Air Operated 3:1 Oil Ratio Pump
OP-31

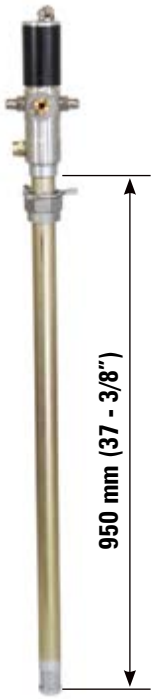
Congratulations on purchase of this World Class Air Operated Oil Ratio Pump !

- World-class Industrial Oil Dispensing pumps with guaranteed performance & hassle free operation
- Pumps are designed to work in tough conditions & are ideal for use with medium to high viscosity oils (upto SAE 130) for transferring over short distances (upto 30 metres), mostly used with Trolley mounted kits
- All metal construction, fully CNC machined with hardened wear resistant moving parts
- Reciprocating piston operated 2-1/2" (63 mm) dia. Air Motor
- Available in three different sizes - Stub, 16 Gal & 55 Gal version
- Stub Pumps are supplied with Non Return Valve threaded 1" (F) for use on the bottom of the Suction Tube. Other pump lengths have a built in Strainer at pump inlet to keep contaminants away
- Pumps are single acting with discharge up to 14 LPM (3.70 GPM). Air Consumption: 230 LPM (61 GPM)

Stub Version
OP/S/31B

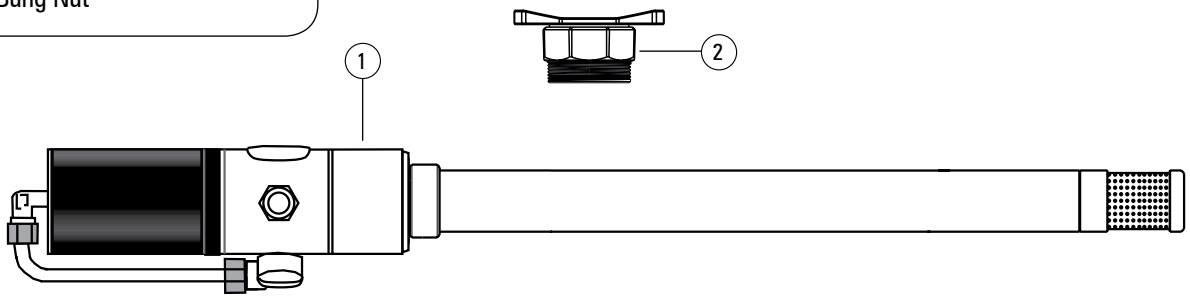
16 Gal Version
OP/T2/31B

55 Gal Version
OP/T3/31B



PUMP CONSTITUENTS **Fig. 1**

1. Pump Assembly
2. Bung Nut



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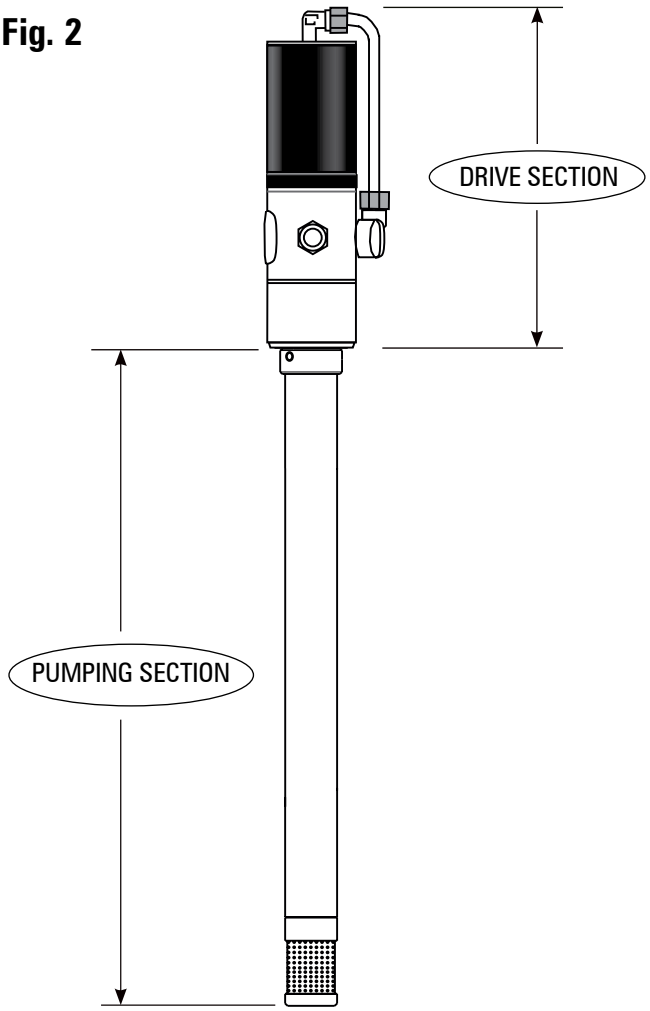
PUMP CONSTRUCTION

