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TREBOR
A Unit of IDEX Corporation

MAGNUM 620R PUMP

Operation / Maintenance Manual

SERIAL NUMBER (located on back of product):

IDEX CORPORATION

PATENTS: U.S. 09642426, U.S. 06106246, U.S. 05971402, U.S. 05370507 04/11/2014– M620R-B

CONTENTS

1 INSTALLATION

1.1 UNPACKING

After unpacking, the pump should be checked for any damage that may have occurred during shipment. Damage should be reported to the carrier immediately.

The following items should be included within the shipping container:

Qty	Item	Description
1	620	Magnum 620 Pump
1	M620R	Operation/Maintenance Manual

1.2 UTILITIES / HOOK-UP

It is recommended that the pump be positioned within 15° from level to maintain self-priming ability and pumping efficiency. Allow sufficient room for tubing connectors. The pump mounts on a quick-change base for easy installation.

The pump has an exhaust location on the backside of the master head. The exhaust location requires 1/2" (12mm) minimum clearance behind the master head. Care should be taken to prevent flooding the exhaust port when the pump is located in a wet bench plenum. For remote exhaust connection see Section 0.

Air Inlet: 1/4" FNPT (3/8" Dia. [8mm] supply tube minimum).

Air Supply: 20-80 psig (1.4 – 5.5 bar) clean dry air or nitrogen (see Performance Charts, Section 3.1).

Fluid Ports: 1" NPSM – additional adaptor port options available. Inlet/Outlet adaptor fittings and Surge Suppressor require torqueing during pump installation. See Section 2 for hook-up diagram and torque values.

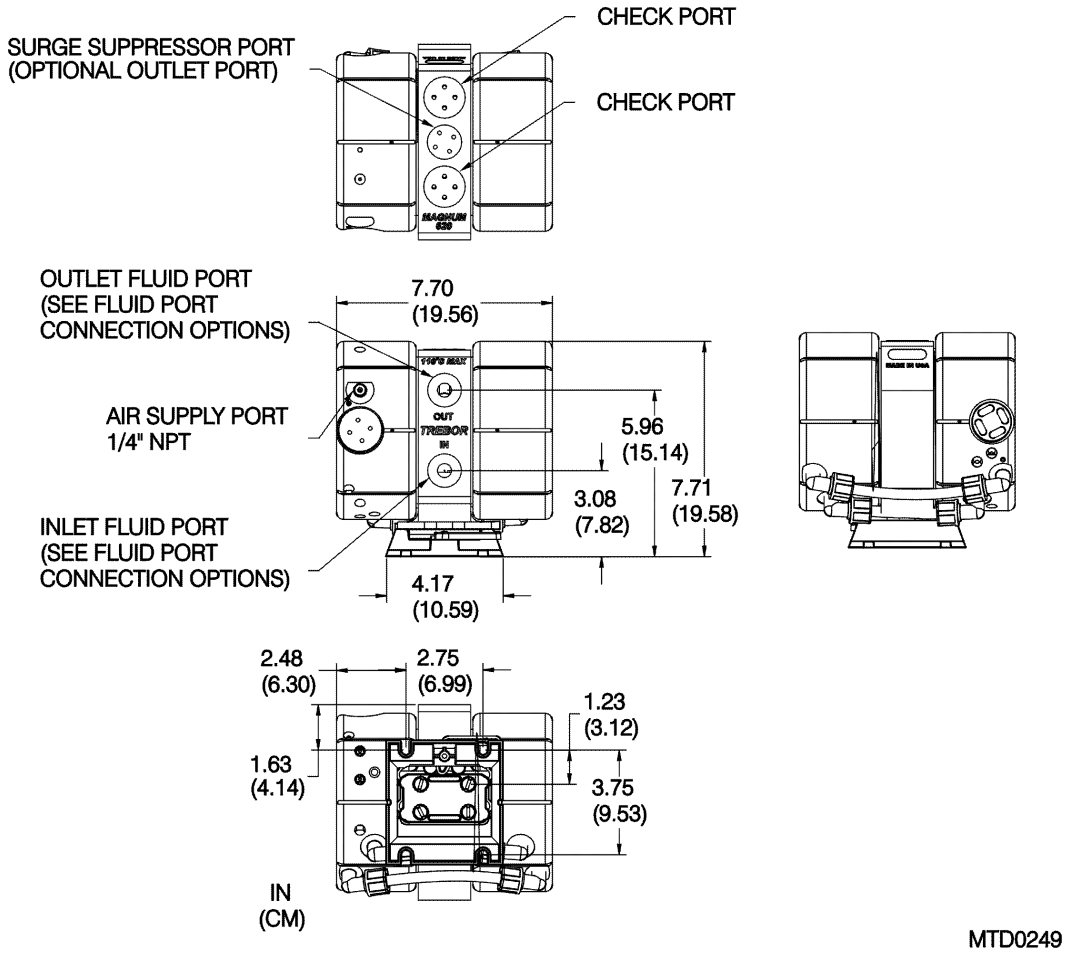


Figure 1-1: Dimensional Views

ATTENTION: The pump should be operated with clean, dry air or nitrogen. Particulate, water and oils in the air supply can damage the pump.

NOTE:

1. It is recommended that a filter be placed on the discharge side of the pump.
2. Although extensive efforts are made to deliver pumps to our customers completely dry, new pumps may contain residual moisture from their final DI water test.

Recommended Maximum Operating Levels:

Temperature Range	Supply Pressure Max
< 60°C	80 PSI (5.5 bar)
60°C - 110°C**	60 PSI (4.1 bar)
*110°C Maximum Fluid Temperature	

1.3 CHECK MUFFLER OPERATION

1.3.a Purpose

NOTE: The check muffler is not designed to control pump speed. Use of the check muffler for this purpose could result in serious damage to the pump.

- Permits pump to operate reliably in systems that incorporate a discharge flow less than 3 gpm.
- Permits pump to operate reliably in systems that have the pump located at an elevation below the liquid supply level and flows below 3 gpm. (Pump air supply remains on.)
- Effectively reduces the amount of harmful acid vapors that can enter into the pump's internal air circuit components while the pump air supply is off.

1.3.b Adjustment

The check muffler has 3 preset arrangements. The pump is shipped from the factory in the medium back pressure setting, see Mid-Setting in Figure 1-2: Check Muffler.

Mid-Setting

- Start pressure <15 psi
- Low flow applications (flow <3 gpm)
- The Check Muffler is preset at the factory at the mid-setting. This setting protects the pump air system from caustic fumes and allows the pump to maintain a "Dead Head" condition with supply pressures up to 35 psi. This setting also protects the pump in conditions of positive inlet supplies up to 10 ft. above the inlet of the pump.

