AIRLESS UNIT

45:1 / 63:1 / 30:1

PUMP

INSTRUCTIONS &
SERVICE Manual-PARTS LIST

Optional Displacement Pump

- Separated 63D200 / 45D200
- Stainless 63S200 / 45S200

<< Standard

		PRO-451	PRO-631	PRO-301
STANDARD SPECIFICATION	AIR MOTOR	45100		55P100
	DIS-PUMP	45200	63200	
	SURGE TANK	45300		
	REGULATOR	45400		
	SUCTION	45500		
	CART	45600		
FLUID PRESSURE RATIO		45:1	63:1	30:1
OUTPUT PER CYCLE(mL)		257.08	198.00	
MAX. COMPRESSIVE PRESSURE(MPa)		27	37.8	18.0
AIR PRESSURE RANGE(MPa)		0.3~06		
STROKE(mm)		123		
WEIGHT(NET/PACKING:kgs)		89/113	85/109	80/104
DIMENSION(NET/PACKING:cm)		85×75×128 / 85×77×142		
TYPICAL FLUID HANDLED		EPOXY, ALKYD, URETHANE, WATER ANTICORROSIVE PRIMER, HIGH VISCOSITY		

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

INSTRUCTIONS

HASCO

Table of Contents

1.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

1-1 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 instructruction 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.

-Do not lift pressurised equipment.

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

⚠ WARNING

1-2 MOVING PARTS HAZARD

Moving parts, such as the air motor piston, 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

1-3 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.

1-4 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-
∘ Serial No.	
∘ Fluid Pressure Ratio	
∘ Output	L/min
∘ Stroke	mm
∘ Air Pressure Range	bar
∘ Max. Discharge Pressure	bar

CE ISO 9001:2009 HASCO MADE IN KOREA

2. Installation

2-1 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 4.2m³/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 3/4 npt(m) 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

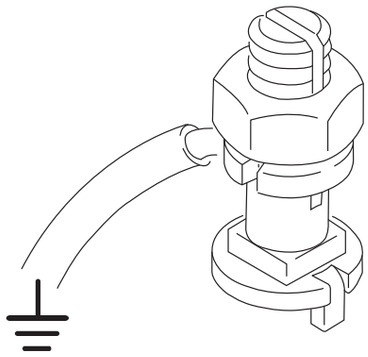
⚠ WARNING

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

(1) Pump :
- Use the ground wire.(see figure)
- Loosen the grounding lug locknut(W) and washer(X)
- Insert one end of the ground wire(Y) into the slot in lug (Z) and tighten the locknut securely.
- Connect the other end of the wire to a true earth ground.

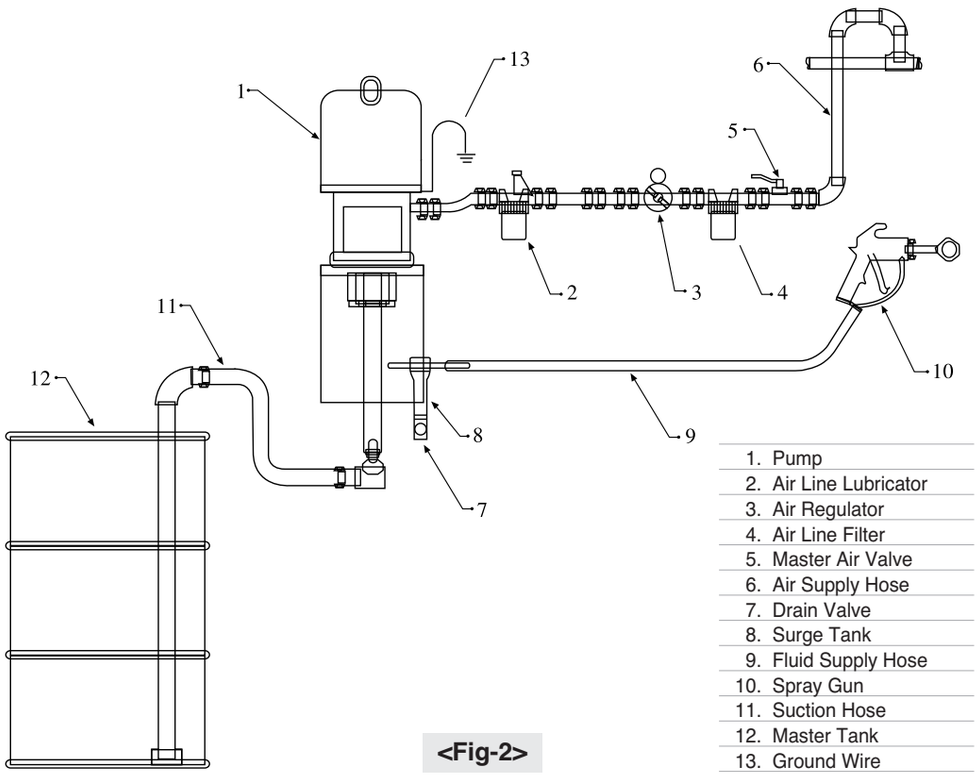
(2) Air compressor : Follow manufacture°Øs recommendations.
(3) Spray gun : Ground through connection to a properly grounded fluid hose and pump.
(4) Fluid supply container : Follow you local code.
(5) Object being sprayed, Follow your local code.
(6) Solvent pails used when flushing :
- Follow your 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 aspaper 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.



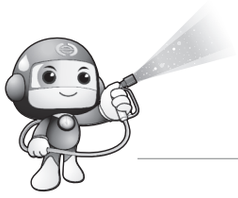
<Fig-1>

2-2 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>



3. Operation

3-1 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 :

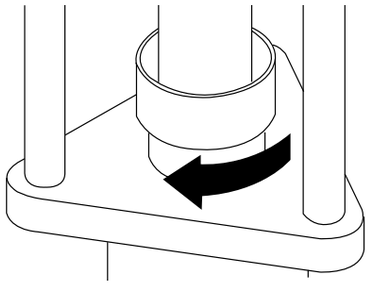
- are instructed to relieve the pressure
- stop spraying
- check or service any of the system equipment, or install or clean the spray tips.

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 packaging nut 1/3 full with TSL.
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 136-149N.m. using a wrench.
Do this whenever necessary. Do not over tighten the packing nut.
See **<Fig-3>.**



<Fig-3>

3-2 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.

3-3 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.

3-4 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 valves(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 flows from the valves. Close the valve.

3-5 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.

3-6 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.**

4. Maintenance and Inspection

4-1 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.

