Form 04581377
Edition 3
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Fixtured In-Line DC Electric Nutrunner

QM7 Series

Maintenance Information

Save These Instructions

Ingersoll Rand

General Instructions:

- Refer to "Suggested Tools " in the Parts Information Manual Form 04581336 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:

1. Separate spindle, transducer, gear pack, and motor.
   (Note: For offset tools, also separate offset gearbox)
2. Disassemble spindle and gear case.
3. Clean and degrease all parts.
4. Once gear case is clean, apply prescribed amounts of **Ingersoll-Rand** #222 Grease as follows:
   a. 4.5 cc into the ring gear.
   b. 4.5 cc into the first stage gears in the Gear Head Assembly (25).
   c. 4.5 cc into the second stage gears in the Spindle Assembly (22).
5. Wipe clean the Spindle Assemblies with a clean, dry and lint-free rag.
6. Work 2.5 cc of **Ingersoll-Rand** #222 grease into the inner diameter of the Coupler (8).

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. For offset tools, there is a sixth module: the offset gearbox 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:

1. Do not disassemble the tool any further than necessary to replace or repair damaged parts.
2. To protect part surfaces and to prevent distortion of housings and threaded joints, use care when grasping the tool.
3. Avoid clamping non-metal surfaces unless directed otherwise.
4. 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)

1. Using an allen wrench remove the M8 Screws (4) that hold the tool to the mounting plate and slide the tool out.
2. Remove the M4 Screws (5) that hold the spindle assembly to the Transducer Assembly (16).
3. Remove the M8 Screws (17) that hold the gear case assembly to the Transducer Assembly (16).
4. Remove the M6 Screws (21) that hold the gear case to the Motor Assembly (27).

For Offset Tools:
Replace Step 3. with:
   3a. Remove the M8 Screws (17) that hold the gear case assembly to the Offset Gearbox Assembly (64).
   3b. Remove the M6 Screws (52) and M8 Screws (51) that hold the Offset Gearbox Assembly to the Transducer Assembly (16).

(B)

1. Using an allen wrench remove the M8 Screws (4) that hold the tool to the mounting plate. The spindle assembly will now become disengaged.
2. Slide off the transducer, gear case, and motor assemblies.
3. Remove the M8 Screws (17) that hold the gear case assembly to the Transducer Assembly (16).
4. Remove the M6 Screws (21) that hold the gear case to the Motor Assembly (27).

For Offset Tools:
Replace Step 3. with:
   3a. Remove the M8 Screws (17) that hold the gear case assembly to the Offset Gearbox Assembly.
   3b. Remove the M6 Screws (52) and M8 Screws (51) that hold the Offset Gearbox Assembly to the Transducer Assembly (16).

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

1. Use snap ring pliers to remove Retainer Ring (14)
2. Pull the Tas Spindle (13) and Driver (11) out of the Housing (3).
3. If necessary, pull out Roll Pin (12) to separate the driver from the tas spindle.
4. Now tilt the Housing (3), causing the Pin (10), Spring (9), Coupler (8), Spindle lock (if applicable), Spindle (7), and Washer (6) to slide out.
5. Using pick or screwdriver end, remove the Seal (1).
6. Press the two Needle Bearings (2) out of the Housing (3) from either direction.

For Offset Tools:
Ignore Step 1.
Replace Step 2. with:
   2. Pull the Driver (11) out of the Housing (3).
Replace Step 3. with:
   3. If necessary, pull two Roll Pins (12) out of the Driver (11).

For Offset Tools:
Offset Gearbox - Disassembly

1. Use an allen wrench to remove M6 Screws (53) from the Gear Housing Cover.
2. Slide the Gear Housing Cover off.

3. Grasp the shaft of the Output Gear (57) and pull it, along with the two Thrust Washers (55 and 56), out of the Gear Housing.
4. Grasp the shaft of the Intermediate Gear (58) and pull it, along with the two Thrust Washers (55), out of the Gear Housing.
5. Grasp the shaft of the Drive Gear (59) and pull it, along with the two Thrust Washers (55 and 56), out of the Gear Housing.
6. Using pick or screwdriver end, remove the Seal (62).
7. Press the three Needle Bearings (60 and 63) out of the Gear Housing Cover.
8. Press the three Needle Bearings (60 and 63) and the Inner Ring (61) out of the Gear Housing.
9. Pull the two Dowel Pins (50) out of the Gear Housing.