Fig. 2



The pump is made up of two sections as below :-

- **DRIVE SECTION**:- It consists of an Air Motor Assembly driven by compressed air. The piston diameter of the air motor is 2.5" / 63 mm. The motor consists of an air cylinder with piston and one reciprocal valve with a nylon slider. The valve directs the compressed air alternately to the top or bottom of the piston, thus producing a reciprocating motion of the piston rod.
- **PUMPING SECTION**:- It consists of a pump in which a piston lifts media through Non Return Valves by reciprocating inside the suction tube. Media is discharged with pressure (from the outlet located at bottom of Air Motor) into the delivery hose / pipe.

NOTE

- **AIR MOTOR** of this pump starts automatically when the dispensing gun / tap is opened. When the dispensing gun / tap is closed, air motor builds up a back-pressure and stops operating the pumping section.
- **PRESSURE RATIO** of the pump states the ratio of the output fluid pressure to the incoming air pressure. When the pressure ratio is 3:1, we achieve an output media pressure up to 450 PSI (30 BAR) when the incoming air pressure is 150 PSI (10 BAR).

GETTING STARTED

Before installing the pump, make sure the following are available:

- **AIR SUPPLY**: An FRL (Filter-Regulator-Lubricator) unit must be used in the Air supply, before it is connected to the pump.
  Set the regulator to 6 BAR (90 PSI) or any required inlet pressure, but never more than 150 PSI (10 BAR) or less than 30 PSI (2 BAR).
  When not in use & at the end of each day , air supply to the pump must be switched off.
- **DISCHARGE HOSE**: It is recommended to use a hose with ½" I.D., with a Working Pressure of not less than 400 PSI (28 BAR). Burst Pressure must be atleast 1000 PSI (70 BAR) or more. Using a smaller I.D. hose will cause higher pressure loss.
- **DISPENSING GUN**: Based on the application, you may use a gun that is compatible with media being dispensed.
- **THREAD SEALANT**: Apply thread sealant on all threaded connections to ensure leak-proof operation.

PUMP INSTALLATION & OPERATION

1. Slide out the Bung from Suction Tube & screw it into the 2" opening on the drum.
2. Loosen the ring nut on Bung & carefully insert the pump Suction Tube through it. Once the Suction Tube touches the bottom of drum, tighten the ring nut.
3. Connect the appropriate hose and dispensing gun to the pump outlet. Use a thread sealant to avoid any leakage.
4. With the air supply turned off, connect the air line into the air inlet on the pump. Remove the vent plug on drum to create the required venting for pump operation.
5. Partially open the on/off air valve (It helps in creating initial vacuum when filling a totally dry pump). Pump will start operating automatically until it gets primed. Pump is said to be **Primed** when media is available at the pump outlet, making the pump ready to use. Once primed, the air motor will stop. Open the on/off air valve fully.
6. Operate the dispensing gun, which will actuate the air motor & pump will start dispensing.

MAINTENANCE & REPAIR
(Refer to Exploded View - Page 9)

General Precautions

- **Before performing any service operation, always shut off the air supply and release the system pressure i.e. let the media out so that the pressure decreases. When storing the pump assembly out of the drum, cover the Filter Tube (60) with Filter Cap (61).**

- **Be careful not to damage any parts when dismantling. While removing shafts which do not have key flats, use a Pipe wrench, Strap wrench or the like. The easiest way to remove such a shaft is to grip it in a vice with aluminium or copper jaws, clamp the shaft in a hand-drill chuck and then turn the chuck by hand.**

- **Be careful when fitting O-rings and seals. Always lubricate them with oil before fitting. They must never be threaded over sharp edges when being fitted. Lubricate all moving parts with oil.**

- **When troubleshooting, be on a lookout for dirt in valves / ball seats, scratches in sealing surfaces & damage in O-rings / seals / gaskets.**

Recommended Tools

A Soft - Jaw vice
(Aluminum or Copper Jaws)

Threaded Pipe
1/2" (M)

