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Armstrong Double Duty™ 4

Steam Trap/Pump Combination

Installation and Maintenance

IB-118

This bulletin should be used by experienced personnel as a guide to the installation and maintenance of the Armstrong DD4 or DD4 package. Selection or installation of equipment should always be accompanied by competent technical assistance. We encourage you to contact Armstrong or its local representative if further information is required.

Application

When there is modulating control on heat exchange equipment there is a possibility that the system will stall (no longer be able to drain condensate). If only a steam trap is used in this case condensate could flood the heat exchange equipment causing corrosion, water hammer, and poor temperature control. The Double Duty™ - 4 has a steam trap with an integral pump to prevent the system from stalling. If the condensate floods the body of the Double Duty™ - 4 and reaches its upper trip point high pressure steam will enter the body and push the condensate out. This prevents condensate from accumulating in the heat exchange equipment.

Suggested Accessories

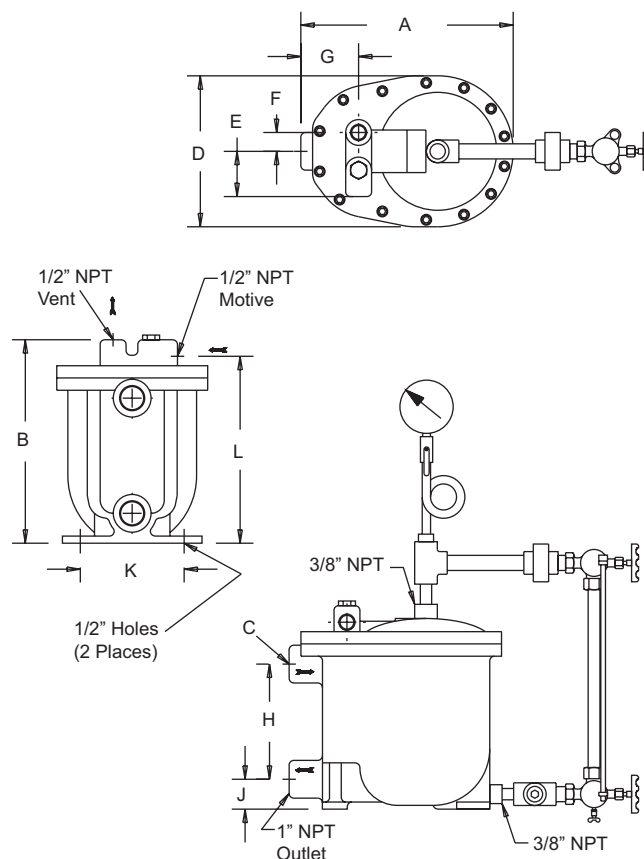
- Stainless steel discharge check valve
- Gauge glass assembly for pump
- Gauge glass assembly for receiver
- Pressure gauge assembly pump body
- Pressure gauge assembly receiver
- Pressure gauge assembly motive steam
- Pressure gauge assembly heat exchange equipment
- Receiver

Features

1. The trap has an integral pump to prevent flooding of the heat exchange equipment. It uses steam motive with no electricity or special mechanical seals required.
2. The majority of parts are attached to the cap which can be removed from the body without taking it out of the condensate line.

Double Duty™ 4 Specifications	
Model	DD4
Motive Fluid	Steam
Maximum Operating Pressure	72 psi
Minimum Motive Differential	5 psi
Maximum Operating Temperature	320°F
Body	Ductile Iron
Mechanism	Stainless Steel
Float	Stainless Steel
Connections	NPT
Inlet Check Valve	Integral (swing type)
Discharge Check Valve	Optional 1" NPT Stainless Steel

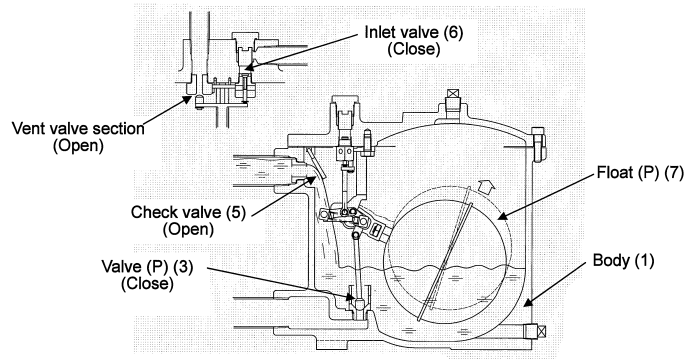
Double Duty™ 4 Physical Data		
	in	mm
"A"	11-3/16	284
"B"	10-13/16	274
"C"	1	50
"D"	8	203
"E"	2-7/16	61
"F"	1	25
"G"	3	76
"H"	6-1/8	155
"J"	1-5/8	41
"K"	5-1/2	140
"L"	9-15/16	251
Weight lb (kg)	37 (17)	



