Operating & Maintenance Manual
Lubricated Vane Air motors

WARNING

PLEASE READ THIS MANUAL COMPLETELY BEFORE INSTALLING AND USING THIS MOTOR. SAVE THIS MANUAL FOR FUTURE REFERENCE AND KEEP IN THE VICINITY OF THE MOTOR

Conforms to NEN-EN13463-1 NON ELECTRICAL EQUIPMENT FOR EXPLOSIVE ATMOPHERES

ATEX II Cat. 2 G&D T5

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Complete the checklist prior to starting installation in a hazardous area. All actions must be completed in accordance with ATEX 100a.

In order to comply to ATEX Group II cat. 2 G&D T5 make sure that:

- The motor is mounted on an earth connected base plate/ gearbox etc.
- Check if in the air line supply the emergency shut off ball valve or other valve operates manually (not supplied with motor).
- Check if the motor is pressurized when not used.
  (correct control valves should be selected and used, not supplied with motor).
- Remove excessive dust and/or debris from motor surface.
- Airline oil is checked every time before starting.
- Check the ambient temperature of the site and the ability to maintain proper ambient temperature.
  normal conditions : 34°F/1°C to 275°F/80°C
  hazardous conditions: 34°F/1°C to 104°F/40°C
- Check the site environment for potentially explosive oils, acids, gases, vapours or radiation.
- Check that products to be driven by the air motor meets ATEX approval.
- Check that the motor is not damaged.

EXPLANATION OF SYMBOLS

Hazard. Possible consequences: death or severe injuries.

Hazardous situation. Possible consequence: slight or mild injuries.

Dangerous situation. Possible consequence: damage to the drive or the environment.

Important instructions on protection against explosion.

Warrenty

The TSA air motor is designed for problem less operation. This only guaranteed if the regulations with regards to installation, operation, maintenance and repair are observed. Problems occurring during the guarantee period are corrected in accordance to TSA Airmotors guarantee conditions. All results of unauthorised replacements and alterations are at the operator's expense. In case of unauthorised opening and repair work carried out during guarantee period by the operator, can render guarantees invalid.

Installation

Correct installation is your responsability. Make sure you have the proper installation conditions.

WARNING

Injury Hazard

Install proper guards around output shaft as needed.

Air stream from product may contain solid or liquid materials that can result in eye or skin damage.

Wear eye protection when instlling this product.

Failure to follow these instructions can result in serious injury or property damage.

In order to the maximum performance and life from these motors it is essential that the following points are strictly observed.

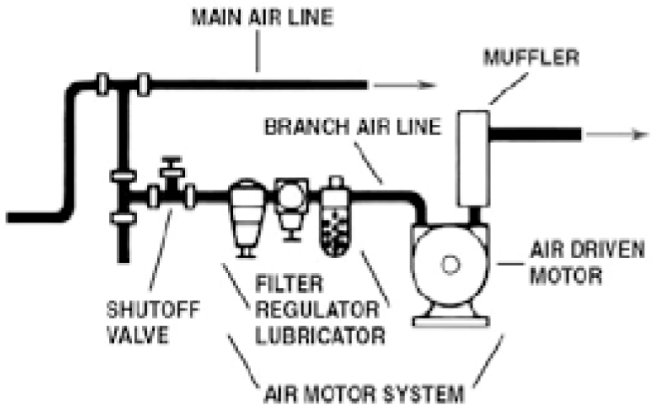
● Mount the unit to the construction. Care should be taken when fitting drive components to the shaft, that excessive force is not used. This will upset the shaft alignments which has been kept to a minimum in order to give high motor performance

● Mount the airlines to the air motor.

● Make sure that there is a air filter(> 64 micron) and lubricator in the airline near to the air motor.
● These motors may be operated in any attitude provided adequate airline lubrication is supplied.
Being totally enclosed they can be used in any environment.
● The maximum working pressure is 7 bar (100 PSI).
● Axial loads must be kept to a minimum
Should be taken, when fitting drive components to the shaft, that excessive force is not used. This will upset the rotor alignments which has to kept to a minimum in order to give high motor performance.
● Radial loads midway along shaft.

	Motor					
	M55	M95	M250	M410	M620	M110
LBF	4	90	40	70	140	400
N	18	400	170	300	620	1.750

Air supply & circuit



The air supply must be clean and relatively dry. An airline filter and lubricator should be fitted in the air supply line. If the rated performance of the motor is to be obtained all valves and pipe work of the air supply must be of adequate size (e.g equal to air connections of motor or one size bigger) For short length pipe runs e.g., up to 2 metres (6 feet) the supply lines should be the same size as.

