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KASUTUSJUHEND / USER MANUAL

Ingersoll Rand 3800 Series Multi-Vane Air Motors – Installation and Maintenance (03523479)

Ingersoll Rand · Planetaarülekandega lamell-suruõhumootorid

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Hooldus · Kalibreerimine · Originaalvaruosad

Service · Calibration · Genuine spare parts

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MULTI–VANE® Air Motors

3800 Series Non-Reversible

3840 Series Reversible

Operation and Maintenance Information

EN Operation and Maintenance Information
ZH 操作和维护信息

Save These Instructions

Ingersoll Rand

WARNING

General Product Safety Information

- **Read and understand this manual before operating this product.**
- **It is your responsibility to make this safety information available to others that will operate this product.**
- **Failure to observe the following warnings could result in injury.**

WARNING

- Always operate, inspect and maintain this motor in accordance with American National Standards Institute Safety Code for Portable Air Tools (ANSI B186.1).
- For safety, top performance and maximum durability of parts, operate this motor at 90 psig (6.2 bar/620 Kpa) air pressure at the inlet with 3/4" (19 mm) air supply hose.
- Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this motor or before performing any maintenance on this motor.
- Do not use damaged, frayed or deteriorated air hoses and fittings.
- Keep hands, loose clothing and long hair away from rotating end of motor.
- Always wear eye protection when operating or performing maintenance on this motor.
- Always wear hearing protection when operating this motor.
- Anticipate and be alert for sudden changes in motion during start up and operation of any motor.
- Motor shaft may continue to rotate briefly after throttle is released.
- Do not lubricate motor with flammable or volatile liquids such as kerosene, diesel or jet fuel.
- Do not remove any labels. Replace any damaged label.
- Use accessories recommended by **Ingersoll Rand**.
- This motor is not designed for working in explosive atmospheres.
- This motor is not insulated against electric shock.

NOTICE

- The use of other than genuine **Ingersoll Rand** replacement parts may result in safety hazards, decreased Motor performance and increased maintenance, and may invalidate all warranties.
- **Ingersoll Rand** is not responsible for customer modification of motors for applications on which **Ingersoll Rand** was not consulted.
- Repairs should be made only by authorized, trained personnel. Consult your nearest **Ingersoll Rand** Authorized Servicenter.
- It is the responsibility of the employer to place the information in this manual into the hands of the operator.

Safety Symbol Identification

Wear Respiratory Protection

Wear Eye Protection

Wear Hearing Protection

Read Manuals Before Operating Product

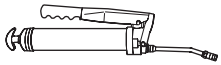
(Dwg. MHP2598)

Safety Information - Explanation of Safety Signal Words

DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.
NOTICE	Indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.

Placing Tool in Service

Lubrication



Ingersoll Rand No. 28

Ingersoll Rand No. 50

Always use an air line lubricator with this motor.
We recommend the following Filter-Lubricator-Regulator Unit:
No. C28241-800

Where the lubricator cannot be permanently mounted, use **Ingersoll Rand** No. 3LUB8 Lubricator.
We recommend the use of an air line lubricator in the air supply line. Attach the unit as close to the tool as practical. For permanent installations, we recommend using an **Ingersoll Rand** C28241-800 Filter-Lubricator-Regulator Unit. These units have 1/2" pipe tap inlet and outlet. The 3LUB8 has 1/6 pt (79 ml) capacity; the C28241-800 has 6 oz (177 ml) capacity. Larger capacity units may be used, but do not use a unit having less than 1/2" pipe tap inlet and outlet.

After each 40,000 cycles or one month, whichever occurs first, inject 1.5 cc of **Ingersoll Rand** No. 28 Grease into the Grease Fitting (30).

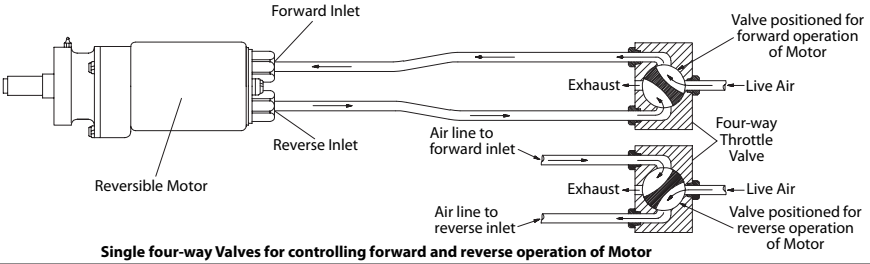
Direction of Spindle Rotation

Series 3800 Nonreversible Motors can be assembled so that the Spindle rotates either clockwise or counter-clockwise. To reverse the direction of the spindle rotation:

