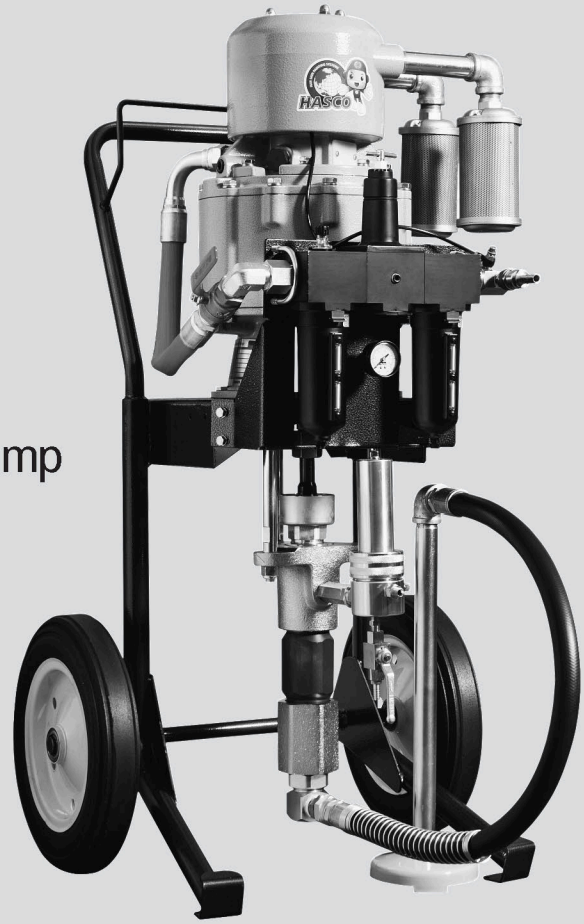
ISO-9001:2000

AIRLESS UNIT
Maru
73:1 / 56:1
PUMP

Original instruction for airless pump
SERVICE Manual-PARTS LIST



HASCO Character HACORI

Optional Displacement Pump

- Stainless 63S200-A / 45S200-A

<< Standard

		PRO-Maru 731 (72000-PB)	PRO-Maru 561 (56000-PB)	PRO-Maru 731 (72000-PBS)	PRO-Maru 561 (56000-PBS)
STANDARD SPECIFICATION	AIR MOTOR	72100			
	DIS-PUMP	63D200	45D200	63D200	45D200
	SURGE TANK	45300-G		A64000 / A65000	
	REGULATOR	72400-PBS (1 ″ FRL)			
	SUCTION	45500			
	CART	45600			
FLUID PRESSURE RATIO		73:1	56:1	73:1	56:1
MAX. CYCLE/min		160			
DELIVERY/cycle (mL)		185.25	240.36	185.25	240.36
MAX. DELIVERY/min (L)		29.64	38.46	29.64	38.46
MAX. DISCHARGE PRESSURE (kgf/cm^2)		511	392	511	392
AIR PRESSURE RANGE (kgf/cm^2)		3 - 7			
STROKE (mm)		115			
WEIGHT (NET/PACKING:kgs)		96 / 120			
DIMENSION (NET/PACKING:cm)		80×75×129 / 85×77×142			
TYPICAL FLUID HANDLED		ALKYD, EPOXY, URETHANE, WATER ANTICORROSIVE PRIMER, HIGH VISCOSITY PAINT, PRIMER, HIGH BUILD			

This manual contains important warnings and information.
READ AND KEEP FOR REFERENCE

INSTRUCTIONS

HASCO

General description

Airless pumps are sprayer for liquid or extruder for viscous materials,
it's also high pressure device for professional use only.
These are composed of two main parts: the air motor and the pumping unit.
This has structure of “pumping by air motor”, and high pressure and output in lower pump is closely affected by air inlet pressure into air motor.
Read all instruction manuals, tags, and labels before you operate the equipment.

1. Transport and Handling

1-1 Transport

To transport the equipment only the systems described below can be used.
In any case make sure that the transport and lifting device can bear the weight of the equipment with its packaging.

⚠ WARNING

ALWAYS KEEP THE PACKAGING IN VERTICAL POSITION.

- DO NOT PLACE THE PACKAGING AT A SLANT.
- DO NOT STAND THE PACKAGES UPSIDE DOWN.
- DO NOT PUT OTHER PACKAGES OR WEIGHTS UP ON THE PACKAGING.

⚠ WARNING

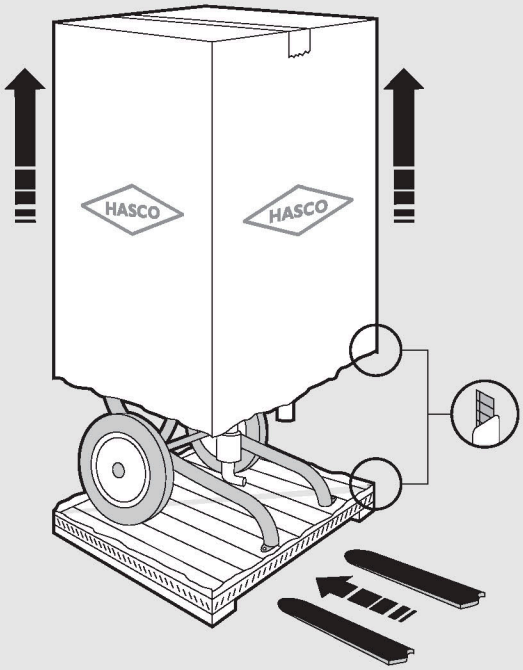
IT IS ADVISABLE THAT THE STAFF IN CHARGE OF HANDLING THE EQUIPMENT WEAR PROTECTIVE GLOVES AND SAFETY SHOES.

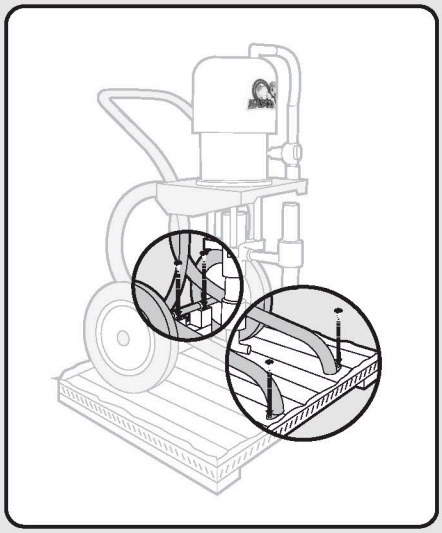
⚠ WARNING

WHILE LIFTING OR HANDLING THE EQUIPMENT OR ANY OF ITS COMPONENT CLEAR THE WORKING AREA. LEAVE ALSO A SUFFICIENT SAFETY AREA AROUND THE EQUIPMENT TO AVOID DAMAGING PEOPLE OR OBJECTS WHICH COULD BE THERE.

1-2 Transport with cardboard packaging

Standard packing(cardboard packaging on pallet), the equipment is put inside a cardboad packaging and wrapped with some shockproof material.





1-3 Handling

To handle the cardboard packaging use a forklift or trolley.
To handle or displace the airless unit only use the handle.

⚠ WARNING

FOLLOW THE INSTRUCTIONS ON THE PACKAGING BEFORE HANDLING AND OPENING IT.

1-4 Temporary storage

During transport and storage make sure the temperatures between 0 and 40°C are not exceeded.
In case of storage, make sure the equipment is not put in places with an excessive humidity, it's necessary to prevent the equipment from being water, moisture. Keep to prevent water penetration especially from the rain or stagnant water not to get carton case wet.

2. Warning

• Warning symbol

⚠ WARNING

This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

• Caution symbol

⚠ CAUTION

This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

• Danger symbol

⚠ DANGER ⚠ **DANGER !** -High Pressure Device For Professional Use Only
- Read instructon manual before operating: observe all warnings.

FIRE -Always keep spray pump in a well ventilated area a minimum of 25' from spray activity to avoid possible fire or explosion with flammable liquids. High velocity flow of material through equipment may create static electricity. All equipment and object being sprayed must be properly grounded to prevent sparking which may cause fire or explosion.

INJECTION HAZARD -High pressure spray or application equipment can cause serous injury if the spray penetrates the skin. DO NOT point any high pressure device, gun or nozzle at anyone or any part of the body. DO NOT attempt to deflect or stop leaks in the system by hand. In case of penetration, adequate medical aid must be immediately obtained.

⚠ WARNING

2-1 EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.

-This equipment is for professional use only.

-Read all instruction manuals, tags, and labels before you operate the equipment.

-Use the equipment only for its intended purpose. If you are not sure, contact HASCO.

-Do not change or adjust this system.

-Check equipment daily. Repair or replace worn or damaged parts immediately.

-Do not exceed the maximum working pressure of the lowest-rated system component. Refer to the **Technical Data** section for the Maximum pressure of this machine.

-Use fluids and solvents that are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer' s warnings.

-Do not use hoses to pull equipment.

-Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose HASCO hoses to temperatures above 82°C(180°F)or below -40°C(-40°F).

-Wear hearing protection when you operate this equipment. (Noise range : 70~100 dBa)

-Do not lift pressurised equipment.

-Comply with all applicable local, state, and national fire, electrical, and safety regulations.

⚠ WARNING

2-2 MOVING PARTS HAZARD

Moving parts, such as the air motor piston and displacement rod, can pinch or amputate your fingers.

-Keep clear of all moving parts when you start and operate the pump.
-Before you service the equipment, follow the Pressure Relief Procedure to prevent the equipment from starting unexpectedly.

⚠ WARNING

2-3 TOXIC FLUID HAZARD

Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed.

-Know the specific hazards of the fluid you are using.
-Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state, and national guidelines.

Always wear protective eyewear, gloves, clothing, and respirator as recommended by the fluid and solvent manufacturer.

2-4 Plate Data

HASCO's identification plate is applied on the airless unit.(See picture below)It must not be removed at all, even if the equipment is resold.
For any communication with the manufacturer always mention the serial number written on the plate itself or attached on the pump

Air-Operated Airless Pump	Pro-731	
• Serial No.		
• Fluid Pressure Ratio	73 : 1	
• Output	29.64	L/min
• Stroke	115	mm
• Air Pressure Range	3~7	bar
• Max. Discharge Pressure	511	bar

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3. Installation

3-1 Conditions for installation

1) The equipment must be installed by a specialized and authorized staff.

In any case, follow the instructions below.
Painting must preferably take place inside spray booth equipped with suction device.
Do not use the unit if the suction device is off.

⚠ WARNING

If painting is carried out outside the spray booth, always operate in a place with a right ventilation to avoid concentrating inflammable vapours coming from solvents or paints.

2) The pump requires 5.3m³/min of compressed air while operating at 7bar air pressure and 60cycles per minute. Ensure that you have an adequate compressed air supply.

Bring a compressed air supply line from the air compressor to the pump location. Be sure all air hoses are properly sized and pressure-rated for your system. Use only electrically conductive hoses.
The air hose should have a 1" thread.
Install a bleed-type shutoff valve in the airline to isolate the air line components for servicing. Install an air line moisture from the compressed air supply.
Keep the site clear of any obstacles or debris that could interfere with the operator's movement.
Have a grounded, metal pail available for use when flushing the system or draining the fluid filter.

3) Grounding

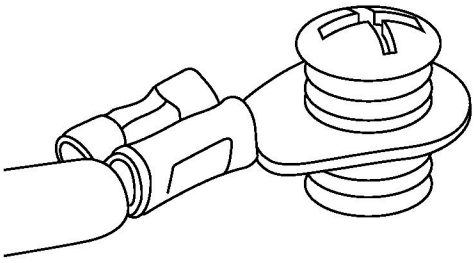
⚠ WARNING

Before operating the pump, ground the system as explained below.

(1) Pump :
- Use the ground wire.(see figure)
- Connect the other end of the wire to a true earth ground.

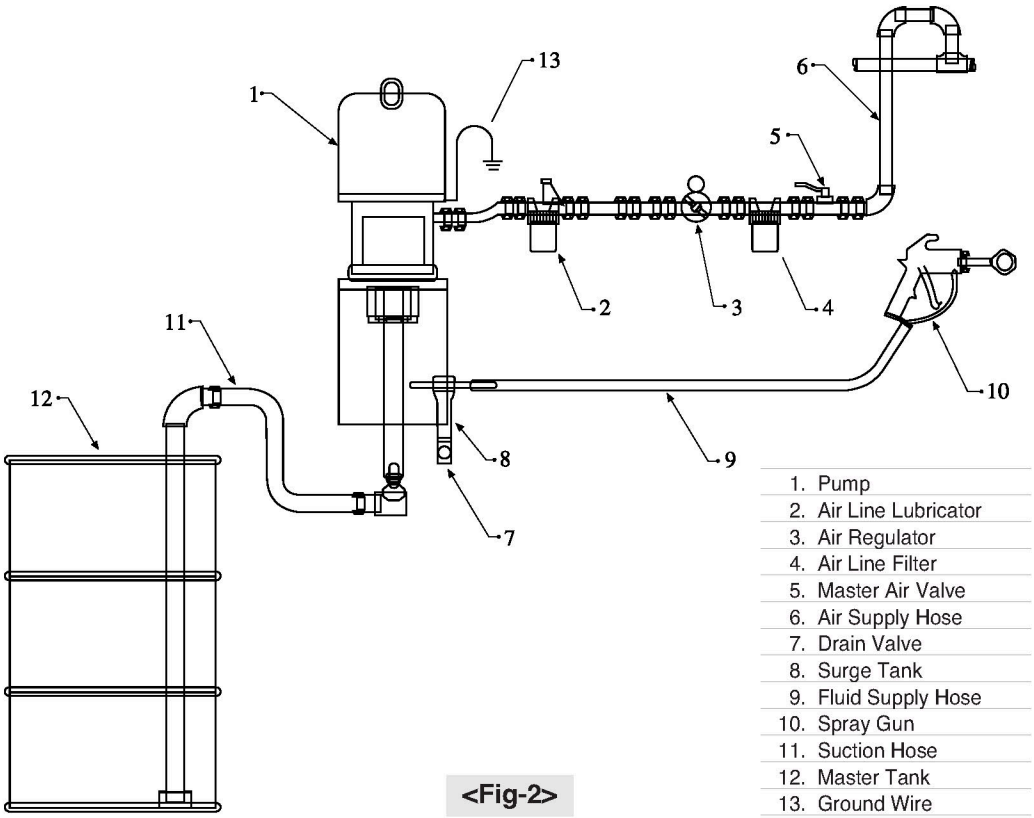
(2) Air compressor : Follow manufacture's recommendations.
(3) Spray gun : Ground through connection to a properly grounded fluid hose and pump.
(4) Fluid supply container : Follow you local code.
(5) Object being sprayed, Follow your local code.
(6) Solvent pails used when flushing :
- Follow your local code.
- Use only metal pails, which are conductive, placed on a grounded surface.
- Do not place the pail on a non-conductive surface, such as paper or cardboard, which interrupts the grounding continuity.

(7)To maintain grounding continuity when flushing or relieving pressure, hold a metal part of the spray gun firmly to the side of a grounded metal pail, then trigger the gun.



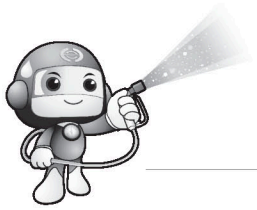
<Fig-1>

3-2 Typical installation



1. Pump
2. Air Line Lubricator
3. Air Regulator
4. Air Line Filter
5. Master Air Valve
6. Air Supply Hose
7. Drain Valve
8. Surge Tank
9. Fluid Supply Hose
10. Spray Gun
11. Suction Hose
12. Master Tank
13. Ground Wire

<Fig-2>



4. Operation

4-1 Pressure relief procedure

⚠ WARNING

INJECTION HAZARD

The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. Fluid under high pressure can be injected through the skin and cause serious injury.
To reduce the risk of an injury from injection, splashing fluid, or moving parts, follow the **Pressure relief Procedure** whenever you :

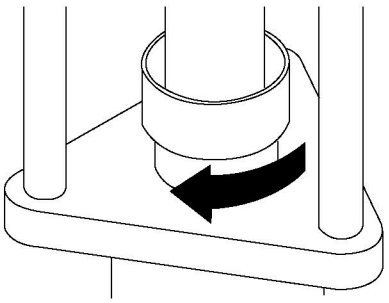
- are instructed to relieve the pressure
- stop spraying
- check or service any of the system equipment, or install or clean the spray tips.

1. Lock the gun trigger safety.
2. Close the red-handed bleed-type master air valve(5, required in your system).
3. Unlock the gun trigger safety.
4. Hold a metal part of the gun firmly to the side of a grounded metal pail, and trigger the gun to relieve pressure.
5. Lock the gun trigger safety.
6. Open the drain valve(7, required in your system), having a container ready to catch the drainage.
7. Leave the drain valve open until you are ready to spray again.

If you suspect that the spray tip or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, very slowly loosen the tip guard retaining nut or hose end coupling to relieve pressure gradually, then loosen completely. Now clear the tip or hose.

Packing nut / wet-cup

Before starting, fill the packing nut 1/3 full with TSL-OIL.
To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the pressure relief procedure.
The packing nut is torqued at the factory and is ready for operation.
If it becomes loose and there is leaking from the throat packings, relieve pressure, then torque the nut to 300kgf·cm using a wrench.
Do this whenever necessary. Do not over tighten the packing nut.
See **<Fig-3>.**



<Fig-3>

4-2 Flush the pump before first use

The pump is tested with lightweight oil ,which is left in to protect the pump parts. If the fluid you are using may be contaminated by the oil, flush it out with a compatible solvent.
Flush the pump

- Before the first use
- When changing colors or fluids
- Before fluid can dry or settle out in a dormant pump(check the pot life of catalysed fluids)
- Before storing the pump

Flush with a fluid that is compatible with fluid you are pumping and with the wetted parts in your system.
Check with you fluid manufacturer or supplier for recommended flushing fluids and flushing frequency.

