



**KRENDL**™  
The Innovator in Insulation Equipment



# OWNERS MANUAL

## MP-20 PUMP



**60 YEARS OF AMERICAN INGENUITY**

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**CONGRATULATIONS ON YOUR PURCHASE OF KRENDL EQUIPMENT**

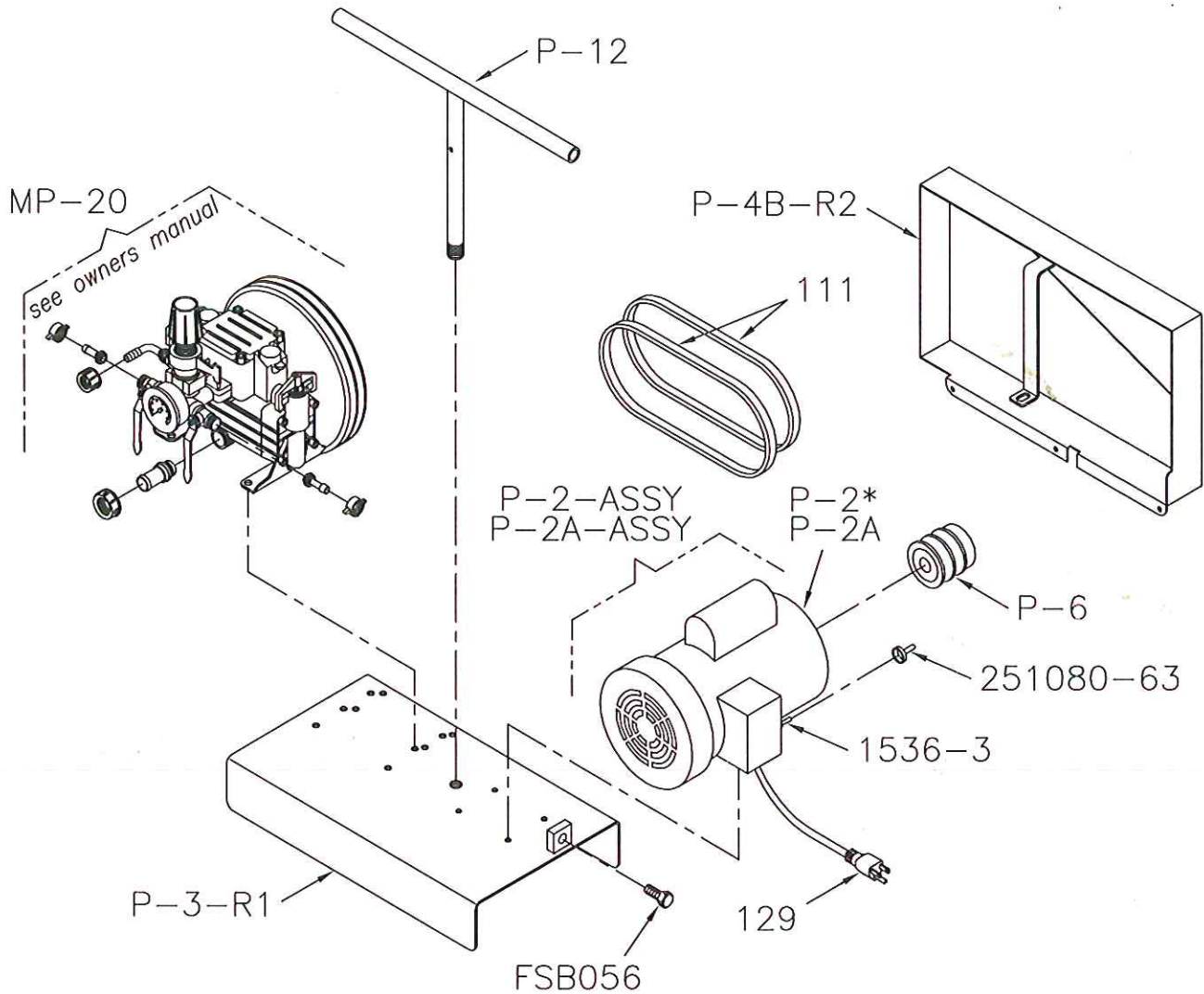
**MODEL MP-20 PUMP  
OWNER'S MANUAL**

FOR ASSURED SAFETY AND CONFIDENCE, PLEASE READ THIS  
MANUAL CAREFULLY BEFORE INSTALLING AND OPERATING  
YOUR MACHINE.

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WEB SITE IS: [www.krendlmachine.com](http://www.krendlmachine.com)**

KRENDL MACHINE CO. INC.  
 MODEL #348B  
 PUMP & MOTOR  
 DYNESCO MP-20

MARCH 2010



PART NO.	DESCRIPTION
348B-60	PUMP & MOTOR, 110/220V., 60 Hz. ASSEMBLY
348B-50	PUMP & MOTOR, 110/220V., 50 Hz. ASSEMBLY
MP-20	MP-20 DIAPHRAGM PUMP
P-2-ASSY	MOTOR, 1 H.P., 120/240 V., 60 Hz. ASSY
P-2A-ASSY	MOTOR, 1 H.P., 120/230 V., 50 Hz. ASSY
P-2*	MOTOR, 1 H.P. 120/240 V., 60 Hz., T.E.F.C.
P-2A	MOTOR, 1 H.P. 120/230 V., 50 Hz., T.E.F.C.
P-3-R1	BASE, PUMP
P-4B-R2	BELT GUARD
111	V-BELT, {2 REQUIRED} (#4L420)
P-6	PULLEY, 3" DIA. x 5/8" BORE (2AK28x5/8)
129	CORD, MOLDED PLUG, 3 FT
1536-3	SWITCH, TOGGLE (SPST) (2FA54-73)
251080-63	COVER F/TOGGLE SWITCH
P-12	T-HANDLE
FSB056	1/2 - 13 x 1 3/4 Hex Head



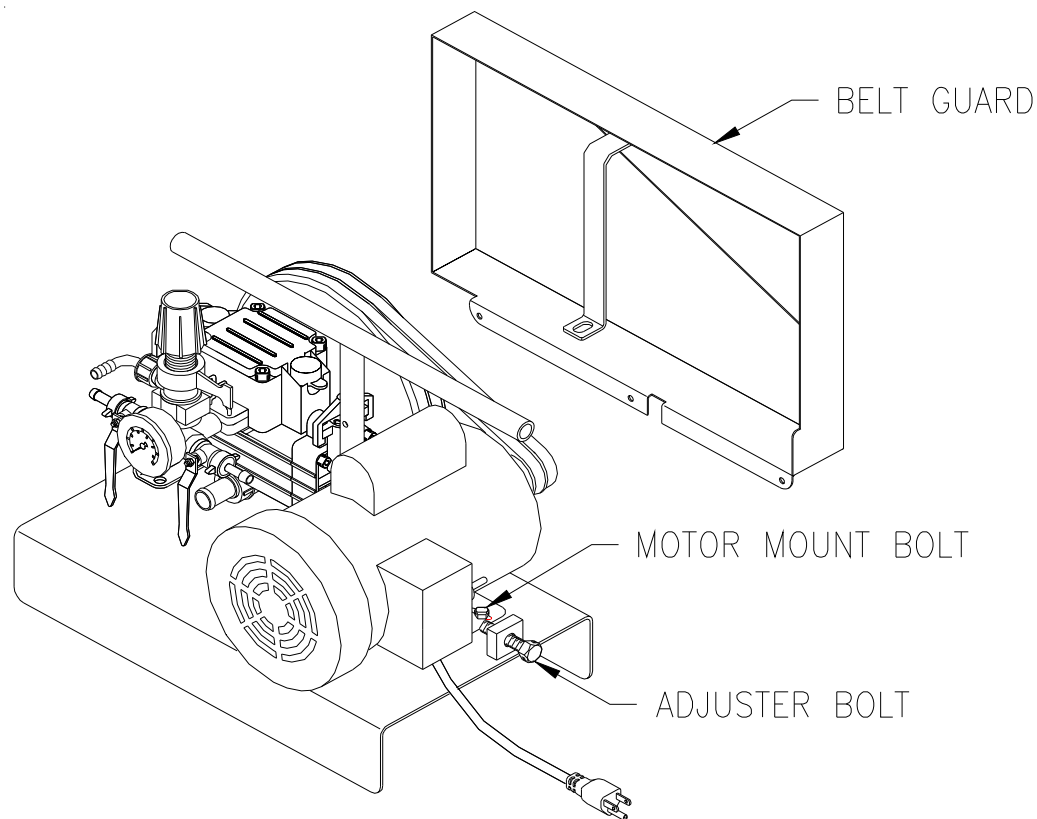
## MAINTENANCE

**CAUTION:** Before performing maintenance disconnect waterlines and power cord.

**BELT TENSION:** When the belt slips, the belt tension and condition should be checked.

- 1.) Unplug unit.
- 2.) Remove Belt Guard.
- 3.) If belt is cracked or worn, replace.
- 4.) Loosen the four Motor Mount bolts. (See diagram below)
- 5.) Turn the Adjustment Bolt until the belt is tight.
- 6.) Tighten the four Motor Mount bolts.
- 7.) Replace Belt Guard.