4-2 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**

5. Troubleshooting and Service

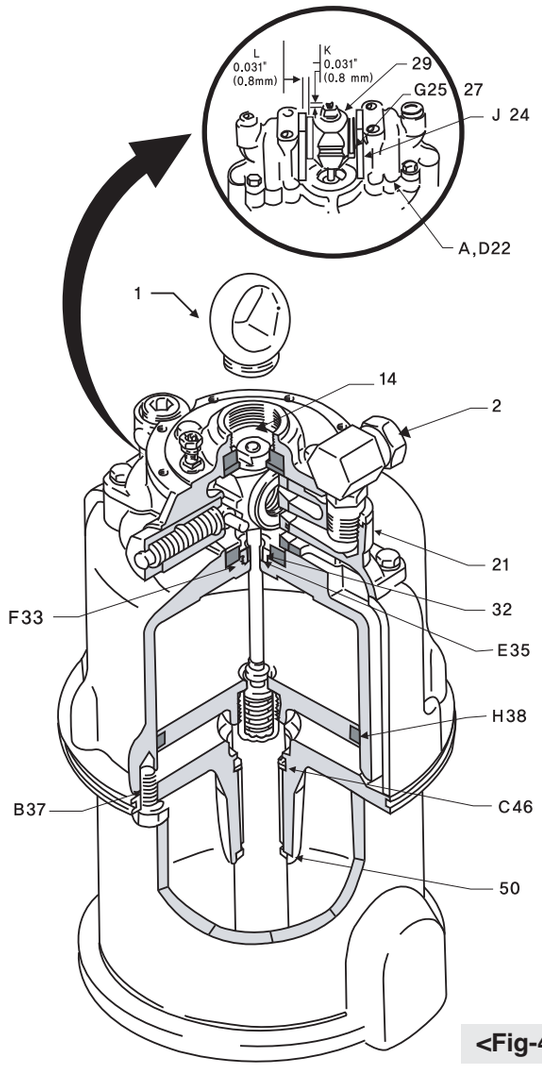
5-1 Air Motor

Troubleshooting

Locating Air Leaks

To locate an air leak, shut off the air supply and disconnect the hose. Screw the inlet union out of the air manifold. Remove the shield. Screw the union back into the manifold. 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

CHECK CHART			
Stroke Position	Fig Ref. Points	Checking Method	Cause of Leakage
UP only (air valve housing down)	A	By feel	Blown air manifold gaskets(22)
	B	By feel	Blown air cylinder gasket(37)
	C	Squirt oil around wiperseal(50)	Worn throat packing(46)
Stroke Position	D	By feel	Blown air manifold gaskets(22)
	E	Squirt oil around bearing(32)	Worn trip rod packing(35)
	F	Squirt oil around bearing(32)	Damaged trip rod bearing gasket(33)
BOTH	G	Squirt oil around valve(25)	Damaged valve ring(27)
	H	Hold paper strip over exhaust holes	Worn air piston packing (38)
	J	Squirt oil around valve plate(24)	Damaged valve plate seal(24)



<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.

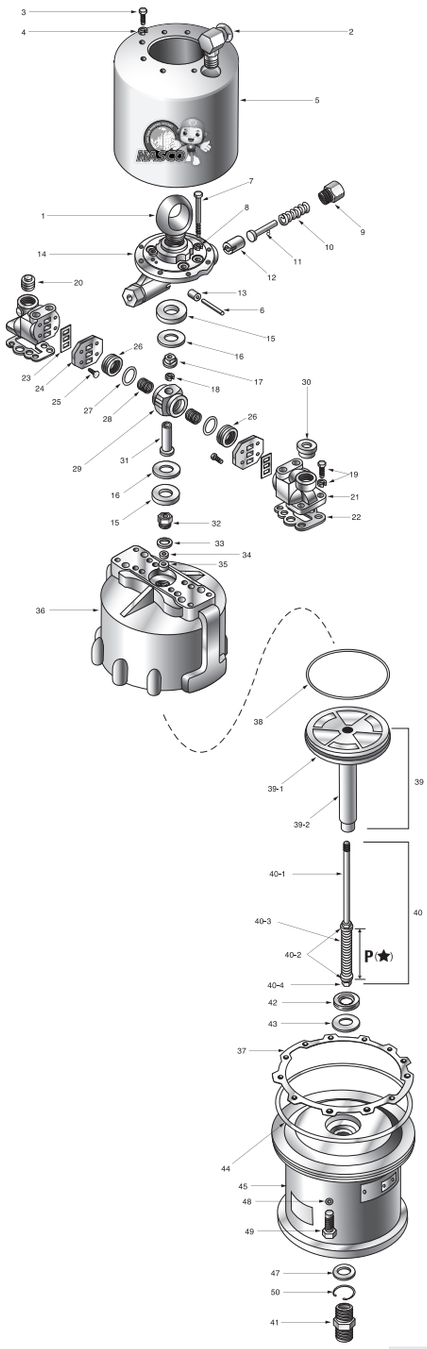
⚠ WARNING

Keep fingers out of the detent housing(14) to reduce the risk of pinching or amputating them.

1) Parts Drawing and List

AIR MOTOR 45100

NO	CODE	DESCRIPTION	QTY
Sub-Total	45100	AIR MOTOR : NURI	1
1	45101	RING	1
2	45102	UNION	1
3	45103	SCREW(1/4~20 X 1/2")	8
4	45104	WASHER(SPRING: 1/4")	8
5	45105	SHIELD	1
6	45106	AXLE	2
7	45107	SCREW(7/16~14 X 3-1/2")	4
8	45108	LOCK WASHER	4
9	45109	RETAINER	2
10	45110	SPRING	2
11	45111	GUIDE SPRING DETENT	2
12	45112	PLUNGER	2
13	45113	ROLLER	2
14	45114	HOUSING, DETENT	1
15	45115	PAD DAMPENING: RUBBER	2
16	45116	WASHER(FLAT: SPRING)	2
17	45117	NUT: SPRING DETENT	1
18	45118	WASHER(SPRING: M10)	1
19	45119	SCREW, WASHER	4
20	45120	PLUG, PIPE SOCKET 3/4NPT	1
21	45121	MANIFOLD	2
22	45122	GASKET MANIFOLDER	2
23	45123	SEAL VALVE PLATE	2
24	45124	PLATE	2
25	G73001	SCREW	8
26	45126	VALVE AIR DIRECTOR	2
27	45127	O-RING Nitrile Rubber	2
28	45128	SPRING compression	2
29	45129	HOUSING, AIR VALVE	1
30	45130	GROMMET Air Inlet Rubber	1
31	45131	HUB Valve Housing	1
32	45132	BEARING Trip Rod	1
33	45133	GASKET FIAT: COPPER	1
34	45134	WASHER(LEATHER)	1
35	45135	PACKING V-Block: Polyurethane	1
36	45136	CYLINDER Air Motor	1
37	45137	GASKET Cylinder rubber Impression Cellul	1
38	45138	PISTON O-RING	1
39	45139	PISTON ASSEMBLY	1
39-1	45139-1	PISTON PAN	1
39-2	45139-2	PISTON ROD	1
40	45140	TRIP ROD ASSEMBLY	1
41	45141	STUD Piston Tube	1
42	45142	U-PACKING Nitrile Rubber	1
43	45143	WASHER Back-up	1
44	45144	O-RING Nitrile Rubber	1
45	45145	BASE Air Motor	1
47	45147	SEAL Plan Enclosed	1
48	45148	WASHER	12
49	45149	SCREW	12
50	45150	SNAP RING	1

