

Models DS-1, DS-2

Drain Separator

Operation Manual

Thank you very much for choosing the Yoshitake's product. Please read this instruction manual thoroughly before using the product, so that you may do so correctly and safely. Please carefully store this manual in a handy place.

— — — The following safety symbols are used in this manual. — — —



This symbol indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.



This symbol indicates a hazardous situation that, if not avoided, may result in minor or moderate injury or may result in only property damage.

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1. Features

Condensate in steam or air pipes cause troubles such as decline in heat efficiency, water hammer and corrosion of equipment/valve/pipe. The Drain Separator DS-1 and DS-2 can effectively separate condensate by centrifugal force generated by the shape of the flow path.

2. Specifications

Model	DS-1	DS-2	
Nominal size	15A-50A	15A-100A	150A *1
Application	Steam*3, Air		
Maximum pressure	2.0MPa (Air: Less than 1.0MPa)		1.8MPa*2 (Air: Less than 1.0MPa)
Maximum temperature	220°C		
Connection*4	JIS Rc screwed	JIS 10KFF flanged JIS 20KFF flanged	JIS 10KFF flanged JIS 10KRF flanged JIS 20KRF flanged

*1 DS-2 size 150A requires Class-2 pressure vessel approval if it is used in Japan.

If used in countries other than Japan, carefully check the country's standards, regulations and laws on pressure vessels before use. Specifications such as applicable fluid, maximum pressure and temperature may differ depending on the country's standards and regulations.

*2 For JIS10KFF and JIS10KRF flanges, maximum pressure is 1.0MPa.

*3 A gasket is durable for 1 to 2 years when applied to steam.

*4 Other connection standards upon request. Contact us for details.

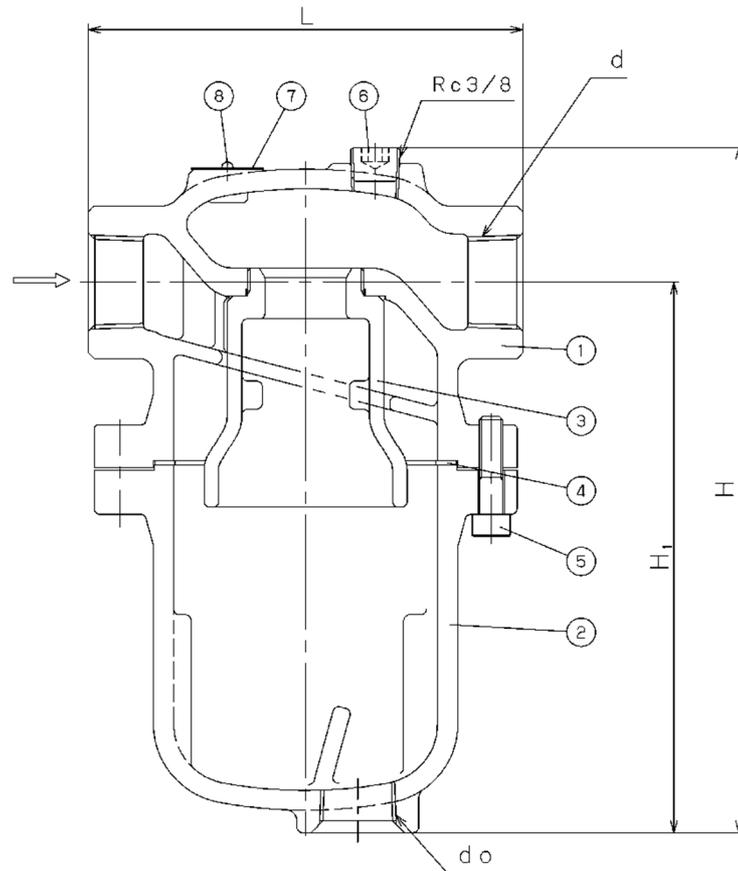
Caution

(1) Please collate with attached name plate and specification of ordered model.

* Please consult factory in case they do not match each other.