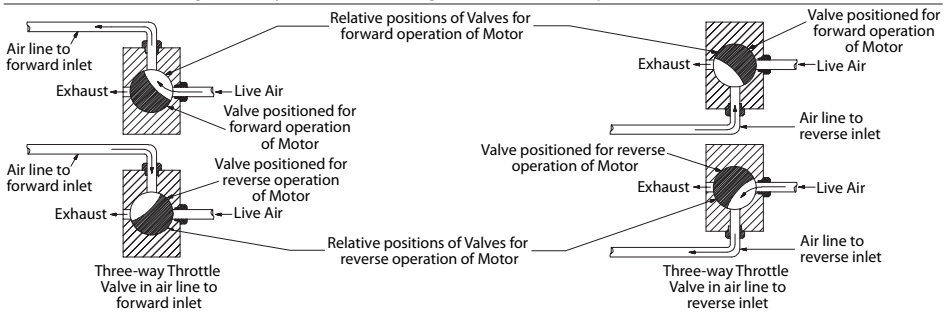
1. Remove the motor assembly from the Motor Housing (15).
2. Remove one End Plate and Bearing from the motor.
3. Lift the Cylinder (16) from the Rotor (13), turn it end for end, and slide it back over the Rotor.
4. Install the End Plate and Bearing assembly on the Rotor Hub and install the assembled motor in the Housing.
5. Remove the three Backhead Cap Screws (3) and rotate the Backhead (2) and Backhead Gasket (6) 90° so that the cavity in the face of the Backhead is in alignment with the alternate set of holes in the back face of the Motor Housing. When the Backhead is correctly applied, the cavity will be over the letter **"F"** for counterclockwise spindle rotation (when facing the end of the Spindle), and over the letter **"R"** for clockwise rotation.
   The rotational direction of an assembled Nonreversible Series 3800 Motor can be determined by removing the Air Strainer (1) and looking through the tapped opening to see whether the letter **"F"** or letter **"R"** is visible. Apply the Backhead on Series 3840 Reversible Motors so that each inlet port aligns with a group of three holes through the housing rear wall.

NOTICE

A four-way Throttle Valve (whether manually, remotely, or automatically controlled) must be used in the air supply line to Series 3840 reversible motors, as one motor inlet is expelling secondary exhaust air, and therefore must be open to atmosphere whenever the opposite inlet is admitting live air to the motor. The use of any throttle valve that closes or restricts the secondary exhaust line will result in sufficient back pressure to drastically reduce the speed and power of the motor.
When the application requires a separate Throttle Valve in each air line, the two three-way valves must be used.



Single four-way Valves for controlling forward and reverse operation of Motor



Two three-way Valves for controlling forward and reverse operation of Motor

(Dwg. TPB176)

Parts and Maintenance

When the life of the motor has expired, it is recommended that the motor be disassembled, degreased and parts be separated by material so that they can be recycled.

Manuals can be downloaded from www.irtools.com.

Refer all communications to the nearest **Ingersoll Rand** Office or Distributor.

警　告

通用产品安全信息

- **操作本产品前请阅读并理解本手册。**
- **您有责任为其他操作该产品的人员提供本安全信息。**
- **不按照以下警告进行操作将可能导致人员受伤。**

警　告

- 请始终按照美国国家标准学会便携式气动工具安全标准 (ANSI B186.1) 操作、检查和维护该马达。
- 为确保使用安全并达到最佳性能和零部件的最长使用寿命，在操作马达时，进口处的气压应为 90 psig(6.2bar/620kPa)，气源软管规格为 3/4" (19mm)。
- 请务必在安装、更换或调节马达零件或进行任何维修之前，关闭气源并断开气源软管。
- 切勿使用损坏、磨损或老化的空气软管及其连接件。
- 保持手、宽松衣服、长发远离马达旋转端。
- 在操作或维修本马达的过程中，务必戴上防护眼镜。
- 在操作本马达的过程中，务必戴上听力保护装置。
- 请留心和注意马达在启动和操作过程中出现的异常运转变化。
- 节流阀松开后，马达轴仍会持续短暂旋转。
- 请勿使用易燃、易爆液体如煤油、柴油或喷气燃料润滑马达。
- 请勿撕掉任何标签。 请更换任何受损的标签。
- 请使用 **Ingersoll Rand** 推荐配件。
- 该马达的设计不适用于爆炸性气体。
- 该马达没有防电击绝缘装置。