High-Setting

- Start pressure at <30 psi
- Air supply >40 psi, low flow application (flow <3 gpm)
- By removing the muffler from the pump and reversing the spring assembly in the muffler then reinstalling the muffler, the Check Muffler is now set in the highest back pressure setting. This setting protects the pump from dead head conditions up to 60 psi, or from positive inlet heads up to 20 ft. However, this setting is not recommended for operating fluid temperatures over 60°C as damage to the pump shaft can occur. This setting also diminishes the pump's flow capacity by 15% from normal published curves. This setting also increases the pump start pressure from 15 psi to approximately 30 psi.

Low-Setting (no picture shown)

- Spring assembly removed
- Start pressure <10 psi
- Low back pressure, high flow (>3 gpm) requirement

- If none of the aforementioned conditions exist when operating the pump, then the final setting of the check muffler may be used. To obtain maximum flow capability and lowest start pressure (<10 psi), completely remove the spring assembly from the check muffler assembly. This is the recommended condition to obtain best performance and life from the pump. Most normal open recirculation applications may be operated successfully under this condition.

NOTE: Air consumption during "Dead Cycling" is very little since the pump diaphragms are displacing only internal bypass. "Dead Cycling" should be considered as a normal standby idle mode.

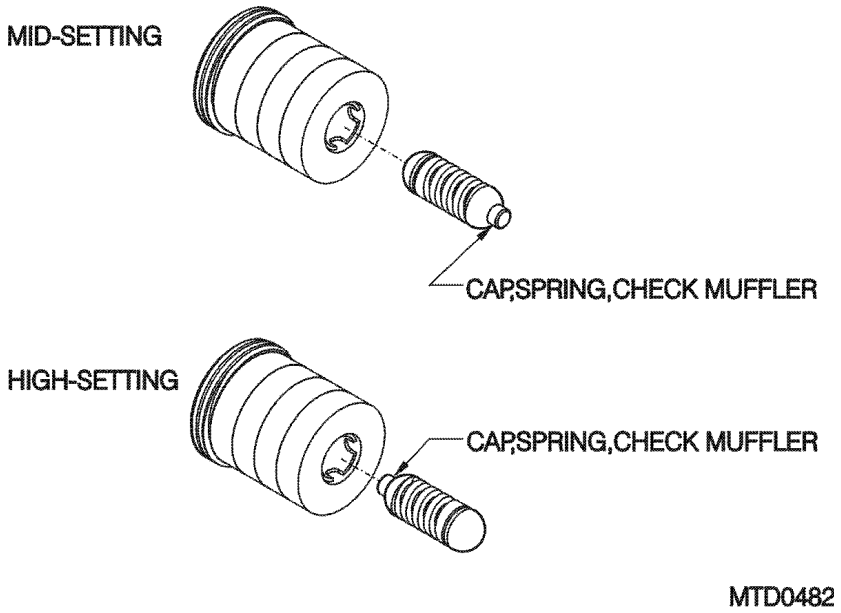


Figure 1-2: Check Muffler

1.4 REMOTE EXHAUST HOOK-UP

Some installations may benefit from remotely exhausting air from the pump to eliminate unwanted air turbulence or to prevent potentially damaging chemical vapors from entering the pump air cavities.

- Remove existing Muffler Assembly from the back of pump head.
- Install Exhaust Plug in Exhaust Port.
- Install the appropriately sized (3/8" OD) fitting and tubing (not provided) to remote exhaust. A remote muffler assembly may be installed at the point of exhaust if required for condition needing the check muffler (see Section 1.3.b).

NOTE: To maintain optimum pump performance use 3/8" (8mm) tubing minimum at a length of 10 ft. (3 meters) maximum.

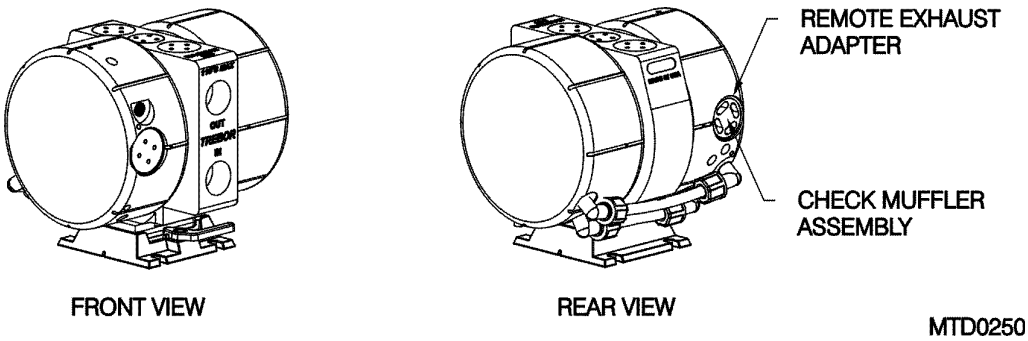


Figure 1-3: Remote Exhaust

2 OPTIONS

2.1 FLUID PORT CONNECTION OPTIONS

NOTE 1: Use O-ring to seal stainless steel or other rigid plumbing.

Available Options

A) Flare style tube adapter….1/2” and 3/4"
B) PFA tube stub out……...3/4"
C) Pillar Super 300……..3/4” OR 1”
D) PFA Weldable pipe…….3/4"

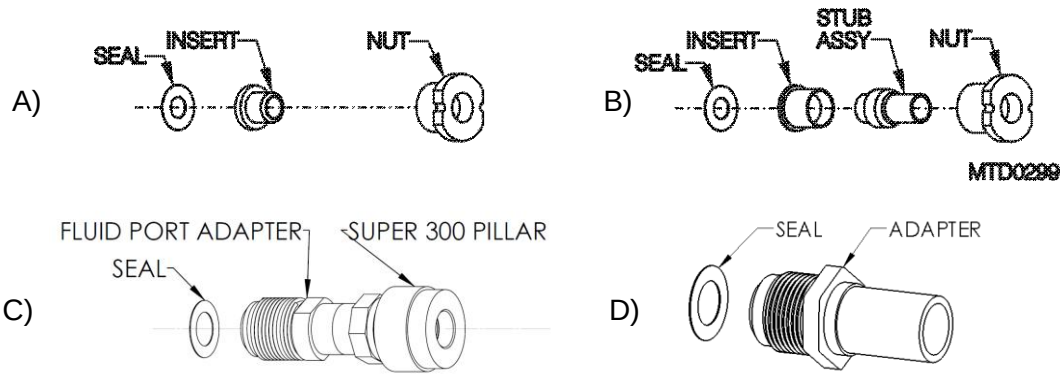


Figure 2-1

2.2 FLUID FITTINGS / SURGE SUPPRESSOR HOOK-UP

Surge Suppressor	Assembled Height: IN (CM)
MODEL SS40	12.63 (32.08)
MODEL SS85	14.97 (38.02)

