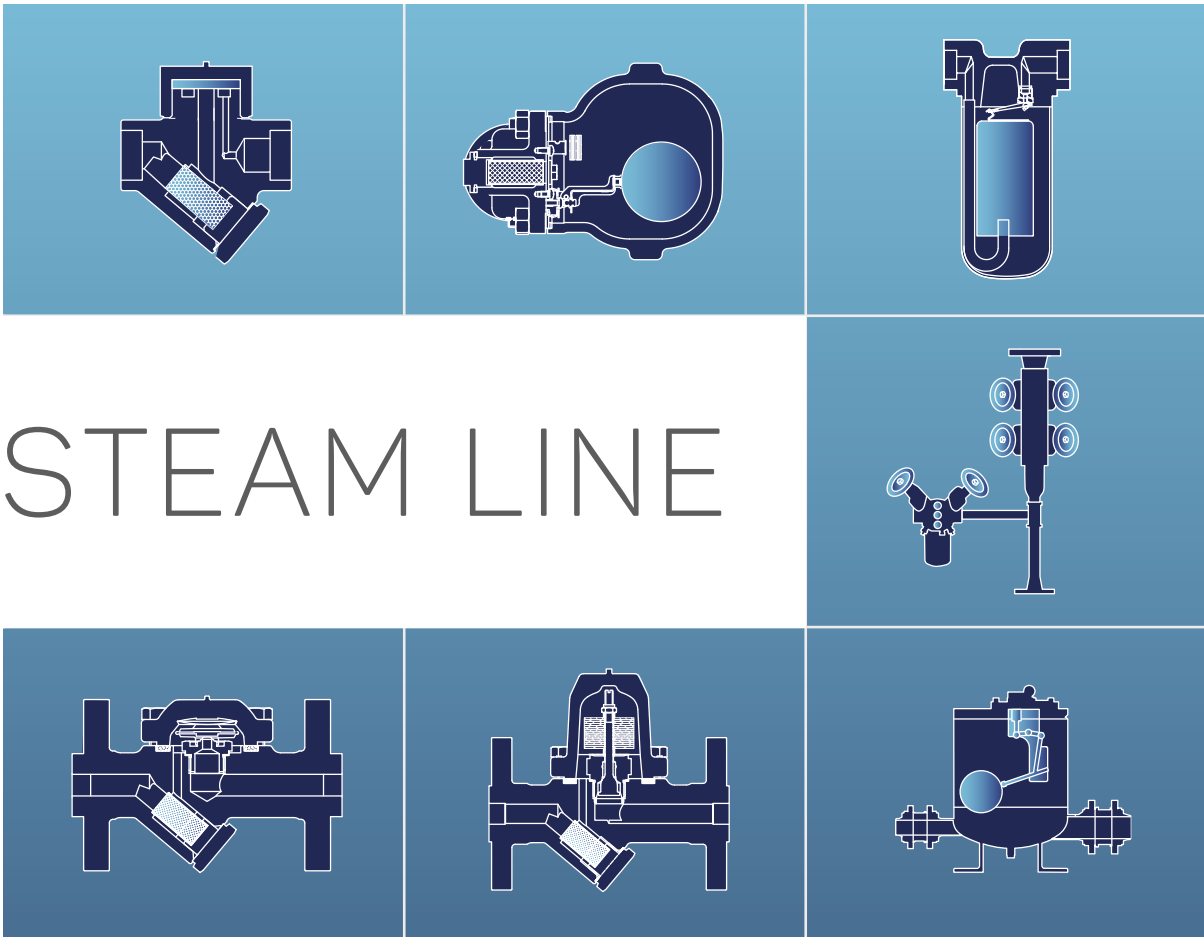
CDB ENGINEERING

Single source Engineered solutions



STEAM LINE

INDEX

ABOUT US

CDB Engineering is a dynamic, independent and consolidated Italian company, capable of the design, manufacture and supply of a wide range of products for the energy industry. CDB Engineering was founded in 2000 and operates in the Oil & Gas industry.

The company is located in the industrial area south of Milan and covers a total surface of 25,000 sq.m. The manufacturing activities are organized in three factories over a covered area of 10,000 sq.m.

Boasting a staff of over 100 people, CDB can cover all phases of engineering: process and mechanical design, manufacturing, testing, painting and packing. All these activities are carried out in-house. Full commitment in achieving and maintaining high quality standards in the management of these processes, enabled CDB Engineering to obtain the most important international certifications, including ASME "U" and "U2" Stamp, PED, ATEX, API6D, API6FA and TS/TR, as well as accreditation from the main international EPC Contractors and End Users.

Focused on the continuous development and realization of customized solutions, CDB Engineering, ethical, responsible and customer-driven business approach is aimed at improving continuously the performance and reliability of the product.

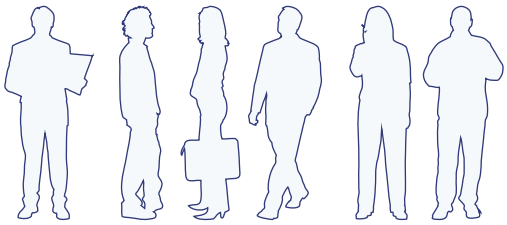
20 YEARS OF SUCCESS

- **2000** — **Founded by Mr Giuseppe Maino, Valentino Sgariboldi and Stefano Simunno**
- **2002** — Started to supply major international EPC's & OEM's with strainers
- **2004** — Started to supply major international EPC's and OEM's with turn-key Skid Packages
- **2005** — Opened brand new plant of 3.000 sq mt
- **2006** — Started production of steam traps and steam line components
- **2008** — Reached business volume of € 10 millions
- **2009** — Expanded manufacturing plants reaching a total covered area of 10.000 sq mt
- **2015** — Staff reached over 100 emplyees
- **2016** — Invested in innovative vertical warehouse storage systems
- **2017** — Started Plug Valves division
- **2019** — Reached business volume of € 20 millions
- **2020** — **20 years of success**

CDB OVERVIEW

NUMBERS

Location:
Milan Area - Italy



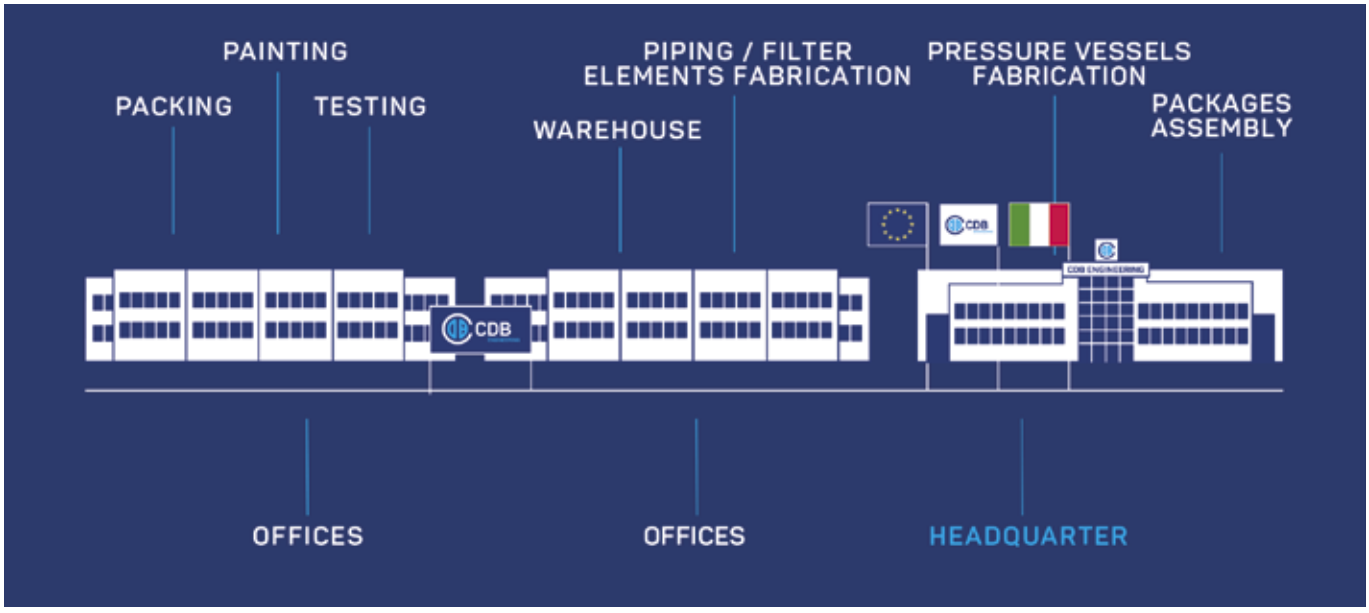
Total number of staff:
102

Total built over area
25.000 sqm

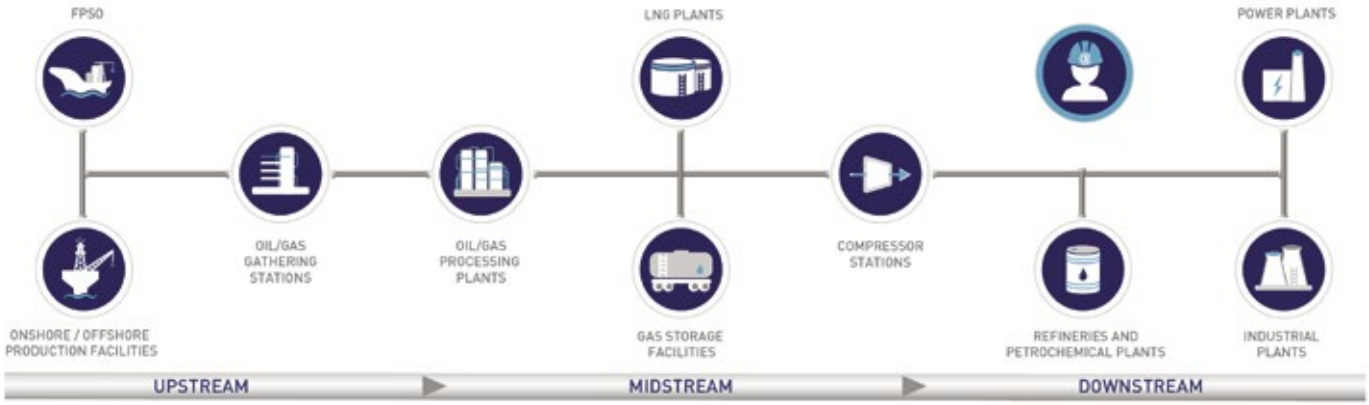
Total factory area
10.000 sqm

Max manufacturing capa.
per month **~80 tons**

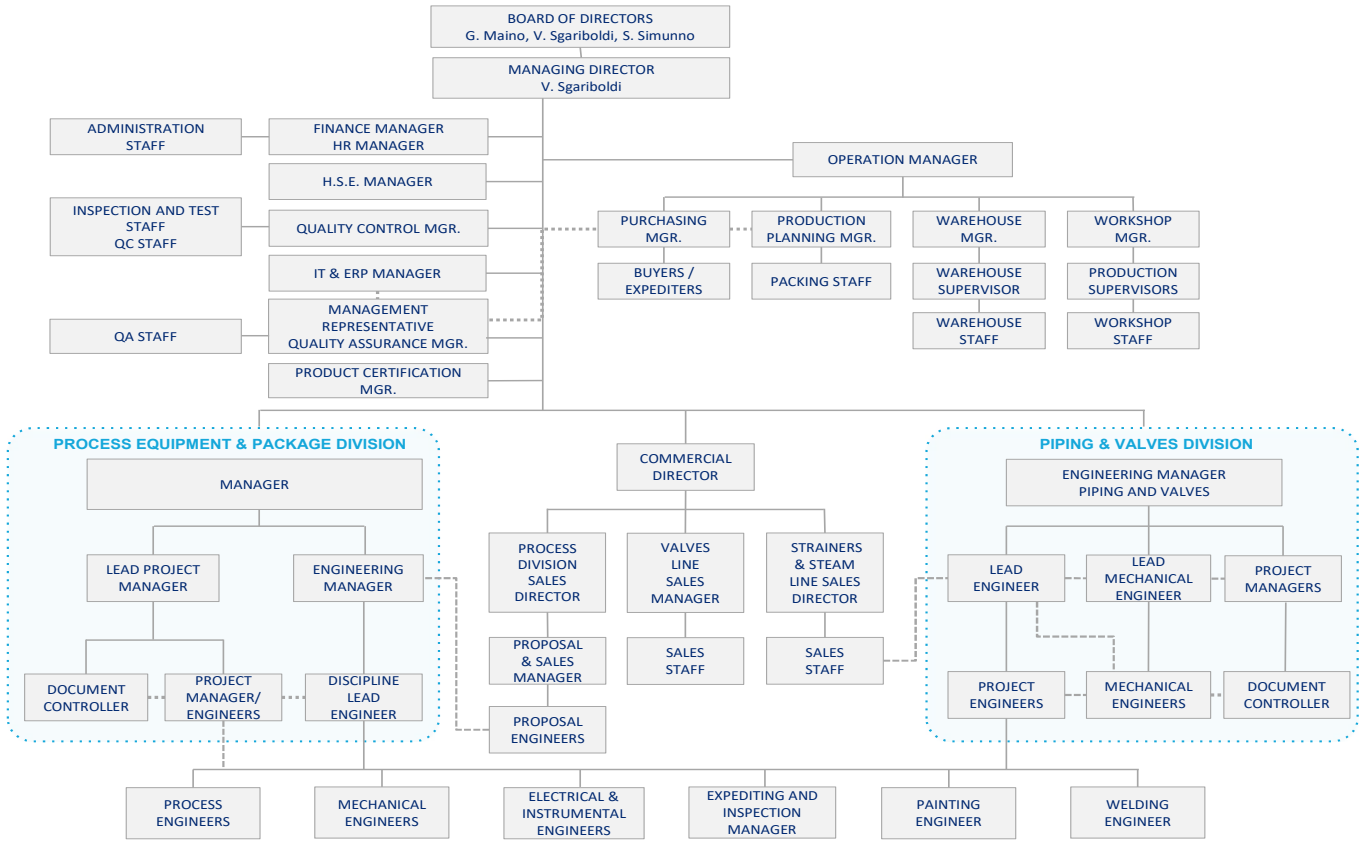
CDB FACILITIES



SERVING OIL&GAS AND POWER



ORGANIZATION CHART



CERTIFICATES QUALITY ASSURANCE DEVELOPMENT

CDB Engineering's design and manufacturing activities are managed in accordance with the highest quality and efficiency standards. CDB is able to offer appropriate services and products in order to serve the marketplace and to warrant the maximum reliability as a confirmation of the quality of its products.

CDB QUALITY SYSTEM INCLUDES THE FOLLOWING CERTIFICATIONS

- ISO 9001-2015
- ISO 14001-2015
- ISO 45001:2018
- PED - 2014/68/EU Directive
- ATEX n°2014/34/UE Directive
- API6D
- ASME - U1
- EAC – RUSSIA
- CRN - Canadian Registration Number
- UL - Underwriter Laboratories

STANDARDS APPLICABLE TO STEAM TRAPS

ISO 6948 automatic steam trap production and performance characteristic tests

ISO 7842 automatic steam traps determination of discharge capacity - test methods

ISO 7841 automatic steam traps determination of steam loss - test methods

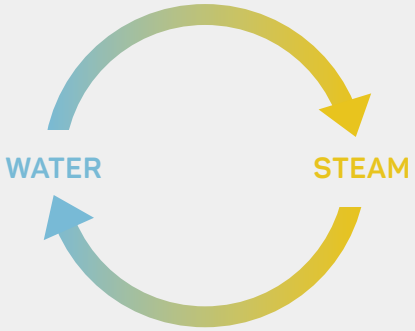
ASME PTC39 steam traps

BASICS OF STEAM

It is useful to introduce the topic of steam by considering its many uses and benefits, before entering an overview of the steam line products.

Steam is an invisible gas generated by adding heat energy to water in a boiler. Enough energy must be added to raise the temperature of the water to the boiling point. Then additional energy – without any further increase in temperature – changes the water to steam.

Water is heating to its boiling point, producing steam



Steam condenses and turns back to water

The heat required to change boiling water into steam is called the heat of vaporisation or latent heat. The quantity is different for every pressure/temperature combination, as shown in the steam table (see page 80). A saturated steam table is an indispensable tool to determine saturated steam temperature from steam pressure, or viceversa.

Steam is a very efficient and easily controlled heat transfer medium. It is most often used for transporting energy from a central location (the boiler) to any number of locations in the plant, where it is used to heat air, water or process applications.

Steam is an excellent way of conveying a large mass of heat and it is needed not at the boiler or in the mains or anywhere else but at the machines where the heating processes are. Its use is popular throughout industry for a broad range of tasks.

Common applications for steam are, for example, steam heated processes in plants and factories and steam driven turbines in electric power plants, but the uses of steam in industry extend far beyond this.

Steam is also sterile, making it popular for process use in the food, pharmaceutical and health industries. It is also widely used in hospitals for sterilisation purposes.
The industries within which steam is used range from huge oil and petrochemical plants to small local laundries. Further uses include the production of paper, textiles, brewing, food production, curing rubber, and heating and humidification of buildings.

Moreover, steam is intrinsically safe, being unable to cause sparks. Many petrochemical plants utilise steam fire-extinguishing systems. It is therefore ideal for use in hazardous areas or explosive atmospheres.

Refinery Plant

Steam exhaust from Power Plants

WHY SHOULD YOU MANAGE STEAM AND CONDENSATE?

Steam generated in a boiler is carried through pipelines to different equipment. At start-up of the boiler, the system is full of air. This air must be vented, to make room for steam to fill the system. When air is vented, initial heating of the system by steam, leads to the formation of large amounts of condensate that must be drained before the system stabilises for normal operation.

Afterwards, when steam is transported from the boiler to the equipment, a small amount of heat is released to the surrounding air. This results in the formation of small amounts of condensate in the distribution lines. Water droplets in the pipes collect at low points and form slugs of water. With the force of steam as it travels through the pipes, these slugs of water are carried forward and slammed into bends, valves, traps, tees, elbows and any other fittings in the piping. This Water Hammer is dangerous and may cause extensive damages.

When it reaches the user equipment, steam will release its heat and the generated condensate must be drained regularly to prevent the condensate from covering the heat transfer surfaces. If condensate collects and covers these surfaces, the heating efficiency of the process decreases, resulting in a reduced plant's output. Steam coming into contact with condensate cooled far below saturation temperature can produce another kind of water hammer known as Thermal Shock. This form of water hammer can damage equipment and it signals that condensate drainage is undersized.

When water boils, carbonates present in the water release carbon dioxide gas (CO2). This gas dissolves in the hot condensate to form carbon acid, which is extremely corrosive and can eat through piping and heat exchanger coils. Dissolved oxygen (O2) present in the water also becomes gaseous on heating. It aggravates the action of carbon acid, speeding corrosion and pitting iron and steel surfaces.

Overall, inadequate removal of condensate leads to mechanical wear, corrosion, poor heat transfer, as well as lower plant's efficiency.

STEAM TRAPS: BASIC CONCEPTS

Taking into consideration the costs needed to generate steam and to install a distribution system, it is absolutely important to get steam to its various users around the plant as efficiently as possible. Efficiency translates into getting it to the users with minimal loss in latent energy at a reasonable cost. This is where Steam Traps go into action.

A Steam Trap is simply an automatic valve that opens for condensate, air and CO2 and closes for steam. Traps are not separators. They do not separate the condensate from the steam, but only drain out condensate that has already separated and collected at the inlet to the trap. For economic reasons, the steam trap should do its work for long periods with minimum attention and should also provide:

- Minimal steam loss;
- Corrosion resistance;
- Air Venting;
- CO2 Venting;
- Operating against back pressure;
- Freedom from dirt problems.

Without steam traps the condensate would form in distribution piping, creating a wide range of problems. In addition, there would be no essential control at the users.

Selecting the right steam trapping solution helps to avoid these issues allowing the condensate to be recovered.
Installing steam traps in strategic locations, for example on the outlet side of a heat exchanger, allows steam to stay there until all the latent heat is transferred and the accumulated condensate is drained. With proper placement and specification of steam traps we can create and maintain an efficient, cost effective steam supply and distribution system. Thus, the next step is to choose the best trap to use for a given application. There are many types of steam traps each having its unique characteristics and system benefits. Deciding which type of trap to use is sometimes confusing and, in many cases, more than one type can be used.

In identifying steam traps we can break them down into three main groups: Thermodynamic, Thermostatic and Mechanical.

THERMODYNAMIC
(OPERATED BY CHANGES IN FLUID DYNAMICS)

Thermodynamic steam traps are the best choice for steam mains drainage due to their simplicity, durability and robust construction. This type of trap utilizes the difference in the thermodynamic properties of condensate and steam. They rely partly on the formation of flash steam from condensate.

THERMOSTATIC
(OPERATED BY CHANGES IN FLUID TEMPERATURE)

For applications where it would be beneficial to make use of heat in condensate, a thermostatic steam trap is an ideal solution as it will not open until condensate temperature drops below saturated steam temperature. This allows the heat in condensate to be utilised before it is drained off which in turn reduces flash steam losses and can help to reduce energy costs.

MECHANICAL
(OPERATED BY CHANGE IN FLUID DENSITY)

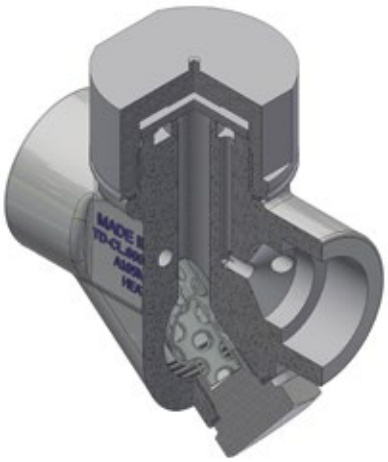
Mechanical steam traps are ideal for use on process applications where condensate must be removed immediately when it forms, to prevent temperature fluctuation which would lead to issues such as product deterioration and inadequate heating. Mechanical traps utilize the difference in density between steam and condensate to operate a float or a bucket.
The above mentioned types are differentiated according to their operating principles. On a general basis, we will take a look at the various types of traps within each group.

STEAM TRAP OPERATING PRINCIPLES

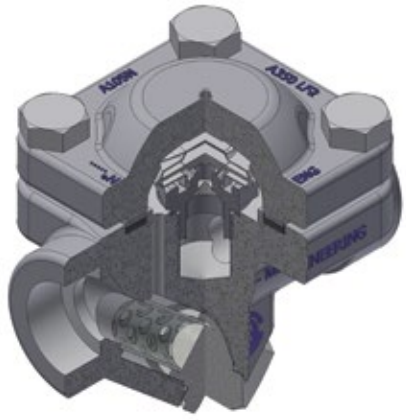
There are five types of steam traps generally used today.
While other types have been designed and built, our production focuses on the basic types described here below.

THERMODYNAMIC STEAM TRAP – DISC TYPE (TD)

The thermodynamic disc type is probably the simplest trap on the market and yet is the most widely used. The disc trap is made up of three primary components: the body, the cap and the disc. This type of trap is operated by the internal energy of steam. Condensate and air entering the trap raise the disc and flow continuously throughout the discharge orifice. Steam entering the trap expands suddenly as it reaches the underside of the disc. The resulting high flow velocity (kinetics energy) causes a decrease in pressure under the disc (Bernoulli's Principle). Steam above the disk is stationary, therefore at higher pressure, forcing the disc onto the seat and closing the trap. When condensate appears at the trap inlet, the steam above the disc condenses releasing the pressure and allowing the discharge cycle to repeat.



THERMOSTATIC STEAM TRAP - BALANCED PRESSURE TYPE (BP)



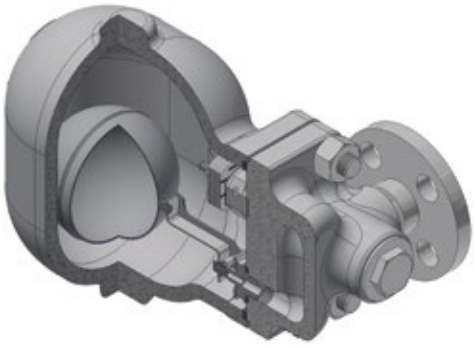
The operating principle is based on the balance between the steam pressure and the internal pressure of the thermostatic membrane capsule, hermetically sealed and filled with a volatile fluid whose saturation temperature is lower than steam at any pressure. At start up the trap is wide open, freely discharging air, non-condensable gases and cool condensate. When the steam reaches saturation temperature, vaporization of the liquid inside the capsule creates a pressure differential which will shut the discharge orifice thus preventing any steam loss. When condensate inside the trap cools, the vaporized filling inside the capsule condenses thus reducing the internal pressure allowing the opening of the trap for discharge again.

