Model TB-20・20F

STEAM TRAP

Installation & Operation Manual

This manual provides the installation and maintenance procedures for TB-20 steam trap manufactured by Yoshitake. Please read and understand this manual before starting operations and keep this manual carefully.

———The precautions in this manual are divided into two levels depending on the degree of injury that may result.———

⚠ Warning	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ Caution	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It is also used to alert against property damage.

Contents

YOSHITAKE

■EPDT-199c■

1. Specifications

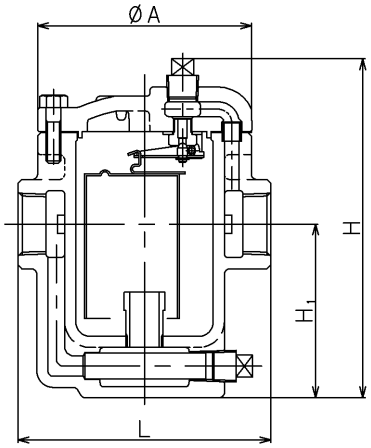
Model		TB-20	TB-20F	
Nominal Size		15A,20A,25A		
Connection		JIS Rc screwed (※)	BSEN PN25 flanged GB/T PN25 flanged JIS20KFF flanged	JIS10KFF flanged
Application		Steam condensate		
Max. Differential Press.	(A)	0.3 MPa		
	(B)	0.6 MPa		
	(C)	1.0 MPa		
	(D)	1.6 MPa		—
Max. Temperature		220℃		
Material	Body	Ductile cast iron		
	Valve	Stainless steel (Heat treated)		
	Valve seat	Stainless steel (Heat treated)		

※ NPT connection is also available.

⚠ Caution

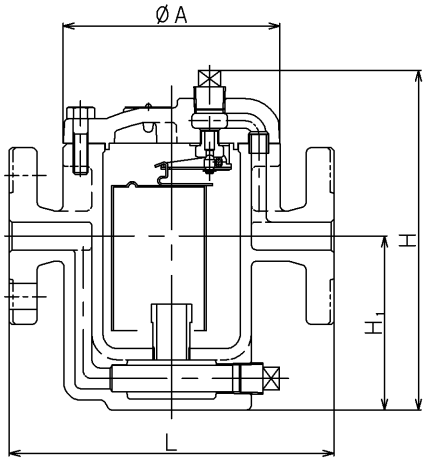
(1) Please confirm that the indications on the product name plate coincide with the specifications of the ordered product model before usage.
※In case they do not coincide, do not use the product and contact us.

2. Dimensions and Weight



TB-20 (mm)

Nominal size	L	H	H_1	A	Weight (kg)
15A	136	183	94	117	4.3
20A					
25A					



TB-20F (mm)

Nominal size	L	H	H_1	A	Weight (kg)
15A	175	183	94	117	5.4
20A					6.0
25A					6.3

3. Discharge Capacity

(1) Be sure to consider the outlet pressure of the steam trap since the discharge capacity is based on the pressure difference between inlet and outlet. For example, the discharge capacity at 0.5 MPa inlet pressure and 0.2 MPa outlet pressure is determined at 0.3 MPa pressure difference.

(2) Secure a safety factor of 2～3. For example, it should be used a steam trap whose discharge capacity is 200～300 kg/h when 100 kg/h discharge is needed.

