



Form 04581351  
Edition 2  
April 2005

# Fixtured In-Line DC Electric Nutrunner

QM3

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## Maintenance Information



**Save These Instructions**

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## General Instructions:

- Refer to "Suggested Tools" in the Parts Information Manual Form 04581310 for quick reference to the tools recommended for the following disassembly/assembly instructions.

### **WARNING**

- Repairs should be made only by authorized trained personnel. Consult your nearest Ingersoll-Rand Authorized Service Center.
- Disconnect the power cord from the receptacle before performing any maintenance on this or any other tool.
- Always use protective eyewear when performing maintenance on a tool or while operating a tool.
- Use of non-Ingersoll-Rand parts or failure to follow Maintenance Instructions may create a risk of electric shock or injury.

## Lubrication

Whenever this product is disassembled, clean the parts and re-lubricate them as follows:

- Separate spindle, transducer, gear pack, and motor.
- Disassemble spindle and gear case.
- Clean and degrease all parts.
- Once gear case is clean, apply prescribed amounts of **Ingersoll-Rand #222 Grease** as follows:

- 1 cc into the ring gear.
  - 1 cc into the first stage gears in the Gear head Assembly (22).
  - 1 cc into the second stage gears in the Spindle assembly (20).
  - 0.25 cc between and around gears, washers, and secondary stage sun gear.
- Wipe clean the Spindle Assemblies with a clean, dry and lint-free rag.
  - Work 2.5 cc of **Ingersoll-Rand #222 grease** into the inner diameter of the Coupler (9).

## Tool Dismounting Methods

It should be noted that disassembly of the tool into the modules will differ slightly depending on the method used for mounting. If the tool is mounted with the plate spacer in place, the tool can be disassembled by following the first set of instructions (A). The reason for the plate spacer is to allow the tool to be dismounted and remain fully assembled.

The tool can also be mounted with a bracket or mounting plate that takes the place of the spacer. If this is the desired mounting method, the mounting plate used must be the same thickness as the plate spacer provided or the tool will not fit together properly. In this case the second set of instructions (B) should be followed.

### Disassembly

To aid in the disassembly process, the tool can be broken down into modules. There are five different modules in the tool; the spindle assembly, transducer, gear case assembly, motor assembly, and electronics pod assembly. The following instructions are for breaking the tool down into each modular assembly.

### **WARNING**

- This procedure is to be performed by an authorized, trained repair person to ensure proper functioning of the tool.

### **CAUTION**

- When replacing a Gear Case Assembly, always use the Assembly designed for that model.

## General Instructions for Disassembly:

- Do not disassemble the tool any further than necessary to replace or repair damaged parts.
- To protect part surfaces and to prevent distortion of housings and threaded joints, use care when grasping the tool.
- Avoid clamping non-metal surfaces unless directed otherwise.
- Do not remove any press fit part or any part of an assembly unless its removal is necessary for repair or replacement.

## Disassembly into Smaller Modules

### (A)

- Using an Allen wrench remove the M8 Screws (4) that hold the tool to the mounting plate and slide the tool out.
- Remove the M3 Screws (5) that hold the Spindle Assembly to the Transducer Assembly (17).
- Remove the M6 Screws (24) that hold the gear case assembly to the Transducer Assembly (17).
- Remove the M6 Screws (26) that hold the gear case to the Motor Assembly (27).

### (B)

- Using an Allen wrench remove the M8 Screws (4) that hold the tool to the mounting plate. The spindle assembly will now become disengaged.

- Slide off the transducer, gear case, and motor assemblies.
- Remove the M6 Screws (24) that hold the gear case assembly to the Transducer Assembly (17).
- Remove the M6 Screws (26) that hold the gear case to the Motor Assembly (27).

## Attachments

### **WARNING**

- NEVER grasp the tool in a vise, as this will likely result in damage to the tool causing wire leads to malfunction, which increases the risk of electric shock.

## Spindle - Disassembly

- Use snap ring pliers to remove Retainer Ring (15).
- Gently tap the end of the spindle on a hard surface while covering the opposite end to dislodge the slip fit bearing.

### **WARNING**

The input spindle is spring loaded and will therefore exert a force once dislodged. Make sure to cover the end to avoid potential injury.

- Pull the Input Spindle Assembly (11) out of the Housing (3).
- If necessary, using a bearing puller tool, pull the rear spindle Bearing (14) off the Input Spindle Assembly (11). The bearing will most likely become damaged in this process and should therefore be replaced.
- Remove the Retaining Ring (13), and Washer (6).
- Now tilt the spindle housing, causing the Spring (10), Coupler (9), Spindle Lock (if applicable), Spindle (8), and Washers (6) and (7) to slide out.
- Using pick or screwdriver end, remove the Seal (1).
- Press the two Needle Bearings (2) out of the Housing from either direction.