THERMOSTATIC STEAM TRAP - BI-METALLIC TYPE (BM)

The bi-metallic trap operates under the principle of thermal expansion of metals. Two dissimilar metals are joined into a series of discs and upon heating will deflect to provide movement to close off the valve. When cold condensate and air are present, the bi-metallic elements are flat and the trap remains open discharging condensate and air from the system. When steam approaches the trap, condensate temperature increases making the bi-metallic elements expand until the valve closes and stops discharging. When the condensate reaches the set subcooling the trap will open again.

MECHANICAL STEAM TRAP - FLOAT AND THERMOSTATIC TYPE (FT)

Float and thermostatics steam traps provide immediate and continuous discharge of condensate, air and non-condensable from a steam system as soon as they reach the trap. The float element is normally a ball type, connected by a lever assembly to the main valve head. As condensate reaches the trap the ball float rises positioning the valve to discharge the condensate at the same rate as it reaches the trap. The response is immediate and the discharge fully modulating and continuous. The condensate level is always maintained above the main valve providing a positive water seal which prevents any steam leakage. The internal thermostatic air vent unit immediately discharges all air and non-condensable gases that reach the trap. This assures maximum condensate capacity through the main valves at all times.



MECHANICAL STEAM TRAP - INVERTED BUCKET TYPE (IB)

The inverted bucket traps respond to the difference in density between steam and condensate and operate on the principal of an inverted water glass (the component referred to as the bucket). The inverted bucket is attached on the valve head by a lever mechanism and operated to open and close the trap. On start-up the bucket, by its own weight, rests on the trap bottom and the valve is open discharging air and non-condensable. When reaching the trap, condensate makes the bucket float (because of air inside) and rise until it closes the discharge orifice. A small hole in the top of the bucket allows air vent and let condensate in until the bucket slowly sinks to the trap bottom opening the valve. Condensate is discharged until steam enters the trap filling the bucket which rises and closes the trap. Steam will be vented through the hole in the bucket and the cycle is repeated providing an intermittent type discharge.

SELECTION OF STEAM TRAPS

To get full benefits from the steam traps described in the previous sections, it is important to choose them properly. The selection is based on two major steps:

- Selection of type
- Selection of size

SELECTION OF TYPE

Although it is not possible to list them in order of importance, here below are listed some of the main criteria for a proper selection of the of the trap type.
Air venting: Air can be present in steam at any time and especially on start-up. Air must be vented for efficient heat transfer and to prevent system binding.

CO2 venting: Venting of CO2 at steam temperature will prevent the formation of carbonic acid.

Resistance to water hammer: All steam systems tend to experience some level of vibration, shock, or water hammer. Not all traps, however, are equally vulnerable to damage from these causes. Thermodynamic traps and bimetallic thermostatic traps are very rugged. The capsule in thermostatic traps and the closed float are fragile and damage-prone.

Discharging capacity: undersizing a trap will cause flooding in the pipelines, reducing the heat transfer surface and the system efficiency also increasing the risk of freezing and water hammer. Oversizing traps wear out more quickly and have a shorter service life, further in the event of a trap failure an oversized trap will lose more steam.

Sensitivity to back pressure: Traps discharging into closed condensate return systems will experience varying amounts of back pressure depending on the return system's design and the number and condition of other traps discharging into it. Bimetallic traps perform well as they experience increasing back pressures. Thermodynamic traps tend to decline in efficiency as back pressure exceeds 80% of the inlet pressure.

Reaction to load changes: Not all trap types accommodate themselves quickly to the changing condensate loads typical of process applications. Mechanical and thermodynamic traps are very responsive, but thermostatic traps must first cool slightly before they can open wider to pass a greater amount of condensate.
Corrosion resistance: Working trap parts should be corrosion-resistant in order to combat the damaging effects of acid or oxygen-laden condensate.

Resistance to freezing: Float traps are not popular for outdoor use in cold climates because they require an internal water reservoir which makes them especially vulnerable to freezing. Bimetallic thermostatic and thermodynamic traps are free of this problem.

Dirt sensitivity: Dirt is an ever-present concern with traps. All steam traps can be put out of commission by pipeline scale, pipe joint sealants, solids that may carry from the boiler, oxide build-up or similar forms of contamination. Typically, dirt is caught between a trap's valve and seat. This prevents tight shut-off, allows steam leakage and very quickly causes permanent erosion damage to these sealing faces. Some thermostatic, thermodynamic and bucket traps will have their smaller passage or vent holes closed by oxide build-up. Engineers should carefully consider the relative susceptibility of various trap types to contamination by dirt before selecting a trap for their plant.

Installation versatility: some steam trap models, can be installed successfully in either a horizontal or vertical line, simplifying storekeeping and installation problems at the plant. On the other hand, some traps do not easily lend themselves to this flexibility of use, thus often creating the need for specific models for installation into either horizontal or vertical lines.

SELECTION OF SIZE

There are three parameters to consider for a correct sizing:

- Differential pressure
- Condensate load
- Safety factor or experience factor to use

DIFFERENTIAL PRESSURE

The trap must be able to open against the differential pressure, which is essentially the difference between upstream and downstream pressure. When a trap discharges to atmosphere the differential pressure is the same of the steam line. Nevertheless, in many installations the piping from the outlet of the trap is connected into a common piping return system. In such installations a back pressure may be generated by flash steam which the trap must operate against. Installing a pressure gauge after the trap, would be the best way to know the value of the back pressure, which otherwise should be calculated by formulas.

CONDENSATE LOAD

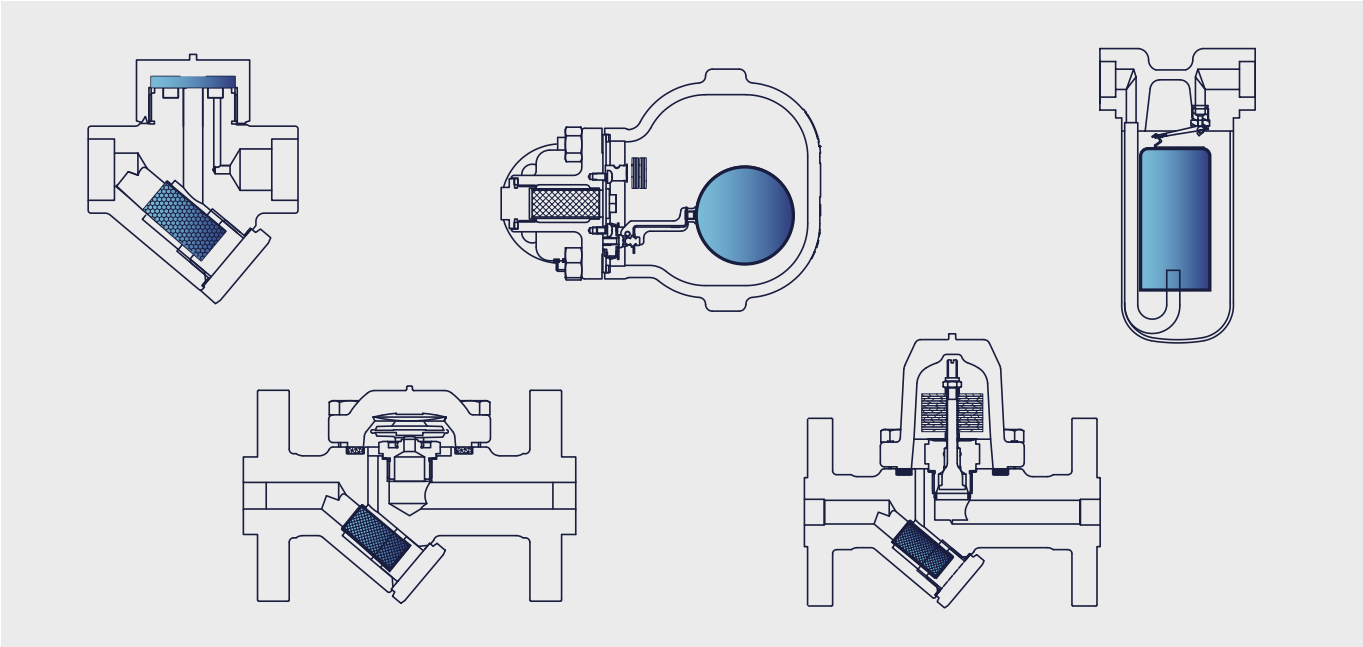
This is the second parameter to be introduced into the capacity tables. Various formulas are used to calculate condensate loads depending on the nature of the application. Some are technically more accurate than others because they employ fewer assumptions about the operating conditions but, in general, most provide acceptable approximations.

SAFETY FACTOR

Once installed on field, the steam trap might not be able to handle the condensate loads given in the capacity tables for several reasons such as:

- type of discharge;
- presence of large quantities of air;
- the way in which the condensate reaches the traps;
- influence of other traps discharging into the same return line.

Additionally there might be incorrect assumptions in the condensate load calculation. Therefore , the size of the trap is selected entering the capacity tables with the differential pressure and with the condensate load, multiplied by the safety factor. The safety load factor is a number that must be always taken into consideration. It is given by the specifications according to particular type of applications or can be based on the judgment of an individual with experience in steam trapping.



STEAM TRAP SELECTION ACCORDING TO APPLICATIONS

The below table provides recommendations for traps likely to be most effective in different applications. For more specific information please contact CDB Engineering.

APPLICATIONS		TRAP CHOICE
STEAM MAINS		TD - BP
TRACING LINES		TD - BM
TANKS	Storage tanks Fuel-Oil tanks Asphalt tanks Dye vats Evaporators Dye vats Suction heaters	BM - BP
HEATHER EQUIPMENTS	Unit heaters Greenhouse coils Drying rooms Fin coils Sugar dryers	FT - IB
HEAT EXCHANGERS	Water heaters Fuel oil preheaters Plating tanks	FT - IB
PANS	Jacketed pans Brew kettles Tilting kettles Submerged coils	FT - IB
DRYING CYLINDERS	Paper dryers Rotary dryers Pulp dryers	FT - IB
PRESSES	Plywood presses Molding presses Tire mold presses Vulcanzing presses Milk dryers	TD - BP
OVENS	Dressing sterilizers Pressure cookers Autoclaves Drum dryers	FT - BP
IRONS	Manual Irons Press Irons	IB - TD
TURBINES		TD - IB
MARINE APPLICATIONS		TD - BM

TD = Thermodynamic BP = Balanced pressure thermostatic BM = Bimetallic thermostatic IB = Inverted bucket FT = Ball float with thermostatic air vent

COMPARISON OF STEAM TRAP TYPES

The below table provides pros and cons of different type of traps, based on CDB's design.
For more specific information please contact CDB Engineering.

TRAP TYPE	ADVANTAGES	DISADVANTAGES
THERMODYNAMIC	Simple construction Small size and light weight Installation in any position Suitable for high pressure Reduced steam losses Excellent air venting Resists to water hammer Resists to corrosion Resists to freezing Easy to clean the filter Good for installation at superheated steam Good response to load fluctuation Performance is easily checked in field	Not suitable for high capacity Poor back pressure tolerance Poor scale proof
THERMOSTATIC BALANCED PRESSURE	Simple construction Small size and light weight Installation in any position Resists to corrosion Resists to freezing Negligible steam losses Excellent air venting Fair back pressure tolerance	Not suitable for high pressure Not suitable for high capacity Poor water hammer proof Limit. capability for install. at superheated steam Delayed response to load fluctuation
THERMOSTATIC BI-METALLIC	Rugged Small size and light weight Installation in any position Suitable for high pressure Reduced steam losses Excellent air venting Resists to water hammer Resists to corrosion Resists to freezing Excellent back pressure tolerance Very good for installation at superheated steam	Not suitable for high capacity Delayed response to load fluctuation Poor scale proof
MECHANICAL FLOAT AND THERMOSTATIC	Simple construction Reduced steam losses Excellent back pressure tolerance Immediate response to load fluctuation	Installation only in a single position Relatively large and heavy Not suitable for high pressure Poor water hammer proof Poor air venting Does not withstand freezing
MECHANICAL INVERTED BUCKET	Simple construction Rugged Suitable for high pressure Negligible steam losses Resists to water hammer Excellent back pressure tolerance Immediate response to load fluctuation Excellent scale proof	Installation only in a single position Not suitable for high capacity Moderate air venting Not suitable for installation at superheated steam

STEAM TRAP MAINTENANCE SAVES YOU MONEY

By the nature of their location alone, steam traps tend to get overlooked, and forgotten. Many plants do not have a steam trap repair and maintenance program, and the great majority of plants, do not know how many traps they have, or where they are located.

The lack of periodic trap maintenance in steam systems will certainly lead to increasing steam losses resulting in higher energy consumption and considerable financial losses. The larger the plant, the larger the magnitude of the problem.

TESTING STEAM TRAP OPERATION

We recommend three simple methods to test the operation of steam traps:

- With an electronic ultrasound assembly.
- With an engineer's stethoscope.
- By observing the discharge of the trap. (Requires isolation valves)
- Installation of automated steam trap performance monitoring system.

The electronic ultrasound assembly is the preferred choice. The operating principle is quite simple.
When gas under pressure discharges through a small orifice, an ultrasonic sound component is generated. The frequency and intensity of the ultrasonic sound produced, depends upon the orifice profile, and the gas pressure. These units work well with all types of traps, however, the operator must know what to listen for, depending upon the type of trap he is testing, and its discharge characteristics.

The electronic ultrasound detector makes regular test and inspection of trap operation, a real breeze. No plant engineer should be without such an instrument.

The engineers stethoscope is an old technique that works well with bucket and float traps, but can be
difficult to determine other types trap cycling, where minimal mechanical movements or actions are involved.

This method cannot detect the ultrasonic sound component of condensate discharging thru the orifice. It detects the audible sound of the mechanical parts in motion as the trap cycles.

The trap discharge method requires at least two isolation valves and a discharge pipe. Here the trap is isolated from the condensate return line by one valve, the other valve opens the path to the discharge pipe, where steam and condensate can be observed to discharge when the trap cycles.

COMPACT PISTON MANIFOLDS & TRAP STATIONS

Amongst very few others in the world, CDB ENGINEERING supplies forged Trap Stations & forged Piston Manifolds, 100% made in Italy.

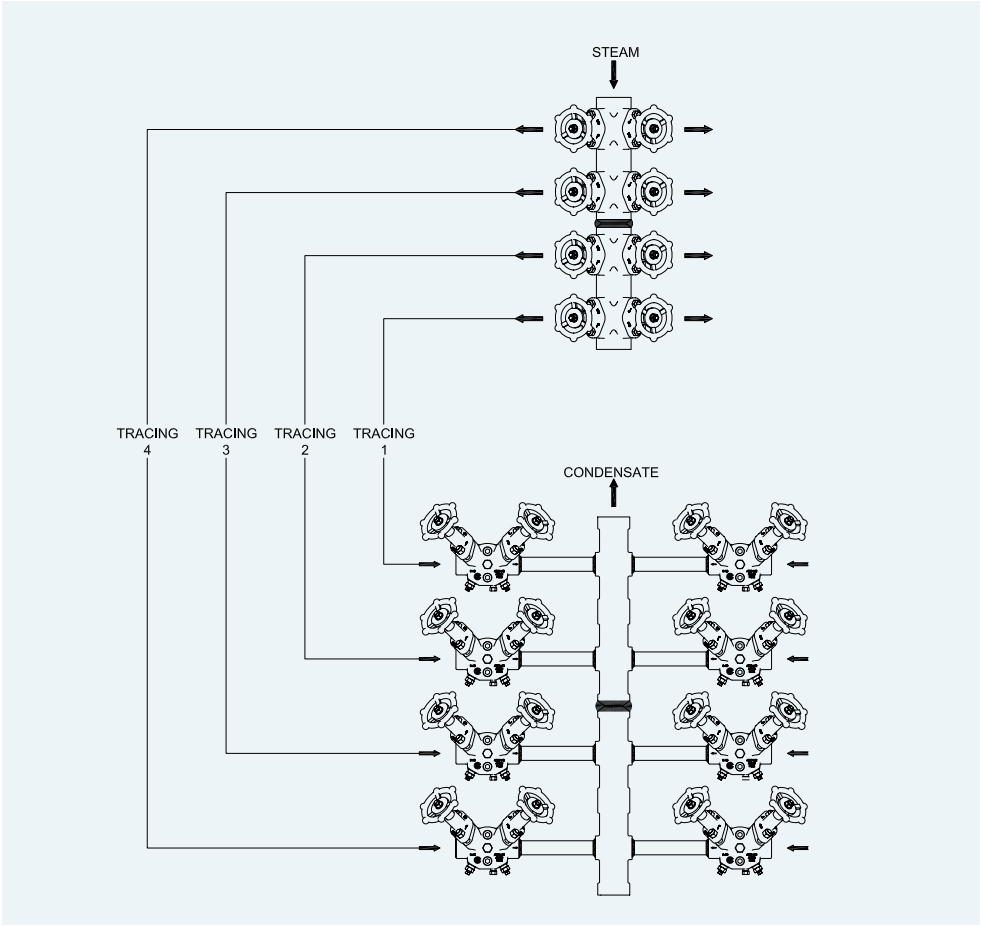
Steam is widely used in both chemical and petrochemical plants. One of its most frequent utilization is the tracing of distribution lines. Steam tracing systems protect industrial plants from the freezing or cooling of the flowing product. A steam tracing system also ensures the right viscosity of the flowing medium at such a level that it protects against any unwanted rise of the flow resistance.

Steam tracing construction is based on assembling many steam tracer sections at the same time. For this purpose piston manifolds are installed on the steam pipelines to ensure the correct steam distribution, as well as, steam traps are installed on the manifold for condensate collection. This kind of solution ensures an easy access to every drainage point as well as simplicity of the control and service of the steam system.

Traditionally, manifolds are made by pipes, whose ends are closed by welding caps and by a large number of connections, whether they are used for steam distribution or condensate collection.

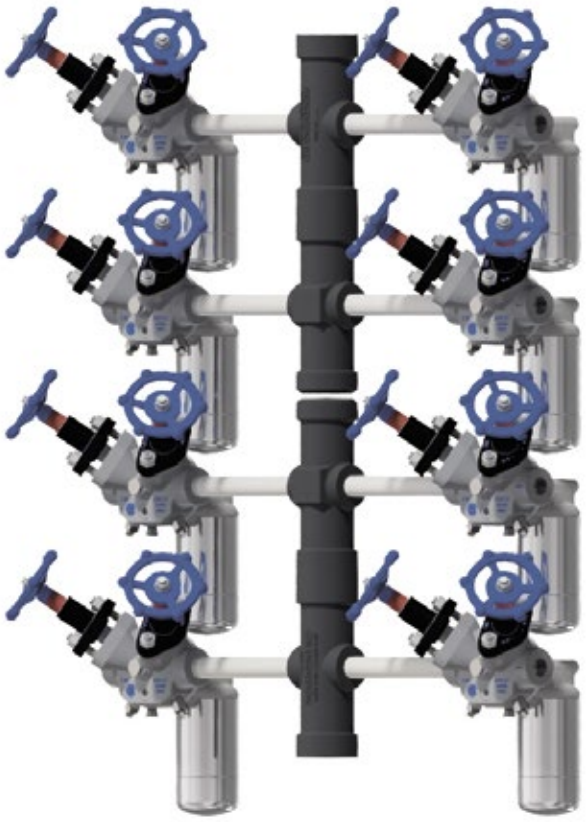
The fabrication of these manifolds implies:

- the use of many welds, often to be provided in hazardous areas;
- very large dimension;
- need of supports, specifically suited for purpose;
- need of continuous engineering due to the location into the plants, and the utilization for steam distribution or collection of condensate.

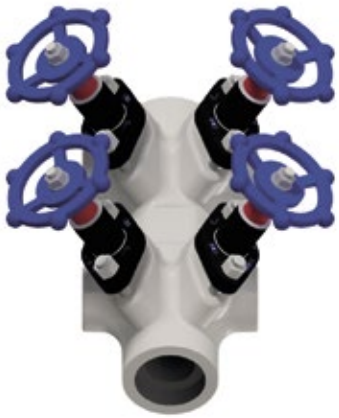


COMPACT PISTON MANIFOLDS & TRAP STATIONS

Taking into consideration all the above, CDB Engineering forged manifold minimizes the required number of welds, has extremely reduced dimensions and does not need special support but can be fixed onto any existing structure.

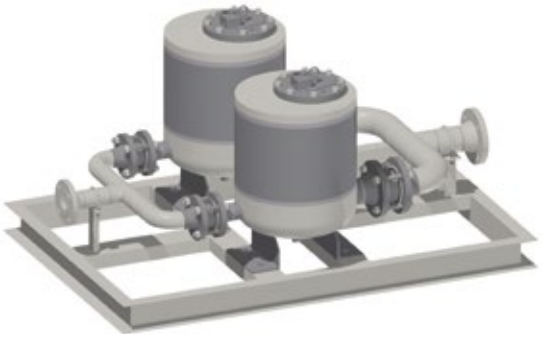


In order to connect many types of steam traps to the line with the possibility to have inlet and outlet piston valves, test, vent and by pass valve installed on a single element, CDB Engineering is also able to offer its own Trap Station.
CDB Trap Stations are available in left or right flow direction and can be installed in horizontal or vertical position.
Both forged Trap Stations and forged Piston Manifolds are available in any required material and are customized to suit the specific client's piping requirements.



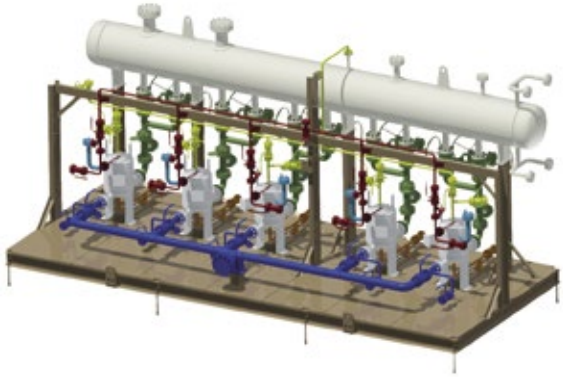
CONDENSATE LIFT STATIONS

Large plants may have many separate pieces of process equipment and thousands of traps discharging condensate into the condensate return lines. On efficiently run steam systems, this condensate is returned back to the boiler for reuse. In some cases, the steam pressure of the system may be enough to push the condensate through the steam traps and condensate return lines, back to the condensate holding tank in the boiler room. In most practical situations, however, one or more condensate return pumps are required to assist in overcoming gravity, pressure drops from long piping runs, and back pressures in return lines.



CDB's Condensate Lift Pumps are non-motorized pumps which return condensate back to the boiler room using steam pressure as the motive force.
Condensate lift pump supplied as stand-alone units will include a pump tank, internal operating mechanism and a set of inlet and outlet check valves.

Turn key Condensate lift packaged systems are supplied fully customized with the number of pumps required to meet the required condensate load. In order to collect condensate from the recovery lines and send it to the pumps, a vented receiver tank is mounted on a common base along with all the necessary valves and ancillaries such as y strainer, sight glasses (fully manufactured by CDB).



Based on the design pressure reducing valves, safety valve, level gauges, pressure gauges and any other component or instrument to comply with customer requirements may be included in the package.