Operation

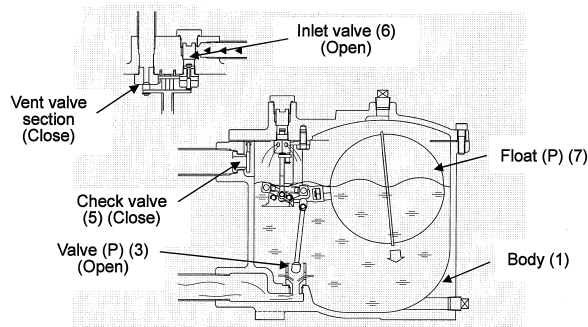
Operating as a trap (system pressure greater than back pressure)

As the condensate flows through the inlet check valve (5), the float (P)(7) becomes buoyant and rises with the fluid level. The upward movement of the float causes trap valve (P)(3) to open. If the system pressure is greater than the back pressure the condensate will flow through the steam trap valve into the condensate return.

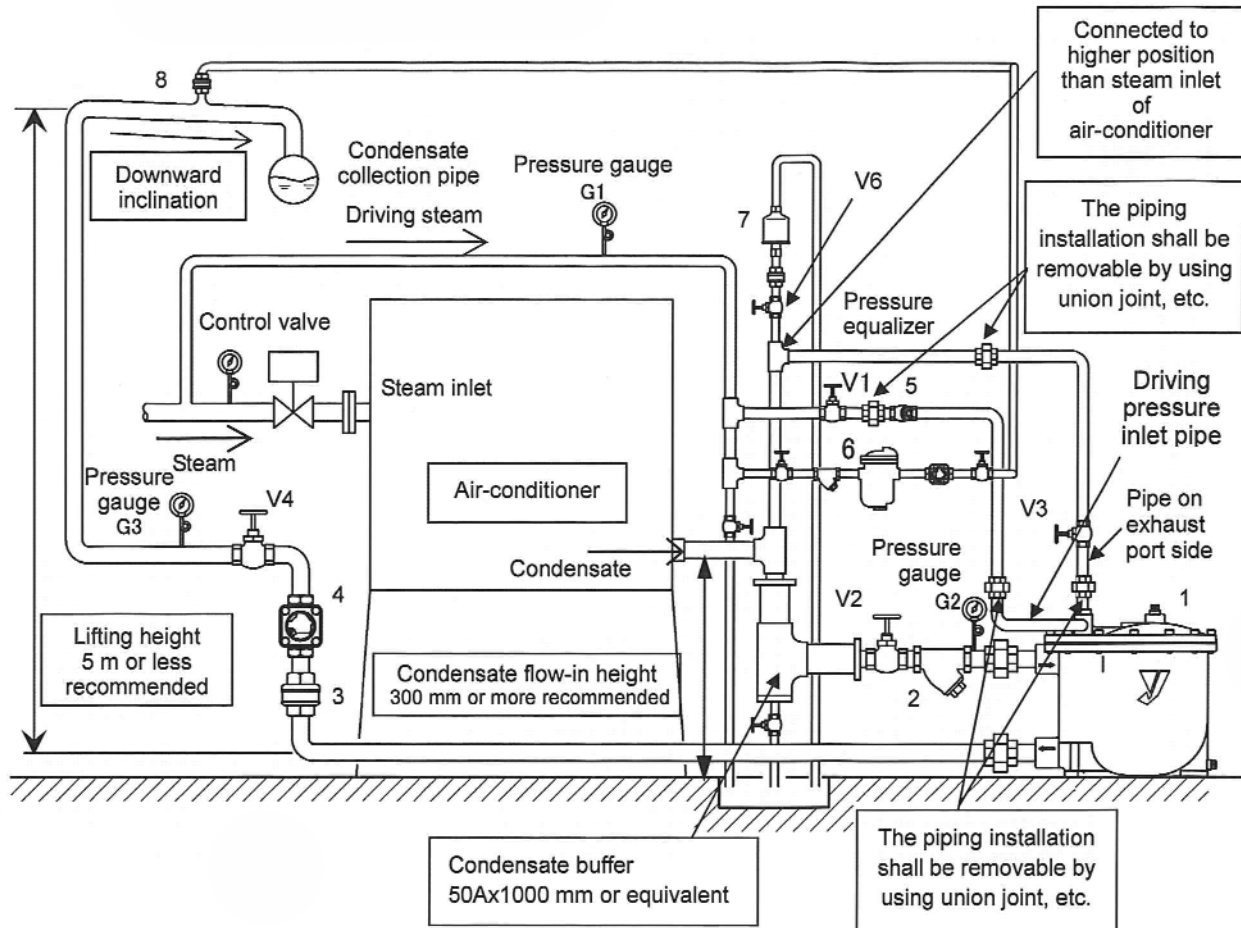


Operating as a pump (system pressure less than or equal to back pressure)

If the system pressure is less than the back pressure liquid floods the body. When the condensate reaches the upper trip point of the mechanism the motive inlet valve (6) opens and the vent valve closes. The open motive valve allows the motive fluid to enter and pressurize the body. The pressure inside the body shuts the inlet check valve and when it is greater than the back pressure pushes the water through the discharge check valve into the condensate return line. The float lowers with the water level and when it reaches the lower trip point the motive inlet valve closes and the vent valve opens. This relieves the pressure in the body and allows it to fill again.

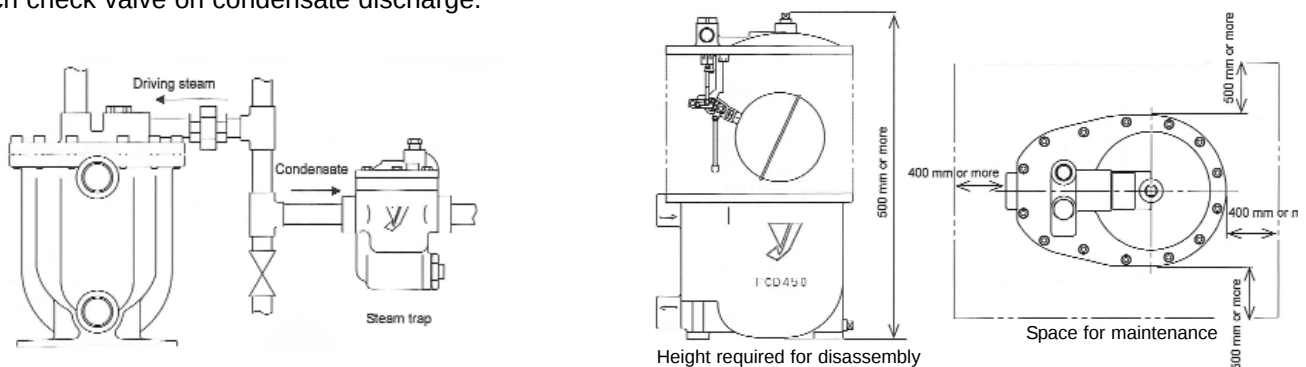


Installation



Instructions

- Before installing make sure the piping is clean and free of debris. When installing take care to not allow pipe tape or similar items to enter the product.