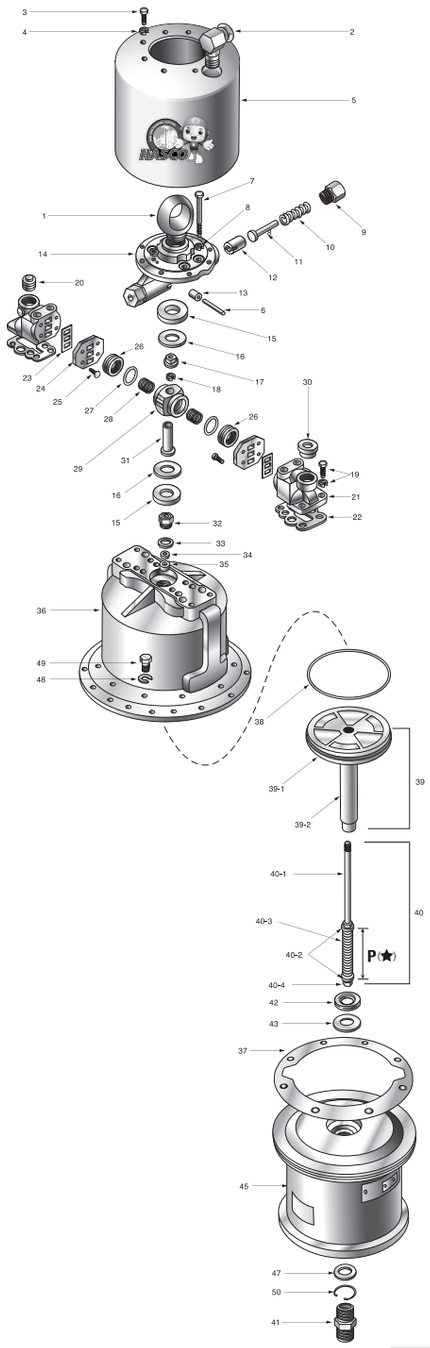


<Fig-5>

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.(R45100)

AIR MOTOR 55P100 (Pro-301)

NO	CODE	DESCRIPTION	QTY
Sub-Total	55P100	AIR MOTOR: MIRINE	1
1	45101	RING	1
2	45102	UNION	1
3	45103	SCREW(1/4~20 X 1/2")	8
4	45104	WASHER(SPRING: 1/4")	8
5	55P105	SHIELD	1
6	45106	AXLE	2
7	45107	SCREW(7/16 ~ 14 X 3-1/2")	4
8	45108	LOCK WASHER	4
9	45109	RETAINER	2
10	45110	SPRING	2
11	45111	GUIDE SPRING DETENT	2
12	45112	PLUNGER	2
13	45113	ROLLER	2
14	45114	HOUSING, DETENT	1
15	45115	PAD DAMPENING: RUBBER	2
16	45116	WASHER(FLAT: SPRING)	2
17	45117	NUT: SPRING DETENT	1
18	45118	WASHER(SPRING: M10)	1
19	45119	SCREW, WASHER	4
20	45120	PLUG, PIPE SOCKET 3/4NPT	1
21	45121	MANIFOLD	2
22	45122	GASKET MANIFOLDER	2
23	45123	SEAL VALVE PLATE	2
24	45124	PLATE	2
25	G73001	SCREW	8
26	45126	VALVE AIR DIRECTOR	2
27	45127	O-RING Nitrile Rubber	2
28	45128	SPRING compression	2
29	45129	HOUSING, AIR VALVE	1
30	45130	GROMMET Air Inlet Rubber	1
31	45131	HUB Valve Housing	1
32	45132	BEARING Trip Rod	1
33	45133	GASKET FIAT: COPPER	1
34	45134	WASHER(LEATHER)	1
35	45135	PACKING V-Block: Polyurethane	1
36	55P136	CYLINDER Air Motor	1
37	55P137	GASKET: Cyilinder	1
38	55P138	PISTON O-RING	1
39	55P139	PISTON ASSEMBLY	1
39-1	55P139-1	PISTON PAN	1
39-2	45139-2	PISTON ROD	1
40	45140	TRIP ROD ASSEMBLY	1
41	45141	STUD Piston Tube	1
42	45142	U-PACKING Nitrile Rubber	1
43	45143	WASHER Back-up	1
45	55P145	BASE Air Motor	1
47	45147	SEAL Plan Enclosed	1
48	45148	WASHER	8
49	55P149	SCREW hex hd cap: 1/2-18 X 1.25"	8
50	45150	SNAP RING	1



<Fig-6>

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.(R55P100)

2) Repair Kits List

Air Motor	Model	RPK
	Nuri(45100) Mirine(55P100)	R45100 R55P100

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 (45) securely. Remove the union (2) and the eight screws (3) and lockwashers (4). Remove the shield (5).

Refer to Fig 5. Remove the detent spring retainers (9), springs (10), guides (11) and plungers (12). Inspect the parts for wear or damage, and replace parts as necessarty.

⚠ CAUTION

HANDLE THE SPRINGS CAREFULLY.
Scrathches or nicks will cause early spring failure.

Remove the four screws (7) and lockwashers (8) holding the detent housing (14) to the air manifolds(21).
Lift the housing off the manifolds. Don't drop the detent rollers (13); take them out of the housing and check the rollers and axles (6) for wear and damage. If either the roller or axle is worn or damaged, replace both; they are a matched set. Remove the rubber pad (15) and washer (16), and check them carefully for damage.

Pull the valve housing (29) up, and remove the valves and springs (28). Take the nut (17) and washer (18) off the trip rod (40). Pull the valve housing off the hub (31). Grip the trip rod velow the housing hub (31) with a padded pliers, and screw the hub off the trip rod.

