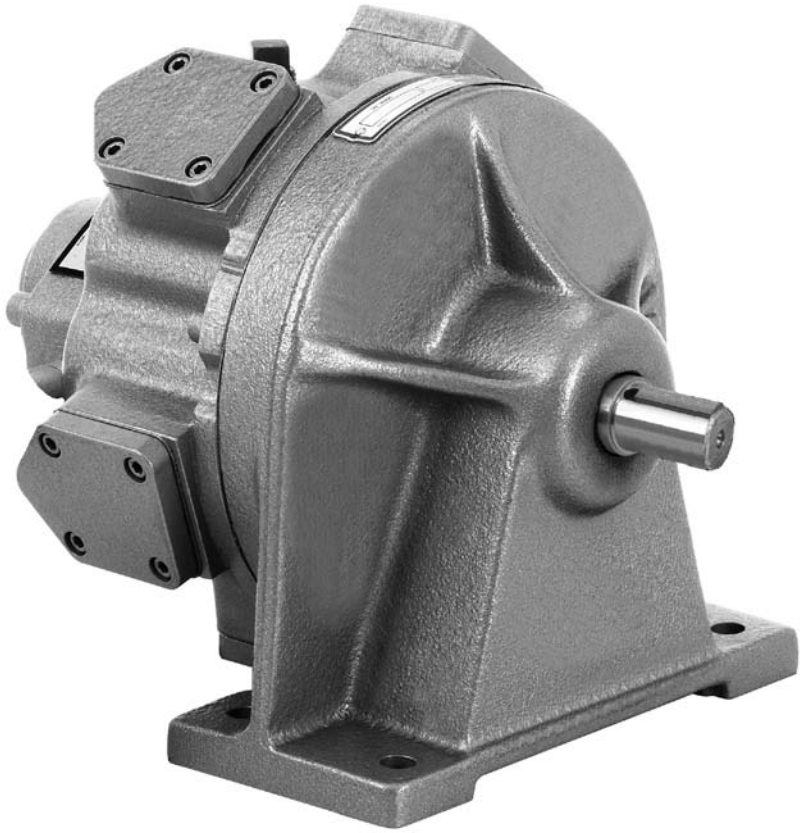
Instruction Manual
PL70-1063EN
07/31/2013

Cleco®

MA3W-2237

Radial Piston Power Motor



For additional product information visit our website at http://www.apextoolgroup.com

For this Instruction Manual

This Instruction Manual is the Original Instruction Manual intended for all persons who will operate and maintain these tools.

This Instruction Manual

- provides important notes for the safe and efficient use of these tools.
- describes the function and operation of the MA3W-2237 motor.
- serves as a reference guide for technical data, service intervals and spare parts ordering.
- provides information on optional equipment.

Identification text:

MA3	represents all models of the radial piston power motor as described in this manual
➔	indicates a required action
•	indicates a list
<..>	indicates a reference number from the exploded parts drawings
Arial	indicates an important feature or instruction written in **Arial Bold**

Identification graphic:

➜	indicates a directional movement
⇩	indicates a function or force

Copyright protection:

Model Number	Maximum Allowable RPM**		Stall Torque		Starting Torque		Weight		Air Consumption		Gear Ratio	Maximum Overhung Load @ Stall *	
	@ Max. HP	Free Speed	ft. lbs.	Nm	ft. lbs.	Nm	lbs.	kg	cfm	m3/min		lbs.	kg
without Valving													
MA3W-2237	48	100	588	797	317	430	67	30.1	95	2.69	24.6:1	2560	1161

* Note: All geared models assume overhung load located at 1.000" (25.40mm) from the face of the motor.
**Note: This motor must be operated with sufficient load to prevent speed from exceeding maximum allowable speed.

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Contents

1 Safety

1.1 Warnings and notes

Warning notes are identified by a signal word and a pictogram.

- The signal word indicates the severity and probability of the impending danger.
- The pictogram indicates the type of danger.

WARNING!

WARNING identifies a potentially **hazardous** situation which, if not avoided, may result in serious injury.

CAUTION!

CAUTION identifies a potentially **hazardous** situation which, if not avoided, may result in minor or moderate injury or property and environmental damage.

NOTE

NOTE identifies general information which may include application tips or useful information but no hazardous situations.

Important information that must be read and understood by all personnel installing, operating or maintaining this equipment.

1.2 Basic requirements for safe working practices

All personnel involved with the installation, operation or maintenance of these tools must read and understand all safety instructions contained in this manual. Failure to comply with these instructions could result in serious injury or property damage.

These safety instructions are not intended to be all inclusive. Study and comply with all applicable National, State and Local regulations.

CAUTION!

Work Area:

- ➔ Ensure there is enough space in the work area.
- ➔ Keep the work area clean.
- ➔ Keep the work area well ventilated.

Personnel Safety:

- ➔ Inspect the air supply hoses and fittings. Do not use damaged, frayed or deteriorated hoses.
- ➔ Make sure the air supply hose is securely attached to the tool.
- ➔ Install adequate guards for all moving parts of the power motor or it's application.