Gear Case - Disassembly

1. Tilt the Gear Case (18) and carefully slide out the Gear Head Assembly (25) and Spacer (24).
2. Use a pick to pry out the metal Spacer (23).
3. Tilt the gear case and slide out the Spindle Assembly (22).
4. If necessary use an allen wrench to unscrew the Plug (19) and remove the Washer (20).

Disassembly of Electronics Pod

1. Use an allen wrench to remove M6 Screws (35) from Flange (34).
2. Remove the M3 Screw (30) and slide the Cover (38) off.
3. Remove the two O-Rings (37) and remove the Memory Chip Assembly (31).
4. Unscrew the Nut (36) and remove the Flange (34).
5. Use a small flathead screwdriver to carefully peel the dried sealant out of the ground slot.
6. Remove the M3 Screw (30) to free the ground wire.
7. Loosen the nut constraining the grommet in the strain relief and unscrew the strain relief from the Housing (29).
8. Pry out the Clip (33) and slide out the Communication Board (32).
9. Disconnect the motor temperature sensor connector, motor communication connector, and the torque transducer connector from the Communication Board (32).
10. Disengage female socket on the communication board from the male connector on the motor cable.
11. 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

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

Assembly of Modules

(A)

1. Apply serviceable thread locker to all screws that connect the assemblies together.
2. Insert the two M4 Screws (5) into the Housing (3), through the plate spacer, and engage the threads in the Transducer Assembly (16).
3. Insert the M8 Screws (17) through holes in the Transducer Assembly (16) and engage the M8 threads in the Gear Case (18).
4. Insert the M6 Screws (21) through the holes in the Gear Case (18) and engage the M6 threads in the Motor Assembly (27).
5. Insert the tool into the mounting plate.
6. Use an allen wrench to Insert four M8 Screws (4) through the holes in the mounting plate, through the holes in the Housing (3), through the Plate Spacer (15), and engage the threads in the Transducer Assembly (16).

For Offset Tools:

Replace Step 3. with:

3a. Insert the M8 Screws (17) through holes in the Offset Gearbox Assembly and engage the M8 threads in the Gear Case (18).

3b. Insert the M6 Screws (52) through holes in the Transducer Assembly (16) and engage the M6 threads in the Offset Gearbox Assembly.

3c. Insert the M8 screws (51) through holes in the Transducer Assembly (16) and engage the threads in Offset Gear Box Assembly.

Replace Step 6. with:

6. Use an allen wrench to Insert three M8 Screws (4) through the holes in the mounting plate, through the holes in the Housing (3), through the Plate Spacer (15), and engage the threads in the Transducer Assembly (16).

(B)

1. Apply serviceable thread locker to all screws that connect the assemblies together.
2. Insert the M8 Screws (17) through holes in the Transducer Assembly (16) and engage the M8 threads in the Gear Case (18).
3. Insert the M6 Screws (21) through the holes in the Gear Case (18) and engage the M6 threads in the Motor Assembly (27).
4. 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.
5. Line up the screw holes and use an allen wrench to insert the four M8 Screws (4) through the holes in the Housing (3), through the holes in the mounting plate and engage the threads in the Transducer Assembly (16).

For Offset Tools:

Replace Step 2. with:

2a. Insert the M8 Screws (17) through holes in the Offset Gearbox Assembly and engage the M8 threads in the Gear Case (18).

2b. Insert the M6 Screws (52) through holes in the Transducer Assembly (16) and engage the M6 threads in the Offset Gearbox Assembly.

2c. Insert the M8 screws (51) through holes in the Transducer Assembly (16) and engage the threads in Offset Gear Box Assembly.

Replace Step 4. with:

4. Position the connected transducer, gear case, offset gearbox, and motor assemblies flush with the backside of the mounting plate and the spindle assembly flush with the front side of the mounting plate.

Replace Step 5. with:

5. Line up the screw holes and use an allen wrench to insert the three M8 Screws (4) through the holes in the Housing (3), through the holes in the mounting plate and engage the threads in the Transducer Assembly (16).

WARNING

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

Spindle Assembly

1. Press Needle Bearing (2) into the top of the Housing (3) below top face to leave room for Seal (1).
2. Press Seal (1) into the top of the Housing (3) below the top face.
3. Turn the housing over and press the second Needle Bearing (2) into the housing below inside shoulder.
4. **Locked Spindle**: Fully Retracted (If spindle will not be locked go to step # 5). Slide spindle lock onto spindle so that it seats flush against the splined face.
5. Position Spring (9) inside large hole of spindle.
6. **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.
7. Slide Washer (6) onto Spindle (7) and insert spindle into the Housing (3).
8. Work 2.5 cc of **Ingersoll-Rand** grease 222 into the inner diameter of the Coupler (8).
9. Align the Coupler (8) to slide over the spline of the spindle and slide to the Housing (3).
10. Insert Tas Spindle (13) into the Driver (11) with the holes aligned. Push the Roll Pin (12) through the holes to fasten the parts together.
11. Insert the large circular end of Pin (10) into the square hole of the Driver (11)
12. Insert other end of Pin (10) into the Spring (9).
13. Align the driver and tas spindle with the spline of the coupler and insert driver and tas spindle into the Housing (3).