注　意

- 如果不使用原装 **Ingersoll Rand** 零配件，可导致安全危害，并会降低马达性能、增加维修次数，还会导致所有保证失效。
- 若用户没有咨询 **Ingersoll Rand** 而改变马达的应用，**Ingersoll Rand** 不承担任何责任。
- 维修须由授权并经过培训的专业人员进行。 请就近垂询 **Ingersoll Rand** 授权服务中心。
- 雇主有责任将本手册交到操作人员手中。

安全标识识别

配戴呼吸保护装置

配戴防护眼镜

配戴听力保护装置

操作产品前，请阅读手册

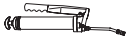
（图 MHP2598）

安全信息：安全信号文字说明

危　险	即将发生的危险情况，若不避免，则将导致严重的伤害或死亡。
警　告	潜在的危险情况，若不避免，则将导致严重的伤害或死亡。
小　心	潜在的危险情况，若不避免，则将导致轻微或中度的伤害或财产损失。
注　意	与人身安全或财产安全有直接或间接关联的信息及公司政策。

工具投入使用

润滑



Ingersoll Rand 28 号

Ingersoll Rand 50 号

请始终使用空气管路润滑器对本马达进行润滑。
我们推荐使用下列过滤润滑调节器装置：C28241-800 号

在不能永久安装润滑器的地方，使用 **Ingersoll Rand** 3LUB8 号润滑器。
我们建议在供气管路中使用空气管路润滑器。 将该装置尽可能靠近工具连接。需要永久安装时，我们推荐使用
Ingersoll Rand C28241-800 过滤润滑调节器装置。
这些装置有1/2″管活栓进口和出口。 3LUB8 型号有 1/6 品脱（79 毫升）的容量；C28241-800 型号有 6 盎司（177 毫升）的容量。 可以使用更大容量的装置，切忌使用进口和出口管活栓小于1/2″的装置。

每运行 40,000 转或一个月（以先发生的为准），注入 1.5 cc 的 **Ingersoll Rand** 28 号润滑脂到润滑脂嘴 (30) 内。

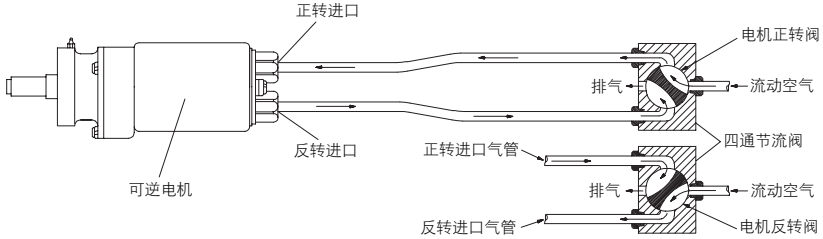
轴的旋转方向

可以组装 3800 系列不可逆转马达，轴可以顺时针旋转或逆时针旋转。 要使轴反转：

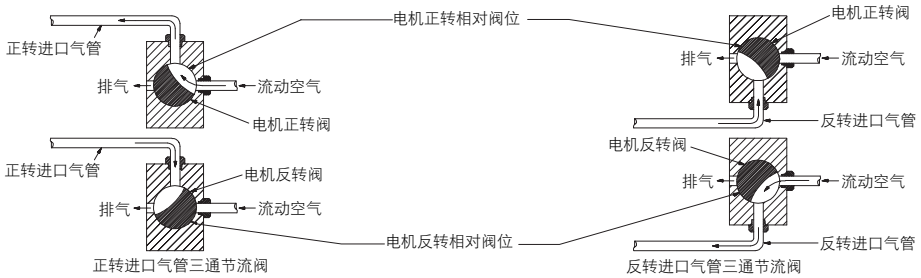
1. 从马达机座 (15) 上拆下马达组件。
2. 从马达上拆下一个端盖和轴承。
3. 将缸体 (16) 从转子 (13) 上抬起，将其两端对调，然后再将其装回转子。
4. 在转子轮毂上安装端板和轴承组件，并将组装好的马达安装到机座中。
5. 拆下3颗背头带帽螺丝 (3)，将背头 (2) 和背头垫圈 (6) 转动 90°，使背头面上的孔槽与马达机座后面的一组错位孔对齐。
   如背头安装正确，则当孔槽位于字母 **"F"** 上方时，为逆时针轴旋转（面向轴端），位于字母 **"R"** 上方时，为顺时针旋转。
   组装后的 3800 系列不可逆转马达旋转方向可以通过拆下空气过滤器 (1)，从锥型开口内看到是字母 **"F"** 或 **"R"** 来确定。 将背头安装在 3840 系列可逆转马达上，每个进气端口通过机座后壁与三个孔位组对齐。