- Before final connection to the motor, blow out the air lines to remove loose scale, swarf or abrasive dust which may be present, and squirt a few drops of oil into the inlet port.
- A silencer is supplied with the motor. When installed **ensure** that condensation or water cannot run back into the motor port. Mount the motor with silencer pointed down or make extra piping on the silencer.
- If the motor unit is not used for a longer period it is advisable to store the

Airline filtration

- Use 64 Micron air filter
- The airline filter should be drained regally and the element examined for signs of clogging.

Lubrication

- The airline lubricator should be replenished as required and set to give the following drop rate/min.

Motor size	Continuous Operation	Intermittent Operation
M55	2-3	4-6
M95	3-4	6-8
M250	4-5	8-12
M410	5-6	10-12
M620	6-7	12-15
M1100	7-8	14-16

Reccomended Airline Lubricants

- For normal ambient temperatures 0°C to 32°C
- Use oil with viscocity VG32.
- For extremes of ambient temperature consult the manufacturers.

Do not use a hammer on the shaft or body of the motor.

Do not exceeded the maximum radial and axial forces on the shaft.
Use the proper size fasteners.
Use a puller to remove pulleys, pinions and couplings.

Operation

WARNING



Injury Hazard

Air stream from product may contain solid or liquid material that can result in eye or skin damage.
Do not use combustible gases to drive this motor.
Wear hearing protection. Sound level from motor may exceed 85 db (A).
Failure to follow these instructions can result in eye injury or other serious injury

- Before use always remove any sediments on the surface of air motor before starting-up.
- During operation be aware if unfamiliar sound or vibrations occur. Stop unit immediately and investigate the source.
- Check if the air line filtration and air line lubrication is OK.

- **Do not run the motor at speeds without load. It may cause motor damage.**

- The starting torque is less then the running torque. The starting torque will vary depending on the position of the vanes when stopped in relation to the air intake port.
- The motor may run continuously at speeds up to the rated running conditions shown in our performance data sheets.
- These sheets give the output power-torque based on running conditions with the actual pressure measured at the motor port. A muffler is supplied together with the motor, but is not installed.

Maintenance

WARNING

Injury Hazard

Disconnect air supply and vent all air line.
Wear eye protection when flushing this product.
Air stream from product may contain solid or liquid material that can result in eye or skin damage.
Flush this product in a well ventilated area.
Do not use kerosene or other combustible solvents to flush this product.
Failure to follow these instructions can result in eye injury or other serious injury.

- Check intake filter and silencer after the first 500 hours of operation.
- Clean filters and determine how frequently filters and lubricators should be checked during future operation. This will help the motor's performance and service life.
- If the muffler becomes dirty this will effect the performance of the mo tor. To clean the muffler follow the next procedure:

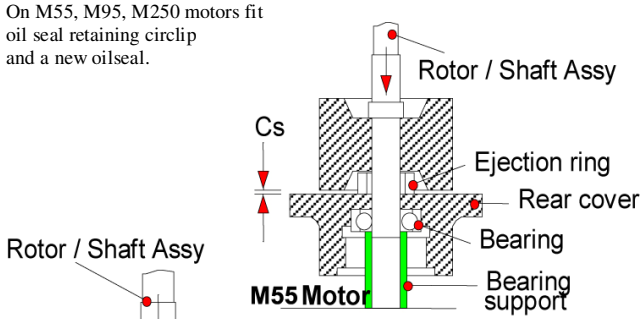
Cleaning muffler:

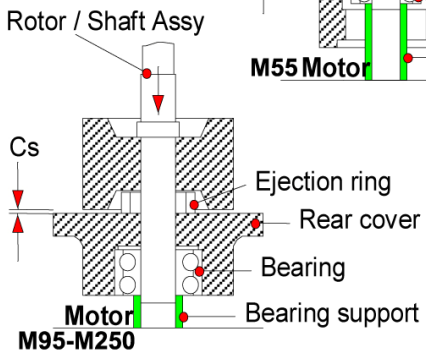
1. Disconnect airline
2. Remove the muffler
3. Clean the muffler
4. Lubricate the motor with 3-4 drops of oil
5. Connect the airline
6. Listen for changes in the sound of the motor, if it runs fine, you are finished.
7. If it is not running fine, you should install a service kit.