■Discharge capacity

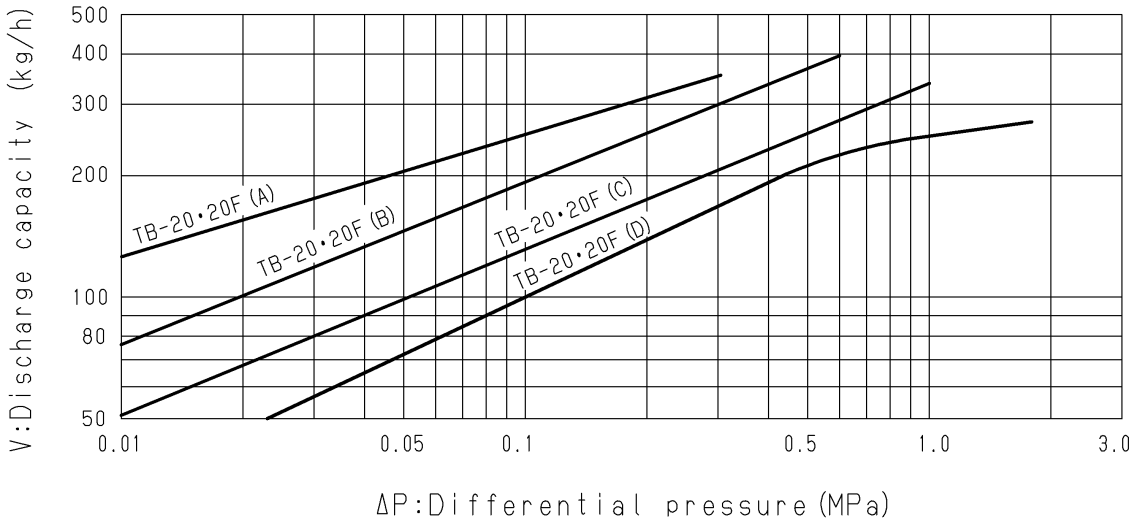
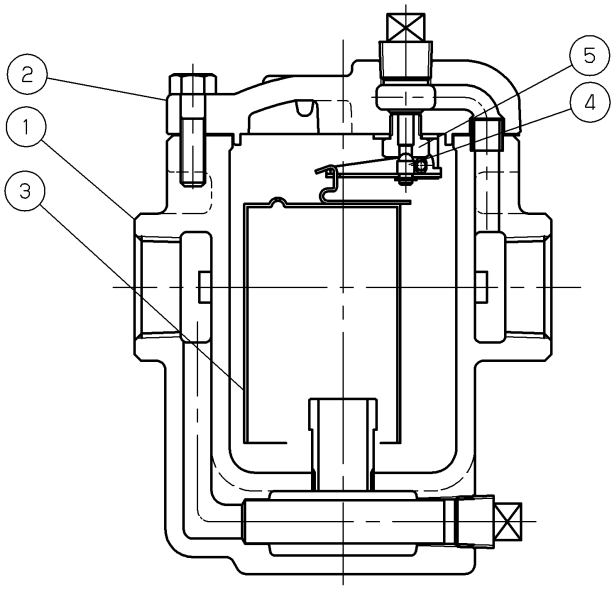


Fig.1 Discharge capacity chart

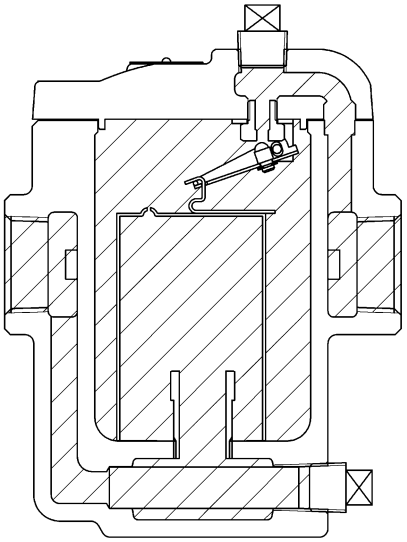
4. Outline of Operation



No.	Name of parts
1	Body
2	Cover
3	Bucket P
4	Valve
5	Valve seat

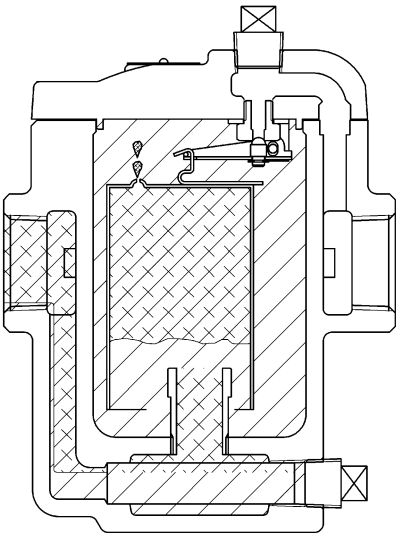
(1) Start of discharge

The air in a trap is pushed up with low-temperature condensate, passes along a upper valve seat, and is discharged at an outlet side. Low-temperature condensate also passes along the inside and the perimeter of a bucket by inflow of high-temperature condensate, and is discharged from a upper valve seat to an outlet side.



