# The Inverted Bucket Steam Trap



### Energy Efficient Because It's So Reliable

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

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

### Wear and corrosion resistance

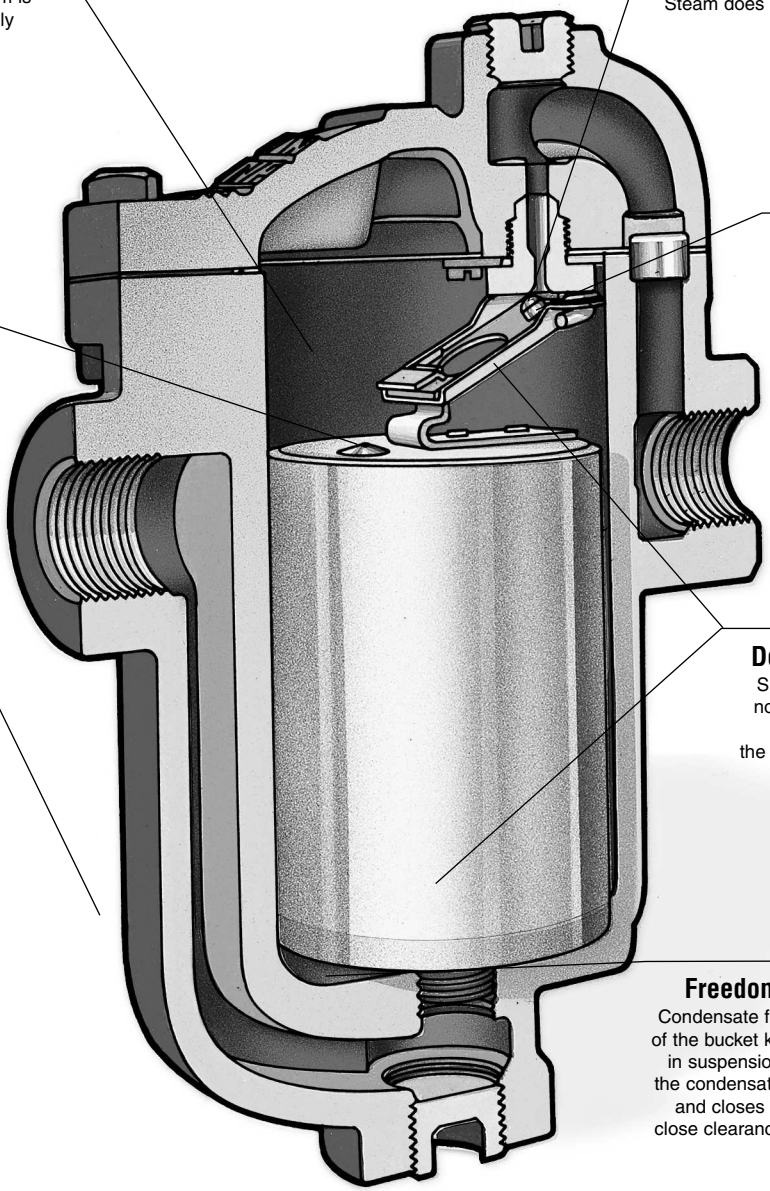
Free-floating guided lever valve mechanism is "frictionless," and all wear points are heavily reinforced. All working parts are stainless steel. Valve and seat are stainless steel, individually ground and lapped together in matched sets.

### Continuous air and $CO_2$ venting

Vent in top of bucket provides continuous automatic air and $CO_2$ venting with no cooling lag or threat of air binding. Steam passing through vent is less than that required to compensate for radiation losses from the trap so it's not wasted.

### Excellent operation against back pressure

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



### Virtually no steam loss

Steam does not reach the water-sealed discharge valve.

### Purging action

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

### Dependable operation

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

### Freedom from dirt problems

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

### Resistance to damage from water hammer

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



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

# Inverted Bucket Steam Trap



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

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

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

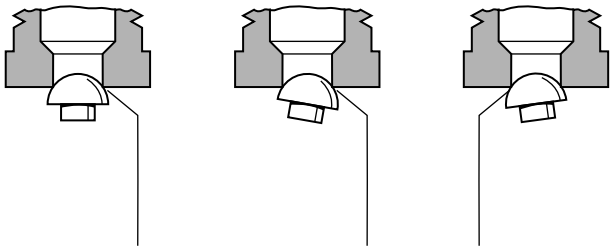
### Corrosion-Resistant Parts
The stainless steel valve and seat of the Armstrong inverted bucket steam trap are individually ground and lapped together in matched sets. All other working parts are wear- and corrosion-resistant stainless steel.

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

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

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

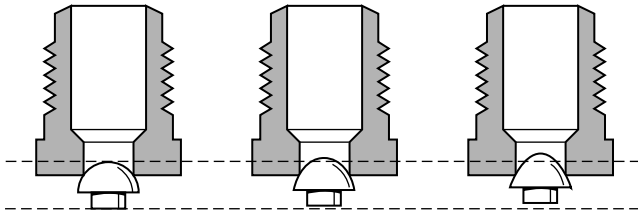
**Armstrong IB Valve Seating/Ball Valve**



Line Contact – Single Seat

Infinite Number of Center Lines and Seating Circumferences

**IB Valve Wear Characteristics**



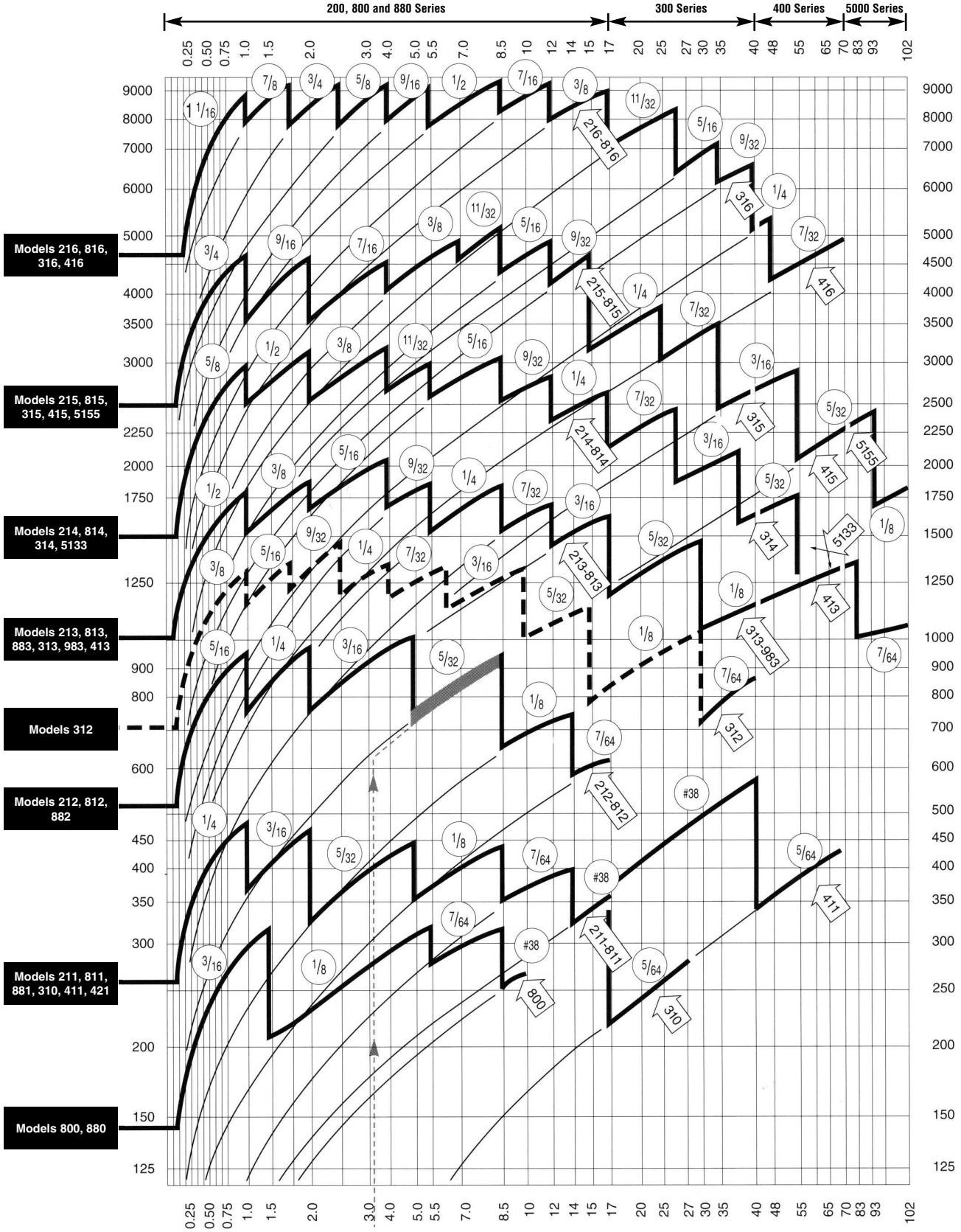
Armstrong IB ball valve continues to seat itself deeper, providing a tight seal even in the presence of wear.

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# IB Steam Trap Summary Capacity Chart

## Pressure difference in bar between steam line and return line with trap valve closed

**Note:** Above capacity chart does not include all models available. Refer to specific page of trap required for capacities not covered above.




## Pressure difference in bar between steam line and return line with trap valve closed

**Note:** Above capacity chart does not include all models available. Refer to specific page of trap required for capacities not covered above.



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.armstrongintenational.eu • info@armstrongintenational.eu

# How to Use the IB Steam Trap Summary Capacity Chart



### How the Capacity Chart was made

The Armstrong capacity chart shows continuous discharge capacities of Armstrong traps under actual operating conditions as determined by literally hundreds of tests. In these tests condensate at the steam temperature corresponding to the test pressure was used. The choking effect of flash steam through the orifice, as well as the back pressure created by flash steam, were automatically taken into account. Actual installation hookups were used so that pipe friction in both inlet and discharge lines also were reflected in the results.

Trap capacity ratings based on cold water tests which produce no flash steam would be much too high. Orifice tests also are too high because they ignore pipe friction. Theoretical calculations of trap capacities have never been conservative. You can rely on Armstrong capacity ratings because they show actual capacities of hot condensate.

### Heavy "sawtooth" curves

show capacities for traps using maximum possible diameter orifices for the pressures shown.

### Thin line curves

extending down to the left of the heavy curves show the capacities of Armstrong traps at pressures below their maximum ratings. For example: a model 216 trap with 1/2" orifice good for a maximum working pressure of 8,5 bar will have a continuous discharge capacity of a little less than 6 000 kg/h at 2,8 bar.

### How to use the inverted bucket trap capacity chart

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

**Example 1:**
**Constant Pressure and Condensing Rate**

Given:

| | |
|---|---|
| Maximum pressure differential: | 5 bar |
| Operating differential: | 4 bar |
| Condensate load: | 133 kg/h |
| times 3:1 safety factor or: | 400 kg/h |

Enter chart at 4 bar and go up to 400 kg/h capacity. This is directly on the 5/32" orifice line as shown in Chart ST-73-1. The capacity of this 5/32" orifice at pressures less than 2 bar is indicated by the thin line. Follow the line to the right to the vertical drop at 5 bar. This means this orifice will operate to a maximum of 5 bar differential - the other requirement for this application. Follow the heavy line back to the left and note that it's attached to the arrow indicating that the 211, 811 or 881 traps (1811 and 1011 are other possibilities) with the 5/32" orifice will yield this capacity. This is the trap to use.

**Example 2:**
**Constant Pressure and Condensing Rate but with Possible High Back Pressure**

Assume for example:

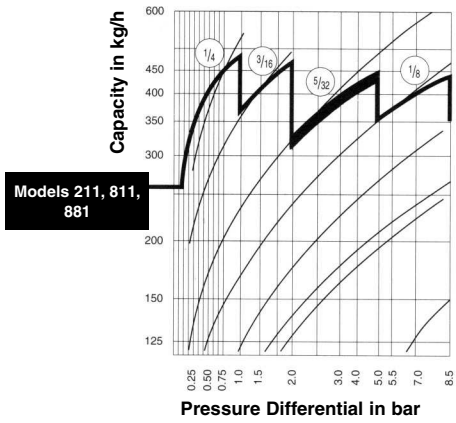
| | |
|---|---|
| Maximum pressure differential: | 6 bar |
| Operating differential minimum: | 3 bar |
| Operating differential normally: | 4 bar |
| Condensate load: | 133 kg/h |
| times 3:1 safety factor or: | 400 kg/h |

To solve the problem, refer to the sawtooth chart, page ST-72. Enter at the minimum differential pressure (3 bar) and move up until you intersect a line that is above 400 kg/h capacity, which is the first thin line above the heavy "sawtooth" for the 211, 811 and 881 traps. Note that this is the continuation of the capacity line for the 5/32" orifice for the 212, 812 and 882 traps. Now follow the line to the right until the vertical drop at 8,5 bar differential. This is within our requirement of 6 bar. Therefore a 5/32" orifice can handle the 400 kg/h condensate load when fitted into a 212, 812 or 882 trap and that it will not lock shut at the 6 bar maximum differential. This is the trap to use since it will handle the load at both the minimum and maximum operating differentials, even though it has a maximum operating pressure differential of 8,5 bar.

### Orifice sizes:

| | | | |
|---|---|---|---|
| 1 7/8" | = 47,0 mm | 5/16" | = 7,9 mm |
| 1 5/8" | = 41,0 mm | 19/64" | = 7,5 mm |
| 1 17/32" | = 39,0 mm | 9/32" | = 7,1 mm |
| 1 1/8" | = 28,0 mm | 17/64" | = 6,7 mm |
| 1 1/16" | = 27,0 mm | 1/4" | = 6,4 mm |
| 7/8" | = 22,2 mm | 7/32" | = 5,6 mm |
| 3/4" | = 19,0 mm | 13/64" | = 5,1 mm |
| 11/16" | = 17,5 mm | 3/16" | = 4,8 mm |
| 5/8" | = 15,9 mm | 11/64" | = 4,4 mm |
| 9/16" | = 14,3 mm | 5/32" | = 4,0 mm |
| 1/2" | = 12,7 mm | 1/8" | = 3,2 mm |
| 7/16" | = 11,2 mm | 7/64" | = 2,8 mm |
| 3/8" | = 9,5 mm | # 38 | = 2,5 mm |
| 11/32" | = 8,7 mm | 5/64" | = 2,0 mm |

### Chart ST-73-1: Selection Curve Example 1

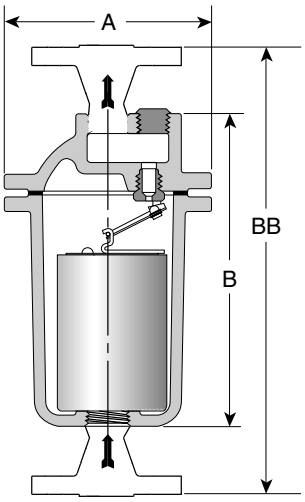


# 200 Series Inverted Bucket Steam Traps

**Cast Iron for Vertical Installation**

For Pressures to 17 bar...Capacities to 9 000 kg/h






## Description

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

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

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

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and $CO_2$ venting at steam temperature.

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

## Maximum Operating Conditions

| | |
|---|---|
| Maximum allowable pressure (vessel design): | 17 bar @ 232°C |
| Maximum operating pressure: | 17 bar |
| Maximum back pressure: | 99% of inlet pressure |

## Connections

Screwed BSPT and NPT
Flanged DIN or ANSI (screw on)

## Materials

| | |
|---|---|
| Body: | ASTM A48 Class 30 |
| Cap: | ASTM A48 Class 30<br>ASTM A-105 (Only 215 if PMO > 9 bar) |
| Internals: | All stainless steel – 304 |
| Valve and seat: | Hardened chrome steel – 440F |
| Test plug: | Carbon steel |

## Options

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

## Specification

Inverted bucket steam trap, type ... in cast iron, with continuous air venting at steam temperature, free floating stainless steel mechanism, and discharge orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

## 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

**Table ST-74-1. 200 Series, Bottom Inlet, Top Outlet Trap (dimensions in mm)**
Add suffix "CV" to model number for internal check valve, "T" for thermic vent bucket.

| Model No. | 211 | 212 | 213 | 214 | 215 | 216 |
|---|---|---|---|---|---|---|
| Pipe Connections | 15 | 15 – 20 | 15 – 20 – 25 | 25 – 32 | 25 – 32 – 40 | 40 – 50 |
| Test plug | 1/8" | 3/8" | 1/2" | 1/2" | 3/4" | 1" |
| "A" Flange Diameter | 108 | 133 | 162 | 190 | 216 | 259 |
| "B" Face-to-Face (screwed) | 162 | 203 | 273 | 317 | 364 | 432 |
| "BB" Face-to-Face (flanged PN40*) | 282 | 320 - 330 | 390 - 400 - 392 | 436 - 440 | 484 - 494 - 494 | 562 - 568 |
| Number of Bolts | 6 | 8 | 6 | 8 | 8 | 12 |
| Weight in kg (screwed) | 2,7 | 5,2 | 9,2 | 15,0 | 20,3 | 35,2 |
| Weight in kg (flanged PN40*) | 4,1 | 7,0 – 7,6 | 11 – 11,6 – 12 | 18,6 – 20,2 | 21 – 22,7 – 23 | 39,6 – 41,2 |

* Other flange sizes, ratings and face-to-face dimensions are available on request.
Shade indicates products that are CE Marked according to the PED (97/23/EC). All the other models comply with the Article 3.3 of the same directive.

