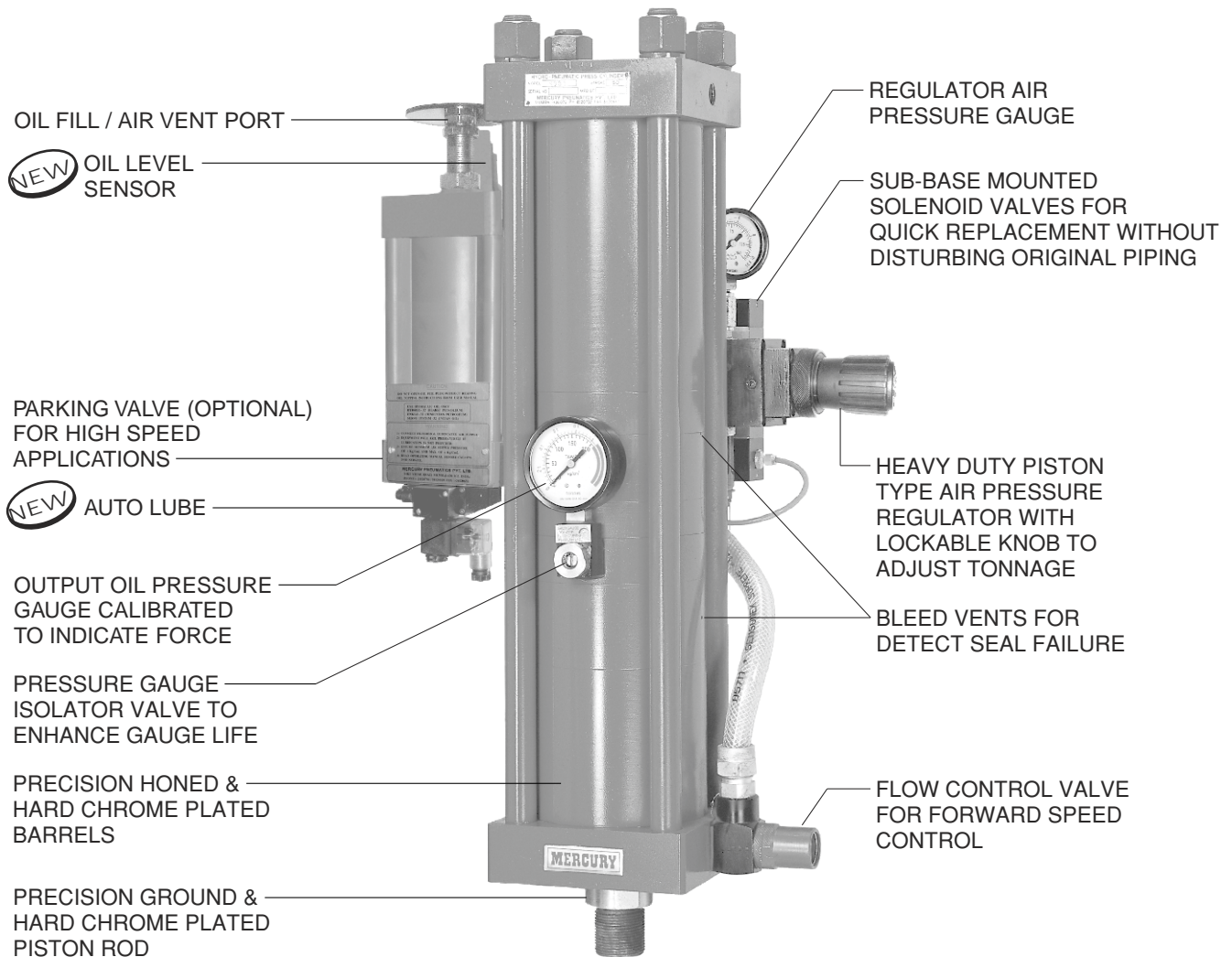


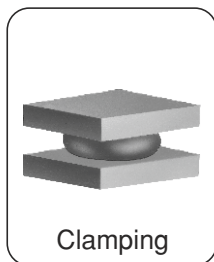
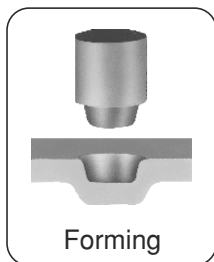
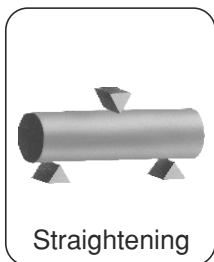
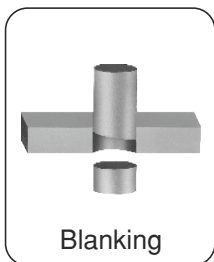
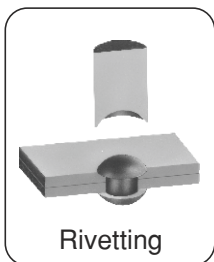


### 5.1 Hydro Pneumatic Press Cylinder



### 5.2 Typical Applications

“MERCURY” Hydro Pneumatic Presses are ideal machines for any application requiring pressing force from 0.4 tonnes to 30 tonnes.



### 5.3 General Description

“MERCURY” series “N” range of Hydro-Pneumatic Presses, combines the advantages of efficient, low cost pneumatics, to achieve the large output forces associated with hydraulics. The system operates on normal compressed air pressure of 5 bar, using standard pneumatic controls, thus completely eliminating the use of expensive hydraulic power pack and associated control equipment.