⚠ CAUTION

Take special care to avoid damaging the plated surface of the trip rod.

Remove two mounting screws (19) of one manifold (21) only, and remove the manifold. Check the valve plates (24). When attaching a new valve plate to the manifold, be sure the mating surfaces of the plate and manifold are completely clean. Handle the plate carefully.

⚠ WARNING

The openings in the valve plates (24) are razor sharp!
Be careful not to cut yourself when checking or handling them.

Remove the washer (16) and rubber pad (15) from the cylinder (36). Screw the trip rod bearing (32) out of the cylinder and carefully pull it up off the trip rod. Check the packing (35), washer (34) and gasket (33) and replace them if necessary. Grease the packings before installing them in the cylinder.

Remove the twelve screws holding the air cylinder (36) to the base (45). Pull the cylinder straight up off the piston. If the cylinder is tuck to the base,use a plastic hammer to break it loose. Be careful not to tilt the cylinder since this could damage the smooth inner surface. Check the piston o-ring (38) for wear or damage and replace if necessary.

Lift the piston and rod (39) from the base. Inspect the v-block throat packing (35) and back-up washer (43) in place. If replacement is necessary, remove the old packing and back-upwasher, and carefully tuck a new back-up washer and packing into the throat cavity. The lips of the v-packing must face up towards the piston. Pack light, water-proof grease into the cavity above the wiper sea and thoroughly lubricate the packing before reassembling.

⚠ CAUTION

Handle the trip rod and spring carefully.
The spring surface must be free of nicks or scratches.

To inspect or replace the trip rod (40), clamp the flats of the piston (39) in a vise and unscrew the stud (41) from the piston tube. Don't damage the polished surface of the tube.

Whenever the trip rod (40) is removed from the piston rod (39) or a new trip rod is being installed, check to make sure the distance between the inside shoulders of the spring guides is **EXACTLY 5.5 in. (139.7mm)**

If the spring guide(s) (P) is removed or the setting is not exacty **5.5 in. (139.7mm)**, or if any part of the trip rod is damaged, the entire trip rod assembly (40) must be replaced.

⚠ CAUTION

DO NOT attempt to redjust the spring guides (P)!
Readjustment could cause air motor failure.

Lubricate the spring and guides with light waterproof grease. Pack the grease into the cavity rod of the air piston (39). use thread sealer on the threads of the stud(41) and torque to a minimum of 150 ft-lb (203 N · m).

Before installing the air cylinder (36), check to see that the gasket (37) is in place and the trip rod bearing (32) is removed from the cylinder top. Carefully place the cylinder (36) over the piston (39).

⚠ CAUTION

DO NOT tilt or force the cylinder since this could damage the smooth inner cylinder wall.

Be sure the floating o-ring seal is in place before bolting the cylinder (36) to the base (45). Be sure the air inlet is in line with the fluid outlet.

Using thread sealer, install the twelves screws (48,49) in the base. Torque the screws to 20-25 ft-lb (27-33 N · m). Install the gasket (33) on the trip rod bearing. Carefully twist the bearing down over the trip rod and tighten it securely into the cylinder. Place the rubber pad (15) and washer (16) into the cylinder top.

Grease and install the valve housing hub (31), housing (29), lockwahser (19) and nut (17) on the trip rod. Adjust the hub and nut until 0.031 in. (0.8mm) of the rod projects, then lock it in place by torquing the bearing (32) to 14-18 ft-lb (19-24 N · m)

Place the springs (28) and air valve rings (26), with the o-rings (27) installed, into the valve housing (29). Install the air manifold (21) and gasket (22) into the cylinder.ed. Operating clearance must not be more that 0.031 in. (0.8mm). Check to be sure the housing moves up and down freely. Then tighten the shorter screws (19) holding the manifold to the cylinder.

Replace the washer (16) and pad (15). Before installing the detent housing (14), grease the detent rollers (13) and plungers (12) and place them into the housing. Line up the roller axles with the plunger slots. The grease will hold the parts in place while installing the guides (11), springs (10), and retainers (9).

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.

5-2 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 alll 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 pages 17
Pump operates but output low on down strokes	Held open or worn intake valve	Clear;service. See pages 18
Pump operates but output low on up strokes	Held open or worn fluid piston valve or packings	Clear;service. See pages 18
Erratic or accelerated operation	Exgausted fluid supply	Refill;purge alll air from pump and fluid lines
	Packing nut too tight	Adjust. See page 7
	Held open or worn intake valve	Clear; service. See pages 18
	Held open or worn fluid piston valve or packings	Clear; service. See pages 18

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.

