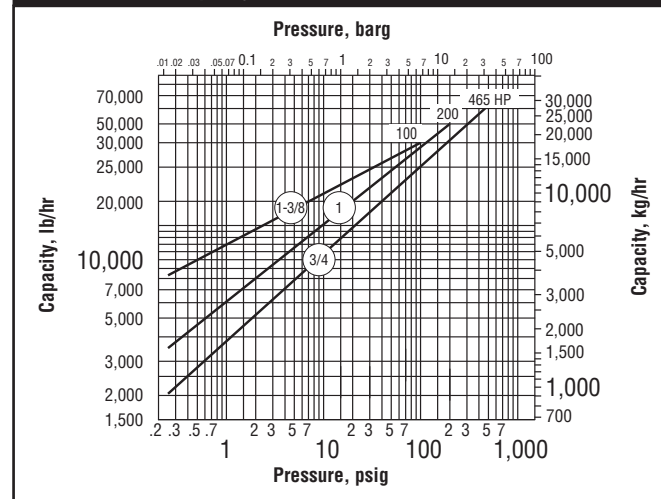
Model ICS Series Capacity 1"



Model ICS Series Capacity 1 1/2"

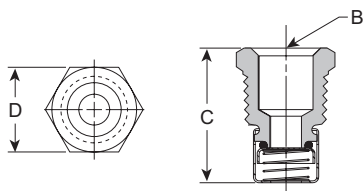


Model ICS Series Capacity 2"



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

(*) Refer to capacity charts to determine orifice.



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 (10.3 barg).

Vacuum Breaker			
Size	in	mm	Max. allow. pres.
	1/2 NPT	DN15	
"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.

ICS Series Float & Thermostatic Steam Traps

Carbon Steel for Horizontal Installation, With Thermostatic Air Vent

For Pressures to 465 psig (32.0 barg) Capacities to 60 000 lb/hr (27 215 kg/hr)

Description

Armstrong ICS Series F&T traps are designed for industrial service upto 465 psig (32.0 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 & Cap:	Carbon Steel ASTM A352 GR.LCB
Internals:	Stainless steel
Valve(s) and Seat(s):	Hardened Stainless Steel, 17-4PH
Thermostatic Air Vent:	Hastelloy Wafer
Bolting:	Low Alloy Steel, ASTM A193 GR.17
Gasket:	Graphite

Connections

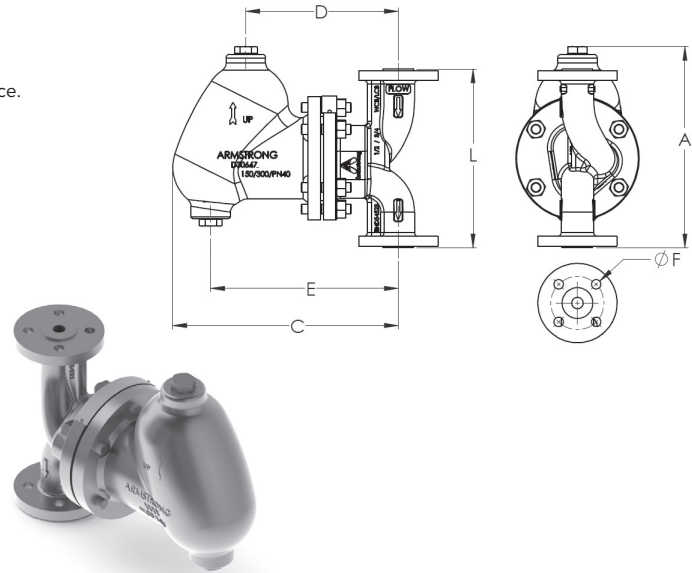
Flanged:	ASME B16.5, Class 150, Class 300
Screwed:	NPT BSPT
Socket Welded	

Option

Integral Vacuum Breaker: Add suffix VB to model number (limited to 150 psig (10.3 barg)).
Liquid Drainer: Add suffix LD to model number

Flow Direction

Vertical: Top to Bottom



Dimensions Table - Screwed and Socketweld										
Pipe Connection	in	mm	in	mm	in	mm	in	mm	in	mm
		1/2	DN15	3/4	DN20	1	DN25	1-1/2	DN40	2
"A" Height	8.5	216	8.5	216	9.0	228	12.6	319	12.6	319
"C" Length	10.9	279	10.9	279	12.2	309	14.9	380	14.9	380
"D" Length Cap \varnothing to Body \varnothing (Vent)	6.8	173	6.8	173	7.6	193	9.4	238	9.4	238
"E" Length Cap \varnothing to Body \varnothing (Drain)	8.4	213	8.4	213	8.9	228	9.4	238	9.4	238
"L" Face-to-Face	7.0	178	7.0	178	7.4	188	12.0	306	12.0	305
Weight lb (kg)	23 lb (10.4 kg)		23 lb (10.4 kg)		31 lb (14.1 kg)		85 lb (38.6 kg)		85 lb (38.6 kg)	
Maximum Allowable Pressure (Vessel Design)	580 psig @ 650°F (40.0 barg @ 343°C)									
Maximum Operating Pressure	465 psig (32.0 barg)									

Dimensions Table - ASME B16.5 Class 150										
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm
		1/2	DN15	3/4	DN20	1	DN25	1-1/2	DN40	2
"A" Height	8.9	228	9.0	229	9.4	238	12.6	321	12.6	321
"C" Length	11.9	301	12.0	306	13.4	339	15.7	399	15.7	399
"D" Length Cap \varnothing to Body \varnothing (Vent)	6.8	173	6.8	173	7.6	193	9.4	238	9.4	238
"E" Length Cap \varnothing to Body \varnothing (Drain)	8.4	213	8.4	213	8.9	228	9.4	238	9.4	238
"F" Bolt Hole Size	1/2" - 13 UNC		1/2" - 13 UNC		0.63	16.0	1/2" - 13 UNC		0.75	19.1
Number of Flange Holes	4									
"L" Face-to-Face	7.9	203	8.1	205	8.2	208	12.2	309	12.2	309
Weight lb (kg)	26 lb (11.7 kg)		27 lb (12.2 kg)		36 lb (16.3 kg)		94 lb (42.6 kg)		94 lb (42.6 kg)	
Maximum Allowable Pressure (Vessel Design)	200 psig @ 400°F (13.6 barg @ 205°C)									
Maximum Operating Pressure	200 psig (14.0 barg)									

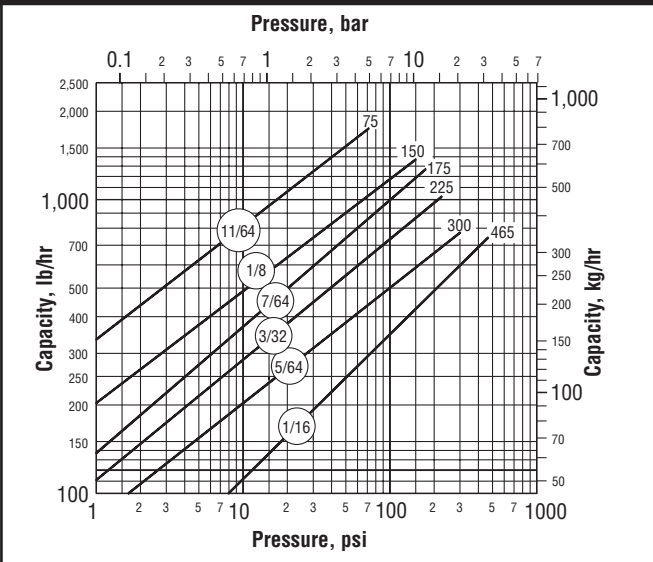
Dimensions Table - ASME B16.5 Class 300											
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm	
		1/2	DN15	3/4	DN20	1	DN25	1-1/2	DN40	2	DN50
"A" Height	9.1	231	9.1	231	9.5	241	12.8	324	12.8	324	
"C" Length	11.9	304	12.4	314	13.7	347	16.3	414	16.5	419	
"D" Length Cap \varnothing to Body \varnothing (Vent)	6.8	173	6.8	173	7.6	193	9.4	238	9.4	238	
"E" Length Cap \varnothing to Body \varnothing (Drain)	8.4	213	8.4	213	8.9	228	9.4	238	9.4	238	
"F" Bolt Hole Size	1/2" - 13 UNC		0.75	19.1	0.75	19.1	0.87	22.2	0.75	19.1	
Number of Flange Holes	4					8					
"L" Face-to-Face	8.2	209	8.2	209	8.4	212	12.4	315	12.4	315	
Weight lb (kg)	26 lb (11.7 kg)		27 lb (12.2 kg)		36 lb (16.3 kg)		94 lb (42.6 kg)		94 lb (42.6 kg)		
Maximum Allowable Pressure (Vessel Design)	580 psig @ 500°F (40.0 barg @ 260°C)										
Maximum Operating Pressure	465 psig (32.0 barg)										

ICS Series Float & Thermostatic Steam Traps

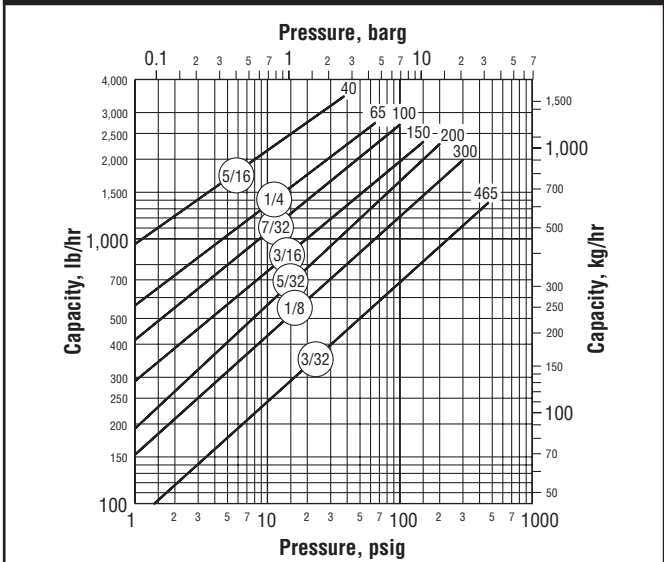
Carbon Steel for Horizontal Installation, With Thermostatic Air Vent

For Pressures to 465 psig (32.0 barg) Capacities to 60 000 lb/hr (27 215 kg/hr)

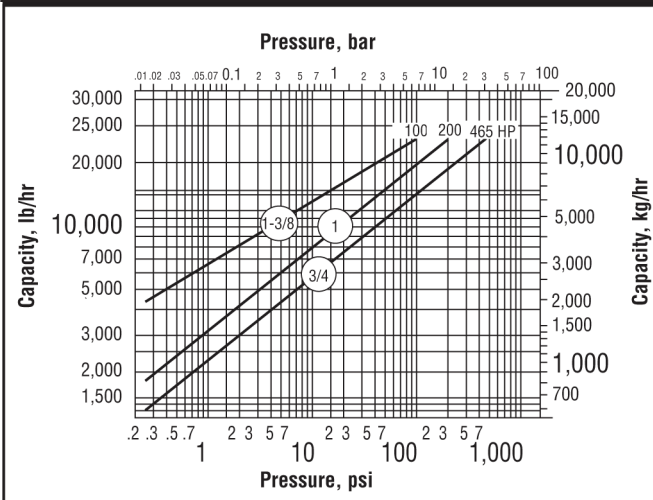
Model ICS Series Capacity 1/2" & 3/4"



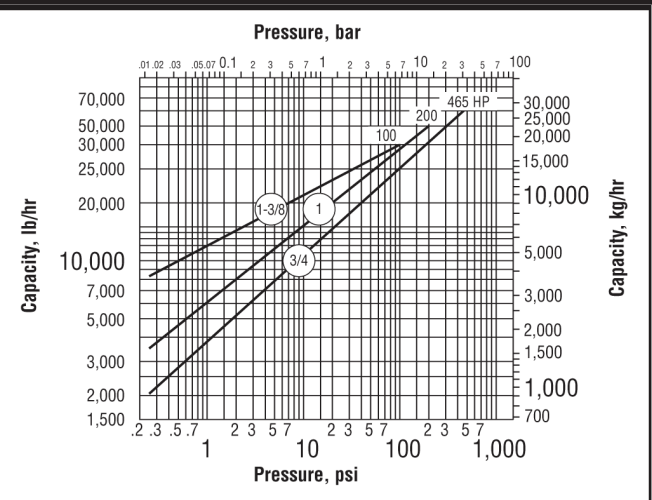
Model ICS Series Capacity 1"



Model ICS Series Capacity 1 1/2"

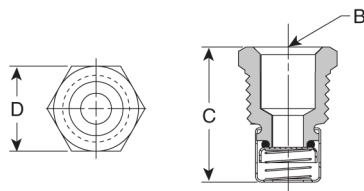


Model ICS Series Capacity 2"



Pressure	Model	Connection Size	Flow Direction	Connection Type
300	ICS	8	V	SCREWED
(*)	ICS	2 = 1/2" 3 = 3/4" 4 = 1" 6 = 1-1/2" 8 = 2"	Top to Bottom	Screw SW 15ORF 30ORF

(*) Refer to capacity charts to determine orifice.



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 (10.3 barg).

Vacuum Breaker			
Size	in	mm	Max. allow. pres.
	1/2 NPT	DN15	
"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.

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

Cast Steel for Horizontal Installation, With Thermostatic Air Vent

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

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 bar). Thus—up to 250 psig (17 bar)—air is vented at slightly below steam temperature.

Maximum Operating Conditions

Maximum allowable pressure (vessel design):

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

Maximum operating pressure:

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

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

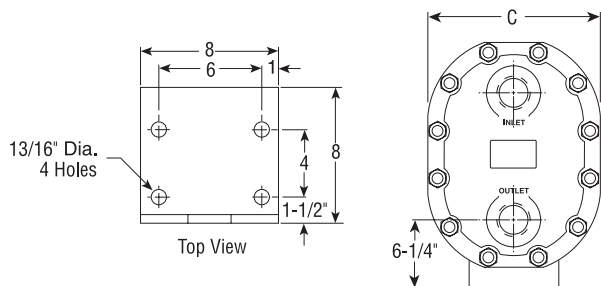
NOTE: For pressures above 250 psig (17 bar), the thermostatic vent should be removed and only a CC or LD version should be used.

Connections

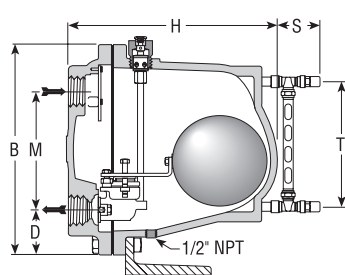
- Screwed NPT and BSPT
- Flanged (weld neck)
- Socketweld

Materials

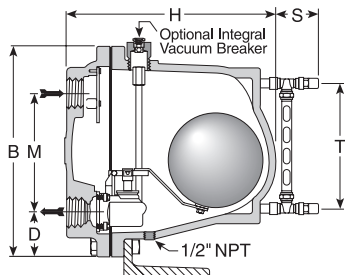
- Body and cap: ASTM A216 WCB
- Internals: All stainless steel—304
- Valve(s) and seat(s): Stainless steel
- Drain plug: Carbon steel
- Thermostatic air vent: Stainless steel and bronze with phosphor bronze bellows, caged in stainless steel



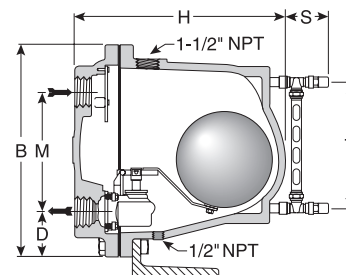
LS and MS Floor Mounting Bracket



Series LS, F&T shown



Series MS, CC shown



Series MS, LD shown

Options

- Integral vacuum breaker 150 psig (10 bar) 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 250 psig @ 424°F (17 bar @ 218°C)
- LS and MS Series available with floor mounting bracket. Consult factory.

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

LS & MS Series Traps		
Trap Series	LS & MS	
	in	mm
Pipe Connections	2, 2-1/2, 3*	50, 65, 80*
"B" (Height)	20	508
"C" (Width)	15-1/4	387
"D" (Bottom to ϕ)	4-3/16	106
"H" (Length)	20-1/4	514
"M" (ϕ to ϕ)	11-5/16	287
"S" (Gauge Glass Width)	4-5/8	117
"T" (Gauge Glass Height)	12	305
Weight, lb (kg)	290 (131.5)	

*MS Series 3" (80 mm) only.

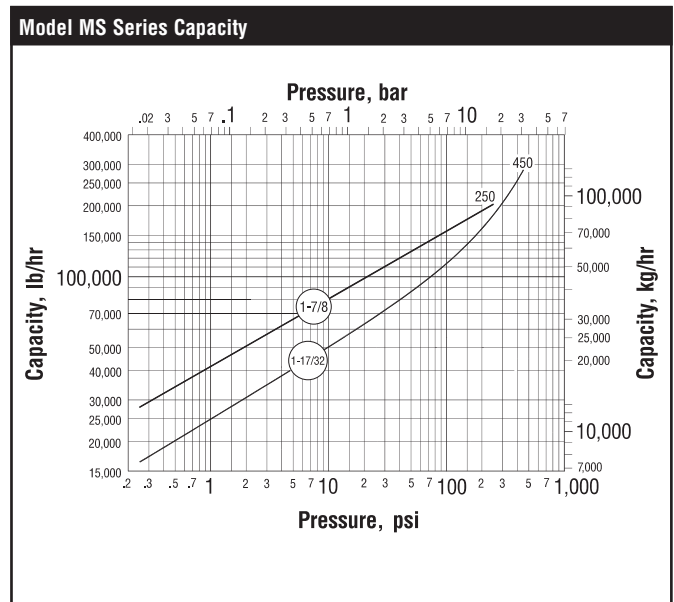
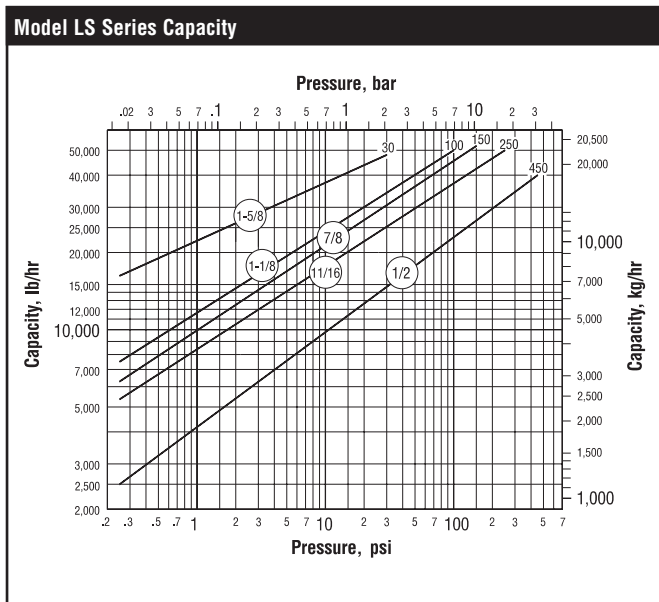
All models are CE marked according to PED (97/23/EC).

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

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

Cast Steel for Horizontal Installation, With Thermostatic Air Vent

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



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 consult your Armstrong Representative.

Installation Notes

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

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

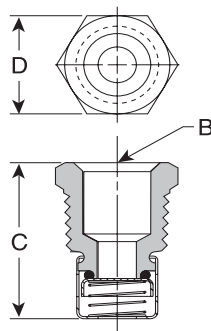
Ultra-Capacity LS and MS Series units **MUST BE WARMED UP** in the proper sequence and gradually. Recommended warm-up rate not to exceed 100°F/8 minutes.

See your Armstrong Representative.

Vacuum Breaker—1/2" (15 mm) NPT

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

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



Vacuum Breaker			
Size	in	mm	Max. allow. pres.
"B" (Pipe Connections)	1/2 NPT	15	150 psig (10) bar
"C" (Height)	3/8 NPT	10	
"D" (Width)	1-1/4	30	
	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.

CD-70 Series Disc Trap

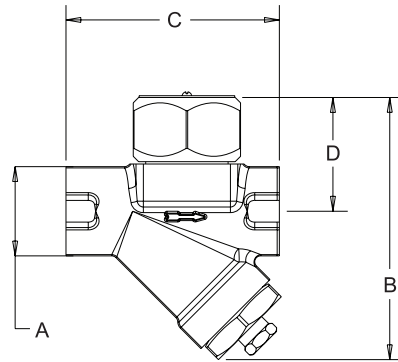
For Steam Service up to 1,010 psig (70 bar)...Capacities to 1,800 lb/hr (816 kg/hr)

The Armstrong CD-70 Series is a disc style trap designed to control the trap's cycle rate. By reducing the cycle rate, the Armstrong CD-70 Series 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-70 Series is designed with three discharge ports, which offer stable disc operation to extend trap operating life. The capacity of the Armstrong CD-70 Series has been engineered specifically for the following applications: large steam main drips, process equipment, and HVAC heating equipment on constant pressure.

Advantages

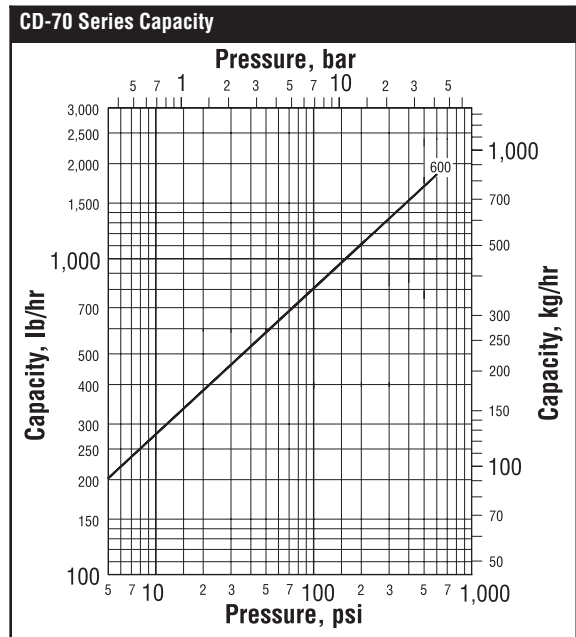
- Three discharge port design
- Minimum wear with controlled cycling
- Freeze-resistant
- Hardened seat and disc
- Weldable



Series CD-70

List of Materials				
Name of Part	Material			
	CD-70	CD-70S	CD-70S Forged	CD-72S
Body	WCB Carbon Steel	ASTM A350 LF2 Cl.1	Dual certified ASTM A105N / A350 LF2 Cl.1	
Cap	ASTM A743 Gr. CA40	ASTM A350 LF2 Cl.1	A105N / A350 LF2 Cl.1	
Disc	ASTM A276 Gr. 420			
Strainer Screen	—	30 x 30 Mesh T-304 Stainless Steel		
Screen Retainer	—	ASTM A276 Gr. 420	ASTM A350 LF2 Cl. 3	A105N / LF2
Blowdown Plug	—	Carbon Steel		T316 stainless steel

Dimensions and Weights				
Model No.	CD-70		CD-70S / CD-72S Forged	
	in	mm	in	mm
		1/2, 3/4	15, 20	1/2, 3/4
"A"	1-1/2	38	1-1/2	38
"B" Height	2-5/8	67	4-7/16	111
"C" Length	3-5/8	90	3-5/8	90
"D" ϕ to top of cap	2	50	2	50
Weight, lb (kg)	1.5 (0.68)		2.3 (1.0)	
Maximum Allowable Pressure (vessel design)	1010 psig @ 750°F (70 bar @ 399°C)			
Minimum Operating Pressure	3.5 psig (0.24 bar)			
Maximum Operating Pressure	600 psig @ 486°F (41 bar @ 252°C)			



Flange sizes, ratings and face-to-face dimensions are available on request.

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

SH-300 Bimetallic Steam Trap

Carbon Steel

For Pressures to 320 psig (22 bar)...Capacities to 4630 lb/hr (2,100 kg/h)

Description

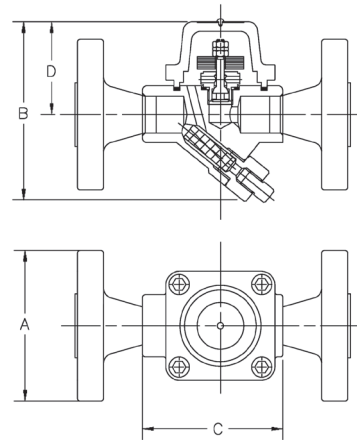
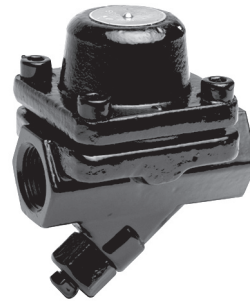
The SH-300 steam trap operates on the temperature principle using two layers of bimetallic elements that have different expansion coefficients. The stem connected to these elements moves a valve into either an open or closed position.

During start-up, the trap is cold so the elements are flat and the valve is wide open. This results in air and condensate being easily removed from the system.

In standard operation, the position of the valve depends on two parameters: first, the pressure, which will cause the valve to open; and second, the temperature, which will cause the elements to convex and the valve to close.

When no condensate is present and set temperature is reached, the force of the elements is then high enough to completely close the valve.

The SH-300 steam trap can adjust itself to changing conditions, because if the pressure rises, the higher pressure works on the valve. At the same time, the higher temperature will work on the elements.



Maximum Operating Conditions

Maximum allowable pressure (vessel design): 580 psi @ 662°F (40 bar @ 350°C)
 Maximum operating pressure: 319 psi (22 bar)
 Maximum back pressure: 99% of inlet pressure

Connections

Screwed BSPT and NPT
 Socketweld
 Flanged DIN or ANSI (welded)

Materials

Body and cap: ASTM A105
 ASTM A350-LF2
 Valve: Chrome Steel - 440C
 Seat: Stainless steel - 303, Boronized
 Bimetallic elements: Nickel plated

Valve Boronized

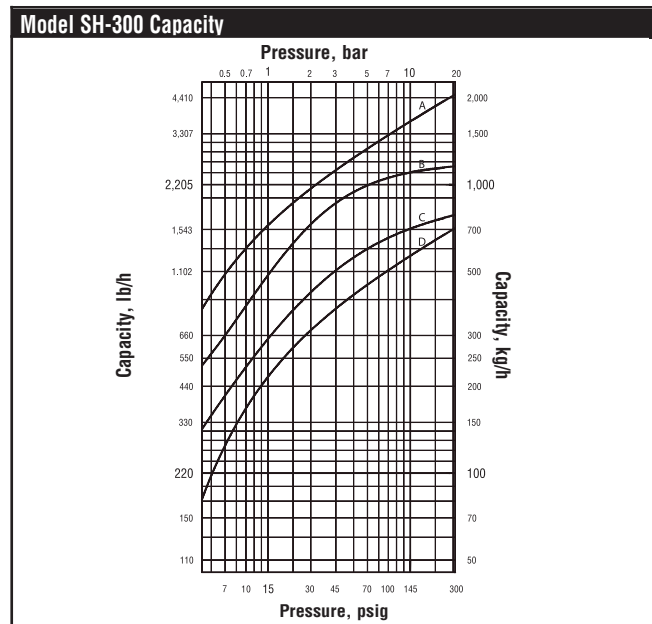
The problem of wiredrawing of valve and seat materials is well known to users of steam traps and other types of valves. Wiredrawing is a particular problem to valves and seats of bimetallic traps, which rely on bimetallic elements to operate.

