

## MM Series Special Construcion Radial Piston Power Motors



Threaded  
Output Shaft



Keyed  
Output Shaft

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

**Motor models included in this manual:**

1. MMR-2236 - reversible valving
2. MMW-2252 - single direction valving
3. MMS-2253 - single direction valving
4. MMW-2263 - no valving
5. MMW-2264 - no valving
6. MMS-2265 - no valving
7. MMW-2266 - no valving
8. MMR-2273 - no valving
9. MMR-2274 - no valving
10. 91600AA6 - single direction valving
11. 91601AA4 - single direction valving
12. 91607AA2 - no valving
13. 91656AA9 - no valving
14. 91656BA8 - no valving

The original language of this manual is English.

**Product Safety Information:**

Intended Use:

This pneumatic motor is to be used exclusively as a power source to be integrated into an application.

For additional product safety information refer to Apex Tool Group, LLC or Apex Tool Group GmbH & Co. OHG document CE-2005, General Safety Instructions for Air Motors.



The motor must not be modified in any manner unless approved in writing by Apex Tool Group, LLC or Apex Tool Group GmbH & Co. OHG. All safety devices must be properly installed and maintained in good working order.

**Declaration of Incorporation:**

We affirm that this machine complies with the basic requirements of the following directives (2006/42/EC) and is intended for installation / assembly in a / with other machine(s). Commissioning of the incomplete machine is prohibited until such time that the incomplete machine has been incorporated in a machine that complies with the EC Machinery Directive 2006/42/EC and for which there is an EC Declaration of Conformity in accordance with Appendix II A. We furthermore declare that the special technical documentation for the incomplete machine is in accordance with Appendix VII Part B. We undertake to have it passed on to the market surveillance body upon request by our representative for the compilation of technical documentation. The following Sections of Appendix I of Directive 2006/42/EC have been fulfilled: 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4, 1.5. Applied harmonized standards are ISO 12100-1: 2004-04, ISO 12100-2:2004-04.

The name, job function and address of the person authorized to compile the technical file.

Mr. Vishnu Irigreddy  
Director of Global R&D- Mechanical Engineering  
Apex Tool Group  
670 Industrial Drive  
Lexington, SC 29072

Signature: Vishnu Irigreddy  
Date: March 12, 2015

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**Air Supply Line:**

Parameter	Description
Air Supply	Air Inlet: 1.25" (31.8mm) NPTF
Working pressure range	Performance rated at: 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.

**Lubrication:**

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 airline 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 1-1/2 quarts 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 these motors for proper oil level, open the oil level drain cock. If oil does not flow from the petcock, add the proper oil until oil begins to flow. Securely tighten the oil drain 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

**Service and Repair:**

Tool service and repair should be performed by an authorized Apex Tool Group, LLC or Apex Tool Group GmbH & Co. OHG Center. Refer to the last page of this manual for locations.

