

What is a Drain Separator ?

In a steam/air piping system, condensate (water) causes problems, such as rust and water hammer. It also decreases the dryness and heat quantity content of steam and thermal efficiency in a steam system.

The DS-1 and DS-2 are separators making use of centrifugal force and impact force to effectively separate condensate inside piping.

■ Problems related to existence of condensate in the piping system

Failure to properly handle condensate in steam piping and air/gas systems results in various problems.

Declined thermal efficiency

Condensate in a steam system reduces the effective heat quantity (latent heat) in addition to the dryness of steam. In some situations, condensate exposes an excessive load on a steam trap, making the discharge capacity insufficient. It also forms water film on the heating surface of the system, which prevents thermal conduction and reduces the system's efficiency.

Additionally, the water directly carried over from a boiler (hot water before evaporation) contains a lot of impurities, and part of them form scale that blocks thermal conduction on the heating surface.

Formation of scale

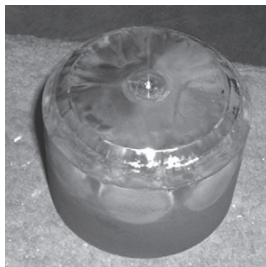
In general, carbon steel pipes for piping are widely used for steam piping. When drain or another liquid contacts them, rust forms. It is quite likely that pressure reducing valves and other control units will malfunction due to scale, including rust.

Condensate problems in air/gas systems

Piping or valve corrosion attributable to condensate causes a strainer or trap to clog, and cleaning by air blowing sometimes increases contamination against expectations.

Outbreak of water hammer

Water is higher than steam in density and slows its velocity inside piping because of its characteristics. However, condensate inside steam piping is carried by steam flowing at high velocity and may give a strong vibration or load to a valve or controlling unit when condensate strikes against it. This is called water hammer and causes damage to or wear (erosion) in units.



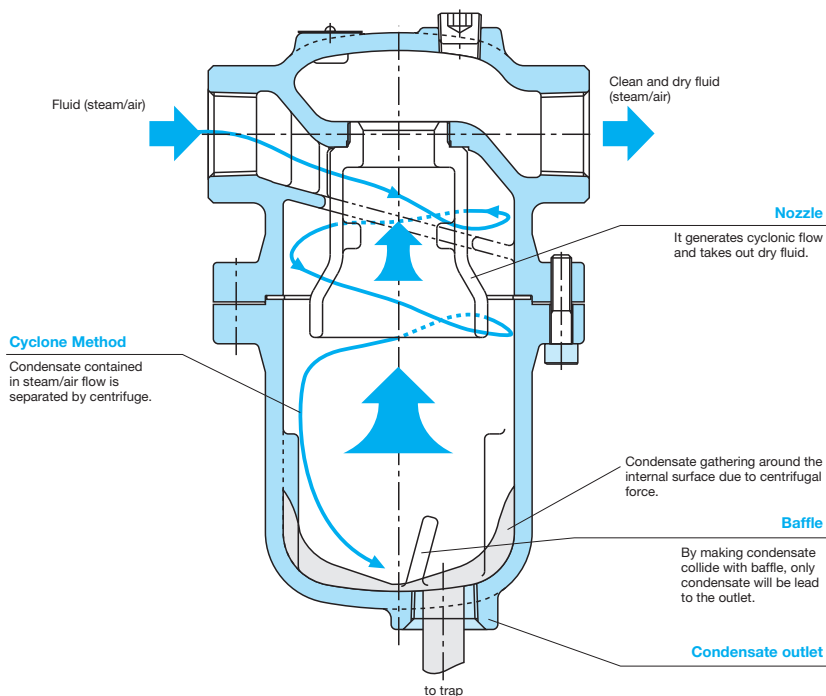
Erosion on main valve of pressure reducing valve

Structure and Principal of Drain Separator

Step
0

2

There is no movable part. The capacity will not change almost permanently, since the design itself has made this performance possible.