**NOTE:** Refer to Pump Manual for further maintenance and operation instructions.





**MAXIMUM FLOW:** 5.7g.p.m.

**MAXIMUM PRESSURE:** 426 p.s.i.

**MAXIMUM SPEED:** 550 r.p.m.

<b><u>PORT SIZE:</u></b>	<b><u>PUMP W/CONTROL ASSEMBLY</u></b>	<b><u>Q.D. COUPLER</u></b>
inlet	7/8" hose barb outlet	3/4"
outlet	3/8" hose barb outlet	3/8"
by-pass	1/2" hose barb outlet	1/2"

**DIAPHRAM:** dual semi-hydraulic

**HOUSING:** aluminum

**WEIGHT:** 13.2 lbs

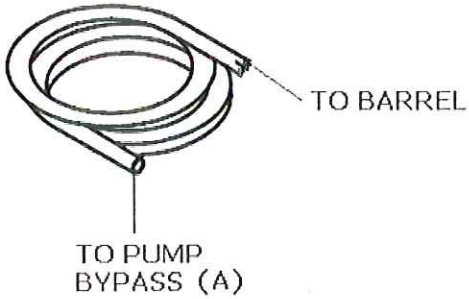
<b><u>DIMENSIONS:</u></b>	<b><u>length</u></b>	<b><u>width</u></b>	<b><u>height</u></b>
	10.25"	8.4375"	8.625"

### PERFORMANCE

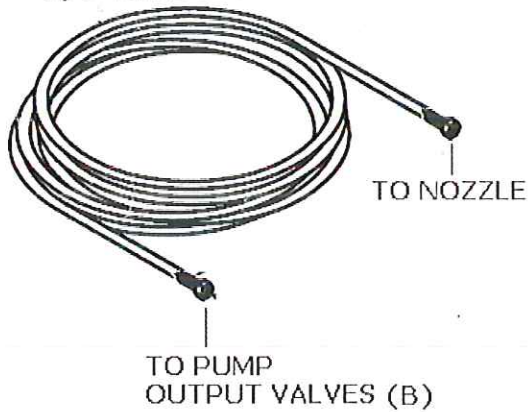
28 PSI	4.7 GPM	.10 HP	350 RPM
28 PSI	5.7 GPM	.12 HP	450 RPM
28 PSI	6.4 GPM	.14 HP	550 RPM
142 PSI	3.7 GPM	.40 HP	350 RPM
142 PSI	4.7 GPM	.50 HP	450 RPM
142 PSI	5.5 GPM	.60 HP	550 RPM
284 PSI	3.6 GPM	.75 HP	350 RPM
284 PSI	4.6 GPM	1.00 HP	450 RPM
284 PSI	5.4 GPM	1.20 HP	550 RPM
426 PSI	3.6 GPM	1.10 HP	350 RPM
426 PSI	4.5 GPM	1.40 HP	450 RPM
426 PSI	5.3 GPM	1.70 HP	550 RPM

# 348B-60 MP-20

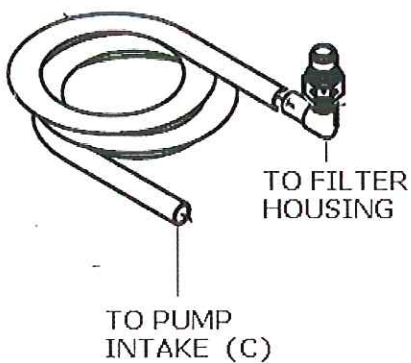
A - BYPASS LINE  
1/2" BLACK 6'



B - OUTPUT LINE  
3/8" BLUE 150'



C - INTAKE LINE  
7/8" BLACK 5'



A - BYPASS LINE (1/2").

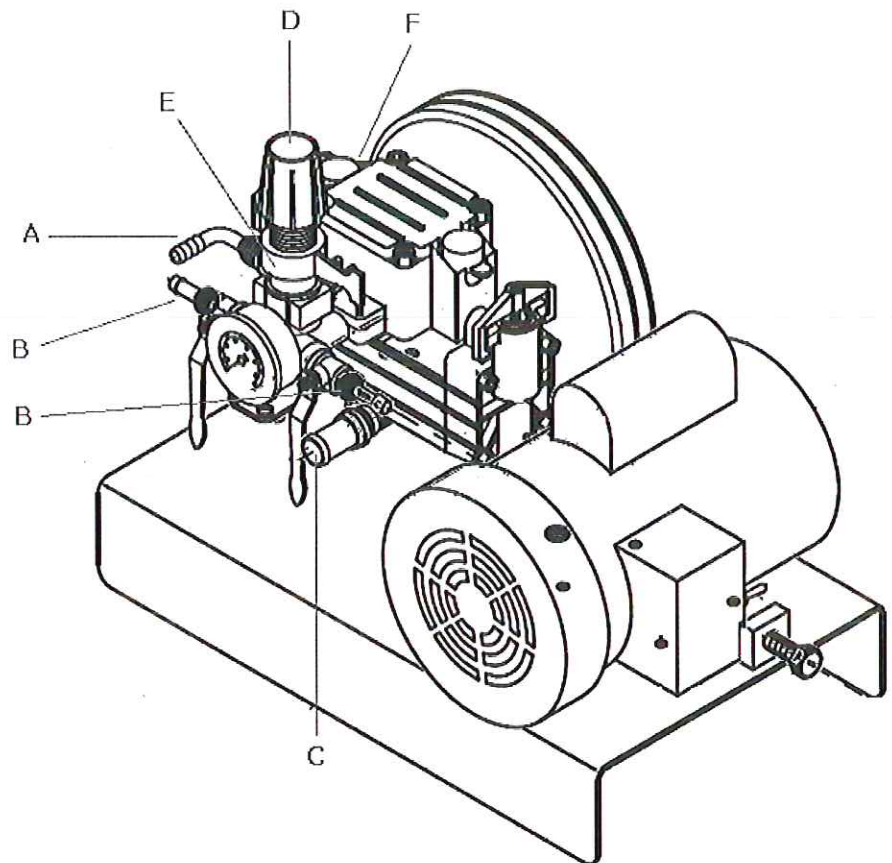
B - OUTPUT VALVES (3/8") (2).

C - INTAKE (7/8")

D - PRESSURE REGULATOR  
ADJUSTMENT KNOB, TURN  
CLOCKWISE TO INCREASE  
PRESSURE.

E - BYPASS LEVER,  
ROTATE TO "ON" POSITION FOR  
PRESSURE,  
ROTATE TO "OFF" FOR BYPASS  
MODE.

F - AIR PRESSURE VALVE,  
SET TO 20% OF PUMP  
PSI.





## DIAPHRAGM REPLACEMENT INSTRUCTIONS: PUMPS MP20

1. Remove the caps (MP20 1800/81).
2. Drain the oil from the pump and any other liquid present from the broken diaphragm. Turn the pump on it's side to properly drain the oil.
3. Remove the 4 bolts that hold the valve chamber (MP20 #48 3609/159) .
4. Remove the valve chamber (MP20 #46) to expose the diaphragm. Do not use a screw driver to pry them apart. Once the valve chamber is removed, the diaphragm should be exposed.
5. Remove the diaphragm holder screw (MP20 #32 3605/27).
6. Remove the old diaphragm.
7. Put the new diaphragm into place. The diaphragm should rest into place.
8. Replace the diaphragm hold screws (MP20 #32) into place.
9. Put the valve chamber back into it's proper place. Make sure the lip of the new diaphragm is tucked down into the valve chamber.
10. Install the 4 bolts (MP20 #48) into the valve chamber to hold it into place. Tighten these in a criss cross fashion. Tighten each bolt on each side half way, and then return to completely tighten each bolt.
11. Pour oil (10W30) into the oil reservoir ( MP20#8 421-13) crankcase 403-134). Be sure to remove both caps prior to pouring the oil, otherwise air will be trapped in the reservoir. Fill to the oil level indicator line found on the oil reservoir.
12. Tilt the pump to the left and rotate the shaft. Then tilt the pump to the right and rotate the shaft again. This will remove any air bubbles that are present.

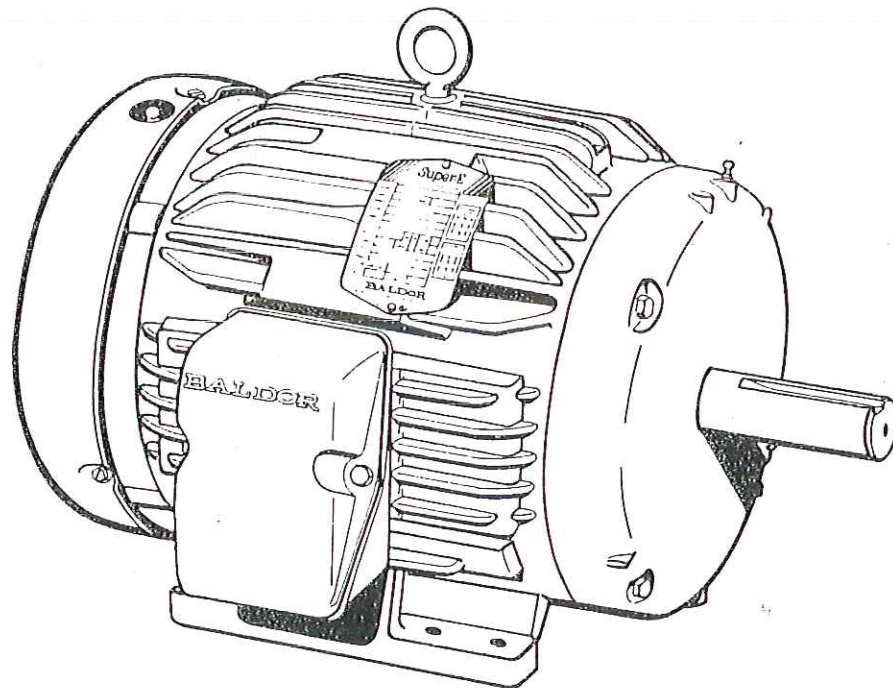
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# **BALDOR<sup>®</sup>**

## **MOTORS AND DRIVES**

**BALDOR ELECTRIC COMPANY  
INSTRUCTION, OPERATION AND  
MAINTENANCE MANUAL**

**INTEGRAL HORSEPOWER  
AC INDUCTION MOTORS  
TEFC ENCLOSURE**





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## SAFETY PRECAUTIONS

**WARNING:** High voltage and rotating parts can cause serious or fatal injury. Installation, operation, and maintenance of electric machinery should be performed by qualified personnel.