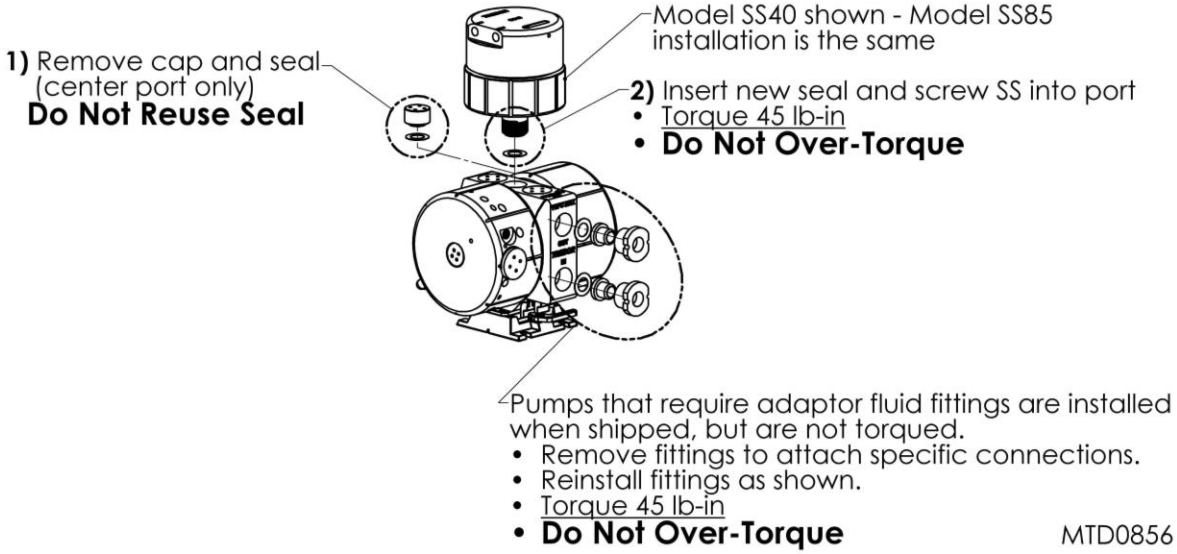


Figure 2-2

NOTE: See Surge Suppressor Operation Manual for detailed installation instructions.

3 START-UP

- Pump air supply pressure must be regulated. (See Figure 3-3: Pressure vs. Fluid Temperature Chart.)
- Open the fluid suction (IN) line valve, if necessary.
- Open the fluid discharge (OUT) line valve, if necessary.
- Start slowly with air regulator at low (> 20 psi) pressure setting. Increase pressure to attain desired flow, up to the maximum rating (See Section 3.1).
- Table 1: Consumption / Efficiency can be used to determine approximate air consumption.
- Refer to Troubleshooting, Section 5, if pump fails to start.

ATTENTION: Prolonged periods (> 5 minutes) of dry running can damage critical internal pump parts.

CAUTION: When handling potentially dangerous fluids under pressure, the pump and its fittings should be placed in an enclosure away from operators.

3.1 PERFORMANCE CHARTS

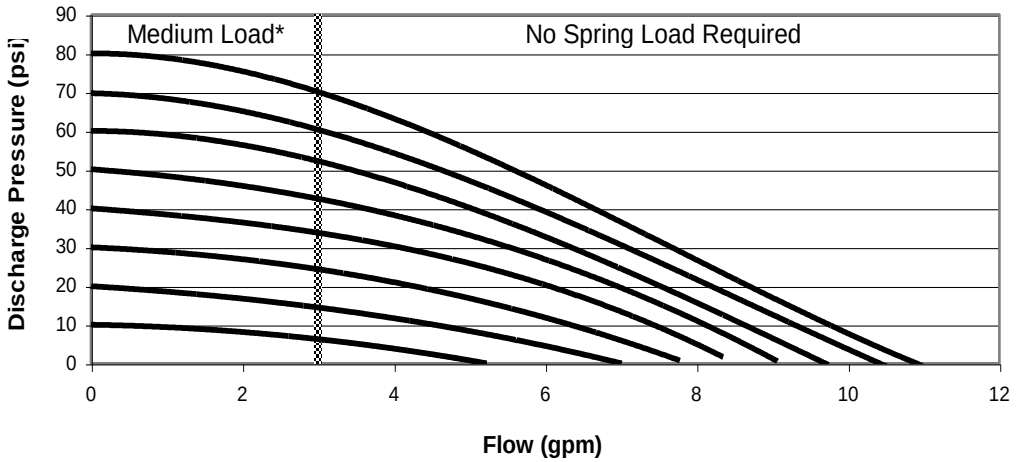
Pumping capacity is a function of air supply pressure and volume, suction head, suction line restrictions, discharge head, discharge line restriction, and fluid specific gravity and viscosity.

Air Supply Pressure (PSIG)	Discharge Fluid Pressure (PSIG)	Air Used (SCFM)	Flow* (GPM)
20	0	4.5	7.2
20	10	3.4	5.3
30	0	7.1	8.1
30	15	5.6	6.0
40	0	9.8	8.6
40	20	7.7	6.3
50	0	12.6	9.7
50	25	10.1	6.9
60	0	15.3	10.5
60	30	12.2	7.2
70	0	18	11.1
70	35	14.9	9.3
80	0	20.6	11.4
80	40	18.3	7.3

Table 1: Consumption / Efficiency

*With check muffler spring assembly removed (see Section 1.3).

NOTE: Specification to be used to size regulators and control valves.



* Switch to high load setting if pump experiences positive inlet condition.

Figure 3-1: Flow Performance

NOTE: Test information is based on specific conditions and limited sampling. Use for general reference only.