⚠ WARNING

To reduce the risk of serous injury whenever you are instructed to relieve pressure, always follow the **Pressure relief procedure.**

1. Relieve the pressure.
2. Remove the tip guard and spray tip from the gun. See the gun instruction manual.
3. Remove the filter element from the surge tank. Reinstall the filter or surge tank below.
4. Place the suction tube in a container of solvent.
5. Hold a metal part of the gun firmly to the side of a grounded metal pail.
6. Start the pump. Awlays use the lowest possible fluid pressure when flushing.
7. Trigger the gun.
8. Flush the system until clear solvent flows from the gun.
9. Relieve the pressure.
10. Clean the tip guard, spray tip, and fluid filter element separately, then reinstall them.
11. Clean the inside and outside of the suction tube.

4-3 Using the Airless spray gun

Before operating the equipment, read the instruction manual supplied with the gun.
Spray some test patterns before doing any finished work.
Refer to the gun manual for detailed information on correct spraying technique.

NOTE : To avoid tip-over, the cart must be on a flat level surface. Failure to follow this caution could result in injury or equipment damage.

4-4 Prime the pump

1. Remove the tip guard and spray tip from the gun(10). See the gun insturction manual.
2. Close the air filter/regulator and master air valves(5).
3. Close the fluid drain valve(7).
4. Engage the air line coupler with the mating coupler attached to the air filter/regulator inlet and twist with a wrench to lock.
5. Check that all fittings throughout the system are tightened securely.
6. Place the suction hose(11) into the fluid supply container(12).
7. Open the fluid shutoff valve.
8. Open the master-air valve(5).
9. Hold a metal part of the gun(10) firmly to the side of a grounded metal pail and hold the trigger open.
10. Slowly open the air filter/regulator until the pump starts.
11. Cycle the pump slowly until all air is pushed out and the pump and hoses are fully primed.
12. Release the gun trigger and lock the trigger safety. The pump should stall against pressure.
13. If the pump fails to prime properly, open the drain valve(7). Use the drain valve as a priming valve until the fluid flows from the valves. Close the valve.

4-5 Set the air and fluid pressure

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure relief procedure.**

1. Relieve the pressure. Install the tip guard and spray tip in the gun, as explained in the gun manual.
2. Open the air filter/regulator slowly. Use the regulator to control pump speed and fluid pressrue.
   Always use the lowest air pressure necessary to get the desired results. Higher pressures cause premature tip and pump wear.

⚠ WARNING

COMPONENT RUPTURE HAZARD

To reduce the risk of overpressurising your system, which could cause component rupture and serious injury, never exceed the specified maximum incoming air pressure to the pump(see **Techincal data**)

⚠ CAUTION

Do not allow the pump to run dry. It will quickly accelerate to a high speed, causing damage. If your pump is running too fast, stop it immediately and check the fluid supply. If the container is empty and air has been pumped into the lines, refill the container and prime the pump and the lines, or flush and leave it filled with a compatible solvent. Eliminate all air from the fluid system.

3. With the pump and lines primed, and with adequate air pressure and volume supplied, the pump will start and stop as you open and close the gun.

4-6 Shutdown and care of the pump

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressrue, always follow the **Pressure relief procedure.**

For overnight shutdown, stop the pump at the bottom of its stroke to prevent fluid from drying on the exposed displacement rod and damaging the throat packings. **Relieve the pressure.**
Always flush the pump before the fluid dries on the displacement rod. See **Flushing.**

5. Maintenance and Inspection

5-1 Safety rules during maintenance

The main rules to follow during maintenance interventions on the unit are :

1. Disconnect the pneumatic supply before replacing any component.
2. Do not wear rings, watches, chains, bracelets etc during maintenance.
3. Always use the individual ptotections(Gloves, safety, shoes etc)
4. Do not use naked flames, points or pins for cleaning.
5. Do not smoke.

5-2 Recommended schedule for Maintenance

Daily Maintenance	1. Clean nozzle tip 2. Clean gun filter 3. loosen air regulator to allow pressure to fall to 0 bar by exhausting paint from gun. When you don't clean pump, always keep paint surface in paint container above intake set... 4. Clean fluid intermediate filter
Every 50 hours	1. Clean paint passages (especially when paint has lot of pigments or deposits easily)
Every 100 hours	1. Clean paint passages with cleaning liquid
Every 300 hours	1. Tighten packings of lower pump set
Every 500 hours	1. Apply grease to each sliding section of lower pump set and air motor set
Every 1000 hours	1. Overhaul the whole unit 2. Replace worn parts
CAUTION	**Regarding to the maintenance every 500/1000 hours, ask HASCO before maintenance**

6. Troubleshooting and Service

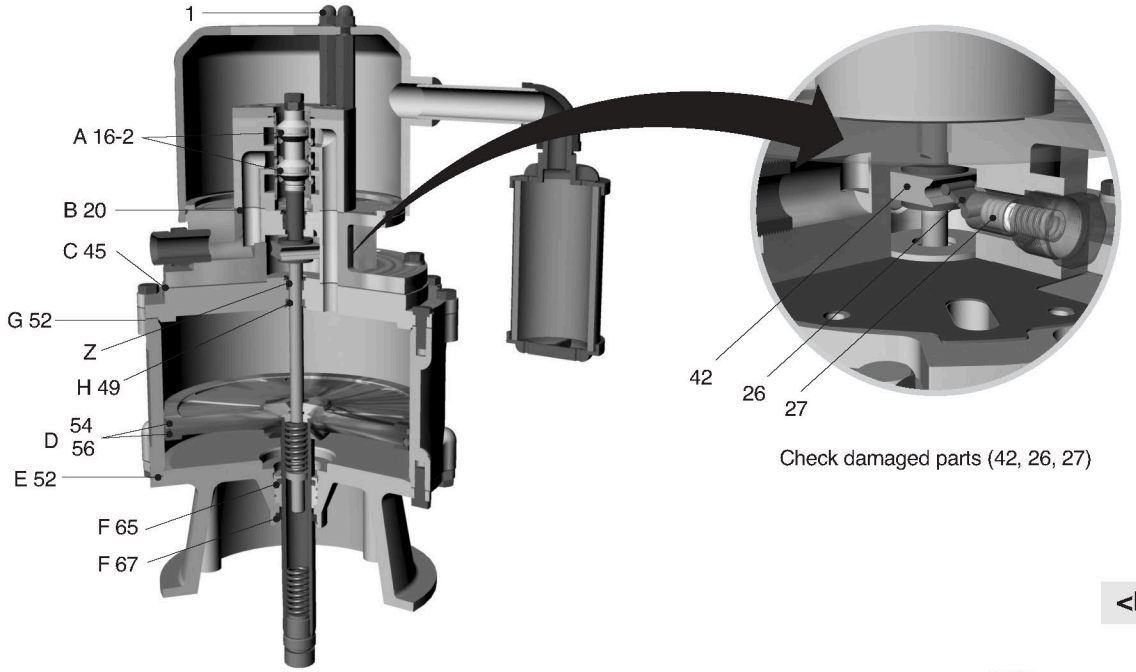
6-1 Air Motor

Troubleshooting

Locating Air Leaks

To locate an air leak, shut off the air supply and disconnect the hose. Unscrew the cap nut(1) to remove the cover. Unscrew the screw(23) and remove the plate(24). Connect the air hose and turn the air on. Use the checking methods listed in the check Chart below, to find where the air is leaking. Refer to Fig(4)

CHECK CHART			
Stroke Position	Fig Ref. Points	Checking Method	Cause of Leakage
BOTH (UP & DOWN)	A	By feel and Squirt oil around wear ring	Worn wear ring(16-2)
	B	By feel and Squirt oil around	Blown gasket(20)
	C	By feel and Squirt oil around	Blown gasket(45)
	D	Hold paper strip over exhaust holes	Worn ring(54) or o-ring(56)
UP only (air valve spool down)	E	By feel and Squirt oil around	Blown gasket(upper:52)
	F	Squirt oil and observe seal(67)'s air leaks	Worn u-packing(65)
DOWN only (air valve spool up)	G	By feel and Squirt oil around	Blown gasket(lower:52)
	H	Squirt oil around Z	Worn u-packing(49)



<Fig-4>

- Grounding -

⚠ WARNING

For your safety, read the **FIRE OR EXPLOSION HAZARD** section on page 3 and ground your entire system as instructed there.

