

Instruction Manual
45-8059EN
07/08/2013

Cleco®

21 Series Double Reduction Rotary Vane Power Motors



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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 21 series tools.
- serves as a reference guide for technical data, service intervals and spare parts ordering.
- provides information on optional equipment.

Identification text:

21 represents all models of the rotary vane 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

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Cleco®
Nomenclature

45-8059EN
07/08/2013

Rotation Direction	Housing Style	Output Speed - RPM			Exhaust
		380	600	900	
Right	Round	21-1000	21-1001	21-1002	Side
Right	Round	21-1040	21-1041	21-1042	Rear
Right	Flange and Base Mounting	21M1000	21M1001	21M1002	Side
Right	Flange and Base Mounting	21M1040	21M1041	21M1042	Rear
Left *	Round	21D1000-49	21D1001-49	21D1002-49	Side
Left *	Round	21D1040-49	21D1041-49	21D1042-49	Rear
Left *	Flange and Base Mounting	21V1000-49	21V1001-49	21V1002-49	Side
Left *	Flange and Base Mounting	21V1040-49	21V1041-49	21V1042-49	Rear

* Note: Left hand rotation (not reversible)



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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.

Work Area:

CAUTION!



- 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 21 series tools. The 21 series 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 hair net
- Do not wear close fitting clothing
- Do not wear jewelry

1.5 Designated use

The 21 series are designed exclusively as a power source to be integrated into an application.

- Do not modify the 21 series, 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 21 series motor
- 1 45-8059EN instruction manual
- 1 Declaration of Conformity (if applicable)
- 1 Lubrication sheet
- 1 Warranty statement

2.2 Transport

Transport and store the 21 series in the original packaging. The packaging is recyclable.

2.3 Storage

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

→ Secure the 21 series to avoid accidental startup.

For storage longer than 2 hours:

→ Disconnect the air supply from the 21 series

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

3 Product description

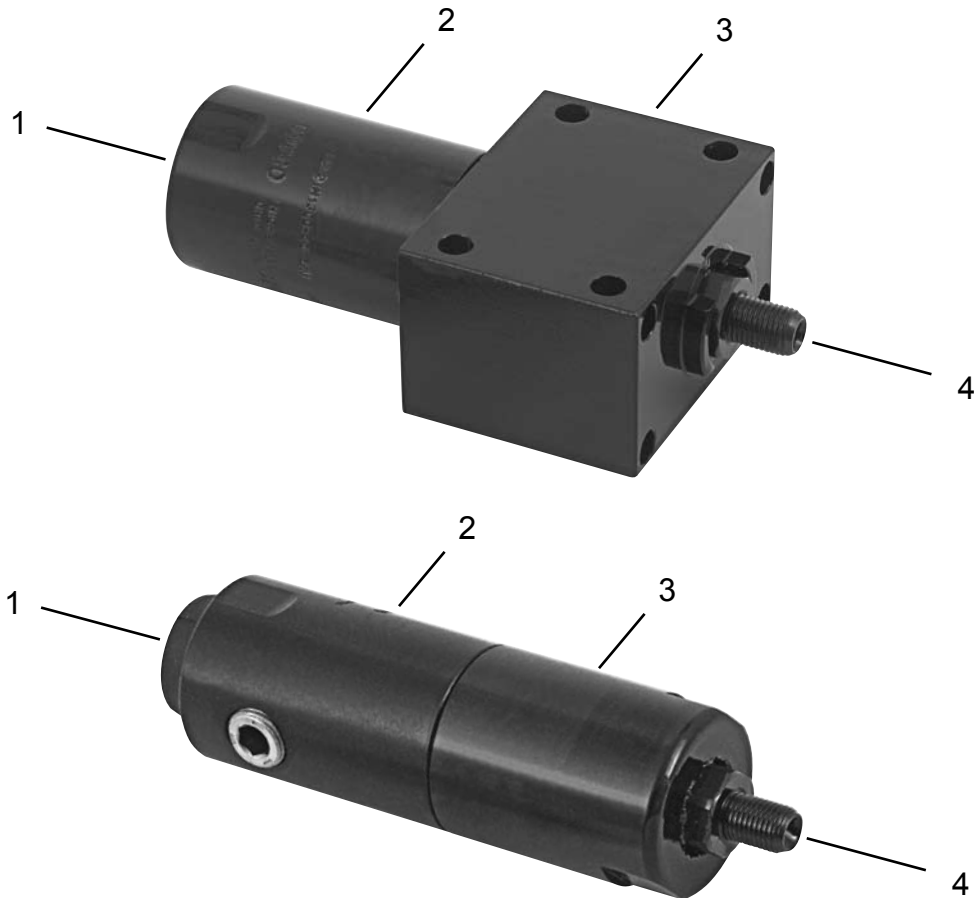
3.1 General description

- Pneumatic powered rotary vane power motor
- 0.3 Horsepower
- Double geared
- Round housing or Flange and Base mounting options

3.2 Operation and functional elements

This section describes the operational and functional elements of the 21 series.

3.2 Operation and functional elements (continued)



Ref.	Description
1	Air Inlet
2	Motor Assembly
3	Gearing Assembly
4	Output Spindle

4 Accessories

None 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	Air inlet: 1/4" (6,4 mm) 5/16" I.D. Air Hose: Maximum length run of 10.0' (3 m) 3/8" I.D. Air Hose: Runs over 10.0' (3 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.



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 should be filled daily

5.3 Connecting the air supply to the tool

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 21 series are rotary vane type motors. All motors feature durable construction with precision heavy-duty bearings throughout, and multiple blade rotors for smooth power. These motors require air line lubrication for long, trouble-free service. The 21 series motors perform satisfactorily in high temperature areas up to 200°F (93°C).

- 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.

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 21 series 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 airline lubricator for proper function
	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 airline lubricator for proper function

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 safety 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	<ul style="list-style-type: none"> → 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	<ul style="list-style-type: none"> → Inspect the air hose for damage or wear → inspect the output spindle for damage or wear → Inspect the airline lubrication for proper function

8.2 Lubricants

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

Oil identification

Use a light air tool oil, Cleco part number 500021. This oil is available from Apex Tool Group in the following quantities:

533484: 1 pint

533485: 1 gallon

DO NOT SUBSITUTE LUBRICANTS!