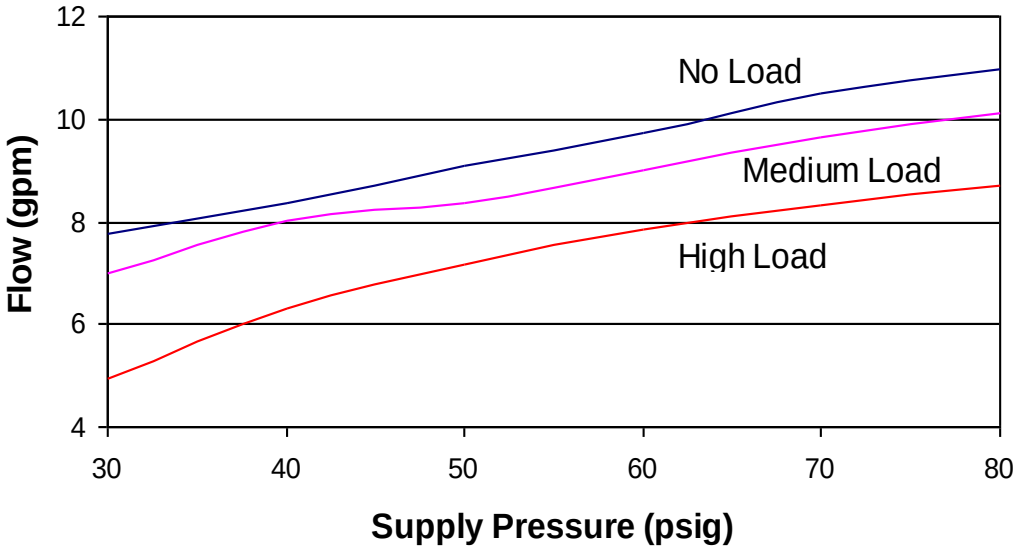


Figure 3-2: Flow Comparison @ Various Loads

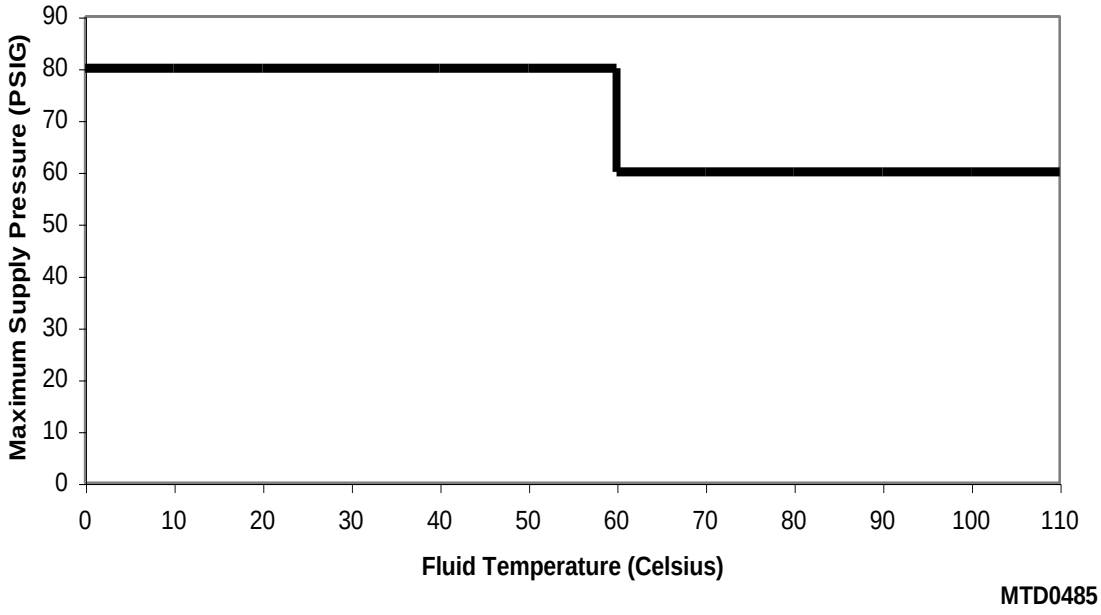


Figure 3-3: Pressure vs. Fluid Temperature Chart
Recommended Maximum Pump Operating Levels

NOTE: Be sure that fittings and tubing used are capable of these operating conditions.

4 MAINTENANCE

Trebor pump maintenance can be divided into two categories: air system maintenance and fluid system maintenance. The purpose of air system maintenance is to prevent air system failures such as stalling or erratic cycling. The purpose of fluid system maintenance is to maintain suction and lift capabilities.

Pump Rebuild Service

Trebor International provides a factory rebuild service for customers using Trebor products. Trebor will rebuild any standard pump (exclusive of options). Please contact Trebor International Sales Department for current rebuild pricing. The fixed rebuild price includes a factory rebuild and parts equivalent to the standard rebuild kit. Each factory rebuild comes with a new one-year warranty. Repairs requiring more extensive part replacements will be quoted prior to proceeding with the pump rebuild. If the pump has exceeded its useful life and cannot be rebuilt, the customer may elect to purchase a new Trebor pump. If the customer chooses not to rebuild or replace the pump, a $150.00 evaluation charge will be required.

All returned pumps are to be shipped freight prepaid with a valid Purchase Order for the cost of rebuild service. Please contact Trebor International prior to returning your pump to obtain an RMA Number and Pump Return Data Sheet to ensure proper safety precautions. Each pump will be evaluated and repaired within 5 working days of the receipt of pump at Trebor facility.

4.1 PREVENTIVE MAINTENANCE SCHEDULE

The following maintenance schedule is recommended to optimize pump performance and minimize failures. Certain operating conditions that require more frequent maintenance intervals have been noted. In positive pressure inlet conditions where suction or lift is not required, fluid system maintenance may be extended.

Adhering to the recommended preventative maintenance schedule along with periodic inspection of the pump will ensure continued efficient operation and overall reliable pump performance.

It is recommended that the Preventive Maintenance Record (Section 4.1.a) be copied, maintained and kept with this unit for future reference.

MAGNUM 620R Maintenance Schedule

	Install	30 Days	3 Months	6 Months	9 Months	12 Months	15 Months	18 Months	21 Months	24 Months
Poppet Pilot Valves and Seats						R				
C-Ring and Detent Legs						R				
Muffler Media						R				
Shaft Seal and Shaft										R
Check Balls and O-Rings										R
Diaphragms										R
Check Plug Seal										R
Suction and Discharge Check Cage										I
I=Inspect, R=Replace										

4.1.a Preventive Maintenance Record

Company Name: _____

Company Address: _____

_____

Product: _____ Serial Number: _____

Date: _____ Tech: _____ Notes: _____

Date: _____ Tech: _____ Notes: _____

Date: _____ Tech: _____ Notes: _____

Date: _____ Tech: _____ Notes: _____

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4.2 RECOMMENDED SPARE PARTS

KR620R-00-A Spares Rebuild Kit, which includes:

Part No	Qty	Description			
KM620R-00-A	1	**Maintenance Kit**			
		Includes:	(2)	AK020	Pilot Poppet
			(2)	L0197	Detent Legs
			(1)	L0145	Detent Ring
			(2)	AW007	Pilot Seat
			(1)	AW045	Muffler Assembly
KD620-00-A	1	**Diaphragm Kit**			
		Includes:	(2)	AW004	Diaphragm
98001415	4	Check Ball			
98002334	4	O-ring, PTFE			
98003322	2	Shaft Seal			
AM064	1	Shaft			
AM083	2	Check Cap Seal			
AW017	1	Damper Port Seal			

In critical applications a spare pump is recommended to minimize possible down time during service intervals.