The **SALIENT** features of Series “N” Hydro-Pneumatic Presses are :-

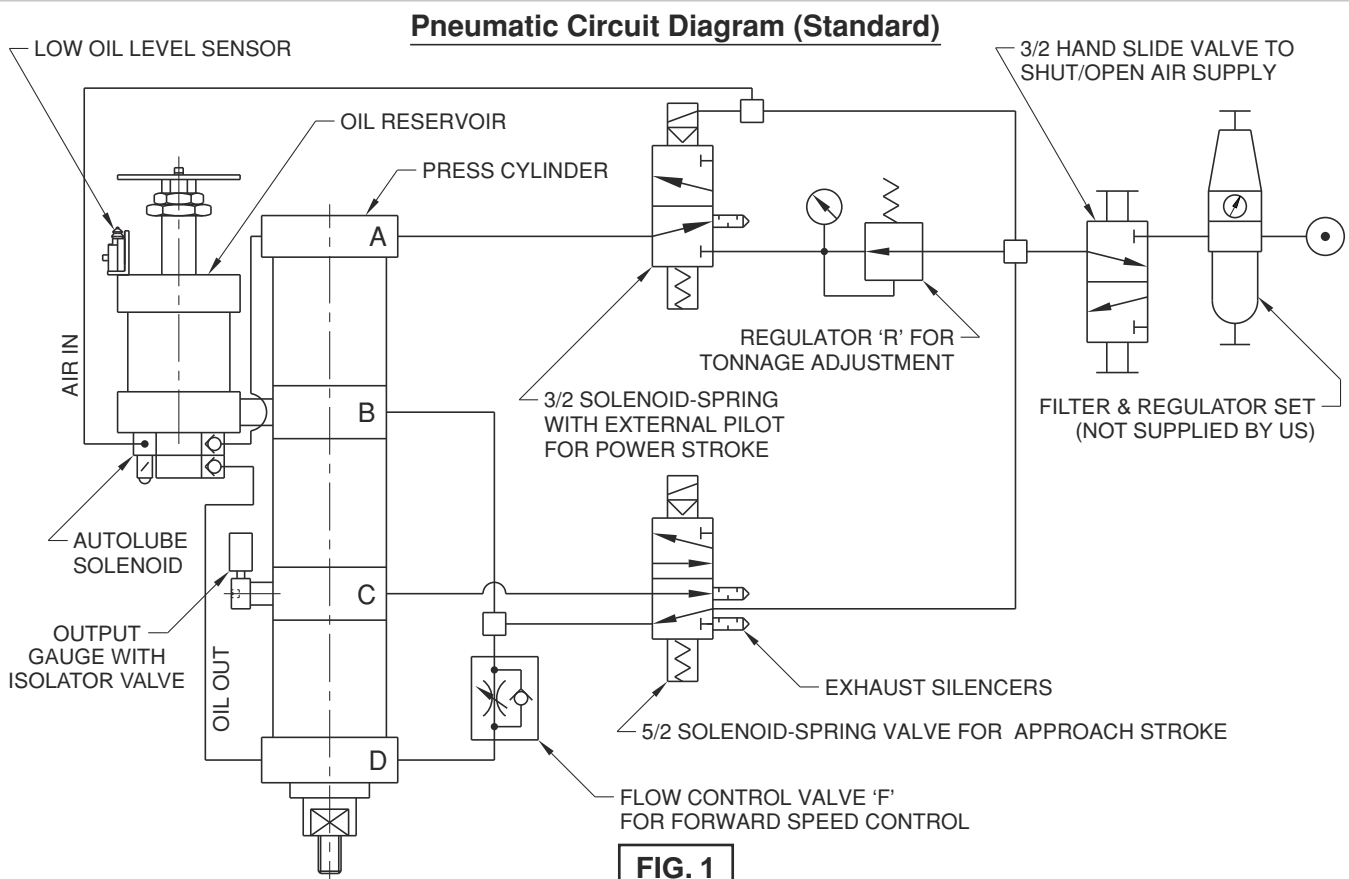
- (i) **Very low air consumption**, resulting in energy saving of up to 80% over equivalent pneumatic cylinders and 50% over equivalent hydraulic systems. The **Speed of Operation** is also much higher than an equivalent standard pneumatic or hydraulic System.
- (ii) **Compact Cylinder** design, which **can be mounted in any position**.
- (iii) **Compact, Lightweight Press Frames**, which can be mounted on a light work bench.
- (iv) **Simple Design** for easy maintenance.
- (v) **High stroke frequency** because of shorter oil path between the oil reservoir and the output hydraulic cylinder.
- (vi) **Force and Speed** can be infinitely adjusted.
- (vii) **Rapid, pneumatically operated approach stroke and return stroke**. In the Series “N” the return force is larger than the approach force, resulting in the loading of heavier tools for respective tonnages.
- (viii) **Absolute separation of air and oil chambers**. This has been achieved by providing bleed holes between the pneumatic and hydraulic seals. In the event of failure of pneumatic seals, the air escapes to atmosphere through a bleed hole and does not mix with the hydraulic oil. If the hydraulic seals fail, oil escapes from its bleed hole, indicating deterioration of the seal, which can be procured and replaced well before total breakdown occurs.
- (ix) **New Automatic Lubrication**. Our new **Auto lubrication** feature has greatly enhanced the reliability of our presses. After a set (with jumper on PCB) number of cycles, the auto lube solenoid comes on for a short time. This actuates a built-in pump which injects, under high pressure, about 2 drops of oil from the reservoir. This high pressure injection ensures complete lubrication of the entire pneumatic components.  
The advantage of this system is that lubrication is positive and not dependent on air flow volume as in a standard lubricator of a FRL set. Also the quantity of lubrication is positive and not dependent on any arbitrary setting by machine operator.
- (x) **New low oil level sensing system** ensures that the machine comes to a stop when oil level reaches minimum. This eliminates product rejections due to reduction in tonnage caused by low/insufficient oil in the reservoir.