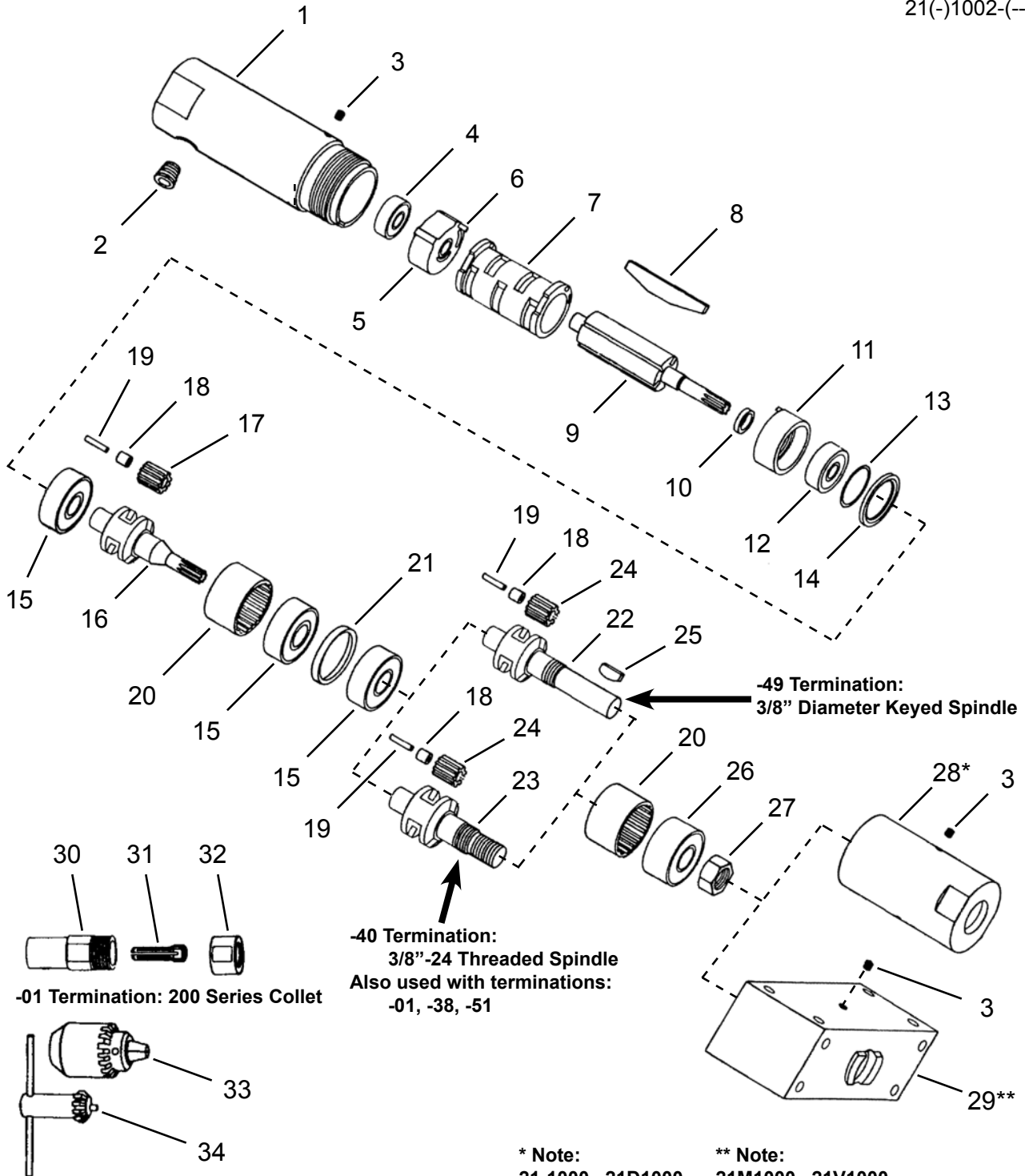
9 Repair instructions



10.1 21 Series - Side Exhaust Models

Models

- 21(-)1000(-)
- 21(-)1001(-)
- 21(-)1002(-)



-49 Termination:
3/8" Diameter Keyed Spindle

-40 Termination:
3/8"-24 Threaded Spindle
Also used with terminations:
-01, -38, -51

-01 Termination: 200 Series Collet

-38 Termination: 1/4" Capacity Drill Chuck
-51 Termination: 3/8" Capacity Drill Chuck

* Note:	21-1000	21D1000	** Note:	21M1000	21V1000
	21-1001	21D1001		21M1001	21V1001
	21-1002	21D1002		21M1002	21V1002