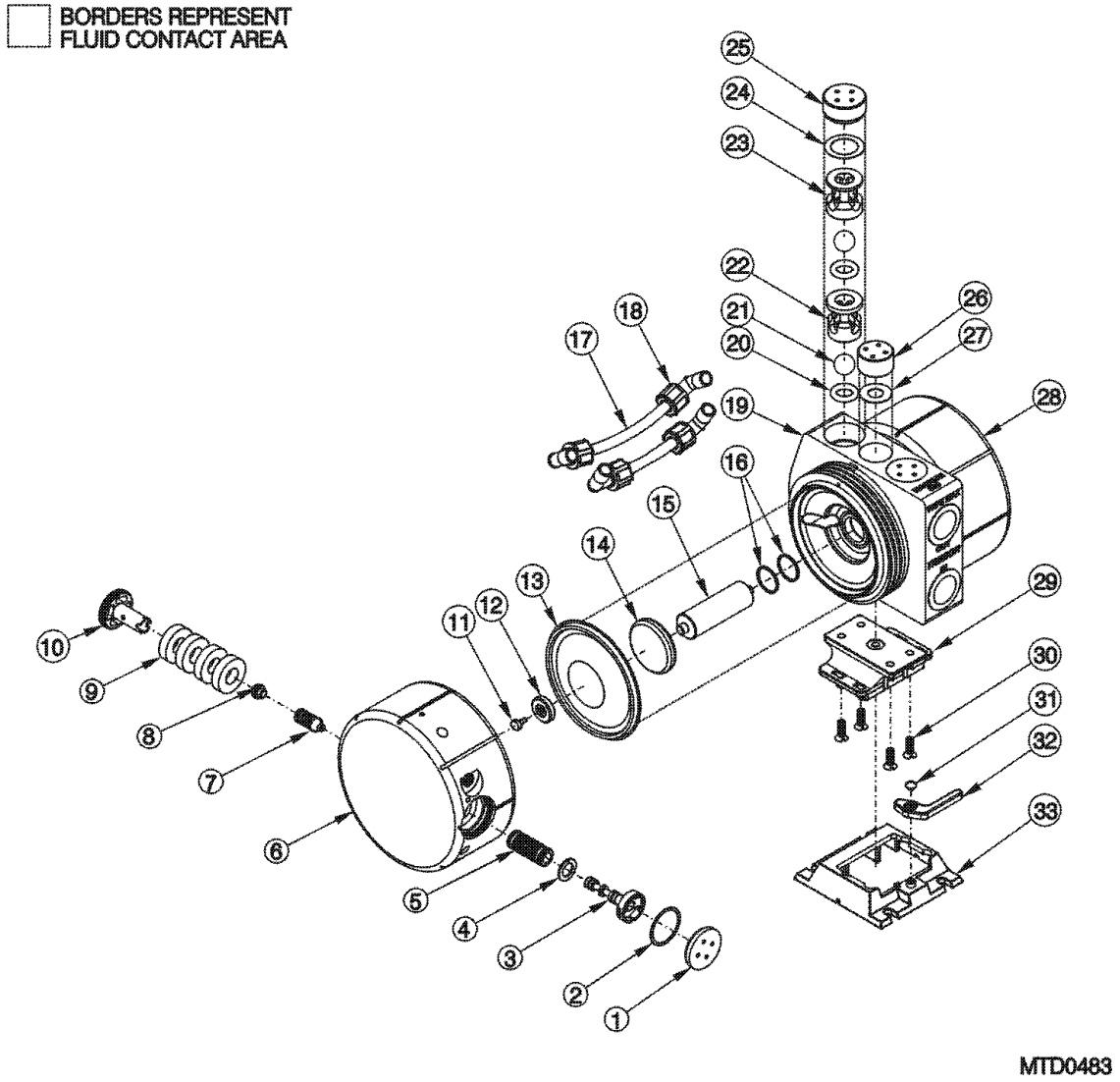
4.3 TOOLS

The following tool kit is recommended as standard service equipment.

KT620-00-A Tool Kit, which includes:

Part No	Qty	Description
98003108	1	Torque Wrench, 30-150 ft/lb., 1/2” Drive Handle
98003150	1	Tool Case
98003305	1	Drive Handle
T000B0014	1	Check Sleeve Removal Tool
T0129	1	Strap Wrench
T0146	1	3/4” Pin Tool
T0154	1	Check Sleeve Insertion Tool
T0155	1	Shaft Bullet
T0157	1	Rebuild Fixture
T0144	1	Cleaning Tool

4.4 PARTS ILLUSTRATION



4.5 PARTS LIST

ILL NO	PART NO	QTY	DESCRIPTION	PM YEAR #	MATERIAL
1	AW021	1	Detent Cap		PP
2	AW022	1	Detent Cap Seal		PTFE
3	AM068	1	Shuttle Spool Assembly		Ceramic, PEEK, Delrin
4	AW023	1	Shuttle Locking Ring		PTFE
5	AK058	1	Shuttle Sleeve Assembly		Ceramic, PTFE
6	AW020	1	Master Head		PP
7	AW044	1	Check Muffler Spring Cap, Offset		PEEK
8	AW043	1	Check Muffler Spring Cap		PTFE
9	C0136	4	Check Muffler Pad (Media)	1	PP
10	AW037	1	Check Muffler Spool		PP
11	AK020	1	Pilot Poppet	1	PFA
12	AW007	1	Pilot Seat	1	PTFE
13	AW004	2	Diaphragm	2	PTFE
14	C0095	2	Push Plate		PTFE
15	AM064	1	Shaft	2	PFA
16	98003322	2	Shaft seal	2	PTFE
17	98001072	2	3/8” Tube		PFA
18	98003395	4	Transfer Tube Fitting		PP
19	AW001	1	Body		PTFE
20	98002334	4	O-ring, PTFE Check Valve	2	PTFE
21	98001415	4	Check Ball	2	PTFE
22	AM060	2	Suction Sleeve		PTFE
23	AM061	2	Discharge Sleeve		PTFE
24	AM083	2	Check Cap Seal	2	PTFE
25	AW003	2	Check Bore Cap		PTFE
26	AW014	1	Damper Port Cap		PTFE
27	AW017	3	Damper and Adapter Port Seal		PTFE
28	AW005	1	Slave Head		PP
29	AW057	1	Base, Quick Release		PP
30	98003207	4	Base Mounting Screw		PP
31	AM023	1	Base Locking Lever		PP
32	98003071	1	Lever Mounting Screw		PP
33	C0102	1	Base		PP

4.6 CLEAN-UP

To help remove potentially dangerous chemicals prior to service or shipment, the pump should be flushed with DI water or disassembled and thoroughly cleaned. Allow DI water to flush through the inlet and out the outlet to prevent pressure build up.

CAUTION: When handling pump, wear appropriate personal protection gear, including safety glasses.

4.7 DISASSEMBLY

During the life of the pump it will be necessary to perform certain preventive maintenance procedures to ensure its continued high performance. This section and the next (4.8, Assembly) are provided for the user’s convenience in disassembly and re-assembly procedures - reference pump exploded view drawing and parts list for assistance in identifying components.

- Immerse or flush the pump assembly using DI water and a neutralizing agent.
- Install mounting fittings in pump adapter ports and lock body into bench mounting fixture. NOTE: Securely attach mounting fixture to work surface using hardware provided.