Familiarization with NEMA publication MG-2, safety standard for construction and guide for selection, installation and use of electric motors and generators, the National Electrical Code and local codes and practices is recommended.

For equipment covered by this instruction manual, it is important to observe the following safety precautions to avoid possible injury:

Avoid contact with energized circuits or rotating parts.

Avoid by-passing or rendering inoperative any safe guards or protective devices.

Avoid use of automatic reset devices where automatic restarting of equipment might be hazardous to the safety of personnel.

Failure to properly ground the frame of this machine can cause serious injury to personnel. Grounding should be in accordance with the National Electrical Code and consistent with pertinent local codes and practices.

Make sure that the shaft key is fully captive before the motor is energized.

Avoid extended exposure in close proximity to machinery with high noise levels.

Use proper care and procedures in handling, lifting, storing, installing, operating, and maintaining the equipment.

If eyebolts are used for lifting motor, they

must be securely tightened. The lifting direction should not exceed a 20-degree angle with the shank of the eyebolt or the lifting lug for safe lifting.

Do not lift both the motor and the driven equipment with the motor lifting provisions. Motor lifting provisions are adequate for lifting the motor only.

Qualified maintenance personnel and safe maintenance practices are imperative. Be sure that the following precautions are taken before beginning maintenance:

The equipment connected to the shaft will not cause mechanical rotation.

Disconnect main machine windings and all accessory devices from the power source before disassembly of motor.

If a high potential insulation test is required, procedure and precautions as outlined in NEMA MG-1 and MG-2 standards should be followed.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently, consult your Baldor distributor or an authorized Baldor Service Center.

## RECEIVING

Each shipment should be thoroughly inspected upon arrival. Any damage should be immediately reported to the carrier and a claim filed. For additional assistance, contact the Baldor distributor from whom you purchased the motor.

## STORAGE

In the event that the motor will not be put into service immediately, certain precautions should be taken. The motor should be stored in a clean, dry, and warm location.

If the storage location is damp or severe humidity changes exist, the motor windings should be protected from excessive moisture by energizing the space heaters, when provided, during storage.

It is recommended that periodic inspections of the insulation integrity be performed by use of a megger, and a log kept of the pertinent information. Any significant drop in insulation resistance should be investigated.

Grease lubricated bearings are prepacked at the factory and no further preventative bearing maintenance on the bearings is required during storage. Rotate the shaft ten or more revolutions at least every two months during storage, more frequently if possible.

## UNPACKING

All motors are packaged for ease of handling and to prevent entry of contaminants. To avoid condensation inside the motor, unpack only when motor temperature has reached the temperature of the room in which it will be unpacked. Motor installation should be completed before attempting to energize. All protective wrapping should be removed before starting.

## HANDLING

The motor should be lifted using the provided lifting lugs or eyebolts. Motor lifting provisions are adequate for lifting the motor only.

They are not to be used to lift the motor plus

additional equipment such as pumps, compressors or other driven equipment. In the case of assemblies on a common base, lugs or eyebolts provided on the motor are not to be used to lift the assembly and base. Rather, the assembly should be lifted by a sling around the base of the entire unit or by other lifting means provided on the base of the assembly. In the event of unbalanced loads (such as couplings or other attachments), additional slings or other effective means should be used to prevent tipping. A motor should never be lifted by the shaft of the motor. Contact your Baldor distributor or an authorized Baldor Service Center for further information.

**Failure to observe these precautions may result in damage to the equipment, injury to personnel, or both.**

## INSTALLATION

**WARNING:** Installation should be in accordance with the National Electrical Code and consistent with pertinent local codes and practices. Coupling, belt and chain guards should be installed to protect against accidental contact with moving parts. Machines accessible to personnel should be further guarded by screening, guard rails, etc.

**Failure to observe these precautions may result in injury to personnel.**

**LOCATION:** Install the motor in a well ventilated area. Make sure there is clearance for ventilation, cleaning, repair, and accessibility for inspection for all machines. It is important that the external provisions for ventilation are not obstructed in any manner that might limit the free passage of air.

TEFC motors are suitable for indoor or outdoor standard service applications.

These motors are not designed for atmospheric conditions requiring explosion proof operation, such as flammable or combustible vapors or dust.

**Failure to observe these precautions may result in damage to the equipment, injury to personnel, or both.**

**MOUNTING:** The motor must be securely mounted to a rigid foundation to minimize vibration and to maintain alignment between the motor and the driven equipment or vibration and bearing damage may result. Foundation caps and sole plates, when used, are designed to act as spacers between the true foundation and the machine and must be evenly supported by the foundation. After accurate alignment of the drive and load-machine shafts, the base should be grouted to the foundation.

Motors may, under certain conditions, be mounted other than horizontally. Consult your Baldor distributor or an authorized Baldor Service Center for further information.

The standard motor base is suitable for horizontal or vertical mounting. Adjustable bases or sliding rails are suitable for horizontal mounting.

### **ALIGNMENT**

**Direct Coupling** - Align motor accurately with the driven unit. For direct drive, use flexible couplings if possible. For drive recommendations, consult drive or equipment manufacturers.

Accurate mechanical alignment is essential for successful operation. Mechanical vibration and roughness in running the motor may indicate poor alignment. It is recommended that the alignment be checked with dial indicators. The space between coupling hubs

should be maintained as recommended by the coupling manufacturer.

**End-Play Adjustment** - The axial position of the motor frame with respect to the load is important. The bearings are not designed to take excessive external axial thrust loads.

**Belt Drive** - Refer to NEMA MG-1 section 14.07 for the application of pulleys, sheaves, sprockets, and gears. Align the sheaves carefully to minimize belt wear and axial load on bearings. Belt tension should be sufficient to prevent belt slippage at rated speed and load, however, slippage may occur during starting.

### **DO NOT OVER-TENSION BELTS**

The pulley ratio should not exceed 8:1. For more information, contact your Baldor distributor or an authorized Baldor Service Center.

### **DOWELING & BOLTING**

After alignment, dowel pins should be inserted through the motor feet into the foundation to maintain the position of the motor should removal be required. Baldor has made provisions on the frame for doweling. Dowel holes should be drilled in the provided location in diagonally opposite feet. These holes should be drilled and reamed together with corresponding holes in the foundation and properly fitting dowel pins inserted.

Mounting bolts must be carefully tightened to prevent changes in alignment and possible damage to equipment. It is recommended that a flat washer and a lock washer be used under each nut or bolt head to insure a secure hold on the motor feet. Flanged nuts or bolts may be used as an alternative to washers.

## POWER SUPPLY & CONNECTION

**WARNING:** Motor and control wiring, overload protection, accessories, and grounding should be in accordance with the National Electrical Codes and consistent with local codes and practices.

**Failure to observe these precautions may result in damage to the equipment, injury to personnel, or both.**

Motor lead connections should be made as shown on the connection diagram located on the nameplate or the inside cover of the conduit box.

The motor frame must be grounded by attaching a ground strap from a known, well established ground point to the grounding bolt provided inside the conduit box.

**Conduit Box** - For ease in connection, an oversized conduit box rotatable 360 degrees in 90 degree increments is provided. Auxiliary conduit boxes are provided for accessories such as space heaters, RTD's, etc., on some motors.

## ALLOWABLE VOLTAGE AND FREQUENCY

Induction machines shall operate successfully under running conditions at rated load with a variation in the voltage or the frequency up to the following:

1. Plus or minus 10 percent of rated voltage, with rated frequency.
2. Plus or minus 5 percent of rated frequency, with rated voltage.
3. A combined variation in voltage and frequency of 10 percent (sum of absolute values) of rated values, provided the frequency variation does not exceed plus or minus 5 percent of rated frequency.

Performance within these voltage and frequency variations will not necessarily be in accordance with the standards established for operation at rated voltage and frequency.

## OPERATION

### PRE-OPERATION CHECK

Disconnect power before motor disassembly and touching any internal part. High voltage may be present even when the machine is not rotating.

Before starting the motor for the first time, the following steps should be followed:

1. Make sure all hold down bolts are tightened.
2. If motor has been idle or in storage for an extended period of time, check winding insulation integrity by using a "megger".
3. All electrical connections should be inspected for correct termination, clearance, mechanical strength, and electrical continuity.
4. Check to be sure all shipping and packaging braces (if used) are removed from the motor shaft.
5. Before connecting to driven equipment, manually turn shaft to make sure it rotates freely.
6. Replace all panels and covers removed during installation before operation.
7. Check to make sure that all coupling guards and other protective hardware are not blocking the ventilation of the motor and not in a position to cause damage or injury when the shaft begins to rotate.

## INITIAL START-UP

◆ **CAUTION:** Read each of the following steps carefully before attempting to start motor.

**IMPORTANT:** If driven equipment can be damaged by rotating in the wrong direction, remove or uncouple motor from the load before checking for rotation.

If direction of rotation needs to be corrected, disconnect input power supply and interchange any two input power leads or refer to the connection diagram on the nameplate or inside of the conduit box cover.