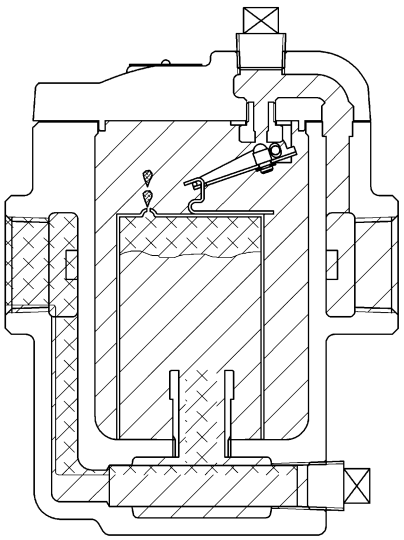
(2) Closing operation

If steam enters in a bucket following high-temperature condensate, a bucket will come floating and will close a valve seat. If there is no inflow of condensate, carrying out a closed valve is continued.

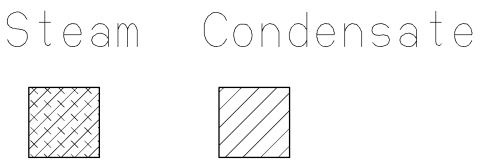


(3) Operation to discharge condensate

If condensate flows in again, a bucket will lose lift, and will sink. A valve will be opened and condensate will be discharged from a valve seat at an outlet side.



Henceforth, the operation of (2) and (3) is repeated according to the amount of generating of condensate.



5. Installation

5. 1 Precautions for installation

⚠ Warning

(1) Connect the outlet side piping to safe places where human damage does not occur, even if condensate is blown off.
※When condensate is blown off, there is a possibility of carrying out a burn and an injury.

⚠ Caution

(1) Before connecting the trap to the piping, be sure to remove dust and dirt inside the piping.
※If such foreign materials enter the trap, it may not perform correctly.
※Take care not to enter a sealing tapes or some sealant into the trap.
(2) Confirm the direction of the flow and the trap and install the trap correctly.
※If install it incorrectly, it may not perform correctly.
(3) Connect the trap by turning up in horizontal piping.
※If connect it incorrectly, it may not perform correctly.
(4) Support or fix the piping certainly.
※If excessive piping stress is subjected to the trap, it may not perform correctly.
(5) Do not disassemble the trap recklessly.
※If disassemble the trap, there is a possibility of malfunction of it.
(6) In order to clean and inspect the strainer, the space shown in the Fig. 2 is required.
※If it is not secured, inspection and maintenance is impossible.
(7) Prevent the freeze of condensate.
※If condensate freezes, it may cause the damage of trap.
(8) Connect the trap to piping certainly.
※If connection is inadequate, it may cause leakage by vibration etc.
(9) Avoid using a quick-operating valve in the vicinity of the trap. (Refer to Fig.3)
※It may cause a generation of water-hammer and damage of the trap.