Safety working with and around power motors:

- ➔ Make sure the motor is securely mounted to the application.
- ➔ Make sure the output spindle is fully engaged with the application.
- ➔ Disconnect the air supply before servicing the motor

1.3 Operator training

All personnel must be properly trained before operating the MA3 tools. The MA3 tools are to be repaired by fully trained personnel only.

1.4 Personal protective equipment

When working

- Wear eye protection to protect against flying metal splinters.
- Wear hearing protection

Danger of injury by being caught by moving equipment.

- Wear a hairnet
- Do not wear close fitting clothing
- Do not wear jewelry

1.5 Designated use

The MA3 is designed exclusively as a power source to be intregrated into an application.

- Do not modify the MA3, any guard or accessory.
- Use only with accessory parts which are approved by the manufacturer.
- Do not use in any improper manner that can cause damage to the motor.

1.6 Codes and standards

It is mandatory that all national, state and local codes and standards be followed.

1.7 Noise and vibration

No data available on this equipment.

2 Scope of supply, transport and storage

2.1 Items supplied

Check shipment for transit damage and ensure that all items have been supplied:

1 MA3
1 PL70-1063EN instruction manual
1 Declaration of Conformity (if applicable)
1 Lubrication sheet
1 Warranty statement

2.2 Transport

Transport and store the MA3 in the original packaging. The packaging is recyclable.

2.3 Storage

For short term storage (less than 2 hours) and protection against damage:

➔ Position the MA3 in a location to avoid accidental startup.

For storage longer than 2 hours:

➔ Disconnect the air supply from the MA3

Object	Time Period	Storage Temperature
MA3 without air supply	No guideline	-13°F to 104°F (-25°C to 40°C)

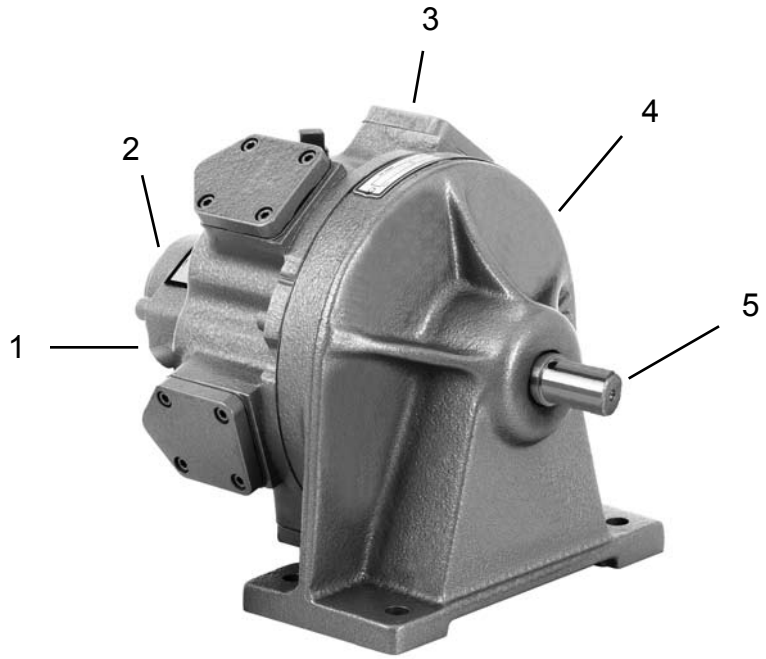
3 Product description

3.1 General description

- Pneumatic powered radial piston power motor
- 3.0 Horsepower
- Direct drive or geared model options
- No valving, single direction valving and reversible valving options

3.2 Operation and functional elements

This section describes the operational and functional elements of the MA3.



Ref.	Description
1	Air Inlet
2	Valve Chest
3	Motor Assembly
4	Gearing Assembly
5	Output Shaft

4 Accessories

No accessories listed.

5 Before initial operation

5.1 Ambient conditions

Ambient temperature: 41°F (5°C) to a maximum of 104°F (40°C)

Acceptable relative humidity: 25% to 90%, non-condensing

5.2 Air supply

Parameter	Description
Air Hose	Minimum inside diameter: 3/4" (19,1 mm) Maximum length: 16.4' (5 m)
Working pressure range	60 to 100 psi (414 to 689 kPa) Recommended: 90 psi (620 kPa)
Compressed air	Air quality according to ISO 8573-1, quality class 2.4.3 The compressed air must be clean and dry.

NOTE

To attain consistent results, maintain a constant working pressure using a suitable air line unit consisting of a filter, lubricator and regulator.

➔ The inside diameter of the air hose must be free of residue, clean if necessary.

➔ If a line lubricator is used, it shoud be filled daily

Oil identification

Fill the motor to the proper level before operating.
Use engine oil API Service Classified “SC” in the following weights:

- **Above 32° F: SAE 30W**
- **Below 32° F: SAE 10W**

5.3 Connecting the air supply to the tool

WARNING!