■Operation

When steam or air flow into the drain separator, centrifugal force is generated by internal structure. Condensate circles along the internal surface of the body due to difference of specific gravity.



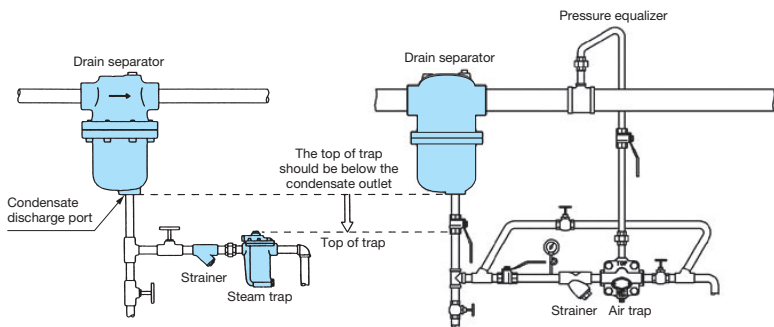
- Size of separator can be the same as piping size. Since sectional area of inside separator is larger than piping size, pressure loss is considered as zero.
- Since no movable parts are used inside, the drain separator is maintenance-free (except the deterioration of the gasket).

Guidelines for Drain Separator

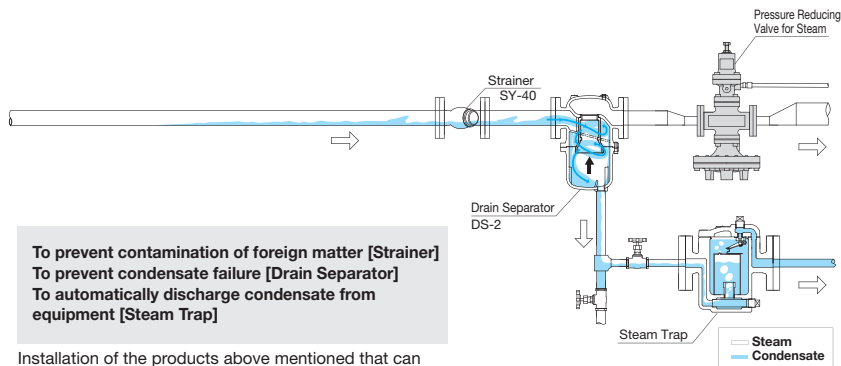
Step
0

<For steam>

<For air>



- Connect the drain separator horizontally to piping with the condensate discharge port down.
 - Install the trap under the condensate discharge port.
 - Set the top of the trap lower than the condensate discharge port of the drain separator.
 - Top cover of steam trap should be lower than the condensate discharge port.
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- Make sure to install strainer, drain separator, steam trap in front of steam pressure reducing valve.
 - Most of the problems for steam pressure reducing valve are from condensate problem or scale problem inside the pipe.



**To prevent contamination of foreign matter [Strainer]
To prevent condensate failure [Drain Separator]
To automatically discharge condensate from
equipment [Steam Trap]**

Installation of the products above mentioned that can be safe and secure steam line.

DS-1,2

Condensate (drain) in steam and air piping causes a decline in thermal efficiency, water hammer, corrosion of devices, valves, pipes, and many other problems.

The DS-1 and DS-2 drain separators are capable of efficiently separating condensate from steam and air with the aid of centrifugal force generated from the configuration of the passage. In normal condition, use a separator of the same size as piping for both steam and compressed air systems.



DS-1



DS-2

■Features

1. High efficient drain separation due to cyclone type.
2. Extremely low pressure loss.
3. Trouble-free by minimizing the number of moving parts.