**Disposal:**



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

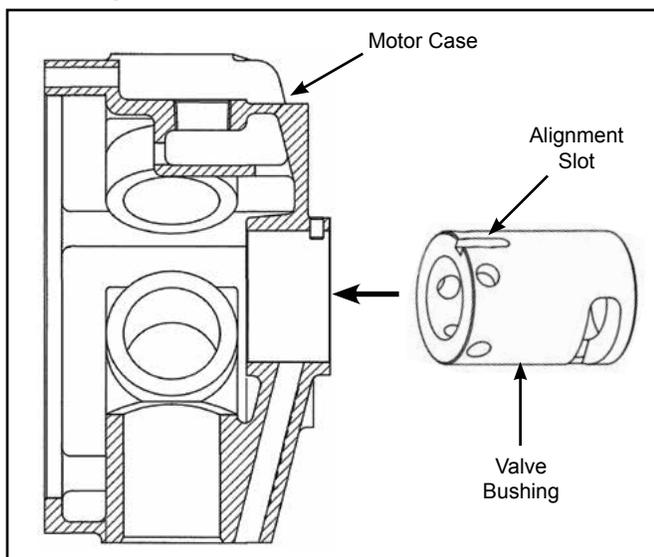
**Repair Instructions:**

**Motor Case Assembly:**

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

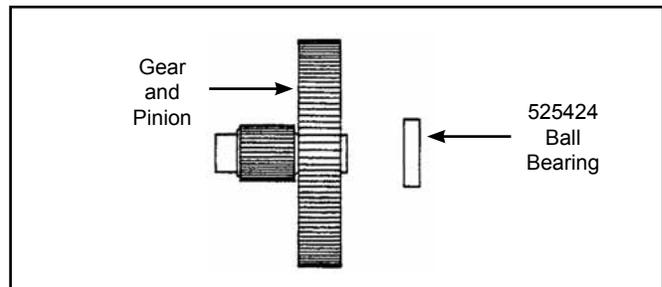
Install the valve bushing (200MAM502) into the motor case counter bore until it is flush with the inside edge of the counter bore. The valve bushing has a slot to enable proper alignment during assembly

**NOTE: The valve bushing must be put in a freezer before assembling into the motor case. This will cause the bushing to contract allowing easier assembly into the motor case.**

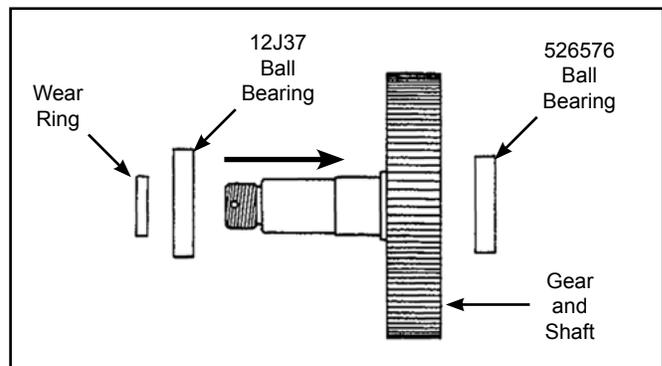


**Gearing Assembly:**

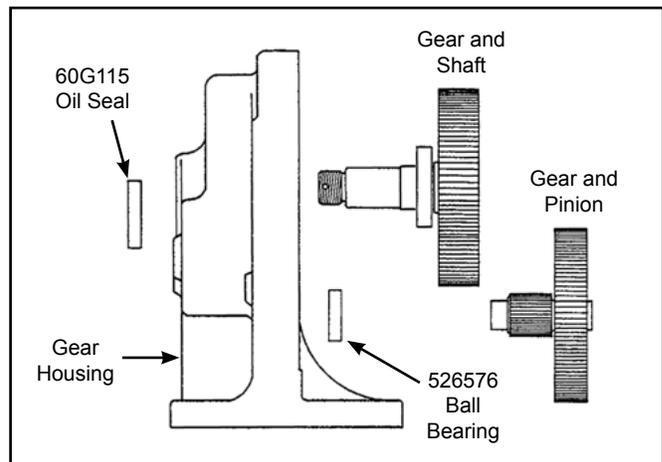
- Press the ball bearing (525424) onto the large gear end of the gear and pinion.



- Press a ball bearing (526576) onto the geared end of the gear and shaft until it bottoms out.
- Press a ball bearing (12J37) and wear ring (MKGP40R) onto the threaded or keyed output shaft end until they bottom out.



- Press the oil seal (60G115) into the gear housing until it is flush with the outside edge of the housing.
- Press the gear and pinion bearing (526576) into the gear housing until it bottoms out.
- Insert the gear and shaft assembly into the gear housing and tap in until it bottoms out.
- Install the gear and pinion assembly into the gear housing. Make sure the small diameter gear teeth fully engage the gear teeth of the gear and shaft.