The air hose can disconnect from the motor by itself and whip around uncontrollably.

➔ Turn off the compressed air before connecting to the motor.

➔ Securely connect the air hose to the motor.

➔ Turn on the compressed air.

5.4 Tool set up

The motor must be configured for the application.

6 First operation

6.1 Putting into use

The MA3 series motors are a five cylinder radial piston type. This radial design, with it's overlap of power impulses, provides even torque at all speeds and full power in either direction of rotation. At least two pistons are always on a power stroke.

These motors are designed for continuous service on 60-100 PSI air pressure. If overloaded beyond their power capacity, the motor will simply stall without causing any damage.

- → Make sure the air line is clean and free of scale and dirt before connecting to the motor.
- → Make sure all pipe fittings are securely tightened to prevent air leaks.
- → Make sure the air supply is securely attached and the compressor is turned on.
- → Make sure the output spindle is properly engaged with the application.
- → Make sure all necessary guards are in place to protect operator from rotating mechanisms.

Continuous Operation: Do not operate the MA3 motors faster than 65% of free speed. Install a filter/lubricator unit in the air line as close as possible to the MA3 motor.

Intermittent Operation: The splash lubrication from the motor case will be adequate.

If an excessive amount of water is found in the air line, a water trap should be installed to trap as much as possible before it reaches the MA3 motor.

7 Troubleshooting

Malfunction	Possible causes	Remedy
Tool does not start	Improper air supply	→ Make sure there is adequate air pressure at the tool air inlet
	Motor dry from lack of lubrication	→ Check the oil levels in the motor case and gear case. Add oil as necessary.
	Broken gears	→ Tool disassembly required (parts replacement)
Tool runs slow and lacks torque	Improper air supply	→ Make sure there is adequate air pressure at the tool air inlet
	Motor dry from lack of lubrication	→ Check the oil levels in the motor case and gear case. Add oil as necessary.

8 Maintenance

CAUTION!

Danger of injury from accidental start up.
Turn off the compressed air before performing any maintenance.

8.1 Service schedule

Only qualified and trained personnel are permitted to perform maintenance on these motors.

Regular maintenance reduces operating faults, repair costs and downtime. In addition to the following service schedule, implement a safetu related maintenance program that takes the local regulations for repair and maintenance for all operating phases of the motor into account.

Maintenance Interval	Designation
Daily	→ Visual inspection of air supply hose and connections → Inspect airline filter, regulator and lubricator for proper operation → Check the tool for excessive vibration or unusual noises → Visual inspection of all external components of the tool
Weekly	→ Inspect the air hose for damage or wear → inspect the output spindle for damage or wear → Inspect the breather cap to make sure it is not plugged, clean or replace → Remove the motor case drain plug to allow water and condensate to drain out → Check oil levels in the motor case and gear case, add as necessary

8.2 Lubricants

For proper function and long service life, use of the correct lubricant is essential.

Oil identification

Fill the motor to the proper level before operating.
Use engine oil API Service Classified “SC” in the following weights:

- Above 32° F: SAE 30W
- Below 32° F: SAE 10W

If the air line carries an excessive amount of water and a water trap cannot be installed, use a good grade of motor oil that will emulsify with water to prevent damage to vital parts of the motor.

Oil quantity

Approximately 1 quart of oil is required to fill the motor case to the proper oil level. Approximately 1 quart of oil is required to fill the gear case to the proper oil level. The oil must flow at all times to properly lubricate the motor components, gears and bearings.

To check the MA3 for proper oil level, open the oil level pet cock. If oil does not flow from the pet cock, add the proper oil until oil begins to flow. Securely tighten the oil level pet cock.

Remove the oil drain plug in the motor case occasionally and drain off accumulated water before adding new oil.

Excessive use of oil is usually due to:

- Worn pistons
- Worn piston rings
- Worn distributing valve and bushing
- Damaged oil seals
- Clogged breather cap