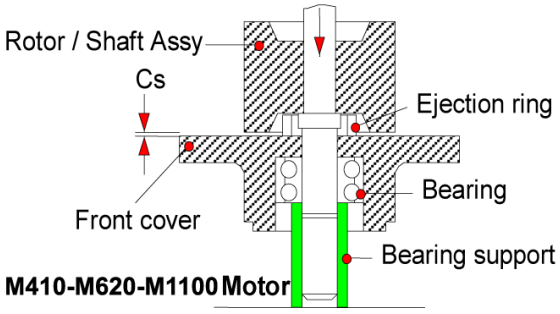
Vane Motor Rebuild Instructions

These motors are made to precise tolerances and it is vital for efficient operation to achive minimum clearances throughout. Every clearance represents an air leakage path from inlet to exhaust, which will detract from the starting and running characteristics.
The spacing of the rotor is of prime importance in two ways:
1- rotor to end covers (side clearance) (Cs)
nominally 0.050 mm (0.002")
2- rotor to body casing (top clearance) (Ct)
nominally 0.050 mm (0.002")
To achieve the side clearance each repair kit has a series of plastic shims, colour coded to different thicknesses.
Purple = 0.025 mm (0.001")
Blue = 0.050 mm (0.002")
Green = 0.076 mm (0.003")
Orange or Brown = 0.102 mm (0.004")
This range of vane motors has three styles of rotor locations.
M55 rotor location by single row bearing at each end.
M95 - M250 rotor location by one double row bearing in rear cover.
M410 - M620 - M1100 rotor location by one double row bearing in front cover.

Assembly details
All parts must be clean and it is recommended that new Oil seals and blades are fitted as a matter of course.
Press all bearings fully home into their respective covers, pressing only on the outer track to prevent damaging the bearings.
On M55, M95, M250 motors fit oil seal retaining circlip and a new oilseal.







Take the location cover for your particular motor i.e. M95-M250 rear cover, M410-M620-M1100 front cover and rear screwed cover for M55 unit.
Provide a good support on the inner bearing track, as the shaft fit is very tight, to provide rotor location.
Place blade ejector ring central on cover and press rotor / shaft assembly down until there is a clearance, Cs of 0.050 mm (0.002") between rotor and cover, check this clearance is even all around the rotor.
Fit a blue plastic body gasket to the cover, lowering the body into position over the rotor assembly, locating on the existing dowels.
NOTE: Ensure the body is the correct way round i.e. port arrows towards the output shaft.

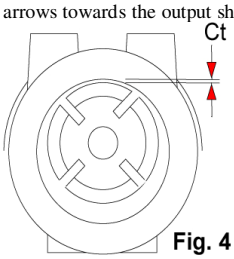


Fig. 4

Tighten body bolts and check top clearance, Ct, see Fig No. 4 This should be 0.050 mm (0.002") if there is a problem with this then then reposition and drill for new dowels. Insert second ejection ring, fit new blades, it may be necessary to work the lower ejection ring across in order to fit the opposite blade.

Refer to Fig No. 5 (axial end clearance, Cs). Measure this by putting a straight edge across the body, then use feeler gauges in the gap between rotor and body face. This should be made up to 0.050 mm (0.002") or as close as possible using the gasket set provided.

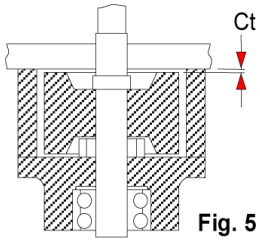


Fig. 5

Oil inside the motor, ensuring it is free to rotate. On M95 to M1100 motors the second cover should slide down into position easily as the second bearing fit is non locating.

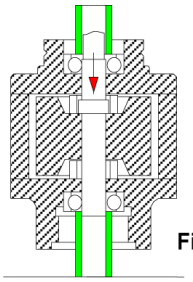


Fig. 6

On M55 motors (see Fig No. 6) this bearing fit takes up location and the inner track of both the lower and upper bearings must be supported.

Locate cover on dowels and tighten bolts. (M55 fit rear plug).
Check for rotation. The motor may be tight at first due to hydraulic lock on the oil just used.
On M55 motors only fit front oil seal and circlip if the motor is free to rotate.
M410, M620, M1100 motors - the front oil seal is carried in a separate
housing, this should be fitted next, followed by the rear bearing cover and its gasket.
M95, M250 motors - the rear bearing cover and ists 'O' ring can now be fitted.

<u>For trouble free running and long life it is vital that the rotor spacing is correct.</u>
<u>Use only genuine replacement blades as these have a special profile to give correct ejection and contact with the rotor body.</u>
<u>Always ensure adequate lubrication.</u>
<u>Never run motors completely off load at high speed.</u>

Shutdown and long storage

You need to take care of the following procedures for a proper shutdown.