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Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

# 200 Series Inverted Bucket Steam Traps

**Cast Iron for Vertical Installation**

For Pressures to 17 bar...Capacities to 9 000 kg/h



**Table ST-75-1. Model 211 Capacity**

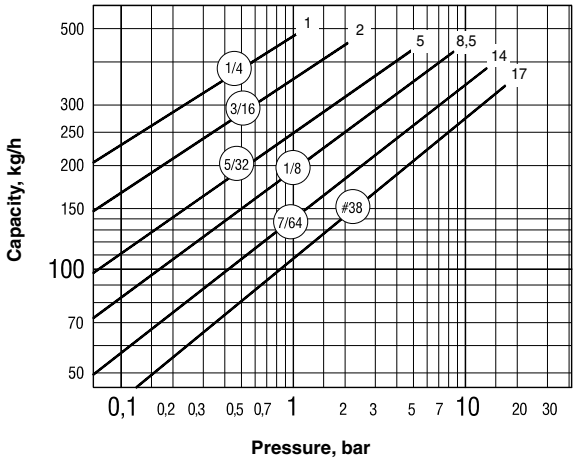



**Table ST-75-2. Model 212 Capacity**

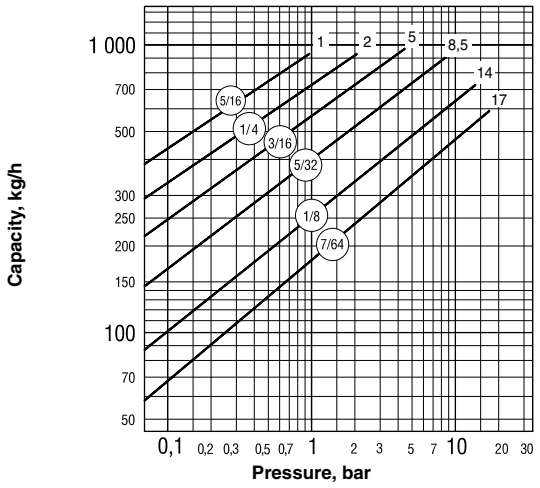



**Table ST-75-3. Model 213 Capacity**

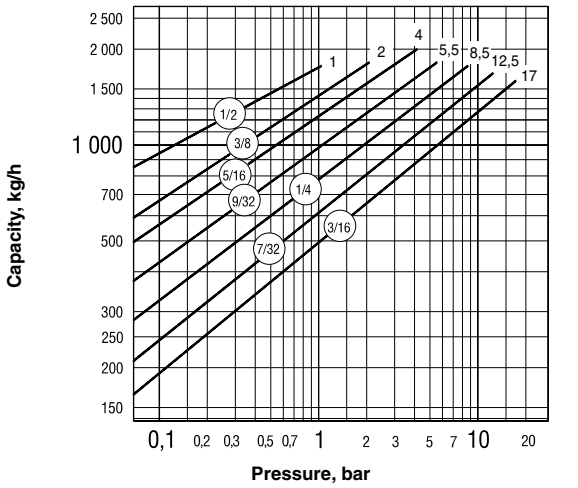



**Table ST-75-4. Model 214 Capacity**

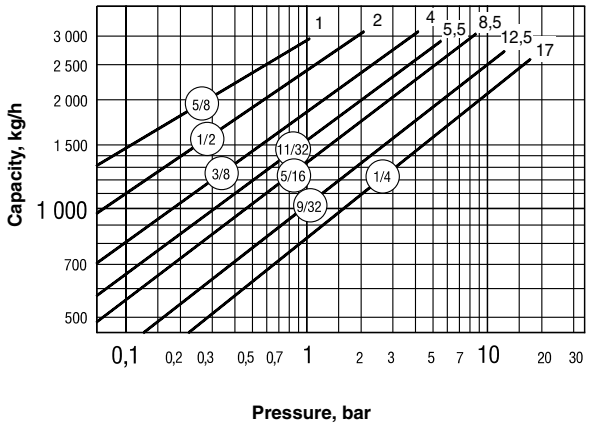



**Table ST-75-5. Model 215 Capacity**

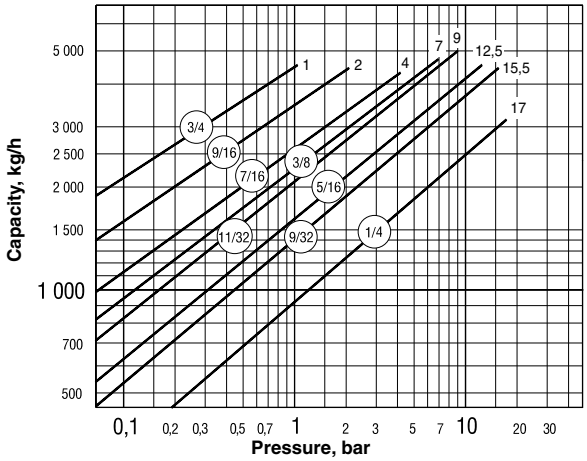
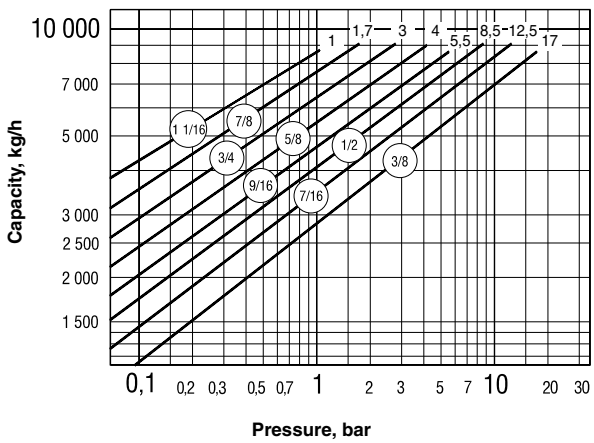



**Table ST-75-6. Model 216 Capacity**



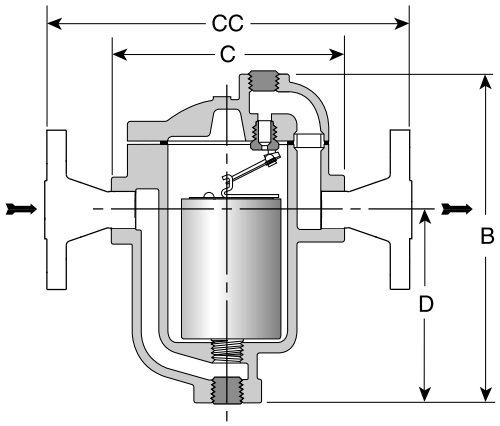

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# 800-813 Series Inverted Bucket Steam Traps

**Cast Iron for Horizontal Installation**

For Pressures to 17 bar...Capacities to 2 000 kg/h






## Description

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

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

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

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and $CO_2$ venting at steam temperature.

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

## Maximum Operating Conditions

| | |
|---|---|
| Maximum allowable pressure (vessel design): | 17 bar @ 232°C |
| Maximum operating pressure: | Model 800: 10 bar<br>Model 811-813: 17 bar |
| Maximum back pressure: | 99% of inlet pressure |

## Connections

Screwed BSPT and NPT
Flanged DIN or ANSI (screw on)

## Materials

| | |
|---|---|
| Body: | ASTM A48 Class 30 |
| Internals: | All stainless steel – 304 |
| Valve and seat: | Hardened chrome steel – 440F |
| Test plug: | Carbon steel |

## Options

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

## Specification

Inverted bucket steam trap, type ... in cast iron, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and discharge orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

## 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

**Table ST-76-1. 800-813 Series Side Inlet, Side Outlet Trap (dimensions in mm)**
Add suffix "CV" to model number for internal check valve, "T" for thermic vent bucket.

| Model No. | 800* | 811 | 812 | 813 |
|---|---|---|---|---|
| Pipe Connections | 15 – 20 | 15 – 20 – 25 | 15 – 20 | 20 – 25 |
| Test plug | 1/4" | 1/4" | 1/2" | 3/4" |
| "B" Height | 138 | 175 | 230 | 298 |
| "C" Face-to-Face (screwed) | 127 | 127 – 127 – 133 | 165 | 197 |
| "CC" Face-to-Face (flanged PN40**) | 195 – 191 | 195 – 191 – 197 | 233 – 229 | 261 |
| "D" Bottom to ℄ Inlet | 70 | 108 | 137 | 179 |
| Number of Bolts | 6 | | | |
| Weight in kg (screwed) | 2,3 | 2,7 | 6,8 | 12,5 |
| Weight in kg (flanged PN40**) | 3,6 – 4,3 | 4,1 – 4,3 – 4,8 | 8,2 – 9,0 | 14,3 – 14,8 |

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

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Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.armstrongintenational.eu • info@armstrongintenational.eu

# 800-813 Series Inverted Bucket Steam Traps

**Cast Iron for Horizontal Installation**

For Pressures to 17 bar...Capacities to 2 000 kg/h



**Table ST-77-1. Model 800 Capacity**

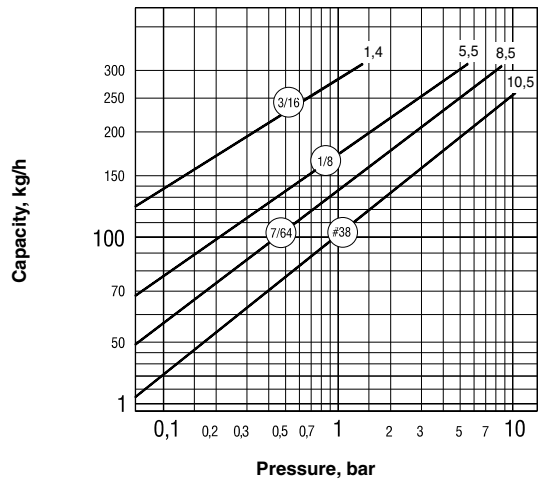



**Table ST-77-2. Model 811 Capacity**

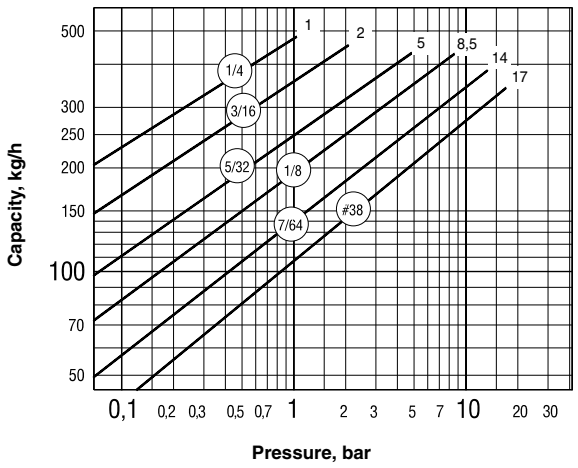



**Table ST-77-3. Model 812 Capacity**

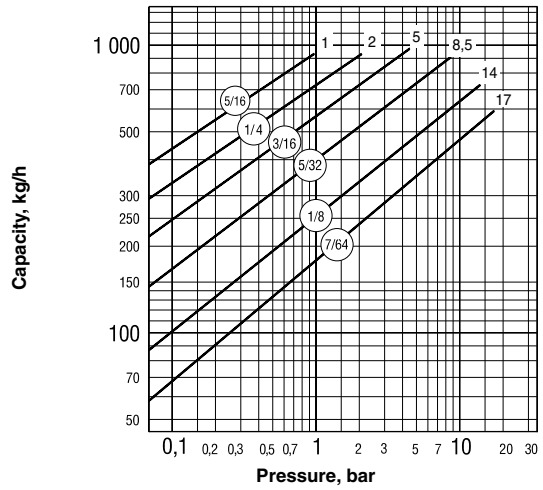
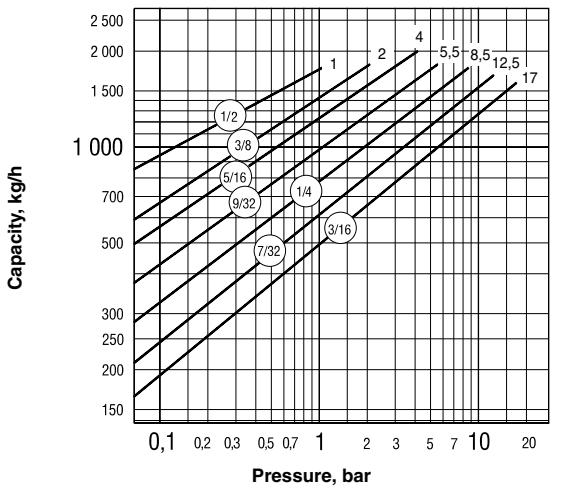



**Table ST-77-4. Model 813 Capacity**

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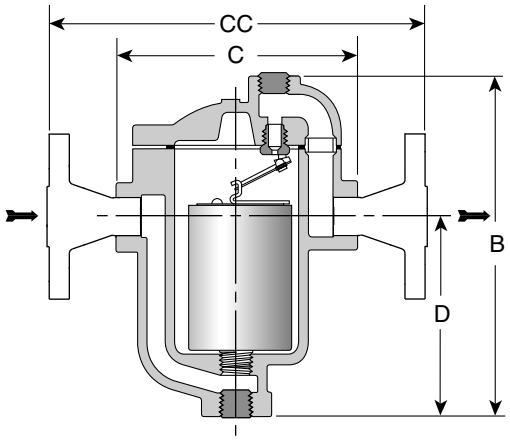
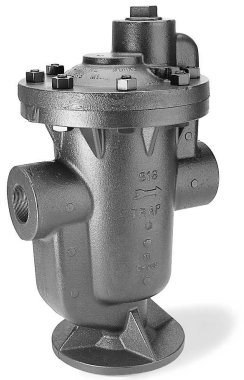
# 814-816 Series Inverted Bucket Steam Traps

**Cast Iron for Horizontal Installation**
For Pressures to 17 bar...Capacities to 9 000 kg/h





## Description

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

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

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and $CO_2$ venting at steam temperature.

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

## Maximum Operating Conditions

| | |
|---|---|
| Maximum allowable pressure (vessel design): | 17 bar @ 232°C |
| Maximum operating pressure: | 17 bar |
| Maximum back pressure: | 99% of inlet pressure |

## Connections

Screwed BSPT and NPT
Flanged DIN or ANSI (screw on)

## Materials

| | |
|---|---|
| Body: | ASTM A48 Class 30 |
| Internals: | All stainless steel – 304 |
| Valve and seat: | Hardened chrome steel – 440F |
| Test plug: | Carbon steel |

## Options

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

## Specification

Inverted bucket steam trap, type ... in cast iron, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and discharge orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

## 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

**Table ST-78-1. 814-816 Series Side Inlet, Side Outlet Trap (dimensions in mm)**
Add suffix "CV" to model number for internal check valve, "T" for thermic vent bucket.

| Model No. | 814 | 815 | 816 |
|---|---|---|---|
| Pipe Connections | 25 – 32 | 25 – 32 – 40 – 50 | 50 – 65 |
| Test plug | 1" | 1 1/2" | 2" |
| "B" Height | 346 | 413 | 541 |
| "C" Face-to-Face (screwed) | 229 | 260 | 330 |
| "CC" Face-to-Face (flanged PN40*) | 293 – 355 | 382 – 386 – 392 – 398 | 468 – 480 |
| "D" Bottom to ℄ Inlet | 198 | 203 | 279 |
| Number of Bolts | 8 | | |
| Weight in kg (screwed) | 20,0 | 32,2 | 59,4 |
| Weight in kg (flanged PN40*) | 23,0 – 24,6 | 34,6 – 36,2 – 36,6 – 38,2 | 65,4 – 68,2 |

* Other flange sizes, ratings and face-to-face dimensions are available on request.
All models are CE Marked according to the PED (97/23/EC), but PMA for 816 is 15 bar.

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
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# 814-816 Series Inverted Bucket Steam Traps

**Cast Iron for Horizontal Installation**

For Pressures to 17 bar...Capacities to 9 000 kg/h



**Table ST-79-1. Model 814 Capacity**

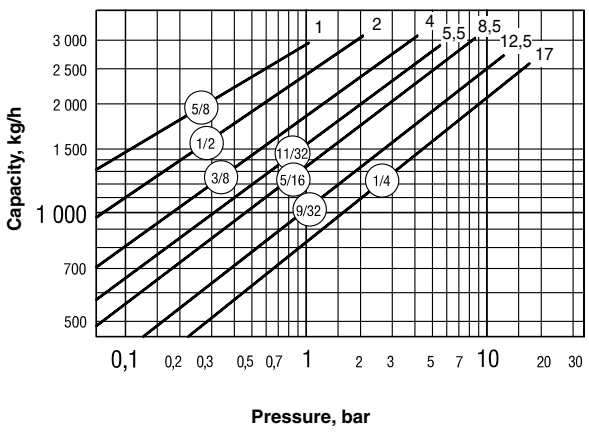



**Table ST-79-2. Model 815 Capacity**

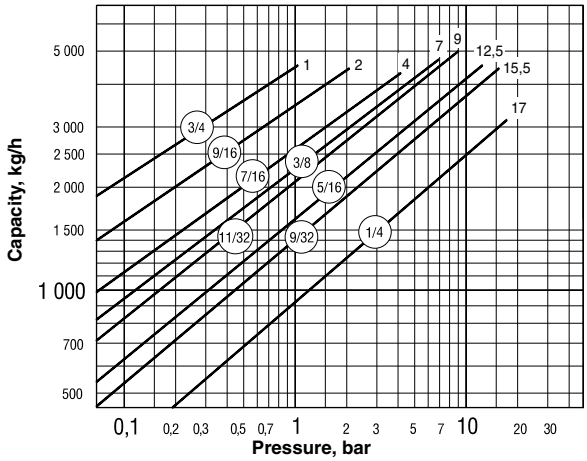
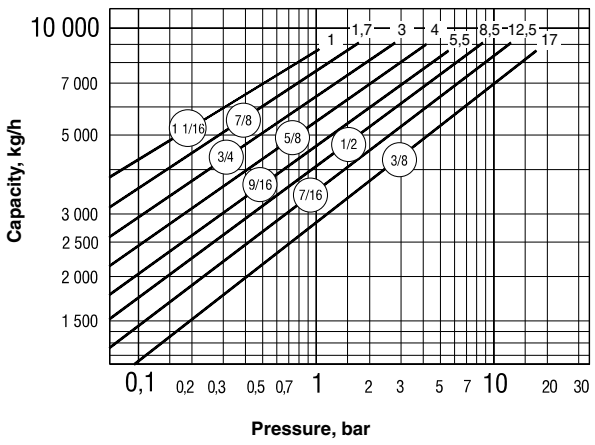



**Table ST-79-3. Model 816 Capacity**



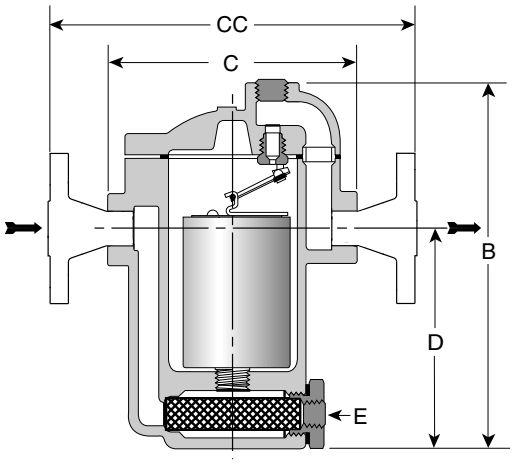

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# 880 Series Inverted Bucket Steam Traps

**Cast Iron for Horizontal Installation, with Integral Strainer**

For Pressures to 17 bar...Capacities to 2 000 kg/h






## Description

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

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

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

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and $CO_2$ venting at steam temperature.

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

## Connections

Screwed BSPT and NPT
Flanged DIN or ANSI (screw on, except for model 881F – integral)

## Maximum Operating Conditions

| | |
|---|---|
| Maximum allowable pressure (vessel design): | 17 bar @ 232°C<br>881F: 16 bar @ 120°C (PN16) |
| Maximum operating pressure: | Model 880: 10 bar<br>Model 881 - 883: 17 bar |
| Maximum back pressure: | 99% of inlet pressure |

## Materials

| | |
|---|---|
| Body: | ASTM A48 Class 30 |
| Internals: | All stainless steel – 304 |
| Valve and seat: | Hardened chrome steel – 440F |
| Test plug: | Carbon steel |
| Strainer: | Stainless steel – 304 |

## Options

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

## Specification

Inverted bucket steam trap, type ... in cast iron with integral strainer, with continuous air venting at steam temperature, with free-floating stainless steel mechanism, and discharge orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

## 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

**Table ST-80-1. 880 Series Side Inlet, Side Outlet Trap with Integral Strainer (dimensions in mm)**
Add suffix "CV" to model number for internal check valve, "T" for thermic vent bucket.

| Model No. | 880* | 881 - 881F | 882 | 883 |
|---|---|---|---|---|
| Pipe Connections | 15 – 20 | 15 – 20 – 25 | 15 – 20 | 20 – 25 – 32 |
| Test plug | 1/4" | 1/4" | 1/2" | 3/4" |
| "B" Height | 154 | 179 | 244 | 314 |
| "C" Face-to-Face (screwed) | 127 | 127 | 165 | 200 |
| "CC" Face-to-Face (flanged PN40** - 881F PN16) | 195 – 191 | 150 – 150 – 160 | 233 – 229 | 264 – 264 – 326 |
| "D" Bottom to ℄ Inlet | 87 | 113 | 146 | 187 |
| "E" Blowdown Connection (883 only) | N/A | N/A | 3/8" | 1/2" |
| Number of Bolts | 6 | | | |
| Weight in kg (screwed) | 2,5 | 2,7 | 7 | 14,1 |
| Weight in kg (flanged PN40** - 881F PN16) | 4,0 – 4,6 | 3,8 – 4,2 – 4,6 | 8,8 – 9,4 | 15,6 – 16,1 – 17,7 |

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

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.armstrongintenational.eu • info@armstrongintenational.eu