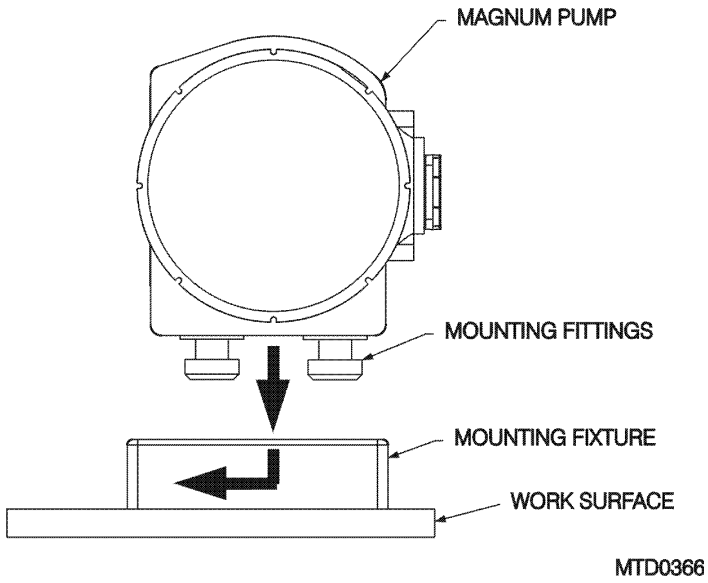


Figure 4-1

- Remove transfer tubes and fittings from pump head.

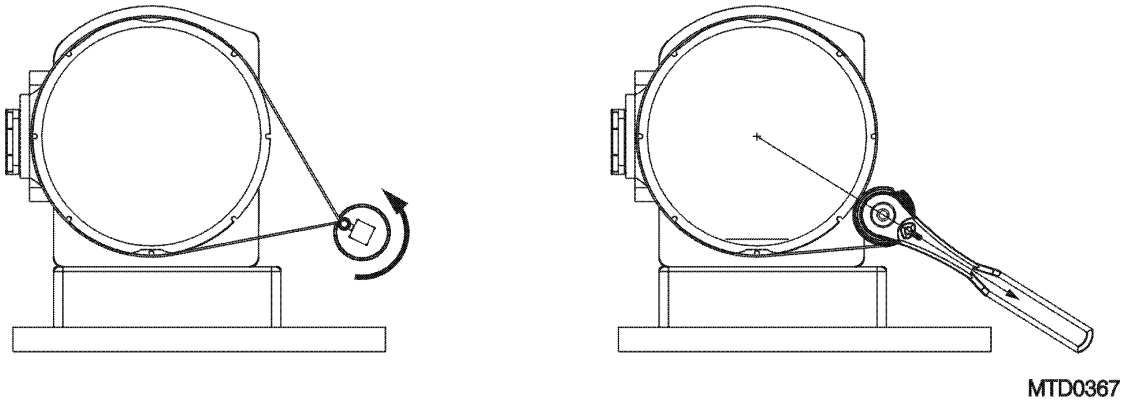


Figure 4-2

- Using a strap wrench, turn heads counter-clockwise to remove.
- Remove head and check diaphragms for cracks or cuts.
- To remove diaphragms, slit diaphragm with a sharp knife and pull the diaphragms from the grooves. (Do not pry on diaphragm seal groove, as this will damage the sealing surface.)
- Unscrew push plate from the shaft in a counter-clockwise direction. Pull other push plate and shaft from pump body.

CAUTION: Following disassembly, parts should be thoroughly washed and free from chemical residue for handling purposes.

4.7.a Body Disassembly

- Remove (2 each) check plugs and seal on top of pump body using 3/4" pin tool.
- Remove discharge sleeve using sleeve removal tool.
- Remove PTFE ball and O-ring.
- Remove suction sleeve using sleeve removal tool.
- Remove second set of O-rings and balls.
- Remove shaft seals from pump shaft seal groove in the center of the shaft bore using the tip of a razor knife. Take care not to damage the shaft bore. NOTE: Do not reuse seals.
- Remove damper plug and seal using 3/4" pin tool.

4.7.b Head Disassembly

- Unscrew and remove pilot seat using 3/4" pin tool. Remove poppet.

4.7.c Master Head Disassembly

- Unscrew and remove muffler assembly from base using the 3/4" pin tool.
- Unscrew and remove the shuttle cap and seal.
- Remove spool assembly from shuttle bore.
- Remove detent legs and detent ring from spool.
- Do not remove the shuttle sleeve from the shuttle bore.
- Remove muffler assembly.

4.7.d Pump Cleaning

- Gently spray clean or dunk rinse all components with DI water to remove any trace materials remaining after disassembly.

4.8 ASSEMBLY

Prior to beginning assembly, inspect all parts to ensure they are clean and dry. Wear clean protective gloves. Precautions should be exercised to prevent contaminating any of the air chamber surfaces with chemicals during handling.

4.8.a Master Head Assembly

Shuttle spool assembly instructions:

- Hold shuttle spool (item 1) upright and align slot 1 in detent legs (item 2) with notch on shuttle spool, see Fig. 1.
- Apply pressure upward onto base of detent legs with thumb and index finger, as shown in Fig. 2.

- Tilt the detent ring (item 3) over one of the legs, and align the groove on the inside of the detent ring with the end of the detent leg. Tilt the other side of the ring down, expanding it slightly, so that the other detent leg snaps into the detent ring groove. See Fig. 3. The completed assembly should look like Fig. 4 (see Figure 4-3).

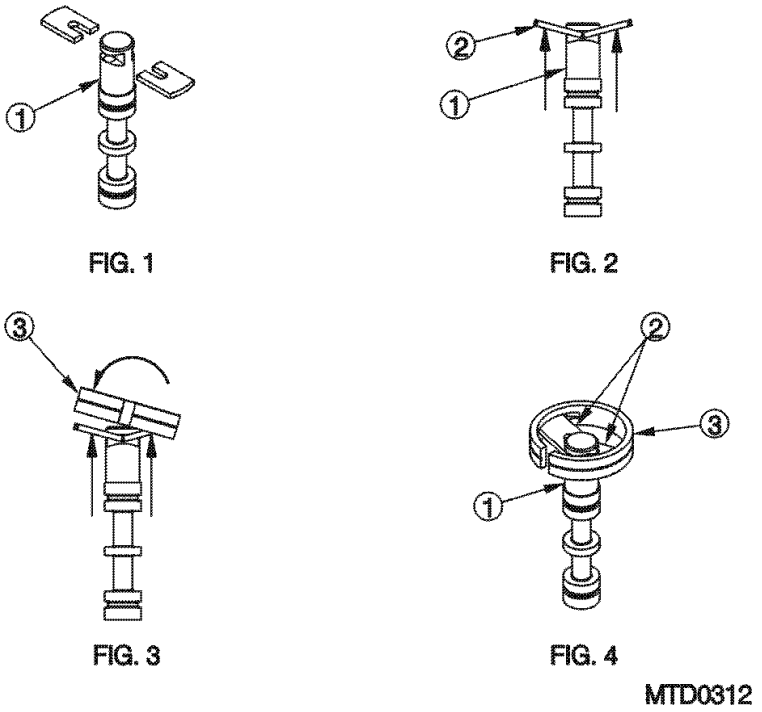


Figure 4-3

- Insert spool assembly into shuttle sleeve (do not lubricate spool or sleeve).
- Install seal onto seal groove shoulder of shuttle cap.
- Thread shuttle cap into head.