1. Check direction of rotation by momentarily applying power to the motor.
2. It is preferred that the initial start and running of the motor be in an uncoupled no load state.
3. After starting the motor, check that the motor is running smoothly without excessive noise or vibration. If either is present, shut down the motor immediately and investigate. The motor should be run uncoupled for approximately 30 minutes to 1 hour.

## COUPLED START-UP

1. After initial start-up procedures are performed successfully, stop motor, assemble the coupling.
2. Check to be sure that the coupling is properly aligned and not binding in any manner.

3. The first coupled start-up should be with no load. Check to see that the driven equipment is not transmitting any vibration back to the motor through the coupling or the base, and any vibration is within an acceptable level.
4. Run for a period of approximately 1 hour with driven equipment in an unloaded condition.
5. After successfully completing these steps, the equipment can now be loaded.

Do not exceed the value of nameplate amperes times the service factor under steady continuous load.

## JOGGING AND REPEATED STARTS

Repeated starts and/or jogs of induction motors greatly reduce the life of the winding insulation. The heat produced by each acceleration or jog is much more than that dissipated by the motor under full load. If it is necessary to repeatedly start or jog a motor, it is advisable to check the application with the local Baldor distributor or an authorized Baldor Service Center or refer to NEMA MG1-12.50.1.

**Heating** - Duty and maximum ambient temperature are stated on the nameplate of the motor. If there is any question regarding safe operation, contact the local Baldor distributor or an authorized Baldor Service Center.

Overheating of the motor may be caused by improper ventilation, excessive ambient temperature, dirty conditions, excessive current due to overload or unbalanced AC voltage.

## MAINTENANCE

### GENERAL

Inspect the motor at regular intervals, approximately every 500 operating hours or every 3 months, whichever comes first. Keep the motor clean and the ventilation openings clear. Keep accurate maintenance records.

The following should always be observed during inspections:

### CLEANLINESS

The interior and exterior of the motor should be kept free of dirt, oil, grease, water, etc. Oily vapor, paper pulp, textile lint, etc., can accumulate and block ventilation. If the motor is not properly ventilated, overheating can occur, causing early motor failure.

**⚠ WARNING:** High voltage. Electric shock may cause serious or fatal injury. Disconnect power before touching any internal part of the motor. High voltage may be present even when the machine is not rotating.

### INSULATION AND WINDINGS

Periodically the motor insulation integrity should be checked using a "megger". Check all electrical connections to be sure they are tight.

### LUBRICATION AND BEARINGS

Anti friction bearing grease used in grease-lubricated anti-friction bearings does not lose its lubricating ability suddenly, but over a period of time. For a given bearing construction and assembly, the lubricating ability of a grease over time depends primarily on the type of grease, the size of the bearing, the speed at which the bearing operates, and the severity of operating conditions. Good results can be obtained if the following recommendations are followed. (See Table I)

## RELUBRICATION RECOMMENDATIONS

### TYPE OF GREASE

A high grade ball and roller bearing grease. Recommended greases for standard service conditions are:

Shell Dolium R or Chevron SRI.

If other greases are preferred, check with a local Baldor Service Center for recommendations.

### RELUBRICATION INTERVALS

**Table I: Recommended relubrication intervals at standard service conditions.**

NEMA/(IEC) FRAME SIZE	RATED SPEED - RPM			
	3600	1800	1200	900
Up to 210 incl. (132)	5500 hrs	12000 hrs	18000 hrs	22000 hrs
Over 210 to 280 incl. (180)	3600 hrs	9500 hrs	15000 hrs	18000 hrs
Over 280 to 360 incl. (225)	*2200 hrs	7400 hrs	12000 hrs	15000 hrs
Over 360 to 5000 incl. (300)	*2200 hrs	3500 hrs	7400 hrs	10500 hrs

\* Bearings in 360 through 5000 frame, 2 pole motors are either 6313 or 6314 bearings. Stated relubrication interval reflects this selection. If roller bearings are used, the listed relubrication interval is to be divided by 2.



**Table II - Service Conditions**

<b>SEVERITY OF SERVICE</b>	<b>AMBIENT TEMPERATURE MAX</b>	<b>ATMOSPHERIC CONTAMINATION</b>	<b>TYPE OF BEARING</b>
STANDARD	40 DEGREES C	CLEAN, LITTLE CORROSION	DEEP GROOVE BALL BEARING
SEVERE	50 DEGREES C	MODERATE DIRT, CORROSION	BALL THRUST, ROLLER
EXTREME	>50 DEGREES C* or CLASS H INSULATION	SEVERE, DIRT, ABRASIVE DUST, CORROSION	ALL BEARINGS
LOW TEMPERATURE	<-30 DEGREES C**		

\* Special high temperature grease is recommended.

\*\* Special low temperature grease is recommended.

**Table III - Lubrication Interval Multiplier**

<b>OPERATING CONDITION</b>	<b>MULTIPLIER</b>
STANDARD	1.0
SEVERE	.5
EXTREME	.1

**Table IV - Bearing Sizes and Types**

FRAME SIZE		BEARING DESCRIPTION (THESE ARE THE "LARGE" BEARINGS IN EACH FRAME SIZE)				
NEMA/(IEC)	Largest Bearing in size category	OD D mm	Width B mm	Weight of Grease to be Added	Volume of grease to be added	
				GRAMS/OZ	IN <sup>3</sup>	tsp
Up to 210 incl. (132)	6307	80	21	8.4/.30	0.6	2.0
Over 210 to 280 incl. (180)	6311	120	29	17.4/.61	1.2	3.9
Over 280 to 360 incl. (225)	6313	140	33	23.1/.81	1.5	5.2
Over 360 to 5000 incl. (300)	NU322	240	50	60.0/2.12	4.1	13.4

Weight in Grams = .005 DB

**RELUBRICATION PROCEDURE**

1. Clean grease fittings.
2. Remove grease outlet plug.
3. Add recommended amount of grease. Be sure grease to be added is compatible with grease already in motor. Consult your Baldor distributor or an authorized Baldor Service Center if grease other than recommended is to be used. If motor is to be greased while running, a somewhat larger quantity of grease will have to be used. Stop when new grease appears at shaft hole in the endplate or purge outlet plug.
4. Replace plug.

**SAMPLE RELUBRICATION DETERMINATION**

ASSUME - . NEMA 286T/(IEC 180), 1750 RPM motor driving an exhauster fan in an ambient temperature of 43° C., atmosphere moderately corrosive.

1. Table I lists 9500 hours for standard conditions.
2. Table II classifies service conditions as "severe".
3. Table III lists a multiplier of .5 for severe conditions.
4. Relubrication interval should be 9500 X .5 = 4750 hours.
5. The amount of grease to be added is 1.2 in<sup>3</sup> or 3.9 tsp.

**NOTE:** Smaller bearings in size category may require reduced amounts of lubricant.

◆ **CAUTION:** To avoid damage to motor, bearings and grease must be kept free of dirt. In case of extremely dirty environment, contact your Baldor distributor or an authorized Baldor Service Center.

Bearing removal - Contact an authorized Baldor Service Center or a District Office.

## ACCESSORIES

The following accessories are available. Contact your Baldor distributor for pricing and lead-time information on each accessory listed below. (Note: Space heaters and/or winding RTD's are standard on some motors).

**Space Heaters** - Used to prevent condensation of moisture within the motor enclosure during periods of shut-down or storage.

**Winding RTD** - (Resistance Temperature Detector) Used to measure or monitor winding temperature during operation.

**Winding Thermostat** - Used to warn of excessive winding temperatures.

**Winding Thermocouples** - Used to measure or monitor winding temperature.

**Bearing RTD** - Used to measure or monitor bearing temperature during operation.

**Bearing Thermostat** - Used to warn of excessive bearing temperatures.

**Bearing Thermocouples** - Used to measure or monitor bearing temperatures during operation.

**Roller Bearings** - Recommended for belt drive applications with speed of 1800 RPM or below.

**Conduit Boxes** - Auxiliary conduit boxes available in smaller and larger sizes.

**Drains and Breathers** - Stainless steel drains and separate breathers are available.

**Hardware** - Stainless steel hardware is available. Standard hardware is corrosion resistant zinc plated steel.

**Nameplates** - Additional stainless steel nameplates are available.

**Rotation Arrows** - Rotation arrows are supplied on motors designed to operate in one direction only. Additional rotation arrows available.

**Drip Covers** - For use when motor is mounted in vertical position. Contact your Baldor distributor to confirm that motor is designed for vertical mounting.

● **NOTE:** On some motors, accessory device leads are brought out to a separate conduit box located on the side of the motor housing unless otherwise specified.