⚠ WARNING

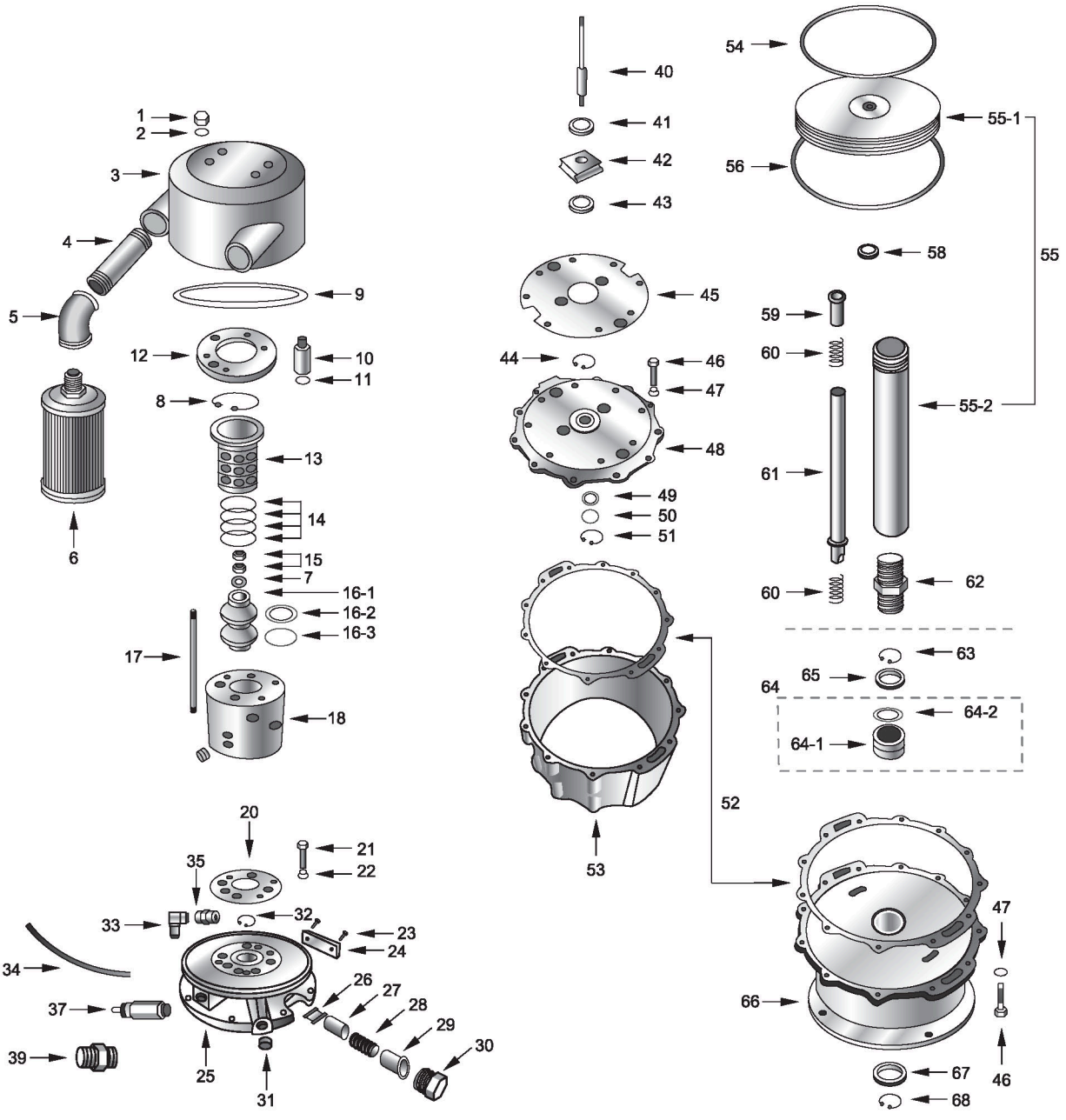
Keep fingers out of the carrier(42) in manifold to reduce the risk of pinching or amputating them.

1) Parts Drawing and List

MARU AIR MOTOR 72100

NO	CODE	DESCRIPTION	QTY	NO	CODE	DESCRIPTION	QTY
1	72101	CAP NUT	4	35	68153	ONE TOUCH FITTING(6)	1
2	72102	FLAT WASHER	4	37	A70040	AIR SAFETY VALVE(1/2″)	1
3	72103-A	COVER(NEW)	1	38	G74002	PLUG 1/4NPT	1
4	68108-3	PIPE	2	39	45225	NIPPLE(PT1″×PF1″)	1
5	45505	ELBOW(1″)	2	40	72140	CONTROL AXLE	1
6	68107	MUFFLER	2	41	72141	DAMPER A	1
7	A70002	FLAT WASHER	1	42	72142	CARRIER	1
8	A70003	SNAP PING	1	43	72143	DAMPER B	1
9	72109-A	O-RING	1	44	72144	SNAP RING	1
10	72110	STAND BOLT	4	45	72145-A	GASKET	1
11	72111	WASHER	4	46	68110	SCREW	24
12	72112	COVER PLATE	1	47	68111	LOCK WASHER	24
13	72113	CONTROL CYLINDER	1	48	72148	CYLINDER COVER	1
14	72114	O-RING	4	49	72149	U-PACKING	1
15	72115	NUT	2	50	72150	WASHER	1
16	72116	SPOOL ASSEMBLY	1	51	72132	SNAP RING	1
16	72116-1	SPOOL	1	52	72152	GASKET	2
16	72116-2	WEAR RING	2	53	72153	CYLINDER	1
16	72116-3	O-RING	2	54	72154	RING(T)	1
17	72117	STUD BOLT	4	55	72155	PISTON ASSEMBLY	1
18	72118	HOUSING SET	1	55	72155-1	PISTON PAN	1
20	72120	GASKET	1	55	72155-2	PISTON ROD	1
21	72121	BOLT	8	56	72156	PISTON O-RING	1
22	45603-2	WASHER	8	58	72158	SPACER	1
22	45607-1	FLAT WASHER	8	59	72159	SPRING GUIDE	1
23	17126	SCREW	2	60	72160	SPRING	2
24	72124	PLATE	1	61	72161C	TRIP ROD(NEW)	1
25	72125	MANIFOLD	1	62	72162	STUD	1
26	72126	TOGGLE JOINT	2	63	72163	SNAP RING	1
27	72127	BEARING	2	64	72164	GUIDE BUSH ASSEMBLY	1
28	72128	SPRING	2	64	72164-1	GUIDE BUSH	1
29	72129	BUSH	2	64	72164-2	OUTSIDE O-RING	2
30	72130	RETAINER	2	65	72165	U-PACKING	1
31	72131	WRENCH PLUG	2	66	72166	BASE	1
32	72132	SNAP RING	1	67	45147	SEAL Plan Enciosed	1
33	72133	L-BOW:(M)PT1/4″×(F)PT1/4″	1	68	45150	SNAP RING	1
34	72134	HOSE	1				

NOTE : All parts in grey are "Wear and Tear" parts to be replaced with HASCO Repair Kit.(RPK) HASCO Repair Kit would be greatly contribute to the customers' stable maintenance.(R72100)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<Fig-5>

2) Repair Kits List

Air Motor	Model	RPK
	Maru(72100)	R72100

3) How to service for Air Motor

Disassembling

Disconnect all hoses, rods, tubes, controls etc. from the air motor as necessary to provide ease in servicing.
Clamp the base(66) securely. Unscrew the cap nuts(1) and flat washers(2). Remove the cover(3).

Refer to Fig.5, Unscrew the stand bolts(10) and washers(11), Remove the cover plate(12), Pull carefully the housing(18) with the inside control cylinder(13) straight up, Check the control cylinder(13) inside, if it is damaged, replace it.
Don't damage the polished surface of the control cylinder(13).

⚠ CAUTION

Take special care to avoid damaging the polished surface of the control cylinder(13).

Unscrew the nuts(15) and the flat washer(7) and then remove the spool assembly(16) after checking the wear ring(16-2), If the wear ring(16-2) was damaged, replace it with new one.
Check the gasket(20), If replacement is necessary, remove it. Unscrew the retainers both sides, Remove the toggle joint(26), bearing(27), spring(28), bush(29) with your inspection. If the bearing(27) is damaged, it must be replaced.

⚠ CAUTION

Handle the springs carefully. Scratches or nicks will cause early spring failure.

Unscrew the bolts(21), washers(22), Lift carefully the manifold(25) up.
Check the gasket(45) and Remove it, Remove the damper A(41), Unscrew the control axle(40), Check the carrier(42), If the carrier(42) is damaged, it must be replaced. and Remove it and the damper B(43).
Unscrew the bolts(46) and washer(47), Pull carefully the cylinder cover(48) up and Inspect the u-packing(49), Check the gasket(52) and Remove it, Lift carefully the piston assembly(55) up, Check the ring(54) and piston o-ring(56) for wear or damage and replace if necessary.

⚠ CAUTION

Handle the piston pan(55-1) and piston rod(55-2) carefully, its surface must be free of nicks or scratches.