*** Debris can affect proper operation and performance**
- Check the condensate inlet, condensate outlet, motive inlet, and vent outlet ports before connecting piping.
- The DD4 must be installed with the vent vertical and the condensate inlet and outlet horizontal.
*** The product will not function properly if not installed in the correct orientation**
- Connect pipes securely
- When connecting pipes unions should be used close to the DD4 connections. This reduces the amount of time needed for maintenance and repair.
- Avoid water hammer. If water hammer is experienced it could injure personnel or damage the equipment.
- Do not disassemble product. If the product is disassembled the function or performance of the unit could be compromised.
- Attach strainer with blow down valve on motive steam inlet.
- Attach check valve on condensate discharge.



Operating procedures

Caution

1. Make sure all connections are secure before opening valves
2. Open valves slowly to reduce the chance of water hammer

Start-up

1. Open isolation valve(s) in condensate discharge.
2. Open isolation valve in equalizing line.
3. Open motive isolation valve. Confirm that the steam does not flow into the pump body or equalizing line by checking pressure gauges.
4. Open the isolation valve on the thermostatic air vent.
5. Open the isolation valve on the condensate inlet.
6. The start-up is complete if the Double Duty™ - 4 Four performs trap operation or pump operation and is confirmed by use of the gauge glasses and pressure gauges.

Maintenance and Inspection

Most failures occur because of debris in the piping.

