

Installation, Operation & Maintenance Manual

D and T-Style Double-Acting Gas Compressors All Models 791 and 891



*Model D791
Compressor*



*Model FD891
Compressor*



*Model FT891
Compressor*

Warning: (1) Periodic inspection and maintenance of Corken products is essential. (2) Inspection, maintenance and installation of Corken products must be made only by experienced, trained and qualified personnel. (3) Maintenance, use and installation of Corken products must comply with Corken instructions, applicable laws and safety standards. (4) Transfer of toxic, dangerous, flammable or explosive substances using Corken products is at user's risk and equipment should be operated only by qualified personnel according to applicable laws and safety standards.

Solutions beyond products...

CORKEN[®]

Warning

Install, use and maintain this equipment according to Corken's instructions and all applicable federal, state, local laws and codes. Periodic inspection and maintenance is essential.

Corken One Year Warranty

CORKEN warrants that its products will be free from defects in material and workmanship for a period of one year from date of installation, provided that the warranty shall not extend beyond twenty-four (24) months from the date of shipment from CORKEN. If a warranty dispute occurs, the DISTRIBUTOR may be required to provide CORKEN with proof of date of sale. The minimum requirement would be a copy of the DISTRIBUTOR'S invoice to the customer.

CORKEN products which fail within the warrant period due to defects in material or workmanship will be repaired or replaced at CORKEN's option, when returned, freight prepaid to CORKEN, 9201 North I-35 Service Road, Oklahoma City, OK. 73131.

Parts subject to wear or abuse, such as mechanical seals, blades, piston rings, valves and packing, and other parts showing signs of abuse, neglect or failure to be properly maintained are not covered by this limited warranty. Also, equipment, parts and accessories not manufactured by CORKEN but furnished with CORKEN products are not covered by this limited warranty and the purchaser must look to the original manufacturer's warranty, if any. This limited warranty is void if the CORKEN product has been altered or repaired without the consent of CORKEN.

All implied warranties, including any implied warranty of merchantability or fitness for a particular purpose, are expressly negated to the extent permitted by law and shall in no event extend beyond the expressed warrantee period.

CORKEN DISCLAIMS ANY LIABILITY FOR CONSEQUENTIAL DAMAGES DUE TO BREACH OF ANY WRITTEN OR IMPLIED WARRANTY ON CORKEN PRODUCTS. Transfer of toxic, dangerous, flammable or explosive substances using CORKEN products is at the user's risk. Experienced, trained personnel in compliance with governmental and industrial safety standards should handle such substances.

Important notes relating to the European Union (EU) Machinery Directive

Compressors delivered without electric motors are not considered as machines in the EU Machinery Directive. To ensure EU compliance, the compressor should be ordered with the optional 3022-1X Declaration of Conformity. The fabricator of the machinery must assure and declare full compliance with this Directive before the machine in which the compressor will be incorporated, or of which it is a part, is put into service.

Contacting the Factory

Before contacting the factory, note the model and serial numbers. The serial number directs Corken personnel to a file containing all information on material specifications and test data applying to the product. When ordering parts, the Corken service manual or Installation, Operations, and Maintenance (IOM) manual should be consulted for the proper part numbers. ALWAYS INCLUDE THE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS.

The model and serial numbers are shown on the nameplate of the unit. Record this information for future reference.

Model No. _____

Serial No. _____

Date Purchased _____

Date Installed _____

Purchased From _____

Installed By _____

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Chapter 1—Features and Benefits

High-efficiency PEEK valves:

Offer quiet operation and increase durability in process gas applications.

Ductile iron construction:

Maximum thermal shock endurance for cylinder and head.

Self-lubricating PTFE piston rings:

Multiple material options provide the most cost-effective operation of compressors for non-lube service. The step-cut design maximizes performance throughout the life of the piston ring.

Positively locked pistons:

Simple piston design allows end clearance to be precisely set to provide maximum efficiency and long life.

Self-lubricating piston rod seals:

Seals constructed of PTFE incorporating special fillers to minimize oil carry over and leakage. Spring loaded seal design self adjusts to compensate for normal wear.

Nitride-coated piston rods:

Impregnated nitride coating provides superior corrosion and wear resistance.

Adjustable packing screw:

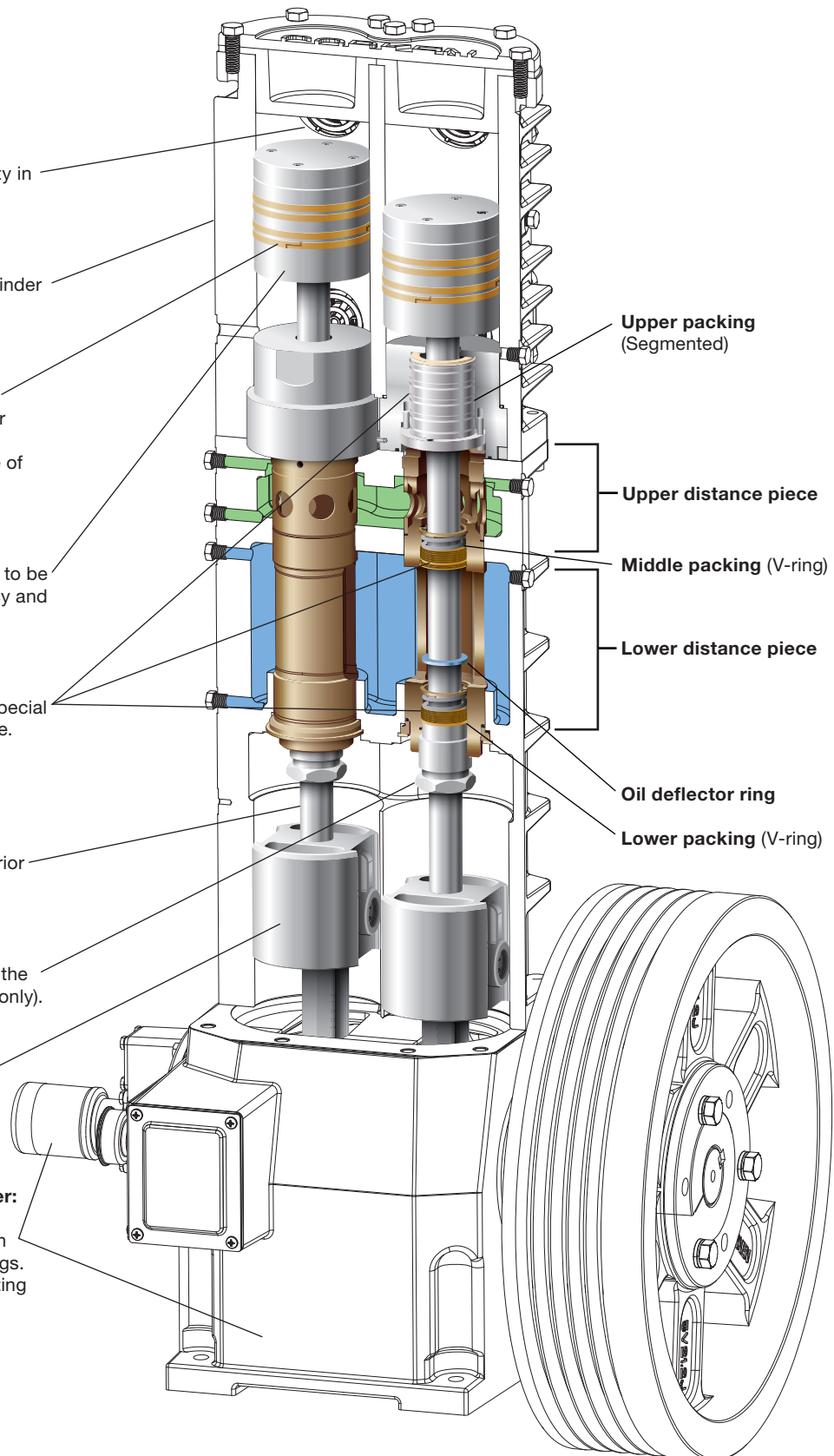
Ensures maximum sealing capacity during the life of the packing (T791 and T891 models only).

Cast iron crossheads:

Durable cast iron crossheads provide superior resistance to corrosion and galling.

Pressure-lubricated crankcase with filter:

Self-reversing oil pump ensures proper lubrication regardless of directional rotation to main bearing and connecting rod bearings. Standard 10-micron filter ensures long-lasting bearing life.



Construction details: Model FT891 compressor

Chapter 2—Installation

2.1 Location

NOTE: Compressor must be installed in a well ventilated area.

Corken’s compressors are designed for outdoor duty. Consult the factory before installing a compressor in extreme conditions such as corrosive environments and arctic conditions for extended periods of time. Always review the local safety regulations and building codes and ensure the installation meets all local safety and building standards.

Since Corken’s compressors typically handle toxic and flammable gases, they should be located outdoors in a well ventilated area. To ensure the compressor is accessible from all sides and has unrestricted air flow for adequate cooling, a minimum of 18 inches (45 cm) clearance between the compressor and the nearest wall is recommended.

Noise:

Many factors affect the noise level generated by a compressor installation. Several of these, including motor noise, piping vibration, foundation/skid design, and surrounding structures are outside Corken’s control. The use of sufficient pipe supports, flexible hoses, and proper baseplate/skid support will all reduce noise. Thus, Corken cannot guarantee a particular noise level from our compressors. However, noise levels from a properly installed Corken compressor typically do not exceed 85 dBa at three feet (0.91 meters).

2.2 Foundation

A proper foundation is essential for a smooth running compression system. The compressor should be mounted to a structural steel skid that is attached to a concrete slab. The slab must be at least eight inches thick with a two inch skirt around the circumference of the structural steel skid. The structural steel skid should be securely anchored into the foundation by 3/4 inch diameter by eight inch long “J” bolts. The total mass of the foundation should be approximately twice the weight of the compressor system (compressor, structural steel skid, motor, etc.). See figure 2.2 for details.

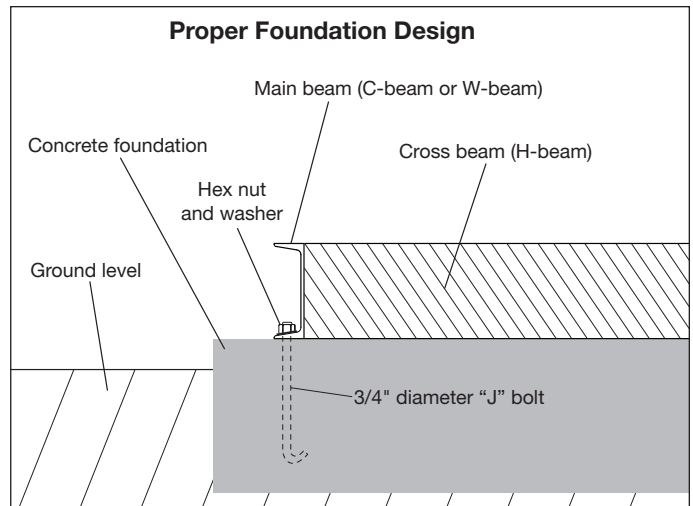


Figure 2.2: Recommended foundation details for Corken compressors.

NOTE: For a more detailed explanation of a proper foundation design, please refer to item number ED410 (Important Instructions for Compressor Foundation Design).

2.3 Piping

A proper piping design is as important as a proper foundation when it comes to a smooth operating compressor. A poorly designed piping system results in an undesirable transmission of compressor vibration to the piping. For best results follow the recommendations below.

DO NOT SUPPORT PIPING WITH THE COMPRESSOR. Unsupported piping is the most frequent cause of vibration. To minimize the transmission of vibration from the compressor to the piping, install flexible connectors vertically as shown below (see figure 2.3 for details).

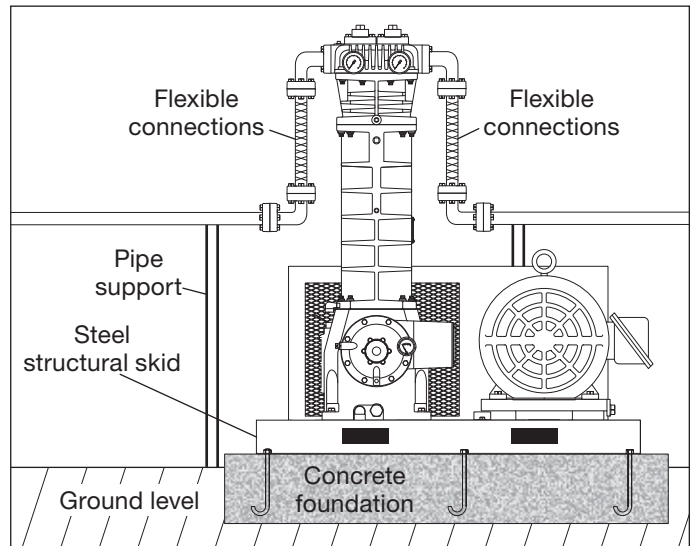


Figure 2.3: Flexible connectors should be used to minimize transmission of vibration to the piping.

To prevent excessive pressure drop between the suction source and the compressor and the final discharge point and the compressor, the piping must be adequately

sized. In most cases, piping should be at least the same diameter as the suction nozzle on the compressor.

If a restrictive device such as a valve, pressure regulator, or back-check valve is to be installed in the compressor's suction line, care must be taken. The suction line volume between the restrictive device and the compressor suction nozzle must be at least ten times the swept cylinder volume.

On liquefied gas applications, a liquid trap must be installed on the inlet side of the compressor. This prevents liquid from entering the compressor (see section 2.4).

It is of equal importance to protect the discharge side of the compressor from liquid entry. Always install a check valve on the discharge side of the compressor and use a piping design that does not allow liquid to gravity drain into the compressor.

For vapor recovery applications, be certain to install a check valve on vapor lines discharging to the liquid space of the tank.

All piping must be in accordance with the laws and codes governing the service. In the United States, the following codes apply:

For LP Gas—The National Fire Protection Association Pamphlet No. 58, Standard for the Storage and Handling of Liquefied Petroleum Gases.

For Ammonia—The American National Standards Institute, Inc., K61.1-1999, Storage and Handling of Anhydrous Ammonia.

Copies of these are available from NFPA, 60 Baterymarch Street, Boston, Mass, 02110 and ANSI, 1430 Broadway, New York, N.Y., 10018. Install, use, and maintain this equipment according to Corken's instructions and all applicable federal, state, and local laws and previously mentioned codes. Other laws may apply in different industries and applications.

2.4 Liquid Trap

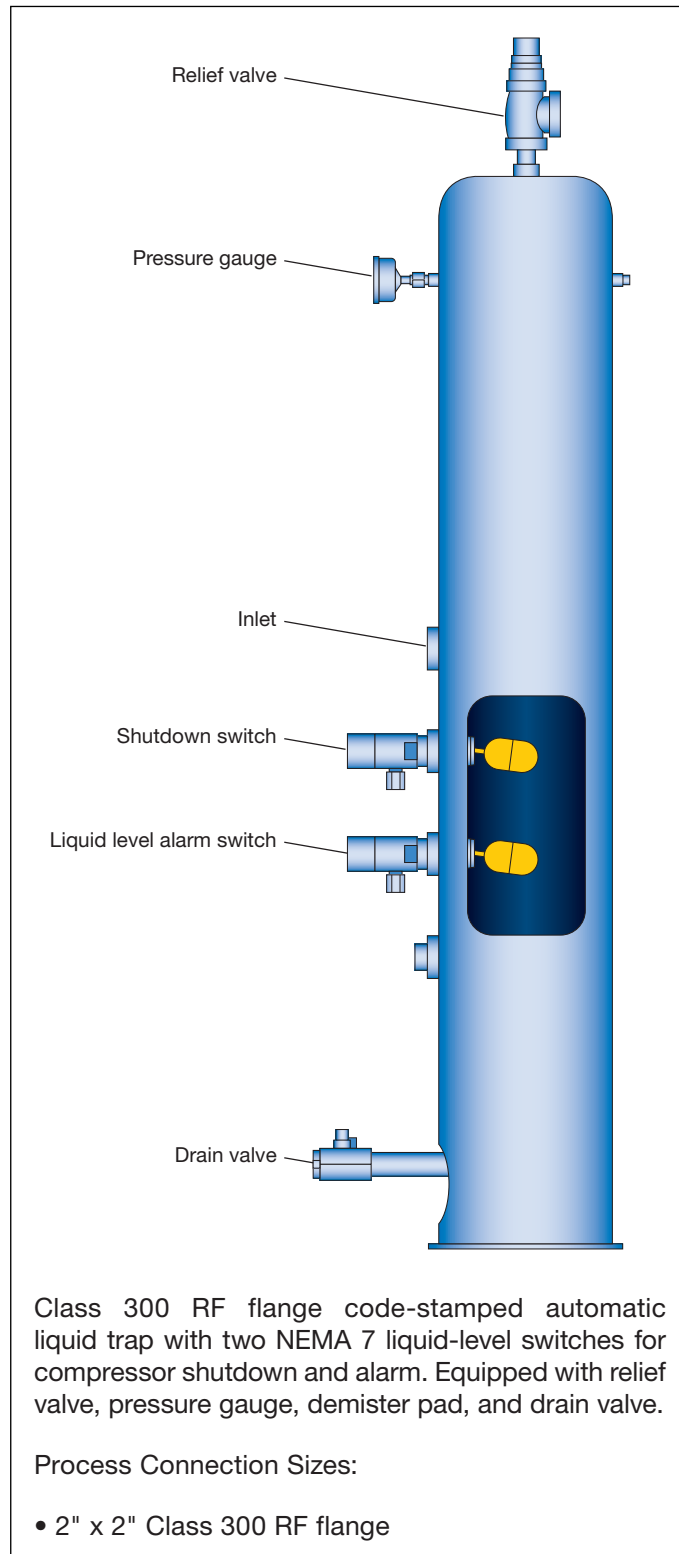
Compressors pressurize gas and are not designed to pump liquids. The entry of even a small amount of liquid into the compressor results in serious damage.

On liquefied gas applications, a liquid trap must be used to prevent liquid from entering the compressor.

Corken's liquid trap is ASME code stamped and provides the most thorough liquid separation (see figure 2.4). It contains two level switches, one for alarm and one for shutdown. In some cases the alarm switch is used to activate a dump valve (not included with trap) or sound an alarm so the trap can be manually drained by the operator. It also contains a mist pad; a mesh of

interwoven wire designed to remove fine liquid mists. The ASME code trap comes standard on Corken's 107B and 109B mountings.

NOTE: Before grounding any welding devices to the trap or associated piping, the LIQUID LEVEL SWITCH MUST BE REMOVED from the trap. **Failure to do so will damage the contacts of the switch.**



Class 300 RF flange code-stamped automatic liquid trap with two NEMA 7 liquid-level switches for compressor shutdown and alarm. Equipped with relief valve, pressure gauge, demister pad, and drain valve.

Process Connection Sizes:

- 2" x 2" Class 300 RF flange

Figure 2.4: ASME automatic liquid trap

If the compressor is equipped with a liquid trap not manufactured by Corken, make sure it is adequately sized to remove the liquid entrained in the suction stream.

2.5 Driver Installation and Flywheels

Corken's vertical compressors can be driven by electric motors or combustion engines (gasoline, diesel, natural gas, etc.). A proper driver selection should turn the compressor between 400 and 825 RPM.

NOTE: Never operate a reciprocating compressor without a flywheel. Severe torsional imbalances will result causing vibration and an unusually high horsepower requirement. The flywheel should never be replaced by another pulley unless it is equal to or higher than the wk2 value of the flywheel.

Humid climates can cause problems with explosion proof motors. The normal breathing of the motor and alternating temperatures—warm when running and cool when stopped—can draw moist air into the motor. As the moist air condenses, it can build up and cause motor failure. To prevent this, make a practice of running the motor at least once a week on a bright, dry, day for an hour or so without the V-belts attached. During this period of time, the motor will heat up and vaporize the condensed moisture. NOTE: No motor manufacturer guarantees an explosion proof or totally enclosed (TEFC) motor against damage from moisture.

When installing an engine driver, carefully review the instructions from the manufacturer and ensure the engine is properly installed.

2.6. Crankcase Lubrication

The crankcase was drained before shipment. Before starting the machine, fill the crankcase to the full mark on the oil bayonet and not above. To ensure proper lubrication of the crankcase parts, the crankcase should be filled through the crankcase inspection plate (see figure 5.5 for the proper oil filling location).

Compressor Model	Approximate Quarts	Capacity Liters
791, 891	7.0	6.6

Figure 2.6A: Oil capacity chart.

General Notes on Crankcase Oil

Corken gas compressors handle a wide variety of gases in a multitude of operating conditions. They are used in all areas of the world from hot dusty deserts, to humid coastal areas, to cold arctic climates. Some compressors may be lightly loaded and run only occasionally, while others may be heavily loaded and operate 24/7. Thus, no single crankcase oil or

maintenance schedule is right for every compressor. Availability of brands and grades of oil can vary from one location to another. These factors can make it challenging for a Corken compressor user to select a suitable crankcase oil. This guide is intended to aid in that regard.

It is safe to say that purchasing a quality crankcase oil, and changing it regularly, is significantly less costly than the repair bill and downtime associated with a lubrication failure in any gas compressor. Considering the relatively small volume of oil used in Corken compressors, and the critical nature of the services where these compressors are used, selecting the appropriate high quality oil is the most economical choice. It will help ensure the dependability and longevity of the compressor.

Corken recommends using industrial oils (rather than engine oil or "motor oil"). Industrial oils have additives selected and blended for specific purposes. Many are designed specifically for the challenges inherent in compressor crankcases. Industrial oils are available as a conventional (mineral based) oil, a synthetic oil, or a blend of the two.

All new Corken compressors are tested at the factory using a conventional mineral oil. This oil is drained prior to shipment. An oil suitable for the anticipated environmental and operating conditions must be selected and added to the compressor prior to the initial startup.

Oils to Avoid

Selecting a crankcase oil based on low price or easy availability is seldom the most economic decision. Following are oils to avoid.

- **Do not use** any oil with a viscosity index below 95.
- **Do not use** any oil with a pour point less than 20°F (11°C) lower than the anticipated minimum ambient temperature (unless a crankcase oil heater is used).
- **Do not use** engine/motor oil.

See below for additional detail on each of these parameters.

Critical Oil Characteristics

Viscosity

Viscosity is the most important physical property of lubricating oil. Simply put, the viscosity of an oil is a measure of its resistance to flow. In gas compressors, oils with higher viscosity (like ISO 100) are thicker and are used for higher ambient temperatures. Oils with lower viscosity (like ISO 68) are thinner and are used at lower ambient temperatures. If the oil's viscosity is too high, the oil may not circulate through the compressor adequately. If the viscosity is too low, the lubricating film will be unable to protect the components from wear.