THERMODYNAMIC STEAM TRAP

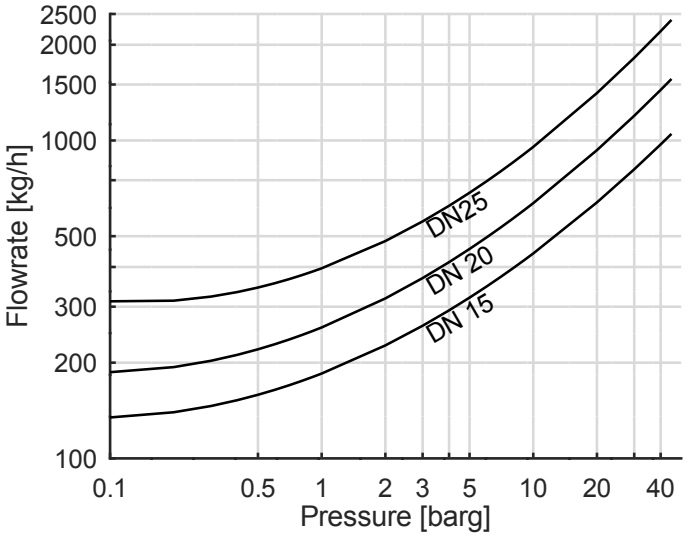
TD45

LIMITING CONDITION	
RATING	ANSI 600
PMA	100 bar
TMA	400°C
MAX DIFFERENTIAL PRESSURE	45 bar

SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1"	Screwed	ASME B1.20.1(NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

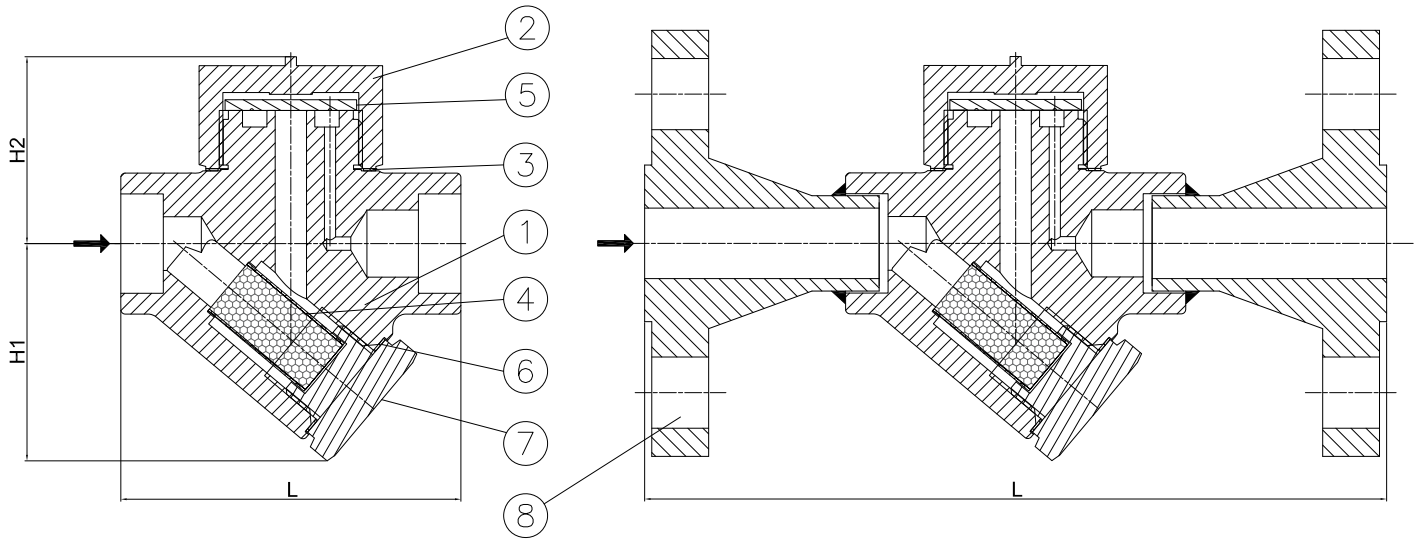
- Discharges air and not condensable gases
- Integral seat with hardened seating surfaces
- Operates with superheated steam
- Simple and compact design
- Intermittent discharge



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A105N/A350 LF2 CL.1	
2	COVER	AISI 416	
3	GASKET	SS 304	x
4	DISC	AISI 420B	x
5	SCREEN	SS 316	x
6	PLUG GASKET	SS 304	x
7	PLUG	ASTM A105N	
8	FLANGE	ASTM A105N	



NPS	H1*	H2*	SW		RF(150#)		RF(300#)		RF(600#)	
			L*	kg	L*	kg	L*	kg	L*	kg
½"	49	41	76	1	156	1,8	166	2,6	179	2,6
¾"	52	46	78	1	162	2,4	171	4	184	4
1"	55	53	92	2	182	3,8	195	4,4	208	4,4

*Dimensions are in millimeters

INSTALLATION

The trap will operate in any position, but the preferred installation is in the horizontal plane with the cap on the top. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks.

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Periodic cleaning of the disc and seat will facilitate trouble free performance. Only the disc and seat are subject to wear.
A worn disc can be replaced and slight seat can be corrected by resurfacing an a lap plate.

THERMODYNAMIC STEAM TRAP

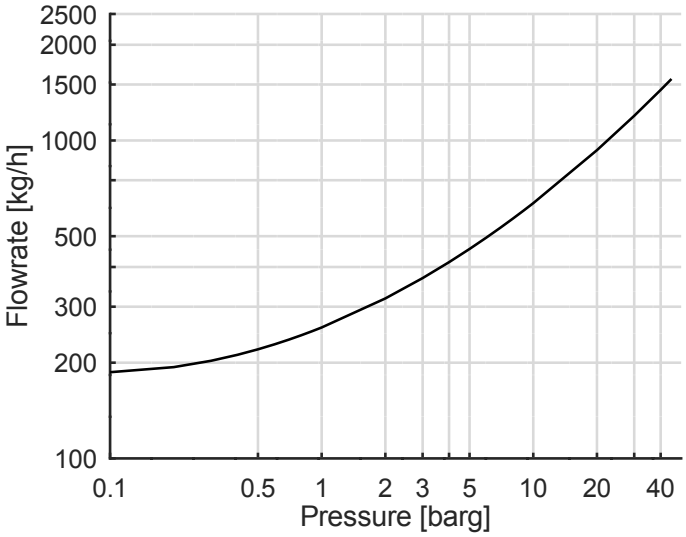
TD50

LIMITING CONDITION	
RATING	ANSI 600
PMA	100 bar
TMA	400°C
MAX DIFFERENTIAL PRESSURE	50 bar

SIZES (NPS)	CONNECTIONS	
⅜"– ½" – ¾" – 1"	Screwed	ASME B1.20.1 (NPT) – EN10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

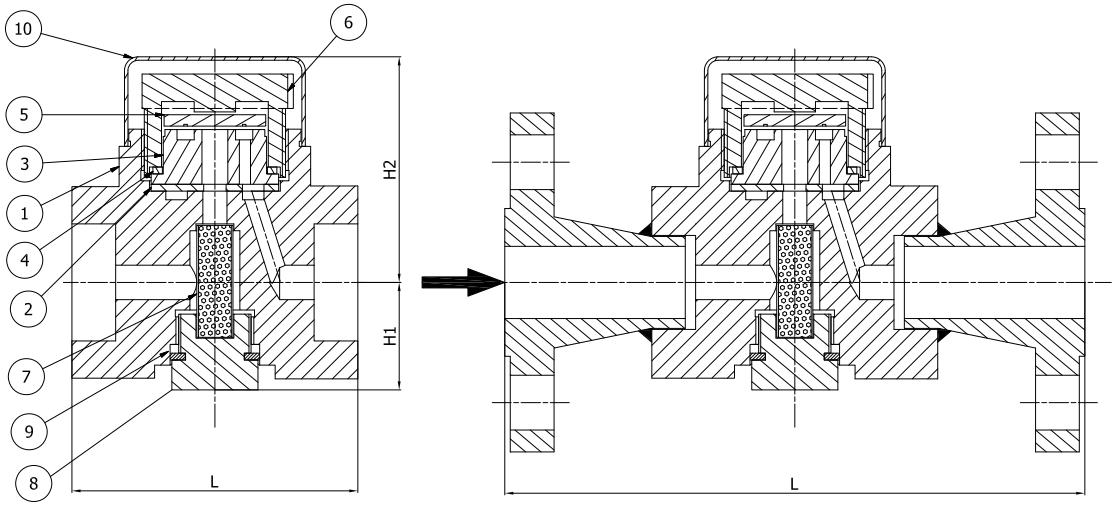
- Discharges air and not condensable gases
- Interchangeable seat with hardened seating surfaces
- Operates with superheated steam
- Simple and compact design
- Intermittent discharge



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A182 F316L	
2	BODY GASKET	ARMOURED GRAPHITE	x
3	SEAT	AISI 420	x
4	SEAT GASKET	ARMOURED GRAPHITE	x
5	DISC	AISI 420	x
6	COVER	ASTM A182 F316L	
7	SCREEN	SS 304	
8	PLUG	ASTM A182 F316L	x
9	PLUG GASKET	SS 304	x
10	INSULATION CAP (OPTION)	SS304	



NPS	H1*	H2*	SW		RF(150#)		RF(300#)		RF(600#)	
			L*	kg	L*	kg	L*	kg	L*	kg
⅜"	28	63	83	2	163	3	173	4	186	4
½"	28	63	83	2	163	3	173	4	186	4
¾"	28	63	83	2	167	4	176	5	189	5
1"	28	63	83	2	173	5	186	6	199	6

*Dimensions are in millimeters

INSTALLATION

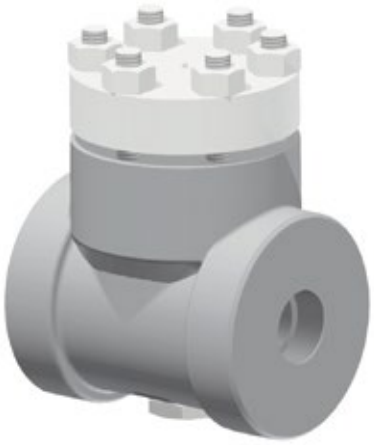
The trap will operate in any position, but the preferred installation is in the horizontal plane with the cap on the top. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks.

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it. Allow the trap to cool before dismantling.
Periodic cleaning of the disc and seat will facilitate trouble free performance. Only the disc and seat are subject to wear. A worn disc can be replaced and slight seat can be corrected by resurfacing an a lap plate.

THERMODYNAMIC STEAM TRAP

TD90

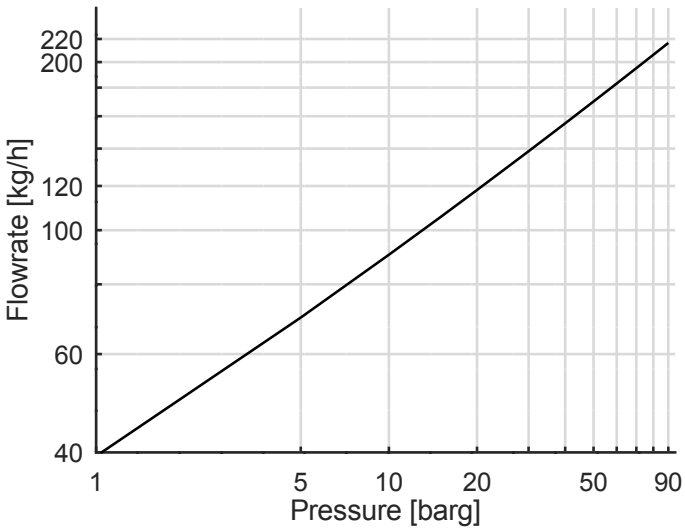


LIMITING CONDITION	
RATING	ANSI 900
PMA	150 bar
TMA	400°C
MAX DIFFERENTIAL PRESSURE	90 bar

SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1" – 1.½" - 2"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN1092

MAIN FEATURES

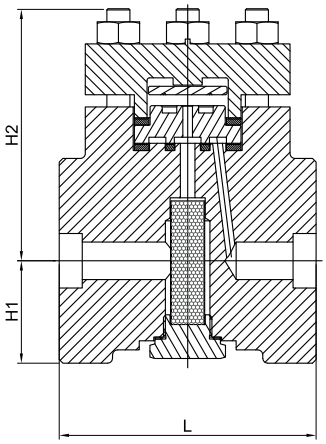
- Discharges air and not condensable gases
- Interchangeable seat with hardened seating surfaces
- Operates with superheated steam
- Simple and compact design
- Intermittent discharge

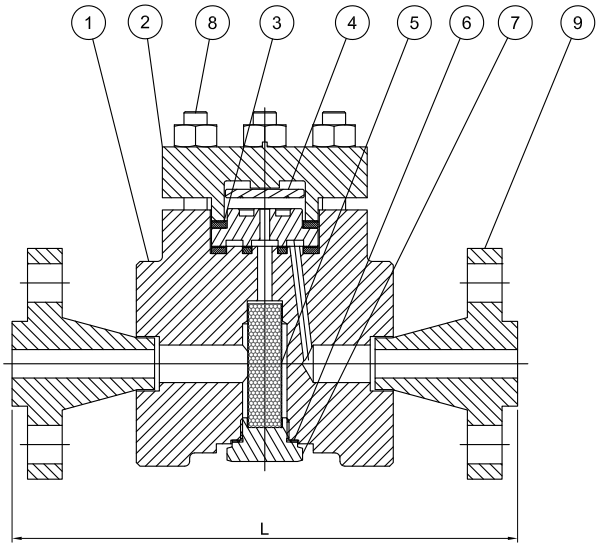


ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A105N	
2	COVER	ASTM A105N	
3	GASKET	ARMOURED GRAPHITE	x
4	DISC & SEAT	AISI 410	x
5	SCREEN	SS 316	x
6	PLUG GASKET	SS316	x
7	PLUG	ASTM A105N	x
8	BOLTS AND NUTS	ASTM A193 B7 / A194 2H	
9	FLANGES	ASTM A105N	





NPS	H1*	H2*	SW		RF(150#)		RF(300#)		RF(600#)	
			L*	kg	L*	kg	L*	kg	L*	kg
½"	42	104	106	6	186	7	196	8	209	8
¾"	42	104	106	6	190	7	199	9	212	9
1"	42	104	106	6	196	8	209	10	222	10
1.½ "	42	104	106	6	209	9	222	12	237	12
2"	42	104	106	5	205	11	218	12	237	12

*Dimensions are in millimeters

INSTALLATION

The trap will operate in any position, but the preferred installation is in the horizontal plane with the cap on the top. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks.

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it. Allow the trap to cool before dismantling.
Periodic cleaning of the disc and seat will facilitate trouble free performance. Only the disc and seat are subject to wear. A worn disc can be replaced and slight seat can be corrected by resurfacing an a lap plate.

THERMODYNAMIC STEAM TRAP

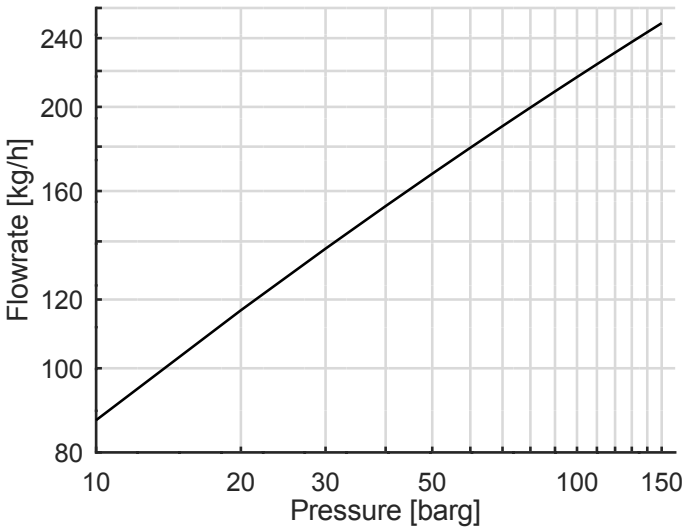
TD150

OPERATING CONDITION	LIMITING CONDITIONS
RATING	ANSI 1500
PMA	250 bar
TMA	500°C
MAX OPERATING BACK PRESSURE	80%

SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1" – 1.½" – 2"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

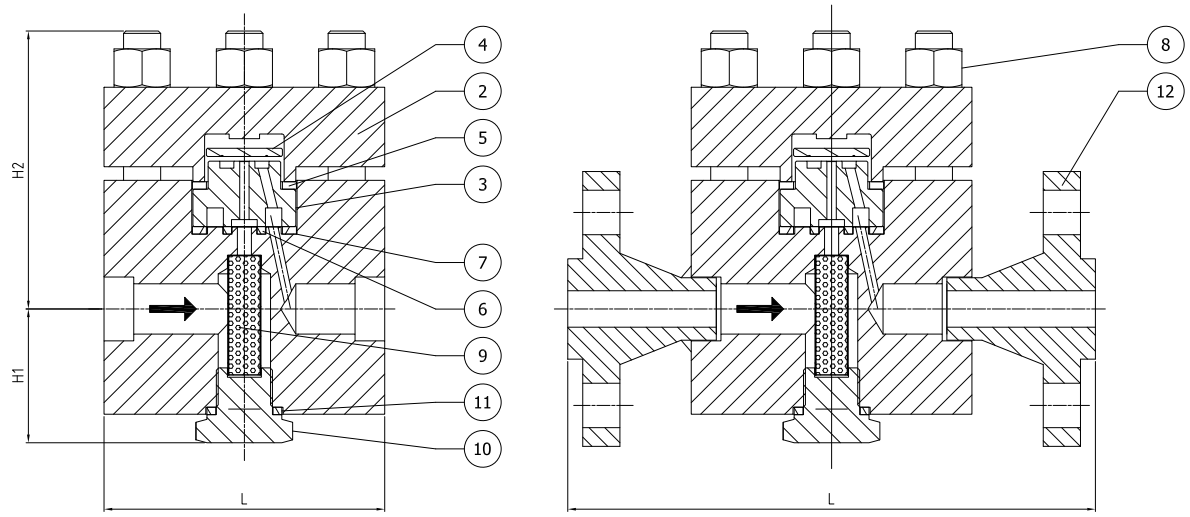
- Discharges air and not condensable gases
- Interchangeable seat with hardened seating surfaces
- Operates with superheated steam
- Simple and compact design
- Intermittent discharge



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A182 F11 CL.2	
2	COVER	ASTM A182 F11 CL.2	
3	SEAT	AISI 410	x
4	DISC	AISI 410	x
5	SEAT GASKET	ARMOURED GRAPHITE	x
6-7	BODY GASKETS	ARMOURED GRAPHITE	x
8	BOLTS & NUTS	ASTM A193 B16/A194 GR.7	
9	SCREEN	SS 316	x
10	PLUG	ASTM A182 F11 CL.2	
11	PLUG GASKET	AISI 316	
12	FLANGES	ASTM A182 F11 CL.2	



NPS	H1*	H2*	SW		RF(1500#)	
			L*	kg	L*	kg
½"	56	122	120	16	238	20
¾"	56	122	120	16	251	21
1"	56	122	120	16	258	24
1.½"	56	122	120	15	277	27
2"	56	142	120	17	308	40

*Dimensions are in millimeters

INSTALLATION

The trap will operate in any position, but the preferred installation is in the horizontal plane with the cap on the top. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks.

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it. Allow the trap to cool before dismantling.
Periodic cleaning of the disc and seat will facilitate trouble free performance. Only the disc and seat are subject to wear. A worn disc can be replaced and slight seat can be corrected by resurfacing an a lap plate.

THERMODYNAMIC STEAM TRAP

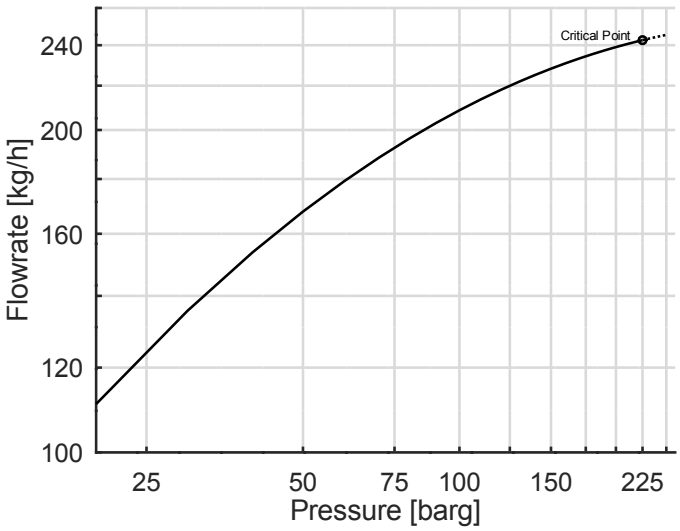
TD250

OPERATING CONDITION	LIMITING CONDITIONS
RATING	ANSI 2500
PMA	250 bar
TMA	550°C
MAX ALLOWABLE DIFFERENTIAL PRESSURE	250 bar

SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1" – 1.½" – 2"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

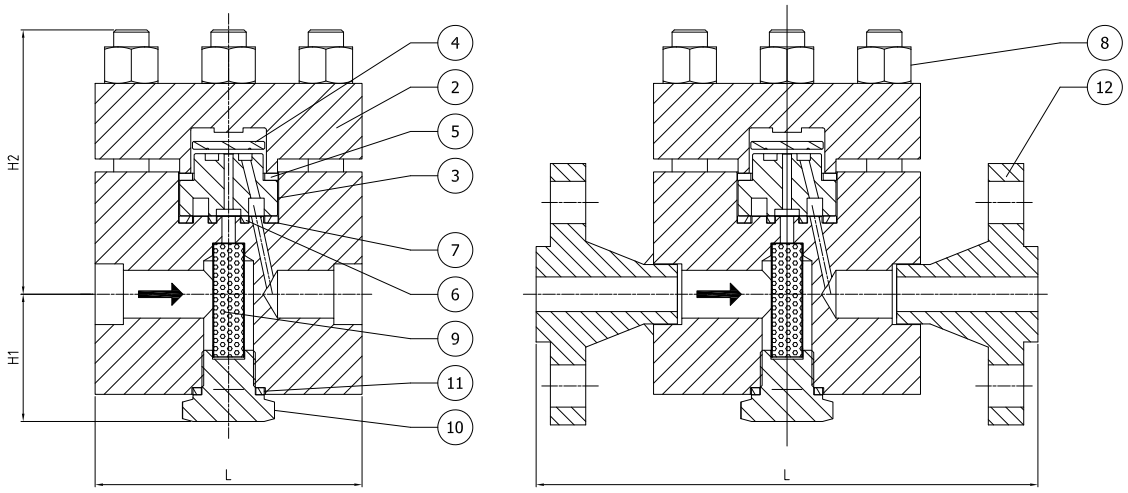
- Discharges air and not condensable gases
- Interchangeable seat with hardened seating surfaces
- Operates with superheated steam
- Simple and compact design
- Intermittent discharge



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A182 F11 CL.2	
2	COVER	ASTM A182 F11 CL.2	
3	SEAT	AISI 410	x
4	DISC	AISI 410	x
5	SEAT GASKET	ARMOURED GRAPHITE	x
6-7	BODY GASKETS	ARMOURED GRAPHITE	x
8	BOLTS & NUTS	ASTM A193 B16/A194 GR.7	
9	SCREEN	SS 316	x
10	PLUG	ASTM A182 F11 CL.2	
11	PLUG GASKET	AISI 304	
12	FLANGES	ASTM A182 F11 CL.2	



NPS	H1*	H2*	SW		RF(1500#)	
			L*	kg	L*	kg
½"	56	137	120	17	238	21
¾"	56	137	120	17	251	22
1"	56	137	120	17	258	25
1.½"	56	137	120	17	277	29
2"	56	157	120	19	308	42

*Dimensions are in millimeters

INSTALLATION

The trap will operate in any position, but the preferred installation is in the horizontal plane with the cap on the top. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks.

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it. Allow the trap to cool before dismantling.
Periodic cleaning of the disc and seat will facilitate trouble free performance. Only the disc and seat are subject to wear. A worn disc can be replaced and slight seat can be corrected by resurfacing an a lap plate.

