

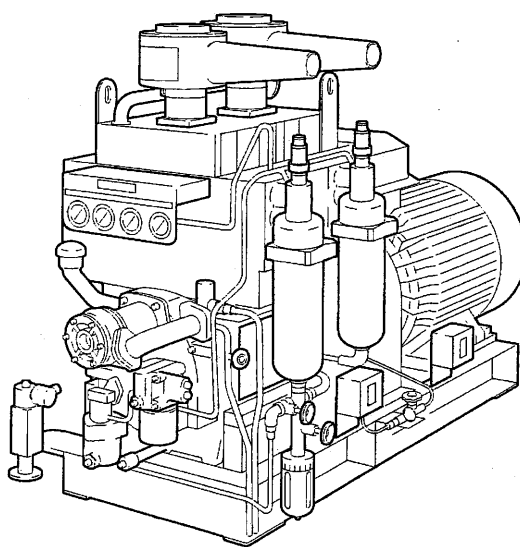
INSTRUCTION MANUAL

FOR

TANABE AIR COMPRESSOR

H - 63 - 64 - 264

H - 73 - 74 - 273 - 274 - 373 - 374



TANABE PNEUMATIC MACHINERY CO.,LTD.

SENRIOKA NEAR OSAKA JAPAN

INTRODUCTION

We wish to appreciate you for choosing this TANABE H-series Compressor.

- * Before installation and starting operation of the compressor, be sure to read this instruction manual carefully to understand the contents.
- * Keep the manual in the place where it is available whenever necessary.
- * If you lost or damaged this manual, be sure to order the same.
- * In case of transferring the compressor, this manual should be handed over to the next owner.
- * Information contained in this manual is subject to change without notice for improvement.
- * "Model and type No.", "Serial No.", and "INST.No. of this instruction manual" should be informed when making inquiry on the compressor.
- * Do not remodel the compressor without our permission. We assume no responsibility for the remodeling.

GENERAL

Features:

TANABE Compressors, Model H-series are vertical water-cooled 2-stage compressor which are mainly used to start the marine and land diesel engine and also used for the general purpose such as pressure test.

Construction:

The compressor consists of the following components: driving unit governed by power supply, air compressing unit, water-cooling unit to cool the compressed air, air receiver tank to store the compressed air, and control panel to control the compressor.



** For the control panel, motor, and air receiver tank provided by the user, be sure to check that they conform to the specifications.

CLASSIFICATION OF DEGREE OF DANGER

Warning display used in this manual and affixed on the compressor classifies the level of danger into the following **three steps**.



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situation.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practice.

This manual contains the following symbols to indicate "danger information".

Picture	Danger information	Meaning
	Electric shock	Receives electric shock by touching high voltage power supply.
	Electric shock	Receives electric shock by touching the object in which power is supplied.
	Entanglement	Entangled in the rotating unit to be injured.
	Spout	Injured by explosion, spout, scattering.
	Hot surface	Surface is hot to cause burn.
	No disassembling	Disassembling and remodeling prohibited.
	Fire	Ignition causes fire.
	Grounding	Be sure to ground the machine.
	Use ear plugs.	Noises may cause disorder in the ear.
	Instruction manual	Follow instruction manual.
	General caution	Call attention to content of cautions.

Table. 1

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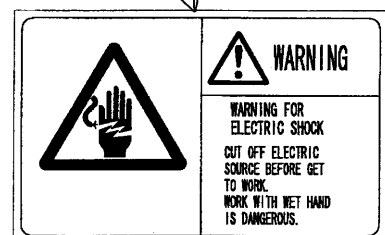
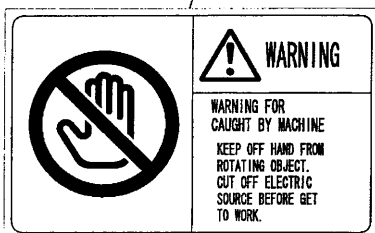
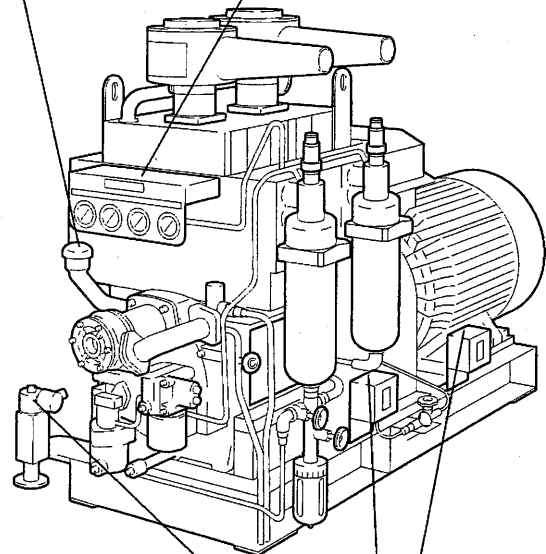
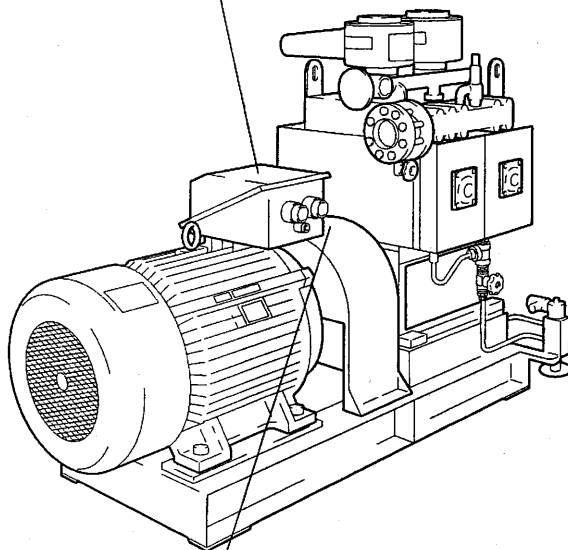
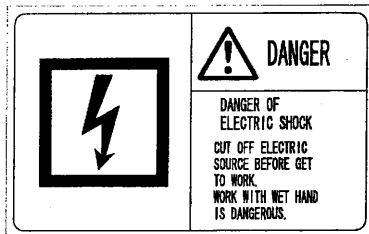
Disassembling and Reassembling Procedure for 2nd Stage Valve

Table of Recommendable Lubricating Oil for Reciprocating Air Compressor

HOW TO INQUIRE

1. TO AVOID DANGER

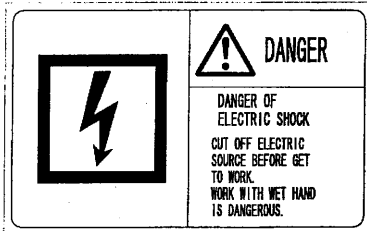
1.1 Position to stick Warning Label



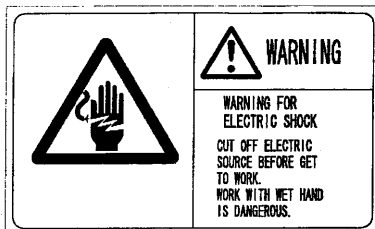
1.2 Warning Labels



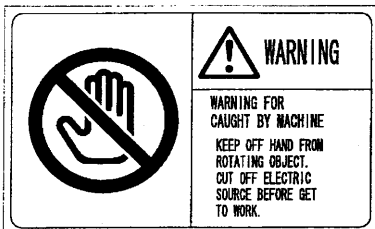
- ** This compressor is provided with five warning labels to be stuck.
- ** In case the label is damaged, peeled off, or discolored, be sure to order a new label and stick it.



Do not touch the electrical equipment and wirings without reasons.
Be sure to disconnect the both of main power supply and operating power supply during repair and maintenance. Work with the wet hand is dangerous.



Do not touch the electrical equipment and wirings without reasons.
Be sure to disconnect the both of main power supply and operating power supply during repair and maintenance. Work with the wet hand is dangerous.



Flywheel is rotating at high-speed in the cover. Never put the hand in the cover. Hand will be entangled.
Disconnect both of main power supply and operating power supply, then remove the cover when starting the work.



Compressed air or oil spouts when pressure is being applied or when pressure remains.
When starting work, make sure no pressure is left in the compressor after it was stopped.



The compressor is hot during operation and immediately after the stopping.
Do not touch. Work with it after completely cooled.

1.3 Safety Measure and Notice of Danger

DANGER

< Electric shock >



- * **Never turn ON/OFF the power with wet hand. Electric shock is caused.**
- * **Be sure to disconnect both of main power supply and operating power supply during maintenance or inspection.**
- * **Power should not be turned ON suddenly by other person during maintenance or inspection. Take measures such as informing beforehand or putting up a sign board.**

WARNING

< Electric shock >



- * **Do not touch the attachments and wirings without reason. Electric shock may be caused.**



- * **Be sure to execute grounding. Otherwise, electric shock may occur during breakdown or leakage.**

< Entanglement >



- * **Do not put the hand or a part of the body in the flywheel cover while the motor is rotating. (Fig. 1)**

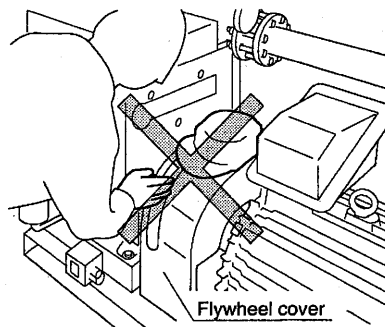


Fig. 1

- * **Do not operate with leaving the turning bar in the flywheel. (Fig. 2)**

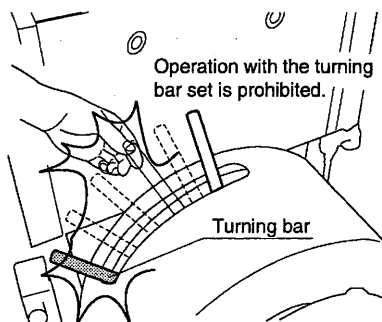


Fig. 2

- * **Do not put any substance on the flywheel cover. (Fig. 1)**
- * **Operate in the wear that can prevent from being entangled in the machine. Wear the clothes with tight sleeves, long trousers, and work cap. Long hair or wearing of accessories is dangerous.**
- * **Do not approach the machine when it is in stop in the automatic start/stop operation mode because it may start to operate suddenly.**
- * **Turn OFF the power switch during power failure. If the power failure is recovered while the power switch is ON, the motor starts to operate suddenly. It is very dangerous.**
- * **Do not put your finger or foreign matter in the wire net at back of the motor.**

(Fig. 3)

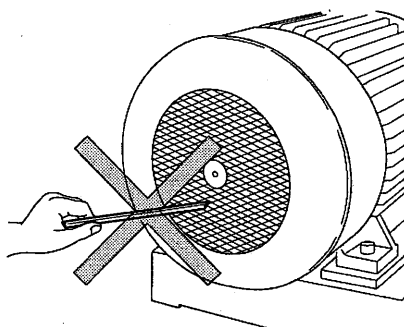


Fig. 3

< Spout >



- * **Before maintenance or inspection, discharge the compressed air from the air receiver tank and make sure that no pressure is left in the compressor.**
- * **Do not remove the parts during operation or when the pressure remains in the compressor. The compressed air and oil spout out. It is very dangerous.**
- * **Oil shall be scattered if it is replenished during operation. Replenish oil always when the compressor is in stop. (Fig. 4)**

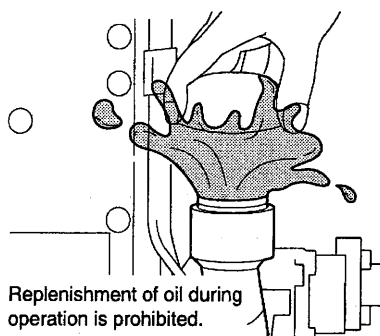


Fig. 4

CAUTION

< Burn >



- * ***During operation and just after the compressor has stopped, never touch the cylinder head and cooler cover that become very hot. (Fig. 5)***



Part of high temperature is dangerous to cause burn.

(Portion in the diagram is especially hot.)

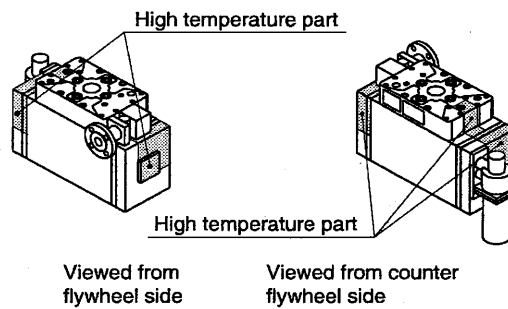


Fig. 5

< Noise >



- * ***If the pressure rises too high, the safety valve functions to generate large sound suddenly. When using the compressor in the room, use the ear plug. (Fig. 6)***

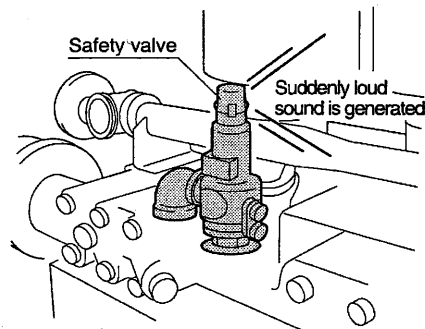


Fig. 6

< Fire >



- * ***Do not put any combustible materials near the compressor. It may cause fire.***

< Others >

- * ***Do not approach the suction filter during operation of the compressor. You will be sucked by strong sucking force. (Fig. 7)***

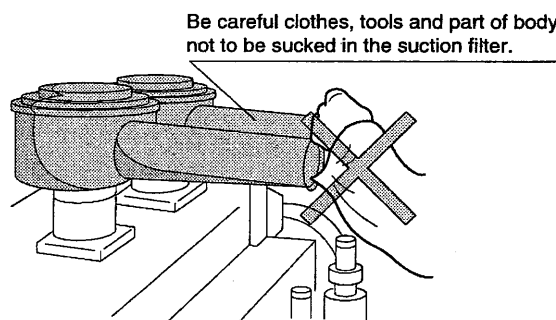


Fig. 7

- * Do not continue to operate the compressor with the foreign matters clogged in the suction filter. Discharging capacity may drop or breakdown may be resulted.
- * Drain valves under the drain separator (1st stage) and cooler cover (2nd stage) have to be closed at maintenance and inspection of the magnetic valve and at malfunction of the magnetic valve. In normal operation, keep the drain valves open. (Fig. 8)

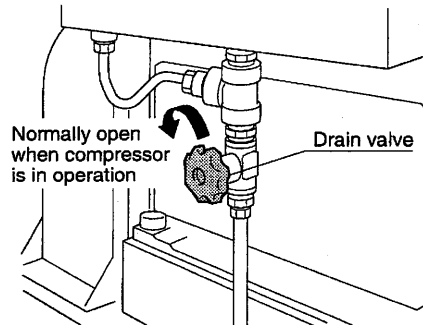


Fig. 8

< General >



- * Never attempt to remodel the machine.
- * Do not move or remodel the safety device. Do not use it with the value other than standard value.



- * Use with the specified power supply and frequency.
- * Check the position of power supply beforehand. (Fig. 9)

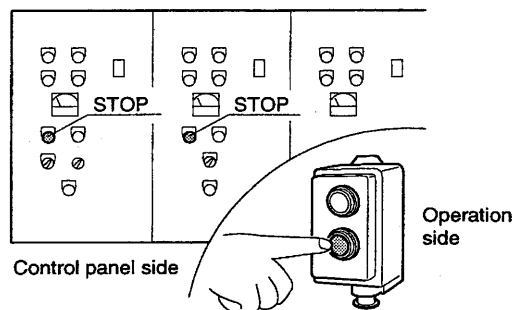


Fig. 9

- * Electric work should be performed by the qualified person or contractor.
- * Inspect periodically.
- * Use Tanabe's genuine parts.
- * Do not use the compressor for the purpose other than regular use.
- * Only the person in charge is allowed to operate.
- * Do not attempt to operate when the result cannot be foreseen or when operation is not confident.
- * If any abnormal condition is sensed, immediately turn OFF the power and contact the manufacturer or service shop.

2. NAME OF EACH PART

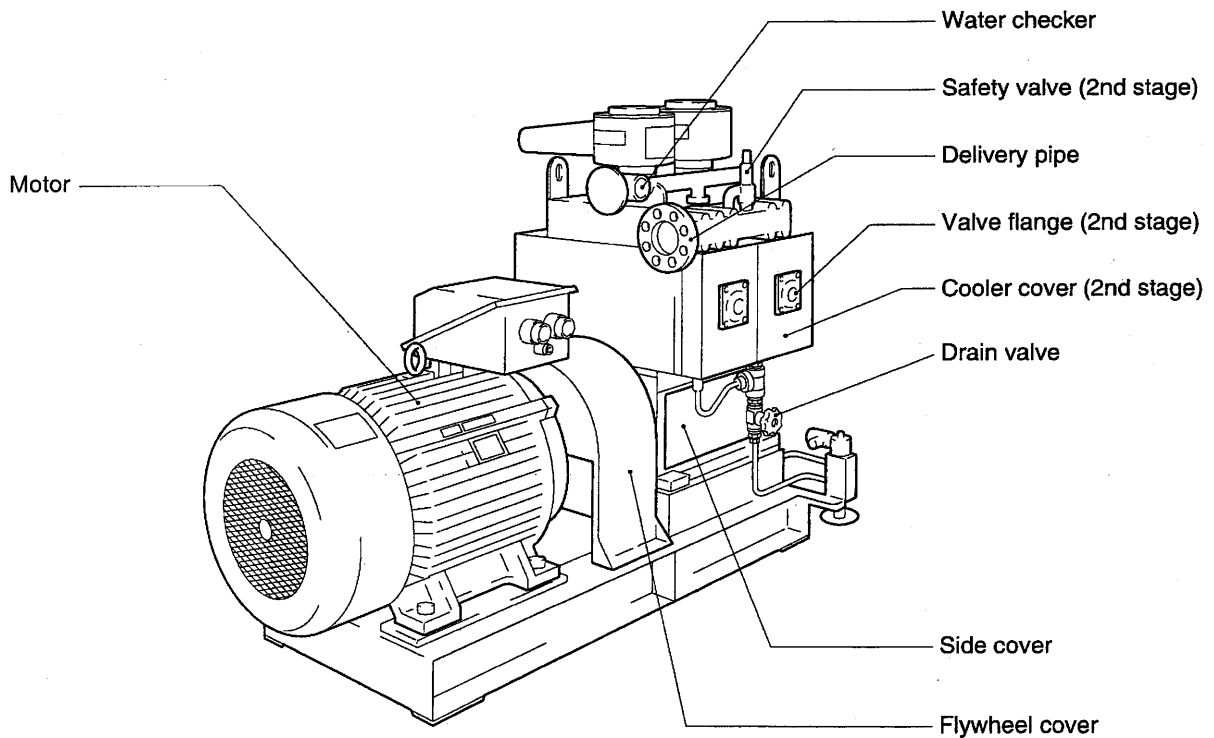
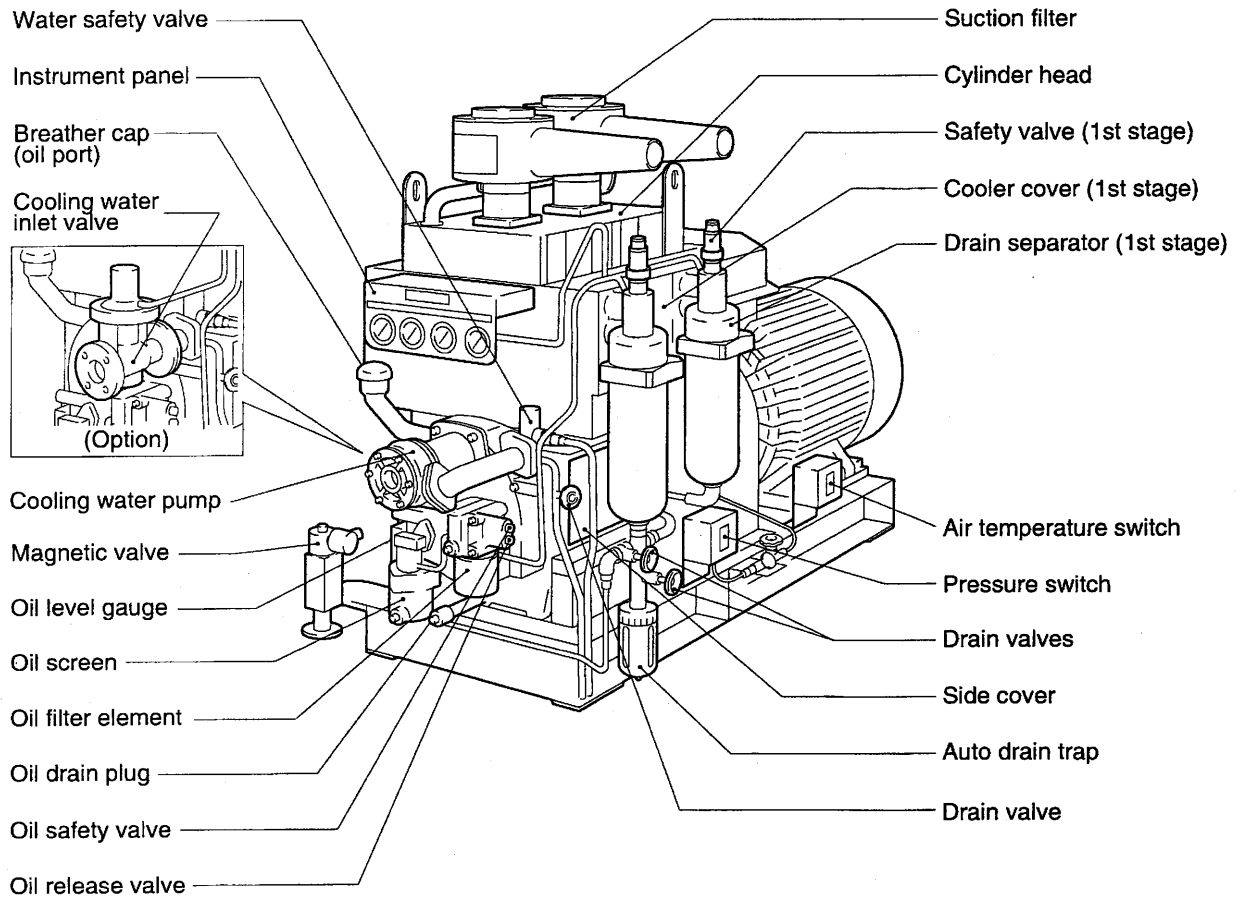


Fig. 10

3. INSTALLATION

⚠ WARNING

- * *Electric work should be performed by qualified person or contractor.*

3.1 Installation Environment

- (1) Location where is less dust, light, quiet, large, and well-ventilated.
- (2) Install possibly nearest to the location of use. If the locations of use are spread, install possibly nearest to the center of load so that the pressure loss of the pipe may be reduced and leak place of air is decreased.
- (3) Provide space of at least 1 m around the compressor.
- (4) Location free from vibration. Looseness is generated by the resonance in the place of vibration.
- (5) Flat and without unevenness.



- ** Sufficient light enables to detect leak of air and abnormal condition of the compressor quickly.
- ** Quiet environment allows to hear faint abnormal sound to prevent accident.
- ** By providing sufficient space, satisfactory safety control is performed and ample place for disassembling is secured to perform maintenance and inspection safely.

3.2 Installation Method

1. Installation of compressor for marine use

- (1) Reciprocating compressor generates certain degree of inertia force.
Compressor installation unit should have structure with sufficient vibration-proof.



- ** Inertia force of the compressor varies according to the type and specification of the compressor. If necessary, make inquiry to us.

2. Installation of compressor for land use

1) Foundation

- (1) Select hard ground for foundation.
- (2) For the soft ground, drive the piles into under the foundation block to make the bottom area of the foundation block large. Standard load of the foundation is 2 to 5t per one square meter.
- (3) Before pouring concrete, lay the broken stones on the ground and strengthen it sufficiently. Then, pour proper combination of concrete to the ground.
- (4) Determine the hole position of anchor bolt and set the correct depth of the square hole.
- (5) If vibration is transferred to the building, insulate the floor and wall using the anti-vibration rubber or coil spring to make vibration proof structure. For this structure, use the flexible pipe in the pipe material.



** To adopt vibration-proof support structure, consult us.

2) Installation of the equipment (example)

- (1) First, bury the anchor bolt with adjusting to the bolt pitch or other template of the common bed of compressor (At this time, provide appropriate space of "adjusting gap A" in Fig. 11 so that mortar is poured into the square holes and, later on the setting level can be adjusted easily.)
- (2) Use crushed stones (6-8mm) for the concrete to fix the anchor bolt. (Do not weld the steel bar of the foundation ferro-concrete and the anchor bolt together for stiffening the latter. Some type of bolt may be broken at the welded portion depending on the quality of material.)
- (3) After the foundation concrete has been hardened, put the taper liner in the both sides, adjust the level of common bed, then tighten the foundation nut. (Few sheets of liner are preferable. Thin "shim" of less than 3 sheets)
- (4) When the level has been adjusted, lay grout between the foundation and common base thoroughly.
- (5) Cure the concrete sufficiently before starting operation, again additionally tighten the foundation nut.

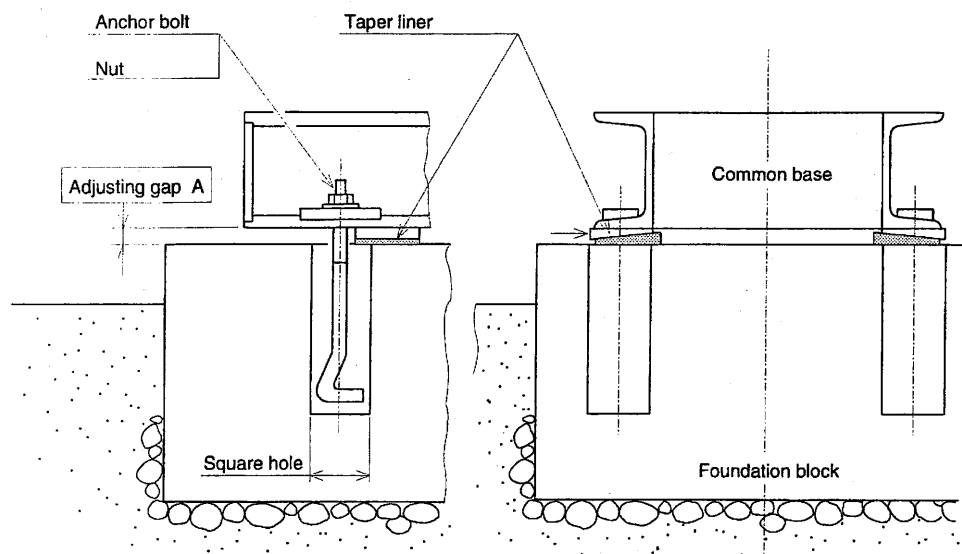


Fig. 11

3.3 Piping

1. Delivery piping

- (1) Arrange the delivery piping as short as possible.
- (2) Delivery piping should not be smaller than compressor discharging diameter.
- (3) For the riser piping, be sure to install the drain valve to discharge the drain. (Fig. 12)

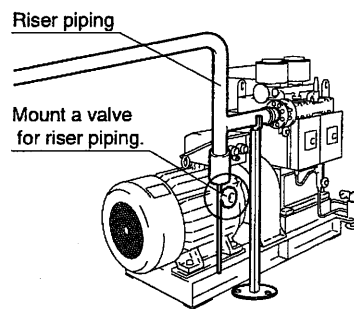


Fig. 12

- (4) As the delivery piping becomes hot and is expanded by heat, provide the bent section more than two on the midway of the piping so that expansion is flexible and provide appropriate support. (Fig. 13)

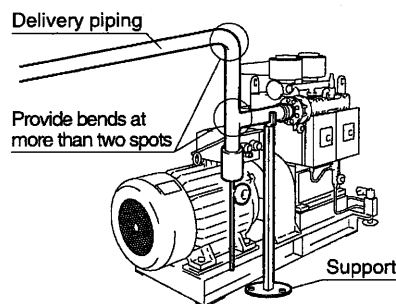


Fig. 13

- (5) When a stop-valve is mounted in the midway of the delivery piping, safety valve having bore diameter matching the discharging quantity should be installed between the compressor and the stop valve.



** To support the compressor unit with vibration-proof material such as anti-vibration rubber, be sure to use the flexible pipe in the discharge air piping and cooling water piping.

2. Cooling water piping

- (1) Provide a stop-valve just before the cooling water inlet.
- (2) Provide a stop-valve at the cooling water outlet.
- (3) Supply water so that limit of temperature rise of cooling water becomes 10°C.
- (4) The following table indicates quantity of cooling water required for this compressor:

Type	H-63		H-64		H-264		H-73		H-74	
Revolution rpm	1200	1800	1200	1800	1200	1800	1200	1800	1200	1800
Quantity of cooling water m ³ /h Fresh water 36°C-45°C	1.4	2.3	2.0	3.2	4.1	6.3	2.5	4.0	3.1	5.2

Type	H-273		H-274		H-373		H-374	
Revolution rpm	1200	1800	1200	1800	1200	1800	1200	1800
Quantity of cooling water m ³ /h Fresh water 36°C-45°C	5.0	7.6	6.2	9.5	7.4	11.3	9.4	14.4

Table. 2

3.4 Electric Wiring

- (1) Wiring must be made correctly by qualified engineers or contractors in conformity with applicable codes.
- (2) Select the wiring materials and equipment conforming to the code and matching the capacity of specification.



** Compressor unit supported by the vibration-proof material such as anti-vibration rubber should be directly grounded.

3.5 Air Receiver Tank

- (1) Select the air receiver tank conforming to the code and specification of the compressor unit.
- (2) Install the air receiver tank possibly closest to the compressor to minimize the pressure loss in the piping.
- (3) Be sure to attach the drain valve at the bottom of the air receiver tank. Frequently discharge the accumulated drain to prevent pollution of air and invading of the drain into the pressure regulator.

(Fig. 14)

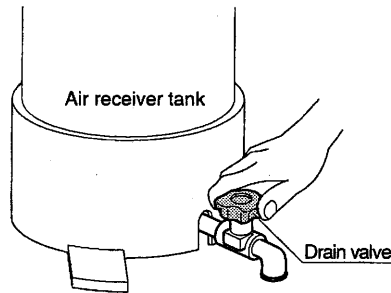


Fig. 14



** Air receiver tank, separator, filter, and piping should be periodically inspected and cleaned. Accumulated carbon may cause fire.

3.6 Lubricating Oil and the Related Fittings

1. Types of oil

- (1) Use the oil specifically selected for compressor lubrication.
- (2) Oil for the compressor should have lubrication characteristics that is not deteriorated by high temperature and high pressure.

Recommendable oils in the market are shown in the separate table.



- ** Use the oil specified for the reciprocating compressor.
- ** Oil for the screw compressor cannot be used.

2. Refilling the oil

- (1) Lubricating oil has been drained from the compressor after shop trial at the factory. Supply the oil from the oil port before use.
- (2) The oil port is underneath the screw cap (breather cap) at the counter flywheel side of the compressor. (Fig. 15)

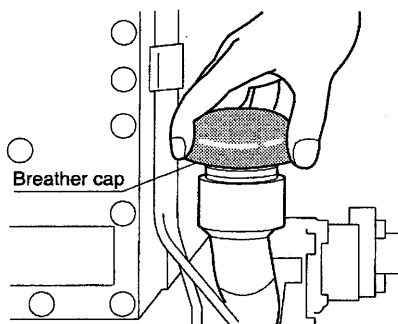


Fig. 15

- (3) Fill the oil up to the level H of the oil level gauge mounted on the lower part of the crank case. (Fig. 16)

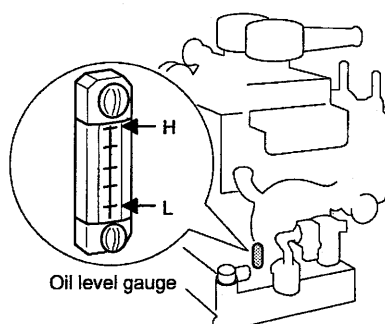


Fig. 16



- ** Fill the oil slowly using a funnel. Oil overflows by rapid filling.
- ** Keep the oil level always between H and L.
- ** If the oil level exceeds H, the consumption of oil will increase because excess oil is carried away by balance weight and the accumulated carbon increases, causing malfunction of the delivery valve.
- ** If oil level becomes less than L, wear increases due to short of oil, and piston and cylinder may be damaged.

3. Initial oiling

- (1) Remove the side cover from the crank case. (Fig. 17)

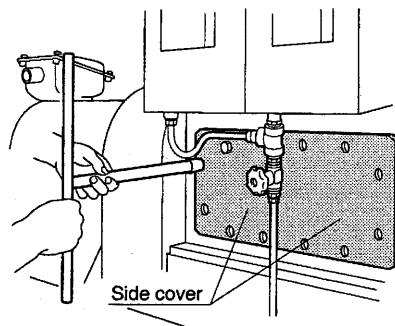


Fig. 17

- (2) With turning the flywheel using the turning bar (Fig. 18), supply oil to the main bearing, crank pin, and lower portion of cylinder wall by hand.

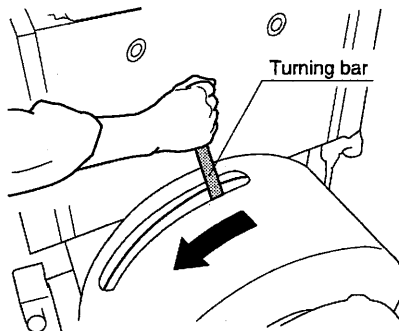


Fig. 18

⚠ WARNING

- * ***Do not operate with leaving the turning bar in the flywheel. (Fig. 2)***

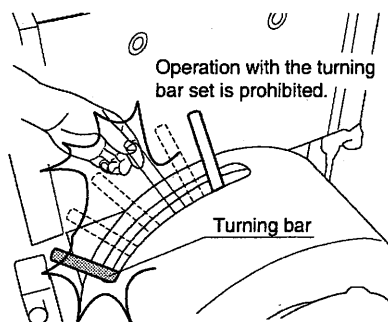


Fig. 2

Type	Oil capacity (ℓ)
H — 63.64 73.74	(H) 11.5 ~ (L) 8
H — 264 273.274	(H) 24.5 ~ (L) 16.5
H — 373.374	(H) 35 ~ (L) 24

Table. 3

3.7 Centering of Direct Coupling

1. Concentric alignment

- (1) As shown in Fig. 19, mount a stand to the coupling on the motor side, apply the dial gauge to flywheel (a) and rotate the flywheel to read the deflection of gauge pointer.
- (2) Measure at four points at 90° interval.
- (3) Adjust by shifting the vertical and horizontal positions of the compressor or motor so that the deflection of dial gauge pointer should not exceed 0.08mm.