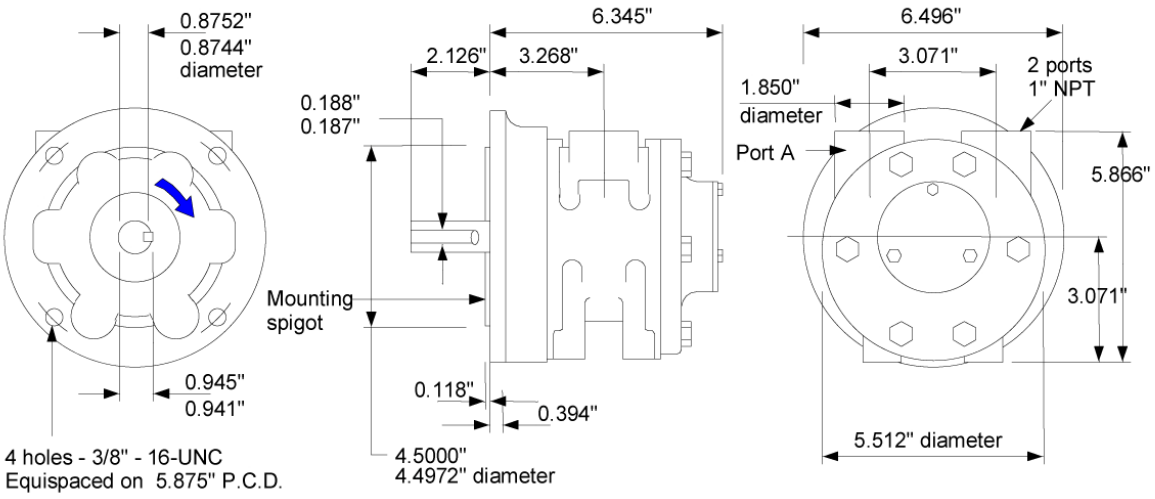
- Were eye protection. Keep out of the air stream.
- Turn off the air supply.
- Disconnect all air supply and vent all airlines
- Disconnect airlines.
- Disassemble the air motor from his connection.
- Remove the muffler.
- Make sure you use clean and dry air to remove condensation from the inlet port.
- Use a small amount of oil to lubricate the motor. Rotate the shaft by hand several times to distribute the oil.
- Cap or plug each port of the air motor.
- Coat output shaft with oil or grease.
- Store motor in a dry environment.

Trouble shooting

Problem					
low speed	low torque	won't run	runs hot	runs well then slows down	conclusion
X	X	X			Dirt or foreign material present Inspect and flush the motor
X	X	X			Internal rust Inspect and flush the motor
X	X				Low air pressure, increase the pressure
	X				Air line too small
	X			X	Restricted exhaust. Inspect and repair
X	X	X		X	Motor is hot. Have a service maintenance
	X			X	Air source inadequate. Inspect and repair
	X			X	Air source to far from motor.

M620C Vane Air Motor

Nema 145TC configuration



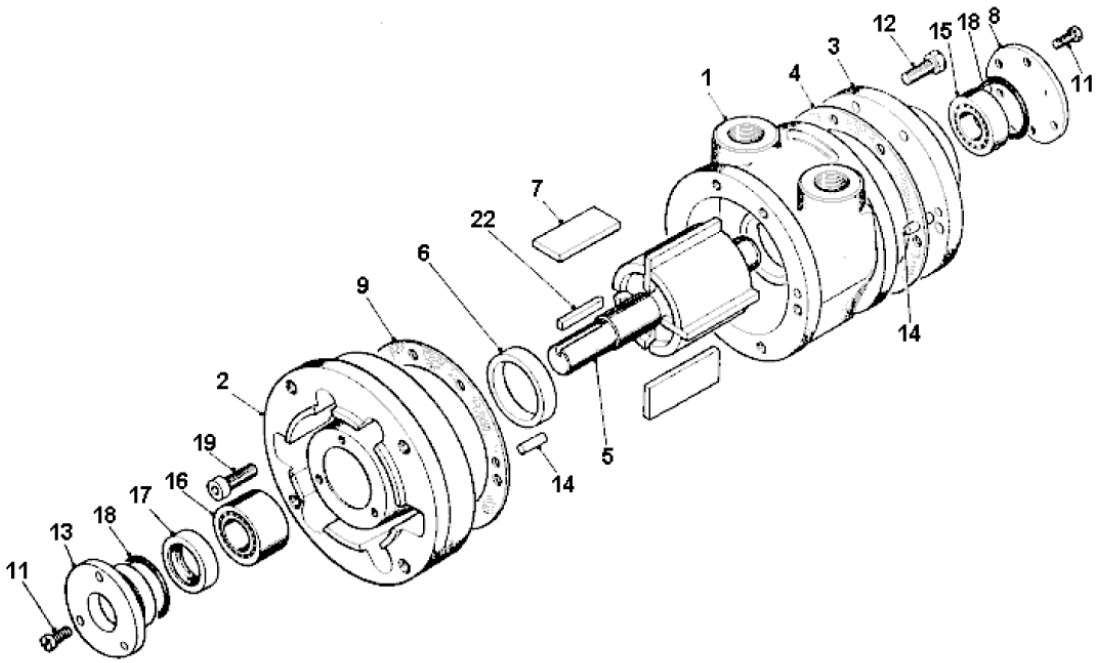
Attitude: The motor can be operated in all positions
Maximum temperature -20℃ to +80℃ (-4℉ to
Mufflers supplied with motor