9 Repair instructions

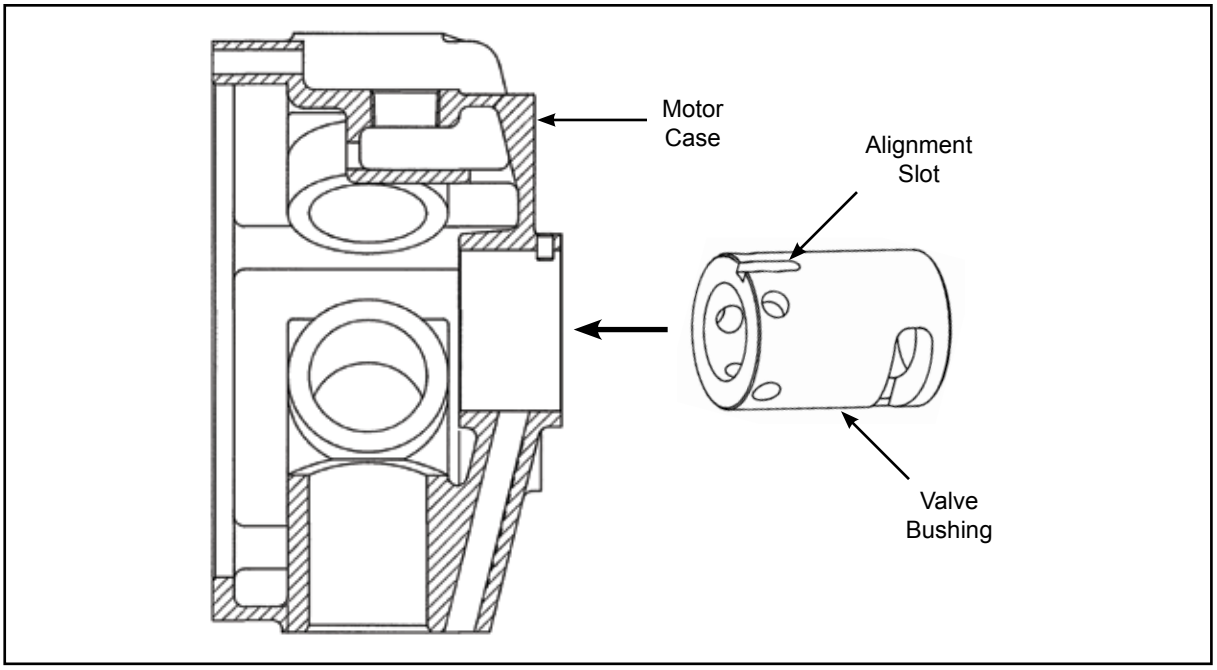
9.1 Motor case assembly

Install the pin (DP114) into the motor case until approximately 1/8” is exposed in the distributing valve bushing hole.

Install the valve bushing (MA311) into the motor case counterbore until it is flush with the inside edge of the counterbore. The valve bushing has a slot to enable proper alignment during assembly.

NOTE

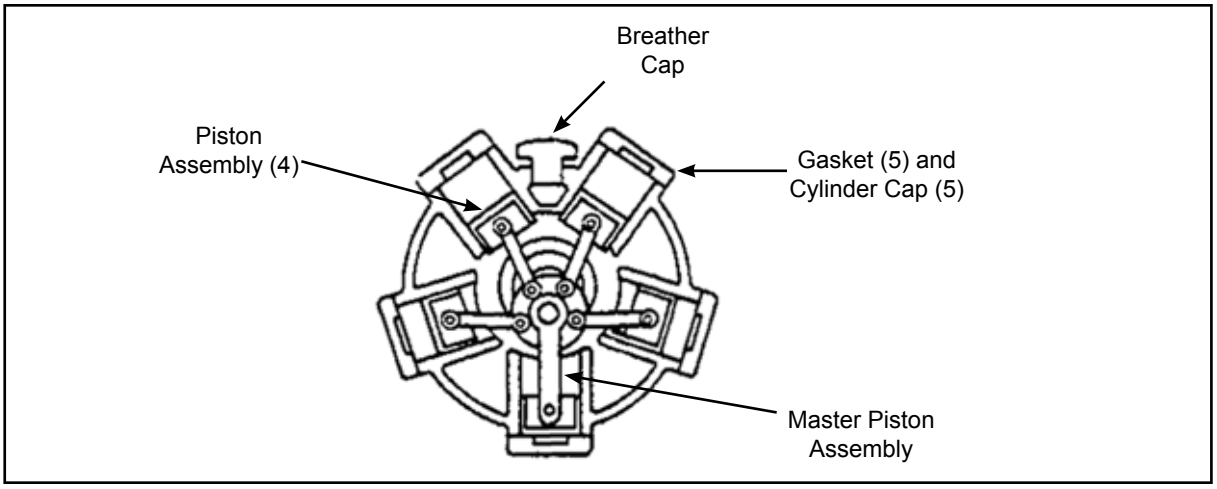
The valve bushing must be placed in a freezer, for a period of time, before assembling into the motor case. This will cause the bushing to contract allowing easier assembly into the motor case.