**BALDOR**  
**MOTORS AND DRIVES**

*Fort Smith, Arkansas 72901*  
*(501) 646-4711*

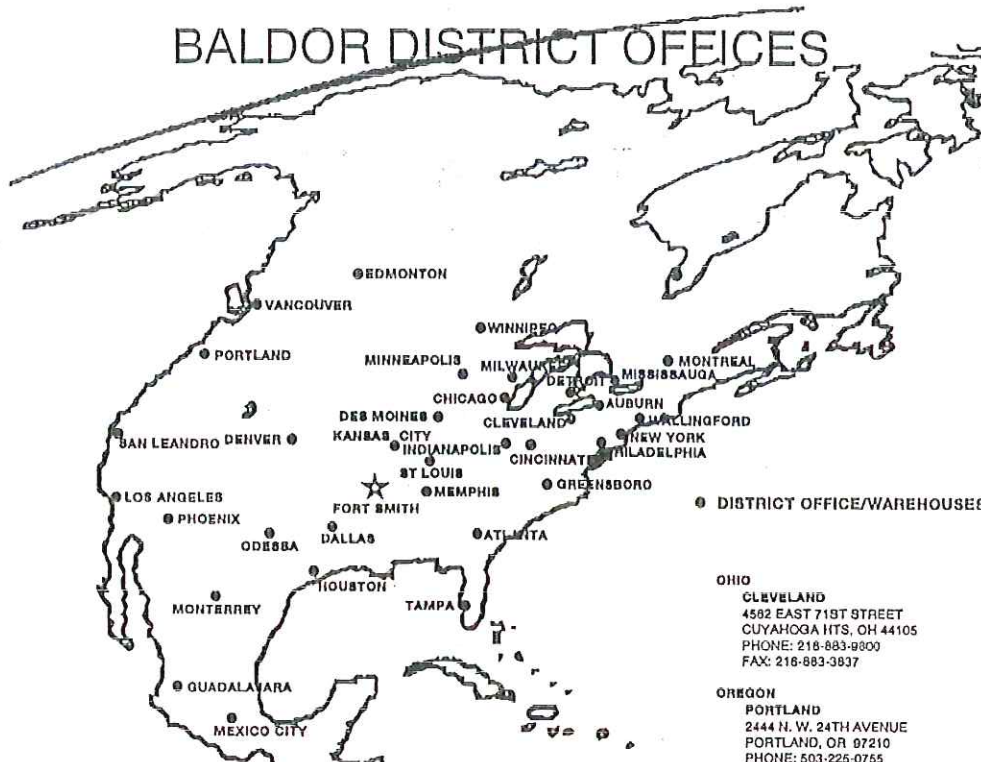
## TROUBLESHOOTING CHART

SYMPTOM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
Motor won't start	Usually line trouble, such as single phasing at the starter.	Check source of power supply. Check overloads, fuses, controls, etc.
Excessive humming	High voltage Eccentric air gap	Check input voltage and for proper connections. Have motor checked at local service center.
Motor over-heating	Overload. Compare actual amps nameplate rating. Single-phasing Improper ventilation Unbalanced voltage Rotor rubbing on stator Over voltage or under voltage Open stator windings Grounded winding Improper connections	Check for excessive friction in motor or driven equipment. Reduce load or replace motor with unit of greater capacity. Check current, all phases. Should be approximately equal. Check external cooling fan to be sure air is moving properly through cooling fins. Check voltage, all phases. Should be approximately equal. Check air gap clearance and bearings. Check voltage. Check stator resistance in all three phases for balance. Dialectric test and repair. Recheck all connections in accordance with connection diagram.
Bearing over-heating	Misalignment Too much tension in belt drive Excessive end thrust Too much grease in bearing Insufficient grease in bearing Dirt in bearing	Realign motor and equipment Reduce belt tension to a point adequate for load. Reduce thrust from driven machine. Remove grease until cavity is approximately 3/4 filled. Add grease to bearing until approximately 3/4 filled. Clean bearing and bearing cavity. Repack with correct grease.
Vibration	Misalignment Rubbing between rotating and stationary parts Rotor out of balance Resonance	Realign motor and driven equipment. Eliminate cause of rub. Have rotor balance check and repaired at local repair center. Tune system or contact a local service center for assistance.
Noise	Foreign material in air gap or ventilation openings.	Remove rotor and foreign material. Replace rotor. Check integrity of insulation. Check ventilation openings.
Growling or whining	Bad bearing	Replace bearing. Purge and replace grease.

## THREE YEAR WARRANTY

BALDOR premium efficiency electric motors are warranted for a period of three (3) years, from the date of shipment from the factory or factory warehouse against defects in material and workmanship. Standard efficiency motors are warranted for a period of one (1) year, from the date of shipment from the factory or factory warehouse against defects in material and workmanship. To allow for stocking and or fabrication period, the warranty period will be extended for an additional period of six months of shipment date from factory or factory warehouse stock. In no case will the warranty be extended for a longer period. BALDOR extends this limited warranty to each buyer of the electric motor for the purpose of resale and to the original purchaser for use.

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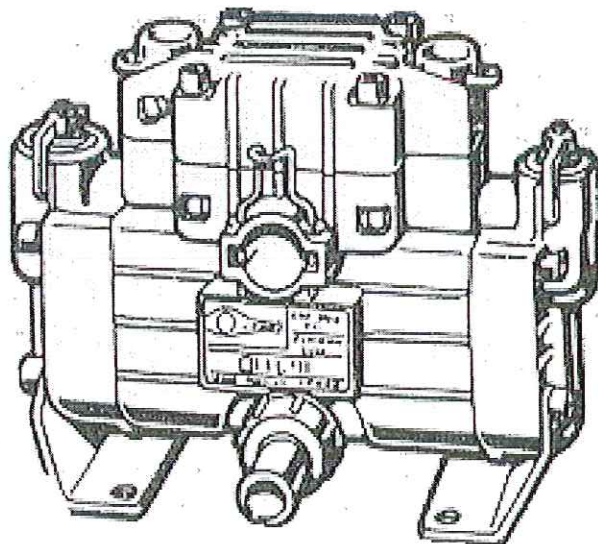
**BALDOR**  
MOTORS AND DRIVES



A World Leader in Diaphragm Pumps

## Operating and Maintenance Manual

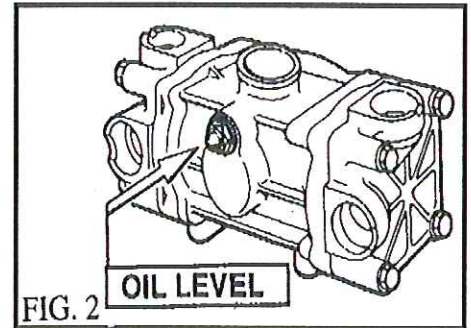
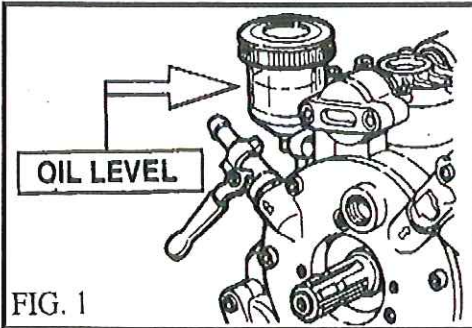
# MP20 Twin Diaphragm Pump



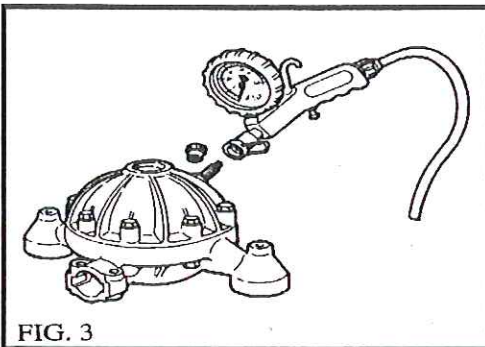
# OPERATING INSTRUCTIONS

## Preliminary Maintenance

A) Check oil level, when pump is idle and placed horizontally, it must be at the mark indicated on the oil site glass (fig. 1) or be visible on the oil level plug (fig. 2), depending on type of pump. Top off with SAE non-detergent oil if necessary.



B) Check the air pressure in the pressure accumulator if applicable, (fig. 3) depending on the range of pressure used in the pump. Pressurize according to table A. The pressure may be checked and changed accordingly using an air pump.



TAB. A

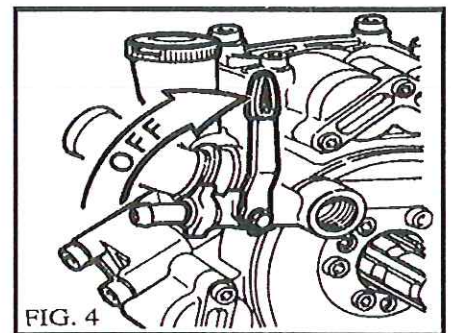
Pressure accumulator (psi)	Pressure of pumps (psi) When in use
30	30-75
30-75	75-150
75-105	150-300
105	150-750

**ATTENTION:** before starting the pump, make sure that taps not in use are in the "closed" position (fig. 4).

**ATTENTION:** Make sure that the moving parts of the pump are properly protected and are not accessible to other persons not authorized.

**NOTICE:** if the machine is used at a very low temperature, make sure there is no ice inside the pump and manifolds, turning the eccentric shaft of the pump by hand, after disconnecting it from the tractor.

**NOTICE:** Avoid exposing pump to freezing temperatures. If this is unavoidable run antifreeze through pump for several minutes then purge system of any antifreeze before use.



## STARTING

- Follow the pump Manual instructions.
- The pump must turn at a rotation speed between 400 - 550 rpm.
- To prime pump quickly, keep the suction circuit at "0" pressure or near to "0". Repeat this operation each time the pump is emptied.
- Bring the pump to the rated pressure according to the type of work to be carried out by regulating the pressure of the control. The pressure must not exceed the maximum pressure of the pump.
- Control the oil level during the first few hours of operation and add oil (when pump is idle) if necessary.

## MAINTENANCE

Wash the pump after use by running clean water through it for a few minutes.