10.1 21 Series Side Exhaust Motors

Ref	Number	#	X	EN	
				Description	
1	1194	1		Motor Housing	
2	2957	1	2	Pipe Plug (1/4-18 NPTF)	
3	2831	2	4	Set Screw (#10-32)	
4	504PT	1	2	Ball Bearing	
5	Table 10.1	1		Bearing Plate (includes Ref. 6)	
6	1041	1	2	Pin	
7	1002PT	1		Cylinder	
8	1006PT	5	10	Rotor Blade	
9	Table 10.1	1		Rotor	
10	1017PT	1		Rotor Spacer	
11	1176	1		Bearing Plate	
12	538PT	1	2	Ball Bearing	
13	1355PT	1	2	Shim Packet	
14	1563PT	1		Spacer	
15	519	3	6	Ball Bearing	
16	Table 10.1	1		Planetary Gear Carrier	
17	Table 10.1	2	4	Planetary Gear (includes Ref. 18)	
18	1464	4	8	Planetary Gear Needle Bearing	
19	1526PT	4	8	Planetary Gear Shaft	
20	1529PT	2		Ring Gear	
21	1491PT	1		Bearing Spacer	
22	1922PT	1		Planetary Gear Carrier (-49 Termination)	
23	02-1107	1		Planetary Gear Carrier (-01 Termination)	
	02-1114	1		Planetary Gear Carrier (-38, -40, -51 Terminations)	
24	Table 10.1	2	4	Planetary Gear (includes Ref. 18)	
25	1920PT	1	2	Woodruff Key (-49 Termination)	
26	558	1	2	Ball Bearing (-49 Termination)	
	519	1	2	Ball Bearing (-01, -38, -40, -51 Terminations)	
27	1486PT	1	2	Lock Nut (-49 Termination)	
	1706PT	1	2	Lock Nut (-38, -40, -51 Terminations)	
28	1509PT	1		Round Housing	
29	1200PT	1		Flange and Base Mounting Housing	
Termination 01					
30	2060PT	1	2	Collet Chuck Body	
31	208	1	2	1/4" Collet	
32	2058PT	1	2	Collet Cap	
--	14-0809	1	2	Wrench (9/16") (not shown)	
--	14-0812	1	2	Wrench (3/4") (not shown)	
Termination 38					
33	14-1485	1	1	1/4" Chuck	
34	621PT	1	2	Chuck Key	
Termination 40					
--	14.0810	1	2	Wrench (5/8") (not shown)	
Termination 51					
33	14-1489	1	1	1/4" Chuck	
34	14-2169	1	2	Chuck Key	