Note: With air inlet at port 'A', shaft rotation is clockwise looking on shaft. For opposite rotation reverse ports. Motor is reversible

Max. Overhung Force on shaft 620 N (140
Axial loads should be kept to a minimum
Mass 11.80 kg (26.01 lb.)

M620C Vane Air Motor

Spare parts List

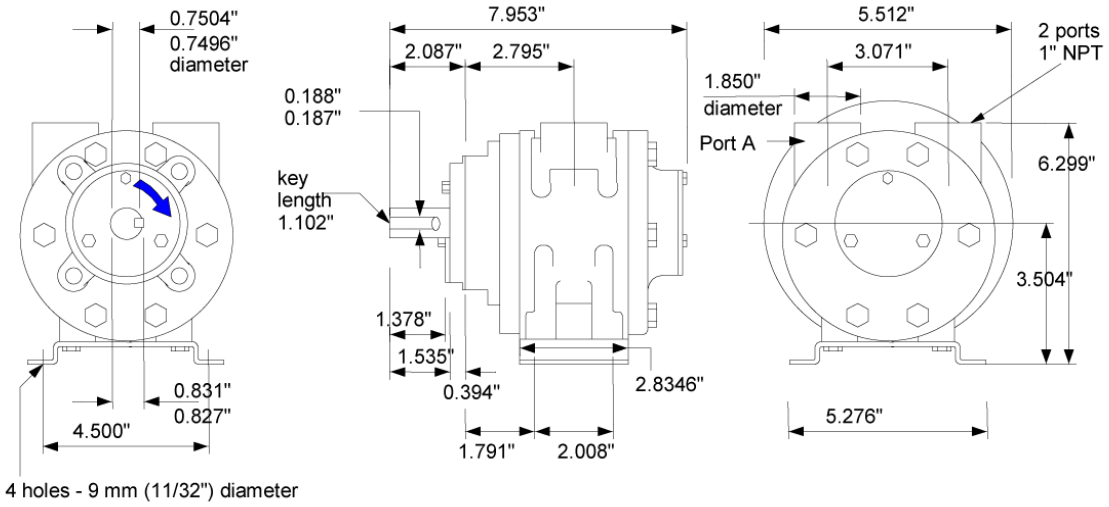


If unit is pre 1990 supply consult manufacturer to confirm design

Item	Part No.	Description	Qty	Kit No.
01	780-101	Body BSP	1	
02	780-036	Front Plate D90	1	
03	780-002	End Plate	1	
04	-	Gasket	2	789-910
05	780-922	Rotor Shaft Assy	1	
06	780-006	Ejection Ring	2	
07	-	Blades	4	789-910
08	740-008	Cover Plate	1	
09-1	-	Gasket	1	789-910
09-2	-	Gasket	1	789-910
09-3	-	Gasket	1	789-910
11	802-001	Screw	6	
12	802-032	Screw	6	
13	780-007	Seal Housing	1	
14	806-024	Dowel	4	
15	807-026	Bearing	1	
16	807-036	Bearing	1	
17	-	Oil Seal	1	789-910
18	-	O Ring	2	789-910
19	809-030	Screw	6	
22	811-042	Key	1	
	789-910	V8 Seal Kit		
	820-006	Silencer 1" BSP	1	