注　意

由于其中一个马达进气口要排出二次废气，因此必须将一个四通节流阀（无论是手动、遥控或自动控制）装在通向 3840 系列可逆转马达的供气管路中，当相反的进气口将空气吸入马达时，该四通阀必须与大气相通。 如果使用关闭或限制二次排气管线的节流阀，将导致很大的反压，并大大降低马达的速度和功率。
当应用时，需要在每根气管中使用单独的节流阀时，必须使用两个 3 通节流阀。



一个控制电机正转和反转的四通阀



两个控制电机正转和反转的三通阀

（图 TPB176）

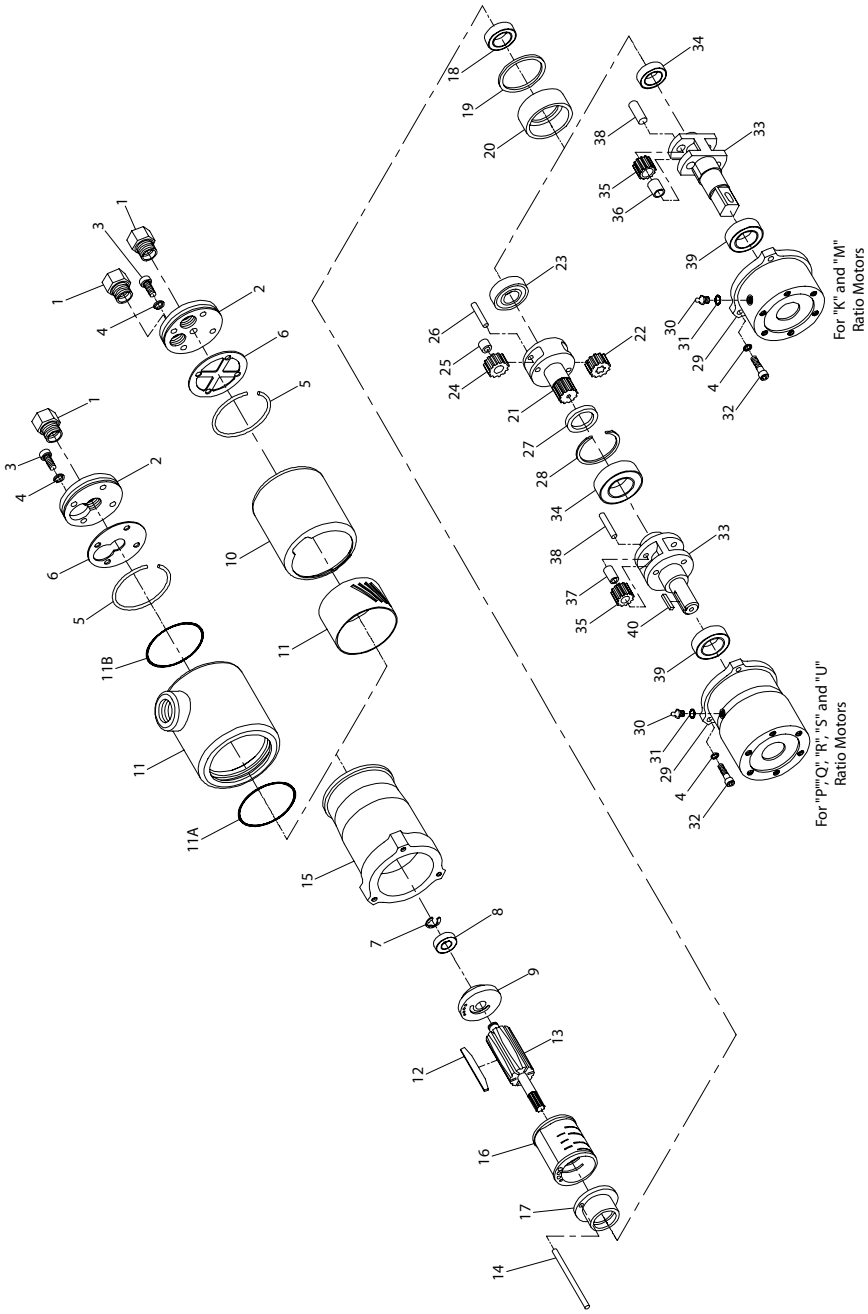
零件和维护

当马达到达使用寿命后，建议您将其拆开、去油，并将零件按材料分类，以便回收利用。

手册可从 www.irtools.com 下载。

如有任何事宜，请就近垂询 **Ingersoll Rand** 办事处或经销商。

Air Motors Exploded Diagram



(Dwg. TPA209-4)