Adjustable Caliper Wrench

Wide Jaw Plumbing Plier

Combination Wrench
Size 10, 13, 14, 21, 25 & 28 mm

Phillips Screwdriver

Adjustable C Hook Wrench
Size 1-1/4" to 3"

Tweezer

Soft Faced Plastic Mallet

Ball Pein Hammer

Pin Punch
Size 2 mm

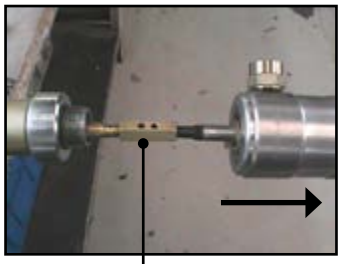
Locking fluid

Air Motor Kit Replacement (Refer to Table 4 - Page 14)

1. Pull out Filter Cap (61) by hand. Hold Barrel (55) in a soft-jaw vice.

2. Tighten a 1/2" male threaded pipe into the outlet adapter (35) & unscrew Air Motor Assembly anticlockwise.

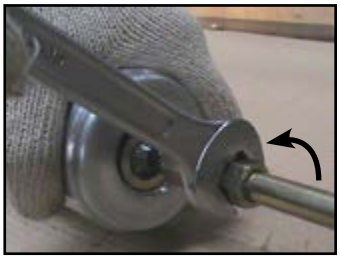
3. Pull Air Motor slightly to get access to Connector (47).



4. Support Extension Rod (48) on a V block & insert a pin punch vertically into the upper hole of Connector (47).

5. Tap lightly with a hammer to drive out upper Slotted Spring Pin (46) taking care not to bend Extension Rod (48).

6. Unscrew Connector (47) with wrench (size 14 mm) & separate Air Motor Assembly from Extension Rod (48).



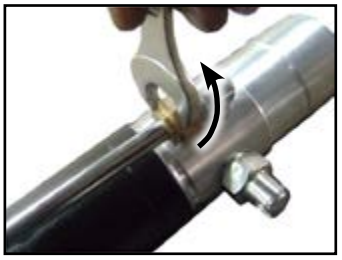
7. Hold Barrel (55) in a soft-jaw vice. Attach an Adjustable C Hook Wrench (size 1-1/4" to 3") into the lug hole & Unscrew Coupler (44) anticlockwise.

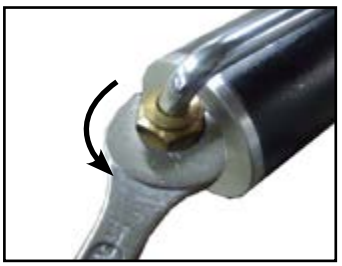
8. Remove Coupler (44). Pull Extension Rod (48) so that Piston (53) also comes out of barrel (55).

9. Remove outlet adapter (35) with wrench (size 28).

10. Unscrew Exhaust valve (23) with a wide jaw plier.

11. Hold Air Motor Assembly in a soft-jaw vice. Loosen both Coupling Nuts (2) using wrench (size 21 mm).



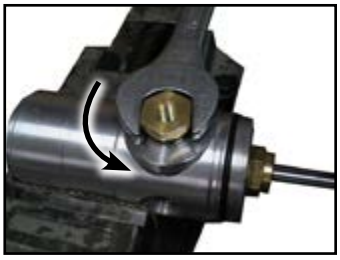


12. Remove Bend Pipe (1) along with both Coupling Nuts (2) & Sealing Rings (3).

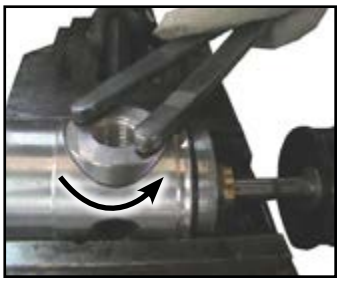
13. Unscrew both Bends (4) using wrench (size 13 mm).

14. Lightly tap Cylinder (10) with a plastic hammer & unscrew it .

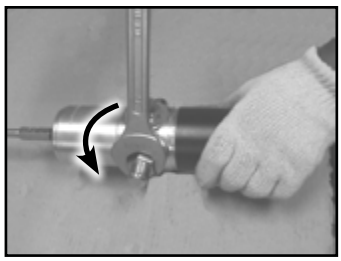
15. Unscrew Inlet Cover Adapter (34) using wrench (size 25 mm).