3. Dimensions, weights, and structure

[DS-1]



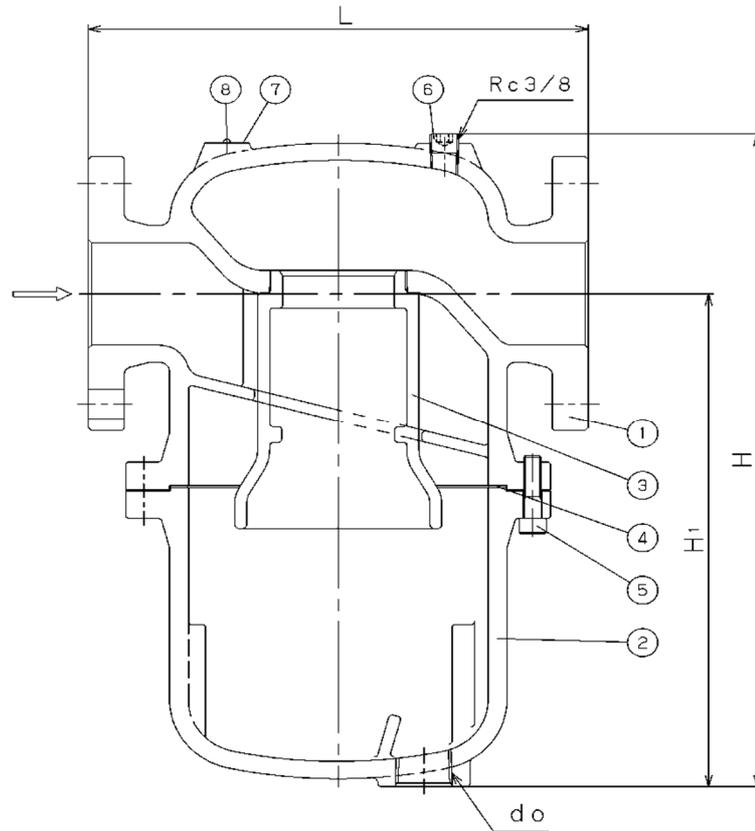
[Figure 1]

(mm)

Nominal size	d	L	H	H ₁	D ₀	Weight (kg)
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

No.	Parts name	No.	Parts name
1	Body	5	Bolt
2	Receiver	6	Plug
3	Nozzle	7	Name Plate
4	Gasket	8	Rivet

[DS-2 (size 15-100A)]