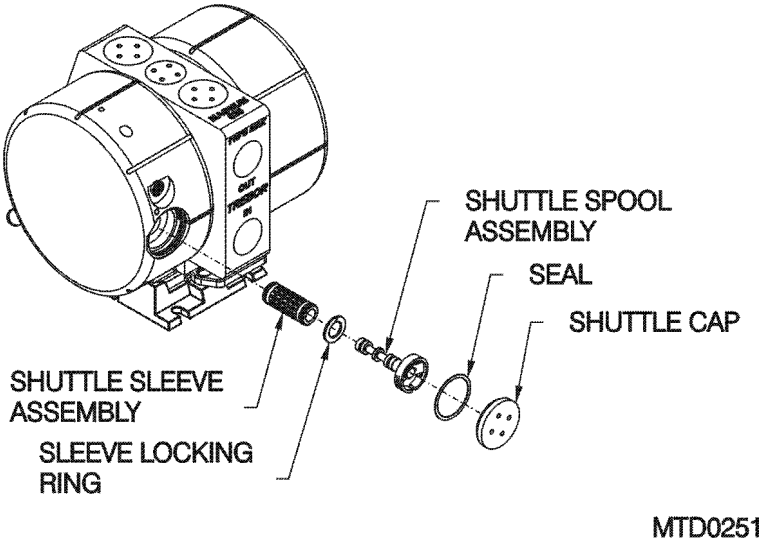


Figure 4-4: Shuttle Assembly

ATTENTION: Threads should be snug. Do not over tighten.

- Thread muffler assembly into head using 3/4" pin tool.

4.8.b Pump Assembly

NOTE: Check sleeves that fit too tightly for easy installation should be placed in a freezer prior to assembly to assist insertion. Body must be upside down with check port extending over a table edge so that parts remain assembled during insertion of sleeves. (See Figure 4-5.)

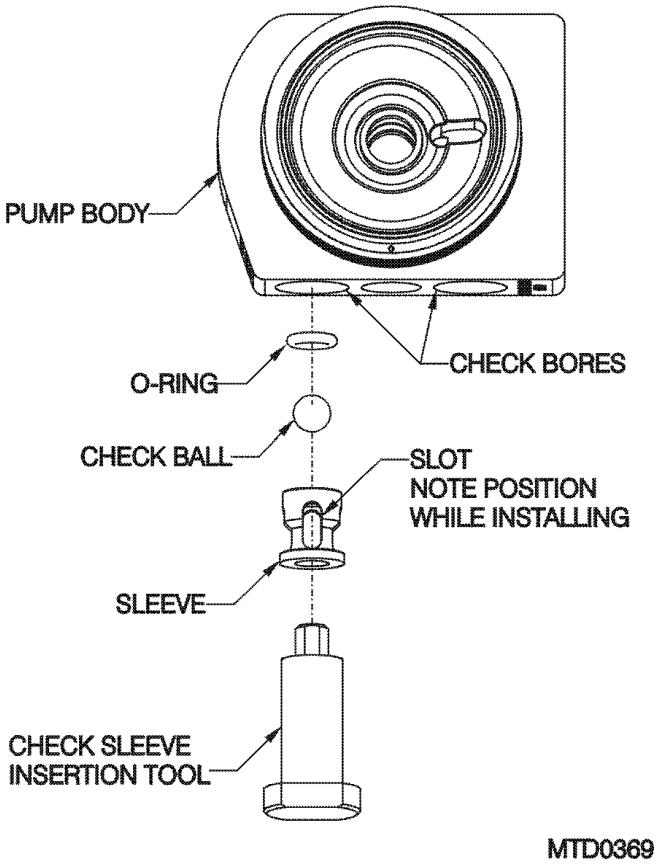


Figure 4-5

- Insert suction sleeve, check ball and O-ring carefully into check bore.

NOTE: The Suction Sleeves have a shoulder diameter larger than their body diameter. Additionally the Suction Sleeves when compared to the Discharge Sleeves have a thicker top region which acts as a robust contact point for the O-rings.

- Repeat insertion process with the discharge sleeve, check ball and O-ring.
- Repeat process for second check bore.
- Replace seals and tighten check bore caps to 45in-lbs.
- Install seal and damper plug using 3/4" pin tool, torque to 45in-lbs.

- Install two shaft seals in shaft bore groove with slits 180° apart.
- Thread shaft into push plate until engagement with the shaft shoulder is achieved. Additionally apply a ¼" turn to ensure proper installation.
- Insert shaft through shaft bore using shaft bullet as shown (This prevents damage to the TFE shaft seals and prevents dislodgement of shaft seals).

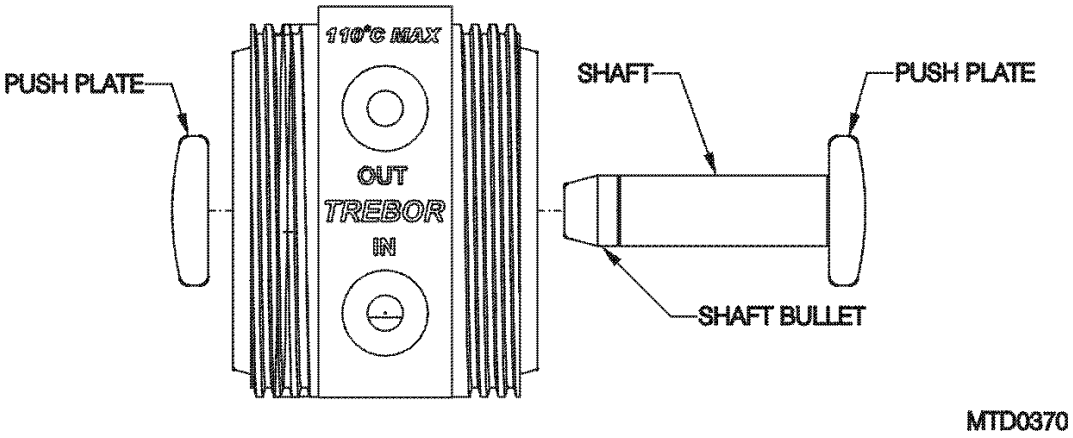


Figure 4-6

Remove shaft insert tool and thread second push plate until engagement with the shaft shoulder is achieved. Additionally apply a ¼" turn to ensure proper installation.

4.8.c Final Assembly

- Reattach pump to assembly fixture.
- Attach head to one side of pump body (hand tight). Do not install diaphragm on this step. This will protect body during initial pump assembly.
- Remove pump from the assembly fixture.
- Place pump body with head down and place one diaphragm with "V" groove point away from the body.
- Install poppet and pilot seat into heads, torque pilot seats to 15in-lbs.
- Install head on body hand tight.
- Turn pump over and remove union nut to install diaphragms on other side.
- Repeat diaphragm and head installation.
- Lock body into mounting fixture.
- Using strap wrench, torque heads slowly until heads are oriented into horizontal alignment of transfer tube holes. See Figure 4-7 with the wrench at 90° +/- 15° to the nut's surface as shown.