16. Connect a caliper wrench into the holes on inlet Cover (32) & unscrew it anticlockwise.

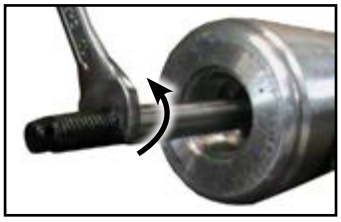


17. Unscrew both Pushers (15) using wrench (size 25 mm).

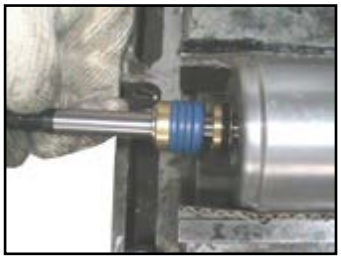


18. Remove both Pushers (15), Springs (17), Pusher Nuts (18) & Pusher Buttons (19).

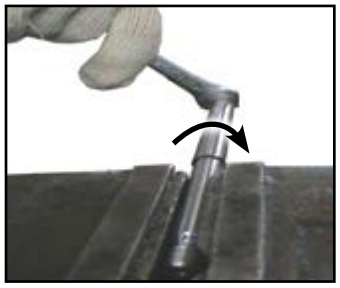
19. Using two wrenches (size 10 mm), hold Plunger Rod (9) & turn Connecting Rod (43) anticlockwise. This will unscrew Connecting Rod (43).



20. Remove Connecting Rod (43) along with Washer (42), Spring (41), Seal Support (40), Seals (39) & Slider Guide (38).

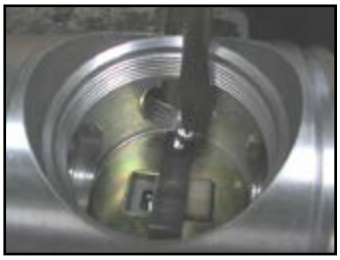


If Connecting Rod (43) is still attached to the inner rod of Slider (30), hold the inner rod in a vice & unscrew Connecting Rod (43) with wrench (size 10 mm).



21. Remove Slider (30) with a tweezer.

22. Open the two Screws (29) with a Philips screwdriver & remove Clip (28).



23. Remove Nylon Slider (27).

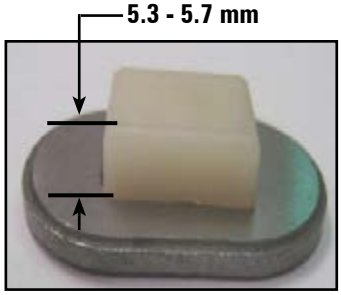
24. Remove Slider Guide (26).

25. Remove Seat (25) & Paper Seal (24). Clean the bottom surface thoroughly.

26. Replace the Air Motor Kit (KIT/T3/31B) as mentioned in Table 4 - Page 14, by following the steps 1-25 in reverse order taking care of the points below:

- **Ensure all mating surfaces are clean before reassembly. Apply minor oil on all mating surfaces, O Rings & moving parts before reassembly.**

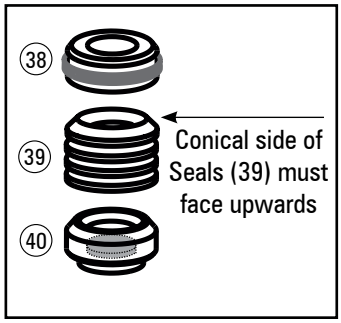
- **Ensure that height of Nylon Slider (27) is approx. 5.3 - 5.7 mm. Also, hollow portion of Nylon Slider should rest evenly on top of Seat (25).**



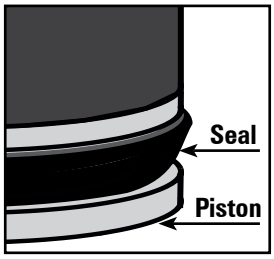
- **When fitting Pushers (15), see through Inlet Cover (32) & ensure Pusher Buttons (19) are installed in centre position. Also ensure that Clip (28) is tight & Nylon Slider (27) moves smoothly.**

- **When fitting Plunger Rod (9) & Connecting Rod (43), apply locking fluid on the inner rod of Slider (30).**

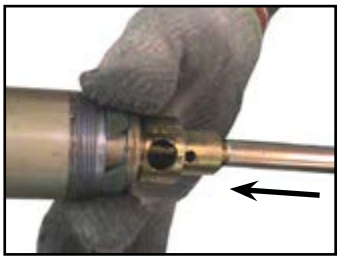
- **Conical side of Seals (39) must face upwards. Assemble them with Slider guide (38), Seal Support (40) & mount them as a set on Connecting Rod (43).**