2. Parallelism of flywheel end face

- (1) As shown in Fig. 20, mount a stand to the coupling on the motor side, apply the dial gauge to flywheel (b) and rotate the flywheel to read the deflection of gauge pointer.
- (2) Measure at four points at 90° interval.
- (3) Insert the liner under the motor or the compressor, adjust so that the deflection of dial gauge pointer should not exceed 0.15mm.

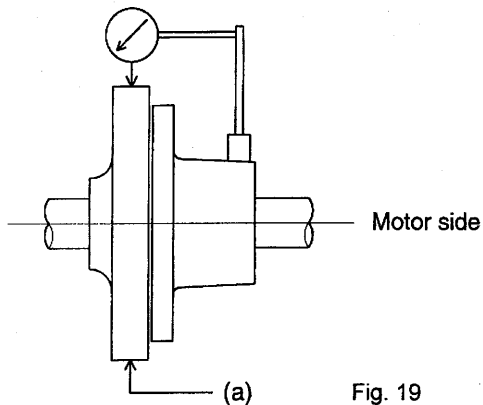


Fig. 19

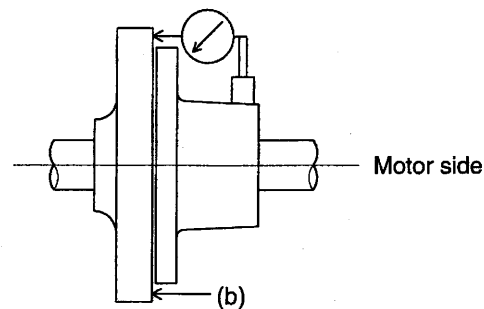


Fig. 20



- **** Insert the turning bar into the set hole of flywheel and turn it so as to pull it to the motor side.
The crank shaft moves in the axial direction due to the side clearance. Because of this, the measurement data may fluctuate and the fixed value may not be obtained.

⚠ CAUTION



- * To modify the concentric alignment and parallelism of the flywheel end face, first, adjust the level at the bottom of the common base, then carry out the above procedures 1 and 2.
- * See the centering data in the shop trial record.

3.8 Grounding



- * Be sure to execute grounding. Otherwise, electric shock may occur during breakdown or leakage.

4. TEST RUN

⚠ DANGER

- * *Be sure to disconnect the main power supply before wiring the motor.*

⚠ WARNING

- * *Do not touch the attachments and wirings without reason. Electric shock may be caused.*



- * *Do not put the hand or a part of the body in the flywheel cover while the motor is rotating. Do not put any substance on the flywheel cover. (Fig. 1)*

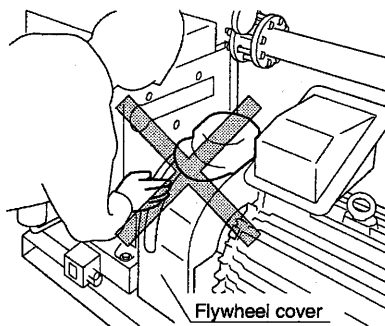


Fig. 1



- * *Oil shall be scattered if it is replenished during operation. Replenish oil always when the compressor is in stop. (Fig. 4)*

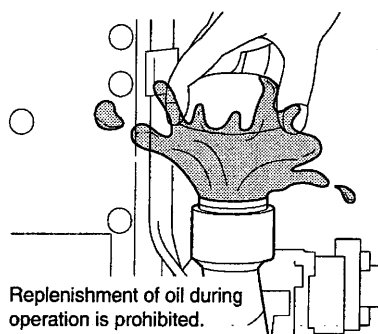


Fig. 4

CAUTION



- * ***During operation and just after the compressor has stopped, never touch the cylinder head and cooler cover that become very hot. (Fig. 5)***

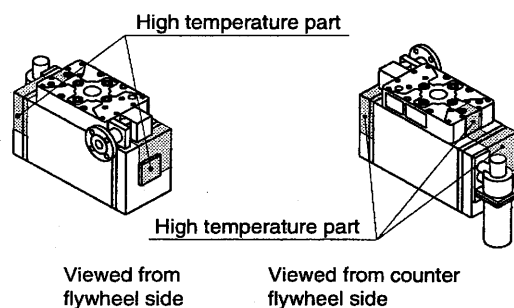


Fig. 5

- * ***When turning ON the power, make sure that nobody is working around.***
- * ***If any abnormal condition is sensed, immediately turn OFF the power and contact the manufacturer or service shop.***

4.1 Test Run

1. Check before start-up

- (1) Check if anchor bolts are well tightened.
- (2) Check if bolts and nuts on the machine are well tightened.
- (3) Check if the oil is filled up to level H of the oil level gauge. (See page 3-6)
- (4) Check if the valves of each drain valve are fully opened. (Fig. 21)

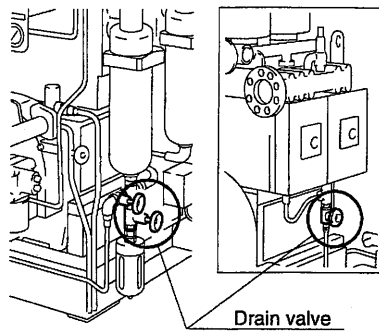


Fig. 21

- (5) Check if the cooling water is supplied by observing the water checker. (Fig. 22)

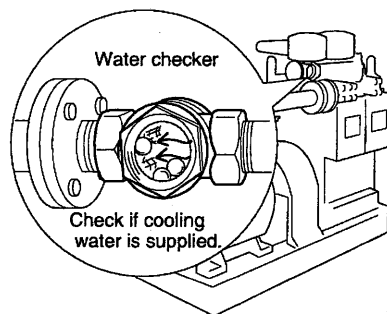


Fig. 22

- (6) Check if there is no person in work by the machine.
- (7) Check if there is no substance on or around the machine.

* After checking the above items, turn on the main switch.

2. Check of rotational direction

1) How to check

Push the switch for the operating power supply for an instant to inch the flywheel and check visually if the flywheel rotates in the same direction of the arrow mark on the top of the flywheel cover. (Fig. 23)

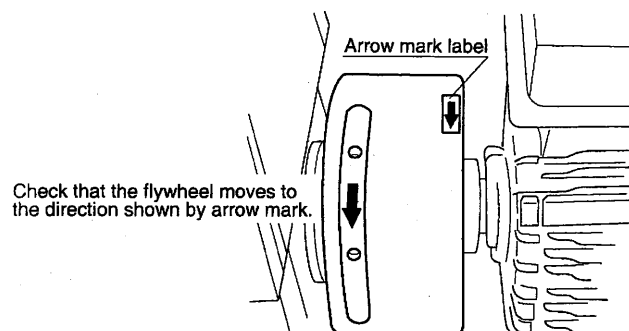


Fig. 23

2) Reverse rotation

If the flywheel rotates in reverse direction, open the terminal box at the motor upper portion and change the wiring. (Fig. 24)

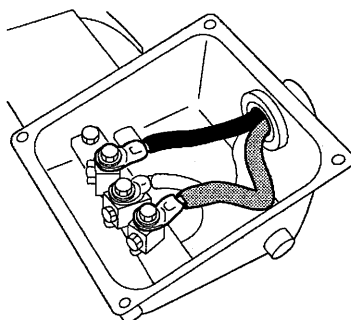


Fig. 24

 **DANGER**



* **Before changing the wiring of the motor, be sure to turn OFF the main power supply.**

※CHECK POINT for the first starting-up

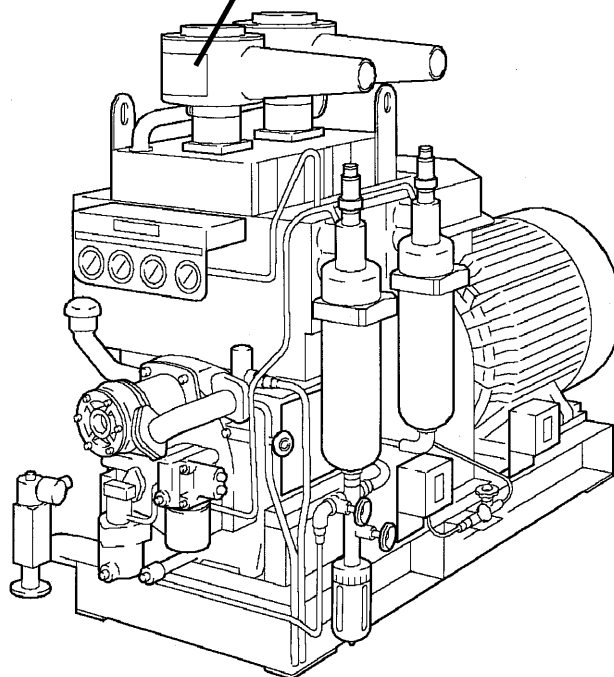
注 意
初起動に際して

- 吸入フィルタエレメントを取り外し、それぞれのシリンダにオイルを約20cc注入して下さい。
- 手動にて5回転ほどターニング後、起動して下さい。
- 30分間は無負荷運転をして下さい。(圧力を上げない)

CAUTION

for the first starting-up

- Take off the suction filter element and Pour oil (approx.20cc)into the each cylinder.
- Turn compressor by hand abt. 5 times. then start it up.
- Keep the compressor under no-load condition for 30 minutes.(without increasing the pressure)



3. Start-up

1) Oil pressure check

Make sure that oil pressure rises up to 0.2MPa and above through the pressure gauge. (Though oil pressure may rise up to 0.4 - 0.6MPa at the start-up, it is not the indication of abnormality since oil pressure becomes stable with temperature rise.)

2) Oil pressure adjustment

When the oil pressure does not rise up to 0.2MPa and above (in case the oil pressure switch is equipped, the machine runs for <approx. 10 sec> of timer setting time and stops), turn OFF the power switch and examine the cause of trouble.

3) Quantity of cooling water adjustment

Adjust quantity of water so that maximum temperature at the cooling water outlet is 50°C or below, and the difference between the inlet temperature and the outlet temperature to 10°C or below. (Fig. 25) (See Table 2 in page 3-4)

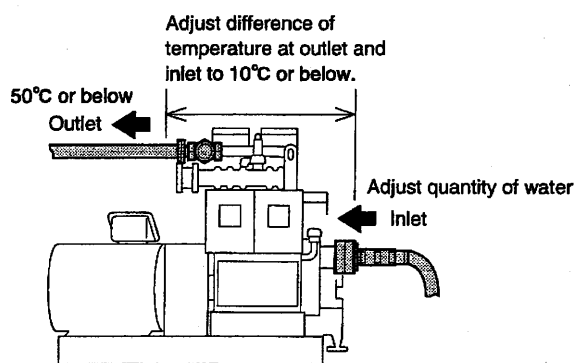


Fig. 25



** For cooling by fresh water (including the cooling tower method), adjust temperature of cooling water inlet to the range of 36°C to 45°C.

4) No load run

After starting the compressor completely, keep it running, as it is, for 30 minutes under no load. (Keep the stop-valve of the delivery air receiver tank open)

5) Load run

When no abnormality is generated during no load run, close the stop valve of air receiver tank and increase the pressure gradually. First increase the pressure up to 1 MPa and then up to 2 MPa during the period of 5 to 10 minutes each. (Table 4)

6) Check of abnormality

Check temperature at cooling water outlet and temperature of discharging air, abnormal sound, abnormal smell, and abnormal deflection of the instruments during load run. If any abnormality is detected, immediately stop the operation and contact the manufacturer or service shop.

7) Check for operation of automatic control unit

(1) Oil pressure switch

Check if the switch operates during rise of oil pressure (immediately after start) and at the time of oil pressure drop (immediately after stop).

(2) Temperature switch (air, water)

Put the temperature sensing element in the hot water. Check that the compressor stops at the set temperature.

(3) Automatic start/stop pressure switch

Start the compressor.

Make sure that the compressor stops when the pressure in the air receiver tank rises up to the upper limit set pressure and restarts when the pressure dropped to the lower set value.

Pressure gauge	Indication value (MPa)
1st stage pressure	0.4 ~ 0.6
2nd stage pressure	2.45 ~ 2.94
Oil pressure gauge	0.2 ~ 0.4
Water pressure gauge	0.01 ~ 0.25

Table. 4

5. OPERATION

DANGER



- * **Never turn ON/OFF the power with wet hand. Electric shock is caused.**

WARNING



- * **Do not touch the attachments and wirings without reason. Electric shock may be caused.**



- * **Do not approach the machine when it is in stop in the automatic start/stop operation mode because it may start to operate suddenly.**



- * **Do not put the hand or a part of the body in the flywheel cover while the motor is rotating. Do not put any substance on the flywheel cover. (Fig. 1)**

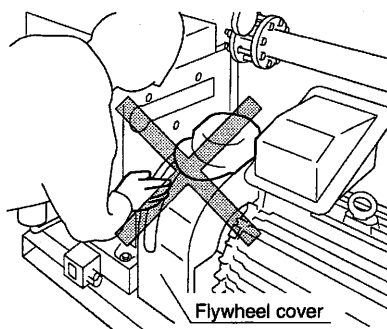


Fig. 1



- * **Operate in the wear that can prevent from being entangled in the machine. Wear the clothes with tight sleeves, long trousers, and work cap. Long hair or wearing of accessories is dangerous.**



- * **Oil shall be scattered if it is replenished during operation. Replenish oil always when the compressor is in stop. (Fig. 4)**

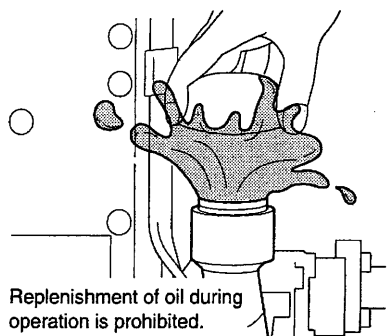


Fig. 4

CAUTION



- * ***During operation and just after the compressor has stopped, never touch the cylinder head and cooler cover that become very hot. (Fig. 5)***

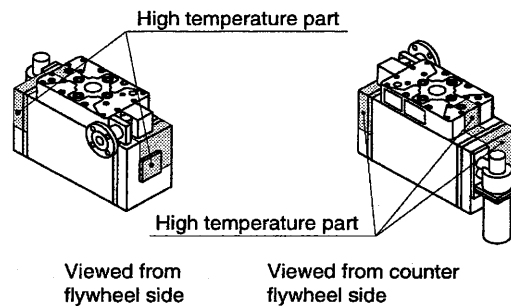


Fig. 5

- * ***Do not approach the suction filter during operation of the compressor. You will be sucked by strong sucking force. (Fig. 7)***

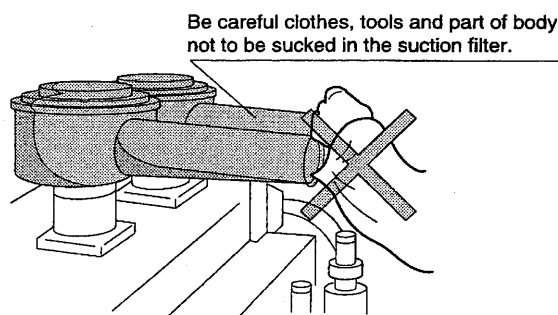


Fig. 7

- * ***Pay attention to the slippery floor made by spilt oil.***
- * ***Make sure there is no material placed on or around the machine.***
- * ***Do not attempt to operate when the result cannot be foreseen or when operation is not confident.***
- * ***Only the person in charge is allowed to operate.***
- * ***When turning ON the power, make sure that nobody is working around.***
- * ***When the compressor is restarted after stop for a long time (about three weeks), operate in accordance with the procedure of test run.***
- * ***When the compressor is not operated for a long time, if necessary maintenance is neglected, the compressor may be affected by rust, dust deposit, change of oil quality, freezing of water cooling portion, corrosion by impure gases in the air. If operation is started carelessly, an accident may be resulted.***
- * ***If any abnormal condition is sensed, immediately turn OFF the power and contact the manufacturer or service shop.***



5.1 Inspection before Starting the Operation

- 1) Be sure to check the following items before starting the operation.
 - (1) Check if the oil is filled up to level H of the oil level gauge. (See page 3-6)
 - (2) Check if each drain valve is fully opened. (Fig. 21)

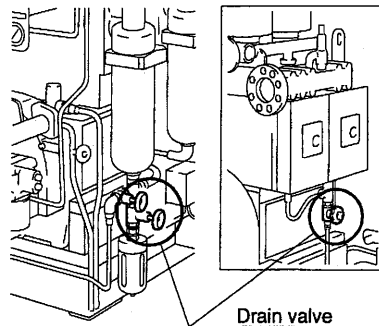


Fig. 21

- (3) Check if the cooling water is supplied, by observing the water checker. (Fig. 22)

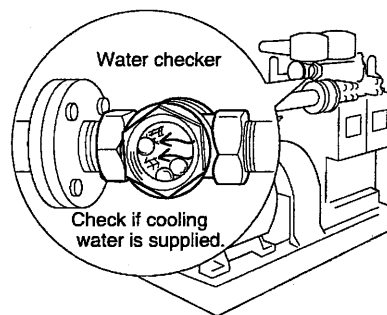


Fig. 22

- (4) Check if there is no person in work by the machine.
- (5) Check if there is no substance on or around the machine.

* Turn ON the main power after having confirmed the above.



** For the compressor with cooling water pump and cooling water inlet valve, the cooling water does not flow before starting the compressor. Check it after starting the compressor.

5.2 Operation and Stop

1) Automatic start/stop operation

- (1) Turn ON the main supply then turn ON the operating power supply, thus the air compressor enters to automatic START/STOP operation mode. Perform control during operation with paying attention to temperature, sound and current.
- (2) Perform automatic start/stop operation using the pressure switch, unloader (magnetic valve) (*1) and accessory devices.
- (3) When the pressure in the air receiver tank reached the upper limit set pressure, the pressure switch operates to stop the compressor and discharge the drain in each stage from the unloader (magnetic valve).
- (4) When the pressure in the air receiver tank has dropped to the lower limit set pressure, the pressure switch operates again and the compressor starts.

WARNING



* ***Do not approach the machine when it is in stop in the automatic start/stop operation mode because it may start to operate suddenly.***

2) Stopping

- (1) Put the compressor in no-load condition (*2) and turn OFF the operating power supply, then turn OFF the main power supply.
- (2) In cold district, stop to supply the cooling water, open the drain valve to discharge the cooling water completely. Otherwise, freezing of water may damage the cylinder. (When atmospheric temperature is above 0°C, draining is not necessary.)
- (3) Close the drain valve of air tank after discharging the drain.

* 1 ... Unloader (magnetic valve)

Normally, an electrical timer relay mechanism is applied for no-load start of the compressor. When the compressor starts, the timer functions to open the unloader (magnetic valve) to enter no-load state (unloading). In approx. 5 - 10 seconds, the magnetic valve is closed and pressure rise operation starts.

* 2 ... How to execute no-load

No-load condition is resulted by opening the drain valve of the air receiver tank or air stop valve placed on delivery pipe line.

5.3 Cautions during Operation

1) Quantity of oil

Make sure that the oil level is between H and L of oil level gauge.

Refill the oil when oil level comes near level L.

2) Instruments

Check with the instrument if oil pressure, each stage pressure, current, temperature at cooling water outlet and discharge air are not abnormal. (If there is leak in the air valve, temperature of cylinder head and discharged air becomes higher than normal condition.)

3) Quantity of water (temperature of water)

Adjust quantity of water so that maximum temperature at the cooling water outlet is 50°C or below, and the difference between the inlet temperature and the outlet temperature to 10°C or below. (Fig. 25) (See Table 2 in page 3-4)

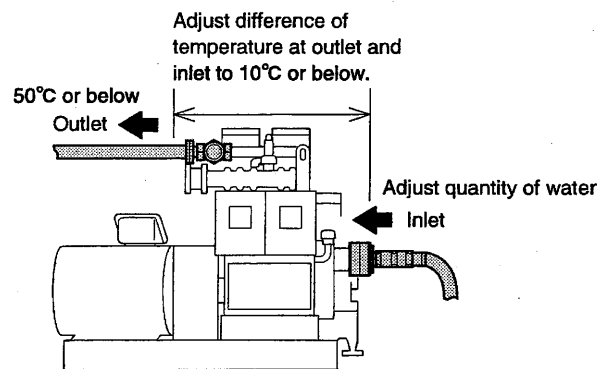


Fig. 25

4) Piping

Check if the discharge pipe and unloader (magnetic valve) piping are suffering from leaks.

5) Drain

Discharge drains from the air receiver tank and drain separators of each stage from time to time. (when manual valve is equipped)

6) Automatic stop

When the compressor is equipped with the cooling water flow switch, oil pressure switch, and discharge air temperature switch, it automatically stops if water failure, drop of oil pressure, or excessive rise of discharge air temperature occurred. Remove the causes and restart.

7) Operation time

Record the operation time every day. It is helpful for detecting trouble.

8) Control of trouble

If any abnormal condition is sensed, immediately turn OFF the power and contact the manufacturer or service shop.

6. CAUSE OF TROUBLE AND REMEDY

CAUTION

- * *Daily operation should be thoroughly attended and whenever abnormality if encountered, compressor should be immediately stopped and checked for the fault.*
- * *If trouble occurred, investigate the cause accurately and remedy that portion. Do not disassemble in haste.*

No.	Condition	Cause	Remedy
1	Abnormal sound around cylinder	Ingress of foreign matter into cylinder	Check inside of cylinder and repair.
		Worn cylinder and larger clearance against piston	Replace cylinder, piston and piston ring.
		Defective cylinder head gasket	Replace.
		Damaged air valve (valve plate and valve spring)	Check air valve and replace if necessary.
2	Abnormal sound in crank case	Wear of piston pin bushing	Replace bushing.
		Wear of main bearing	Replace.
		Wear of rod metal	Replace metal.
		Connecting rod bolt has become loose	Tighten to specified torque.
3	High temperature of delivery air	Damaged delivery valve or leak from it	Check and repair, or replace.
		Back current due to faulty valve seat gasket	Replace.
		Carbon deposit on air valve	Check and clean.
		Defective cooling and decrease of cooling water quantity	Check and clean cooling system (jacket, cooler, pump).
4	Too much carbon deposit on the valve	Large consumption of oil	Replace oil scraper ring.
			Reduce oil in crank case to specified level H.
		Oil is not proper	Replace with oil recommended by manufacturer.
		Deterioration of oil	Replace with new oil.
5	Pressure does not rise.	Leakage on piping	Repair the leak.
		Damaged air valve	Check and clean, or replace.
		Wear of piston ring	Check and replace if necessary.
		Clogged suction filter	Replace element.
		Defective operation of unloader (magnetic valve)	Check and clean, or replace.

Table 5-1

6. CAUSE OF TROUBLE AND REMEDY

No.	Condition	Cause	Remedy
6	Oil pressure does not rise.	Reverse rotational direction	Correct to normal rotational direction.
		Defective pressure gauge	Replace.
		Clogging of oil filter Clogging of oil screen	Replace element. Clean and replace oil.
		Insufficient oil (omission of oil supply)	Replenish oil up to specified level H.
		Ingress of air into oil system	Extract air.
		Worn metal and consequential increase of clearance	Replace metal.
		Accumulated dust in oil system	Clean oil screen, oil pipe.
7	Amount of oil consumption has increased.	Wear of piston ring and oil ring	Replace.
		Wear of piston and cylinder	Replace.
		Too much oil quantity in crank case	Extract oil to specified level H.
8	Too much vibration	Defective alignment	Adjust. (See page 3-9)
		Fixing bolt has become loose	Tighten enough.
		Wear of metal	Replace.
9	Ingress of bubbles into cooling water	Cylinder head bolt has become loose	Tighten enough. Replace cylinder head gasket.
		Cooler cover tightening bolt has become loose	Tighten enough. Replace cooler cover gasket.
		Cooler pipe has corroded	Block corroded pipe. Replace cooler.
10	Seizure of piston	Ingress of foreign matter into cylinder	Clean inside of cylinder, replace piston.
		Insufficient oil pressure	See item 6 "Oil pressure does not rise."
		Insufficient lubricating oil to low pressure cylinder	Check lubricator piping. Replace lubricator.
11	Blowout of safety valve (1st stage)	Omission of installing valve seat gasket (2nd stage) or improper loading	Install correctly.
		Damaged air valve (2nd stage) plate	Disassemble and replace.
		Inverted installation between inlet and outlet of air valve (2nd stage)	Install correctly.
	Blowout of safety valve (2nd stage)	Setting error of pressure switch	Set correctly.
		Shut-off valve on delivery pipe is closed	Open the valve.
		Inverted installation between inlet and outlet of check valve	Install correctly.
12	Failure of water pump	Occurrence of freezing, rusting	Clean up inside of casing.
		Ingress of air	Extract air.
		Inclusion of foreign matter	Clean up inside of casing.
		Failure of pump driving parts	Check and replace drive gear.

Table. 5-2

No.	Condition	Cause	Remedy
13	Emulsification of lubricating oil	Humid environment of setting room	Improve ventilation and dry(*1)
		Excessive cooling of compressor	Adjust quantity and temperature of cooling water(*2)
		Poor discharge of drain generated in compressor	<ul style="list-style-type: none"> ○ Adjust intermittent timer for drain discharge magnetic valve(*3) ○ Make the drain piping so as to discharge to atmosphere ○ Make the drain piping to be not affected by the function of other machines(*4)



Emulsification

When the air is compressed, a part of water contained in the air as the saturated steam is condensed to generate condensed water particle in the compressor. If once this condensed water comes to be mixed in lubricating oil, gives rise to emulsification phenomenon, which impairs the life (durability) of lubricant and result in lubricant degradation.

- *1....Do not install the compressor on the wet floor or at the side of the equipment that generate steam.
- *2....Cooling condition is determined based on the relation between quantity and temperature of the cooling water
Standard of difference of temperature at the cooling water inlet and outlet is approx. 5°C when temperature of cooling water inlet is between 36°C and 45°C.
- *3....Drain (condensed water) is often generated in rainy season of high humidity.
Adjust the intermittent timer to discharge for 5 to 10 seconds in interval of 5 to 10 minutes as the standard.
If amount of drain generated is large, this interval must be shorted.
- *4....If the drain piping are collected, the drain discharged from the compressor in operation may blow into the other compressor that is in stop.
Set the downstream of collecting point to become atmospheric pressure so that the drain is quickly discharged out of the equipment.

ANTI EMULSION V/V

This valve is installed on the upside of intercooler.
It is set to the "NORMALY CLOSE", but open the valve when using the compressor in an environment that is likely to cause emulsification.

Table 5-3

7. MAINTENANCE AND INSPECTION

DANGER



- * *Be sure to disconnect both of main power supply and operating power supply during maintenance or inspection.*
- * *Power should not be turned ON suddenly by other person during maintenance or inspection. Take measures such as informing beforehand or putting up a sign board.*

WARNING



- * *Do not touch the attachments and wirings without reason. Electric shock may be caused.*



- * *Before maintenance or inspection, discharge the compressed air from the air receiver tank and make sure that no pressure is left in the compressor.*

CAUTION



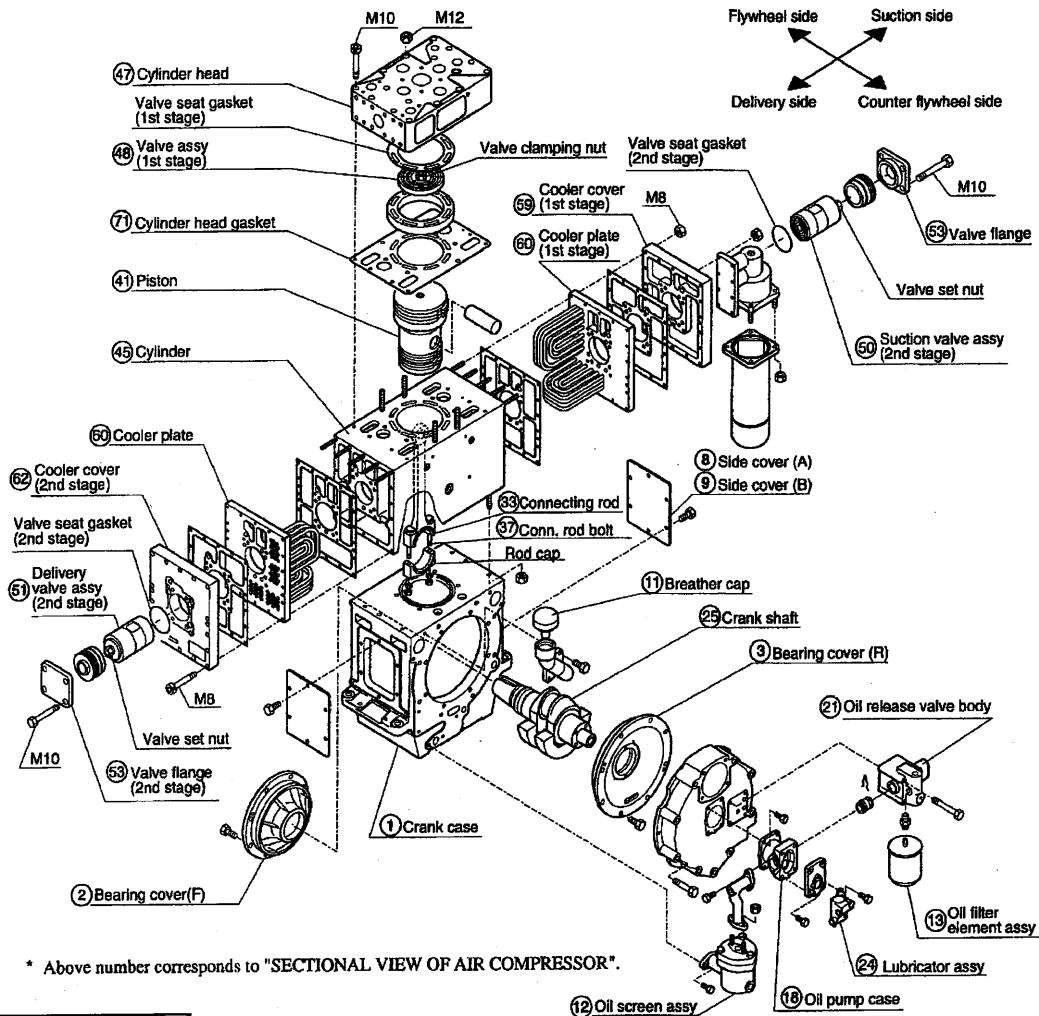
- * *Disassemble the compressor after it has been cooled completely. It is very hot just after the stop which causes to burn.*
- * *Dropping any part on the foot is dangerous. Be sure to wear the safety shoes.*
- * *If the oil entered the eye during maintenance or inspection, wash it out with clean water.*
- * *When disassembling the compressor, drain the cooling water from the compressor.*
- * *Clean up the outside so that dust may not enter into the unit.*
- * *Carefully mend the paint removed at disassembling. Rust will be generated to shorten the life of the part if it is left as the base exposed.*
- * *Use Tanabe's genuine parts.*
- * *Daily inspection and maintenance are available to avoid serious accident.*

7.1 Maintenance and Inspection Chart

Division	Check and adjustment		Operating time (h)						Remarks
	Items to be checked	Contents of check	250	1000	2000	3000	6000	8000	
Air valve	Valve as a whole	Disassembling and cleaning				○			Interval may be lightened depending on condition.
	Valve plate	Check wear amount or replace.				○			
	Spring	Check for extent of fatigue				○			
Cylinder	Inside of cylinder	Check extent of wear.				○			
	Water jacket	Wash off the water dirt.				○			
Cooler	Cooler plate	Wash off the water dirt.				○			
Piston	Piston outside	Check outside diameter, extent of wear of ring groove.					○		
	Piston ring	Check extent of wear or replace.					○		
	Oil scraper ring	Check extent of wear or replace.					○		
Oil system	Crank case	Replace oil.		○					Check oil quantity daily
	Oil screen	Clean		○					
	Oil filter	Replace			○				
	Oil pump	Check extent of wear.						○	
	Lubricator	Replace						○	
	Oil check valve	Replace						○	
Others	Piping	Check for leak	○						
	Pressure switch	Check for function		○					
	Magnetic valve	Check for function		○					
	Suction filter	Replace			○				
	Pressure gauge	Check and correct	More than every year						
	Safety valve	Check for function	Once every year						
	Cooling water pump	Check for extent of wear of machanical seal and drive gear. Cleaning				○			
	Anchor bolt, anti-vibration rubber.	Check for loosening Check for break and fatigue				○			
	Auto draintrap	Check for drain discharge status	Every time work						
	Compressor as a whole	Overhaul	Once three years or 9000hours						
	Gasket, O-ring	Replace	At each overhauling						

Table. 6

7.2 Exploded View for Maintenance and Inspection



CAUTION

Order of tightening

* To assemble the cooler cover and cylinder head, first tentatively fix the whole, then tighten diagonally in the order from inner to outer side with the tightening torque shown in Table 7.

Fig. 26

(Unit: N·m)

Torque shown in Table 7:				
Type	H-63,64,264		H-73,74,273,274,373,374	
Number of stages	1 st. stage	2 nd. Stage	1 st. stage	2 nd. stage
Cylinder head bolt	M10 : 70 M12 : 120	_____	M10 : 70 M12 : 120	_____
Valve clamping nut	25	_____	45	_____
Valve set nut	_____	12	_____	25
Cooler cover mounting bolt	_____	M8 : 40	_____	M8 : 40
Valve flange mounting bolt	_____	M10 : 70	_____	M10 : 70
Conn. rod bolt	110		180	
The values are applicable to screws, not being greased. With oil greased screws deduct 5 percent from the torque value indicates. Conn. rod bolt cannot be used more than 5 times, and replace the bolts in the elongated case.				

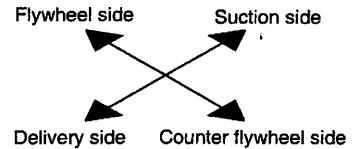
7.3 Cautions at Disassembling and Reassembling

⚠ CAUTION

Mounting of cylinder head gasket and valve seat gasket(1st stage):

Cylinder head gasket is correctly positioned by knock pins, therefore discrimination for facing direction is not necessary at the time of mounting. Valve seat gasket(1st stage for H-70 model) can be mounted wrong side out regardless of knock pin existence, therefore pay attention to this gasket as informed in the followings.

The gasket should be placed between bottom face of cavity machined at the center of cylinder head and top face of 1st stage valve seat. At this time, wider side of grommet processed metal ring has to become upper side(cylinder head side), then its narrow side faces to bottom side(valve seat side).



