



# 400 Series Inverted Bucket Steam Trap

## Forged Chrome-moly Steel for Vertical Installation

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

### Description

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

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

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

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

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

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

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

#### For Superheat Service:

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

### Connections

Screwed NPT and BSPT

Socketweld

Flanged

See page 187 for dimensional information for socketweld connections.

### Materials

Body:

ASTM A182 F22 Class 3

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

Internals:

All stainless steel—304

Valve and seat:

Stainless steel—17-4PH or Titanium

### Options

Stainless steel internal check valve

### Specification

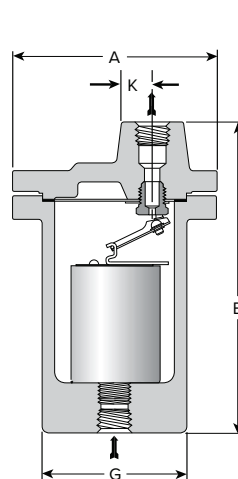
Inverted bucket steam trap, type ... in forged chrome-moly steel, with continuous air venting at steam temperature, free-floating stainless steel mechanism, with the discharge orifice at the top of the trap.

### How to Order

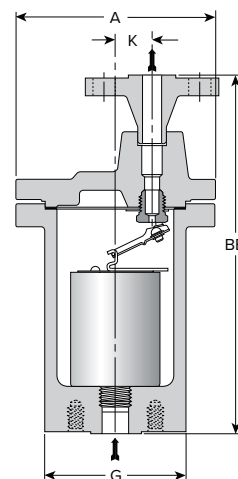
Specify:

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

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



Series 400 Trap



Series 400-FW Trap

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

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

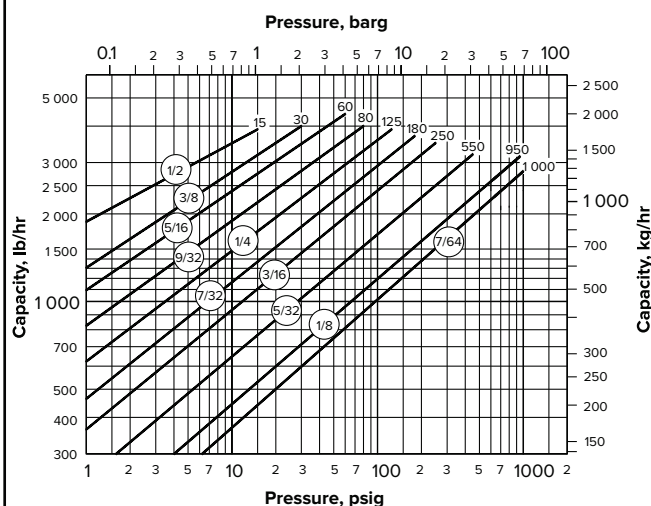
# 400 Series Inverted Bucket Steam Trap

Forged Chrome-moly Steel for Vertical Installation

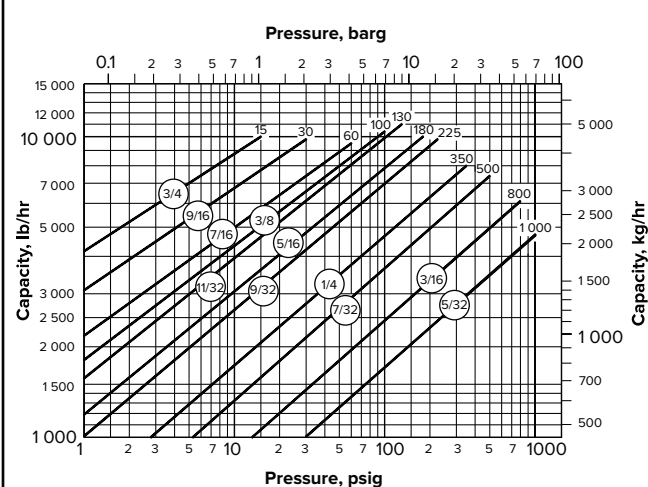
For Pressures to 1 000 psig (69 barg)...Capacities to 20 000 lb/hr (9 072 kg/hr)



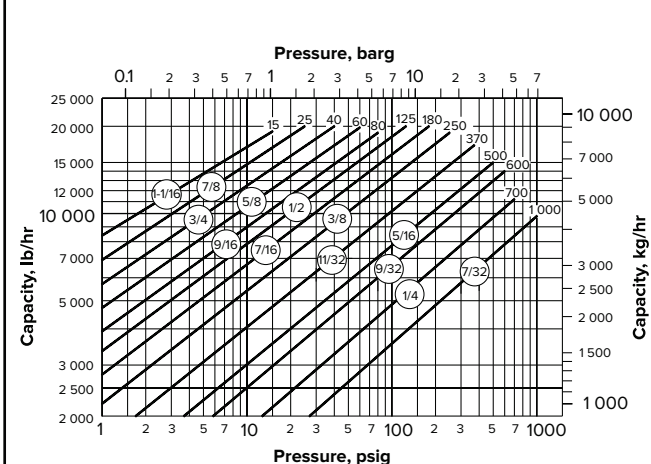
**Model 413 Capacity**



**Model 415 Capacity**



**Model 416 Capacity**



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

| Model No | Max. Oper. Pressure, Sat. Steam |      | Maximum Allowable Pressure (Vessel Design) of Pressure-Containing Parts at Indicated Temperature |          |      |      |      |      |      |      |      |      |      |      |
|----------|---------------------------------|------|--------------------------------------------------------------------------------------------------|----------|------|------|------|------|------|------|------|------|------|------|
|          |                                 |      | °F                                                                                               |          | °C   |      | °F   |      | °C   |      | °F   |      | °C   |      |
|          |                                 |      | -20/+650                                                                                         | -28/+343 | 700  | 371  | 750  | 399  | 800  | 427  | 850  | 454  | 900  | 482  |
|          | psig                            | barg | psig                                                                                             | barg     | psig | barg | psig | barg | psig | barg | psig | barg | psig | barg |
| 413      | 1000                            | 69   | 1200                                                                                             | 83       | 1200 | 83   | 1200 | 83   | 1200 | 83   | 1050 | 72   | 780  | 54   |
| 415      | 1000                            | 69   | 1100                                                                                             | 76       | 1100 | 76   | 1100 | 76   | 1100 | 76   | 1080 | 74.5 | 965  | 66.5 |
| 416      | 1000                            | 69   | 1700                                                                                             | 117      | 1700 | 117  | 1700 | 117  | 1660 | 114  | 1350 | 93   | 990  | 68   |

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