THERMOSTATIC STEAM TRAP
BALANCE PRESSURE

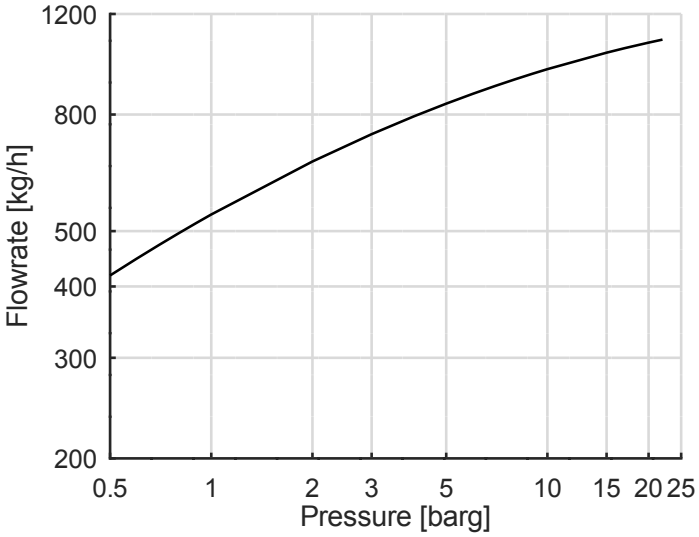
BP322

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	50 bar
TMA	400°C
MAX. DIFFERENTIAL PRESSURE	22 bar

SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 - EN 1092

MAIN FEATURES

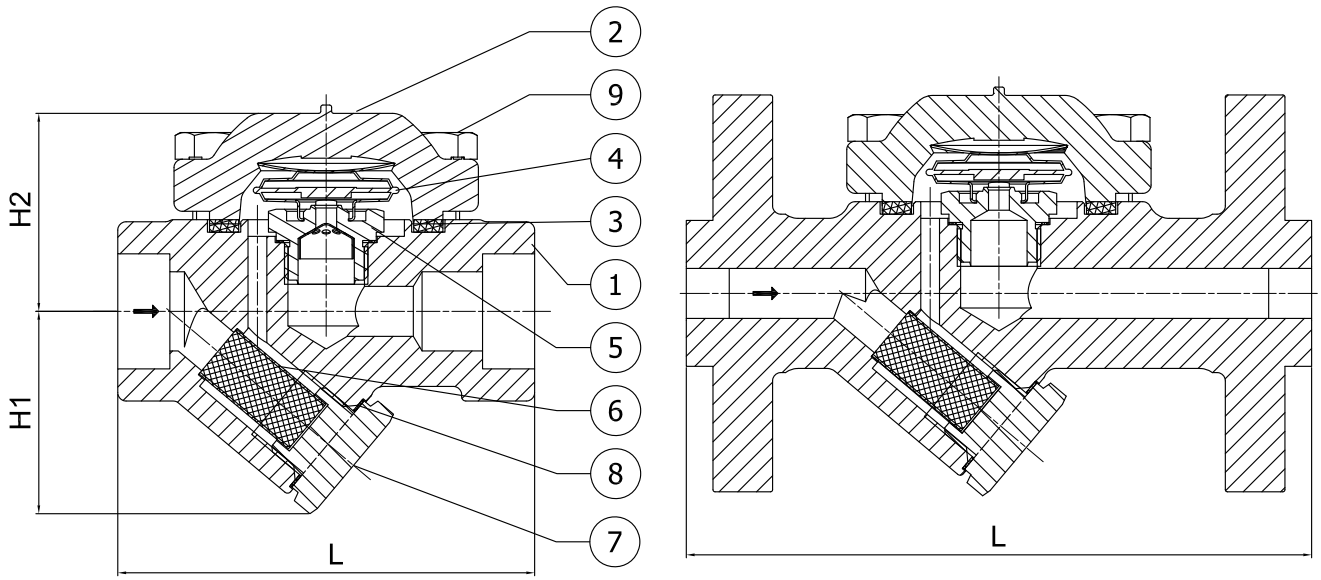
- Excellent air venting
- Can be installed in any position
- Maximum thermal efficiency under varying conditions
- Sub cooling 10°C
- Simple and reliable construction



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A105N	ASTM A350 LF2	
2	COVER	ASTM A105N	ASTM A350 LF2	
3	COVER GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
4	VALVE ASSEMBLY	STAINLESS STEEL	STAINLESS STEEL	x
5	VALVE GASKET	AISI 304	AISI 304	x
6	SCREEN	SS 316L	SS 316L	x
7	PLUG	ASTM A105N	ASTM A350 LF2	x
8	PLUG GASKET	AISI 304	AISI 304	x
9	BOTING	ASTM A193 B7	ASTM A320 L7	



NPS	H1*	H2*	SW		RF (150#)		RF (300#)		RF (600#)	
			L*	kg	L*	kg	L*	kg	L*	kg
½"	49	56	100	2	150	3	150	4	150	4
¾"	49	56	100	2	150	3	150	5	160	5
1"	49	56	100	2	160	4	160	5	160	6

*Dimensions are in millimeters

INSTALLATION

Prior to installation, clean the lines by blowing through at full steam pressure to remove dirt.
For steam trapping applications the trap should be fitted below the equipment to be drained and as close to the drain point as possible.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3,5,8 (gasket), 4 (valve assembly), 6 (screen) can be replaced bring the traps as new conditions

THERMOSTATIC STEAM TRAP
BALANCE PRESSURE

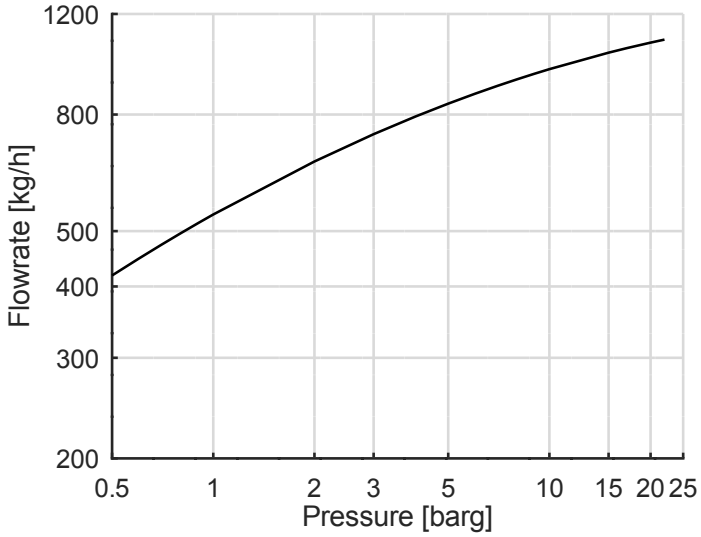
BPZ22

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	48 bar
TMA	500°C
MAX. DIFFERENTIAL PRESSURE	22 bar

SIZES (NPS)	CONNECTIONS	
⅜" - ½" – ¾"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11

MAIN FEATURES

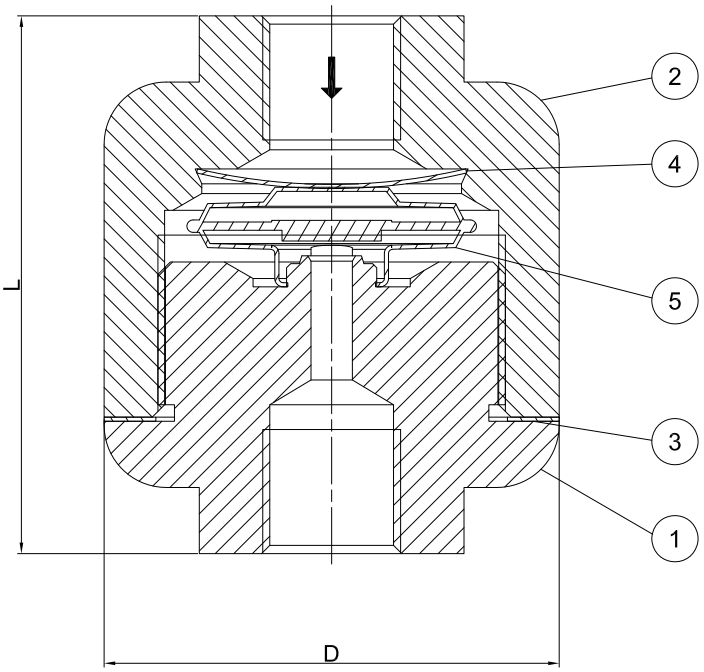
- Excellent air venting
- Can be installed in any position
- Maximum thermal efficiency under varying conditions
- Sub cooling 10°C - 20°C - 30°C
- Simple and reliable construction



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A182 F304/304L	ASTM A182 F316/316L	
2	COVER	ASTM A182 F304/304L	ASTM A182 F316/316L	
3	GASKET	FLAT RING SS 316	FLAT RING SS 316	x
4	SPRING	SS 301	SS 301	x
5	VALVE ASSMEBLY	STAINLESS STEEL	STAINLESS STEEL	x



NPS	L*	D*	Weight kg
⅜"	65	55	1
½"	65	55	1
¾"	65	55	1

*Dimensions are in millimeters

INSTALLATION

Prior to installation, clean the lines by blowing through at full steam pressure to remove dirt.
For steam trapping applications the trap should be fitted below the equipment to be drained and as close to the drain point as possible.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3,5,8 (gasket), 4 (valve assembly), 6 (screen) can be replaced bring the traps as new conditions

THERMOSTATIC STEAM TRAP BIMETALLIC

BM300 SERIES

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	50 bar
TMA	400°C
MAX. DIFFERENTIAL PRESSURE (BAR)	15 bar (BM315) – 25 bar (BM325) – 40 bar (BM340)

SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

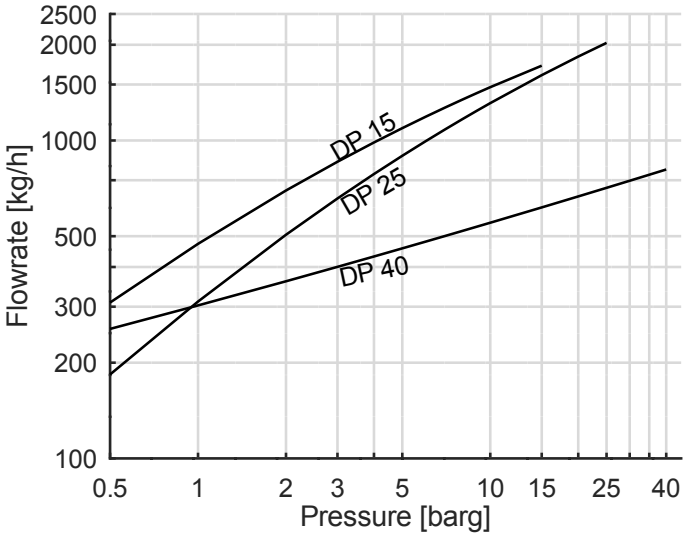
MAIN FEATURES

- Excellent air venting
- Can be installed in any position
- Maximum thermal efficiency under varying conditions
- Simple and reliable construction

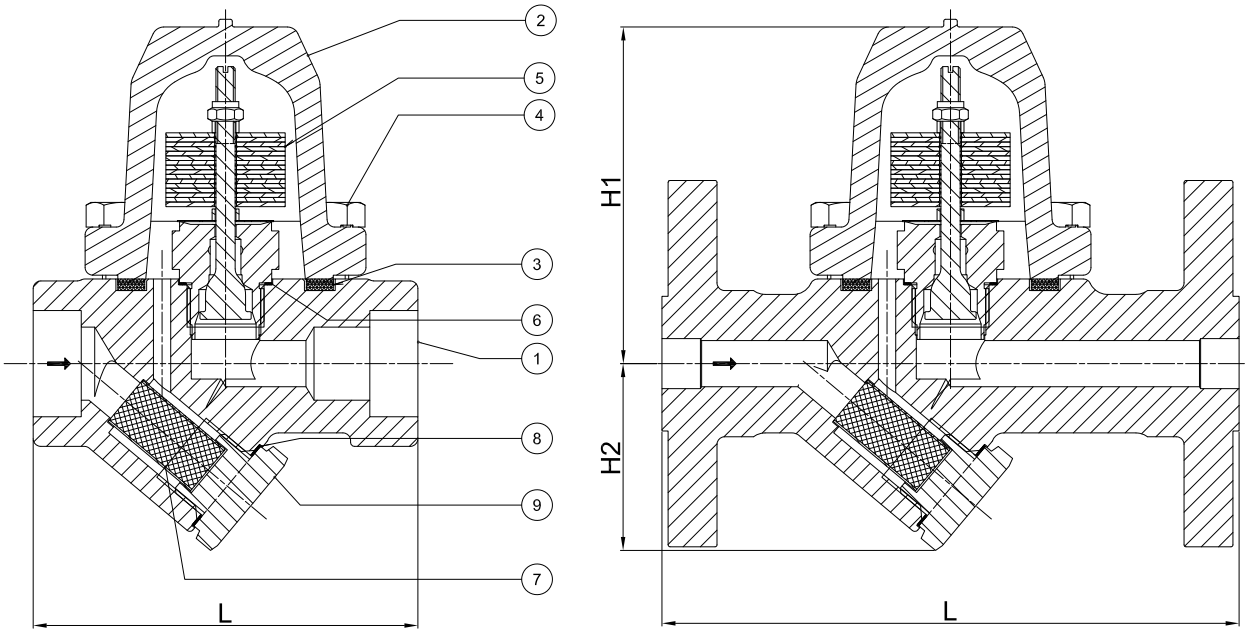
ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

Flowrate of sub-cooled condensate 30°C below saturation



POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A105N	ASTM A350 LF2	
2	COVER	ASTM A105N	ASTM A350 LF2	
3	BODY GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
4	BOLT	ASTM A193 B7	ASTM A320 L7	
5	VALVE ASSMEBLY	SS	SS	x
6	VALVE GASKET	FLAT RING SS 316	FLAT RING SS 316	x
7	SCREEN	SS 316L	SS 316L	x
8	PLUG GASKET	FLAT RING SS 316	FLAT RING SS 316	x
9	PLUG	ASTM A105N	ASTM A350 LF2	



NPS	H1*	H2*	SW		RF(150#)		RF(300#)		RF(600#)	
			L*	kg	L*	kg	L*	kg	L*	kg
½"	90	50	100	2	150	3	150	4	150	4
¾"	90	50	100	2	150	4	150	5	160	5
1"	90	50	100	2	160	4	160	5	160	6

*Dimensions are in millimeters

INSTALLATION

Prior to installation, clean the lines by blowing through at full steam pressure to remove dirt.
For steam trapping applications the trap should be fitted below the equipment to be drained and as close to the drain point as possible.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it. Allow the trap to cool before dismantling.
Item 3 4-5-6 (valve assembly and screen) can be replaced bring the traps as new conditions

THERMOSTATIC STEAM TRAP BIMETALLIC

BM600 SERIES

LIMITING CONDITIONS	
RATING	ANSI 600
PMO	50 bar
TMO	400°C
MAX. DIFFERENTIAL PRESSURE (BAR)	40 bar (BM640) – 60 bar (BM660)

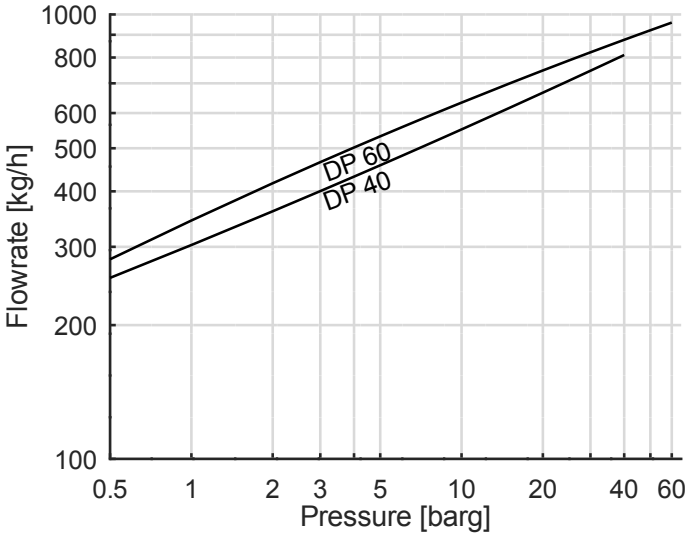
SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1" – 1.½" – 2"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

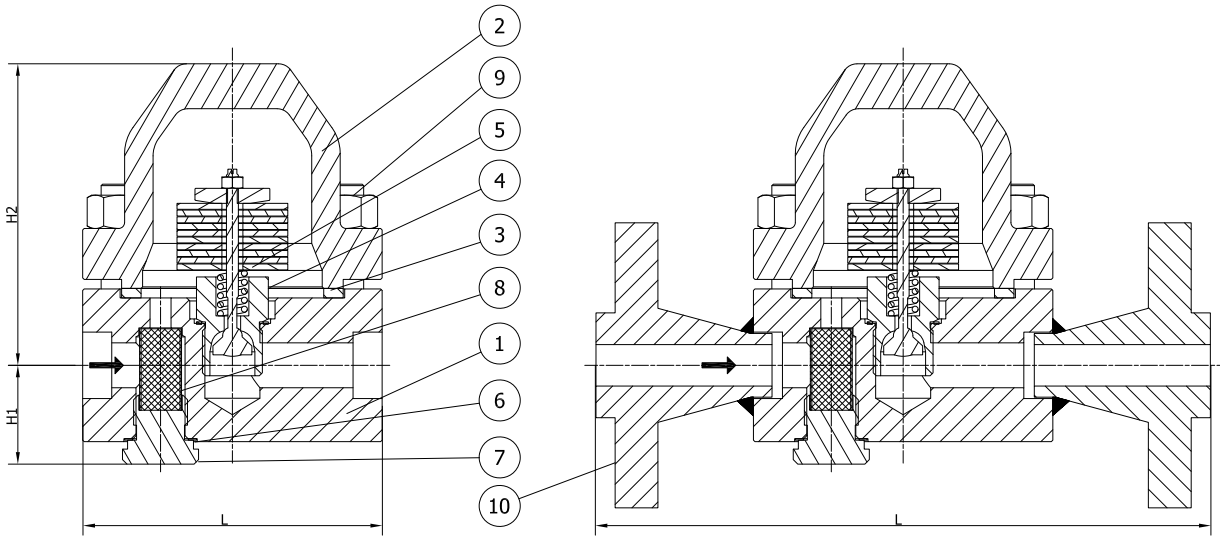
- Excellent air venting
- Can be installed in any position
- Maximum thermal efficiency under varying conditions
- Simple and reliable construction

ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection



POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A105N	ASTM A182 F22 CL.3	
2	COVER	ASTM A105N	ASTM A182 F22 CL.3	
3	BODY GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
4	VALVE GASKET	SS 316	SS 316	x
5	VALVE ASSEMBLY	SS	SS	x
6	PLUG GASKET	SS 316	SS 316	x
7	PLUG	ASTM A105N	ASTM A182 F22 CL.3	
8	SCREEN	SS 316	SS 316	x
9	BOLTING	ASTM A193 B7/A194 2H	ASTM A193 B16/A194 GR.7	
10	FLANGES	ASTM A105N	ASTM A182 F22 CL.3	



NPS	H1*	H2*			RF(150#)		RF(300#)		RF(600#)	
			L*	kg	L*	kg	L*	kg	L*	kg
½"	34	113	100	6	180	7	190	8	202	8
¾"	34	113	100	6	184	8	193	9	206	9
1"	34	113	100	6	196	8	203	10	216	10
1.½"	45	125	100	8	203	11	216	14	219	17
2"	45	125	100	8	206	13	220	15	225	20

*Dimensions are in millimeters

INSTALLATION

Prior to installation, clean the lines by blowing through at full steam pressure to remove dirt.
For steam trapping applications the trap should be fitted below the equipment to be drained and as close to the drain point as possible.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 5-7 (valve assembly and screen) can be replaced bring the traps as new conditions

THERMOSTATIC STEAM TRAP BIMETALLIC

BM900 SERIES

LIMITING CONDITIONS	
RATING	ANSI 900
PMA	150 bar
TMA	500°C
DIFFERENTIAL PRESSURE	80 bar (BM980) – 140 bar (BM9140)

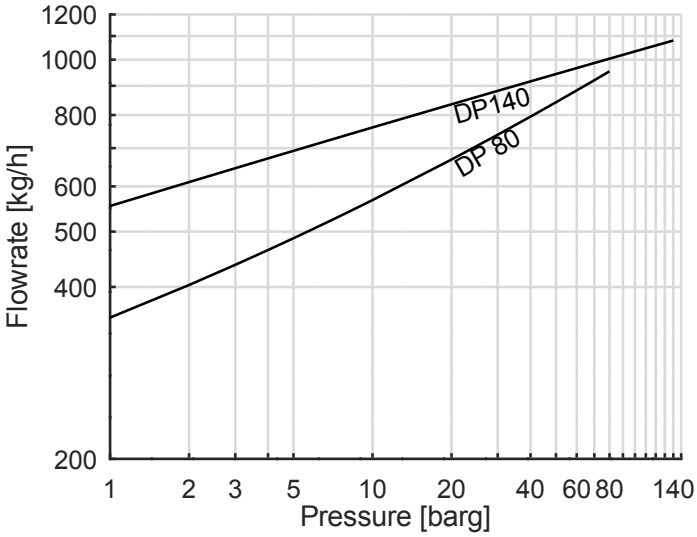
SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

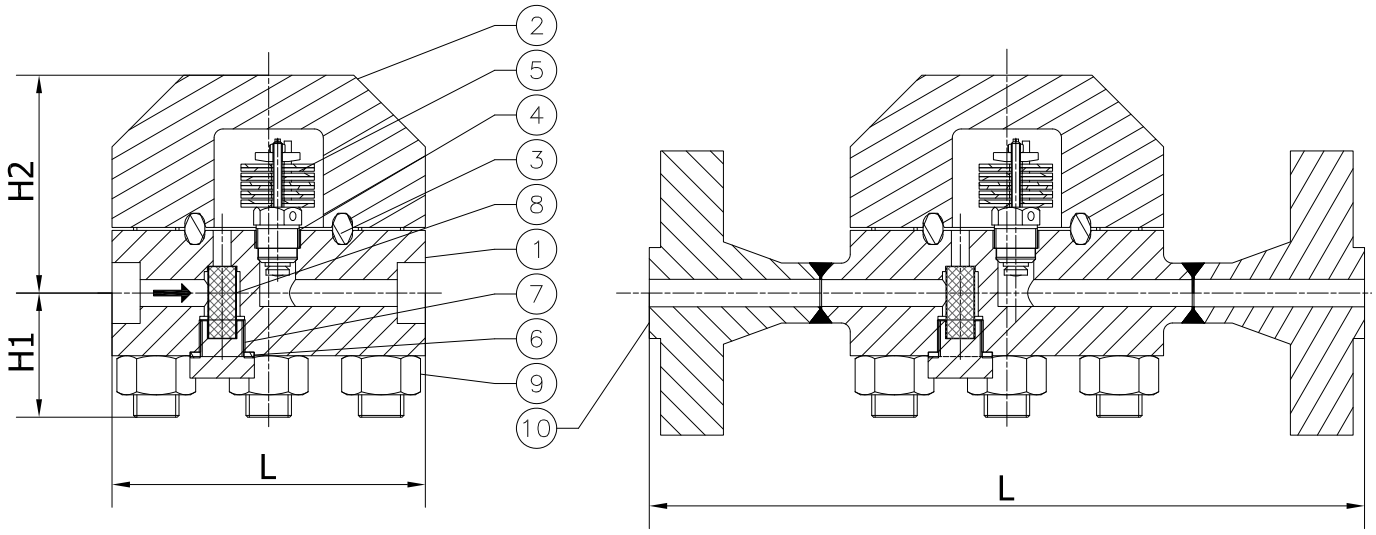
- Excellent air venting
- Can be installed in any position
- Maximum thermal efficiency under varying conditions
- Simple and reliable construction

ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection



POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A105N	ASTM A182 F11 CL.2	
2	COVER	ASTM A105N	ASTM A182 F11 CL.2	
3	BODY GASKET	OVAL RTJ – SS316	OVAL RTJ – SS316	x
4	VALVE GASKET	FLAT RING SS 316	FLAT RING SS 316	x
5	VALVE ASSEMBLY	SS	SS	x
6	PLUG GASKET	FLAT RING SS 316	FLAT RING SS 316	x
7	PLUG	ASTM A105N	ASTM A182 F11 CL.2	
8	SCREEN	SS 316	SS 316	x
9	BOLTING	ASTM A193 B7/A194 2H	ASTM A193 B16/A194 GR.7	
10	FLANGES	ASTM A105N	ASTM A182 F11 CL.2	