Check the u-packing(65).

Reassembling

the lips of the u-packing(65) must face up towards the piston. Pack light, water-proof grease into the cavity, and thoroughly lubricate the packing before reassembling.

⚠ CAUTION

DO NOT tilt or force the piston assembly since this could damage the smooth inner cylinder(53) wall.

Grease inner cylinder(53) wall, Install carefully the piston assembly(55) into the cylinder(53).
Before installing the cylinder cover(48), Grease the cover and gasket(52) to meet, place the gasket(52), Install carefully the cylinder cover(48) and Screw the bolts(46), washers(47).
Grease on the gasket(45) and Put the damper B(43), the carrier(42), If the carrier(42) is damaged, it must be replaced.
Using thread sealer, install the screw of the control axle(40) into trip rod(61). Tighten it securely.
Place the damper A(41) on the carrier.
Install carefully the manifold(25) and Grease the gasket(20).

⚠ CAUTION

DO NOT tilt or force the spool assembly(16) since this could damage the surface of the wear ring(16-2) by the control cylinder(13) when the spool assembly(16) install into control cylinder(13). Be sure to Grease inner cylinder(13) and the wear ring(16-2).

Install the remaining air motor parts in the reverse order of disassembly. Connect the air motor to the displacement pump. Remount the pump and connect the air and fluid lines. If the grounding wire was disconnected before servicing, be sure to reconnect it before operating the pump.

6-2 Displacement Pump

Troubleshooting

NOTE : CHECK ALL POSSIBLE PROBLEMS AND SOLUTIONS BEFORE DISASSEMBLING PUMP.

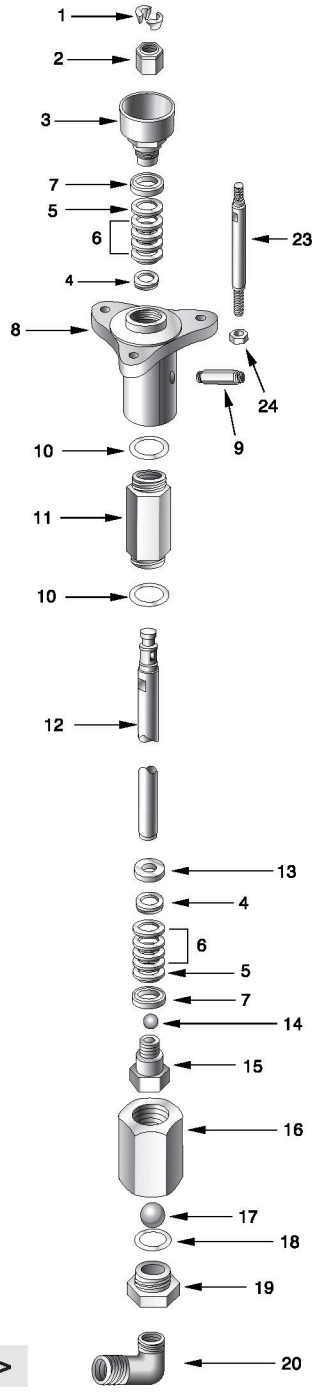
	CAUSE	SOLUTION
Pump fails to operate	Restricted line or inadequate air supply	Clear : increase air supply
	Obstructed fluid hose, gun, or dispensing valve	Open, clear
	Exhausted fluid supply	Refill : purge all air from pump and fluid lines
	Fluid dried on displacement rod	Clean : always stop pump at bottom of stroke: keep wet-cup 1/2 filled with compatible solvent
	Damaged air motor	Service air motor
Pump operates but output low on both strokes	Restricted line or inadequate air supply	Clear : increase air supply
	Obstructed fluid hose, gun, or dispensing valve	Open, clear
	Exhausted fluid supply	Refill : purge all air from pump and fluid lines
	Air in displacement pump and hose	Reprime. See page 8
	Packing nut too tight or too loose	Adjust. See page 7
	Worn throat packings	Replace. See page 17
Pump operates but output low on down strokes	Held open or worn intake valve	Clear : service. See page 17
Pump operates but output low on up strokes	Held open or worn fluid piston valve or packings	Clear : service. See page 17
Erratic or accelerated operation	Exgausted fluid supply	Refill : purge all air from pump and fluid lines
	Packing not too tight	Adjust. See page 7
	Held open or worn intake valve	Replace. See page 17
	Held open or worn fluid piston valve or packings	Replace. See page 17

To determine if the fluid hose or gun/valve is obstructed, follow the Pressure Relief Procedure Warning below. Disconnect the fluid hose and place a container at the pump fluid outlet to catch any fluid. Turn on the air just enough to start the pump (about 20-40psi=1.4-2.8bar).
If the pump starts when the air is turned on, the obstruction is in the fluid hose or gun/valve.

1) Parts Drawing and List

DIS-PUMP 63D200 / 45D200 : STANDARD

NO	CODE		DESCRIPTION	QTY
Sub	63D200		PRO-731D(DISPLACEMENT PUMP)	1
Total		45D200	PRO-561D(DISPLACEMENT PUMP)	1
1	45202		COUPLING	2
2	45201		COUPLING NUT	1
3	63203	45203	PACKING NUT	1
4	63208	45208	GLAND(M)	2
5	63205	45205	PACKING(TEFLON)	2
6	63206	45206	PACKING(LEATHER)	8
7	63204	45204	GLAND(F)	2
8	72208	72208-45D	PUMP HOUSING	1
9	68209		NIPPLE(PT3/4"×PF3/4")	1
10	72210		O-RING(TEFLON)	2
11	72211N	72211N-45D	SLEEVE	1
12	63213N	45213N	DISPLACEMENT ROD	1
13	63216	45216	WASHER(PISTON)	1
14	45215		BALL(7/8" DIA)	1
15	63217	45217	PISTON	1
16	72216		HOUSING	1
17	45221		BALL(1-1/4" DIA)	1
18	68210		SEAL(TEFLON)	1
19	68219		VALVE(INTAKE)	1
20	45224-A		TUBE(NEW)	1
23	72223		TIE ROD	3
24	45209		NUT(TEFLON)	3

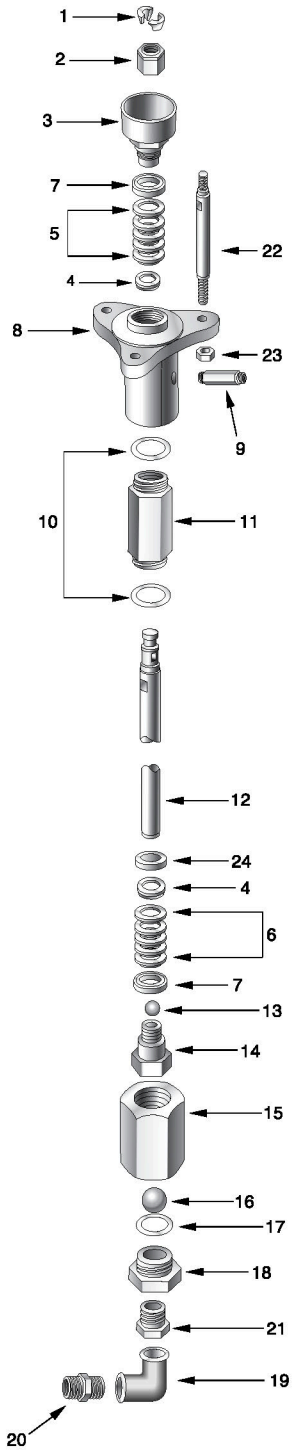


<Fig-6>

DIS-PUMP 63S200-A / 45S200-A : OPTIONAL STAINLESS

NO	CODE		DESCRIPTION	QTY
Sub	63S200-A		PRO-731S(DISPLACEMENT PUMP)	1
Total		45S200-A	PRO-561S(DISPLACEMENT PUMP)	1
1	45202		COUPLING	2
2	45201		COUPLING NUT	1
3	63203	45203	PACKING NUT	1
4	63S204S	45S204S	GLAND(M)	2
5	63205	45205	PACKING(TEFLON)	5
6	63205	45205	PACKING(TEFLON)	5
7	63S207S	45S207S	GLAND(F)	2
8	63S208S	45S208S	PUMP HOUSING	1
9	45S209S		NIPPLE(PT3/4×PF3/4)	1
10	72210		O-RING(TEFLON)	2
11	63S211S	45S211S	SLEEVE	1
12	63S212S	45S212S	DISPLACEMENT ROD	1
13	45S213S		BALL(7/8)	1
14	63S214S	45S214S	PISTON	1
15	45S215S		HOUSING(INTAKE)	1
16	45S216S		BALL(1-1/4)	1
17	68210		SEAL(TEFLON)	1
18	45S218S		VALVE(INTAKE)	1
19	45S219S		ELBOW	1
20	45S220S		HOSE NIPPLE	1
21	45S221S		BUSHING	1
22	72223		TIE ROD	3
23	45209		NUT(TEFLON)	3
24	63S224S	45S224S	WASHER	1