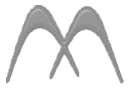
## 5.4 Sequence of Operation

The sequence of operation is outlined in Fig. 1 & Fig. 2

There are three stages of operation :-

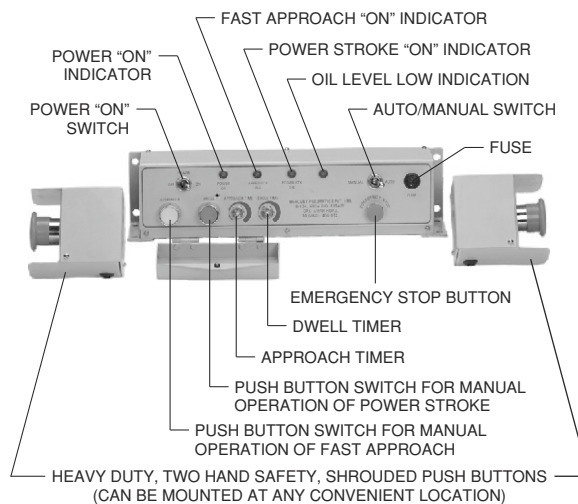
- (a) Initial Low force, Large travel, Rapid Approach.
- (b) High Force, Short travel, Power Stroke.
- (c) Low Force, Rapid Retraction.
- (i) In the retracted position air is admitted to ports 'B' and 'D' and exhausted from port 'C' through **5/2 Approach Solenoid Valve**. Port 'A' is also exhausted through 3/2 **Power Stroke Solenoid Valve**.
- (ii) When the Electrical Two Hand Safety push buttons are actuated simultaneously, the **Approach Solenoid Valve** is switched "ON". This causes air to be admitted to port 'C', and ports 'B' and 'D' are exhausted. The output shaft extends rapidly, with a low force due to the air pressure acting on top of the approach piston through port 'C'. The speed of extension can be varied infinitely by adjusting the Flow Control Valve 'F'. The Hydraulic Shaft, which is attached to the output shaft, also moves down, causing oil from the spring loaded reservoir to fill the Hydraulic Chamber.
- (iii) When the output shaft touches the workpiece, the **Power Stroke Solenoid Valve** is switched "ON". The change over from approach to power stroke depends on the setting of the "**APPROACH TIME**" knob on control panel. This causes air to be admitted to port 'A'. The Intensifier Piston extends and moves the Intensifier plunger into the Hydraulic Chamber, causing the pressure of the oil in this chamber to rise. The intensified oil pressure acts on the Hydraulic Shaft, generating the high force "**Power-Stroke**". The output force can be varied by adjusting the Air Pressure Regulator 'R'. The change over from "**APPROACH**" to "**POWER-STROKE**" can be varied by adjusting the "**APPROACH TIME**" knob on the Control Panel.
- (iv) The duration of application of high force on the workpiece can be varied by adjusting the "**CYCLE TIME**" knob on the Control Panel. When this time has elapsed, both the **Approach and Power Stroke Solenoid Valves** are switched "OFF". This causes air to be admitted to ports 'B' and 'D' and exhausted from Ports 'A' and 'C'. The Approach and Intensifier Pistons retract rapidly and oil is transferred back to the reservoir.
- (v) The cylinder is now ready for the next cycle.





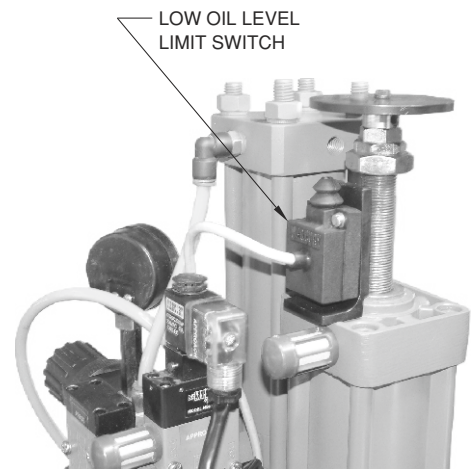
## Standard Control Panel

- 1) True, 2 hand “Non Tie Down” controls. If the 2 push buttons are not actuated within 1 sec., The press will not start.
- 2) Compact, yet easy to service.
- 3) Hinged and locable cover to avoid tempering of timer settings.
- 4) Status LED indicators for each stage of sequence.



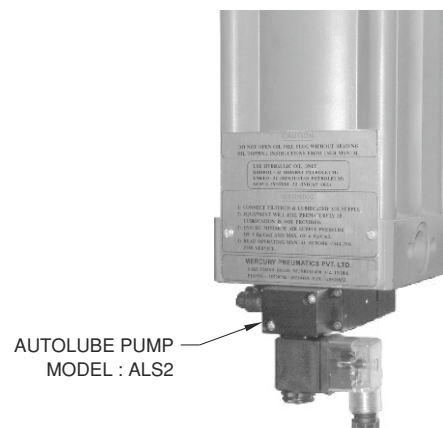
## **NEW** Low Oil Level Sensing

When oil level becomes low (5% reserve capacity) the limit switch is actuated. This stops operation of the press and “OIL LEVEL LOW” indicator glows. The press can be operated temporarily by pressing 2 hand safety buttons for forward & emergency stop button for return



## **NEW** Programmed Automatic Lubrication

A pneumatically actuated pump is installed below the oil reservoir. This pump injects oil under high pressure directly into cylinder. The no. of strokes after which oil should be injected can be programmed by changing a jumper on the PCB of the panel. Unlike a FRL in which oil flow depends on the flow of air, the direct injection of oil at the top & bottom of the cylinder guarantees proper lubrication.