Viscosity Index

Viscosity Index (VI) is a measure of how much the oil's viscosity changes as its temperature changes. A low viscosity index is an indication that the viscosity changes more as the temperature changes. Oils with low viscosity index tend to become thin as the oil temperature increases. This can cause lubrication failure as well as unstable oil pressure. A high viscosity index reflects a more stable viscosity, and is generally preferred for Corken compressors. The minimum Viscosity Index for oils used in Corken compressors is 95 (VI is a unit-less number). This is particularly important when operating at high or low temperature extremes, or at a variety of ambient temperatures (seasonal changes). Oils with a high viscosity index can be used at wider ambient temperature range compared to oils with a lower viscosity index.

It should be noted that a conventional oil (not synthetic) with a high viscosity index may not necessarily be suitable for continuous service at high temperature.

Such an oil will oxidize faster than a synthetic oil. Synthetics have naturally high viscosity index, and are therefore recommended for "heavy service" as described below—including high temperature and continuous duty applications. In many climates, the use of the correct synthetic oil will eliminate the need to change oil viscosity grades as the seasons change.

Pour Point

The pour point of an oil is the lowest temperature at which the oil flows. At temperatures below the pour point, the oil is essentially solid and can't freely flow to the compressor's bearings and other wear surfaces, or even to the compressor's oil pump.

The oil's pour point is particularly critical when starting a compressor at low temperature conditions. An oil should have a pour point at least 20°F (11°C) below the lowest expected ambient temperature. For example, if the minimum ambient temperature is expected to

Crankcase Oil Recommendations (Except Ammonia Service)

Normal Service					
Ambient Temperature ¹	Oil Product	Oil Type ²	Viscosity ISO ³	Viscosity Index ³	Pour Point ³
40 to 100°F (4 to 38°C)	Mobil DTE 10 Excel 100	C	100	127	-27°F (-33°C)
	Mobil Rarus 427	C	100	100	16°F (-9°C)
	Phillips 66 Gas Compressor Oil	C	100	102	-20°F (-29°C)
	Chevron Regal R&O	C	100	97	5°F (-15°C)
	Sunoco Sunvis 900	C	100	95	-15°F (-26°C)
10 to 65°F (-12 to 18°C)	Mobil DTE 10 Excel 68	C	68	156	-38°F (-39°C)
	Mobil DTE Heavy Medium	C	68	95	5°F (-15°C)
	Phillips 66 Premium Gas Compressor Oil	B	68	133	-27°F (-33°C)
	Chevron Regal R&O	C	68	99	-11°F (-24°C)
	Sunoco Sunvis 900	C	68	104	-21°F (-29°C)
Heavy Service					
10 to 100°F (-12 to 38°C)	Mobil SHC 627 ⁴	S	100	162	-49°F (-45°C)
	Royal Purple Synfilm NGL 100	S	100	130	-44°F (-42°C)
	Dyna-Plex 21C Synzol CO ISO 100	S	100	132	-49°F (-45°C)
-20 to 90°F (-29 to 32°C)	Mobil SHC 626 ⁴	S	68	165	-59°F (-51°C)
	Royal Purple Synfilm NGL 68	S	68	132	-76°F (-60°C)

Crankcase Oil Recommendations (Ammonia Service Only)

Normal Service					
Ambient Temperature ¹	Oil Product	Oil Type ²	Viscosity ISO ³	Viscosity Index ³	Pour Point ³
40 to 100°F (4 to 38°C)	Mobil Rarus 427	C	100	100	16°F (-9°C)
10 to 65°F (-12 to 18°C)	Phillips 66 Ammonia Compressor Oil	C	68	102	-27°F (-33°C)
	Chevron Capella P68	C	68	96	-44°F (-42°C)
	Mobil Rarus 426	C	68	105	16°F (-9°C)
Heavy Service					
10 to 100°F (-12 to 38°C)	Mobil Gargoyle Arctic SHC 228 ⁵	S	100	147	-43°F (-45°C)
	Royal Purple Uni-Temp 100	S	100	124	-53°F (-47°C)
-20 to 90°F (-29 to 32°C)	Mobil Gargoyle Arctic SHC 226E ⁵	S	68	136	-58°F (-50°C)
	Royal Purple Uni-Temp 68	S	68	118	-51°F (-46°C)

¹ Consult Corken for oil recommendations in very hot climates—ambient temperatures consistently above 100°F (38°C).

² Oil type: C=Conventional, S=Synthetic, B=Conventional/Synthetic blend

³ Information available from oil manufacturers at the time of publication.

⁴ Mobil SHC oils are synthetic oils which require that the crankcase be flushed of residual mineral oil.

⁵ Mobil Gargoyle Arctic SHC oils are synthetic oils which require that the crankcase be flushed of residual mineral oil.

Figure 2.6B: Oil selection chart.

be 0°F (-18°C), the pour point must be no higher than -20°F (-29°C).

Do not assume the pour point of an oil is low enough. Consult the oil's technical data sheet – generally available on the oil manufacturer's website. Many conventional oils have a pour point around 0 to 15°F (-18 to -9°C) which is too high to use at low ambient temperatures. Synthetic oils generally have a lower pour point than conventional oils.

Crankcase Oil Recommendations

The primary factors for selecting a suitable crankcase oil from the chart below are ambient temperature range and the anticipated service—normal service or heavy service. The ambient temperature determines the required oil viscosity. Consider the full range of high and low ambient temperatures at the compressor's location when selecting an oil. It may be necessary to use an ISO 100 in summer and an ISO 68 in winter. Synthetic oils generally have a wider ambient temperature range due to their higher viscosity index.

For the purpose of selecting a suitable crankcase oil for a Corken compressor, normal and heavy service are defined below.

Normal Service

T "Normal service" can be defined as anything that is not considered "heavy service" as described below.

Common examples of "normal service" applications:

- LPG liquid transfer (intermittent duty)
- Ammonia liquid transfer (intermittent duty)
- Most tank evacuation applications

Conventional mineral based oils have been used successfully for many years in these services.

Heavy Service

O "Heavy Service" is defined as an application where the compressor is subject to any one (or more) of the following:

- Continuous duty service (several hours each day or more)
- Compressor consistently loaded at or near its maximum horsepower rating
- Compressor speed is at or near its maximum speed rating
- Services with a "wet" gas such as natural gas with high content of heavy hydrocarbons such as butane, pentane, etc.

- Services dealing with low vapor pressure hydrocarbons (such as butane unloading in winter) where condensation in the gas can result in dilution of the crankcase oil
- Compressors operating at high or low temperature extremes

Synthetic oils are recommended for "heavy" services.

Ammonia Service

Compressing ammonia presents particular challenges from a lubrication standpoint. Never use a detergent oil in a compressor in ammonia service. Ammonia will react with the detergent and cause lubrication failure. Fortunately, some oils are specifically blended for use in ammonia compressors — though some of these are best suited only for cooler climates.

Consult these charts or the oil manufacturer's product data sheet for information regarding the oil's viscosity, viscosity index, pour point, etc. This information is generally available on line or from the oil supplier. Do not use an oil if it's critical properties can not be confirmed, or if there is any other reason to doubt its suitability. Contact Corken if additional assistance is needed when selecting a crankcase oil.

Oil Change Intervals

Oil change intervals can vary significantly depending on local environmental conditions, the gas being compressed, and the oil being used. Unless there are factors that shorten the life of the oil, the following recommendations apply:

Conventional oil: 2200 hours or 6 months—whichever comes first

Synthetic oil: 6000–8000 hours* or one year—whichever comes first

* Oil change intervals in this range should be confirmed via oil analysis.

Environmental or operational issues such as dirty/dusty or humid conditions will require more frequent oil changes. Contamination/dilution of the oil by liquids in the gas stream can also shorten the life of the oil. Visually check the oil level and the oil condition at least monthly (compare to unused oil).

Indications that dictate more frequent oil changes:

- Unusually dirty or discolored oil (or unusual smell)
- Oil dilution by condensation or other liquids in the gas stream (see below)
- Change in viscosity for any reason (various oil additives can break down over time)

-
- Changing ambient temperature may cause the need for a different viscosity

The oil should be changed as often as necessary to maintain clean, undiluted oil of the proper viscosity. Each time the oil is changed, the oil filter (Corken part number 4225) should also be changed.

Oil Analysis

The best way to determine the needed oil change interval for any particular compressor is to have an oil analysis conducted. Numerous labs can analyze a used oil sample and advise its condition. After 2–3 such tests, a determination can be made for a recommended oil change interval for a particular compressor in its specific environmental situation and operating conditions. Regular oil analysis can help improve the compressor durability and decrease oil usage by maximizing the oil change intervals. Based on the oil analysis, the oil can be changed when it is needed, and not changed when it is not yet necessary.

Oil Dilution

Crankcase oil can be diluted by various products in the gas stream. As an example, when compressing butane in winter, the vapor pressure is very low and there can be a lot of entrained liquid butane with the gas stream. This liquid can collect in the compressor and dilute the crankcase oil. This thins the oil and reduces its ability to properly lubricate the compressor.

Hydrocarbon mixtures containing heavy hydrocarbons such as butane, pentane, hexane, etc. often operate at pressure above the vapor pressure of these heavier constituents. Thus, they often produce a “wet” gas which can dilute the crankcase oil.

Long Term Storage

When a compressor is removed from long term storage, the oil should be changed before putting the compressor back into service. Specifically, if it has been unused over a season (such as over a winter), the oil should be changed.

Crankcase Oil Heater Option

Corken offers a crankcase oil heater as an option on all models except the small model 91. This heater is available in 110V and 220V versions and is rated for Class 1, Division 1 and 2, Group B, C, D service. The heater includes a thermostat set at 70°F (21.1°C). The heater alleviates concerns about cold weather startup. When using the heater, an ISO 100 viscosity oil will do well regardless of low ambient temperature.

Cylinder Lubricating Oil

All Corken gas compressors are designed to operate without cylinder lubrication. However, many Corken

Customers, particularly in the oil and gas industry, use lubricated compressor cylinders to extend the service life of the compressor’s valves, piston rings, and packing. Compressor cylinders operate at higher temperatures than the crankcase, so oils used in this service often have a higher viscosity than the crankcase oil. A viscosity of ISO 150 (or higher) is common for cylinder lube oil. Several companies make oil specifically designed for this service and many of these oils have properties that inhibit dilution or washing away of the oil by condensates in the process gas. These oils typically also have properties that prevent corrosion and carbon buildup in the cylinders and valves. Contact Corken is assistance is needed in selecting a suitable cylinder lubricating oil. Oil manufacturers are often a good source for this information as well.

Engine oils (motor oils) should never be used as a cylinder lubricant. The additives in engine oil are poorly suited for that purpose.

Engine Oils (Motor Oils)

As noted above, engine oils (or motor oils) are not recommended for use in Corken compressor crankcases or cylinders. Engine oils are formulated for use in internal combustion engines and contain additives that specifically counter the contaminants created by the combustion of fuel (soot, CO₂, water, etc.). As such, they are not necessarily the best oils to use in a gas compressor.

Detergents and dispersants in engine oils can react with the compressor’s process gas, or form emulsions inside the compressor’s crankcase that are detrimental to lubrication. Ultimately, this negatively effects the oil’s properties and damages the compressor’s critical internal components.

If a suitable industrial oil is not readily available, engine oils can temporarily be used in Corken compressors in normal service, but only until a suitable industrial oil can be sourced (see above for definition of “normal service”). Engine oils should not be used for compressors in “heavy service”.

Engine oil is labeled with an API “donut” indicating the API Service Grade. It is critical that the engine oil have an API Service Grade of SJ or better. Engine oils with an API Service Grade of SA and SB are obsolete, but still readily available. These very low quality oils should never be used in Corken compressors. Industrial oils do not receive an API Service Grade like engine oil does.

2.7 Purging, Padding, Venting, and Draining of Distance Pieces

With Corken's compressor the distance piece is key to leakage control and oil-free compression. It is integral with the crosshead guide. The distance piece is equipped with tapped holes for purging, padding, venting, and draining (see Figure 2.7). Proper connections to and from these tapped holes are essential for optimum compressor performance.

Determining the ideal leakage control system can be complicated. Factors to consider include the hazards of the gas being handled, operating conditions, duty cycle, compressor location, proximity to personnel, local regulations, etc. Compressors installed indoors that are handling flammable or toxic gasses should always be properly purged. Corken's applications engineers are always available for assistance.

Corrosive gases should be prevented from entering the crankcase. Even small amounts of particular gases in the crankcase can seriously contaminate the crankcase oil. To prevent contamination of the crankcase, the distance piece must be purged, padded, or vented using a clean, non-corrosive gas like dry air or nitrogen.

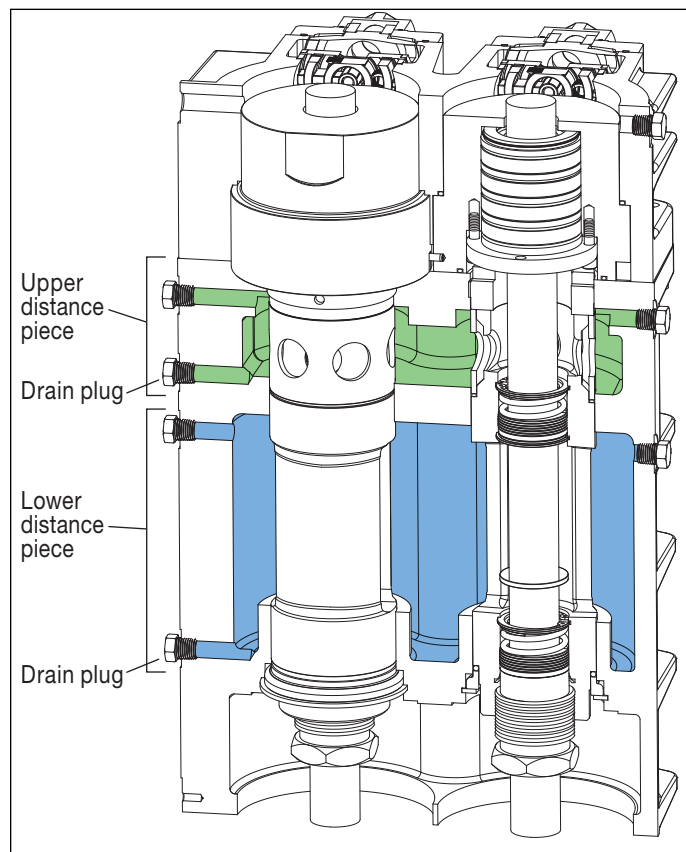


Figure 2.7: Distance piece details for a model FT891

Purging:

Purging the distance piece minimizes leakage of process gas to the atmosphere. Any process gas

leaked into the distance piece is quickly diluted by the purge gas and swept away. Depending on the type of gas and local regulations, the purge gas should be vented to a safe release area, flare, compressor's inlet, or treatment facility.

When purging, it is critical to maintain the proper pressure loading across each set of packing. The higher pressure should be on the open side of the "V" which is the side with the spring.

Moisture, oil, or condensate can be removed from the distance piece with the purge gas by using the lower distance piece connection (drain location) as the purge gas outlet connection.

Corken offers purge kits with the necessary regulator, valves, fittings, etc. Consult factory for details.

Padding (Buffering):

If purging is not practical, the distance piece should be pressurized with a static pressure. This is called padding or buffering. Padding is done at a pressure above the compressor's suction pressure using a clean noncorrosive gas like dry air or nitrogen. The higher pressure in the distance piece tends to reduce the process gas leakage to the atmosphere. A small amount of purge gas will likely get into the process gas. A pressure regulator can be used to help maintain the proper pressure in the distance piece.

When padding, it is critical to maintain the proper pressure loading across each set of packing. The higher pressure should be on the open side of the "V" which is the side with the spring.

Venting:

The distance piece can be vented to an appropriate release area, flare, or treatment facility. This is sometimes useful for indoor installations.

Draining:

Since some oil passes the lower packing set, the distance piece must be drained on a regular basis to maintain oil-free compression (see figure 2.7). Corken recommends draining the distance piece once a week in continuous-duty operation. Installing a drain cock to the distance piece helps simplify the process.

Highly Corrosive Gases:

When shutting down the compressor for an extended period of time, it should be blocked from the system using the valves located in the suction and discharge piping and purged with dry inert gas. This procedure significantly lowers potential damage to the compressor caused by corrosive gases.

2.8 Relief Valves

A relief valve must be installed on the discharge side of the compressor before the first block valve. With Corken's 107 mountings, a relief valve should be fitted in the piping between the compressor discharge and the four-way valve. NOTE: Relief valves may be required at other points in the piping system.

The material specification for the relief valve must be compatible with the gas being compressed. Review local codes and regulations for specific requirements related to relief valves.

2.9 Shutdown and Alarm Devices

For many applications shutdown and alarm switches provide worthwhile protection and may prevent serious damage to the compression system. All electronic devices must meet local code requirements. The shutdown and alarm devices typically used with Corken's compressors are as follows:

Low Oil Pressure Switch: Shuts down the compressor if the crankcase oil pressure falls below 15 psi due to oil pump failure or low oil level in crankcase.

High Temperature Switch: Shuts down the compressor if the normal discharge temperature is exceeded. This is strongly recommended for all applications. Typically, the set point is about 30°F (-17°C) above the normal discharge temperature but not exceed the 250°F (121°C) when using Buna-N or Neoprene® trim or 300°F when using PTFE or Viton® (Neoprene and Viton are registered trademarks of the DuPont company).

Low Suction, High Discharge Pressure Switch: Shuts down the compressor if inlet or outlet pressures are not within preset limits.

Vibration Switch: Shuts down the compressor if vibration becomes excessive. Recommended for compressors mounted on portable skids.

Chapter 3—Start Up

NOTE: Read all of this chapter, before proceeding with the startup checklist.

3.1 Inspection After Extended Storage

If the compressor has been out of service for an extended period of time, make certain the cylinder bore and valve areas are free of rust or debris of any kind. For instructions on removing the valves and/or cylinder head, refer to chapter five.

Drain the oil from the crankcase and remove the nameplate and access cover on the crankcase. Inspect the running gear for signs of rust and clean or replace parts as necessary. Replace the access cover and fill the crankcase with the appropriate amount of lubricant through the opening behind the nameplate. NOTE: For best lubrication results, do not fill the crankcase through the access cover. Squirt oil on the crossheads and rotate the crankshaft by hand to ensure all bearing surfaces are coated with oil.

Rotate the compressor manually and ensure running gear functions properly. Replace the nameplate and proceed with the startup.

3.2 Flywheel and V-belt Alignment

Before working on the drive assembly, make sure the electric power is disconnected. When mounting new belts, always make sure the driver and compressor are close enough together to avoid forcing/prying the belts over the flywheel grooves.

Improper belt tension and/or sheave alignment can cause vibration, excessive belt wear, and premature bearing failure. Before operating the compressor, confirm V-belt grooves of the flywheel and driver sheave are properly aligned. Visual inspection often will indicate if the belts are properly aligned, but use of a square is the best method (See video titled "How to Align the Sheave to the Flywheel" on Corken's YouTube Channel).

The flywheel is mounted on the shaft via a split, tapered hub, and three bolts (see figure 3.2A). These bolts should be tightened in an even and progressive manner to the specified torque values listed below. There must be a gap between the bushing flange and the flywheel when installation is complete. Always check the flywheel runout before startup and readjust if it exceeds the value listed in Appendix B.

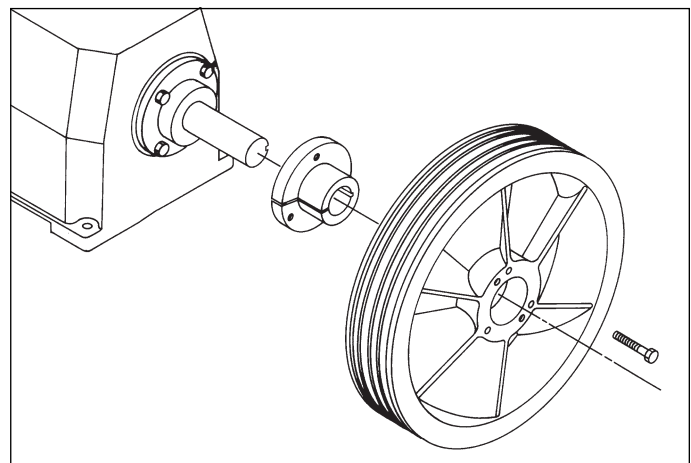


Figure 3.2A: Flywheel installation

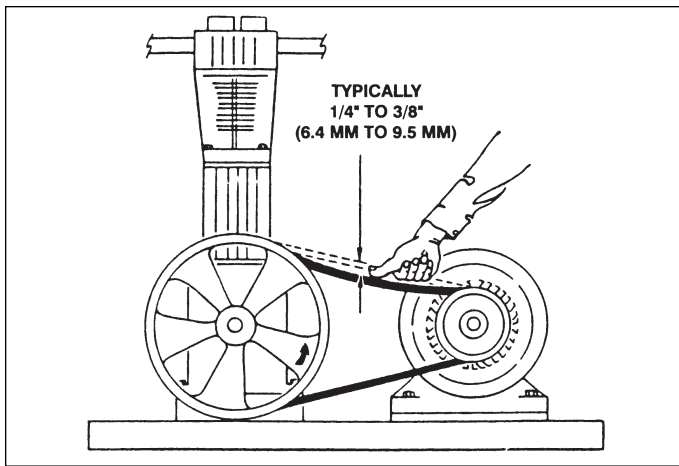


Figure 3.2B: Proper belt tension

Hub Size	Diameter in. (cm)	Bolt Torque Ft-lb (N-Meter)	Set Screw Torque Ft-lb (N-Meter)
J	7.25 (18.4)	75-81 (101-110)	22 (29.8)



Scan QR Code and refer to the maintenance video titled "How to Align the Sheave to the Flywheel and Set Proper V-Belt Tension".

Tighten the belts until taut which means they should not be extremely tight. Consult your V-belt supplier for specific tension recommendations. Over tightened belts are can cause premature bearing failure. Refer to figure 3.2B for general guidelines.

3.3 Crankcase Oil Pressure Adjustment

Corken's compressors are equipped with an automatically reversible gear type oil pump. Before starting the compressor, check and fill the crankcase with the proper amount of lubricating oil.

Make sure the pumping system is primed and the oil pressure is properly adjusted. When the compressor is first started, observe the pressure gauge on the crankcase. If the gauge fails to indicate pressure within 30 seconds, stop the machine. Loosen the oil filter and remove the pressure gauge. Restart the compressor and run it until oil comes out of the opening for the pressure gauge or around the filter. Retighten the filter and reinstall the pressure gauge.