(#) Quantity

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

Table 10.1

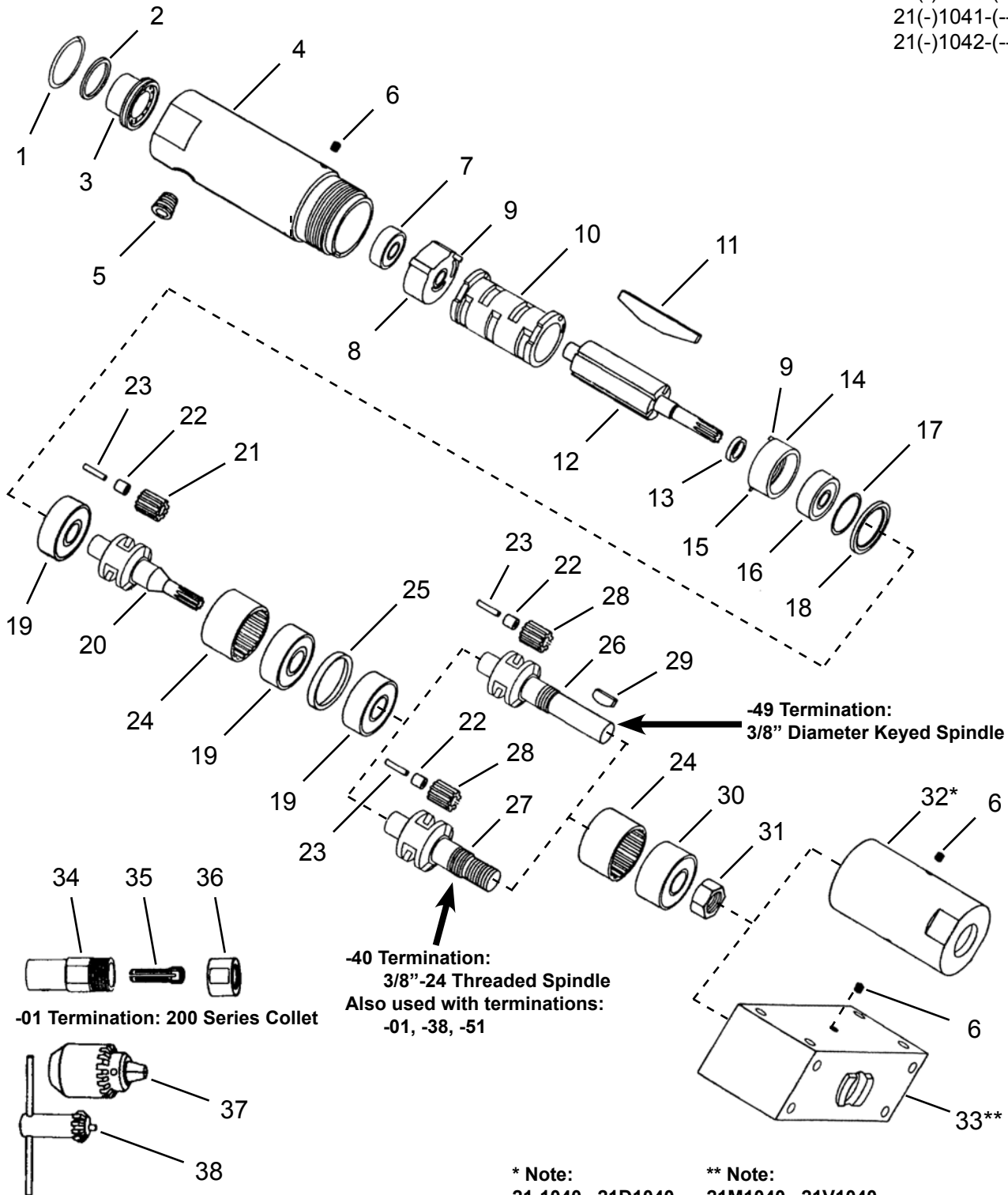
Ref.	Description	#	21-1000 21M1000	#	21-1001 21M1001	#	21-1002 21M1002	#	21D1000 21V1000	#	21D1001 21V1001	#	21D1002 21V1002
5	Bearing Plate	1	1203PT	1	1203PT	1	1203PT	1	2157PT	1	2157PT	1	2157PT
9	Rotor	1	2912S	1	2912S	1	1959	1	2912S	1	2912S	1	1959
16	Planetary Gear Carrier	1	1918PT	1	1917PT	1	1917PT	1	1918PT	1	1917PT	1	1917PT
17	Planetary Gear	2	1536 (18T)	2	1536 (18T)	2	1540PT (16T)	2	1536 (18T)	2	1536 (18T)	2	1540PT (16T)
24	Planetary Gear	2	1536 (18T)	2	1540PT (16T)	2	1540PT (16T)	2	1536 (18T)	2	1540PT (16T)	2	1540PT (16T)

(T) Teeth

10.1 21 Series - Rear Exhaust Models

Models

- 21(-)1040(-)
- 21(-)1041(-)
- 21(-)1042(-)



-01 Termination: 200 Series Collet

-40 Termination:
3/8" -24 Threaded Spindle
Also used with terminations:
-01, -38, -51

-38 Termination: 1/4" Capacity Drill Chuck
-51 Termination: 3/8" Capacity Drill Chuck

* Note:

21-1040	21D1040
21-1041	21D1041
21-1042	21D1042

** Note:

21M1040	21V1040
21M1041	21V1041
21M1042	21V1042

10.2 21 Series Rear Exhaust Motors

Ref	Number	#	X	EN
				Description
1	2690PT	1	3	Retaining Ring
2	1838PT	1	3	O-Ring
3	2685	1	2	Muffler
4	1192PT	1		Motor Housing
5	2957	1	2	Pipe Plug (1/4-18 NPTF)
6	2831	2	4	Set Screw (#10-32)
7	504PT	1	2	Ball Bearing
8	Table 10.2	1		Bearing Plate (includes 1 Ref. 9)
9	1041	2	4	Pin
10	1002PT	1		Cylinder
11	1006PT	5	10	Rotor Blade
12	Table 10.2	1		Rotor
13	1017PT	1		Rotor Spacer
14	Table 10.2	1		Bearing Plate (includes 1 Ref. 9 and 15)
15	2964	1	2	Pin
16	538PT	1	2	Ball Bearing
17	1355PT	1	2	Shim Packet
18	1563PT	1		Spacer
19	519	3	6	Ball Bearing
20	Table 10.2	1		Planetary Gear Carrier
21	Table 10.2	2	4	Planetary Gear (includes 1 Ref. 22)
22	1464	4	8	Planetary Gear Needle Bearing
23	1526PT	4	8	Planetary Gear Shaft
24	1529PT	2		Ring Gear
25	1491PT	1		Bearing Spacer
26	1922PT	1		Planetary Gear Carrier (-49 Termination)
27	02-1107	1		Planetary Gear Carrier (-01 Termination)
	02-1114	1		Planetary Gear Carrier (-38, -40, -51 Terminations)
28	Table 10.2	2	4	Planetary Gear (includes Ref. 22)
29	1920PT	1	2	Woodruff Key (-49 Termination)
30	558	1	2	Ball Bearing (-49 Termination)
	519	1	2	Ball Bearing (-01, -38, -40, -51 Terminations)
31	1486PT	1	2	Lock Nut (-49 Termination)
	1706PT	1	2	Lock Nut (-38, -40, -51 Terminations)
32	1509PT	1		Round Housing
33	1200PT	1		Flange and Base Mounting Housing
Termination 01				
34	2060PT	1	2	Collet Chuck Body
35	208	1	2	1/4" Collet
36	2058PT	1	2	Collet Cap
--	14-0809	1	2	Wrench (9/16") (not shown)
--	14-0812	1	2	Wrench (3/4") (not shown)
Termination 38				
37	14-1485	1	1	1/4" Chuck
38	621PT	1	2	Chuck Key
Termination 40				
--	14.0810	1	2	Wrench (5/8") (not shown)
Termination 51				
37	14-1489	1	1	1/4" Chuck
38	14-2169	1	2	Chuck Key

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

Table 10.2

Ref.	Description	#	21-1040 21M1040	#	21-1041 21M1041	#	21-1042 21M1042	#	21D1040 21V1040	#	21D1041 21V1041	#	21D1042 21V1042
8	Bearing Plate	1	1204	1	1204	1	1204	1	02-1209	1	02-1209	1	02-1209
12	Rotor	1	2912S	1	2912S	1	1959	1	2912S	1	2912S	1	1959
14	Bearing Plate	1	1531PT	1	1531PT	1	1531PT	1	1262PT	1	1262PT	1	1262PT
20	Planetary Gear Carrier	1	1918PT	1	1917PT	1	1917PT	1	1918PT	1	1917PT	1	1917PT
21	Planetary Gear	2	1536 (18T)	2	1536 (18T)	2	1540PT (16T)	2	1536 (18T)	2	1536 (18T)	2	1540PT (16T)
28	Planetary Gear	2	1536 (18T)	2	1540PT (16T)	2	1540PT (16T)	2	1536 (18T)	2	1540PT (16T)	2	1540PT (16T)