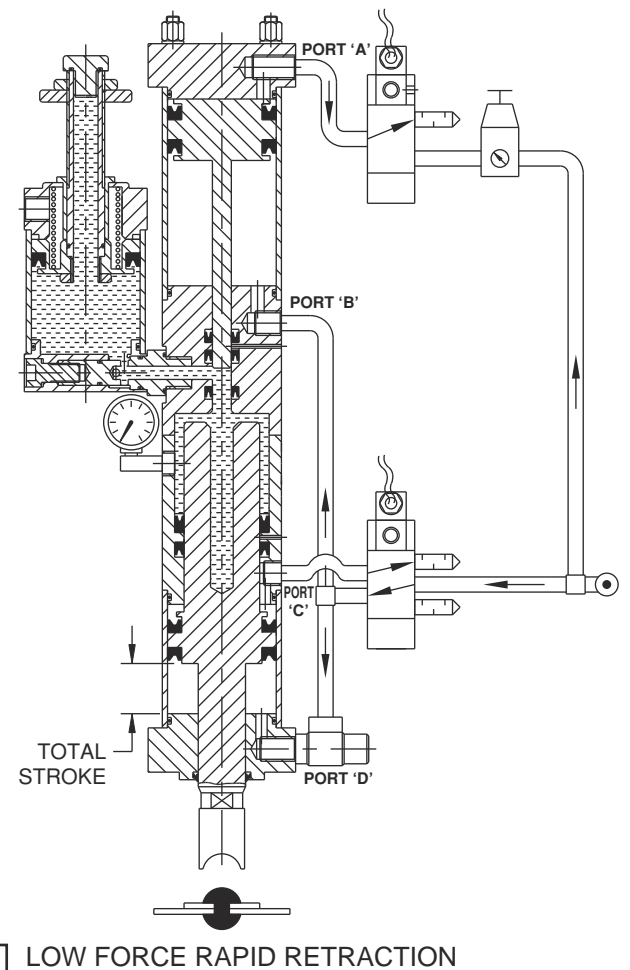
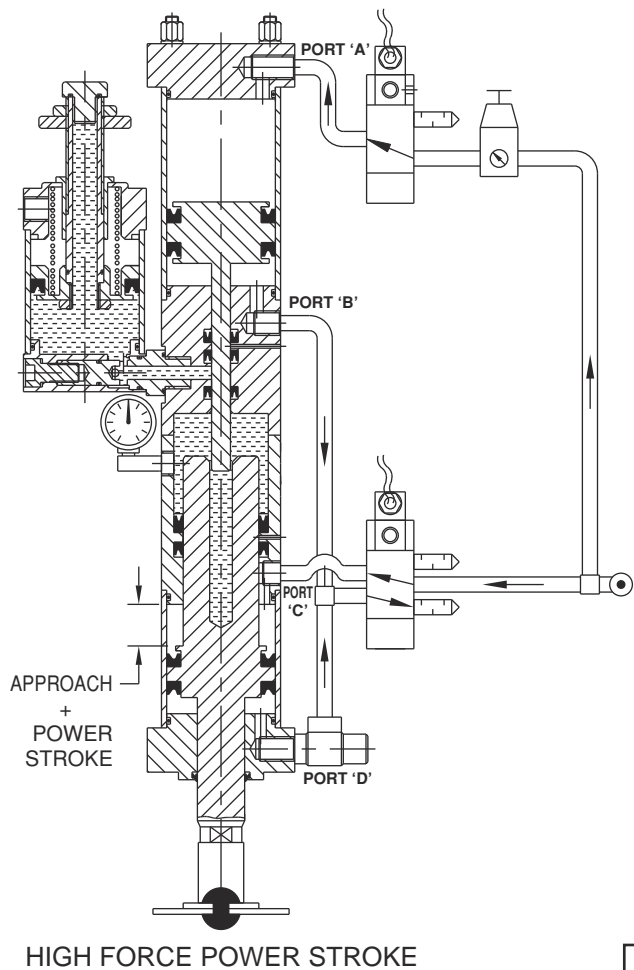
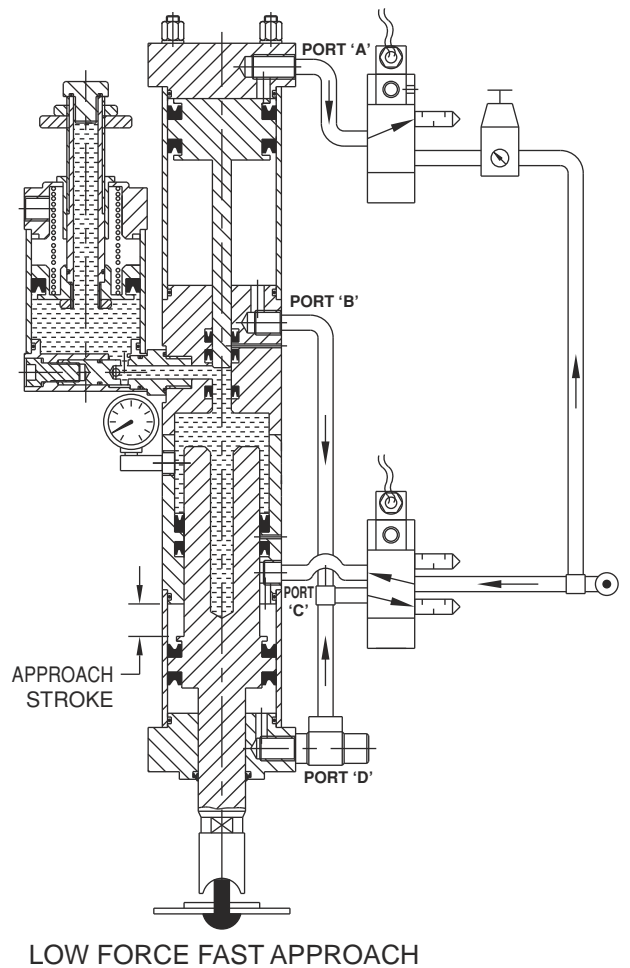
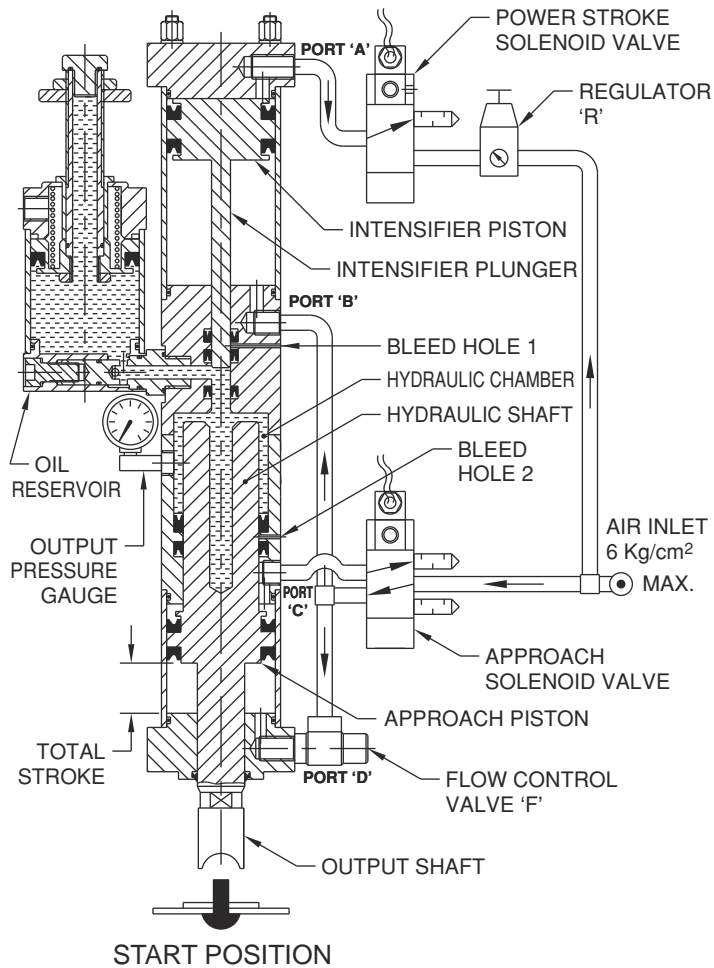
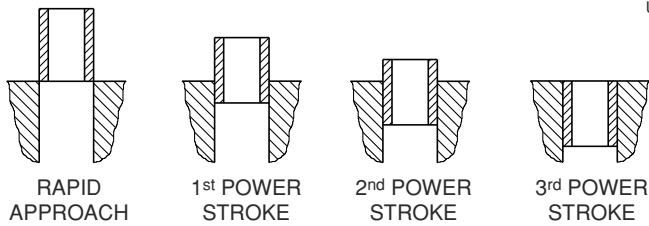