9.2 Piston assembly

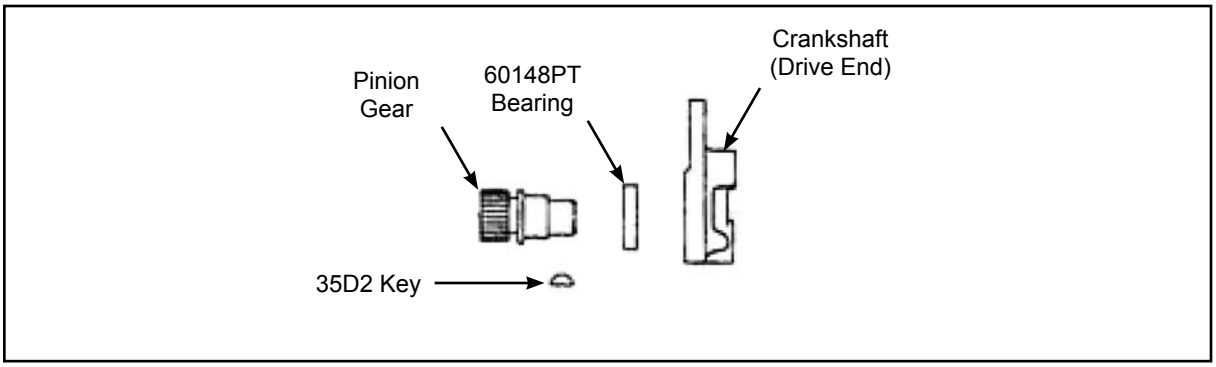
- Install the five (5) cylinder liners in the cylinder holes of the motor case until they bottom out.
- Lightly oil all pistons and cylinder liners.
- Insert the master piston assembly directly across from the breather cap hole and to the rod retainer assembly.
- Assemble the piston pin (MA325) with the threaded side up.
- Place the connecting rod washer (MA326WA) over the connecting rod (washer ears go to the side of the connecting rod).
- Tighten the connecting rod nut (MA326N) and bend the washer ears over the nut.
- Assemble the other four (4) pistons to the rod retainer assembly using the piston pins (MA325).
- After all piston pins have been installed, secure with the retaining ring (65W1).
- Position the gaskets and cylinder caps over the cylinder holes and secure using the 75V10 screws. Tighten all screws to 7 ft. lbs. (9.5 Nm) torque.

9.2 Piston assembly (continued)



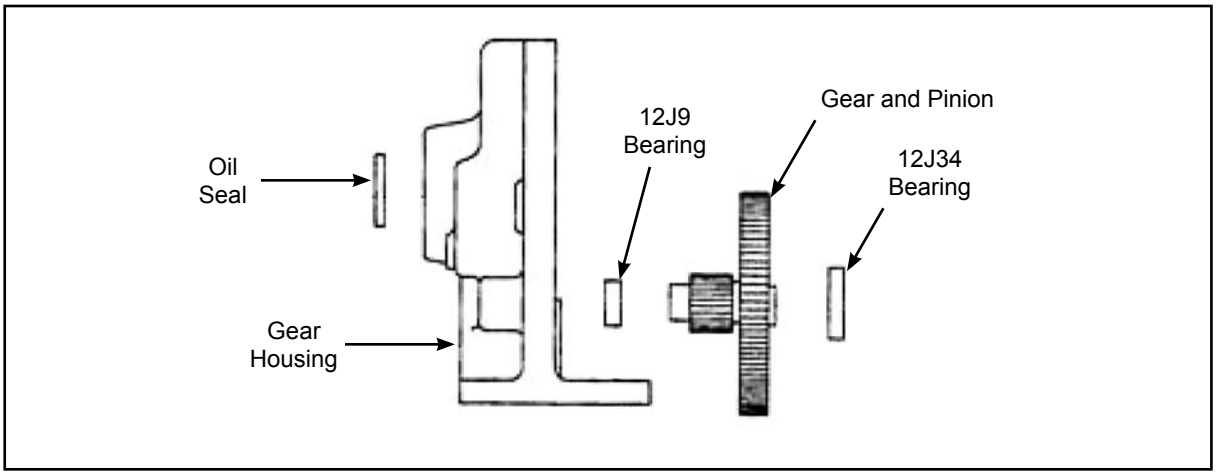
9.3 Geared models: assembly

- Press the bearing (60148PT) onto the pinion gear until it bottoms out.
- Tap the key (35D2) into the keyway and press the pinion gear into the crankshaft (drive end).