## Gear Case - Disassembly

- Use snap ring pliers to remove Retainer Ring (18).
- Carefully slide out all of the internal components: Washer (19), Spindle Assembly (20), Washer (21), Gear Head Assembly (22), and Washer (23).
- Use a pick to pry out the Spacer Clip (25A) if necessary.

## Disassembly of Electronics Pod

- Use an Allen wrench to remove M6 Screws (35) from Flange (34).
- Remove the M3 Screw (30) and slide the Cover (38) off.
- Remove the two O-Rings (37) and remove the Memory Chip Assembly (31).
- Unscrew the Nut (36) and remove the Flange (34).
- Use a small Flathead Screwdriver, carefully peel the dried sealant out the ground slot.
- Remove the M3 Screw (30) to free the ground wire.
- Loosen the nut constraining the grommet in the strain relief and unscrew the strain relief from the Housing (29).
- Pry out the Clip (33) and slide out the Communication Board (32).

- Disconnect the motor temperature sensor connector, motor communication connector, and the torque transducer connector from the Communication Board (32).

- Disengage female socket on the communication board from the male connector on the motor cable.
- Slide the Housing (29) off of the transducer and motor cables.

## Tool Mounting Methods

It should be noted that assembly of the tool into the modules will differ slightly depending on the method used for mounting. If the tool will be mounted with the plate spacer in place, the tool can be assembled by following the first set of instructions (A). The reason for the plate spacer is to allow the tool to be mounted fully assembled.

The tool can also be mounted with a bracket or mounting plate that takes the place of the spacer. If this is the desired mounting method, the mounting plate used must be the same thickness as the plate spacer provided or the tool will not fit together properly. In this case the second set of instructions (B) should be followed.

## Assembly

### General Instructions

- To protect the part's surfaces and to prevent distortion of Housings and threaded joints, use care when grasping the tool.
- Always press on the inner ring of a ball-type bearing when installing the bearing onto a shaft.
- Always press on the outer ring of a ball-type bearing when pressing the bearing into a bearing recess.
- Refer to the "Lubrication" section of this manual for instructions on how to properly grease this tool.

## Assembly of Modules

### (A)

- Apply serviceable thread locker to all screws that connect the assemblies together.
- Insert the two M3 Screws (5) into the Transducer Assembly (17), through the plate spacer, and engage the threads in the Spindle Housing (3).
- Insert the M6 Screws (24) through holes in the Transducer Assembly (17) and engage the M6 threads in the Gear Case (25).
- Insert the M6 screws (26) through the holes in the Motor Assembly (27) and engage the M6 threads in the Gear Case (25).
- Insert the tool into the mounting plate.
- Use an Allen Wrench to Insert two M8 Screws (4) through the holes in the mounting plate, through the holes in the Spindle Assembly Housing (3), through the Plate Spacer (16), and engage the threads in the Transducer Assembly (17).

### (B)

- Apply serviceable thread locker to all screws that connect the assemblies together.
- Insert the M6 Screws (24) through holes in the Transducer Assembly (17) and engage the M6 threads in the Gear Case (25).
- Insert the M6 screws (26) through the holes in the Motor Assembly (27) and engage the M6 threads in the Gear Case (25).
- Position the connected transducer, gear case and motor assemblies flush with the backside of the mounting plate and the spindle assembly flush with the front side of the mounting plate.
- Line up the screw holes and use an Allen Wrench to insert the two M8 Screws (4) through the holes in the Spindle Assembly Housing (3), through the holes in the mounting plate and engage the threads in the Transducer Assembly (17).



- This procedure is to be done by an authorized, trained repair person to ensure proper functioning of the tool.

## Spindle Assembly

- Press Needle Bearing (2) into the top of the Housing (3) slightly below the shoulder to leave room for Seal (1).
- Press Seal (1) into the front of the Spindle Housing (3) flush with the face of the housing.
- Turn the housing over and press the second Needle Bearing (2) into the housing flush with the inside shoulder.
- Locked Spindle:** Fully Retracted (If spindle will not be locked go to step #5). Slide spindle lock on to spindle so that it seats flush against the splined face.
- Position Spring (10) inside large hole of spindle.
- Locked Spindle:** Fully Extended (If spindle will not be locked go to step #7). Insert spindle lock into the housing so that it rests on the rear face of the splined drive.

- Slide Washers (7) and (6) onto Spindle (8) and insert spindle into the Housing (3).
- Work 2.5 cc of **Ingersoll-Rand** grease 222 into the inner diameter of the Coupler (9).
- Align the Coupler (9) to slide over the spline of the spindle and slide into the Housing (3).
- Slide Washer (6) on the Input Spindle Assembly (11).
- Use snap ring pliers to install the Retaining Ring (13) on top of the washer.
- Using an Arbor Press, press the inner diameter of the rear Bearing (14) onto the Input Spindle Assembly (11).
- Insert pin end of Input Spindle Assembly (11) into the Spring (10).
- Align the input spindle assembly with the spline of the coupler and insert input spindle assembly into the Housing (3).
- Insert Bearing (14) into housing and use snap ring pliers to then install the Retaining Ring (15) into the back of the housing.
- Slide Plate Spacer (16) over the back of the housing.