# MAINTENANCE

Periodical maintenance to be carried out by user as follows:

**ATTENTION:** check pump only when it is not running.

## OIL

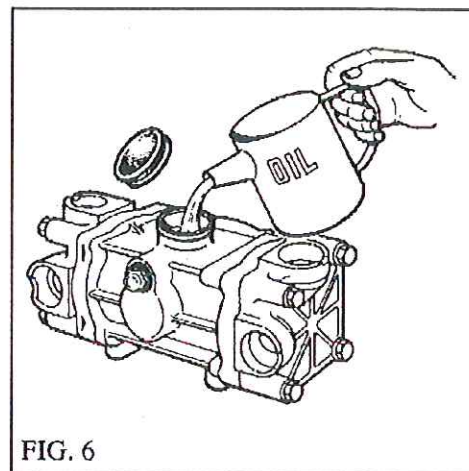
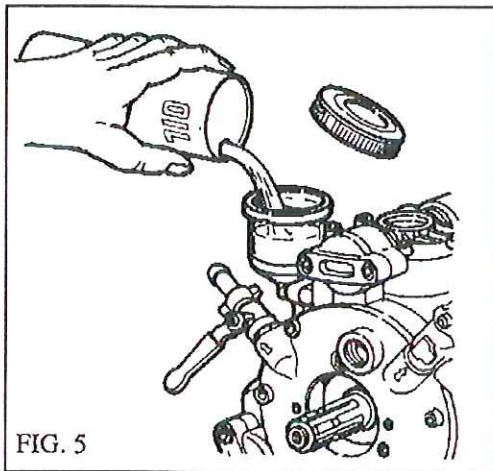
The level and cleanliness of the oil should be frequently checked (eg: each time the tank is filled). This will indicate if the pump and diaphragm are working properly.

## OIL LEVEL

When pump is not on the oil level must correspond to the reference slot found on the oil sight glass or oil level cap depending on type of pump. The oil level is not always constant when the diaphragm pump is working: the pump level is lowered when the pump starts working and is without liquid, when the water arrives, it rises to normal level.

During operation attention must be made to a decrease in the oil level:

a) if this happens during the first hours of working it is normal. Add SAE 10W30 type oil to proper level as in fig.5. For pump BP 60 where the oil sight glass is not present, remove the diaphragm and the rubber cap (fig.6). When remounting the manifold tighten the connecting plate screws to a torque of 17 Nm.



b) if this happens after many hours of work and continues after 1 or 2 top offs, it is a symptom of diaphragm swelling caused by choking during inlet (dirty filter, deformed inlet tube or chemical attack to diaphragm). In this case check the filter and inlet system and/or refer to a specialized technician to check the diaphragm.

## STATE OF OIL IN THE CASE OF BROKEN DIAPHRAGM

If the oil becomes white (water present in oil), it may be a symptom of breakage of one or more diaphragms, therefore it is necessary to stop work and let a specialized technician check the conditions of the diaphragm and substitute if necessary.

### **Notice:**

- If work is continued during these conditions it may cause serious damage to internal parts of the pump.
- If it is not possible to substitute the diaphragm within one day of its breakage, empty the crankcase of water and pour in oil (even used) or diesel oil to stop rust from forming on the internal components .

## INLET SYSTEM

The inlet system must be kept efficient, that is:

There must not be:

- Entrance of air caused by tube wear;
- Loosening of fittings;
- Wear of joints;

Regarding this, check that there are no small drips when the pump is still, this means air is entering the pump when in motion.

The filter must be maintained and kept clean with frequent inspections especially if powder based products are used.

## PUMP FIXING

**ATTENTION:** periodically check, especially when there is vibration during use (chain tractors, gasoline/diesel engines) that the pump fixing screws on the machine frame are tightened and if necessary re-tighten according to the machine manufacturer instructions.

## PRESSURE ACCUMULATOR

Check pressure in pulsation dampner, if present, and for pulsation on the pressure gauge.

## EXTRA MAINTENANCE

The following maintenance operations must be carried out periodically by a specialized technician.

## OIL REPLACEMENT

It is advised to replace the oil after the first 300 hours of work and then every time the diaphragm is changed.

**ATTENTION:** The oil must be collected in the proper containers and not thrown into the environment.

## DIAPHRAGM REPLACEMENT

At the end of every season it is advised to check the diaphragms and see to their replacement if worn or distorted . If particularly strong chemical products are used and if a guarantee is wanted for a perfect efficiency of the pump, when work begins again it is advised to replace the diaphragms regardless of their state.

## INLET AND DELIVERY VALVES

Periodically check (every 300 hours under normal working conditions) the state of the inlet and delivery valves. The maintenance must be more frequent if sandy liquid or abrasive liquids are used. It must also be carried out if drops or changes of pressure, irregular functioning and strange noises are noticed.

# MAINTENANCE CHART

OPERATION	Maintenance Intervals			
	Every 8h	Every 50h	Every 300h	End of season
CHECK STATE AND LEVEL OF OIL	X			
CHECK PRESSURE ACCUMULATOR		X		
CHECK INTAKE (TUBES & FITTINGS)		X		
CHECK AND CLEAN THE INLET FILTER	X			
CHECK FIXING OF PUMP MOUNTING		X		
CHECK DIAPHRAGM AND POSSIBLE SUBSTITUTE				0
CHANGE OIL			0 (1)	0 (2)
CHECK INLET/DISCHARGE VALVES			0	
CHECK TIGHTENING OF PUMP SCREWS				0

Note: X operation to be carried out by the operator  
0 operation to be carried out by specialized technician  
(1) first oil change  
(2) change to be carried out same as diaphragm change

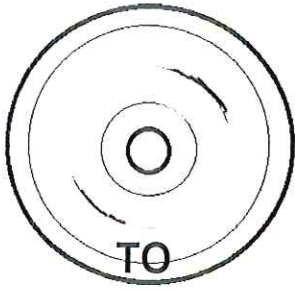
## TROUBLE SHOOTING

SYMPTOM	CAUSE	REMEDY
The pump does not charge	Air inlet Regulation valve closed control group not at zero Valve and/or site of inlet valve and delivery worn or dirty	Check for inlet blockage Position the lever  Replace or clean
The pump does not reach the desired pressure	Worn valve and/or site of regulation valve Valve and/or site of inlet valve and delivery worn or dirty Insufficient rpm's. Worn nozzles used or holes too big	Replace or clean Replace or clean  Bring the rpm to 350 - 550 rpm Replace
Pressure irregular or with pulse	Valve and/or site of inlet valve and delivery worn or dirty	Replace or clean
	Air inlet	Check for inlet blockage
Excessive diaphragm vibrations	Pressure accumulator discharged or with incorrect air pressure	Bring air to correct pressure
Noise when oil level is lowered	Blocked inlet	Check for inlet blockage.
Water present in oil	Broken diaphragm	Replace. If replacement is not immediate, empty water from pump introduce oil without water (even used) or naphtha to stop internal parts from rusting.

## WARRANTY INFORMATION

- The Manufacturer warrants its products for 12 months from the date of purchase, provided that the below is sent to the Manufacturer fully filled out and within 10 days from the delivery date.
- In accordance with the above –mentioned terms, the Manufacturer agrees to furnish free of charge any replacement parts for such parts as, in the Manufacturer's opinion or that of their authorized representative, are defective either in material or manufacture. In any case transport and labor costs shall be charged to the customer.
- The product returned to Comet S.p.A. for warranty inspection or repair must be sent back together with each single part the unit is complete with and must not have been improperly damaged. Comet will otherwise decline all responsibility for any warranty claims.
- The warranty does not include any payment for faults due to incorrect usage by the operator and for parts falling within the usual maintenance, such as: Gaskets, diaphragms sealing rings, oil and so on.
- The Manufacturer shall not be held responsible for accidents to the operator or third parties while the equipment is in use.
- This warranty shall not be valid if:
  - A) Previous service or repairs were performed by unauthorized individuals or companies.
  - B) The equipment was previously repaired with non original parts
- Breakdowns and failures in our machines during or after the warranty period, do not grant any right to suspend payments for the goods delivered which have already been agreed to. Nor can such breakdowns and failures be used to excuse further delay in such payments
- The Manufacturer reserves the right at any time to carry out any and all changes to improve his products. Nor shall he be obliged by this to add such improvements to units previously manufactured already consigned or in the process of installation.
- These general conditions of warranty hereby substitute and nullify every previous condition expressed or implicit.

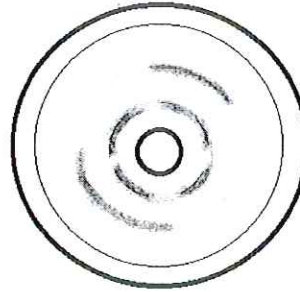
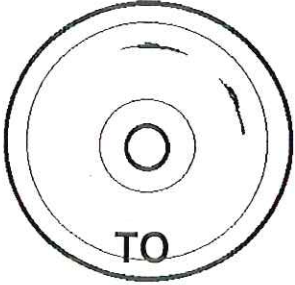
# Common causes of diaphragm failure



Two marks in correspondence to valve seat

**Causes**

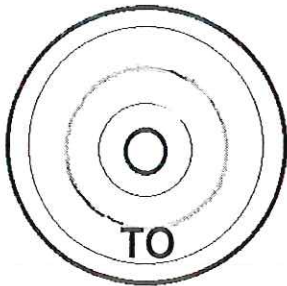
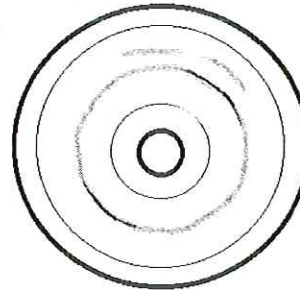
1. Restricted suction. Blocked suction filter. Suction hose blocked or kinked. Suction lift too high. Spray mixture too thick (dense)
2. Pump RPM above specification
3. Suction valve not sealing
4. Cylinder Sleeve holes not in correct position
5. Chemical incompatible with diaphragm material, in addition to one of the above causes.