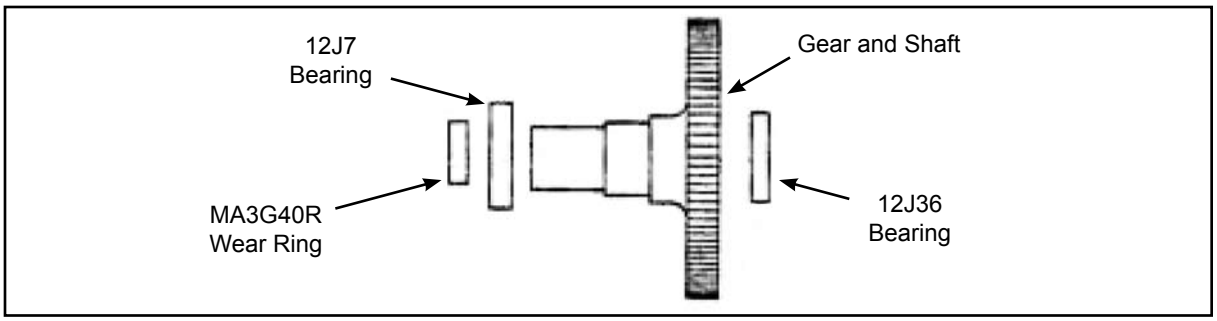


- Press the bearing (12J33) onto the crankshaft (valve end) and install the crankshaft into the valve bushing.
- Assemble the rod retainer over the crankshaft. Center the piston assembly to the breather port.
- Assemble the bearing (12P5) onto the small diameter of the crankshaft until it bottoms out.
- Slide the valve chest over the valve bushing and secure with the washers and screws. Tighten the screws to 21 ft. lbs. (28.5 Nm) torque. Apply air to test run the assembly.
- Place the key (35D2) in the crankshaft (valve end) keyway and assemble the crankshaft (drive end).
- Press the oil seal (60G117), flat side out, into the gear housing until it is flush with the outer edge of the housing.
- Press the bearing (12J9) into the gear housing until it bottoms out.
- Press the bearing (12J34) onto the gear and pinion (large gear end).

9.3 Geared models: assembly (continued)



- Press the bearing (12J36) onto the geared end of the gear and shaft.
- Press the bearing (12J7) and wear ring (MA3G40R) onto the threaded end of the gear and shaft until they bottom out.



- Place the gear and pinion, with bearing, into the bearing housing (MA3G20) making sure the bearing bottoms out in the housing.
- Assemble the bearing housing (MA3G39) to the bearing housing (MA3G20) and secure using washers and screws. Tighten the screws to 21 ft. lbs. (28.5 Nm) torque.
- Slide the gear and shaft into the gear housing and tap in until it bottoms out.
- Place the bearing housing gasket (MA3G25) over the bearing housing and assemble the bearing housing to the gear housing. Secure using washers and screws. Tighten the screws to 21 ft. lbs. (28.5 Nm) torque.
- Place the motor case gasket (MA319) over the motor case and assemble the motor case to the gear housing assembly, breather hole up. Secure using washers and screws. Assembly two (2) screws (75P56) to the left of the breather hole and three (3) screws (75P5) to the right of the breather hole. Tighten the screws to 21 ft. lbs. (28.5 Nm) torque.
- Make sure the pipe plugs and pet cock are securely installed in the motor case and gear housing.
- Fill the motor case with 3/4 pint of oil and the gear housing with 1-1/2 pints of oil.

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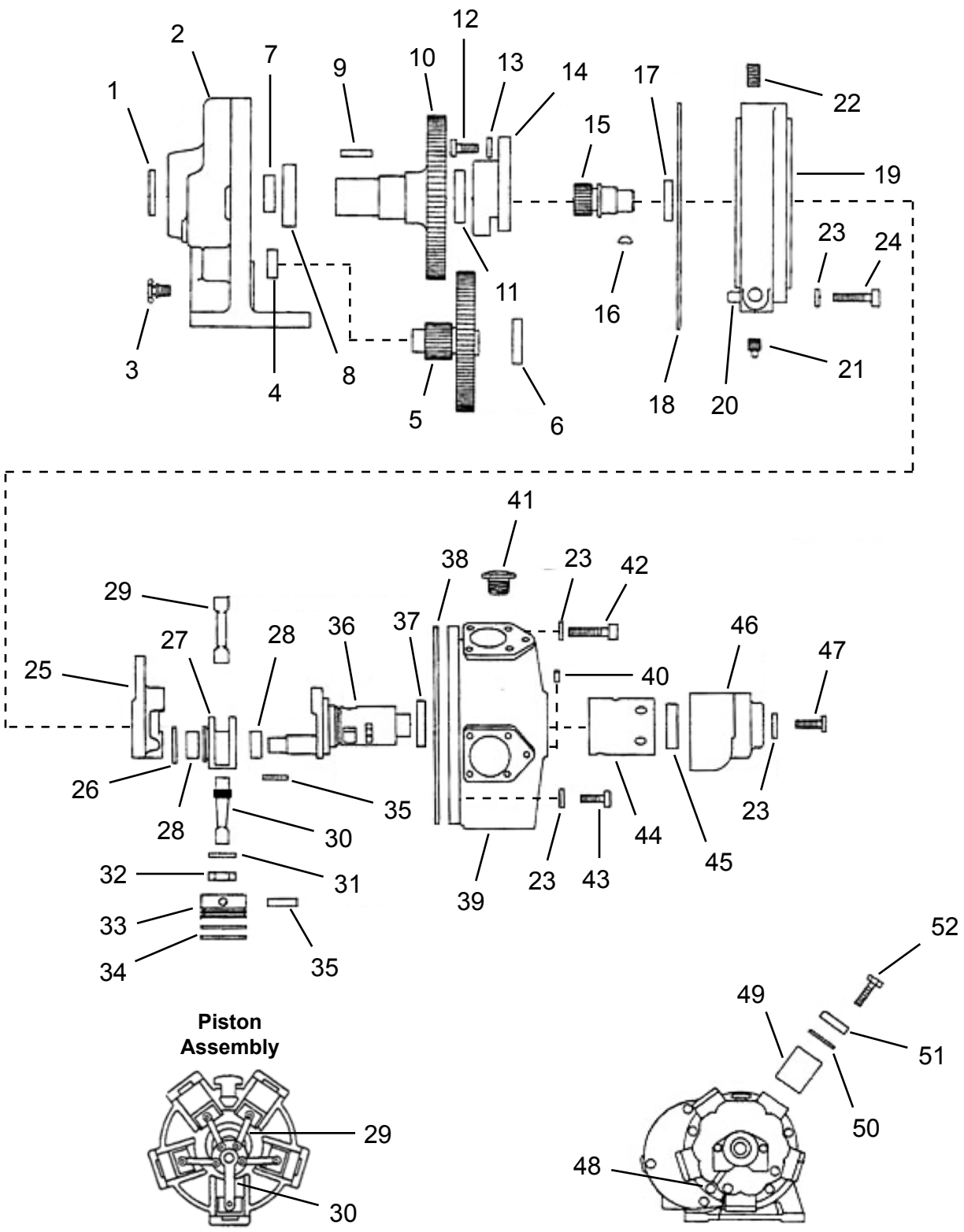
10.1.1 MA3W-2237 Geared Power Motor