To solve the problem of wiredrawing, a new thermochemical surface treatment has been developed. The basic valve material is machinable hardened chrome steel. Atoms of highly resistant material are thermochemically diffused into the valve, giving a layer of protection and a hardness of 1700 HV to the basic material. Because of this new thermochemical treatment, the surface of the valve is highly resistant to the erosive action of flashing condensate. The failure rate of Armstrong bimetallic traps due to wearing out of valve and seat material is greatly reduced.

How to Order

- Specify:
- Model number
 - Size and type of pipe connection.

Model SH-300 Trap						
Model No.	SH-300					
	in	mm	in	mm	in	mm
Pipe Connections	1/2	15	3/4	20	1	25
"B" (Height, screwed & SW)	4-1/2	115	4-1/2	115	4-1/2	115
"A" (Height, flanged PN40*)	4-1/2	115	4-1/2	115	4-1/2	115
"C" (Face-to-Face, screwed & SW)	3-1/2	90	3-1/2	90	-	-
"CC" (Face-to-Face, flanged PN40*)	6	150	6	150	6-1/4	160
"D" (C to Top)	2-5/16	60	2-5/16	60	2-5/16	60
Weight in kg (screwed & SW)	4.1 (1.9)					
Weight in kg (flanged PN40*)	9.5 (4.3)		10 (4.5)		10.4 (4.7)	



A = Cold Water
 B = 104°F (40°C) Below Saturation
 C = 68°F (20°C) Below Saturation
 D = 50°F (10°C) Below Saturation

* Other flange sizes, ratings and face-to-face dimensions are available on request.
 All sizes comply with the article 3.3 of the PED (97/23/EC).

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

SH-900 and SH-1500 Superheat Traps

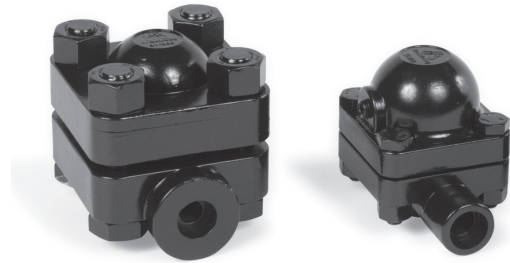
Bimetallic Steam Traps For Superheat Conditions

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

Description

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

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



Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model SH-900: 900 psig @ 900°F (62 bar @ 482°C)

Model SH-1500: 1,800 psig @ 1,050°F (124 bar @ 565°C)

Maximum operating pressure:

Model SH-900: 900 psig (62 bar)

Model SH-1500: 1,800 psig (124 bar)

Suggested minimum operating pressure:

Model SH-900: 200 psig (14 bar)

Model SH-1500: 600 psig (41 bar)

Connections

Model SH-900: Socketweld, flanged, buttweld, screwed, NPT, BSPT

Model SH-1500: Socketweld, flanged, buttweld

Materials

Model SH-900

Body and cap: ASTM A351 Gr. CF8M

Valve and seat: Titanium

Elements: Ni-Cr and stainless steel

Strainer: Stainless steel screen

Model SH-1500

Body and cap: ASTM 217 Gr. C12A

Valve and seat: Titanium

Elements: Ni-Cr and stainless steel

Strainer: Stainless steel screen

How to Order

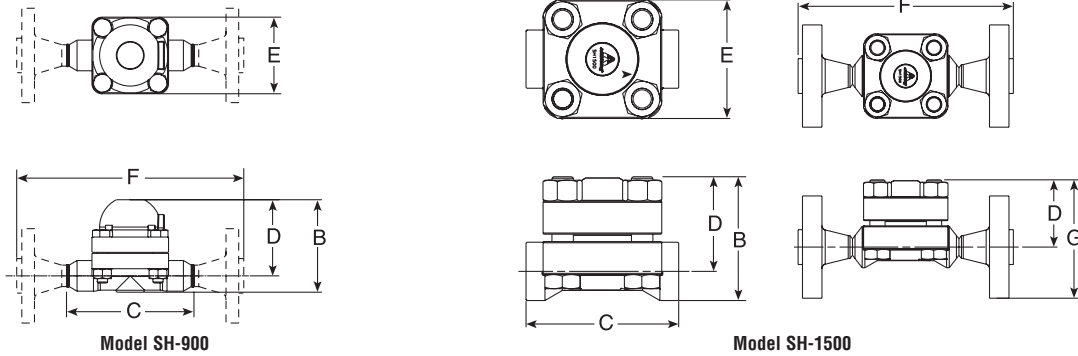
- Specify model number
- Specify maximum operating pressure
- Specify size and type of pipe connection. When flanges are required, specify type of flange in detail

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

SH-900 and SH-1500 Superheat Traps

Bimetallic Steam Traps For Superheat Conditions

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

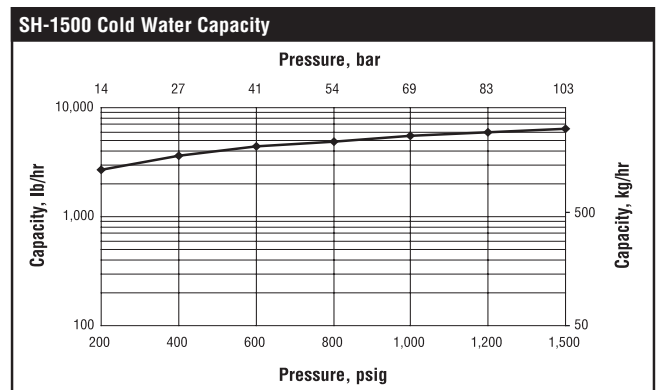
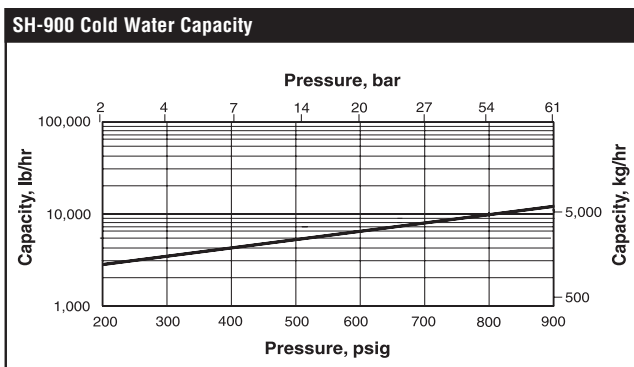
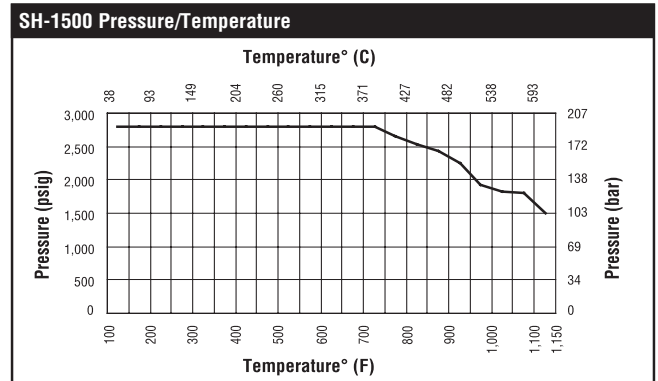
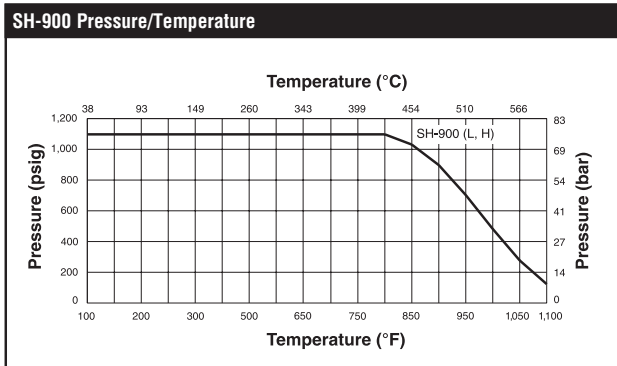


Model SH-900/SH-1500				
Model No.	SH-900		SH-1500	
	in	mm	in	mm
Pipe Connections	1/2, 3/4, 1**	15, 20, 25	1/2, 3/4, 1	15, 20, 25
"B" (Height)	4-1/2	115	5	127
"C" (Face-to-Face)	6-1/4	158	6-1/4	158
"D" (Ø to Top)	3-3/4	95	3-13/16	97
"E" (Width)	3-3/4	95	4-7/8	124
**"F"	11	279	12	305
**"G"	-	-	6-3/8	162
Weight, lb (kg)	10 (4.4)		15 (6.8)	

**SH-900 1" butt weld

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

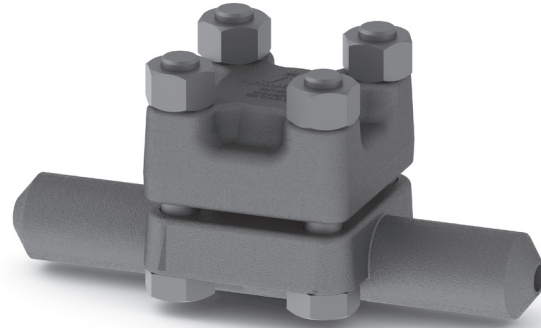
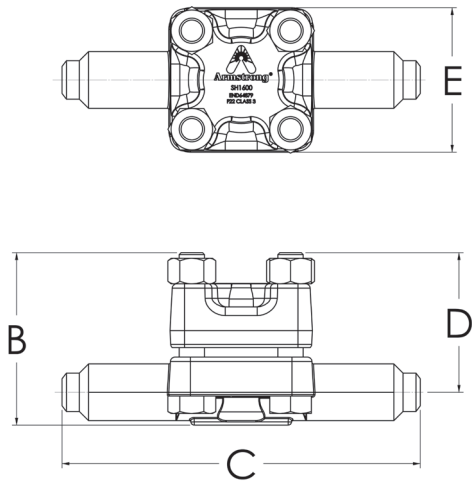
All sizes comply with article 3.3 of the PED (97/23/EC)



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)



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)

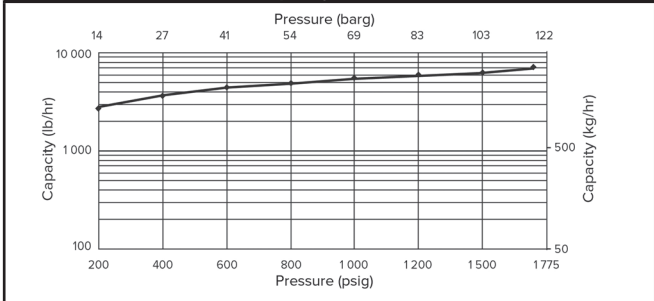
Maximum operating pressure: 1 750 psig (120.6 barg)

Suggested minimum operating pressure: 600 psig (41 barg)

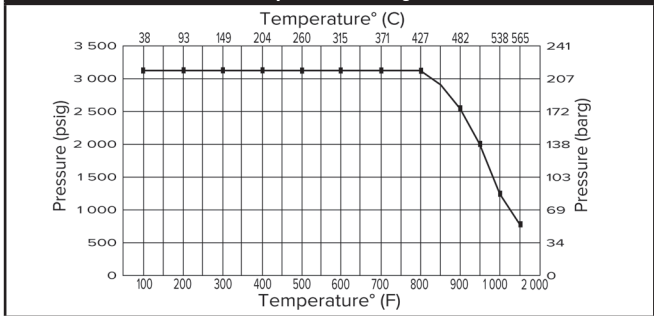
SH-1600		SH-1600	
Model			
Pipe Connections	in	mm	
	1/2, 3/4, 1	15, 20, 25	
"B" (Height)	5-3/16	148	
"C" (End-to-End) - Socket Weld	12-3/8	315	
"C" (End-to-End) - Butt Weld	12-3/8	315	
"D" (Centerline to Top)	4-13/16	123	
"E" (Width)	5	127	
Weight in lb(Kg) - SW/BW	33 (15.0)		

Consult the factory for weight and dimensions of flanged connections.

Model SH-1600 Cold Water Capacity



Model SH-1600 Pressure/Temperature Rating



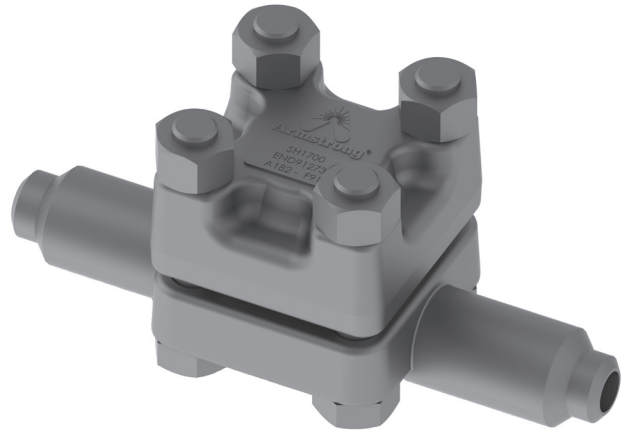
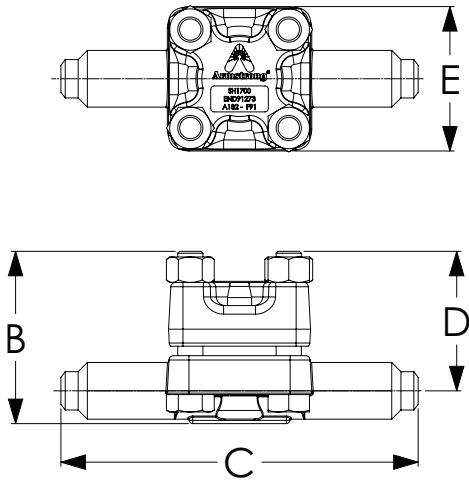
SH-1600

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

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

SH-1700 Bimetallic Steam Trap for Superheat Conditions

For Pressures to 1 990 psig (137.2 barg)...Cold Water Capacities to 6 500 lb/hr (2 950 kg/hr)



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-1700 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): 1 990 psig @ 1 004°F (137.2 barg @ 540°C)

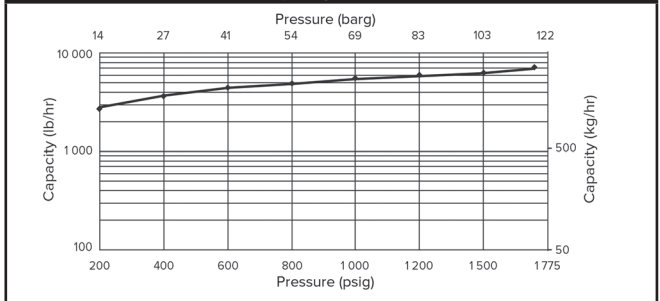
Maximum operating pressure: 1 800 psig (124.1 barg)

Suggested minimum operating pressure: 600 psig (41 barg)

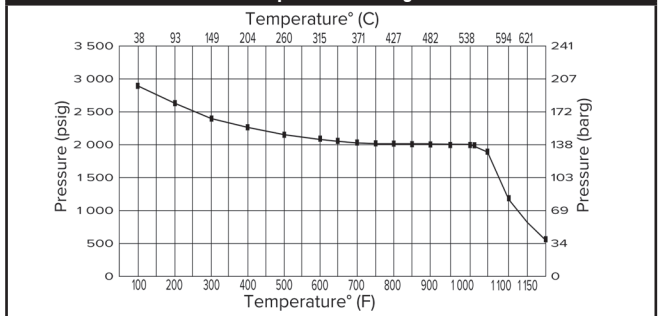
SH-1700		
Model	SH-1700	
Pipe Connections	in	mm
	1/2, 3/4, 1	15, 20, 25
"B" (Height)	5-3/16	148
"C" (End-to-End) - Socket Weld	12-3/8	315
"C" (End-to-End) - Butt Weld	12-3/8	315
"D" (Centerline to Top)	4-13/16	123
"E" (Width)	5	127
Weight in lb(Kg) - SW/BW	33 (15.0)	

Consult factory for weight and dimensions of flanged connections.

Model SH-1700 Cold Water Capacity



Model SH-1700 Pressure/Temperature Rating



SH-1700

Connections	Socketweld, Butt weld, Flanged
Material	
Body and Cap	ASTM A-182 F91
Valve	Titanium
Seat	
Bimetallic Elements	Nickel-chrome and stainless steel
Screen	Stainless Steel
Bolts	ASTM A193 Gr. B8C
Nuts	ASTM A194 Gr. 8C

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

MT Series Thermostatic Wafer Steam Trap

Stainless Steel or Carbon Steel

For Pressures to 350 psig (24 bar)...Cold Water Start-Up Capacities to 1,000 lb/hr (453 kg/hr)

Description

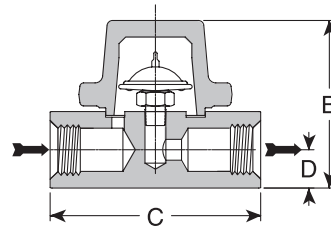
The thermostatic wafer steam trap, the Series MT-2, is sized precisely to handle the extremely low condensate load found in most instrument steam tracer lines. The MT thermostatic wafer traps are designed to last longer than other oversized, all-purpose thermostatic and thermodynamic steam traps.

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

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

How to Order

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



Model MT-2 Trap

MT-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 (10°C) Below Saturation	
psi	bar	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

* 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.

MT-2 Thermostatic Wafer Steam Trap		
Model No.	MT-2	
	in	mm
Pipe Connections	1/2, 3/4	15, 20
"B" (Height)	3	76
"C" (Face-to-Face)	3-1/2	89
"D" (⌀ to Bottom)	11/16	17
Weight, ln (kg)	4 (1.7)	

All models comply with the article 3.3 of the PED (97/23/EC).

Model	MT-2
Pipe Connections	Screwed NP7 & BSPT, Socketweld flanged
Material	
Cap and body	Carbon steel
Capsule	All stainless steel - 304
Maximum Operating Conditions	
Maximum Allowable Pressure (vessel design)	350 psig @ 662°F (24 bar @ 350°C)
Maximum Operating Pressure	250 psig (17 bar)

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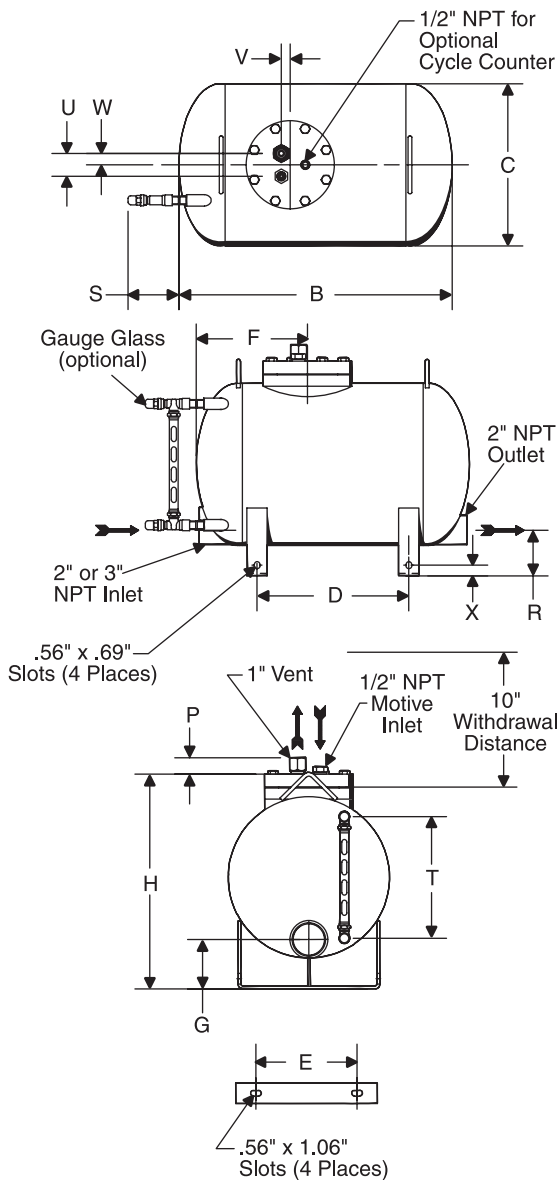
PT-300 Series Horizontal Steel, Low Profile Pump Trap



The Armstrong PT-300 Series Horizontal, Low Profile Pump Trap is the low maintenance non-electric solution to move condensate or other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned at temperatures well above the 200°F (93°C) limit of conventional electric condensate pumps without the headaches of leaking seals or cavitation problems.

Features

- Non-electric—Uses inexpensive steam, air or gas to operate the pump trap
- Low profile—For tight space requirements
- High capacity—Provides highest capacity in the industry, moving 12 gallons per pump cycle
- Standard unit intrinsically safe
- ASME code stamped 150/300 carbon steel or stainless steel body vessel
- Low maintenance—No leaking seals, impeller or motor problems
- All stainless steel internals with durable Inconel X-750 springs
- Externally removable/replaceable seats—Valve and seats can be replaced or cleaned without removing pump cap from body



PT-300 Pumping Trap Physical Data		
Model No.	PT-308 PT-312	
	in	mm
"B"	27	686
"C"	16	406
"D"	15	381
"E"	10	254
"F"	11	279
"G"	5-7/16	138
"H"	21-3/16	538
"P"	1-5/8	41
"R"	4-13/16	122
"S"	5-1/32	128
"T"	12	305
"U"	2-1/4	57
"V"	7/8	22
"W"	1-1/4	32
"X"	1-1/16	27
Face to Face	27-1/2*	698
Weight lb (kg)	154 (70)	
Number of Body/Cap Bolts	8	
Check Valve Conn. in (mm)	2 (50)	3 (75)
Bronze Check Valves lb (kg)	16 (7)	29 (13)
Stainless Steel Check Valves lb (kg)	15 (7)	38 (17)

Maximum Allowable Pressure (Vessel Design): 150 psig @ 650°F (10 bar @ 343°C)
 Maximum Operating Pressure: 125 psig (9 bar)

*Tolerance +/- 1/2"

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

PT-300 Series Horizontal Steel, Low Profile Pump Trap

PT-300 Pumping Trap Capacities	
Name of Part	Series PT-300*
Body and Cap	Fabricated steel 150 psi ASME Sec. VIII design "U" stamped
Cap Gasket	Compressed non-asbestos
Bolts	SA-449 steel
Nuts	None
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Valve Assembly Washers	Zinc plated steel
Plug	Steel
Mechanism Assembly	Stainless steel
Springs	Inconel X-750

PT-300 Pumping Trap Connections Sizes				
Model	Horizontal Steel			
	PT-308		PT-312	
	in	mm	in	mm
Inlet Connection	2	50	3	80
Outlet Connection	2	50	2	50
Motive Pressure Connection	1/2	15	1/2	15
Vent Connection	1	25	1	25
Optional Gauge Glass Connection	1/2	15	1/2	15

NOTES: Optional flanged or socketweld connections available. Consult factory.

*Series PT-300 is available in all stainless steel. Consult factory.

PT-300 Pumping Trap Capacities											
Motive Pressure		Total Lift or Back Pressure		PT-308 (12" Fill Head) 2" x 2"				PT-312 (12" Fill Head) 3" x 2"			
psig	bar	psig	bar	Steam Motive		Air Motive		Steam Motive		Air Motive	
				lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0	5	0.34	6,900	3,130	9,200	4,173	9,000	4,082	12,300	5,579
25	1.7			10,200	4,622	10,900	4,944	13,200	5,987	14,200	6,441
50	3.5			10,600	4,808	11,100	5,035	15,100	6,849	15,800	7,167
75	5.0			10,800	4,898	11,300	5,126	15,300	6,940	16,100	7,303
100	7.0			11,200	5,080	*	*	15,500	7,031	*	*
125	8.5			11,600	5,261	*	*	16,600	7,530	*	*
25	1.7	15	1	7,000	3,175	10,100	4,581	9,000	4,082	11,200	5,080
50	3.5			9,600	4,354	10,900	4,944	12,800	5,806	13,800	6,260
75	5.0			10,750	4,876	11,100	5,035	14,200	6,441	15,000	6,804
100	7.0			10,900	4,944	*	*	14,300	6,486	*	*
125	8.5			11,300	5,125	*	*	15,100	6,849	*	*
35	2.5	25	1.5	7,100	3,221	9,200	4,173	8,100	3,674	11,500	5,216
50	3.5			8,300	3,765	10,200	4,627	10,200	4,627	12,750	5,783
75	5.0			10,100	4,581	11,000	4,989	12,500	5,670	13,500	6,123
100	7.0			10,200	4,627	*	*	12,700	5,761	*	*
125	8.5			10,300	4,672	*	*	13,000	5,897	*	*
50	3.5	40	3	5,700	2,585	7,600	3,447	6,600	2,994	9,800	4,445
60	4.0			6,600	2,994	8,800	3,992	8,400	3,810	10,500	4,763
75	5.0			7,600	3,447	10,100	4,581	9,800	4,445	12,700	5,761
100	7.0			8,400	3,810	*	*	10,100	4,581	*	*
125	8.5			9,400	4,264	*	*	10,300	4,672	*	*
70	4.5	60	4	4,500	2,041	7,000	3,175	6,000	2,722	10,200	4,627
75	5.0			4,700	2,132	7,100	3,221	6,400	2,903	10,400	4,717
100	7.0			6,400	2,903	*	*	7,100	3,221	*	*
125	8.5			6,600	2,994	*	*	7,400	3,357	*	*

NOTES: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump cap.

Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1 bar) above discharge (outlet) pressure. This ensures longevity of economical (brass) check valves and reduces both venting time and temperature differential (on steam). If a higher differential is used, stainless steel check valves are recommended.

*Consult factory.

PT-300 Capacity Conversion Factors for Others Fill Heads										
Fill Head	in		mm		in		mm		in	
	0	0	6	152	12	305	24	610	36	914
Model	PT-308	0.7	0.85	1.0	1.2	1.3				
	PT-312	0.7	0.85	1.0	1.08	1.2				

NOTES: Fill head is measured from drain point to top of cap.