NOTE : All parts in grey are "Wear and Tear" parts to be replaced with HASCO Repair kit(RPK). HASCO Repair Kit would be greatly contribute to the customer's stable maintenance.(refer to Repair Kits List)



<Fig-7>

2) Repair Kits List

Dis-Pump	Model	RPK
	63D200	R63D200
	45D200	R45D200
	63S200-A	R63S200
	45S200-A	R45S200

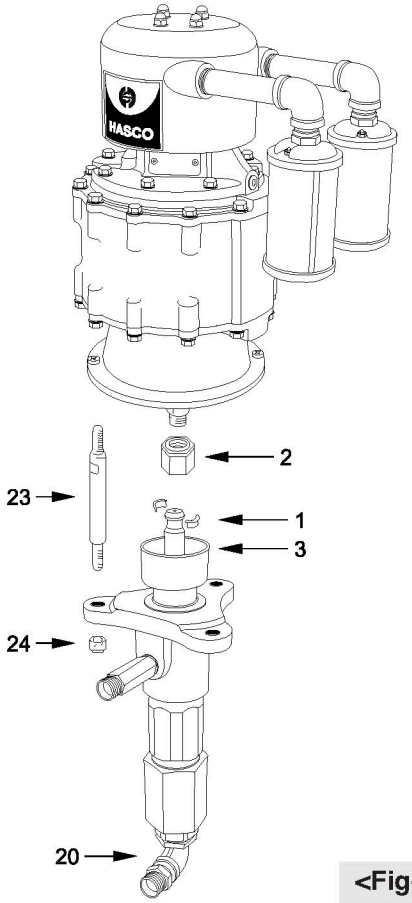
3) How to service for the Displacement Pump

Disconnecting

1. Flush the pump if possible. Stop the pump at the bottom of its stroke.
   Follow the Pressure Relief Procedure Warning on page 7.
2. Disconnect the air and fluid hoses. Remove the pump from its mounting.
3. Unscrew the coupling nut(2) off of the air motor piston rod. Be careful not to lose the two couplers(1).
   Unscrew the tie rod locknuts(24) from the tie rods(23).
   Carefully pull the displacement pump away from the air motor. See Fig-8.
4. To service the displacement pump, refer to Displacement Pump Service on page 18.

Reconnecting

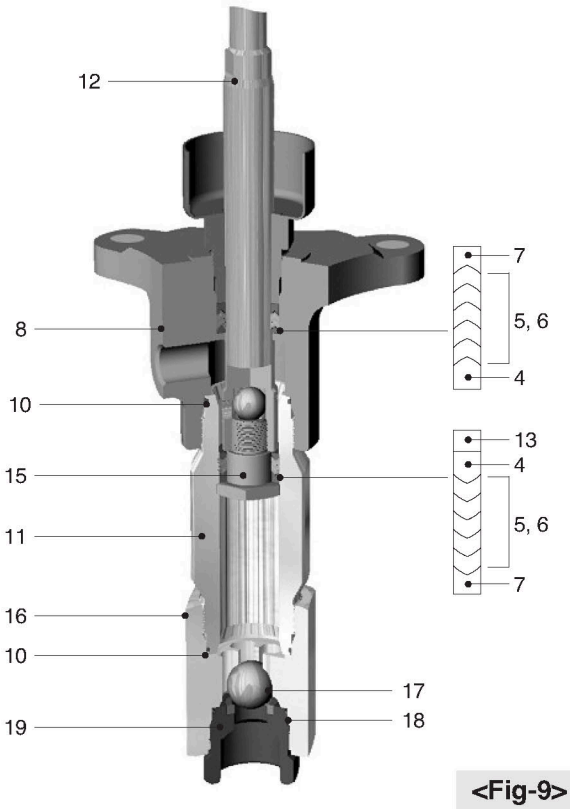
1. Position the displacement pump on the tie rods(23).
   See Fig-8.
2. Make sure the couplers(1) are in place inside the coupling nut(2).
   Screw the coupling nut up onto the air motor piston rod snugly.
   Screw the locknuts(24) onto the tie rods(23) loosely.
3. Mount pump and reconnect all hoses. Reconnect the ground wire if it was disconnected during repair.
4. Tighten the tie rod locknuts(24) evenly, and torque to 550-690kgf·cm. Torque the coupling nut(2) to 2,000-2,100kgf·cm.
5. Start the pump and run it slowly, at about 40psi(2.8bar) air pressure, to check the tie rods for signs of binding.
   Adjust the tie rods as necessary to eliminate binding.
   Tighten the packing nut/wet-cup(3) with the wrench supplied, it's just snug-no tighten.
   Fill the wet-cup half full with Throat Seal Liquid or compatible solvent.



<Fig-8>

Displacement Pump Service

- Disconnect from the air motor.
- Secure the flats of the displacement pump in a vise.
- From the intake housing(16), unscrew the intake valve(19). Be careful not to lose the intake ball(17).
- Check the ball(17) where is in and mark.
- From the intake valve(19), unscrew the tube.
- From the sleeve(11), unscrew the intake housing(16).
- Ease the packing nut(3), push down the dis-rod(12) until you can catch the piston(15).
- Pull the piston(15) and displacement rod(12) out through the bottom of the sleeve(11).



<Fig-9>

⚠ CAUTION

Grease the intake valve(19), reinstall into the intake housing(16), torque to 4,500kgf·cm.

- Secure the flats of the displacement rod(12) in a vise and unscrew the piston(15).
- Remove the v-packing(5,6), gland(4,7), washer(13) and ball(14).
- Unscrew the sleeve(11), check the sleeve(11) inner and the displacement rod(12) outer surface. If there are any damaged parts, replace it.

⚠ CAUTION

If the inner surface of the sleeve(11) is damaged, it must be replaced.
also when replacing the sleeve(11) sure to install a new o-rings(10) both sides.

- Grease the gland(4,7), v-packing(5,6) and install the piston, Be sure to install with the lips of the v-packing facing up.
- Never disassemble the stack, install the washer(13) on top of the gland(4,7), v-packing(5,6).
- Place the ball(14) on the piston(15), screw the piston(15) stacked into the displacement rod(12) torque to 180kgf·cm.

ATTENTION

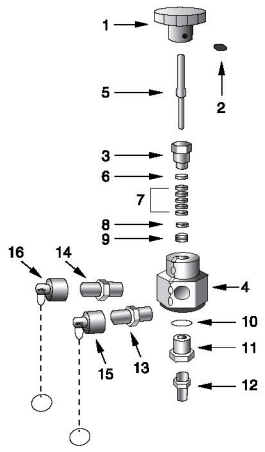
Using thread sealer, install the thread of piston(15) into displacement rod(12).

- Remove the packing nut(3), v-packing(5,6), gland(4,7) from the pump housing(8), make cleanly the inside of pump housing(8).
- Grease the gland(4,7), v-packing(5,6), packing nut(3) and then install into the throat with the lips of the v-packing facing down. Never disassemble the stack.
- Install the packing nut(3) loosely.
- Carefully insert the displacement rod(12) stacked up through the bottom of the sleeve(11) and push it all the way up.
- Screw the intake housing(16) to the sleeve(11).
- Tighten the packing nut(3) just only enough to stop leakage, but no tighter.(300kgf·cm)
- Install the other all parts as the drawing to the air motor and displacement pump.

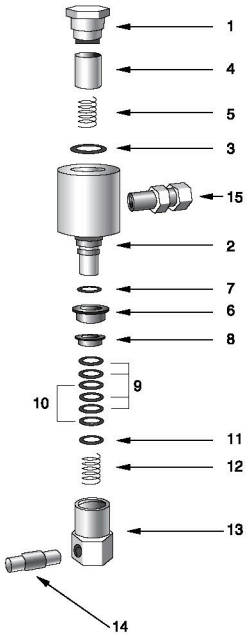
6-3A Optional Safety Surge Tank Assembly

A64000 AND A65000

NO	CODE	DESCRIPTION	QTY
	A64000	ROTARY SURGE-TANK	1
1	A64001	CAP	1
2	A64002	HOUSING	1
3	A64003	O-RING(TEFLON)	1
4	A64004A	STRAINER(#60)	1
5	A64005	SPRING(SUPPORT)	1
6	A64006	NUT(PACKING)	1
7	A64007	BEARING BALL(1/8")	24
8	A64008	GLAND(F)	1
9	28206	V-PACKING(TEFLON)	4
10	28205	V-PACKING(Leather)	2
11	28204	GLAND(M)	1
12	A64012	SPRING	1
13	A64013	CYLINDER	1
14	A64014	NIPPLE(PT3/8"×PT3/8")	1
15	45311	UNION(3/4")	1
	A65000	SAFETY HIGH PRESSURE VALVE	1
1	A65001	HANDLE(VALVE)	1
2	A65002	PLUG(LOCK)	1
3	A65003	PACKING NUT	1
4	A65004	MANIFOLDER	1
5	A65005	NEEDLE	1
6	A65006	GLAND(F)	1
7	A65007	V-PACKING(T)	5
8	A65008	GLAND(M)	1
9	A65009	SPRING(PLATE)	2
10	A65010	GASKET	1
11	A65011	SEAT	1
12	45314	DRAIN NIPPLE	1
13	45309	NIPPLE(PT3/8"×NPS1/4")	1
14	45309-A	NIPPLE(PT3/8"×NPS3/8")	1
15	A65015	CAP(NPS1/4")	1
16	A65016	CAP(NPS3/8")	1



