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Fixtured In-Line DC Electric Nutrunner

QM9 Series

Maintenance Information

Save These Instructions

Ingersoll Rand

General Instructions:

- Refer to "Suggested Tools" in the Parts Information Manual Form 04581344 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.**

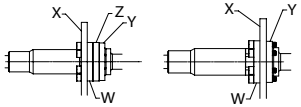
Lubrication

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 and Gear Multiplied tools, also separate Offset Gearbox or Gear Multiplier)
2. Disassemble Spindle and Gear Case.
   (**Note**: For Offset Tools, and Gear Multiplied tools, also disassemble Offset Gear Box or Gear Multiplier)
3. Clean and degrease all parts.
4. Once Spindle and Gear Case are clean, apply prescribed amounts of **Ingersoll Rand** #222 Grease as follows:
   a. 5 cc into the Gear Case (15).
   b. 2 cc into the Ring Gear (first stage) (12).
   c. 9 cc onto the gears and gear heads in the Gear Head Assembly (21).
   d. 10.5 cc into the gears and spline in the Spindle Assembly (19).
   e. 40 cc into the Gear Multiplier (70), if applicable.
   f. 0.5 cc in all Needle Bearings in Offset Gear Box.
   g. 5 cc in gear surfaces in Offset Gear Box.
   h. 1 cc to 1.5 cc into splined surfaces in Offset Gear Box.
5. Work 2.5 cc of **Ingersoll Rand** #222 grease into the inner diameter of the Coupler Assembly (8).
6. Apply coat of **Ingersoll Rand** #222 grease onto the external spline and outer diameter of the spindle and onto the Tas Spindle.

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 and the type of tool. The tool can be mounted with or without the supplied Spacer Plate (Z).



(1) (2)

Mounting Method #1
The supplied Spacer Plate (Z) being used with a Mounting Plate (X) in front of the Spindle Flange (W) ensures that the tool remains assembled when it is taken away from the Mounting Plate (X).
When Mounting Plate (X) is in front of Spindle Flange (W), Spacer Plate (Z) thickness may be ignored.
Note: M10 or M6 mounting screws must be lengthened by Mounting Plate (X) thickness.
Note: See Mounting Plate illustration (1).

Mounting Method #2
The Spacer Plate (Z) can be replaced with a Mounting Plate (X) of the same thickness as the Spacer Plate (Z).
When Mounting Plate (X) is between Flange (W) and Transducer (Y), remove and discard Spacer Plate (Z).
Note: Mounting Plate (X) must maintain thickness of Spacer Plate (Z).
Note: See Mounting Plate illustration (2).

Disassembly

⚠ 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 of Modules

1. Using an allen wrench remove the M8 or M10 Screws (4, 4A) that hold the tool to the Mounting Plate (X).

If using Mounting Method #1:
The tool will be disengaged from the Mounting Plate (X). Remove the M4, M6 Screws (5) that hold the Spindle Assembly to the Transducer Assembly (13).

If using Mounting Method #2:
The Spindle Assembly will now become disengaged.

For Inline Models Only

2. Remove the M8 Screws (14) that hold the Gear Case Assembly to the Transducer Assembly (13).

For Offset Models Only

2a. Remove the M10 Screws (50 & 51) that hold the Offset Gear Box Assembly to the Transducer Assembly (13).
2b. Remove the M8 Screws (14) that hold the Gear Case Assembly to the Offset Gear Box Assembly.

For Gear Multiplied Models Only

2a. Remove the M8 Screws (67) that hold the Adapter-Transducer (68) to the Transducer Assembly (13).
2b. Remove the 2BA, BSF Screws (71, 71A) that hold the Gear Multiplier (70) to the Adapter-Transducer (68).
2c. Remove the M5, M6 Screws (74, 74A) that hold the Adapter-Motor (73) to the Adapter-Transducer (68).
2d. Remove the M8 Screws (14) that hold the Adapter-Motor (73) to the Gear Case Assembly.

3. Remove the M6 Screws (18) that hold the Gear Case (15) 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

1. Using snap ring pliers remove Retainer Ring (11), if applicable.
2. Tilt the Spindle Housing, causing the Tas Spindle (10) if applicable, Spring (9), Spindle Lock (9A), Coupler Assembly (8) Spindle (7), Washer (6) and Spacer Rings (10A) to slide out.
3. Using pick or screwdriver end, remove the Seal (1).
4. Press all Needle Bearings (2) out of the Housing (3) from either direction.