Discharge per cycle is typically 12 gallons for PT-3000 Series.

Options

Use of external check valves required for operation of pumping trap.

- Inlet Swing Check Valve
 - NPT Bronze ASTM B 62
 - Teflon® Disc
 - Class 150 (Minimum)
- Outlet
 - Stainless Steel Check Valve
 - Class 150 (Minimum)
- In-line Check Valves
 - Stainless Steel Non-Slam Check Valves
- Bronze Gauge Glass Assembly
- Steel Gauge Glass Assembly
- Removable Insulation Jacket
- Digital Cycle Counter

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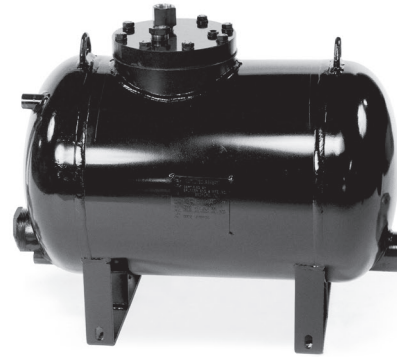
PT-300LL Light Liquid Pump Traps

Features

- Non-electric uses nitrogen or inert gas to operate
- Standard unit intrinsically safe
- ASME code stamped carbon steel or stainless steel body vessel
- Low maintenance—No leaking seals, impeller or motor problems
- All stainless steel internals with durable Inconel X-750 springs
- Externally removable/replaceable seats—seats can be replaced or cleaned without removing pump cap from body
- For specific gravity down to 0.65

Typical Applications

- Hydrocarbon knockout drum/separator
- Flare header drain
- Applications where the specific gravity of the liquid could be as low as 0.65
- Applications where hydrocarbons may be present



PT-300LL Light Liquid Pump Trap

Technical Data

Back Pressure

- Maximum back pressure for the PT-300LL is 60 psig (4.1 bar)

Motive Pressure

- Maximum motive pressure (Nitrogen or Inert Gas) is 100 psig (6.9 bar)

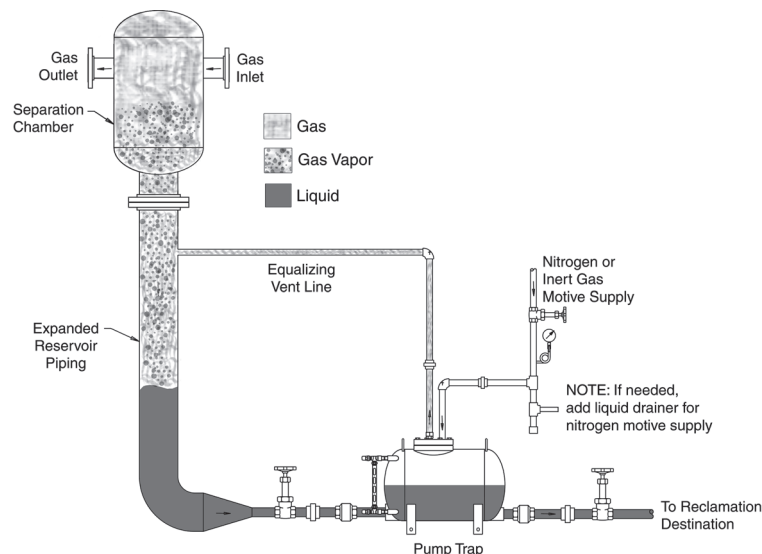
Capacities

- PT-300LL will discharge approximately 12 gallons (45 liters) per cycle

NOTE: To determine the lb/hr of liquid being pumped, use the following formula:

$$\text{lb/hr of liquid} = \text{capacities} \times \text{specific gravity of liquid}$$

Consult Armstrong for engineered pre-piped receiver packages.



Hydrocarbon Knockout Drum Separator

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

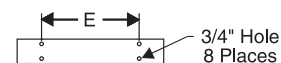
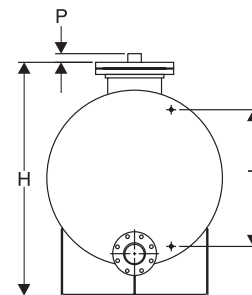
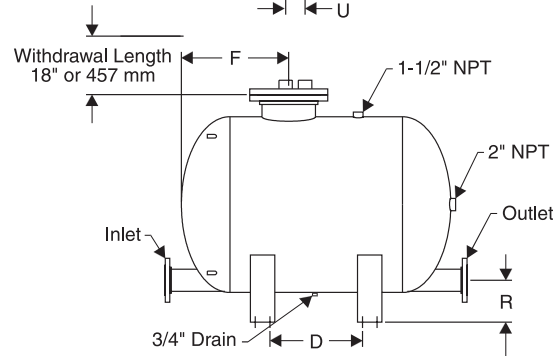
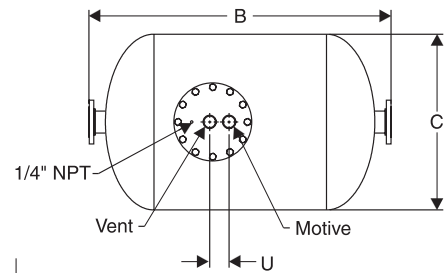
PT-516 High Capacity Pump Trap

Effective recovery and return of hot condensate are essential to overall plant efficiency while conserving energy. Large amounts of condensate provide the best opportunities to save energy.

The Armstrong PT-516 High Capacity Pump Trap is the low maintenance, non-electric solution to moving large amounts of condensate and other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned at temperatures well above the 200°F (93°C) limit of conventional electric pumps without the headaches of leaking seals or cavitation.

Features

- Non-electric—Uses inexpensive steam, air or gas to operate the pump trap
- No leaking seals/packings, impeller wear, electrical or motor problems—Reduces maintenance and downtime
- Single trade installation or repair reduces installation and maintenance costs
- Direct spring/float actuated mechanism—No maintenance intensive diaphragm operated valve mechanism
- Compression spring design—Reduces downtime, ensures performance and reliability
- Rugged stainless steel internals—Durable and corrosion resistant for enhanced service life
- Closed loop—No motive steam or flash steam loss, therefore capturing and returning all valuable Btu back to the system
- Safety—Pump can be placed in flooded pits without fear of electrocution or circuit breaker defaults
- Standard unit intrinsically safe



PT-516 High Capacity Pump Trap Physical Data		
	in	mm
Inlet Connection	4 150# ANSI Flg.	100 150# ANSI Flg.
Outlet Connection	4 150# ANSI Flg.	100 150# ANSI Flg.
Motive Connection	2 NPT	50 NPT
Vent Connection	2 NPT	50 NPT
Gauge Glass Connection	1/2 NPT	15 NPT
"B"	62	1,574
"C"	36	914
"D"	19-1/16	484
"E"	20	508
"F"	22	559
"H"	48	1,219
"P"	1-3/4	44
"R"	8-3/4	222
"T"	28	711
"U"	4	102
Weight lb (kg)	807 (366)	
Number of Bolts	12	

Maximum Operating Pressure on standard unit: 150 psig (10 bar).
 For higher pressure, consult factory.
 Maximum Allowable Pressure (standard vessel design): 150 psig @ 500°F (10 bar @ 277°C).
 300 psig (21 bar)vessel upon request.

PT-516 Capacity Conversion Factors for Other Fill Heads												
Fill Head	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	0	0	6	152	12	305	16	406	24	610	36	914
PT-516	0.7		0.75		0.8		0.85		1.0		1.08	

Discharge per cycle is typically 130 gallons.

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

PT-516 High Capacity Pump Trap

Typical Applications

- Low pressure heating systems
- Process heat exchanger or coils with modulating steam control
- Remote installations (tracing, tank farms or remote coils)
- Systems under vacuum
- Hazardous (explosion proof) areas
- Caustic environments
- Sumps or submersed areas

PT-516 High-Capacity Pump Trap Materials	
Name of Part	Description
Cap, Body, Bolting	Fabricated steel 150 psi ASME Sec. VIII design "U" stamp coded
Cap Gasket	Compressed non-asbestos
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Machanism Assembly: Frame, Float, and Spring	Stainless steel

NOTES: 300 psig ASME vessel available upon request. PT-516 available in all stainless steel. Consult factory.

Armstrong PT-516 Pump Trap Sizing and Selection

PT-516 Pump Trap Capacities								PT-516 Pump Trap Capacities							
Motive Pressure		Total Lift or Back Pressure		4" x 4" Connections 24" Fill Hard				Motive Pressure		Total Lift or Back Pressure		4" x 4" Connections 24" Fill Hard			
				Steam Motive		Air Motive						Steam Motive		Air Motive	
psig	bar	psig	bar	lb/hr	kg/hr	lb/hr	kg/hr	psig	bar	psig	bar	lb/hr	kg/hr	lb/hr	kg/hr
15	1	5	0.34	28,962	13,137	57,619	26,136	35	2.5	25	1.7	29,212	13,251	46,238	20,973
25	1.7			37,162	16,857	61,911	28,083	50	3.5			33,413	15,156	50,962	23,116
35	2.5			42,563	19,307	64,738	29,365	60	4			35,672	16,181	53,418	24,211
50	3.5			48,288	21,903	67,735	30,725	70	4.5			37,646	17,076	56,313	25,138
60	4			51,214	23,231	69,267	31,420	75	5			38,548	17,485	60,141	25,544
70	4.5			53,688	24,138	70,562	32,007	100	7			42,454	19,257	*	27,280
75	5			54,796	24,855	71,142	32,270	125	8.5			45,649	20,706	*	*
100	7			59,414	26,950	73,559	33,366	150	10.34			*	*	*	*
125	8.5			62,995	28,575	*	*	50	3.5			26,210	11,889	41,244	18,708
150	10.34			65,922	29,902	*	*	60	4			27,353	12,407	44,028	19,971
25	1.7	15	1	36,720	16,656	50,783	23,035	70	4.5	40	3	28,319	12,846	46,382	21,039
35	2.5			40,611	18,421	54,293	24,627	75	5			28,752	13,042	47,435	21,517
50	3.5			45,196	20,501	58,013	26,315	100	7			30,555	13,860	51,828	24,022
60	4			47,740	21,655	59,915	27,177	125	8.5			31,954	14,494	*	*
70	4.5			50,005	22,682	61,523	27,907	150	10.34			33,097	15,013	*	*
75	5			51,054	23,159	62,243	28,233	70	4.5			25,973	11,781	32,026	14,527
100	7			55,675	25,254	65,243	29,594	75	5			26,373	11,963	33,514	15,202
125	8.5			59,552	27,013	*	*	100	7			28,042	12,720	40,951	18,575
150	10.34			62,923	28,542	*	*	125	8.5			29,336	13,307	*	*
								150	10.34			30,394	13,787	*	*
100	7	80	5.5	23,892	10,837	34,893	15,827	100	7	23,892	10,837	34,893	15,827		
125	8.5			24,231	10,991	*	*	125	8.5	24,231	10,991	*	*		
150	10.34			24,570	11,145	*	*	150	10.34	24,570	11,145	*	*		

NOTES: Published capacities above are based on **actual** steam testing using a minimum 200°F condensate. Published capacities are based on the use of external check valves supplied by Armstrong.

*Consult factory.

Options

External check valves required for use of pumping trap.

- Inlet/Outlet Check Valve
CS/SS Wafer Style or All Stainless Steel Wafer Style
- Bronze 6.6 Assembly
- Removable Insulation Jacket
- Digital Cycle Counter

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

Reservoir and Vented Receiver Sizing— PT-516 Series High Capacity

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

For Closed Reservoir Piping

1. Determine condensate load.

Example 30,000 lb/hr:

- Reference the Inlet Reservoir Pipe table top right. Find the 30,000 lb/hr condensate load in column one. Move across the columns to find the proper pipe sizing.

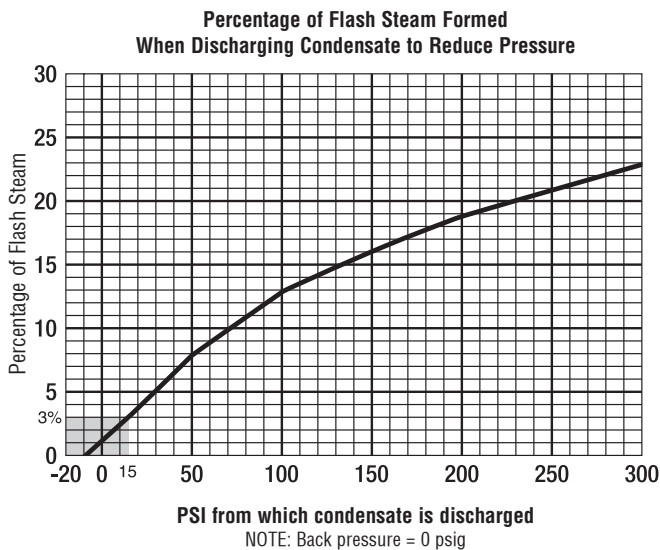
For Vented Receiver Sizing

1. Determine the pressure from where the condensate is being discharged.

2. Determine condensate load.

- Reference the chart below to find the pressure that corresponds with the discharge condensate pressure. For this example, use 15 psig.
- Follow 15 psig to where it intersects the “0” psig curve. Move to the left from intersecting lines for the percentage of flash that will be created. For this example, it will be 3%.
- Multiply the 3% by the condensate load. For this example, it is 30,000 lb/hr. Thus, 30,000 x .03 = 900 lb/hr of flash steam.

Using the Vented Receiver table bottom right, find the amount of flash steam in column one. Follow the table across to determine the sizing of the vented receiver.



PT-516 Inlet Reservoir Pipe Sizing for Closed Systems						
Condensate Load lb/hr (kg/hr)	Reservoir Pipe Diameter, in					
	8	10	12	16	20	24
up to	Length of Pipe, ft (m)					
10,000 (4 500)	6-1/2 (2)	6 (1,8)	5 (1,5)	3 (0,9)	2 (0,6)	
20,000 (9 000)	12 (3,6)	11-1/2 (3,5)	10 (3,0)	7 (2,1)	4 (1,2)	
30,000 (13 500)		12 (3,6)	10-1/2 (3,2)	9 (2,7)	6 (1,8)	4 (1,2)
40,000 (18 000)		17 (5,2)	14 (4,3)	12 (3,6)	8 (2,4)	6 (1,8)
50,000 (22 500)			16 (4,9)	13 (4,0)	9 (2,7)	6 (1,8)
60,000 (27 000)				15 (4,6)	11 (3,3)	8 (2,4)
70,000 (31 500)					15 (4,6)	10 (3,0)

NOTE: When BP/MP is less than 50%, the reservoir diameters above can be reduced by 1/2" (15 mm). When draining condensate from a single piece of equipment in a closed system, to achieve maximum energy efficiency a reservoir should be installed horizontally above and ahead of the pump trap. Sufficient reservoir volume is required above the filling head level to hold condensate during the pump trap discharge cycle. The table above shows the minimum reservoir sizing, based on the condensate load, to prevent equipment flooding during the pump trap discharge cycle.

PT-516 Vented Receiver for an Open System			
Flash Steam lb/hr (kg/hr)	Receiver Diameter, in	Receiver Length, in (mm)	Vent Line Diameter, in
up to			
1,000 (450)	16	60 (150)	6
2,000 (900)	20	60 (150)	8
3,000 (1 360)	24	60 (150)	8
4,000 (1 820)	26	60 (150)	10
5,000 (2 270)	28	60 (150)	10
6,000 (2 720)	30	72 (180)	12
7,000 (3 180)	32	72 (180)	12
8,000 (3 630)	36	72 (180)	14

NOTE: When draining from single or multiple pieces of equipment in an open system, a vented receiver should be installed horizontally above and ahead of the pump trap. In addition to sufficient holding volume of the condensate above the fill head of the pump trap to hold the condensate during the pump trap cycle, the receiver must also be sized to allow enough area for flash steam and condensate separation. An overflow could also be added when required. The minimum recommended water seal is 12" (305 mm). The table above shows proper receiver tank sizing based on flash steam present. See chart left to calculate the percentage (%) of flash steam at a given pressure drop.

Double Duty® 6

Steam Trap/Pump Combination

Description

Armstrong's Double Duty® Series steam trap/pump combination offers a low profile solution to draining heat exchangers in various applications.

The Double Duty® 6 is an ASME code stamped carbon steel vessel. The Double Duty® 6 offers you the versatility of combining a pump within a steam trap to aid in condensate drainage under all operating conditions.

Features

- Non-Electric
- Low profile for tight space requirements
- Inconel X-750 springs
- ASME code stamped to 200 psig (available in stainless steel)
- All stainless steel internals
- Externally removable vent/motive seats

Maximum Operating Conditions

Maximum allowable pressure

DD-6 200 psig @ 400°F (14 bar @ 204°C)

Maximum operating pressure:

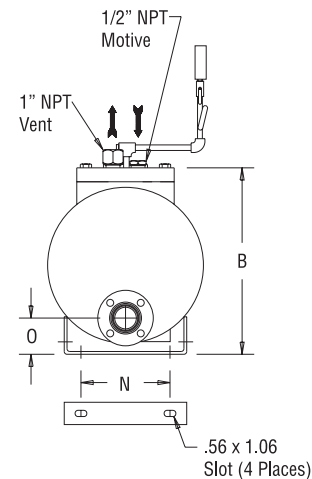
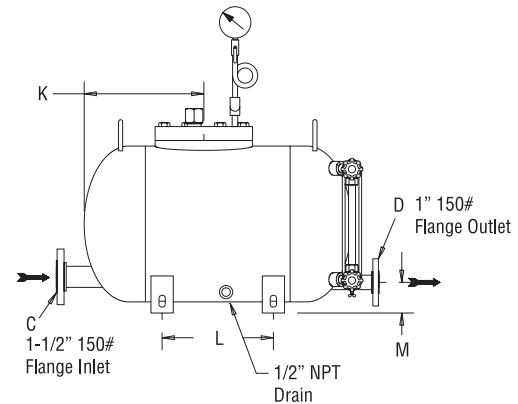
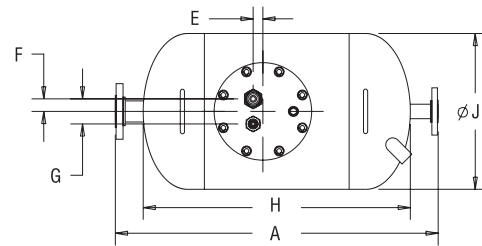
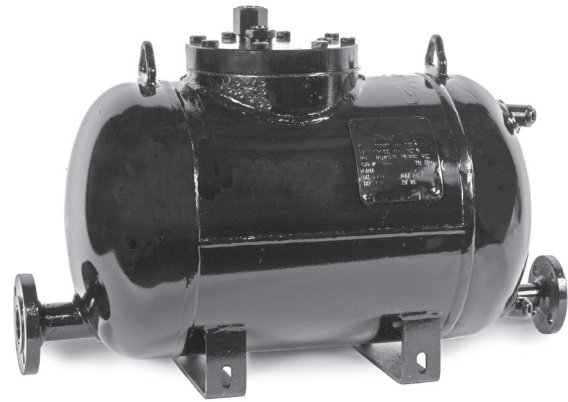
DD-6 200 psig @ 400°F (14 bar @ 204°C)

Materials

Body: ASME Code Stamped Carbon Steel

Springs: Inconel X-750

Internals: All stainless steel



Double Duty® 6		
	in	mm
"A"	29	737
"B"	16-11/16	424
"C"	1-1/2	38
"D"	1	25
"E"	7/8	22
"F"	1-1/8	28
"G"	2-1/4	57
"H"	24	610
"J"	14	356
"K"	10-13/16	275
"L"	10	254
"M"	2-13/16	71
"N"	8	203
"O"	3-3/16	81
Weight, lb (kg)	140 (64)	

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

Double Duty® 6

Steam Trap/Pump Combination

Double Duty® 6 Pump Capacities					
Motive		Back Pressure		Capacity	
psig	bar	psig	bar	lb/hr	kg/hr
15	1	5	.034	2,400	1,089
25	1.7			3,000	1,361
50	3.5			4,000	1,814
75	5			4,500	2,041
100	7			4,600	2,087
125	8.5			4,700	2,132
150	10.34			4,800	2,177
175	12			4,800	2,177
200	14			4,600	2,087
25	1.7	15	1	2,000	907
50	3.5			2,800	1,270
75	5			3,400	1,542
100	7			3,600	1,633
125	8.5			3,700	1,678
150	10.34			3,800	1,724
175	12			3,600	1,633
200	14			3,500	1,588
35	2.5	25	1.7	1,800	816
50	3.5			2,300	1,043
75	5			2,900	1,315
100	7			3,000	1,361
125	8.5			3,000	1,361
150	10.34			2,900	1,315
175	12			2,500	1,134
200	14			2,300	1,043
50	3.5	40	3	1,400	635
75	5			2,000	907
100	7			2,400	1,089
125	8.5			2,500	1,134
150	10.34			2,500	1,134
175	12			1,800	816
200	14			1,700	771
75	5	60	4	1,500	680
100	7			1,800	816
125	8.5			2,000	907
150	10.34			1,700	771
175	12			1,500	680
200	14			1,400	635

NOTE: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump case.

DoubleDuty 6 Packaged Solution

The Double Duty® 6 Trap/Pump receiver package provides you with effective condensate drainage under all operating conditions. The built in steam trap allows for successful removable of condensate when system pressures are sufficient to return condensate while the integral pump mechanism will provide a steam powered pump assist when system pressures stall the heat exchanger. Built out of rugged carbon steel, the Double Duty® 6 Low Boy package will provide you the very latest in condensate return technology from Armstrong International.

Double Duty® 6 Pump Capacities			
Differential Pressure		Capacity	
psig	bar	lb/hr	kg/hr
2	0.14	9,500	4,309
5	0.34	12,400	5,625
10	0.7	15,000	6,804
25	1.7	20,400	9,253
50	3.5	22,500	10,206
75	5.2	22,500	10,206
100	6.9	22,500	10,206
150	10.3	22,500	10,206
200	13.8	22,500	10,206

Capacity Conversion Factors for Other Filling Heads				
Filling Head				
in	0	6	12	* 24 or greater
mm	0	150	305	* 620 or greater
Double Duty DD-6	0.7	1.0	1.08	* Consult factory

*Discharge per cycle typically 3.5 gallons for DD-6.
NOTE: Fill head measured from drain to top of cap.

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

Double Duty® 12

Steam Trap/Pump Combination

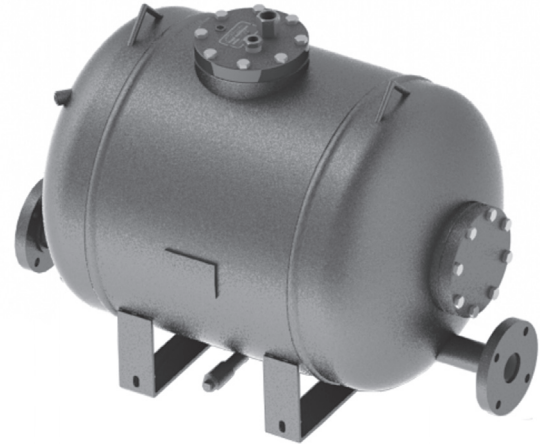
Description

Armstrong's Double Duty-12 steam trap/pump combination offers a unique solution for draining condensate from heat exchangers and coils in various applications.

The Double Duty-12 is an ASME code stamped carbon steel vessel which offers you the versatility of combining a pump mechanism within a steam trap to assist in condensate drainage under all operating conditions.

Features

- ASME Section VIII "U" stamped vessel
- Inconel X-750 springs for long service life
- All stainless steel internals
- Easy access to the steam trap mechanism without removing cap assembly
- Externally removable vent and motive seats
- Separate pump and trap mechanisms



Maximum Operating Conditions

Maximum allowable pressure: 200 psig @ 400°F (14 bar @ 204°C)

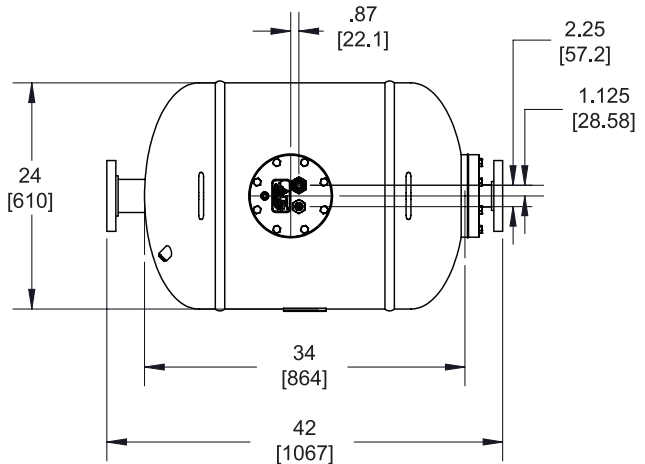
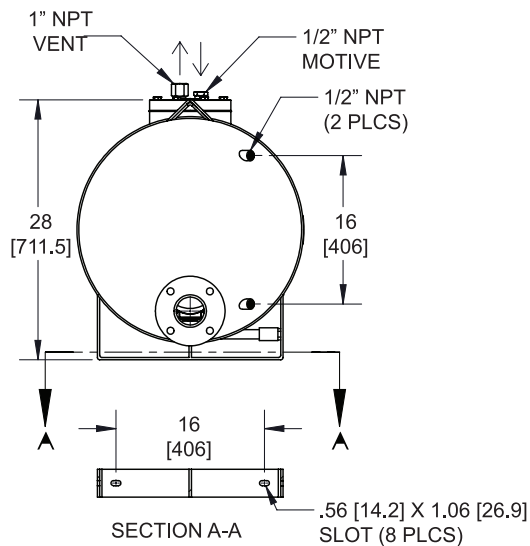
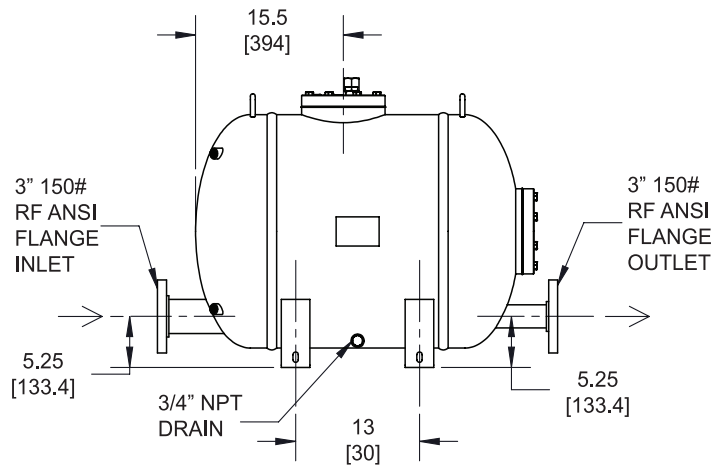
Maximum operating pressure: 200 psig @ 400°F (14 bar @ 204°C)

(Consult factory for different pressure/temperature ratings)

Materials

Body: ASME code carbon steel
 Springs: Inconel X-750
 Internals: Stainless steel

For a fully detailed certified drawing, refer to CD-2472.