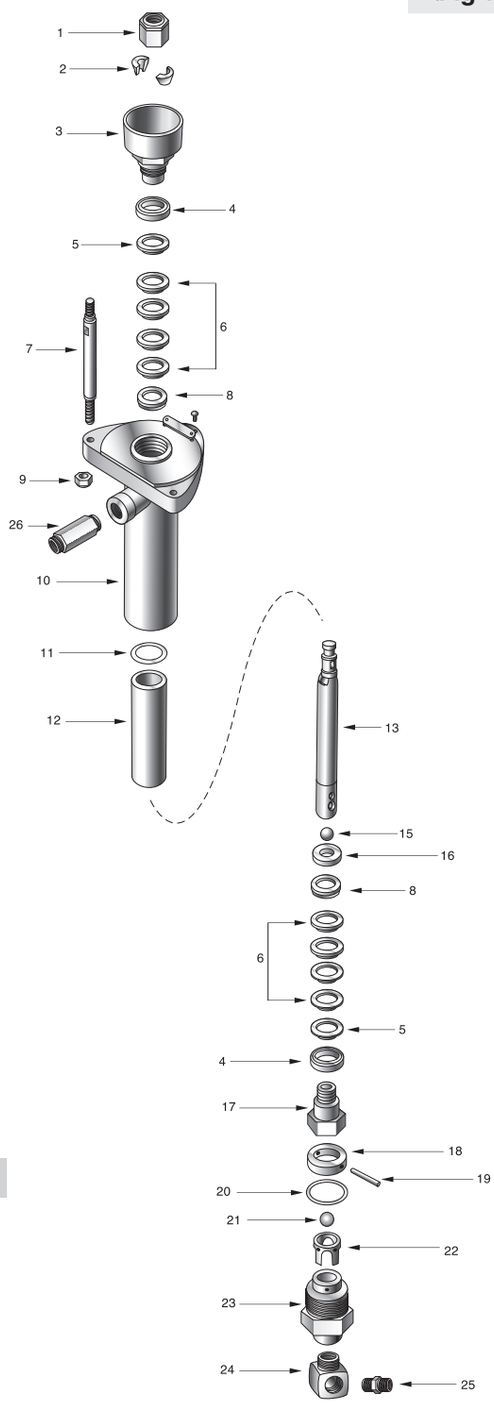
1) Parts Drawing and Parts List

45200 / 63200 : Standard

NO	CODE		DESCRIPTION	QTY
Sub	45200		PRO-451(DISPLACEMENT PUMP)	1
Total		63200	PRO-631(DISPLACEMENT PUMP)	1
1	45201		COUPLING NUT	1
2	45202		COUPLING	2
3	45203	63203	PACKING NUT	1
4	45204	63204	GLAND(F)	2
5	45205	63205	PACKING(TEFLON)	2
6	45206	63206	PACKING(LEATHER)	8
7	45207		TIE ROD	3
8	45208	63208	GLAND(M)	2
9	45209		NUT	3
10	45210	63210	PUMP HOUSING	1
11	45211	63211	GASKET	1
12	45212	63212N	SLEEVE	1
13	45213N	63213N	DISPLACEMENT ROD	1
15	45215		BALL(7/8" DIA)	1
16	45216	63216	WASHER	1
17	45217	63217	PISTON	1
18	45218	63218	RETAINER	1
19	45219	63219	PIN	1
20	45220	63220	O-RING	1
21	45221		BALL(1-1/4" DIA)	1
22	45222	63222	BALL GUIDE	1
23	45223	63223	INTAKE HOUSING	1
24	45224		TUBE	1
25	45225		NIPPLE(PT1" X PF1")	1
26	45226		NIPPLE(PT1" X PF3/4")	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

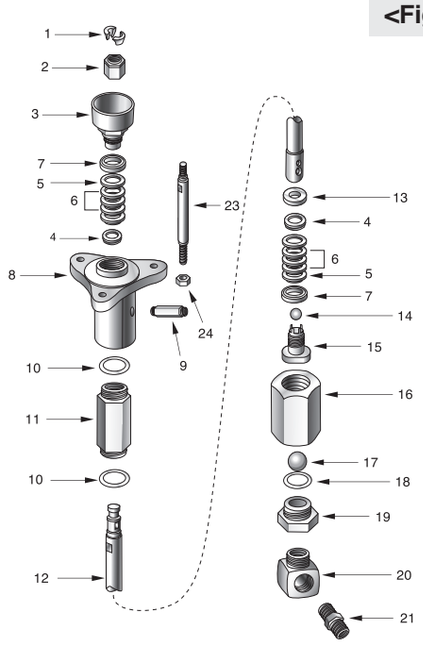
Dis-Pump	Model	RPK
	63200	R63200
	45200	R45200
	63D200	R63D200
	45D200	R45D200
	63S200	R63S200
	45S200	R45S200

3) Parts Drawing and Parts List

45D200 / 63D200 : Optional Separated

NO	CODE		DESCRIPTION	QTY
Sub	45D200		PRO-451D(DISPLACEMENT PUMP)	1
Total		63D200	PRO-631D(DISPLACEMENT PUMP)	1
1	45202		COUPLING	2
2	45201		COUPLING NUT	1
3	45203	63203	PACKING NUT	1
4	45208	63208	GLAND(M)	2
5	45205	63205	PACKING(TEFLON)	2
6	45206	63206	PACKING(LEATHER)	8
7	45204	63204	GLAND(F)	2
8	72208-45D	72208	PUMP HOUSING	1
9	68209		NIPPLE(PT3/4" X PF3/4")	1
10	72210		O-RING(TEFLON)	2
11	72211N-45D	72211N	SLEEVE	1
12	45213N	63213N	DISPLACEMENT ROD	1
13	45216	63216	WASHER	1
14	45215		BALL(7/8" DIA)	1
15	45217	63217	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		TUBE	1
21	45225		NIPPLE(PT1" X PF1")	1
23	72223		TIE ROD	3
24	45209		NUT	3

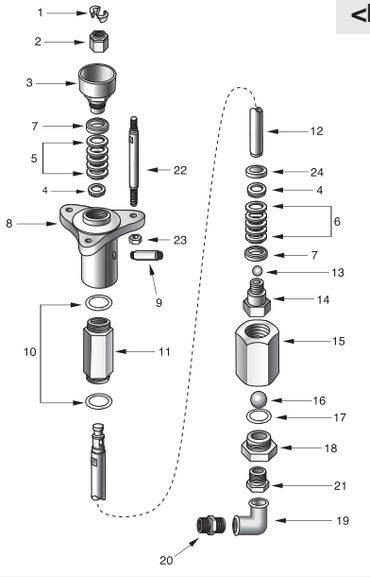
<Fig-8>



45S200 / 63S200 : Optional Stainless

NO	CODE		DESCRIPTION	QTY
Sub	45S200		PRO-451S(DISPLACEMENT PUMP)	1
Total		63S200	PRO-631S(DISPLACEMENT PUMP)	1
1	45202		COUPLING	2
2	45201		COUPLING NUT	1
3	45203	63203	PACKING NUT	1
4	45S204S	63S204S	GLAND(M)	2
5	45205	63205	PACKING(TEFLON)	5
6	45205	63205	PACKING(TEFLON)	5
7	45S207S	63S207S	GLAND(F)	2
8	45S208S	63S208S	PUMP HOUSING	1
9	45S209S		NIPPLE(PT3/4 X PF3/4)	1
10	72210		O-RING(TEFLON)	2
11	45S211S	63S211S	SLEEVE	1
12	45S212S	63S212S	DISPLACEMENT ROD	1
13	45S213S		BALL(7/8)	1
14	45S214S	63S214S	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	3
24	45S224S	63S224S	WASHER	1

<Fig-9>



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)