**Refer to Illustrations “A” or “B”:**

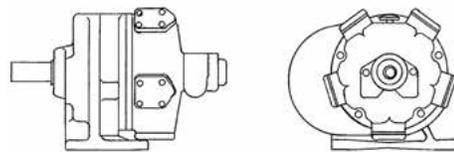
- Place the bearing housing (MK39) on the bearing housing (MK20) and secure with three washers (W125) and screws (75B4). Tighten the screws to 45 ft. lbs. (61 Nm) torque.
- Place the gasket (HK25) over the gear housing and assemble the bearing housing. Make sure the pin in the bearing housing fits into the mating hole in the gear housing.
- Press the bearing (12J37) onto the pinion gear until it bottoms out. Tap the key (35D13) into the pinion gear keyway. Insert the pinion gear assembly into the crankshaft assembly until it bottoms out.
- Install the piston rings in the grooves on the pistons. The step on the ring must be toward the open part of the piston.
- Assemble a retainer into one end of the hole in the pistons.
- Slip the bushing (MK33), chamfer down, over the crankshaft (drive end) until it bottoms out. Line up the oil holes with the groove in the crankshaft
- Put a light coating of oil on the bushing (MK28) and slide it over the bushing (MK33) on the crankshaft.
- Tap the key (35D13) into the keyway on the crankshaft.
- Place one connecting rod retainer over the bushing (MK28). Place the five connecting rods into the connecting rod retainer. Make sure the lettering on the rods are up. Place the other connecting rod retainer over the connecting rods and bushing (MK28).
- Assemble the crankshaft (drive end) to the crankshaft (valve end). Line up the shaft groove with the hole in the crankshaft and insert the screw (MK32). Secure with the nut (50E5) and cotter pin.
- Press the bearing (12J37) onto the crankshaft assembly until it bottoms out.
- Place the crankshaft assembly into the motor case and tap into position.
- Using the piston pins, attach the five pistons to the connecting rods and secure with the retainers (MK26).
- Place a cylinder gasket on each of the cylinders. Oil the inside of the cylinders.
- Compress the piston rings and slide a cylinder over each piston. Secure the cylinders using the washers (95G24) and screws (75A20). Tighten the screws to

45 ft. lbs. (61 Nm) torque.

- Lightly oil the valve bushing and distributor valve. Insert the distributor valve into the valve bushing (locate in dowel pin).
- Slide the valve chest over the bushing and secure with two washers (95G24) and screws (75A167). Tighten the screws to 45 ft. lbs. (61 Nm) torque.
- Apply air to the unit and test run in one direction only.
- Place the gasket on the motor case and assemble the motor case to the motor frame, breather hole up. Secure with washers (95G24) and screws (75A12). Tighten the screws to 45 ft. lbs (61 Nm) torque.
- Assemble the pipe plugs and drain cock. Fill the motor case with 1-1/2 quarts of oil and the gear housing with 1 quart of oil.