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

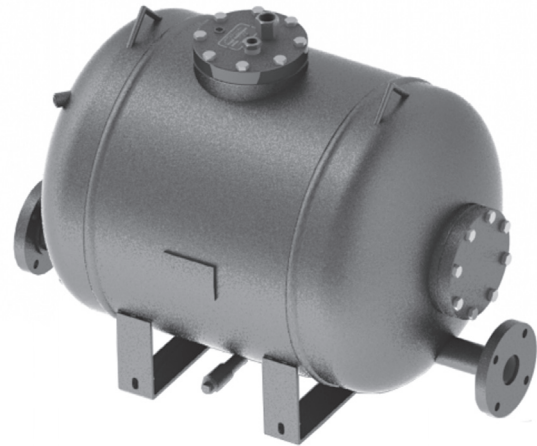
Double Duty® 12

Steam Trap/Pump Combination

Double Duty® 12 Pump Capacities					
Motive		Back Pressure		Capacity	
psi	bar	psi	bar	lb/hr	kg/hr
15	1	5	0.34	9,800	4,445
25	1.7			12,900	5,581
50	3.5			16,500	7,484
75	5			18,200	8,255
100	7			18,900	8,573
125	8.5			19,300	8,754
150	10.34			19,800	8,981
175	12			19,900	9,026
200	14			19,900	9,026
25	1.7	15	1	8,500	3,856
50	3.5			12,900	5,851
75	5			14,800	6,713
100	7			16,000	7,257
125	8.5			16,400	7,439
150	10.34			17,200	7,802
175	12			17,300	7,847
200	14	17,300	7,847		
35	2.5	25	1.7	7,200	3,266
50	3.5			10,300	4,672
75	5			12,300	5,579
100	7			13,700	6,214
125	8.5			13,700	6,214
150	10.34			14,700	6,668
175	12			14,800	6,713
200	14	15,000	6,804		
50	3.5	40	3	6,700	3,039
75	5			9,500	4,309
100	7			10,600	4,808
125	8.5			10,900	4,944
150	10.34			11,300	5,126
175	12			11,300	5,126
200	14	11,400	5,171		
75	5	60	4	6,900	3,130
100	7			8,300	3,765
125	8.5			8,300	3,765
150	10.34			8,400	3,810
175	12			8,400	3,810
200	14			8,600	3,901
100	7	80	5.5	6,400	2,903
125	8.5			6,400	2,903
150	10.34			7,200	3,266
175	12			7,200	3,266
200	14			7,300	3,311

NOTE: Published capacities are based on the use of external check valves supplied by Armstrong.

Capacity Conversion Factors for Other Filling Heads					
Filling Head					
in	0	6	12	24	* 24 or greater
mm	0	150	305	610	* 620 or greater
Double Duty DD-12	.7	.85	1	1.08	* Consult Factory



Double Duty® 12 Trap Capacities			
Differential Pressure		Capacity	
psi	bar	lb/hr	kg/hr
2	.14	21,500	9,752
5	.34	28,700	13,018
10	.7	35,900	16,284
25	1.7	52,100	23,632
50	3.5	59,600	27,034
75	5.2	72,000	32,659
100	6.9	81,000	36,741
150	10.3	93,000	42,184

NOTE: Fill head measured from drain to top of cap.
Weight in lb/kg: 348 (158)

Free Floating Guided Lever Drain Traps

For Loads to 9,500 lb/hr (4,309 kg/hr)...Pressures to 570 psig (39 bar)

Armstrong's stainless steel, free-floating guided lever drain traps use the same bodies, caps, lever mechanisms, valves and seats of Armstrong inverted bucket steam traps that have been proven in years of service. Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for drain trap size and weight.

The hemispherical valve, seat and leverage of the 11-LD, 22-LD and 13-LD stainless steel traps are identical in design, materials and workmanship to those for saturated steam service up to 570 psig (39 bar) with the exception of the addition of a guidepost to assure a positive, leaktight valve closing under all conditions.

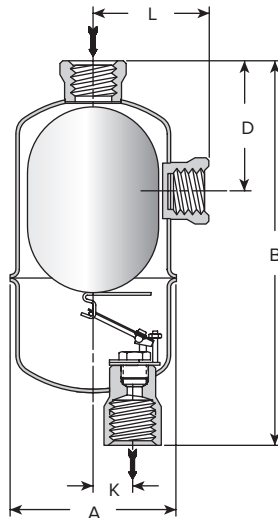
List of Materials					
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket
11-LD 22-LD 13-LD	Stainless Steel			Sealed Stainless Steel, 304L	—

For information on special materials, consult the Armstrong Application Engineering Department.

For a fully detailed certified drawing, refer to list below:

11-LD CD #1066
13-LD and 22-LD CD #1086

Figure LD-34.
No. 22-LD and 13-LD stainless steel guided lever liquid drain trap with sealed, tamperproof construction.



Physical Data						
Model No.	Stainless Steel					
	11-LD**		22-LD		13-LD	
Pipe Connections	in	mm	in	mm	in	mm
	3/4*	20*	3/4	20	1	25
"A"	2-3/4	70	3-15/16	100	4-1/2	114
"B"	7-1/4	184	8-13/16	224	11-3/8	289
"D"	—	—	3	76	6-1/8	156
"K"	9/16	14	7/8	22	1-3/16	30
"L"	—	—	2-5/8	67	3-9/32	83
Approx. Wt. lbs (kg)	1-3/4 (0.79)		3-1/4 (1.5)		7-1/2 (3.4)	
Max. Allowable Pressure (Vessel Design)	500 psig @ 100°F (35 bar @ 38°C) 440 psig @ 500°F (30 bar @ 260°C)		600 psig @ 100°F (41 bar @ 38°C) 475 psig @ 500°F (33 bar @ 260°C)		570 psig @ 100°F (39 bar @ 38°C) 490 psig @ 500°F (34 bar @ 260°C)	

Note: Vessel design pressure may exceed float collapse pressure in some cases.

Pipe size of vent connection is same as that of inlet and outlet connections.

*1/2" (15 mm) outlet. **No side connection.

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

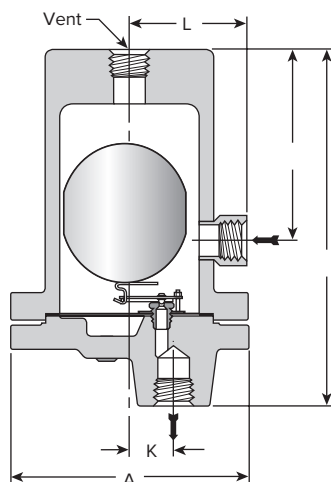
Free Floating Guided Lever Drain Traps

For Loads to 42,000 lb/hr (19,050 kg/hr)...Pressures to 1,000 psig (69 bar)

Armstrong's forged steel, free floating guided lever drain traps use the same bodies, caps, lever mechanisms, valves and seats of Armstrong inverted bucket steam traps that have been proven in years of service. Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for drain trap size and weight.

The hemispherical valve, seat and leverage of the 32-LD, 33-LD and 36-LD forged steel traps are identical in design, materials and workmanship to those for saturated steam service up to 1,000 psig (69 bar) with the exception of the addition of a guidepost to assure a positive, leaktight valve closing under all conditions.

Armstrong can accommodate your offshore requirements such as compliance with NACE and special offshore painting.



No. 32-LD, 33-LD and 36-LD forged steel guided lever drain trap. Socketweld or flanged connections are also available.

List of Materials				
Model No.	Valve & Seat	Leverage System	Float	Body & Cap
32-LD 33-LD 36-LD	Stainless Steel			Forged Steel ASTM A105

For Information on special materials, consult the Armstrong Application Engineering Department.

Physical Data						
Model No.	Forged Steel					
	32-LD t		33-LD t		36-LD t	
Pipe Connections	in	mm	in	mm	in	mm
	1/2, 3/4, 1	15, 20, 25	1/2, 3/4, 1	15, 20, 25	1-1/2, 2	40, 50
"A"	6-3/4	171	8	203	11-7/8	302
"B"	10-3/16	259	11-9/16	294	17-1/8	435
"D"	5-9/16	141	6-1/16	294	17-1/8	435
"K"	1-1/4	32	1-7/16	37	2-1/8	54
"L"	3-3/8	86	3-9/16	90	6-1/6	154
Weight, lb (kg)	31 (14)		49 (22)		163 (74)	
Max. Allowable Pressure (vessel design)	600 psig @ 100 F (41 bar @ 38 C)		1,000 psig @ °100 F (69 bar @ 38° C) 600 psig @ °750 F (41 bar @ 400° C)			

NOTE: Vessel design pressure may exceed float collapse pressure in some cases.

Pipe size of vent connection is same as that of the inlet and outlet connections.

t Available in Type 316 stainless steel. Consult factory.

Shade indicates products that are CE marked according to the PED (97/23/EC). All other models comply with article 3.3 if the same directive.

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

Free Floating Lever Dual Gravity Drain Traps

For Pressures to 1,000 psig (69 bar)

Armstrong's cast iron, free-floating guided lever drain traps use the same bodies, caps, lever mechanisms, valves and seats of Armstrong inverted bucket steam traps that have been proven in years of service.

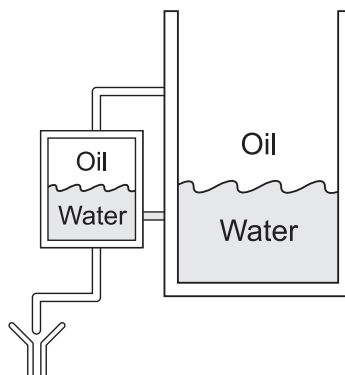
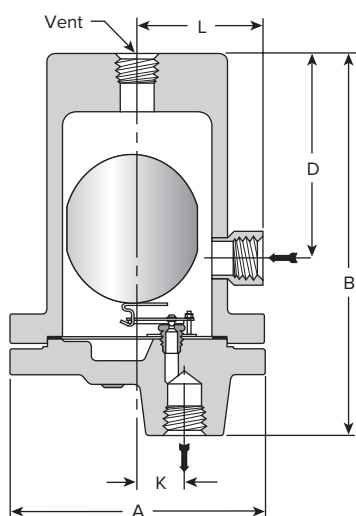
Floats for dual gravity drain traps are weighted with quenching oil which, in the unlikely possibility of float failure, may be dispersed through the system. If this is a hazard, consult the Armstrong Application Engineering Department.

NOTE: Armstrong can design dual gravity traps for venting light liquids from above heavier liquids. Consult the Armstrong Application Engineering Department.

Viscosity Considerations for Dual Gravity Traps

The operation of dual gravity traps depends upon a float that will sink in the light liquid and float in the heavy liquid. When the specific gravities of the two liquids are very close, the available operating forces are, therefore, also very small. Viscous fluids may impair the ability of the trap to respond to changing liquid levels.

Consult Armstrong's Application Engineering Department if your application involves fluids more viscous than 70 cs, which is approximately the viscosity of a light machine oil.



No. 32-DG, 33-DG and 36-DG
Forged steel
dual gravity drain traps.
Socketweld or
flanged connections are also
available.

List of Materials

Model No.	Valve & Seat	Leverage System	Float	Body & Cap
32-DG	Stainless Steel			Forged Steel ASTM A105
33-DG				
36-DG				

For information on special materials, consult the Armstrong Application Engineering Department.

Physical Data

Model No.	Forged Steel					
	32-DG*		33-DG*		36-DG*	
Pipe Connections	in	mm	in	mm	in	mm
		1/2, 3/4, 1	15, 20, 25	1/2, 3/4, 1	15, 20, 25	1-1/2, 2
"A"	6-3/4	171	8	203	11-7/8	302
"B"	10-3/16	259	11-9/16	154	9	229
"D"	5-9/16	141	6-1/16	154	9	229
"K"	1-1/4	32	1-7/16	37	2-1/8	54
"L"	3-3/8	86	3-7/8	98	6-1/16	154
Weight, lb (kg)	31 (14)		49 (22)		163 (74)	
Max. Allowable Pressure (vesel design)	600 psig @ 100°F (41 bar @ 38°C) 500 psig @ 750°F (35 bar @ 400°C)		1000 psig @ 100°F (69 bar @ 38°C) 600 psig @ 750°F (41 bar @ 400°C)			

* Available in Type 316 stainless steel. Consult factory.

Shade indicates products that are CE marked according to the PED (97/23/EC). All other models comply with article 3.3 of the same directive.

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

Free Floating Lever Drain Traps

For Loads to 50,000 lb/hr (22,679 kg/hr)...Pressures to 1,000 psig (69 bar)

Maximum Operating Pressures for Handling Different Specific Gravity Liquids With Orifices Available in Guided Free Floating Lever Drain Traps.																								
Model No.	Sp. Grav	1.00		.95		.90		.85		.80		.75		.70		.65		.60		.55		.50		
		Orifice		Maximum Operating Pressure psig (bar)																				
		in	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
1-LD	1/8	121	8.3	109	7.6	98	6.8	87	6.0	75	5.2	64	4.4	52	3.6	41	2.8	29	2.0	18	1.2	6	0.4	
	7/64	143	9.9	130	9.0	116	8.0	103	7.1	89	6.1	75	5.2	62	4.3	48	3.3	35	2.4	21	1.4	7	0.5	
	#38	182	12.5	164	11	147	10.2	130	9.0	113	7.8	95	6.6	78	5.4	61	4.2	44	3.0	26	1.8	9	0.6	
	5/64	300	20.7	289	19.9	259	17.8	228	15.7	198	13.7	168	11.6	137	9.5	107	7.4	77	5.3	47	3.2	16	1.1	
11-LD	1/8	176	12.1	161	11.1	146	10.1	130	9.0	115	7.9	100	6.9	85	5.8	69	4.8	54	3.7	39	2.7	24	1.6	
	7/64	209	14	191	13	173	12	155	10.7	137	9.4	119	8.2	100	6.9	82	5.7	64	4.4	46	3.2	28	1.9	
	#38	264	18	242	17	219	15	196	14	173	12	150	10.4	127	8.8	104	7.2	81	5.6	59	4.0	36	2.5	
	5/64	400	28	400	28	384	27	344	24	304	21	264	18	224	15	183	13	143	9.9	103	7.1	63	4.3	
2-LD to 250 psi (17 bar) 22-LD to 533 psi (36.7 bar)	5/16	22	1.5	20	1.4	18	1.3	17	1.1	15	1.0	13	0.9	11	0.8	10	0.7	8	0.5	6	0.4	4	0.3	
	1/4	36	2.5	33	2.3	30	2.1	27	1.9	24	1.7	22	1.5	19	1.3	16	1.1	13	0.9	10	0.7	7	0.5	
	3/16	79	5.5	73	5.0	67	4.6	60	4.2	54	3.7	47	3.3	41	2.8	35	2.4	28	2.0	22	1.5	16	1.1	
	5/32	137	9.4	126	8.7	115	7.9	104	7.2	93	6.4	82	5.6	71	4.9	60	4.1	49	3.4	38	2.6	27	1.8	
	1/8	234	16.1	215	14.8	196	13.5	178	12.2	159	10.9	140	9.6	121	8.4	102	7.1	83	5.8	65	4.5	46	3.2	
	7/64	299	20.6	275	19	251	17.3	227	15.7	203	14	179	12	155	10.7	131	9.0	107	7.4	83	5.7	59	4.0	
	#38	372	25.7	342	23.6	313	21.6	283	19.5	253	17.4	223	15	193	13	163	11.2	133	9.2	103	7.1	73	5.0	
5/64	533	37	475	33	461	32	417	29	372	26	328	23	284	20	240	17	196	14	152	10.5	108	7.4		
32-LD	5/16	29	2.0	26	1.8	23	1.6	21	1.4	18	1.2	15	1.0	12	0.9	10	0.7	7	0.5	4	0.3	2	0.1	
	1/4	47	3.3	43	3.0	38	2.6	34	2.3	29	2.0	25	1.7	20	1.4	16	1.1	12	0.8	7	0.5	3	0.2	
	3/16	104	7.2	94	6.5	85	5.8	75	5.2	65	4.5	55	3.8	45	3.1	35	2.4	25	1.8	16	1.1	6	0.4	
	5/32	180	12	163	11	146	10	129	8.9	112	7.7	95	6.5	78	5.4	61	4.2	44	3.0	27	1.9	10	0.7	
	1/8	307	21	278	19	249	17	220	15	191	13	162	11	133	9	104	7.2	75	5.2	46	3.2	17	1.2	
	7/64	393	27	356	25	319	22	282	19	245	17	207	14	170	12	133	9	96	6.6	59	4.1	22	1.5	
	#38	489	34	443	31	397	27	351	24	304	21	258	18	212	15	166	11	120	8	73	5.1	27	1.9	
5/64	600	41	600	41	585	40	517	36	449	31	381	26	313	22	244	17	176	12	108	7	40	2.8		
3-LD to 250 psi (17 bar) (Cast Iron)	1/2	16	1.1	14	1.0	13	0.9	12	0.8	10	0.7	9	0.6	7	0.5	6	0.4	5	0.3	3	0.2	2	0.1	
	3/8	33	2.3	31	2.1	28	1.9	25	1.7	22	1.5	19	1.3	16	1.1	13	0.9	10	0.7	7	0.5	4	0.3	
	5/16	54	3.7	49	3.4	44	3.0	39	2.7	35	2.4	30	2.1	25	1.7	20	1.4	16	1.1	11	0.8	6	0.4	
	9/32	71	4.9	65	4.5	59	4.0	52	3.6	46	3.2	40	2.7	34	2.3	27	1.9	21	1.4	15	1.0	8	0.6	
13-LD to 570 psi (39 bar) (Stainless)	1/4	107	7.4	97	6.7	88	6.1	79	5.4	69	4.8	60	4.1	50	3.5	41	2.8	32	2.2	22	1.5	13	0.9	
	7/32	153	10.5	139	9.6	126	8.7	112	7.7	99	6.8	85	5.9	72	5.0	59	4.0	45	3.1	32	2.2	18	1.2	
33-LD to 900 psi (62 bar) (Steel)	3/16	230	16	209	14	189	13	169	12	149	10.3	129	8.9	108	7.5	88	6.1	68	4.7	48	3.3	27	1.9	
	5/32	359	25	327	23	296	20	264	18	233	16	201	14	169	12	138	9.5	106	7.3	74	5.1	43	2.9	
	1/8	726	50	662	46	598	41	534	37	470	32	406	28	342	24	278	19	214	15	150	10.3	86	5.9	
7/64	900	62	847	58	765	53	683	47	601	41	519	36	437	30	356	25	274	19	192	13	110	7.6		
6-LD Cast Iron	1-1/16	21	1.4	19	1.3	18	1.2	16	1.1	15	1.0	13	0.9	12	0.8	10	0.7	9	0.6	7	0.5	6	0.4	
	7/8	32	2.2	30	2.1	28	1.9	26	1.8	23	1.6	21	1.4	19	1.3	16	1.1	14	1.0	12	0.8	9	0.6	
	3/4	47	3.2	44	3.0	40	2.8	37	2.5	34	2.3	30	2.1	27	1.9	24	1.6	20	1.4	17	1.2	14	0.9	
	5/8	72	4.9	67	4.6	61	4.2	56	3.9	51	3.5	46	3.2	41	2.8	36	2.5	31	2.1	26	1.8	21	1.4	
	9/16	95	6.5	88	6.1	81	5.6	75	5.2	68	4.7	61	4.2	55	3.8	48	3.3	41	2.8	34	2.4	28	1.9	
	1/2	138	9.5	128	8.8	118	8.1	108	7.5	99	6.8	89	6.1	79	5.4	69	4.8	59	4.1	50	3.4	40	2.8	
	7/16	196	13	182	13	168	12	154	11	140	10	126	8.7	77	98	6.8	85	5.8	71	4.9	57	3.9		
	3/8	250	17	250	17	250	17	243	17	221	15	199	14	177	12	155	11	133	9.0	111	7.7	90	6.2	
	11/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	236	16	207	14	178	12	148	10	119
	5/16	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250
	9/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250
	1/4	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250
	7/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250
	3/16	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250
36-LD Forged Steel	1-1/16	16	1.1	15	1.01	13	0.91	12	0.81	10	0.71	9	0.6	7	0.5	6	0.4	4	0.3	3	0.2	1	0.1	
	7/8	25	1.7	23	1.6	21	1.4	18	1.3	16	1.1	14	0.95	11	0.79	9	0.63	7	0.47	5	0.31	2	0.16	
	3/4	36	2.5	33	2.3	30	2.1	27	1.8	23	1.6	20	1.4	17	1.1	13	0.91	10	0.68	7	0.45	3	0.22	
	5/8	56	3.9	51	3.5	46	3.1	41	2.8	35	2.4	30	2.1	25	1.7	20	1.4	15	1.05	10	0.69	5	0.34	
	9/16	74	5.1	67	4.6	60	4.2	54	3.7	47	3.2	40	2.8	34	2.3	27	1.8	20	1.4	13	0.92	7	0.46	
	1/2	107	7.4	97	6.7	88	6.0	78	5.4	68	4.7	58	4.0	49	3.4	39	2.7	29	2.0	19	1.3	10	0.66	
	7/16	152	10.5	138	9.6	125	8.6	111	7.6	97	6.7	83	5.7	69	4.8	55	3.8	41	2.9	27	1.9	14	0.94	
	3/8	240	17	218	15	197	14	175	12	153	10.5	131	9.0	109	7.5	87	6.0	65	4.5	43	3.0	21	1.5	
	11/32	320	22	291	20	262																		

Fixed Pivot and Snap Action Drain Traps

For Loads to 3,900 lb/hr (1,769 kg/hr)...Pressures to 1,000 psig (69 bar)

Physical Data								
Model No.	Cast Iron				Forged Steel			
	21†		71-A*		21-312†		71-315*	
Pipe Connections	in	mm	in	mm	in	mm	in	mm
		1/2, 3/4	15, 20	3/4, 1	20, 25	1/2, 3/4, 1	15, 20, 25	3/4, 1, 1-1/4, 1-1/2
"A"	6-3/16	157	8-1/2	216	6-3/4	171	9-3/4	248
"B"	5-1/4	133	10-3/4	273	10-3/16	259	15-5/8	397
"D"	—	—	4-1/4	108	5-9/16	141	7-13/16	198
"K"	1-5/16	33	—	—	1-1/4	32	—	—
"L"	—	—	3-1/2	89	3-5/16	84	4-5/8	117
Weight, lbs (kg)	8 (4)		29 (13)		30 (14)		92 (42)	
Maximum Allowable Pressure (Vessel Design)	250 psig @ 450°F (17 bar @ 232°C)				600 psig @ 100°F (41 bar @ 38°C) 500 psig @ 750°F (34 bar @ 400°C)		1,000 psig @ 100°F (69 bar @ 38°C) 600 psig @ 750°F (41 bar @ 400°C)	

† Cast 316 stainless steel body and cap with all stainless steel internals available. Aluminum body and cap available for Model 21 only. Consult factory.

*Snap action drain traps should not be used where load exceeds 120 lb/hr (54 kg/hr). Use on greater loads shortens spring life.

List of Materials					
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket
21	Stainless Steel			Cast Iron ASTM A48 Class 30	Compressed Asbestos-free
71-A				Forged Steel* ASTM A105	
21-312 71-315					

*No. 71-315 cap is cast steel.

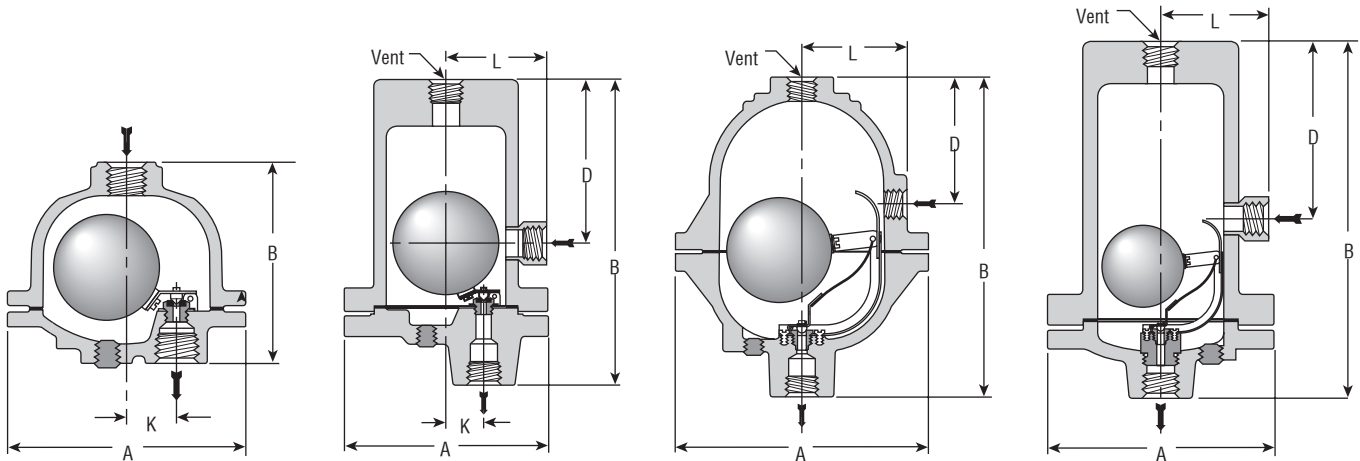
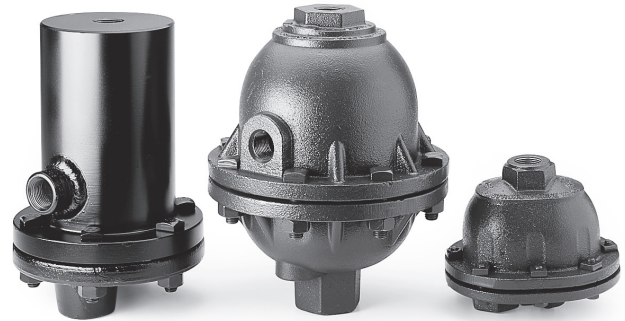


Figure LD-38.
No. 21 cast iron fixed lever drain trap.

Figure LD-39.
No. 21-312 forged steel fixed lever drain trap.

Figure LD-40.
No. 71-A cast iron snap action drain trap.

Figure LD-41.
No. 71-315 forged steel snap action drain trap.