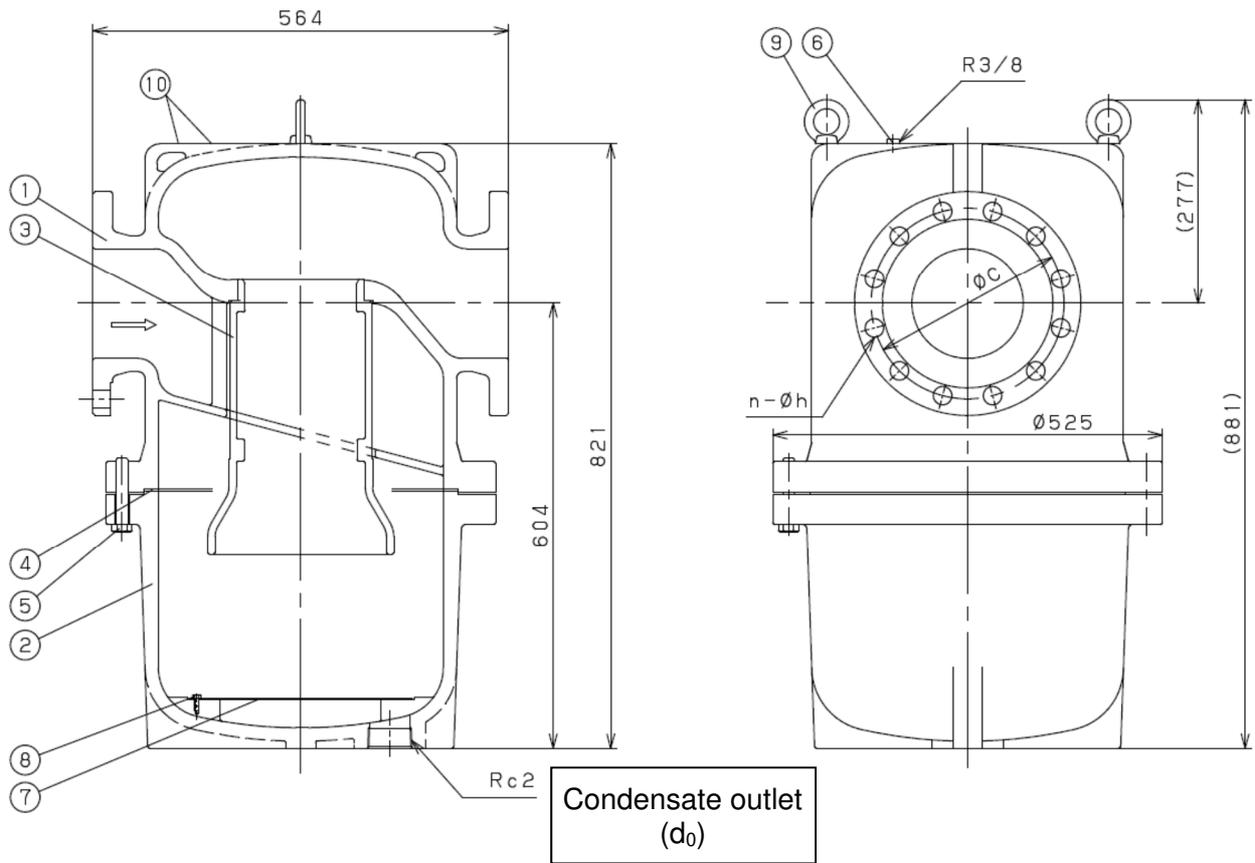
[Figure 2]

(mm)

Nominal size	L (JIS 20K)	H	H ₁	D ₀	Weight (JIS 20K) (kg)
15A	178	243	193	Rc 3/4	8.7
20A	208	243	193	Rc 3/4	9.8
25A	208	243	193	Rc 3/4	10.5
32A	226	282	213	Rc 1	16.0
40A	246	282	213	Rc 1	16.7
50A	250	342	260	Rc 1	24.9
65A	292	418	314	Rc 1	40.0
80A	343	484	361	Rc 1 1/4	65.0
100A	402	594	445	Rc 1 1/4	100.0

No.	Parts name	No.	Parts name
1	Body	5	Bolt
2	Receiver	6	Plug
3	Nozzle	7	Name Plate
4	Gasket	8	Rivet

[DS-2 (size 150A)]



[Figure 3]