**Motor Mounting Options**

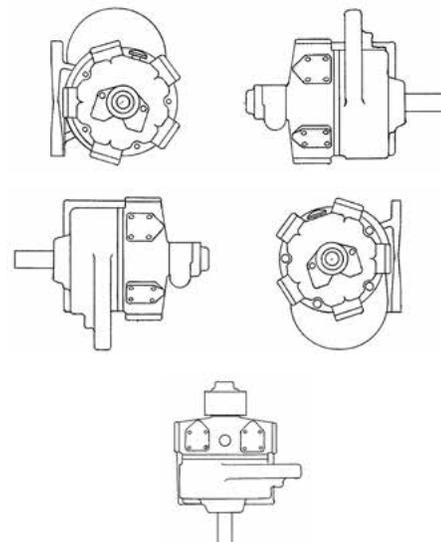
Floor Mounting



Ceiling Mounting



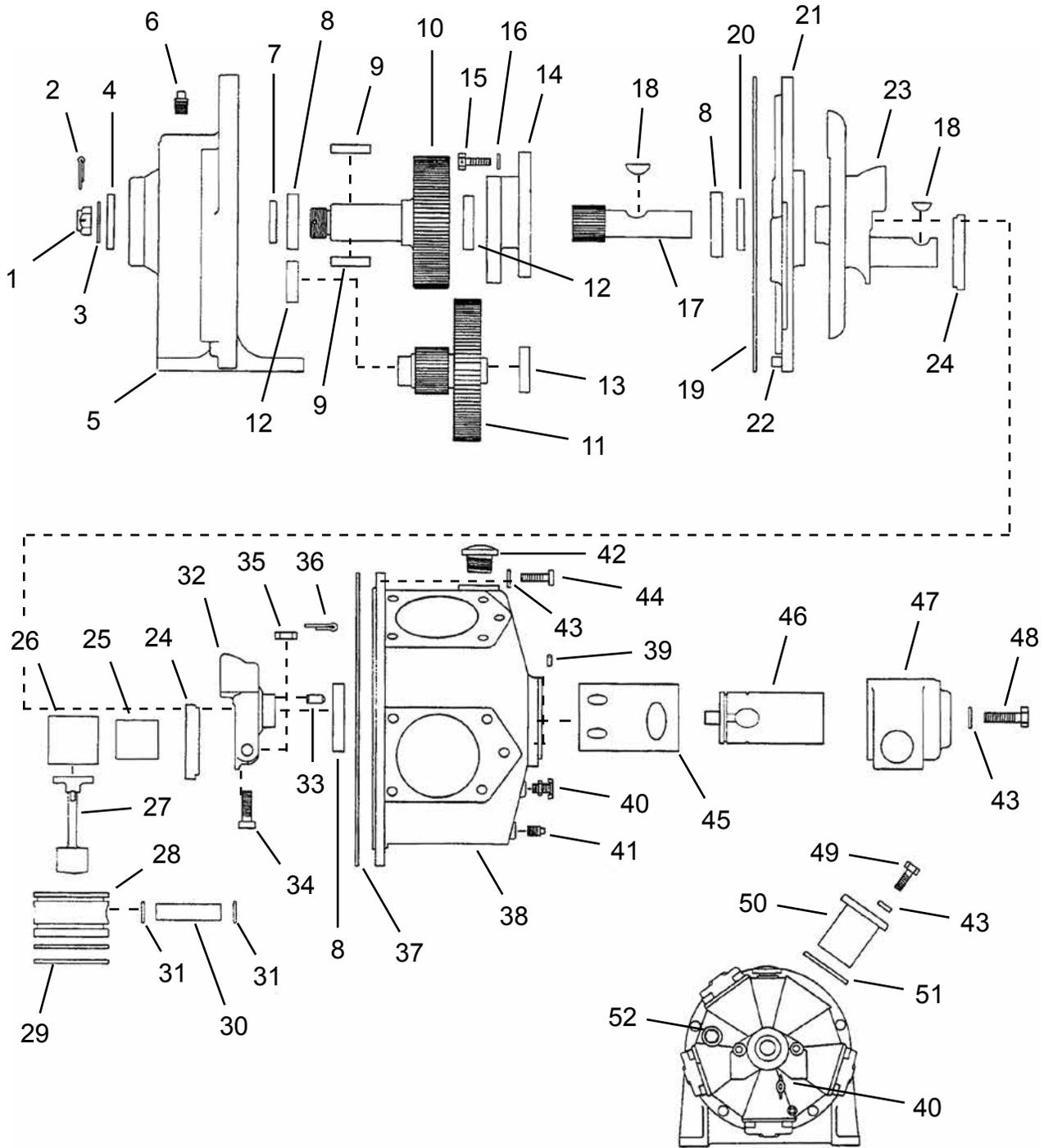
Wall Mountings



**Cleco®**  
Power Motor with Threaded Output Shaft

**“A”** 5.2:1 Gear Ratio

**Models**  
MMW-2263      MMW-2266  
MMW-2264      91607AA2  
MMS-2265



**Power Motor with Threaded Output Shaft**

**Illustration A: MM Series Power Motor (5.2:1 Gear Ratio)**

Ref.	Number	#	X	EN		Ref.	Number	#	X	EN	
					Description						Description
1	MKU52	1	2		Output Shaft Hex Nut	41	64AA5	1	1		Pipe Plug
2	62E66	1	3		Cotter Pin	42	542139	1	2		Low Profile Breather
3	95A11	1	2		Output Shaft Washer	43	95G24	27	27		Flat Washer
4	60G115	1	3		Oil Seal	44	B154M	5	5		Motor Case Screw
5	MKG1	1			Gear Housing (Includes 2 Ref. 6)	45	200MAM502	1			Distributing Valve Bushing
6	B110E	3	3		Pipe Plug	46	MM13	1			Distributing Valve
7	MKGP40R	1	3		Wear Ring	47	533799	1			Valve Chest
8	12J37	3	6		Ball Bearing	48	75A167	2	2		Valve Chest Screw
9	35B125	2	6		Gear and Shaft Key	49	75A20	20	20		Cylinder Screw
10	MKG51S	1			Gear and Shaft	50	MM22	5			Cylinder
11	MKG38	1			Gear and Pinion	51	MM23	5	15		Cylinder Gasket