Fatigued and worn underneath piston retaining disc and two marks in correspondence to valve seat.

**Causes**

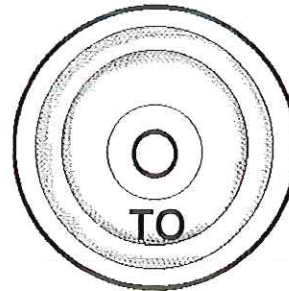
1. Chemical incompatible with diaphragm material
2. Diaphragm swollen and soft
3. Diaphragm soft and spongy (Below 60°)
4. Diaphragm profile distorted
5. Diaphragm shape distorted
6. Increase in external diameter
7. Diaphragm swollen



Circular fracture on piston side of diaphragm that is same size as piston.

**Causes**

1. Excessive wear between piston and valve
2. Suction has too much pressure (excessive head)
3. Low pump RPM
4. Cylinder sleeve holes not in correct position
5. Delivery valve not sealing
6. Low oil level in pump



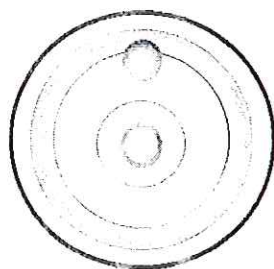
Fracture on external diameter and worn or fatigued under piston retaining disc.

**Causes**

Fatigue breakage, diaphragm worn out

**Remedy**

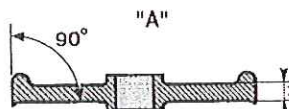
Diaphragm must be checked once a year.



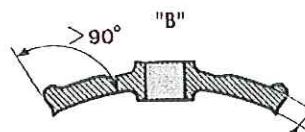
Straight fracture

**Causes**

Incorrect air bleeding, air trapped under diaphragm



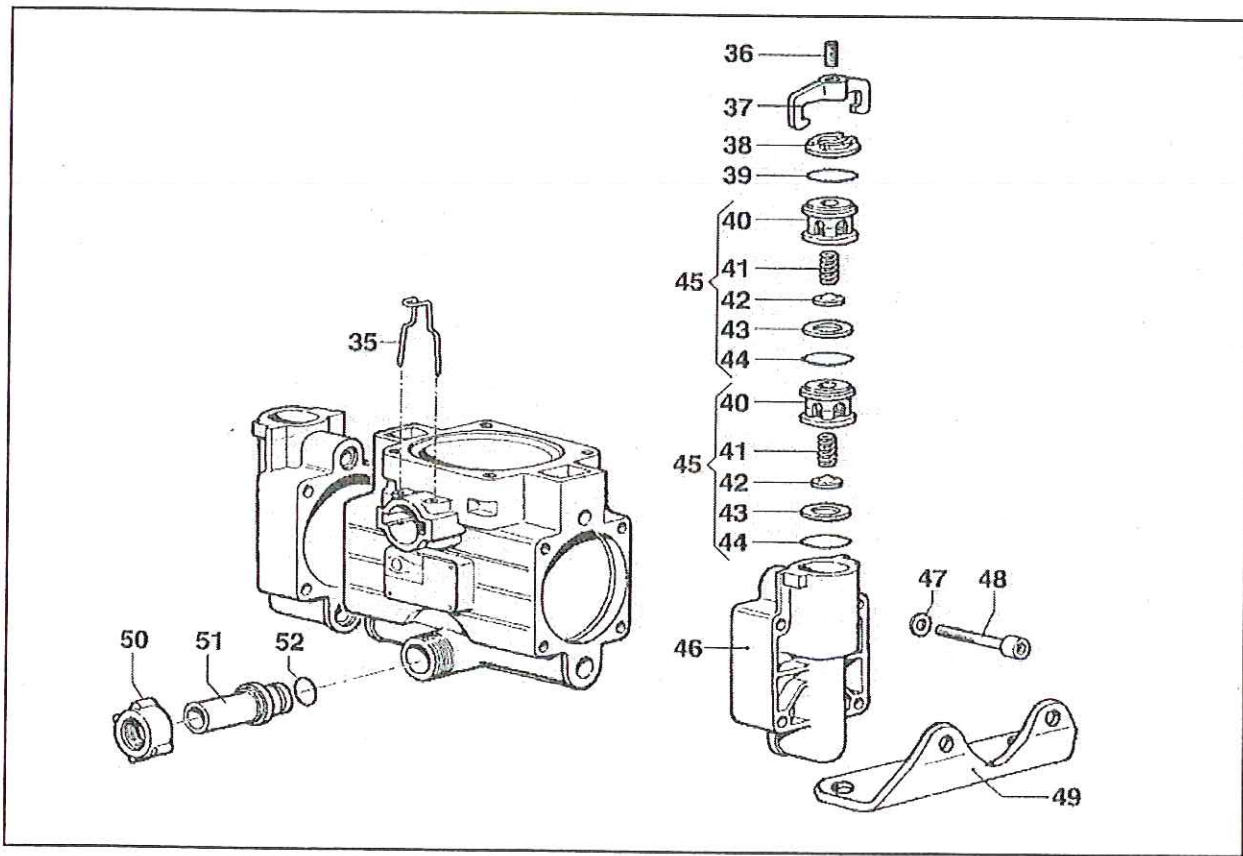
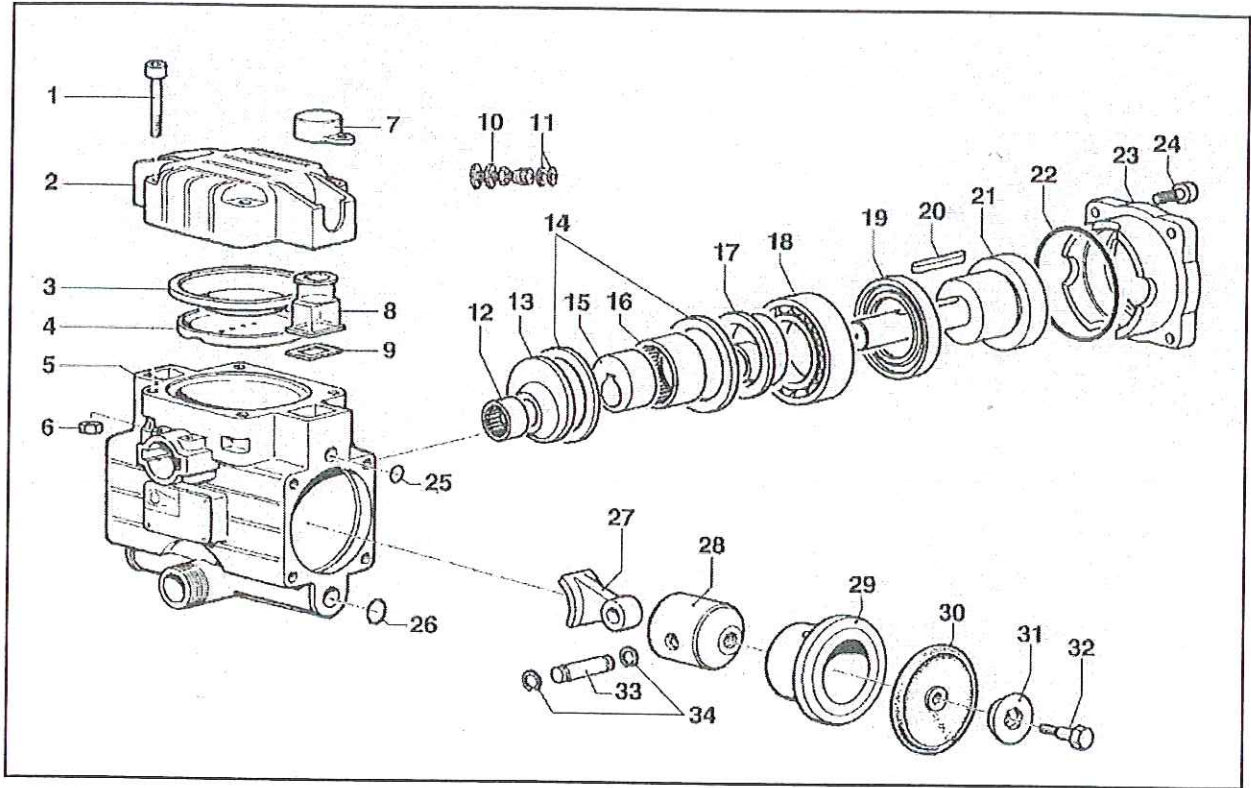
A. Standard shape



B. Diaphragm distorted

B. Swollen diaphragm

# MP20 Parts Breakdown



# MP20 Parts List

Code	Krendl Part #	Part #	Description	Qty
1		3609 0095	screw	4
2		0003 0023	pulsation dampner	1
3	P-1800-33	1800 0033	diaphragm	1
4	P-460-11	0460 0011	support	1
5		0403 0083	crankcase	1
6		0604 0105	screw	4
7	P-1800-81	1800 0081	oil cap	2
8	P-421-13	0421 0013	oil cap	2
9	P-1201-71	1201 0071	gasket	2
10	P-3610-3	3610 0003	air valve	1
11	P-1209-33	1209 0033	gasket	2
12	P-437-26	0437 0026	roller bearing	1
13	P-2813-47	2813 0047	washer	1
14	P-10-8	0010 0008	connecting rod ring	2
15	P-800-6	0800 0006	spacer	1
16	P-437-27	0437 0027	roller bearing	1
17	P-2813-23	2813 0023	washer	1
18		0438 0037	ball bearing	1
19	P-19-23	0019 0023	oil seal	1
20		1602 0021	key	1
21	P-4-10	0004 0010	shaft	1
22	P-1210-69	1210 0069	o-ring	1
23	P-405-22	0405 0022	support	1
24		3609 0009	screw	4
25	P-1210-57	1210 0057	o-ring	2
26	P-1210-21	1210 0021	o-ring	2