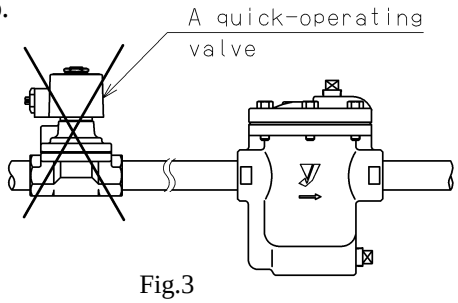


Fig.3

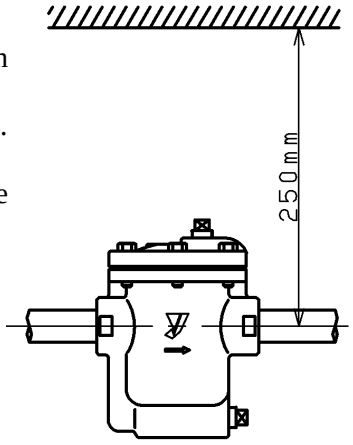
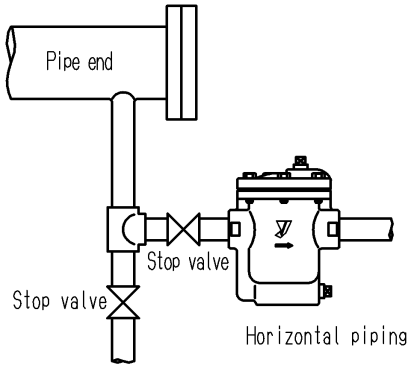
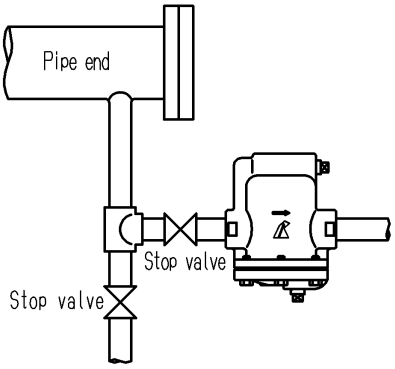
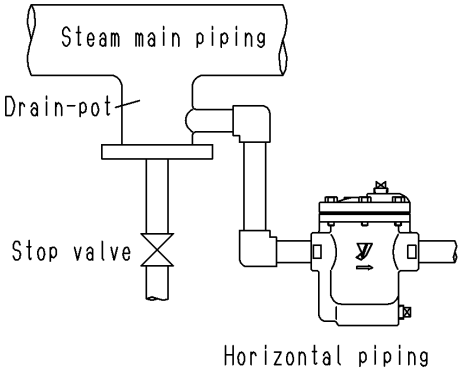
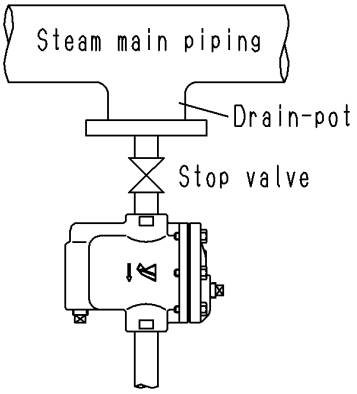
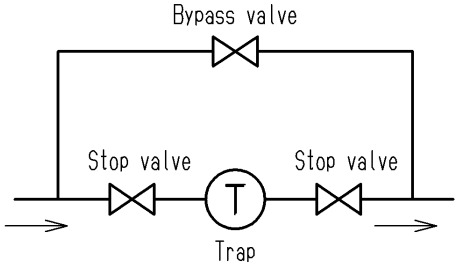
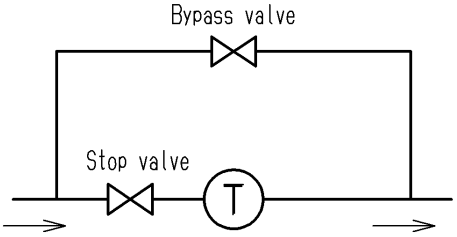
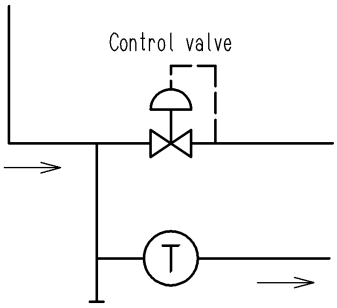
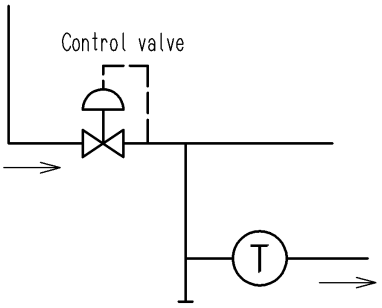
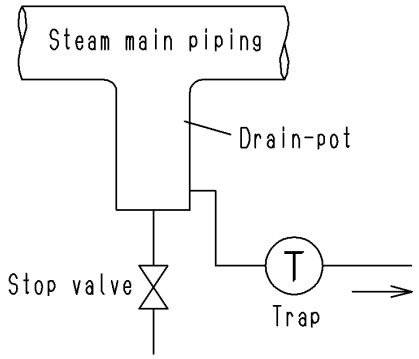
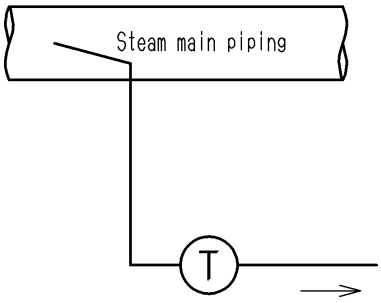
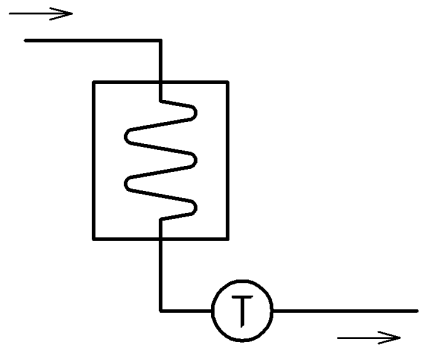
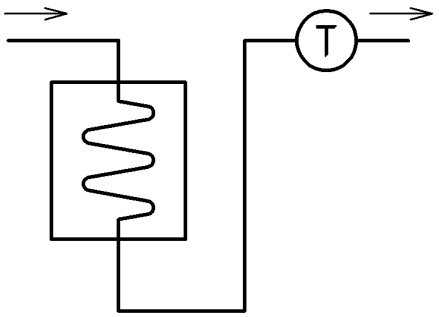
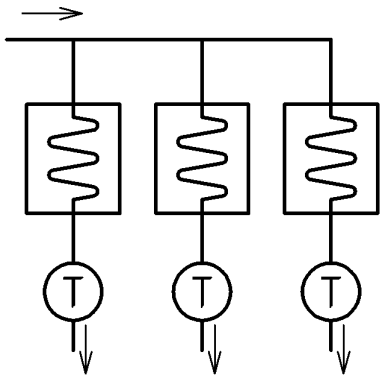
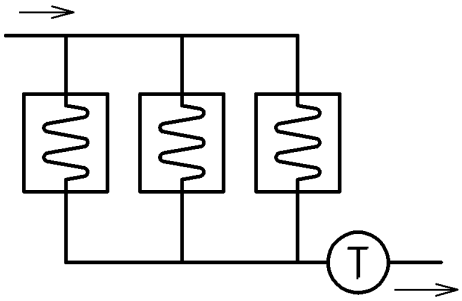
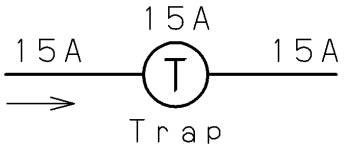
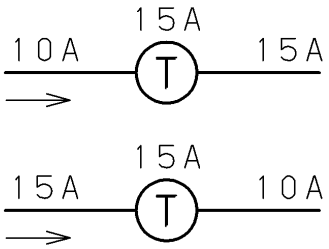