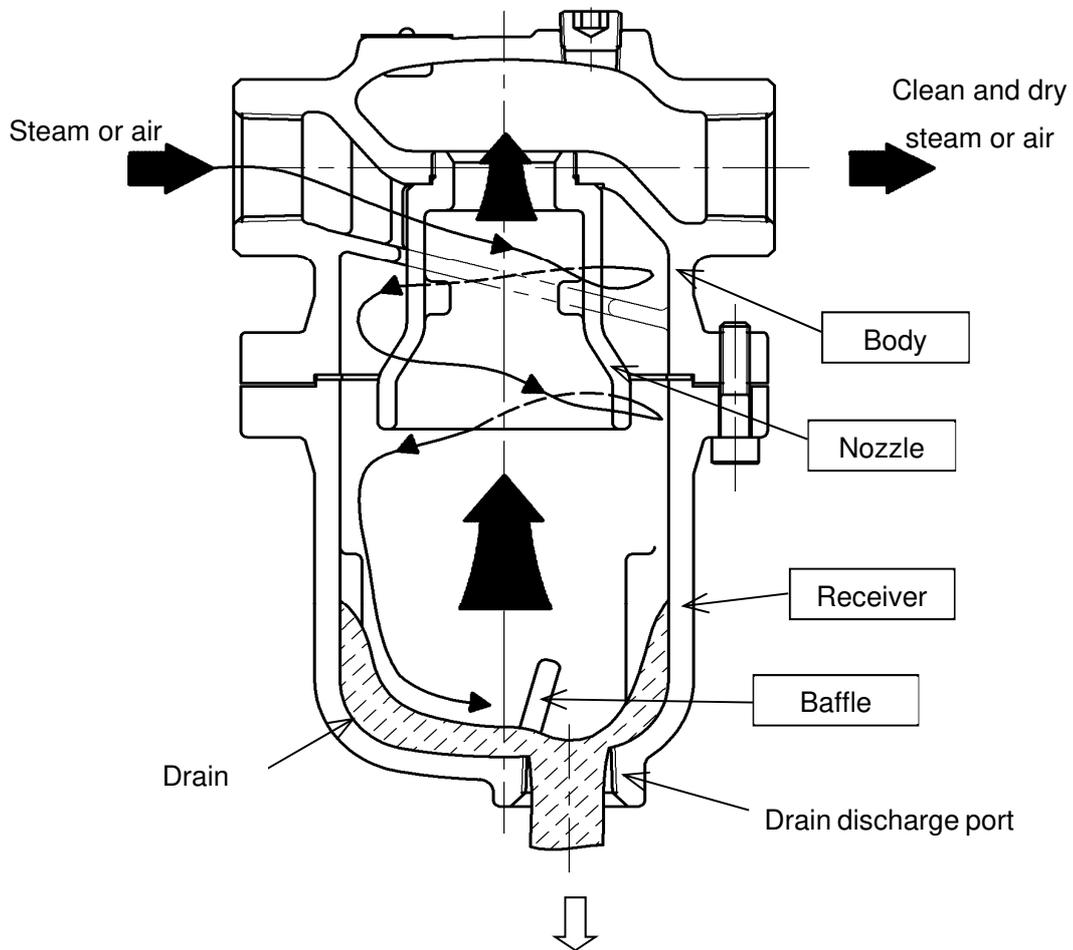
Weight: 290kg (dry weight)

*Dimensions above are for JIS20KRF. For other flanges, the face-to-face dimension and the weight will be different

No.	Parts name	No.	Parts name
1	Body	6	Plug
2	Receiver	7	Baffle plate
3	Nozzle	8	Bolt
4	Gasket	9	Eye bolt
5	Bolt	10	Name plate

4. Operation

The steam or air flow is subjected to a centrifugal force when it enters the drain separator. As soon as steam or air flows into the drain separator, centrifugal force starts to work by the internal structure of the body. Condensate swirls along the wall surface in consequence of the difference in specific gravity between it and the steam or air, and strikes against the baffle. The condensate is then guided to discharge port, while clean and dry steam or air flow to the outlet side through the nozzle.



[Figure 3]

5. Selection of nominal size

To make the best use of the drain separator and satisfy the operating requirements to the maximum, take notice of the following.

[Selection of nominal size]

Select a nominal size equivalent to that of the pipe (piping nominal size = nominal size of drain separator). Note that the use of a smaller nominal size increases the pressure loss through the drain separator, possibly causing inadequate pressure at equipment inlet.