- **Lip of lower Seal (54) must face upwards, when mounted on Piston (53). Apply some oil on Seal before installation.**



- **While pushing Extension Rod (48) into Barrel (55), apply some oil on all parts & keep Slitted Washer (52) pressed evenly around Piston (53).**



- **While fitting Air Motor with Barrel (55), apply locking fluid on Barrel threads. TIGHTEN WITH HAND to avoid overtightening. DO NOT tighten with any tool otherwise Seal (45) may get damaged.**

EXPLODED VIEW

Fig. 3

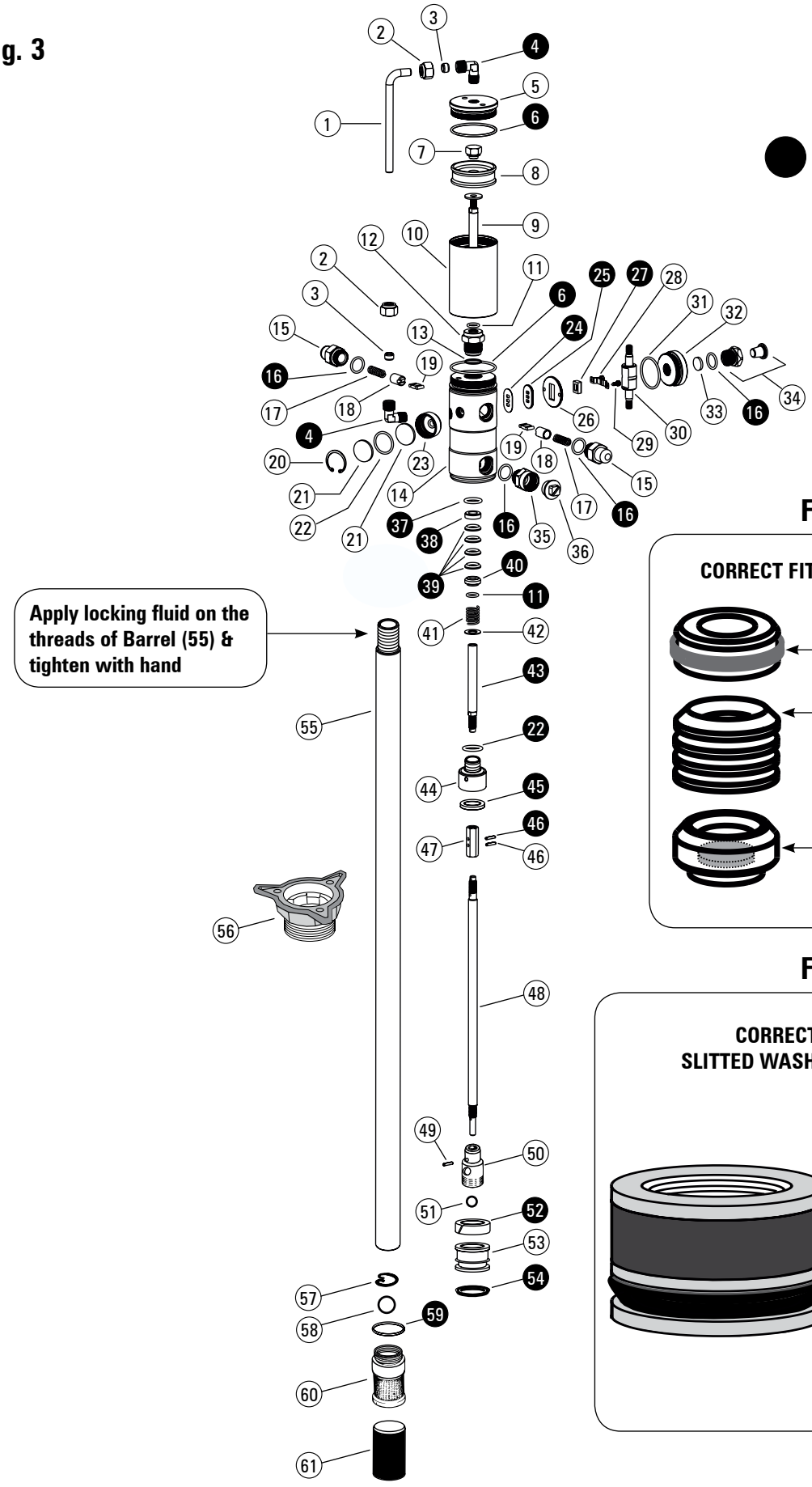


Fig. 3A

CORRECT FITMENT OF SEALS (39)