Caution

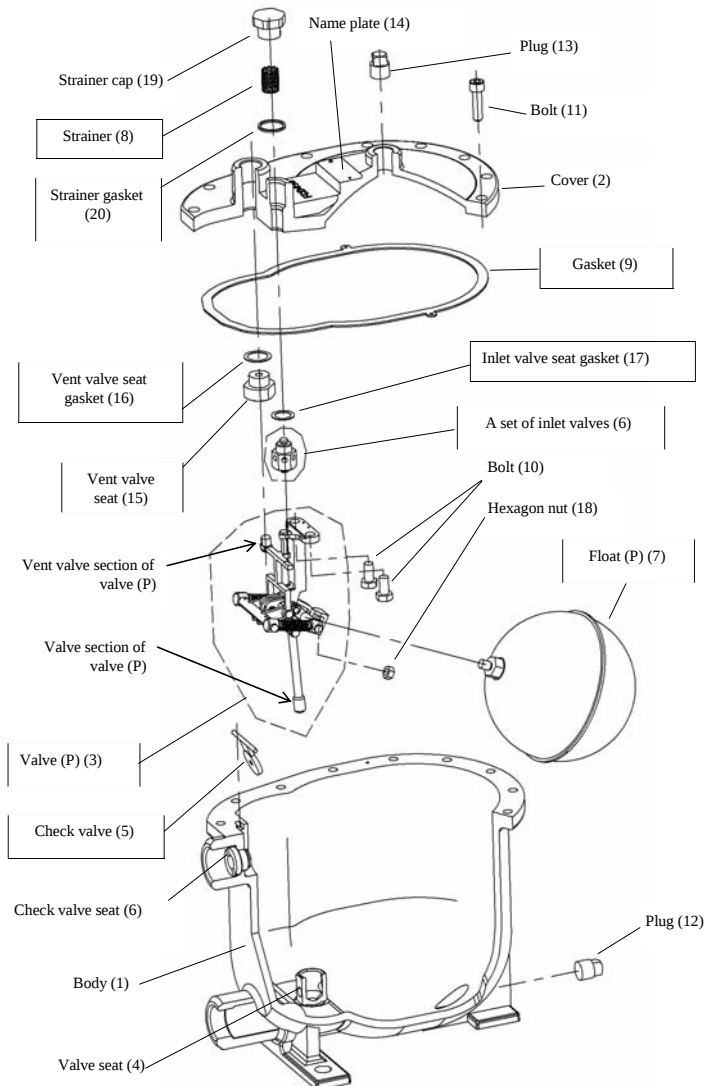
1. Before starting any maintenance make sure the Double Duty™ - 4 Four is completely isolated from the system
2. Make sure the system is at atmospheric pressure

Periodic inspection (once a year)

1. Close all isolation valves
2. remove plug from top of unit and flow water into this connection
3. Confirm a clicking noise when the mechanism trips
4. Remove plug from the bottom of unit to drain the water out of the body
5. Confirm clicking noise when mechanism trips
**if mechanism does not trip replace mechanism and float*
6. Disassemble motive strainer and check visually
**if strainer is clogged it should be cleaned or replaced*

Trouble shooting

Problem	Diagnosis	Solution
Condensate not discharging	Inlet isolation valve closed	Open valve
	Pump inlet and outlet switched	Re-pipe
	Motive inlet and vent switched	
	Discharge isolation valve closed	Open valve
	Equalizer line isolation valve closed	
	Motive pressure not adequate	Adjust pressure
	Motive inlet isolation valve closed	Open valve
	Motive strainer clogged	Clean or replace
	Air vent damaged	Replace air vent
	Motive pressure exceeds pump rating	Adjust pressure
	Outlet check valve installed backward	Install check valve properly
	Outlet check valve does not open	Replace
	Inlet check valve does not open	Confirm lack of pressure in body
	Inlet check valve is not completely closed	Disassemble and clean check valve
	Vent valve leaks	Disassemble, clean and inspect - replace defective parts
	Motive steam valve leaks	Disassemble and replace inlet valve
	Float damaged	Disassemble and replace float
Motive steam remains on	Motive steam valve leaks	Disassemble and clean or replace
	Mechanism not assembled properly	Assemble so the motive valve is inserted in motive seat
Steam leaks out of body	Body gasket leaks	Replace gasket
	Strainer gasket leaks	
	Plugs leak	Remove, add thread sealer and reinstall



Disassembly and Assembly Procedure

Caution and Warning

Before disassembly or inspection, release internal pressure of the product, pipes, and devices completely and cool down the product. Do not touch the product with bare hands when it is still hot.