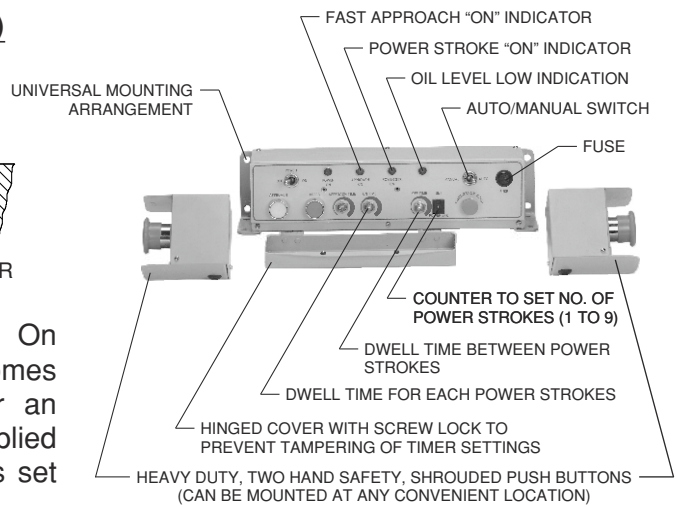
FIG. 2



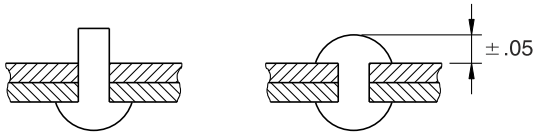
### Automatic Cycling of Power Stroke (Optional)



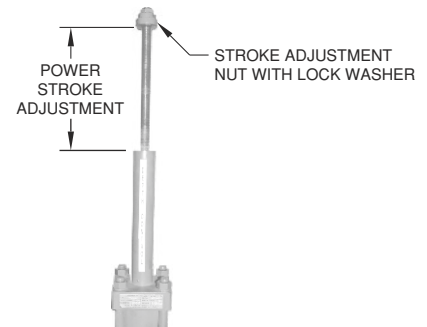
**APPLICATION :-** Bearing and bush pressing. On actuation of 2 hand safety buttons, the ram comes down rapidly and applies power stroke. After an adjustable delay, power stroke is automatically applied a second time. This repeats for the no. of times set (1 to 9) on the counter.



### Power Stroke Depth Control

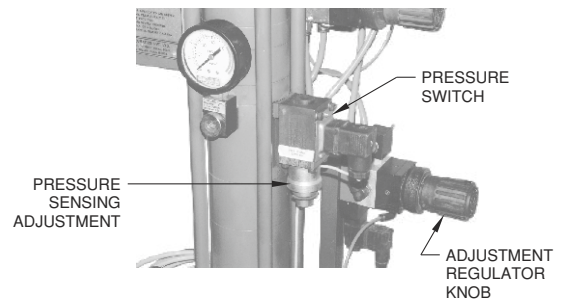


**APPLICATION :-** Useful for toolings in which it is not possible to control the stroke with a mechanical stopper in the tool.



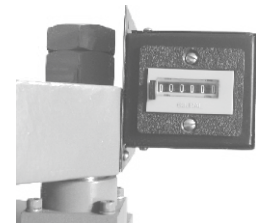
### Pressure Switch Sensing

The press retracts automatically when the set (adjustable) pressure is reached. If for any reason the set pressure is not reached (e.g. oil level low, input air pressure low), the press does not retract. It has to be retracted by pressing emergency stop. This feature ensures on line quality control.



### Stroke Counter

- (a) An electromagnetic stroke counter registers the number of power strokes applied.
- (b) Reset is by manual push button.



### Continuous Cycling

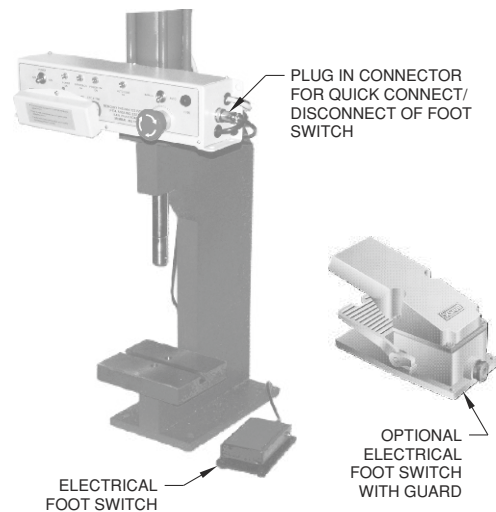
- (a) This features integrates the press to feeding devices. The return position of the press gives a signal for the feeder to start and the end stroke of the feeder gives a signal for the press to start.
- (b) Can be made to stroke continuously as in mechanical power presses.



## Foot Switch Operation

A momentary press of the foot pedal initiates the press cycle. The return is automatic after the set time.

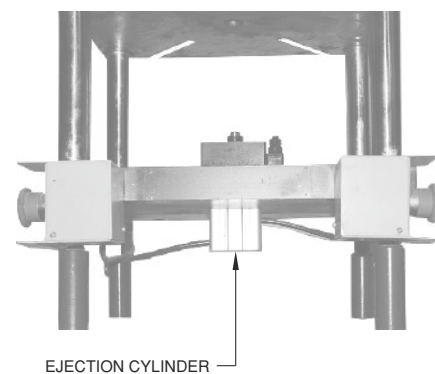
**IMPORTANT NOTE** :- There is no safety in foot operation mode. The foot switch is connected to the control panel through a Plug-In connector for easy removal. It is the responsibility of the management to ensure that the foot switch is unplugged whenever the press is operated in 2 hand safety mode and foot operation is not required.