# 880 Series Inverted Bucket Steam Traps

**Cast Iron for Horizontal Installation, with Integral Strainer**

For Pressures to 17 bar...Capacities to 2 000 kg/h



**Table ST-81-1. Model 880 Capacity**

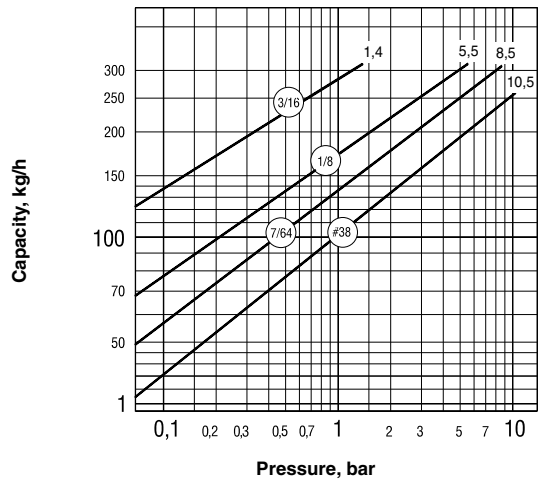



**Table ST-81-2. Model 881 Capacity**

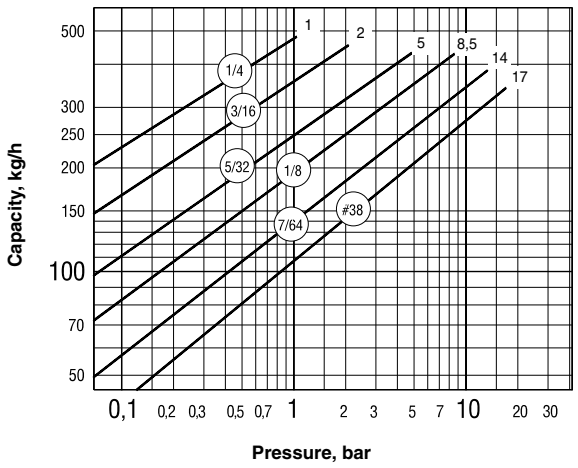



**Table ST-81-3. Model 882 Capacity**

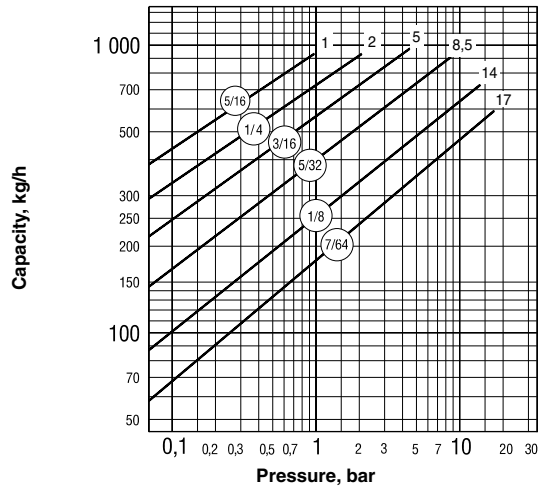
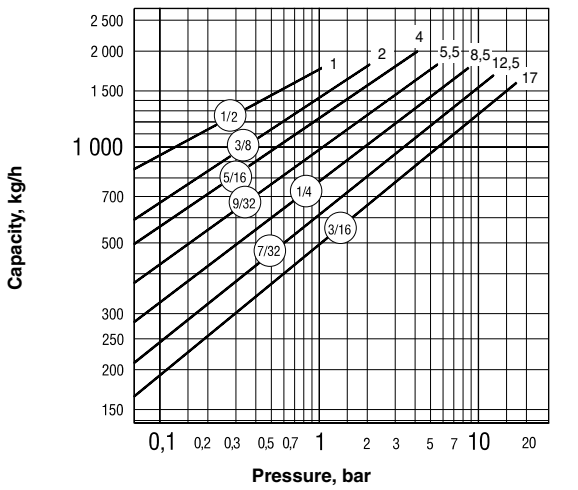



**Table ST-81-4. Model 883 Capacity**



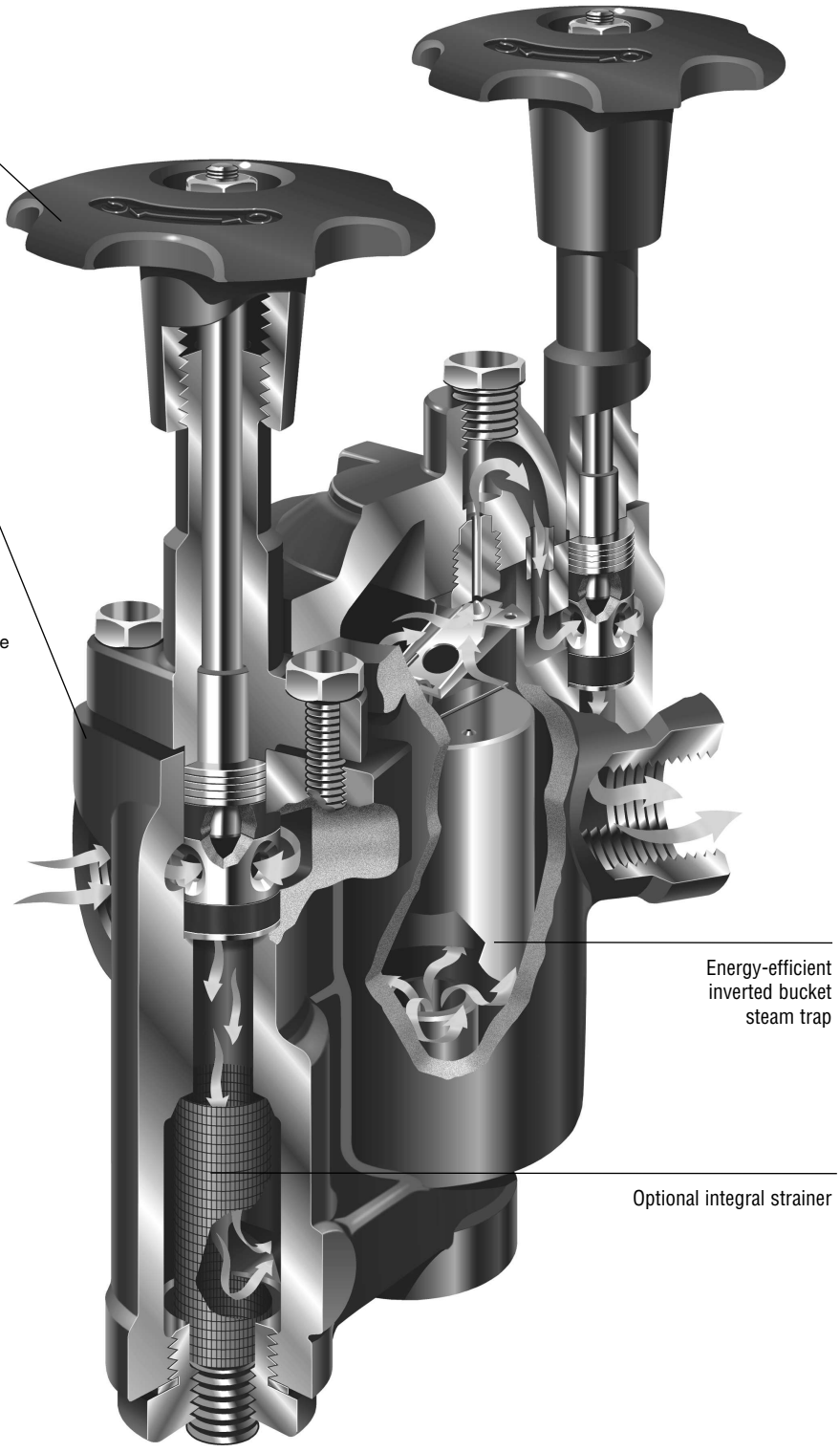

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# TVS-800 Series Cast Iron Trap Valve Station

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

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






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

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

### A full range of options
TVS will accommodate a test valve, strainer, internal check valve, thermic vent bucket, TrapAlert™ and SteamEye™ – remote steam trap monitoring system for steam traps.

### Easy, in-line repairability

### Elimination of potential leak points

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

*U.S. Patent 5 947 145



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
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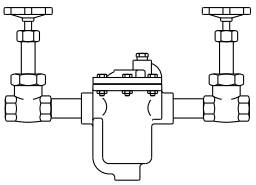
# TVS-800 Series Cast Iron Trap Valve Station

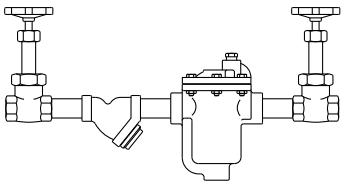


## TVS makes a long story…short.

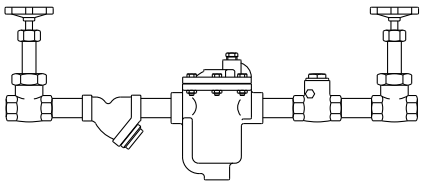
**Typical Installation**



Inverted bucket trap with two isolation valves

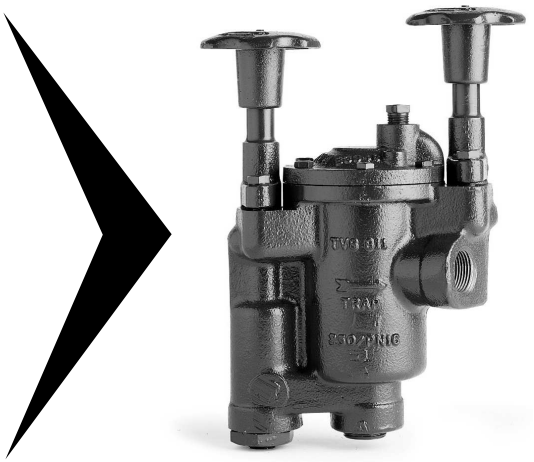


Inverted bucket trap with two isolation valves, strainer



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

**Trap Valve Station**



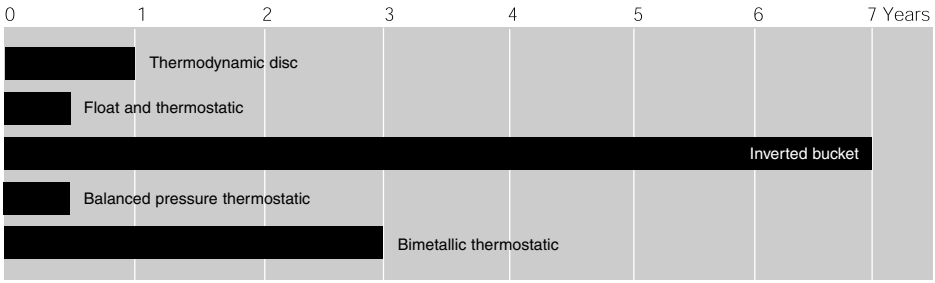
### The Innovation Is Integration

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

For example, here's an old description for a typical installation: *valve-nipple-strainer-nipple-trap-nipple-valve*. It's a long tale, even for this simple piping arrangement. The Trap Valve Station rewrites this steam story: *pipe-TVS-pipe*. In other words, the TVS makes it all one, delivering the functions of multiple components in a dramatically smaller unit. It integrates two high-value products in a package of revolutionary versatility.

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

### Average Service Life for Different Trap Types 14 bar Steam Pressure

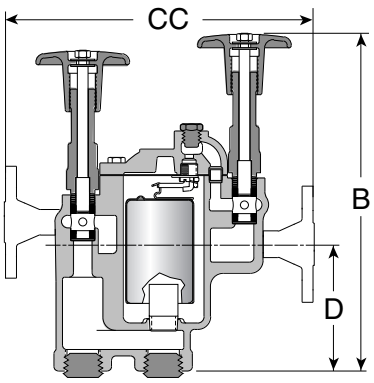



Above data from "ICI Engineer" January 1993 special issue with permission from ICI Engineering.

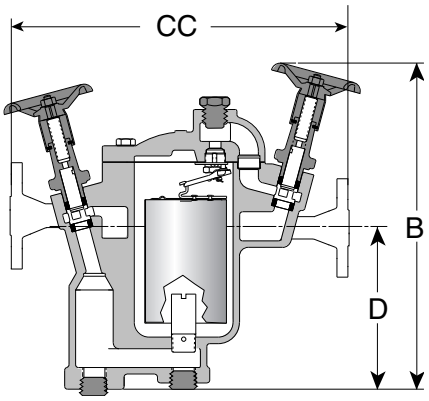
# TVS-800 Series Trap Valve Stations

**Cast Iron for Horizontal Installation, with Integral Piston Valves**
For Pressures to 17 bar...Capacities to 2 000 kg/h

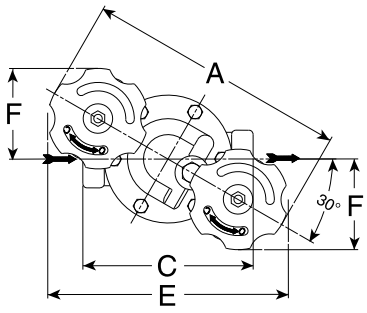





**Model TVS-811**




**Series TVS-812/813**




**Series TVS-811/812/813 - Top View**

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

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

## Maximum Operating Conditions

| | |
|---|---|
| Maximum allowable pressure (vessel design): | 17 bar @ 232°C |
| Maximum operating pressure: | 17 bar |
| Maximum back pressure: | 99% of inlet pressure |

## Connections

Screwed BSPT and NPT
Flanged DIN or ANSI (screw on)

## Materials

| | |
|---|---|
| Cap and Body: | ASTM A48 Class 30 |
| Internals: | All stainless steel – 304 |
| Valve and seat: | Hardened chrome steel – 440F |
| Piston Valve Handle : | Cast Iron ASTM A47 |
| Internals: | Stainless Steel |
| Valve Sealing Rings: | Graphite and Stainless Steel |
| Blowdown valve: | Stainless Steel |

## Options

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

## Specification

Inverted bucket steam trap, type ... in cast iron, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and discharge orifice at the top of the trap. Integral upstream and downstream shutoff piston style valves in same dimensional space as standard bucket trap. Maximum allowable back pressure 99% of inlet pressure.

## 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

**Table ST-84-1. TVS-800 Series Trap Valve Station (dimensions in mm)**

| Model No. | TVS-811 | TVS-812 | TVS-813 |
|---|---|---|---|
| Pipe Connections | 15 – 20 | 15 – 20 | 20 – 25 |
| Test Plug | 1/4" | 1/2" | 3/4" |
| "A" Width Across Handwheels | 197 | 349 | 384 |
| "B" Height Valve Open | 254 | 298 | 362 |
| "C" Face-to-Face (screwed) | 127 | 165 | 197 |
| "CC" Face-to-Face (flanged PN40*) | 247 – 257 | 285 – 295 | 327 – 359 |
| "D" Bottom to ℄ Inlet | 94 | 121 | 184 |
| "E" Width | 179 | 330 | 365 |
| "F" | 68 | 114 | 124 |
| Number of Bolts | 6 | 6 | 6 |
| Weight in kg (screwed) | 5,4 | 11,3 | 24,0 |
| Weight in kg (flanged PN40*) | 6,8 – 7,0 | 12,7 – 13,5 | 25,8 – 26,3 |

* 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).

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

# TVS-800 Series Trap Valve Stations

**Cast Iron for Horizontal Installation, with Integral Piston Valves**

For Pressures to 17 bar...Capacities to 2 000 kg/h



**Table ST-85-1. Model TVS-811 Capacity**

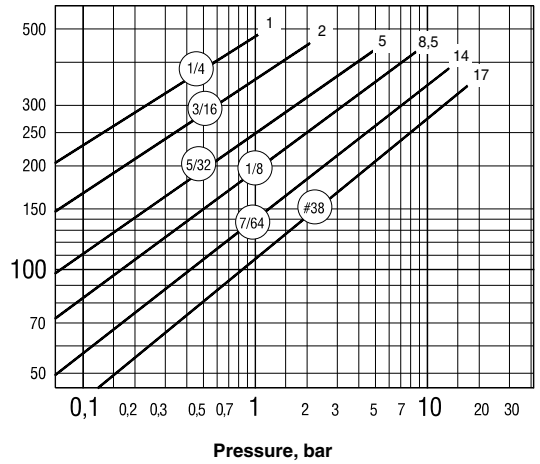



**Table ST-85-2. Model TVS-812 Capacity**

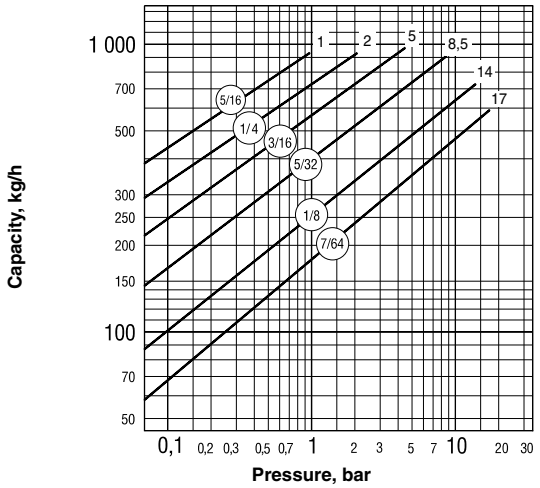
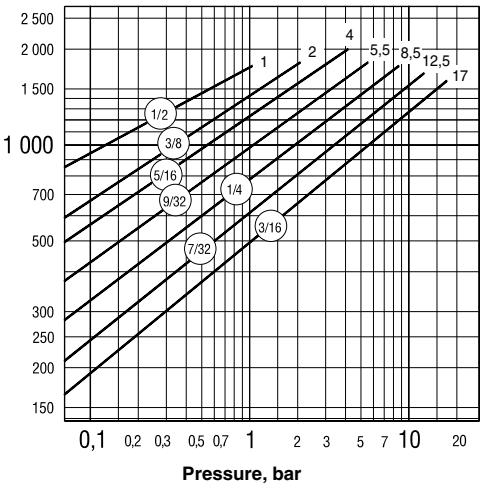



**Table ST-85-3. Model TVS-813 Capacity**




## Options

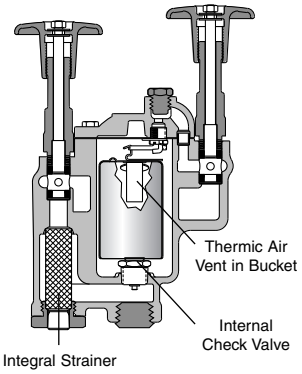
**Internal Check Valves** are spring-loaded stainless steel and screw directly into the trap inlet or into an extended inlet tube having a pipe coupling at the top to save fittings, labor and money.

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

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

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

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



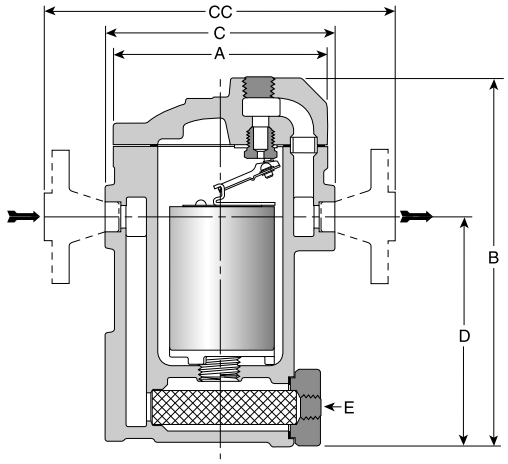

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# 980 Series Inverted Bucket Steam Traps

**Cast Steel for Horizontal Installation, with Integral Strainer**

For Pressures to 41 bar...Capacities to 2 000 kg/h






## Description

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

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

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

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and $CO_2$ venting at steam temperature.

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

## Maximum Operating Conditions

| | |
|---|---|
| Maximum allowable pressure (vessel design): | 41 bar @ 343°C |
| Maximum operating pressure: | 41 bar |
| Maximum back pressure: | 99% of inlet pressure |

## Connections

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

## Materials

| | |
|---|---|
| Body: | ASTM A216 WCB |
| Internals: | All stainless steel – 304 |
| Valve and seat: | Hardened chrome steel – 440F (<38 bar)<br>Titanium (>38 bar) |
| Strainer: | Stainless steel – 304 |
| Test plug: | Carbon steel |

## Options

- Stainless steel internal check valve
- Thermic vent bucket 17 bar maximum
- Scrub wire

## Specification

Inverted bucket steam trap, type ... in cast steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, integral strainer, and discharge orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

## 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

**Table ST-86-1. 980 Series Side Inlet, Side Outlet Trap with Integral Strainer (dimensions in mm)**

| Model No. | 981 | 983 |
|---|---|---|
| Pipe Connections | 15 – 20 | 20 – 25 |
| Test plug | 1/2" | 3/4" |
| "A" Flange Diameter | 114 | 184 |
| "B" Height | 219 | 313 |
| "C" Face-to-Face (screwed & SW) | 137 | 197 |
| "CC" Face-to-Face (flanged PN40*) | 196 – 194 | 282 |
| "D" Bottom to ℄ Inlet | 122 | 193 |
| "E" Blowdown Connection | 3/8" | 3/4" |
| Weight in kg (screwed & SW) | 5,2 | 19,5 |
| Weight in kg (flanged PN40*) | 7,0 | 26,0 |

* Other flange sizes, ratings and face-to-face dimensions are available on request.
Shade indicates products that are CE Marked according to the PED (97/23/EC). All the other models comply with the Article 3.3 of the same directive.