[A65000]



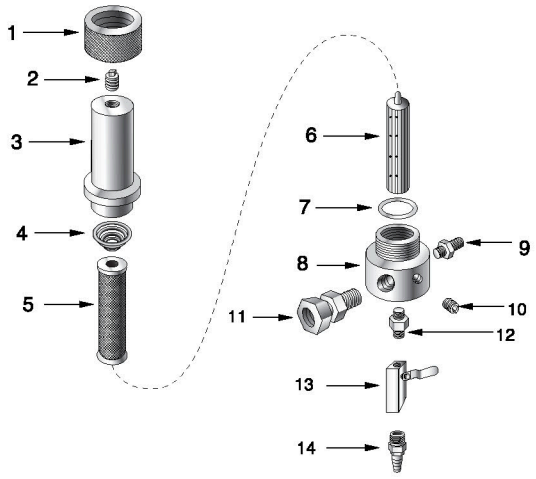
[A64000]

<Fig-10>

6-3B Surge Tank Assembly

STANDARD 45300-G / OPTIONAL STAINLESS 45S300-G

NO	CODE		DESCRIPTION	QTY
Sub	45300-G		SURGE TANK:OUTLET 3/8"	1
Total		45S300-G	SURGE TANK:OUTLET 3/8"(STAINLESS)	1
1	45301	45S301S	RING	1
2	45302	45S302S	PLUG	1
3	45303	45S303S	BOWL	1
4	45304		SPRING	1
5	A97060		SURGE FILTER #60	1
6	45306		SUPPORT	1
7	45307		PACKING	1
8	45308	45S308S	MANIFOLD	1
9	45309-A	45S309S-A	NIPPLE(PT3/8"×NPS3/8")	1
10	45302	45S302S	PLUG	1
11	45311	45S311S	UNION(3/4")	1
12	45312	45S312S	NIPPLE(PT1/4"×PT1/4")	1
13	45313		BALL VALVE(HIGH)	1
14	45314		DRAIN NIPPLE	1

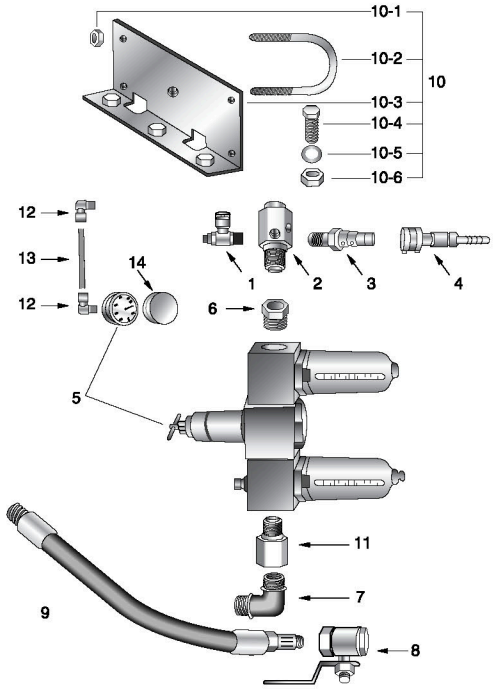


<Fig-11>

6-4 Air Regulator Assembly

72400-PBS

NO	CODE	DESCRIPTION	QTY
1	68401	SPEED CONTROL	1
2	68402	AIR MANIFOLD	1
3	45406-1-A	AIR COUPLING(M:3/4":PM400)	1
4	45406-2-A	AIR COUPLING(F:3/4":SH600)	1
5	68405-PB	REGULATOR(1"FRL:PARKER)	1
6	68405-PA	BUSHING	1
7	68409-PB	ELBOW(1"×1")	1
8	45402-A	VALVE(1")	1
9	A70045	AIR HOSE(1":400MM)	1
10	68406-PB	BRACKET SET(PARKER)	1
10	28209	NUT(TEFLON)	4
10	45603-1	BOLT	3
10	45603-2	WASHER	3
10	45603-3	NUT	3
10	68406-1-PB	BRACKET(PARKER)	1
10	68406-2-PB	U BOLT	2
11	A70046	BUSHING(PT1"M×PT1"F)	1
12	55E340	PLUG	2
13	A70010	TUBE(8)	1
14	A70011	COVER(451 REGULATOR GAUGE)	1

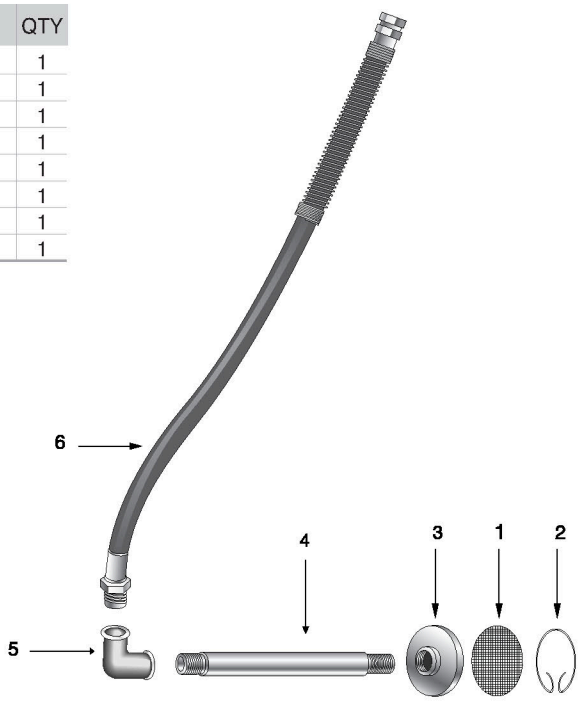


<Fig-12>

6-5 Suction Assembly

STANDARD 45500 / OPTIONAL STAINLESS 45S500

NO	CODE		DESCRIPTION	QTY
Sub	45500		SUCTION ASSEMBLY	1
Total		45S500	SUCTION ASSEMBLY(STAINLESS)	1
1	45501		SCREEN	1
2	45502	45S502S-1	CLIP	1
3	45503P		CUP(POM)	1
4	45504	45S504S	PIPE	1
5	45505	45S505S	ELBOW	1
6	45506	45S506S	HOSE	1

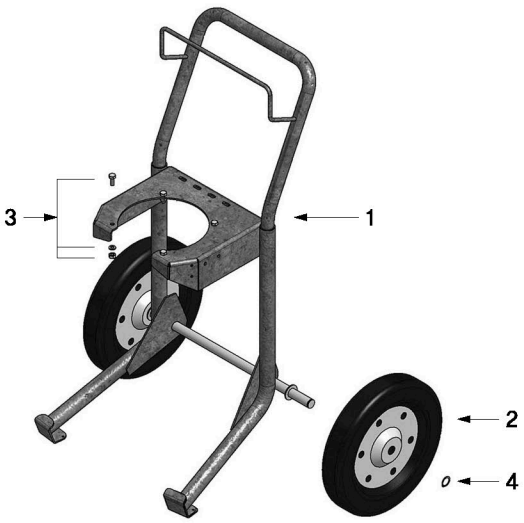


<Fig-13>

6-6 Cart Assembly

45600

NO	CODE	DESCRIPTION	QTY
Sub Total	45600-H	CART ASS'Y	1
1	45601-H	NEW CART FRAME	1
2	45602C	CRUMB WHEEL (15" × 3")	2
3	45603	BOLT & NUT & WASHER	1
3-1	45603-1	BOLT	4
3-2	45603-2	WASHER	4
3-3	45603-3	NUT	4
4	45604	TIRE SNAP RING	2