Table 1: Maximum flow velocity

Fluid	Maximum flow velocity
Steam	30 m/s
Air	15 m/s

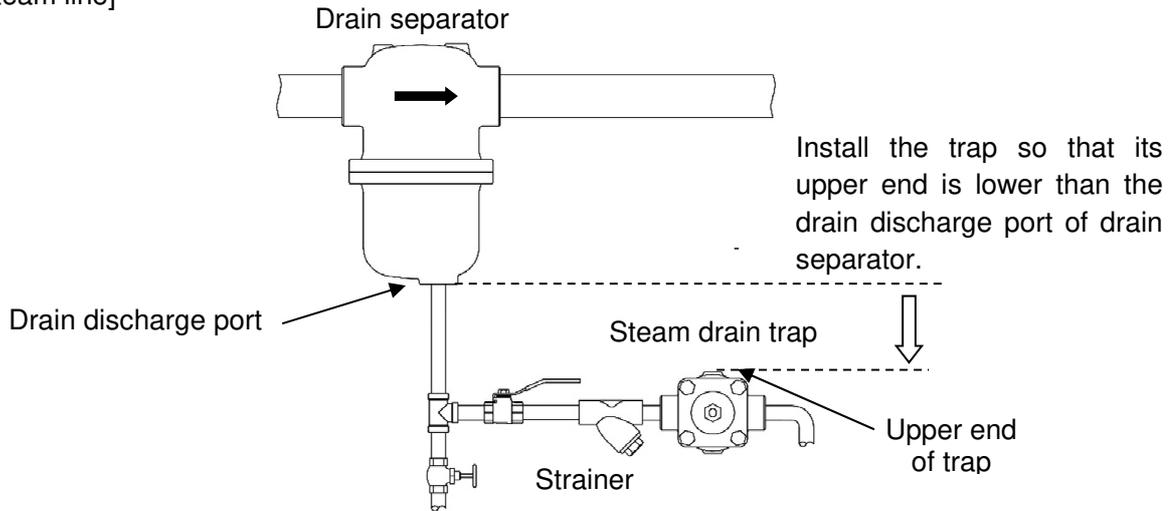
*Use drain separator at less than maximum flow velocity.

*If flow velocity is too fast, the drain separator cannot function satisfactorily.

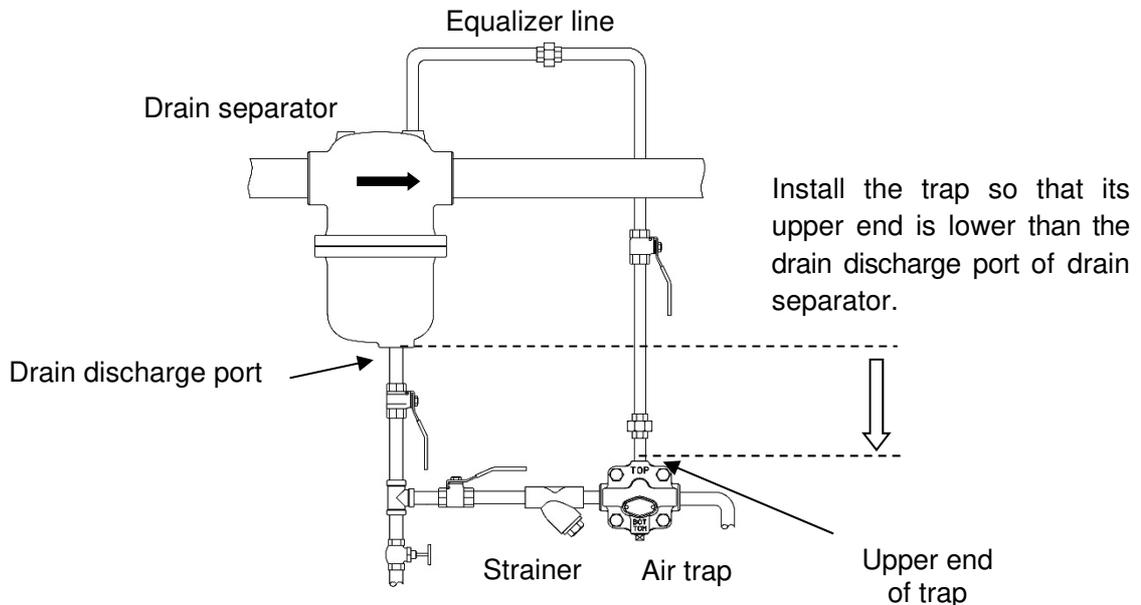
6. Installation procedures

6.1 Piping example

[Steam line]



[Air line]



[Figure 4]