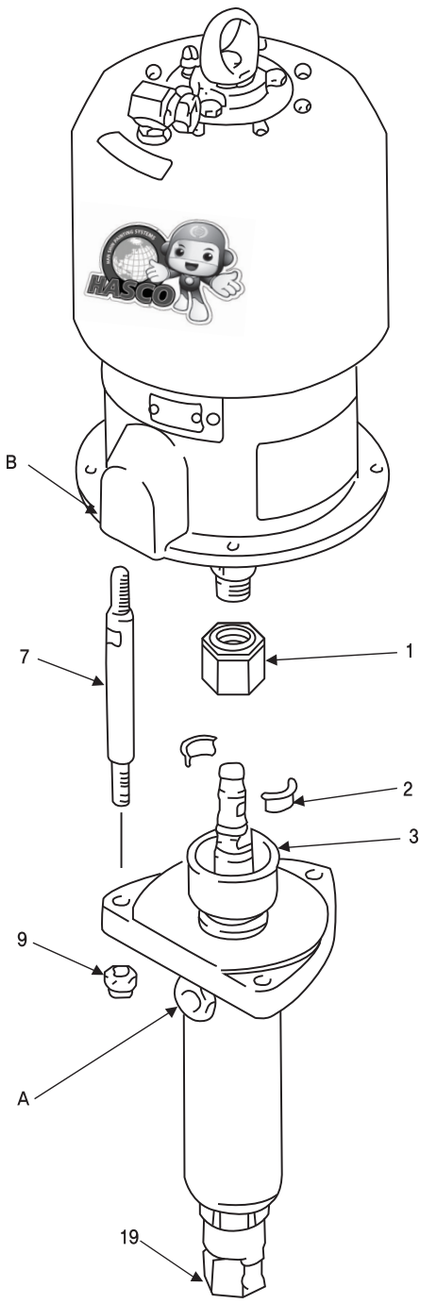
4) How to service for the Pump

Disconnecting the displacement pump

- Flush the pump if possible. Stop the pump at the bottom of its stroke. Follow the Pressure Relief Procedure Warning on page8.
- Disconnect the air and fluid hoses. Remove the pump from its mounting.
- Screw the coupling nut(1) off of the air motor piston rod. Be careful not to lose the two couplers(2) as you lower the nut. Unscrew the tie rod locknuts (9) from the tie rods (7). Carefully pull the displacement pump away from the air motor. See Fig 4.
- To service the displacement pump, refer to Displacement Pump Service on page 19through the bottom of the sleeve(11).

Reconnecting the displacement pump

- Align the pump's fluid outlet (A) to the optional fluid outlet (B) of the air motor. Position the displacement pump on the tie rods (7). See Fig 10
- Make sure the couplers (2) are in place inside the coupling nut (1). Screw the coupling nut up onto the air motor piston rod snugly. Screw the locknut (9) onto the tie rods (7) loosely.
- Mount pump and reconnect all hoses. Reconnect the ground wire if it was disconnected during repair.
- Tighten the tie rod locknuts (9) evenly, and torque to 40 -50 ft-lb(54-68 N · m). Torque the coupling nut (1) to 145-155 ft-lb (195-210 N · m)
- 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, soit tis just snug-notighter. Fill the wet-cup half full with Throat Seal Liquid or compatible solvent.



<Fig-10>

Displacement pump sevice

- Disconnect from the air motor.
- UFrom the pump housing/10, unscrew the intake housing/23.
- UFrom the intake housing/23, unscrew the tube.
- UDisconnect the ball/21&the intake housing/23.
- UDisconnect the pin/19 from the intake housing/23 check the pin/19 where is in and mark.
- UDisconnect the throat packing nut/3 pull the connecting rod until you can catch the piston/17.
- UPull the piston and displacement rod/13 out through the bottom of the pump housing/10.
- UInsert the new O-ring/20 on the intake housing/23 and then install the pin/19 in the intake housing that you marked.
- UScrew the intake housing into the pump housing torque to 90-100ft-1b(122-136N.m.)
- UTighten the packing nut just only enough to stop leakage, but no tighter.
- UInstall the other all parts as the drawing to the air motor & pump.

⚠ WARNING

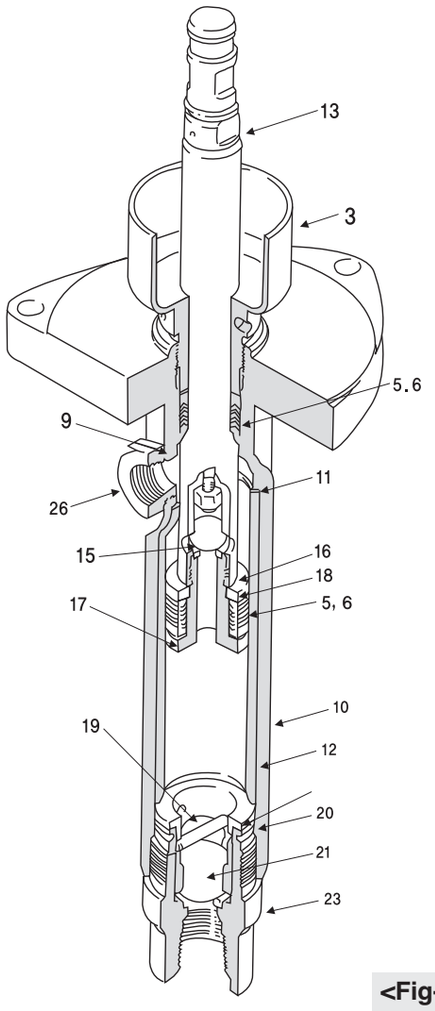
Grease the intake housing/23, reinstall into the pump housing, torque to 325ft-1b(440N.m.).

- USecure the flats of the displacement rod in a vise and screw the piston stud/17 in Air Motor.
- URemove the packing, gland/5, 6, 18, washer/16&ball/15.
- UCheck the cylinder sleeve/12inner and the displacement rod/13 outer surface. : If any parts of damage there, replace.

⚠ WARNING

If the cylinder sleeve/12 can not be easily remove for replacement, contact the nearest our head office or branch agency office for kind assistance and be sure to install the new sleeve with the internally tapered end down also when replacing the sleeve sure to install a new gasket/11.

- Grease the gland/18, the packing stack/5.6 and install the piston Be sure to install with the lips of the V-packing facing up.
- UNever disassemble the stack install the washer/16 on top of the gland/18, packing stack/5.6.
- UPlace the ball/15 on the piston and screw the stud into the displacement rod torque to 165-185ft-1b(225-250N.m.).
- URemove the packing nut/3 the packings/5.6 & the glands/18 from the pump housing/10 make cleanly.
- UGrease the gland/18 the packing stack/5.6 then install into the throat with the lips of the V-packing facing down. Never disassemble the stack.
- UInstall the packing nut/3 loosely.
- UCarefully insert the displacement rod/13 up through the bottom of the pump housing/10 and push it all the way up.