■Specifications

Model	DS-1	DS-2	
Size	15A-50A	15A-100A	150A *1
Application	Steam, Air		
Maximum pressure	2.0 Mpa *2 (Less than 1.0 MPa for air)		1.8 MPa *2 (Less than 1.0 MPa for air)
Maximum temperature	220°C		
Material	Body	Ductile cast iron	
	Nozzle	Cast iron	
	Receiver	Ductile cast iron	
Connection	JIS Rc screwed	JIS 10K/20K FF flanged	JIS10KFF·JIS20KRF

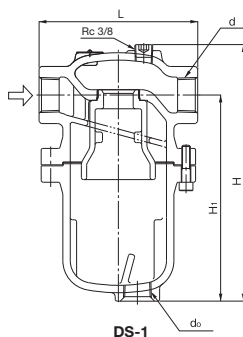
*1 150A require class 2 pressure vessel approval for use in Japan.

*2 JIS10KFF and JIS10KRF is up to 1.0MPa.

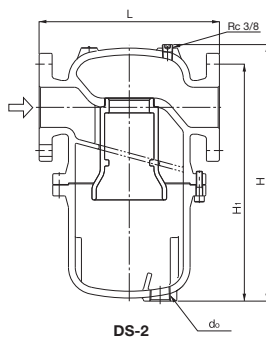
■Dimensions (mm) and Weights (kg)

Model	Nominal size	d	L	H	H ₁	d ₀	Weight
DS-1	15A	Rc 1/2	150	243	193	Rc 3/4	7.1
	20A	Rc 3/4	150	243	193	Rc 3/4	7.1
	25A	Rc 1	150	243	193	Rc 3/4	7.3
	32A	Rc 1-1/4	190	282	213	Rc 1	12.5
	40A	Rc 1-1/2	190	282	213	Rc 1	12.5
	50A	Rc 2	219	342	260	Rc 1	20.5
DS-2	15A	-	174 (178)	243	193	Rc 3/4	8.5 (8.7)
	20A	-	204 (208)	243	193	Rc 3/4	9.6 (9.8)
	25A	-	204 (208)	243	193	Rc 3/4	10.1 (10.5)
	32A	-	222 (226)	282	213	Rc 1	15.6 (16.0)
	40A	-	242 (246)	282	213	Rc 1	16.3 (16.7)
	50A	-	246 (250)	342	260	Rc 1	24.7 (24.9)
	65A	-	288 (292)	418	314	Rc 1	40.0 (40)
	80A	-	335 (343)	484	361	Rc 1-1/4	54.0 (56.0)
	100A	-	390 (402)	594	445	Rc 1-1/4	96.0 (100.0)
	150A	-	556 (568)	880	603	Rc 2	280 (290)

· The above values in parentheses are the dimensions and weights of JIS 20K flanged.



DS-1



DS-2

■Selecting a Nominal Size

Keep the instruction described below in mind to enable the drain separator to operate most effectively and meet working conditions to the fullest extent possible.

- Selecting a drain separator nominal size
Select the same nominal size as that of piping (nominal size of piping = nominal size of drain separator). Using a drain separator of a smaller nominal size may increase pressure loss, resulting in failure to keep the specified pressure at the outlet of a unit.

■Guidelines for Drain Separator

1. Check the following direction of the fluid and the inlet and outlet directions of the drain separator in advance, and properly install it.
2. When connecting it to piping, securely support the product and the piping with a lifting device.
3. When installing the product, secure the space of the dimension H_3 shown in the figure below, which is required for maintenance and inspections.

* When using model DS-1, 2 for steam application, it is recommended to replace the gasket after 2 years as a guide.

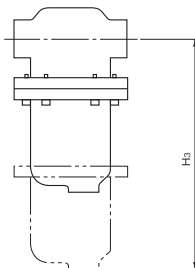


Table 1: Working flow velocity

Application	Flow velocity
Steam	30 m/sec or less
Air	15 m/sec or less

* Keep the fluid below the specified flow velocity.

* A higher flow velocity may cause condensate separation to fail.

Table 2: Maintenance required dimension

Model	Nominal size	H ₃
DS-1 DS-2	15A	210
	20A	210
	25A	210
	32A	240
	40A	240
	50A	290
DS-2	65A	350
	80A	410
	100A	550
	150A	1000