NPS	H1*	H2*	SW		RF(900#)	
			L*	kg	L*	kg
½"	65	110	150	25	265	29
¾"	65	110	150	25	285	30
1"	65	110	150	25	290	33

*Dimensions are in millimeters

INSTALLATION

Prior to installation, clean the lines by blowing through at full steam pressure to remove dirt.
For steam trapping applications the trap should be fitted below the equipment to be drained and as close to the drain point as possible.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3 4-5-6 (valve assembly and screen) can be replaced bring the traps as new conditions

THERMOSTATIC STEAM TRAP BIMETALLIC

BM1500 SERIES

LIMITING CONDITIONS	
RATING	ANSI 1500
PMA	250 bar
TMA	550°C
DIFFERENTIAL PRESSURE	140 bar (BM15140) – 250 bar (BM15250)

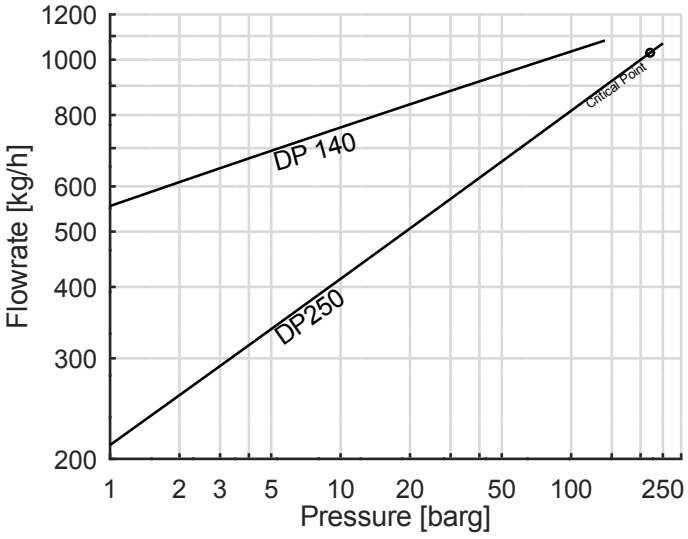
SIZES (NPS)	CONNECTIONS	
½"– ¾" – 1" – 1.½"-2"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Butt Weld	ASME B16.25
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

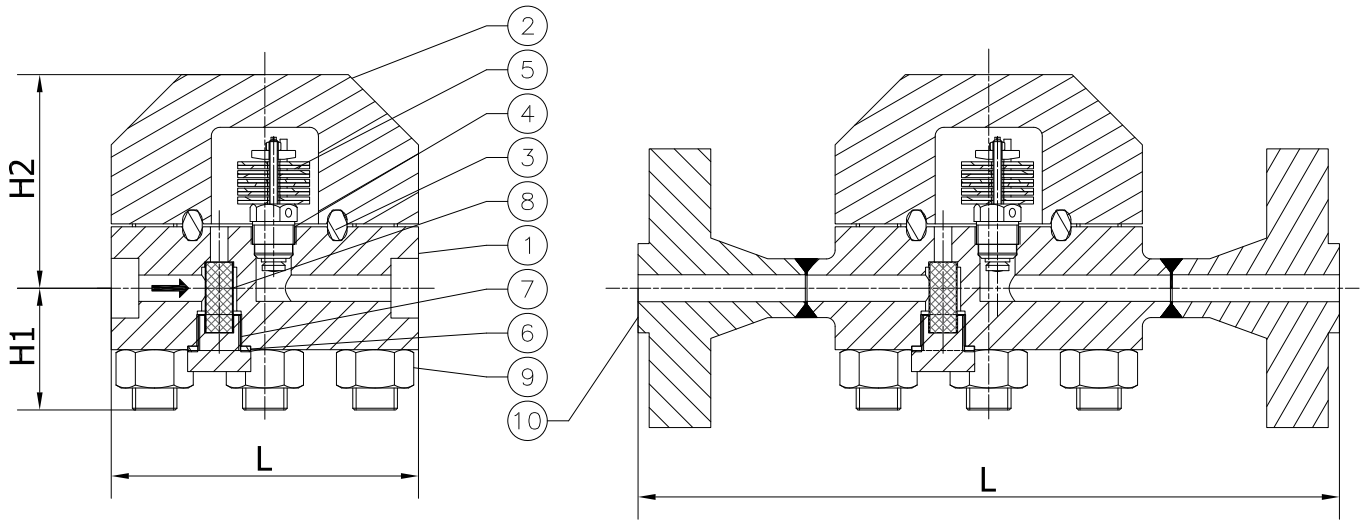
- Excellent air venting
- Can be installed in any position
- Maximum thermal efficiency under varying conditions
- Simple and reliable construction

ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection



POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A182 F11 CL.2	
2	COVER	ASTM A182 F11 CL.2	
3	BODY GASKET	OVAL RTJ – SS316	x
4	VALVE GASKET	FLAT RING SS 316	x
5	VALVE ASSEMBLY	SS	x
6	PLUG GASKET	FLAT RING SS 316	x
7	PLUG	ASTM A182 F11 CL.2	
8	SCREEN	SS 316	x
9	BOLTING	ASTM A193 B16 / A194 GR.7	
10	FLANGES	ASTM A182 F11 CL.2	



NPS	SW		H1*	H2*	BW		RF(1500#)		RF(2500#)	
	L*	kg			L*	kg	L*	kg	L*	kg
½"	175	38	70	122	207	38	345	42	370	45
¾"	175	38	70	122	207	38	365	43	385	46
1"	175	38	70	122	207	38	370	45	400	50
1.½"	175	38	70	122	207	38	430	50	445	64
2"	175	38	70	122	207	38	435	61	480	76

*Dimensions are in millimeters

INSTALLATION

Prior to installation, clean the lines by blowing through at full steam pressure to remove dirt.
For steam trapping applications the trap should be fitted below the equipment to be drained and as close to the drain point as possible.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3 4-5-6 (valve assembly and screen) can be replaced bring the traps as new conditions

THERMOSTATIC STEAM TRAP BIMETALLIC

BM2500 SERIES

LIMITING CONDITIONS	
RATING	ANSI 2500
PMA	420 bar
TMA	550°C
DIFFERENTIAL PRESSURE	140 bar (BM25140) – 270 bar (BM25270)

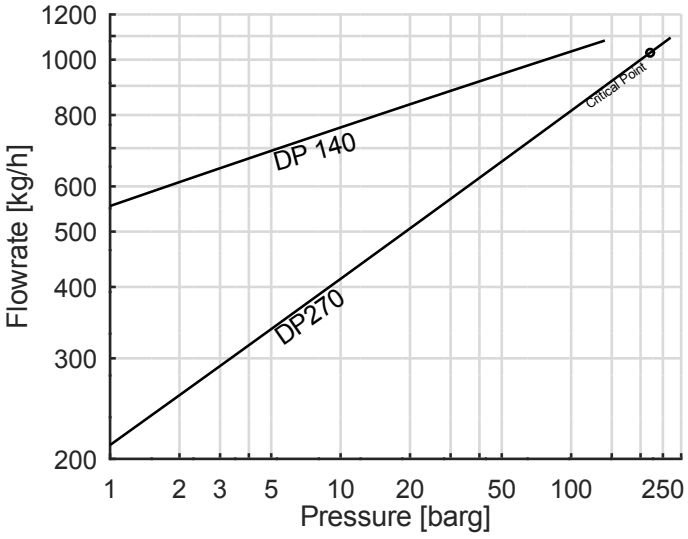
SIZES (NPS)	CONNECTIONS	
½"– ¾" – 1" – 1.½"-2"	Screwed	ASME B1.20.1(NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Butt Weld	ASME B16.25
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

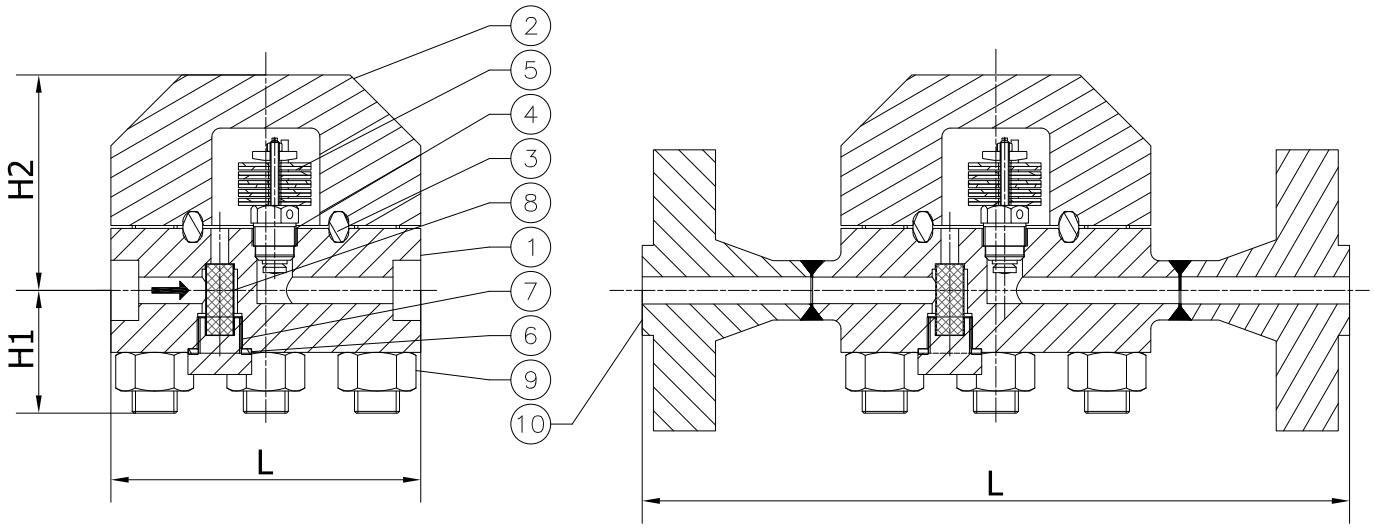
- Excellent air venting
- Can be installed in any position
- Maximum thermal efficiency under varying conditions
- Simple and reliable construction

ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection



POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A182 F11 CL.2	
2	COVER	ASTM A182 F11 CL.2	
3	BODY GASKET	OVAL RTJ – SS316	x
4	VALVE GASKET	FLAT RING SS 316	x
5	VALVE ASSEMBLY	SS	x
6	PLUG GASKET	FLAT RING SS 316	x
7	PLUG	ASTM A182 F11 CL.2	
8	SCREEN	SS 316	x
9	BOLTING	ASTM A193 B16 / A194 GR.7	
10	FLANGES	ASTM A182 F11 CL.2	



NPS	H1*	H2*	SW		BW		RF(2500#)	
			L*	kg	L*	kg	L*	kg
½"	88	185	270	130	300	130	450	137
¾"	88	185	270	130	300	130	465	138
1"	88	185	270	130	300	130	484	142
1.½"	88	185	270	130	300	130	530	158
2"	88	185	270	130	300	130	555	168

*Dimensions are in millimeters

INSTALLATION

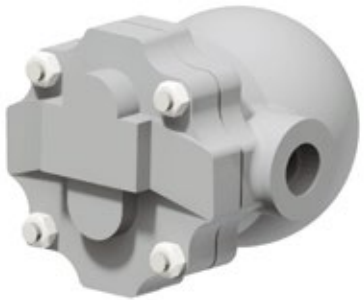
Prior to installation, clean the lines by blowing through at full steam pressure to remove dirt.
For steam trapping applications the trap should be fitted below the equipment to be drained and as close to the drain point as possible.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3 4-5-6 (valve assembly and screen) can be replaced bring the traps as new conditions

BALL FLOAT AND THERMOSTATIC STEAM TRAP

LFT14

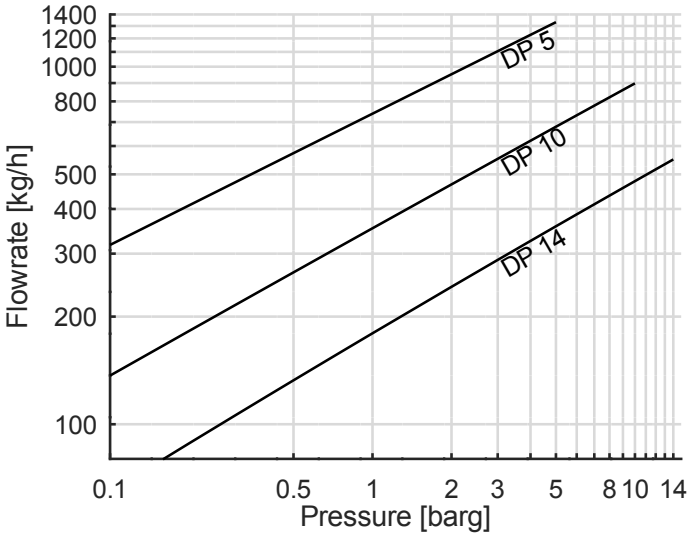


LIMITING CONDITIONS	
RATING	ANSI 150
PMA	19 bar
TMA	400°C
MAX. DIFFERENTIAL PRESSURE	5 – 10 – 14 bar

SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

- Excellent air venting
- Discharge condensate at steam temperature
- Operates with saturated and superheated steam
- Suitable for heavy condensate load
- Simple and reliable construction

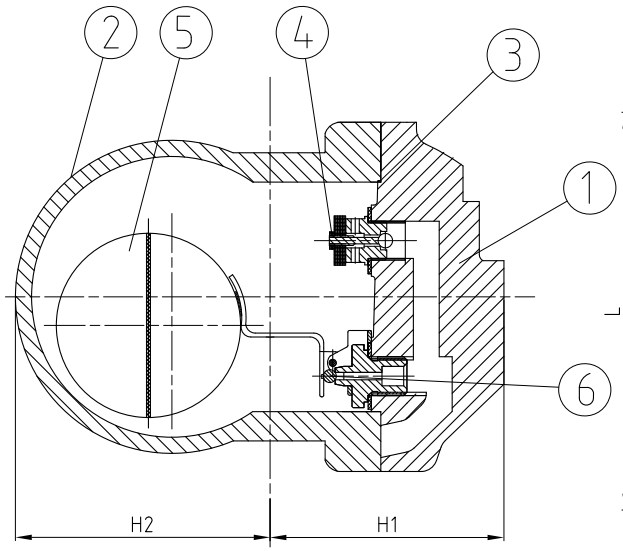


ORDERING INFORMATION

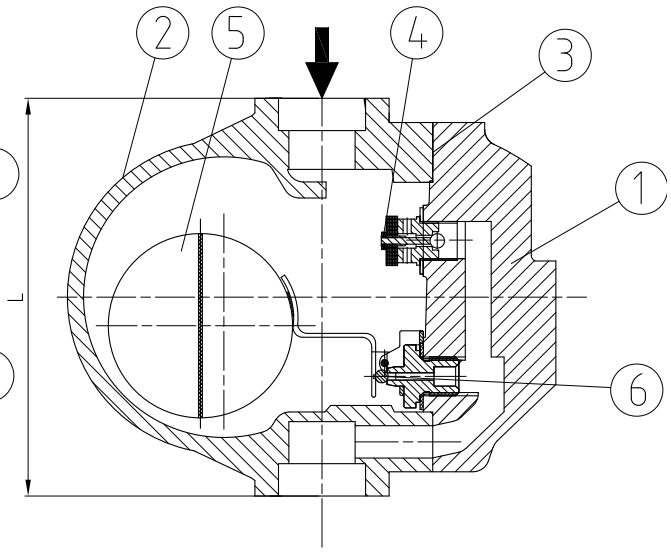
- Installation position (horizontal or vertical)
- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A216 WCB	
2	COVER	ASTM A216 WCB	
3	GASKET	GRAPHITE	x
4	THERMOSTATIC AIR VENT	STAINLESS STEEL	x
5	BALL FLOAT	STAINLESS STEEL	
6	VALVE ASSEMBLY	STAINLESS STEEL	x
7	BOLTING	ASTM A193 B7 / ASTM A194 2H	

Horizontal connection



Vertical connection



SIZE (INCHES)	H1*	H2*	L*	Weight kg
½"	85	65	125	4
¾"	85	65	125	4
1"	95	70	145	5

*Dimensions are in millimeters

INSTALLATION

The trap should be installed with the float arm in horizontal plane. Must be fitted below the drain point of the equipment. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 5 (gasket), 8-9-10 (valve assembly), 2 (ball float) and 3,4,6 (air vent) can be replaced bring the traps as new conditions.

BALL FLOAT AND THERMOSTATIC STEAM TRAP

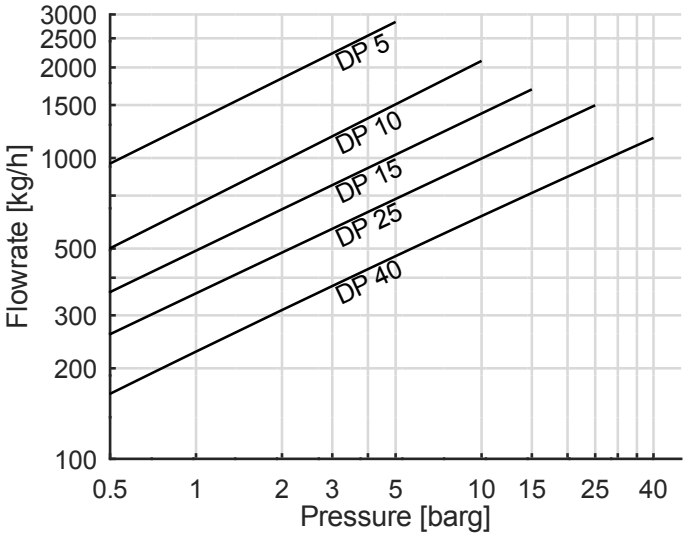
FT325

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	50 bar
TMA	400°C
MAX. DIFFERENTIAL PRESSURE	5 – 10 – 15 – 25 – 40 bar

SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1"	Screwed	ASME B1.20.1(NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

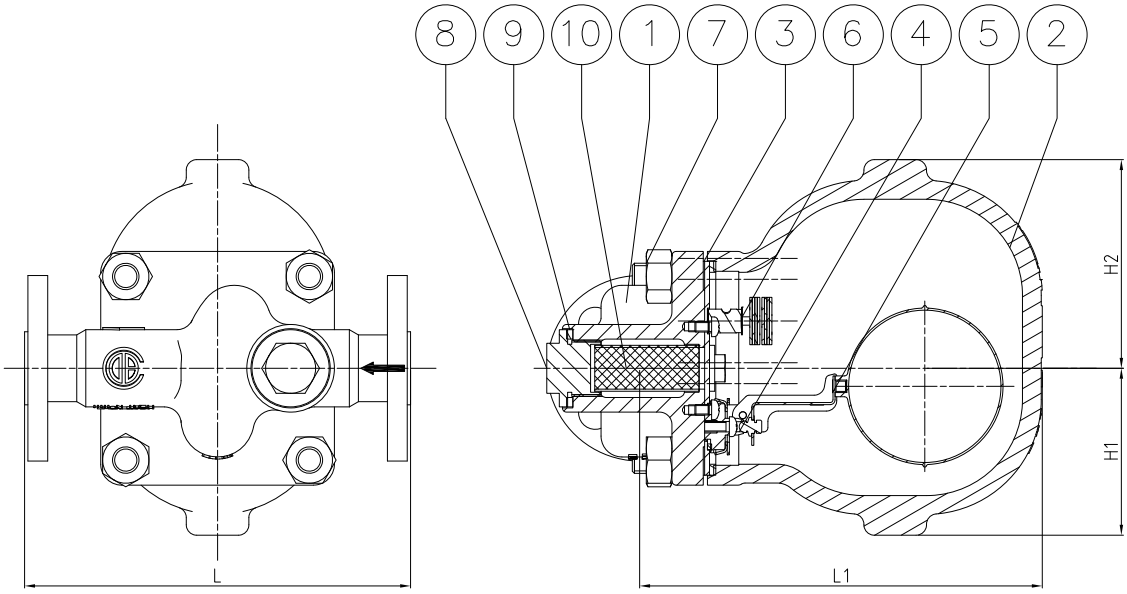
- Excellent air venting
- Discharge condensate at steam temperature
- Operates with saturated and superheated steam
- Suitable for heavy condensate load
- Simple and reliable construction



ORDERING INFORMATION

- Installation position (horizontal or vertical)
- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A216 WCB	ASTM A351 CF8M	
2	COVER	ASTM A216 WCB	ASTM A351 CF8M	
3	BODY GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
4	VALVE ASSEMBLY	AISI 316	AISI 316	x
5	LEVER & BALL FLOAT	AISI 316	AISI 316	x
6	THERMOSTATIC AIR VENT	FLAT RING SS 316	FLAT RING SS 316	x
7	BOLTING	A193 B7/A194 2H	A193 B8M/A194 GR.8M	
8	PLUG	ASTM A105N	ASTM A182 F316	
9	PLUG GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
10	SCREEN	AISI 316	AISI 316	x



NPS	H1*	H2*	L*				L1*	Weight (kg)
			SW	RF(150#)	RF(300#)	RF(600#)		
½"	80	100	185	185	185	200	193	9
¾"	80	100	185	185	185	200	193	9
1	80	100	185	185	185	200	193	9

*Dimensions are in millimeters, weights are referred to SW version

INSTALLATION

The trap should be installed with the float arm in horizontal plane. Must be fitted below the drain point of the equipment. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3 (gasket), 4 (valve assembly), 5 (lever & ball float) and 7 (air vent) can be replaced bring the traps as new conditions

BALL FLOAT AND THERMOSTATIC STEAM TRAP

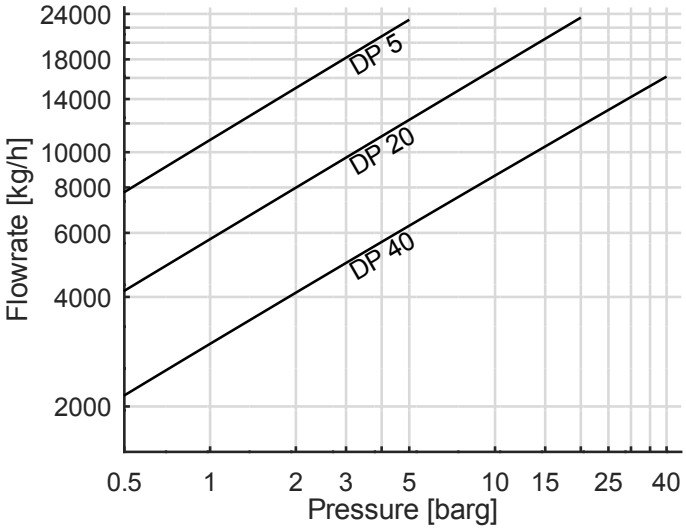
FT350

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	50 bar
TMA	400°C
MAX. DIFFERENTIAL PRESSURE	5 – 20 – 40 bar

SIZES (INCHES)	CONNECTIONS	
1.½" – 2"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

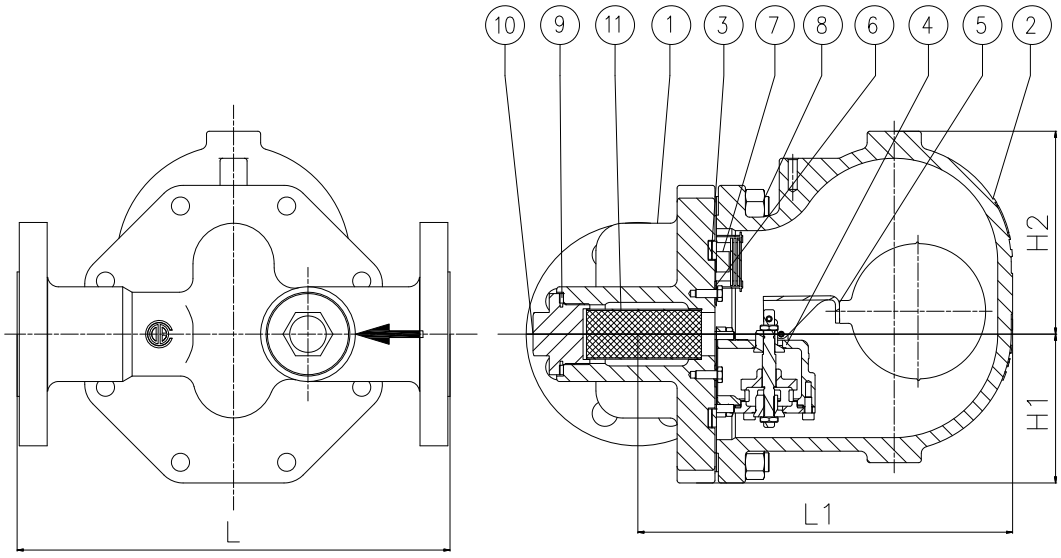
- Excellent air venting
- Discharge condensate at steam temperature
- Operates with saturated and superheated steam
- Suitable for heavy condensate load
- Simple and reliable construction