Slider Guide (38) with its outer O Ring (37)

Conical side of all four Seals (39) must face upwards

Seal Support (40) with its inside O Ring (11)

Fig. 3B

CORRECT FITMENT OF SLITTED WASHER (52) & SEAL (54)

Slitted Washer (52) should be pressed evenly around Piston (53)

Lip of Seal (54) must face upwards, when fitted on Piston (53)

PARTS LIST

Table 1

REFERENCE NO. FROM EXPLODED VIEW	DESCRIPTION	QUANTITY
1	Bend Pipe	1
2	Coupling Nut	2
3	Sealing Ring	2
4	Bend	2
5	Cylinder Cover	1
6	O Ring BS141	2
7	Plunger Nut	1
8	Rubber Plunger	1
9	Plunger Rod	1
10	Cylinder	1
11	O Ring BS614	2
12	Rod Guide	1
13	O Ring	1
14	Housing	1
15	Pusher	1
16	O Ring BS617	4
17	Pusher Spring	2
18	Pusher Nut	2
19	Pusher Button	2
20	Circlip	1
21	Filter (B)	2
22	O Ring BS121	2
23	Exhaust Valve	1
24	Paper Seal	1
25	Seat	1
26	Slider Guide	1
27	Nylon slider	1
28	Clip	1
29	Self Tapping Screw	2
30	Slider	1
31	O Ring BS129	1
32	Inlet Cover	1
33	Filter (B)	1
34	Air Inlet Adapter	1
35	Outlet Adapter	1
36	Adapter Cap	1
37	O Ring BS115	1
38	Slider Guide	1
39	Seal	4
40	Seal Support	1
41	Spring	1
42	Washer	1
43	Connecting Rod	1
44	Coupler	1

REFERENCE NO. FROM EXPLODED VIEW	DESCRIPTION	QUANTITY
45	Washer	1
46	Slotted Spring Pin (Upper)	2
47	Connecter	1
48	Extension Rod	1
49	Slotted Spring Pin (Lower)	1
50	Piston Coupler	1
51	Ball (5/8")	1
52	Slitted Washer	1
53	Piston	1
54	Seal	1
55	Barrel	1
56	Bung	1
57	Circlip	1
58	Ball (7/8")	1
59	O Ring BS126	1
60	Filter Tube	1
61	Filter Cap	1

TROUBLESHOOTING
(Refer to Exploded View - Page 9)

Table 2

PROBLEM	POSSIBLE CAUSE	SOLUTION
Pump operates, but does not dispense media at all	Media viscosity is too high	Make sure that media used has a viscosity of SAE 130 or lower
	Drum is Empty	Media level inside the drum may be too low. Refill drum
	Pump inlet is blocked	Remove suction tube & clean strainer at pump inlet
	Air Inlet Pressure is too less	Increase air pressure. It must be at least 30 PSI (2 BAR)
Pump not working / less discharge	Air Inlet pressure is too less	Increase air pressure. It must be at least 30 PSI (2 BAR)
	Nylon Slider (27) is jammed / overtight	1. Check for any build-up edge on Clip (28) & tighten it again. Make sure the movement of Nylon Slider (27) is neither very loose nor very tight 2. If needed, replace Nylon Slider (27). Also replace the Paper Seal (24), Seat (25) & Slider Guide (26) to ensure the best fitting
	Plunger (9) / Connecting Rod (43) / Piston (53) jammed.	1. Remove suction tube. Disconnect Air Motor Assembly from Pumping Section by removing the upper Slotted Spring Pin (46) from Connector (47) 2. Supply input air to Air Motor. If it works properly without the barrel assembly, then the problem lies with the pumping section. Otherwise check the Air Motor for smooth movement 3. After locating the faulty section, check the respective Piston / Plunger & the associated washers & seals for any overlap or wear & tear. Replace the defective parts from Repair Kit 4. Ensure to replace the moving parts having close tolerances (such as Nylon Slider (27) & Seat (25) as a SET to ensure the best fitting
Pump continues to operate even after the trigger of dispensing gun has been released	Leakage in the assembly	Check all the connections to ensure they are air tight. Use thread sealant. Check O rings & seals for damage. Replace the defective parts from Repair Kit
Media comes through the air Exhaust Valve (23)	Media leaks into the Air Motor	Check Slider Guide (38), O Rings (11) & (37), Seals (39) & Seal Support (40) for wear & tear. Replace the damaged parts from Repair Kit
Air passes directly from inlet to the outlet & pump does not work	Nylon Slider (27) is jammed / overtight	1. Check for any build-up edge on Clip (28) & tighten it again. Make sure the movement of Nylon Slider (27) is neither very loose nor very tight 2. If needed, replace Nylon Slider (27). Also replace the Paper Seal (24), Seat (25) & Slider Guide (26) to ensure the best fitting
Discharge suddenly stopped while the pump was running	Seals / O Rings Damage	Check all seals / O Rings & replace the damaged parts from Repair Kit
	Chip / Other foreign particles get clogged at dispensing gun / discharge outlet	Clean all foreign particles / chips
	Clogging of Filter Tube (60)	Open Filter Tube (60), clean it & reassemble it properly