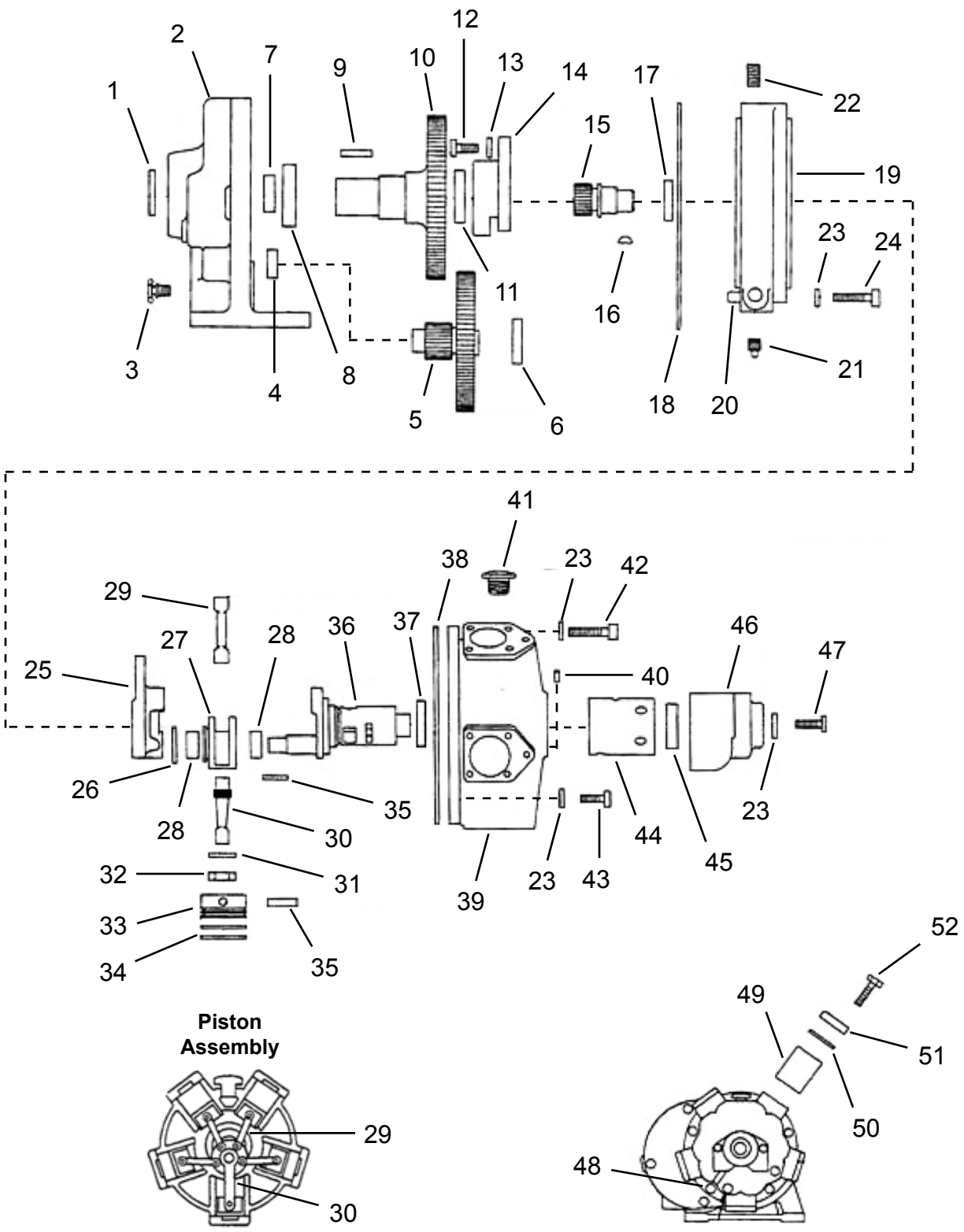


10.1.1 MA3W-2237 Geared Power Motor

Ref	Number	#	X	EN Description
1	60G117	1	3	Oil Seal
2	MA3G1	1		Gear Housing
3	90C12	1	2	Drain Cock
4	12J9	1	2	Ball Bearing
5	MA3G38	1		Gear and Pinion
6	12J34	1	2	Ball Bearing
7	MA3G40R	1	3	Wear Ring
8	12J7	1	2	Ball Bearing
9	35C114	1	2	Gear and Shaft Key
10	MA3G40E	1		Gear and Shaft
11	12J36	1	2	Ball Bearing
12	B150G	3	3	Bearing Housing Screw
13	W161PT	3	3	Flat Washer
14	MA3G39	1		Bearing Housing
15	MA3RM38	1		Pinion Gear
16	35D2	1	3	Woodruff Key
17	60148PT	1	2	Ball Bearing
18	MA3G25	1	3	Bearing Housing Gasket
19	MA3G20	1		Bearing Housing (includes Ref. 23)
20	DP162	1		Pin
21	64AA4	1		Pipe Plug
22	B110E	1		Pipe Plug
23	93G33	10	10	Flat Washer
24	75P60	3	3	Bearing Housing Screw
25	MA330D	1		Crankshaft (Drive End)
26	65W1	1	1	Retaining Ring
27	MA328X	1		Connecting Rod Retainer Assembly (includes Ref. 31)
28	800168	2	4	Needle Bearing
29	MA327	4		Connecting Rod
30	MA326B	1		Connecting Rod (Master)
31	MA326WA	1		Connecting Rod Washer (Master)
32	MA326N	1		Connecting Rod Nut (Master)

(#) Quantity
(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

10.1.2 MA3W-2237 Geared Power Motor (continued)



10.1.2 MA3W-2237 Geared Power Motor (continued)

Ref	Number	#	X	EN Description
33	MA324	5		Piston
34	65A225	10	10	Piston Ring
35	MA325	10		Piston Pin
36	MA331	1		Crankshaft (Valve End)
37	12J33	1	2	Ball Bearing
38	MA319	1	3	Motor Case Gasket
39	MA318E	1		Motor Case (includes Ref. 43)
40	DP114	1		Motor Case Pin
41	540805	1	2	Low Profile Breather Cap
42	B156U	3	3	Motor Case Screw
43	845676	2	2	Motor Case Screw
44	MA311	1		Distributing Valve Bushing
45	12P5	1	2	Ball Bearing
46	533701	1		Valve Chest
47	B158S	2	2	Valve Chest Screw
48	64AA5	2		Pipe Plug
49	MA318L	5		Cylinder Liner
50	MA323	5	15	Cylinder Gasket
51	MA322	5		Cylinder Cap
52	75V10	20	20	Cylinder Screw

(#) Quantity
(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

11 Technical data

11.1 MA3W-2237 Specifications