⚠ CAUTION

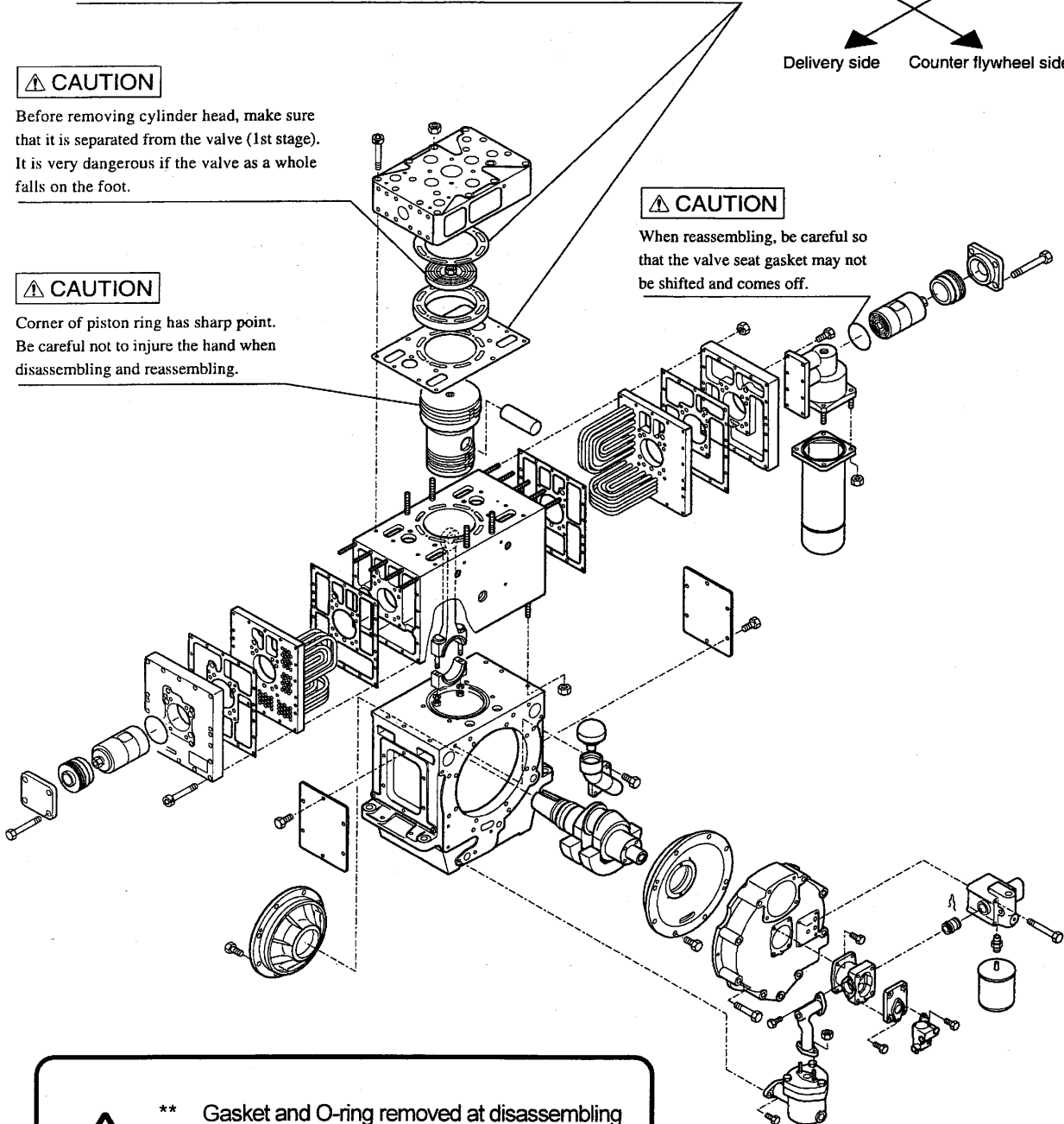
Before removing cylinder head, make sure that it is separated from the valve (1st stage). It is very dangerous if the valve as a whole falls on the foot.

⚠ CAUTION

Corner of piston ring has sharp point. Be careful not to injure the hand when disassembling and reassembling.

⚠ CAUTION

When reassembling, be careful so that the valve seat gasket may not be shifted and comes off.



** Gasket and O-ring removed at disassembling of the compressor cannot be used again. They must be replaced with new ones.

Fig. 27

7.4 Maintenance and Inspection



- ** Before starting disassembling, clean up the surroundings to provide large space and prepare boxes to store the disassembled parts therein.
- ** See "Fig. 26 in page 7-3".

1. Air valve

- * Remove the valve (1st stage), suction valve (2nd stage) and delivery valve (2nd stage). (Figs. 28 and 29)

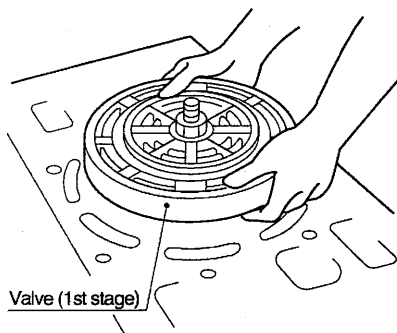


Fig. 28

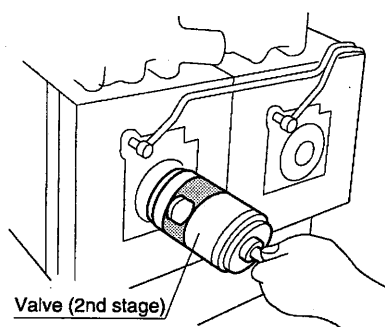


Fig. 29

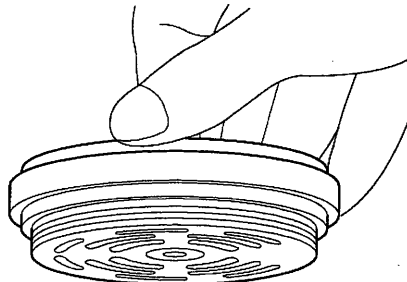
- * For disassembling the air valve, refer to the separate volumes described below.
 - ① Disassembling and reassembling procedure for suction valve (2nd stage) and delivery valve (2nd stage)
 - ② Caution and request
 - ◆ Caution for the use of gaskets
 - ◆ Caution for cylinder head and sunk plug
 - ◆ Caution for cylinder head opening up
 - ③ Exploded view of valves
 - ④ Procedure of 2nd stage valve installation

CAUTION

- * **Remove the valve (1st stage) stuck to the cylinder head by lightly hitting it with handle of hammer.**
- * **Pay attention to the position and state of the valve seat gasket (1st stage) at reassembling.**
- * **Do not damage the air valve seat. Do not assemble the plate and spring reversely.**
- * **When reassembling the valve seat gasket (2nd stage), apply grease to prevent slippage, falling, and air leak.**

1) Entire air valve

- (1) Wipe out the air valve outside (both 1st and 2nd valves) with a clean cloth, and check deposit of carbon or sticking of foreign matters. (Fig. 30)



Check for sticking of carbon and foreign matter

Fig. 30

- (2) If carbon or foreign matter is stuck, disassemble the valve and carefully clean it with soft cloth or brush.

2) Valve plate

- (1) Push the valve plate from the valve seat side using a driver or steel bar (3mm dia.), and check abnormality of valve plate face, and action of spring. (Fig. 31)

Put the driver in several place to check action of the valve plate. The valve plate will make stroke equivalent to valve lift.

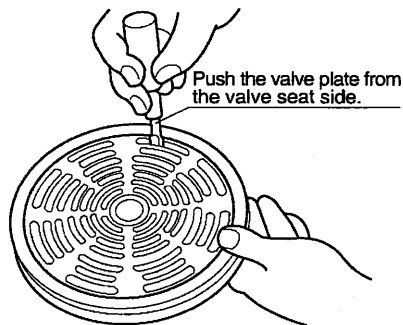


Fig. 31

- (2) If the valve plate shows improper action, disassemble and clean it.
- (3) If the valve plate is worn, replace it with new one.

3) Spring

- (1) Disassemble the 1st stage side spring to check its damage or wear.
- (2) Check the appearance of the 2nd stage side spring if there is no damage or wear. (Fig. 32)

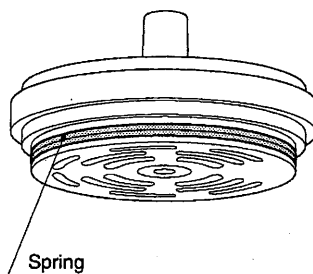


Fig. 32

(3) Replace the damaged or worn spring with new one.

* Standard value of valve lift is shown as follows.

- Component parts of valve (1st stage) and valve lift.
- The valve replacement thickness is in reference value which is not guaranteed value.

Type of valve(1st. stage)		VZ-6100		VH-7100	
Applied type		H-63.64.264		H-73.74.273.274.373.374	
Purpose		Suction valve	Delivery valve	Suction valve	Delivery valve
Number of individual parts	Valve seat	1	1	1	1
	Valve plate	3	2	1	1
	Valve spring	6	4	2	2
	Lift washer	-	-	2	-
	Cushion plate	-	-	1	-
	Valve guard	1	1	-	-
Valve lift (mm)		1.6	1.2	1.6	1.8
Basic valve plate thickness (Replacement) (mm)		1.2 (1.05)	1.6 (1.45)	1.0 (0.9)	1.8 (1.65)

Table 8

Component parts of suction valve (2nd stage) /Delivery valve (2nd stage) and valve lift

Type of valve(2nd. stage)		VP-2700-(S)	VP-2700-(D)	VP-3100B-(S)	VP-3100B-(D)
Applied type		H63.64.264		H-73.74.273.274.373.374	
Purpose		Suction valve	Delivery valve	Suction valve	Delivery valve
Number of individual parts	Valve seat	1	1	1	1
	Valve plate	1	1	1	1
	Valve spring	3	4	1	3
	Guide ring(lift washer)	1	1	1	1
	Valve guard	1	1	1	1
Valve lift (mm)		1.6	1.6	1.2	1.2
Basic valve plate thickness (Replacement) (mm)		1.5 (1.4)	1.5 (1.4)	1.25 (1.05)	1.25 (1.05)

Table 9

2. Cylinder

* Remove the cylinder head.

* Remove the cooler covers of both 1st and 2nd stages.

* For disassembling the cylinder head, refer to the separate volumes described below.

① Caution and request

- ◆ Caution for the use of gaskets
- ◆ Caution for cylinder head and sunk plug
- ◆ Caution for cylinder head opening up

1) Inside of cylinder

- (1) Check if cylinder inside is worn or proper quantity of oil is applied. (Fig. 33)

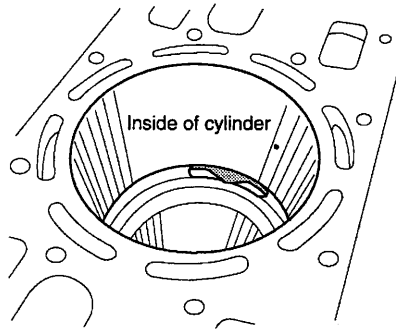


Fig. 33

- (2) When the inside of the cylinder is worn, consult the manufacturer or service shop.
- (3) When quantity of oil applied is insufficient, replace the lubricator. (See page 7-13.)

2) Water jacket

- (1) Check if water dirt is stuck on the water jacket surface (both 1st and 2nd stages).
- (2) When water dirt is stuck, clean the portion shown in Fig. 34 with the brush.

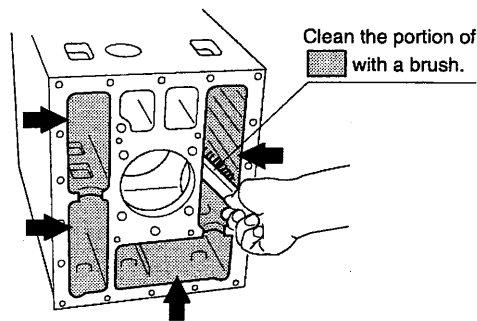


Fig. 34

3. Cooler

- * Remove the cooler covers of both 1st and 2nd stages.

1) Cooler

- (1) Check if water dirt is stuck on the water jacket surfaces.
- (2) When water dirt is stuck, clean the portion shown in Fig. 35 with the brush.

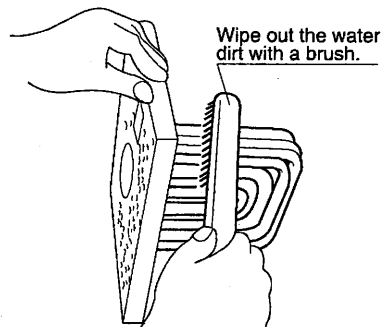


Fig. 35

4. Piston

- * Remove the cylinder head.
- * Remove the rod cap from the connecting rod.
- * Screw in the piston removing tool at the top of piston, then extract the piston carefully so that the crank pin and the inside of the cylinder may not be scratched. At this time, connecting rod comes up together with piston assembly.

⚠ CAUTION

- * **Carefully treat the piston since it is easily scratched.**
- * **Use a ring mounting tool when reassembling the ring.**
- * **The piston should not be clamped by vise or hit by hammer.**
- * **Piston ring has sharpened edge. Be careful not to injure your finger.**

1) Outside of the piston

- (1) Check that oil is properly applied.
- (2) When quantity of oil applied is insufficient, first readjust the lubricator then replace it when it was found to be damaged or fault. (See page 7-13.)

2) Piston ring

- (1) Three piston rings are set on the 1st stage and three piston rings are set on the 2nd stage.
- (2) Check direction of the ring (face and back) and extent of wear. (Fig. 36)

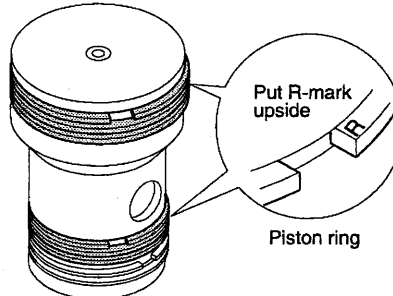


Fig. 36

- (3) If the direction of the ring is wrong, mount it correctly.
- (4) Replace the worn piston ring.
- (5) When setting piston rings into piston ring grooves, put the R-mark side of each ring upside and arrange the cut ends at interval of 120° so that all the cut ends will not be aligned. (Fig. 37)

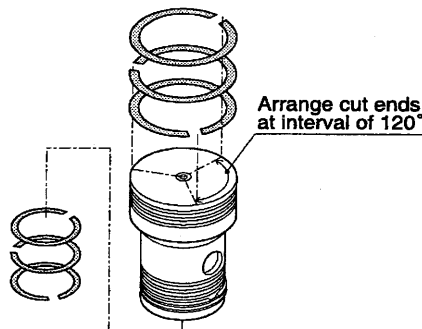


Fig. 37

(6) As each ring is narrow shaped and easily deforms, handle it with care.

3) Oil scraper ring

- (1) Two oil scraper rings are set on piston skirt.
- (2) Check direction of the ring (face and back) and extent of wear. (Fig. 38)

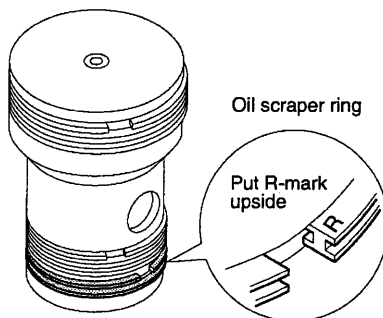


Fig. 38

- (3) If the direction of the ring is wrong, mount it correctly.
- (4) Replace the worn scraper ring.
- (5) When setting scraper rings into piston ring grooves, put the R-mark side of each ring upside and arrange the cut ends at interval of 180° so that the cut ends will not be aligned. (Fig. 39)

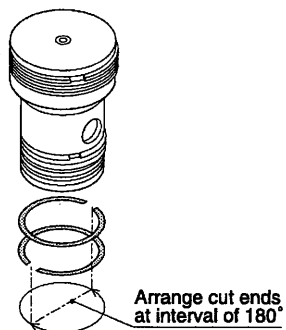


Fig. 39

(6) As each ring is narrow shaped and easily deforms, handle it with care.

5. Oil system

CAUTION

- * *If the oil entered the eye during maintenance or inspection, wash it out with clean water.*

1) Crank case

(1) Replace oil according to the operation time in Table 6.

(2) Replacement of oil

As the compressor has not yet been "shaken down" sufficiently while it is as new, observe the following cautionary instructions during the initial operation of 100 hours as break-in period.

- * Use ISO.VG100 (SAE No.30) oil as the lubricant for compressor.
- * Drain the whole of oil while the compressor is kept warm at the interval of 50 and 100 hours after the initial start of the compressor operation and wash the oil screen with clean flushing oil, followed by filling the compressor with fresh oil. However, when using synthetic oil, use mineral oil in initial operation of 300 hours.
- * Thereafter replace the oil at intervals of 1000 hours.
- * Replace the oil filter at intervals of 2000 hours.
- * Never fail to conduct daily inspection and service.
- * It is a fundamental rule to clean up the compressor thoroughly and fill it with fresh oil.

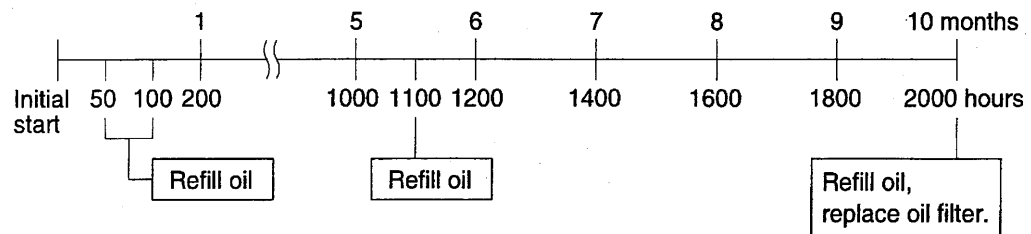


Table. 10

(3) Types of oil (See page 3-5.)

2) Oil screen

(1) Oil screen blocks coarse dirt. (Fig. 40)

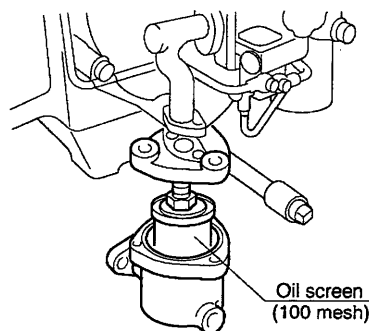


Fig. 40

- (2) Clean the oil screen when replacing the oil.
- (3) Cover so that no dirt enters the oil screen, remove the stain with soft cloth, and wash with clean flushing oil. (Fig. 41)

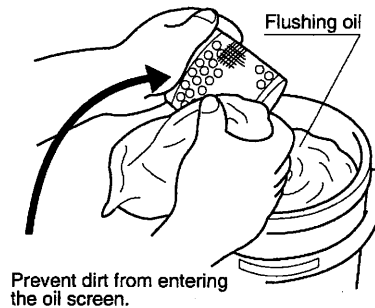


Fig. 41

- (4) Replace the oil screen if it is broken.
- 3) Oil filter
- (1) Oil filter filters minute dirt.
 - (2) Oil filter is cartridge type.
 - (3) Replace oil filter with a new one at every two times of replacement. (Fig. 42)

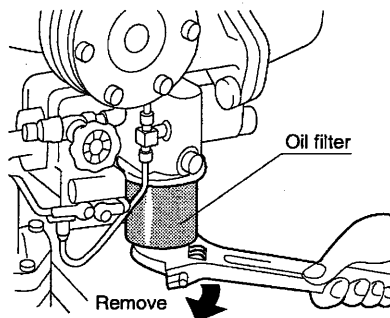


Fig. 42

- 4) Oil pump
- (1) Inspect oil pump every 8000 hours of operation.
 - (2) After removing the bolts, replace the connecting piece suppressor as shown in Fig. 43. Shift the connecting piece toward the oil release valve body side using a minus screwdriver, then remove the oil pump.

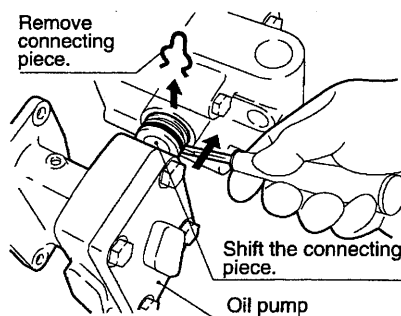


Fig. 43

- (3) Make sure that the pump can be rotated smoothly by hand. (Fig. 44)

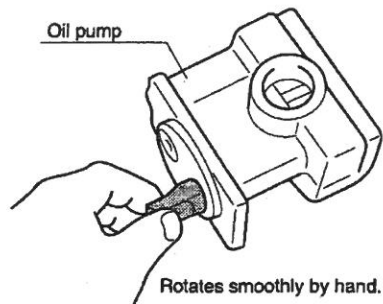


Fig. 44

- (4) If it cannot be rotated by hand or resistance is large, disassemble and clean. Replace if necessary.

5) Lubricator (works for the lubrication of 1st stage cylinder)

- (1) Replace the lubricator at every 8000 hours of operation.
- (2) Replace the lubricator as illustrated in Fig. 45.
- (3) As quantity of oil supply has been adjusted to appropriate quantity before shipment, basically do not change it.

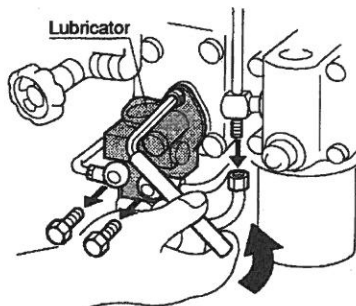


Fig. 45

6. Others

1) Piping

- (1) Check leak in the pipings.

2) Pressure switch

- (1) Check function of pressure switch. (See page 4-6.)

3) Magnetic valve

- (1) Repeat ON/OFF of the operating power switch to check operation.

4) Suction filter

- (1) Replace the suction filter at every 2000 hours of operation. (Figs. 46 and 47)

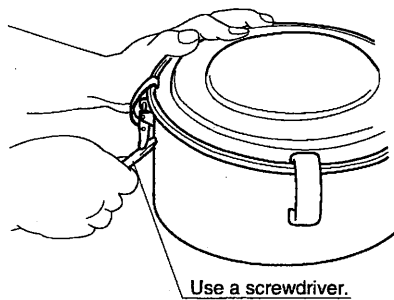


Fig. 46

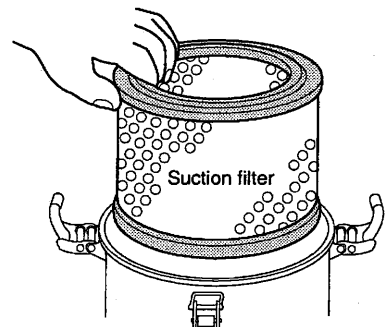


Fig. 47

5) Pressure gauge

- (1) Calibrate the pressure gauge periodically.
- (2) If abnormality is detected, replace with new pressure gauge.

6) Safety valve

- (1) Periodically check operation of the safety valve of 1st stage and 2nd stage.

7) Cooling water pump (for compressor with a cooling water pump)

- (1) Check if water dirt is stuck.
- (2) If water dirt is stuck, clean the pump using a brush.

8) Anchor bolt, anti-vibration rubber

- (1) Check the anchor bolt and anti-vibration rubber for loosening, breakage, and wear. (Fig. 48)

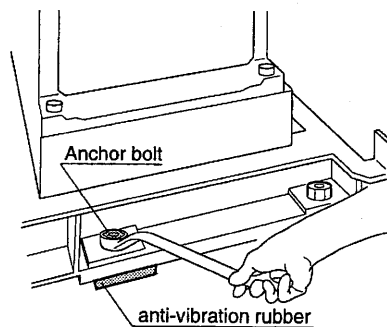


Fig. 48

- (2) If the anchor bolt is loosened, retighten it.
 - (3) Replace the broken or worn anti-vibration rubber with new one.
- 9) Whole
- (1) Overhaul the anchor bolt and anti-vibration rubber according to the operation hour in Table 6 in page 7-2.
 - (2) For an overhaul, contact the manufacturer or service shop.
- 10) Gasket, O-ring

⚠ CAUTION

- * **Cylinder head gasket of H-60 series is made from blanking out of joint sheet. For 1st stage valve, outer seat gasket is made from joint sheet, and inner seat gasket is made from copper sheet.**
 - * **Cylinder head gasket and valve seat gasket (1st stage) has thin metal grommet-processed at the portion where the valve (1st stage) is sealed. If this thickness is not correct, top clearance (*1) of the 1st stage changes and volume of discharge air cannot be secured. Use Tanabe genuine part accordingly.**
 - * **When reassembling, adjust the position of knock pin hole with paying attention to the direction of gasket.**
 - * **Valve seat gasket (2nd stage) is made of copper sheet. Use of other material in the high pressure section is very dangerous. Be sure to use Tanabe genuine part.**
 - * **Use of the parts other than genuine part may cause blow and damage of gasket by heat and pressure.**
 - * **Gasket and O-ring removed when disassembling the compressor cannot be used again. They must be replaced.**
- (1) Mounting of cylinder head gasket and valve seat gasket(1st stage):
Cylinder head gasket is correctly positioned by knock pins, therefore discrimination for facing direction is not necessary at the time of mounting.
Valve seat gasket(1st stage for H-70 model) can be mounted wrong side out regardless of knock pin existence, therefore pay attention to this gasket as informed in the followings.
- * The gasket should be placed between bottom face of cavity machined at the center of cylinder head and top face of 1st stage valve seat.
 - * At this time, wider side of grommet processed metal ring has to become upper side(cylinder head side), then its narrow side faces to bottom side(valve seat side).
- (2) Special coating is applied on the surface of H-series cylinder head gasket and valve seat gasket (1st stage). Be careful not to scratch them.

* 1 ... Top clearance

clearance generated between the top face of piston and bottom face of 1st stage valve seat when the piston has reached the top dead point. (Fig. 49)

Thickness of standard gasket

Type	Number of stages	1st stage		2nd stage
		Outside	Inside	
H- 63.64.264	Material Thickness (mm)	Joint sheet 1.5	Copper 1.5	Copper 1.5
H- 73.74.273 274.373.374	Material Thickness (mm)	Grommet processed 1.5	FKM (O-ring) V120: 119-mm I.D., 4-mm dia.	Copper 1.5

Table. 11

- * Top clearance of 1st stage side
 - * Measure the clearance between 1st stage piston top face and bottom face of 1st stage valve seat by using a depth gauge.
- * Step clearance of 2nd stage side
 - * Insert a lead wire into the clearance between 2nd stage piston annular face and the step face of cylinder. Turn the crank shaft so as to bring the piston to its "bottom dead point." At this time, the inserted lead wire is flattened to its minimum thickness which corresponds to actual step clearance of 2nd stage side.

WARNING

- * **Be sure to remove the turning bar from flywheel when crank shaft turning for abovementioned clearance setting is completed.**
- * Refer to the clearance table for standard value. (See page 8-1.)

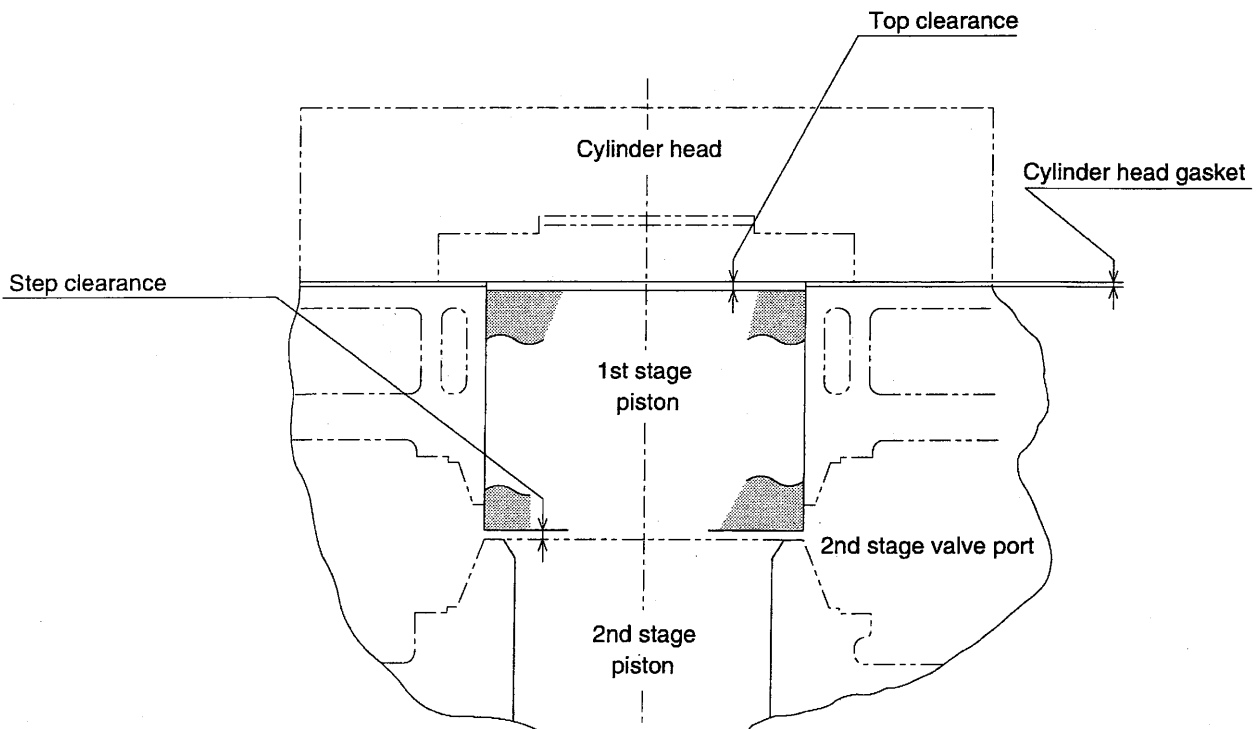


Fig. 49

8. CLEARANCE TABLE

[H-63/64/264]

Unit : mm

No.	Parts name		Basic size	Standard	Replacement
1	Piston O.D. and Cylinder I.D.	1st stage	ϕ 140	0.26 ~ 0.33	0.5
		2nd stage	ϕ 115	0.215 ~ 0.275	0.4
2	Piston pin O.D. and Piston pin bushing I.D.		ϕ 26	0.02 ~ 0.04	0.11
3	Piston pin O.D. and Piston pin hole I.D.		ϕ 26	0.007 ~ 0.027	0.05
4	Crank pin O.D. and Connecting rod metal I.D.		ϕ 72	0.04 ~ 0.098	0.15
5	Connecting rod side clearance		36	0.15 ~ 0.3	0.7
6	Crank shaft axial clearance		—	0.1 ~ 0.7	1.0
7	Main bearing I.D. and Crank journal O.D.		ϕ 80	0.07 ~ 0.171	0.32
8	Piston ring width and Ring groove	1st stage	3.5	0.02 ~ 0.05	0.1
		2nd stage	4	0.02 ~ 0.05	0.12
9	Oil ring width and Ring groove		5	0.02 ~ 0.05	0.15
10	Piston ring step joint clearance	1st stage	—	0.25 ~ 0.45	2.0
		2nd stage	—	0.25 ~ 0.45	1.6
11	Oil ring step joint clearance		—	0.25 ~ 0.45	1.6
12	Top clearance and step clearance	1st stage (H-63)	3.0	2.7 ~ 3.3	—
		1st stage (H-64/264)	1.5	1.2 ~ 1.8	—
		2nd stage	2	1.8 ~ 2.5	—
13	Oil pump	Oil pump gear side clearance	18	0.07 ~ 0.22	0.5
		Pump gear shaft hole I.D. and shaft O.D.	ϕ 20	0.007 ~ 0.049	0.12

Table. 12-1

Note : No.12 Top clearance (1st stage) includes thickness of cylinder head gasket.

[H-73/74/273/274/373/374]

Unit : mm

No.	Parts name		Basic size	Standard	Replacement
1	Piston O.D. and Cylinder I.D.	1st stage	ϕ 180	0.35 ~ 0.42	0.7
		2nd stage	ϕ 140	0.26 ~ 0.31	0.5
2	Piston pin O.D. and Piston pin bushing I.D.		ϕ 34	0.025 ~ 0.05	0.15
3	Piston pin O.D. and Piston pin hole I.D.		ϕ 34	0.009 ~ 0.033	0.07
4	Crank pin O.D. and Connecting rod metal I.D.		ϕ 72	0.04 ~ 0.098	0.15
5	Connecting rod side clearance		36	0.15 ~ 0.3	0.7
6	Crank shaft axial clearance		—	0.1 ~ 0.7	1.0
7	Main bearing I.D. and Crank journal O.D.		ϕ 80	0.07 ~ 0.171	0.32
8	Piston ring width and Ring groove	1st stage	4	0.2 ~ 0.3	0.12
		2nd stage	3.5	0.02 ~ 0.6	0.1
9	Oil ring width and Ring groove		4.5	0.07 ~ 0.055	0.14
10	Piston ring step joint clearance	1st stage	—	0.02 ~ 0.6	2.5
		2nd stage	—	0.02 ~ 0.45	2
11	Oil ring step joint clearance		—	0.25 ~ 0.45	2
12	Top clearance and step clearance	1st stage	1.5	1.2 ~ 1.8	—
		2nd stage	1.5	1.3 ~ 2.0	—
13	Oil pump	Oil pump gear side clearance	18	0.07 ~ 0.22	0.5
			27	0.07 ~ 0.23	
		Pump gear shaft hole I.D. and shaft O.D.	ϕ 20	0.007 ~ 0.049	0.12

Table. 12-2

Note : No.12 Top clearance (1st stage) includes thickness of cylinder head gasket.