The oil pressure should be about 20 psi (1.4 bars) minimum for normal service. A spring-loaded relief valve mounted in the bearing housing opposite the flywheel regulates the oil pressure. As shown in figure 3.3, turn the adjusting screw clockwise to increase the oil pressure and counterclockwise to lower it. Be sure to loosen the adjusting screw locknut before trying to turn the screw and retighten it after making any adjustment.

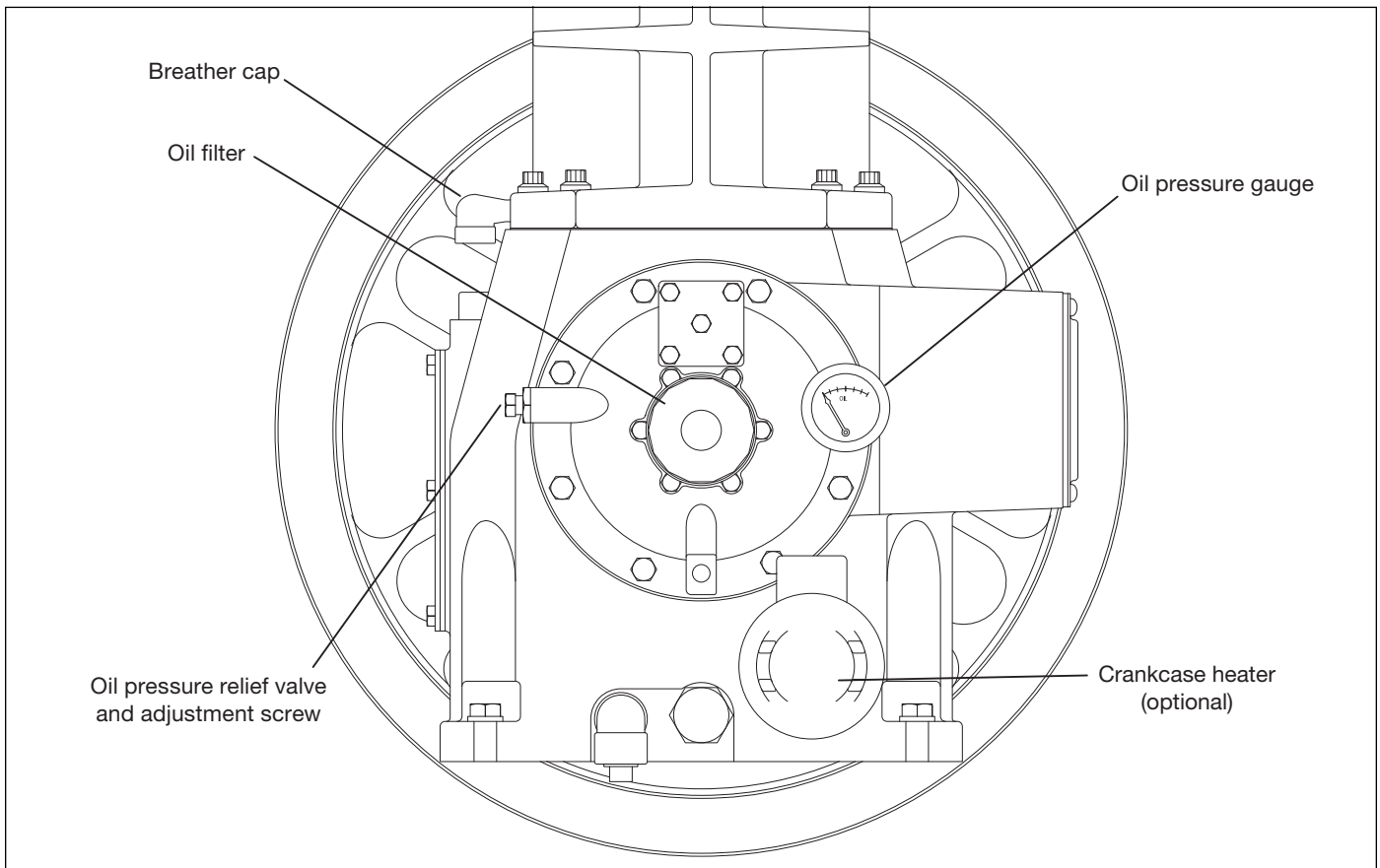


Figure 3.3: Oil pressure adjustment

3.4 Startup Check List

NOTE: Before starting the compressor, verify each item on the list below!

Failure to do so may result in a costly (or dangerous) mistake.

1. Become familiar with the function of all piping associated with the compressor. You must know each line's purpose!
2. Make certain actual operating conditions match the anticipated conditions.
3. Ensure line pressures are within cylinder pressure ratings.
4. Clean out all piping.
5. Ensure all distance piece openings are tubed or plugged as needed.
6. Check all mounting shims, cylinder, and piping supports and ensure no undue twisting forces exist on the compressor.
7. Make certain strainer elements are in place and clean.
8. Make certain cylinder bore and valve areas are clean.
9. Check the V-belt tension and alignment or drive alignment on direct drive units.
10. Rotate flywheel by hand and make certain there is no wobble or play.
11. Confirm the oil level in the crankcase is correct.
12. Drain all liquid traps, separators, etc.
13. Verify proper electrical supply to the motor and panel.
14. Check all gauges and confirm a zero level reading.
15. Test piping system for leaks.
16. Purge unit of air before pressurizing with gas.
17. Carefully check for any loose connections or bolts.
18. Remove all stray objects (rags, tools, etc.) from vicinity of the unit.
19. Confirm all valves are open or closed as required.
20. Double-check all of the items listed above.

After Starting Compressor

1. Verify and note oil pressure. Shut down and correct any problems immediately the pressure is not within specification.
2. Observe the noise and vibration levels and correct immediately if excessive.
3. Confirm the RPMs are within proper compressor speed.
4. Examine entire system for gas or oil leaks.
5. Note rotation direction.
6. Check start-up voltage drop, running amperage, and voltage at motor junction box (not at the starter).
7. Verify proper lubrication rate (lubed units only).
8. Test each shutdown device and record set points.
9. Test or confirm set point on all relief valves.
10. Check and record all temperatures, pressures, and volumes after thirty minutes and one hour.
11. After one hour running time, tighten all head bolts, valve holddown bolts, and baseplate bolts (see [Appendix B](#) for torque values).

Chapter 4—Routine Maintenance Chart

Item to Check	Daily	Weekly	Monthly	Six Months	Yearly
Crankcase oil pressure	●				
Compressor discharge pressure	●				
Overall visual check	●				
Crankcase oil level		● ⁴	● ¹		
Drain liquid from accumulation points		● ²			
Drain distance pieces		●			
Clean cooling surfaces on compressor and intercooler (if any)		●			
Lubricator supply tank level (if any)		●			
Check belts for correct tension			●		
Inspect valve assemblies				●	
Lubricate motor bearings in accordance with manufacturers' recommendations				●	
Inspect motor starter contact points					●
Inspect piston rings				● ³	

¹ Change oil every 2,200 hours of operation or every 6 months, whichever occurs first. If the oil is unusually dirty, change it as often as needed to maintain a clean oil condition. Change replacement filter 4225 with every oil change.

² Liquid traps should be drained prior to startup.

³ Piston ring life varies greatly, depending on application, gas, and operating pressures. Consult factory for additional recommendations for your specific application.

⁴ If the compressor is used daily, check your oil level on a weekly basis. Otherwise check oil level on a monthly basis.

Chapter 5—Service Procedures

CAUTION: Always relieve the pressure in the compressor before attempting any repairs. After servicing the compressor, it should be pressure tested and checked for leaks at all joints and gasket surfaces.

If routine maintenance is performed as listed in chapter four, repair service on Corken's gas compressor is generally limited to replacing valves or piston rings. When it comes time to order replacement parts, be sure to consult the part details in [Appendix D](#) for a complete list of part numbers and descriptions.

5.1 Valves

Test the compressor valves by closing the inlet piping valves while the unit is still running; however, do not allow the machine to operate in this way very long. If the inlet pressure gauge does not drop to zero almost immediately, one or more of the valves is probably damaged or dirty. NOTE: A faulty pressure gauge is also possible so make sure it is in good operational order before assuming the valves are faulty.

In most cases if a valve or gasket is leaking, it will create more heat. On a single-stage compressor, compare the operating temperatures of either two suction or

discharge valves and cover plates to each other. If a valve or gasket is leaking, it will have a higher operating temperature. NOTE: This method is not suitable for two-stage compressors that does not have at least two suction valves or two discharge valves per cylinder.

Each suction and/or discharge valve assembly can be easily removed for inspection. If any part of the valve assembly is broken, it should be replaced. See parts details for valve assemblies in [Appendix D](#) for a complete list of part numbers and descriptions.

If a valve is leaking due to dirt or any other foreign material between the valve plate and seat, the valve can be cleaned and reused. However, new valve gaskets and O-rings should be used to ensure a proper seal.

The valve holddown assemblies in [Appendix D](#) show the various specifications used on models 791 and 891 compressors. Since more than one suction valve arrangement is available for each model of compressor, it is necessary to know the complete model number in order to identify the correct valve specification (see example listed below).

Model number FD891JM	4P	FBANSNN
Valve type = Spec 4P		

Valve Inspection and/or Replacement

Before removing and inspecting the valves, begin by depressurizing and purging (if necessary) the compressor.

Disassembly

1. Unscrew the valve cap and remove the O-ring.
2. Remove the valve cover plate, O-ring, and holddown screw by removing each of the four bolts. The holddown screw is easily removed using the special wrench supplied with the compressor.
3. After the cover plate and O-ring have been removed, the valve cage, valve assembly, and valve gasket can be lifted out.
4. Inspect valves for breakage, corrosion, debris, and scratches on the valve plate. In many cases, valves may simply be cleaned and reinstalled. If the valves show any damage, they should be repaired or replaced. Replacement is usually preferred since it always ensures a proper seal; however, repair parts are available. If valve plates are replaced, the existing valve seats must be lapped until they are perfectly smooth. If more than .005 of an inch must be removed to achieve a smooth surface, the valve should be discarded. Replacing valve plates without relapping the seat may cause rapid wear and leakage.

Reassembly

1. Insert the metal valve gasket into the suction and/or discharge opening of the cylinder. The metal valve gasket should always be replaced when a new or repaired valve is installed.
2. Insert the repaired or new valve assembly. Make sure each suction and discharge valve is placed in the proper opening in the cylinder.
3. Insert the valve cage.
4. Replace the O-ring and valve cover plate. Torque the bolts to the value listed in [Appendix B](#).

NOTE: Make sure the holddown screw has been removed before tightening the bolts in the cover plate.

5. To ensure the valve gasket is properly seated, insert the holddown screw and tighten to the value listed in [Appendix B](#). NOTE: Gaskets and O-rings are not normally reusable.
6. With a new O-ring, screw on the valve cap and tighten to the value listed in [Appendix B](#).
7. Check bolts and valve holddown screws after first week of operation and re-torque if necessary. See [Appendix B](#) for torque values.

5.2 Heads/Cylinder Cap

A compressor cylinder cap and cylinder head very seldom require replacement if the compressor is properly maintained. The primary cause of damage to a cylinder cap or head is corrosion, entry of solid debris, or liquid into the compression chamber. Improper storage methods can cause corrosive damage to the cylinder cap and cylinder head. For proper storage instructions, refer to [Appendix E](#).

Many compressor services require removal of the cylinder cap or cylinder head. While the compressor is disassembled, special care should be taken to avoid damage or corrosion. If the compressor is left open for more than a few hours, bare metal surfaces should be coated with rust preventative oil.

When reassembling the compressor, make sure the bolts are retightened to the torque values listed in [Appendix B](#).

5.3 Piston Rings and Piston Ring Expanders

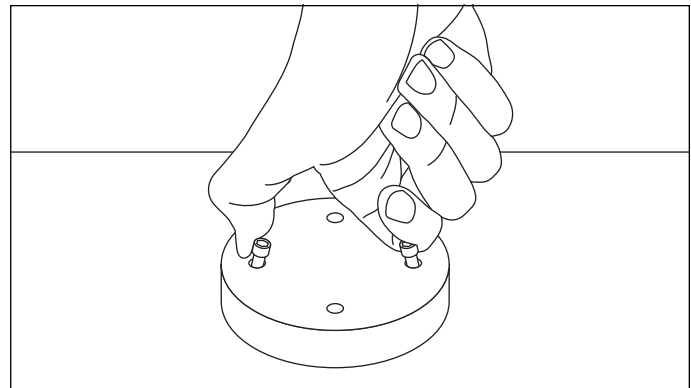


Figure 5.3: Piston cap removal

Piston ring life will vary considerably from application to application. Ring life is much longer at lower speeds and temperatures.

1. To replace the piston rings, depressurize the compressor and purge if necessary.
2. To gain access to the piston, remove the cylinder cap and cylinder head.
3. Loosen the piston cap bolts and remove the piston cap as shown in figure 5.3 by pinching two loose bolts together.
4. Remove the lock nut and lift the piston off the end of the piston rod.
5. After the piston is removed, the piston rings and expanders can be easily removed and replaced. Corken recommends replacing expanders whenever rings are replaced. To determine if the piston rings need to be replaced, measure the radial thickness and compare it to the chart in [Appendix B](#).

5.4 Piston Replacement

1. To replace the pistons, depressurize the compressor and purge if necessary.
2. Remove the cylinder cap and cylinder head (see section 5.2).
3. Remove the piston cap by loosening and removing the socket head bolts holding the piston cap to the piston (see figure 5.3).
4. Next, remove the lock nut and lift the piston off the end of the piston rod.
5. Check the thrust washer and shims for damage and replace if necessary.
6. Before installing the new piston, measure the thickness of the existing shims.
7. Reinstall the piston with new piston rings and expanders using the same thickness of shims as before and tighten the lock nut to the torque value listed in [Appendix B](#).
8. For this step please refer to the section labeled Piston Clearance (Cold) listed in [Appendix D—Piston Assembly Details](#). Next, remove a lower valve and measure dimension Y at the bottom of the piston as shown in [Appendix D](#). If the measurement does not fall between the minimum and maximum tolerances, adjust the shims as necessary and confirm dimension Y is within tolerance.
9. When the piston is properly shimmed to the tolerances listed in the table labeled Piston Clearance (Cold), tighten the lock nut as shown in [Appendix B](#).
10. Reinstall the piston cap with the same thickness of shims as before and torque to the value listed in [Appendix B](#).
11. Reinstall the cylinder head.
12. Now remove an upper valve and measure dimension X at the top of the piston shown in [Appendix D—Piston Assembly Details](#). If this measurement does not fall within the tolerances in [Appendix D](#), remove the cylinder head and piston cap and adjust the shims as necessary. Repeat the steps and measure dimension X is within tolerance.
13. When the piston cap is properly shimmed, tighten the socket head bolts in an alternating sequence and torque the socket head bolts to the values listed in [Appendix B](#).
14. Reinstall valves in the proper suction and discharge openings. NOTE: For best results insert new valve gaskets before reinstalling the valves.
15. Follow standard startup procedures.

5.5 Piston Rod Packing Adjustment

On T-Style compressors the piston rod packing should be adjusted or replaced when leakage is prevalent. Adjust packing by tightening packing nuts as shown in Figure 5.5.

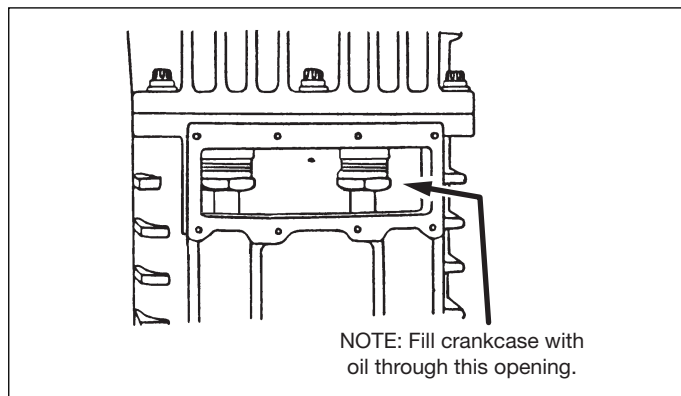


Figure 5.5: Adjusting nuts for packing
(Applies to models T791 and FT891 only)

NOTE: Compressor models D791 and FD891 do not have adjustable packing nuts.

Typically, it is a good idea to replace piston rod packing and piston rings at the same time. For instructions on replacing the piston rod packing, see section 5.6.

5.6 Cylinder and Packing Replacement

Cylinders very seldom require replacement if the compressor is properly maintained. The primary cause of damage to cylinders is corrosion or the entry of solid debris or liquid into the compression chamber. Improper storage methods can also result in corrosion damage to the cylinder. For proper storage instructions, refer to [Appendix F](#).

If the cylinder is damaged or corroded, use a honing device to smooth the cylinder bore and then polish it to the value shown in [Appendix B](#). If more than .005 of an inch must be removed to smooth the bore, replace the cylinder. Cylinder liners and oversized rings are not available. **OVERBORING THE CYLINDER RESULTS IN GREATLY REDUCED RING LIFE.**

Many compressor services require removal of the cylinder. While the compressor is disassembled, special care should be taken to avoid damage or corrosion to the cylinder. If the compressor is to be left open for more than a few hours, bare metal surfaces should be coated with rust preventative.

When reassembling the compressor, make sure the bolts are retightened using the torque values listed in [Appendix B](#).

Packing Replacement

NOTE: In this section, there are two sets of instructions: one for D-Style compressors and another for T-Style compressors. Before performing any maintenance, identify the compressor style and model and refer to the instructions for that model.

For specific construction details and actual part numbers, consult [Appendix D](#). Be careful to arrange packing sets in the proper order.

CAUTION: Before installing the new packing on the piston rod, bleed all pressure from the compressor and piping and purge if necessary. After the new piston rod packing is installed, the unit should be pressure tested and checked for leaks at all joints and gasket surfaces. When the compressor is used with toxic, dangerous, flammable or explosive gases, pressure and leak testing should be done with air or a dry, inert gas such as nitrogen.

Cleanliness:

Sealing a reciprocating piston rod is a very difficult task. Keep all parts, tools, and hands clean during installation. New packing needs every chance it can get, so keep it clean.

Workmanship:

Corken's compressors are a precision piece of equipment with very close tolerances so treat them with care and never hammer parts in or out of the compressor.

Packing Configuration

The packing for the models 791 and 891 compressors uses a combination of segmented packing and V-ring packing. Refer to [Appendix D](#) for details on each packing assembly. Use the model identification table in [Appendix A](#) to identify the compressor style and packing configuration and refer to the section that applies to that model.

5.6.1 D-Style Models D791 and FD891

On models D791 and FD891 there is one set of V-ring packing inside a packing cartridge that attaches to a packing barrel. The packing cartridge holds the segmented packing inside the packing barrel (see packing details in [Appendix D](#)).

Disassemble D-Style Packing

1. Depressurize and open the compressor.
2. Remove the cylinder cap, cylinder heads, pistons, and cylinder.
3. Remove the packing barrels by prying upwardly through the inspection plate opening under each one and lifting entire packing barrel and cartridge assembly up from piston rod.

4. Remove the four socket head screws that hold the packing cartridge to the barrel.
5. Remove segmented packing and cartridge from barrel.
6. Remove lower retainer ring, washers, packing spring, and old V-ring packing from packing cartridge.

Reassemble D-Style Packing

1. Replace packing as required. The segmented packing and cups are located in the packing barrel while the V-ring packing is located in the packing cartridge.
NOTE: Always use new O-rings when replacing the packing barrel and cartridge.

2. V-ring packing set:

NOTE: The instructions below are for packing specification J. Depending on the packing specification used in on the compressor, the order of assembly for the packing rings, V-ring packing, washers, and packing spring will vary. Refer to [Appendix D](#) to view the V-ring packing arrangements and follow the order of assembly and V-ring direction. If the packing arrangement in the compressor being currently serviced is not known, refer to the model number identification table listed in [Appendix A](#).

- a. Clean and lightly oil the packing area inside the packing cartridge.
 - b. Insert the oil deflector ring through the bottom opening of the packing cartridge.
 - c. Insert the first retainer ring followed by a washer.
 - d. Insert the packing spring followed by another washer.
 - e. Insert a male packing ring followed by four V-rings and one female packing ring. **NOTE: Insert packing rings and V-rings one at a time. Refer to [Appendix D](#) for the proper direction of the male and female packing rings and V-rings.**
 - f. Lastly, insert the final washer. Push in on the washer and install the second retainer ring.
3. Segmented packing:

NOTE: The instructions below are for packing specification G. Depending on the packing specification used in the compressor, the order of assembly for the segmented packing arrangement (radial or tangent) will vary. Refer to [Appendix D](#) to view the segmented packing arrangements. If you do not know the packing arrangement used in the compressor, refer to the model number identification table listed in [Appendix A](#).

- a. Clean the segmented packing cups and the area inside the packing barrel.
 - b. Insert the segmented packing cups, segmented packing pairs, and backup rings one at a time in the order shown in [Appendix D](#).
 - c. Reattach the packing cartridge to the packing barrel using the four socket head screws.
4. Install three O-rings on the packing barrel and packing cartridge as shown in the D-Style Crosshead Guide Assembly Details in [Appendix D](#).
 5. Install the packing installation cone part number 3905 over the threaded end of the piston rod as shown in [Appendix D-Connecting Rod and Crosshead Assembly Details](#).
 6. Carefully install barrel/cartridge assemblies over the piston rods, noting the alignment of the barrels as they sit on the crosshead guide. Align the pin on one of the barrels with the slot in the other barrel as shown in [Appendix D—Crosshead Guide Parts Details](#).
 7. Remove packing installation cone.
 8. Replace pistons, cylinders, heads, and cylinder cap. See details in Section 4.4 for proper assembly of pistons.
 9. Rotate the flywheel by hand to ensure all components are properly assembled.

5.6.2 T-Style Models T791 and T891

On Models T791, T891, and FT891 there are two sets of V-ring packing in a single packing cartridge. The cartridge is held in the crosshead guide by a cartridge holddown screw. A separate packing adapter holds the segmented packing inside the packing barrel.

Disassemble T-Style Packing

1. Depressurize and open the compressor.
 2. Remove the cylinder cap, cylinder heads, pistons, and cylinder.
 3. Remove the packing barrels.
 4. Remove the four socket head screws that hold packing adapter to the barrel.
 5. Remove segmented packing and cups from barrel.
 6. Remove cartridge holddown screws with the special wrench (part number 2409-X) supplied with the compressor, and remove the cages and packing cartridges as shown in [T-Style Crosshead Guide Assembly Details in Appendix D](#).
7. To remove the lower V-ring packing set, remove the adjusting screw at the bottom of the packing cartridge followed by the washers, packing spring, and old packing.
 8. To remove the middle V-ring packing set, remove upper retainer ring followed by the washers, packing spring, and old packing.
 9. Repeat this process for the other side of the compressor.