For a fully detailed certified drawing, refer to list below:

No. 21 CD #1037
No. 21-312 CD #1106

No. 71-A CD #1038
No. 71-315 CD #1107

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

Fixed Pivot and Snap Action Drain Traps

For Loads to 3,900 lb/hr (1,769 kg/hr)...Pressures to 1,000 psig (69 bar)

Continuous Flow or On-Off Float Type Drain Traps

Armstrong's line of fixed lever and snap action drain traps includes two basic models available in cast iron and forged steel. The floats are light enough to handle light liquids.

No. 21—A small, high-quality, economical drain trap for use on drainage jobs where dirt and oil are not encountered. It employs a single lever with a fixed pivot.

No. 21-312—Forged steel version of the No. 21 with larger float and higher leverage.

No. 71-A—Wide open, tight-shut drain trap for use where fine dirt and grit may be present or where liquid load is light. A flat spring in the leverage system holds the valve closed until the trap body is nearly full of water. Then it snaps open, washing dirt through. When the trap body is nearly empty, the spring snaps the valve shut.

No. 71-315—Forged steel version of No. 71-A.

CAUTION: Ball float drain traps are not recommended where heavy oil, sludge or considerable dirt are encountered in lines. Under these circumstances use Armstrong inverted bucket BVSU traps.

Maximum Operating Pressures for Handling Different Specific Gravity With Orifices Available in Fixed Lever and Snap Action Drain Traps

Model No.	Sp. Grav.	Maximum Operating Pressure psig (bar) at 100°F (38°C)																						
		1.00		.95		.90		.85		.80		.75		.70		.65		.60		.55		.50		
		Orifice size (in)		psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig
21	1/4	22	1.5	20	1.4	18	1.3	16	1.1	15	1.0	13	0.9	11	0.8	10	0.7	8	0.5	6	0.4	4	0.3	
	7/32	28	1.9	26	1.8	24	1.6	21	1.5	19	1.0	17	1.2	15	1.0	12	0.9	10	0.7	8	0.6	6	0.4	
	3/16	38	2.6	35	2.4	32	2.2	29	2.0	26	1.8	23	1.6	20	1.4	17	1.2	14	1.0	11	0.7	8	0.5	
	5/32	54	3.8	50	3.5	46	3.2	41	2.9	37	2.6	33	2.3	29	2.0	24	1.7	20	1.4	16	1.1	11	0.8	
	9/64	67	4.6	62	4.2	56	3.9	51	3.5	46	3.1	40	2.8	35	2.4	30	2.1	24	1.7	19	1.3	14	1.0	
	1/8	84	5.8	78	5.4	71	4.9	64	4.4	58	4.0	51	3.5	44	3.0	37	2.6	31	2.1	24	1.7	17	1.2	
	3/32	148	10.2	136	9.4	124	8.6	112	7.7	101	6.9	89	6.1	77	5.3	66	4.5	54	3.7	42	2.9	30	2.1	
	5/64	210	14	193	13	176	12	160	11	143	9.9	126	8.7	110	7.6	93	6.4	77	5.3	60	4.1	43	3.0	
1/16	250	17	250	17	250	17	245	17	220	15	194	13	168	12	143	9.9	117	8.1	92	6.3	66	4.6		
21-312*	3-3/8 oz (96 g) Float	1/4	42	2.9	39	2.7	36	2.5	33	2.3	30	2.1	28	1.9	25	1.7	22	1.5	19	1.3	16	1.1	13	0.9
		7/32	54	3.8	51	3.5	47	3.2	43	3.0	40	2.7	36	2.5	32	2.2	28	2.0	25	1.7	21	1.5	17	1.2
		3/16	74	5.1	69	4.7	64	4.4	59	4.0	54	3.7	49	3.4	44	3.0	39	2.7	34	2.3	28	2.0	23	1.6
		5/32	200	14	197	14	182	13	168	12	153	10.6	139	9.6	125	8.6	110	7.6	96	6.6	82	5.6	67	4.6
	4-1/2 oz (128 g) Float	9/64	229	16	211	15	200	14	200	14	189	13	171	12	153	10.6	136	9.4	118	8.1	100	6.9	83	5.7
		1/8	288	20	266	18	243	17	221	15	200	14	200	14	193	13	171	12	148	10.2	126	8.7	104	7.2
		3/32	500	34	465	32	426	29	387	27	348	24	309	21	270	19	231	16	200	14	200	14	182	13
	6 oz (170 g) Float	5/64	589	41	533	37	500	34	500	34	495	34	440	30	384	27	329	23	274	19	218	15	200	14
		1/16	600	41	600	41	600	41	600	41	563	39	500	34	500	34	500	34	420	29	335	23	250	17
	71-A & 71-315	1/4	10	0.7	10	0.7	10	0.7	10	0.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3/16		20	1.4	20	1.4	20	1.4	20	1.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1/8		100	6.9	100	6.9	100	6.9	100	6.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
7/64		200	14	200	14	200	14	200	14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
71-A	5/64	250	17	250	17	250	17	250	17	—	—	—	—	—	—	—	—	—	—	—	—	—		
71-315	5/64	500	35	500	35	500	35	500	35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	1/16	1,000	69	1,000	69	1,000	69	1,000	69	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

NOTE: If actual specific gravity falls between those shown in above table, use next lower. For example, if actual gravity is 0.73, use 0.70 gravity data.

*5/32" orifice (and smaller) utilizes higher leverage mechanism designated 21-312V.

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

High Leverage Spring-Loaded Ball Float Type Drain Traps

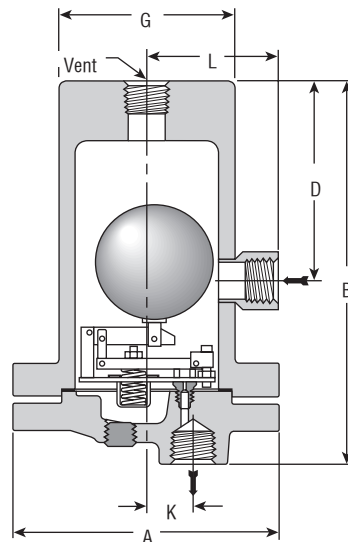
For Low Flows at Pressures to 3,700 psi (255 bar) and Specific Gravity Down to 0.40

List of Materials					
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket
2313-HLS 2315-HLS 2316-HLS	Stainless Steel			ASTM A105 Forged Steel	Compressed Asbestos-free
2413-HLS 2415-HLS 2416-HLS 25133G-HLS 25155G-HLS 26155G-HLS				ASTM A182 Grade F22 Forged Steel	



Figure LD-42.
High leverage ball float drain trap.

For a fully detailed certified drawing, refer to CD #1074.



Physical Data																		
Model No.	2313-HLS†		2315-HLS		2316-HLS		2413-HLS†		2415-HLS†		2416-HLS		25133G-HLS		25155G-HLS		26155G-HLS	
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50	1/2, 3/4, 1	15, 20, 25	3/4, 1, 1-1/4	20, 25, 32	1, 1-1/4, 1-1/2	25, 32, 40
"A"	8	203	9-3/4	248	11-7/8	302	8-5/8	219	10-3/4	273	12-1/2	318	8-1/2	216	10-3/8	263	11-3/4	298
"B"	11-9/16	294	15-1/16	383	17-1/8	435	11-7/8	3002	15	381	17-3/4	451	14-1/4	362	16-7/32	412	24-1/8	613
"D"	6-1/16	154	7-13/16	198	9	229	5-3/8	137	7-1/4	184	9	229	3	75	4	102	5	127
"G"	5-1/8	130	6-7/8	175	8-3/8	213	5-3/8	137	6-7/8	175	8-5/8	219	5-3/4	146	7-3/8	187	8-3/8	213
"K"	1-7/16	37	1-3/4	44	2-1/8	54	1-7/16	37	1-3/4	44	2-1/8	54	1-5/16	33	1-3/4	44	1-3/4	44
"L"	3-7/8	98	4-11/16	119	5-3/4	146	4	102	4-13/16	122	5-13/16	148	—	—	—	—	—	—
Weight, lbs (kg)	46 (21)		98 (44)		160 (73)		69 (31)		130 (59)		210 (95)		113 (51)		171 (78)		325 (147)	
Maximum Allowable Pressure (Vessel Design)	1,000 psig @ 100°F (69 bar @ 38°C) 600 psig @ 750°F (41 bar @ 400°C)						1,500 psig @ 100°F (103 bar @ 38°C) 900 psig @ 850°F (62 bar @ 454°C)		1,800 psig @ 100°F (125 bar @ 38°C) 900 psig @ 900°F (62 bar @ 482°C)		2,120 psig @ 100°F (146 bar @ 38°C) 1,700 psig @ 900°F (117 bar @ 482°C)		2,520 psig @ 100°F (174 bar @ 38°C) 2,000 psig @ 900°F (138 bar @ 482°C)		3,700 psig @ 100°F (255 bar @ 38°C) 3,000 psig @ 900°F (207 bar @ 482°C)			

Note: Available with screwed, socketweld or flanged connections.

† Available with cast 316 stainless steel body and all stainless steel internals. Consult factory.

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

High Leverage Spring-Loaded Ball Float Type Drain Traps

For Low Flows at Pressures to 3,700 psi (255 bar) and Specific Gravity Down to 0.40

The Armstrong High Leverage Series of liquid drain traps was developed especially for draining low specific gravity fluids from gases at high pressures. They use standard Armstrong forged steel bodies with very high leverage systems and spring assist.

NOTE: Models 2313-HLS, 2316-HLS, 2413-HLS and 2415-HLS are also available with cast T-316 stainless steel body and all-stainless steel internals. Consult factory.

Because of design considerations in this drain trap, it is essential that a safety factor of at least 2 be applied to the peak liquid load for sizing purposes.

Do not use HLS drain traps on steam service.

Sour Gas Service
 Forged steel and stainless steel traps can be modified to resist hydrogen sulfide stress corrosion. These modifications involve annealing the float, which will reduce the maximum working pressure of the float to about half its normal value. Consult Armstrong Application Engineering for allowable working pressures.

Reference Data			
Model No.		Float Diameter	Unbalanced Float Weight
2313-HLS 25133G-HLS	2413-HLS	3-1/2" (89 mm)	4 oz (113 g)
2315-HLS 25155G-HLS	2415-HLS 26155G-HLS	4" (102 mm)	4-1/2 oz (128 g)
2316-HLS	2416-HLS	5" (127 mm)	6 oz (170 g)

Maximum Operating Pressures for Handling Different Specific Gravity Liquids With Orifices Available in High Leverage Drain Traps																																
Model No.	Sp. Grav.	Maximum Operating Pressure psig (bar) at 100°F (38°C)																														
		Orifice																														
		1.00		.95		.90		.85		.80		.75		.70		.65		.60		.55		.50		.45		.40						
in	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar						
2313-HLS	1/16	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	630	43			
	5/64	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	940	65	670	47	410	29	
	3/32	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	850	58	660	46	480	33	290	20			
	7/64	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	910	63	770	53	630	44	490	34	360	25	220	15			
1/8	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	920	63	810	56	700	48	600	41	490	34	380	26	280	19	170	11.7						
2315-HLS	3/32	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	960	66			
	1/8	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	900	62	730	50	550	38	
	5/32	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	810	56	700	48	590	40	470	33	360	25					
	3/16	1,000	69	1,000	69	1,000	69	1,000	69	970	67	890	61	810	56	730	50	650	45	570	39	490	34	410	28	330	23	250	17			
2316-HLS	3/32	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69			
	1/8	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69			
	5/32	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69			
	3/16	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	830	57	
7/32	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	880	61	750	52	620	43
2413-HLS	1/16	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,420	98	1,020	71	630	43					
	5/64	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,460	101	1,200	83	940	65	670	47	410	29					
	3/32	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,500	103	1,400	97	1,220	84	1,030	71	850	58	660	46	480	33	290	20					
	7/64	1,500	103	1,500	103	1,500	103	1,460	101	1,320	91	1,180	82	1,050	72	910	63	770	53	630	44	490	34	360	25	220	15					
2415-HLS	3/32	1,800	124	1,800	124	1,800	124	1,800	124	1,800	124	1,800	124	1,800	124	1,800	124	1,800	124	1,800	124	1,560	108	1,260	87	960	66					
	1/8	1,800	124	1,800	124	1,800	124	1,800	124	1,800	124	1,780	122	1,600	110	1,430	98	1,250	86	1,080	74	900	62	730	50	550	38					
	5/32	1,720	119	1,610	111	1,490	103	1,380	95	1,270	87	1,150	80	1,040	72	930	64	810	56	700	48	590	40	470	33	360	25					
	3/16	1,210	83	1,130	78	1,050	72	970	67	890	61	810	56	730	50	650	45	570	39	490	34	410	28	330	23	250	17					
2416-HLS	3/32	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110			
	1/8	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110			
	5/32	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,480	102	1,220	84					
	3/16	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,580	109	1,400	97	1,220	84	1,040	72	860	59					
7/32	1,600	110	1,600	110	1,600	110	1,600	110	1,600	110	1,570	108	1,440	99	1,300	90	1,170	81	1,040	71	900	62	770	53	640	44						
25133G-HLS	1/16	2,120	146	2,120	146	2,120	146	2,120	146	2,120	146	2,120	146	2,120	146	2,120	146	2,120	146	1,820	125	1,420	98	1,020	71	630	43					
	5/64	2,120	146	2,120	146	2,120	146	2,120	146	2,120	146	2,120	146	1,980	137	1,720	119	1,460	101	1,200	83	940	65	670	47	410	29					
	3/32	2,120	146	2,120	146	2,120	146	1,960	135	1,770	122	1,590	110	1,400	97	1,220	84	1,030	71	850	58	660	46	480	33	290	20					
	7/64	1,870	129	1,740	120	1,600	110	1,460	101	1,320	91	1,180	82	1,050	72	910	63	770	53	630	44	490	34	360	25	220	15					
25155G-HLS	5/64	2,520	174	2,520	174	2,520	174	2,520	174	2,520	174	2,520	174	2,520	174	2,520	174	2,520	174	2,520	174	2,210	152	1,780	123	1,350	93					
	3/32	2,520	174	2,520	174	2,520	174	2,520	174	2,520	174	2,520	174	2,520	174	2,470	170	2,170	150	1,870	129	1,560	108	1,260	87	960	66					
	1/8	2,520	174	2,470	171	2,300	159	2,130	147	1,950	135	1,780	122	1,600	110	1,430	98	1,250	86	1,080	74	900	62	730	50	550	38					
	5/32	1,720	119	1,610	111	1,490	103	1,380	95	1,270	87	1,150	80	1,040	72	930	64	810	56	700	48	590	40	470	33	360	25					
3/16	1,210	83	1,130	78	1,050	72	970	67	890	61	810	56	730	50	650	45	570	39	490	34	410	28	330	23	250	17						
26155G-HLS	5/64	3,700	255	3,700	255	3,700	255	3,700	255	3,700	255	3,700	255	3,700	255	3,490	241	3,060	211	2,630	182	2,210	152	1,780	123	1,350	93					
	3/32	3,700	255	3,700	255	3,700	255	3,680	254	3,380	233	3,080	212	2,770	191	2,470	170	2,170	150	1,870	129	1,560	108	1,260	87	960	66					

Ultra-Capacity Drain Traps

Capacities to 700,000 lb/hr (317,520 kg/hr)... Pressures to 450 psig (31 bar)

Armstrong ultra-capacity ball float drain traps are designed to meet exceptionally large capacity needs in draining water and other liquids from air or other gases under pressure.

Options. L and M Series drain traps are available with armored gauge glass with a maximum allowable pressure of 250 psig @

425°F (17 bar @ 218°C). When ordering, be sure to specify "Liquid Drainer" or "LD." Example, LS-series LD, 2" (50 mm) NPT, 7/8" orifice.

For a fully detailed certified drawing, refer to:
L and M Series, CD #1010 **JD and KD Series, CD #1302**

Maximum Operating Pressures for Handling Different Specific Gravity Liquids With Orifices Available in Ultra-Capacity Drain Traps																							
Model No.	Specific Gravity	Maximum Operating Pressure																					
		1.00		.95		.90		.85		.80		.75		.70		.65		.60		.55		.50	
		Orifice Size		psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
JD	1-1/16	16	1.0	15	1.0	13	0.89	12	0.82	11	0.75	10	0.69	9	0.62	7	0.48	6	0.41	5	0.34	4	0.28
	3/4	35	2.4	32	2.2	30	2.0	27	1.8	24	1.6	22	1.5	19	1.3	16	1.0	14	0.97	11	0.75	9	0.62
	9/16	87	6.0	81	5.5	75	5.0	68	4.6	61	4.2	55	3.8	48	3.3	41	2.8	35	2.4	28	1.8	22	1.5
	1/2	146	10	135	9.0	125	8.5	113	8.0	102	7.0	91	6.2	81	5.5	69	4.8	59	4.0	47	3.2	37	2.6
	7/16	175	12	175	12	175	12	175	12	158	11	141	10	125	8.5	107	7.3	91	6.2	73	5.0	57	3.9
	3/8	250	17	232	16	214	15	195	13	177	12.2	159	10.9	140	9.7	122	8.4	103	7.1	85	5.9	67	4.6
	1/4	300	21	300	21	300	21	300	21	300	20.7	300	20.7	300	20.7	300	20.7	272	18.8	224	15.4	176	12.1
30KD	1-7/8 dual orifice	30	2	30	2	30	2	30	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50KD		50	3.5	50	3.5	50	3.5	50	3.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—
300KD		300	21	300	21	300	21	300	21	—	—	—	—	—	—	—	—	—	—	—	—	—	—
L to 250 psi (17 bar)	1-5/8	35	2.4	32	2.2	30	2.0	27	1.8	25	1.6	23	1.6	20	1.4	18	1.2	15	1.0	13	0.89	10	0.69
	1-1/8	116	8.0	108	7.4	100	7.0	92	6.3	84	5.8	76	5.2	68	4.7	60	4.1	52	3.6	44	3.0	36	2.5
	7/8	174	12	162	11	150	10.5	138	9.5	126	8.6	114	7.9	102	7.0	90	6.2	78	5.4	65	4.5	53	3.7
LS For all Pressures	11/16	*315	*22	*294	*20	*272	*19	250	17	228	16	206	14	184	13	162	11	141	9.7	119	8.2	97	6.7
	1/2	*450	*31	*450	*31	*450	*31	*450	*31	*450	*31	*400	*28	*354	*24	*298	*21	248	17	197	14	147	10
M to 250 psi (17 bar)	1-7/8 dual orifice	250	17	250	17	250	17	250	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MS For all Pressures	1-17/32 dual orifice	*450	*31	*450	*31	*450	*31	*450	*31	*450	*31	—	—	—	—	—	—	—	—	—	—	—	—

*These pressures applicable only to LS and MS models.

List of Materials			
Name of Part	Material		
	Series JD, KD, L & M	Series LS & MS	
Cap & Body	JD, KD	ASTM A395 Ductile Iron	
	L, M	ASTM A48 Class 31	
Cap Extension*	L, LS	304 Stainless Steel, ASTM A351 Grade CF8	
	KD, M, MS	17-4 Ph, ASTM A747 Grade CB7Cu-1	
Cap Bolting	ASTM A193 Grade B 7**		ASTM A193 Grade B 7
Cap Gaskets	Flexible Graphite		
Float Mechanism	Stainless Steel		

* JD Series does not have cap extension.

**JD and KD Series - ASTM A307 Grade B.

Physical Data						
Trap Series	JD & KD		L & M		LS & MS	
	in	mm	in	mm	in	mm
"B"	13-1/16	332	20-1/4	514	20	508
"C"	9-5/8	244	14-3/4	375	15-1/4	387
"H"	13-7/8	352	19-3/4	502	20	508
"M"	6-1/2	165	11-5/16	287	11-5/16	287
"D"	3	76	4-3/16	106	4-3/16	106
"S"	—	—	3-3/4	95	3-3/4	95
"T"	—	—	12	305	12	305
Weight lbs (kg)	100 (45)		196 (89)		290 (132)	
Max. Allow. Pressure (Vessel Design)	300 psig @ 650°F (21 bar @ 343°C)		250 psig @ 450°F (17 bar @ 232°C)		450 psig @ 650°F (31 bar @ 338°C)	

JD, KD, L and M Series also may be used for steam service as float and thermostatic traps and as condensate controllers. Steam service capacities for all configurations are given in the Steam Trapping section of this catalog.

Connections Available						
Model	Size		NPT	BSPT	SW	FLG
	in	mm				
JD	2	50	X	X	—	*
KD	2, 2-1/2, 3	50, 65, 80	X	X	—	*
L	2, 2-1/2	50, 65	X	X	—	X
M	3	80	X	X	—	X
LS	2, 2-1/2	50, 65	X	X	X	X
MS	3	80	X	X	X	X

*Flanged connections available. Consult factory.

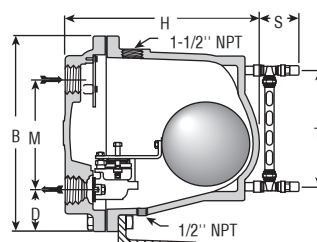


Figure LD-45.
L and LS Series

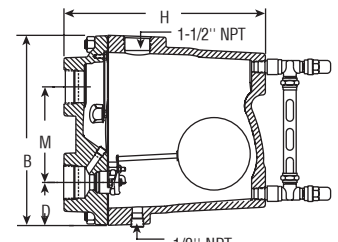


Figure LD-46.
JD and KD Series

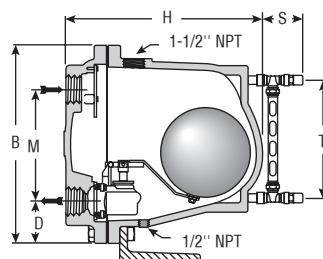
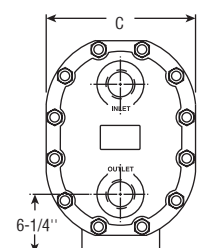


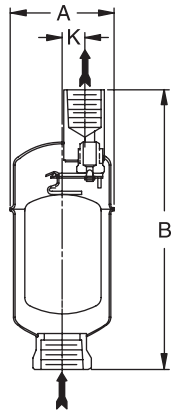
Figure LD-47.
M and MS Series



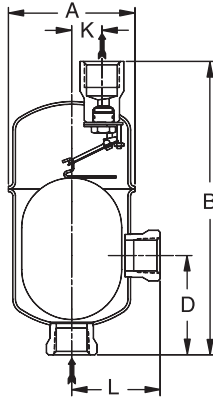
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

Free Floating Lever Air/Gas Vents—All Stainless Steel

For Pressures to 600 psig (41 bar) or Specific Gravity Down to 0.50



Model 11-AV



Model 22-AV and 13-AV



The Armstrong all-stainless steel guided lever air vents have been developed to provide positive venting of air/gases under pressure.

The body and cap and all working parts of the No. 11-AV, 22-AV and 13-AV are made of high strength, corrosion resistant stainless steel. Body and caps are welded together to form a permanently sealed, tamperproof unit with no gaskets. Elliptical floats and high leverage provide up to 115 SCFM capacity for these compact air/gas vents. Lever action is guided to assure proper seating of the valve under all operating conditions.

11-AV, 22-AV and 13-AV—All stainless steel construction where exposure to either internal or external corrosion is a problem. These air/gas vents have the same proven free floating mechanisms used in other Armstrong steam traps. Pressures to 600 psi @ 100°F (41 bar @ 38°C).

For a fully detailed certified drawing, refer to list below:

11-AV CD #1066

13-AV and 22-AV CD #1086

Physical Data						
Model No.	11-AV		22-AV		13-AV	
Pipe Connections	1/2, 3/4**	15, 20**	3/4	20	1	25
"A"	2-3/4	70	3-7/8	99	4-1/2	114
"B"	7-1/4	184	8-13/16	224	11-3/8	289
"D"	—	—	3-3/8	86	6-1/8	156
"K"	9/16	14	7/8	22	1-3/16	30
"L"	—	—	2-5/8	67	3-1/4	83
Weight, lb (kg)				5 (2.3)	7-1/2 (3.4)	
Max. Allow. Pressure (Vessel Design)	500 psig @ 100°F (34 bar @ 38°C) 440 psig @ 500°F (30 bar @ 260°C)		600 psig @ 100°F (41 bar @ 38°C) 475 psig @ 500°F (33 bar @ 260°C)		570 psig @ 100°F (39 bar @ 38°C) 490 psig @ 500°F (34 bar @ 260°C)	

** 1/2" (15 mm) outlet.

List of Materials				
Model No.	Valve & Seat	Leverage System	Float	Body & Cap
11-AV	*440	303/304	304	Sealed Stainless Steel 304-L
22-AV	Stainless Steel	Stainless Steel	Stainless Steel	
13-AV				

*Type 316 SS valve and seat available. Consult factory.