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
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# 980 Series Inverted Bucket Steam Traps

**Cast Steel for Horizontal Installation, with Integral Strainer**

For Pressures to 41 bar...Capacities to 2 000 kg/h



**Table ST-87-1. Model 981 Capacity**

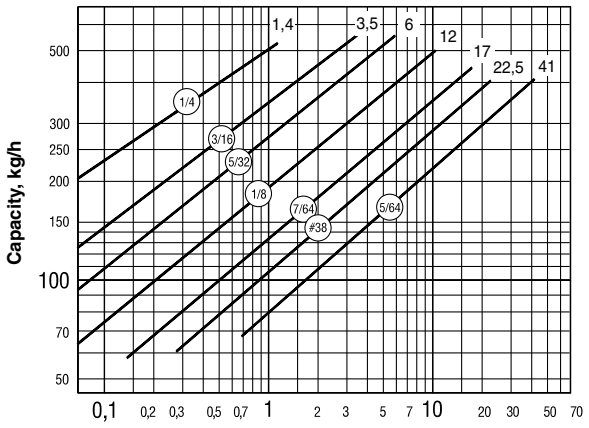
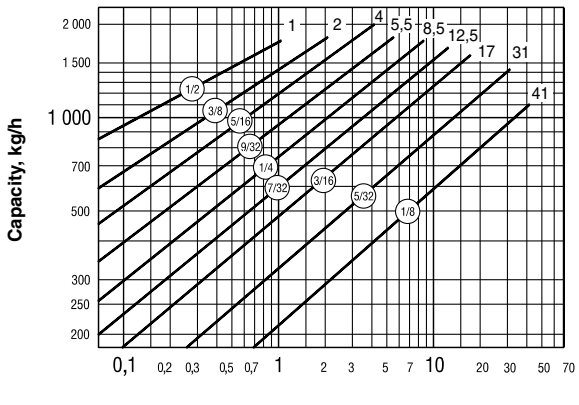



**Table ST-87-2. Model 983 Capacity**



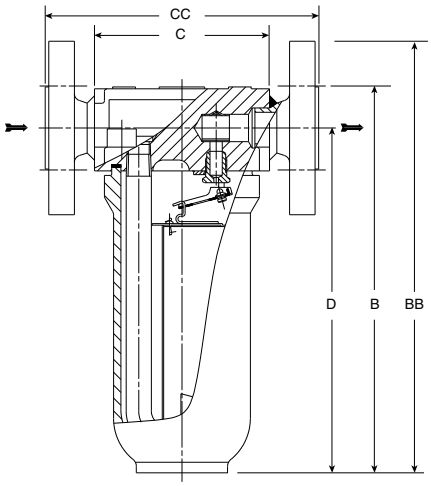

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# EM Inverted Bucket Steam Trap

**Forged Carbon Steel for Horizontal Installation**

For Pressures to 32 bar… Capacities to 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 $CO_2$ 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): | 32 bar - 250°C |
| Maximum operating pressure: | 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: | Hardened chrome steel – 440F |
| 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

## Specification

Inverted bucket steam trap, type EM in forged steel, with automatic air vent, free-floating lever mechanism, with the orifice in the top. Maximum allowable back pressure 99% of inlet pressure.

## How to order

Specify:

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

**Table ST-88-1. Model EM Side Inlet, Side Outlet Trap (dimensions in mm)**

| Pipe Connections | 15 | 20 | 25 |
|---|---|---|---|
| “C” Face-to-Face (screwed & SW) | 98 | 98 | – |
| “CC” Face-to-Face (flanged PN40*) | 150 | 150 | 160 |
| “D” Bottom to ℄ Inlet | 189 | 189 | 189 |
| “B” Height (screwed & SW) | 210 | 210 | – |
| “BB” Height (flanged PN40*) | 235 | 240 | 245 |
| Weight in kg (screwed & SW) | 3,1 | 3,1 | – |
| Weight in kg (flanged PN40*) | 5,5 | 7,1 | 8,1 |

* 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).

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

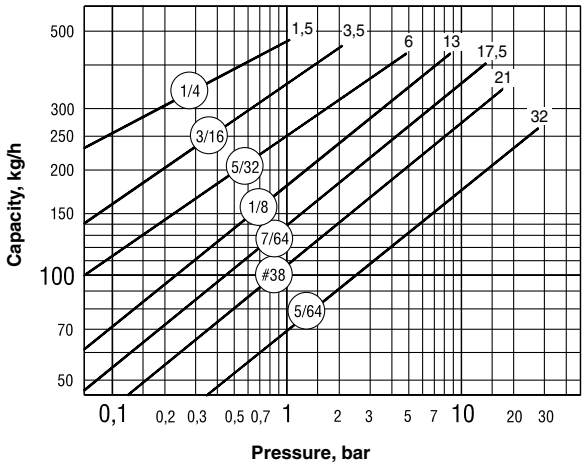
# EM Inverted Bucket Steam Trap

**Forged Carbon Steel for Horizontal Installation**

For Pressures to 32 bar… Capacities to 480 kg/h



**Table ST-89-1. Model EM Capacity**




***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# 300 Series Inverted Bucket Steam Traps

**Forged Carbon Steel for Vertical Installation**
For Pressures to 45 bar...Capacities to 9 000 kg/h



## Description

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

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

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

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket, which provides continuous automatic air and $CO_2$ venting at steam temperature.

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

## For Superheat Service:

1. Don't oversize the orifice; a restricted orifice may be advisable.
2. Specify 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 (600-900 mm) of inlet piping, with the trap below the main.
5. Don't insulate the trap or the inlet piping.

## Connections

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

## Materials

| | |
|---|---|
| Body: | ASTM A105<br>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: | Hardened chrome steel – 440F (<38 bar)<br>Titanium (>38 bar) |

## Options

- Stainless steel internal check valve
- Thermic vent bucket 17 bar maximum
- Scrub wire

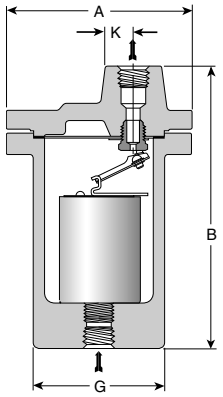
## Specification

Inverted bucket steam trap, type ... in forged carbon steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and discharge orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

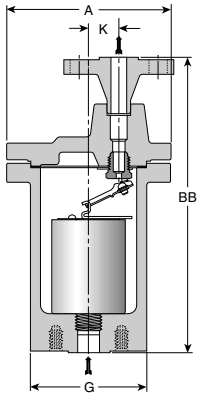
## How to Order

Specify:

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




**Model 300 Trap**




**Series 300 FW Trap**

**Table ST-90-1. Pressure-Temperature Rating for Forged Steel Traps**

| Model No. | Maximum Oper. Pr., Saturated Steam | Maximum Allowable Pressure (Vessel Design) of Pressure - Containing Parts at Indicated Temperature | | | |
|---|---|---|---|---|---|
| | | -28°C / +343°C | 371°C | 399°C | 427°C |
| | bar | bar | | | |
| 310 | 27,5 | 53 | **53** | 50 | 41 |
| 312 | 41,5 | 41 | **41** | 38,5 | 34,5 |
| 313 | 45 | 74 | **74** | 67 | 54 |
| 314 | 45 | **78** | 77 | 68 | 56 |
| 315 | 45 | **70** | 66,5 | 59 | 47,5 |
| 316 | 45 | **76** | 72 | 65 | 52 |

**Notes:** Maximum operating pressure to be marked on nameplate will be determined by actual orifice used.
Maximum allowable pressures shown in boldface will be marked on nameplate, unless otherwise requested.
Traps with flanges may have different pressure-temperature ratings.
Maximum back pressure is 99% of inlet pressure.

**Table ST-90-2. 300 Series Bottom Inlet, Top Outlet Trap (dimensions in mm)**
Add suffix "CV" to trap number for internal check valve.

| Model No. Screwed or SW<br>Model No. Flanged | 310<br>310-FW | 312<br>312-FW | 313<br>313-FW | 314<br>314-FW | 315<br>315-FW | 316<br>316-FW |
|---|---|---|---|---|---|---|
| Pipe Connections | 15 – 20 | 15 – 20 – 25 | 15 – 20 – 25 | 25 – 32 | 25 – 32 – 40 | 40 – 50 |
| "A" Flange Diameter | 114 | 171 | 203 | 219 | 248 | 302 |
| "B" Face-to-Face (screwed & SW) | 202 | 259 | 295 | 348 | 381 | 435 |
| "BB" Face-to-Face (flanged PN100*) | 282 – 287 | 307 – 314 – 320 | 343 – 349 – 355 | 409 – 411 | 442 – 444 – 446 | 499 – 505 |
| "G" Body Outside Diameter | 78 | 121 | 130 | 146 | 168 | 213 |
| "K" ℄ Outlet to ℄ Inlet | 14,3 | 31,7 | 36,5 | 36,5 | 44,4 | 54,0 |
| Number of Bolts | 6 | 6 | 8 | | 9 | |
| Weight in kg (screwed & SW) | 4,5 | 13,6 | 22,0 | 31,8 | 44,5 | 81,2 |
| Weight in kg (flanged PN100*) | 5,5 – 6,5 | 14,5 – 15,5 – 16 | 22,5 – 23,5 – 24 | 36,5 – 37,0 | 45,5 – 47,5 – 49 | 85,8 – 87,8 |

* Other flange sizes, ratings and face-to-face dimensions are available on request.
Shade indicates products that are CE Marked according to the PED (97/23/EC). All the other models comply with the Article 3.3 of the same directive.

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

# 300 Series Inverted Bucket Steam Traps

**Forged Carbon Steel for Vertical Installation**

For Pressures to 45 bar...Capacities to 9 000 kg/h



**Table ST-91-1. Model 310 Capacity**

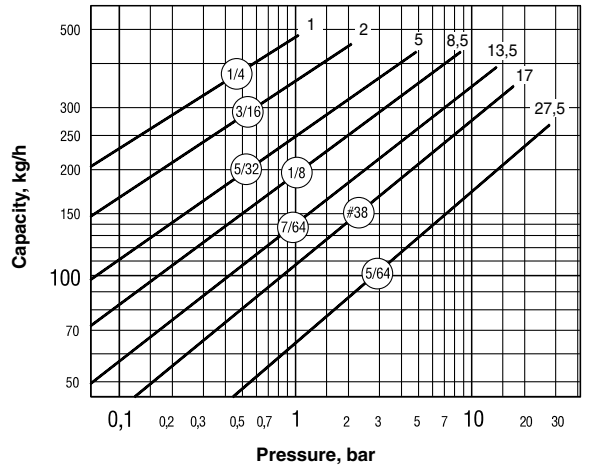



**Table ST-91-2. Model 312 Capacity**

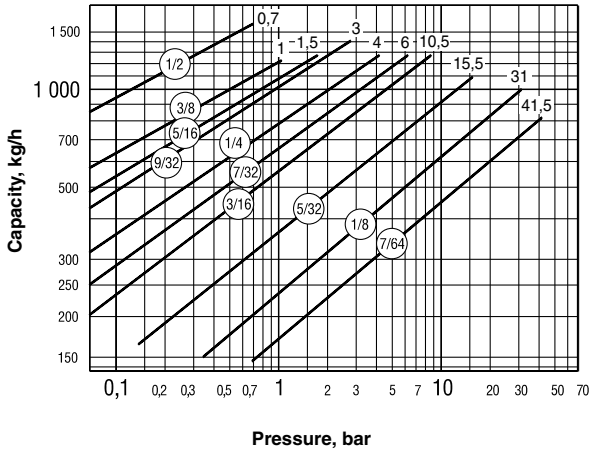



**Table ST-91-3. Model 313 Capacity**

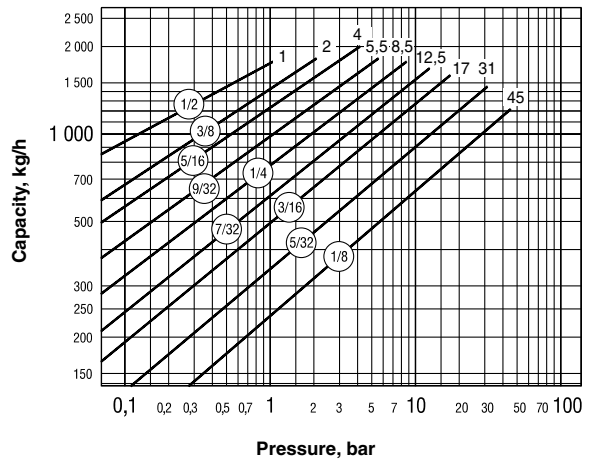



**Table ST-91-4. Model 314 Capacity**

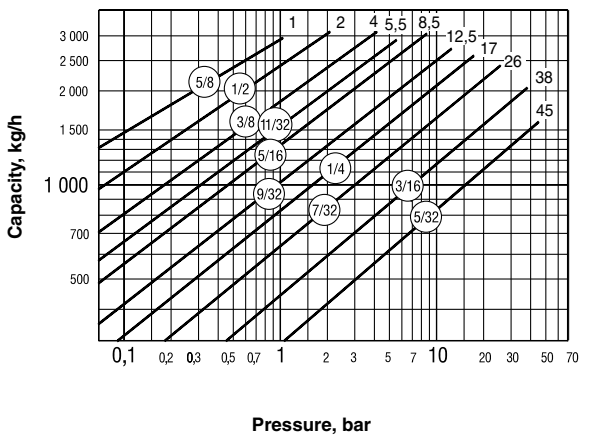



**Table ST-91-5. Model 315 Capacity**

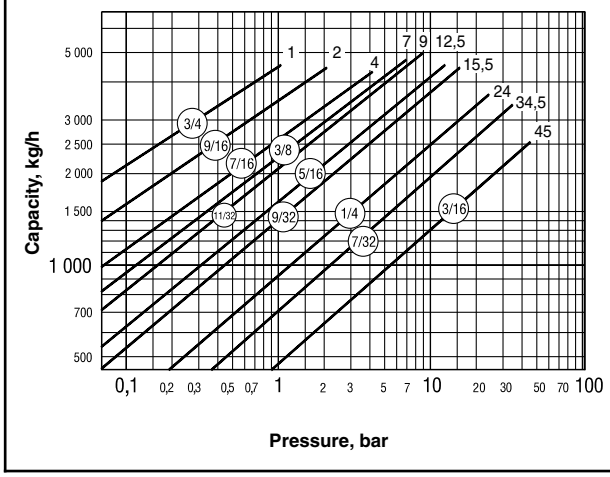
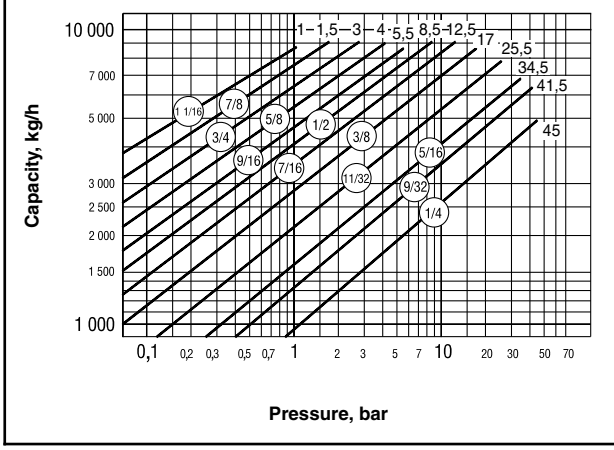



**Table ST-91-6. Model 316 Capacity**

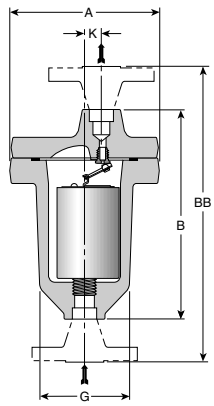



***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

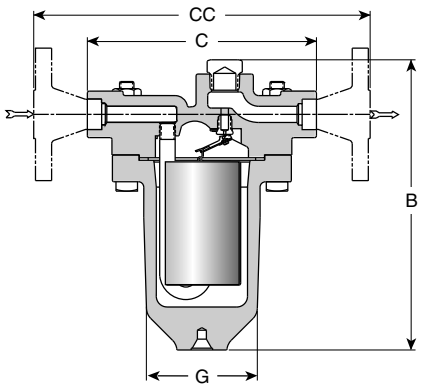
# 411G/421 Inverted Bucket Steam Traps

**Forged Carbon Steel for Vertical and Horizontal Installation**
For Pressures to 69 bar...Capacities to 590 kg/h






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

## 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)

## Specifications

Inverted bucket steam trap, type ... in forged carbon steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, with the discharge orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

## 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

**Table ST-92-1. Model 411G Bottom Inlet, Top Outlet Trap; Model 421 Side Inlet, Side Outlet Trap (dimensions in mm)**
Add suffix "CV" to trap number for internal check valve.

| Model No. Screwed or SW<br>Model No. Flanged | 411G<br>411G-FW | 421<br>421-FW |
|---|---|---|
| Pipe Connections | 15 – 20 | 15 – 20 |
| "A" Flange Diameter | 160 | – |
| "B" & "C" Face-to-Face (screwed & SW) | 224 | 203 |
| "BB" & "CC" Face-to-Face (flanged PN100*) | 298 – 304 | 277 – 283 |
| "G" Body Outside Diameter | 103 | 98 |
| "K" ℄ Outlet to ℄ Inlet | 19 | – |
| Number of Bolts | 8 | 8 |
| Weight in kg (screwed & SW) | 11,3 | 12,6 |
| Weight in kg (flanged PN100*) | 14,4 – 15,4 | 15,1 – 16,1 |

* 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).

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

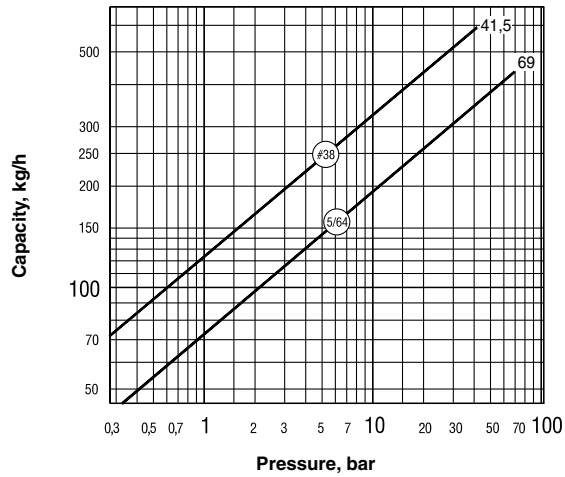
# 411G/421 Inverted Bucket Steam Traps

**Forged Carbon Steel for Vertical and Horizontal Installation**

For Pressures to 69 bar...Capacities to 590 kg/h



**Table ST-93-1. Model 411G and 421 Capacity**




**Note**: #38 orifice in Model 421 is limited to 39 bar.

**Table ST-93-2. Pressure-Temperature Rating for Forged Steel Traps**

| Model No. | Maximum Operating Pressure, Saturated Steam | Max. Allowable Pressure (Vessel Design) of Pressure-Containing Parts at Indicated Temp. | | |
|---|---|---|---|---|
| | | -21 / +371°C | 399°C | 427°C |
| | bar | bar | | |
| **411G / 421** | 69 | **69** | 65,5 | 58 |

**Notes**: Maximum operating pressure to be marked on nameplate will be determined by actual orifice used.
Maximum allowable pressures shown in boldface will be marked on nameplate, unless otherwise requested.
Traps with flanges may have different pressure-temperature ratings.
Maximum back pressure is 99% of inlet pressure.

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# 400 Series Inverted Bucket Steam Traps

**Forged Chrome-moly Steel for Vertical Installation**
For Pressures to 69 bar...Capacities to 9 000 kg/h



## Description

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

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

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

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket. This provides continuous automatic air and $CO_2$ venting at steam temperature.

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

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

**Trap Selection.** The pressure-containing parts of the steam trap should safely withstand the maximum pressure and temperature conditions of the system. For example, a trap is required for a 62 bar main at 482°C. The normal operating temperature of the trap will be about 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 (600-900 mm) of inlet piping, with the trap below the main.
5. Don't insulate the trap or the inlet piping.