Reassemble T-Style Packing

1. Replace packing as required. The segmented packing and cups are located in the packing barrel while the V-ring packing is located in the packing cartridge. NOTE: Always use new O-rings when replacing the packing barrel and cartridge.
2. Lower V-ring packing set:

NOTE: The instructions below are for packing specification G. Depending on the packing specification used in on the compressor, the order of assembly for the packing rings, V-ring packing, washers, and packing spring will vary. Refer to [Appendix D](#) to view the V-ring packing arrangements and follow the order of assembly and V-ring direction. If the packing arrangement in the compressor being currently serviced is not known, refer to the model number identification table listed in [Appendix A](#).

- a. Clean and lightly oil the packing area inside the packing cartridge.
 - b. Insert the first retainer ring followed by a washer through the bottom of the packing cartridge.
 - c. Insert the packing spring followed by another washer.
 - d. Insert a male packing ring followed by four V-rings and one female packing ring. NOTE: Insert packing rings and V-rings one at a time. Refer to [Appendix D](#) for the proper direction of the packing rings and V-rings.
 - e. Lastly, install and tightened the adjusting screw until the PTFE locking device located on the side of the adjusting screw is engaged with the first thread of the packing cartridge. **DO NOT OVER TIGHTEN!** The PTFE locking device should engage (slightly bent) the first thread but not break off.
3. Middle V-ring packing set:
 - a. Clean and lightly oil the packing area inside the packing cartridge.
 - b. Insert the second retainer ring followed by a washer through the top of the packing cartridge.

- c. Insert a female packing ring followed by four V-rings and one male packing ring. **NOTE: Insert packing rings and V-rings one at a time. Refer to Appendix D for the proper direction of the male and female packing rings and V-rings.**
 - d. Insert a washer and a packing spring followed by another washer.
 - e. Lastly, push in on the washer and insert the third retainer ring.
 - f. Install two O-rings on the packing cartridge as shown in the T-Style Crosshead Guide Assembly Details in Appendix D.
4. Segmented packing:
 8. Install and tighten holddown screws with Corken's special compressor wrench.
 9. Install packing barrels. NOTE: Align the pin on one of the barrels with the slot in the other barrel as shown in Appendix D—Crosshead Guide Parts Details.
 10. Remove the packing installation cone.
 11. Replace cylinder, pistons, cylinder heads, and cylinder cap. See details in Sections 5.2 through 5.4 for proper assembly of pistons.
 12. Rotate the flywheel by hand to ensure proper assembly.

NOTE: The instructions below are for packing specification G. Depending on the packing specification used in the compressor, the order of assembly for the segmented packing arrangement (radial or tangent) will vary. Refer to Appendix D to view the segmented packing arrangements. If you do not know the packing arrangement used in the compressor, refer to the model number identification table listed in Appendix A.

- a. Clean the segmented packing cups and the area inside the packing barrel. Replace the O-ring on the packing cup.
 - b. Insert the segmented packing cups, spacer, segmented packing pairs, and backup rings one at a time in the order shown in Appendix D.
 - c. Reattach the packing adapter to the packing barrel using the four socket head screws.
 - d. Install TWO O-rings on the packing barrel as shown in the T-Style Crosshead Guide Assembly Details in Appendix D.
5. Install the packing installation cone (part number 3905) over the threaded end of the piston rod as shown in Connecting Rod and Crosshead Assembly Details - Appendix D.
 6. NOTE: Before installing the packing cartridge over the packing cone and piston rod, ATTACH THE TWO O-RINGS SHOW IN THE T-STYLE CROSSHEAD GUIDE ASSEMBLY DETAILS-APPENDIX D. Next, insert the oil deflector ring through the side opening of the packing cartridge. The oil deflector ring should rest on top of the lower packing set. Make sure the oil deflector ring is centered over the piston rod opening before sliding packing cartridge over the installation cone and piston rod.
 7. Install cages.

5.7 Bearing Replacement for Crankcase and Connecting Rod

1. To replace the crankcase roller bearings, wrist pin bushing, and connecting rod bearings, begin by removing the cylinder caps, cylinder heads, cylinder, pistons, packings, crosshead guide, and crosshead assemblies.
2. Drain the crankcase and remove the inspection cover.
3. Before disassembly, choose and mark one connecting rod and the corresponding connecting rod cap. DO NOT MIX CONNECTING RODS AND CAPS. Loosen and remove the connecting rod bolts in order to remove the crosshead and connecting rod assembly.

5.7.1 Wrist Pin Bushing Replacement

1. To replace the wrist pin bushing, remove the retainer rings that position the wrist pin in the crosshead.
2. Press out the wrist pin so the crosshead and connecting rod can be separated. Inspect the wrist pin for wear and damage and replace if necessary.
3. Press out the old wrist pin bushing and press a new bushing into the connecting rod. DO NOT MACHINE THE O.D. OR I.D. OF THE BUSHING BEFORE PRESSING INTO CONNECTING ROD.
4. Make sure the lubrication hole in the bushing matches the oil passage in the connecting rod. If the holes do not align, drill out the bushing through the connecting rod lubricant passage with a long drill. Bore the wrist pin bushing I.D. as indicated (see Appendix D for details). Over boring the bushing can lead to premature failure of the wrist pin bushing.
5. Inspect the oil passage for debris and clean thoroughly before proceeding.
6. Press the wrist pin back into the crosshead and wrist pin bushing and reinstall retainer rings. NOTE: The fit between the wrist pin and bushing is tighter than lubricated air compressors and combustion engines.

5.7.2 Replacing Connecting Rod Bearings

Connecting rod bearings are easily replaced by removing the semicircular bearings. Make sure the indentations in the connecting rod bearing and connecting rod line up when installing the new bearings. **MAKE SURE THE ARROW AND/OR ALIGNMENT NOTCH ON CONNECTING ROD AND CAP ARE ALIGNED.** Before reinstalling the crosshead/connecting rod assembly, make sure the crankshaft throw and bearing surface are clean and lubricated. Tighten the connecting rod bolts to the torque values listed in [Appendix B](#).

5.7.3 Replacing Crankcase Roller Bearings

To inspect the roller bearings, remove the flywheel from the crankshaft and then remove the bearing carrier and crankshaft from the crankcase. If corrosion or pitting is present, the roller bearings should be replaced. When replacing roller bearings, always replace the entire bearing and not just the cup or the cone.

1. To replace the bearings, press the cups out of the crankcase and press the cones off the crankshaft. If bearing cup on bearing carrier is damaged, replace the whole bearing carrier.
2. Press the new bearings into position and reassemble the crankshaft and bearing carrier to the crankcase. When reinstalling the bearing carrier, make sure the oil pump shaft slot is aligned with the pin in the crankshaft. Make sure to install the bearing carrier gasket so the oil passage hole is not blocked (see figure 5.7).
3. In order to check the crankshaft endplay, the oil pump must be removed (see section 5.8).
4. Push the end of crankshaft towards the bearing carrier. If a clicking noise or motion is detected, the crankshaft has too much endplay. See [Appendix B](#).
5. To reduce endplay, remove the bearing cover and remove a thin shim. Recheck the endplay after replacing the bearing cover.
6. When there is no detectable endplay, the shaft must still be able to rotate freely. If the crankshaft sticks or becomes abnormally warm, then the crankshaft bearings are too tight. When the crankshaft is too tight, add more shims but do not over shim. ([Appendix B](#) lists the proper crankshaft endplay). When the crankshaft can be rotated freely by hand with proper endplay, the rest of the compressor may be reassembled. If the crankshaft roller bearings are too tight or too loose, premature bearing failure will result.
7. Reinstall the oil pump and flywheel and check the flywheel run out as shown in [Appendix B](#).

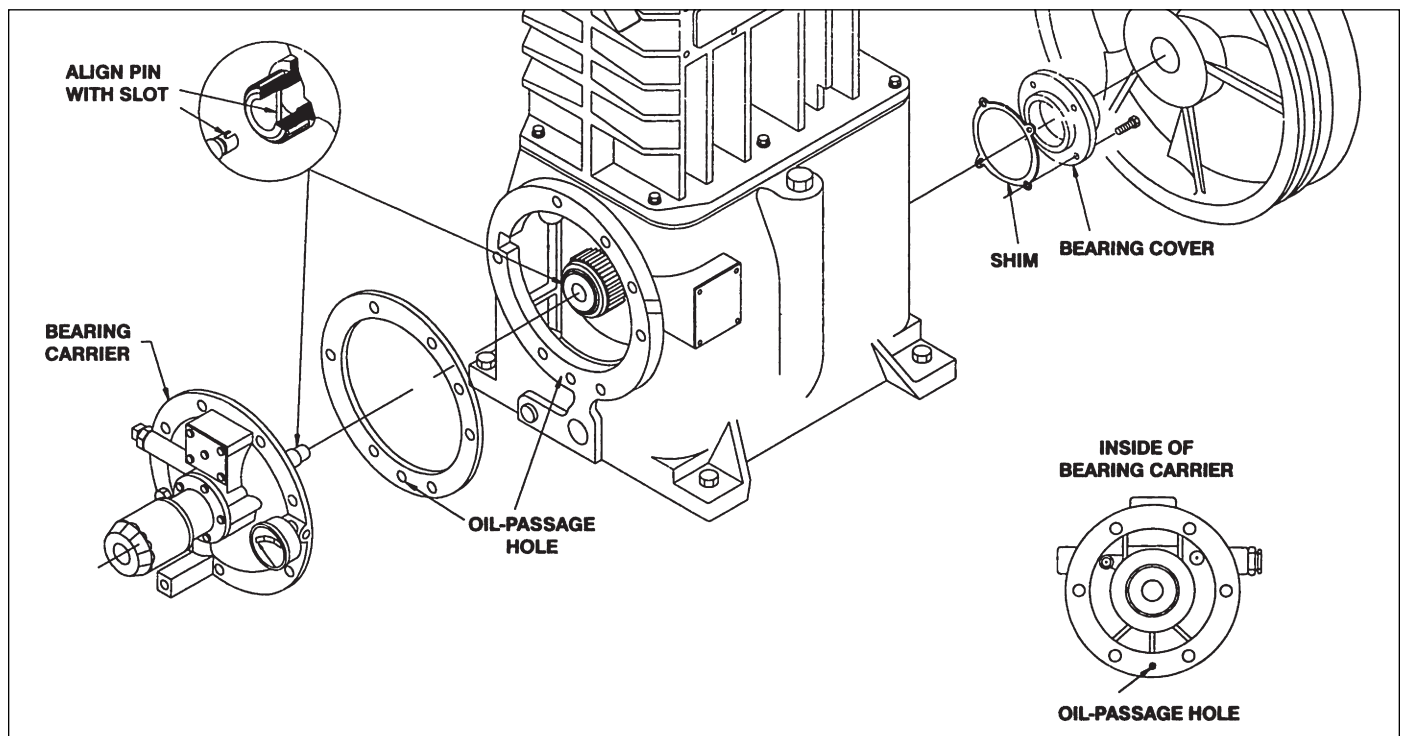


Figure 5.7: Bearing carrier replacement

5.8 Oil Pump Inspection

If the compressor operates for a prolonged period with dirty or contaminated crankcase oil, damage to the oil pump and bearings may result.

1. To check the oil pump, unbolt the oil filter adapter and remove the oil pump, spring guide, spring, and oil pump shaft adapter as shown in figure 5.8.
2. Inspect the gears in the oil pump for corrosion or pitting and replace if necessary.
3. Check the oil pump shaft bushing in the bearing carrier. If the bushing is corroded, pitted or worn, the oil pump shaft bushing should be replaced. Inspect and replace other parts as necessary.
4. Before reassembling the oil pump mechanism, replace the O-rings in the oil pump cover and on the oil pump adapter shaft (see figure 5.8).
5. Rotate the drive pin in the crankshaft to a vertical position for easiest reassembly.
6. Insert the shaft adapter so it engages the drive pin.
7. Next, insert the spring, spring guide, and oil pump assembly. The pin on the oil pump must align with the slot in the oil filter adapter.
8. Install the pin on the oil filter adapter is in the opening on the oil pump assembly as shown in figure 5.8. When you are sure the pin is properly aligned, install the cover bolts finger tight. If alignment is correct, the pump cover will mount flush to the bearing carrier. If it does not, re-check the pin alignment.
9. Tighten the bolts in an alternating sequence. See section 3.3 for directions on oil pressure adjustment.
10. Finally, rotate the crankshaft by hand to ensure smooth operation. Then rotate it in opposite directions, listening for a click, which indicates proper alignment of the oil pump's pins and slots.

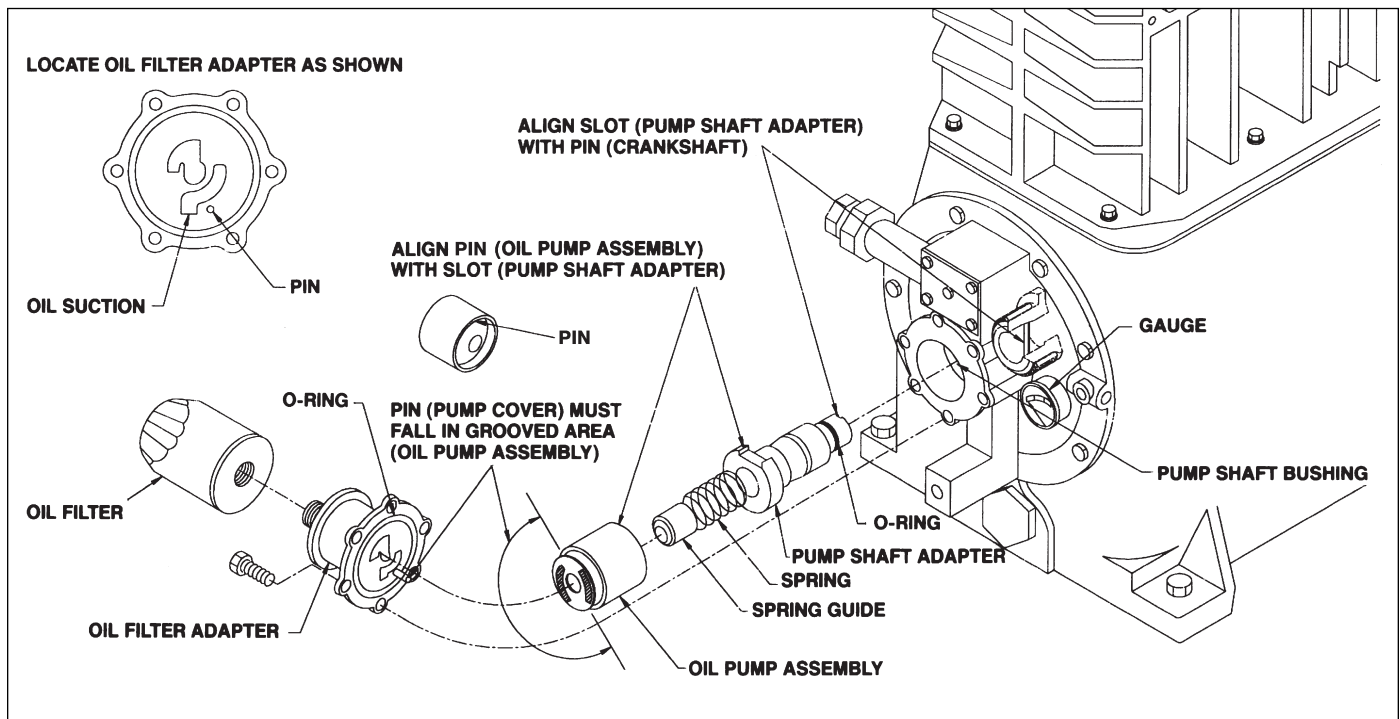


Figure 5.8: Oil pump inspection

5.9 Gasket Sets

Repair Kit	Part Type
3969-X1A	D791 (Buna-N and Aluminum)
3969-X1B2	D791 (Neoprene ^{®1} and Steel)
3969-X1D	D791 (Viton ^{®1} and Aluminum)
3969-X1D2	D791 (Viton ^{®1} and Steel)
3969-X1E2	D791 (PTFE and Steel)
3969-X2A	T791 (Buna-N and Aluminum)
3969-X2A2	T791 (Buna-N and Iron-Compressor Part)
3969-X2B	T791 (Neoprene ^{®1} and Aluminum)
3969-X2B2	T791 (Neoprene ^{®1} and Iron)
3969-X2D	T791 (Viton ^{®1} and Aluminum)
3969-X2D2	T791 (Viton ^{®1} and Iron-Compressor Part)
3969-X2E	T791 (PTFE and Aluminum)
3969-X2E2	T791 (PTFE and Iron-Compressor Part)
3970-X1A	FD891 (Buna-N and Aluminum)
3970-X1D	FD891 (Viton ^{®1} and Aluminum)
3970-X1D2	FD891 (Viton ^{®1} and Steel)
3970-X1E	FD891 (PTFE and Aluminum)
3970-X1E2	FD891 (PTFE and Steel)
3970-X2A	FT891 (Buna-N and Aluminum)
3970-X2A2	FT891 (Buna-N and Iron-Compressor Part)
3970-X2B	FT891 (Neoprene ^{®1} and Aluminum)
3970-X2B2	FT891 (Neoprene ^{®1} and Iron)
3970-X2D	FT891 (Viton ^{®1} and Aluminum)
3970-X2D2	FT891 (Viton ^{®1} and Iron-Compressor Part)
3970-X2E	FT891 (PTFE and Aluminum)
3970-X2E2	FT891 (PTFE and Iron-Compressor Part)

¹Registered trademark of the DuPont company.

Appendix A—Model Number Identification Code and Available Options

Double Acting, Two Stage, Double Packed (D-Style 791)

Base Model	Air Cooled
	D791
Inlet	2" weld
Outlet	2" weld
Intercooler connection	2" weld
Approximate shipping weight lb (kg)	930 (422)

Model Number
Base X X X X X X X X X X

Specification Fields

Packing Arrangement	Packing arranged for padding of distance piece	Standard	J
	Packing arranged for venting of distance piece	No charge option	K
	Atmospheric inlet or light vacuum service	No charge option	R
Crankcase Style	Pressure lubricated crankcase	Standard	M
	Standard crankcase with crankcase heater (1" NPT)	Charge option	MH
	Standard crankcase drilled for heater	Charge option	MR
	Standard crankcase with cylinder lubricator	Charge option	L
	Standard crankcase with cylinder lubricator and crankcase heater	Charge option	LH
Valves ^a	Standard suction and discharge valves with PEEK plates	Standard	4P
	Standard suction and discharge valves with light springs and PEEK plates	No charge option	4PL
	Suction valve unloaders with PEEK plates	Charge option	9P
	Suction valve unloaders with light springs and PEEK plates	Charge option	9PL
	Spec 4 valves with MC1002 corrosion resistant coating and PEEK plates	No charge option	4PC ^b
	Spec 9 valves with MC1002 corrosion resistant coating and PEEK plates	Charge option	9PC ^b
Piston Ring and Packing Material	PTFE piston ring and Alloy 50 packing material	Standard	F
	Alloy 50 piston rings and Alloy 50 packing material	Charge option	G
	PEEK piston ring and Alloy 50 packing material	Charge option	H
Gasket Material	Aluminum	Standard	B
	Steel	No charge option	D
O-ring Material	Buna-N	Standard	A
	Neoprene ^{®c}	No charge option	B
	Viton ^{®c}	Charge option	D
	PTFE and Kalrez ^{®c}	Charge option	E
Intercooler Connections	Weld flanges only and no intercooler	Standard	F
	Cooling loop (carbon steel)	Charge option	H
Flywheel	No flywheel supplied	No charge option	N
	Standard flywheel	Standard	S
Protective Coating	Coated cylinder only	Charge option	C
	No coating	Standard	N
	Coating on all necessary wetted parts	Charge option	W ^b
Piston Rod Coating	Nitrotec ^{®d}	Standard	N

^a PEEK valve plates are standard on the first stage and not available on the second stage of the model D791.

^b Must select protective coating option "W" when selecting valve option "4PC" or "9PC" for the D791.

^c Registered trademark of the DuPont company.

^d Registered trademark of TTI Group Ltd.

Appendix A—Model Number Identification Code and Available Options

Double Acting, Two Stage, Triple Packed (T-Style 791)

		Air Cooled		Model Number										
		Base Model	T791	Base	X	X	X	X	X	X	X	X	X	X
Double Packed	Inlet		2" weld											
	Outlet		2" weld											
	Intercooler connection		2" weld											
	Approximate shipping weight lb (kg)		915 (415)											
Specification Fields														
Packing Arrangement	Packing arranged for padding of distance piece		Standard	G										
	Packing arranged for purging of distance piece		No charge option	H										
	Atmospheric inlet or light vacuum service		No charge option	F										
Crankcase Style	Pressure lubricated crankcase		Standard	M										
	Standard crankcase with crankcase heater (1" NPT)		Charge option	MH										
	Standard crankcase drilled for heater		Charge option	MR										
	Standard crankcase with cylinder lubricator		Charge option	L										
Valves^a	Standard suction and discharge valves with PEEK plates		Standard	4P ^a										
	Standard suction and discharge valves with light springs and PEEK plates		No charge option	4PL										
	Suction valve unloaders with PEEK plates		Charge option	9P ^a										
	Suction valve unloaders with light springs and PEEK plates		Charge option	9PL										
	Spec 4 valves with MC1002 corrosion resistant coating and PEEK plates		No charge option	4PC ^b										
	Spec 9 valves with MC1002 corrosion resistant coating and PEEK plates		Charge option	9PC ^b										
Piston Ring and Packing Material	PTFE piston ring and Alloy 50 packing material		Standard	F										
	Alloy 50 piston rings and Alloy 50 packing material		Charge option	G										
	PEEK piston ring and Alloy 50 packing material		Charge option	H										
Gasket Material	Aluminum		Standard	B										
	Steel		No charge option	D										
O-ring Material	Buna-N		Standard	A										
	Neoprene ^{®c}		No charge option	B										
	Viton ^{®c}		Charge option	D										
	PTFE and Kalrez ^{®c}		Charge option	E										
Intercooler Connections	Weld flanges only and no intercooler		Standard	F										
	Cooling loop (carbon steel)		Charge option	H										
Flywheel	No flywheel supplied		No charge option	N										
	Standard flywheel		Standard	S										
Protective Coating	Coated cylinder only		Charge option	C										
	No coating		Standard	N										
	Coating on all necessary wetted parts		Charge option	W ^b										
Piston Rod Coating	Nitrotec ^{®d}		Standard	N										

^a PEEK valve plates are standard on the first stage and not available on the second stage of the model T791.