9. SPECIFICATION

9.1 Specification

Item Compressor model	Type	Number of cylinders	Cylinder bore mm	Stroke mm	Pressure MPa	Revolution min ⁻¹	Type of air valve		
							1st stage	2nd stage	
							suction/delivery combined	suction	delivery
H-63	Vertical type, Water-cooled 2-stage Compression	1	1st 140 2nd 115	80	2.94 (Max.)	1000 ~ 1800	VZ- 6100	VP- 2700(S)	VP- 2700(D)
H-64				100					
H-264				100					
H-73		1	1st 180 2nd 140	80			VH- 7100	VP- 3100B(S)	VP- 3100B(D)
H-74				100					
H-273				2					
H-274		100							
H-373		80							
H-374		3		100					

Item Compressor model	Method of Driving	Lubrication oil Capacity ℓ	Piping connection		Weight of Compressor (dry)kg
			Cooling water	Air outlet	
H-63	Direct coupled	11.5	JIS 5K-25A	JIS 30K-32A	400
H-64					420
H-264					700
H-73		11.5	JIS 5K-25A	JIS 30K-40A	460
H-74					480
H-273					740
H-274		24.5	JIS 5K-32A	JIS 30K-50A	760
H-373					1070
H-374					1120

Item Compressor model	Lubricating system		Type of suction filter	Type of unloader
	Bearing	1st stage cylinder		
H-63	Forced lubrication by oil pump	Forced lubrication by lubricator	Dry element type	Discharge to atmosphere by magnetic valve
H-64				
H-264				
H-73				
H-74				
H-273				
H-274				
H-373				
H-374				

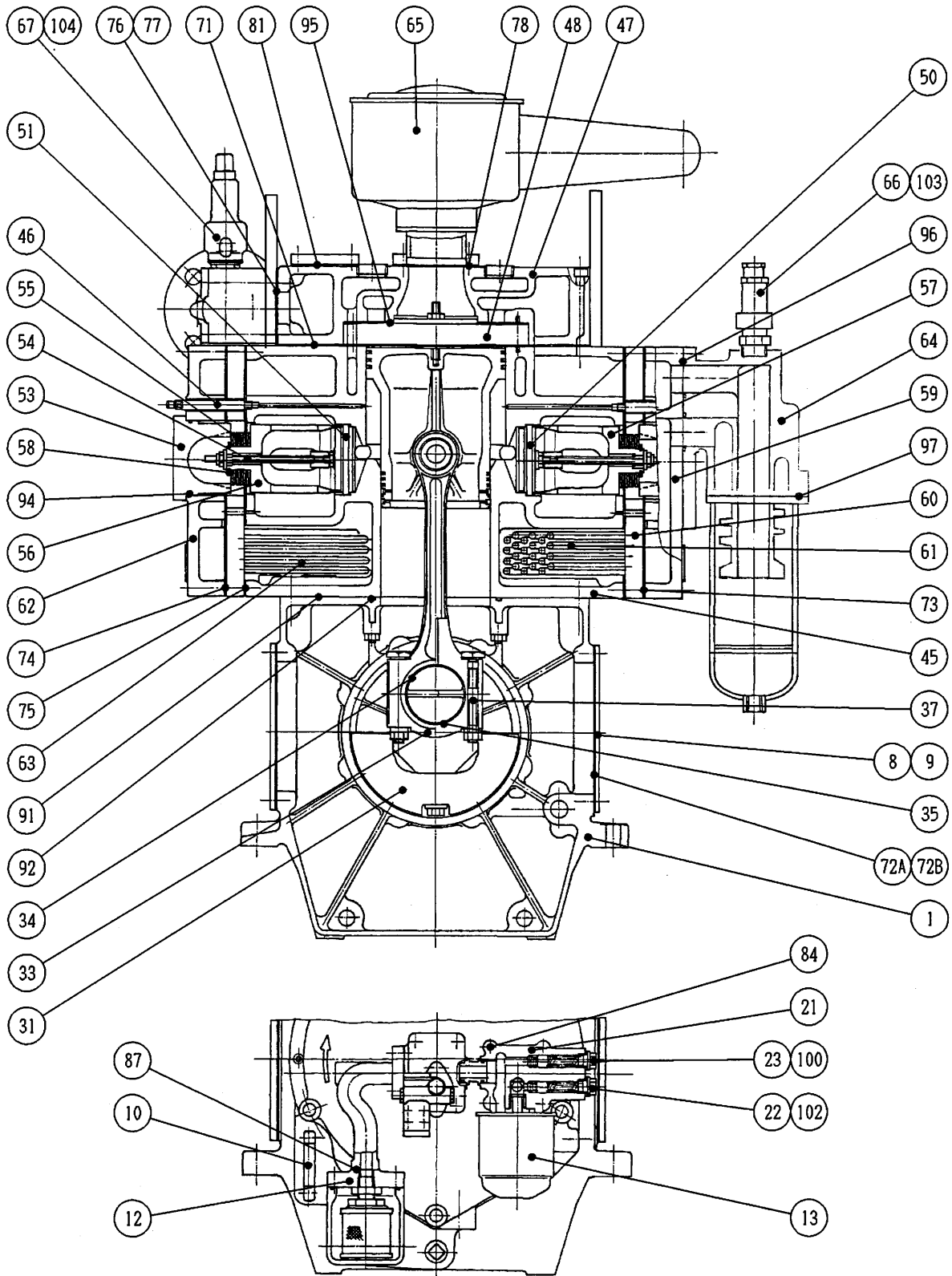
表 13

APPENDIX

Drawing and Parts List

		Drawing No.
Sectional View of Air Compressor	H-63, 64, 264	
.....		S4-8424 (1/5)
.....		S4-8424 (2/5)
.....		S4-8424 (3/5)
.....		S4-8424 (4/5)
.....		S4-8424 (5/5)
Sectional View of Air Compressor	H-73, 74, 273, 274, 373, 374	
.....		S4-8422 (1/6)
.....		S4-8422 (2/6)
.....		S4-8422 (3/6)
.....		S4-8422 (4/6)
.....		S4-8422 (5/6)
.....		S4-8423 (6/6)
Detail of Air Valve (Type: VZ-6100)	H-63, 64, 264	
.....		A3-16980
Detail of Air Valve (Type: VP-2700-S, D)	H-63, 64, 264	
.....		A3-6109
Detail of Air Valve (Type: VH-7100)	H-73, 74, 273, 274, 373, 374	
.....		A3-3003
Detail of Air Valve (Type: VP-3100B-S, D)	H-73, 74, 273, 274, 373, 374	
.....		A3-17780
Explanation for Installation of 2nd Stage Valve		
	H-63, 64, 264	
	H-73, 74, 273, 274, 373, 374	
Detail of Cooling Water Pump		A3-5719
Detail of Check Valve		A3-4243E
Disassembling and Reassembling Procedure for 2nd. Stage Valve		
Exploded View of Valves		
	H-63, 64, 264	
	H-73, 74, 273, 274, 373, 374	
Caution and Request for the Handling of Air Compressor		
Procedure of 2nd. Stage Valve Installation		
	H-63, 64, 264	
	H-73, 74, 273, 274, 373, 374	

ANGLE PROJECTION



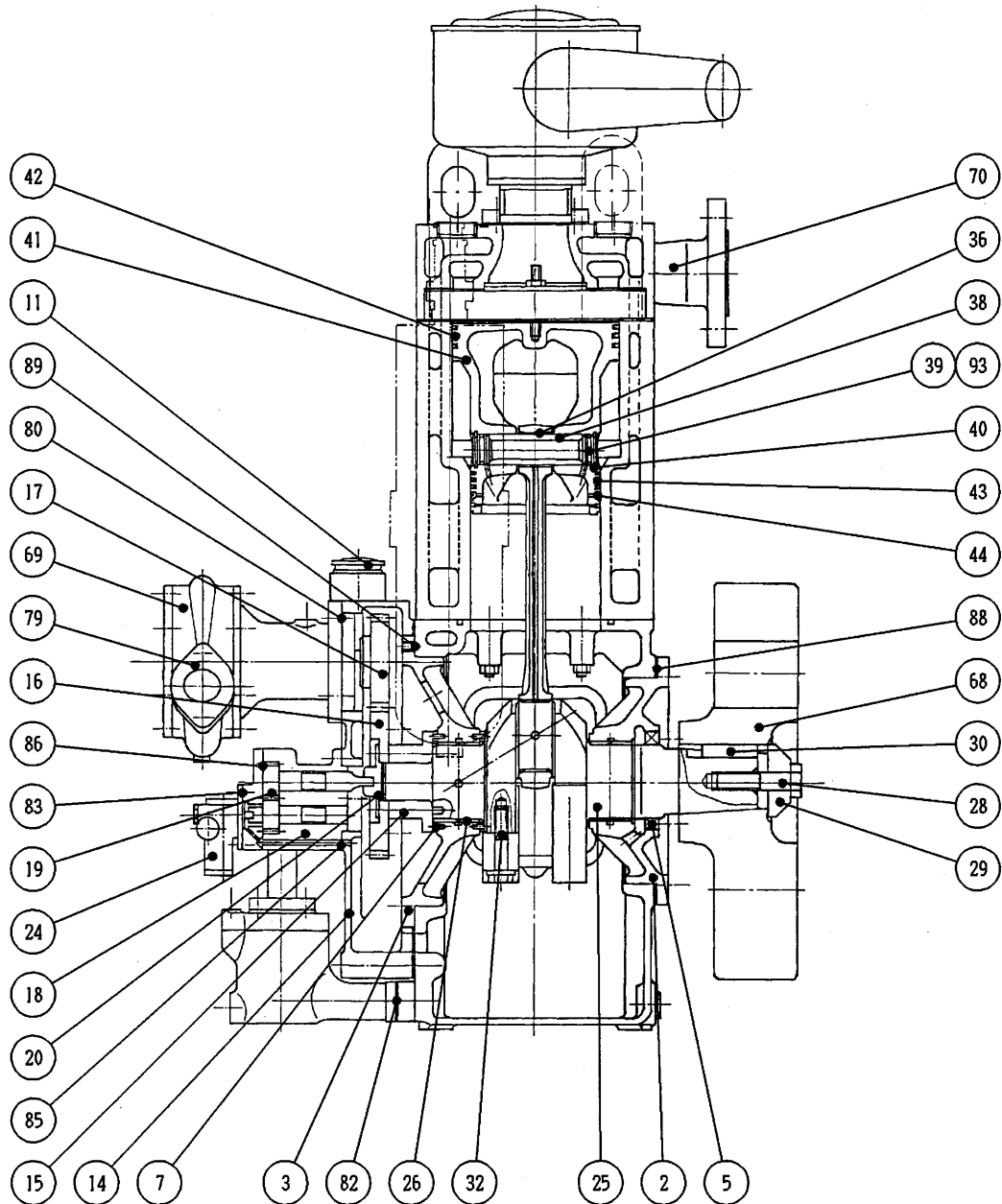
	DATE	NAME	TANABE PNEUMATIC MACHINERY CO., LTD.	
DRAWN BY	00 • 4 • 4	T. UEDA		
CHECKED BY	• •			
APPROVED BY	• •	J. Iwasaki		
SCALE	H-63, 64, 264 SECTIONAL VIEW OF AIR COMPRESSOR (1/5)			DRAWING No.
				S4-8424

OSAKA NAGOYA JAPAN

...Parts attached when "COOLING WATER PUMP" is attached.

ANGLE PROJECTION

H-63, H-64



MESSERS.

	DATE	NAME
DRAWN BY	00 • 4 • 4	T. UEDA
CHECKED BY	• •	
APPROVED BY	• •	J. Iwasaki

TANABE PNEUMATIC MACHINERY CO., LTD.

OSAKA NAGOYA JAPAN

SCALE

H-63, 64, 264
SECTIONAL VIEW OF
AIR COMPRESSOR (2/5)

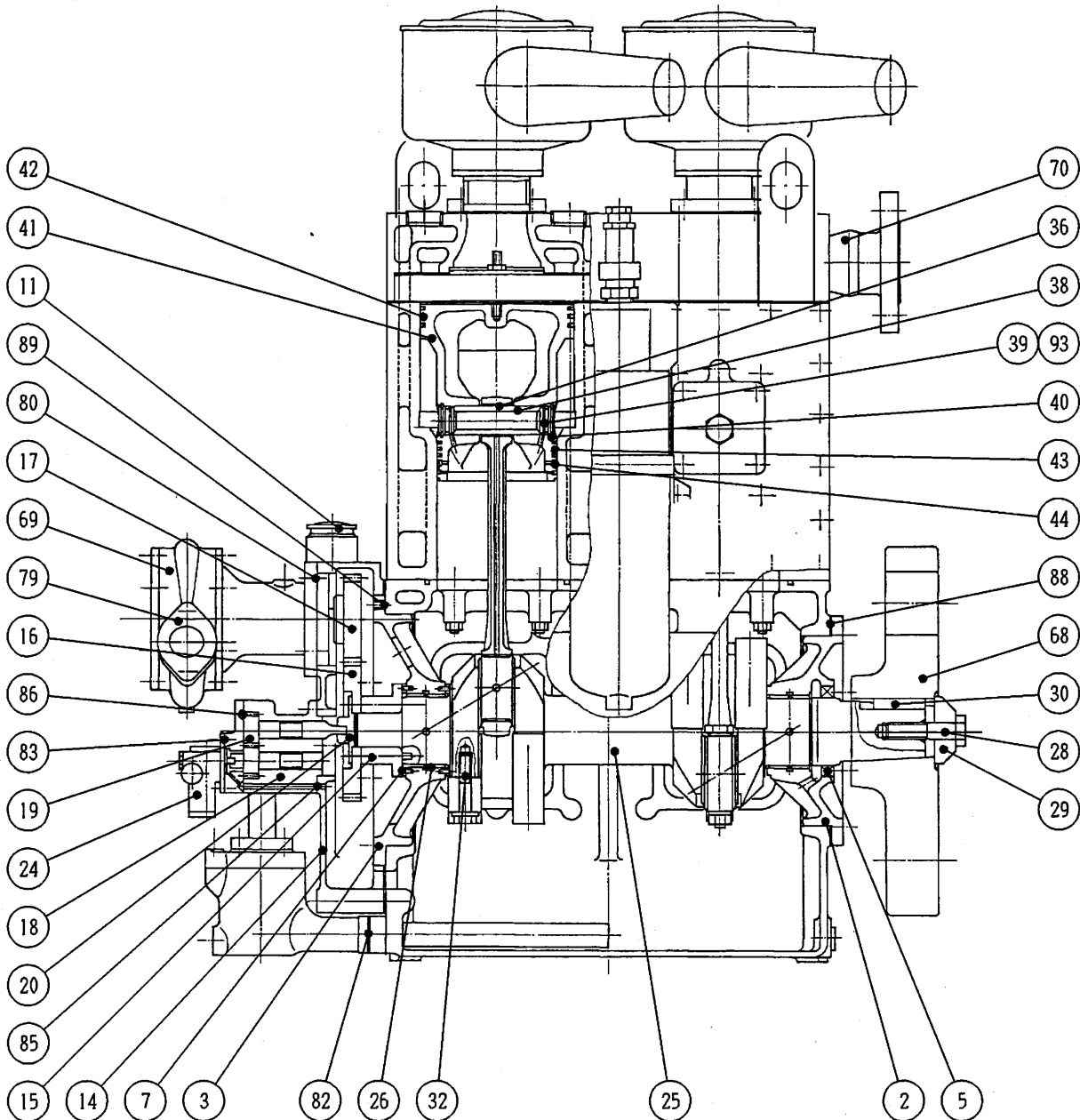
DRAWING No.

S4-8424

...Parts attached when "COOLING WATER PUMP" is attached.

ANGLE PROJECTION

H-264



MESSERS.

	DATE	NAME
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CHECKED BY	• •	
APPROVED BY	• •	J. Iwasaki

TANABE PNEUMATIC MACHINERY CO., LTD.

OSAKA NAGOYA JAPAN

SCALE

H-63, 64, 264
SECTIONAL VIEW OF
AIR COMPRESSOR (3/5)

DRAWING No.

S4-8424

...Parts attached when "COOLING WATER PUMP" is attached.

53	VALVE FLANGE (2nd. STAGE)	CAST IRON	FC250	2	4		H163.5123A
51	DELIVERY VALVE Assy. (2nd. STAGE)			1set	2sets		VP-2700-D
50	SUCTION VALVE Assy. (2nd. STAGE)			1set	2sets		VP-2700-S
48	VALVE Assy. (1st. STAGE)			1set	2sets		VZ-6100
47	CYLINDER HEAD	CAST IRON	FC250	1	2		H163.6101
46	OIL CHECK Assy.			2sets	4sets		VCO-130A
45	CYLINDER	CAST IRON	FC250	1	2		H163.5101A
44	OIL SCRAPER RING (2nd. STAGE)	SPECIAL CAST IRON		2	4		RO-11550
43	PISTON RING (2nd. STAGE)	SPECIAL CAST IRON		3	6		RP-11540
42	PISTON RING (1st. STAGE)	SPECIAL CAST IRON		3	6		RP-14035
41	PISTON	ALUMINIUM	AC8A-T6	1	2		H163.4101B, H164.4101A
40	RETAINING RING-C TYPE	CARBON TOOL STEEL	SK5M	2	4		RS-228
39	SEAL DISK	ALUMINIUM	A2014B-T4	2	4		H163.4105
38	PISTON PIN	Cr-Mo STEEL	SCM415	1	2		H163.4102
37	CONN. ROD BOLT & NUT	Ni-Cr-Mo STEEL, CARBON STEEL	SNCM630, S45C	2sets	4sets		H163.3107, UNM-12-S45
36	PISTON PIN BUSHING	LEAD BRONZE, CARBON STEEL	SPCE, CAC603	1	2		H163.3103A
35	CONN. ROD BEARING (B)	ALUMINIUM ALLOY, CARBON STEEL	SPCE, (A17S)	1	2		H163.3114A
34	CONN. ROD BEARING (A)	ALUMINIUM ALLOY, CARBON STEEL	SPCE, (A17S)	1	2		H163.3104A
33	CONNECTING ROD	FORGED STEEL	SF490A	1	2		H163.3101
32	BALANCE WEIGHT BOLT	Cr-Mo STEEL	SCM435	2	4		BM-1475-SCM
31	BALANCE WEIGHT	DUCTILE CAST IRON	FCD400	2	4		H163.2105, H174.2105
30	CRANK KEY	CARBON STEEL	S45C	1	1		H163.2104
29	CRANK WASHER	STEEL	SS400	1	1		H163.2103
28	CRANK BOLT	Cr-Mo STEEL	SCM435	1	1		BM-2080-SCM
26	MAIN BEARING	ALUMINIUM ALLOY, CARBON STEEL	SPCE, (A17S)	2	2		H163.1112A
25	CRANK SHAFT	FORGED STEEL	SF590A	1	1		H163.2101A, H264.2101A
24	LUBRICATOR Assy.			1set	1set		LM-2210, 2300
23	OIL SAFETY VALVE Assy.			1set	1set		VSO-400
22	OIL RELEASE VALVE Assy.			1set	1set		VO-520
21	OIL RELEASE VALVE BODY	CAST IRON	FC250	1	1		VO-521
20	OIL PUMP COUPLING	CARBON STEEL	S45C	1	1		H163.2127
19	OIL PUMP GEAR	Cr-Mo STEEL	SCM435	1set	1set		PG.9503, 9504
18	OIL PUMP CASE	CAST IRON	FC250	1	1		PG.9501
17	IDLE GEAR	Cr-Mo STEEL	SCM435	1	1		H163.2152, 2162
16	DRIVE GEAR	Cr-Mo STEEL	SCM435	1	1		H163.2151, 2161
15	GUIDE RING	STEEL	SS400	1	1		H163.2125
14	GEAR CASE	CAST IRON	FC250	1	1		H163.1201
13	OIL FILTER ELEMENT Assy.			1set	1set		FO-600
12	OIL SCREEN Assy.			1set	1set		SO-530
11	BREATHING CAP	STEEL, CARBON STEEL	SS400, SGP	1	1		H163.1143
10	OIL LEVEL GAUGE	PLASTIC		1	1		KL-70
9	SIDE COVER (B)	STEEL	SS400	2	2		H264.1131
8	SIDE COVER (A)	STEEL	SS400	2	2		H163.1131
7	SLIP RING	BRONZE	CAC403	2	2		H163.1122
5	OIL SEAL	FKM & STEEL		1	1		SB-8010513
3	BEARING COVER (R)	CAST IRON	FC250	1	1		H163.1121
2	BEARING COVER (F)	CAST IRON	FC250	1	1		H163.1111
1	CRANK CASE	CAST IRON	FC250	1	1		H163.1101, H264.1101

No.	NAME OF PART	MATERIAL	H-64	H-264	H-63	Q'TY	REMARKS
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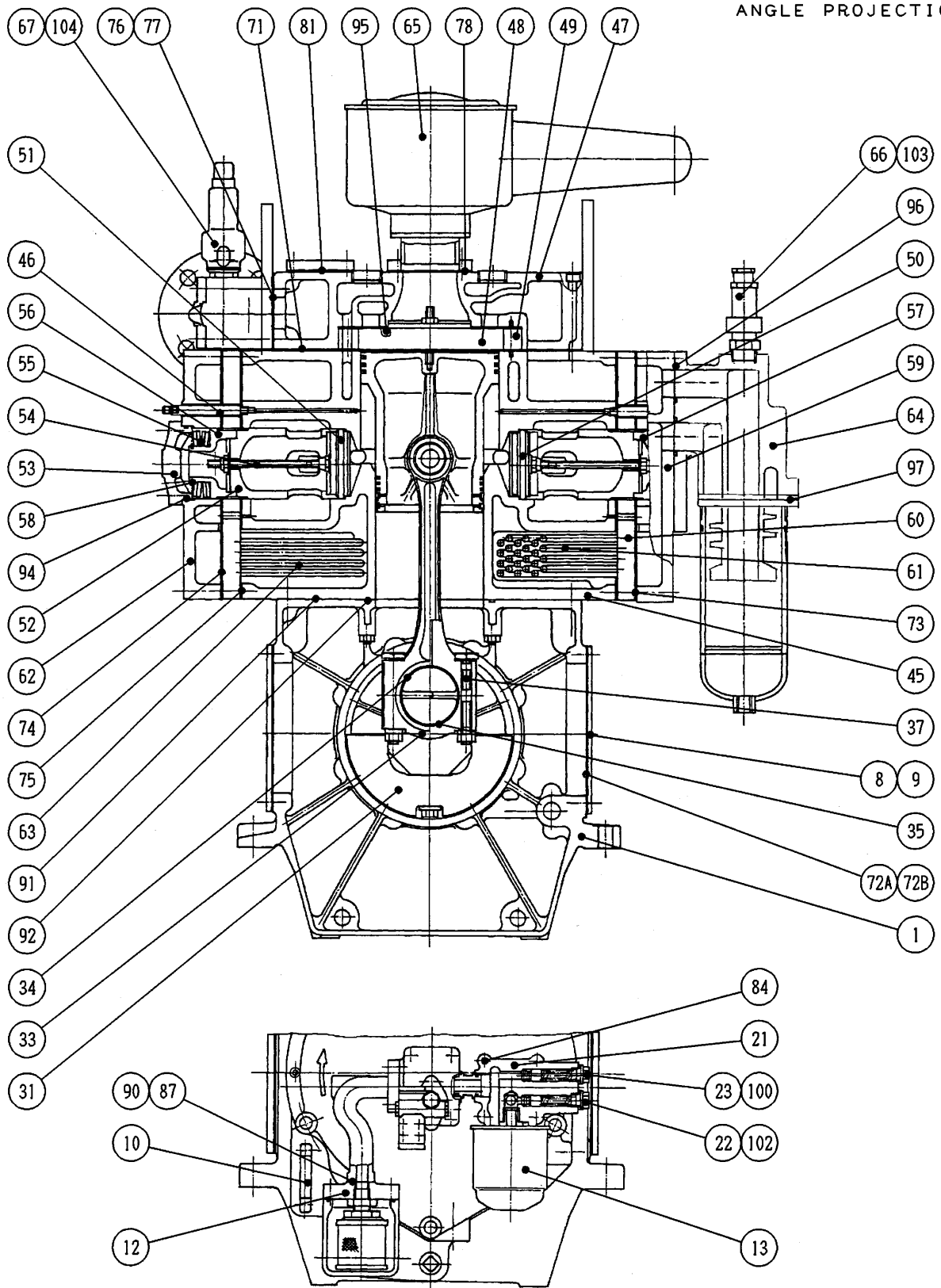
DRAWN BY	00.4.4	T. UEDA	TANABE PNEUMATIC MACHINERY CO., LTD.				
CHECKED BY	.	.					
APPROVED BY	.	J. Iwasaki					
SCALE	H-63, 64, 264 SECTIONAL VIEW OF AIR COMPRESSOR (4/5)					DRAWING No. S4-8424	

OSAKA NAGOYA JAPAN

※ . . . Parts attached when "COOLING WATER PUMP" is attached.

104	COIL SPRING (2nd. STAGE SAFETY VALVE)	STAINLESS STEEL		1	1		RGX-S-3/4 ^B
103	COIL SPRING (1st. STAGE SAFETY VALVE)	PIANO WIRE		1	2		VS・10604
102	COIL SPRING (OIL RELEASE VALVE)	PIANO WIRE		1	1		VO・502A
100	COIL SPRING (OIL SAFETY VALVE)	PIANO WIRE		1	1		VSO・402
97	O-RING (DRAIN SEPARATOR)	VITON		1	2		OR-2G115
96	O-RING (DRAIN SEPARATOR)	VITON		2	4		OR-2G45
95	GASKET (1st. STAGE VALVE)	COPPER		1	2		H163・6108A
94	O-RING (2nd. STAGE VALVE FLANGE)	VITON		2	4		OR-2G80
93	O-RING (PISTON PIN)	VITON		2	4		OR-2P22
92	O-RING (CRANK CASE)	NBR		1	2		OR-1G160
91	O-RING (CRANK CASE)	NBR		2	4		OR-1P34
89	GASKET (GEAR CASE)	NON ASBESTOS		1	1		H163・1207
88	GASKET (BEARING COVER F)	NON ASBESTOS		1	1		H163・1118
87	GASKET (OIL SCREEN OUTLET PIPE & OIL PRESS. OUTLET FLANGE)	NON ASBESTOS		3	3		LG・N0201
86	GASKET (OIL PUMP COVER)	NON ASBESTOS		1	1		PG・9510
85	GASKET (OIL PUMP CASE)	NON ASBESTOS		1	1		PG・9511
84	GASKET (OIL RELEASE BODY)	NON ASBESTOS		1	1		VO・522
83	GASKET (LUBRICATOR)	NON ASBESTOS		1	1		LM・2202
82	GASKET (OIL INLET PIPE & OIL SCREEN HOUSING)	NON ASBESTOS		2	2		LG-N0281
81	GASKET (WATER OUTLET PIPE)	NON ASBESTOS		1	2		LG-N0351
80	GASKET (COOLING WATER PUMP)	NON ASBESTOS		1	1		H163・1209
79	GASKET (WATER INLET PIPE & BREATHER FOOT)	NON ASBESTOS		4	4		LG-N0440
78	GASKET (AIR INLET PIPE)	NON ASBESTOS		1	2		SG-N0702
77	GASKET (AIR OUTLET PIPE)	NON ASBESTOS		1	1		H163・0208
76	GASKET (AIR OUTLET PIPE)	NON ASBESTOS		1	2		QG-N0400
75	GASKET (COOLER PLATE)	NON ASBESTOS		2	4		H163・8107
74	GASKET (2nd. STAGE COOLER COVER)	NON ASBESTOS		1	2		H163・8209
73	GASKET (1st. STAGE COOLER COVER)	NON ASBESTOS		1	2		H163・8109
72B	GASKET (SIDE COVER)	NON ASBESTOS		/	2		H264・1137
72A	GASKET (SIDE COVER)	NON ASBESTOS		2	/		H163・1137
71	CYLINDER HEAD GASKET	NON ASBESTOS		1	2		H163・6107
70	DELIVERY PIPE	CAST STEEL	SC450	1	1		H163・0201, H264・0201
69	COOLING WATER PUMP Assy.			1 set	1 set		PWC-20A, 32A
68	FLY WHEEL	CAST IRON	FC300	1	1		H163・9101, H264・9101
67	SAFETY VALVE (2nd. STAGE)			1 set	1 set		RGX-S-3/4 ^B
66	SAFETY VALVE (1st. STAGE)			1 set	2 sets		VS-10600A
65	SUCTION FILTER Assy.			1 set	2 sets		F-4150B
64	DRAIN SEPARATOR Assy.			1 set	2 sets		H163・8150A
63	COOLER PIPE (2nd. STAGE)	COPPER	C1220T	1 set	2 sets		H163・8110B
62	COOLER COVER (2nd. STAGE)	CAST IRON	FC250	1	2		H163・8203A
61	COOLER PIPE (1st. STAGE)	COPPER	C1220T	1 set	2 sets		H163・8110B
60	COOLER PLATE	STEEL	SS400	2	4		H163・8101A
59	COOLER COVER (1st. STAGE)	CAST IRON	FC250	1	2		H163・8103A
58	RETAINING RING-C TYPE	CARBON TOOL STEEL	SK5M	2	4		RS-130
57	VALVE SET SPRING RETAINER (2nd. STAGE S)	CAST IRON	FC250	1	2		H163・5121A
56	VALVE SET SPRING RETAINER (2nd. STAGE D)	CAST IRON	FC250	1	2		H163・5122A
55	VALVE SET SPRING (2nd. STAGE)	SPRING STEEL	SUP9	16	32		H163・5125
54	VALVE SET BOLT & NUT (2nd. STAGE)	CARBON STEEL	S15C	2	4		H163・5124B, 5126
				H-64	H-264		
				H-63	/		
No.	NAME OF PART		MATERIAL	Q'TY		REMARKS	
	DATE	NAME	TANABE PNEUMATIC MACHINERY CO., LTD.				
DRAWN BY	00・4・4	T. UEDA					
CHECKED BY	・	/					
APPROVED BY	・	J. Iwasaki	OSAKA NAGOYA JAPAN				
SCALE	H-63, 64, 264 SECTIONAL VIEW OF AIR COMPRESSOR (5/5)					DRAWING No.	
/						S4-8424	

ANGLE PROJECTION

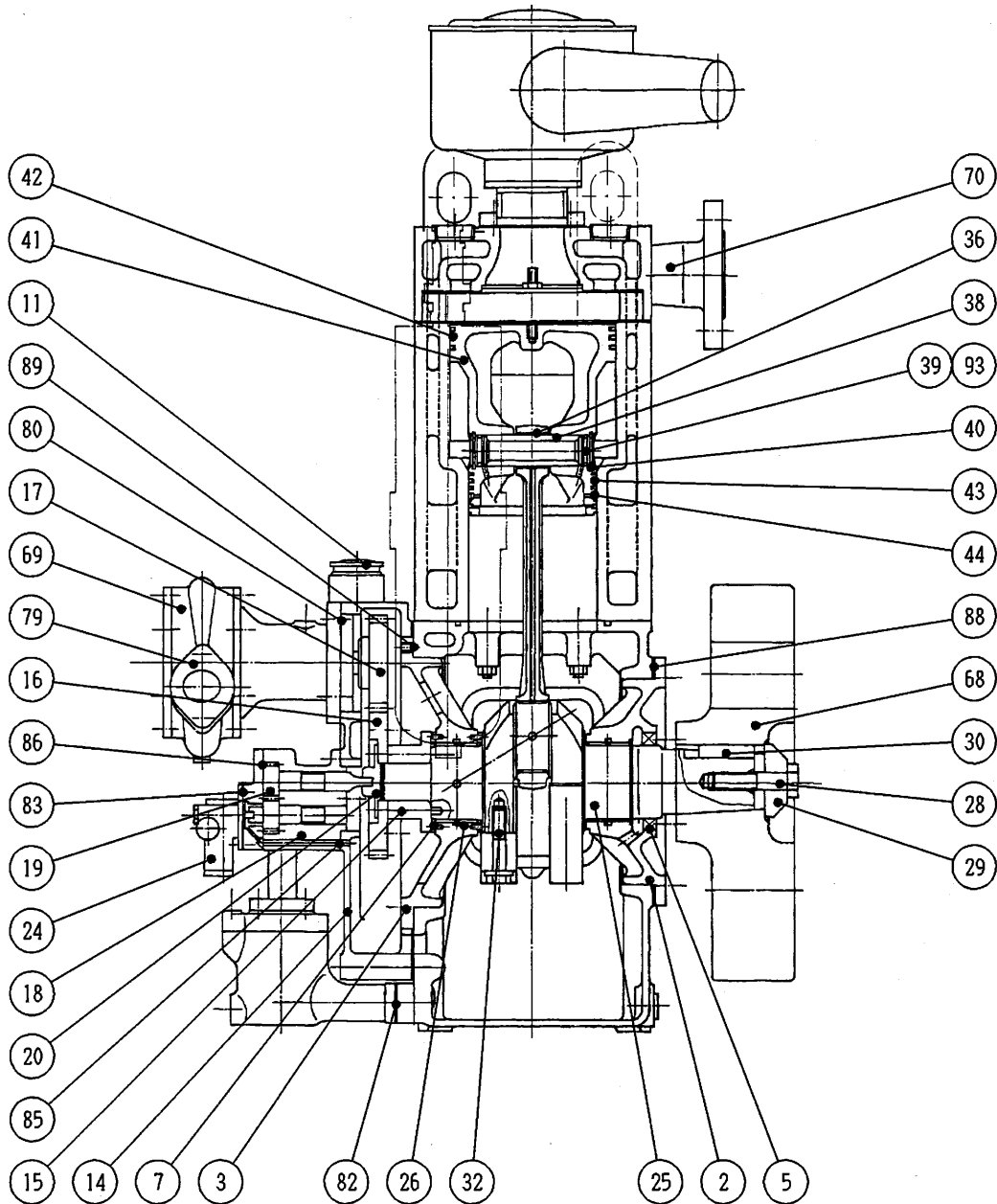


		DATE	NAME	TANABE PNEUMATIC MACHINERY CO., LTD.	
DRAWN	BY	00 • 3 • 31	T. UEDA		
CHECKED	BY	• •			
APPROVED	BY	• •	J. Iwasaki	OSAKA	NAGOYA JAPAN
SCALE	H-73, 74, 273, 274, 373, 374 SECTIONAL VIEW OF AIR COMPRESSOR (1/6)				DRAWING No.
					S4-8422

...Parts attached when "COOLING WATER PUMP" is attached.

ANGLE PROJECTION

H-73, H-74



MESSERS.

	DATE	NAME
DRAWN BY	00 • 3 • 31	T. UEDA
CHECKED BY	• •	
APPROVED BY	• •	J. Iwasaki

TANABE PNEUMATIC MACHINERY CO., LTD.