## Connections

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

## Materials

| | |
|---|---|
| Body: | ASTM A182 F22 Class 3<br>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: | Hardened chrome steel – 440F (<38 bar)<br>Titanium (>38 bar) |

## Options

Stainless steel internal check valve

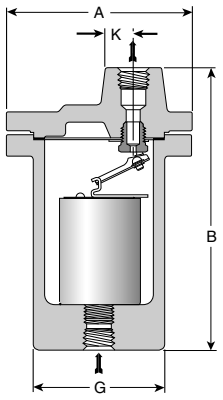
## Specification

Inverted bucket steam trap, type ... in forged chrome-moly steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, with the discharge orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

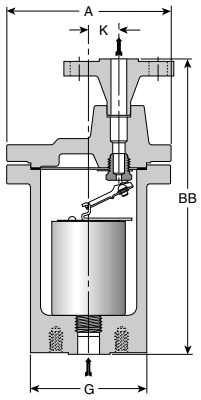
## How to Order

Specify:

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




**Model 400 Trap**




**Series 400 FW Trap**

**Table ST-94-1. 400 Series Bottom Inlet, Top Outlet Trap (dimensions in mm)**
Add suffix "CV" to trap number for internal check valve.

| Model No. Screwed or SW<br>Model No. Flanged | 413<br>413-FW | 415<br>415-FW | 416<br>416-FW |
|---|---|---|---|
| Pipe Connections | 15 – 20 – 25 | 25 – 32 – 40 | 40 – 50 |
| "A" Flange Diameter | 219 | 273 | 317 |
| "B" Face-to-Face (screwed & SW) | 305 | 379 | 448 |
| "BB" Face-to-Face (flanged PN100*) | 353 – 360 – 366 | 440 – 444 – 446 | 513 – 519 |
| "G" Body Outside Diameter | 137 | 175 | 216 |
| "K" ℄ Outlet to ℄ Inlet | 36,5 | 44,4 | 54 |
| Number of Bolts | 8 | 9 | 12 |
| Weight in kg (screwed & SW) | 29,5 | 57,2 | 88,0 |
| Weight in kg (flanged PN100*) | 31,5 – 32,5 – 33,0 | 58,0 – 60,0 – 61,5 | 92,5 – 94,5 |

* Other flange sizes, ratings and face-to-face dimensions are available on request.
All models are CE Marked according to the PED (97/23/EC).

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Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
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# 400 Series Inverted Bucket Steam Traps

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

For Pressures to 69 bar...Capacities to 9 000 kg/h



**Table ST-95-1. Model 413 Capacity**

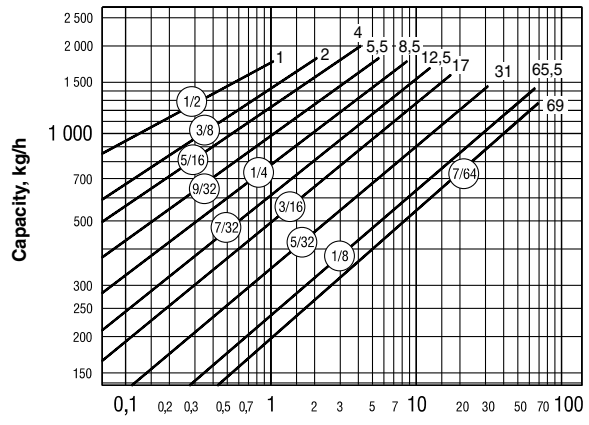



**Table ST-95-2. Model 415 Capacity**

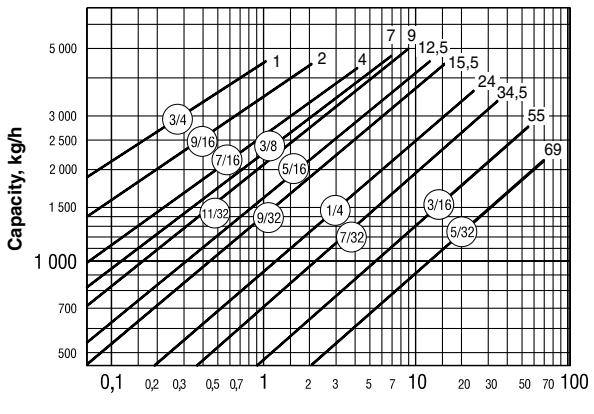



**Table ST-95-3. Model 416 Capacity**

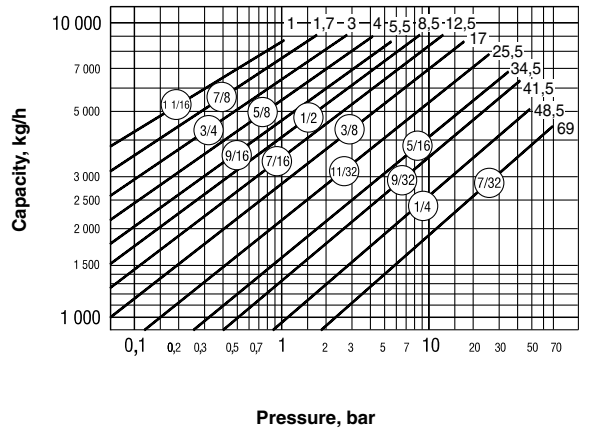



**Table ST-95-4. Pressure-Temperature Rating for Forged Steel Traps**

| Model No. | Maximum Operating Pressure, Saturated Steam | Max. Allowable Pressure (Vessel Design) of Pressure-Containing Parts at Indicated Temp. | | | |
|---|---|---|---|---|---|
| | | -28 / +399°C | 427°C | 454°C | 482°C |
| | bar | bar | | | |
| **413** | 69 | 83 | **83** | 72 | 54 |
| **415** | 69 | 76 | **76** | 74,5 | 66,5 |
| **416** | 69 | **117** | 114 | 93 | 68 |

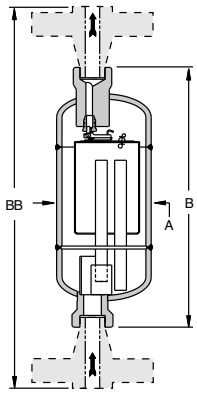
**Notes**: Maximum operating pressure to be marked on nameplate will be determined by actual orifice used.
Maximum allowable pressures shown in boldface will be marked on nameplate, unless otherwise requested.
Traps with flanges may have different pressure-temperature ratings.
Maximum back pressure is 99% of inlet pressure.

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

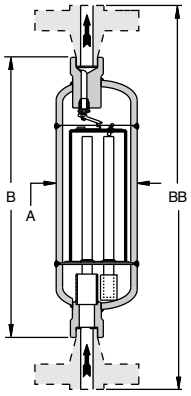
# 401-SH/501-SH Inverted Bucket Superheated Steam Traps

**Carbon Steel or Stainless Steel for Vertical Installation**
For Pressures to 106 bar...Capacities to 430 kg/h






**Model 401-SH**




**Model 501-SH**

## Description

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

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

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

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

## Connections

Screwed BSPT and NPT (401-SH only)
Socketweld
Flanged DIN or ANSI (welded)

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):
Model 401-SH: 69 bar @ 427°C
Model 501-SH: 106 bar @ 454°C

Maximum operating pressure:
Model 401-SH: 69 bar
Model 501-SH: 106 bar

Maximum back pressure: 99% of inlet pressure

## Materials

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

## Specification

Inverted bucket steam trap, type 401-SH in carbon steel or 501-SH in stainless steel, with accumulation chamber, continuous air venting at steam temperature, stainless steel leverage system, with the discharge orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

## 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

**Table ST-96-1. Model 401-SH and Model 501-SH Bottom Inlet, Top Outlet Trap (dimensions in mm)**

| Model No. | 401-SH | 501-SH |
|---|---|---|
| Pipe Connections | 15 – 20 | 15 – 20 |
| "A" Body Outside Diameter | 100 | 100 |
| "B" Face-to-Face (screwed & SW) | 260 – 253 | 350 |
| "BB" Height (flanged 401-SH PN100 & 501-SH PN250*) | 353 – 363 | 476 – 480 |
| Weight in kg (screwed & SW) | 5,5 | 7 |
| Weight in kg (flanged 401-SH PN100 & 501-SH PN250*) | 6,7 – 7,3 | 13 – 13,5 |

* Other flange sizes, ratings and face-to-face dimensions are available on request.
All models are CE Marked according to the PED (97/23/EC).

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

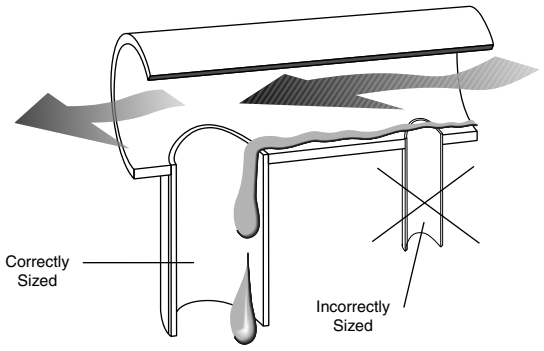
# 401-SH/501-SH Inverted Bucket Superheated Steam Traps

**Carbon Steel or Stainless Steel for Vertical Installation**
For Pressures to 106 bar...Capacities to 590 kg/h



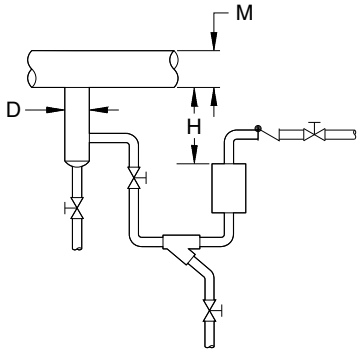
## Installation Recommendations

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




## Drip Leg Sizing

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




**Trap Draining Drip Leg on Steam Main**

**Table ST-97-1. Model 401/501 Capacity**

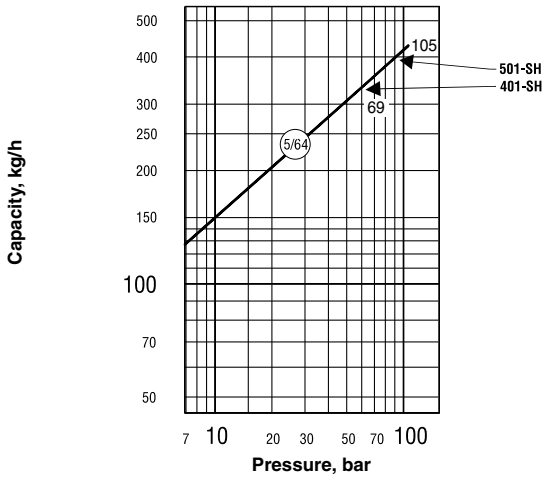
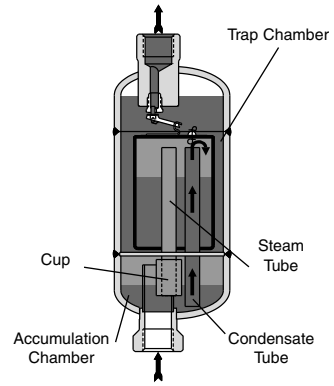


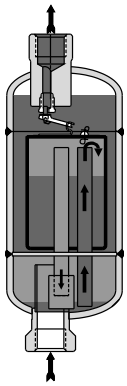

**Table ST-97-2. Recommended Steam Main and Branch Line Drip Leg Tracing**

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

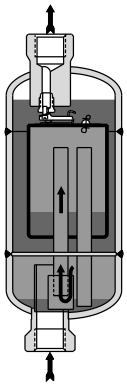
Air Steam Condensate



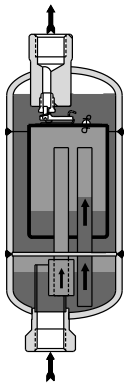

**Cycling – Discharge Valve Wide Open**
With the steam feed tube to the trap chamber sealed, condensate flows through the condensate feed tube (from accumulation chamber) into the trap chamber. This sinks the inverted bucket, which opens the discharge valve, cycling the trap.



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



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



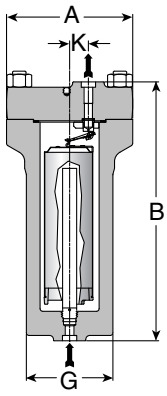
**Cycle About to Repeat**
As the level of condensate rises in the accumulation chamber, the cup floats up until it again seals the steam feed tube, and the cycle repeats.

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

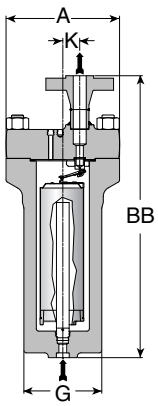
# 5000 Series Inverted Bucket Steam Traps

**Forged Chrome-moly Steel for Vertical Installation**
For Pressures to 124 bar...Capacities to 2 340 kg/h






**Series 5133G & 5155G Traps**




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

## Description

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

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

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

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket. This provides continuous automatic air and $CO_2$ venting at steam temperature.

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

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

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

**For Superheat Service:**

1. Don't oversize the orifice; a restricted orifice may be advisable.
2. Specify 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 (600-900 mm) of inlet piping, with the trap below the main.
5. Don't insulate the trap or the inlet piping.

## Connections

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

## Materials

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

## Options

- Stainless steel internal check valve
- Burnished valve and seat

**Table ST-98-1. 5000 Series Bottom Inlet, Top Outlet Trap (dimensions in mm)**
Add suffix "CV" to trap number for internal check valve.

| Model No. Screwed or SW<br>Model No. Flanged | 5133G<br>5133G-FW | 5155G<br>5155G-FW |
|---|---|---|
| Pipe Connections | 15 – 20 – 25 | 20 – 25 – 32 |
| "A" Flange Diameter | 216 | 264 |
| "B" Face-to-Face (screwed & SW) | 362 | 412 |
| "BB" Face-to-Face (flanged PN160*) | 457 – 463 – 470 | 540 – 540 – 540 |
| "G" Body Outside Diameter | 146 | 194 |
| "K" ℄ Outlet to ℄ Inlet | 33,0 | 44,5 |
| Number of Bolts | 8 | 10 |
| Weight in kg (screwed & SW) | 44,5 | 77,5 |
| Weight in kg (flanged PN160*) | 47,0 – 47,5 – 48,0 | 89,0 – 89,5 – 90,0 |

* Other flange sizes, ratings and face-to-face dimensions are available on request.
All models are CE Marked according to the PED (97/23/EC).

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Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

# 5000 Series Inverted Bucket Steam Traps

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

For Pressures to 124 bar...Capacities to 2 340 kg/h



**Table ST-99-1. Model 5133G Capacity**

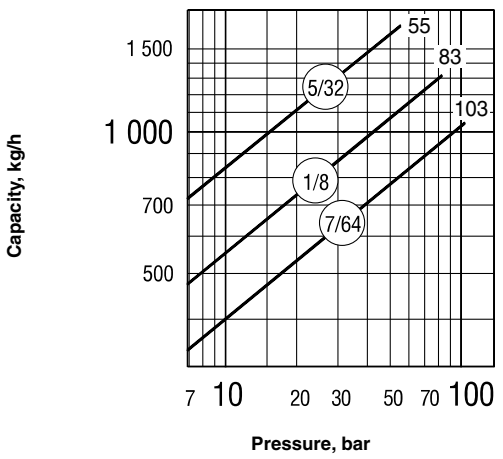



**Table ST-99-2. Model 5155G Capacity**

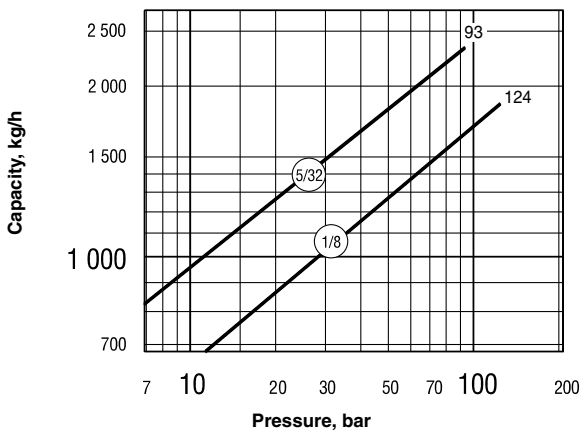



**Table ST-99-3. Pressure-Temperature Rating for Forged Steel Traps**

| Model No. | Maximum Operating Pressure, Saturated Steam | Maximum Allowable Pressure (Vessel Design) of Pressure-Containing Parts at Indicated Temperature | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | -28 / +343°C | 371°C | 399°C | 427°C | 454°C | 482°C | 510°C | 538°C |
| | bar | bar | | | | | | | |
| **5133G** | 103 | 146 | 146 | 146 | **146** | 137 | 119 | 93 | 64 |
| **5155G** | 124 | 174 | 174 | 174 | **174** | 163 | 143 | 111 | 76,5 |

**Notes**: Maximum operating pressure to be marked on nameplate will be determined by actual orifice used.
Maximum allowable pressures shown in boldface will be marked on nameplate, unless otherwise requested.
Traps with flanges may have different pressure-temperature ratings.
Maximum back pressure is 99% of inlet pressure.

## Options

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

**Screwed Connections** are available in all sizes for pressures of 63 bar or less. Traps for pressures of 63 bar or higher are available with socketweld or flanged connections.

## Specification

Inverted bucket steam trap, type ... in forged chrome-moly steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, with the discharge orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

## 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

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# 6000 Series Inverted Bucket Steam Traps

**Forged Chrome-moly Steel for Vertical Installation**
For Pressures to 186 bar...Capacities to 2 950 kg/h



## Description

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

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

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

The discharge orifice is surrounded by a water seal, preventing live steam loss. Automatic air venting is provided by a small vent hole in the bucket. This provides continuous automatic air and $CO_2$ venting at steam temperature.

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

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

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

**For Superheat Service:**

1. Don't oversize the orifice; a restricted orifice may be advisable.
2. Specify 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 (600-900 mm) of inlet piping, with the trap below the main.
5. Don't insulate the trap or the inlet piping.

## Connections

Socketweld
Flanged DIN or ANSI (welded)

## Materials

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

## Options

- Stainless steel internal check valve
- Burnished valve and seat

Screwed connections are available in all sizes for pressures of 62 bar or less. Traps for pressures of 62 bar or higher are available with socketweld or flanged connections.

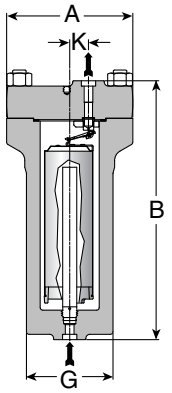
## Specification

Inverted bucket steam trap, type 6155 in forged chrome-moly steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, with the discharge orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

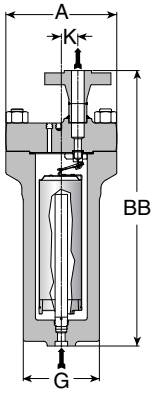
## How to Order

Specify:

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




**Model 6000 Trap**




**Series 6000 FW Trap**

**Table ST-100-1. 6000 Series Bottom Inlet, Top Outlet Trap (dimensions in mm)**
Add suffix "CV" to trap number for internal check valve.

| Model No. Screwed or SW<br>Model No. Flanged | 6155G<br>6155G-FW |
|---|---|
| Pipe Connections | 25 – 32 |
| "A" Flange Diameter | 300 |
| "B" Face-to-Face (SW) | 613 |
| "BB" Face-to-Face (flanged PN250*) | 740 – 740 |
| "G" Body Outside Diameter | 213 |
| "K" ℄ Outlet to ℄ Inlet | 44,5 |
| Number of Bolts | 10 |
| Weight in kg (SW) | 147,4 |
| Weight in kg (flanged PN250*) | 151,0 – 154,0 |

* Other flange sizes, ratings and face-to-face dimensions are available on request.
All models are CE Marked according to the PED (97/23/EC).

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.armstrongeurope.eu • info@armstrongeurope.eu

# 6000 Series Inverted Bucket Steam Traps

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

For Pressures to 186 bar...Capacities to 2 950 kg/h



**Table ST-101-1. Model 6155G Capacity**

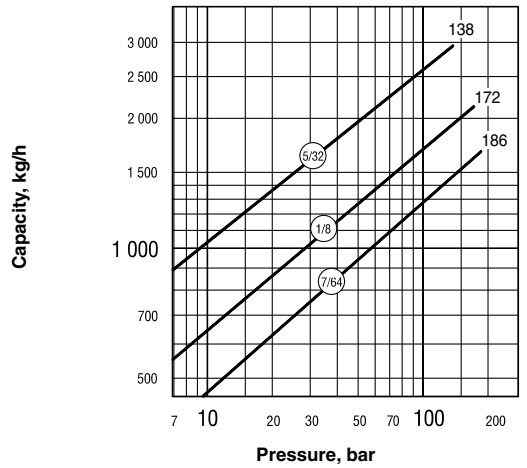



**Table ST-101-2. Pressure-Temperature Rating for Forged Steel Traps**

| Model No. | Maximum Operating Pressure, Saturated Steam | Maximum Allowable Pressure (Vessel Design) of Pressure-Containing Parts at Indicated Temperature | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | -28 / +343°C | 371°C | 399°C | 427°C | 454°C | 482°C | 510°C | 538°C |
| | bar | bar | | | | | | | |
| **6155G** | 186 | 241 | 241 | 241 | 241 | **241** | 213 | 166 | 114 |

**Notes**: Maximum operating pressure to be marked on nameplate will be determined by actual orifice used.
Maximum allowable pressures shown in boldface will be marked on nameplate, unless otherwise requested.
Traps with flanges may have different pressure-temperature ratings.
Maximum back pressure is 99% of inlet pressure.