Air Motors Parts List

Item	Part Description	Part Number
1	Air Strainer (2 for non-reversible models; 1 for reversible models)	R38-565A
2	Backhead	
	for Series 3800	R3800-102
	for Series 3840	R3840-102
3	Backhead Cap Screw (4)	510-638
4	1/4" Lock Washer (7)	8U-58
5	Exhaust Deflector Retaining Ring	R4-323
• 6	Backhead Gasket	
	for Series 3800	R3800-283
	for Series 3840	R3840-283
• 7	Rotor Bearing Retainer	404-118
• 8	Rear Rotor Bearing	R1-24
• 9	Rear End Plate	R3800-12
* 10	Muffler	R3800-23
11	Exhaust Deflector	
	with slotted front exhaust	R38-23
	with 3/4" Pipe Tap exhaust	R3800-A123
11A	Deflector Front Seal	
	(used with R3800-A123)	R3800-210
11B	Deflector Rear Seal	
	(used with R3800-A123)	10BMP-604
• 12	Vane Packet (set of 5 Vanes)	R38-42-5
13	Rotor	
	for M, P, S and U ratios (7 teeth)	R3800M-53
	for K, Q ratio (11 teeth)	R3800Q-53
	for R ratio (9 teeth)	R3800R2-53
14	Cylinder Dowel	R38KT-198
15	Motor Housing	R3800-40
• 16	Cylinder	
	for Series 3800	R3800-3
	for Series 3840	R3840-3
• 17	Front End Plate	R3800-11
• 18	Front Rotor Bearing	R1-24A
19	Motor Retaining Ring	34U-216
20	Motor Retainer	R3800-118
	Gear Head Assembly	
	for P ratio	R38P-A216
	for Q ratio	R380Q-A216
	for R ratio	R3800R2-A216
	for S ratio	R380S-A216
	for U ratio	R3800U2-A216
21	Gear Head	
	for P ratio	R38P-216
	for Q ratio	R380Q-216
	for R ratio	R3800R2-216
	for S ratio	R380S-216
	for U ratio	R3800U2-216
22	Rotor Pinion (for P ratio) (19 teeth)	R38P-17

Item	Part Description	Part Number
23	Gear Head Bearing (for P, Q, R, S and U ratios)	4E-510
24	Gear Head Planet Gear (2)	
	for P ratio (22 teeth)	R38P-10
	for Q ratio (25 teeth)	R380Q-10
	for R ratio (26 teeth)	WBT380NL-A10
	for S and U ratios (27 teeth)	4E-10AX
25	Gear Head Planet Gear Bearing (one for each Gear)	8U-654
26	Gear Head Planet Gear Shaft (2)	8U-191
27	Gear Head Spacer (for P, Q, R, S and U ratios)	R38P-80
28	Spindle Bearing Retainer (for P, Q, R, S and U ratios)	FMC2-280
29	Gear Case	
	for K, M ratio	ET3802M-A37
	for P, Q, R, S and U ratios	ET3802P-A37
30	Grease Fitting	R1-188
31	Grease Fitting Washer	R3-92A
32	Gear Case Cap Screw (3)	R0H-354
	Spindle Assembly	
	for M ratio (3/4" round shaft)	R3800M-A108
	for M ratio (5/8" square drive)	R3800M-A8
	for P, Q, R and S ratios (3/4" round shaft)	R3800P-A108
	for P, Q, R and S ratios (5/8" square drive)	R3800P-A8
	for U ratio (3/4" round shaft)	R3800U-A108
33	Spindle	
	for M ratio (3/4" round shaft)	R3800M-108
	for M ratio (5/8" square drive)	R3800M-8
	for P, Q, R and S ratios (3/4" round shaft)	R3800P-108
	for P, Q, R and S ratios (5/8" square drive)	R3800P-8
	for U ratio (3/4" round shaft)	R3800U-108
	for U ratio (5/8" Square Drive)	R-3800U2-8
	for K ratio (3/4" round key shaft)	R3800K-108
34	Spindle Rear Bearing	
	for K, M ratio	4E-510
	for P, Q, R, S and U ratios	R38P-97
35	Spindle Planet Gear	
	for K ratio (25 teeth) (2)	R380Q-10
	for M ratio (27 teeth) (2)	4E-10A
	for P, Q, R and S ratios (12 teeth) (3)	R38P-9
	for U ratio (13 teeth) (3)	R3800U2-9
36	Spindle Planet Gear Bearing (for K, M ratio) (one for each Gear)	8U-654
37	Spindle Planet Gear Bushing	
	(for P, Q, R, S and U ratios) (one for each Gear)	R38P-500
38	Spindle Planet Gear Shaft	
	for K, M ratio (2)	8U-191
	for P, Q, R, S and U ratios (3)	R38P-190
39	Spindle Front Bearing	4UA9-593
40	Spindle Key	P25-150

• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair on set) of each part indicated by a bullet (•) for every four tools in service.