^b Must select protective coating option "W" when selecting valve option "4PC" or "9PC" for the T791.

^c Registered trademark of the DuPont company.

^d Registered trademark of TTI Group Ltd.

Appendix A—Model Number Identification Code and Available Options

Double Acting, Single Stage, Double Packed (D-Style 891)

Base Model	Air Cooled
	FD891
	Inlet
	Outlet
Approximate shipping weight lb (kg)	915 (415)

Model Number
Base X X X X X X X X X

Specification Fields

Packing Arrangement	Packing arranged for padding of distance piece	Standard	J
	Packing arranged for venting of distance piece	No charge option	K
	Atmospheric inlet or light vacuum service	No charge option	R
Crankcase Style	Pressure lubricated crankcase	Standard	M
	Standard crankcase with crankcase heater	Charge option	MH
	Standard crankcase drilled for heater (1" NPT)	Charge option	MR
	Standard crankcase with cylinder lubricator	Charge option	L
	Standard crankcase with cylinder lubricator and crankcase heater	Charge option	LH
Valves	Standard suction and discharge valves with PEEK plates	Standard	4P
	Standard suction and discharge valves with light springs and PEEK plates	No charge option	4PL
	Standard suction and discharge valves with PEEK plates and unloaders	Charge option	9P
	Suction valve unloaders with light springs and PEEK plates	Charge option	9PL
Piston Ring and Packing Material	PTFE piston ring and Alloy 50 packing material	Standard	F
	Alloy 50 piston rings and Alloy 50 packing material	Charge option	G
	PEEK piston ring and alloy 50 packing material	Charge option	H
Gasket Material	Aluminum	Standard	B
	Steel	No charge option	D
O-ring Material	Buna-N	Standard	A
	Neoprene ^a	No charge option	B
	Viton ^a	Charge option	D
	PTFE and Kalrez ^a	Charge option	E
Intercooler Connections	No intercooler—not applicable on single stage compressors	Standard	N
Flywheel	No flywheel supplied	No charge option	N
	Standard flywheel	Standard	S
Protective Coating	Coated cylinder only	Charge option	C
	No coating	Standard	N
	Coating on all necessary wetted parts	Charge option	W
Piston Rod Coating	Nitrotec ^b	Standard	N

^a Registered trademark of the DuPont company.

^b Registered trademark of TTI Group Ltd.

Appendix A—Model Number Identification Code and Available Options

Double Acting, Single Stage, Triple Packed (T-Style 891)

Base Model	Air Cooled
	FT891
Inlet	2" ASME Class 300 RF flange
Outlet	2" ASME Class 300 RF flange
Approximate shipping weight lb (kg)	915 (415)

Model Number
Base X X X X X X X X X X

Specification Fields

Packing Arrangement	Packing arranged for padding distance piece	Standard	G
	Packing arranged for purging distance piece	No charge option	H
	Atmospheric inlet or light vacuum service	No charge option	F

Crankcase Style	Pressure lubricated crankcase	Standard	M
	Standard crankcase with crankcase heater	Charge option	MH
	Standard crankcase drilled for heater (1" NPT)	Charge option	MR
	Standard crankcase with cylinder lubricator	Charge option	L
	Standard crankcase with cylinder lubricator and crankcase heater	Charge option	LH

Valves	Standard suction and discharge valves with PEEK plates	Standard	4P
	Standard suction and discharge valves with light springs and PEEK plates	No charge option	4PL
	Standard suction and discharge valves with PEEK plates and unloaders	Charge option	9P
	Suction valve unloaders with light springs and PEEK plates	Charge option	9PL

Piston Ring and Packing Material	PTFE piston ring and Alloy 50 packing material	Standard	F
	Alloy 50 piston rings and Alloy 50 packing material	Charge option	G
	PEEK piston ring and alloy 50 packing material	Charge option	H

Gasket Material	Aluminum	Standard	B
	Steel	No charge option	D

O-ring Material	Buna-N	Standard	A
	Neoprene ^{®a}	No charge option	B
	Viton ^{®a}	Charge option	D
	PTFE and Kalrez ^{®a}	Charge option	E

Intercooler Connections	No intercooler—not applicable on single stage compressors	Standard	N
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Flywheel	No flywheel supplied	No charge option	N
	Standard flywheel	Standard	S

Protective Coating	Coated cylinder only	Charge option	C
	No coating	Standard	N
	Coating on all necessary wetted parts	Charge option	W

Piston Rod Coating	Nitrotec ^{®b}	Standard	N
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^a Registered trademark of the DuPont company.

^b Registered trademark of TTI Group Ltd.

Appendix B—Specifications

Equipment Type and Options

Double-acting, vertical, reciprocating piston type compressor
Two-stage (model 791) and single stage (model 891) designs
Double packed rod (models D791, D891, and FD891); triple packed rod (models T791, T891, and FT891)
2" Slip-on weld connections (model 791 only)
2" ASME Class 300 RF flange (model 891 only)

Features and Benefits

Self-lubricating piston rings:	Non-lubricated operation to minimize oil in gas
Multiple materials and configurations:	Versatility for the application
Multiple mounting configurations:	Versatility for the application
High efficiency valves:	Quiet, reliable operation
Reversible oil pump:	Allows operation in either direction
Simplified top down design:	Routine maintenance is minimally invasive

Material Specifications

Part	Standard Material	Optional Material
Head, cylinder, cylinder cap	Ductile iron ASTM A536	
Crosshead guide	Gray iron ASTM A48, Class 30	
Crankcase, flywheel		
Bearing carrier		
Flange	ASTM A36 carbon steel	
Valve seat, bumper	17-7 PH stainless steel	
Valve plate	PEEK (models 891 and 791 first stage) 410 stainless steel (second stage of model 791)	PEEK (second stage of model 791 only)
Valve spring	17-7 PH stainless steel	
Valve gaskets	Soft aluminum	Steel
Piston	Ductile iron ASTM A536	
Piston rod	1045 steel, Nitrotec ^{®2}	
Crosshead	Ductile iron ASTM A536	
Piston rings	PTFE, glass and moly filled	Alloy 50, PEEK
Piston ring expanders	302 stainless steel	
Packing cartridge and barrel	Ductile iron ASTM A536	
Connecting rod		
Segmented packing rings	Carbon-filled PTFE	
V-ring packing	Filled reinforced PTFE	
Crankshaft	Ductile iron ASTM A536	
Connecting rod bearing	Bimetal SAE 12 babbitt	
Wrist pin	C1018 steel or equivalent	
Wrist pin bushing	Bronze SAE J461	
Main bearing	Tapered roller	
Inspection plate	Aluminum	
O-rings	Buna-N	PTFE, Viton ^{®1} , Neoprene ^{®1}
Retainer rings	Steel	
Miscellaneous gaskets	Rubber compositions	

¹ Registered trademark of the DuPont company.

² Registered trademark of TTI Group Ltd.

Appendix B—Specifications

Operating Specifications

Specification	All Models 791	All Models 891
Bore of cylinder, inches (mm)		
first stage	6 (152.4)	4.5 (113)
second stage	3.25 (82.5)	—
Stroke, inches (mm)	4.0 (101.6)	4.0 (101.6)
Piston displacement, cfm (m ³ /hr)		
minimum @ 400 RPM	51.2 (87.0)	56.6 (96.2)
maximum @ 900 RPM	115.3 (196.0)	127.4 (216.5)
Maximum working pressure, psig (bar g)		
first stage	350 (24.1)	450 (31.0)
second stage	600 (41.3)	—
Maximum brake horsepower, (kW)	45 (34)	45 (34)
Maximum rod load, lb (kg)	7,000 (3,175.2)	7,000 (3,175.2)
Maximum outlet temperature °F (°C)	350 (177)	350 (177)

Clearances and Dimensions

Specification	Inches
Piston clearance (see Appendix D)	
Clearance: connecting rod bearing to crankshaft journal	0.0019 0.0035
Clearance: wrist pin to wrist pin bushing (maximum) ³	0.0009 0.0015
Cylinder bore diameter (maximum)	
Single stage 891	4.515
Cylinder bore diameter (maximum)	
First stage 791	6.018
Second stage 791	3.260
Cylinder finish	16–32 RMS
Piston ring radial thickness (minimum)	
Single stage 891	0.082
First stage 791	0.155
Second stage 791	0.082
Clearance: oil pump adapter shaft to bushing (maximum) ³	0.0050
Crankshaft end play (cold)	0.002 0.003
Flywheel runout at O.D. (maximum)	0.020
Clearance: crosshead to crosshead guide bore (maximum)	0.008
Crosshead guide bore finish (limited number of small pits and scratches are acceptable)	32 RMS

Bolt Torque Values

Specification	ft•lb (N•m)
Connecting rod bolt	40 (54.23)
Bearing carrier	40 (54.23)
Bearing cover	40 (54.23)
Crankcase inspection plate	9 (12.2)
Crosshead guide	65 (88.13)
Cylinder to head ^{1, 2}	65 (88.13)
Valve cover plate bolt	37 (50.17)
Valve holddown screw ²	40 (54.23)
Piston lock nut	150 (203.37)
Piston screw (in•lb)	100 (10.85)
Valve cap	25 (52.88)

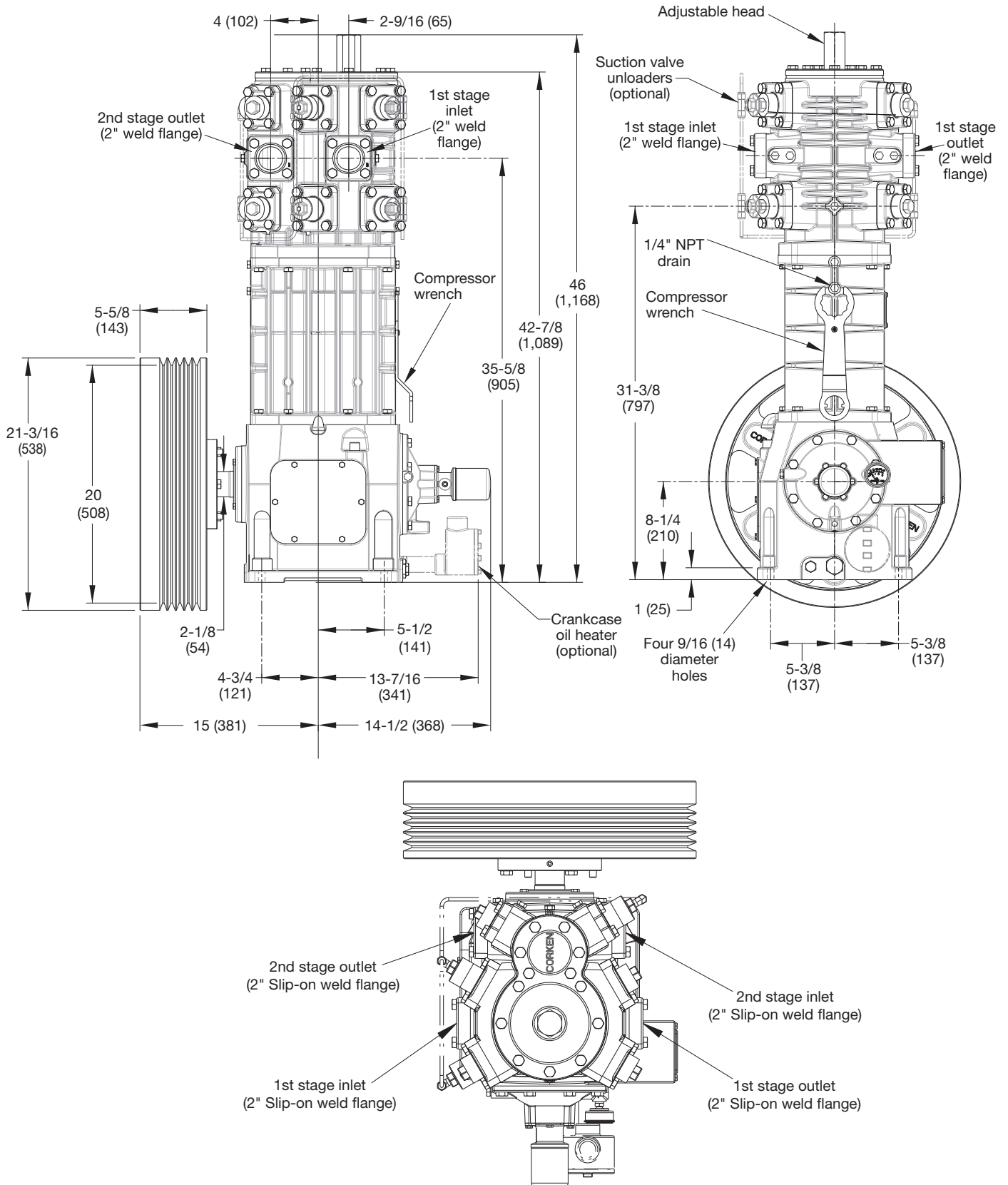
¹ Preliminary tightening—snug all head bolts in the sequence shown. Final torqueing—torque all head bolts in the sequence shown to the listed value.

² Retorque to the listed value after 2–5 hours running time.

³ Dimensions for honing are included with new bushings (which must be installed, then honed).

Appendix C—Outline Dimensions

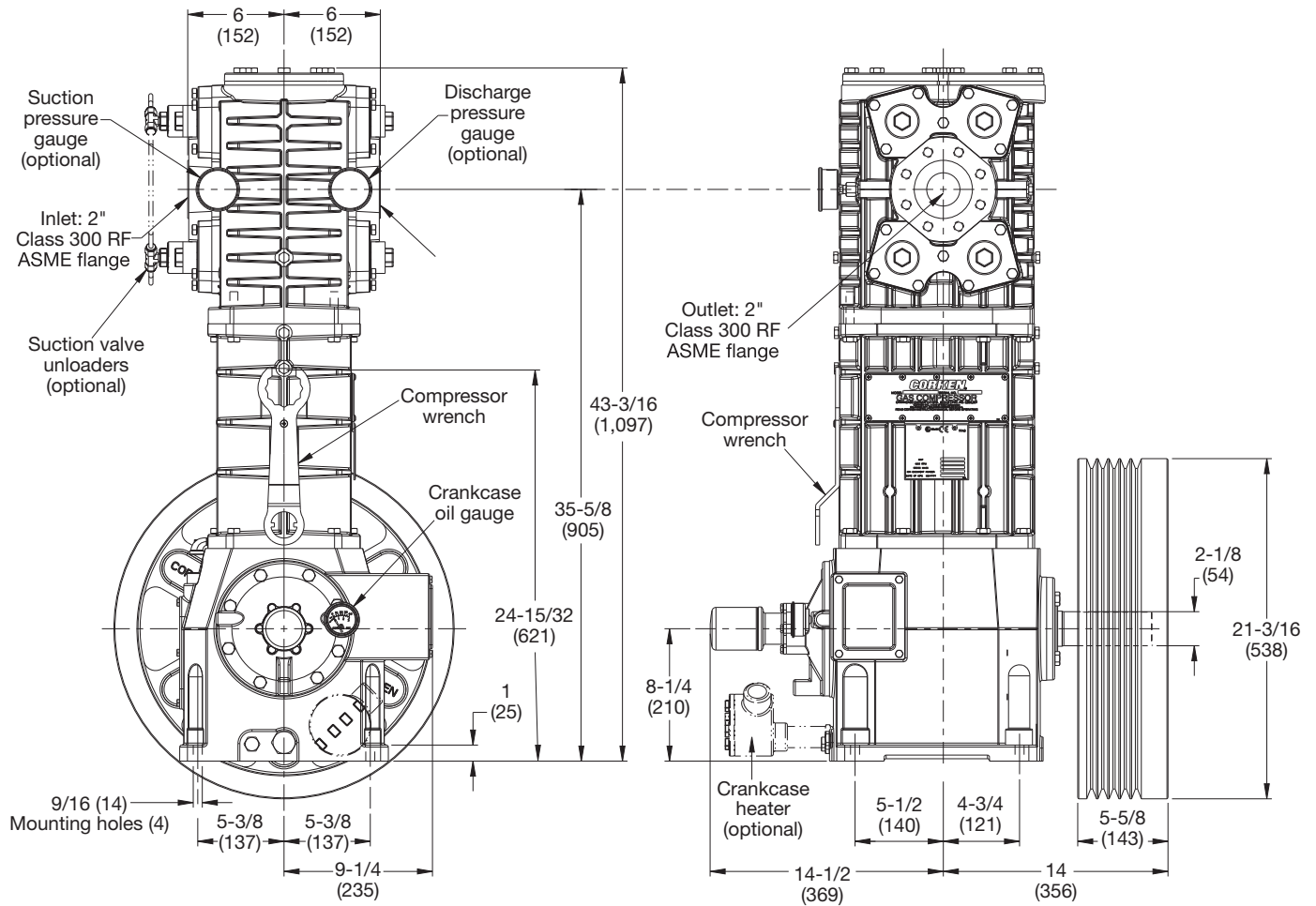
Model D791 (Two Stage) Bare Compressor with Flywheel



All dimensions are in inches (millimeters).

Appendix C—Outline Dimensions

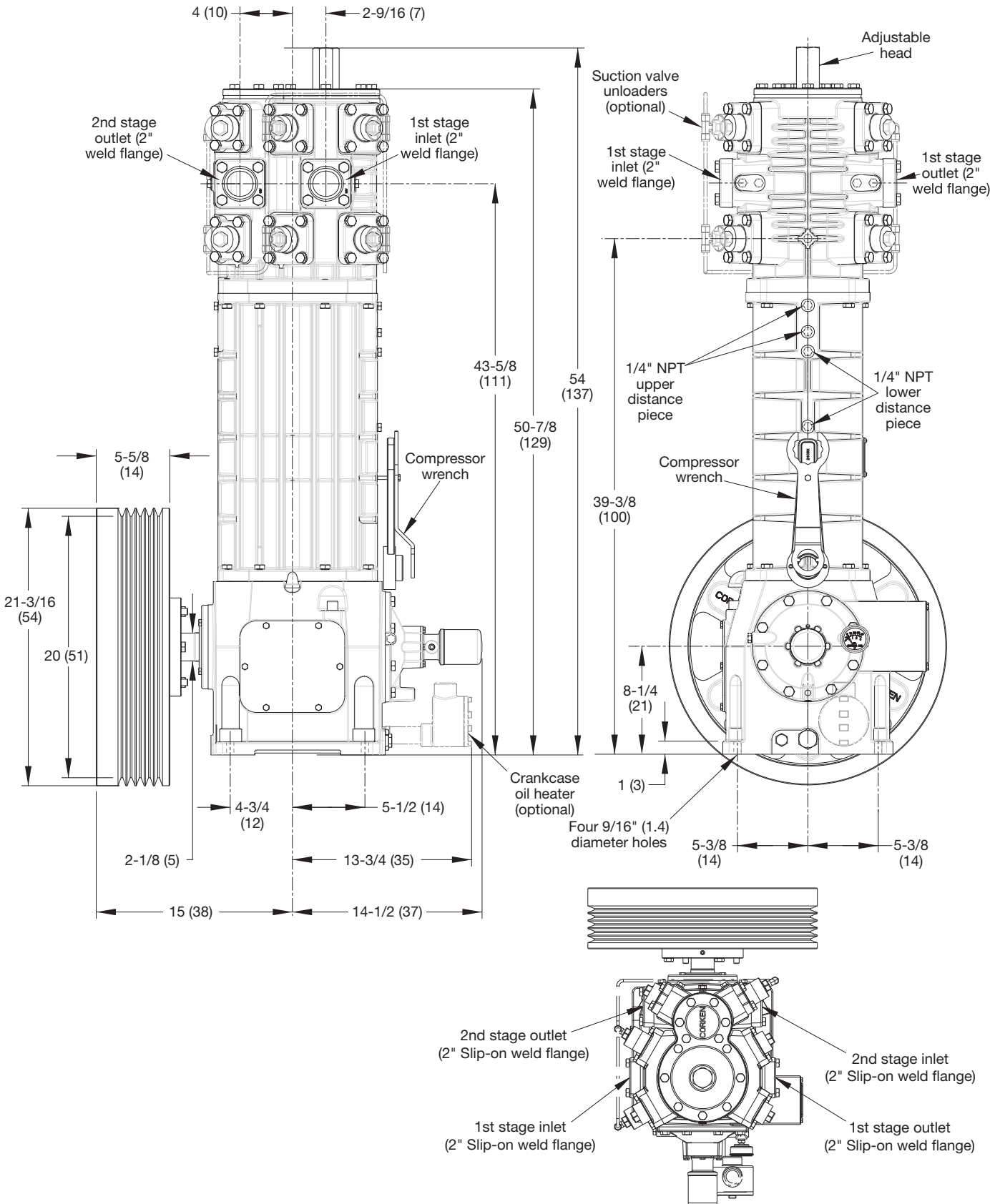
Model D891 (Single Stage) Bare with Flywheel



All dimensions are in inches (millimeters).