## Options

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

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# 2000 Series Stainless Steel Steam Traps

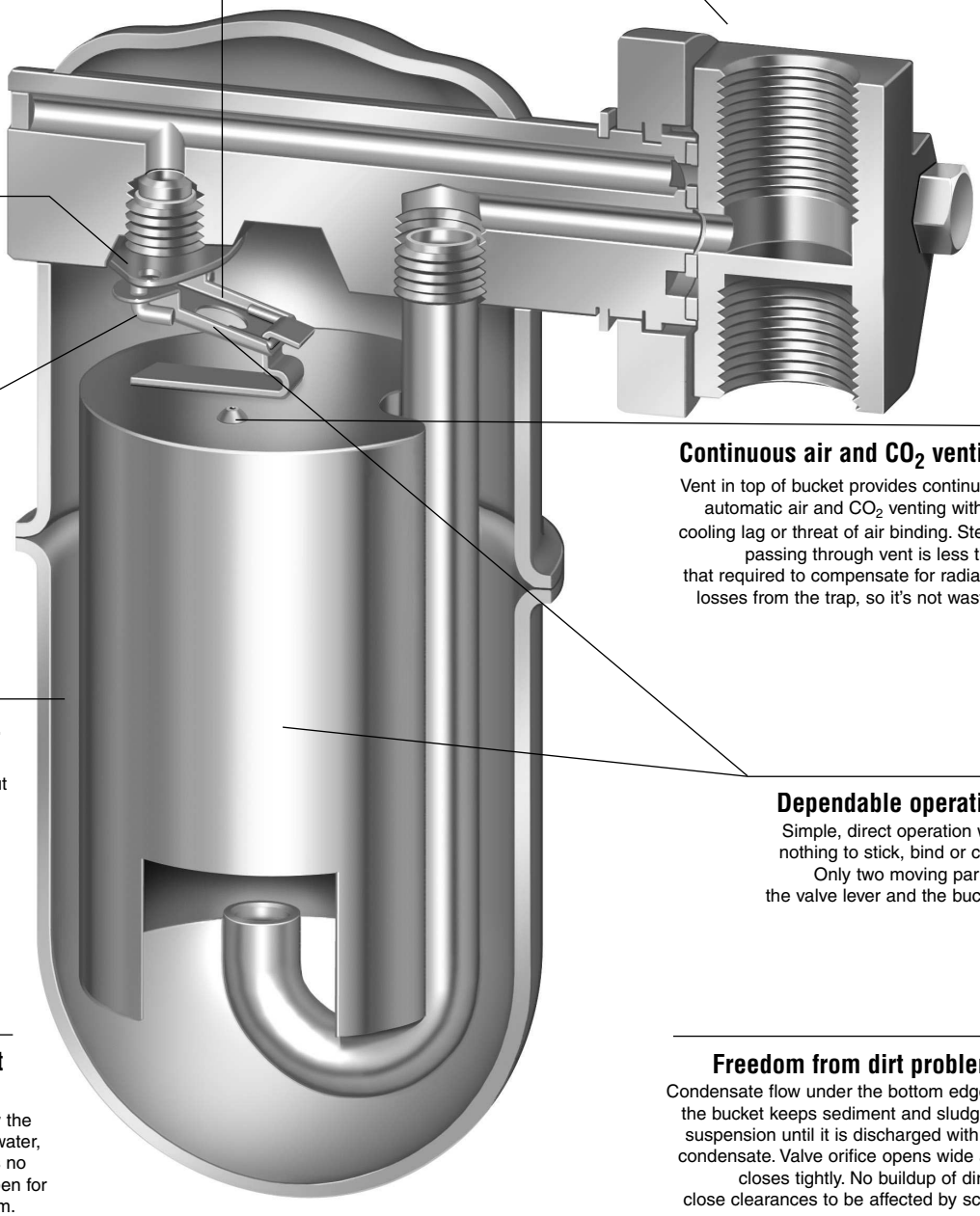


The Armstrong stainless steel traps – Series 1000, Series U-1000, Series 1800 and Series 2000 – have high resistance to damage from freeze-ups. They also offer high resistance to wear and corrosion for longer service reliability, and they provide continuous air venting.

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

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

### 360° universal 304 stainless steel connector
Provides quick, easy in-line renewability along with all the proven advantages of an inverted bucket operation. Also available with optional IS-2 integral strainer connector with 20 x 20 mesh stainless steel strainer.



### Virtually no steam loss
Steam does not reach the water-sealed discharge valve.

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

### Continuous air and $CO_2$ venting
Vent in top of bucket provides continuous automatic air and $CO_2$ venting with no cooling lag or threat of air binding. Steam passing through vent is less than that required to compensate for radiation losses from the trap, so it's not wasted.

### Sealed, tamperproof 304-L stainless steel package
Able to withstand freeze-ups without damage.

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

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

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

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



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.armstrongintenational.eu • info@armstrongintenational.eu

# 2000 Series Stainless Steel Steam Traps



### For Pressures to 45 bar…Capacities to 590 kg/h

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

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

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

Also available with optional IS-2 integral strainer connector.




Available with Standard Connector
Material: 304 Stainless Steel

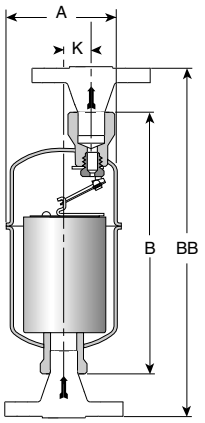

Available with IS-2 Integral Strainer Connector
(shown with optional blowdown valve)
Material: 316 Stainless Steel

# 1000 Series Inverted Bucket Steam Traps

**All Stainless Steel for Vertical Installation**

For Pressures to 45 bar...Capacities to 2 000 kg/h






**Model 1010 Trap**

## 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 62 bar and temperatures to 482°C. 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 Serie is **guaranteed for three years**.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):

| | |
|---|---|
| Model 1010, 1011: | 28 bar @ 427°C |
| Model 1022: | 45 bar @ 316°C |
| Model 1013: | 31 bar @ 427°C |

Maximum operating pressure:

| | |
|---|---|
| Model 1010: | 10,5 bar |
| Model 1011: | 28 bar |
| Model 1022: | 45 bar @ 316°C<br>43 bar @ 371°C<br>41,6 bar @ 427°C |
| Model 1013: | 31 bar |

Maximum back pressure: 99% of inlet pressure

## Connections

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

## Materials

| | |
|---|---|
| Body: | ASTM A240 Grade 304L |
| Internals: | All stainless steel – 304 |
| Valve and seat: | Hardened chrome steel – 440F (<38 bar)<br>Titanium (>38 bar) |
| Strainer body: | Carbon steel |
| Strainer screen: | Stainless steel |

## Options

- Stainless steel internal check valve
- Thermic vent bucket 17 bar maximum; for Model 1022 – 1 bar maximum
- Wiggle wire

## Specification

Inverted bucket steam trap, type ... in all stainless steel, freeze resistant, without gaskets, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

## 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

**Table ST-104-1. 1000 Series Bottom Inlet, Top Outlet Trap (dimensions in mm)**

| Model No. | 1010 | 1011 | 1022 | 1013 |
|---|---|---|---|---|
| Pipe Connections | 15 – 20 | 15 – 20 | 20 | 25 |
| "A" Body Outside Diameter | 70 | 70 | 100 | 100 |
| "B" Face-to-Face (screwed & SW) | 152 – 152 / 137 – 144 | 183 – 183 / 167 – 175 | 221 / 217 | 289 / 289 |
| "BB" Face-to-Face (flanged PN40*) | 195 – 200 | 225 – 230 | 271 | 375 |
| "K" ℄ Outlet to ℄ Inlet | 14 | 14 | 23 | 30 |
| Weight in kg (screwed & SW) | 0,7 | 0,8 | 2 | 3,4 |
| Weight in kg (flanged PN40*) | 2,1 – 2,8 | 2,2 – 2,9 | 4,1 | 6,0 |

* Standard flanges are in carbon steel, stainless steel flanges are optional. Other flange sizes, ratings and face-to-face dimensions are available on request.
Shade indicates products that are CE Marked according to the PED (97/23/EC). All the other models comply with the Article 3.3 of the same directive.

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

# 1000 Series Inverted Bucket Steam Traps

**All Stainless Steel for Vertical Installation**

For Pressures to 45 bar...Capacities to 2 000 kg/h



**Table ST-105-1. Model 1010 Capacity**

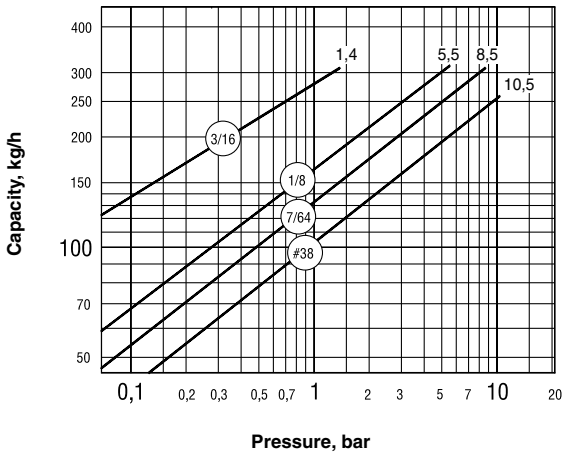



**Table ST-105-2. Model 1011 Capacity**

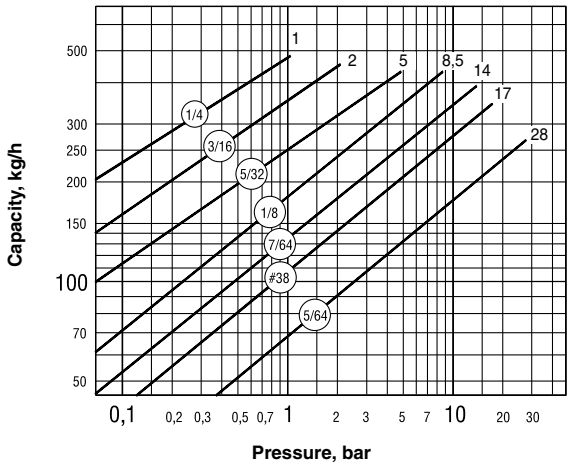



**Table ST-105-3. Model 1022 Capacity**

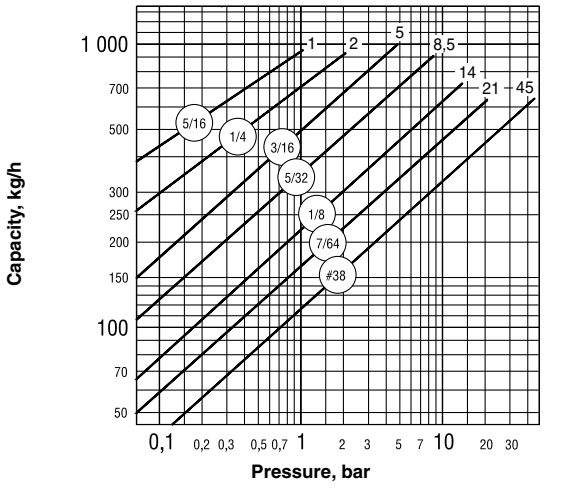
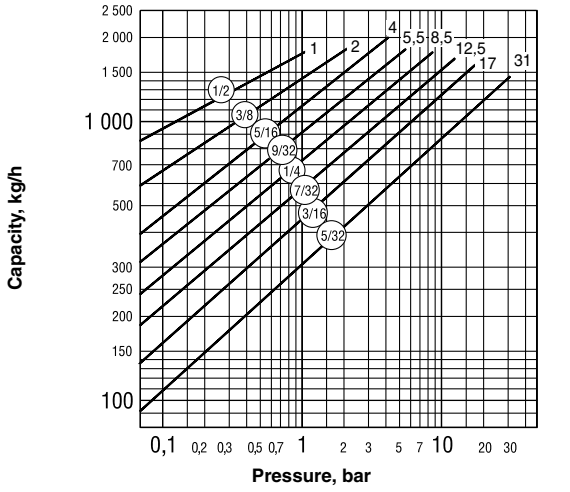



**Table ST-105-4. Model 1013 Capacity**

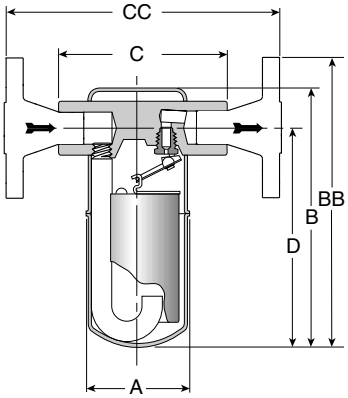



***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

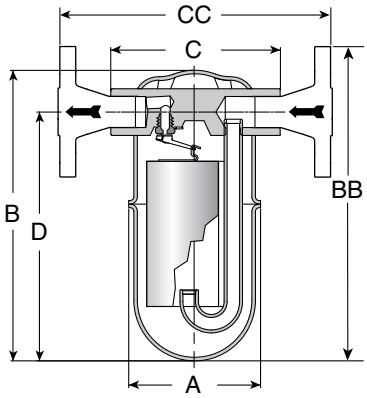
# 1800 Series Inverted Bucket Steam Traps

**All Stainless Steel for Horizontal Installation**
For Pressures to 45 bar...Capacities to 1 090 kg/h






**Model 1811 Trap**




**Model 1822 Trap**

## Description

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

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

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

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):
Model 1810, 1811: 28 bar @ 427°C
Model 1822: 45 bar @ 315°C

Maximum operating pressure:
Model 1810: 14 bar
Model 1811: 28 bar
Model 1822: 45 bar @ 316°C
43 bar @ 371°C
41,6 bar @ 427°C

Maximum back pressure: 99% of inlet pressure

## Connections

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

## Materials

| | |
|---|---|
| Body: | ASTM A240 Grade 304L |
| Internals: | All stainless steel – 304 |
| Valve and seat: | Hardened chrome steel – 440F (<38 bar) |
| | Titanium (>38 bar) |

## Options

- Insu-Pak™ insulation for Models 1810/1811
- Stainless steel pop drain for Models 1811/1822
- Probe connection
- Wiggle wire

## Specification

Inverted bucket steam trap, type ... in all stainless steel, freeze resistant, without gaskets, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and orifice at the top of the trap. Maximum allowable back pressure 99% of inlet pressure.

## 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

**Table ST-106-1. 1800 Series Side Inlet, Side Outlet Trap (dimensions in mm)**

| Model No. | 1810 | 1811 | 1822 |
|---|---|---|---|
| Pipe Connections | 10 – 15 – 20 | 15 – 20 | 15 – 20 – 25 |
| "A" Body Outside Diameter | 70 | 70 | 99 |
| "B" Height | 136 | 167 | 218 |
| "C" Face-to-Face (screwed & SW) | 110 | 110 | 127 |
| "CC" Face-to-Face (flanged PN40*) | 150 | 150 | 190 – 190 – 200 |
| "D" Bottom to ℄ Inlet | 113 | 138 – 141 | 186 – 181 |
| Weight in kg (screwed & SW) | 0,8 | 0,9 – 1,0 | 3 |
| Weight in kg (flanged PN40*) | 2,3 – 2,3 – 2,8 | 2,5 – 3,2 | 4,5 – 5,2 – 5,6 |

* Standard flanges are in carbon steel, stainless steel flanges are optional. 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).

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

# 1800 Series Inverted Bucket Steam Traps

**All Stainless Steel for Horizontal Installation**

For Pressures to 45 bar...Capacities to 1 090 kg/h



**Table ST-107-1. Model 1810 Capacity**

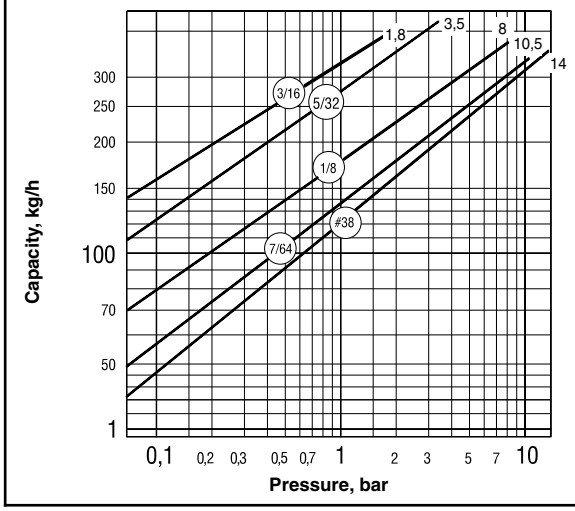
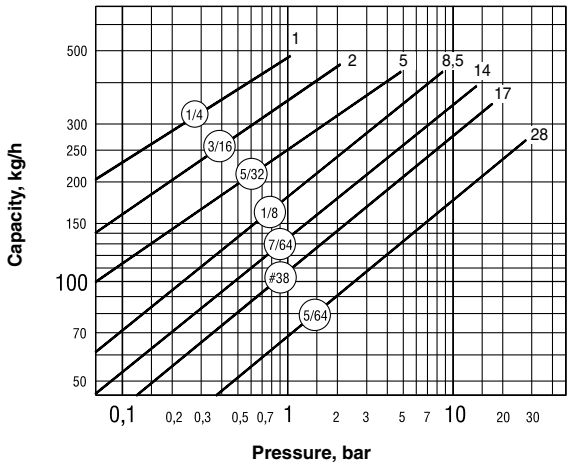



**Table ST-107-2. Model 1811 Capacity**




## Options

**Pop Drain for Freeze Protection**

In general, a properly selected and installed Armstrong trap will not freeze as long as steam is coming to the trap. If the steam supply is shut off, a pop drain should be used to automatically drain the trap. Stainless steel pop drain available for Models 1811 and 1822.

**Maximum Operating Conditions**

| | |
|---|---|
| Pressure: | 41 bar |
| Temperature: | 177°C |

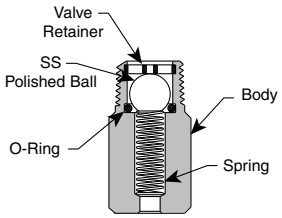
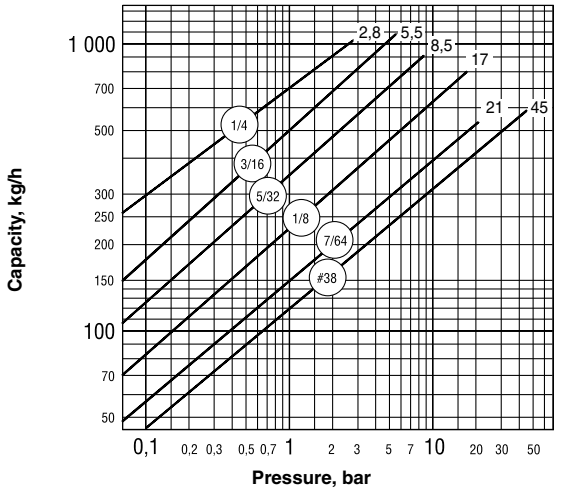


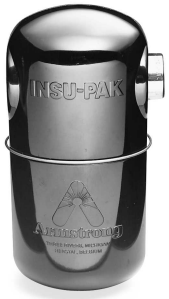

**Table ST-107-3. Model 1822 Capacity**




**Insu-Pak™**

Now you can insulate the in-line traps in your plant without complicating regular trap maintenance. Insu-Pak, a simple reusable insulation package, cuts the time and cost of in-field installation because it goes on in a snap. And it comes off just as easily. Insu-Pak can prevent trap freeze-up when used with a properly designed condensate manifold. Designed for use with Model 1810 and Model 1811 traps.

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




*All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.*

# 2000 Series Inverted Bucket Steam Traps

**All Stainless Steel with 360° Connector**

For Pressures to 45 bar...Capacities to 590 kg/h



## Description

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

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

2000 Series steam traps combine savings in three important areas: energy, installation and replacement. The 360° universal connector provides quick, easy in-line replacement along with all the proven advantages of inverted bucket operation. Also available with optional IS-2 integral strainer connector.