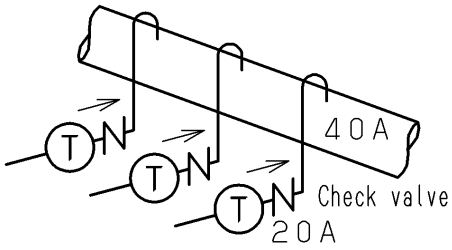
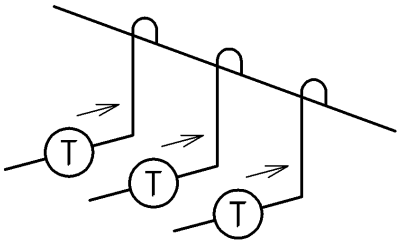
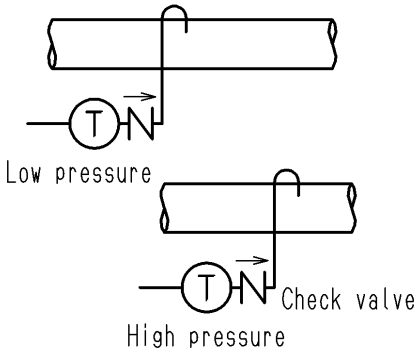
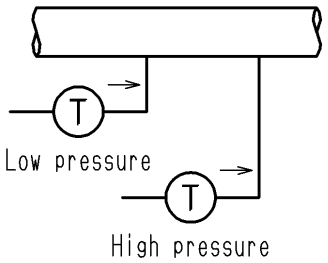
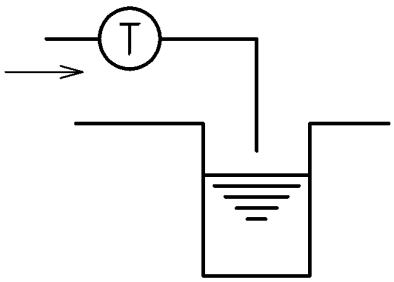
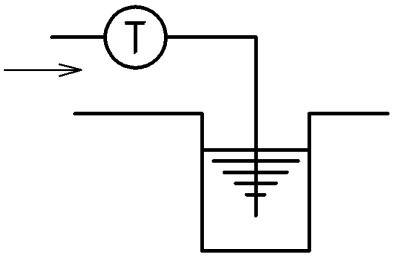
Fig.2

(10) Install a trap in the lowest possible position to collect condensate to the trap by their weight. And make a slope to piping.
(11) Make a drain-pot before a trap when the trap is installed to main steam line.
(12) Do not install a trap where atmosphere temperature is higher than the temperature of condensate.
(13) If a bypass pipe is installed in parallel, there are the following advantages.
・Available to discharge large amount of condensate and air at start-up period by opening the bypass valve.
・Blow-off at the time of piping establishment is possible by closing the inlet/outlet valves of the trap and opening the bypass valve.
・Inspection of a trap and replacement of parts are possible, without stopping operation.