OSAKA NAGOYA JAPAN

SCALE

H-73, 74, 273, 274, 373, 374
SECTIONAL VIEW OF
AIR COMPRESSOR (2/6)

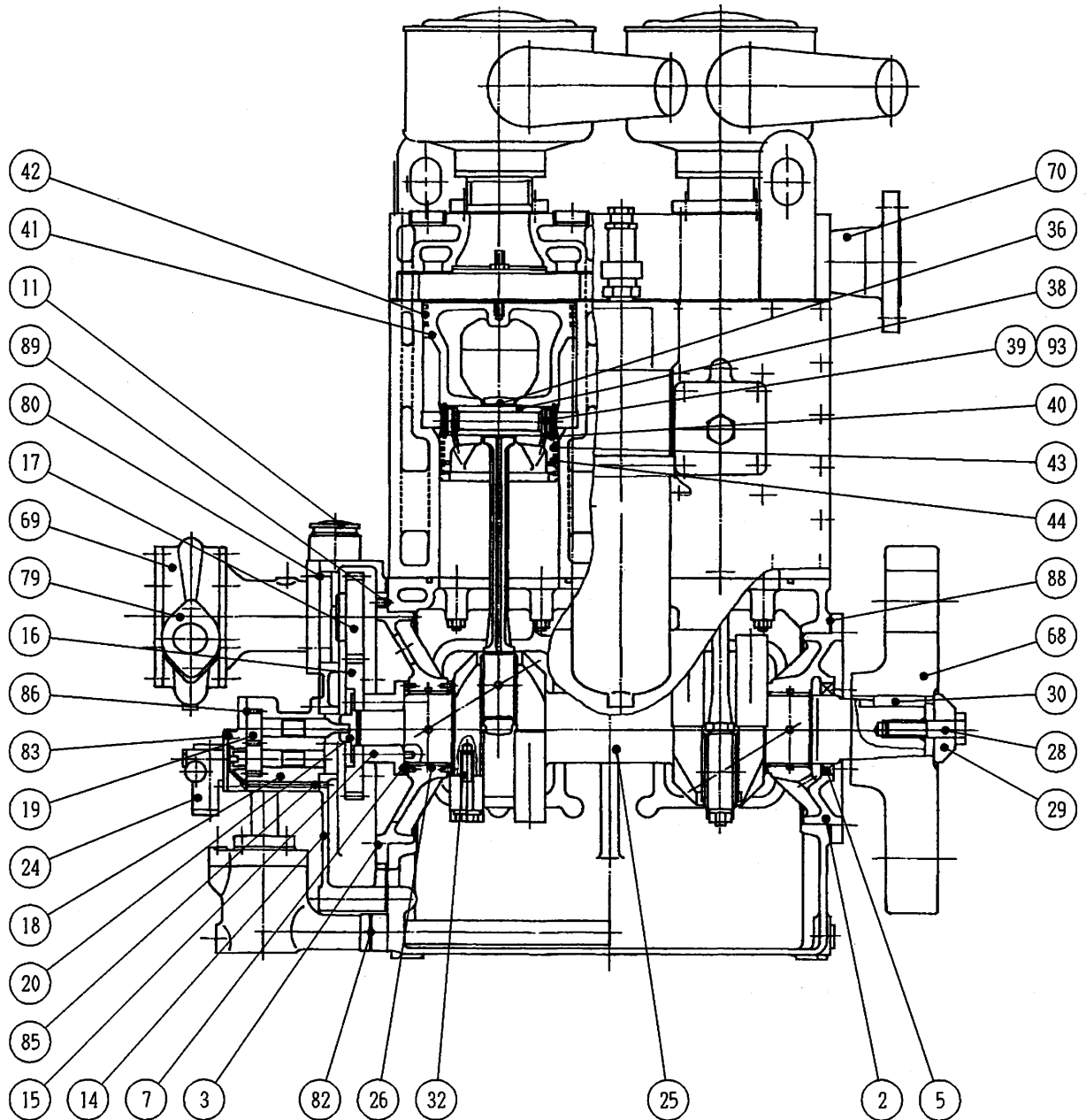
DRAWING No.

S4-8422

...Parts attached when "COOLING WATER PUMP" is attached.

ANGLE PROJECTION

H-273, H-274



MESSERS.

	DATE	NAME
DRAWN BY	00 • 3 • 31	T. UEDA
CHECKED BY	• •	
APPROVED BY	• •	J. Iwasaki

TANABE PNEUMATIC MACHINERY CO., LTD.

OSAKA NAGOYA JAPAN

SCALE

H-73, 74, 273, 274, 373, 374
SECTIONAL VIEW OF
AIR COMPRESSOR (3/6)

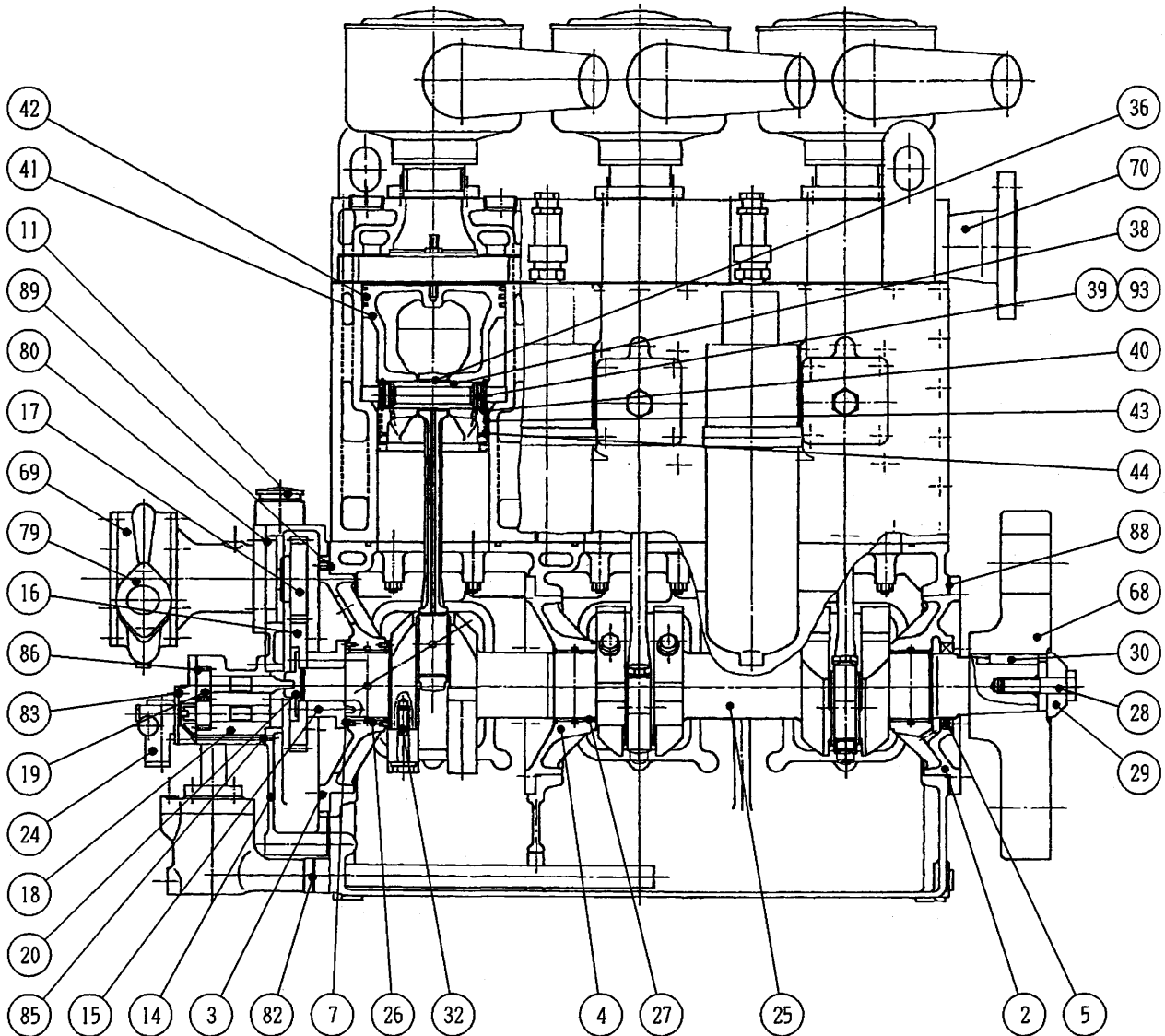
DRAWING No.

S4-8422

...Parts attached when "COOLING WATER PUMP" is attached.

ANGLE PROJECTION

H-373, H-374



MESSERS.

	DATE	NAME
DRAWN BY	00 • 3 • 31	T. UEDA
CHECKED BY	• •	
APPROVED BY	• •	J. Iwasaki

TANABE PNEUMATIC MACHINERY CO., LTD.

OSAKA NAGOYA JAPAN

SCALE

H-73, 74, 273, 274, 373, 374
SECTIONAL VIEW OF
AIR COMPRESSOR (4/6)

DRAWING No.

S4-8422

...Parts attached when "COOLING WATER PUMP" is attached.

53	VALVE FLANGE (2nd. STAGE)	CAST IRON	FC250	2	4	6	H173.5123A
52	VALVE RETAINER (2nd. STAGE)	CAST IRON	FC250	2	4	6	H173.5121A
51	DELIVERY VALVE Assy. (2nd. STAGE)			1set	2sets	3sets	VP-3100B-D
50	SUCTION VALVE Assy. (2nd. STAGE)			1set	2sets	3sets	VP-3100B-S
49	OUTER RING	CAST IRON	FC250	1	2	3	H173.6131
48	VALVE Assy. (1st. STAGE)			1set	2sets	3sets	VH-7100
47	CYLINDER HEAD	CAST IRON	FC250	1	2	3	H173.6101
46	OIL CHECK Assy.			2sets	4sets	6sets	VCO-120A
45	CYLINDER	CAST IRON	FC250	1	2	3	H173.5101A
44	OIL SCRAPER RING (2nd. STAGE)	SPECIAL CAST IRON		2	4	6	RO-14045
43	PISTON RING (2nd. STAGE)	SPECIAL CAST IRON		3	6	9	RP-14035
42	PISTON RING (1st. STAGE)	SPECIAL CAST IRON		3	6	9	RP-18040
41	PISTON	ALUMINIUM	AC8A-T6	1	2	3	H173.4101B, H174.4101B
40	RETAINING RING-C TYPE	CARBON TOOL STEEL	SK5M	2	4	6	RS-236
39	SEAL DISK	ALUMINIUM	A2014B-T4	2	4	6	H173.4105
38	PISTON PIN	Cr-Mo STEEL	SCM415	1	2	3	H173.4102
37	CONN. ROD BOLT & NUT	Ni-Cr-Mo STEEL, CARBON STEEL	SNM630, S45C	2sets	4sets	6sets	H173.3106A, 3107, UNM-12-S45
36	PISTON PIN BUSHING	LEAD BRONZE, CARBON STEEL	SPCE, CAC603	1	2	3	H173.3103A
35	CONN. ROD BEARING (B)	ALUMINIUM ALLOY, CARBON STEEL	SPCE, (A17S)	1	2	3	H163.3114A
34	CONN. ROD BEARING (A)	ALUMINIUM ALLOY, CARBON STEEL	SPCE, (A17S)	1	2	3	H163.3104A
33	CONNECTING ROD	FORGED STEEL	SF490A	1	2	3	H173.3101
32	BALANCE WEIGHT BOLT	Cr-Mo STEEL	SCM435	2	4	6	BM-1475-SCM
31	BALANCE WEIGHT	DUCTILE CAST IRON	FCD400	2	4	6	H164.2105, H174.2105, H274.2105
30	CRANK KEY	CARBON STEEL	S45C	1	1	1	H163.2104
29	CRANK WASHER	STEEL	SS400	1	1	1	H163.2103
28	CRANK BOLT	Cr-Mo STEEL	SCM435	1	1	1	BM-2080-SCM
27	MIDDLE MAIN BEARING	ALUMINIUM ALLOY, CARBON STEEL	SPCE, (A17S)			1set	H373.1153A
26	MAIN BEARING	ALUMINIUM ALLOY, CARBON STEEL	SPCE, (A17S)	2	2	2	H163.1112A
25	CRANK SHAFT	FORGED STEEL	SF590A	1	1	1	H163.2101A, H273.2101A, H373.2101A
24	LUBRICATOR Assy.			1set	1set	1set	LM-2210, 2300, 2400
23	OIL SAFETY VALVE Assy.			1set	1set	1set	VSO-400
22	OIL RELEASE VALVE Assy.			1set	1set	1set	VO-520
21	OIL RELEASE VALVE BODY	CAST IRON	FC250	1	1	1	VO-521
20	OIL PUMP COUPLING	CARBON STEEL	S45C	1	1	1	H163.2127
19	OIL PUMP GEAR	Cr-Mo STEEL	SCM435	1set	1set	1set	PG.9503, 9504, 9603, 9604
18	OIL PUMP CASE	CAST IRON	FC250	1	1	1	PG.9501, 9601
17	IDLE GEAR	Cr-Mo STEEL	SCM435	1	1	1	H163.2152, 2162
16	DRIVE GEAR	Cr-Mo STEEL	SCM435	1	1	1	H163.2151, 2161
15	GUIDE RING	STEEL	SS400	1	1	1	H163.2125
14	GEAR CASE	CAST IRON	FC250	1	1	1	H163.1201
13	OIL FILTER ELEMENT Assy.			1set	1set	1set	FO-600
12	OIL SCREEN Assy.			1set	1set	1set	SO-530, -530, -540
11	BREATHING CAP	STEEL, CARBON STEEL	SS400, SGP	1	1	1	H163.1143
10	OIL LEVEL GAUGE	PLASTIC		1	1	1	KL-70
9	SIDE COVER (B)	STEEL	SS400		2	2	H264.1131
8	SIDE COVER (A)	STEEL	SS400	2		2	H163.1131
7	SLIP RING	BRONZE	CAC403	2	2	2	H163.1122
5	OIL SEAL	FKM & STEEL		1	1	1	SB-8010513
4	BEARING COVER (M)	CAST IRON	FC250			1	H373.1151
3	BEARING COVER (R)	CAST IRON	FC250	1	1	1	H163.1121
2	BEARING COVER (F)	CAST IRON	FC250	1	1	1	H163.1111
1	CRANK CASE	CAST IRON	FC250	1	1	1	H163.1101, H264.1101, H373.1101

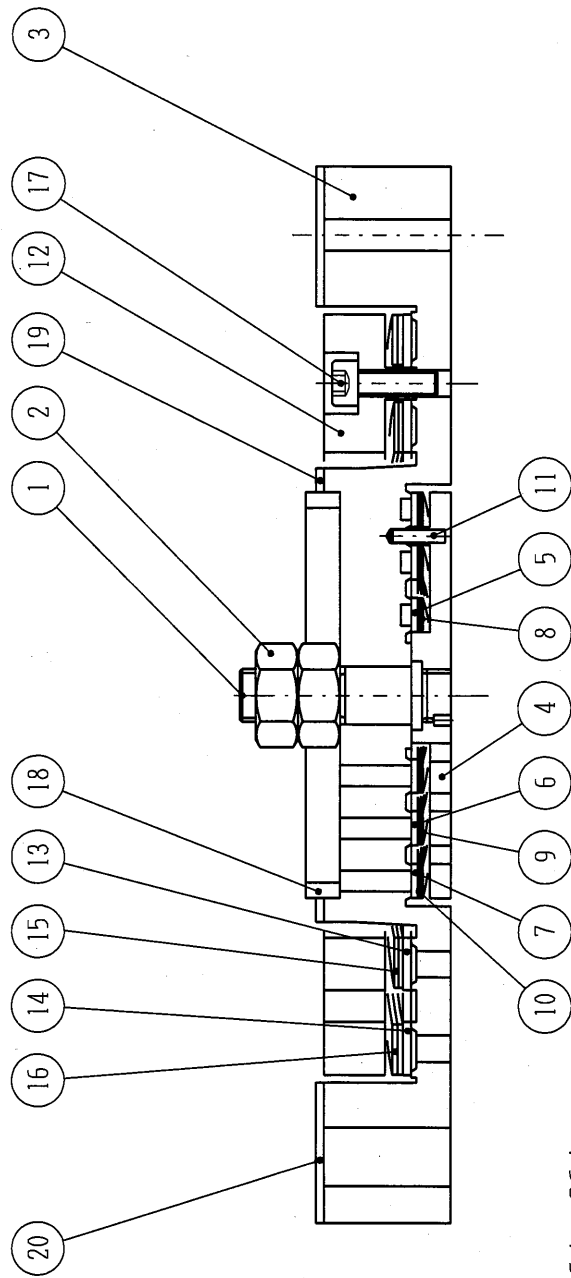
No.	NAME OF PART	MATERIAL	Q'TY	REMARKS
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DRAWN BY	00.3.31	T. UEDA	TANABE PNEUMATIC MACHINERY CO., LTD.		
CHECKED BY	.	.			
APPROVED BY	.	J. Iwasaki			
SCALE	H-73, 74, 273, 274, 373, 374 SECTIONAL VIEW OF AIR COMPRESSOR (5/6)			DRAWING No. S4-8422	

OSAKA NAGOYA JAPAN

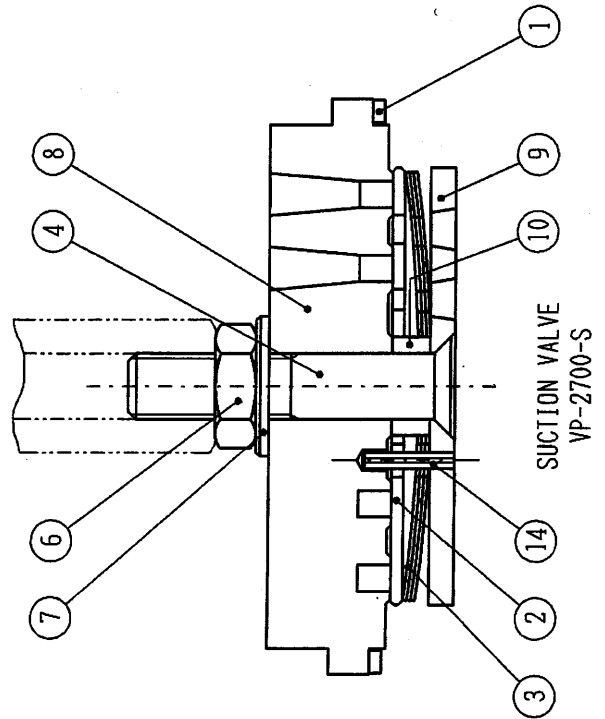
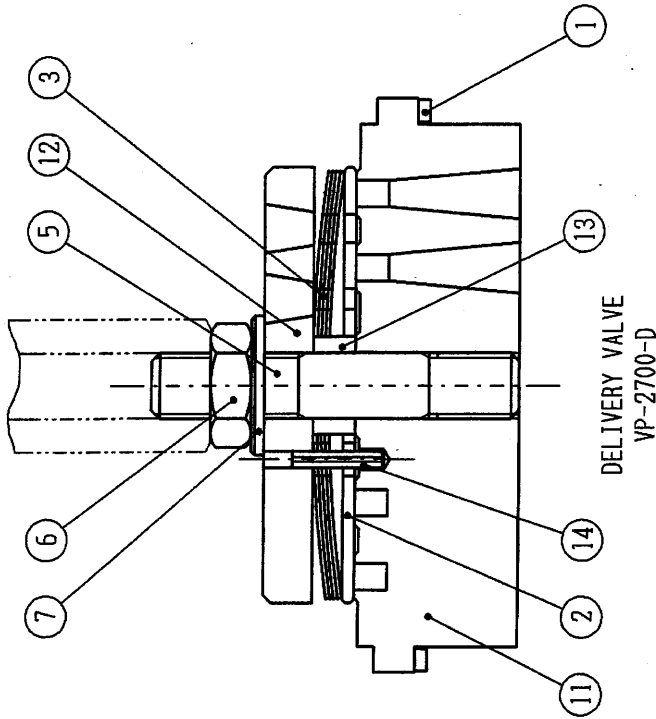
※・・・Parts attached when "COOLING WATER PUMP" is attached.

104	COIL SPRING(2nd.STAGE SAFETY VALVE)	STAINLESS STEEL		1	1	1	RGX-S-3/4 ^B , -3/4 ^B , -1 ^B
103	COIL SPRING(1st.STAGE SAFETY VALVE)	PIANO WIRE		1	2	3	VS・11003
102	COIL SPRING(OIL RELEASE VALVE)	PIANO WIRE		1	1	1	VO・502A
100	COIL SPRING(OIL SAFETY VALVE)	PIANO WIRE		1	1	1	VS0・402
97	O-RING(DRAIN SEPARATOR)	FKM		1	2	3	OR-2G115
96	O-RING(DRAIN SEPARATOR)	FKM		2	4	6	OR-2G45
95	O-RING(1st.STAGE VALVE)	FKM		1	2	3	OR-2V120
94	O-RING(2nd.STAGE VALVE FLANGE)	FKM		2	4	6	OR-2G90
93	O-RING(PISTON PIN)	FKM		2	4	6	OR-2P28
92	O-RING(CRANK CASE)	NBR		1	2	3	OR-1G160
91	O-RING(CRANK CASE)	NBR		2	4	6	OR-1P34
90	GASKET(OIL SCREEN OUTLET PIPE)	NON ASBESTOS				1	SO・549
89	GASKET(GEAR CASE)	NON ASBESTOS		1	1	1	H163・1207
88	GASKET(BEARING COVER F)	NON ASBESTOS		1	1	1	H163・1118
87	GASKET(OIL SCREEN OUTLET PIPE & OIL PRESS. OUTLET FLANGE)	NON ASBESTOS		2	2	1	LG・N0201
86	GASKET(OIL PUMP COVER)	NON ASBESTOS		1	1	1	PG・9510
85	GASKET(OIL PUMP CASE)	NON ASBESTOS		1	1	1	PG・9511
84	GASKET(OIL RELEASE BODY)	NON ASBESTOS		1	1	1	VO・522
83	GASKET(LUBRICATOR)	NON ASBESTOS		1	1	1	LM・2202A
82	GASKET(OIL INLET PIPE & OIL SCREEN HOUSING)	NON ASBESTOS		2	2	2	LG-N0281
81	GASKET(WATER OUTLET PIPE)	NON ASBESTOS		1	2	3	LG-N0351
80	GASKET(COOLING WATER PUMP)	NON ASBESTOS		1	1	1	H163・1209
79	GASKET(WATER INLET PIPE & BREATHER FOOT)	NON ASBESTOS		4	4	4	LG-N0440
78	GASKET(AIR INLET PIPE)	NON ASBESTOS		1	2	3	SG-N0702
77	GASKET(AIR OUTLET PIPE)	NON ASBESTOS		1	1	1	H163・0208
76	GASKET(AIR OUTLET PIPE)	NON ASBESTOS		1	2	3	QG-N0400
75	GASKET(COOLER PLATE)	NON ASBESTOS		2	4	6	H173・8107
74	GASKET(2nd.STAGE COOLER COVER)	NON ASBESTOS		1	2	3	H173・8209
73	GASKET(1st.STAGE COOLER COVER)	NON ASBESTOS		1	2	3	H173・8109
72B	GASKET(SIDE COVER)	NON ASBESTOS			2	2	H264・1137
72A	GASKET(SIDE COVER)	NON ASBESTOS		2		2	H163・1137
71	CYLINDER HEAD GASKET	NON ASBESTOS		1	2	3	H173・6107B
70	DELIVERY PIPE	CAST STEEL	SC450	1	1	1	H173・0201, H273・0201, H373・0201
69	COOLING WATER PUMP Assy.			1 set	1 set	1 set	PWC-25A, 32A, 40A
68	FLY WHEEL	CAST IRON	FC300	1	1	1	H163・9101, H264・9101
67	SAFETY VALVE (2nd. STAGE)			1 set	1 set	1 set	RGX-S-3/4 ^B , -3/4 ^B , -1 ^B
66	SAFETY VALVE (1st. STAGE)			1 set	2sets	3sets	VS-EW0 351-264
65	SUCTION FILTER Assy.			1 set	2sets	3sets	F-4150B
64	DRAIN SEPARATOR Assy.			1 set	2sets	3sets	H173・8150A, H174・8150A
63	COOLER PIPE (2nd. STAGE)	COPPER	C1220T	1 set	2sets	3sets	H173・8101A
62	COOLER COVER (2nd. STAGE)	CAST IRON	FC250	1	2	3	H173・8203A
61	COOLER PIPE (1st. STAGE)	COPPER	C1220T	1 set	2sets	3sets	H173・8110B
60	COOLER PLATE	STEEL	SS400	2	4	6	H173・8101A
59	COOLER COVER (1st. STAGE)	CAST IRON	FC250	1	2	3	H173・8103A
58	RETAINING RING-C TYPE	CARBON TOOL STEEL	SK5M	2	4	6	RS-145
57	VALVE SET SPRING RETAINER (2nd. STAGE S)	CAST IRON	FC250	1	2	3	H173・5126
56	VALVE SET SPRING RETAINER (2nd. STAGE D)	CAST IRON	FC250	1	2	3	H173・5127
55	VALVE SET SPRING (2nd. STAGE)	SPRING STEEL	SUP9	8	16	24	H173・5125
54	VALVE SET BOLT & NUT (2nd. STAGE)	CARBON STEEL	S15C	2	4	6	H173・5124, 5128
				H-74 H-73	H-274 H-273	H-374 H-373	
No.	NAME OF PART		MATERIAL	Q'TY			REMARKS
DRAWN BY		DATE	NAME	TANABE PNEUMATIC MACHINERY CO., LTD. OSAKA NAGOYA JAPAN			
CHECKED BY		00・3・31	T. UEDA				
APPROVED BY		・ ・	J. Iwasaki				
SCALE		H-73, 74, 273, 274, 373, 374 SECTIONAL VIEW OF AIR COMPRESSOR (6/6)					DRAWING No. S4-8422



20	VALVE SEAT GASKET (OUT SIDE)	NON ASBESTOS			1	H163 • 6109
19	VALVE SEAT GASKET (IN SIDE)	COPPER			1	H163 • 6108A
18	GUIDE RING	STEEL			1	H163 • 6105
17	SCREW	Cr-Mo STEEL			4	HBM • 0516A
16	VALVE SPRING (DEL., 2)	STAINLESS STEEL			2	VZ • 6163
15	VALVE SPRING (DEL., 1)	STAINLESS STEEL			2	VZ • 6133
14	VALVE PLATE (DEL., 2)	STAINLESS STEEL			1	VZ • 6162
13	VALVE PLATE (DEL., 1)	STAINLESS STEEL			1	VZ • 6132
12	VALVE GUARD (DEL.)	CARBON STEEL			1	VZ • 6134
11	PARALLEL PIN	STAINLESS STEEL			1	C-602508
10	VALVE SPRING (SUC., 3)	STAINLESS STEEL			2	VZ • 6153
9	VALVE SPRING (SUC., 2)	STAINLESS STEEL			2	VZ • 6143
8	VALVE SPRING (SUC., 1)	STAINLESS STEEL			2	VZ • 6123
7	VALVE PLATE (SUC., 3)	STAINLESS STEEL			1	VZ • 6152
REF. No.	NAME OF PART	MATERIAL			Q'TY	REMARKS

6	VALVE PLATE (SUC., 2)	STAINLESS STEEL	1	VZ • 6142	
5	VALVE PLATE (SUC., 1)	STAINLESS STEEL	1	VZ • 6122	
4	VALVE GUARD (SUC.)	CARBON STEEL	1	VZ • 6124	
3	VALVE SEAT	CARBON STEEL	1	VZ • 6121	
2	NUT	CARBON STEEL	2	VZ • 6115	
1	BOLT	Cr-Mo STEEL	1	VZ • 6111	
REF. No.	NAME OF PART		MATERIAL	Q'TY	REMARKS
CLIENT					
DRAWN BY	DATE	NAME	TANABE PNEUMATIC MACHINERY CO., LTD. OSAKA NAGOYA JAPAN		
CHECKED BY	10 • 09 • 15	T. FUJITWARA			
APPROVED BY	• •	• •			
SCALE	• •	S. TOKIDA			
		VZ-6100			DRAWING No.
		DETAILS OF AIR VALVE			A3-16980A
		FOR AIR COMPRESSOR			



TYPE : H-63, 64, 264

REF. NO.	NAME OF PART	MATERIAL	SUC. QUANTITY	DEL. QUANTITY	REMARKS
14	SPRING PIN	SUS420J2	1	1	VP • 2717
13	GUIDE RING (DEL.)	CARBON STEEL		1	VP • 2733
12	VALVE GUARD (DEL.)	CARBON STEEL		1	VP • 2732
11	VALVE SEAT (DEL.)	CARBON STEEL		1	VP • 2731
10	GUIDE RING (SUC.)	CARBON STEEL	1		VP • 2723
9	VALVE GUARD (SUC.)	CARBON STEEL	1		VP • 2722
8	VALVE SEAT (SUC.)	CARBON STEEL	1		VP • 2721
7	WASHER	CARBON STEEL	1	1	VP • 2718
6	VALVE CLAMPING NUT	CARBON STEEL	1	1	VP • 2743
5	VALVE CLAMPING BOLT (DEL.)	Cr-Mo STEEL		1	VP • 2716
4	VALVE CLAMPING BOLT (SUC.)	Cr-Mo STEEL	1		VP • 2712
3	VALVE SPRING	SUS420J2	3	4	VP • 2715
2	VALVE PLATE	SUS420J2	1	1	VP • 2711
1	VALVE SEAT GASKET	COPPER	1	1	VP • 2151

MESSRS.

det: VP-2700:011

TANABE PNEUMATIC MACHINERY CO., LTD.

OSAKA NAGOYA JAPAN

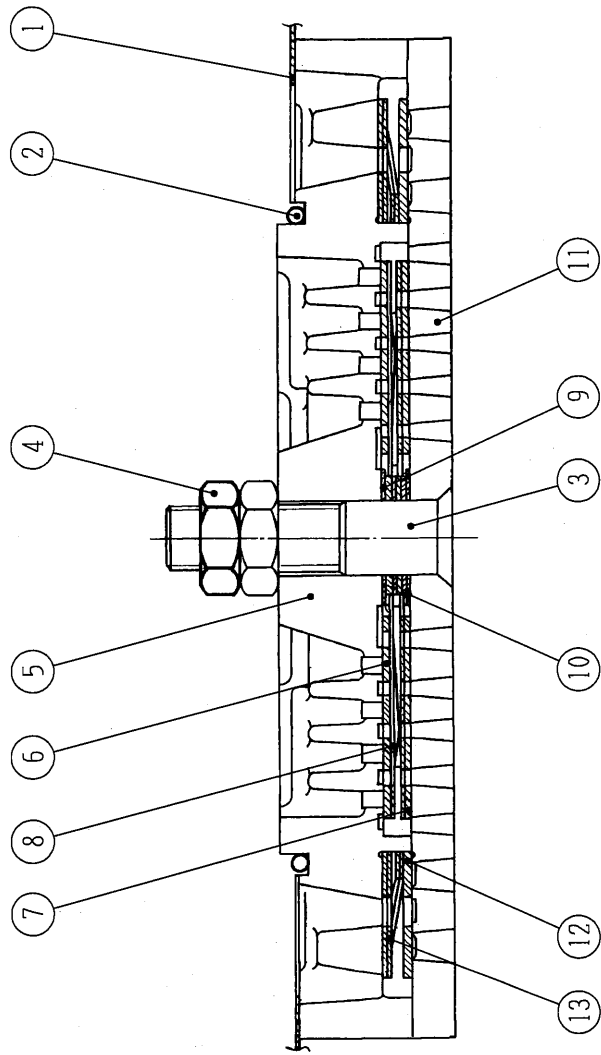
DRAWING No.

A3-6109

VP-2700-S & VP-2700-D

DETAILS OF AIR VALVE

FOR AIR COMPRESSOR



TYPE : H-73, 74, 273, 274, 373, 374

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3rd. ANGLE PROJECTION



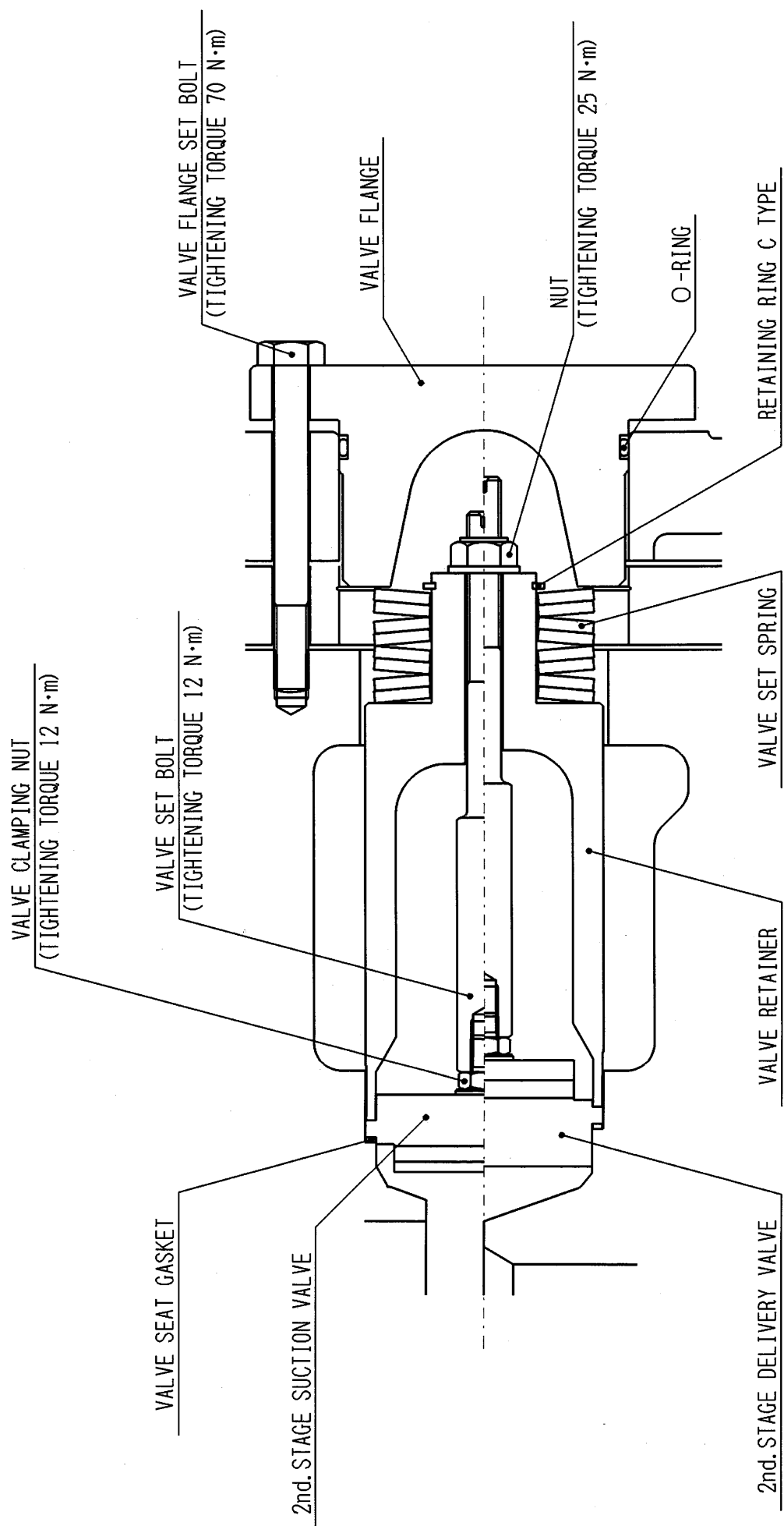
TANABE PNEUMATIC MACHINERY CO., LTD.