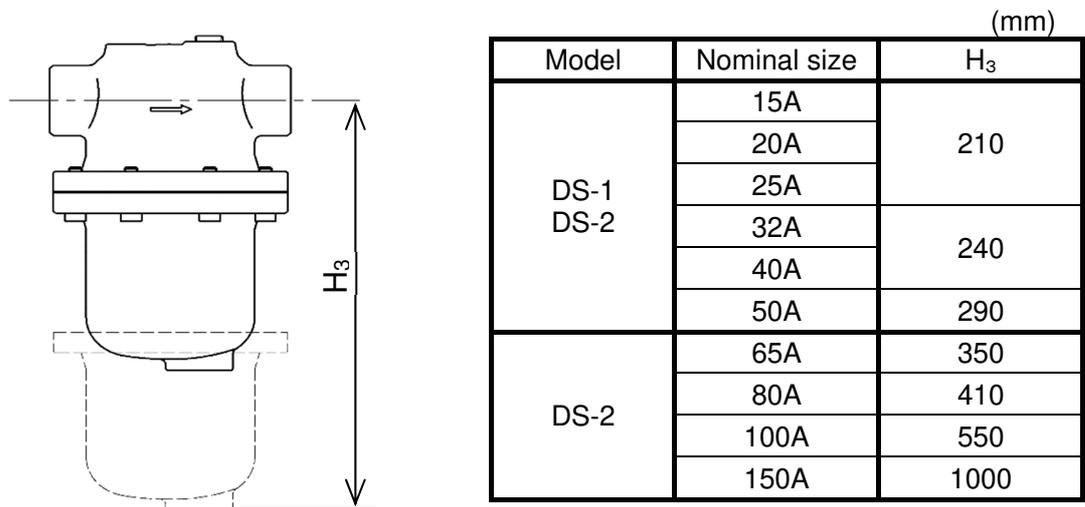
6.2 Caution in installation

Warning

- (1) The product is heavy and shall be securely suspended with a hoist or the like when installed. (For the weight of the product, see section 3 "Dimensions, weights, and structure.")
*Failure to suspend the product may cause it to fall down, possibly resulting in injury.
- (2) Place supports when installing DS-2 size 150A.

⚠ Caution

- (1) Install the product in such a way that the arrow on the body follows the fluid flowing direction.
 - * Installing the product in a wrong direction prevents the product from performing as intended.
- (2) Firmly support pipes and secure the product.
 - * If an excessive stress is applied to the pipes, the product may be deformed.
- (3) When installing the product, reserve a space required for maintenance and inspection as specified in Figure 5.
 - * Failure to do so prevents later maintenance and inspection.
- (4) Firmly connect pipes.
 - * If incompletely connected, the fluid may leak from pipes when vibration is applied. The fluid may scald your skin.
- (5) Connect the drain separator horizontally to piping with the drain discharge port down.
 - * Failure to do so prevents the product from performing as intended.
- (6) Be sure to install a trap under the drain discharge port. (For connection size for trap, see the size of d_0 shown in section 3 "Dimensions, weights, and structure".)
 - * Failure to do so prevents discharging the drain.
- (7) Install the trap so that its upper end is lower than the drain discharge port of drain separator. (See section 6.1 "Piping example".)
 - * Failure to do so prevents discharging the drain.
- (8) Do not apply excessive load, bend or vibration to the product.
- (9) The product or parts will be damaged if impact of rapid pressure fluctuation is applied, such as water hammer.
- (10) If the product is left connected to a sealed piping, volume expansion of the fluid in the pipe due to fluid temperature rise may damage the product.
- (11) Be sure to remove foreign substances and scales in the pipe. Seal tape, liquid sealant or other materials used for piping connection should not be flow into the pipe. Such foreign substances, scales or sealant may cause malfunction.



[Figure 5]

7. Operation procedures

7.1 Caution in operation

Warning

- (1) Before letting the fluid into the product, check that there will be no possibility of danger if the fluid flows into the ends of piping.
- * The hot fluid, if spouted out, may scald your skin.
 - * The fluid outflow may cause physical damage.

8. Maintenance procedures

8.1 Periodic self-inspection

*For part numbers, refer to “3. Dimensions, weights, and structure”

Warning

When overhauling or inspecting the product, be sure that the product and piping internal pressures have been released to the atmosphere.
When the fluid is hot, cool the product down until it can be touched by bare hand.
*The residual pressure in the product or piping may lead to injury or burn.