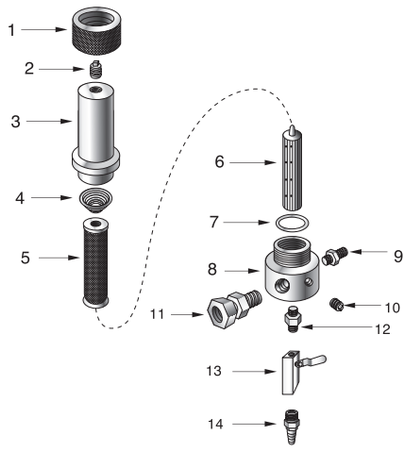


<Fig-11>

5-3 Surge Tank Assembly

STANDARD:45300 / OPTIONAL STAINLESS 45S300

NO	CODE		DESCRIPTION	QTY
Sub Total	45300		SURGE TANK ASS'Y	1
		45S300	SURGE TANK ASS'Y(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	45S309S	NIPPLE(PT3/8" X NPS1/4")	1
10	45302	45S302S	PLUG	1
11	45311	45S311S	UNION(3/4")	1
12	45312	45S312S	NIPPLE(PT1/4°»X PT1/4")	1
13	45313		BALL VALVE	1
14	45314		DRAIN NIPPLE	1

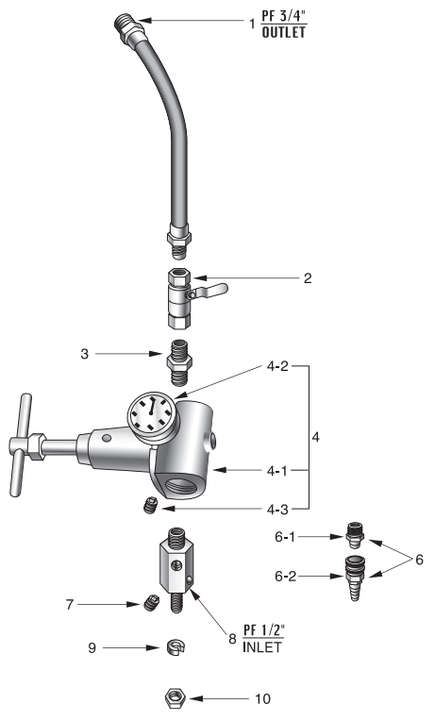


<Fig-12>

5-4 Air Regulator Assembly

45400

NO	CODE	DESCRIPTION	QTY
Sub-Total	45400	REGULATOR ASS'Y	1
1	45401	AIR HOSE(420mm)	1
2	45402	VALVE(3/4")	1
3	68407	NIPPLE(3/4" X 3/4")	1
4	45404	AIR REGULATOR & GAUGE	1
4-1	45404-1	AIR REGULATOR	1
4-2	45404-2	GAUGE	1
4-3	G74002	PLUG 1/4NPT	1
6	45406	AIR COUPLING SET	1
6-1	45406-1	AIR COUPLING(M)	1
6-2	45406-2	AIR COUPLING(F)	1
7	G74002	PLUG 1/4NPT	1
8	45408	AIR MANIFOLD	1
9	45148	WASHER	1
10	45410	NUT	1

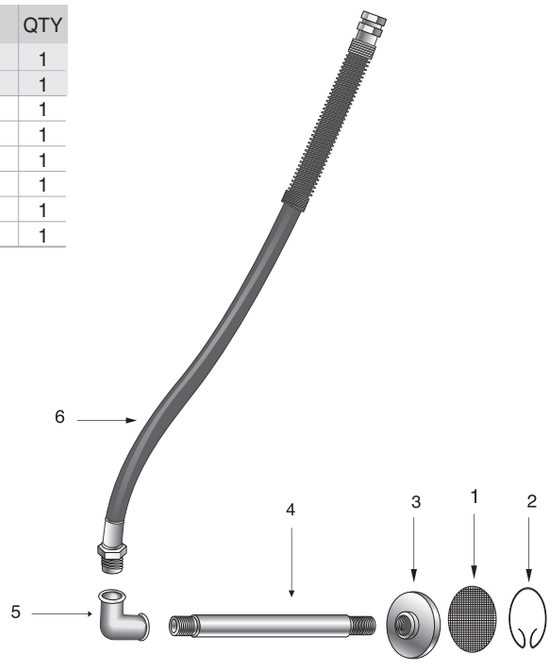


<Fig-13>

5-5 Suction Assembly

STANDARD:45500 / OPTIONAL STAINLESS 45S500

NO	CODE		DESCRIPTION	QTY
Sub Total	45500		SUCTION ASS'Y	1
		45S500	SUCTION ASS'Y(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")	1
6	45506	45S506S	HOSE(1")	1

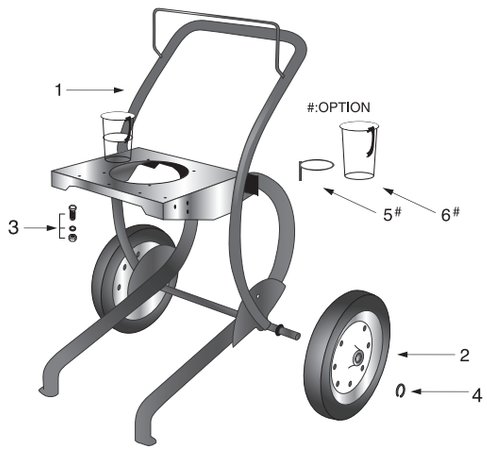


<Fig-14>

5-6 Cart Assembly

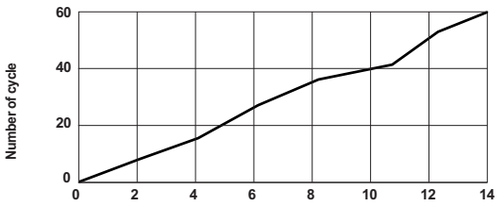
45600

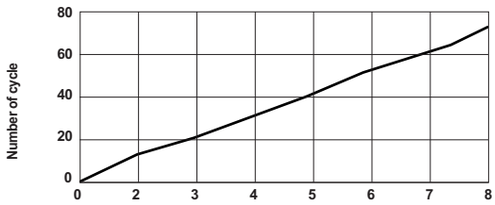
NO	CODE	DESCRIPTION	QTY
Sub Total	45601-S	CART ASS'Y	1
1	45601-S	S1-CART	1
2	45602C	CRUMB WHEEL 15" X3"	2
3	45603	BOLT & WASHER & NUT	1
3	45603-1	BOLT	4
3	45603-2	WASHER	4
3	45603-3	NUT	4
4	45604	TIRE SNAP RING	2
5#	60N087-2	RING(CUP)	2
6#	60N087-1	CUP	2