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

Free Floating Lever Air/Gas Vents—All Stainless Steel

For Pressures to 600 psig (41 bar) or Specific Gravity Down to 0.50

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

11-AV Maximum Operating Pressures				
Minimum Specific Gravity	0.75		0.50	
Float wt., oz (g)	2.90 (82) Standard		2.08 (59) Special	
Orifice Size (in)	Maximum Operating Pressure			
	psi	bar	psi	bar
1/8	178	12	118	8
#38	267	18	177	12
5/64	400	28	311	21

22-AV Maximum Operating Pressure																						
Specific Gravity*	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50											
Float wt., oz (g)	10.0 (282)	9.5 (268)	9.0 (254)	8.5 (240)	8.0 (226)	7.5 (212)	7.0 (198)	6.5 (184)	6.0 (170)	5.5 (156)	5.0 (141)	4.6 (130)	4.2 (119)	3.8 (109)								
Orifice Size (in)	Maximum Operating Pressure																					
	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar
5/16	35	2.4	33	2.3	31	2.2	30	2.0	28	1.9	26	1.8	19	1.3	18	1.2	16	1.1	15	1.0	14	0.9
1/4	57	3.9	54	3.7	51	3.5	49	3.4	46	3.2	43	3.0	31	2.1	29	2.0	27	1.8	24	1.7	22	1.5
3/16	126	8.7	120	8.2	113	7.8	107	7.4	101	7.0	95	6.5	68	4.7	64	4.4	59	4.1	54	3.7	49	3.4
5/32	217	14.9	206	14.2	195	13.5	185	12.7	174	12.0	163	11.2	118	8.1	110	7.6	101	7.0	93	6.4	85	5.8
1/8	371	25.6	352	24.3	334	23.0	316	21.8	297	20.5	279	19.2	202	13.9	187	12.9	173	12.0	159	11.0	145	10.0
7/64	474	32.7	451	31.1	427	29.5	404	27.9	380	26.2	357	24.6	258	17.8	240	16.5	222	15.3	204	14.0	186	12.8
#38	590	40.7	561	38.7	532	36.7	503	34.7	473	32.7	444	30.6	321	22.1	298	20.6	276	19.0	253	17.5	231	15.9
5/64	600	41.4	600	41.4	600	41.4	600	41.4	600	41.4	600	41.4	473	32.6	440	30.3	407	28.1	374	25.8	341	23.5

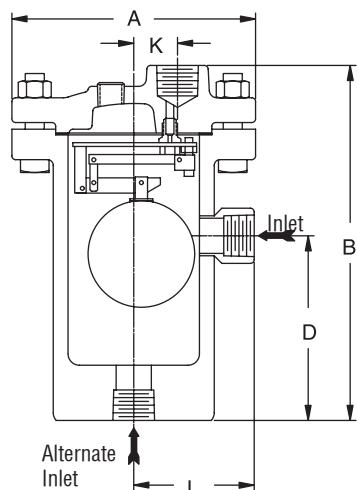
13-AV Maximum Operating Pressures																				
Specific Gravity*	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60											
Float wt., oz (g)	14.9 (423)	14.2 (402)	13.4 (381)	12.7 (360)	12.0 (339)	11.2 (318)	10.5 (296)	9.7 (275)	9.0 (254)											
Orifice Size (in)	Maximum Operating Pressure																			
	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar
1/2	21	1.5	20	1.4	19	1.3	18	1.3	17	1.2	16	1.1	15	1.0	14	1.0	13	0.9		
3/8	45	3.1	43	3.0	41	2.8	38	2.7	36	2.5	34	2.3	32	2.2	30	2.0	27	1.9		
5/16	72	5.0	69	4.7	65	4.5	61	4.2	58	4.0	54	3.8	51	3.5	47	3.3	44	3.0		
9/32	96	6.6	91	6.3	87	6.0	82	5.6	77	5.3	72	5.0	68	4.7	63	4.3	58	4.0		
1/4	144	9.9	137	9.4	130	8.9	123	8.5	116	8.0	109	7.5	102	7.0	94	6.5	87	6.0		
7/32	206	14	196	13	186	13	176	12	165	11	155	10.7	145	10.0	135	9.3	125	8.6		
3/16	309	21	294	20	279	19	264	18	249	17	234	16	218	15	203	14	188	13		
5/32	484	33	460	32	437	30	413	28	389	27	365	25	342	24	318	22	294	20		
1/8	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39		
7/64	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39		

*If specific gravity falls between those shown, use next lowest: e.g., if actual gravity is 0.73, use 0.70 specific gravity data.

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High Leverage Ball Float Type Air Relief Traps

For Low Flows at Pressures to 2,700 (186 bar) or Specific Gravity Down to 0.49



The Armstrong High Leverage Series of Air Relief traps were developed especially for venting gases from low specific gravity fluids at high pressures. They use standard Armstrong forged steel bodies with very high leverage air relief mechanisms. Available with screwed, socketweld or flanged connections.

NOTE: Models 2313-HLAR, 2316-HLAR, 2413-HLAR and 2415-HLAR are also available with cast T-316 stainless steel body and all-stainless steel internals. Consult factory.

Sour Gas Service

Forged steel and stainless steel traps can be modified to resist hydrogen sulfide stress corrosion. These modifications involve annealing the float, which will reduce the maximum working pressure of the float to about half its normal value. Consult Armstrong Application Engineering for allowable working pressures.

Physical Data—High Leverage Ball Float Type Air Relief Traps																								
Model No.	2313-HLAR†		2315-HLAR		2316-HLAR		2413-HLAR†		2415-HLAR		2416-HLAR		25133G-HLAR		25155G-HLAR		26155G-HLAR							
Pipe Connections	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm						
	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50	1/2, 3/4, 1	15, 20, 25	3/4, 1, 1-1/4	20, 25, 32	1, 1-1/4	25, 32						
"A"	8	203	9-3/4	248	11-7/8	302	8-5/8	219	10-3/4	273	12-1/2	318	8-1/2	216	10-3/8	263	11-3/4	298						
"B"	11-9/16	294	15-1/16	383	17-1/8	435	11-7/8	302	15	381	17-3/4	451	14-1/4	362	16-7/32	412	24-1/8	613						
"D"	6-1/16	154	7-13/16	198	9	229	5-3/8	137	7-1/4	184	9	229	3	75	4	102	5	127						
"G"	5-1/8	130	6-7/8	175	8-3/8	213	5-3/8	137	6-7/8	175	8-5/8	219	5-3/4	146	7-3/8	187	8-3/8	213						
"K"	1-7/16	37	1-3/4	44	2-1/8	54	1-7/16	37	1-3/4	44	2-1/8	54	1-5/16	33	1-3/4	44	1-3/4	44						
"L"	3-7/8	98	4-11/16	119	5-3/4	146	4	102	4-13/16	122	5-13/16	148	—	—	—	—	—	—						
Weight, lbs (kg)	46 (21)		98 (44)		160 (73)		69 (31)		130 (59)		210 (95)		113 (51)		171 (78)		325 (147)							
Maximum Allowable Pressure (Vessel Design)	1,000 psig @ 100°F (69 bar @ 38°C) 600 psig @ 750°F (41 bar @ 400°C)				1,500 psig @ 100°F (103 bar @ 38°C) 900 psig @ 850°F (62 bar @ 454°C)				1,800 psig @ 100°F (125 bar @ 38°C) 900 psig @ 900°F (62 bar @ 482°C)				2,120 psig @ 100°F (146 bar @ 38°C) 1,700 psig @ 900°F (117 bar @ 482°C)				2,520 psig @ 100°F (174 bar @ 38°C) 2,000 psig @ 900°F (138 bar @ 482°C)				3,700 psig @ 100°F (255 bar @ 38°C) 3,000 psig @ 900°F (207 bar @ 482°C)			

†Available with cast 316 stainless steel body and all stainless steel internals. Consult factory.

List of Materials					
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket
2313-HLAR 2315-HLAR 2316-HLAR	Stainless Steel			ASTM A105 Forged Steel	Compressed Asbestos-free
2413-HLAR 2415-HLAR 2416-HLAR				ASTM A182 Grade F22 Forged Steel	
25133G-HLAR 25155G-HLAR 26155G-HLAR					Spiral Wound Stainless Steel non-asbestos

2315-HLAR Maximum Operating Pressures				
Specific Gravity	1.00 – 0.61		0.60 – 0.51	
Float Weight, oz (g)	9.0 (255)		7.1 (201)	
Orifice	Maximum Operating Pressure			
	psi	bar	psi	bar
3/16	825	56	600	41
5/32	1,000		69	
1/8				
3/32				

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

2313-HLAR Maximum Operating Pressures				
Specific Gravity	1.00 - 0.69		0.68 - 0.54	
Float Weight, oz (g)	6.75 (191)		4.75 (135)	
Orifice size (in)	Maximum Operating Pressure			
	psi	bar	psi	bar
1/8	1,000	69	475	33
7/64				
3/32				
5/64				
1/16				

2316-HLAR Maximum Operating Pressures				
Specific Gravity	1.00 – 0.70		0.69 – 0.55	
Float Weight, oz (g)	22 (624)		15.5 (439)	
Orifice	Maximum Operating Pressure			
	psi	bar	psi	bar
7/32	1,000	69	475	33
3/16				
5/32				
1/8				
3/32				

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High Leverage Ball Float Type Air Relief Traps

For Low Flows at Pressures to 2,700 (186 bar) or Specific Gravity Down to 0.49

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

2413-HLAR Maximum Operating Pressures						
Specific Gravity	1.00 – 0.90		0.89 – 0.69		0.68 – 0.54	
Float Weight, oz (g)	9.375 (266)		6.75 (191)		4.75 (135)	
Orifice size (in)	Maximum Operating Pressure					
	psi		bar		psi	
1/8	1,500	03	1,000	69	475	33
7/64						
3/32						
5/64						
1/16						

2416-HLAR Maximum Operating Pressures				
Specific Gravity	1.00 – 0.70		0.69 – 0.55	
Float Weight, oz (g)	22 (624)		15.5 (439)	
Orifice	Maximum Operating Pressure			
	psi		bar	
7/32	1,500	103	475	33
3/16				
5/32				
1/8				
3/32				

2415-HLAR Maximum Operating Pressures						
Specific Gravity	1.00 – 0.85		0.84 – 0.61		0.60 – 0.51	
Float weight, oz (g)	13.75 (390)		9.0 (255)		7.1 (201)	
Orifice	Maximum Operating Pressure					
	psi		bar		psi	
3/16	1,200	83	825	56	600	41
5/32	1,725	119	1,150	80		
1/8	1,800	124	1,200	83		
3/32						

25133G HLAR Maximum Operating Pressures								
Specific gravity	1.00 – 0.98		0.97 – 0.90		0.89 – 0.69		0.68 – 0.54	
Float weight, oz (g)	10.5 (298)		9.375 (266)		6.75 (191)		4.75 (135)	
Orifice	Maximum Operating Pressure							
	psi		bar		psi		bar	
1/8	1,850	128	1,500	103	1,000	69	475	33
7/64	2,125	146						
3/32								
5/64								
1/16								

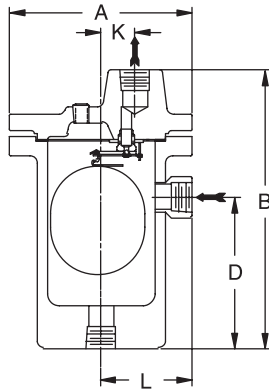
25155G HLAR Maximum Operating Pressures								
Specific gravity	1.00 – 0.95		0.94 – 0.86		0.85 – 0.63		0.62 – 0.52	
Float weight, oz (g)	15.4 (437)		13.75 (390)		9.25 (262)		7.1 (201)	
Orifice	Maximum Operating Pressure							
	psi		bar		psi		bar	
3/16	1,350	93	1,200	83	825	58	600	41
5/32	1,925	132	1,725	119	1,200	82		
1/8	2,500	172	2,000	138	1,200	83		
3/32								

26155G HLAR Maximum Operating Pressures								
Specific gravity	1.00 – 0.95		0.94 – 0.86		0.85 – 0.63		0.62 – 0.52	
Float weight, oz (g)	15.4 (437)		13.75 (390)		9.25 (262)		7.1 (201)	
Orifice	Maximum Operating Pressure							
	psi		bar		psi		bar	
3/16	1,350	93	1,200	83	825	58	600	41
5/32	1,925	132	1,725	119	1,200	82		
1/8	2,700	186	2,000	138	1,200	83		
3/32								

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

Free Floating Lever Air/Gas Vents—Forged Steel

For Pressures to 1,000 psig (69 bar) or Specific Gravity Down to 0.40



Model 32-AV, 33-AV and 36-AV



32-AV, 33-AV and 36-AV—Forged steel vents using the same proven free floating lever mechanisms used in Armstrong steam traps.

For applications where high air/gas venting capacity is required up to 1,000 psi. Available with screwed, socketweld or flanged connections.

List of Materials					
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Bolting
32-AV	Stainless Steel			ASTM A105 Forged Steel	Bolts ASTM A193 Gr. B7 Nuts ASTM A194 Gr. 2H
33-AV					
36-AV					

Physical Data						
Model No.	Forged Steel					
	32-AV		33-AV		36-AV	
Pipe Connections	in	mm	in	mm	in	mm
	1/2, 3/4	15, 20	3/4, 1	20, 25	1-1/2, 2	40, 50
"A"	6-3/4	171	8	203	11-7/8	301
"B"	10-3/16	259	11-9/16	294	17-1/8	435
"D"	5-9/16	141	6-1/16	154	9	229
"K"	1-1/4	32	1-7/16	37	2-1/8	54
"L"	3-3/8	86	3-7/8	98	6-1/6	154
Weight, lb (kg)	31 (14)		49 (22)		163 (74)	
Max. Allowable Pressure (vessel design)	600 psig @ 100°F (41 bar @ 38°C) 500 psig @ 750°F (34 bar @ 399°C)		1000 psig @ 100°F (69 bar @ 38°C) 600 psig @ 750°F (41 bar @ 399°C)			

Available in Type 316 SS. Consult factory. Pipe size of side connections if provided is same as that of inlet and outlet connections. Some floats are old filled. Consult factory for details.

Shade indicates products that are CE marked according to the PED (97/23/EC). All other models comply with article 3.3 of the same directive.

High-Temperature Service

Maximum allowable working pressures of floats decrease at temperatures above 100°F. Allow for approximately:

- 10% decrease at 200°F
- 15% decrease at 300°F
- 20% decrease at 400°F

The float is not always the limiting factor, however. Consult with Armstrong Application Engineering if you have a high-temperature application that also requires maximum operating pressures.

Sour Gas Service

Forged steel and stainless steel traps can be modified to resist hydrogen sulfide stress corrosion. These modifications involve annealing the float, which will reduce the maximum working pressure of the float to about half of its normal value. Consult Armstrong Application Engineering for allowable working pressures.

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

Free Floating Lever Air/Gas Vents—Forged Steel

For Pressures to 1,000 psig (69 bar) or Specific Gravity Down to 0.40

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

32-AV Maximum Operating Pressures																
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65	
Float Weight, oz (g)	11.8 (335)		11.2 (318)		10.6 (301)		10.0 (285)		9.4 (268)		8.9 (251)		8.3 (234)		7.7 (218)	
Orifice Size (in)	Maximum Operating Pressure															
	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
5/16	41	2.8	39	2.7	37	2.6	35	2.4	33	2.3	31	2.1	29	2.0	27	1.9
1/4	68	4.7	64	4.4	61	4.2	58	4.0	54	3.7	51	3.5	47	3.3	44	3.0
3/16	149	10.3	142	9.8	134	9.3	127	8.8	120	8.2	112	7.7	105	7.2	97	6.7
5/32	257	18	244	17	231	16	219	15	206	14	193	13	180	12	168	12
1/8	439	30	417	29	396	27	374	26	352	24	330	23	309	21	287	20
7/64	562	39	534	37	506	35	478	33	450	31	423	29	395	27	367	25
#38	600	41	600	41	600	41	595	41	561	39	526	36	491	34	457	31
5/64	600	41	600	41	600	41	600	41	600	41	600	41	600	41	600	41

33-AV Maximum Operating Pressures																		
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60	
Float Weight, oz (g)	14.9 (423)		14.2 (402)		13.4 (381)		12.7 (360)		12.0 (339)		11.2 (318)		10.5 (296)		9.7 (275)		9.0 (254)	
Orifice Size (in)	Maximum Operating Pressure																	
	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
1/2	21	1.5	20	1.4	19	1.3	18	1.3	17	1.2	16	1.1	15	1.0	14	1.0	13	0.9
3/8	45	3.1	43	3.0	41	2.8	38	2.7	36	2.5	34	2.3	32	2.2	30	2.0	27	1.9
5/16	72	5.0	69	4.7	65	4.5	61	4.2	58	4.0	54	3.8	51	3.5	47	3.3	44	3.0
9/32	96	6.6	91	6.3	87	6.0	82	5.6	77	5.3	72	5.0	68	4.7	63	4.3	58	4.0
1/4	144	9.9	137	9.4	130	8.9	123	8.5	116	8.0	109	7.5	102	7.0	94	6.5	87	6.0
7/32	206	14	196	13	186	13	176	12	165	11	155	10.7	145	10.0	135	9.3	125	8.6
3/16	309	21	294	20	279	19	264	18	249	17	234	16	218	15	203	14	188	13
5/32	484	33	460	32	437	30	413	28	389	27	365	25	342	24	318	22	294	20
1/8	900	62	900	62	883	61	835	58	787	54	739	51	691	48	643	44	595	41
7/64	900	62	900	62	900	62	900	62	900	62	900	62	883	61	822	57	760	52

36-AV Maximum Operating Pressures																										
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60		0.55		0.50		0.45		0.40	
Float Weight, oz (g)	73.5 (2,084)		69.8 (1,979)		66.2 (1,875)		62.5 (1,771)		58.8 (1,667)		55.1 (1,563)		51.5 (1,459)		47.8 (1,354)		44.1 (1,250)		40.4 (1,146)		36.8 (1,042)		33.1 (938)		29.4 (883)	
Orifice Size (in)	Maximum Operating Pressure																									
	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
1-1/61	22	1.5	21	1.5	20	1.4	19	1.3	18	1.2	17	1.2	16	1.1	14	1.0	13	0.9	12	0.8	11	0.8	10	0.7	9	0.62
7/8	35	2.4	33	2.3	31	2.2	30	2.0	28	1.9	26	1.8	24	1.7	23	1.6	21	1.5	19	1.3	18	1.2	16	1.1	14	1
3/4	50	3.5	48	3.3	45	3.1	43	3.0	40	2.8	38	2.6	35	2.4	33	2.3	30	2.1	28	1.9	25	1.8	23	1.6	20	1.4
5/8	77	5.3	73	5.0	69	4.8	66	4.5	62	4.3	58	4.0	54	3.7	50	3.5	46	3.2	43	2.9	39	2.7	35	2.4	31	2.2
9/16	102	7.0	97	6.7	92	6.3	87	6.0	82	5.6	77	5.3	72	4.9	67	4.6	62	4.2	57	3.9	51	3.6	46	3.2	41	3.9
1/2	148	10.2	140	9.7	133	9.2	126	8.7	119	8.2	111	7.7	104	7.2	97	6.7	89	6.2	82	5.6	75	5.1	67	4.6	60	4.1
7/16	210	14	200	14	189	13	179	12	168	12	158	11	148	10.2	137	9.5	127	8.7	116	8.0	106	7.3	96	6.6	85	5.9
3/8	331	23	315	22	299	21	282	19	266	18	249	17	233	16	216	15	200	14	184	13	167	12	151	10.4	134	9.3
11/32	441	30	419	29	398	27	376	26	354	24	332	23	310	21	288	20	266	18	245	17	223	15	201	14	179	12
5/16	567	39	539	37	511	35	483	33	455	31	427	29	399	27	371	26	342	24	250	17	250	17	250	17	230	16
9/32	743	51	706	49	669	46	633	44	596	41	559	39	522	36	485	33	449	31	250	17	250	17	250	17	250	17
1/4	1,000	69	1,000	69	979	67	925	64	871	60	817	56	763	53	710	49	656	45	250	17	250	17	250	17	250	17
7/32	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	926	64	250	17	250	17	250	17	250	17
3/16	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	1,000	69	250	17	250	17	250	17	250	17

* If specific gravity falls between those shown, use next lowest: e.d., if actual gravity is 0.73, use 0.70 specific gravity data.

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Features/Benefits of Armstrong Tank Heaters

Application Flexibility

Four types of tank heaters are offered in several materials and sizes to suit your specific requirements. Several heaters are custom built, consult factory.

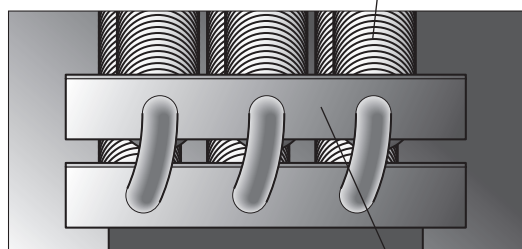
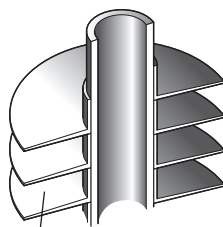
Space Savings

Flange mounted heaters are installed on various standard manhole sizes. You save internal space because only the heating element itself is inside. Steam and condensate connections are outside of the tank.

Heat Transfer Efficiency

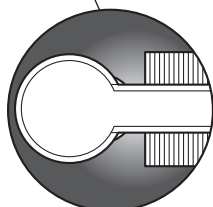
Stiff, helically wound L fin design for an efficient and long-lasting heat transfer surface.

Vertical fin surface provides uniform heating of liquid with a minimum of coking due to hot spots.



Durability Over Long Life

Pipes and headers are of heavy construction (minimum Sch. 40 pipe for steel). Greater thickness means a stronger, more corrosion-resistant design that lasts longer.



Corrosion Resistance

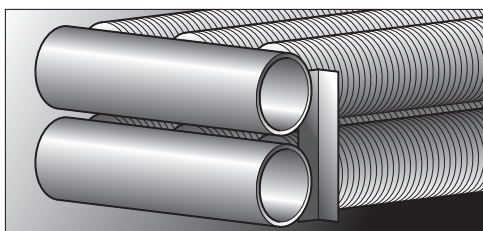
Pipes, headers and connections are welded together for a tough, single material joint. Eliminating dissimilar materials precludes galvanic corrosion, thereby lengthening service life.

Several heaters are custom built - consult factory.

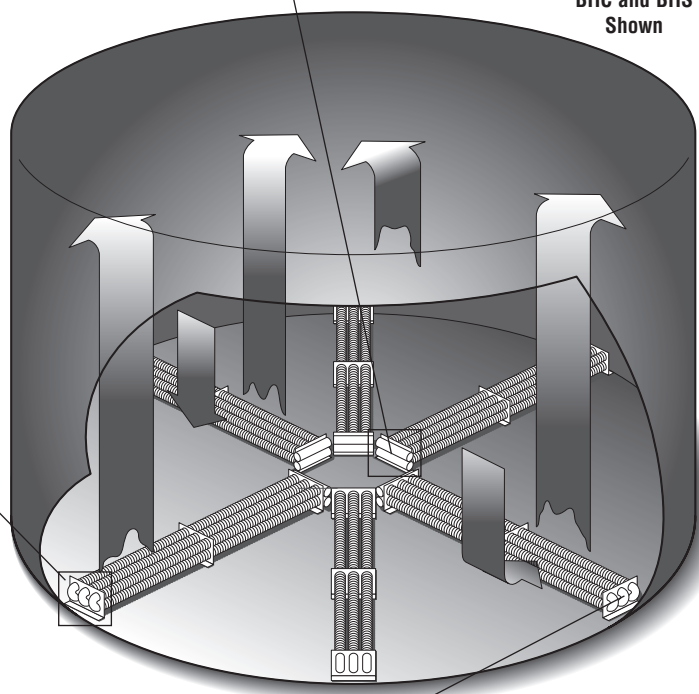
Typical Tank Heater Arrangement

Fast, Direct Connection

Heaters are ready for connection to the steam and condensate systems as supplied. Numerous types of connections are available.



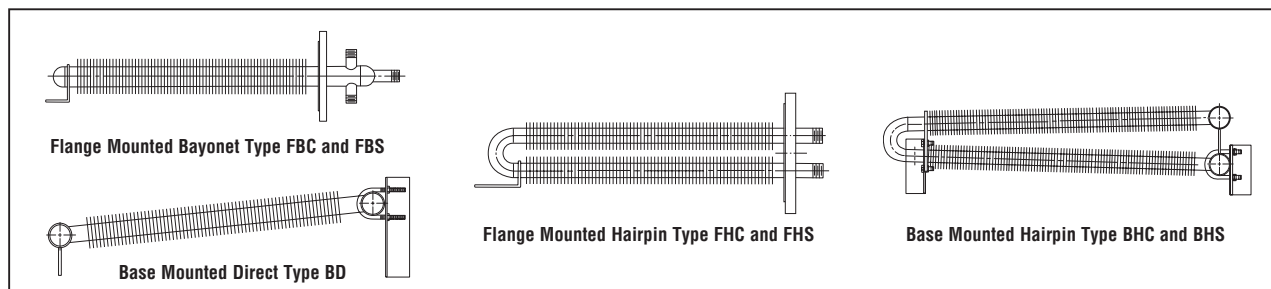
Base Mounted Hairpin Types BHC and BHS Shown



Base mounted heaters come with supports to allow for a proper distance between the tank bottom and the heating surface. This also helps to minimize the need for internal welding. Longer units are provided with mid-support members to further minimize inside welding and ensure rigid footing.

Minimum Installation Welding

Armstrong base-mounted tank heaters are installed and removed easily through manholes, eliminating the need for time-consuming welding inside the tank.



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Steamix® - Hose Stations

Whisper quite operation is achieved by special steam diffuser design.

Will not pass live steam if cold water pressure falls or fails completely.

Rugged steam valve seat is made from new high-temperature-resistant polymer.

Fails safe.

Steamix will deliver only cold water if the primary operating component (diaphragm) is damaged.

Intrinsically safe.

Operating principle means steam can flow only if water is already flowing.

Reliable all stainless steel internal parts move freely every time flow takes place.

Flexibility of application allows Steamix to operate at lower steam pressures than other style dual globe valve Mixing "Y".

User friendly single-handle temperature control means no "juggling" of inlet supply globe valves is required to find temperature.

Lock in the temperature.

Tamper resistant locking device option allows Steamix to be preset to a desired temperature and locked. Discourages adjustments by unauthorized personnel.

2-year warranty on mixing unit wetted components.



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

Steamix® - Steam & Water Hose Stations – Premium

Steamix - Premium

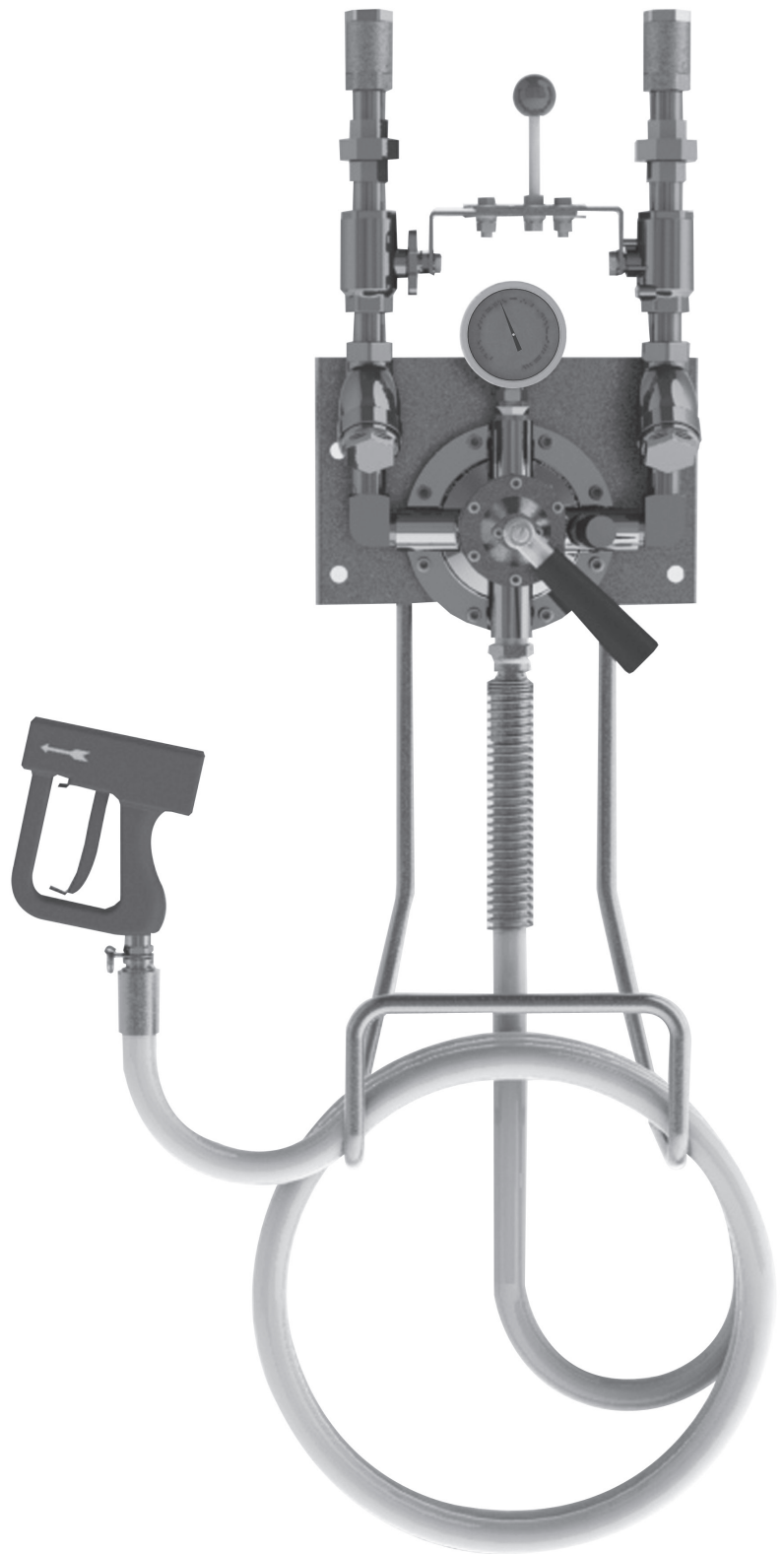
The Steamix – Premium series is supplied fully assembled and pressure tested in the following configurations.