**You may get burned or injured due to remaining pressure.*

1. Internal condensate flows out during disassembly.
**Without a container for the removal of draining condensate, peripheral devices might get dirty.*
2. Check that there are no flaws, dents or stains on the seat suction such as the valve seat. If any stains are found clean them. If flaws or dents are found, replace parts.
**Flaws, dents, or stains might result in malfunction.*
3. Assemble the parts securely. Tighten the bolts evenly in the diagonal order.
**Improper assembly or uneven tightening of bolts might result in malfunction or leakage.*
4. Use regular parts for repair of products. Never modify the products.
**If the product is modified, you might get burned or injured due to product damage, steam, condensate or abnormal operation.*
5. Replace the gasket with a new one.
**The gasket is a replaceable item. If it is reused, leakage might occur.*

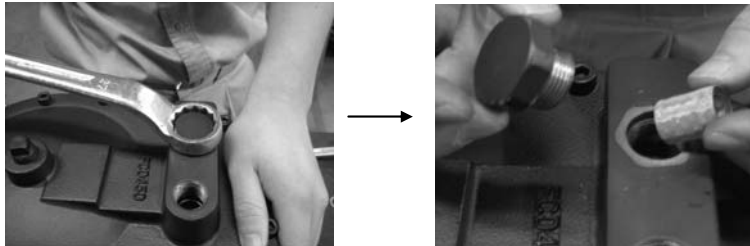
Disassembly procedure (see Figure 11)

Tools Required

- Spanner (13mm, 17mm, 24mm)
- Adjustable end wrench (width = 0-25mm)
- Closed wrench (19mm, 27mm)
- Hexagon socket wrench (width across flat: 5mm)
- Ratchet handle (used with hexagon socket wrench)

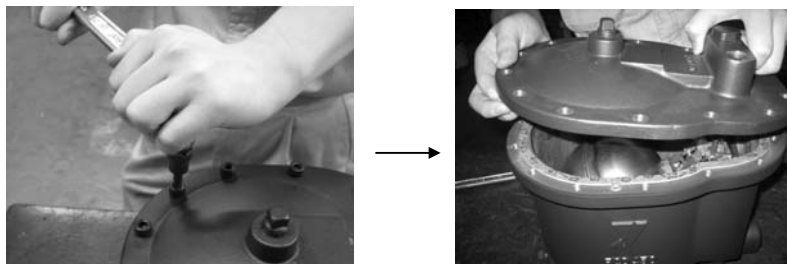
Step 1:

Remove strainer cap (19) using a closed wrench (width across flat: 27mm). Next remove the strainer (8) and strainer gasket (20).



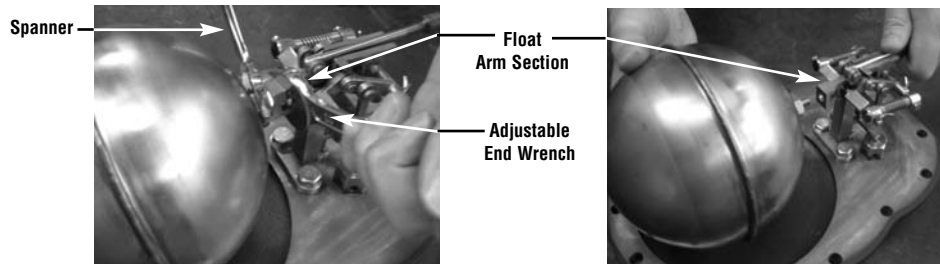
Step 2:

Attach the hexagon wrench to the ratched handle. Remove the bolt (11). Move up and remove the cover (2) and gasket (9) from the body (1).



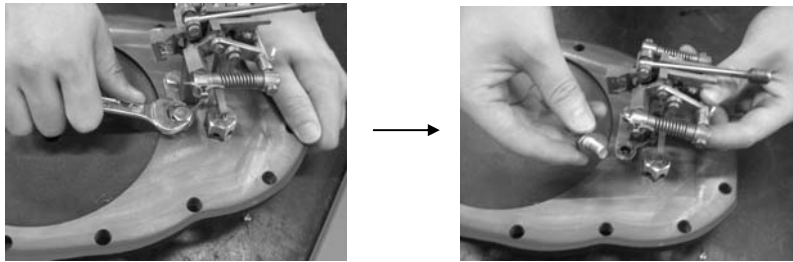
Step 3:

Fix the float arm section of valve (P) (3) using the adjustable end wrench. Set the spanner (width across flat 17 mm) at the hexagon section of the float (P) and remove the float (P) (7). The hexagon nut (18) is located at the float arm section. The hexagon nut is necessary for the float (P) assembly.