* Muffler (10) is not used with Tapped Exhaust Deflector.

Maintenance Section

WARNING

Always use protective eyewear when performing maintenance on a motor or operating a motor.Always turn off the air supply and disconnect the air supply line before installing, removing or adjusting any accessory on this motor, or before performing maintenance on this motor. Failure to do so could result in injury.

Disassembly

General Instructions

1. Do not disassemble the motor any further than necessary to replace or repair damaged parts.
2. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.
3. Whenever grasping a motor or part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part or motor and help prevent distortion. This is particularly true of threaded members and housings.
4. When removing the Planet Gear Shafts (26 or 38), support the motor end of the assembly and press the Shafts out toward the motor end. The shaft holes through the web are slightly tapered so that the Shafts have a tighter fit in the front web.
5. Do not press any needle bearing from a part unless you have a new needle bearing on hand for installation. Needle bearings are always damaged during the removal process.

Disassembly of the Motor

1. Unscrew and remove one Air Strainer (1) for nonreversible models and two Air Strainers for reversible models from the Backhead (2).
2. Using a 3/16" hex wrench, unscrew and remove the four Backhead Cap Screws (3), Lock Washers (4) and separate the Backhead from the Motor Housing (15). Remove the Backhead Gasket (6).
3. **For Standard Exhaust models,** slide the Exhaust Deflector (11) with the Muffler (10) off the Motor Housing. **For Piped-Away Exhaust Models,** slide the Exhaust Deflector (11) off the Motor Housing and remove the Exhaust Deflector Front Seal (11A) and Exhaust Deflector Rear Seal (11B) from the grooves inside the Exhaust Deflector.
4. Using a 3/16" hex wrench unscrew and remove the three Gear Case Cap Screws (32) and Lock Washers (4).
5. Separate the assembled Gear Case (29) from the Motor Housing and set the assembled Gear Case aside.
6. Remove the Motor Retainer (20) and Motor Retaining Ring (19) from the Motor Housing.
7. Grasp the pinion of the Rotor (13) and pull the assembled motor out of the Motor Housing. It may be necessary to gently tap the face of the Motor Housing with a plastic hammer to jar the assemble free.
8. Grasp the Cylinder (18) in one hand and using a plastic hammer, sharply rap the spline at the end of the spline on the end of the Rotor to remove the Front End Plate (17) and Front Rotor Bearing (18) which will free the Cylinder and Vanes (12). Remove the Cylinder Dowel (14).
9. Jar the Front Rotor Bearing out of the Front End Plate by bumping the End Plate on a wooden block.
10. Using snap ring pliers, remove the Rear Rotor Bearing Retainer (7) from the hub of the Rotor and remove the Rear Rotor Bearing (8) and Rear End Plate (9).