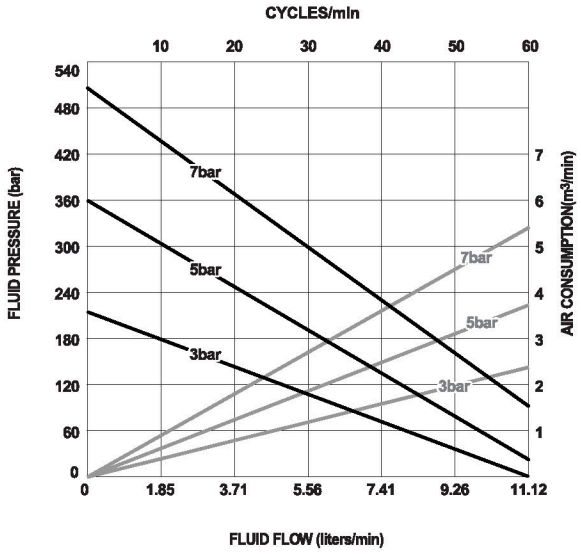


<Fig-14>

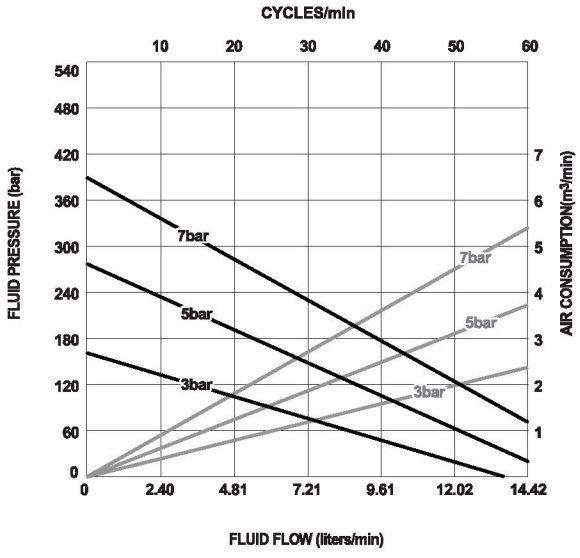
Technical Data

Pro-731							
cycles/min	0	10	20	30	40	50	60
liters/min	0	1.85	3.71	5.56	7.41	9.26	11.12
Fluid pressure(air pressure setting 3bar to start)	210	156	123	90	57	24	0
Fluid pressure(air pressure setting 5bar to start)	360	327	267	207	147	87	27
Fluid pressure(air pressure setting 7bar to start)	511	456	383	310	237	164	91
Air consumption(m^3/min:air pressure 3bar)	0	0.38	0.76	1.14	1.52	1.90	2.28
Air consumption(m^3/min:air pressure 5bar)	0	0.63	1.26	1.90	2.53	3.16	3.80
Air consumption(m^3/min:air pressure 7bar)	0	0.88	1.77	2.66	3.55	4.43	5.32

Pro-561							
cycles/min	0	10	20	30	40	50	60
liters/min	0	2.40	4.81	7.21	9.61	12.02	14.42
Fluid pressure(air pressure setting 3bar to start)	162	138	109	80	51	22	0
Fluid pressure(air pressure setting 5bar to start)	275	254	208	162	116	70	24
Fluid pressure(air pressure setting 7bar to start)	392	362	304	246	188	130	72
Air consumption(m^3/min:air pressure 3bar)	0	0.38	0.76	1.14	1.52	1.90	2.28
Air consumption(m^3/min:air pressure 5bar)	0	0.63	1.26	1.90	2.53	3.16	3.80
Air consumption(m^3/min:air pressure 7bar)	0	0.88	1.77	2.66	3.55	4.43	5.32



[Pro-731]



[Pro-561]

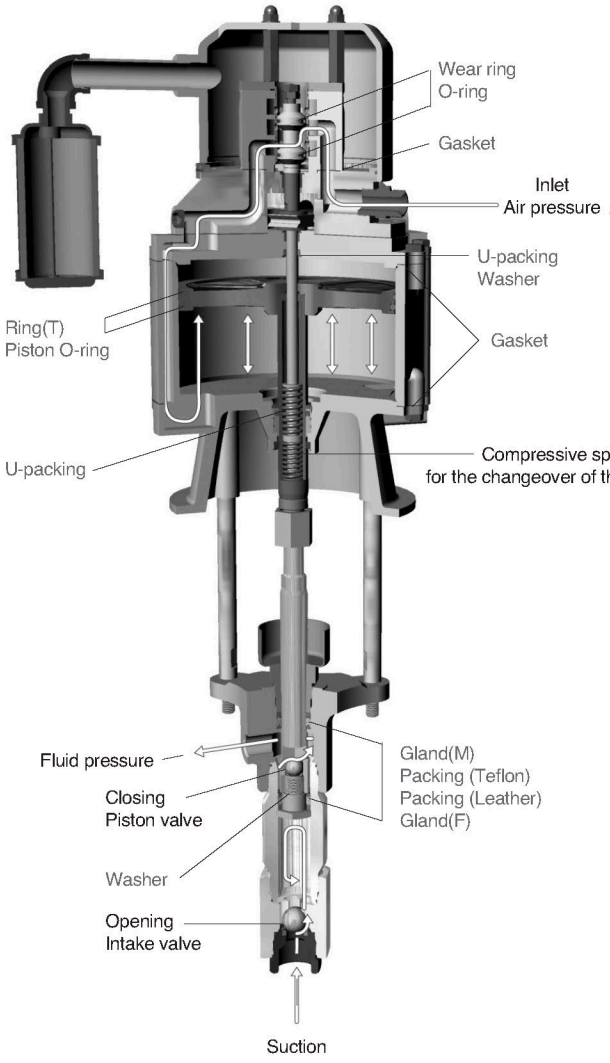
Key : Fluid outlet pressure - Black curves
Air consumption - Gray curves

Test Conditions : Air inlet connecting as standard SH600 touch coupler. Fluid outlet size : 1/4" 30m
Test fluid : General hydraulic oil (RANDO 32)

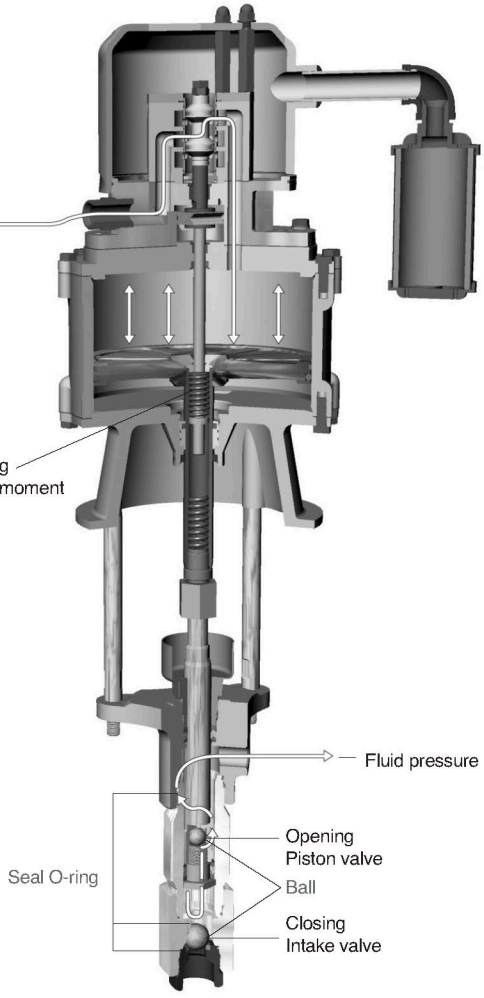
The Flow Mechanism

with Air / Liquid / Pro-731, 561

[Going Up]



[Going Down]



Note : All parts described in gray color are "Wear and Tear" parts to be replaced with HASCO Repair Kit.(RPK) HASCO Repair Kit would be greatly contribute to the customers' stable maintenance.

7. Warranty and Limitations

7-1 Warranty General

All HASCO products have a one year guarantee from the invoice date, unless otherwise stated in writing. The warranty covers all manufacturing faults and material defects. Any spare part replacement or repair operations are covered only if they are carried out by our authorized distributors. This warranty covers when the equipment is installed, operated and maintained in accordance with HASCO's written recommendations. HASCO shall not be liable for, any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of Non-HASCO component parts. This warranty is conditioned upon the CARRIAGE PAID return of the equipment claimed to be defecive to an authorized HASCO distrbutors for verification of the claim. If the claimed defect is verified, HASCO will repair or replace free of charge any defective parts. This components will be returned to the original purchase CARRIAGE PAID If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

7-2 The Warranty does not cover

- Damage or breakdown caused by improper use or assembly.
- Damage or breakdown caused by the use of spare parts that are different from the original or recommended ones.
- Damage or breakdown caused by bad preservation.
- **Components subject to wear(described in parts list)**

Warranty Forfeiture:

- In case of delayed payment or other contractual defaults.
- Whenever changes or repairs are carried out on our equipment without prior authorization.
- When the serial number is damaged or removed.
- When the damage is caused by improper use or functioning, or if the equipment falls, is bumped or by other causes not due to the normal working conditions.
- Whenever the unit disassembled, tampered with or repaired without the authorization of HASCO.

7-3 Special Warranty Parts

If the products be supplied to shipyard - industry customers, the warranty period of the following parts shall be limited to 3 months after the delivery to the end user.

DESCRIPTION
Sleeve
Displacement Rod

Note : In other fields, these two parts can be guaranteed for 6 months after the date of delivery to the end user.

HASCO

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