14. Use snap ring pliers to install the Retaining Ring (14) into the back of the housing.
15. Slide Plate Spacer (15) over the back of the housing.

For Offset Tools:
Replace Step 10. with:
10. Push the two Roll Pins (12) into the holes in the Driver (11).
Replace Step 13. with:
13. Align the Driver (11) with the spline of the Coupler (8) and insert into the Housing (3).
Ignore Step 14

For Offset Tools:

Offset Gearbox - Assembly

1. Ensure that all the gears are free of debris.
2. Press the Seal (62), the two Needle Bearings (60), and the Needle Bearing (63) into the Gear Housing Cover.
3. Press the two Dowel Pins (50), the Inner Ring (61), the two Needle Bearings (60), and the Needle Bearing (63) into the Gear Housing.
4. Slide Thrust Washer (56) on longer end of Drive Gear (59) and Thrust Washer (55) on shorter end, both leading with beveled edge.
5. Insert longer end of Drive Gear (59) into Gear Housing.
6. Slide Thrust Washer (55) on both ends of Intermediate Gear (58), leading with beveled edge.
7. Insert shorter end of Intermediate Gear (58) into Gear Housing.
8. Slide Thrust Washer (56) on longer end of Output Gear (57) and Thrust Washer (55) on shorter end, both leading with beveled edge.
9. Insert shorter end of Drive Gear (57) into Gear Housing.
10. Slide the Gear Housing Cover onto the Gear Housing, while aligning the two Dowel Pins (50) with the corresponding holes and the shafts with the corresponding bearings.
11. Insert M6 Screws (53) with thread locker and tighten to secure the Gear Housing Cover to the Gear Housing.

Gear Case Assembly

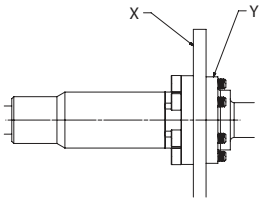
1. Ensure that all the gears are free of debris.
2. Work 3 cc of IR #222 grease into the 2nd stage planet gears. Work 1.5 cc into the inner chamber of the Spindle Assembly (22). Work 4.5 cc into the Gear Case (18). Work 2 cc into the 1st stage planet gears. Work 1 cc into the chamber of the Gear Head Assembly (25). Finally work 1.5 cc into spline of the gear head.
3. Place the Washer (20) over the Plug (19) and screw into the hole in the Gear Case (18).
4. Insert the Spindle Assembly (22) into the Gear Case (18).
5. Insert the Spacer (23) into place to retain the Spindle Assembly (22).
6. Put the Spacer (24) over the head of the Gear Head Assembly (25)
7. Insert the gear head into the Gear Case (18).

Assembly of Electronics Pod

1. Carefully slide Housing (29) over the motor and transducer cables until all of the connectors emerge from the opposite end.
2. Insert the green yellow ground wire back into the Housing (29), push through designated hole, and fasten in place with the M3 Screw (30).
3. Connect the motor temperature sensor connector, motor communication connector, and the torque transducer connector to the Communication Board (32).
4. Engage female socket on the communication board to the male connector on the motor cable.
5. Center wires on board and carefully slide the communication board into the Housing (29) along grooves with the connectors facing 180° from ground connection.
6. Press the Clip (33) into place in the inner grove in the housing to retain the communication board.
7. 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 drives.
8. Screw the strain relief into the back of the housing and tighten the grommet in place to restrain the transducer and motor cable.
9. Slide the Flange (34) over the housing and retain in place with the Nut (36).
10. 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.
11. Push two O-Rings (37) into groove around the memory chip assembly to hold it in place.
12. 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



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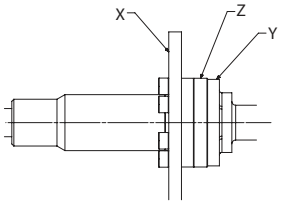

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There are two options for mounting tools.

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)		(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

Note: For Offset Tools refer to engineering drawings 80155815 and 80156037.

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

Notes

Notes

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