Disassembly of the Gearing

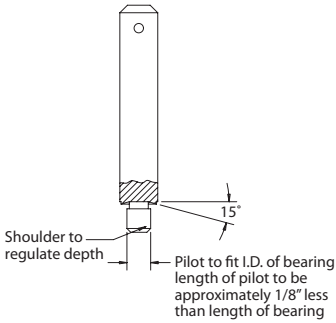
1. **For all Models except 3800K, 3800M or 3840K, 3840M,** grasp the Gear Head Bearing (23) and pull the assembled Gear Head (21) out of the Gear Case (29).
2. **For all Models except 3800K, 3800M or 3840K, 3840M,** using a bearing puller, pull the Gear Head Bearing off the rear hub of the Gear Head.
3. **For all Models except 3800K, 3800M or 3840K, 3840M,** support the short hub end of the Gear Head on the table of an arbor press and press the Gear Head Planet Gear Shafts (26) from the Gear Head. Make certain the Shafts are pressed out toward the short hub because the holes in the Gear Head are tapered smaller toward the Gear Head.
4. **For all Models except 3800K, 3800M or 3840K, 3840M,** remove the Gear Head Planet Gears (24) from the Gear Head.
5. **For Model 3800P or 3840P,** remove the Rotor Pinion (22).
6. **For all Models except 3800K, 3800M or 3840K, 3840M,** If the Gear Head Planet Gear Bearings (25) must be replaced, press them from the Planet Gears.
7. **For all Models except 3800K, 3800M or 3840K, 3840M,** use a thin blade screwdriver to spiral the Spindle Bearing Retainer (28) out of the Gear Case.
8. Holding the Gear Case, push the output end of the Spindle (33) to move the Spindle Assembly out the motor end of the Gear Case.
9. Using a bearing puller, pull the Spindle Rear Bearing (34) off the rear hub of the Spindle.
10. Using a bearing puller, pull the Spindle Front Bearing (39) off the front hub of the Spindle.
11. Support the short hub end of the Spindle on the table of an arbor press and press the Spindle Planet Gear Shafts (38) from the Spindle. **Make certain the Shafts are pressed out toward the short hub because the holes in the gear frame of the Spindle are tapered smaller toward the output end of the spindle shaft.**
12. Remove the Spindle Planet Gears (35) from the Spindle.
13. **For Models 3800K, 3800M or 3840K, 3840M,** if the Spindle Planet Gear Bearings (36) must be replaced, press them from the Planet Gears.
    For all Models except 3800K, 3800M or 3840K, 3840M, if the Spindle Planet Gear Bushings (37) must be replaced, press them from the Planet Gears.

Assembly

General Instructions

1. Always press on the **Inner** ring of a ball-type bearing when installing the bearing on a shaft.
2. Always press on the **Outer** ring of a ball-type bearing when pressing the bearing into a bearing recess.
3. Whenever grasping a tool or part in a vise, always use leather-covered or copper-covered vise jaws. Take extra care not to damage threads or distort housings.
4. Except for bearings, clean every part and wipe every part with a thin film of oil before installation.
5. Check every bearing for roughness. If an open bearing must be cleaned, wash it thoroughly with a clean suitable solution and dry with a clean cloth. Sealed or shielded bearings should not be cleaned. Work grease into every bearings before installation.
6. Apply a film of O-ring lubricant to every O-ring before installation.
7. When installing the Planet Gear Shafts (26 or 38), support the spindle end of the assembly and press the Shafts in toward the spindle end. The shaft holes through the web are slightly tapered so that the Shafts have a tighter fit in the front web.
8. Unless otherwise noted, always press on the stamped end of a needle bearing when installing a needle bearing into a recess. Use a bearing inserting tool similar to the one shown in Dwg. TPD786.

Needle Bearing inserting tool



(Dwg. TPD786)

Assembly of the Gearing

1. **For Models 3800K, 3800M or 3840K, 3840M,** if the Spindle Planet Gear Bearings (36) were removed, press new Bearings into the Planet Gears (35) using a needle bearing inserting tool. Press the Bearings into the Gear until they are flush with the face of the Gear. If any Gears are damaged, install a complete new set of Gears. Do not mix old Gears with new Gears in the same motor.
   For all Models except 3800K, 3800M or 3840K, 3840M, if the Spindle Planet Gear Bushings (37) were removed, press new Bushings into the Planet Gears (35). Press the Bushings into the Gear until they are flush with the face of the Gear. If any Gears are damaged, install a complete new set of Gears. Do not mix old Gears with new Gears in the same motor.
2. Support the web at the output end of the Spindle (33) on the table of an arbor press and position an assembled Spindle Planet Gear in the web. The holes in the webs of the Spindle are tapered and smaller toward the output end of the Spindle. Press a Spindle planet Gear Shaft (38) through the rear web and Gear and into the front web until the Shaft is flush with the face of the rear web.
3. Repeat Step 2 with the remaining Spindle Planet Gears.
4. Stand the Spindle output end upward, on the table of an arbor press and using a piece of tubing that will clear the Spindle, press the Spindle Front Bearing (39) onto the Spindle.
5. Invert the Spindle and without applying pressure to the Spindle Front Bearing, press the Spindle Rear Bearing (34) onto the short hub of the Spindle.
6. Apply lubricant to the gearing and shaft and insert the assembled Spindle, output end leading, into the end of the Gear Case (29) with the largest opening. Push the assembly into the Gear Case until the Spindle Front Bearing seats in the gear case bearing recess.
7. **For all Models except 3800K, 3800M or 3840K, 3840M,** install the Spindle Bearing Retainer (28) in the groove inside the Gear Case behind the assembled Spindle.
8. **For all Models except 3800K, 3800M or 3840K, 3840M,** if the Gear Head Planet Gear Bearings (25) were removed from the Gear Head Planet Gears (24), press new Bearings into the Gears using a needle bearing inserting tool. If any Gears are damaged, install a complete new set of Gears. Do not mix old Gears with new Gears in the same motor.
9. **For all Models except 3800K, 3800M or 3840K, 3840M,** support the web at the spline shaft end of the Gear Head (21) on the table of an arbor press and position a Gear Head Planet Gear with a Bearing in the web. The holes in the webs of the Gear Head are tapered and smaller toward the spline shaft end of the Gear Head. Press a Gear Head Planet Gear Shaft (26) through the rear web and Bearing into the front web until the Shaft is flush with the face of the rear web.
10. **For Models 3800P or 3840P,** insert the Rotor Pinion (22) into the center of the Gear Head. **This must be done before installing the second Gear in the Gear Head. It cannot be installed after a second Gear is secured in position.**
11. **For all Models except 3800K, 3800M or 3840K, 3840M,** repeat Step 9 with the remaining Gear Head Planet Gear and Bearing.
12. **For all Models except 3800K, 3800M or 3840K, 3840M,** stand and support the assembled Gear Head on the table of an arbor press with the spline shaft end downward and press the Gear Head Bearing (23) onto the hub of the Gear Head.
13. **For all Models except 3800K, 3800M or 3840K, 3840M**, install the Gear Head Spacer (27) on the spline shaft of the Gear Head.
14. **For all Models except 3800K, 3800M or 3840K, 3840M,** apply lubricant to the gear head gearing and while engaging the spline of the Gear Head with the gearing of the Spindle, slide the assembled Gear Head into the Gear Case.