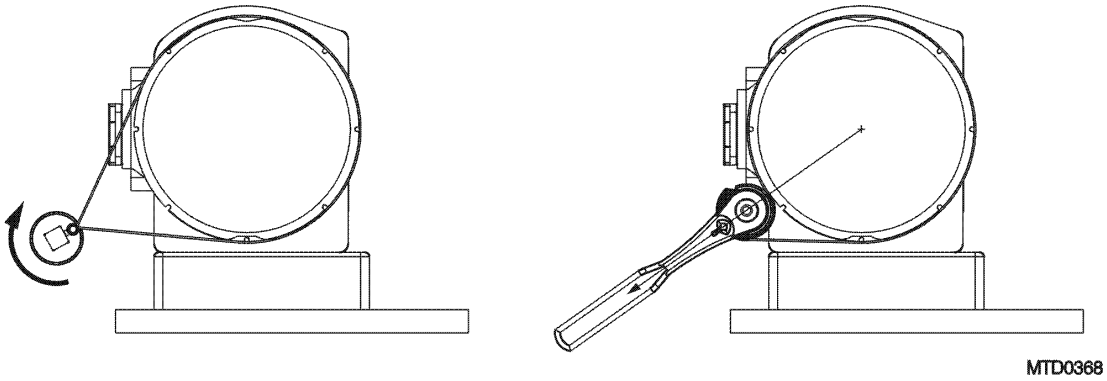


Figure 4-7

- Install fittings and transfer tubes. See Figure 4-8.
- Reconnect both air supply and fluid lines.

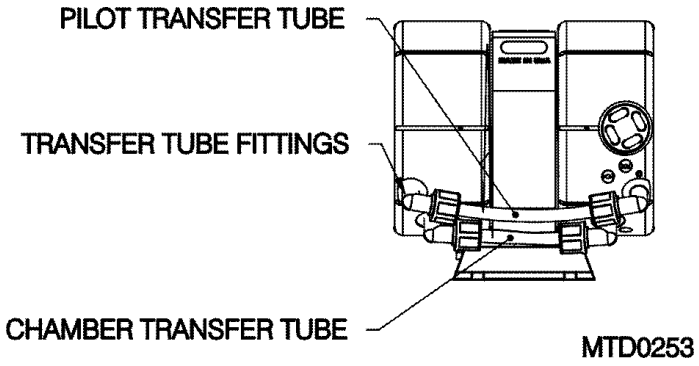


Figure 4-8

4.9 TESTING

Performance Test

- With the air supply at 0 psi open the air supply valve
- Increase the air pressure until the pump starts to cycle
- Record the start pressure, Target = 20psig
- Pump must prime and even cycling must be achieved
- Increase pressure to 60 psi and allow pump to run for 5 minutes
- Check for fluid leaks, listen for air leaks, check for irregularity
- Prepare the pump for drying

Dry Pump

- Connect vacuum hose to discharge line
- Connect purge line to fluid inlet
- 60 psig Supply Pressure
- Cycle pump & vacuum dry by rotating pump side to side for 30 seconds.
- Turn off Air Supply and allow the pump to purge for 5 minutes.

Dry Suction

- 20 psig Supply Pressure Target
- Record Suction Value
- Target = 10 in-Hg.

5 TROUBLESHOOTING

Pump Will Not Start, Fails to Operate

Cause:	Solution:
• Insufficient air pressure.	• Must be minimum 12 psig at pump air hook-up. If check muffler spring assembly is installed at high setting, start pressure may be up to 35 psi.
• Insufficient air volume (low supply pressure during running).	• See Performance Charts (3.1) for requirements. Check for both regulator and control valve Cv's >.85 capabilities.
• Fluid discharge line blocked. Downstream valve closed, filter plugged or other obstruction.	• Remove obstruction.
• Pilot valve failure.	• Inspect and replace pilot valve body and poppet.
• Detent failure.	• Inspect detent legs for worn or damaged parts.

Bubbles in Fluid Discharge

Cause:	Solution:
• Leaking fluid inlet fitting.	• Tighten fittings or replace adapter seal.
• Leaking main seal.	• Tighten heads an additional 15°. Replace diaphragms, and check head and body grooves for nicks or scratches.
• Pump inlet line pressure reached saturation point (due to high suction requirement).	• Increase diameter of suction supply line (reduces restriction). Reduce output flow.
• Ruptured (perforated) diaphragm.	• Replace diaphragms.
• Check bore caps leaking.	• Tighten check bore caps or replace seals.

Fluid Leaks

Cause:	Solution:
• Head torque not enough to effect seal.	• Remove heads and allow to sit for 1 hour. Reassemble with new diaphragms.
• Leaking main seal.	• Replace diaphragms. Check head and body seal grooves for nicks and scratches.
• Check bore cap.	• Tighten, or remove and replace seal.
• Ruptured diaphragm(s) can result in fluid leaks through air exhaust port and shuttle valve.	• Replace diaphragms, and any parts that may have been damaged by fluid exposure.

Erratic Cycling

Cause:	Solution:
• Fluid supply inlet pressure too high.	• Adjust check muffler per Section 1.3.
• Pilot valve failure.	• Inspect and replace pilot valve body and poppet.
• Suction line restricted (cavitation).	• Reduce fluid restriction
• Detent failure.	• Inspect and replace spool assembly.
• Check ball(s) not seating.	• Check O-rings for damage; replace if necessary. Make sure check balls move freely in sleeves.
• Over pressurization of pump discharge.	• Reduce discharge pressure by reducing restriction.

6 WARRANTY CE

MAGNUM 620 PUMP

TREBOR International, Inc. warrants to the purchaser of new equipment manufactured by TREBOR to be free from defects in material and workmanship when used for its intended purpose under normal operating conditions, and maintained according to the Operation/Maintenance Manual.

TREBOR's obligation under this warranty is limited to repairing or replacing, at TREBOR's option and at the TREBOR factory, any part or parts thereof which shall, within 1 year after delivery thereof to the original purchaser, be demonstrated to TREBOR's satisfaction to have been defective. This warranty may be transferred to subsequent owners. The warranty period is based on the original ship date from the factory. All warranty related freight costs shall be borne by the customer.

Excessive wear to pump components caused by pumping abrasive solutions or chemicals, as well as damage caused by ingesting foreign objects shall not be covered by this warranty.

This warranty shall not apply to any equipment which, in the judgment of TREBOR, shall have been repaired or altered outside TREBOR's factory in any way, so as to affect its performance or reliability; subjected to misuse, negligence or accident; or used other than in accordance with TREBOR's printed instructions.

There are no terms, conditions or warranties, expressed, implied or statutory, of merchantability, fitness, capacity, or otherwise, of the goods ordered, other than, or different from, the warranty set forth above. This warranty takes precedence over any other warranty, expressed or implied.

TREBOR neither assumes, nor authorizes any other party to assume for it, any liability in connection with said equipment except as set forth above.

7 CONTACT INFORMATION

7.1 GENERAL CONTACT INFORMATION

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7.3 REGIONAL REPRESENTATIVES

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