Perform a self-inspection once a year on following items.

- (1) Abnormalities on body [1] and receiver [2].
- (2) Slackness or abnormalities on bolt [5]
- (3) External leakage

If any abnormalities are found in the self-inspection, refer to “8.2 Troubleshooting” and replace the product or parts.

8.2 Troubleshooting (See Figure 1 or 2)

Trouble	Cause	Remedy
Fluid leaks out of the product.	Leak from gasket [4] between body [1] and [2].	Replace gasket [4]. (Refer to 8.3)
	Leak from plug [6].	Remove plug [6], replace plug and seal tape and re-assemble.
Condensate is not separated.	Fluid velocity in the pipe is too high.	Review and follow velocity on Table 1.
	Nozzle [3] is damaged. Baffle plate [7] is damaged. (for 150A only)	Replace the product. (Nozzle and baffle plate cannot be detached from the product.)
Damage or abnormalities on appearance of the product.	Body [1] or receiver [2] has abnormalities.	Replace the product. (Body or receiver cannot be replaced separately.)
	Bolt [5] is loose or has abnormalities.	Detach all the bolts [5] and replace gasket [4]. (Refer to 8.3) Replace the bolts if they have abnormalities. (Use replacement bolt from Yoshitake.)

Refer to “8.3 Caution in disassembly and assembly” and “8.4 Disassembly procedures” when replacing parts.

8.3 Caution in disassembly and assembly

Warning

- (1) Before disassembling or inspecting the product, check that pressures inside the product, piping and devices have been released to the atmosphere.
 - * A residual pressure inside the product may lead to injury or burns.
- (2) If the fluid is hot, cool it down until it can be touched by bare hand.
 - * A hot fluid may scald your skin.

Caution

- (1) Clean up the faces of the body and receiver which the gasket is touching.
 - * Failure to do so may lead to leak from the gasket, and may result in injury or burns.
- (2) Replace the gasket and assemble the parts securely. Tighten the bolts evenly in the diagonal order.
 - * The gasket is a consumable part. If it is reused, leakage might occur. A hot fluid may scald your skin.

8.4 Disassembly procedures

* Tools used

Tool name	Nominal size
Hexagon socket wrench	Nominal 6 mm (15A-50A)
	Nominal 8 mm (65A-80A)
	Nominal 10 mm (100A)
Spinner handle	Used with hexagon socket wrench.
Box end wrench	Nominal 24mm (150A)

- (1) After confirming that no pressure is left inside the drain separator, remove the bolt [5] using a spinner handle with hexagon socket wrench.
- (2) Remove the receiver [2] and the gasket [4].



The receiver is heavy and shall be securely suspended with a hoist or the like when removed. Failure to suspend the product may cause it to fall down, possibly resulting in injury.

8.5 Assembly procedures

* Tools used

Tool name	Description (sizes)
Torque wrench	Use one capable of tightening at the torque of 30-200N·m. Used with hexagon socket wrench.
Hexagon socket wrench	Nominal 6 mm (15A-50A) Nominal 8 mm (65A-80A) Nominal 10 mm (100A)
Open head wrench	Width across flat: 24mm (150A)

(1) Replace the gasket [4] with a new one. Before assembling a new one, apply the paste on the entire surface and inside surface of the gasket.

(Recommended paste is SOLVEST110 manufactured by STT Co. Ltd.)

(2) Attach the new gasket [4] to the receiver [2]. First, temporarily install the bolt [5], and then tighten it evenly with a torque wrench at the torque shown in Table 2.

Table 2: Tightening torques

Nominal size	Bolt nominal size	Tightening torque
15A-25A	M8	30 N·m
32A-40A		35 N·m
50A		45 N·m
65A	M10	80 N·m
80A		85 N·m
100A	M12	145 N·m
150A	M16	200N·m

9. Disposal

When disposing the product, refer to the drawing to check the material of the parts and dispose each part properly.