For Offset Tools Only

Offset Gear Box - Disassembly

1. Using an allen wrench to remove M6 Screws (61) from the Gear Housing Cover (64).
2. Slide the Gear Housing Cover (64) off.
3. Remove the Thrust Washers (62) from the Drive Gear (53).
4. Remove the Thrust Washers (55 and 62) and the Thrust Bearing (56) from the Output Gear (52).
5. Slide out the Intermediate Gear (59), along with the two Thrust Washers (60).
6. Slide out the Output Gear (52), along with the Thrust Washer (62).
7. Slide out the Drive Gear (53), along with the Thrust Washer (62).
8. Using a pick or screwdriver end, remove the Seal (54).
9. Press the three Needle Bearings (57 and 65 and 58) out of the Gear Housing Cover (64).
10. Press the three Needle Bearings (58 and 65 and 57) out of the Gear Housing (64).
11. Pull the two Dowel Pins (63) out of the Gear Housing (64).

For Gear Multiplier Tools Only

Gear Multiplier - Disassembly

1. Remove Snap Ring.
2. Press out Cover Plate by supporting Ring Gear around the perimeter and pressing on the Carrier Assembly.

Gear Case - Disassembly

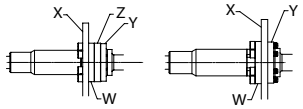
1. Tilt the Gear Case (15) and carefully slide off the Washers (24).
2. Slide out the Gear Head Assembly (21) and Spacer (20).
3. Using a pair of pliers, carefully pull out Ring Gear (22).
4. If necessary remove Keys (23).
5. Tilt the Gear Case and slide out the Spindle Assembly (19).
6. Using an allen wrench unscrew the Plug (16) and remove the Washer (17).

Disassembly of Electronics Pod

1. Using an allen wrench 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 flat-head 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 and the type of tool. The tool can be mounted with or without the supplied Spacer Plate (Z).



(1) (2)

Mounting Method #1

The supplied Spacer Plate (Z) being used with a Mounting Plate (X) in front of the Spindle Flange (W) ensures that the tool remains assembled when it is taken away from the Mounting Plate (X).
When Mounting Plate (X) is in front of Spindle Flange (W), Spacer Plate (Z) thickness may be ignored:
Note: M10 or M6 mounting screws must be lengthened by Mounting Plate (X) thickness.
Note: See Mounting Plate illustration (1).

Mounting Method #2

The Spacer Plate (Z) can be replaced with a Mounting Plate (X) of the same thickness as the Spacer Plate (Z).
When Mounting Plate (X) is between Spindle Flange (W) and Transducer (Y), remove and discard Spacer Plate (Z).
Note: Mounting Plate (X) must maintain thickness of Spacer Plate (Z).
Note: See Mounting Plate illustration (2).

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. Refer to the "Lubrication" section of this manual for instructions on how to properly grease this tool.

Assembly of Modules

Mounting Method # 1

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 Spacer Plate (Z) and engage the threads in the Transducer Assembly (13).

For Inline Model Only

3. Insert the M8 Screws (14) through holes in the Transducer Assembly (13) and engage the threads in the Gear Case (15).

For Offset Models Only

3a. Insert the M10 Screws (50, 51) through the holes in the Transducer Assembly (13) and engage the threads in the Offset Gear Box Assembly.
3b. Insert the M8 Screws (14) through the holes in the Offset Gear Box Assembly and engage the threads in the Gear Case Assembly.

For Gear Multiplied Models Only

3a. Insert the M8 Screws (14) through the holes in the Adapter-Motor (73) and engage the threads in the Gear Case (15).
3b. Insert the Drive Spindle (72) in the Gear Case (15).
3c. Place the Gear Multiplier (70) on the Drive Spindle (72).
3d. Insert the Dowel Pins (69, 69A) in the holes on the Gear Multiplier (70).
3e. Place the Adapter-Transducer (68) over the Gear Multiplier (70) and rotate until it drops onto the Dowel Pins (69, 69A).
3f. Insert the 2BA, BSF Screws (71, 71A) through the Adapter-Transducer (68) and engage the threads in the Gear Multiplier (70).
3g. Insert the M8 Screws (67) through the holes in the Transducer Assembly (13) and engage the threads in the Adapter-Transducer (68).

4. Insert the M6 Screws (18) through the holes in the Gear Case (15) and engage the M6 threads in the Motor Assembly (27).

For Inline and Gear Multiplied Models Only

5. Align the tool with the Mounting Plate (X).
6. Using an allen wrench insert M8 Screws (4) through the holes in the Mounting Plate (X), through the holes in the Housing (3), through the Spacer Plate (Z), and engage the threads in the Transducer Assembly (13).

For Offset Models Only

5a. Align the tool with the Mounting Plate (X).

5b. Using an allen wrench insert M10 Screws (4) through the holes in the Mounting Plate (X), through the holes in the Housing (3), through the Spacer Plate (Z), and engage the threads in the Transducer Assembly (13).