## Maximum Operating Conditions

Maximum allowable pressure (vessel design):

| | |
|---|---|
| Model 2010, 2011: | 28 bar @ 427°C |
| Model 2022: | 45 bar @ 315°C |

Maximum operating pressure:

| | |
|---|---|
| Model 2010: | 14 bar |
| Model 2011: | 28 bar |
| Model 2022: | 45 bar @ 316°C |
| | 43 bar @ 371°C |
| | 41,6 bar @ 427°C |

Maximum back pressure: 99% of inlet pressure

## Connections

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

## Materials

| | |
|---|---|
| Body: | ASTM-A 240 Grade 304L |
| Internals: | All stainless steel – 304 |
| Valve and seat: | Hardened chrome steel – 440F (<38 bar) |
| | Titanium (>38 bar) |
| Standard connector: | Stainless steel – 304 |
| IS-2 connector with integral strainer: | ASTM A351 Gr.CF8 |
| | 20 x 20 mesh 304 SS Screen |

## 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. Maximum allowable back pressure 99% of inlet pressure.

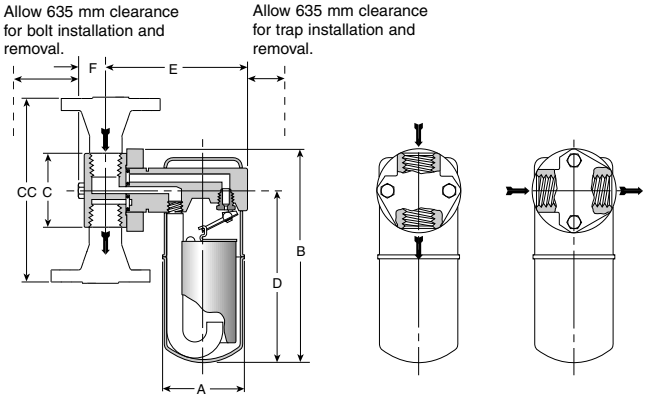
## How to Order

Specify:

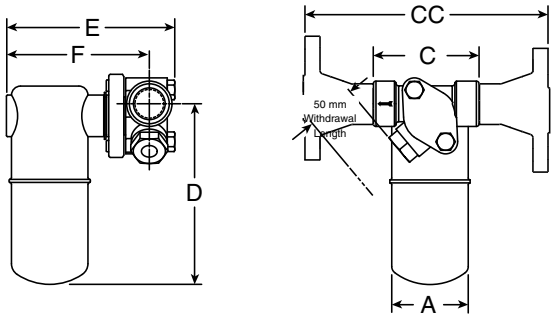
- Model number
- Size and type of pipe connection
- Type of 360° connector (with or without strainer)
- Maximum working pressure that will be encountered or orifice size
- Any options required

## Options

- Insu-Pak™ insulation for Models 2010/2011
- Stainless steel pop drain for Models 2011/2022
- Wiggle wire
- Probe connection for Models 2011/2022
- SS plug for IS-2 connector strainer blowdown connection 360° Connector Styles
- Standard connector
- IS-2 connector with integral strainer




**Model 2011 Trap with Standard Connector**




**Model 2010-2022 with IS-2 Connector**

**Table ST-108-1. 2000 Series Traps with Standard Connector**

| Model No. | 2010 | 2011 | 2022 |
|---|---|---|---|
| Pipe Connections | 15 – 20 – 25 | | |
| "A" Body Outside Diameter | 68 | 68 | 98 |
| "B" Height** | 152 | 176 | 221 |
| "C" Face-to-Face (screwed & SW) | 60 | 60 | 60 |
| "CC" Face-to-Face (flanged PN40*) | 150 – 150 – 160 | | |
| "D" Bottom to ℄ Inlet | 117 | 142 | 187 |
| "E" ℄ to Outside (Standard)*** | 116 | 116 | 146 |
| "F" ℄ to Bolt | 25 | 25 | 25 |
| Weight in kg (screwed & SW) | 1,9 | 2,0 | 3,0 |
| Weight in kg (flanged PN40*) | 3,6 – 4,2 – 4,7 | 3,7 – 4,3 – 4,8 | 4,7 – 5,3 – 5,7 |

**Table ST-108-1. 2000 Series Traps with IS-2 Integral Strainer Connector**

| Model No. | 2010 | | 2011 | | 2022 | |
|---|---|---|---|---|---|---|
| Pipe Connections | 15 – 20 | 25 | 15 – 20 | 25 | 15 – 20 | 25 |
| "C" Face-to-Face (screwed & SW) | 89 | 102 | 89 | 102 | 89 | 102 |
| "CC" Face-to-Face (flanged PN40*) | 150 | 160 | 150 | 160 | 150 | 160 |
| "D" Bottom to ℄ Inlet** | 127 | 127 | 152 | 152 | 197 | 197 |
| "E" Outside to Bolt | 140 | 144 | 140 | 144 | 170 | 175 |
| "F" ℄ to Outside | 117 | 122 | 117 | 122 | 148 | 152 |
| Weight in kg (screwed & SW) | 2,2 | 2,4 | 2,3 | 2,5 | 3 | 3 |
| Weight in kg (flanged PN40*) | 3,9 – 4,5 | 5,1 | 4,0 – 4,6 | 5,2 | 4,7 – 5,3 | 5,7 |

* Standard flanges are in carbon steel, stainless steel flanges are optional. Other flange sizes, ratings and face-to-face dimensions are available on request.
** For IS-2 connector, add 15 mm to "B" and "D" dimensions when optional probe connections is required. Dimensions in mm
*** When trap is installed in vertical position on flanged connector, the "Export - Long Neck" version should be used.
All models comply with the article 3.3 of the PED (97/23/EC).

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Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

# 2000 Series Inverted Bucket Steam Traps

**All Stainless Steel with 360° Connector**

For Pressures to 45 bar...Capacities to 590 kg/h



**Table ST-109-1. Model 2010 Capacity**

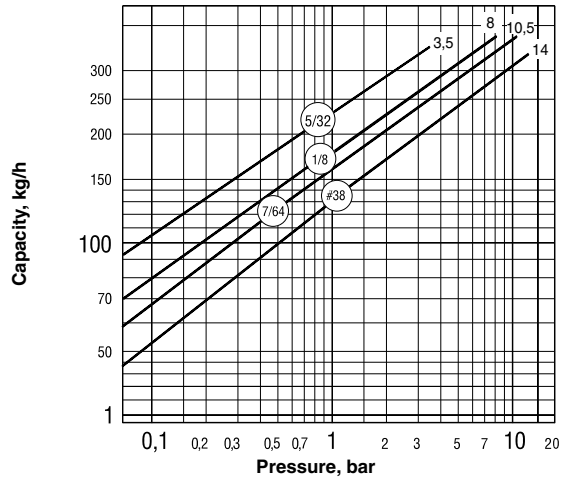
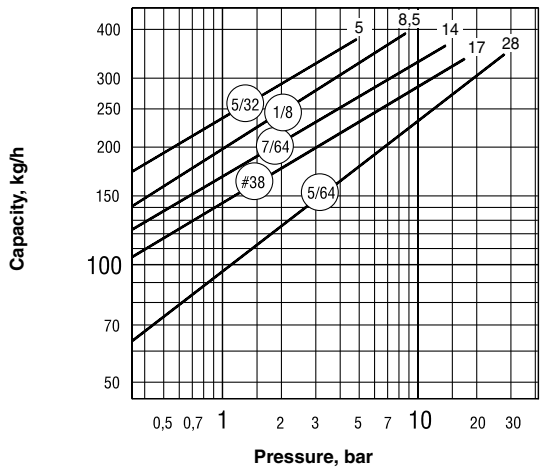



**Table ST-109-2. Model 2011 Capacity**




## Connectors

Besides the inverted bucket traps, the standard connector or IS-2 connector with integral strainer can also be used on thermostatic, thermostatic wafer, controlled disc traps and Float & Thermostatic traps.

**CD-3300 Controlled Disc with IS-2 Integral Strainer Connection**

## 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: 41 bar
Temperature: 177°C

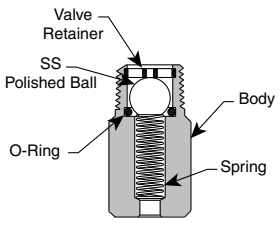
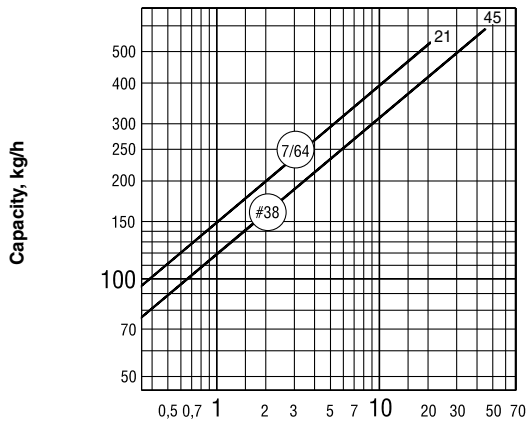



**Table ST-109-3. Model 2022 Capacity**



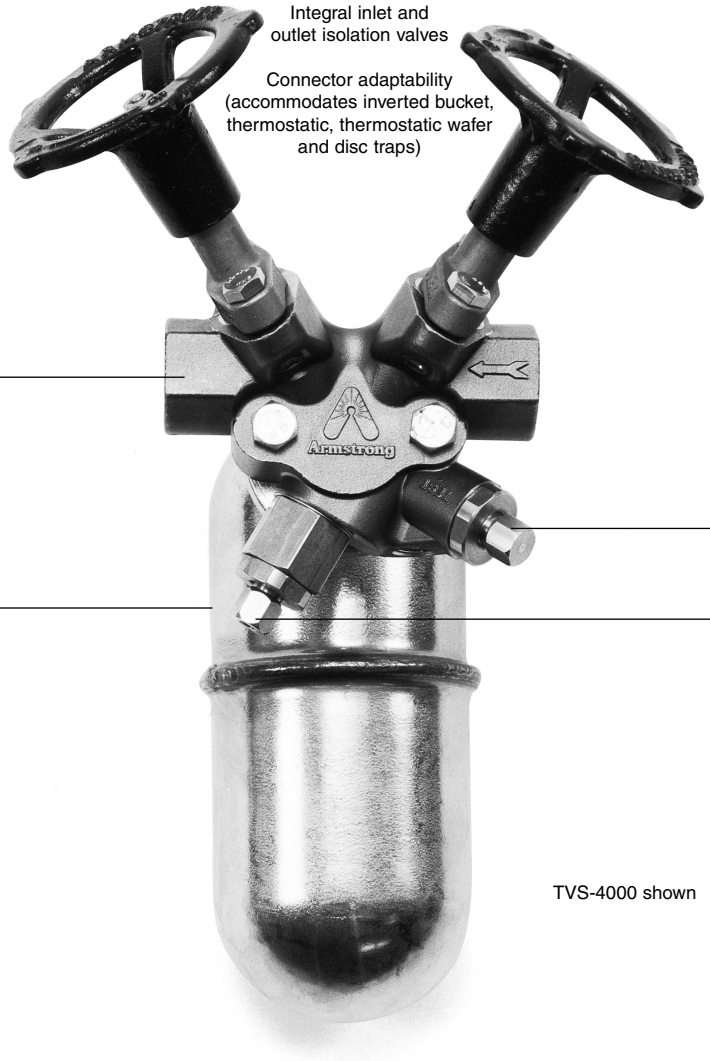

**Insu-Pak™**

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


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

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# TVS-4000 Stainless Steel Trap Valve Station




TVS-4000 shown

**3-years guarantee**

## Trap Valve Station

- **Reduced costs**
  TVS saves on these fronts: energy, installation and maintenance.
- **Integration of trap, four valves and strainer**
  Inverted bucket long life and energy efficiency plus the savings and convenience of components merged into a single connector.
- **A full range of features**
  TVS has test and strainer blowdown valves. When installed with 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-4000 is guaranteed for three years when it's used with an Armstrong stainless steel inverted bucket trap.
- **Easy, in-line repairability**
- **Installation versatility**
  The connector design makes the TVS adaptable to any piping configuration.
- **Simplified trap testing**
  TVS enhances your capability to check trap operation and offers a built-in method to block and bleed traps.
- **Elimination of potential leak points**



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
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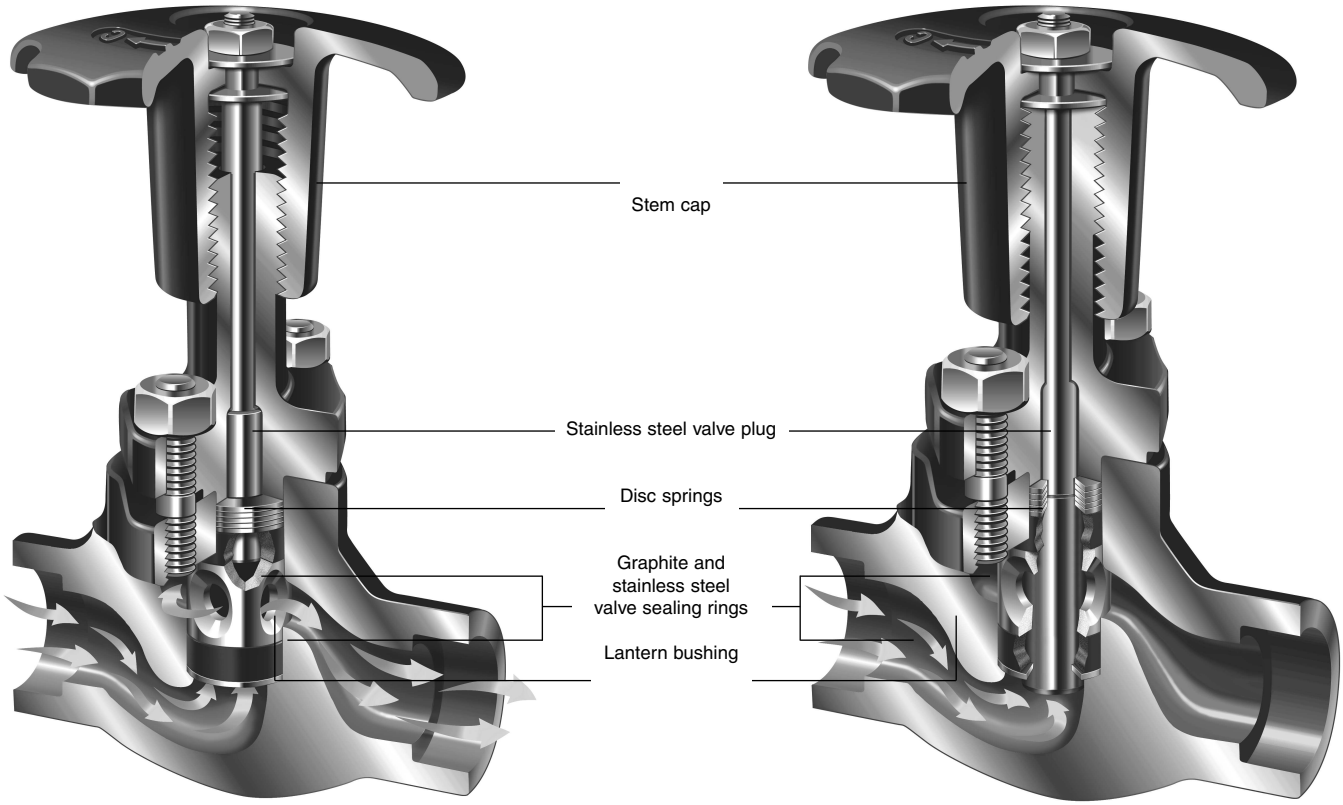
# TVS Series Stainless Steel Trap Valve Station



**The Piston Valve**




**Open Position**

**Closed Position**

- **Dual sealing action**
  The piston valve is a seatless valve that includes two graphite and stainless steel valve sealing rings that seal the stem and function as a valve 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 sealing 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 assured by the compression of the sealing rings against the piston and the valve body. This combination of disc springs and dual valve seal rings protects against expansion and contraction due to heating and cooling. This assures 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.

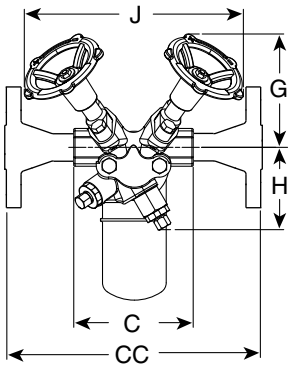
- **In-line repairability**
  All valve components may be easily replaced in-line.

- **Long-term operation**
  Piston valve design assures actuation even after many years without operation.

# TVS-4000 Stainless Steel Trap Valve Station

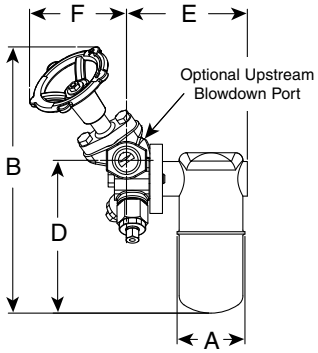
**Stainless Steel with 360° Connector**
For Pressures to 45 bar...Capacities to 590 kg/h (Using 2000 Series Inverted Bucket Steam Traps)





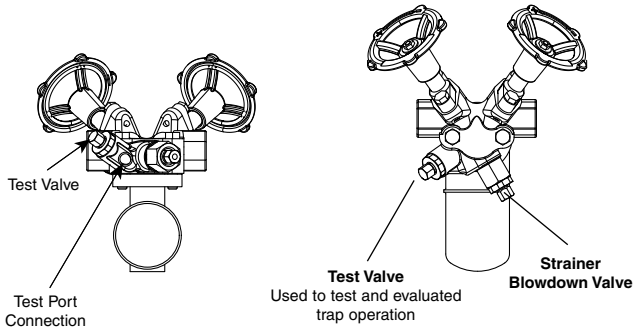

**Model TVS-4000 with 2000 series SS Trap**

Front View




**Model TVS-4000 with 2000 series SS Trap**

Side View




**Model TVS-4000 with 2000 series SS Trap**

Bottom View

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 |

## Connections

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

## Isolation Valve Components

| | |
|---|---|
| Handwheel: | Cast iron |
| Nut : | Stainless steel |
| Stem, Washers: | Stainless steel |
| Bonnet: | ASTM A351 Gr. CF8M |
| Bonnet, Bolts: | Stainless steel Gr. A2 |
| 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 – 440F (<38 bar)<br>Titanium (>38 bar) |

**Table ST-112-1. TVS-4000 Series with 2000 Series Inverted Bucket Steam Trap (dimensions in mm)**

| Model No. | 2010 | 2011 | 2022 |
|---|---|---|---|
| Pipe Connections | 15 – 20 | 15 – 20 | 15 – 20 |
| "A" Trap Diameter | 68 | 68 | 98 |
| "B" Height Valve Open | 203 | 268 | 318 |
| "C" Face-to-Face (screwed & SW) | 120 | 120 | 120 |
| "CC" Face-to-Face (flanged PN40*) | 312 | 312 | 312 |
| "D" Connection ℄ to Bottom | 120 | 154 | 203 |
| "E" Connection ℄ to Outside of Trap | 114 | 122 | 149 |
| "F" Connection ℄ to Front of Handwheel (Valve Open) | 89 | 98 | 98 |
| "G" Connection ℄ to Top of Handwheel (Valve Open) | 83 | 114 | 114 |
| "H" Connection ℄ to Bottom of Connector | 47 | 83 | 83 |
| "J" Width Across Handwheels (Valve Open) | 235 | 222 | 222 |
| Weight in kg (screwed & SW) | 4,1 | 4,3 | 5,4 |
| Weight in kg (flanged PN40*) | 5,8 – 6,4 | 6,0 – 6,6 | 7,1 – 7,7 |
| Maximum Operating Pressure (Trap) | 14 bar | 28 bar | 45 bar |
| Maximum Allowable Pressure (Trap) | 28 bar @ 399°C | 28 bar @ 399°C | 45 bar @ 315°C |

* Standard flanges are in carbon steel, stainless steel flanges are optional. 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).