## Gear Case Assembly

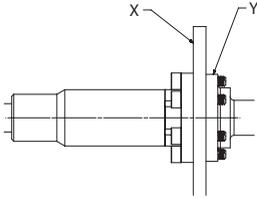
- Ensure that all the gears are free of debris.
- Apply 1 cc of IR #222 grease into the ring gear. Work 1 cc into the first stage gears in the Gear Head Assembly (22). Work 1 cc into the second stage gears in the Spindle Assembly (20). Finally work 0.25 cc between and around gears, washers, and second stage sun gear.
- Insert the Spacer Clip (25A) into the bottom of the Gear Case (25) so it expands to fill the larger diameter at the bottom of the spline.
- Insert parts into the Gear Case (25) in the following order: Washer (23), Gear Head Assembly (22), Washer (21), Spindle Assembly (20), Washer (19).
- Use snap ring pliers to install Retaining Ring (18).

## Assembly of Electronics Pod

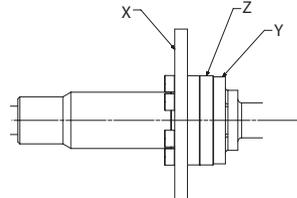
- Carefully slide Housing (29) over the motor and transducer cables until all of the connectors emerge from the opposite end.
- Insert the green yellow ground wire back into the Housing (29), push through designated hole, and fasten in place with the M3 Screw (30).
- Connect the motor temperature sensor connector, motor communication connector, and the torque transducer connector to the Communication Board (32).
- Engage female socket on the communication board to the male connector on the motor cable.
- Center wires on board and carefully slide the communication board into the Housing (29) along grooves with the connectors facing 180° from ground connection.
- Press the Clip (33) into place in the inner groove in the housing to retain the communication board.
- Fill ground slot (A) with Lexel clear sealant or equivalent until flush with outer surface of the slot. Slot must be water tight when sealant dries.
- Screw the strain relief into the back of the housing and tighten the grommet in place to restrain the transducer and motor cable.
- Slide the Flange (34) over the housing and retain in place with the Nut (36).
- Place the Memory Chip Assembly (31) into the slot in the Housing (29) with the metal tabs exposed and facing the rear of the housing.
- Push two O-Rings (37) into groove around the memory chip assembly to hold it in place.
- Slide the Cover (38) onto the housing and retain in place with M3 Screw (30).

Refer to Recommended Fixture Plate Dimensions Table on Page 4.

## Mounting Options



(Dwg. 80149735)



(Dwg. 80150675)

### There are two options for mounting tools.

1) When fixture is between Spindle and Transducer (Y), remove and discard Spacer Plate (Z).

**Note:** Fixture Plate (X) must maintain thickness of Spacer Plate (Z).

2) When Fixture Plate (X) is in front of Spindle Flange, Spacer Plate (Z) thickness may be ignored:

**Note:** M8 or M10 mounting screws must be lengthened by Fixture Plate (X) thickness.

### Recommended Fixture Plate Dimensions

Series	Plate Thickness	Minimum Counter-bore Ø	Bolt Circle Ø	Number of Bolt Holes	Bolt Hole Ø	Supplied Bolt Size	Through Hole Ø	Through Hole ID Chamfer
	(mm)				(mm)		(mm)	
QM3	10	59	45	2	8.97 - 8.71	M8x1.25x30	31.015 -30.985	0.5 x 45°
QM5	11.2	67	50	2	8.97 - 8.71	M10x1.5x35	32.515 -32.485	1.05 x 45°
QM7	11.2	71	57.16	6	8.97 - 8.71	M8x1.25x30	44.48 - 44.45	1.05 x 45°
QM9	18	90	76.2	6	10.63 - 10.37	M8x1.25x45	63.53 - 63.5	1.55 x 45°
Electronics Pod	N/A	N/A	60	2	6.65 - 6.05	M6x1x18	39.0 - 50.0	N/A

### QM Series Wiring (Cable) Chart

Connector Pin	Wire color (Cable)	Logic	Connector Pin
A	Red	VCC	13
B	Black	COM	14
C	Gray	Spare 1	12
D	Pink	Spare 2	27
E	Brown	Spare 4	15
F	Yellow	Sine	21
G	Orange	Cosine	28
H	Violet	Spare 3	7
J	Green	Ground Sense	20
K	Blue	RX+	5
L	Blue/White	RX-	6
M	White	TX-	8
N	White/Blue	TX+	9
U	Red	Motor Phase B	23
V	Black	Motor Phase C	34
W	White	Motor Phase A	36
X	Green/Yellow	Ground	25
----	----	TX Shield	1
----	----	RX Shield	4
----	----	Hall Shield	22
----	----	Motor Shield	16

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