12	526576	2	4		Ball Bearing	52	64A5	1	1		Pipe Plug
13	525424	1	2		Ball Bearing	53	MBA15	1			Instruction Plate (not shown)
14	MK39	1			Bearing Housing	54	530322	1			Name Plate (not shown)
15	75B4	3	3		Bearing Housing Screw	55	534820	4			Drive Screw (not shown)
16	W125	3	3		Flat Washer						
17	MKG37	1			Pinion Gear						
18	35D13	2	6		Woodruff Key						
19	HK25	1	3		Bearing Housing Gasket						
20	60G116	1	3		Oil Seal						
21	MK20	1			Bearing Housing (includes 22)						
22	DP162	1			Pin						
23	MK30Y	1			Crankshaft (Drive End)						
24	MK29	2			Connecting Rod Retainer						
25	MK33	1	1		Crankshaft Bushing						
26	MK28	1	1		Connecting Rod Bushing						
27	MK27	5			Connecting Rod						
28	MM24	5			Piston						
29	65A224	10	10		Piston Ring						
30	MM25	5			Piston Pin						
31	MK26	10			Piston Pin Retainer						
32	MM31	1			Crankshaft (Valve End) (includes 33)						
33	DP142	1			Crankshaft Pin						
34	MK32	1	1		Crankshaft Bolt						
35	50E5	1	1		Hex Castle Nut						
36	P101J	1	3		Cotter Pin						
37	MK19	1	3		Motor Case Gasket						
38	MM18	1			Motor Case (includes 39)						
39	DP114	1			Motor Case Pin						
40	90C12	2	4		Drain Cock						