Appendix C—Outline Dimensions

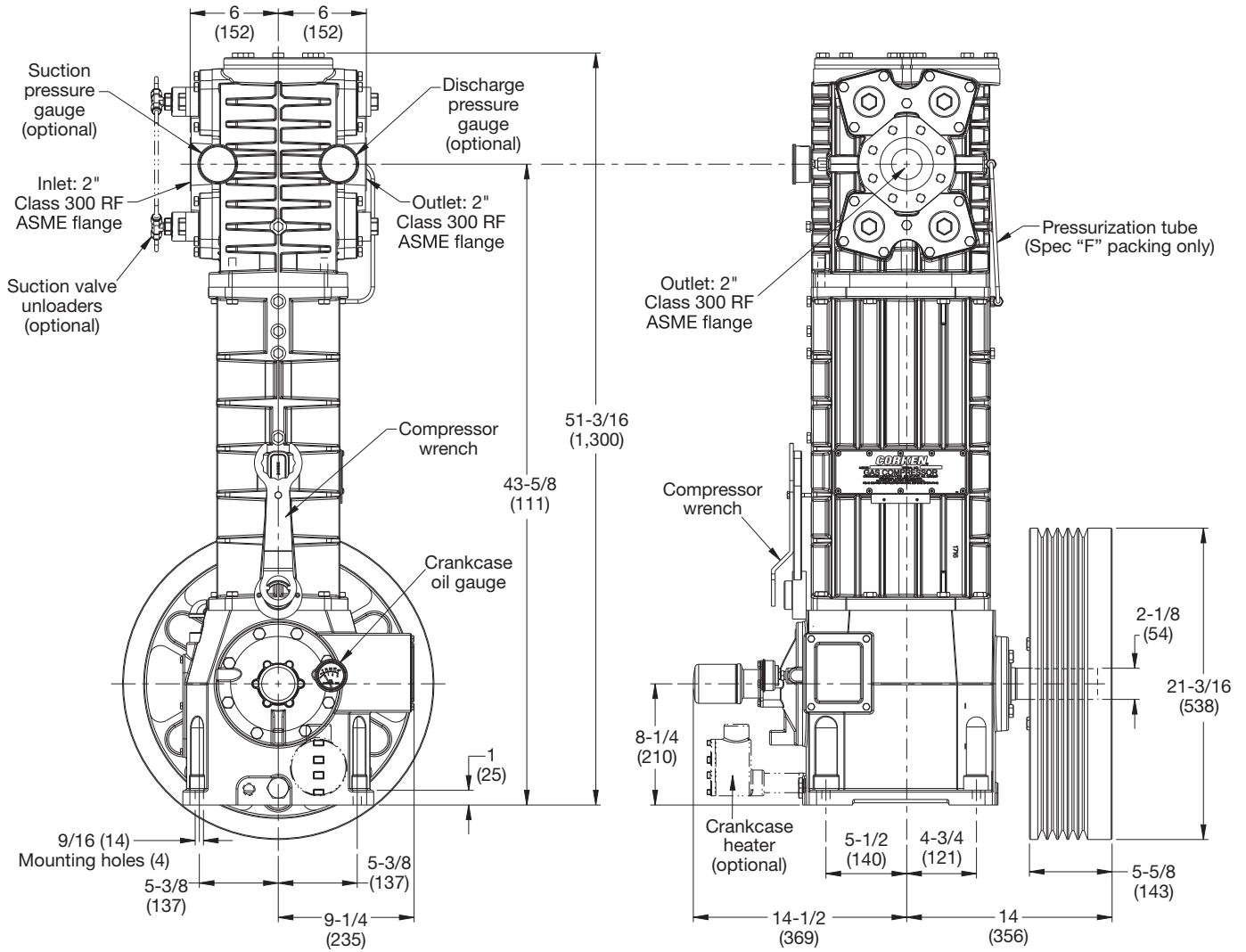
Model T791 (Two Stage) Bare Compressor with Flywheel



All dimensions are in inches (millimeters).

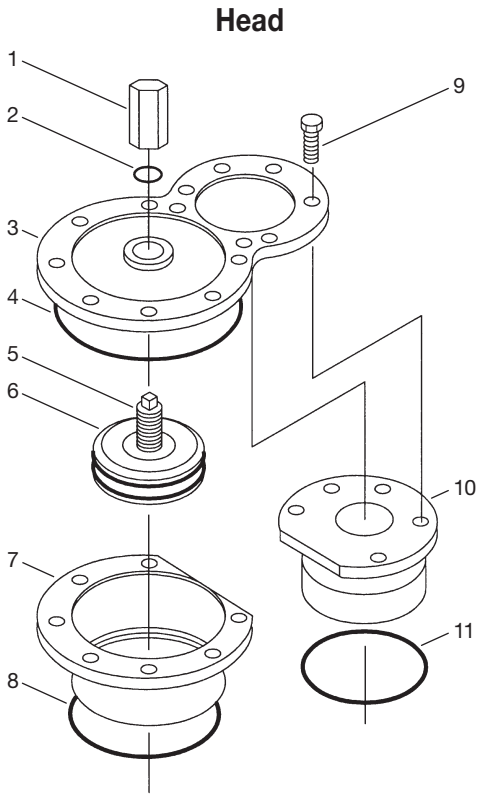
Appendix C—Outline Dimensions

Model FT891 (Single Stage) Bare Compressor with Flywheel



All dimensions are in inches (millimeters).

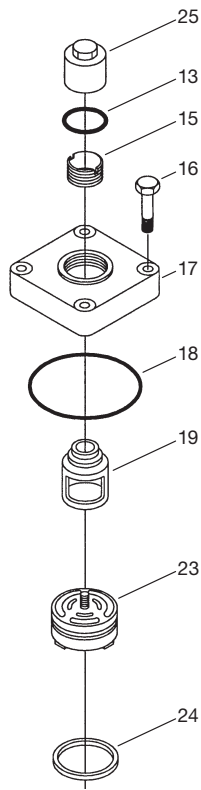
Appendix D—Head and Valve Holddown Assembly Details for All Models 791



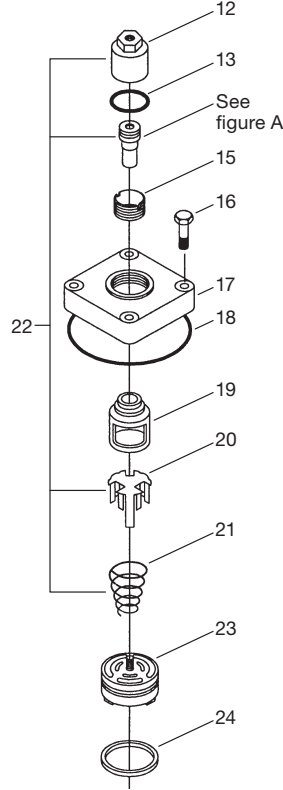
CAUTION: Always relieve pressure in the unit before attempting any repairs.

First Stage Holddown Assembly (6" Cylinder)

Suction (Standard)
Spec 4P and 4PL

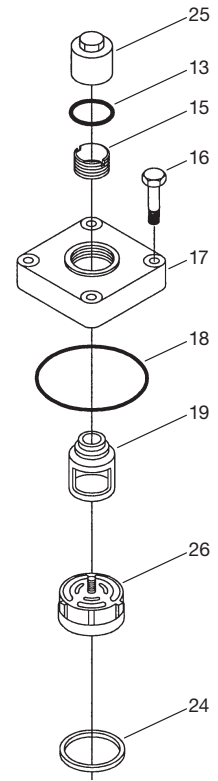


Suction (Standard)
Spec 9P and 9PL



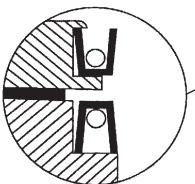
First Stage Holddown Assembly (6" Cylinder)

Discharge (All Specs)



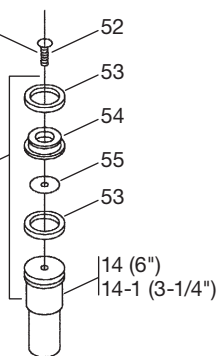
Unloader Piston Assembly Details

Apply Loctite #290 when assembling



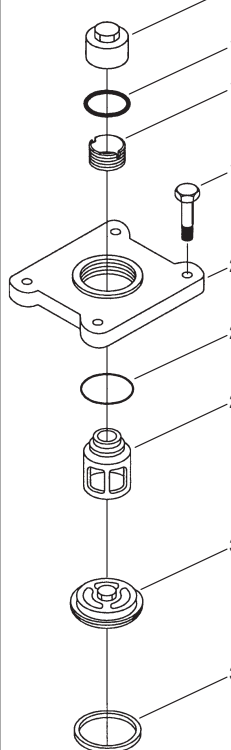
Important:
Note seal direction

Figure A

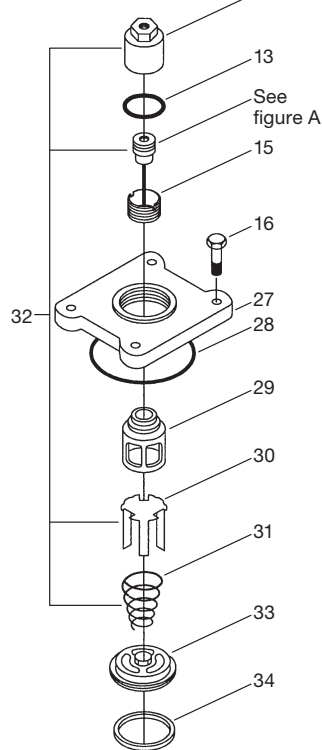


Second Stage Holddown Assy. (3-1/4" Cylinder)

Suction
Spec 4P and 4PL

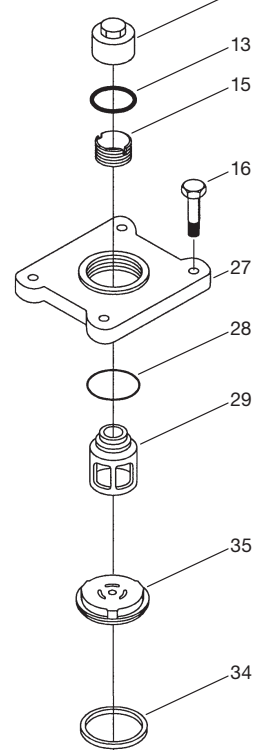


Suction
Spec 9P and 9PL



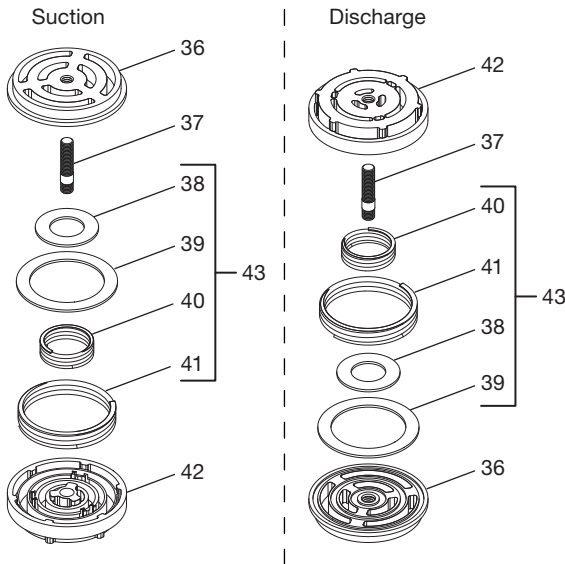
Second Stage Holddown Assembly (3-1/4" Cylinder)

Discharge (All Specs)

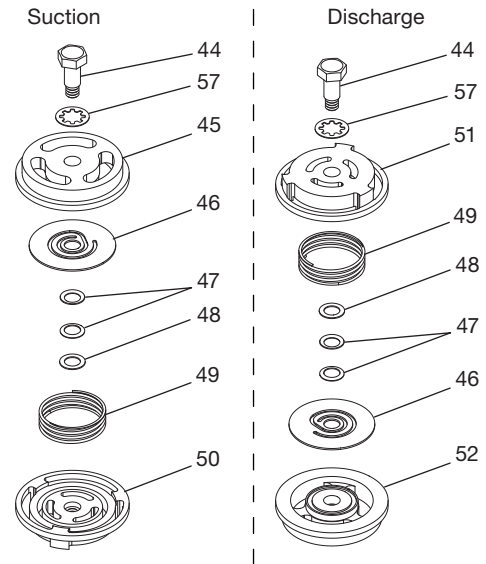


Appendix D—Head and Valve Holddown Assembly Details for All Models 791

First Stage Valve Assembly (6" Cylinder)



Second Stage Valve Assembly (3-1/4" Cylinder)



Ref No.	Part No.	Description	Qty.
1.	3665 ^g	Adjusting screw nut	1
2.	2-127_ ^a	O-ring	2
3.	3867 ^g	Cylinder cap	1
4.	2-250_ ^a	O-ring	1
5.	3663 ^g	Adjusting cup	1
6.	2-248_ ^{a,h}	O-ring	1
7.	3876 ^g	Cylinder head (6")	1
8.	2-258_ ^a	O-ring	1
9.	7001-050NC150A	Bolt (1/2-13 x 1-1/2" hex head gr 5)	13
10.	3877 ^g	Cylinder head (3-1/4")	1
11.	2-236_ ^a	O-ring	1
12.	2598-1 ^{c,g}	Unloader cap	4
13.	2-031_ ^a	O-ring	12
14.	3696 ^c	Unloader piston (6" cylinder)	4
14-1.	2618 ^c	Unloader piston (3-1/4" cylinder)	2
15.	2715 ^g	Holddown screw	12
16.	7001-043NC150A	Bolt (7/16-14 x 1-1/2" hex head)	48
17.	1764 ^g	Valve cover plate (6" cylinder)	6
18.	2-235_ ^a	O-ring	8
19.	3570-1 ^g	Valve cage (6" cylinder)	8
20.	3694 ^c	Actuator (6" cylinder)	4
21.	3695 ^c	Spring (1st stage)	4
22.	3694-X	Unloader assembly (6" cylinder)	4
23.	3856-2X2	Suction valve assembly (spec 4P)	4
	3856-3X2	Suction valve assembly (spec 4PL)	4
24.	2114 b	Valve gasket (aluminum)	8
	2114-2 ^b	Valve gasket (steel, 6" cylinder)	8
25.	2714-1 ^g	Valve cap (spec 4P or 4PL)	12
		Valve cap (spec 9P or 9PL)	6
26.	3857-2X2	Discharge valve assembly (6" cylinder)	4
27.	2205 ^g	Valve cover plate (3-1/4" cylinder)	4
28.	2-143_ ^a	O-ring	4
29.	3569 ^g	Valve cage (3-1/4" cylinder)	4
30.	3689 ^c	Actuator (3-1/4" cylinder)	2
31.	3690 ^c	Spring (3-1/4" cylinder)	2
32.	3689-X	Unloader assembly (3-1/4" cylinder)	2
33.	2438-X	Suction valve assembly (spec 4P or 4PL with aluminum)	2
	2438-1X2	Suction valve assembly (coated, spec 4PC/9PC with steel)	2
	2438-X2	Suction valve assembly (spec 4P or 4PL with steel)	2

Ref No.	Part No.	Description	Qty.
34.	1418 ^b	Valve gasket (aluminum)	8
	1418-2 ^b	Valve gasket (steel, 3-1/4")	4
35.	2439-X2	Discharge valve assembly (3-1/4")	2
36.	3856	Valve seat (6" cylinder)	
37.	3920	Stud (6" cylinder)	
38.	4229 ^d	Valve plate (outer, 6" cylinder)	
39.	4230 ^d	Valve plate (inner, 6" cylinder)	
40.	3929 ^d	Spring, heavy (inner, 6" cylinder)	
40A.	4230 ^d	Spring, light (inner, 6" cylinder)	
40B.	4229 ^d	Spring, light (outer, 6" cylinder)	
41.	3928 ^d	Spring, heavy (outer, 6" cylinder)	
42.	3857-1	Valve bumper (6" cylinder)	
43.	3146-X2	Valve repair kit, standard spring (6" cylinder)	
	43B. 3146-X4	Valve repair kit, light spring (6" cylinder)	
44.	2446	Bolt (3-1/4" cylinder)	4
45.	2438	Suction valve seat (3-1/4")	2
46.	2442	Valve plate (3-1/4" cylinder)	4
47.	2445 ^e	Spacer (3-1/4", two per valve)	8
48.	3355	Washer (3-1/4")	4
49.	1407	Spring (3-1/4")	4
50.	2440	Suction valve bumper (3-1/4")	
51.	2441	Discharge valve bumper (3-1/4")	
52.	2439	Discharge valve seat (3-1/4")	
53.	1910 ^c	Bolt	
54.	2619-X ^c	Seal assembly (unloader piston)	8/12
55.	2857 ^c	Unloader piston cap	6
56.	2858 ^c	Gasket	6
57.	8207	Lock tooth washer	

^a Denotes O-ring material code.

^b Included with valve assembly.

^c Included with unloader assembly.

^d Included with valve repair kit.

^e Install spacers back to back.

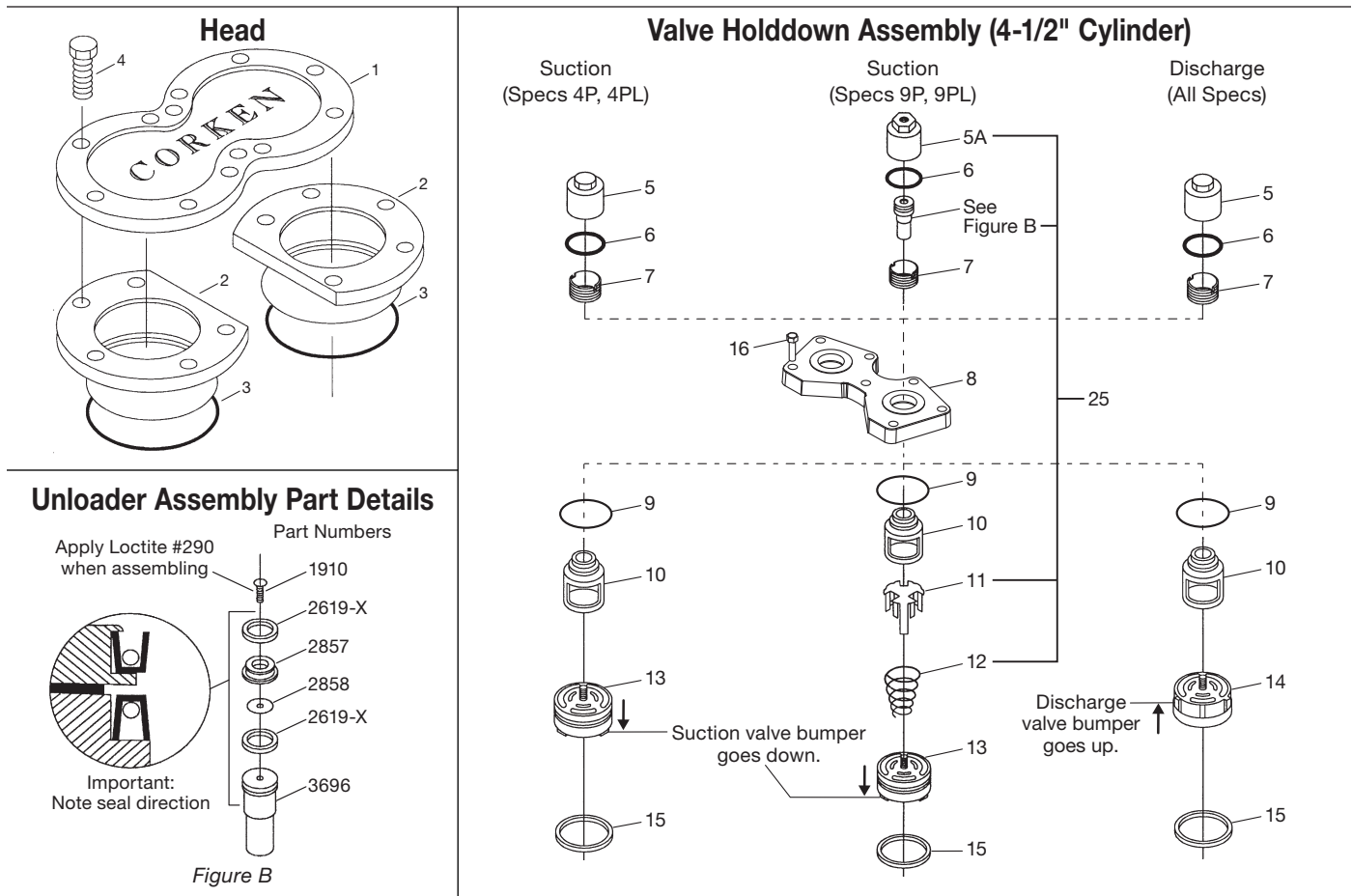
^f Registered trademark of the DuPont company.

^g Add "C" to end of the part number if the item requires MC1002 coating.

^h If material code calls for E (PTFE), use K (Kalrez).

Material Code	
A	Buna-N
B	Neoprene ^{®f}
D	Viton ^{®f}
E	PTFE
K	Kalrez ^{®f}

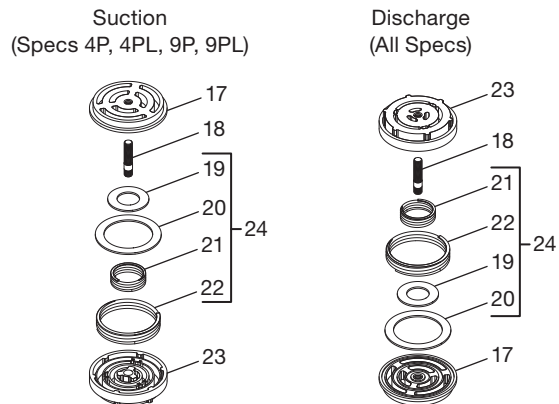
Appendix D—Head & Valve Assembly Parts Details for All Flanged Models 891



Head and Valve Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3923 ^e	Cylinder cap	1
2.	3924 ^e	Cylinder head (4-1/2")	2
3.	2-246_a	O-ring	2
4.	7001-050NC150A	Bolt (hex head, 1/2"-13 x 1-1/2", grade 5)	12
5.	2714-1 ^e	Valve cap	4/8
5A.	2598-1 ^e	Unloader cap	4
6.	2-031_a	O-ring	8
7.	2715 ^e	Holddown screw	8
8.	4854 ^e	Valve cover plate (model FD/FT891)	4
9.	2-235_a	O-ring	8
10.	3570-1 ^e	Valve cage	8
11.	3694	Actuator	4
12.	3695	Spring	4
13.	3856-2X2	Suction valve assembly (Spec 4P, 9P)	4
	3856-3X2	Suction valve assembly (Spec 4PL, 9PL)	4
14.	3857-2X2	Discharge valve assembly (All Specs)	4
15.	2114 ^b	Valve gasket (aluminum)	8
	2114-2 ^b	Valve gasket (steel)	8
16.	7001-043NC150A	Bolt (hex head, 7/16"-14 x 1-1/2", model FD891)	28
17.	3856	Valve seat (4-1/2")	8
18.	3920	Stud	8
19.	4230 ^c	Valve plate (inner)	8
20.	4229 ^c	Valve plate (outer)	8
21.	3929 ^c	Inner spring (standard)	4
	3951	Inner spring (light)	4
	3928 ^c	Outer spring (standard)	4
	3993	Outer spring (light)	4

Valve Assemblies (Suction and Discharge)



Ref No.	Part No.	Description	Qty.
23.	3857-1	Valve bumper (4-1/2")	8
24.	3146-X2	Valve repair kit (Specs 4P, 9P)	1
	3146-X4	Valve repair kit (Specs 4PL, 9PL)	1
25.	3694-X ^e	Unloader assembly	1

^a Denotes O-ring material code.

^b Included with valve assembly.

^c Included with valve repair kit.

^d Registered trademark of the DuPont company.

^e Add "C" to end of the part number if the item requires MC1002 coating.