Steamix Model 2031P - is a steam/water mixing valve of brass/stainless steel construction. The valve is supplied as standard with integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. The unit is supplied with stainless steel dual scale top mount Thermometer and Inlet Check Valves.

Steamix Model 2032P - is a steam/water mixing valve of brass/stainless steel construction. The valve is supplied as standard with integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. The unit is supplied with a stainless steel hose rack. Stainless Steel dual scale top mount Thermometer and Inlet Check Valves.

Steamix Model 2033P (shown) - is a steam/water mixing valve of brass/stainless steel construction. The valve is supplied as standard with integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. The unit is supplied with a stainless steel hose rack. Stainless Steel dual scale top mount Thermometer and Inlet Check Valves.

Steamix Model 2033P also includes 25 feet of "safety yellow" washdown hose rated, low-heat-transfer polymer spray nozzle with trigger guard, swivel adapter and a stainless steel nozzle hook.



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

Steamix® - Steam & Water Hose Stations – Stainless Steel

Steamix - Stainless Steel

The Steamix – Stainless Steel series is supplied fully assembled and pressure tested in the following configurations.

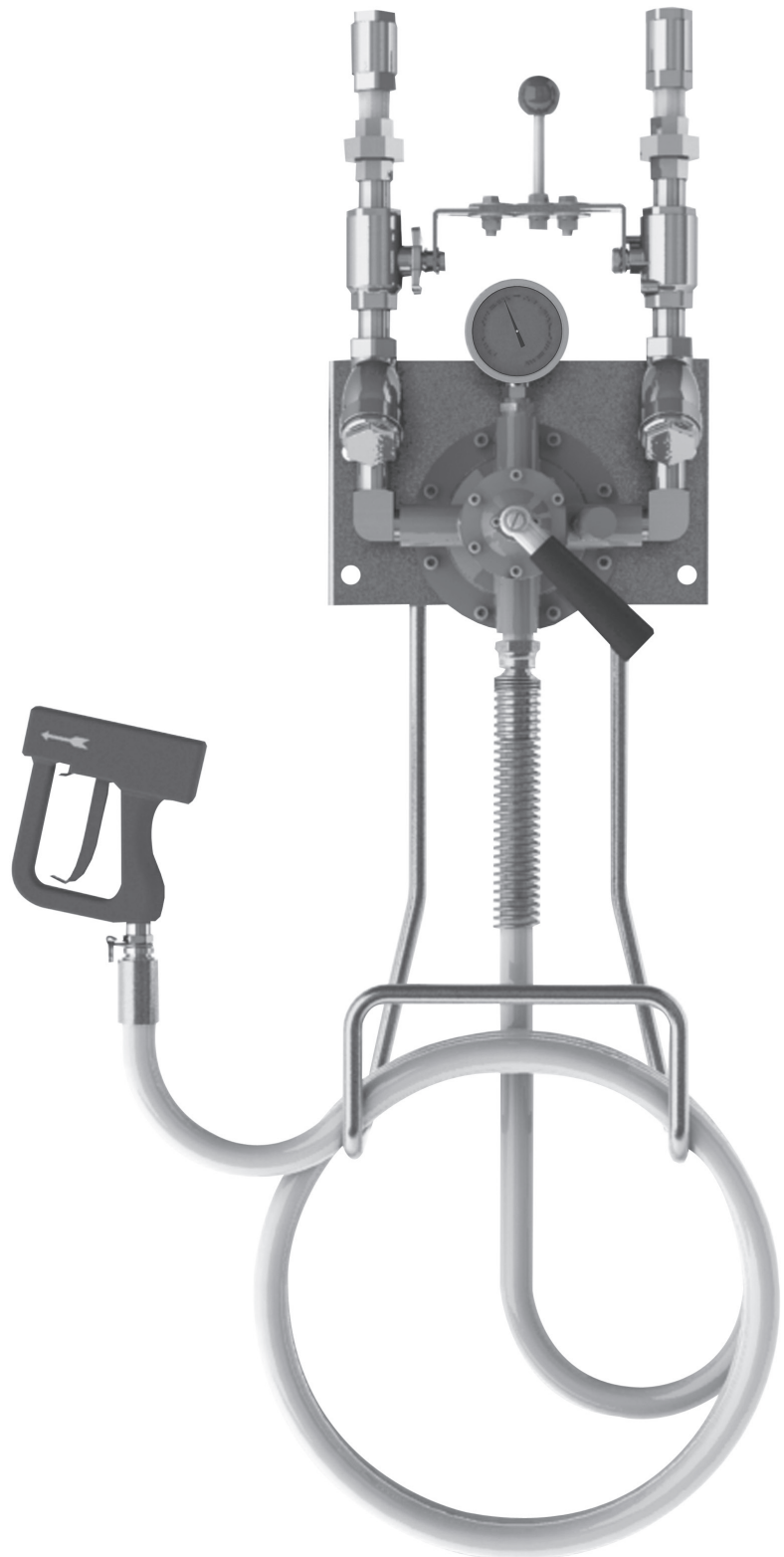
Steamix Model 2030SS - is a steam/water mixing valve of Type 304 stainless steel construction.

Steamix Model 2031SS - is a steam/water mixing valve of Type 304 stainless steel construction. The valve is supplied as standard with all stainless steel (SS) integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. Stainless Steel dual scale top mount Thermometer and Stainless Steel Inlet Check Valves.

Steamix Model 2032SS - is a steam/water mixing valve of Type 304 stainless steel construction. The valve is supplied as standard with all stainless steel (SS) integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. The unit is supplied with a stainless steel hose rack. Stainless Steel dual scale top mount Thermometer and Stainless Steel Inlet Check Valves.

Steamix Model 2033SS (shown) - is a steam/water mixing valve of Type 304 stainless steel construction. The valve is supplied as standard with all stainless steel (SS) integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. The unit is supplied with a stainless steel hose rack. Stainless Steel dual scale top mount Thermometer and Stainless Steel inlet Check Valves.

The STEAMIX Model 2033SS also includes 25 feet of "safety yellow" washdown hose, SS rubber cushioned spray nozzle with SS swivel adapter and a stainless steel nozzle hook.



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

Forged Y-Type Strainers

Armstrong Forged Y-Type Strainers are designed to ASME B 16.34. The strainer bodies are produced with a superior wall thickness for corrosion allowance. Standard strainers are equipped with screens for the average service of most mediums (steam, gas, air, oil, chemicals, etc.). The large screen open area ensures an

efficient filtering action with a low pressure drop. Filtering area to inlet area ratio is larger than 3 to 1. Screens area manufactured with perforated plate in the materials and with perforation specified in the relevant tables. Different filtrations or materials are available on request. ANSI Rating of Body: 800#.

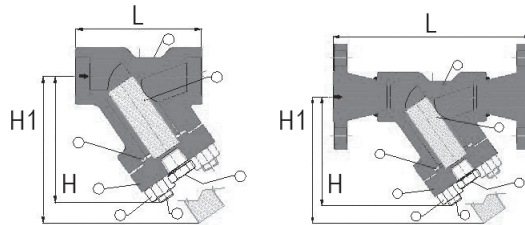
Materials

Body:	ASTM A 105N; ASTM A 182 F316
Cover:	ASTM A 105N; ASTM A 182 F316
Screen (Spare):	SS 304; SS316
Gasket (Spare):	SW 316 / Graphite; SW 316 / Graphite
Drain Plug:	ASTM A 105N; ASTM A 182 F316
Flanges:	ASTM A 105N; ASTM A 182 F316

Connections

Screwed:	ANSI B 1.20 1 (NPT) / BS21 (BSP)
Buttweld:	ANSI B 16.25
Socket Welding:	ANSI B 16.111
Flanged:	ANSI / UNI / DIN

Bolted cover 2" only (bolting mat. B7/2H or B8/GR8).



Size (inches)	DRAIN PLUG	L	H	H1	Weight (Kg)	UNI-DIN PN16-25-40		RF-150#		RF-300#		RF-600#	
						L	Kg	L	Kg	L	Kg	L	Kg
3/8"	1/4"	90	60	85	1	-	-	-	-	-	-	-	-
1/2"	1/2"	98	99	113	1	153	2.6	178	2.3	187	2.8	200	3.2
3/4"	1/2"	98	99	113	1	153	4	182	3.2	190	4.3	205	4.7
1"	1/2"	111	110	130	3	166	4.4	202	4.2	214	5.3	227	5.8
1 1/2"	1/2"	140	138	162	6	203	11	243	9.7	256	13	271	15
2"	1/2"	170	168	200	11	233	13	270	12	283	15	302	16.3

STANDARD PERFORATIONS: 0.8 mm (SPECIAL PERFORATIONS ON REQUEST)
Dimension : L, H, H1 are in millimeters (mm)

Size (inches)	DRAIN PLUG	L	H	H1	RF-1500#	
					L	Kg
3/8"	1/4"	90	60	85	-	-
1/2"	1/2"	98	99	113	216	5
3/4"	1/2"	98	99	113	230	6.2
1"	1/2"	111	110	130	250	10.6
1 1/2"	1/2"	140	138	162	297	16.5
2"	1/2"	170	168	200	360	33.1

Installation Instructions

1. All strainers should be installed as close as possible to the machinery which they are being installed to protect.
2. It is important to ensure that the strainer is installed with the flow following the same direction as the flow direction arrow cast onto the strainer body.
3. For mounting in horizontally or inclined pipelines, ensure that the screen housing is always mounted below the pipeline.
4. Y-type strainers should never be installed in vertical pipelines in the upward flow condition.

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

Cast Y-Type Strainers

Armstrong Cast Y-Type Strainers are designed to ASME B 16.34. The strainer bodies are produced with a superior wall thickness for corrosion allowance. Standard strainers are equipped with screens for the average service of most mediums (steam, gas, air, oil, chemicals, etc.).

The large screen open area ensures an efficient filtering action with a low pressure drop. Filtering area to inlet area ratio is larger than 3 to 1. Screens are manufactured with perforated plate in the materials and with perforation specified in the relevant tables. Different filtrations or materials are available on request.

Materials

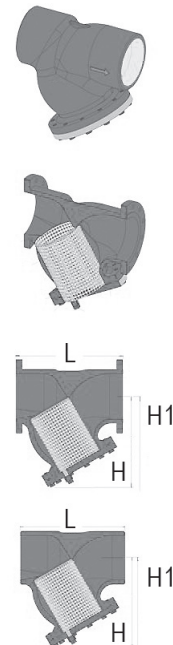
Body: ASTM A216WCB; ASTM A351 CF8M
 Cover: ASTM A 105N; ASTM A 182 F316
 Screen (Spare): SS 304; SS316
 Gasket (Spare): SW 316 / Graphite; SW 316 / Graphite
 Drain: ASTM A 105N; ASTM A 182 F316
 Bolts: ASTM A 193B7; ASTM A 193 B8
 Nuts: ASTM A 1942H; ASTM A 194 GR8

Connections

Buttweld: ANSI B 16.25
 Flanged: ANSI B 16.5

Bolted cover 2" only (bolting mat. B7/2H or B8/GR8).

Size (inches)	ANSI 150#				ANSI 300#				ANSI 600#				
	L	H	H1	Kg	L	H	H1	Kg	L	LrTJ	H	H1	Kg
½"	169	135	170		175	140	170		188	188	140	170	13
¾"	172	135	170	9,5	178	140	170	12	191	191	140	170	14
1"	197	150	195	10,5	203	160	195	14	216	216	160	195	18
1 ½"	219	185	245	12	229	185	245	16	241	241	185	245	28
2"	203	210	300	14	267	215	300	19	292	295	230	310	25
2 ½"	216	220	250	20									
3"	241	255	355	26	318	260	365	34	356	359	300	390	48
4"	292	295	420	39	356	315	437	61	432	435	360	480	93
6"	406	395	570	70	445	440	625	104	559	562	485	670	139
8"	495	485	700	133	559	485	675	200	660	663	575	780	320
10"	622	600	900	218	622	635	930	210	787	790	705	990	590
12"	699	700	1060	340	711	730	1075	410	838	841	720	1200	700
14"	788	770	1200	350	838	805	1200	670	889	892	865	1420	770
16"	914	910	1385	640	864	920	1350	780	991	994	1180	1520	1140
18"	978	1030	1600	700	978	1025	1400	863					
20"	978	1095	1750	895	1016	1140	1700	1125					
24"	1295	1310	2030	1370	1346	1380	2095	1625					



Size (inches)	900#				1500#				2500#			
	L	LrTJ	H	H1	L	LrTJ	H	H1	L RF	LrTJ	H	H1
½"	264	-	165	250	264	-	165	250	264	-	165	250
¾"	273	-	175	255	273	-	175	255	273	-	175	255
1"	308	-	180	270	254	254	210	280	308	308	215	280
1 ½"	305	-	230	340	305	305	250	320	387	387	285	390
2"	368	371	250	400	368	371	320	420	451	454	340	430
3"	381	384	350	475	470	473	360	470	368	360	400	475
4"	457	460	430	570	546	546	390	630	457	410	620	480
6"	610	613	510	670	705	711	575	730				
8"	737	740	650	885	832	842	730	950				
10"	838	841	765	1070								
12"	965	968	892	1250								
14"	1029	1038	895	1300								
16"	1130	1140	960	1400								

Installation Instructions

1. All strainers should be installed as close as possible to the machinery which they are being installed to protect.
2. It is important to ensure that the strainer is installed with the flow following the same direction as the flow direction arrow cast onto the strainer body.
3. For mounting in horizontally or inclined pipelines, ensure that the screen housing is always mounted below the pipeline.
4. Y-type strainers should never be installed in vertical pipelines in the upward flow condition.

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

Fabricated Y-Type Strainers

Armstrong Fabricated Y-Type Strainers have been specifically designed to meet all customer requirements including high pressure applications. Designed and fabricated to ASME VIII Div. 1AS standard. Can also be produced to other pressure valve codes, i.e. ASME B31.3 etc.

Standard features include low pressure drops at high velocities. Stainless steel perforated baskets as standard, vents and drains with the ability to supply Davit Lifts. Quick open closures. DP Gauges. Strainers can be manufactured to customer's specifications in all types of materials and sizes.

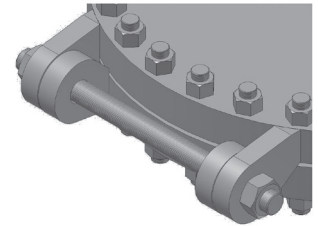
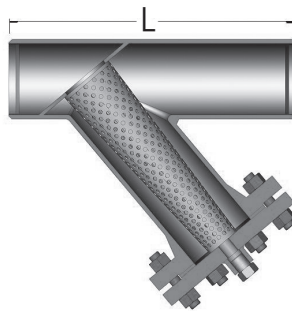
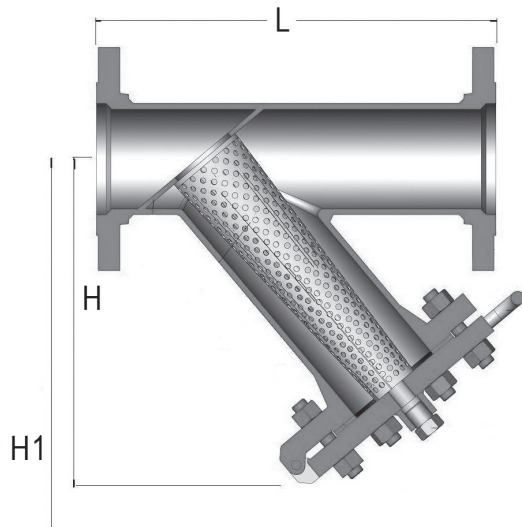
Materials

Body: C.S.; SS304 or 316
 Cover: A105N; F304/F316
 Screen (Spare): SS 304; SS304/316
 Ring: C.S.; SS
 Gasket: SW 316/Graphite
 Drain (Spare): A105N; F316
 Bolting: B7/2H; B8/GR8
 Hinge*: C.S.
 Handle: C.S.

Connections

Buttweld: ANSI B 16.25
 Flanged: ANSI / UNI / DIN

*Optional



Size (inches)	ANSI 150#				ANSI 300#				ANSI 600#				ANSI 900#						
	L	H	H1	Kg	L	H	H1	Kg	L	L/RTJ	H	H1	Kg	L	L/RTJ	H	H1	Kg	
½"																			
¾"																			
1"																			
1½"																			
2"	203	200	370	18	267	215	370	22	292	295	225	370	25	368	371	250	400	56	
3"	241	250	350	20	318	270	360	30	356	359	290	390	35	381	384	300	420	85	
4"	292	315	450	25	356	335	465	35	432	435	370	495	55	457	460	375	435	150	
6"	406	410	615	55	445	380	470	105	559	562	550	730	135	610	613	550	630	250	
8"	495	495	725	90	559	555	740	120	660	663	610	805	205	737	740	660	780	580	
10"	622	600	875	140	622	650	950	195	787	790	750	1100	470	838	841	680	880	1450	
12"	699	700	800	200	711	740	1100	260	838	841	720	1200	700	965	968	700	970	1700	
14"	787	800	1175	260	838	805	1200	325	889	892	865	1420	770						
16"	914	850	1300	330	914	920	1350	400	991	994	1180	1520	1140						
18"	978	955	1400	400	978	1025	1400	480	1092	1095	1300	1650	1300						
20"	978	1110	1700	500	1016	1140	1700	750	1194	1197	1420	1820	1450						
24"	1295	1180	1750	680	1346	1360	2050	800	1397	1400	1660	2120	1720						

HIGHER RATINGS AND DIN DIMENSIONS AVAILABLE ON REQUEST

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

Fabricated Y-Type Strainers

Armstrong Fabricated Y-Type Strainers have been specifically designed to meet all customer requirements including high pressure applications. Designed and fabricated to ASME VIII Div. 1AS standard. Can also be produced to other pressure valve codes, i.e. ASME B31.3 etc.

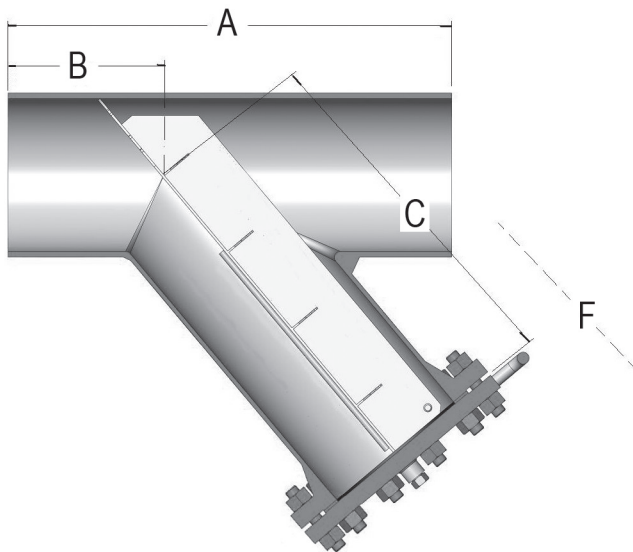
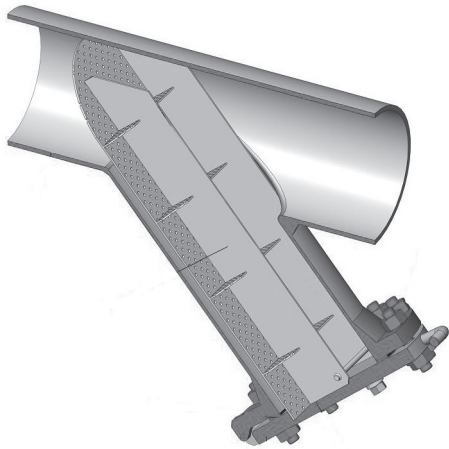
Standard features include low pressure drops at high velocities. Stainless steel perforated baskets as standard, vents and drains with the ability to supply Davit Lifts. Quick open closures. DP Gauges. Strainers can be manufactured to customer's specifications in all types of materials and sizes.

Materials

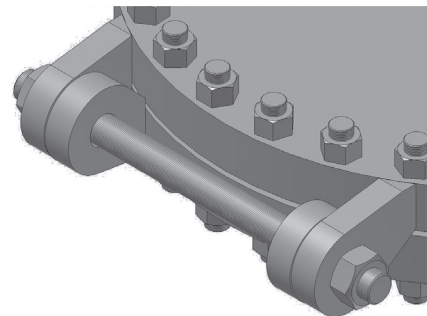
Body: C.S.
 Cover: A105N
 Screen (Spare): SS 304
 Lifting Lug: C.S.
 Gasket: SW 304/Graphite
 Drain (Spare): A105N
 Bolting: B7/2H

Connections

Buttweld: ANSI B 16.25



Size	A	B	C	F
2"	290	110	210	500
3"	380	140	260	560
4"	420	150	300	590
6"	520	180	400	770
8"	610	210	500	970
10"	740	260	600	1170
12"	820	280	700	1370
14"	880	290	750	1470
16"	980	330	850	1660



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

T-Type Strainers

Armstrong Fabricated T-Type Strainers have been specifically designed to meet all customer requirements including high pressure applications. Standard strainers are equipped with screens for the average service of most mediums (steam, gas, air, oil, chemicals, etc.). The large screen open area ensures an efficient filtering action with a low pressure drop.

Filtering area to inlet area ratio is larger than 3 to 1. Standard features include low pressure drops at high velocities. Stainless steel perforated baskets as standard, vents and drains with the ability to supply Davit Lifts. Quick open closures. DP Gauges. Strainers can be manufactured to customer's specifications in all types of materials and sizes.

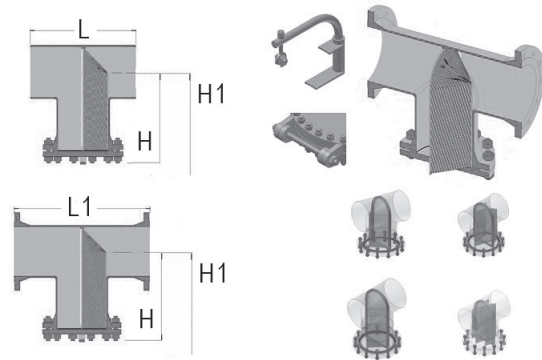
Materials

Body:	Acc. to M.R.
Cover:	Acc. to M.R.
Basket (Spare):	Acc. to M.R.
Gasket (Spare):	Acc. to M.R.
Drain:	Acc. to M.R.
Guide Rods:	Acc. to M.R.
Bolting:	Acc. to M.R.
Flange:	Acc. to M.R.
Hinge*:	Acc. to M.R.
Davit*:	Acc. to M.R.

*Optional

Connections

Buttweld:	ANSI B 16.25
Flanged:	ANSI B 16.5



RATING 150#																			
Size	2"	3"	4"	6"	8"	10"	12"	16"	18"	20"	24"	26"	28"	30"	32"	34"	36"	38"	40"
L	127	172	210	286	356	432	508	610	686	762	864	990	1042	1118	1194	1270	1346	1422	1498
L1	254	312	363	464	560	636	737	864	966	1052	1169	1172	1236	1322	1414	1494	1585	1674	1759
H	148	182	208	260	311	351	403	472	525	571	635	586	618	661	707	747	792	837	880
H1 = H x 2																			
RATING 300#																			
L	127	172	210	286	356	432	508	610	686	762	864	990	1042	1118	1194	1270	1346	1422	1498
L1	268	332	382	483	579	668	769	903	1004	1086	1201	1283	1345	1438	1534	1620	1712	1810	1900
H	158	197	225	281	333	385	438	511	565	609	673	642	672	719	767	810	856	905	1071
H1 = H x 2																			
RATING 600#																			
L	127	172	210	286	356	432	508	610	686	762	864	990	1042	1118	1194	1270	1346	1422	1498
L1	286	351	427	535	636	750	833	979	1067	1156	1284	1356	1427	1531	1630	1541	1836	1788	2043
H	177	216	260	324	382	447	492	574	624	676	753	678	714	766	815	770	918	894	1195

Maintenance

1. Strainer maintenance should be performed at least once a year, or whenever the pressure drop is found to be in excess of the normal figures.
2. Be sure the main line is shut-off.
3. Untighten cover stud bolts and nuts. Remove cover and gasket.
4. Remove basket and carefully inspect it for damages. Clean screen and remove any obstructions. If the basket is broken or out of shape, replace it.
5. Carefully clean the inside of the strainer body.
6. Install a new Gasket and replace the (cleaned) screen or a new screen. Replace cover.
7. Slowly give pressure to the line, checking for leakage.
8. Write on the strainer body the date of this maintenance operation.