Model Number	Maximum Allowable RPM**		Stall Torque		Starting Torque		Weight		Air Consumption		Gear Ratio	Maximum Overhung Load @ Stall *	
	@ Max. HP	Free Speed	ft. lbs.	Nm	ft. lbs.	Nm	lbs.	kg	cfm	m3/min		lbs.	kg
without Valving													
MA3W-2237	48	100	588	797	317	430	67	30.1	95	2.69	24.6:1	2560	1161

* Note: All geared models assume overhung load located at 1.000" (25.40mm) from the face of the motor.
**Note: This motor must be operated with sufficient load to prevent speed from exceeding maximum allowable speed.

12 Service

12.1 Replacement parts

NOTE

Use only original Cleco replacement parts. Failure to comply can result in reduced power and increased service requirements. The tool warranty may be voided if replacement parts are not manufactured or approved by Apex Tool Group.

12.2 Tool repairs

Only qualified and trained personnel are to repair this equipment.

12.3 Warranty repairs

All warranty repairs are to be performed by an authorized Apex Tool Group service center. Contact your local representative for assistance with warranty repair claims.

13 Disposal

CAUTION!

Injuries and environmental damage from improper disposal.

Components and auxillary materials of the tool pose risks to health and the environment.

- ➔ Capture auxillary materials (oils, greases) when drained and dispose of them properly.
- ➔ Separate the packaging components and dispose of them properly.
- ➔ Comply with all applicable local regulations.

Observe local disposal guidelines for all components of this tool and its packaging.

Sales & Service Centers

Note: All locations may not service all products. Please contact the nearest Sales & Service Center for the appropriate facility to handle your service requirements.

Detroit, Michigan
Apex Tool Group
Sales & Service Center
2630 Superior Court
Auburn Hills, MI 48326
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Fax: (248) 391-6295

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Sales & Service Center
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Houston, TX 77041
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