(#) Quantity

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

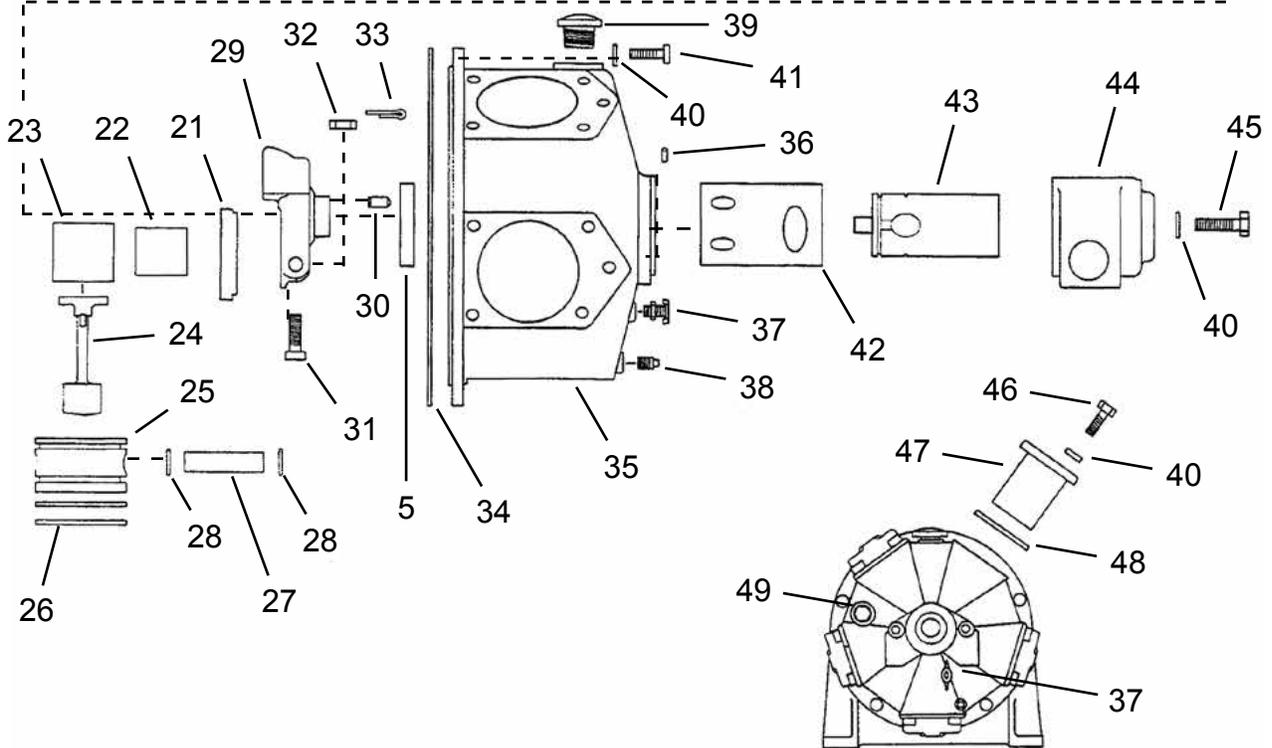
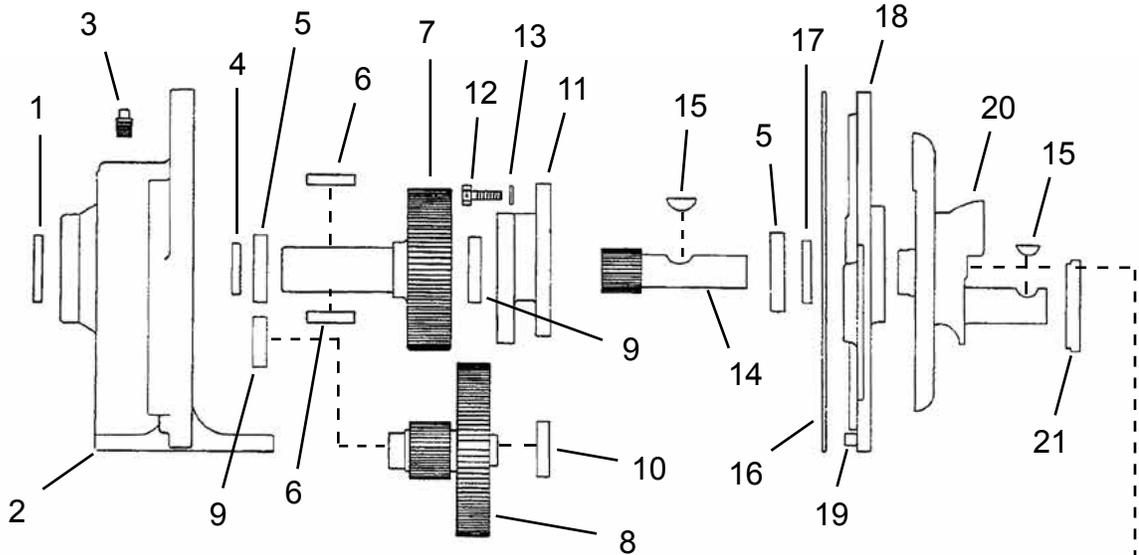
**Cleco®**  
Power Motor with Keyed Output Shaft