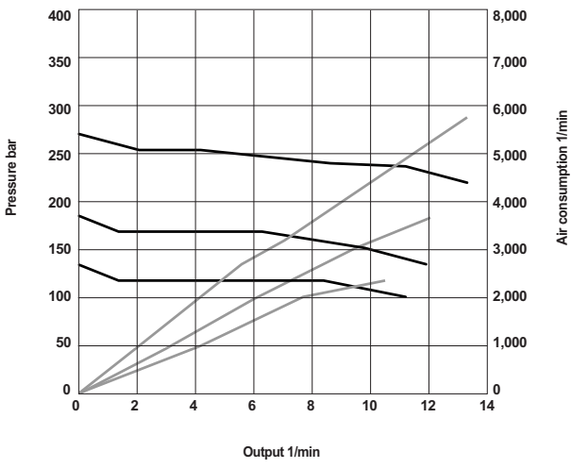


<Fig-15>

Technical Reference







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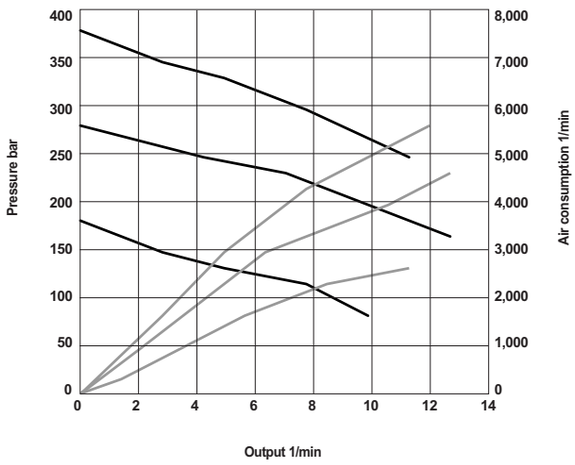

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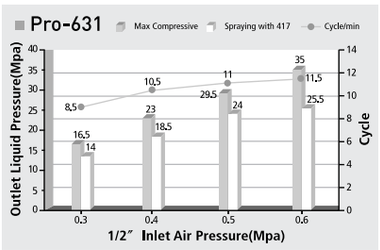
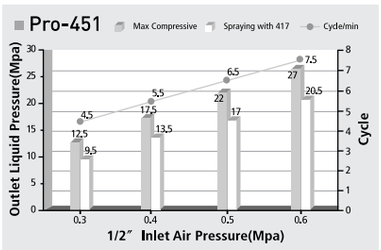
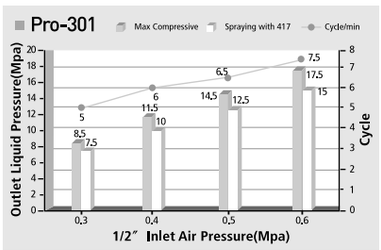


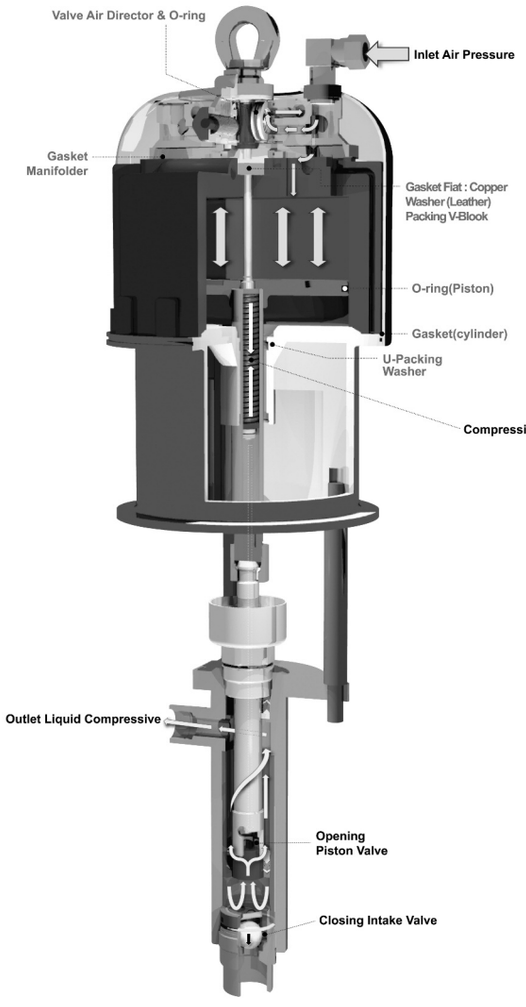




The Flow Mechanism

with Air / Liquid / Pro-451

[Going Down]



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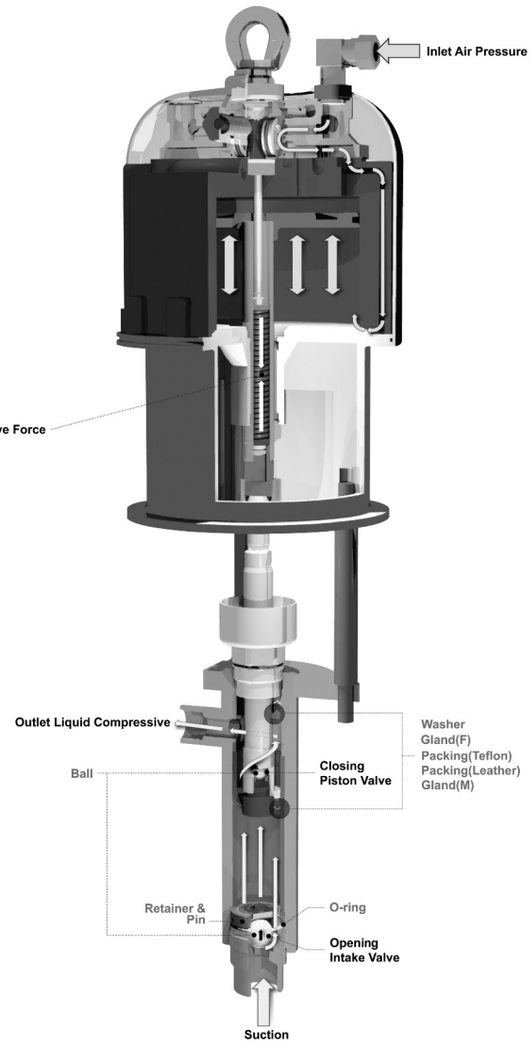

Note : All parts described in gray color are “Wear and Tear” parts to be replaced with HASCO Repair Kit.(RPK) HASCO Repair Kit would be greatly contribute to the customers’ stable maintenance.

6. Warranty and Limitations

6-1 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.

6-2 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.

6-3 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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