## Ejection Cylinder

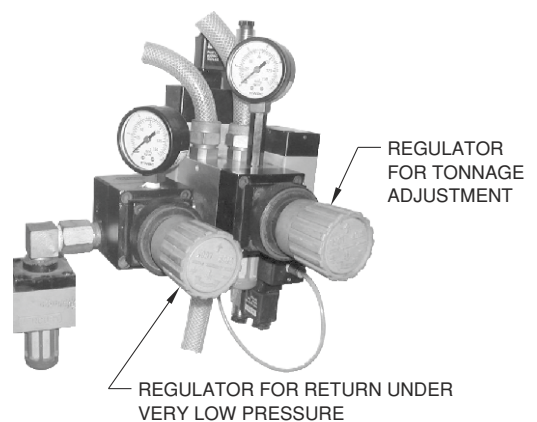
**APPLICATION** :- For ejecting components out of the die when press is retracting. The control panel has as standard 2 terminals for switching a solenoid valve with off delay timer to operate the ejection cylinder.

The size of the cylinder can be ordered as per customer requirement of the ejection force.



## Low Energy System

This is useful for saving compressed air in 8T, 15T & 30T presses operated at more than 15 strokes/min. The return of the cylinder force can be adjusted to the minimum pressure required to retract the cylinder and connected tooling.



## Dual Force Systems for Online Quality Control

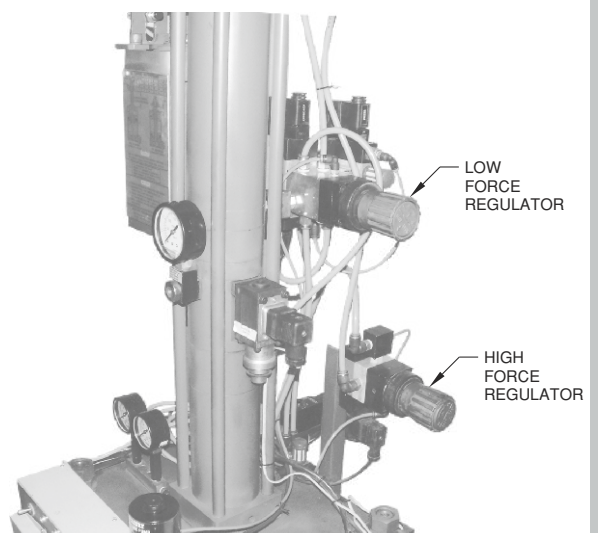
**APPLICATION** :- For critical pressing such as press fitting of bearing, shear pins etc., under close tolerance.

The machine can be set for "LOW" & "HIGH" level pressing forces, the difference of which can be as low as 1000N (100 kgf.)

The Press first applies the "LOW" force. If the job is pressed then it is loose and machine stops.

If pressing force is within the set limit, then the press operates normally.

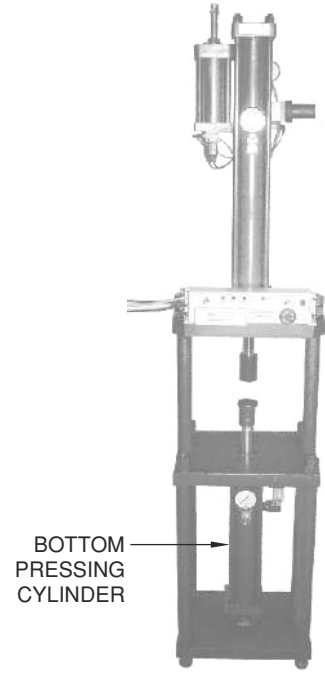
If job is not pressed when "HIGH" force is applied then it is tight and machine stops.



## Double Action Press

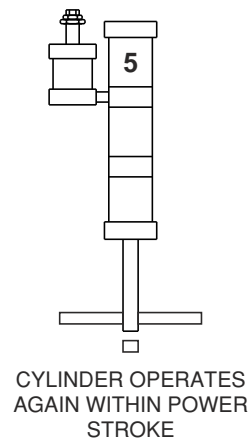
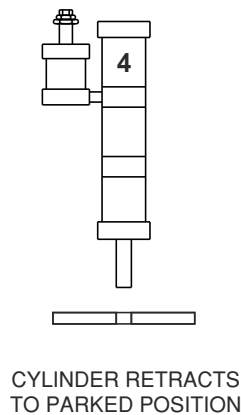
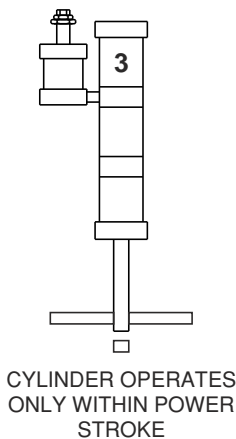
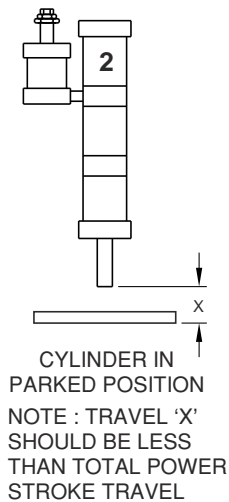
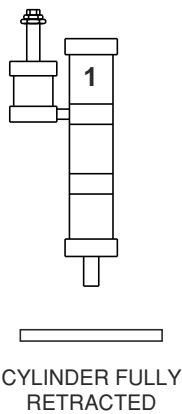
APPLICATION :- For jobs which need pressing from top and bottom such as powder compacting, deep drawing etc.

These special purpose presses are designed as per customer requirement.



## Parking Feature

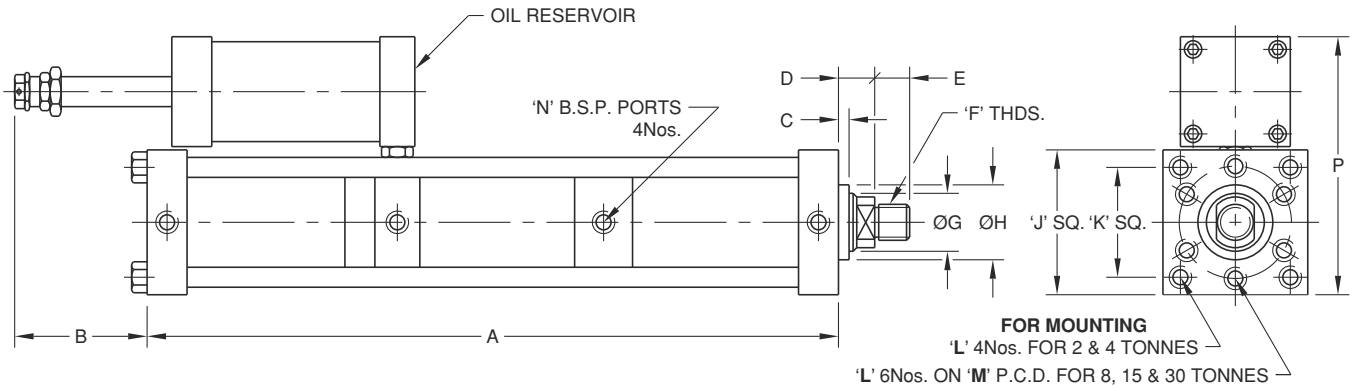
5



APPLICATION :- This feature is useful for applications where the job is automatically fed into the die by press feeders etc. The cylinder is not required to retract/travel fully. This saves cycle time and air consumption considerably.