Assembly of the Motor

1. Push the Rear End Plate (9), flat face leading, onto the short hub of the Rotor (13).
2. Push the Rear Rotor Bearing (8) onto the short hub of the Rotor into the recess of the Rear End Plate and install the Rear Rotor Bearing Retainer (7) in the groove on the shaft of the Rotor to retain the Bearing and End Plate.
3. Place a Vane (12) in each vane slot in the Rotor and place the Cylinder (16) down over the Rotor and Vanes and against the Rear End Plate make certain the holes in the Cylinder and End Plate can be aligned. If they can't, invert the Cylinder.
4. Press the Front Rotor Bearing (18) into the smaller bearing recess of the Front End Plate (17).
5. Press the Front Rotor Bearing, Front End Plate leading, onto the spline end of the rotor shaft until the End Plate contacts the Cylinder.
6. Use a 1/8" rod approximately 10" long to align the cylinder dowel holes in the Front End Plate, Cylinder and Rear End Plate. Insert the end of the rod at the Rear End Plate end into the dowel hole in the Motor Housing. Slide the assembled motor along the rod into the Motor Housing. Slide the assembled motor along the rod into the Motor Housing until it stops against the bottom of the motor bore.
7. Remove the assembly rod and install the Cylinder Dowel (14) in its place.
8. Install the Motor Retaining Ring (19) in the Motor Housing against the Front End Plate.
9. Insert the Motor Retainer (20), large opening trailing, over the rotor shaft and into the Motor Housing against the Motor Retaining Ring.
10. Install the assembled Gear Case against the Motor Housing. It may be necessary to rotate the Spindle by hand to properly engage the gearing with the spline on the Rotor. Make certain the Gear Head Bearing (23) or Spindle Rear Bearing (34) enters the recess in the Front End Plate.
11. Secure the Gear Case to the Motor Housing with the three Gear Case Cap Screws (32) and Lock Washers (4).
12. **For Models with Piped-Away Exhaust,** install new Exhaust Deflector Seals (11A and 11B) in the internal grooves at each end of the Exhaust Deflector (11).
13. Slide the Exhaust Deflector over the rear of the Motor Housing until it stops against the Housing.
14. Position the Backhead Gasket (6) against the rear face of the Motor Housing.
    For Series 3800 Non-reversible Motors, position the Gasket to block off the holes in the quadrant marked with an "R" if forward rotation is desired, or to block off the holes in the quadrant with an "F" if reverse rotation is desired.
    For Series 3840 Reversible Motors, position the Gasket so that each gasket inlet port aligns with a group of three holes through the housing rear wall.
15. Place the Backhead (2) against the Gasket. Install the four Backhead Cap Screws (3) and Lock Washers (4) to secure the Backhead and Exhaust Deflector to the Motor Housing.
16. Install one Air Strainer (1) for non-reversible models and two Air Strainers for reversible models in the Backhead.

Notes:

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