REPLACEMENT & SERVICE PARTS PROGRAM

Table 3

(Refer to Exploded View - Page 9)

REPLACEMENT PARTS PROGRAM

REFERENCE NO. FROM EXPLODED VIEW	PART NO.	DESCRIPTION	QUANTITY
56	BUNG/OP/42	Bung	1

SERVICE PARTS PROGRAM

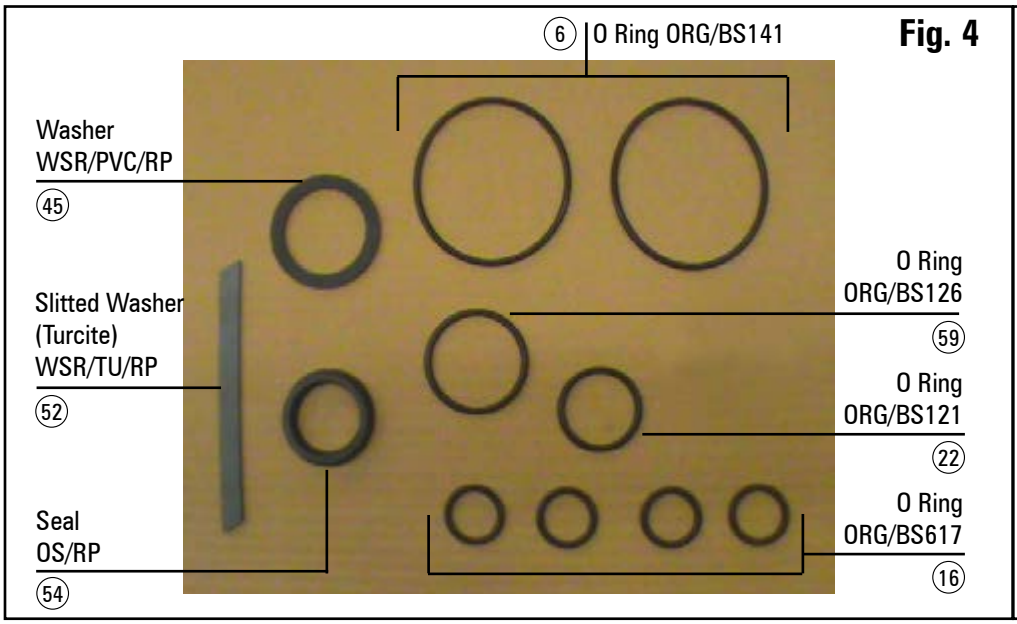


Fig. 4

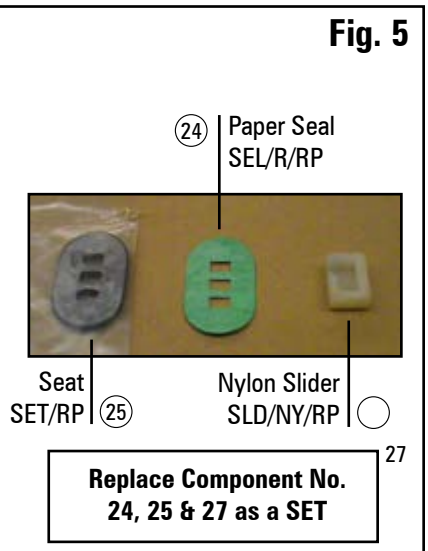


Fig. 5

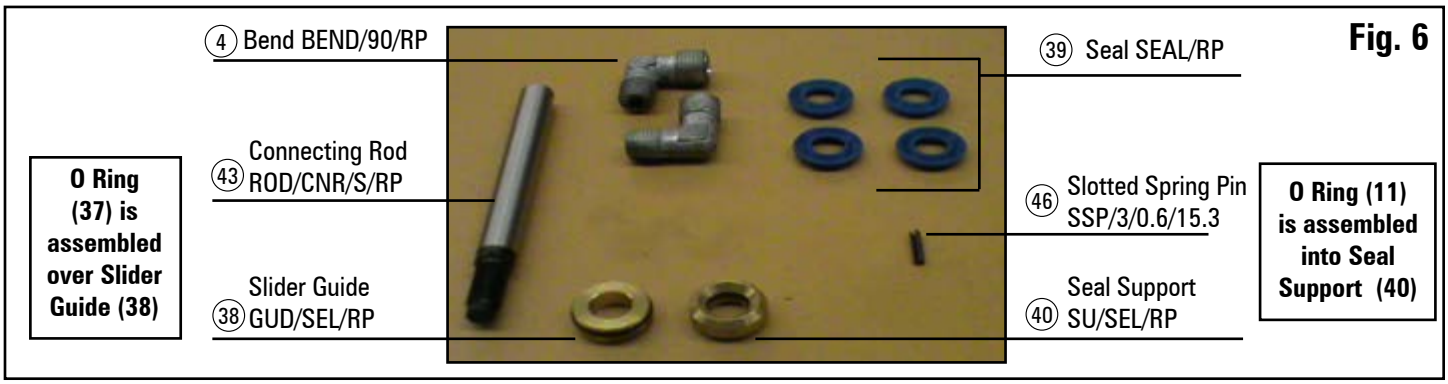


Fig. 6

Table 4

KIT PART NO.	KIT DESCRIPTION	CONSTITUENT PART NO.	PART DESCRIPTION	REFERENCE NO.	QUANTITY PER KIT
KIT/T3/31B	AIR MOTOR KIT	BEND/90/RP	Bend	4	2
		ORG/BS141	O Ring	6	2
		ORG/BS614	O Ring	11	1
		ORG/BS617	O Ring	16	4
		ORG/BS121	O Ring	22	2
		SEL/P/RP	Paper Seal	24	1
		SET/RP	Seat	25	1
		SLD/NY/RP	Nylon Slider	27	1
		ORG/BS115	O Ring	37	1
		GUD/SEL/RP	Slider Guide	38	1
		SEAL/RP	Seal	39	4
		SU/SEL/RP	Seal Support	40	1
		ROD/CNR/S/RP	Connecting Rod	43	1
		WSR/PVC/RP	Washer	45	1
		SSP/3/0.6/15.3	Slotted Spring Pin	46	1
		WSR/TU/RP	Slitted Washer (Turcite)	52	1
		OS/RP	Seal	54	1
		ORG/BS126	O Ring	59	1

SPECIFICATIONS* Table 5

Flow Rate	Up to 14 LPM (3.70 GPM)
Working Pressure	2-10 BAR (30-150 PSI)
Maximum Air Inlet Pressure	10 BAR (150 PSI)
Maximum Media Outlet Pressure	30 BAR (450 PSI)
Air Inlet Connection	1/4" (F)
Pump Inlet on Stub Pumps only	1" (F)
Pump Outlet Connection	1/2" (F)
Air Consumption	230 LPM (61 GPM)
Noise Level	81 db