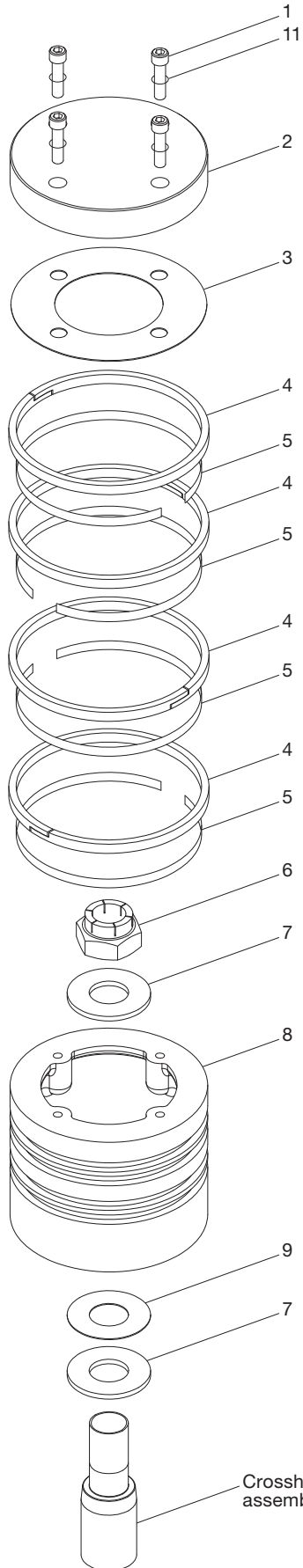
Material Code

A	Buna-N
B	Neoprene ^{®d}
D	Viton ^{®d}
E	PTFE
K	Kalrez ^{®d}



CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix D—Piston Assembly Details for All Models 791 and Flange 891



Piston Assembly Bill of Materials

Ref. No.	Part No.			Description	Qty per Piston
	All Models 791 1st Stage 3879-X1 ^d (6")	All Models 791 2nd Stage 3884-X1 ^d (3-1/4")	All Models 891 3925-X1 ^d (4-1/2")		
1.	7002-025TP100A	7002-010TP100A	7002-025TP100A	Screw, orlo gr. 8 (torque to 8 ft•lbs)	4
2.	3562 ^{a,d}	3561 ^{a,d}	3927 ^{a,d}	Piston cap	1
3.	3625	3731	2902	Shim washer (thick)	As req.
	3625-1	3731-1	2902-1	Shim washer (thin)	
4.	1752	1756	1739	Piston rings	4
	1752-2	1756-4	1739-2	Alloy 50 rings (opt.)	
	1752-3	1756-3	1739-3	Peek rings (opt.)	
5.	1753	1757	1740	Expander ring	4
6.	3604			Lock nut (torque to 150 ft•lbs)	1
7.	3730			Thrust washer	2
8.	3879 ^{a,d} (6" diameter)	3884 ^{a,d} (3-1/4" diameter)	3925 ^{a,d} (4-1/2" diameter)	Piston	1
9.	3603			Shim washer (thick)	As req.
	3603-1			Shim washer (thin)	
10.	3812 (not shown)			Loctite tube (620)	1
11.	7207-025A	7207-010A	7207-025A	Lock washer	4

Piston Clearance (Cold)

Model	(X) Top Min. ^b	(X) Top Max. ^b	(Y) Bottom Min. ^c	(Y) Bottom Max. ^c
D791 FD891	0.084" (2.13 mm)	0.104" (2.64 mm)	0.010" (0.25 mm)	0.020" (0.50 mm)
T791 T891	0.089" (2.26 mm)	0.109" (2.77 mm)	0.005" (0.13 mm)	0.015" (0.38 mm)

^a MC1002 coated piston and cap available. Add "C" to end of a standard part number (e.g. 3562C).

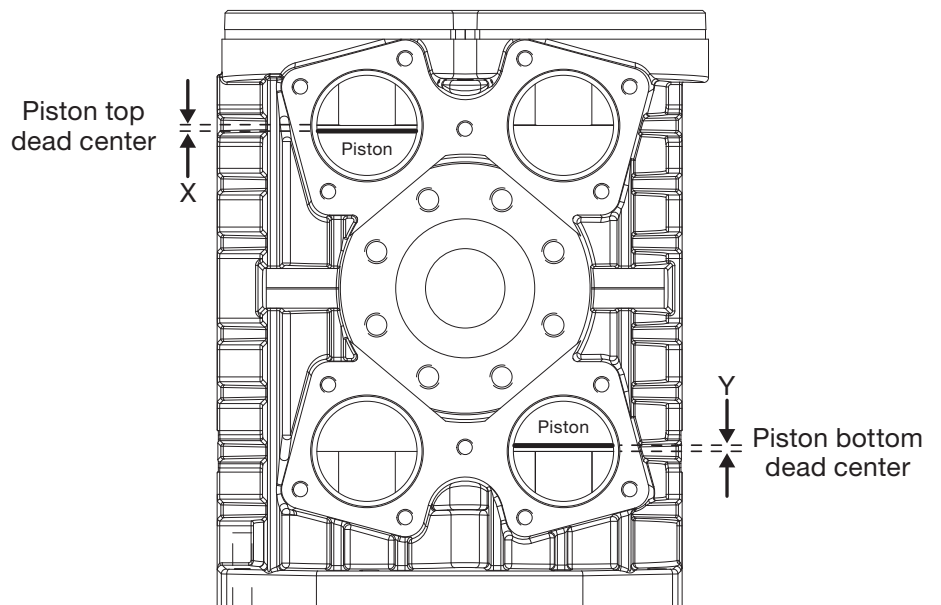
^b The distance from the bottom of the head to the top of the piston.

^c The distance from the bottom of the piston to the top of the packing barrel.

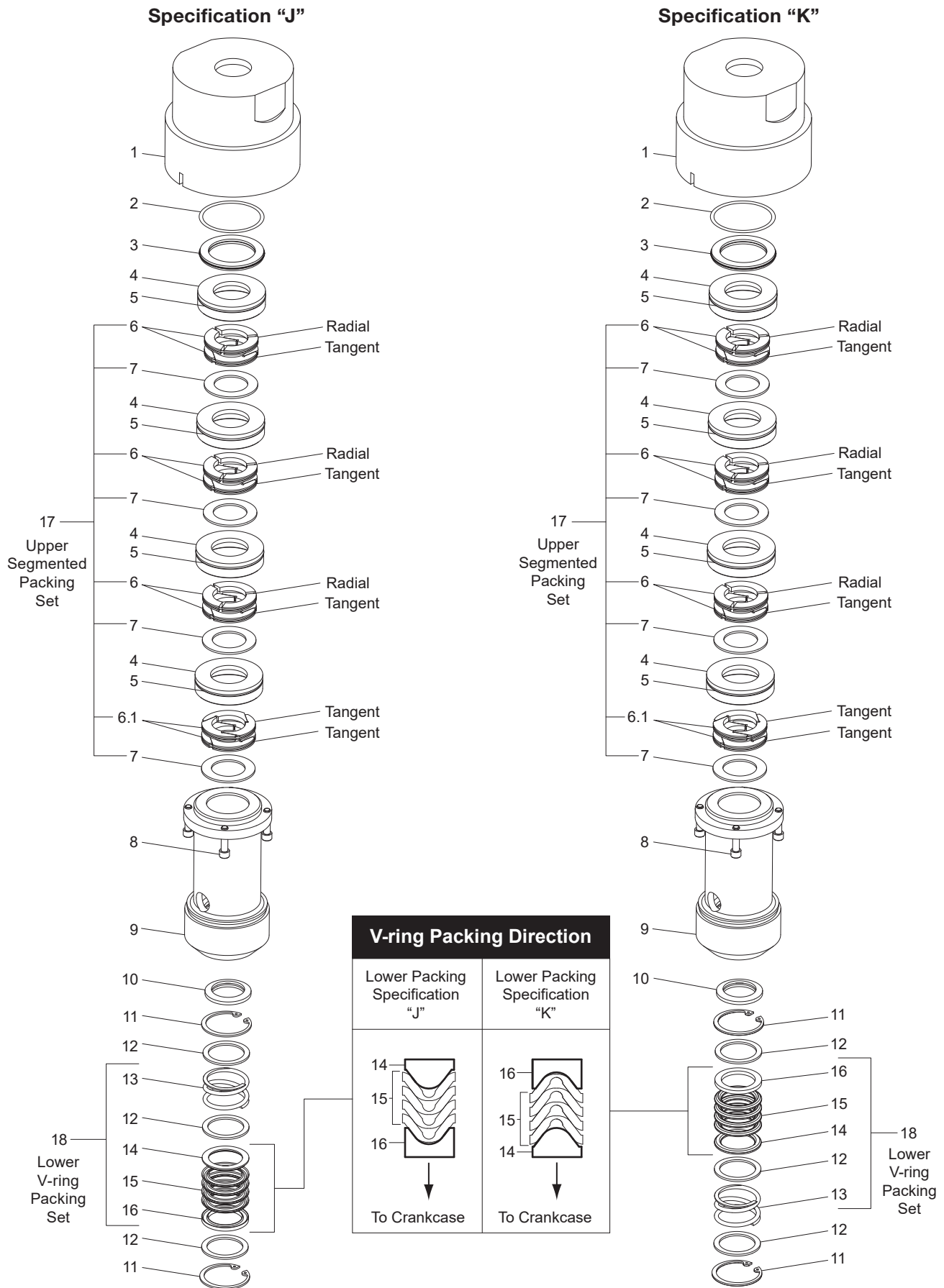
^d Add "C" to end of the part number if the item requires MC1002 coating.



CAUTION: Always relieve pressure in the unit before attempting any repairs.

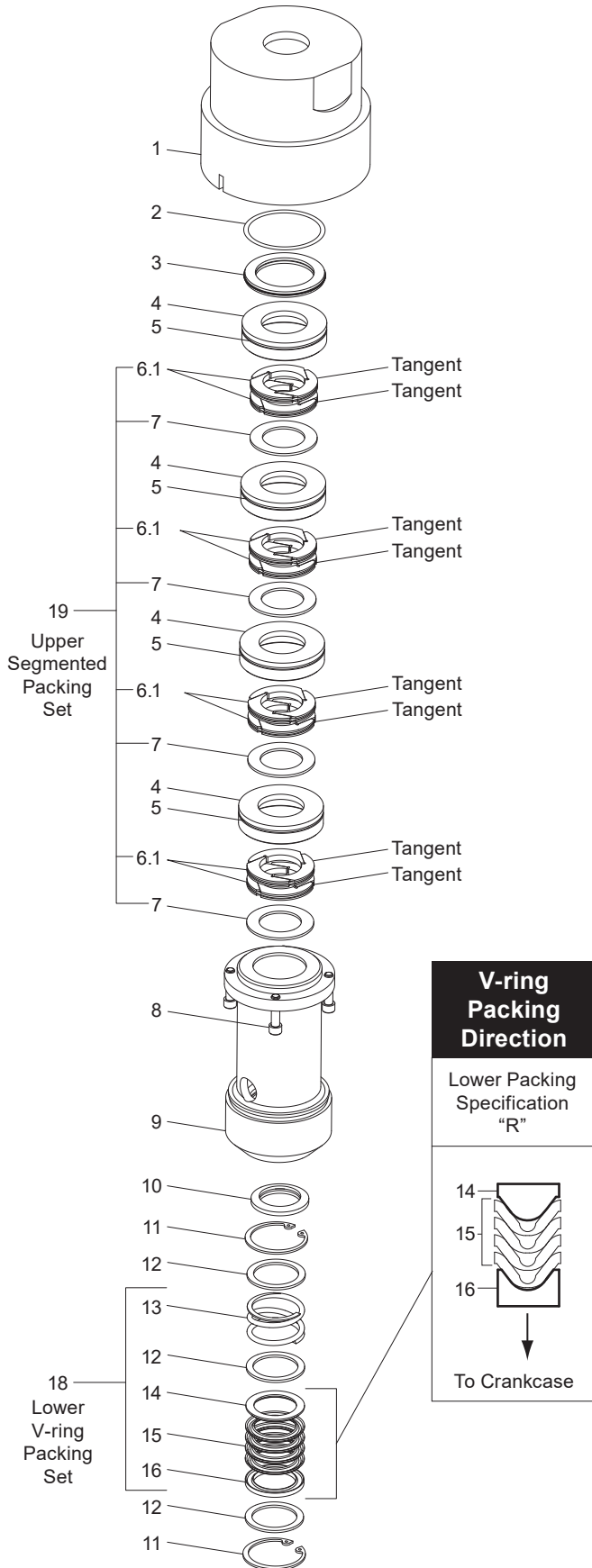


Appendix E—D791 and D891 Packing Assembly Details



Appendix E—D791 and D891 Packing Assembly Details

Specification "R"

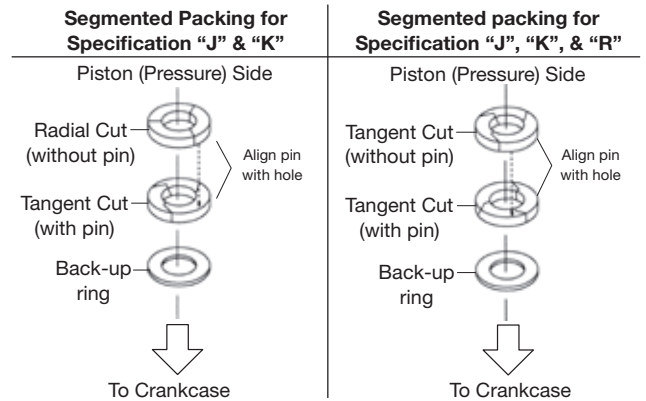


Packing Assembly Bill of Materials

Ref No.	Part No.	Description	Qty. per Compressor
1.	3886	Packing barrel (3-1/4" cylinder) (791 second stage)	1
	3887	Packing barrel (6" cylinder) (791 first stage)	1
	3926	Packing barrel (4-1/2" cylinder) (891 only)	2
2.	2-228 ^{a,e}	O-ring	2
3.	4272	Packing spacer	2
4.	3817	Packing cup	8
5.	2-036 ^{a,c,e}	Cup O-ring	8
6.	3810 (radial, tangent)	Segmented packing (Specs J & K)	6
6.1.	3814 (tangent, tangent)	Segmented packing (Specs J & K)	2
	3811	Segmented packing (Spec R)	8
7.	3811	Back-up ring	8
8.	7002-025TP100A	Screw (1/4-20 x 1" socket head)	8
9.	3885 ^f	Cartridge	2
10.	1732 ^b	Oil deflector ring	2
11.	5000-175	Retainer ring	4
12.	1728	Washer	6
13.	1731	Spring	2
14.	1724	Male packing ring	2
15.	1725-2	V-ring packing	8
16.	1723	Female packing ring	2
17.	3810-X1	Segmented packing set (Specs J & K)	2
18.	1725-2X	V-ring packing set	2
19.	3814-X1	Segmented packing set (Spec R)	2

Identification of Packing Specification

Example: Model Number FD891JM4P **F** DANSNN
 Packing Specification _____



IMPORTANT: Identify and line up the rings before installing. Be sure they face the way shown here and that the pin and hole are aligned when assembled.

^a Denotes O-ring material code.

^b Deflector ring is loose within the packing cartridge until fitted on the piston rod. Must be put in from the bottom of the cartridge.

^c Starting with serial number NN51397.

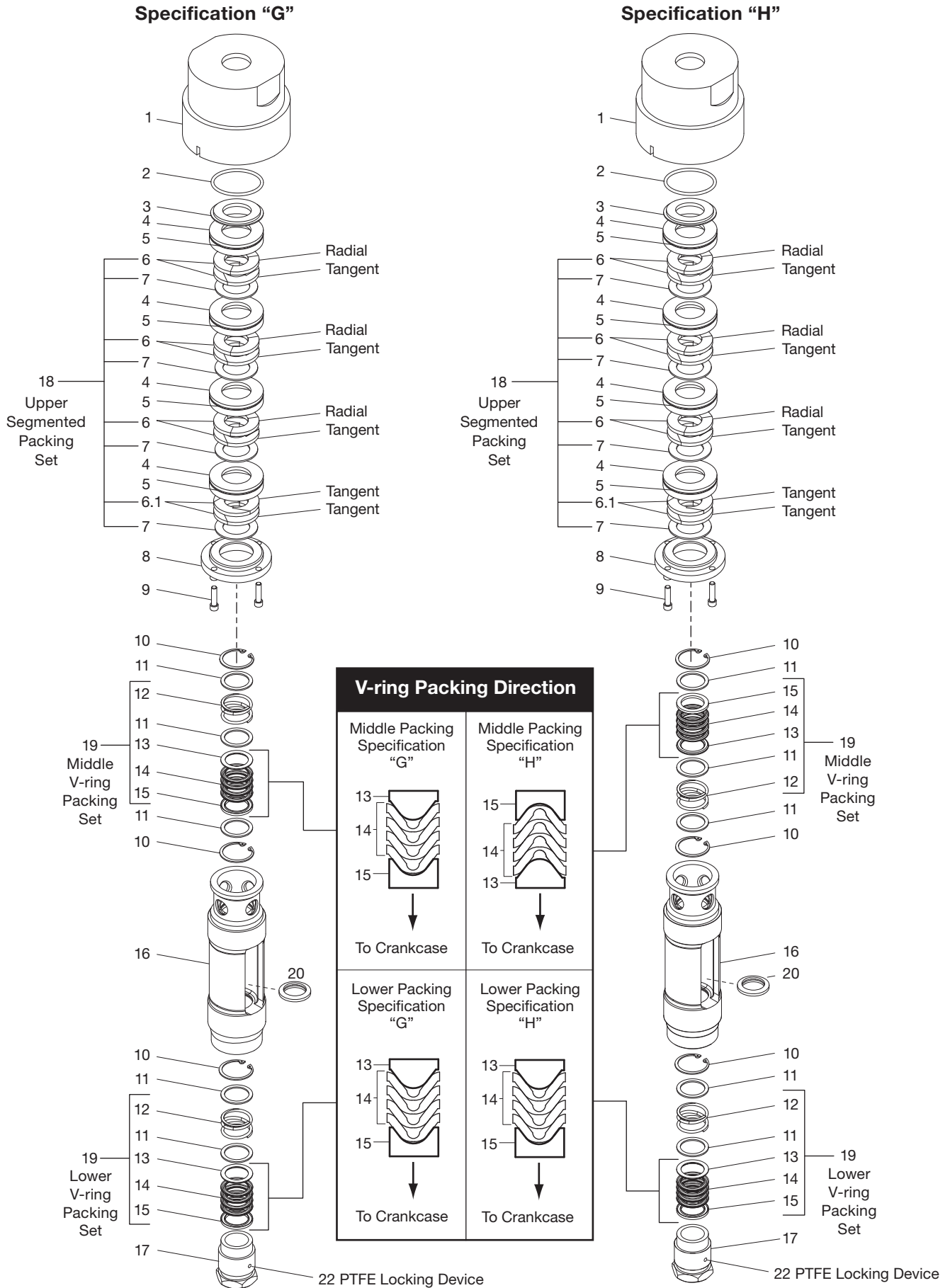
^d Registered trademark of the DuPont company.

^e If the material code call for E, use K for this part number.

^f Add "C" to end of the part number if the item requires MC1002 coating.

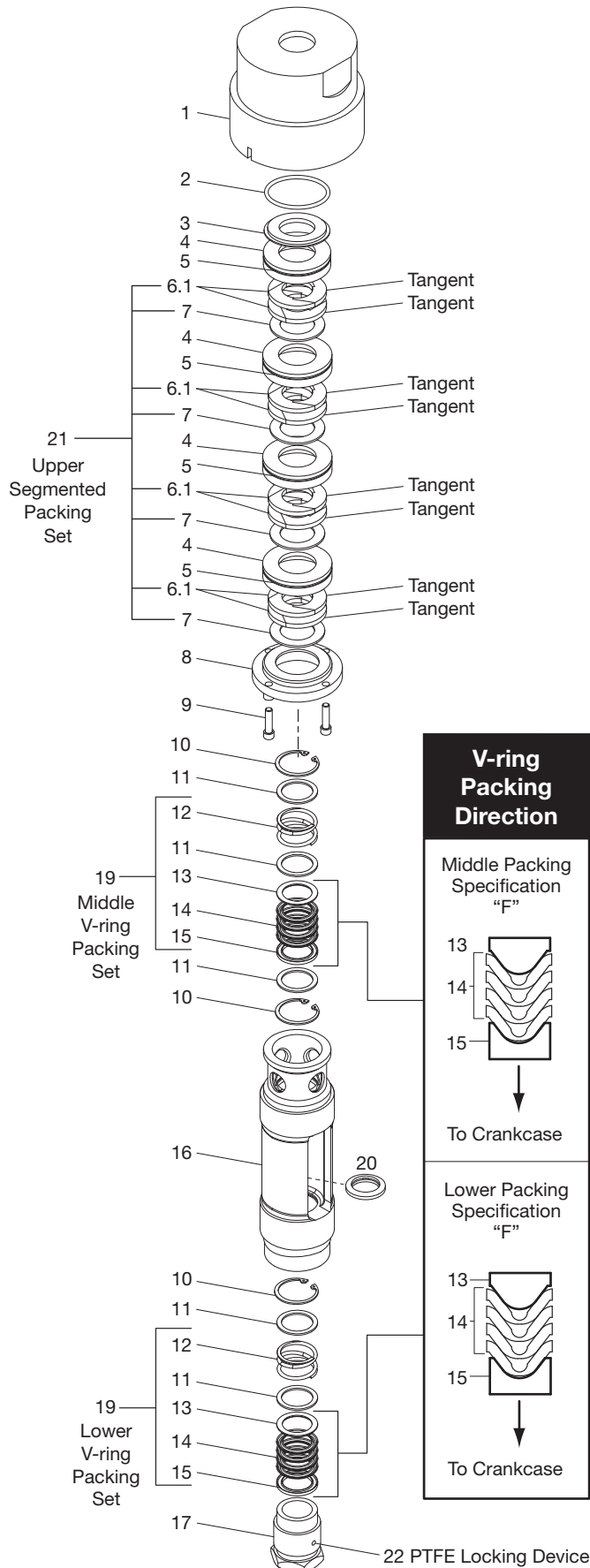
Material Code	
A	Buna-N
B	Neoprene ^{®d}
D	Viton ^{®d}
E	PTFE
K	Kalrez ^{®d}

Appendix D—Packing Assembly Details for Models T791 and FT891



Appendix D—Packing Assembly Details for Models T791 and FT891

Specification "F"

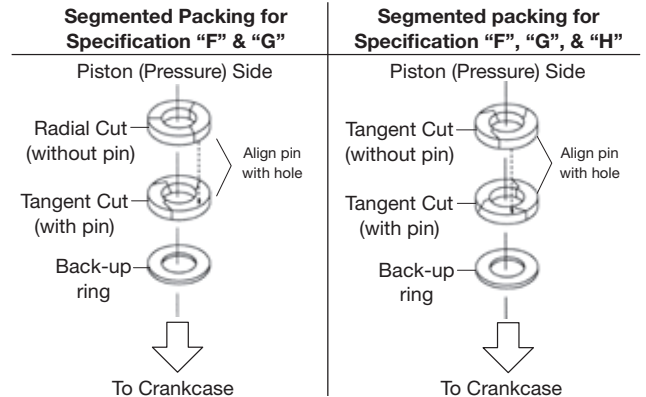


Packing Assembly Bill of Materials

Ref No.	Part No.	Description	Qty. per Compressor
1.	3886	Packing barrel (3-1/4", 791 2nd stage)	1
	3887	Packing barrel (6", 791 1st stage)	1
	3926	Packing barrel (4-1/2", 891 only)	2
2.	2-228 _{a,f}	O-ring	2
3.	4272	Packing spacer	2
4.	3817	Packing cup (Not included in packing set)	8
	3810-X1		
5.	2-036 _{a,c,d,f}	Cup O-ring	8
6.	3810 (radial, tangent)	Segmented packing (Specs G & H)	6
6.1	3814 (tangent, tangent)	Segmented packing (Specs G & H)	2
		Segmented packing (Spec F)	8
7.	3811	Back-up ring	8
8.	4748	Packing adapter	2
9.	7002-025TP100A	Screw (1/4-20 x 1" socket head)	8
10.	5000-175	Retainer ring	6
11.	1728	Washer	10
12.	1731	Spring	4
13.	1724	Male packing ring	4
14.	1725-2	Packing ring, alloy	16
15.	1723	Female packing ring	4
16.	4746	Cartridge	2
17.	1722-X	Adjusting screw	2
18.	3810-X1 ^d	Segmented packing set (Specs G & H)	2
19.	1725-2X	V-ring packing set	4
20.	1732	Oil deflector ring	2
21.	3814-X1 ^d	Segmented packing set (Spec F)	2
22.	1192	Locking device (included with 1722-X)	2

Identification of Packing Specification

Example: Model Number FT891GM4P **F** DANSNN
 Packing Specification _____



IMPORTANT: Identify and line up the rings before installing. Be sure they face the way shown here and that the pin and hole are aligned when assembled.