ORDERING INFORMATION

- Installation position (horizontal or vertical)
- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A216 WCB	ASTM A351 CF8M	
2	COVER	ASTM A216 WCB	ASTM A351 CF8M	
3	BODY GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
4	VALVE ASSEMBLY	AISI 316	AISI 316	x
5	LEVER & BALL FLOAT	AISI 316	AISI 316	x
6	THERMOSTATIC GASKET	AISI 304	AISI 304	x
7	THERMOSTATIC AIR VENT	STAINLESS STEEL	STAINLESS STEEL	x
8	BOLTING	A193 B7/A194 2H	A193 B8M/A194 GR.8M	
9	PLUG GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
10	PLUG	ASTM A105N	ASTM A182 F316	
11	SCREEN	AISI 316	AISI 316	x



NPS	H1*	H2*	L*				L1*	Weight (kg)
			SW	RF(150#)	RF(300#)	RF(600#)		
1.½"	110	150	320	320	320	320	275	32
2"	110	150	320	320	320	320	275	32

*Dimensions are in millimeters, weights are referred to SW version

INSTALLATION

The trap should be installed with the float arm in horizontal plane. Must be fitted below the drain point of the equipment. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3 (gasket), 4 (valve assembly), 5 (lever & ball float) and 7 (air vent) can be replaced bring the traps as new conditions

BALL FLOAT AND THERMOSTATIC STEAM TRAP

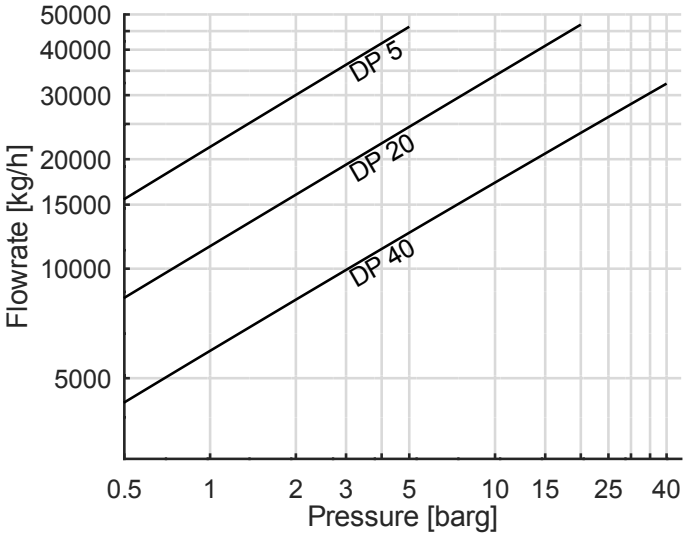
FT350HC

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	50 bar
TMA	400 °C
MAX. DIFFERENTIAL PRESSURE	5 – 20 – 40 bar

SIZES (NPS)	CONNECTIONS	
1.½" – 2"- 3"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

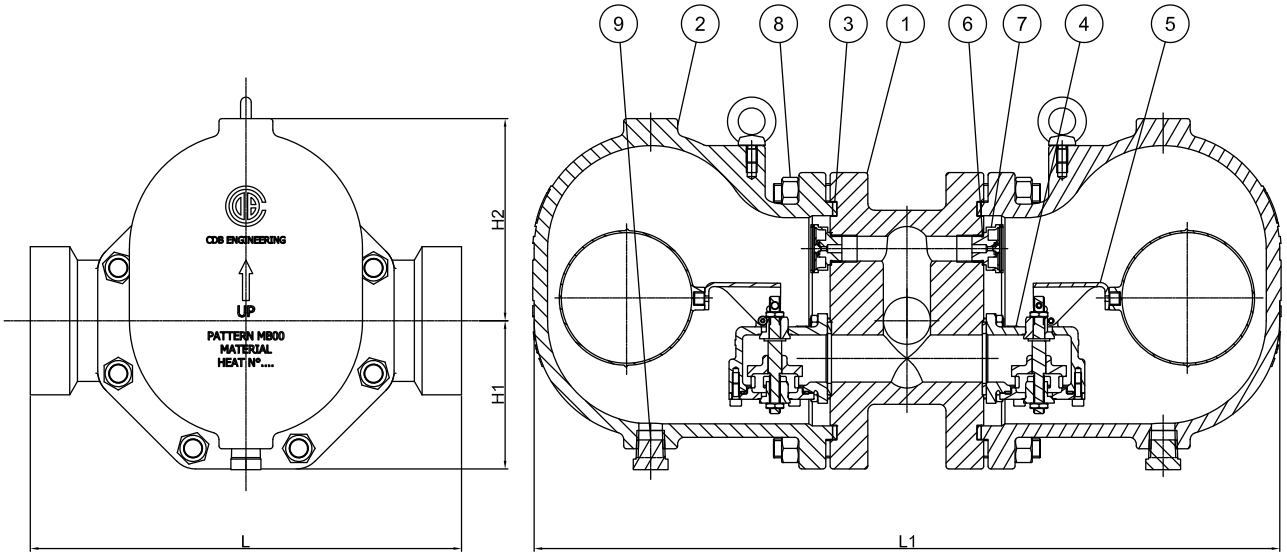
- Excellent air venting
- Discharge condensate at steam temperature
- Operates with saturated and superheated steam
- Suitable for heavy condensate load
- Simple and reliable construction



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A216 WCB	ASTM A351 CF8M	
2	COVER	ASTM A216 WCB	ASTM A351 CF8M	
3	BODY GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
4	VALVE ASSEMBLY	AISI 316	AISI 316	x
5	LEVER & BALL FLOAT	AISI 316	AISI 316	x
6	THERMOSTATIC VALVE	AISI 316	AISI 316	x
7	THERMOSTATIC VALVE	STAINLESS STEEL	STAINLESS STEEL	x
8	BOLTING	A193 B7/A194 2H	A193 B8M/A194 GR.8M	
9	PLUG GASKET	AISI 304	AISI 304	x
10	PLUG	ASTM A105N	ASTM A182 F316	
11	SCREEN	AISI 316	AISI 316	x



NPS	H1*	H2*	L*				L1*	Weight (kg)
			SW	RF(150#)	RF(300#)	RF(600#)		
1.½"	110	150	320	423	436	452	555	56
2"	110	150	320	419	432	451	555	57
3"	110	150	320	432	451	470	555	58

*Dimensions are in millimeters, weights are referred to SW version

INSTALLATION

The trap should be installed with the float arm in horizontal plane. Must be fitted below the drain point of the equipment. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3 (gasket), 4 (valve assembly), 5 (lever & ball float) and 7 (air vent) can be replaced bring the traps as new conditions

BALL FLOAT AND THERMOSTATIC STEAM TRAP

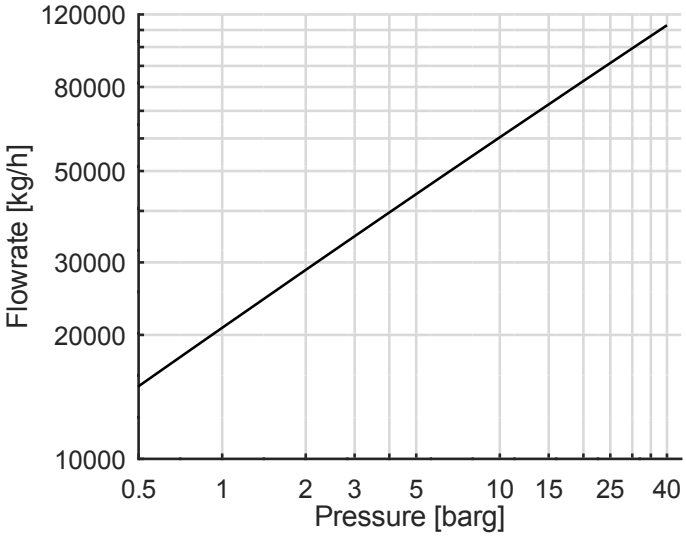
FT380

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	50 bar
TMA	400 °C
MAX. DIFFERENTIAL PRESSURE	32 bar

SIZES (NPS)	CONNECTIONS	
3" – 4"	Screwed	ASME B1.20.1(NPT)-BS21 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

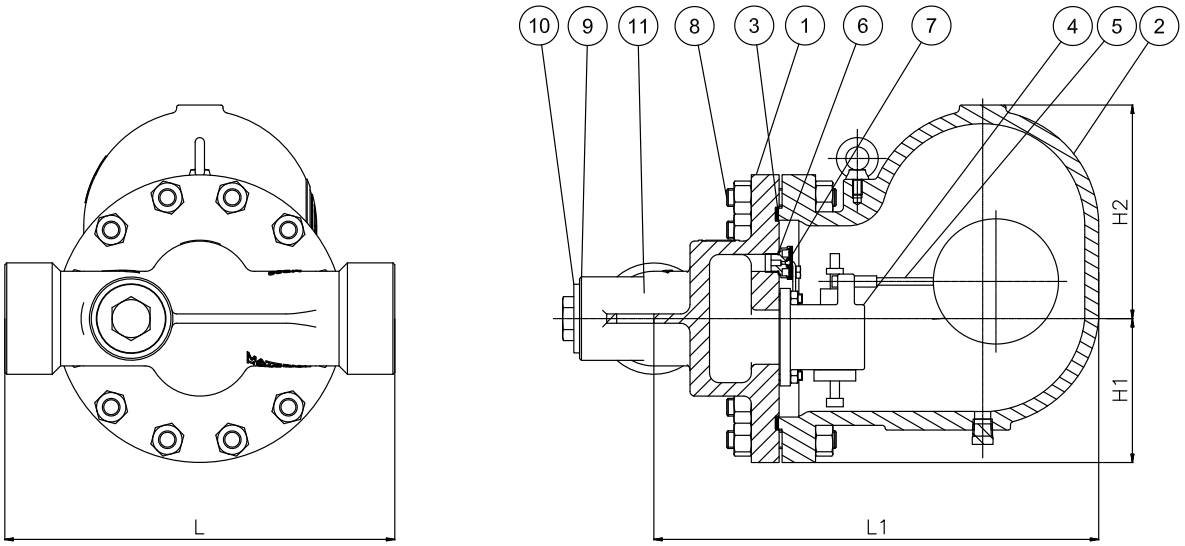
- Excellent air venting
- Discharge condensate at steam temperature
- Operates with saturated and superheated steam
- Suitable for heavy condensate load
- Simple and reliable construction



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A216 WCB	ASTM A351 CF8M	
2	COVER	ASTM A216 WCB	ASTM A351 CF8M	
3	BODY GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
4	VALVE ASSEMBLY	AISI 316	AISI 316	x
5	LEVER & BALL FLOAT	AISI 316	AISI 316	x
6	THERMOSTATIC GASKET	AISI 304	AISI 304	x
7	THERMOSTATIC AIR VENT	STAINLESS STEEL	STAINLESS STEEL	x
8	BOLTING	A193 B7/A194 2H	A193 B8M/A194 GR.8M	
9	SCREEN PLUG GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
10	SCREEN PLUG	ASTM A105N	ASTM A182 F316	
11	SCREEN	AISI 316	AISI 316	x



NPS	H1*	H2*	L			L1*	Weight (kg)
			SW	RF(150#)	RF(300#)		
3"	155	230	420	420	420	480	88
4"	155	230	N.A.	545	563	480	88

*Dimensions are in millimeters, weights are referred to SW version

INSTALLATION

The trap should be installed with the float arm in horizontal plane. Must be fitted below the drain point of the equipment. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3 (gasket), 4 (valve assembly), 5 (lever & ball float) and 7 (air vent) can be replaced bring the traps as new conditions

BALL FLOAT AND THERMOSTATIC STEAM TRAP

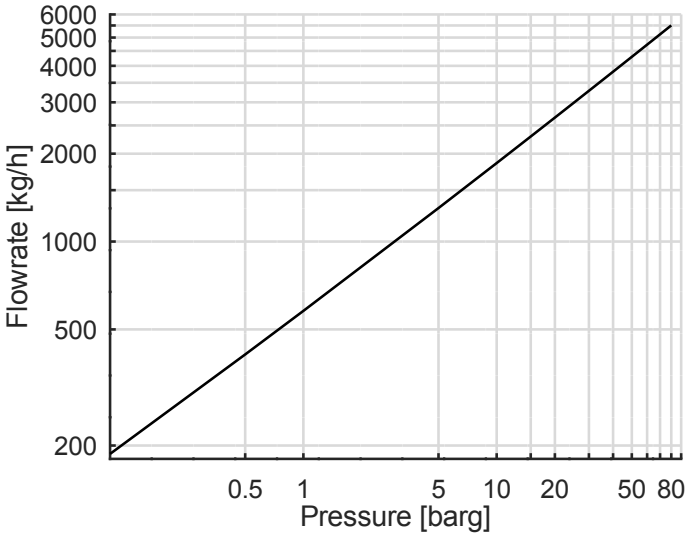
FT650

LIMITING CONDITIONS	
RATING	ANSI 600
PMA	100 bar
TMA	400°C
MAX. DIFFERENTIAL PRESSURE	80 bar

SIZES (NPS)	CONNECTIONS	
1.½" – 2"	Screwed	ASME B1.20.1(NPT)-BS21 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN1092

MAIN FEATURES

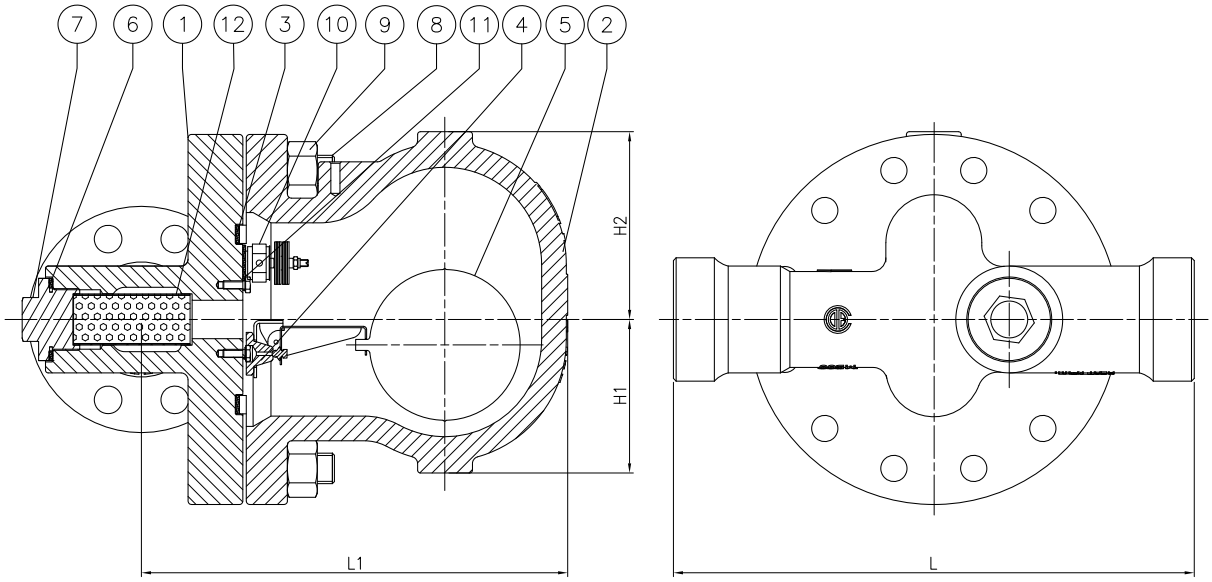
- Excellent air venting
- Discharge condensate at steam temperature
- Operates with saturated and superheated steam
- Suitable for heavy condensate load
- Simple and reliable construction



ORDERING INFORMATION

- Installation position (horizontal or vertical)
- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A216 WCB	ASTM A351 CF8M	
2	COVER	ASTM A216 WCB	ASTM A351 CF8M	
3	BODY GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
4	VALVE ASSEMBLY	AISI 316	AISI 316	x
5	LEVER & BALL FLOAT	AISI 316	AISI 316	x
6	THERMOSTATIC GASKET	AISI 304	AISI 304	x
7	THERMOSTATIC AIR VENT	STAINLESS STEEL	STAINLESS STEEL	x
8	BOLTING	A193 B7/A194 2H	A193 B8M/A194 GR.8M	
9	SCREEN PLUG GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
10	SCREEN PLUG	ASTM A105N	ASTM A182 F316	
11	SCREEN	AISI 316	AISI 316	x



SIZE (INCHES)	L1*	H1*	H2*	L*		kg
				SW	RF(600#)	
1.½"	310	135	137	400	400	67
2"	310	135	137	400	400	67

*Dimensions are in millimeters, weights are referred to SW version

INSTALLATION

The trap should be installed with the float arm in horizontal plane. Must be fitted below the drain point of the equipment. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3 (gasket), 4 (valve assembly), 5 (lever & ball float) and 7 (air vent) can be replaced bring the traps as new conditions

BALL FLOAT AND THERMOSTATIC STEAM TRAP

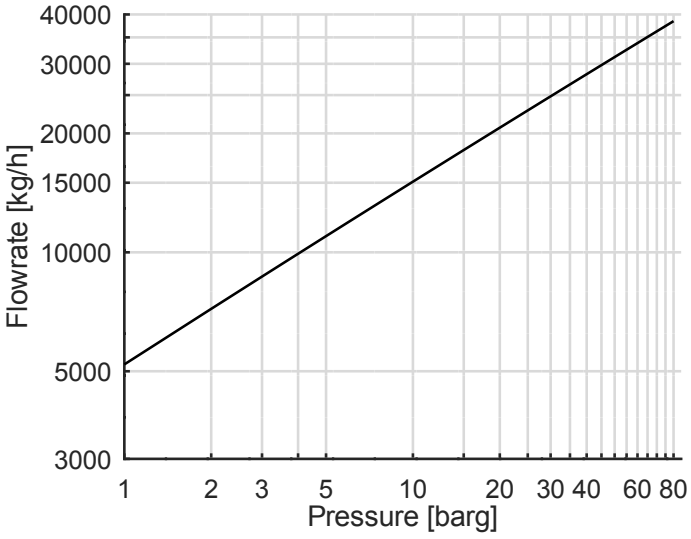
FT680

LIMITING CONDITIONS	
RATING	ANSI 600
PMA	100 bar
TMA	400 °C
MAX. DIFFERENTIAL PRESSURE	80 bar

SIZES (NPS)	CONNECTIONS	
3"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

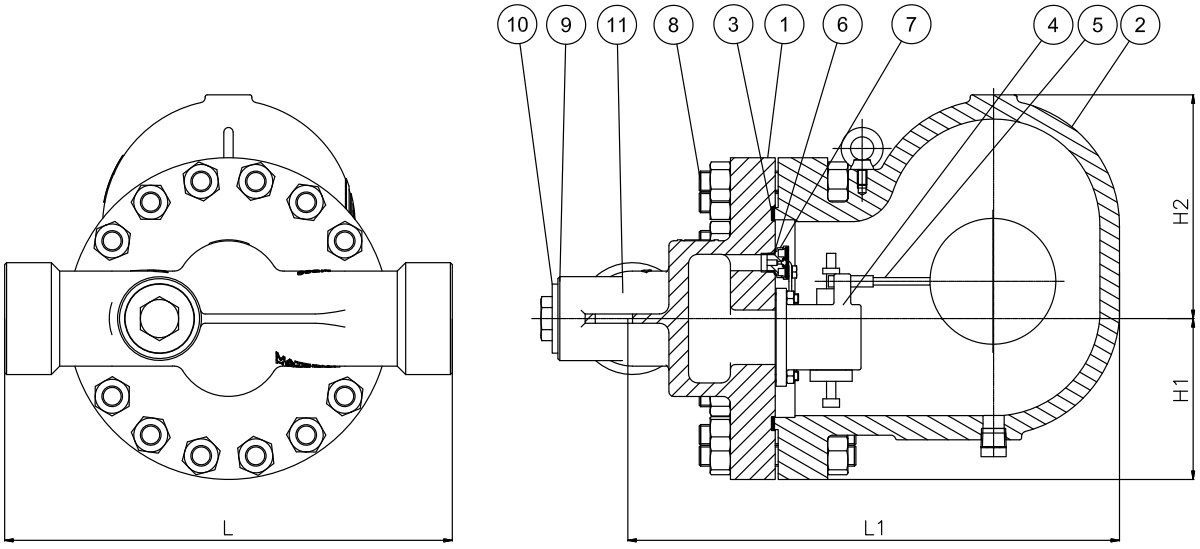
- Excellent air venting
- Discharge condensate at steam temperature
- Operates with saturated and superheated steam
- Suitable for heavy condensate load
- Simple and reliable construction



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A216 WCB	ASTM A351 CF8M	
2	COVER	ASTM A216 WCB	ASTM A351 CF8M	
3	BODY GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
4	VALVE ASSEMBLY	AISI 316	AISI 316	x
5	LEVER & BALL FLOAT	AISI 316	AISI 316	x
6	THERMOSTATIC GASKET	AISI 316	AISI 316	x
7	THERMOSTATIC AIR VENT	STAINLESS STEEL	STAINLESS STEEL	x
8	BOLTING	A193 B7/A194 2H	A193 B8M/A194 GR.8M	
9	SCREEN PLUG GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
10	SCREEN PLUG	ASTM A105N	ASTM A182 F316	
11	SCREEN	AISI 316	AISI 316	x



NPS	H1*	H2*	L		L1*	Weight (kg)
			SW	600# RF		
3"	173	240	480	480	522	140

*Dimensions are in millimeters, weights are referred to SW version

INSTALLATION

The trap should be installed with the float arm in horizontal plane. Must be fitted below the drain point of the equipment. Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3 (gasket), 4 (valve assembly), 5 (lever & ball float) and 7 (air vent) can be replaced bring the traps as new conditions

INVERTED BUCKET STEAM TRAP

IB301H

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	45 bar
TMA	500°C
AVAILABLE DIFFERENTIAL PRESSURE	5 – 17 – 28 bar

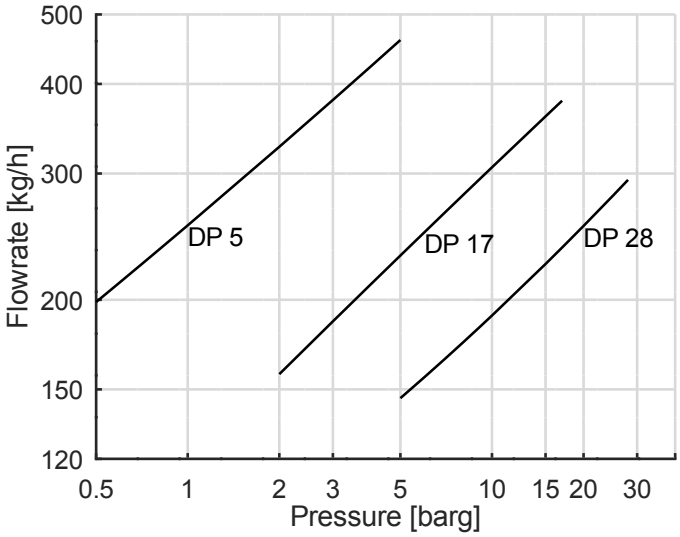
SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
Series available up to 1.½"	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

- Discharge condensate and air at steam temperature
- Operates with saturated and superheated steam
- Simple and reliable construction