OSAKA NAGOYA JAPAN

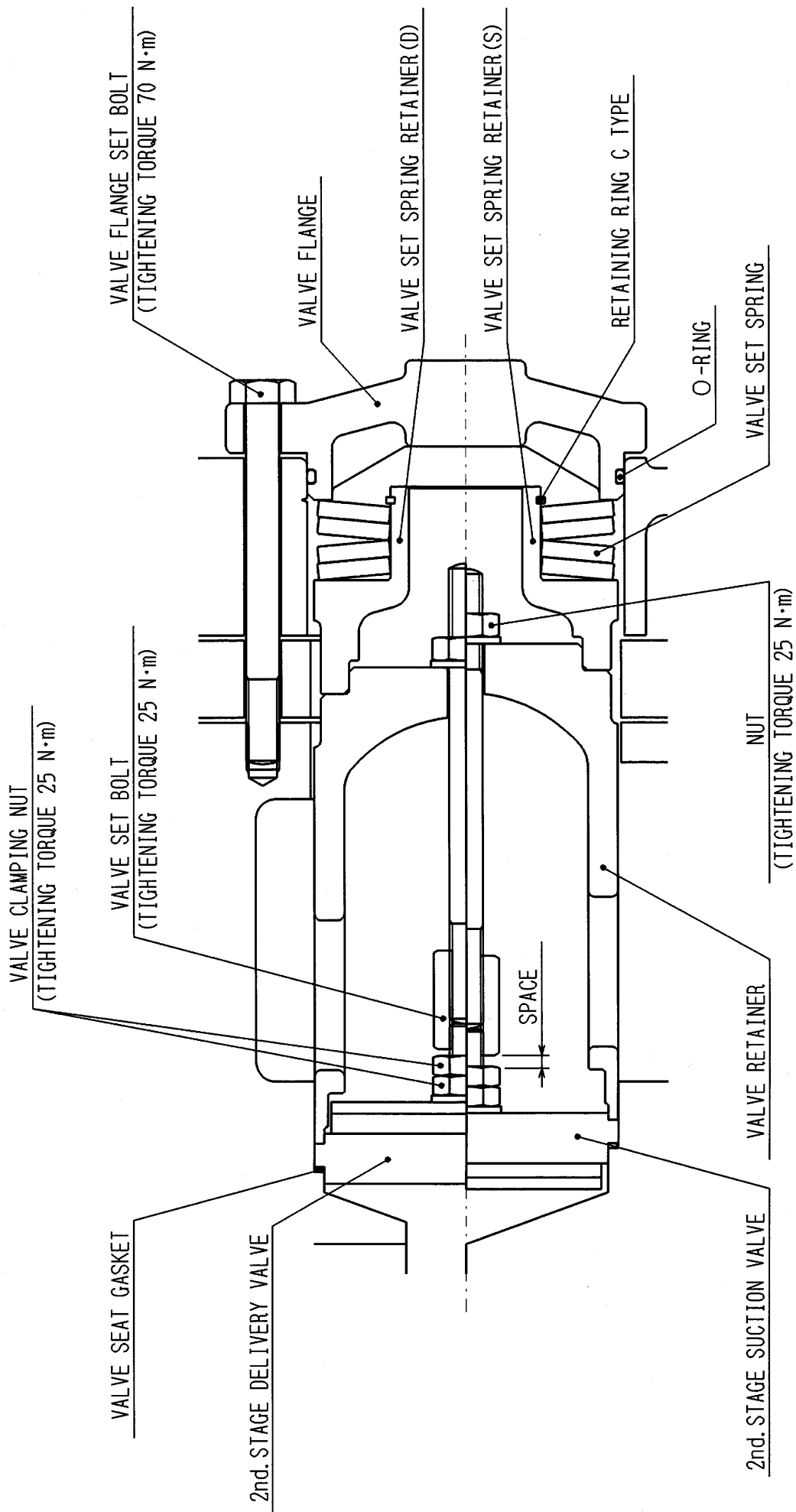
DRAWING No.

VP-3100B-S & VP-3100B-D DETAILS OF AIR VALVE

WING No. A3-17780



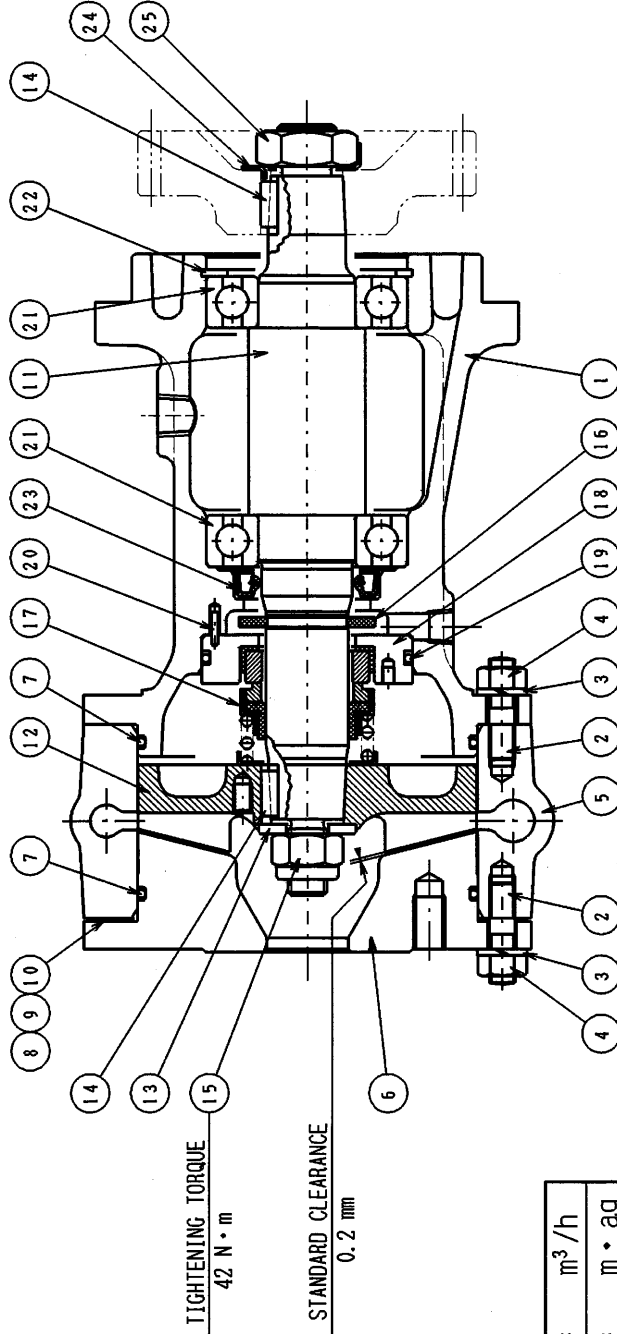
EXPLANATION FOR INSTALLATION OF 2nd. SUCTION VALVE AND DELIVERY VALVE
 (TYPE:H-63, 64, 264)



EXPLANATION FOR INSTALLATION OF 2nd. SUCTION VALVE AND DELIVERY VALVE

(TYPE:H-73, 74, 273, 274, 373, 374)

ANGLE PROJECTION

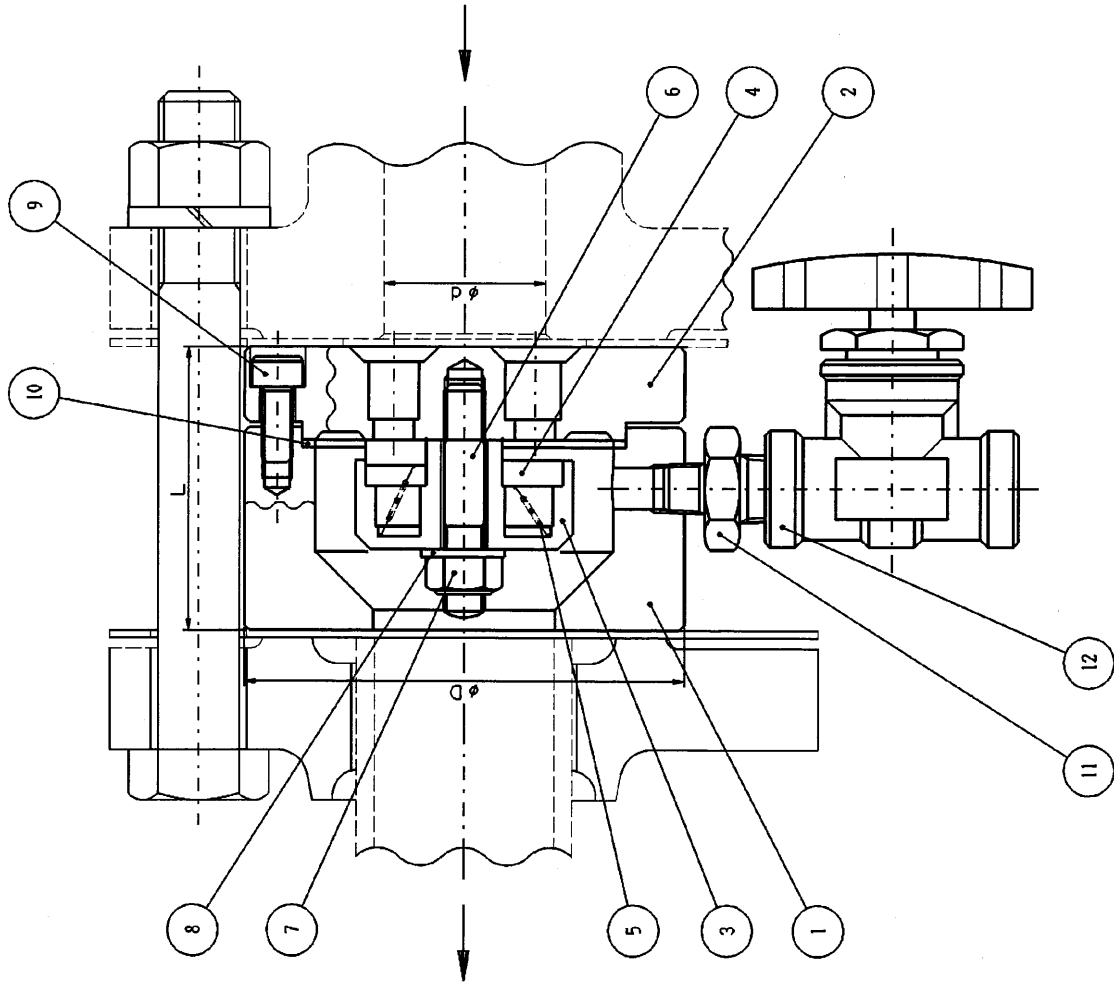


CAPACITY	***	m ³ /h
TOTAL HEAD	***	m · aq

REF. No.	PARTS NAME	MATERIAL	Q'TY	REMARKS
25	HEXAGON NUT	CARBON STEEL	S15C	1 NLM-18XP1.5
24	CLAMP WASHER	CARBON STEEL	SPCC	1 PC · 3234
23	OIL SEAL	NBR		1 SB-284508
22	RETAINING RING (C-TYPE)	CARBON TOOL STEEL	SK5M	1 RS-262
21	BEARING	BEARING STEEL	SUJ	2 R-6206
20	SPRING PIN	CARBON TOOL STEEL	SK5M	2 C-502010
19	O-RING	NBR		1 OR-1060
18	SEAL HOLDER	STAINLESS STEEL	SUS304	1 PC · 3222
17	MECHANICAL SEAL Assy.			1 PC · 3221
16	WATER CUTTER	NBR		1 PC · 3215A
15	LOCK NUT	STEEL, NYLON	SS400, NYLON	1 NM-12-N
14	KEY	STAINLESS STEEL	SUS304	2 PC · 3214
13	WASHER	STAINLESS STEEL	SUS304	1 PWC · 3213
12	IMPELLER	CAST IRON	FC200	1
11	SHAFT	STAINLESS STEEL	SUS304	1 PWC · 3211
10	ADJUST SHIM(C)	BRASS	C2801P	2

REF. No.	PARTS NAME	MATERIAL	Q'TY	REMARKS
9	ADJUST SHIM(B)	BRASS	C2801P	2
8	ADJUST SHIM(A)	BRASS	C2801P	2
7	O-RING	NBR		2
6	SUCTION COVER	CAST IRON	FC200	1
5	VOLUTE CASING	CAST IRON	FC200	1
4	HEXAGON NUT	CARBON STEEL	S15C	12 NM-08
3	SPRING WASHER	CARBON STEEL	SWRH62A	12 WS-08M
2	STUD BOLT	CARBON STEEL	S15C	12 BSM-0820
1	BODY	CAST IRON	FC200	1

TANABE PNEUMATIC MACHINERY CO., LTD.			
DATE	NAME	OSAKA	NAGOYA JAPAN
DRAWN BY 95 · 6 · 14	T. Ueda		
CHECKED BY			
APPROVED BY	S. Tokida		
SCALE			
PWC-20A, 25A, 32A, 40A		DRAWING No. A3-5719	
DETAIL OF COOLING WATER PUMP			
FOR AIR COMPRESSOR			



VCP-3065008	71	138	65		JIS 30K-65A
VCP-3050008	61	113	50		JIS 30K-50A
VCP-3040008	61	98	40		JIS 30K-40A
VCP-3032008	56	87	32		JIS 30K-32A
MODEL	L	ϕD	ϕd		FLANGE

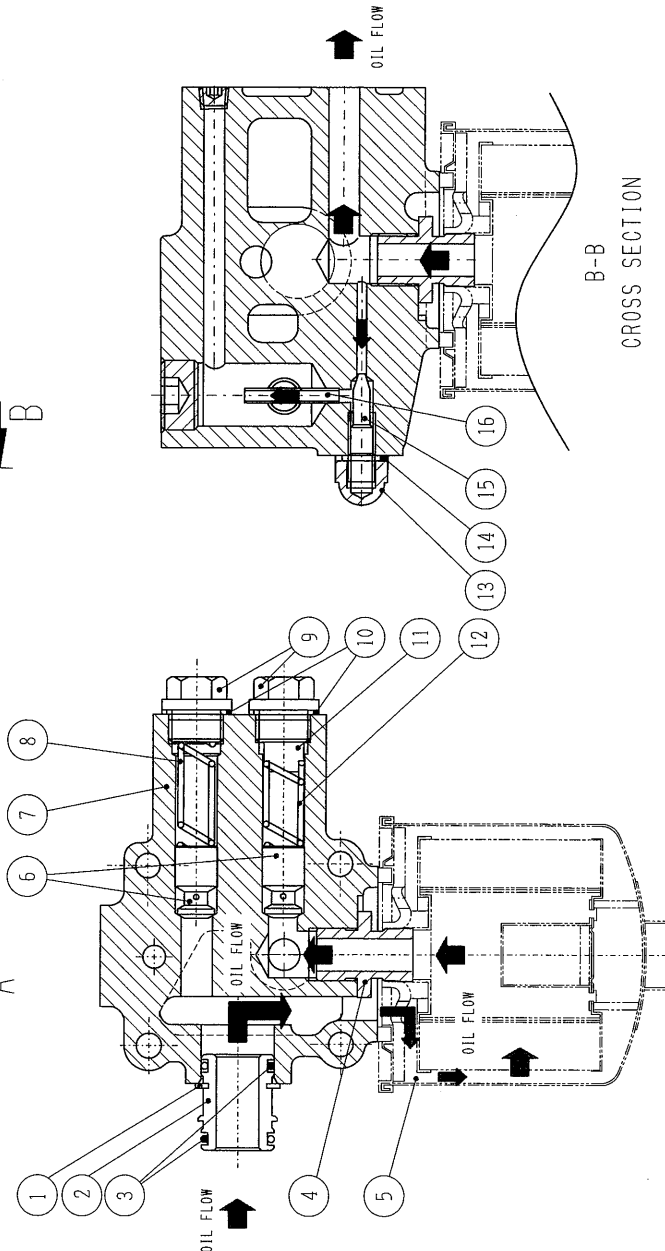
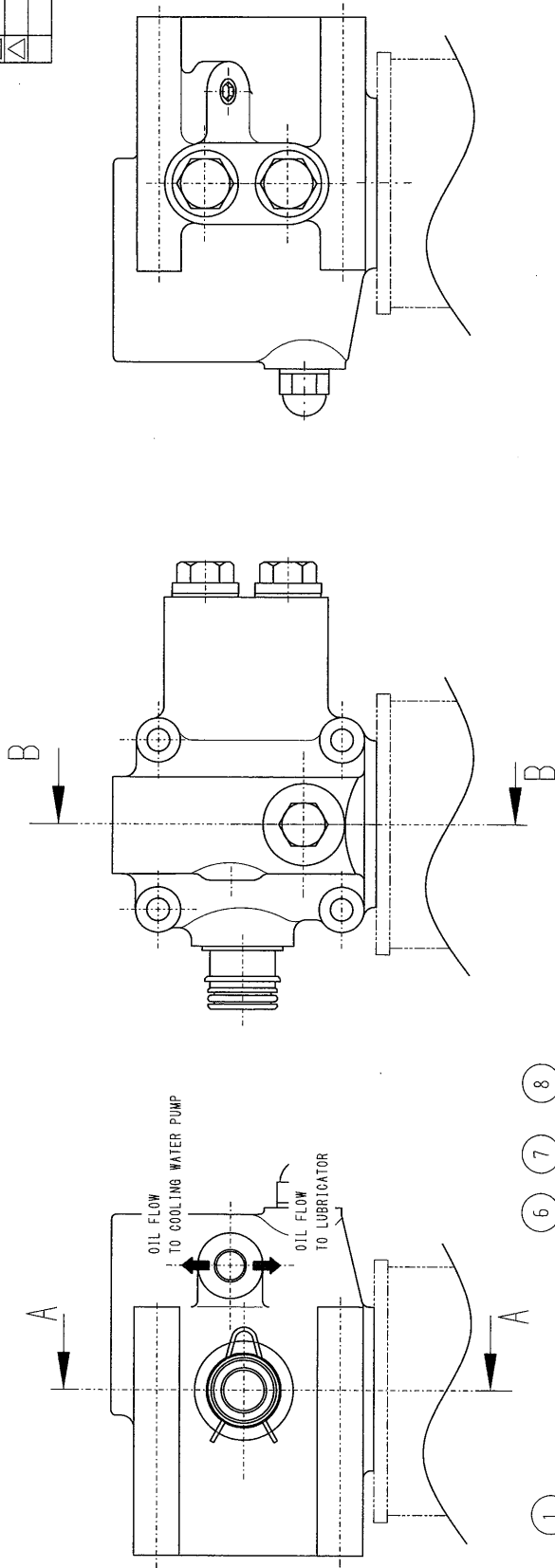
12	DRAIN VALVE (PT1/4)				1
11	NIPPLE	CARBON STEEL	S25C		1
10	GASKET	COPPER	C1220P-0		1
9	SOCKET SCREW	Cr-Mo STEEL	SCM435	2	HBW-0615
8	WASHER	STAINLESS STEEL	SUS304	1	
7	U NUT	STAINLESS STEEL	SUS304	1	UNW-08-SUS
6	STUD BOLT	STAINLESS STEEL	SUS304	1	BSM-0820-SUS
5	VALVE SPRING	STAINLESS STEEL	SUS304-WPB	1	
4	DISK	PLASTIC		1	
3	GUARD	STAINLESS STEEL	SUS303	1	
2	SEAT	STAINLESS STEEL	SUS303	1	
1	BODY	FORGED STEEL	SF440A	1	
No.	NAME OF PART	MATERIAL		Q'TY	REMARKS

MESSRS.

det:VCP3000008-001.ver1
TCD:A CHE VCP-3000008-1

DRAWN BY	95.4.20	NAME	T. Ueda	TANABE PNEUMATIC MACHINERY CO.,LTD. OSAKA NAGOYA JAPAN	
CHECKED BY	.		S. Tokida		
APPROVED BY	.				
SCALE				DRAWING No. A3-4243E	
				VCP-3000008	
				DETAILS OF CHECK VALVE	

3rd. ANGLE PROJECTION	NO.	DATE	REVISION HISTORY	NAME
	△			
	△			



SAFETY VALVE ACTIVATING PRESSURE CONTROLLED WITH (8) SPRING : 0.7MPa
OIL CONTROL PRESSURE CONTROLLED WITH (12) SPRING : 0.2-0.4MPa

No.	NAME OF PART	MATERIAL	Q'TY	REMARKS
16	LEVEL KEEPING PIPE	STAINLESS STEEL	SUS304	1 V0 - 527
15	SWAGE VALVE	BRASS	C3604	1 V0 - 526
14	GASKET	NON ASBESTOS		1 R6-C0110
13	CAP NUT M10	STEEL	SS400	1 C-NW-10
12	COIL SPRING	PIANO WIRE	SWP-A	1 V0 - 502A
11	OIL RELEASE PLATE	BRASS	C3604	1 V0 - 528
10	GASKET	NON ASBESTOS		2 R6-C0203
9	BLIND PLUG	BRASS	C3604	2 V0 - 503
8	COIL SPRING	PIANO WIRE	SWP-A	1 VS0 - 402
7	OIL RELEASE VALVE BODY	CAST IRON	FC250	1 V0 - 521A
6	PISTON	BRASS	C3604	2 V0 - 525
5	OIL FILTER ELEMENT Assy			1 F0 - 600
4	NIPPLE	STEEL OR CARBON STEEL	SS400 OR S46C	1 F0 - 602
3	O-RING	NBR		2 OR-1P22A
2	CONNECTION PIECE	STEEL	SS400	1 V0 - 524A
1	RETAINING SPRING	PIANO WIRE	SWP-A	1 V0 - 529

OIL RELEASE VALVE BODY ASSY

DRAWN BY 17-01-24 K. HASE CHECKED BY 17-01-26 T. FUJIMURA APPROVED BY 17-01-26 M. MATSUYAMA SCALE	DATE NAME TANAHE PNEUMATIC MACHINERY CO., LTD. OSAKA NAGOYA JAPAN DRAWING No. V0-520, VS0-400, F0-600 DETAILS OF OIL RELEASE VALVE BODY ASSY A3-19022
--	--

MANUAL FOR DISASSEMBLING AND ASSEMBLING OF 2ND. STAGE (HP) AIR VALVE

Preface

Read this manual well before carry out disassembling and assembling of compressor valve.

It is important to understand the set up of them and make correct assembling work in order to avoid wrongly assembled valve to be attached to air compressor which occasionally will cause not only breakage of valve itself but also serious damage of main component of air compressor such as cylinder, piston and others.

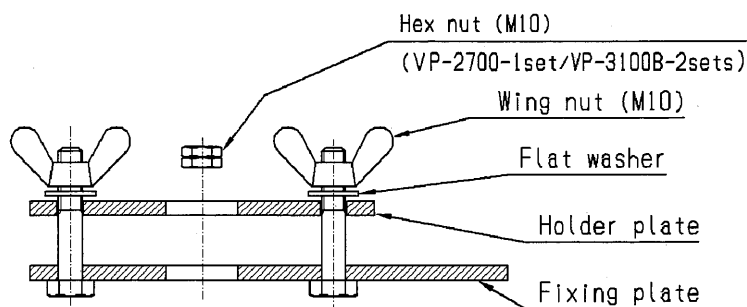
1. Preparation of tools

Prior to carry out disassembling and assembling, prepare necessary tools as shown in the followings.

1-1 Standard tools

	Tools to be used for valve	
	Type VP-2700	Type VP-3100B
(1) Torque wrench (Adjusted to)	12 N·m	25 N·m
(2) Socket wrench (Nominal size)	13 mm	17 mm
(3) Hexagon socket screw key (Nominal size)	4 mm	5 mm
(4) Flat head screw driver (small)	Common	

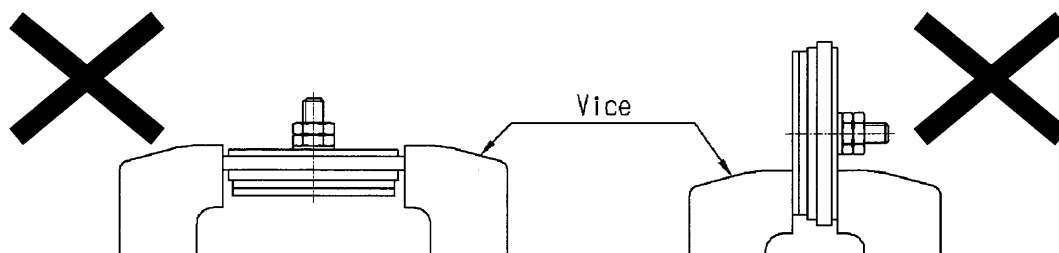
1-2 Valve assembling jig --- 1set



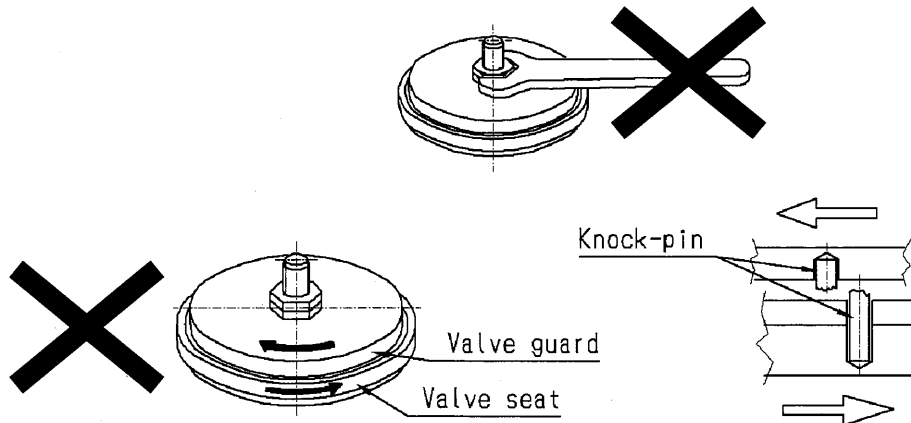
1-3 Suitable box to house overhauled valve parts (protect them from missing)

2. To prevent deformation and breakage of valve

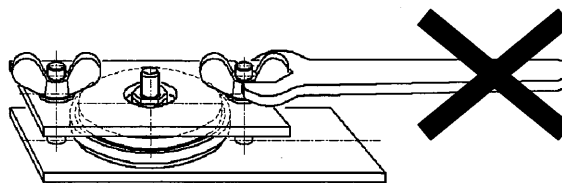
2-1 Do not clamp valve directly by vice.



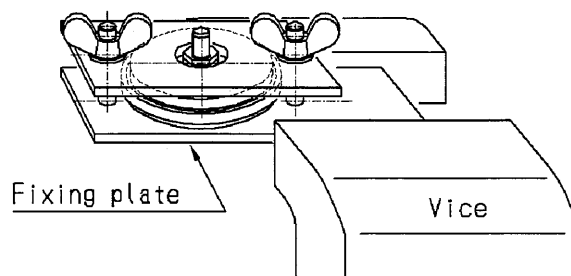
- 2-2 Do not apply tightening or loosening torque to valve clamping nut at free state, ie without fixing valve as a whole in valve assembling jig.
Straight knock-pin which keeps the relative position of valve guard against seat shall be cut away by shearing force generated at this time.



- 2-3 Tighten the wing nuts (M10) by finger but not by spanner or other tightening tool when fix valve in assembling jig.
Too strong force given to the wing nuts will cause bending deformation of holder plate.



- 2-4 Clamp the fixing plate of jig by vice, then begin working.



3. Disassembling of valve

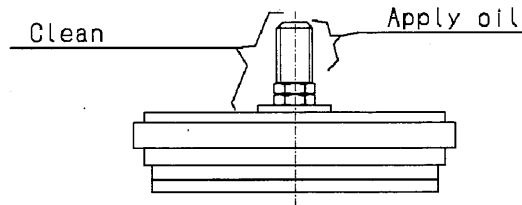
- 3-1 Check for the necessary tools.

- 3-2 Study the set up of valve to be overhauled by viewing annexed figure.

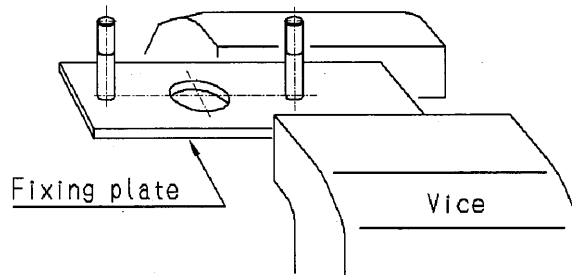
Compressor model	Valve to be overhauled		Annexed figure
	Name	Type of valve	
H-63,64,264	Suction valve	VP-2700(S)	Refer to APPENDIX Detail of Air Valve
	Delivery valve	VP-2700(D)	
H-73,74,273,274 H-373,374	Suction valve	VP-3100B(S)	
	Delivery valve	VP-3100B(D)	

3-3 Next, begin disassembling work following to undermentioned procedure.

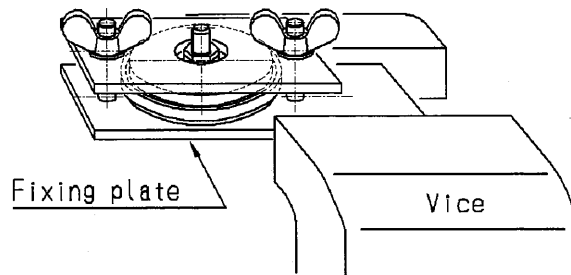
- (1) Clean especially around the thread of clamping bolt and nut by removing accumulated carbon and dirt.
- (2) Apply lub. oil on to the cleaned thread.



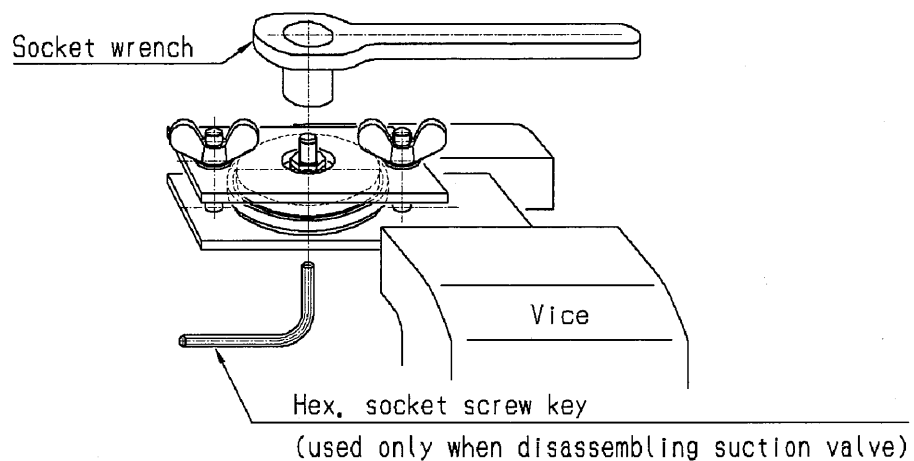
- (3) Clamp the fixing plate of jig by vice, then begin disassembling of valve.



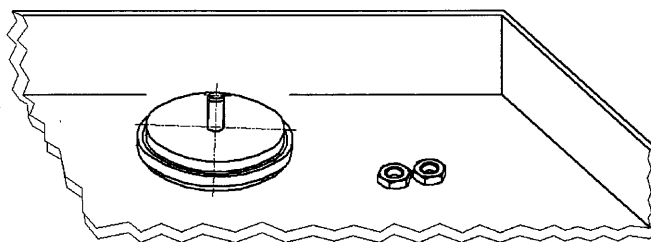
- (4) Place valve on the assembling jig, put holder plate and flat washer on it, then fix the valve by wing nuts tightened with finger force.



- (5) Loosen valve clamping nut by socket wrench until it can be removed by finger force thereafter.



(6) Take out valve from assembling jig, the overhaul it in the prepared box.



4. Assembling of valve

4-1 Check for the necessary tools.

4-2 Study the set up of valve to be assembled by viewing annexed figure.

Compressor model	Valve to be overhauled		Annexed figure
	Name	Type of valve	
H-63,64,264	Suction valve	VP-2700(S)	Refer to APPENDIX Detail of Air Valve
	Delivery valve	VP-2700(D)	
H-73,74,273,274 H-373,374	Suction valve	VP-3100B(S)	
	Delivery valve	VP-3100B(D)	

4-3 Next, begin assembling work following to undermentioned procedure.

(1) Apply new oil on to the thread of valve clamping bolt and nut.

(2) Place individual valve parts one over another in correct order as shown in annexed figure, then assemble them by tightening hexagon nut against clamping bolt temporarily with finger force.

(At this time, use ordinary hex. nut but not slotted lock nut for type VP-3100B(S) and VP-3100B(D) valves.)

(3) At this assembled state, check for following points.

a) Outer face of valve guard and seat to be parallel.

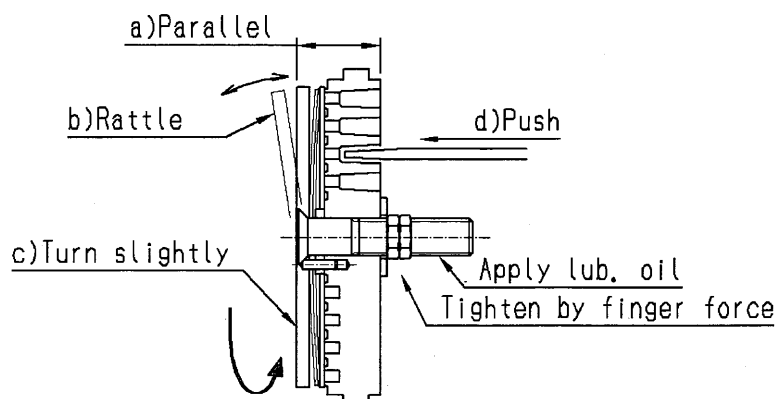
b) Rattling of valve guard against seat not to be seen.

c) Valve guard to be securely positioned against seat by knock pin.

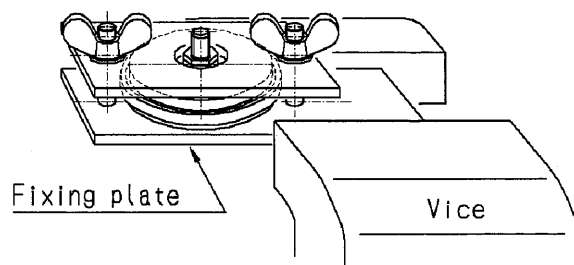
It can be slightly turned by hand to radial direction within about 5° angle.

d) Valve plate should leave freely from valve seat, ie make lifting function without any obstruction.

(Check it by pushing valve plate with small screw driver through air passage channel of valve seat.)



- (4) Place the valve made abovementioned checking on to the assembling jig. Fix it by tightening wing nuts with finger force.