H1 = H x 2												RATING 900#					
Size	2"	3"	4"	6"	8"	10"	12"	16"	18"	20"	24"	L	L1	H			
L	127	172	210	286	356	432	508	610	686	762	864	127	172	210			
L1	343	389	453	579	694	813	922	1056	1157	1271	1462	343	389	453			
H	219	242	279	353	419	485	549	626	689	752	879	219	242	279			
H1 = H x 2												RATING 1500#					
Size	2"	3"	4"	6"	8"	10"	12"	16"	18"	20"	24"	L	L1	H			
L	127	172	210	286	356	432	508	610	686	762	864	127	172	210			
L1	343	421	472	643	796	953	1087	1256	1354	1488	1691	343	421	472			
H	219	274	298	417	521	625	714	816	886	968	1108	219	274	298			

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

Angle T-Type Strainers

Armstrong Fabricated Angle T-Type Strainers have been specifically designed to meet all customer requirements including high pressure applications. Standard strainers are equipped with screens for the average service of most mediums (steam, gas, air, oil, chemicals, etc.). The large screen open area ensures an efficient filtering action with a low pressure drop. Filtering area

to inlet area ratio is larger than 3 to 1. Standard features include low pressure drops at high velocities. Stainless steel perforated baskets as standard, vents and drains with the ability to supply Davit Lifts. Quick open closures. DP Gauges. Strainers can be manufactured to customer's specifications in all types of materials and sizes.

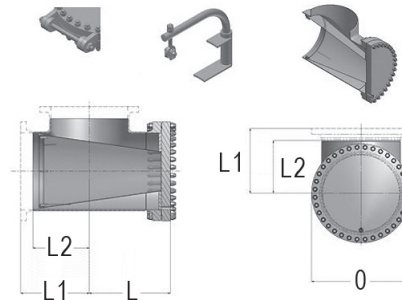
Materials

Body:	Acc. to M.R.
Cover:	Acc. to M.R.
Basket (Spare):	Acc. to M.R.
Gasket (Spare):	Acc. to M.R.
Drain:	Acc. to M.R.
Guide Rods:	Acc. to M.R.
Bolting:	Acc. to M.R.
Flange:	Acc. to M.R.
Hinge*:	Acc. to M.R.
Davit*:	Acc. to M.R.

*Optional

Connections

Buttweld:	ANSI B 16.25
Flanged:	ANSI B 16.5



SIZE	S	L2	L1					L					O							
RATING			150	300	600	900	1500	2500	150	300	600	900	1500	2500	150	300	600	900	1500	2500
2"	127	63, 5	258	271	290		347	398	152	162	181		222	260	152	165	165	no	216	235
2 1/2"	152	76, 2	296	309	328		379	455	174	184	203		241	295	178	190	190	no	244	267
3"	171	85, 7	315	334	353	391	423	525	186	200	219	244	270	339	190	210	210	241	267	305
4"	210	105	366	385	430	455	474	607	211	228	263	282	301	390	229	254	273	292	311	356
5"	248	124	429	448	493	518	576	722	243	263	301	320	371	463	254	279	330	349	375	419
6"	286	143	467	486	537	582	675	849	263	284	327	357	416	543	279	318	356	381	394	483
8"	356	178	563	582	639	696	798	1007	314	336	386	422	501	641	343	381	419	470	483	552
10"	432	216	639	671	753	817	957	1287	354	387	451	489	597	819	406	444	508	546	584	673
12"	508	254	741	772	836	925	1090	1452	406	441	495	552	679	921	483	521	559	610	673	762
14"	559	279	817	849	906	1001	1173		447	482	533	597	730		533	584	603	641	749	
16"	610	305	868	906	982	1058	1249		474	514	578	628	781		597	648	686	705	826	
18"	686	343	969	1007	1071	1160	1357		528	568	629	692	851		635	711	743	787	914	
20"	762	381	1055	1090	1160	1274	1490		574	612	679	756	933		698	775	813	857	984	
24"	864	432	1172	1204	1287	1465	1693		638	676	755	882	1060		813	914	940	1041	1168	

Maintenance

1. Strainer maintenance should be performed at least once a year, or whenever the pressure drop is found to be in excess of the normal figures.
2. Be sure the main line is shut-off.
3. Untighten cover stud bolts and nuts. Remove cover and gasket.
4. Remove basket and carefully inspect it for damages. Clean screen and remove any obstructions. If the basket is broken or out of shape, replace it.
5. Carefully clean the inside of the strainer body.
6. Install a new Gasket and replace the (cleaned) screen or a new screen. Replace cover.
7. Slowly give pressure to the line, checking for leakage.
8. Write on the strainer body the date of this maintenance operation.

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

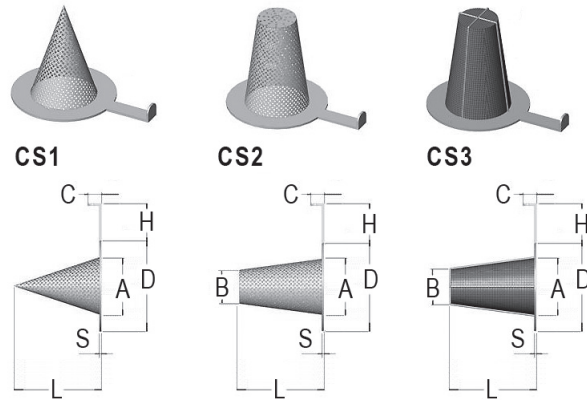
Conical Strainers

Armstrong Conical Type Temporary Strainers are designed for the efficient removal of solids in new pipeline start-up service. They are compact, rugged and can be installed either vertically or horizontally. Manufactured in wire mesh or perforated plate using carbon, stainless steel or other alloys.

Strainers can be manufactured to customer's specifications. Strainers are designed to be installed between ANSI B 16.5 Flanges and meet FF, RF and RTJ Facings.

Materials

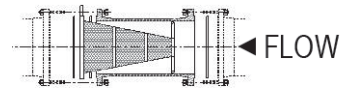
Ring: C.S.; SS 304
 Perforation Plate: SS 304; SS 304
 Reinforcements: SS 304; SS 304



Size (inches)	1½"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
R	11	10	10	8	8	6	6	6	6	6	6	6	6
D	73	92	127	157	216	270	324	381	412	470	534	584	692
H	70	70	70	80	100	100	110	110	120	130	130	140	150
L (CS1)	300	350	450	460	670	680	800	950	1070	1220	1350	1540	1850
L (CS2/CS3)	140	180	230	260	400	470	520	600	680	780	900	1000	1230
C	20	20	20	20	20	20	20	20	20	20	20	20	20
S	3	3	3	3	3	3	5	5	8	8	10	10	10
A (SCH STD)	30	40	65	90	140	190	235	285	315	365	420	460	560
B	40	40	65	70	95	115	130	170	180	200	215	250	285
Dimensions : D , H , L , C , S , A , B are in millimeters (mm) OTHER SIZES ON REQUEST													

Assembly Instructions

1. Insert the strainer between the two flanges.
2. Make sure the two gaskets are fitted on both sides.
3. Tighten bolts, keeping the strainer and gasket in the correct position.



Maintenance Instructions

1. Unscrew bolts.
2. Remove the strainer and clean or replace it.
3. When re-assembling, use new gaskets.

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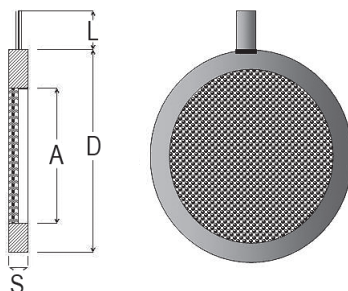
Flat Strainers

Armstrong Flat Type Strainers are designed for the efficient removal of solids in new pipeline start-up service. They are compact, rugged and can be installed either vertically or horizontally. Manufactured in wire mesh or perforated plate using carbon, stainless steel or other alloys.

Strainers can be manufactured to customer's specifications. Strainers are designed to be installed between ANSI B 16.5 Flanges and meet FF, RF and RTJ Facings.

Materials

Ring: C.S.; SS 304
 Screen: SS 304; SS 304
 Handle: SS 304; SS 304



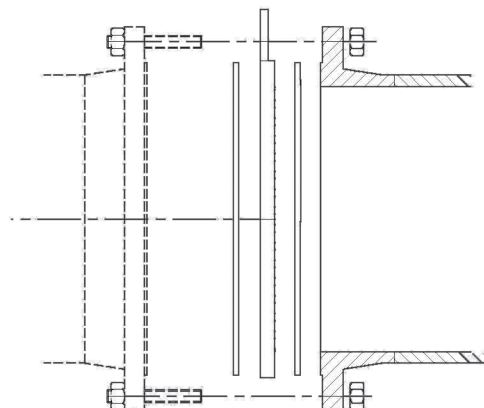
Size (inches)	1½"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
D	73	92	127	157	216	270	324	381	412	470	534	584	692
L	70	70	70	80	100	100	110	110	120	130	130	140	150
S	3	3	3	3	5	5	5	5	5	7	7	7	7
A	33	48	75	100	150	200	250	300	332	383	434	485	587
Dimensions : D , L , S , A , B are in millimeters (mm) OTHER SIZES ON REQUEST													

Assembly Instructions

1. Insert the strainer between the two flanges.
2. Make sure the two gaskets are fitted on both sides.
3. Tighten bolts, keeping the strainer and gasket in the correct position.

Maintenance Instructions

1. Unscrew bolts.
2. Remove the strainer and clean or replace it.
3. When re-assembling, use new gaskets.



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Three Challenges - One System Solution

Three constant challenges that plant managers and maintenance personnel face in the operation of any system include:

- Identifying a failure - ability to immediately pinpoint what has failed, when it failed and where it failed.
- Evaluating the scope - comprehending the magnitude of the failure especially in terms of energy lost and emissions discharged to the atmosphere.
- Measuring the impact - accurately calculate the costs including wasted energy, process disruptions and plant shutdowns, safety hazards and fines levied.

AIM enables your team to tackle all three challenges with one system solution that combines a mix of methods including acoustic and temperature monitoring with integrated software through a smart wireless gateway to deliver:

- Immediate failure notification of devices such as steam traps
- Immediate notification of release to flare for emissions mitigation
- Pinpoint accuracy of failure location for fast resource deployment
- Detection of "sizzling" relief valves for proactive maintenance scheduling
- Preemptive warning of hazardous vapor release to improve worker safety



ARMSTRONG INTELLIGENT MONITORING

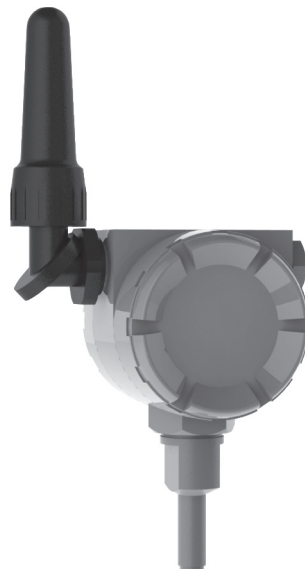
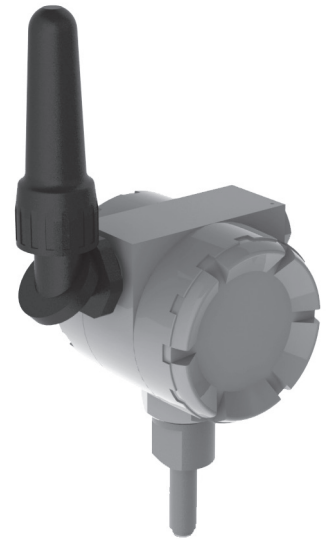


TD5100 Temperature Monitoring

The Armstrong Intelligent Monitoring Model TD5100 is a temperature monitoring solution that allows you to tackle critical temperature problems. The AIM® TD5100 can wirelessly monitor the skin temperature of any pipe, vessel or piece of equipment. Using non-intrusive technology combined with WirelessHART, the AIM® TD5100 is the ideal solution for any temporary or permanent 24/7 temperature monitoring.

ST5700 Steam Trap Monitoring

Armstrong Intelligent Monitoring Model ST5700 is a wireless monitoring technology that efficiently monitors and evaluates steam trap operation. The AIM® ST5700 identifies the conditions of a steam trap to determine significant problems that could put your operation at risk. The AIM® ST5700 can accurately detect potential issues such as plugged and blow thru steam traps which can result in a range of issues from failed equipment, to loss of product, to safety concerns. Immediate failure notification from the AIM® ST5700 helps identify the root cause while you minimize production losses and reduce energy consumption. Using non-intrusive technology combined with WirelessHART, the AIM® ST5700 is the ideal solution for any temporary or permanent 24/7 steam trap monitoring.



AD5000 Acoustic Monitoring

Armstrong Intelligent Monitoring Model AD5000 is a wireless monitoring technology designed to monitor acoustic patterns associated with leaking gasses and high pressure fluids. The AIM® AD5000 is the ideal solution to identify leaking isolation or safety relief valves. Identifying the source quickly can reduce the use of flare to burn off product and the costly fines that may be associated with it. Instant notification helps to minimize material and production loss.

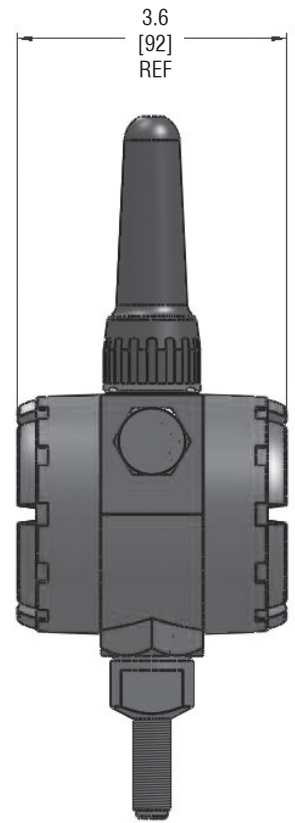
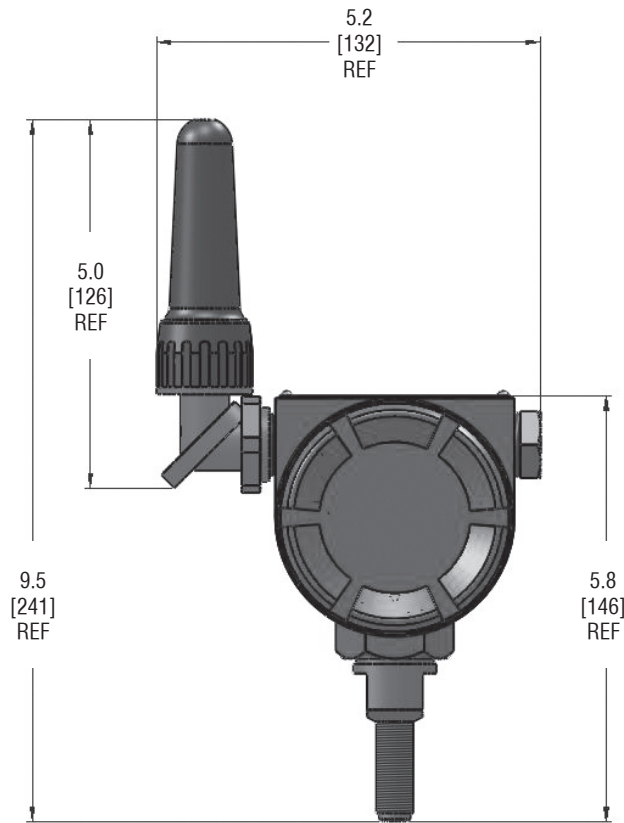
Ultimately, the AD5000 can help cut down on environmental fines, reduce product recirculation and improve safety by instantly identifying the leak source. Using non-intrusive technology combined with WirelessHART, the AIM® AD5000 is the ideal solution for any temporary or permanent 24/7 acoustic monitoring.

AIM®

Armstrong® Intelligent Monitoring

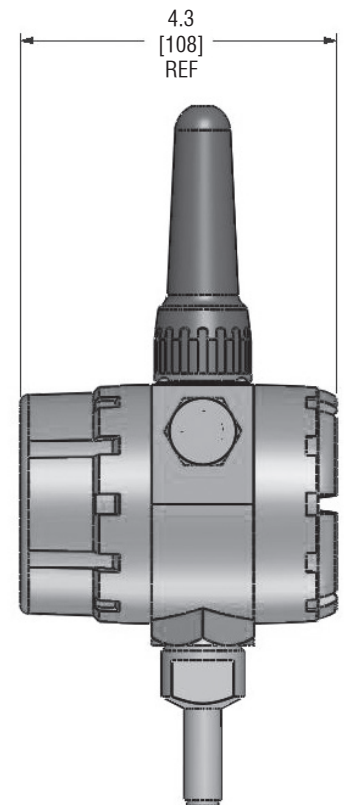
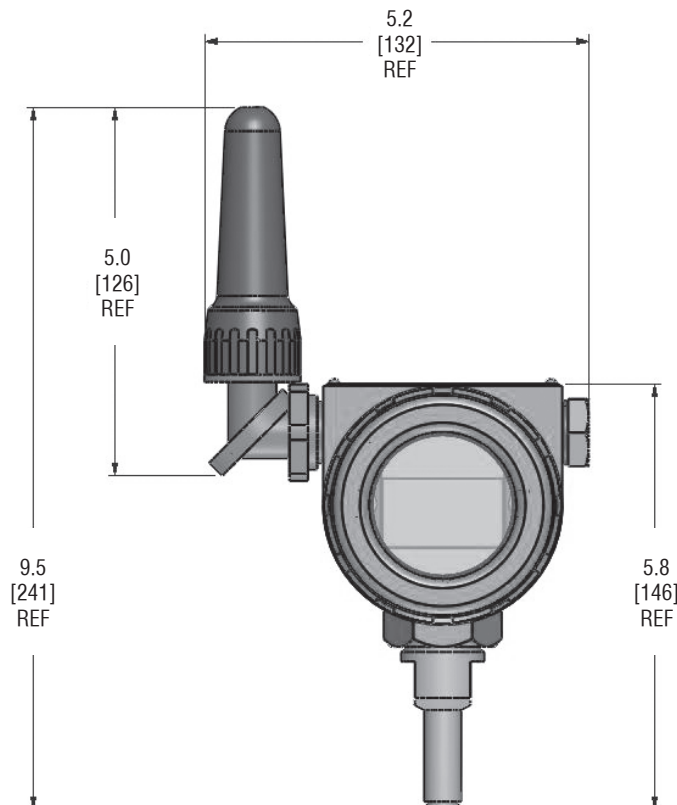
**Models AD500,
ST5700 and
TD5100
without display
screen**

inches
[mm]



**Models AD500,
ST5700 and
TD5100
with display
screen**

inches
[mm]



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The HART Communication Protocol has served as the world’s leading process communication technology for smart instruments since 1989. Today, more than 30 million HART devices are installed and in service worldwide.

Industry suppliers are manufacturing and shipping HART products in record numbers—75% of the smart devices installed are HART-enabled.

More HART products are installed in more plants around the world than any other. No other communication protocol comes close.

Wireless technology allows users to access the vast amount of unused information stranded in these installed HART smart devices— 85% of the installed HART devices. It also provides a cost-effective, simple and reliable way to deploy new points of measurement and control without the wiring costs.

Simple

- Reduced installation and wiring costs
- Always on security
- Adjusts as new instruments are added and to changes in plant infrastructure

Reliable

- “Hops” across channels
- Co-existence with other wireless networks
- Optimizes bandwidth and radio time
- Mesh network and multiple access points

Secure

- Protects valuable information with multi-layered security
- Robust multi-tiered always on security
- Protects wireless network with channel hopping
- Reports message integrity failures and authentication failures

Item	Description
Based on Industrial Standards	HART - IEC 61158 WirelessHART - IEC/PAS 62591Ed.1 EDDL - IEC 61804-3 Radio & MAC - IEEE 802.15.4(TM)-2006 IEC/PA
Radio Standard	IEEE 802.15.4-2006 @ 250kbps
Frequency Band	2.4GHz
Frequency Management	Channel hopping on a per packet basis
Distance	Up to 250 m (820 ft) line-of-sight between devices
Power	Battery
Topologies	WirelessHART Mesh

Transmitted Information • The following information is sent from the nodes.

Information	Device ID	HART Tag	Primary Variable (PV)	Secondary Variable (SV)	Tertiary Variable (TV)	Quaternary Variable (QV)
Acoustic Model AD5000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Counts (0-255)	Current temperature reading (°F or °C)	Alarm Setting (default 0)	Estimated Battery Life (Days)
Steam Trap Model ST5700	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Trap Condition • 1 – OK = no alarm; steam trap is functioning properly. • 2 – CD = alarm; steam trap plugged/locked or steam supply valve off. • 3 – BT = alarm; steam trap failed open, experiencing steam loss.	Current temperature reading (°F or °C)	Temperature Setting*	Estimated Battery Life (Days)
Temperature Model TD5100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Temperature (°F or °C)	Status Bit • 1 – Temp. above setting • 2 – Temp. below setting	Temperature Setting	Estimated Battery Life (Days)




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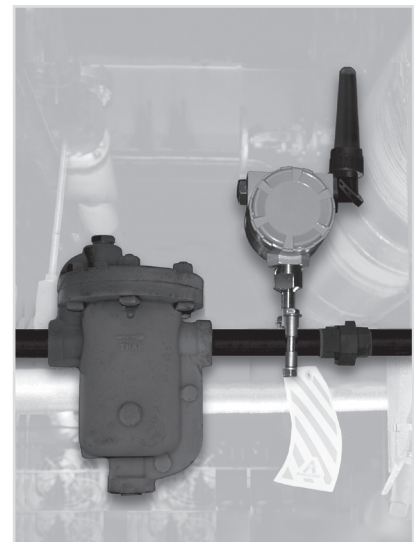
Adjustable



Extreme Weather

Factory Mutual (FM) Approval	
  	
<i>United States</i>	Intrinsic Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G Zone Rating: Zone 0, AEx ia IIC Temperature Code: T3 Ambient Temperature Range: T _{amb} -40°C to 90°C (-40°F to 194°F) For use with TADIRAN model TLH-5920 lithium ion battery only Standards used for Certification: FM3600, FM3610, FM3810, ANSI/ISA 60079-0, ANSI/ISA 60079-11
<i>Canada</i>	Intrinsic Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G Zone Rating: Zone 0, Ex ia IIC Temperature Code: T3 Ambient Temperature Range: T _{amb} -40°C to 90°C (-40°F to 194°F) For use with TADIRAN model TLH-5920 lithium ion battery only Standards used for Certification: CSA 1010.1, CSAC22.2No.157, CSAC22.2No.25,CAN/CSAE60079-0, CAN/CSA60079-11
<i>European Certification</i>	ATEX Intrinsic Safety Ex ia IIC T3 Ambient Temperature Range: T _{amb} -40°C to 90°C (-40°F to 194°F) For use with TADIRAN model TLH-5920 lithium ion battery only Standards used for Certification: EN60079-0,EN60079-11, EN 60079-26
<i>IECEx Certification</i>	Equipment Protection Level: Ga Gas/Vapour: EX ia IIC T3 Ambient Temperature Range: T _{amb} -40°C to 90°C (-40°F to 194°F) For use with TADIRAN model TLH-5920 lithium ion battery only Standards used for Certification: IEC 60079-0, IEC 60079-11, IEC 60079-26

Output	WirelessHART 2.4 GHz
Local Display (if applicable)	Liquid Crystal Display Viewing Area: 1.34" x 0.55" (34 mm x 14 mm)
Temperature Operating Range	With display: -30°C to 80°C (-22°F to 176°F) Without display: -40°C to 90°C (-40°F to 194°F)
Materials of Construction	Housing – Aluminum Paint – Powder Coat O-ring – Nitrile Stem – 304 SS Antenna – Nylon 6,6 Nampelate – 304 SS
Battery Type	Tadiran Lithium Ion Model – TLH-5920
Weight	2.2 lbs (1 Kg)
ST5700 Note: For proper operation, node must be installed on a steam trap operating at no less than 15 psig (1 bar).	



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Armstrong - SteamStar®



SteamStar®

The first and only Web-based application for measuring, monitoring and managing steam trap information.

SteamStar® can:

- Improve steam system efficiency. SteamStar provides diagnostic reporting at various levels of organizational responsibility. The reports permit the evaluation of current conditions and provide the knowledge necessary to make money-saving decisions.

Location Name	Location	Installed	In Service	Defective	Last Survey	Last Activity	Alarms
Andover Petrochemical							
Asia							
Daya Bay	Guangdong Province	246	218	23	11/26/04	6/6/05	●
Klang, Malaysia	Klang	49	49	12	10/17/04	6/6/05	●
Europe							
Bratislava, Slovakia	Bratislava	653	653	62	8/12/04	6/6/05	●
Hamburg, Germany	Hamburg	815	815	336	3/15/04	6/6/05	●
Marseille, France	Marseille	1,087	1,087	99	6/19/04	6/6/05	●
Southampton, United Kingdom	Southampton	25	25	3	10/17/04	6/6/05	●
Zagreb, Croatia	Zagreb	997	997	130	4/12/04	6/6/05	●
United States							
Central Region							
Baytown, TX	Baytown, TX	1,630	1,630	410	10/2/04	6/6/05	●
Joliet, IL	Joliet, IL	3,260	3,260	815	10/17/04	6/6/05	●
Phillipsburg, KS	Phillipsburg, KS	543	543	116	9/13/04	6/6/05	●
East Coast Region							
Bradford, PA	Bradford, PA	465	465	79	8/10/04	6/6/05	●
Paulsboro, NJ	Paulsboro, NJ	816	816	336	8/2/04	6/6/05	●
Gulf Coast Region							
Biloxi, MS	Biloxi, MS	53	46	14	10/4/04	6/6/05	●
Corpus Christi, TX	Corpus Christi, TX	47	47	21	6/15/04	6/6/05	●
Meraux, LA	Meraux, LA	47	47	11	5/12/04	6/6/05	●
West Coast Region							
Los Angeles, CA	Los Angeles, CA	815	815	336	1/5/05	6/6/05	●
Oakland, CA	Oakland, CA	543	543	116	4/22/05	6/6/05	●
Portland, OR	Portland, OR	1,087	1,087	165	7/12/04	6/6/05	●

- Achieve best practice energy management goals. History has shown that companies maximize sustainable cost savings only when energy results are measured, monitored and managed on a consistent basis. SteamStar is the Web-based tool that can bring data together—by site, by region and by company—to help achieve your best practice energy management goals.

- Eliminate software-licensing costs. Licensing agreements can cost tens of thousands of dollars for initial software purchase—and thousands more if the software is to serve multiple users. The Web-based SteamStar platform eliminates licensing fees, slashing the up-front investment.

- Improve company-wide communication. Plant users on the front lines can dig down to the root causes of steam trap issues. Using the same platform, the global energy manager can analyze data for sites around the world.

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INTELLIGENT SOLUTIONS IN STEAM, AIR AND HOT WATER

Armstrong International

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

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