M620P Vane Air Motor

Foot mounting configuration



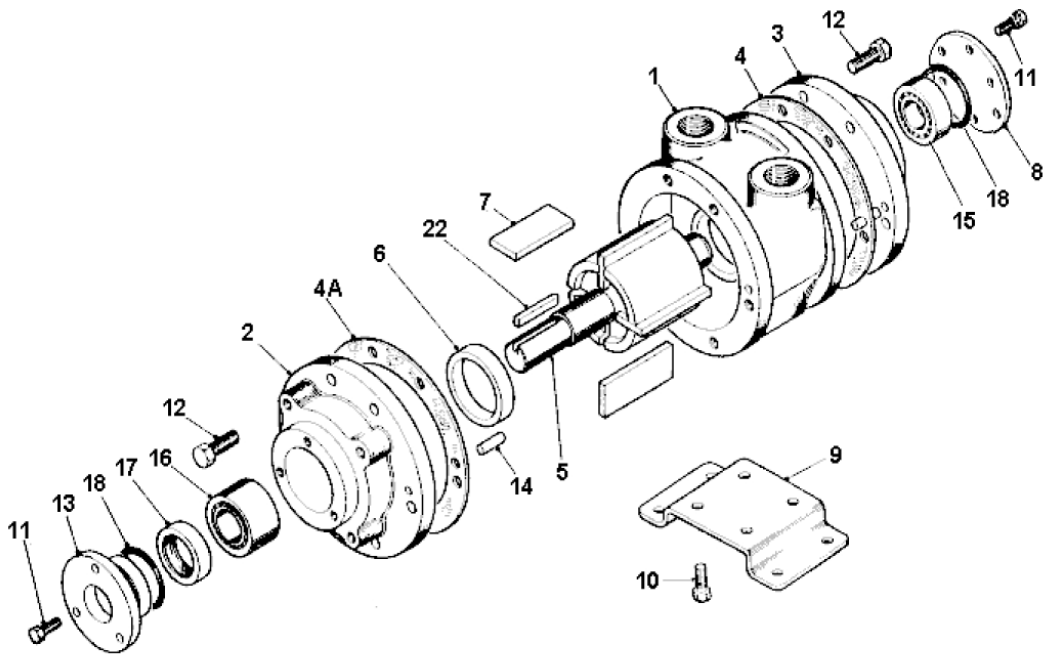
Attitude: The motor can be operated in all positions
Maximum temperature -20℃ to +80℃ (-4℉ to
Muffler supplied with motor

Note: With air inlet at port 'A', shaft rotation is clockwise looking on shaft. For opposite rotation reverse ports. Motor is reversible

Max. Overhung Force on shaft 620 N (140
Axial loads should be kept to a minimum
Mass 11.10 kg (24.46 lb.)