## Series 'N' Press Cylinder Dimensions



MODEL No.	TON	Total Stroke	Power Stroke	A	B	C	D	E	F	ØG	ØH	J SQ.	L	M	N	P	Q (NL) AIR. CONSU.
N 086-75	7.25	75	24	760	-	4	24.5	50	M56x3	80	90	182	M20x2.5	125	1/2"	330	52
N 086-100	7.25	100	24	810	90	4	24.5	50	M56x3	80	90	182	M20x2.5	125	1/2"	330	55
N 086-150	7.25	150	24	910	90	4	24.5	50	M56x3	80	90	182	M20x2.5	125	1/2"	330	62
N 151-50	15	50	6	617	33	4	24.5	35	M40x2	56	90	182	M20x2.5	125	1/2"	330	33
N 151-75	15	75	6	667	33	4	24.5	35	M40x2	56	90	182	M20x2.5	125	1/2"	330	36
N 151-100	15	100	6	717	183	4	24.5	35	M40x2	56	90	182	M20x2.5	125	1/2"	330	40
N 151-150	15	150	6	817	183	4	24.5	35	M40x2	56	90	182	M20x2.5	125	1/2"	330	46
N 154-75	15	75	12	760	-	4	24.5	35	M40x2	56	90	182	M20x2.5	125	1/2"	330	54
N 154-100	15	100	12	810	90	4	24.5	35	M40x2	56	90	182	M20x2.5	125	1/2"	330	57
N 154-150	15	150	12	910	90	4	24.5	35	M40x2	56	90	182	M20x2.5	125	1/2"	330	64
N 156-75	14.75	75	24	854	-	4	26.0	50	M56x3	80	90	240	M24x3	150	1/2"	420	92
N 156-100	14.75	100	24	894	58	4	26.0	50	M56x3	80	90	240	M24x3	150	1/2"	420	96
N 156-150	14.75	150	24	994	58	4	26.0	50	M56x3	80	90	240	M24x3	150	1/2"	420	104
N 301-50	30	50	6	672	20	4	26.0	40	M48x3	63	90	240	M24x3	150	1/2"	420	56
N 301-75	30	75	6	722	20	4	26.0	40	M48x3	63	90	240	M24x3	150	1/2"	420	60
N 301-100	30	100	6	772	190	4	26.0	40	M48x3	63	90	240	M24x3	150	1/2"	420	64
N 301-150	30	150	6	872	190	4	26.0	40	M48x3	63	90	240	M24x3	150	1/2"	420	72
N 304-75	30	75	12	854	-	4	26.0	40	M48x3	63	90	240	M24x3	150	1/2"	420	95
N 304-100	30	100	12	894	58	4	26.0	40	M48x3	63	90	240	M24x3	150	1/2"	420	99
N 304-150	30	150	12	994	58	4	26.0	40	M48x3	63	90	240	M24x3	150	1/2"	420	107
N 306-100	30	100	24	1133	-	4	31.0	50	M64x4	80	100	285	M42x4.5	175	3/4"	459	218
N 306-150	30	150	24	1233	-	4	31.0	50	M64x4	80	100	285	M42x4.5	175	3/4"	459	231
N 306-200	30	200	24	1333	-	4	31.0	50	M64x4	80	100	285	M42x4.5	175	3/4"	459	243
N 451-100	45	100	6	842	161	4	31.0	50	M64x4	80	100	285	M42x4.5	175	3/4"	459	110
N 451-150	45	150	6	942	161	4	31.0	50	M64x4	80	100	285	M42x4.5	175	3/4"	459	122
N 451-200	45	200	6	1042	211	4	31.0	50	M64x4	80	100	285	M42x4.5	175	3/4"	459	134
N 454-100	45	100	12	1015	-	4	31.0	50	M64x4	80	100	285	M42x4.5	175	3/4"	459	175
N 454-150	45	150	12	1115	-	4	31.0	50	M64x4	80	100	285	M42x4.5	175	3/4"	459	187
N 454-200	45	200	12	1215	38	4	31.0	50	M64x4	80	100	285	M42x4.5	175	3/4"	459	199

### To Calculate Compressor Power Capacity

1HP = 120 litres of Free Air (NL) Per Minute at 5 Bars.

N = Number of Cycles per minute

Q = Free Air Consumed Per Cycle (From Chart) in Normal Litres (NL)

Power Required =  $\frac{Q \times N}{120}$  (H.P.) or  $\frac{Q \times N}{120} \times 0.746$  (KW)

### To Calculate the cost of electricity

Example :- A 15 Tonne, 50mm stroke with 6mm power stroke press is used at 5 bars to cut Aluminium washers from a sheet at the rate of 10 pieces per minute.

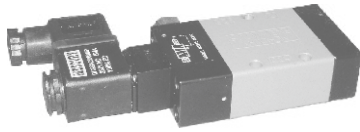
- From above chart model N151-50 cylinder consumes 33 NL of air per cycle.
- @ 10 strokes/min air consumption =  $33 \times 10 = 330$  NLPM
- Electric Power used =  $330 \div 120 = 2.75$  HP  $\approx 2.05$  KW/min
- Power used per hour (KWH) =  $2.05 \times 60 = 123$  KWH
- Cost of electricity @ Rs 4.5 per KWH =  $123 \times 4.5 =$  Rs 553
- Cost of electricity per cut piece ( $10 \times 60 = 600$ /hr) =  $553 \div 600 = 0.92$  i.e. Rs. 0.92 per piece

### Output Forces (Kgf.) at Inlet Air Pressure of 5 Bars

Tonnage	8T	14.75T	15T	30T	45T
Approach	275	435	475	435	680
Power	8585	14750	14800	29175	44950
Return	425	1050	825	1160	1300