*** Pump is available in three different sizes - Stub, 16 Gal & 55 Gal version**

! WARNING

- Always wear protection gear like safety goggles, gloves, apron, and ear plugs while operating the pump
- Never let any body part come in front of, or in contact with the control outlet
- Always cut off air supply after use, so that media cannot leak in case any of the pump component fails
- Before switching the air supply on, check hoses for any sign of wear, leak or loose fittings. Replace as necessary
- Do not smoke near the pump. Do not use the pump near a source of spark / open flames
- When changing the working fluid, at least 1 litre of new fluid should be discarded to avoid mixing of fluids
- Pump should NOT be operated for more than 4 hrs continuously
- Pump must be supplied with CLEAN & DRY compressed air via an FRL unit
- Before attempting any maintenance or repair of this product, disconnect air supply and then operate dispensing gun to release fluid pressure
- Use only genuine factory parts for repair

WETTED COMPONENTS
Steel, Brass, Aluminum, Hi Nitrile Rubber, Polyurethane, Turcite

RECOMMENDED USE
ATF, Engine Oil, Gear Oil, Hydraulic Oil, Medium to high viscosity oils (up to SAE 130), Diesel, Kerosene

DO NOT USE WITH
Corrosive Fluids, Solvents, Acid, Alkalis, Antifreeze, waste oil or any other media not compatible with the pump components