5. 2 Piping diagrams

Matter	Proper piping	Improper piping
Connect the trap by turning up in horizontal piping.		
		
Install a stop valve after the trap when bypass pipe is installed.		
Install the trap before a control valve when it is installed in the vicinity of the control valve.		

Matter	Proper piping	Improper piping
Connect the trap in the lowest position when it is installed to main steam line.		
Install a trap in the lowest position of a equipment generating condensate.		
Install traps one-by-one for discharge from some equipments.		
Install same nominal size piping in outlet side against the inlet side.		 ※Difference between inlet pipe size and outlet pipe size may cause drop of inlet pressure and increase of back pressure.

Matter	Proper piping	Improper piping
The size of collecting condensate pipe should be larger than the sum area of each discharge pipe. And install check valves for prevention of back flow.		
For condensate recovery, connect condensate pipe to the top of return pipe. Install individual return pipe for each pressure. And install check valves for prevention of back flow.		 ※Back pressure of low pressure line is increased with flash steam in high pressure line.
Not to soak a pipe end in the water of pit.		 ※Soak the pipe end in water may cause malfunction of trap with foreign material siphoned.

6. Operation

6. 1 Precautions for operation

⚠ Warning

(1) Confirm that there is no danger even if steam and condensate are flown to the end of piping.
※Blow-off of steam or condensate may cause burn.
(2) Do not stand in front of the outlet opening of piping at confirmation of trap operation. Large amount of condensate must be discharged at the first operation.
※Blow-off of condensate may cause burn.

⚠Caution

(1) Confirm there is condensate in the trap at the first operation.
※If the filling up of condensate does not exist, steam can be blown out continuously.

7. Maintenance

7.1 Troubleshooting

Trouble	Cause	Measure
No discharge	1. Operating pressure is higher than the proper pressure of the trap.	1. Replace the trap which can be used the operating pressure.
	2. Valve seat⑤ is clogged.	2. Disassemble and clean the valve seat⑤.
	3. Bucket vent is clogged.	3. Disassemble and clean the bucket vent.
	4. Screen⑨ is clogged.	4. Disassemble and clean the screen.
	5. Breakage of trap by freezing or water-hammer, etc.	5. Replace the trap.
Poor discharge of condensate.	1. Too low pressure difference due to too high back pressure.	1. Examine inlet/outlet pressure of the trap and whole piping condition.
	2. Screen⑨ is clogged.	2. Disassemble and clean the screen.
Condensate continues blowing off.	1. There is foreign material between valve④ and valve seat⑤.	1. Disassemble and clean the valve④ and the valve seat⑤.
	2. There is flaw or wear between valve ④ and valve seat⑤.	2. Replace them by the conversion kit or the cover assembly.
	3. Low discharge capacity to specified condition.	3. Replace the trap to proper one.
	4. Lever holder⑦ is deformed.	4. Replace the trap.
	5. Too high back pressure.	5. Examine the piping condition.
	6. Disappearance of condensate in the trap.	6. Please make condensate flow in to the bucket.
Leakage to the outside	1. Leakage between body ① and cover②.	1. Replace gasket⑩ between the body① and the cover②.
	2. Leakage around plug⑪・⑫.	2. Remove, rewind sealing tapes and reassemble the plug⑪・⑫.
	3. Breakage of trap by freezing.	3. Replace the trap and take a measure to prevent freezing.

※Refer to "7.6 Exploded drawing" for the part name of the above table.
※Use a hexagonal socket (Double-side width: 1/2", 12.7mm) for disassembly and assembly of the valve seat.
※Contact us if you are not sure on necessity of damaged parts replacement.

7.2 Cautions for maintenance and inspection

⚠Warning

(1) Before starting disassembly and inspection, make sure that the residual pressure in the trap, piping and equipment is relieved and wait until the temperature of them are sufficiently lowered.
※If residual pressure is not relieved, you can be injured. If the temperature is still high, you can get burned.
(2) Do not touch the trap with bare hands.
※There is a possibility of carrying out a burn.
(3) Do not re-tighten the hexagonal bolts⑬ even if there is leakage between the body① and cover②.
※There is a possibility of carrying out a burn by breakage of gaskets⑩ and blowing out of steam.