Mounting Method #2

1. Apply serviceable thread locker to all screws that connect the assemblies together.

For Inline Model Only

2. Insert the M8 Screws (14) through holes in the Transducer Assembly(13) and engage the threads in the Gear Case (15).

For Offset Models Only

2a. Insert the M10 Screws (50, 51) through the holes in the Transducer Assembly (13) and engage the threads in the Offset Gear Box Assembly.

2b. Insert the M8 Screws (14) through the holes in the Offset Gear Box Assembly and engage the threads in the Gear Case Assembly.

For Gear Multiplied Models Only

2a. Insert the M8 Screws (14) through the holes in the Adapter-Motor (73) and engage the threads in the Gear Case (15).

2b. Insert the Drive Spindle (72) in the Gear Case (15).

2c. Place the Gear Multiplier (70) on the Drive Spindle (72).

2d. Insert the Dowel Pins (69, 69A) in the holes on the Gear Multiplier (70).

2e. Place the Adapter-Transducer (68) over the Gear Multiplier (70) and rotate until it drops onto the Dowel Pins (69, 69A).

2f. Insert the 2BA, BSF screws (71, 71A) through the Adapter-Transducer (68) and engage the threads in the Gear Multiplier (70).

2g. Insert the M8 Screws (67) through the holes in the Transducer Assembly (13) and engage the threads in the Adapter-Transducer (68).

3. Insert the M6 Screws (18) through the holes in the Gear Case (15) and engage the M6 threads in the Motor Assembly (27).

For Inline Models Only

4. Position the connected Transducer, Gear Case and Motor Assemblies flush with the backside of the Mounting Plate (X) and the Spindle Assembly flush with the front side of the Mounting Plate (X).
5. Line up the screw holes and use an allen wrench to insert the M8 Screws (4) through the holes in the Housing (3), through the holes in the Mounting Plate (X) and engage the threads in the Transducer Assembly (13).

For Offset Models Only

4a. Position the connected Transducer, Offset Gearbox, Gear Case and Motor Assemblies flush with the backside of the Mounting Plate (X) and the Spindle Assembly flush with the front side of the Mounting Plate (X).

4b. Line up the screw holes and use an allen wrench to insert the M8 Screws (67) through the holes in the Offset Gear Case (64), through the holes in the Mounting Plate (X) and engage the threads in the Transducer Assembly (13).

For Gear Multiplied Tools Only

4a. Position the connected Transducer, Gear Multiplier, Gear Case and Motor Assemblies flush with the backside of the Mounting Plate (X) and the Spindle Assembly flush with the front side of the Mounting Plate (X).

4b. Line up the screw holes and use an allen wrench to insert the M8 Screws (67) through the holes in the Offset Gear Case (64), through the holes in the Mounting Plate (X) and engage the threads in the Transducer Assembly (13).

⚠ 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 front of the Housing (3) below top face to leave room for Seal (1).
2. Press Seal (1) into the front of the Spindle Housing (3) below the top face.
3. Turn the Housing (3) over and press the second Needle Bearing (2) into the Housing (3) below inside shoulder.
4. Slide Washer (6) onto Spindle (7) and insert Spindle (7) into the Housing (3).

For Locked Spindles Only

4a. Fully Retracted Locked Spindle: Slide Spindle Lock (9A) onto Spindle (7) so that it seats flush against the splined face. Slide Washer (6) onto Spindle (7) and insert Spindle (7) into the Housing (3).

4b. Fully Extended Locked Spindle: Slide Washer (6) onto Spindle (7) and insert Spindle (7) into the Housing (3). Insert Spindle Lock (9A) into the Housing (3) so that it rests on the rear face of the splined drive.

5. Position Spring (9) inside large hole of Spindle (7).
6. Align the Coupler Assembly (8) to slide over the spline of the Spindle (7) and slide into the Housing (3).
7. Using snap ring pliers install the Retaining Ring (11) into the back of the Housing, if applicable.
8. Insert the Spacer Ring (10A) on each end of the Tas Spindle (10).
9. Insert square end of the Tas Spindle (10) into the square end of the Coupler Assembly (8), if applicable.
10. Slide Plate Spacer (12) over the back of the Housing (3).