**"B"**

**5.2:1 and 14.2:1 Gear Ratios**

**Models**

MMR-2236	91600AA6
MMW-2252	91601AA4
MMS-2253	91656AA9
MMR-2273	91656BA8
MMR-2274	



**Power Motor with Keyed Output Shaft**

**Illustration B: MM Series Power Motor (5.2:1 and 14.2:1 Gear Ratios)**

Ref.	Number	#	X	EN		Ref.	Number	#	X	EN	
					Description						Description
1	60G115	1	3		Oil Seal	41	B154M	5	5		Motor Case Screw
2	MKG1	1			Gear Housing (Includes 2 Ref. 3)	42	200MAM502	1			Distributing Valve Bushing
3	B110E	3	3		Pipe Plug	43	MM13	1			Distributing Valve
4	MKGP40R	1	3		Wear Ring	44	533799	1			Valve Chest
5	12J37	3	6		Ball Bearing	45	75A167	2	2		Valve Chest Screw
6	Table "B"	2	6		Gear and Shaft Key	46	75A20	20	20		Cylinder Screw
7	Table "B"	1			Gear and Shaft	47	MM22	5			Cylinder
8	Table "B"	1			Gear and Pinion	48	MM23	5	15		Cylinder Gasket
9	526576	2	4		Ball Bearing	49	64A5	1	1		Pipe Plug
10	525424	1	2		Ball Bearing	50	MBA15	1			Instruction Plate (not shown)
11	MK39	1			Bearing Housing	51	530322	1			Name Plate (not shown)
12	75B4	3	3		Bearing Housing Screw	52	534820	4			Drive Screw (not shown)
13	W125	3	3		Flat Washer						
14	MKG37	1			Pinion Gear						
15	35D13	2	6		Woodruff Key						
16	HK25	1	3		Bearing Housing Gasket						
17	60G116	1	3		Oil Seal						
18	MK20	1			Bearing Housing (includes 19)						
19	DP162	1			Pin						
20	MK30Y	1			Crankshaft (Drive End)						
21	MK29	2			Connecting Rod Retainer						
22	MK33	1	1		Crankshaft Bushing						
23	MK28	1	1		Connecting Rod Bushing						
24	MK27	5			Connecting Rod						
25	MM24	5			Piston						
26	65A224	10	10		Piston Ring						
27	MM25	5			Piston Pin						
28	MK26	10			Piston Pin Retainer						
29	MM31	1			Crankshaft (Valve End) (includes 30)						
30	DP142	1			Crankshaft Pin						
31	MK32	1	1		Crankshaft Bolt						
32	50E5	1	1		Hex Castle Nut						
33	P101J	1	3		Cotter Pin						
34	MK19	1	3		Motor Case Gasket						
35	MM18	1			Motor Case (includes 36)						
36	DP114	1			Motor Case Pin						
37	90C12	2	4		Drain Cock						
38	64AA5	1	1		Pipe Plug						
39	542139	1	2		Low Profile Breather						
40	95G24	27	27		Flat Washer						

(#) Quantity

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

**Table B**

Ref.	Description	#	MMR-2273 MMR-2274 91656AA9 91656BA8	#	MMR-2236 MMW-2252 91600AA6	#	MMS-2253 91601AA4
--	Gear Ratio		14.2:1		14.2:1		5.2:1
6	Gear and Shaft Key	1	35B125	1	35B117	1	35B117
7	Gear and Shaft	1	MKG52S	1	MKG52S	1	2MKG50S
8	Gear and Pinion	1	MK38A	1	MK38A	1	MKG38
14	Pinion Gear	1	MK37	1	MK37	1	MKG37

<b>“C”</b>	<b>Single Direction Valving</b>	<b>Models</b>	
		MMW-2252	91600AA6
		MMS-2253	91601AA4

<b>“D”</b>	<b>Reversible Valving</b>	<b>Model</b>
		MMR-2236

**Illustration C: Single Direction Valving**

Ref	Number	#	X	EN
				Description
1	90A39	1		Air Control Valve
2	63J11	1		Pipe Nipple (1-1/4" NPT x 3" Long)

(#) Quantity

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

**Illustration D: Reversible Valving**

Ref	Number	#	X	EN
				Description
1	539527	1		4-Way Control Valve
2	63J16	2		Pipe Nipple (1-1/4" NPT x 2-1/2" Long)
3	818451	3		90° Elbow (1-1/4" NPT)
4	64D7	2		90° Street Elbow (1-1/4" NPT)
5	63J11	4		Pipe Nipple (1-1/4" NPT x 3" Long)
6	64Z5	2		Union (1-1/4" NPT)
7	63J15	1		Pipe Nipple (1-1/4" NPT x 1-5/8" Long)
8	532820	3		Plastic Plug Cap

(#) Quantity

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

## 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.

Brazil

**Apex Tool Group  
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Av. Liberdade, 4055  
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Canada

**Apex Tool Canada, Ltd  
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Mississauga, Ont. L4T 3T1  
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Tel: (866) 691-6212  
Tel: (905) 673-4400

China

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Tel: (248) 393-5640  
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USA - Lexington, South Carolina

**Apex Tool Group**  
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Lexington, SC 29072  
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Fax: (803) 358-7681

USA - Los Angeles, California

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6881 Stanton Avenue  
Unit B  
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Fax: (714) 994-9576

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**Apex Tool Group  
Sales & Service Center**  
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Tel: (425) 497-0476  
Fax: (425) 497-0496

USA - York, Pennsylvania

**Apex Tool Group  
Sales & Service Center**  
3990 East Market Street  
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