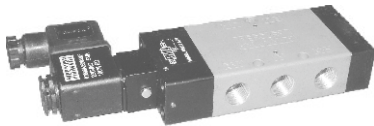


**POWER STROKE SOLENOID VALVE FOR STANDARD PRESS**



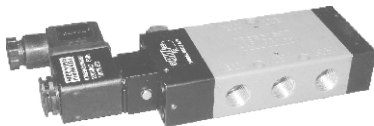
PART No.	DESCRIPTION	SEAL KIT No.
NS312EPR	1/4" 3/2 N.C. SOLENOID VALVE WITH EXTERNAL PILOT	SKNS312EPR
NS314EPR	1/2" 3/2 N.C. SOLENOID VALVE WITH EXTERNAL PILOT	SKNS314EPR

**RAPID APPROACH SOLENOID VALVE**



PART No.	DESCRIPTION	SEAL KIT No.
NS612PR	1/4" 5/2 SOLENOID VALVE	SKNS612PR
NS614PR	1/2" 5/2 SOLENOID VALVE	SKNS614PR

**SOLENOID VALVE FOR AUTOMATIC CYCLING OF POWER STROKE**



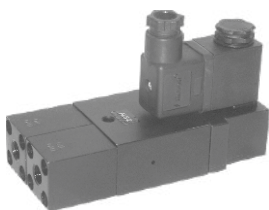
PART No.	DESCRIPTION	SEAL KIT No.
NS612EPR	1/4" 5/2 SOLENOID VALVE WITH EXTERNAL PILOT	SKNS612EPR
NS614EPR	1/2" 5/2 SOLENOID VALVE WITH EXTERNAL PILOT	SKNS614EPR

**TONNAGE GAUGE WITH ISOLATOR VALVE**



PART No.	DESCRIPTION	PART No.	DESCRIPTION
88-009-2T	FOR 2T 'N' SERIES CYLINDERS	88-009-4TP	FOR 4T 'P' & 'X' SERIES CYLINDERS
88-009-4T	FOR 4T 'N' SERIES CYLINDERS	88-009-8TP	FOR 8T 'P' & 'X' SERIES CYLINDERS
88-009-8T	FOR 8T 'N' SERIES CYLINDERS	88-009-15TP	FOR 15T & 30T 'P' & 'X' SERIES CYLINDERS
88-009-15T	FOR 15T 'N' SERIES CYLINDERS	88-077	FOR 'Z' SERIES CYLINDER, 210 bar
88-009-30T	FOR 30T 'N' SERIES CYLINDERS	88-078	FOR 'Z' SERIES CYLINDER, 350 bar
88-009-2TP	FOR 2T 'P' & 'X' SERIES CYLINDERS		

**AUTOLUBE**



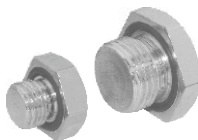
PART No.	DESCRIPTION	SEAL KIT No.
ALS2	AUTOLUBE	SKALS2

**REGULATED AIR PRESSURE GAUGE**



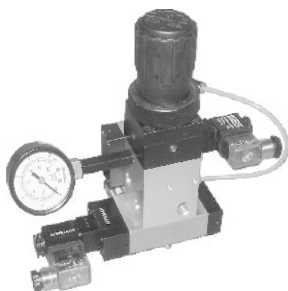
PART No.	DESCRIPTION
20-940	1/8", Ø50, 0-10 bar PNEUMATIC GAUGE FOR ALL PRESS CYLINDER MODELS

**OIL FILL PLUG**



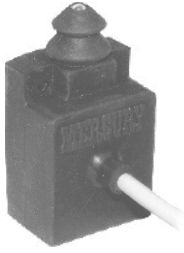
PART No.	DESCRIPTION
86-001	1/4" OIL PLUG WITH 'O' RING FOR 'N' SERIES 2T & 4T
105-036	1/2" OIL PLUG WITH 'O' RING FOR 'N' SERIES 8T, 15T & 30T

**VALVE REGULATOR ASSEMBLY**



PART No.	DESCRIPTION
VRA2	1/4" VALVE-REGULATOR ASSEMBLY
VRA2T	1/4" VALVE-REGULATOR ASSEMBLY WITH TIMER
VRA4	1/2" VALVE-REGULATOR ASSEMBLY
VRA4T	1/2" VALVE-REGULATOR ASSEMBLY WITH TIMER

### LOW OIL LEVEL LIMIT SWITCH



PART No.	DESCRIPTION
105-092	LOW OIL LEVEL SENSING LIMIT SWITCH

### STANDARD 2 HAND SAFETY CONTROL PANEL



PART No.	DESCRIPTION
86-545-1	STANDARD CONTROL PANEL

### AUTO CYCLE 2 HAND SAFETY CONTROL PANEL



PART No.	DESCRIPTION
86-547	AUTOMATIC CYCLING OF POWER STROKE PANEL

### AIR SILENCERS



PART No.	DESCRIPTION
SL2	1/4" SILENCER
SL4	1/2" SILENCER

### SOLENOID COILS



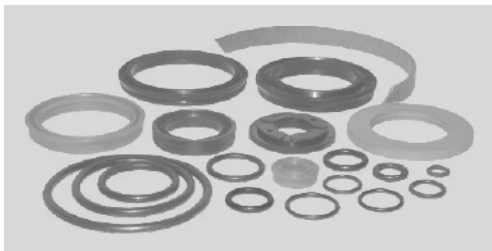
PART No.	DESCRIPTION
M22L	230VAC COIL WITH ILLUMINATED CONNECTOR
M22P	24DC COIL WITH ILLUMINATED CONNECTOR

### ELBOW FLOW CONTROL VALVE



PART No.	DESCRIPTION	SEAL KIT No.
UF2	1/4" SWIVEL ELBOW FLOW CONTROL VALVE FOR 2T & 4T	SKUF2
UF4	1/2" SWIVEL ELBOW FLOW CONTROL VALVE FOR 8T, 15T & 30T	SKUF4

### SPARE SEAL KITS



PART No.	DESCRIPTION
90-051	SEAL KIT FOR PRESS CYLINDER MODEL No. N151 & N154
90-052	SEAL KIT FOR PRESS CYLINDER MODEL No. N301 & N304
90-069	SEAL KIT FOR PRESS CYLINDER MODEL No. N086
90-070	SEAL KIT FOR PRESS CYLINDER MODEL No. N156
90-103	SEAL KIT FOR PRESS CYLINDER MODEL No. N451 & N454