For Offset Tools Only

Offset Gearbox - Assembly

1. Ensure that all the gears are free of debris.
2. Press the three Needle Bearings (57 and 65 and 58) into the Gear Housing Cover (64).
3. Press the Seal (54), the two Dowel Pins (63), and the three Needle Bearings (57 and 65 and 58) into the Gear Housing (64).
4. Slide Thrust Washer (62) on longer end of Output Gear (52), leading with beveled edge.
5. Insert longer end of Output Gear (52) into Gear Housing (64).
6. Slide a Thrust Washer (62) on both ends of Drive Gear (53), leading with beveled edge.
7. Insert shorter end of Drive Gear (53) into Gear Housing (64).
8. Slide Thrust Washer (60) on both ends of Intermediate Gear (59), leading with beveled edge.
9. Insert shorter end of Intermediate Gear (59) into Gear Housing (64).
10. Slide Thrust Washer (62) on the longer end of the Drive Gear (53), leading with beveled edge.
11. Slide Thrust Washer (62) on the shorter end of the Output Gear (52), leading with beveled edge, then slide Thrust Bearing (56), Thrust Washer (55), and Thrust Washer (62) on, leading with the beveled edge.
12. Slide the Gear Housing Cover (64) onto the Gear Housing (64), while aligning the two Dowel Pins (63) with the corresponding holes and the shafts with the corresponding bearings.
13. Using serviceable thread locker, insert M6 Screws (61) and tighten to secure the Gear Housing Cover (64) to the Gear Housing (64).

For Gear Multiplied Tools Only

Gear Multiplier - Assembly

1. Ensure that all the gears are free of debris.
2. Work 15 cc of **Ingersoll Rand** # 222 grease into the Ring Gear. Work 20 cc into the Planets of the Carrier Assembly. Work 3 cc into the Gear Input. Finally work 2 cc into the Input Bushing.
3. Insert the carrier Assembly into the Ring Gear.
4. Insert the Input Gear into the center of the Carrier Assembly.
5. Slide Cover Plate onto Gear Input shaft.
6. Press Cover Plate into Ring Gear until fully seated.
7. Install Snap Ring.

Gear Case Assembly

1. Ensure that all the gears are free of debris.
2. Work 7.5 cc of **Ingersoll Rand** #222 grease into the Spindle Assembly planet gears. Work 3 cc into the inner chamber of the Spindle Assembly (19). Work 5 cc into the Ring Gear (22) in the Gear Case (15). Work 4 cc into the Gear Head Assembly planet gears. Work 1.5 cc into the chamber of the Gear Head Assembly (21). Work 3.5 cc onto spline of the Gear Head. Finally work 2 cc in the Ring Gear (22).
3. Place the Washer (17) over the Plug (16) and screw into the hole in the Gear Case (15).
4. Insert the Spindle Assembly (19) into the Gear Case (15).
5. Insert Keys (23) into holes in Ring Gear (22).
6. Slide the Ring Gear (22) into the Gear Case by engaging the Keys (23).
7. Slide Spacer (20) over the head of the Gear Head Assembly (21).
8. Insert the Gear Head into the Gear Case (15).
9. Orient the first Washer (24) so that the outer diameter of the Ring Gear (22) and the washer are flush. Orient the second Washer (24) on top of the first washer so the inner diameters are flush.

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 (32) to the male connector on the Motor Cable.
5. Center wires and carefully slide the Communication Board (32) 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 (29) to retain the Communication Board (32).
7. Fill ground slot with Lexel clear sealant or equivalent until flush with outer surface of the slot. Slot must be water tight when the sealant dries.
8. Screw the strain relief into the back of the Housing (29) and tighten the grommet in place to restrain the Transducer and Motor Cable.
9. Slide the Flange (34) over the Housing (29) 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 (29).
11. Push two O-Rings (37) into groove around the Memory Chip Assembly (31) to hold it in place.
12. Slide the Cover (38) onto the Housing (29) and retain in place with M3 Screw (30).

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	M8 x 1.25 x 30	31.015 - 30.985	0.5 x 45°
QM5	11.2	67	50	2	10.63 - 10.37	M10 x 1.5 x 35	32.515 - 32.485	1.05 x 45°
QM7	11.2	71	57.16	6	8.97 - 8.71	M8 x 1.25 x 30	44.48 - 44.45	1.05 x 45°
QM9 1000 Nm and Below	18	90	76.2	6	8.97 - 8.71	M8 x 1.25 x 45	63.53 - 63.5	1.55 x 45°
QM9 1500 Nm - QM9 2500 Nm	18	123	100	12	10.33 - 10.13	M10 x 1.5 x 45	82.095 - 82.065	1.55 x 45°
QM7 Offset	11.2	----	----	3	8.97 - 8.71	M8 x 1.25 x 35	44.48 - 44.45	1.55 x 45°
QM9 Offset	18	----	----	5	10.63 - 10.37	M10 x 1.25 x 45	63.53 - 63.5	1.55 x 45°
Electronics Pod	N/A	N/A	60	2	6.65 - 6.05	M6 x 1 x 18	39.0 - 50.0	N/A

Note: Minimum flatness of 0.05 required on both mounting faces of fixture plate.
For offset tool bolt circle and counter-bore information, refer to engineering drawings 80155815 and 80156032.

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

Related Documentation

For additional information refer to:
Product Safety Information Manual Form 16573693.
Product Information Manual Form 04581278.
Parts List Information Manual Form 04581344.

Manuals can be downloaded from www.irtools.com.

Notes:

www.irtools.com

Ingersoll Rand