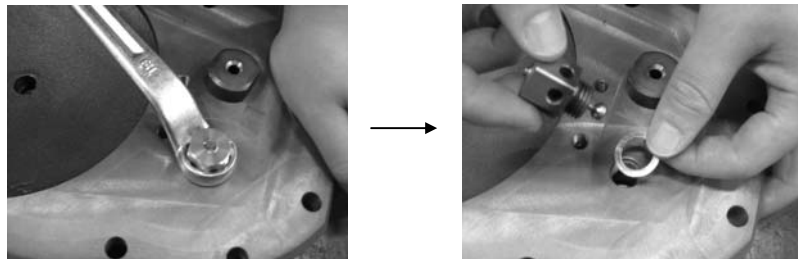
Step 4:

Remove two bolts (10) attached to the cover using a spanner (width across flat 13mm) and remove the valve (P) (3).



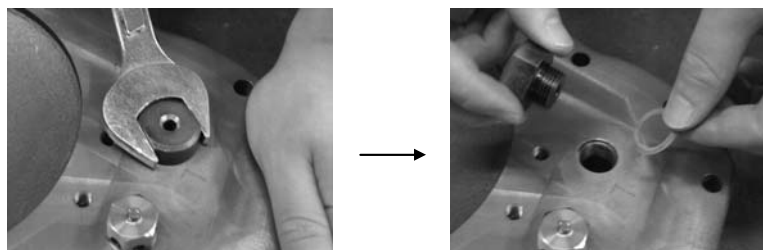
Step 5:

Remove a set of the inlet valve (6) using the closed wrench (width across flat 19 mm) and remove the inlet valve seat gasket (17).



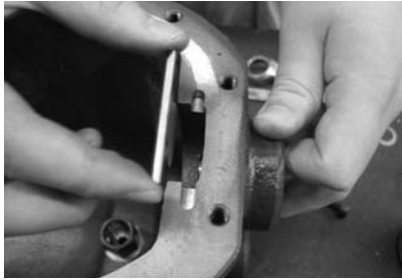
Step 6:

Remove the vent valve seat (15) using a spanner (width across flat 24mm).
Remove the vent valve seat gasket (16).



Step 7:

Remove the check valve (5) from the body (1) manually.



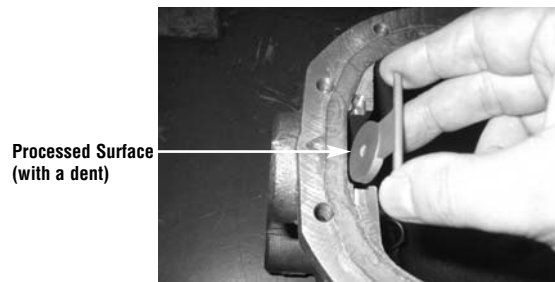
Assembly procedure (see Figure 11)

Tools Required

- Torque wrench: Contents (size nominal, etc.)
- Spanner-type torque wrench (spanner width across flat 17mm - for items that be tightened by 15N•m)
(spanner width across flat 19mm - for items that be tightened by 50N•m)
(spanner width across flat 24mm - for items that be tightened by 80N•m)
- Spanner: (13mm)
- Closed wrench: (27mm)
- Adjustable end wrench: (Width 0-25mm)
- Hexagon socket wrench: (Width across flat 5mm)

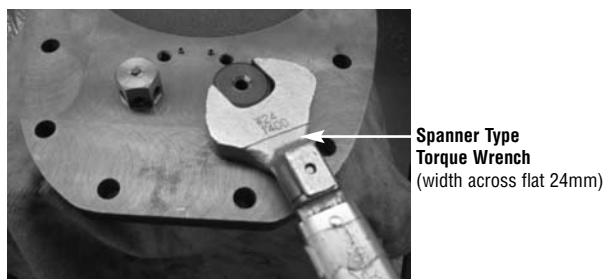
Step 1:

Attach check valve (5) to the body (1). Note the installation direction of the check valve. Face the processing surface (with a dent at the center) toward the screw side.