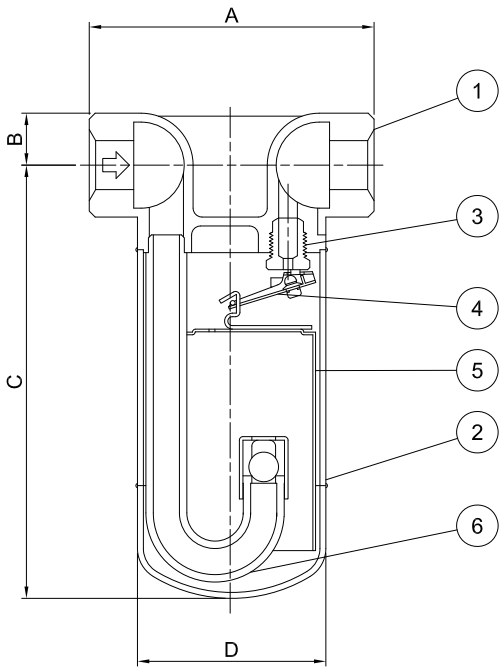
ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connections



Capacity up to 2900 kg/n available

POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A351 CF8	
2	COVER	SS 304	
3	SEAT	AISI 410	
4	LEVER	SS 304	
5	PIPE	SS 304	
6	BUCKET	SS 304	
7	FLANGES	ASTM A182 F304	



NPS	A*	B*	C*	D*	Weight (kg)
½"	96	19	163	64	1
¾"	96	19	163	64	1
1"	96	19	163	64	1

*Dimensions are in millimeters

INSTALLATION

The trap should be fitted with the inlet and outlet connections horizontally in-line. Correct fitment with body vertical is essential for easy movement of the bucket.
Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

INVERTED BUCKET STEAM TRAP

IB301V

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	45 bar
TMA	500°C
AVAILABLE DIFFERENTIAL PRESSURE	5 – 17 – 28 bar

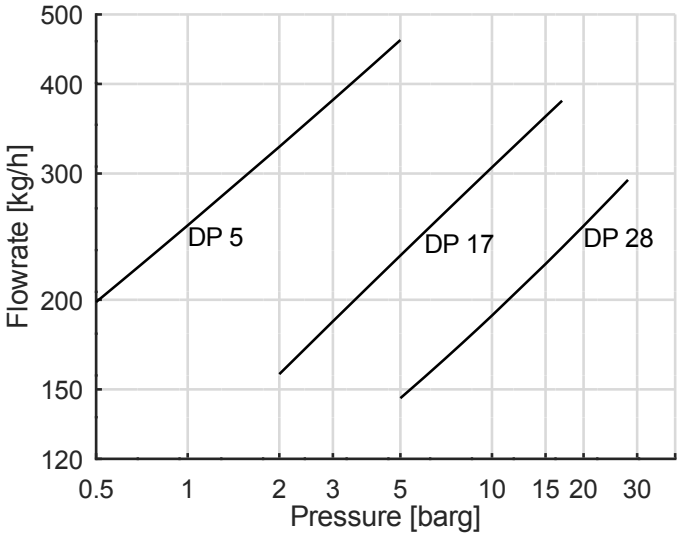
SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
Series available up to 1.½"	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

- Discharge condensate and air at steam temperature
- Operates with saturated and superheated steam
- Simple and reliable construction

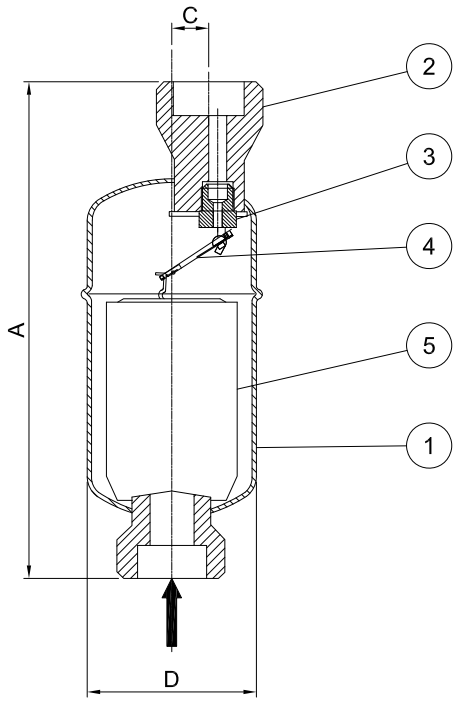
ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connections



Capacity up to 2900 kg/n available

POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A240 GR. 304	
2	CONNECTOR	ASTM A351 CF8	
3	SEAT	AISI 410	
4	LEVER	SS 304	
5	BUCKET	SS 304	
6	FLANGES	ASTM A182 F304	



NPS	A*	B*	C*	D*	Weight (kg)
½"	182	70	14	170	3
¾"	182	70	14	180	4
1"	182	70	14	190	5

*Dimensions are in millimeters

INSTALLATION

The trap should be fitted with the inlet and outlet connections horizontally in-line. Correct fitment with body vertical is essential for easy movement of the bucket.
Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

INVERTED BUCKET STEAM TRAP

IB381

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	50 bar
TMA	400°C
AVAILABLE DIFFERENTIAL PRESSURE	5 – 15 – 30 bar

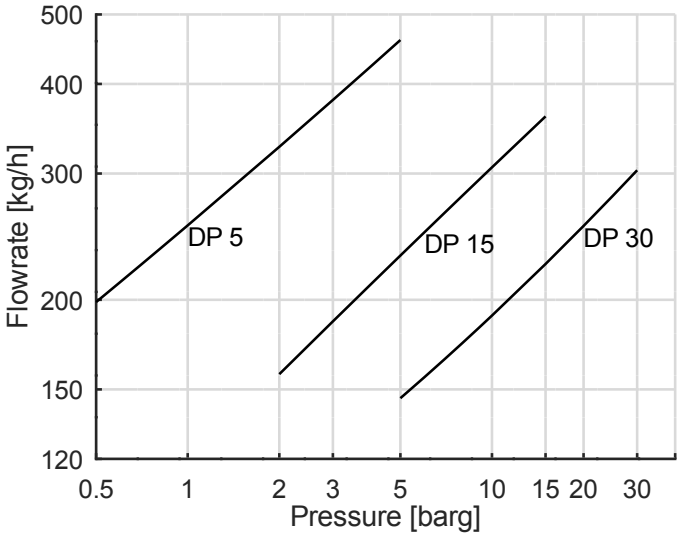
SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1"	Screwed	ASME B1.20.1 (NPT) – EN 10226 (BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

MAIN FEATURES

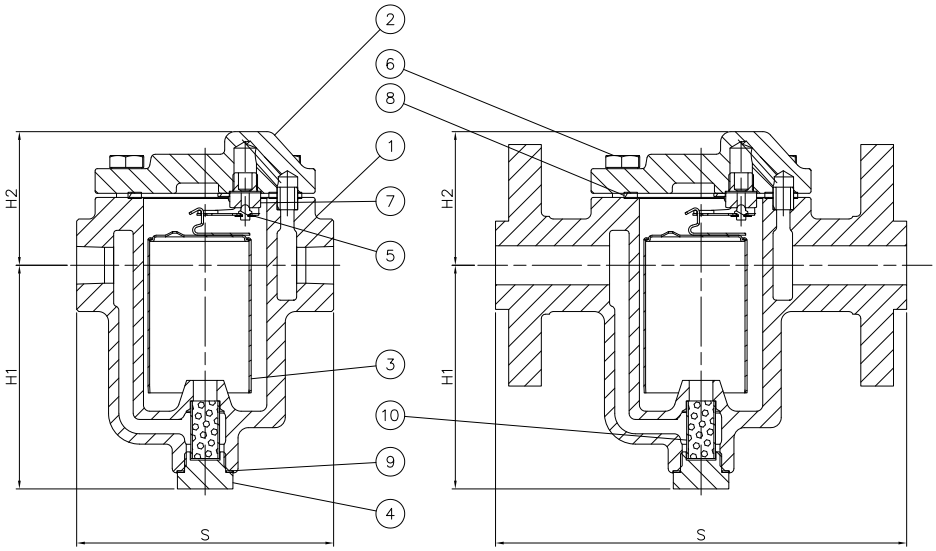
- Discharge condensate and air at steam temperature
- Operates with saturated and superheated steam
- Simple and reliable construction

ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connections



POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A216 WCB	
2	COVER	ASTM A216 WCB	
3	BUCKET	SS 304	x
4	PLUG	ASTM A105N	
5	LEVER	SS 304	x
6	BOLTS	ASTM A193 B7	x
7	SEAT	AISI 420	x
8	BODY GASKET	ARMOURED GRAPHITE	x
9	PLUG GASKET	SS 316	x
10	SCREEN	AISI 316	



NPS	H1*	H2*	L*				Weight (kg)
			SW	RF(150#)	RF(300#)	RF(600#)	
½"	110	65	125	180	180	200	4
¾"	110	65	125	180	180	200	5
1"	110	65	125	180	200	200	6

*Dimensions are in millimeters, weights are referred to SW version

INSTALLATION

The trap should be fitted with the inlet and outlet connections horizontally in-line. Correct fitment with body vertical is essential for easy movement of the bucket.
Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

UNIVERSAL CONNECTORS FOR STEAM TRAP

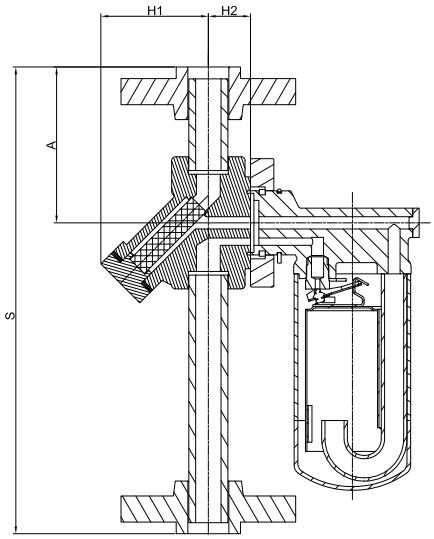
LIMITING CONDITIONS	
RATING	ANSI 300
PMA	50 bar
TMA	400°C

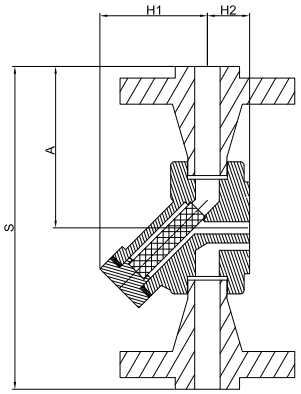
SIZES (NPS)	CONNECTIONS	
½" – ¾" – 1"	Screwed	ASME B1.20.1(NPT) – EN 10226(BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

AVAILABLE MATERIALS:

- ASTM A105N
- ASTM A350 LF2 cl.1
- ASTM A182 F304/F304L

EXAMPLES OF CONFIGURATION





MODEL	NPS	S*	A*	H1*	H2*	Weight (kg)
SW	½" – ¾" – 1"	72	37	52	26	1
RF 600#	½" – ¾" – 1"	176 / 186 / 196	89 / 94 / 99	52	26	3 / 4 / 5
RF 600# FOR IB301UC	½"	255	86	52	26	4

*Dimensions are in millimeters

TRAP STATIONS FOR STEAM TRAP

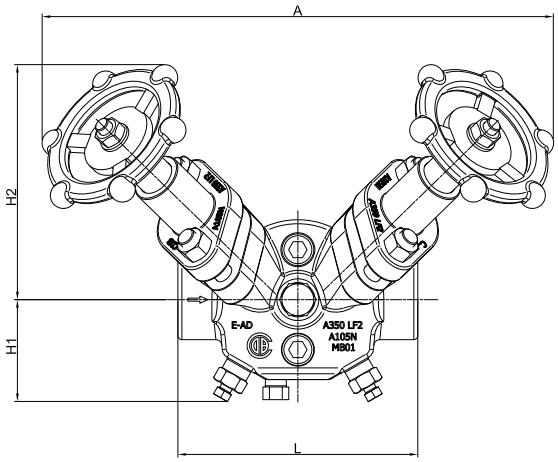
LIMITING CONDITIONS	
RATING	ANSI 600
PMA	100 bar
TMA	400°C

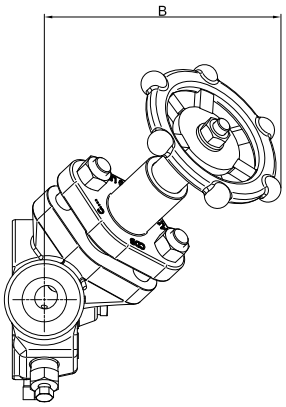
SIZES (NPS)	CONNECTIONS	
½" – ¾"	Screwed	ASME B1.20.1(NPT) – EN 10226(BSP)
	Socket Weld	ASME B16.11
	Flanged	ASME B16.5 – EN 1092

AVAILABLE MATERIALS:

- ASTM A105N
- ASTM A350 LF2 cl.1
- ASTM A182 F304/F304L
- ASTM A182 F11 cl.2

EXAMPLES OF CONFIGURATION





MODEL	NPS	L*	A*	B*	H1*	H2*	Weight (kg)
SW	½" – ¾"	120	256	118	47	118	4
RF 600#	½"	223	256	118	47	118	5
RF 600#	¾"	232	256	118	47	118	7

*Dimensions are in millimeters

In the interest of products development and improvment, CDB Engineering reserves the right to carry out any necessary modification without prior notice. PMA and TMA can change with the materials of steam trap components. For more information please contacts our sales department.

THERMOSTATIC STEAM TRAP
THERMODYNAMIC

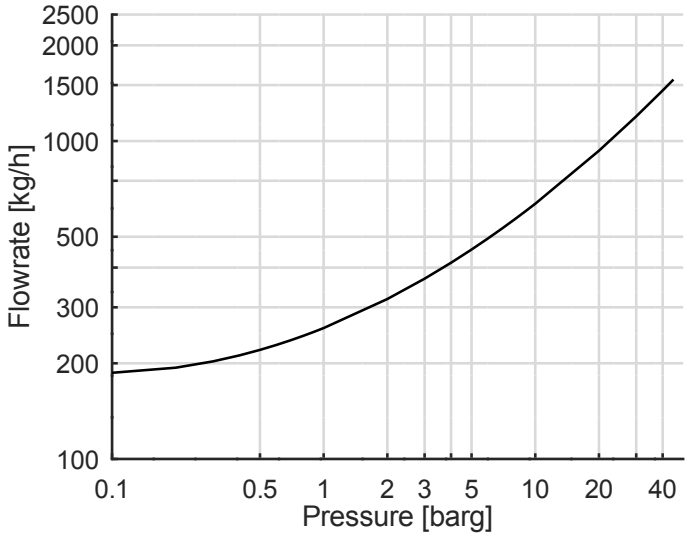
TD50UC

LIMITING CONDITIONS	
RATING	ANSI 600
PMA	100 bar
TMA	400°C
MAX. DIFFERENTIAL PRESSURE	50 bar

CONNECTIONS
Universal connection

MAIN FEATURES

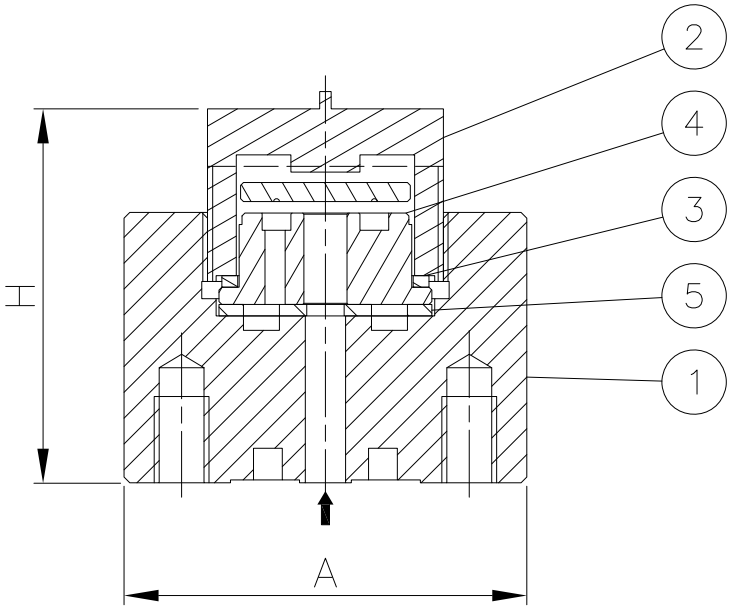
- Discharges air and not condensable gases
- Interchangeable seat with hardened seating surfaces
- Operates with superheated steam
- Simple and compact design
- Intermittent discharge



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load

POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A105N	ASTM A350 LF2	
2	COVER	ASTM A105N	ASTM A350 LF2	
3	BODY GASKET	ARM. GRAPHITE	ARM. GRAPHITE	x
4	SEAT AND DISC	AISI 410	AISI 410	x
5	VALVE GASKET	ARM. GRAPHITE	ARM. GRAPHITE	x



A*	H*	Weight (kg)
Ø70	65	2

*Dimensions are in millimeters

INSTALLATION

Prior to installation, clean the lines by blowing through at full steam pressure to remove dirt.
For steam trapping applications the trap should be fitted below the equipment to be drained and as close to the drain point as possible.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3, 5 and 6 (gaskets and valve assembly) can be replaced bring the traps as new conditions

THERMOSTATIC STEAM TRAP
THERMODYNAMIC

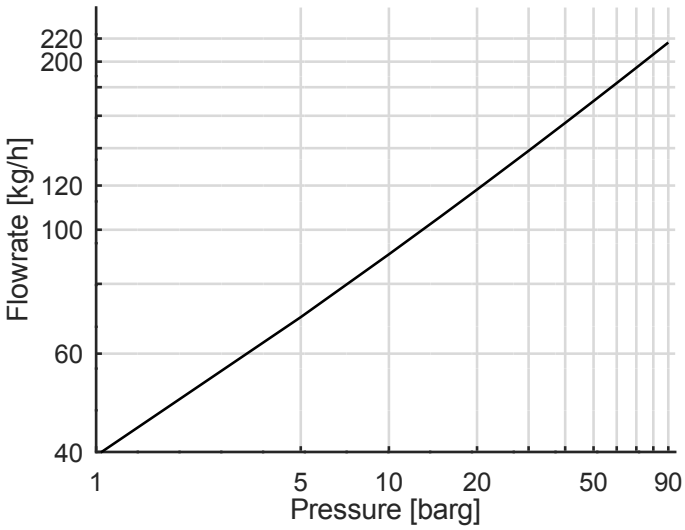
TD90UC

LIMITING CONDITIONS	
RATING	ANSI 600
PMA	100 bar
TMA	400°C
MAX. DIFFERENTIAL PRESSURE	90 bar

CONNECTIONS
Universal connection

MAIN FEATURES

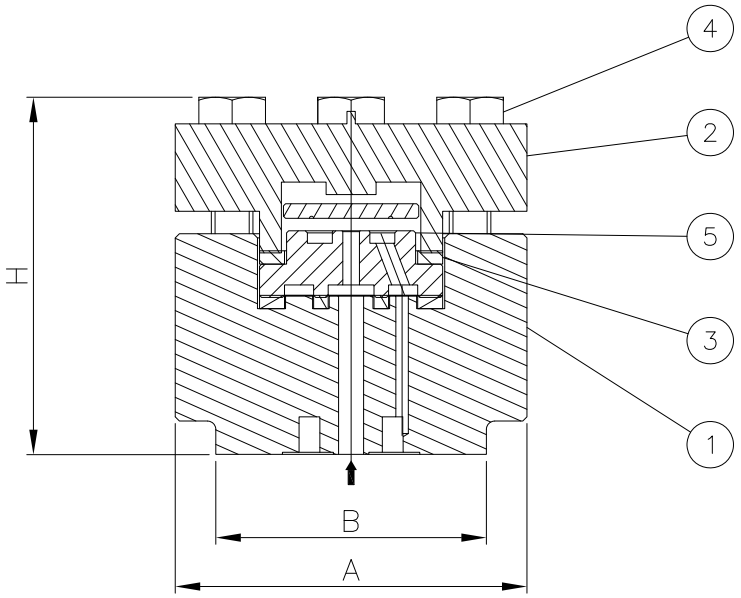
- Discharges air and not condensable gases
- Interchangeable seat with hardened seating surfaces
- Operates with superheated steam
- Simple and compact design
- Intermittent discharge



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load

POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A105N	ASTM A350 LF2	
2	COVER	ASTM A105N	ASTM A350 LF2	
3	GASKET	ARMOURED GRAPHITE	ARMOURED GRAPHITE	x
4	BOLT	ASTM A193 B7	ASTM A320 L7	
5	SEAT AND DISC	AISI 410	AISI 410	x



A*	B*	H*	Weight (kg)
Ø 85	Ø 65	91	4

*Dimensions are in millimeters

INSTALLATION

Prior to installation, clean the lines by blowing through at full steam pressure to remove dirt.
For steam trapping applications the trap should be fitted below the equipment to be drained and as close to the drain point as possible.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 3, 5 and 6 (gaskets and valve assembly) can be replaced bring the traps as new conditions

THERMOSTATIC STEAM TRAP
BALANCE PRESSURE

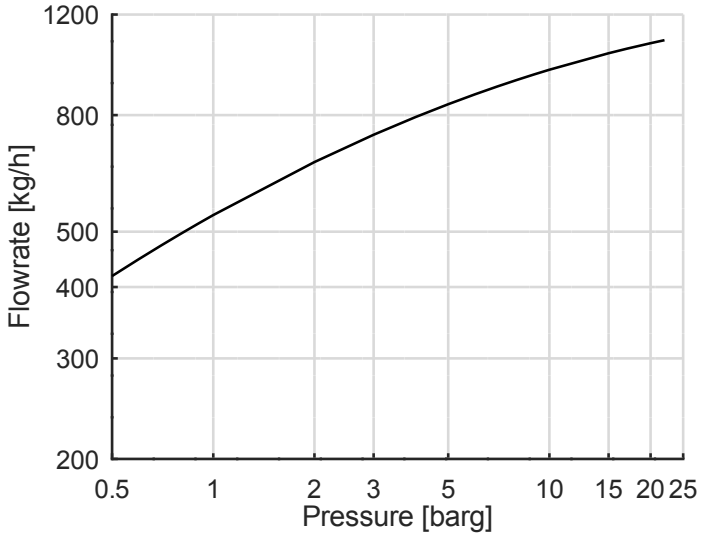
BP322UC

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	50 bar
TMA	400°C
MAX. DIFFERENTIAL PRESSURE	22 bar

CONNECTIONS
Universal connection

MAIN FEATURES

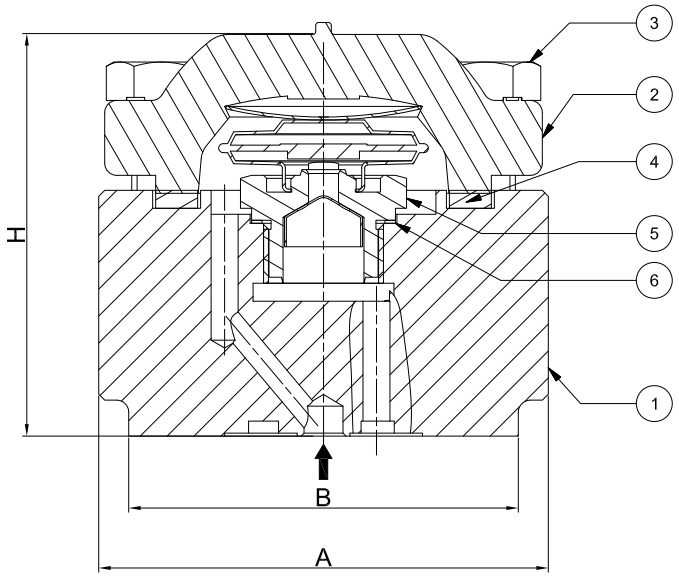
- Excellent air venting
- Can be installed in any position
- Maximum thermal efficiency under varying conditions
- Sub cooling 10°C
- Simple and reliable construction



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connection

POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A105N	ASTM A350 LF2	
2	COVER	ASTM A105N	ASTM A350 LF2	
3	BOLTING	ASTM A193 B7	ASTM A193 B7	
4	COVER GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
5	VALVE ASSEMBLY	STAINLESS STEEL	STAINLESS STEEL	x
6	VALVE GASKET	AISI 316	AISI 316	x