(T) Teeth

11 Technical data

11.1 21 Series Specifications

Model Number	Maximum Allowable RPM		Stall Torque		Weight		Overall Length		Air Consumption		Gear Ratio	Exhaust
	@ Max. HP	Free Speed	ft. lbs.	Nm	lbs.	kg	in.	mm	cfm	m3/min		
Round Housing - Right Hand Rotation - See Termination Options												
21-1000	190	380	15.2	20.60	2.3	1.04	5.66	144	12	0.34	68.9:1	Side
21-1040	190	380	15.2	20.60	2.1	0.95	5.66	144	12	0.34	68.9:1	Rear
21-1001	300	600	9.9	13.41	2.3	1.04	5.66	144	12	0.34	44.82:1	Side
21-1041	300	600	9.9	13.41	2.1	0.95	5.66	144	12	0.34	44.82:1	Rear
21-1002	450	900	6.4	8.67	2.3	1.04	5.66	144	12	0.34	29.1:1	Side
21-1042	450	900	6.4	8.67	2.1	0.95	5.66	144	12	0.34	29.1:1	Rear
Round Housing - Left Hand Rotation - 3/8" Diameter Keyed Spindle (only)												
21D1000-49	190	380	15.2	20.60	2.3	1.04	5.66	144	12	0.34	68.9:1	Side
21D1040-49	190	380	15.2	20.60	2.1	0.95	5.66	144	12	0.34	68.9:1	Rear
21D1001-49	300	600	9.9	13.41	2.3	1.04	5.66	144	12	0.34	44.82:1	Side
21D1041-49	300	600	9.9	13.41	2.1	0.95	5.66	144	12	0.34	44.82:1	Rear
21D1002-49	450	900	6.4	8.67	2.3	1.04	5.66	144	12	0.34	29.1:1	Side
21D1042-49	450	900	6.4	8.67	2.1	0.95	5.66	144	12	0.34	29.1:1	Rear
Flange and Base Mounting - Right Hand Rotation - See Termination Options												
21M1000	190	380	15.2	20.60	3.1	1.41	5.66	144	12	0.34	68.9:1	Side
21M1040	190	380	15.2	20.60	3.0	1.36	5.66	144	12	0.34	68.9:1	Rear
21M1001	300	600	9.9	13.41	3.1	1.41	5.66	144	12	0.34	44.82:1	Side
21M1041	300	600	9.9	13.41	3.0	1.36	5.66	144	12	0.34	44.82:1	Rear
21M1002	450	900	6.4	8.67	3.1	1.41	5.66	144	12	0.34	29.1:1	Side
21M1042	450	900	6.4	8.67	3.0	1.36	5.66	144	12	0.34	29.1:1	Rear
Flange and Base Mounting - Left Hand Rotation - 3/8" Diameter Keyed Spindle (only)												
21V1000-49	190	380	15.2	20.60	3.1	1.41	5.66	144	12	0.34	68.9:1	Side
21V1040-49	190	380	15.2	20.60	3.0	1.36	5.66	144	12	0.34	68.9:1	Rear
21V1001-49	300	600	9.9	13.41	3.1	1.41	5.66	144	12	0.34	44.82:1	Side
21V1041-49	300	600	9.9	13.41	3.0	1.36	5.66	144	12	0.34	44.82:1	Rear
21V1002-49	450	900	6.4	8.67	3.1	1.41	5.66	144	12	0.34	29.1:1	Side
21V1042-49	450	900	6.4	8.67	3.0	1.36	5.66	144	12	0.34	29.1:1	Rear

Termination Options for Right Hand Rotation Models:

- 01 Series 200 Collet Chuck (for milling and routing)
- 38 0"-1/4" Capacity Drill Chuck
- 40 3/8"-24 Threaded Spindle
- 49 3/8" Diameter Keyed Spindle
- 51 1/16"-3/8" Capacity Drill Chuck

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 auxiliary materials of the tool pose risks to health and the environment.

- Capture auxiliary 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
Tel: (248) 393-5640
Fax: (248) 391-6295

Houston, Texas

**Apex Tool Group
Sales & Service Center**
6550 West Sam Houston
Parkway North, Suite 200
Houston, TX 77041
Tel: (713) 849-2364
Fax: (713) 849-2047

Lexington, South Carolina

Apex Tool Group
670 Industrial Drive
Lexington, SC 29072
Tel: (800) 845-5629
Tel: (803) 951-7544
Fax: (803) 358-7681

Los Angeles, California

**Apex Tool Group
Sales & Service Center**
6881 Stanton Avenue
Unit B
Buena Park, CA 90621
Tel: (714) 994-1491
Fax: (714) 994-9576

Seattle, Washington

**Apex Tool Group
Sales & Service Center**
2865 152nd Avenue N.E.
Redmond, WA 98052
Tel: (425) 497-0476
Fax: (425) 497-0496

York, Pennsylvania

**Apex Tool Group
Sales & Service Center**
3990 East Market Street
York, PA 17402
Tel: (717) 755-2933
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