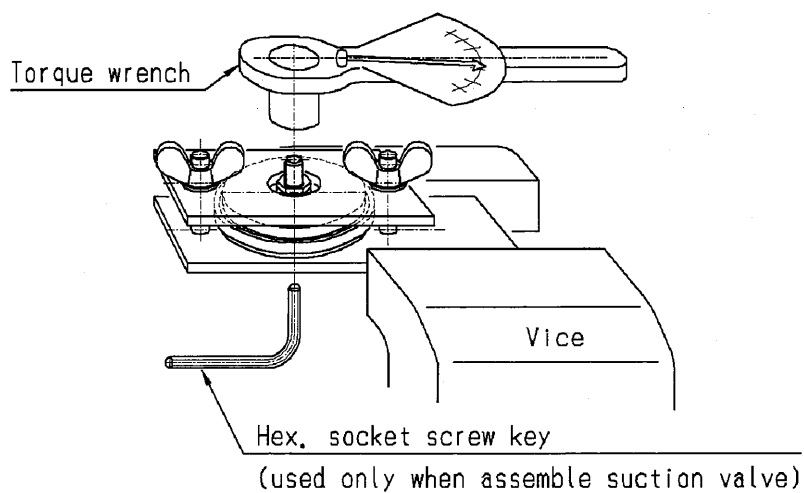


- (5) Tighten clamping nut with undermentioned tightening torque by using torque wrench.

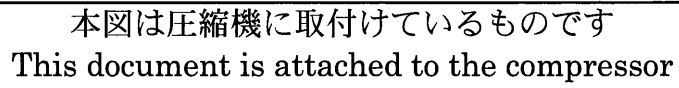
valve type	tightening torque
VP-2700 (S) and (D)	----- 12 N·m
VP-3100B (S) and (D)	----- 25 N·m

CAUTION

For type VP-3100B(S), (D) valves : Remove temporarily used hexagon nut from clamping bolt and replace it with standard nut.
Tighten it with abovementioned torque.

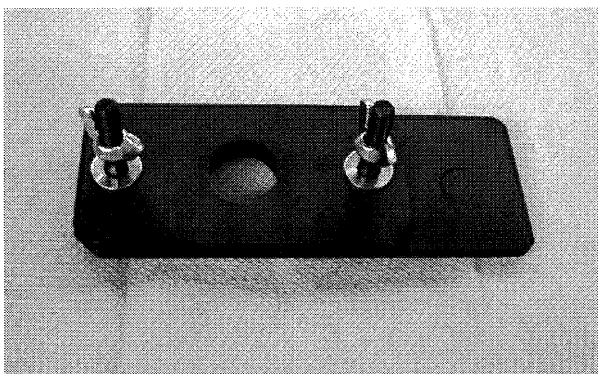
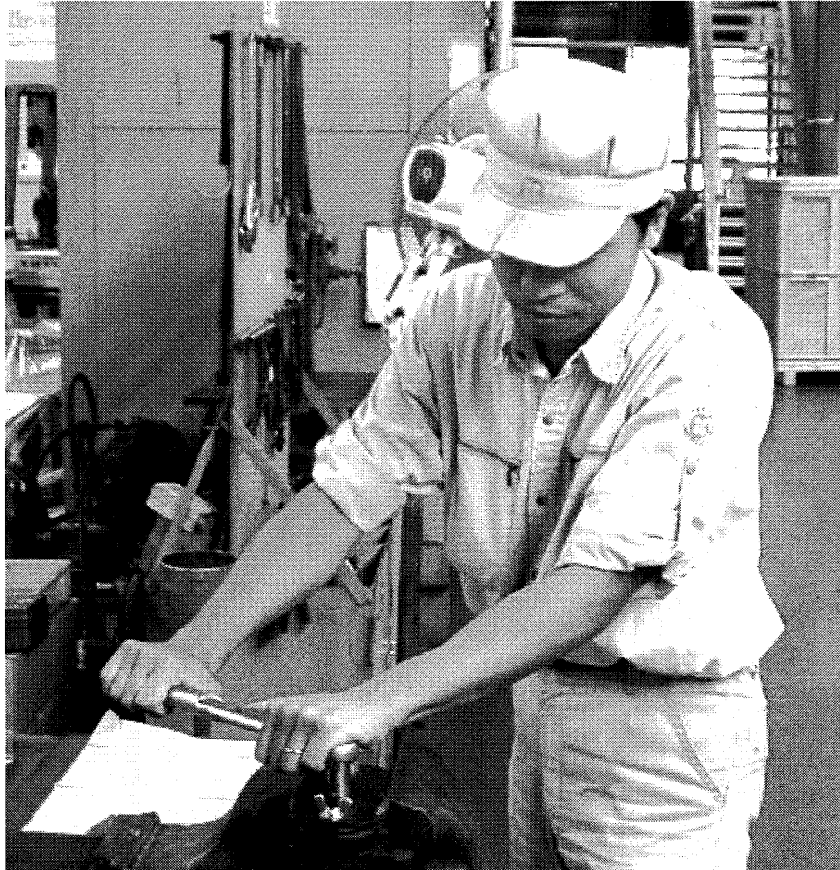


- (6) Take out valve from assembling jig, then check for the free state of valve plate again.
If no defect were found, assembling of valve is completed at this point.

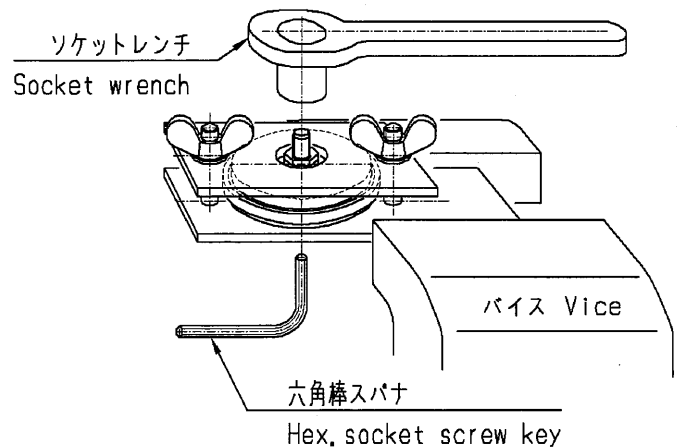


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2 段弁分解及び組立時には、当社供給の専用工具をご使用下さい。
In case of disassembling and assembling of 2nd. stage valve,
please use the valve tool that we supply.



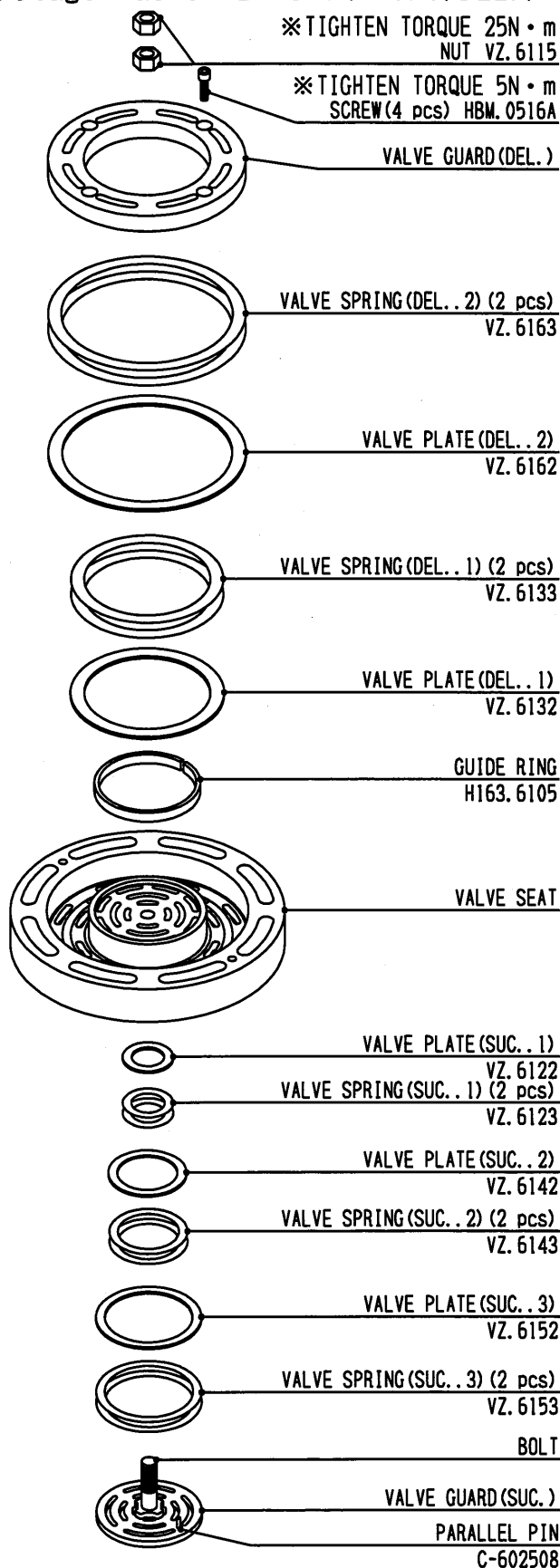
2 段弁専用工具 the valve tool



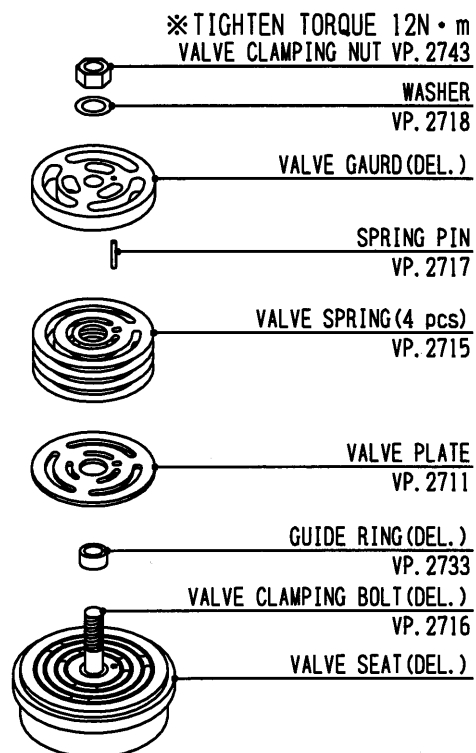
In reference to the compressor, its mending and its spare

◆EXPLODED VIEW OF VALVES FOR MODEL H-63, 64, 264 AIR COMPRESSORS.

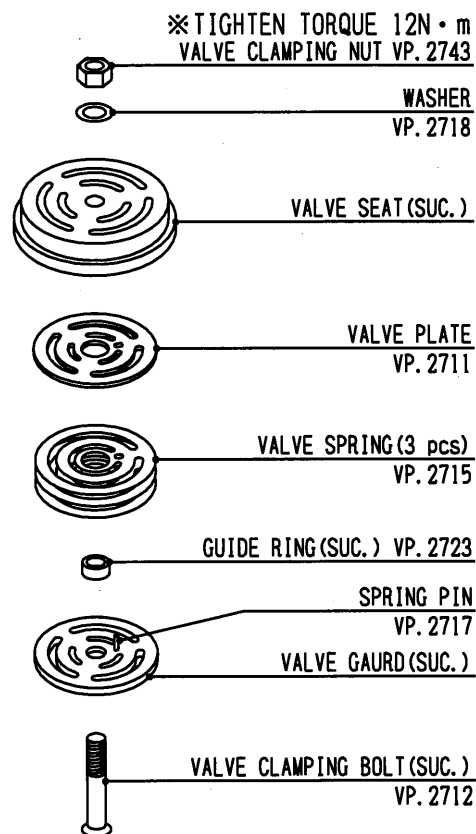
1st. Stage Valve VZ-6100 (SUC. & DEL.)



2nd. Stage Valve VP-2700 (DEL.)



2nd. Stage Valve VP-2700 (SUC.)

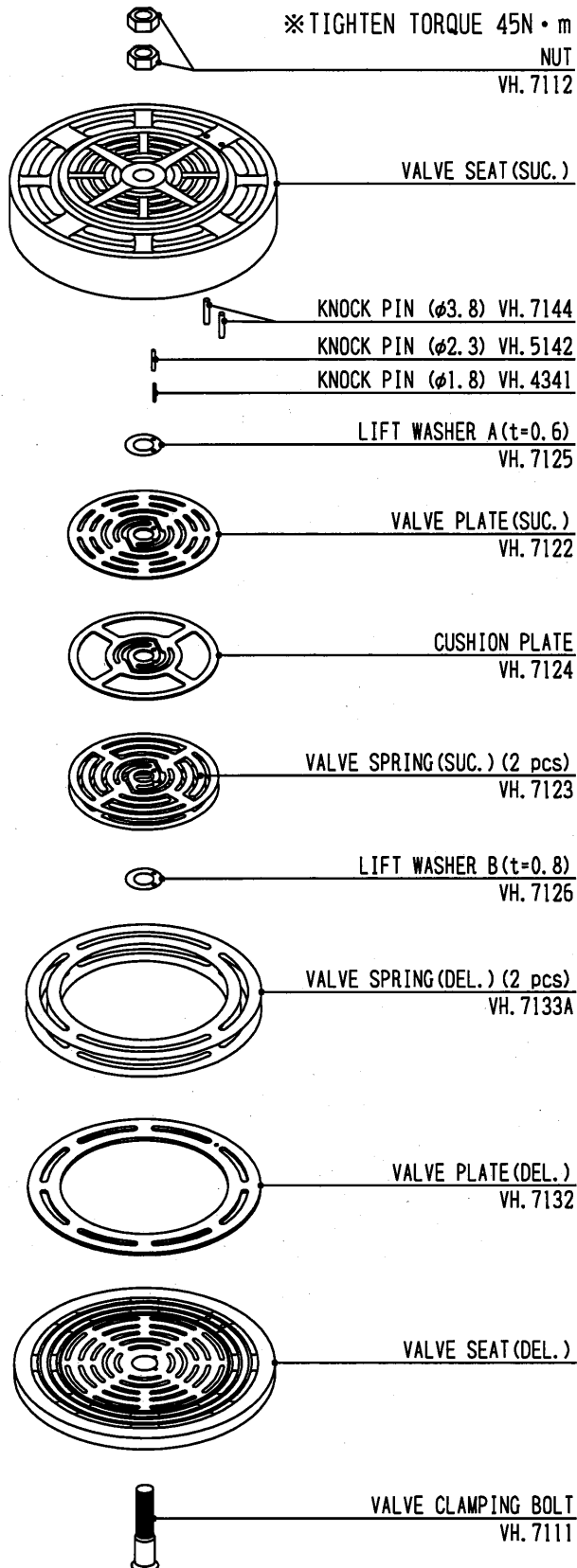


Please use TANABE'S genuine at the time of air compressor overhauling.
otherwise we shall be absolved from responsibility on durability and performance of air compressor.

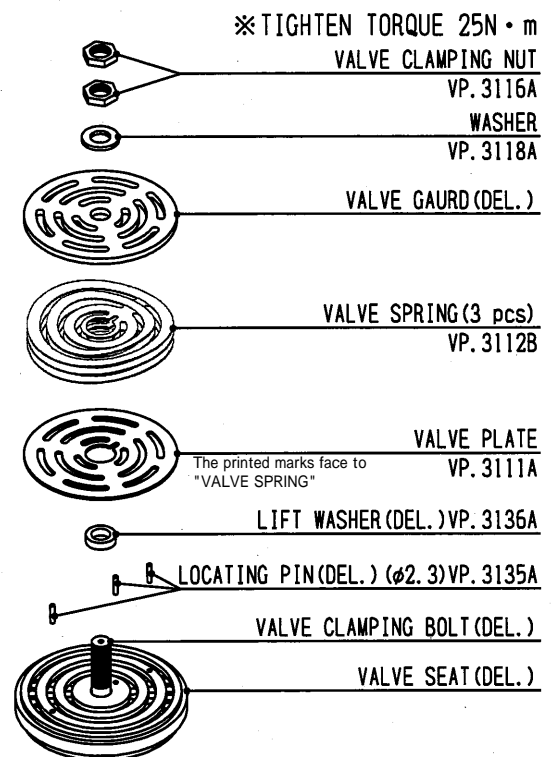
TANABE PNEUMATIC MACHINERY CO., LTD

◆EXPLODED VIEW OF VALVES FOR MODEL H-73, 74, 273, 274, 373, 374 AIR COMPRESSORS.

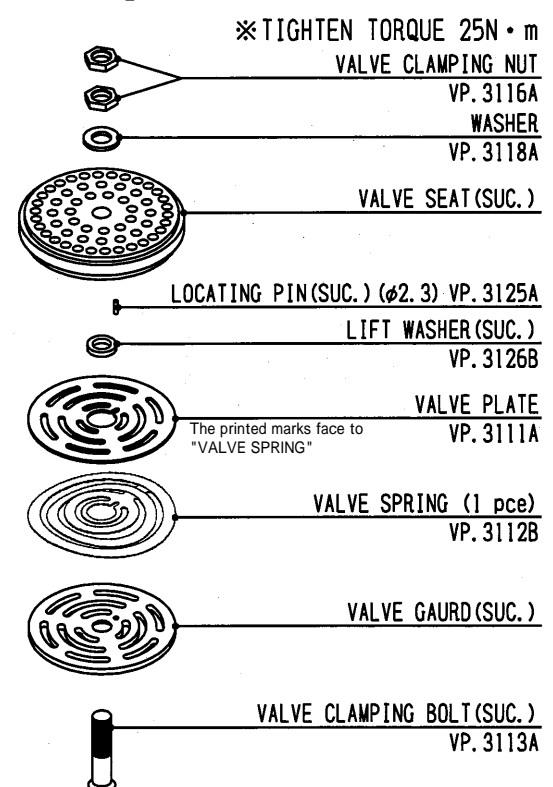
1st. Stage Valve VH-7100 (SUC. & DEL.)



2nd. Stage Valve VP-3100B (DEL.)



2nd. Stage Valve VP-3100B (SUC.)



Please use TANABE'S genuine at the time of air compressor overhauling,
otherwise we shall be absolved from responsibility on durability and perform-
ance of air compressor.

TANABE PNEUMATIC MACHINERY CO., LTD.

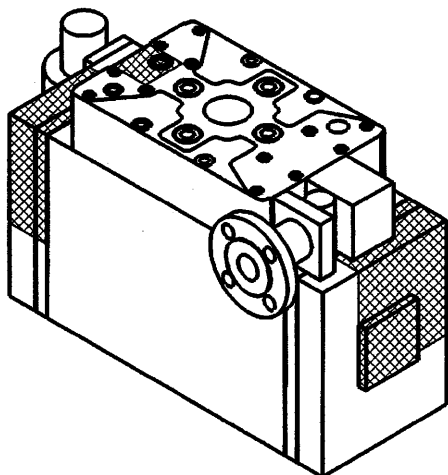
<CAUTION AND REQUEST FOR THE HANDLING OF AIR COMPRESSOR>

◆For keeping your safety:

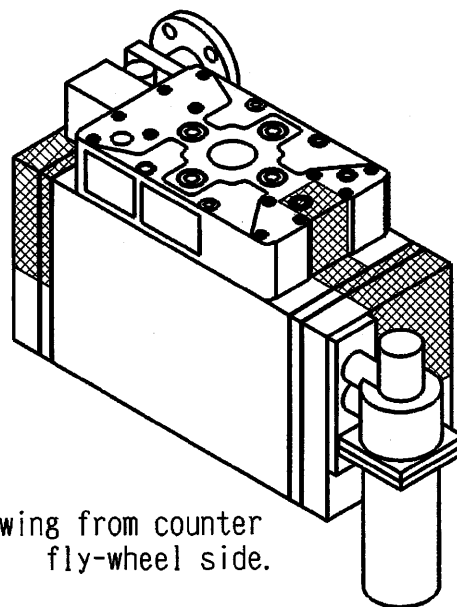
Please review the INSTRUCTION BOOK prior to operation or overhauling of air compressor.

◆Caution to high temperature part:


Do not touch compressor body just after its operation stopping. As shown in following figure, some part of compressor becomes very high temperature state. To touch such part directly by hand and others will cause a burn on your body.



Viewing from fly-wheel side.



Viewing from counter fly-wheel side.

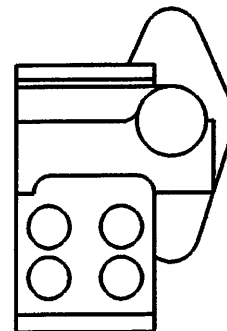
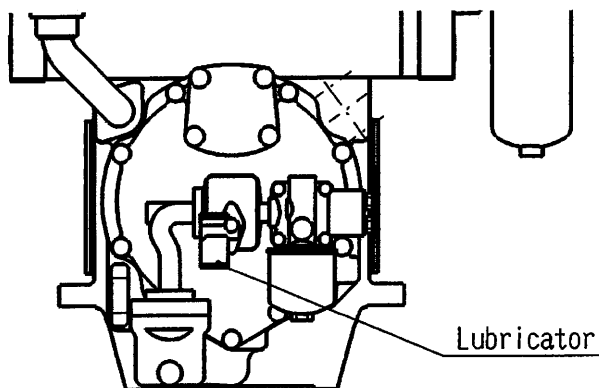
 — shows, high temperature zone.

◆Caution to the brand of lub.oil:

Please use lub.oil recommended by TANABE(Refer to "OIL LIST" shown in the INSTRUCTION BOOK.)

◆Maintenance of cylinder lubricator:

We recommend to replace cylinder lubricator with new ones after about 8000hrs operation.
(At 8000hr interval)



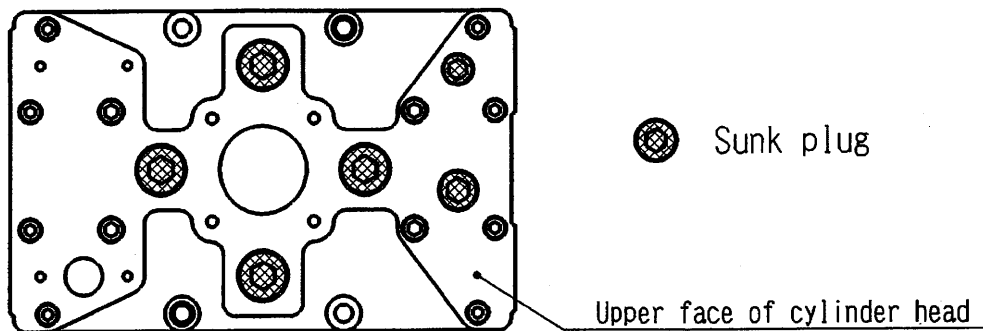
◆Caution for the use of gaskets:

Used cylinder head gasket and valve seat gasket can not be applied again.
Always replace them with new ones at the time of overhauling and reassembling.

◆Caution for cylinder head bolt and sunk plug:

Hex. socket head cap screws are used as cylinder head tightening bolts.

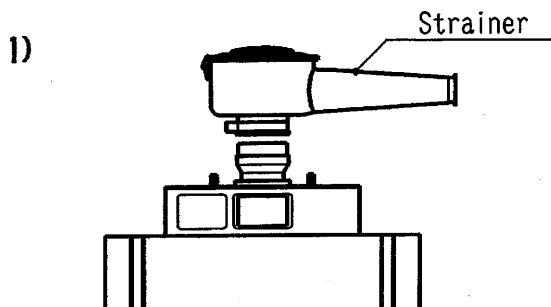
- ⊗ marked parts are sunk plug, but not cylinder head bolts.
Do not take it out at the time of disassembling.



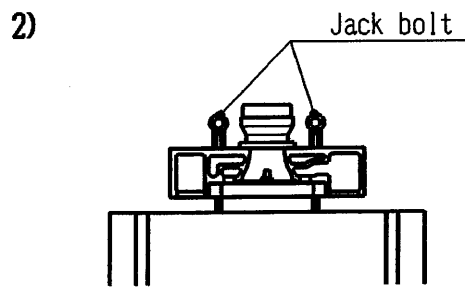
◆Caution for cylinder head opening up:

Cylinder head must not be fully lifted up with L.P valve assy. remaining in it, because there shall be a possibility of dropping down of the stuck valve which will cause damage and danger.

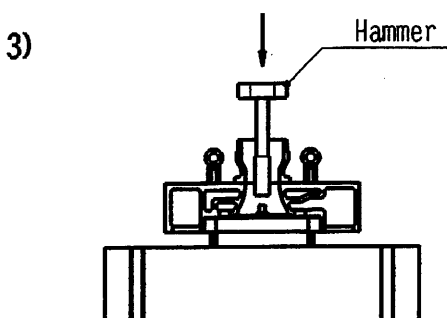
Stuck valve should be taken out from cylinder head by applying light striking with non-metal tools.



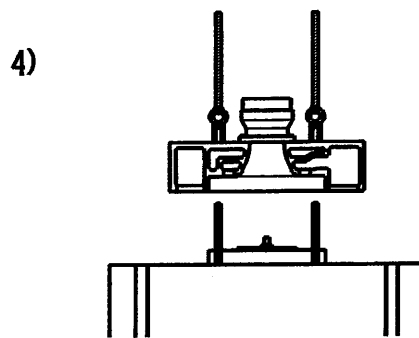
Take out suction strainer from cylinder head.



Lift up cylinder head by using jack bolts.



Drive out L.P valve assy from cylinder head by applying light striking by handle of hammer. Do not strike L.P valve directly by hammer or metal rod.

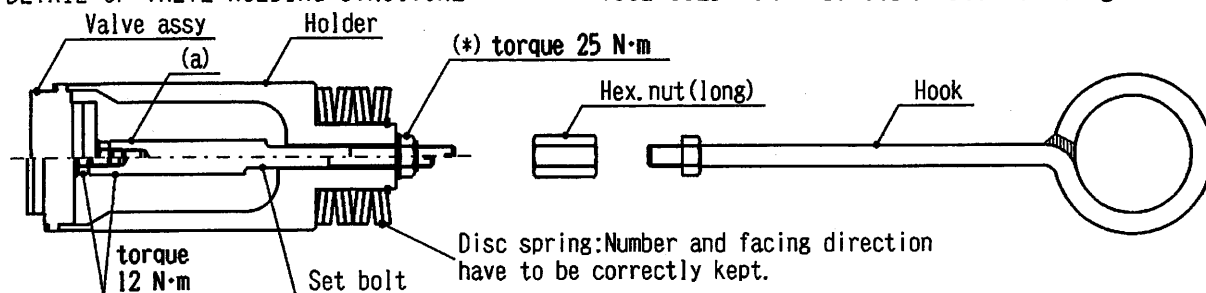


Lift up cylinder head and take it off from cylinder block.


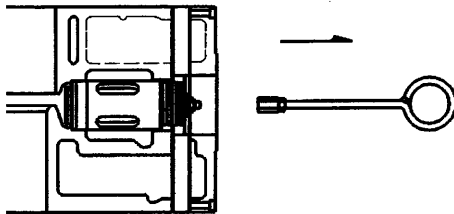
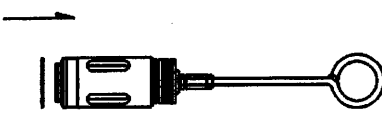
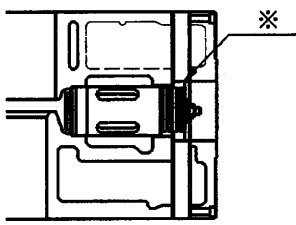
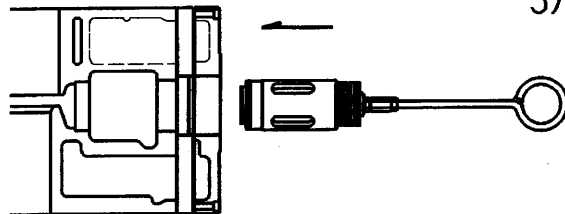
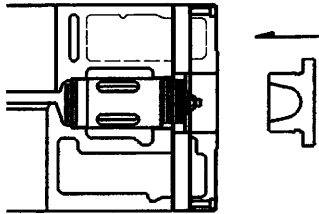
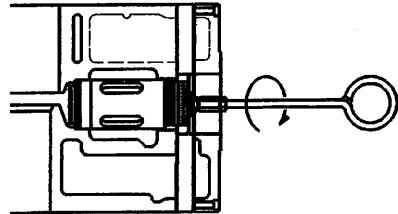
◆PROCEDURE OF 2nd. VALVE INSTALLATION FOR MODEL H-63, 64, 264 AIR COMPRESSORS.

DETAIL OF VALVE HOLDING STRUCTURE

TOOL USED FOR THIS JOB (Piston lifting hook)

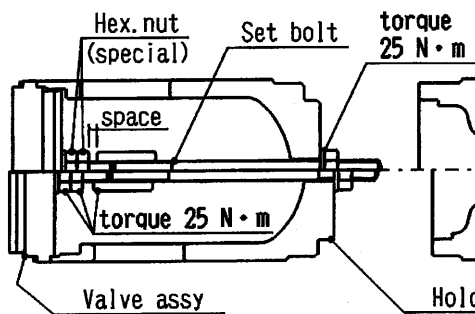


Hold (a) Part by spanner when tighten nut(*) in order to keep valve set bolt at fixed state.

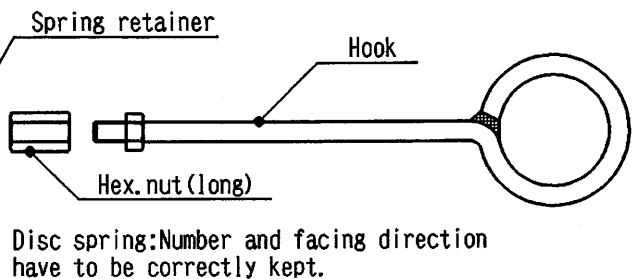
<p>1)</p>  <p>Fix the tool on to set bolt thread.</p>	<p>5)</p>  <p>Unscrew the tool and take it off.</p>
<p>2)</p>  <p>Apply thin coat of grease on seat gasket, then place it on to stepped face of valve seat.</p>	<p>6)</p>  <p>Check: Outside edge of disc spring have to correspond to the marked line※ on cylinder block.</p>
<p>3)</p>  <p>Insert holder assy, into valve chamber of cylinder.</p>	<p>7)</p>  <p>Place valve flange and tighten its setting nut.</p>
<p>4)</p>  <p>Turn the tool slowly and check for correct positionig of holder assy.</p>	


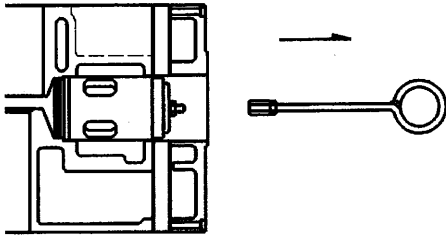
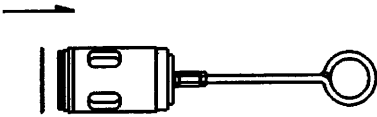
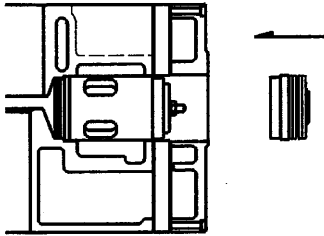
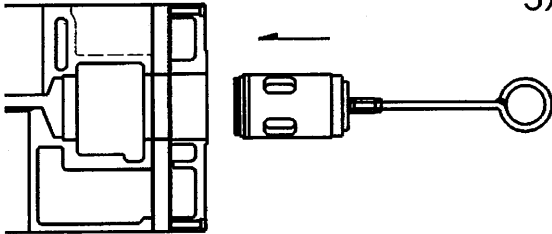
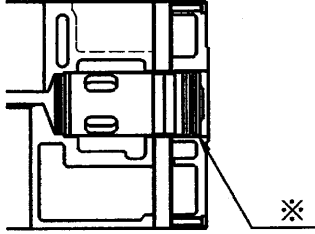
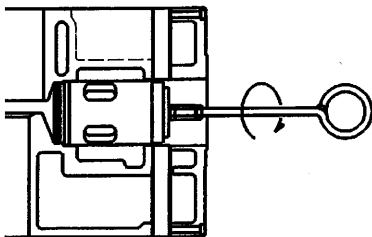
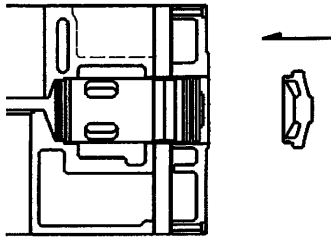
◆PROCEDURE OF 2nd. VALVE INSTALLATION FOR MODEL H-73, 74, 273, 274, 373, 374 AIR COMPRESSORS.

DETAIL OF VALVE HOLDING STRUCTURE



TOOL USED FOR THIS JOB(Piston lifting hook)

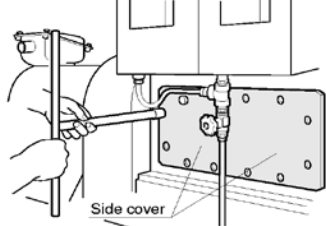
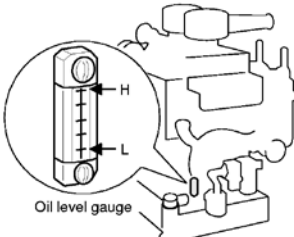
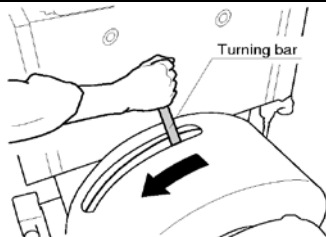
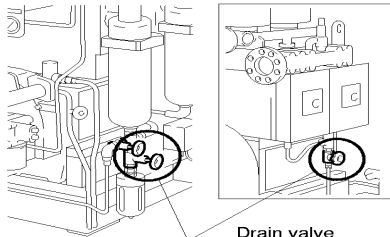
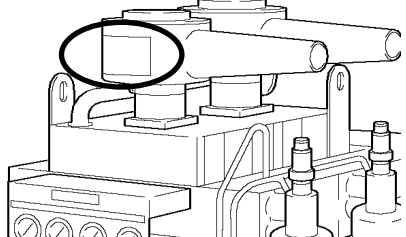
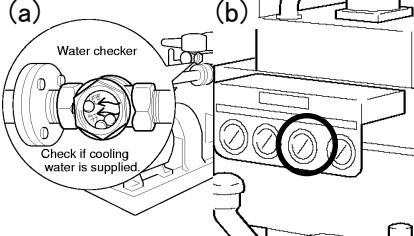
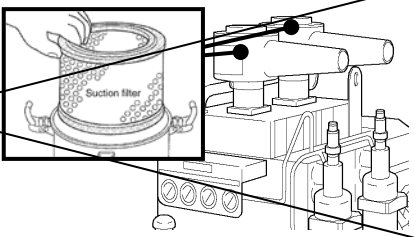


- | | |
|--|--|
| <p>1)</p>  <p>Fix the tool on to set bolt thread.</p> | <p>5)</p>  <p>Unscrew the tool and take it off.</p> |
| <p>2)</p>  <p>Apply thin coat of grease on seat gasket, then place it on to stepped face of valve seat.</p> | <p>6)</p>  <p>Install retainer kit on to the valve holder assy.</p> |
| <p>3)</p>  <p>Insert holder assy, into valve chamber of cylinder.</p> | <p>7)</p>  <p>Check: Outside edge of disc spring have to correspond to the marked line※ on cylinder block.</p> |
| <p>4)</p>  <p>Turn the tool slowly and check for correct positionig of holder assy.</p> | <p>8)</p>  <p>Place valve flange and tighten its setting nut.</p> |

PROCESS FOR INITIAL START-UP BY SHIPYARD

Make sure to do the following mentioned process for INITIAL START-UP.