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

# TVS-4000 Stainless Steel Trap Valve Station

**Stainless Steel with 360° Connector**
For Pressures to 45 bar...Capacities to 590 kg/h (Using 2000 Series Inverted Bucket Steam Traps)



**Table ST-113-1. Model 2010 Capacity**

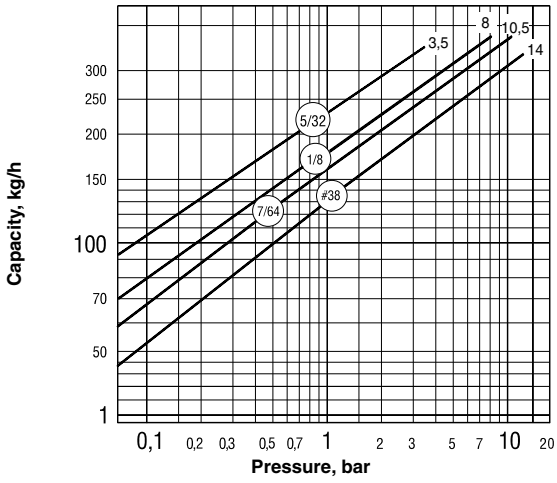



**Table ST-113-2. Model 2011 Capacity**

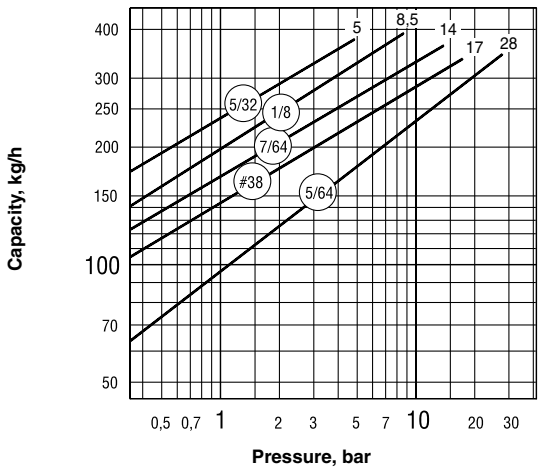
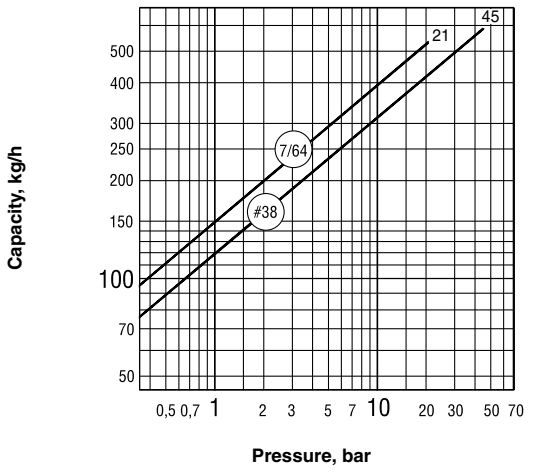



**Table ST-113-4. How to Order**

| Model | Connection | Type of Connection Inlet/Outlet | Flow Direction | Trap Type |
|---|---|---|---|---|
| TVS-4000 | 15<br>20 | NPT<br>SW<br>BSPT<br>Flanged | R = Right to Left<br>L = Left to Right | Inv. Bucket<br>Disc<br>Thermostatic<br>Bimetallic<br>F&T |

**Table ST-113-3. Model 2022 Capacity**

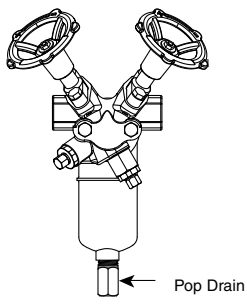



## Options

**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 0,35 barg for Models 2011 and 2022.

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



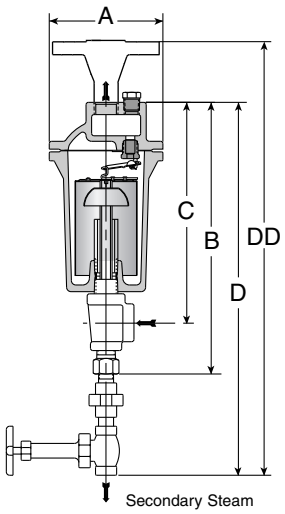

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# 20-DC Series Automatic Differential Condensate Controllers

**Cast Iron for Vertical Installation**

For Pressures to 17 bar...Capacities to 9 000 kg/h






## Description

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

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

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

## Maximum Operating Conditions

| | |
|---|---|
| Maximum allowable pressure (vessel design): | 17 bar @ 232°C |
| Maximum operating pressure: | 17 bar |
| Maximum back pressure: | 99% of inlet pressure |

## Connections

Screwed BSPT and NPT
Flanged DIN or ANSI (screw on)

## Materials

| | |
|---|---|
| Body: | ASTM A48 Class 30 |
| Cap: | ASTM A48 Class 30<br>ASTM A-105 (Only 25-DC if PMO > 9 bar) |
| Internals: | All stainless steel – 304 |
| Valve and seat: | Hardened chrome steel – 440F |
| Fittings metering valve: | Metering valve – Bronze with stainless steel trim. Fittings 250# malleable iron |

## Specification

Automatic differential condensate controller, type ... in cast iron. Maximum allowable back pressure 99% of inlet pressure.

## How to Order

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

**Table ST-114-1. 20-DC Series Bottom Inlet, Top Outlet Differential Condensate Controllers (dimensions in mm)**

| Model No. | 21-DC | 22-DC | 23-DC | 24-DC | 25-DC | 26-DC |
|---|---|---|---|---|---|---|
| Inlet & Outlet Connections | 15 | 20 | 25 | 32 | 40 | 50 |
| Secondary Steam Connection | 3/8" | 1/2" | 1/2" | 3/4" | 3/4" | 1" |
| "A" Flange Diameter | 108 | 133 | 162 | 190 | 216 | 259 |
| "B" Height of Trap | 248 | 311 | 394 | 457 | 514 | 597 |
| "C" ℄ Inlet to top of trap | 197 | 241 | 324 | 381 | 425 | 502 |
| "D" Height valve included (screwed) | 378 | 460 | 543 | 606 | 679 | 787 |
| "DD" Height valve included (flanged PN40*) | 393 | 492 | 575 | 669 | 746 | 856 |
| Weight in kg (screwed) | 3,2 | 6,4 | 10,9 | 17,2 | 24,0 | 39,0 |
| Weight in kg (flanged PN40*) | 4,7 | 8,5 | 13,5 | 21,4 | 28,6 | 45,2 |

* Other flange sizes, ratings and face-to-face dimensions are available on request.
Shade indicates products that are CE Marked according to the PED (97/23/EC). All the other models comply with the Article 3.3 of the same directive.

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***



Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

# 20-DC Series Automatic Differential Condensate Controllers

**Cast Iron for Vertical Installation**

For Pressures to 17 bar...Capacities to 9 000 kg/h



**Table ST-115-1. Model 21-DC Capacity**

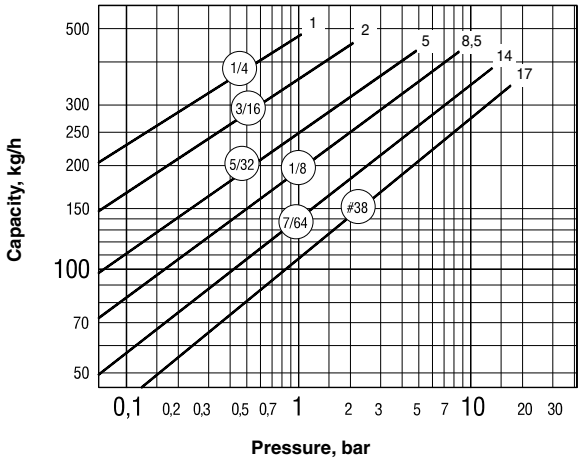



**Table ST-115-2. Model 22-DC Capacity**

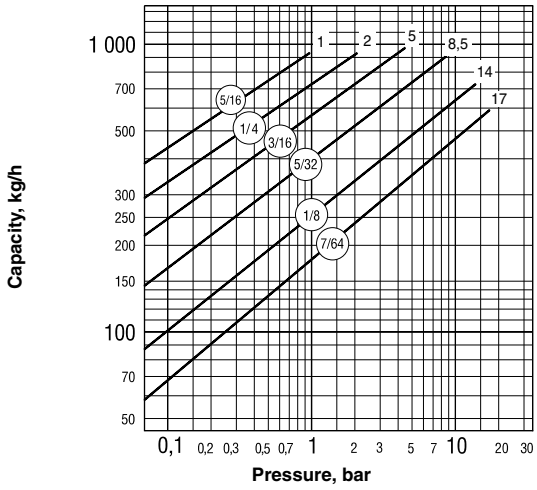



**Table ST-115-3. Model 23-DC Capacity**

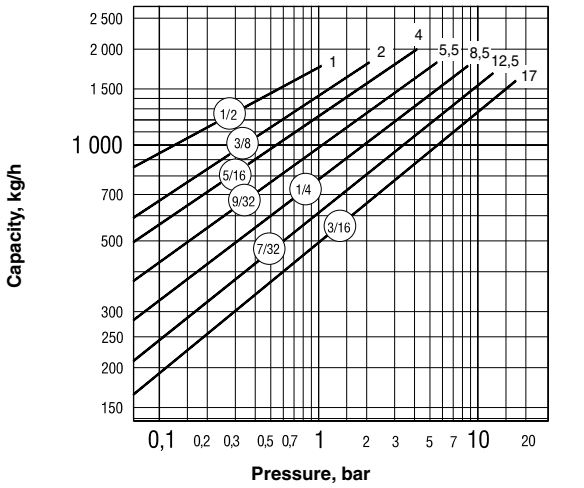



**Table ST-115-4. Model 24-DC Capacity**

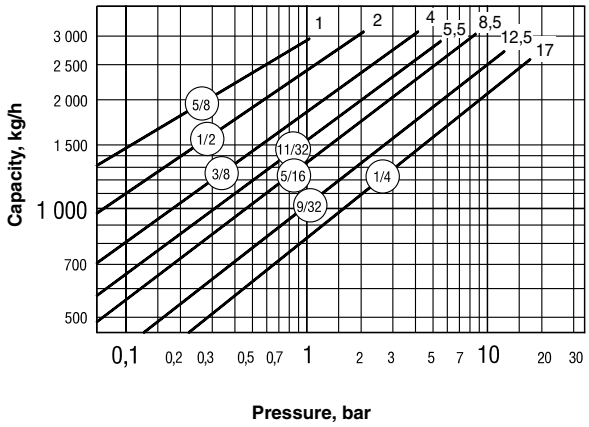



**Table ST-115-5. Model 25-DC Capacity**

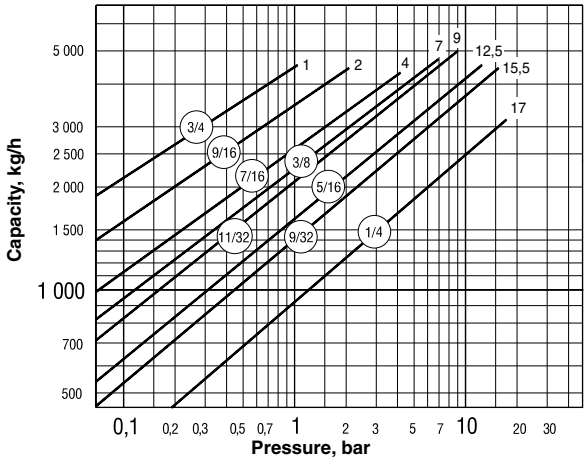
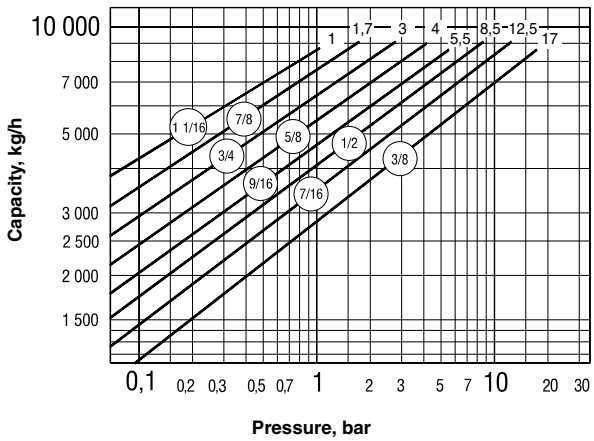



**Table ST-115-6. Model 26-DC Capacity**



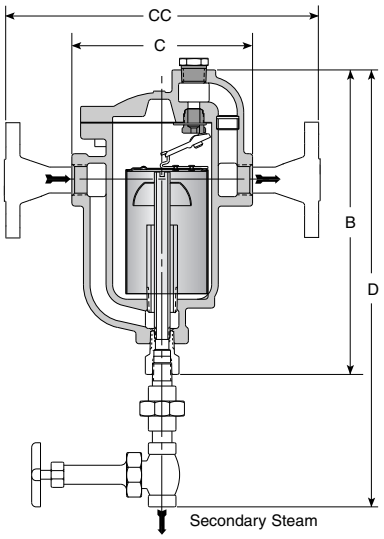

***All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.***

# 80-DC Series Automatic Differential Condensate Controllers

**Cast Iron for Horizontal Installation**

For Pressures to 17 bar…Capacities to 9 000 kg/h






## Description

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

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

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

## Maximum Operating Conditions

| | |
|---|---|
| Maximum allowable pressure (vessel design): | 17 bar @ 232°C |
| Maximum operating pressure: | 17 bar |
| Maximum back pressure: | 99% of inlet pressure |

## Connections

Screwed BSPT and NPT
Flanged DIN or ANSI (screw on)

## Materials

| | |
|---|---|
| Body: | ASTM A48 Class 30 |
| Internals: | All stainless steel – 304 |
| Valve and seat: | Hardened chrome steel – 440F |
| Fittings metering valve: | Metering valve – Bronze with stainless steel trim. Fittings 250# malleable iron. |

## Specification

Automatic differential condensate controller, type ... in cast iron. Maximum allowable back pressure 99% of inlet pressure.

## How to Order

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

**Table ST-116-1. 80-DC Series Side Inlet, Side Outlet Differential Condensate Controllers (dimensions in mm)**

| Model No. | 81-DC | 82-DC | 83-DC | 84-DC | 85-DC | 86-DC |
|---|---|---|---|---|---|---|
| Inlet & Outlet Connections | 20 | 20 | 25 | 32 | 50 | 50 |
| Secondary Steam Connection | 3/8" | 1/2" | 1/2" | 3/4" | 1" | 1 1/2" |
| "B" Height | 203 | 267 | 330 | 381 | 445 | 584 |
| "D" Height (valve included) | 337 | 445 | 476 | 552 | 610 | 813 |
| "C" Face-to-Face (screwed) | 127 | 165 | 197 | 229 | 260 | 330 |
| "CC" Face-to-Face (flanged PN40*) | 191 | 229 | 261 | 355 | 398 | 468 |
| Weight in kg (screwed) | 3,4 | 7,9 | 13,7 | 21,3 | 34,0 | 63,0 |
| Weight in kg (flanged PN40*) | 5,3 | 9,4 | 15,3 | 25,5 | 39,0 | 69,0 |

* Other flange sizes, ratings and face-to-face dimensions are available on request.
Shade indicates products that are CE Marked according to the PED (97/23/EC), but PMA for 86-DC is 15 bar. All the other models comply with the Article 3.3 of the same directive.

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Armstrong International SA • Parc Industriel des Hauts-Sarts (2e Avenue) • 4040 Herstal • Belgium
Tel.: +32 (0)4 240 90 90 • Fax: +32 (0)4 240 40 33
www.**armstrong**international.eu • info@**armstrong**international.eu

# 80-DC Series Automatic Differential Condensate Controllers

**Cast Iron for Horizontal Installation**

For Pressures to 17 bar…Capacities to 9 000 kg/h



**Table ST-117-1. Model 81-DC Capacity**

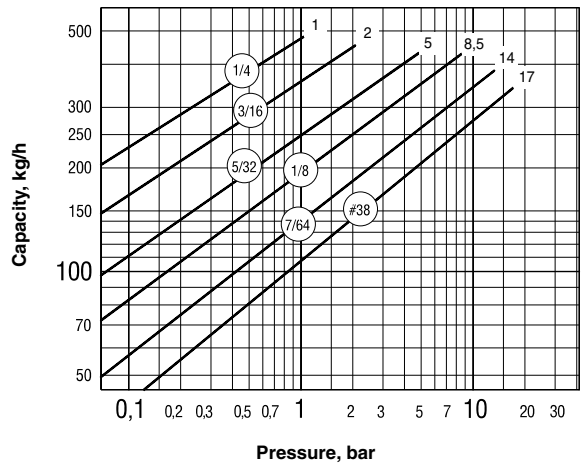



**Table ST-117-2. Model 82-DC Capacity**

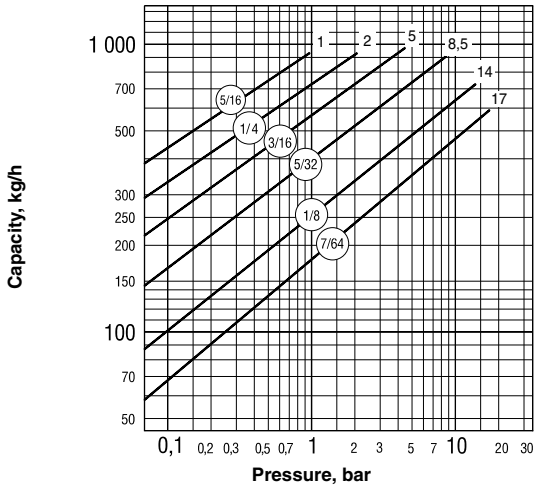



**Table ST-117-3. Model 83-DC Capacity**

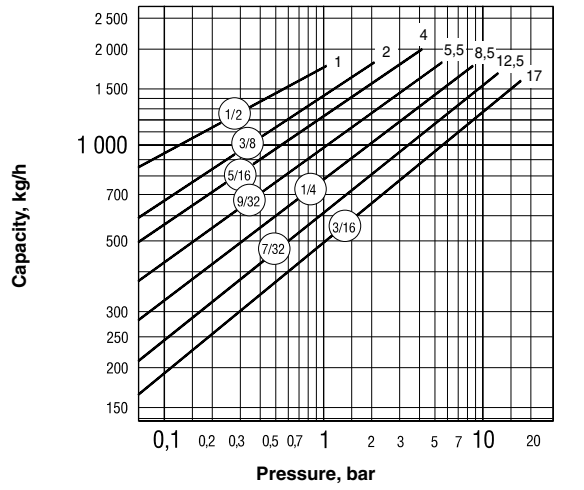



**Table ST-117-4. Model 84-DC Capacity**

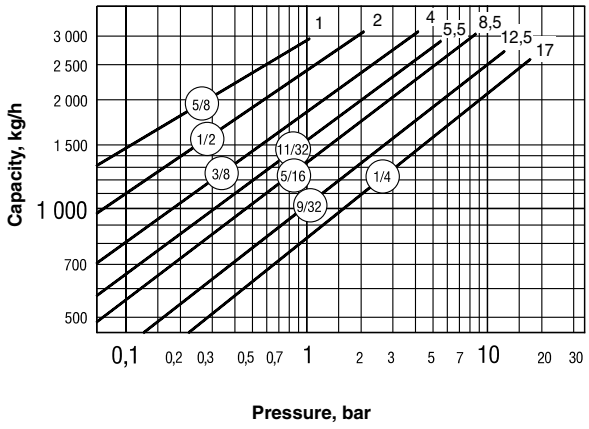



**Table ST-117-5. Model 85-DC Capacity**

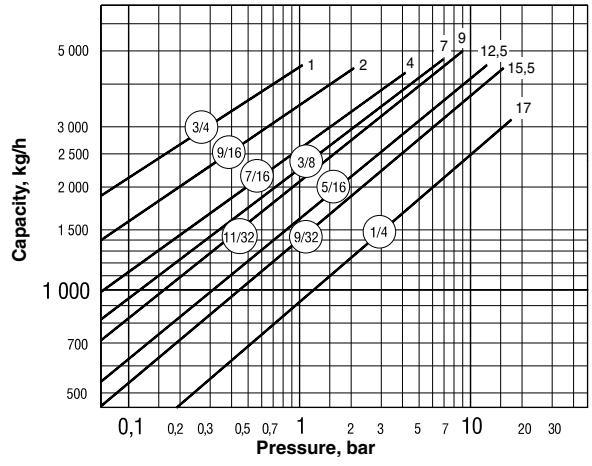
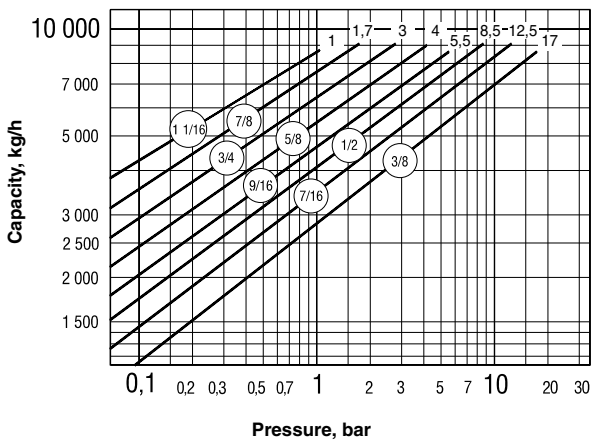



**Table ST-117-6. Model 86-DC Capacity**

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