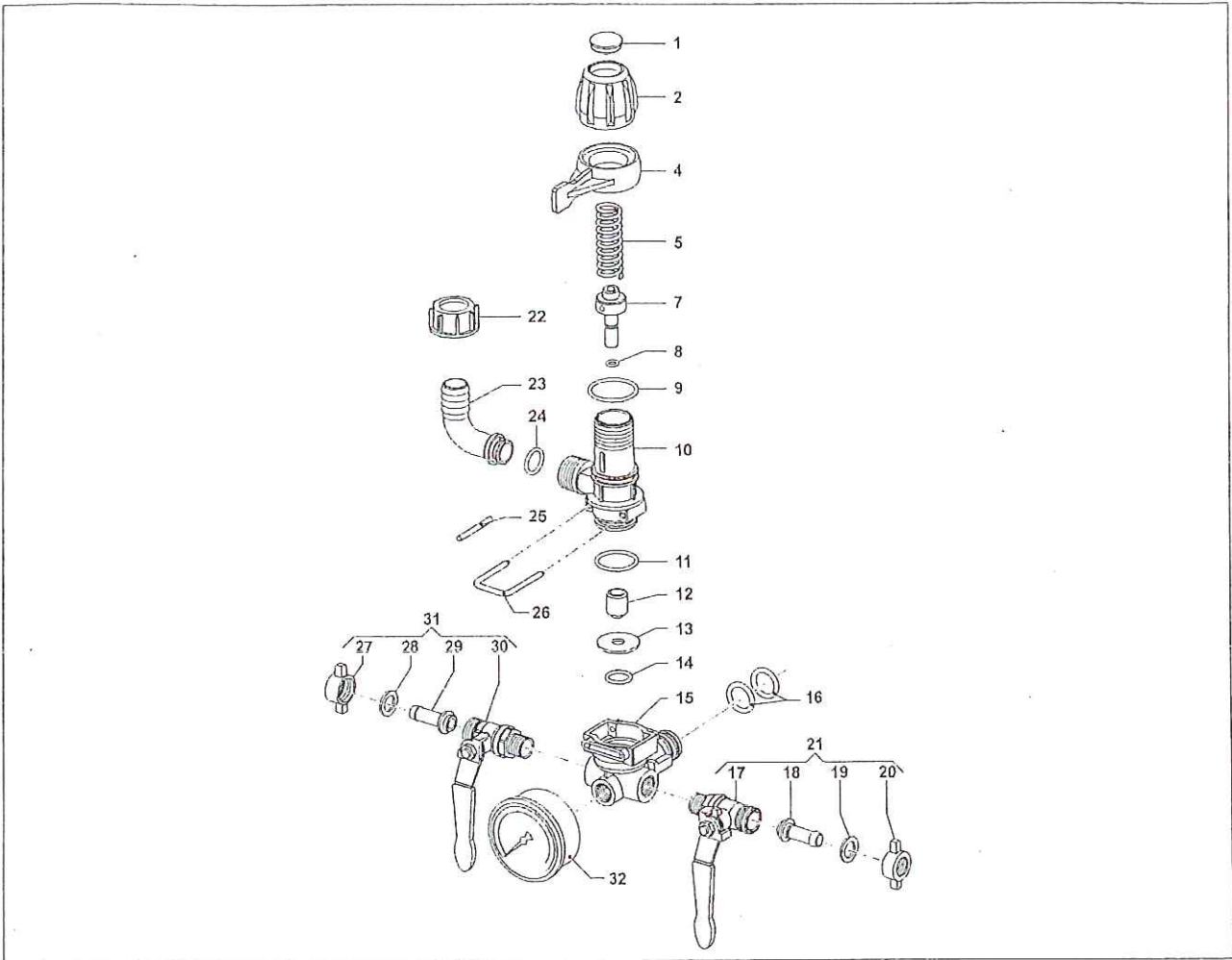
Code	Krendl Part #	Part #	Description	Qty
27	P-205-21	0205 0021	connecting rod	1
28	P-2409-23	2409 0023	piston	
29	P-400-30	0400 0030	piston sleeve	2
30	P-1800-20	1800 0020	diaphragm	2
31	P-602-8	0602 0008	retaining disc.	2
32	P-3605-27	3605 0027	screw	2
33		3011 0006	piston rod	2
34	P-3020-20	3020 0020	retaining clip	4
35	P-1202-17	1202 0017	hook pin	1
36	P-3622-17	3622 0017	screw	2
37	P-418-33	0418 0033	u-bolt	2
38	P-3202-81	3202 0081	plug	2
39	P-1210-191	1210 0191	o-ring	2
40	P-1205-21	1205 0021	valve cage	4
41	P-1802-34	1802 0034	spring	4
42	P-3604-7	3604 0007	valve plug	4
43	P-3009-57	3009 0057	balbe seat	4
44	P-1210-191	1210 0191	o-ring	4
45	P-1220-21	1220 0021	valve	4
46	P-3218-69	3218 0069	valve chamber	2
47	P-2811-4	2811 0004	washer	4
48		3609 0159	screw	8
49	P-2400-43	2400 0043	mounting brackets	2
50	P-1200-8	1200 0008	wing nut	1
51	P-2800-19	2800 0019	hose tail	1
52	P-1210-46	1210 0046	o-ring	1

## Repair Kit

Code	Krendl Part #	Part #	Description	Qty
3	P-1800-33	1800 0033	diaphragm	1
9	P-1201-71	1201 0071	gasket	2
25	P-1210-57	1210 0057	o-ring	2
26	P-1210-21	1210 0021	o-ring	2
30	P-1800-20	1800 0020	diaphragm	2
44	P-1210-191	1210 0191	o-ring	4
45	P-1220-21	1220 0021	valve	4
52	P-1210-46	1210 0046	o-ring	1

◦ Gruppo Comando SIRIUS - 2 vie 30 bar - su Pompa  
 ◦ On Pump 2 outlets 30 bar SIRIUS Control Assembly

(1204 0460)



PER POMPE MODELLO: / FOR PUMP MODEL: ◦ MP 20 ◦ MP 30 ◦ MP 40 ◦ MP 40AP

Gruppo Comando SIRIUS - 2 vie 30 bar - su Pompa  
On Pump 2 outlets 30 bar SIRIUS Control Assembly

No	Krendl Part #	Code	Descrizione	Description	Note	Qty
1		3202 0255	Tappo	Plug		1
2		1223 0097	Amello Regol. Molla Press.	Adjustable Nut		1
4		1600 0076	leva comando	Lever		1
5	P-1802-48	1802 0048	Molla (Filo 03,2)	Spring (Wire 03,2)	0e22x59	1
7		2426 0024	Pattino Valvoia Regoiazione	Valve Guide		1
8	P-1210-72	1210 0072	Guarnizione OR Viton	Viton O-Ring	02x6	1
9	P-1210-461	1210 0461	Guarnizione OR	O-Ring	02x32	1
10	P-0424-0367	0424 0367	Corpo Valvola Regolazione	Regulation Valve Body		1
11	P-1210-79	1210 0079	Guarnizione OR Viton	Viton O-Ring	02,62X26,65	1
12		3600 0009	Valvola Pressione	Pressure Valve		1
13		3009 0133	Sede Valvola Regolazione	Valve Seat		1
14	P-1210-21 (235)	1210 0021	Guarnizione OR	O-Ring	02,62x15,54	1
15		0424 0370	Corpo Gruppo di Comando	Control Assembly Body		1
16	P-1210-2 (91, 259)	1210 0002	Guarnizione OR	O-Ring	02,62x20,7	2
17	P-2826-29	2826 0029	Rubinetto DX	Right Top	3/8-1/2 GAS	1
18	P-2802-18 (254)	2802 0018	Raccordo p.g. Mandata DX	Right Delivery Hose Tail	08x10	1
19	P-1209-13	1209 0013	Guarnizione	Gasket	012x18x2	1
20	P-1200-38	1200 0038	Galletto DX	Right Wing Nut	1/2" GAS	1
21		1214 0015	Gruppo Rubinetto DX	Right Complete Top		1
22	P-1200-59	1200 0059	Galletto	Wing Nut	G3/4	1
23	P-1200-80	2801 0080	Raccordo p.g. Aspiraz. Curvo	Suctin Elbow Tail	013 G3/4	1
24	P-1210-36	1210 0036	Guarnizione OR	O-Ring	02,62x13,10	1
25	P-3005-27	30050027	Spina	Pin	4x40	1
26		1202 0051	Gancio	Hook		1
27	P-1200-38	1200 0038	Galletto SX	Left Wing Nut	1/2" GAS	1
28	P-1209-13	1209 0013	Guarnizione	Gasket	012x18x2	1
29	P-2802-18 (254)	2802 0018	Raccordo p.g. Mandata SX	Left Delvery Hose Tail	08x10	1
30	P-2826-30	2826 0030	Rubinetto SX	Left Top	3/8-1/2 GAS	1
31	P-1214-14	1214 0014	Gruppo Rubinetto SX	Left Complete Top		1
32		1816 0035	Manometro	Pressure Gauge	30 bar	1





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