2011/5/26

FLOW		No.	PROCESS	POINT	CHECK
<div>START</div> <div>CLEAN</div> <div>FILL THE OIL</div> <div>UNDER OILING</div> <div>VALVE CHECK</div> <div>INITIAL OILING</div> <div>PRESSURE CHECK</div> <div>REPLACE</div> <div>END</div>		1	Remove the side cover. Wipe the crank case , remove the rust preventive oil.		
		2	Fill the mineral oil up to the level H. Refer to the back for OIL BRAND NAME. 1 cylinder type.....approx.11.5 L 2 cylinder type.....approx.24.5 L 3 cylinder type.....approx.35 L		
		3	Turn the flywheel using the turning bar, supply oil to the main bearing, crank pin, and lower portion of cylinder wall by hand. Install the side cover.		
		4	Check if the valves of each drain valve are fully opened.		
		5	Do initial oiling. See caution plate for suction air filter. •Take off the suction filter and Pour oil. •Turn compressor by hand abt. 5 times. •Keep the compressor under no-load condition for 30minutes.		
		6	(a) Check if the cooling water is supplied by observing the water checker. (b) Make sure that oil pressure rises up to 0.2 MPa and above through the pressure gauge. (0.4 ~ 0.6 MPa at the start-up)		
		7	Replace the suction filter element before compressor is delivered to the owner.		

※Can not guarantee when damaging without doing the above mentioned process.

TANABE PNEUMATIC MACHINERY CO.,LTD.

**Table of Recommendable Lubricating Oil for Reciprocating
Marine Air Compressor**

Manufacturer		Brand name	
		Mineral oil	Synthetic oil
1	Anderol		ANDEROL 555(VG100)
2	BP	BP Energol RC 68 , 100 ----- BP Energol RC-R 68, 100	BP Enersyn RX 100
3	Castrol	Castrol Aircol PD 68 , 100 ----- Castrol Aircol CM 68 , 100	Castrol Aircol SN 68 , 100
4	ChevronTexaco	Compressor Oil EP VDL 68 , 100 ----- RPM Compressor Oil 68 , 1000 ----- Chevron HD Compressor Oil 100 ----- Regal R&O N 68 , 100	Cetus DE 68 , 100
5	COSMO	COSMO RECIPRO 68 , 100	
6	ExxonMobil	Mobil Rarus 426(VG68) , 427(VG100)	Mobil Rarus 827(VG100) ----- Mobil Rarus 829(VG150) ----- Mobilgard 1SHC(VG100)
7	Gulf Marine	GulfSea Compressor Oil 100	GulfSea DE Compressor Oil 100
8	IDEMITSU KOSAN	Daphne Super CS 68 , 100 ----- Daphne Marine Compressor 68 , 100	Daphne Alfa Marine Compressor 100
9	JXTG Nippon Oil & Energy	FAIRCOL A 68 , 100	FAIRCOL SA 100
10	LENOL	RENOLIN 503 , 504	LENOL Syn E 100
11	Shell Lubricants	Shell Corena Oil P68 , 100 ----- Shell Corena Oil S2P68 , 100	Shell Corena Oil AP100 ----- Shell Corena Oil S4P 68 , 100
12	TOTAL LUBRICANTS	Dacnis 68 , 100	BARELF CH 68 , 100
13	YUKONG	Yukong Compressor Oil P100	



CAUTION

- During the initial operation of 300 hours, please use the mineral oil only.
After it, the synthetic oil would be able to use on our compressor,
same as the mineral oil.

- When the crank shaft or the cylinder would be replaced with the new one, please use the mineral oil again during 300 hours.

- Normally use ISO VG100 oil (SAE 30 oil) for the compressor.

If the temperature in the compressor room is 10°C or lower, use ISO VG68 oil (SAE 20 oil).

Specifications are subject to change without notice!

2022.12.06



This document is attached to the compressor

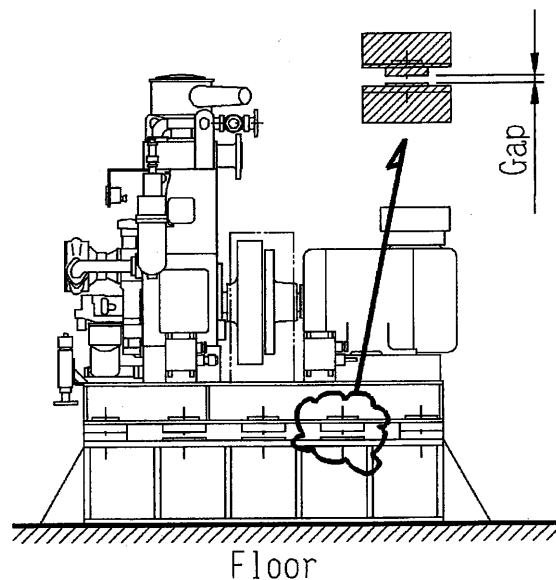
TANABE PNEUMATIC MACHINERY CO., LTD.

Installation of the air compressor on the vessel

Damage to the coupling can be caused if the compressor unit is not set properly on the supporting bed plate.

See drawing and pay attention to the following:

1. Place compressor unit on the bed plate.
In case that the bolts are already fastened to the bed plate, remove bolts.
2. Check the gap at all locations where a bolt will be used for fastening compressor unit to the bed plate - see drawing!
This is an important step and it serves the purpose of measuring the gap.



3. In case that the gap is wider than 0.1 mm,
a shim (sometimes referred to as chock) must be inserted.
Repeat procedure until the gap conforms to the requirement:

gap must be equal or smaller than 0.1 mm

4. Insert the bolts and fasten compressor unit to bed plate.
Now check the center alignment of air compressor and e-motor according to instructions contained in the Instruction Book, (3.7 Centering of Direct Coupling).

SERVICE NEWS

Document No. : 02. 1. 20020

ANTI EMULSION VALVE for the compressor

Published : 11th Jun, 2020

Models	H-63 / 64 / 73 / 74 / 264 / 273 / 274 / 373 / 374
Use	MAIN AIR COMPRESSOR
Type	Vertical 2 stages water cooled

This compressor is equipped with Anti emulsion valve (below valve) to prevent emulsification.
(Adopted as standard from production machine in August 2013)

This valve is mounted on the top of the intercooler and is "close" when shipped.

Full open this valve when operating the compressor in an emulsifying environment.

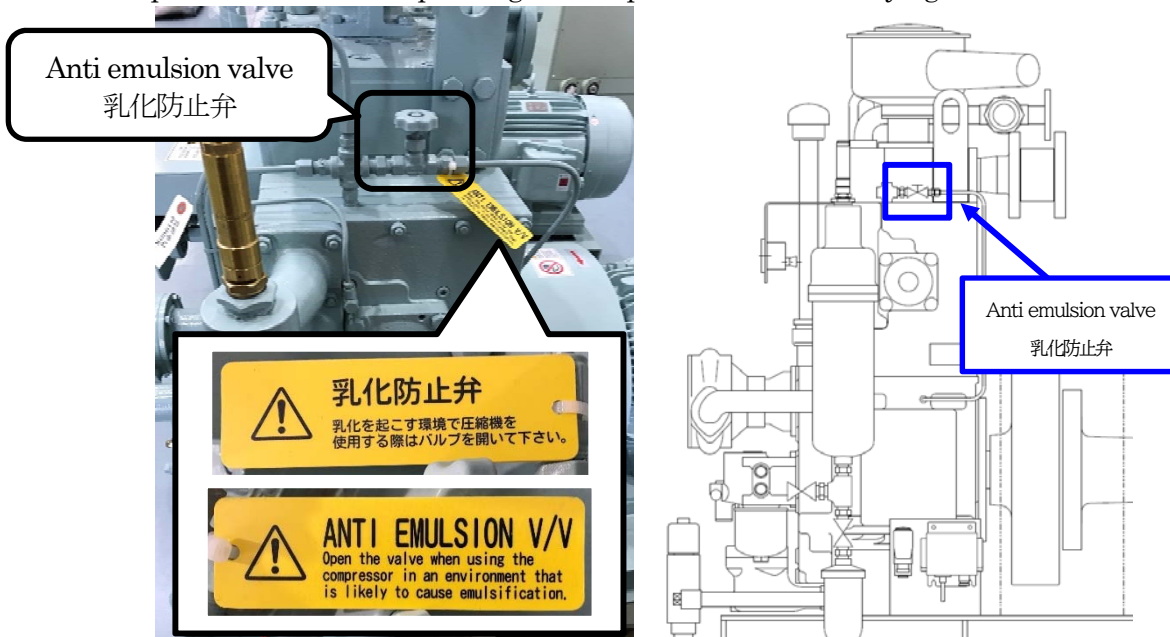


Fig. About anti emulsion valve

Since emulsification occurs due to various factors (room temperature, humidity, operating load situation, oil temperature and oil brand etc.) it is not possible to specify the environment in which it is likely to occur.

As a guide, it is recommended to open the valve and use it under the following conditions.

【Guideline for opening the valve】

Room temperature 40 degree over or humidity 40% over

As a harmful effect of opening the valve, compressed air after the first stage cooler is sent to forcibly scavenge the inside of the crankcase, so oil smoke is generated from the oil filler that is a vent to the outside.

Oil drips due to the generation of oil smoke, but there is no problem in using it as a “normal open” compressor.

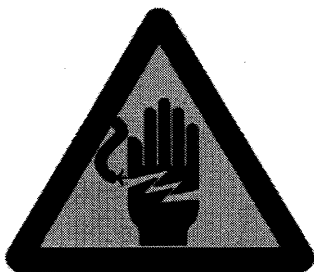
※What is Emulsion

When the air is compressed, a part of water contained in the air as the saturated steam is condensed to generate condensed water particle in the compressor.

If once this condensed water comes to be mixed in lubricating oil, gives rise to emulsification phenomenon, which impairs the life (durability) of lubricant and result in lubricant degradation.



WARNING



ELECTRIC SHOCK

Do not touch electrical wiring. Working with wet hands is dangerous.

Turn off the power supply before checking and exchanging electrical parts or working in the vicinity of the machine.

Disconnect the main power supply.

Follow these steps before starting work.



WARNING



BEING CAUGHT

To avoid being caught by the machine, keep your hands away from rotating objects such as the motor pulley, compressor pulley, v-belt, and fan.

Turn off the power supply before checking or exchanging parts of rotating objects or starting work in the vicinity of the compressor.

Disconnect the main power supply. Follow these steps before starting work.



WARNING



ERUPTION

Be careful of leaks from the oil filler plug, oil filter, oil separator, safety valve, oil drain valve, oil, and air pipes.

Turn off the power supply before removing the aforementioned parts or wasting oil.

Disconnect the main power supply.

Make sure the pressure decreases after the machine stops. Loosen oil drain plug slowly. Open the drain valve before starting work.



WARNING



RESPIRATORY LESION

Operating with insufficient ventilation can cause a fatal accident.

Operate the compressor in a well ventilated environment.

Avoid breathing compressed air as it may cause a lesion.



CAUTION



FIRE

Ventilate the room sufficiently.

Check the oil filter, oil separator, motor, control board relay, and electromagnetic valve regularly.

Exchange the suction filter, oil filter, and oil separator element, also the oil regularly.

Flush inside of machinery regularly.



CAUTION



BURN

Avoid direct contact while the machine is operating as the oil filter, compressor body, oil, air pipes, oil separator, and oil cooler reach high temperatures.

Stop the compressor before starting work in the vicinity of the high temperature compressor. Disconnect the main power supply.

Start to work after stopping the machine and allowing it to cool sufficiently.

添付要領を配慮の上
吐出空気配管及び
ドレン配管を計画下さい。

Please design air piping
& drain pipings referring
to the attached appropriate
example No.1(P1) & No.2(P2)

船 番
S.No.

型 番
MODEL

コンプレッサの空気配管
及びドレン配管

AIR PIPING & DRAIN
PIPINGs OF COMPRESSOR
for
GENERAL

製造番号
SERIAL No.

整理番号
CARD No.

株 式 会 社
田 辺 空 気 機 械 製 作 所
技 術 部
TANABE PNEUMATIC MACHINERY.CO.,LTD.
OSAKA NAGOYA JAPAN

承 認
APPROVED BY

審 査
CHECKED BY

作 成
DRAWN BY

日 付
DATE OF DRAWN
1993 年 10 月 21 日
Oct.21,1993

船 級
CLASSIFICATION

DRAWING No.

02・1・93021

△ 2022.10.25

△ 2022.07.26

△ 2012.02.24

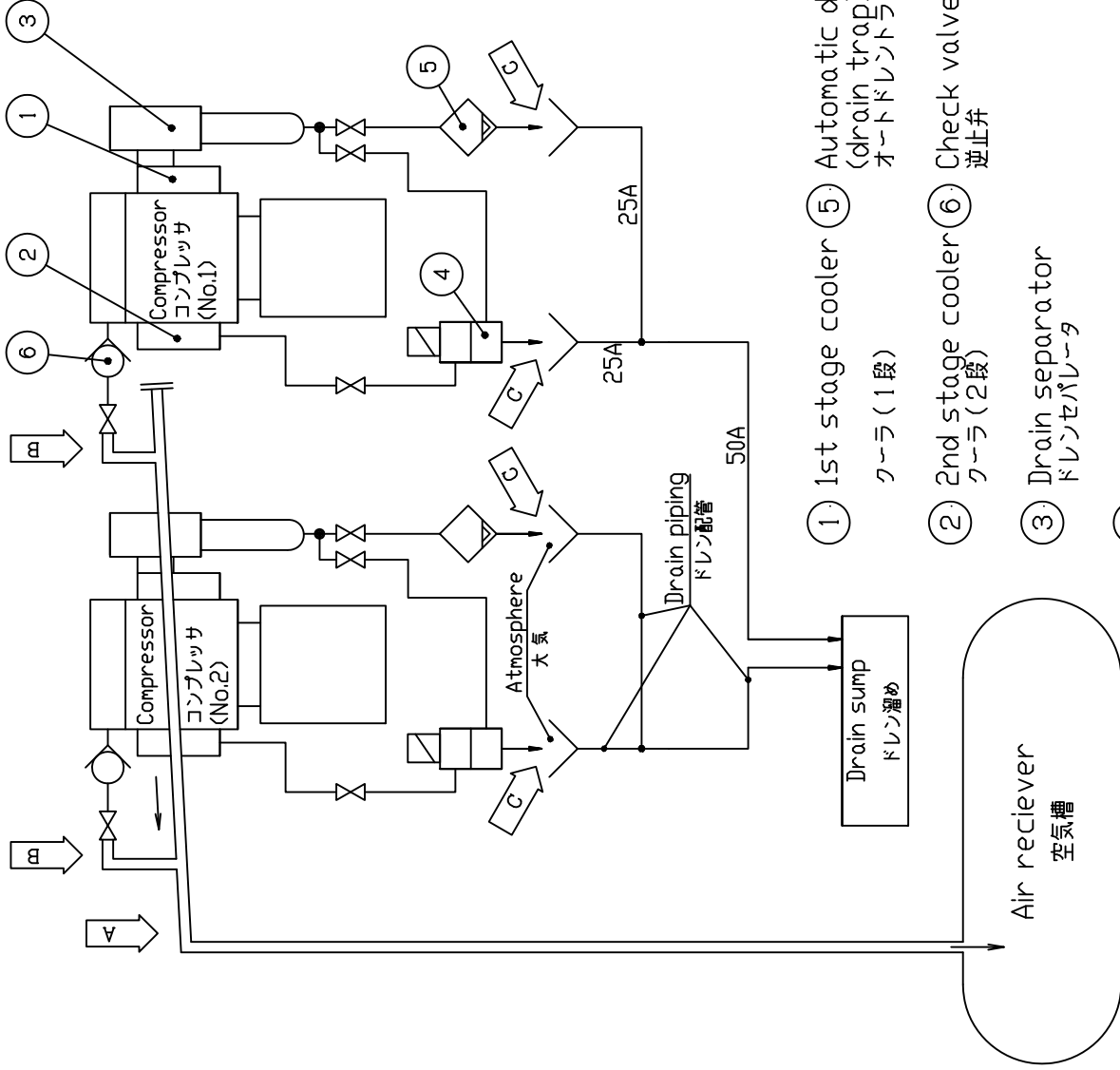
2012.02.03

AIR PIPING AND DRAIN PIPINGS OF COMPRESSOR

(Appropriate example No.1)

コンプレッサの空気配管及びドレン配管

(良い実例 その1)



←A Air piping is made slightly slant at its horizontal plane.
空気配管は先下がり配管になっている。

←B Air outlet nozzle of compressor is connected to air piping downward with vertical arrangement.
コンプレッサの空気吐出口は下向きで空気配管の上側に接続されている。

←C The outlet nozzle of ④ and ⑤ are opened to atmosphere by using funnels to receive purged drain.
④と⑤の出口はドレン受けで大気に開放されている。

←A Prevent back flow of condensed water, --- drain generated in air piping ---- into compressor.

A, Bによって、空気配管内で生じる凝縮水（ドレン）のコンプレッサへの逆流が起こらない。

←C Make treatment of purged drain at natural state without being influenced by restriction in drain piping of downstream.
Cによって、ドレン配管の末端の抵抗なしに、ドレンは自然の状態で排出される。

① 1st stage cooler (1st stage) クーラ (1段)
⑤ Automatic drainer (drain trap) オートドレントラップ

② 2nd stage cooler (2nd stage) クーラ (2段)
⑥ Check valve 逆止弁

③ Drain separator ドレンセパレータ

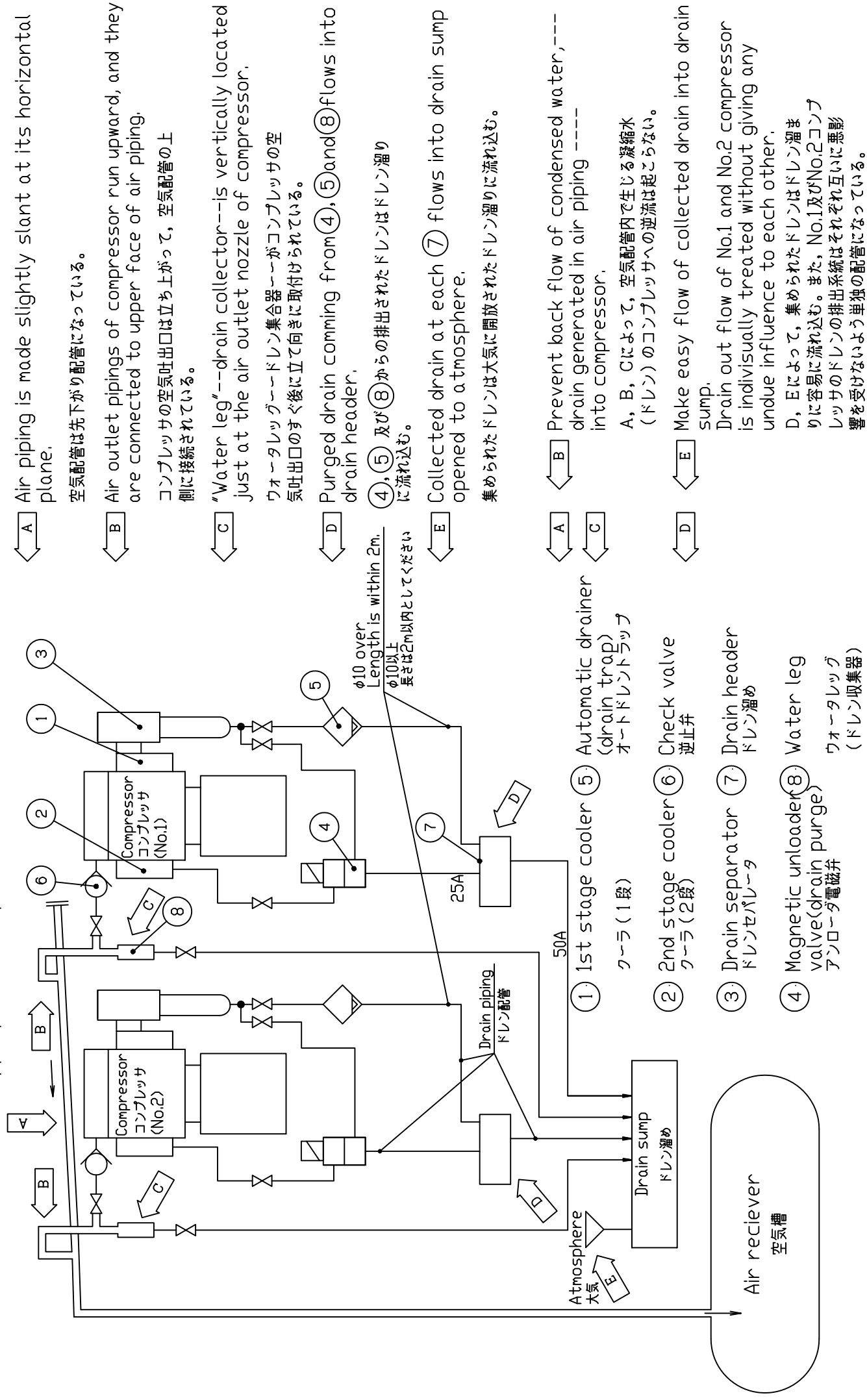
④ Magnetic unloader valve (drain purge) アンローダ電磁弁

AIR PIPING AND DRAIN PIPINGS OF COMPRESSOR

(Appropriate example No.2)

コンプレッサの空気配管及びドレン配管

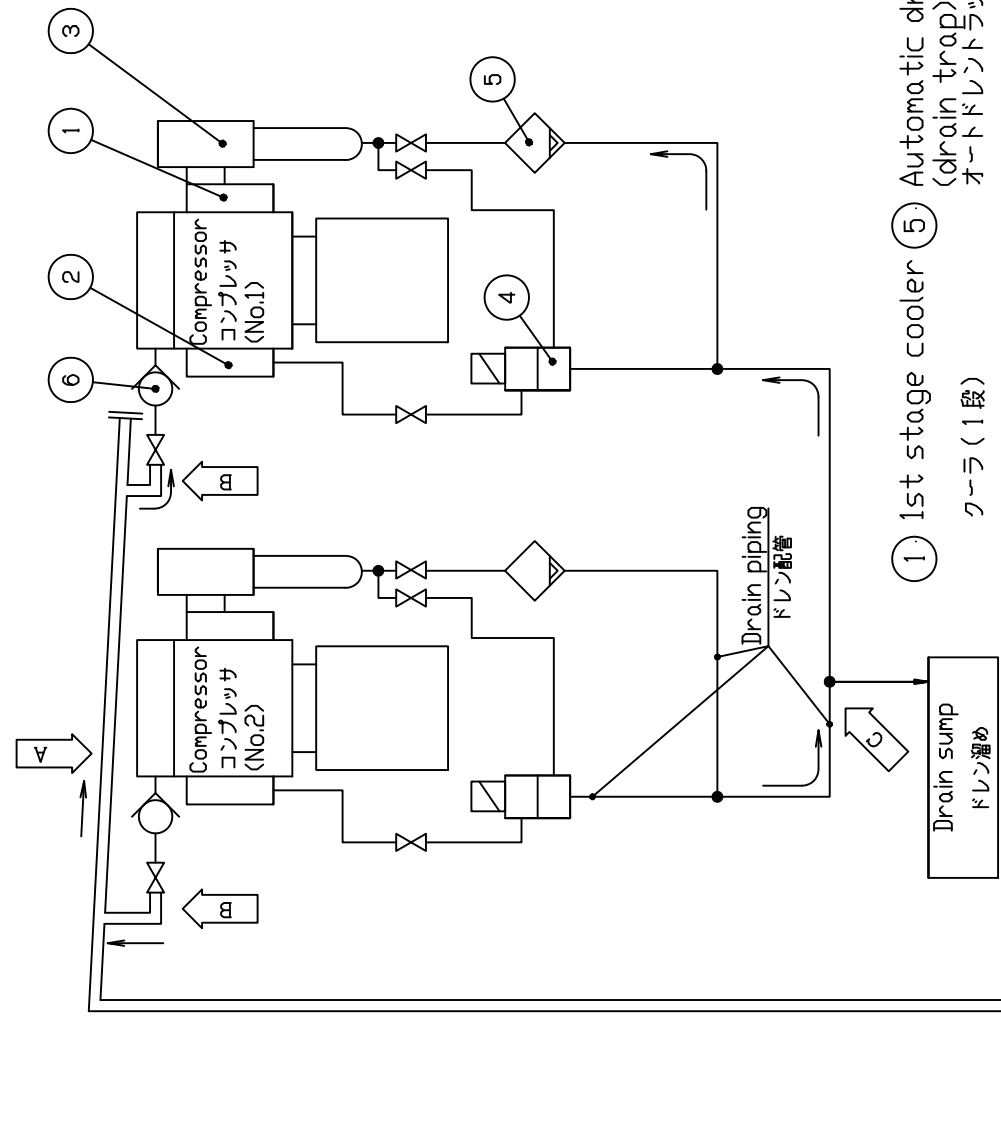
(良い実例 その2)



- ➡ A Air piping is made slightly slant at its horizontal plane.
空気配管は先下がり配管になっている。
- ➡ B Air outlet pipings of compressor run upward, and they are connected to upper face of air piping.
コンプレッサの空気吐出口は立ち上って、空気配管の上側に接続されている。
- ➡ C "Water leg"---drain collector---is vertically located just at the air outlet nozzle of compressor.
ウォーターレグ---ドレン集合器---がコンプレッサの空気吐出口のすぐ後に立て向きに取付けられている。
- ➡ D Purged drain coming from ④, ⑤ and ⑧ flows into drain header.
④, ⑤ 及び ⑧ からの排出されたドレンはドレン溜めに流れ込む。
- ➡ E Collected drain at each ⑦ flows into drain sump opened to atmosphere.
集められたドレンは大気に開放されたドレン溜りに流れ込む。
- ➡ A Prevent back flow of condensed water, --- drain generated in air piping --- into compressor.
A, B, Cによって、空気配管内で生じる凝縮水(ドレン)のコンプレッサへの逆流は起らない。
- ➡ D Make easy flow of collected drain into drain sump.
Drain out flow of No.1 and No.2 compressor is individually treated without giving any undue influence to each other.
D, Eによって、集められたドレンはドレン溜めに容易に流れ込む。また、No.1及びNo.2コンプレッサのドレンの排出系統はそれぞれ互いに悪影響を受けないよう単独の配管になっている。

AIR PIPING AND DRAIN PIPINGS OF COMPRESSOR

※ Please do not make following pipings. ※
 ※ 下図のような配管は絶対にしないで下さい。 ※



- ① 1st stage cooler (1st stage) クーラ (1 段)
- ② 2nd stage cooler (2nd stage) クーラ (2 段)
- ③ Drain separator ドレンセパレータ
- ④ Magnetic unloader valve (drain purge) アンローダ電磁弁
- ⑤ Automatic drainer (drain trap) オートドレントラップ
- ⑥ Check valve 逆止弁

Air reciever
空気槽

コンプレッサの空気配管及びドレン配管

〈悪い例〉

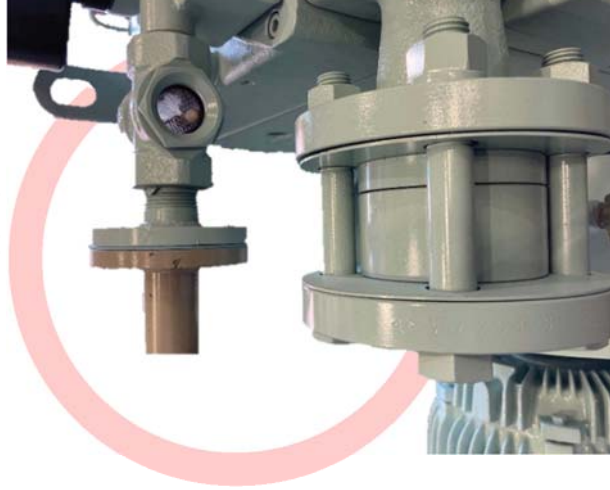
- ◀ A Air piping is made slightly slant towards air compressor at its horizontal plane.
空気配管は先上がり配管になっている。
- ◀ B Air outlet pipings of compressor run upward and they are connected to bottom face of air piping.
コンプレッサの空気吐出口は立ち上って、空気配管の下側に接続されている。
- ◀ C Drain pipings of No.1 and No.2 compressor are connected together at one point, then is lead to drain sump.
No.1及びNo.2の圧縮機のドレン配管は一点にまとめられ、ドレン溜まりにつながっている。

- ◀ A Cause the back flow of condensed water, -- drain generated in air piping -- into compressor.
A, Bによって、空気配管内に生じる凝縮水（ドレン）がコンプレッサに逆流する。
- ◀ C Cause the back flow of drain as shown by marks -->, for example, in case where No.1 air compressor is at stan-by state, and No.2 air compressor is at that of running.
Cによって、マーク――→に示すように逆流が生じる。
例えば、No.1コンプレッサが待機状態で、No.2コンプレッサが運転状態の時、No.2コンプレッサから排出されたドレンがドレン配管を逆流してNo.1コンプレッサの機内に入り込む。

コンプレッサ配管の接続に際して

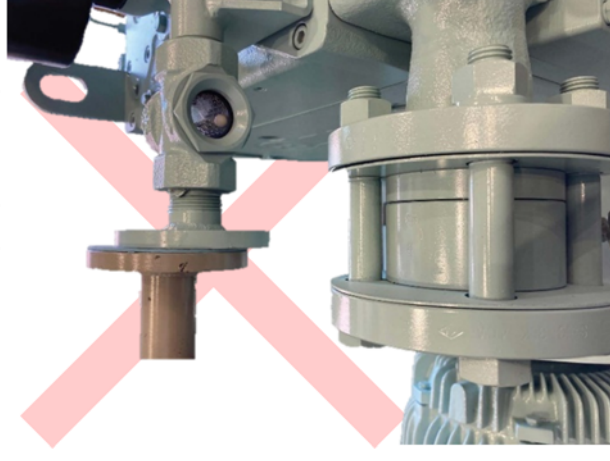
CONNECTION OF COMPRESSOR PIPING

良い実例 - Appropriate example



- ・ 配管同士の芯にずれが無い
There is no misalignment
between each pipe's centerline.

悪い実例 - Improper example



- ・ それぞれの配管の芯がずれている
Each pipe is misalignment.

配管の芯がずれたままフランジを締結すると、漏れや配管の破損を引き起こします。
芯ずれのある状態で無理やり配管することは絶対にしないでください。

The piping misalignment cause the leakage and piping breakage.

Please DO NOT pipe with misalignment.

SERVICE NEWS

Document No. : 02.1.23029

Regarding the volatile rust preventive oil sealed in the compressor

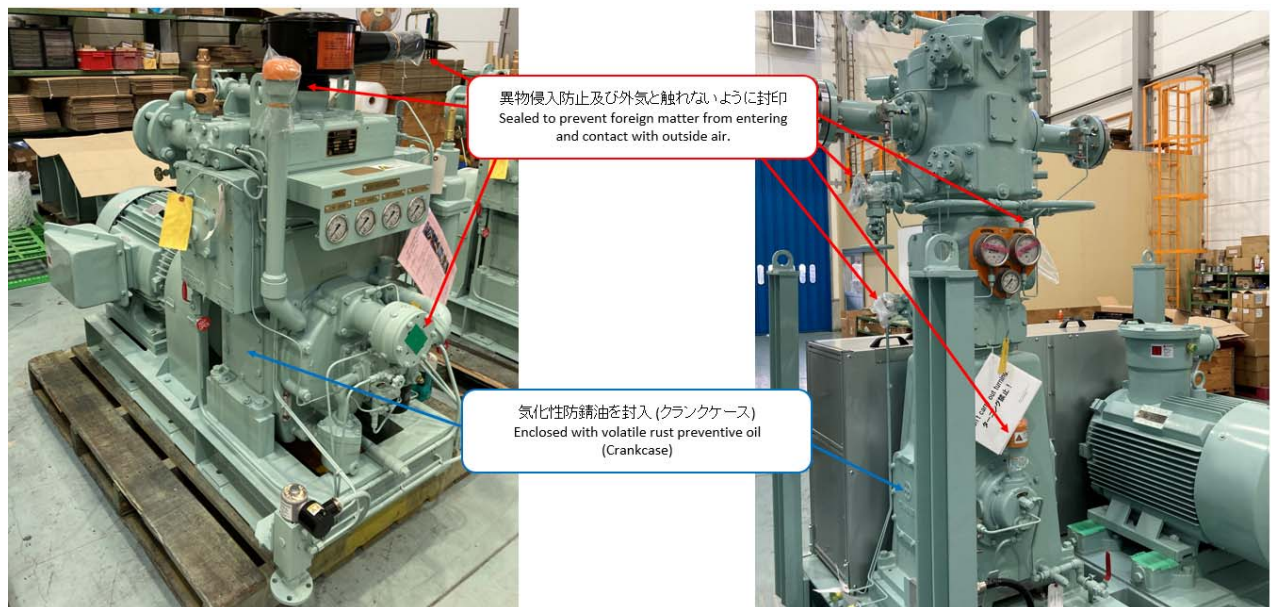
Published : DEC.21.2023

We would like to inform you about the volatile anti-rust oil sealed in the compressor at the time of shipment.

Compressors shipped without lubricating oil have volatile anti-corrosion oil placed inside the crankcase to prevent internal rust.

The joint is covered with a plastic bag to prevent it from coming into contact with the outside air , and a rust-preventing film is formed on the metal surface using vaporized rust-preventing oil that evaporates in a closed room.

However, if the compressor is stored for a long time, in a hot and humid place, or outdoors, rust may develop inside the compressor. Therefore, please avoid storing the product in locations that fall under the Above conditions as much as possible.



出荷状態 (圧縮機型式:H-74)
Shipment status (Compressor type:H-74)

出荷状態 (圧縮機型式:LNGOS-97)
Shipment status (Compressor type:LNGOS-97)

Fig. Shipment status

When storing for a long period of time (more than 3 months), please periodically check the amount of volatile rust preventive oil remaining in the crankcase. If there is no remaining amount, please replenish it.

We enclose the volatile rust preventive oil “Shell VSI Circulating oil 32”.

When using other brands of volatile rust preventive oil, wipe the inside of the crankcase.

※ Before initial operation, be sure to wipe off the volatile anti-rust oil in the crankcase before filling it with lubricating oil.

Don't inject compressed air into the body !

The compressor discharges air with extremely strong pressure (compressed air). If this compressed air is injected directly into a human body with an air duster or blow gun, there is a risk of life-threatening accidents such as the rupture of internal organs. Never play and get into mischief with compressed air and the tools.



The Japan Society of Industrial
Machinery Manufacturers
General Compressor Committee