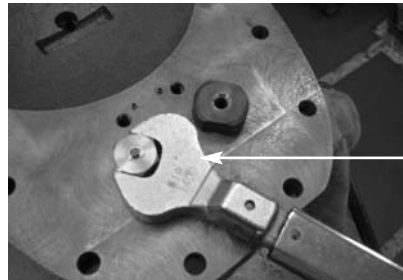
Step 2:

Assemble the vent valve seat (15) and vent valve seat gasket (16) to the cover (2). Apply lubricant to the vent valve seat gasket and assemble it with the vent valve seat. Tighten the vent valve seat with the torque of 80N•m using the spanner-type torque wrench (width across flat 24mm).



Step 3:

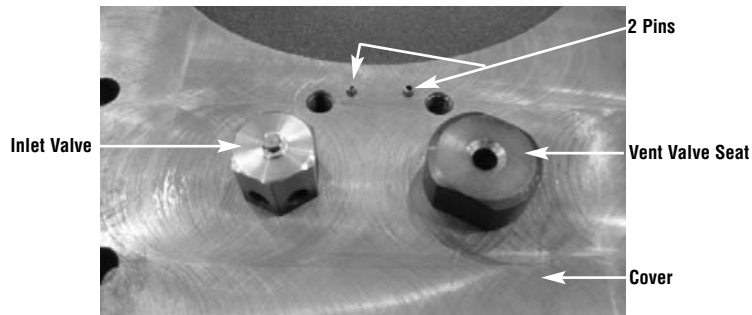
Assemble a set of the inlet valve (6) and inlet valve seat gasket (17) with the cover (2). Apply lubricant to the inlet valve seat gasket and assemble it with the inlet valve seat. Tighten the inlet valve seat with the torque of 50N•m using the spanner-type torque wrench (width across flat 19mm).



Spanner Type
Torque Wrench
(width across flat 24mm)

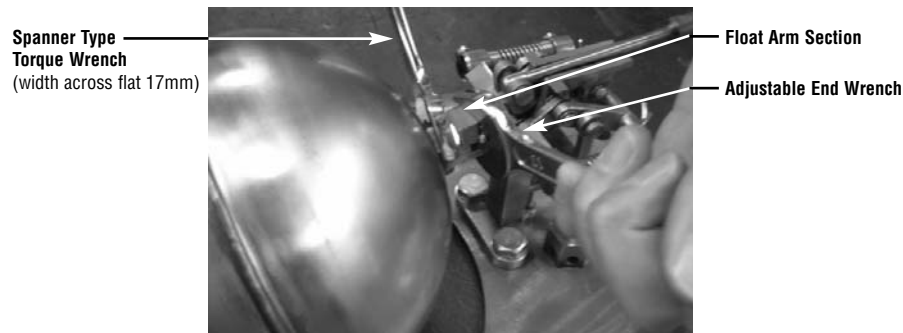
Step 4:

To assemble the valve (P) (3) with the cover (2), align the two cover pins with the valve (P). Use two bolts (10) for assembly with the spanner (width across flat 13mm).



Step 5:

Assemble the float (P) (7) with the valve (P)(3). Insert the hexagon nut (18) to the float arm. Fix the float arm using an adjustable end wrench. Tighten the hexagon section (width across flat 17 mm) of the float (P) with the torque of 15 N•m using a spanner-type torque wrench.

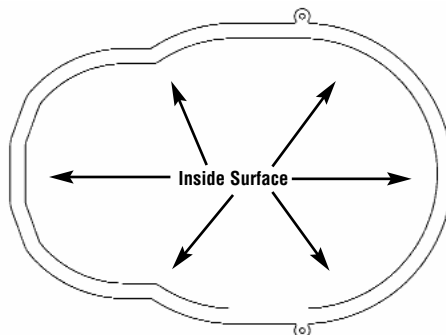


Spanner Type
Torque Wrench
(width across flat 17mm)

Float Arm Section
Adjustable End Wrench

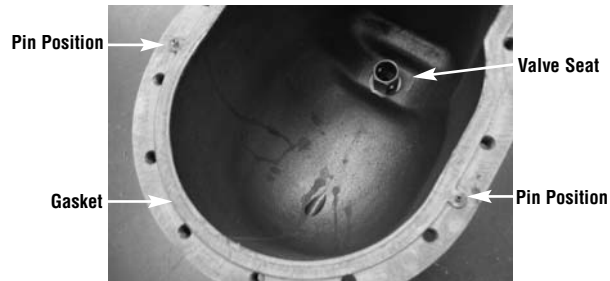
Step 6:

Replace the gasket (9) with a new one. Before assembling a new one, apply the paste on the entire surface and inside surface of the gasket.