⚠Caution

(1) Carry out periodical inspection by following "7.5 Periodical inspection".
※Ordinary user must ask an inspection of special contractor.
(2) After long time down of system, working inspection of trap should be carried out before operation.
※There is a possibility of malfunction with rust in the trap and piping.

7.3 Cautions for disassembling and reassembling

⚠Warning

(1) Disassembly and reassembly should be done by experts who design, construct and/or maintain installations using steam.
※An ordinary person must not disassemble a product. Ask a special contractor to take a measure for the trouble.
(2) Before starting disassembly and reassembly, make sure that the residual pressure in the trap, piping and equipment is relieved and wait until the temperature of them are sufficiently lowered.
※If residual pressure is not relieved, you can be injured. If the temperature is still high, you can get burned.

⚠Caution

(1) Receive internal condensate flowing out with a container at the time of disassembly
※There is a possibility of soiling surrounding apparatus.
(2) Take care not to drop parts at the time of disassembly. Place the disassembled parts on soft cloth etc. not to give a crack.
※If the parts have a crack, there is a possibility of malfunction.
(3) At the time of reassembly, take care to assemble the parts certainly and tighten the bolts at the diagonal position operation. Refer to table-1 for tightening valve seat⑤ and hexagonal bolts⑬.
※Reassembly and tightening in incorrect can cause malfunction and leakage to the outside.

table-1 : Bolting torque (Recommendation value)

Name of parts	Bolting torque (N・m)
Valve seat⑤	35
Hexagonal bolts⑬	30

(4) Regular parts must be used for repair of a product. Do not alter the product.
※There is a possibility of injury or burn by the damage of product, blowing out of steam or condensate and malfunction.
(5) Use new gaskets at the time of reassembly.
※Gaskets are consumable parts. There is a possibility of leakage to the outside if it is re-used.

(6) When the trouble of continuation blowing out by existence of foreign materials between the valve and seat, contact us since there is a possibility of necessity of parts replacement.

※Repair of the products with the trouble of continuation blowing out by existence of foreign materials at the customer using is paid service.

7.4 Procedure for disassembling and reassembling

(1) Remove each part by removing hexagonal bolts⑬ and pulling up cover②.

(2) Tear spindle⑧ out of cover②, and remove lever-P⑥ and bucket-P③.

(3) Remove valve seat⑤ by using hexagonal socket (Double-side width: 1/2", 12.7mm).

(4) Remove plug⑫ and pulling out screen⑨.

(5) Assembly should be performed the contrary of the disassembly procedure. Use new gaskets.

(5-1) Plug⑫ should be tightened after confirmation that screen is certainly inserted to the back.(Fig.4).

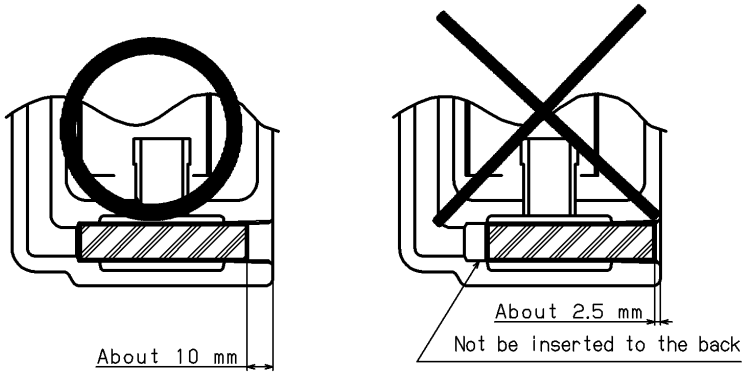


Fig.4

(5-2) Tighten the plug⑫ after rewinding sealing tapes.

(5-3) Refer to Table-1 for tightening the valve seat⑤ and the hexagonal bolts⑬. Apply liquid sealant to the thread of the valve seat⑤.
(Recommendation: No. 1209 Three Bond Co., LTD.)