A*	B*	H*	Weight (kg)
Ø 75	Ø 65	68	2

*Dimensions are in millimeters

INSTALLATION

Prior to installation, clean the lines by blowing through at full steam pressure to remove dirt.
For steam trapping applications the trap should be fitted below the equipment to be drained and as close to the drain point as possible.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it.
Allow the trap to cool before dismantling.
Item 4,5 and 6 (gaskets and valve assembly can be replaced bring the traps as new conditions

THERMOSTATIC STEAM TRAP BIMETALLIC

BM300UC

SERIES

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	50 bar
TMA	400°C
MAX. DIFFERENTIAL PRESSURE	15 bar (BM315) – 25 bar (BM325) – 40 bar (BM 340)

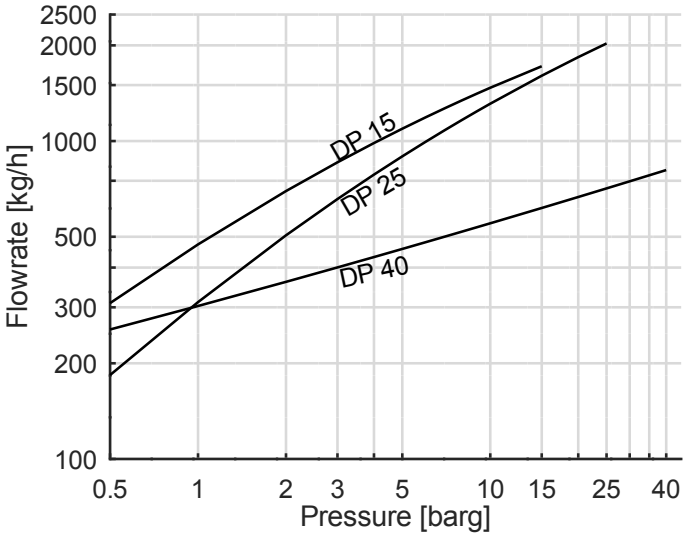
CONNECTIONS
Universal connection

MAIN FEATURES

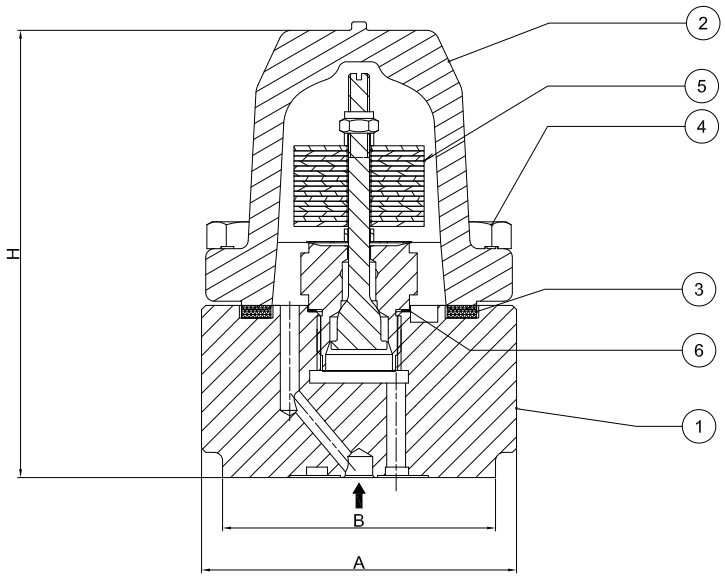
- Excellent air venting
- Can be installed in any position
- Maximum thermal efficiency under varying conditions
- Simple and reliable construction

ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load



POS	DESCRIPTION	MATERIALS		SPARES
1	BODY	ASTM A105N	ASTM A350 LF2	
2	COVER	ASTM A105N	ASTM A350 LF2	
3	BODY GASKET	SW 316/GRAPHITE	SW 316/GRAPHITE	x
4	BOLT	ASTM A193 B7	ASTM A320 L7	
5	VALVE ASSMEBLY	SS	SS	x
6	VALVE GASKET	FLAT RING SS 304	FLAT RING SS 304	x



A*	B*	H*	Weight (kg)
Ø 75	Ø 65	107	3

*Dimensions are in millimeters

INSTALLATION

Prior to installation, clean the lines by blowing through at full steam pressure to remove dirt.
For steam trapping applications the trap should be fitted below the equipment to be drained and as close to the drain point as possible.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

MAINTENANCE

The trap can be maintained without disturbing the piping connections. Ensure that trap is isolated upstream and downstream before attempting to dismantle it. A
llow the trap to cool before dismantling.
Item 3, 5 and 6 (gaskets and valve assembly) can be replaced bring the traps as new conditions

INVERTED BUCKET STEAM TRAP

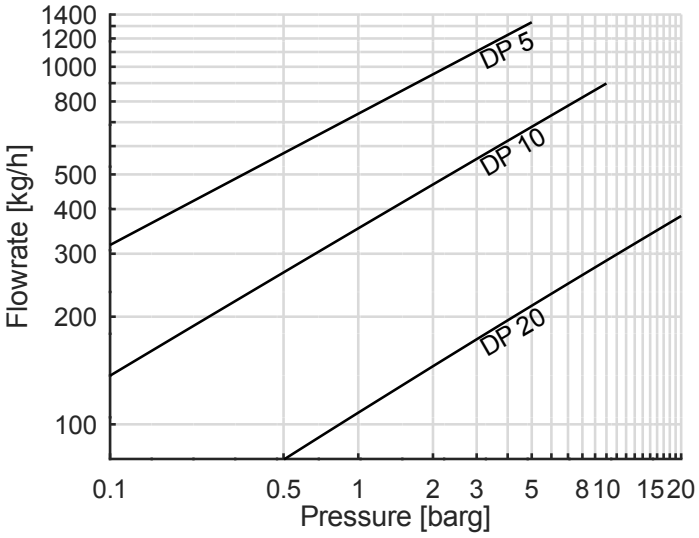
FT315UC

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	45 bar
TMA	500°C
AVAILABLE DIFFERENTIAL PRESSURE	5 – 10 – 20 bar

CONNECTIONS
Universal connection

MAIN FEATURES

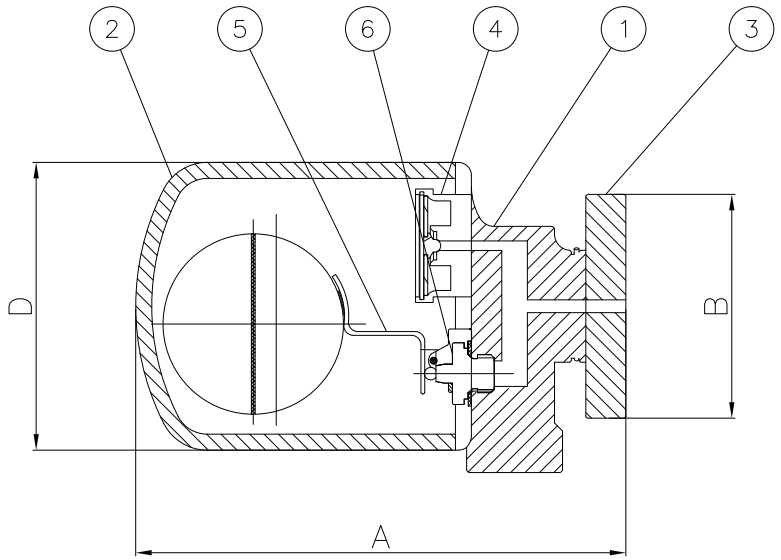
- Excellent air venting
- Discharge condensate at steam temperature
- Operates with saturated and superheated steam
- Suitable for heavy condensate load
- Simple and reliable construction



ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load

POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A351 CF8	
2	COVER	ASTM A240 304	
3	RING	SS 304 / A105	
4	THERMOSTATIC AIR VENT	SS	
5	LEVER AND BALL FLOAT	SS 304	
6	SEAT	SS 304	



D*	A*	B*	Weight (Kg)
100	155	70	1

*Dimensions are in millimeters

INSTALLATION

The trap should be fitted in horizontal or vertical pipework thank to a universal connector.
Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

INVERTED BUCKET STEAM TRAP

IB301UC

LIMITING CONDITIONS	
RATING	ANSI 300
PMA	45 bar
TMA	500°C
AVAILABLE DIFFERENTIAL PRESSURE	5 – 17 – 28 bar

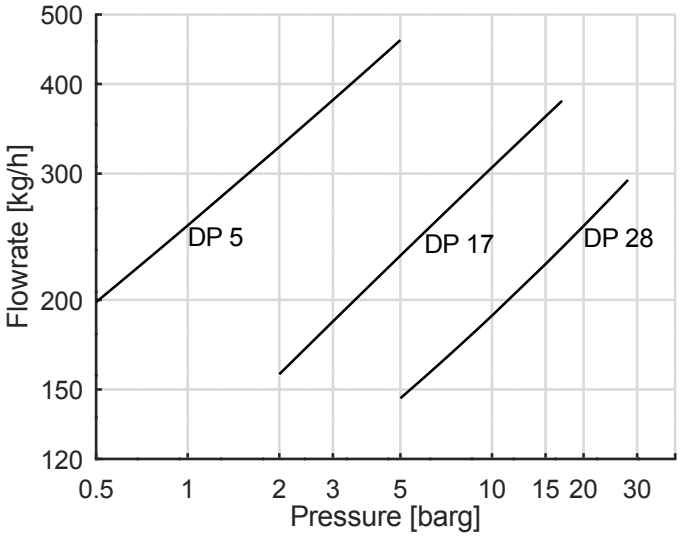
CONNECTIONS
Universal connection

MAIN FEATURES

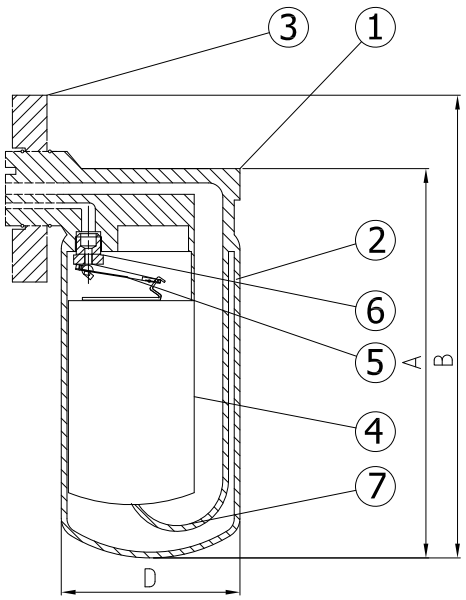
- Discharge condensate and air at steam temperature
- Operates with saturated and superheated steam
- Simple and reliable construction

ORDERING INFORMATION

- Inlet pressure
- Back pressure
- Operating temperature
- Condensate load
- End connections



POS	DESCRIPTION	MATERIALS	SPARES
1	BODY	ASTM A351 CF8	
2	COVER	SS 304	
3	RING	SS 304 / A105	
4	BUCKET	SS 304	
5	LEVER	SS 304	
6	SEAT	AISI 410	
7	PIPE	SS 304	



D*	A*	B*	Weight (Kg)
65	155	205	1

*Dimensions are in millimeters

INSTALLATION

The trap should be fitted in horizontal or vertical pipework thank to a universal connector.
Isolating valve should be installed upstream and downstream of the trap for safe maintenance.
Always open isolation valve slowly until normal operating conditions are achieved to avoid system shocks

CONDENSATE LIFT PUMP

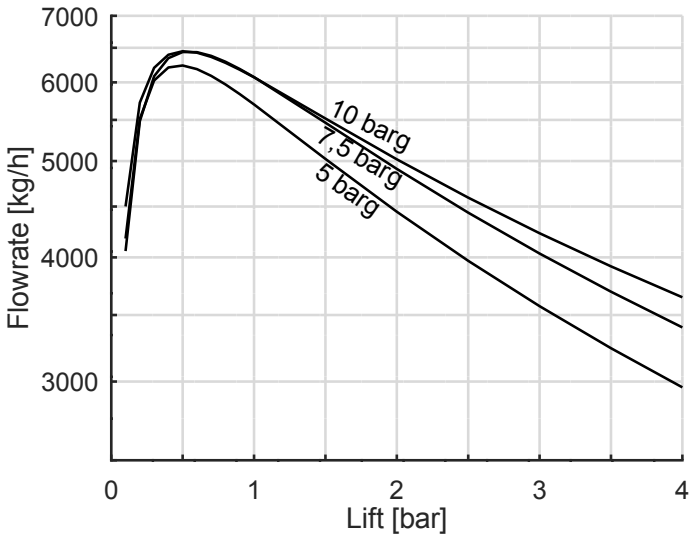
PT01

LIMITING CONDITIONS	
RATING	ANSI 150# - 300#
PMA	19 - 50 bar
TMA	400°C
MAX. OPERATIVE PRESSURE	10 bar

SIZES (NPS)	CONNECTIONS	
From 1" – 3"	Flanged	ASME B16.5 – EN 1092
	Butt weld	ASME B16.25 – EN 12627

Connections available:
1" x 1"
1.½" x 1.½"
2" x 2"
3" x 2 "

FLOWRATE FOR DIFFERENT MOTIVE PRESSURE - INLET X OULET 3"X2"



CONDENSATE LIFT PUMP

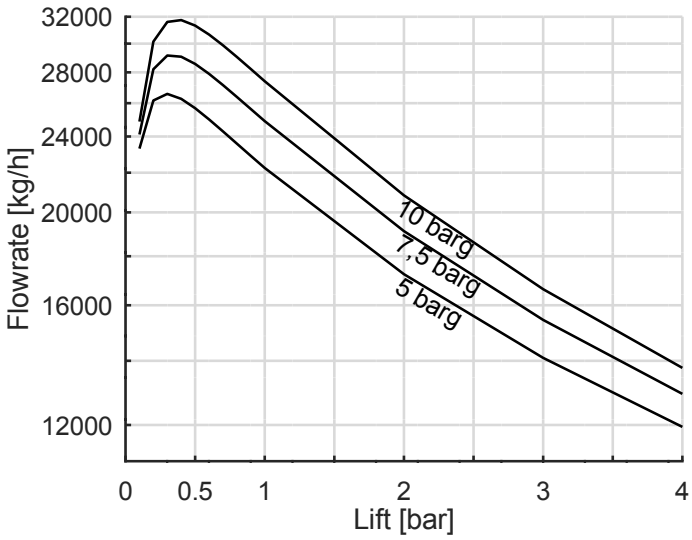
PT02

LIMITING CONDITIONS	
RATING	ANSI 150# - 300#
PMA	19 - 50 bar
TMA	400°C
MAX. OPERATIVE PRESSURE	10 bar

SIZES (NPS)	CONNECTIONS	
Up to 4	Flanged	ASME B16.5 – EN 1092
	Butt weld	ASME B16.25 – EN 12627

Suggested connections:
4" x 4"

FLOWRATE FOR DIFFERENT MOTIVE PRESSURE - INLET X OULET 4"X4"



SATURATED STEAM TABLE

PRESSURE (bar)	BOILING TEMP. °C	SPECIFIC VOLUME (steam) m3/Kg	SPECIFIC WEIGHT (steam)	TOTAL HEAT (steam enthalpy) kcal/kg	SENSIBLE HEAT (water enthalpy) kcal/kg	LATENT HEAT (evaporation) Kcal/kg
0.10	45.45	14.95	0.07	617.0	45.41	571.6
0.15	53.60	10.21	0.10	620.5	53.54	567.0
0.2	59.67	7.80	0.13	623.1	59.61	563.5
0.25	64.56	6.32	0.16	625.1	64.49	560.6
0.3	68.68	5.33	0.19	626.8	68.61	558.2
0.4	75.42	4.07	0.25	629.5	75.36	554.1
0.45	78.27	3.64	0.27	630.8	78.25	552.5
0.5	80.86	3.30	0.30	631.6	80.81	550.8
0.55	83.24	3.09	0.33	623.7	83.25	549.5
0.6	85.45	2.78	0.36	633.4	85.41	548.0
0.65	87.51	2.58	0.39	634.4	87.53	546.9
0.7	89.45	2.40	0.42	634.9	89.43	545.5
0.75	91.27	2.26	0.44	635.8	91.30	544.5
0.8	92.99	2.13	0.47	636.2	92.99	543.2
0.85	94.62	2.00	0.50	637.1	94.68	542.6
0.9	96.18	1.90	0.53	637.4	96.19	541.2
0.95	97.66	1.81	0.55	638.3	97.74	540.5
1	99.09	1.73	0.58	638.5	99.12	539.4
1.5	110.79	1.18	0.85	642.8	110.9	531.9
2	119.62	0.90	1.11	645.8	119.8	525.9
2.5	126.79	0.73	1.37	648.3	127.2	521.1
3	132.88	0.62	1.62	650.3	133.4	516.9
3.5	138.19	0.53	1.87	651.9	138.8	513.1
4	142.92	0.47	2.13	653.4	143.6	509.8
4.5	147.20	0.42	2.37	654.7	148.0	506.7
5	151.11	0.38	2.62	655.8	152.1	503.7
5.5	154.71	0.35	2.87	656.9	155.8	501.1
6	158.08	0.32	3.11	657.8	159.3	498.6
6.5	161.15	0.30	3.36	658.7	162.6	496.2
7	164.17	0.28	3.60	659.4	165.6	493.8
7.5	166.96	0.26	3.84	660.2	168.5	491.7
8	169.61	0.24	4.09	660.8	171.3	489.5
8.5	172.11	0.23	4.33	661.4	173.9	487.5
9	174.53	0.22	4.57	662.0	176.4	485.6
9.5	176.82	0.21	4.81	662.5	178.9	483.6
10	179.04	0.20	5.05	663.0	181.2	481.8
11	183.20	0.18	5.53	663.9	185.6	478.3
12	187.08	0.17	6.01	664.7	189.7	475.0
13	190.71	0.15	6.49	665.4	193.5	471.9

PRESSURE (bar)	BOILING TEMP. °C	SPECIFIC VOLUME (steam) m3/Kg	SPECIFIC WEIGHT (steam)	TOTAL HEAT (steam enthalpy) kcal/kg	SENSIBLE HEAT (water enthalpy) kcal/kg	LATENT HEAT (evaporation) Kcal/kg
14	194.13	0.14	6.97	666.0	197.1	468.9
15	197.36	0.134	7.47	666.6	200.6	466.0
16	200.43	0.13	7.93	667.1	203.9	463.2
17	203.35	0.12	8.40	667.5	207.1	460.4
18	206.14	0.11	8.89	667.9	210.1	457.8
19	208.81	0.11	9.37	668.2	213.0	455.2
20	211.38	0.10	9.84	668.5	215.8	452.7
21	213.85	0.10	10.33	668.7	218.5	450.2
22	216.23	0.09	10.81	668.9	221.2	447.7
23	218.53	0.09	11.29	669.1	223.6	445.5
24	220.75	0.08	11.78	669.3	226.1	443.2
25	222.90	0.08	12.26	669.4	228.5	440.9
26	224.99	0.08	12.75	669.5	230.8	438.7
27	227.02	0.08	13.25	669.6	233.2	436.4
28	228.98	0.07	13.72	669.7	235.2	434.5
29	230.90	0.07	14.23	669.7	237.5	432.2
30	232.76	0.07	14.70	669.7	239.5	430.2
32	236.35	0.07	15.70	669.3	243.7	425.6
34	239.77	0.06	16.69	669.3	247.6	421.7
36	243.04	0.06	17.69	669.3	251.3	418.0
38	246.17	0.05	18.68	669.3	254.8	414.5
40	249.18	0.05	19.69	669.0	258.2	410.8
42	252.07	0.05	20.72	668.7	261.7	407.0
44	254.87	0.05	21.74	668.5	265.0	403.5
46	257.56	0.04	22.77	668.2	268.2	400.0
48	260.17	0.04	23.80	667.9	271.3	396.6
50	262.70	0.04	24.85	667.3	274.2	393.1
55	268.89	0.04	27.50	666.2	281.4	384.8
60	274.29	0.03	30.21	665.0	288.4	376.6
65	279.54	0.03	32.97	663.6	294.8	368.8
70	284.48	0.03	35.78	662.1	300.9	361.2
75	289.17	0.03	38.66	660.5	307.0	353.5
80	293.62	0.02	41.60	658.9	312.6	346.3
85	297.80	0.02	44.62	657.0	318.2	338.8
90	301.92	0.02	47.71	655.1	323.6	331.5
95	305.80	0.02	50.91	653.2	328.8	324.4
100	309.53	0.02	54.21	651.1	334.0	317.1
110	316.58	0.02	61.08	646.1	344.0	302.7
120	323.15	0.01	68.42	641.9	353.9	288.0

BASIC DEFINITIONS

STEAM
It is simply the gas that is formed when water is heated to its boiling temperature at a given pressure.

SENSIBLE HEAT
Heat that produces a temperature rise in a body such as water.

LATENT HEAT OF VAPORIZATION
Heat that produces a change of state without a change in temperature, such as changing water into steam.

SATURATED STEAM OR DRY SATURATED STEAM
When heat is applied to water, its temperature continues to rise until it reaches its boiling point at that pressure. As further heat is added, the water vaporizes and converts to steam. The steam that exists at the same temperature as the water from which it is formed is known as saturated steam.

SATURATION TEMPERATURE
It is the temperature for a corresponding saturation pressure at which a liquid boils into its vapor phase

WET STEAM
Typically, steam is not dry but contains fine water droplets resulting from the boiling process. The significance is that wet steam has a lower heat content than dry saturated steam.

SATURATED WATER
Water at the same temperature as the steam which it is in contact with.

SUPERHEAT
Heat added to dry saturated steam to increase its temperature.

CONDENSATE
Any time steam releases its heat energy (latent heat), the steam condenses back to water. This water is therefore referred to as condensate, which is nothing more than extremely hot water.

FLASH STEAM
The term is traditionally used to describe steam formed from hot condensate when the pressure is reduced. Flash steam is no different from normal steam, it is just a convenient name used to explain how the steam is formed. Normal or "live" steam is produced at a boiler, steam generator, or waste heat recovery generator. Flash steam occurs when high pressure/ high temperature condensate is exposed to a large pressure drop such as when exiting a steam trap.

CDB PLUG VALVES

CDB Plug valves are designed for use in the most severe service applications, where performance and safety are critical. CDB Engineering offers a complete range of in-house-engineered plug valves to completely meet customers' specifications. Thanks to our consolidated expertise in the field of oil and gas supply to major EPC companies, our extended machining capability and dedicated in-house assembly and test facilities, CDB has included a complete range of plug valves in its products portfolio.

LUBRICATED PRESSURE BALANCE PLUG VALVE

EXPANDING PLUG VALVE

PTFE – SLEEVE PLUG VALVE

PFA – LINED PLUG VALVE

3 WAY LUBRICATED PLUG VALVES

CDB PROCESS EQUIPMENT & PACKAGES

CDB Process Division is focused on the design, manufacturing and supply of tailor-made solutions for the Oil&Gas Process Industry. Our multi-disciplined engineering team has proven expertise in the design of high valued engineered solutions providing support during the entire project lifecycle. We ensure a single-point responsibility, starting from process and detailed engineering to commissioning and start up.

AUTOMATIC FILTRATION SYSTEM

ELECTRO CHLORINATION SYSTEM

PROCESS DEHYDRATION PACKAGE

STRAINERS AND ANCILLARIES

NOTES: Catalogue is available on request

STRAINERS

Ytype

UL basket

Cast steel basket

Tee Type

Simplex Basket

Rubber lined basket

Duplex basket

ANCILLARIES

Sight Glasses

Sight Glasses

Sample Coolers

CDB ENGINEERING WORLDWIDE

OUR EXPERIENCE

We have extensive experience in cooperating with some of the major Oil & Gas Companies, EPC Contractors and Engineering firms.

OIL&GAS COMPANIES

EPC CONTRACTORS

CDB ENGINEERING S.P.A.
Via L. Maggi, 19
26841 Casalpusterlengo (Lo), Italy
Tel. +39 0377 912268 - Fax +39 0377 910668
info@cdbengineering.com
www.cdbengineering.com