M620P Vane Air Motor

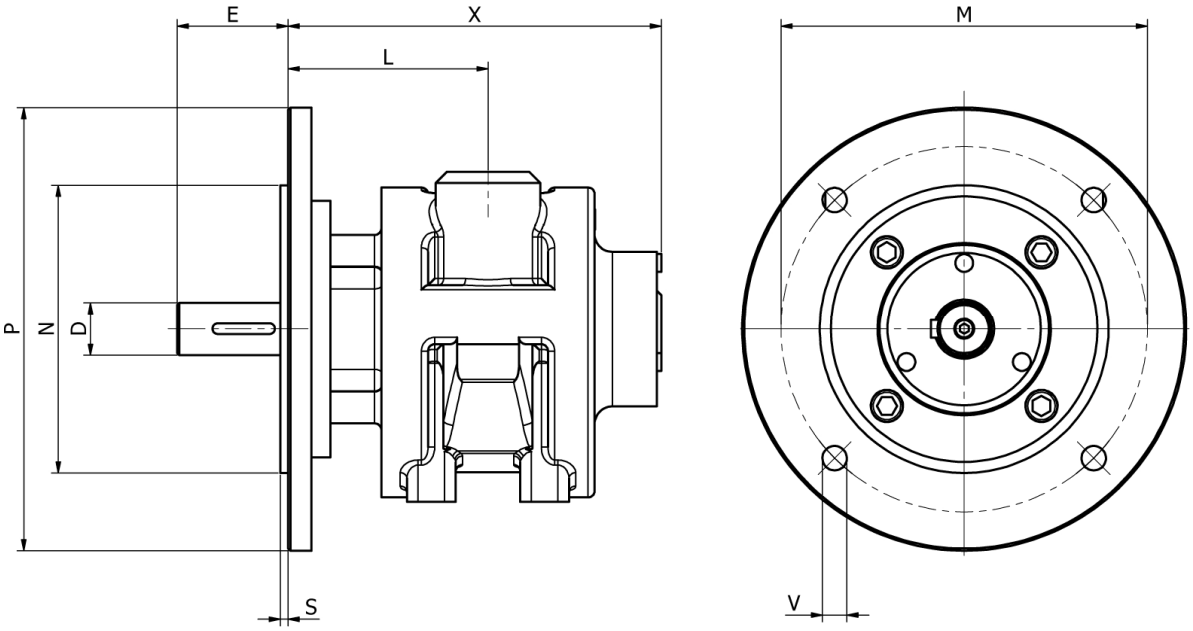
Spare parts List



If unit is pre 1990 supply consult manufacturer to confirm design

Item	Part No.	Description	Qty	Kit No.
01	780-001	Body NPT	1	
02	780-003	Front Plate	1	
03	780-002	End Plate	1	
04	-	Gasket	2	789-910
04A-1	-	Gasket	1	789-910
04A-2	-	Gasket	1	789-910
04A-3	-	Gasket	1	789-910
05	780-911	Rotor Shaft Assy	1	
06	780-006	Ejection Ring	2	
07	-	Blades	4	789-910
08	740-008	Cover Plate	1	
09	780-023	Foot	1	
10	809-026	Capscrew	4	
11	802-001	Screw	6	
12	802-032	Set Screw	12	
13	780-007	Seal Housing	1	
14	806-024	Dowel	4	
15	807-026	Bearing	1	
16	807-036	Bearing	1	
17	-	Oil Seal	1	789-910
18	-	O Ring	2	789-910
22	811-021	Key	1	
	789-910	V8 Seal Kit		
	820-026	Silencer 1" NPT	1	

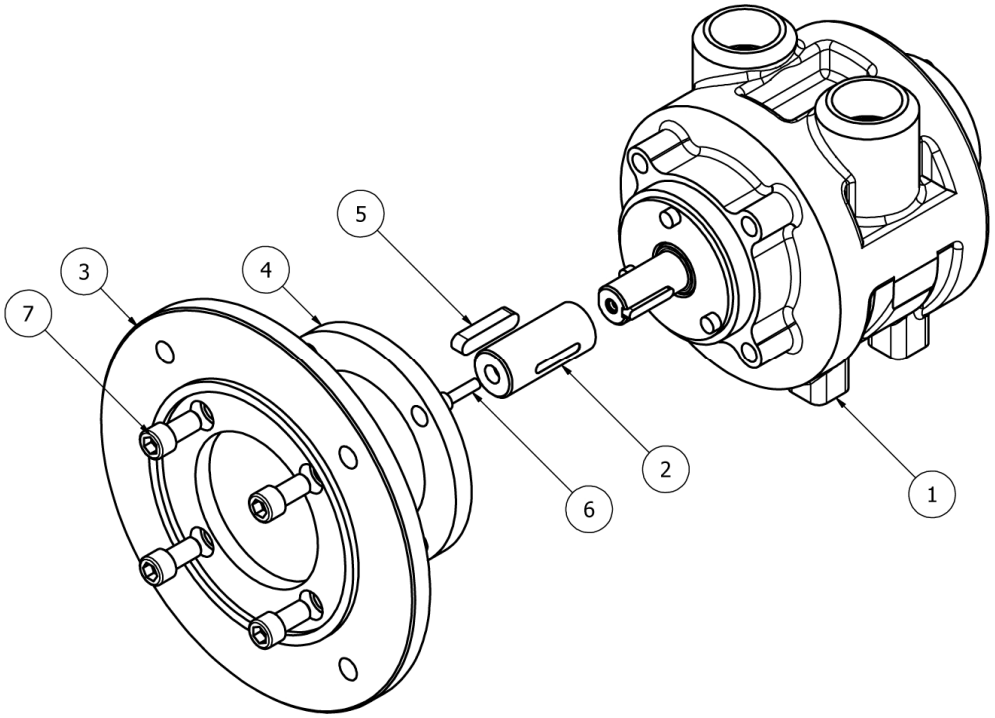
M620B Vane Air Motor



Model	D	E	L	N	M	P	S	X	V
M620B14D90	24	50	90	95	115	140	3	169	M8
M620B14D100	28	60	89,5	110	130	160	3,5	167,5	M8
M6200B5D90	24	50	90	130	165	200	3,5	169	11
M6200B5D100	28	60	89,5	180	215	250	4	167,5	14