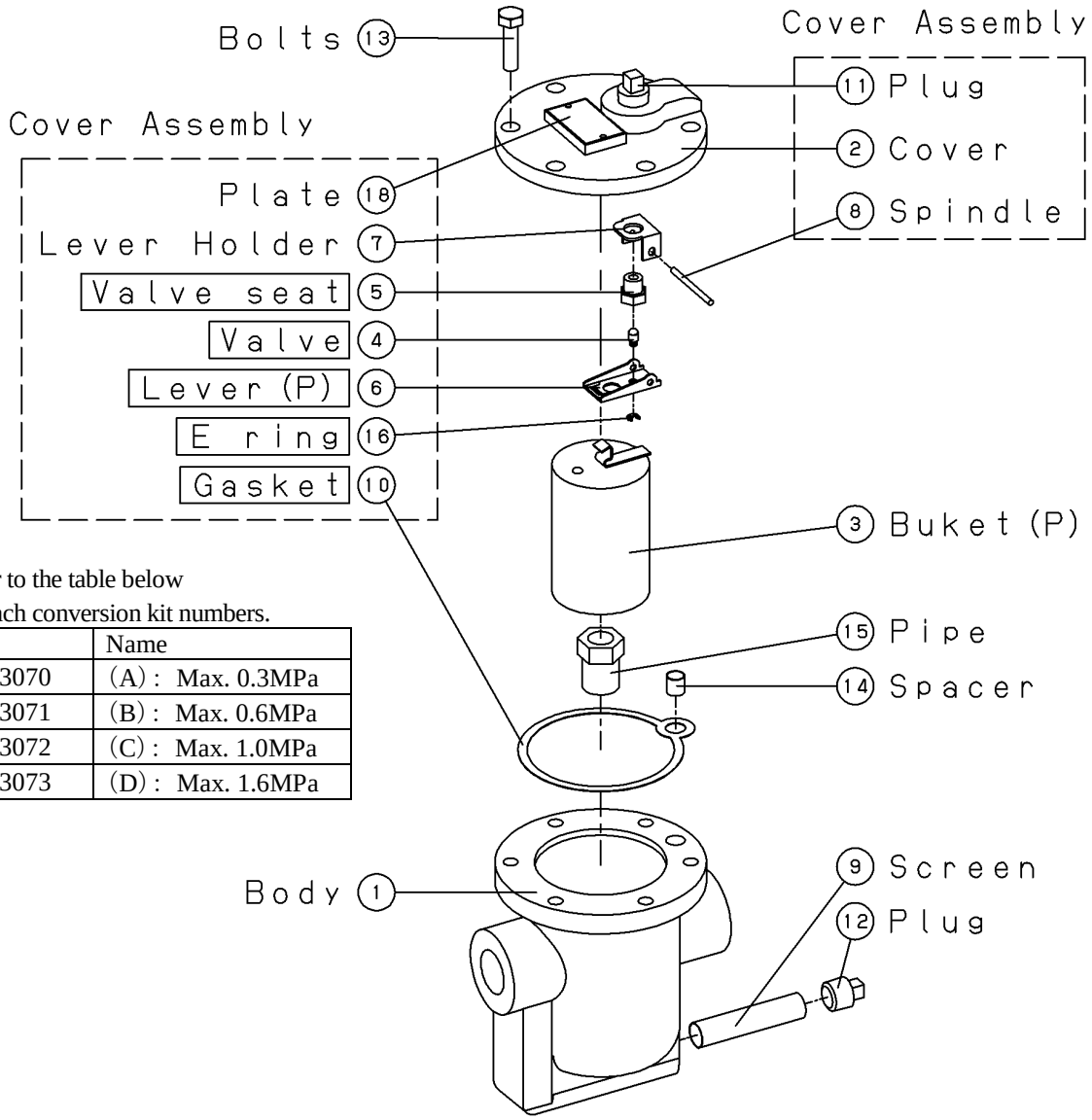
7.5 Periodical inspection

Carry out periodical inspection of trap to maintain its specified performance.

1. Periodical inspection (1 time/year)

Item to be checked	Method	Trouble and measure	
Discharge of condensate	Check with eyes	(1) No discharge	Refer to "7.1 Troubleshooting"
		(2) Poor discharge	
		(3) Continuous blowing out	
Leakage to outside	Check with eyes	Refer to "7.1 Troubleshooting"	

7.6 Exploded drawing



Refer to the table below
for each conversion kit numbers.

No.	Name
K-93070	(A) : Max. 0.3MPa
K-93071	(B) : Max. 0.6MPa
K-93072	(C) : Max. 1.0MPa
K-93073	(D) : Max. 1.6MPa

※ The parts shown in the boxes ▭ are consumable items.
These are available as conversion kits as shown in the table above.
※ Cover assembly shown in the broken lines ⬚ is also available for easy replacement.
※ Refer to the table below for replacement period.

No.	Name of parts	Replacement period (Estimation)
⑩	Gasket	At disassembly
④⑤	Valve, Valve seat	When scratches or wear exist