Step 7:

Attach the new gasket to the body (1). Confirm that the gasket is completely set to two pins on the body.

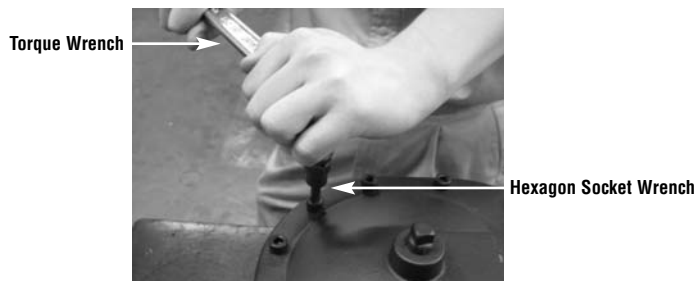
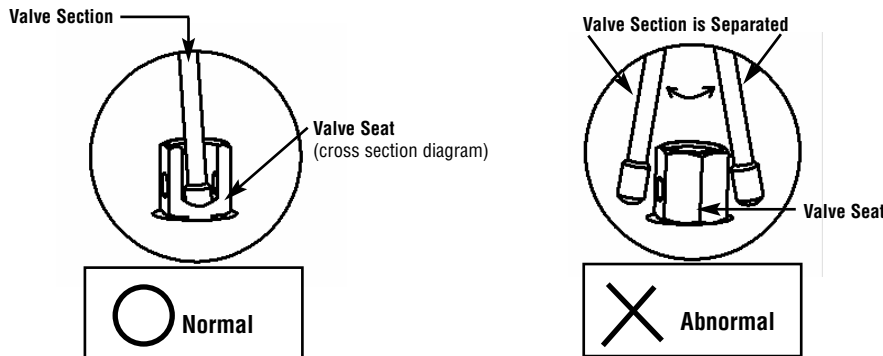


Step 8:

Attach the cover (2) to the body (1). Confirm that the valve section of valve (P) (3) is completely inserted to the valve seat inside. (see drawing below) Attach the cover. Tighten the bolt (11) with the torque wrench of the hexagon socket wrench (width across flat 5 mm).

** Please confirm that the cover (2) attaches to the bolt (2 places) on the body (1) before tighten the hexagon bolt (11). Failure to do so may results in a broken bolt or inadequate assembly.*

** Do not use the hexagon L-type wrench for tightening; otherwise, the hexagon hole might be damaged or assembly failures might occur due to insufficient tightening.*



Step 9:

Attach the strainer (8) (cylindrical), strainer gasket (20), and strainer cap (19) to the cover (2). Insert the strainer and strainer gasket to the strainer cap, and screw them into the cover using the closed wrench (width across flat 27 mm).

Replacement procedure of parts

Replacement procedure of gasket

Disassemble the gasket in the procedure of step 2 of 9.5.2 Disassembly method. Replace and assemble it in the procedure of steps 6, 7, and 8 of 9.5.3 Assembly procedure.

Replacement procedure of float (P)

Disassemble the float in the procedure of steps 2 and 3 of 9.5.2 Disassembly method. Replace and assemble it in the procedure of steps 5, 6, 7, and 8 of 9.5.3 Assembly procedure.

Replacement procedure of valve (P)

Disassemble the valve in the procedure of steps 2, 3, and 4 of 9.5.2 Disassembly procedure. Replace and assemble it in the procedure of steps 4~8 of 9.5.3 Assembly procedure.

Replacement procedure of a set of inlet valve

Disassemble the inlet valve in the procedure of steps 2~5 of 9.5.2 Disassembly procedure. Replace and assemble it in the procedure of steps 3~8 of 9.5.3 Assembly procedure.

Replacement procedure of vent valve seat

Disassemble the vent valve seat in the procedure of steps 2, 3, 4 and 6 of 9.5.2 Disassembly procedure. Replace and assemble it in the procedure of steps 4~8 of 9.5.3 Assembly procedure.

Replacement procedure of check valve

Disassemble the check valve in the procedure of steps 2 ~7 of 9.5.2 Disassembly procedure. Replace and assemble it in the procedure of steps 1, 6~8 of 9.5.3 Assembly procedure.

Replacement procedure of strainer and strainer gasket

Disassemble the strainer and strainer gasket in the procedure of step 1 of 9.5.2 Disassembly procedure. Replace and assemble it in the procedure of step 9 of 9.5.3 Assembly procedure.

Waste

To dispose (classify and dispose) the product, check the materials of each part, referring to the delivery drawings.