M620B Vane Air Motor

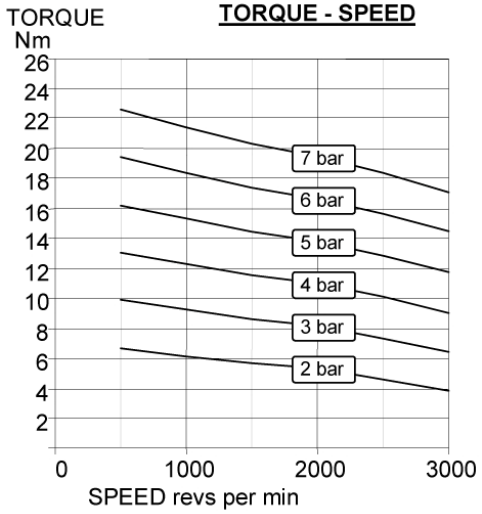
Spare Parts list

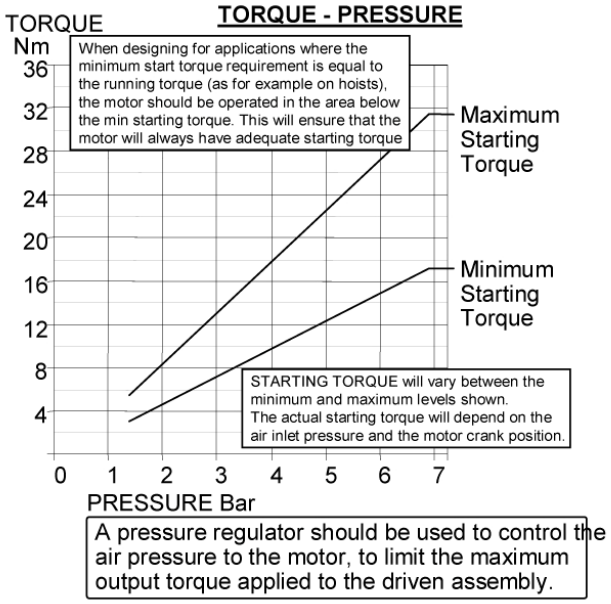


ITEM	QTY	DESCRIPTION	MODEL			
			M620B14D90	**M620B14D100**	**M620B5D90**	**M620B5D100**
1	**1**	Vane air motor	3-9-003200	3-9-003200	3-9-003200	M620
2	**1**	Bushing	3-9-003199	3-9-002512	3-9-003199	3-9-002512
3	**1**	Flange	3-9-003198	3-9-002511	3-9-003450	3-9-003448
4	**1**	Spacer	-	-	3-9-003451	-
5	**1**	Feather	UNI 6604-69 8X7X36	UNI 6604-69 8X7X36	UNI 6604-69 8X7X36	UNI 6604-69 8X7X36
6	**1**	Socket screw	DIN 912 M5X20	-	DIN 912 M5X20	DIN 912 M5X30
7	**4**	Socket screw	3/8" W X 3/4"	3/8" W X 3/4"	3/8" W X 3/4"	3/8" W X 5/8"

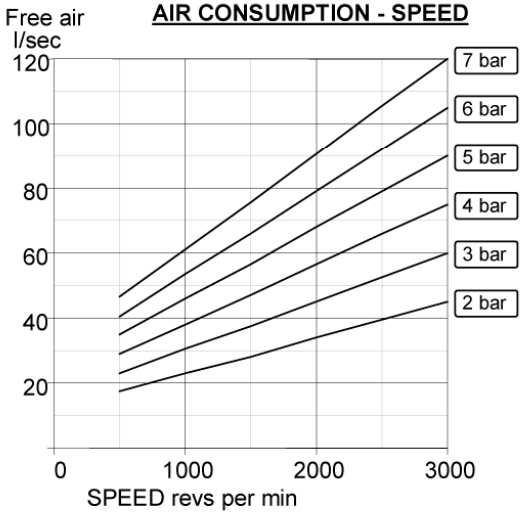
M620PERFORMANCE

Maximum continuous speed 3000rpm





A pressure regulator should be used to control the air pressure to the motor, to limit the maximum output torque applied to the driven assembly.



Muffler supplied with motor
Motor is reversible

Attitude: The motor can be operated in all positions
Maximum temperature -20℃ to +80℃ (-4℉ to +176℉)

Max. Overhung Force on motor shaft 620 N (140 lbf.)
Axial loads should be kept to a minimum

AIRLINE FILTRATION AND LUBRICATION

Use 64 micron filtration or better. Choose a lubricator suitable for the flow required. Prior to initial start-up, inject oil into the inlet port.
Lubricator drop rate 6-7 drops/minute continuous operation
Lubricator drop rate 12-15 drops/minute intermittent operation