^a Denotes O-ring material code.

^b Deflector ring is loose within the packing cartridge until fitted on the piston rod. Must be put in from the bottom of the cartridge.

^c Starting with serial number NN51397.

^d Packing cup O-ring not included in packing set.

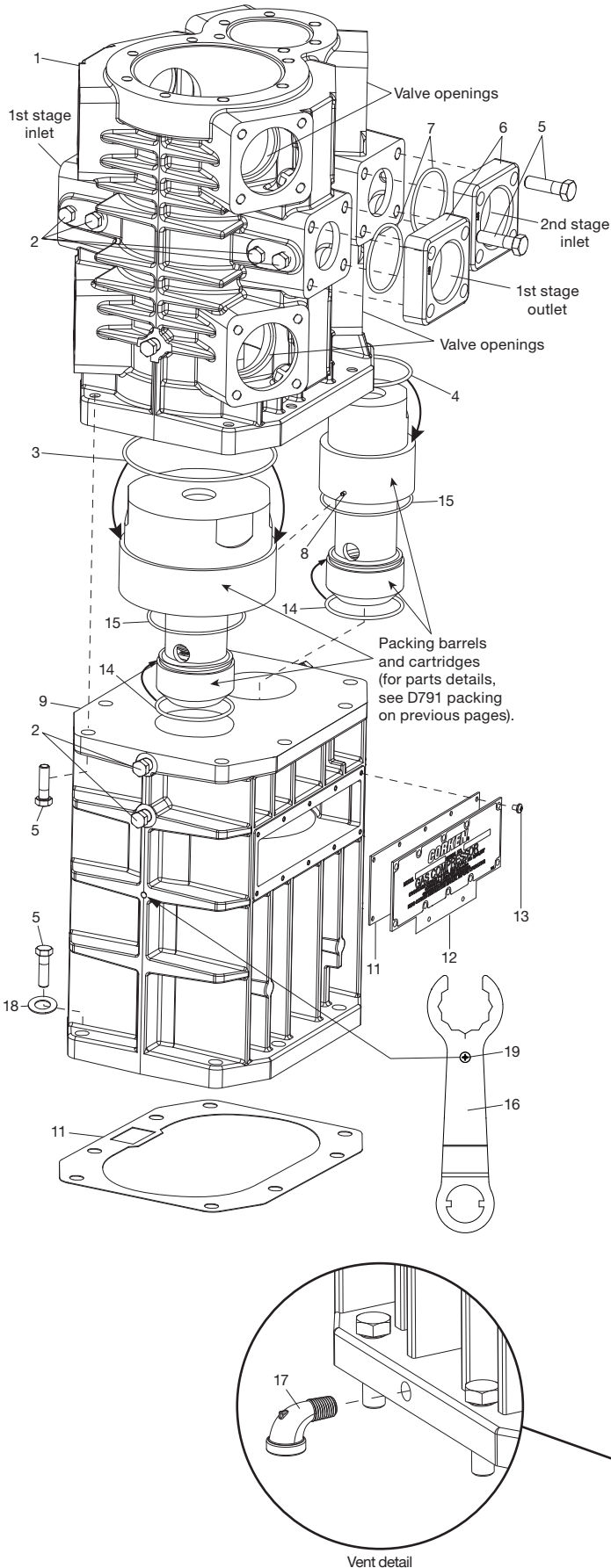
^e Registered trademark of the DuPont company.

^f If material code calls for E (PTFE), use K (Kalrez).

Material Code	
A	Buna-N
B	Neoprene ^{®e}
D	Viton ^{®e}
E	PTFE
K	Kalrez ^{®e}

Appendix D—Crosshead Guide Parts Details for Model D791

Crosshead Guide Bill of Materials



Ref No.	Part No.	Description	Qty. per Compressor
1.	3866 ^d	Cylinder	1
2.	3442	Pipe plug (1/4" NPT)	14
3.	2-258 ^{a,c}	O-ring for cylinder (1st stage)	1
4.	2-236 ^{a,c}	O-ring for cylinder (2nd stage)	1
5.	7001-050NC175A	Bolt (1/2"-13 x 1-3/4" hex head gr 5)	32
6.	3793-2S	Flange (2" slip-on weld)	4
6A.	3793-2	Flange (2" NPT)	4
7.	2-231 ^a	O-ring for flange	4
8.	3253	Roll pin	1
9.	2405-1	Crosshead guide	1
10.	1761	Gasket (crankcase)	1
11.	1760	Gasket (inspection cover)	1
12.	1721	Inspection cover	1
13.	7012-010NC025B	Bolt (10 - 24 x 1/4" Phillips head)	10
14.	2-231 ^{a,c}	O-ring	2
15.	2-238 ^a	O-ring	2
16.	2644	Compressor wrench	1
17.	1064	Crankcase vent	1
18.	7206-050A	Regular lockwasher, 1/2"	8
19.	7001-025NC050A	Bolt (Hex head 1/4-20 x 1/2", gr 5)	1
20.	2590	Pipe plug (1/8" NPT flush)	2

^a Denotes O-ring material code.

^b Registered trademark of the DuPont company.

^c When PTFE is specified as the trim option for the compressor, this O-ring must be Kalrez.

^d Add "C" to end of the part number if the item requires MC1002 coating.

Never attempt to separate the piston rod and crosshead. When repair becomes necessary, the entire crosshead assembly must be replaced.

Material Code

A	Buna-N
B	Neoprene ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

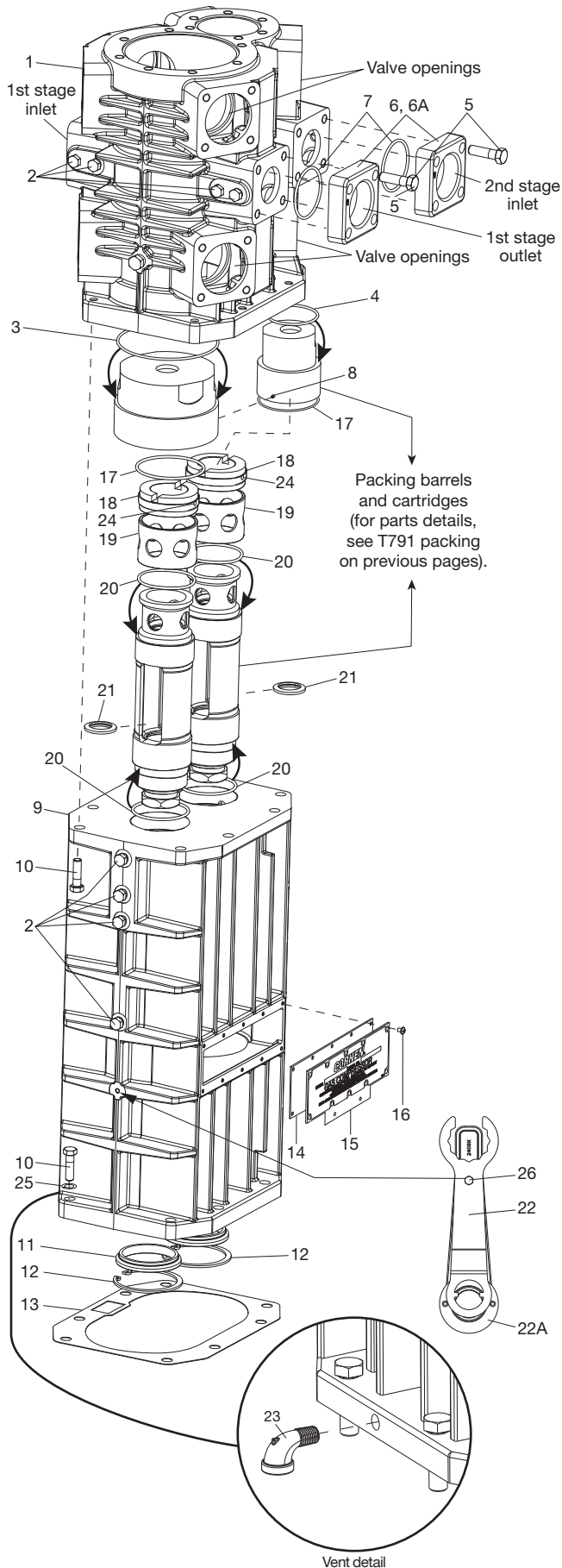
WARNING CAUTION: Always relieve pressure in the unit before attempting any repairs.

NOTE:

Packing barrel installation:

1. Use packing installation cone #3905 on the piston rod.
2. Insert small barrel first, use finger holes to align slinger ring on to the rod. Slip the packing barrel into place.
3. Align pin with slot in large packing barrel.
4. Slip large packing barrel in place.

Appendix D—Crosshead Guide Parts Details for Model T791



Crosshead Guide Bill of Materials

Ref No.	Part No.	Description	Qty. per Compressor
1.	3866 ^e	Cylinder	1
2.	3442	Pipe plug (1/4" NPT, Specs G and H/F)	16/14
3.	2-258 ^{a,c}	O-ring for cylinder (1st stage)	1
4.	2-236 ^{a,c}	O-ring for cylinder (2nd stage)	1
5.	7001-050NC175A	Bolt (1/2" 13 x 1-3/4" hex head, gr 5)	16
6.	3793-2S	Flange (inlet/outlet)	4
6A.	3793-2	Flange (2" NPT)	4
7.	2-231 ^a	O-ring for flange	4
8.	3253	Roll pin	1
9.	1716-4X	Crosshead guide	1
10.	7001-050NC175A	Bolt (1/2" 13 x 1-3/4" hex head)	16
11.	1748 ^d	Cartridge plate	2
12.	5000-350 ^d	Retainer ring	2
13.	1761	Gasket (crankcase)	1
14.	1760	Gasket (inspection cover)	1
15.	1721	Inspection cover	1
16.	7012-010NC025B	Bolt (10 - 24 x 1/4" Phillips head)	10
17.	2-238 ^a	O-ring	2
18.	1749-X	Cartridge holddown screw assy.	2
19.	4747	Cage	2
20.	2-233 ^a	O-ring	4
21.	1732	Oil deflector ring	2
22.	2644	Compressor wrench	1
22A.	2409-X	Compressor wrench	1
23.	1064	Crankcase vent	1
24.	2893	Locking device (included in 1749-X)	2
25.	7206-050A	Regular lockwasher, 1/2"	8
26.	7001-025NC125A	Bolt (hex head 1/4" 20 x 1-1/4", gr 5)	1

^a Denotes O-ring material code.

^b Registered trademark of the DuPont company.

^c When PTFE is specified as the trim option for the compressor, this O-ring must be Kalrez.

^d included with 1716-4X.

^e Add "C" to end of the part number if the item requires MC1002 coating.

Never attempt to separate the piston rod and crosshead. When repair becomes necessary, the entire crosshead assembly must be replaced.

Material Code	
A	Buna-N
B	Neoprene ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

WARNING CAUTION: Always relieve pressure in the unit before attempting any repairs.

NOTE:

Packing barrel installation:

1. Use packing installation cone #3905 on the piston rod.
2. Insert small barrel first, use finger holes to align slinger ring on to the rod. Slip the packing barrel into place.
3. Align pin with slot in large packing barrel.
4. Slip large packing barrel in place.

Appendix D—Crosshead Guide Parts Details for Model FD891

Crosshead Guide Bill of Materials

Ref No.	Part No.	Description	Qty. per Compressor
1.	4851 ^c	Cylinder (Class 300 RF flange)	1
2.	3442	Pipe plug (1/4" NPT)	10/8
3.	2-246 ^a	O-ring for cylinder	2
4.	2405-1	Crosshead guide	1
5.	7001-050NC175A	Bolt (hex head, 1/2"-13 x 1-3/4", grade 5, model)	16
6.	1761	Gasket (crankcase)	1
7.	1760	Gasket (inspection cover)	1
8.	1721	Inspection cover	1
9.	7012-010NC025B	Bolt (phillip head, 10"-24 x 1/4")	10
10.	2-231 ^a	O-ring	2
11.	2-238 ^a	O-ring	2
12.	3253	Roll pin	1
13.	2644	Compressor wrench	1
14.	1064	Crankcase vent	1
15.	2590	Pipe plug (1/8" NPT flush)	2
16.	7001-025NC050A	Bolt (Hex head 1/4-20 x 1/2", GR 5)	1
17.	7206-050A	Regular lockwasher, 1/2"	8

^a Denotes O-ring material code.

^b Registered trademark of the DuPont company.

^c Add "C" to end of the part number if the item requires MC1002 coating.

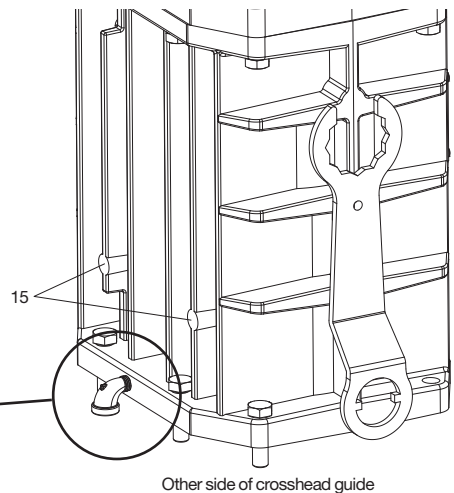
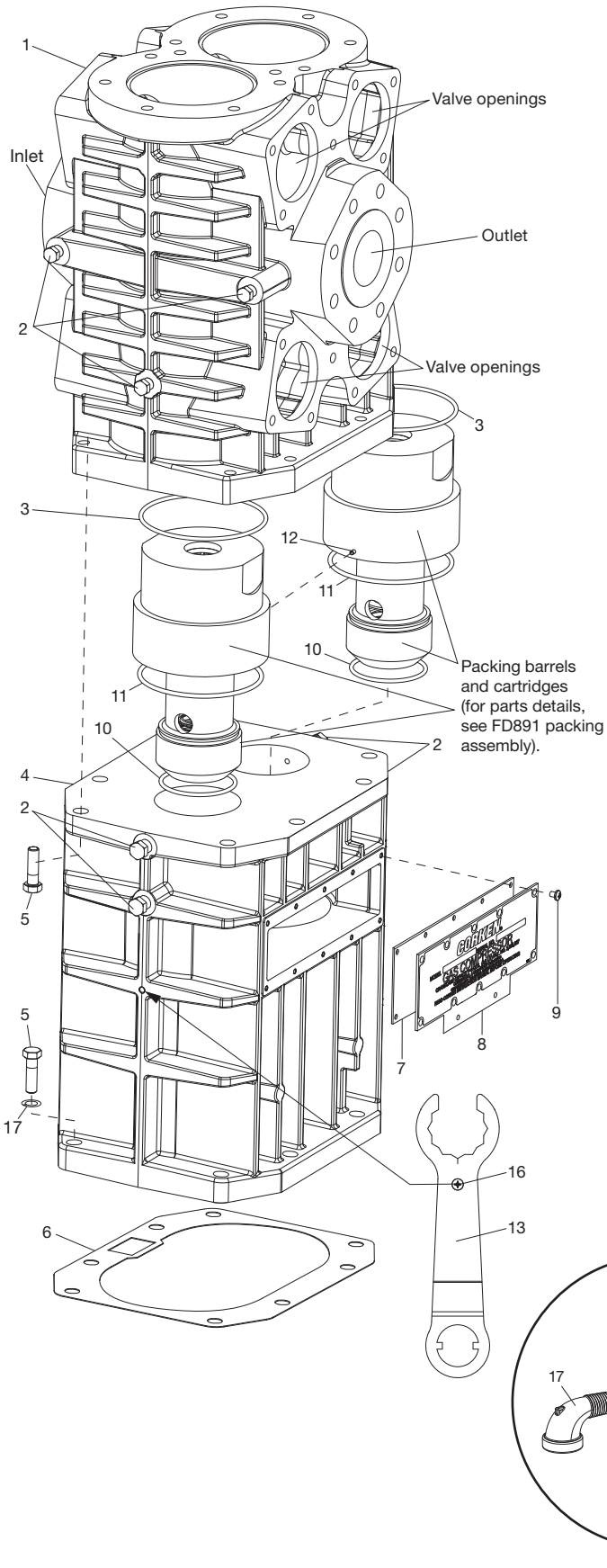
Never attempt to separate the piston rod and crosshead. When repair becomes necessary, the entire crosshead assembly must be replaced.

Material Code

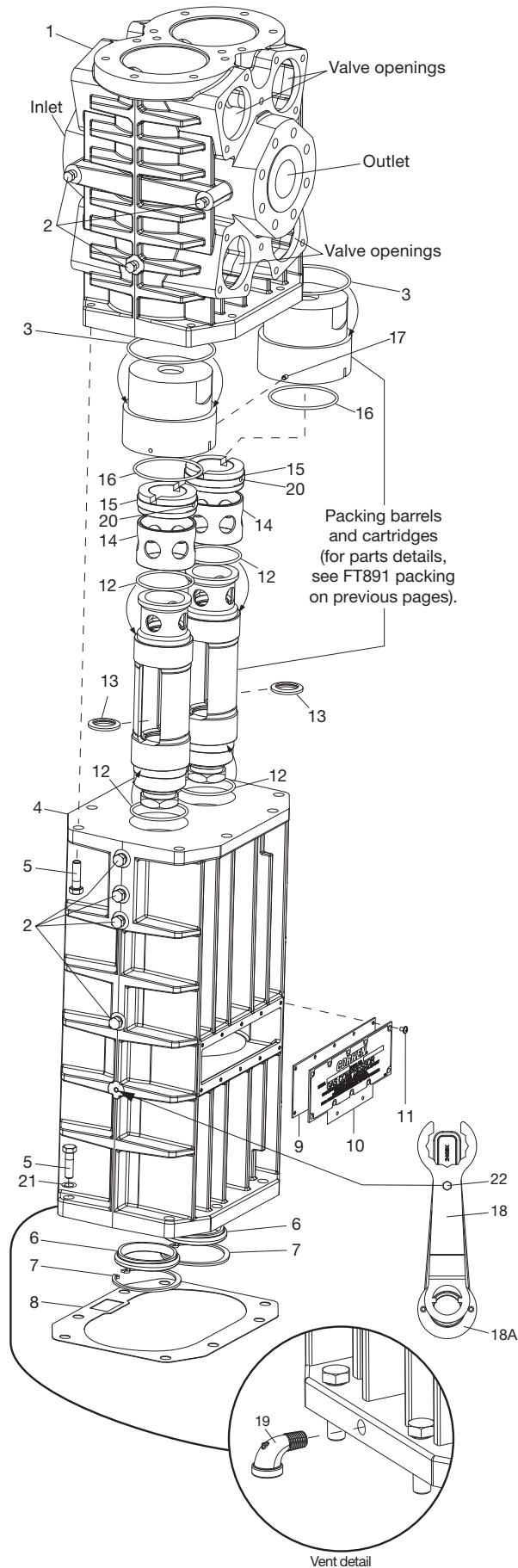
A	Buna-N
B	Neoprene ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}



CAUTION: Always relieve pressure in the unit before attempting any repairs.



Appendix D—Crosshead Guide Parts Details for Model FT891



Crosshead Guide Bill of Materials

Ref No.	Part No.	Description	Qty. per Compressor
1.	4851 ^d	Cylinder (Class 300 RF flange)	1
2.	3442	Pipe plug (1/4" NPT)	12
3.	2-246 ^a	O-ring for cylinder	2
4.	1716-4X	Crosshead guide	1
5.	7001-050NC175A	Bolt (1/2" 13 x 1-3/4" hex head)	16
6.	1748 ^c	Cartridge plate	2
7.	5000-350 ^c	Retainer ring	2
8.	1761	Gasket (crankcase)	1
9.	1760	Gasket (inspection cover)	1
10.	1721	Inspection cover	1
11.	7012-010NC025B	Bolt (10 - 24 x 1/4" Phillips head)	10
12.	2-233 ^a	O-ring	4
13.	1732	Oil deflector ring	2
14.	4747	Cage	2
15.	1749-X	Cartridge holddown screw assy.	2
16.	2-238 ^a	O-ring	2
17.	3253	Roll pin	1
18.	2644	Compressor wrench	1
18A.	2409-X	Compressor wrench	1
19.	1064	Crankcase vent	1
20.	2893	Locking device (included in 1749-X)	2
21.	7206-050A	Regular lockwasher, 1/2"	8
22.	7001-025NC125A	Bolt (hex head 1/4" 20 x 1-1/4", gr 5)	1

^a Denotes O-ring material code.

^b Registered trademark of the DuPont company.

^c included with 1716-4X.

^d Add "C" to end of the part number if the item requires MC1002 coating.

Never attempt to separate the piston rod and crosshead. When repair becomes necessary, the entire crosshead assembly must be replaced.

Material Code	
A	Buna-N
B	Neoprene ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}



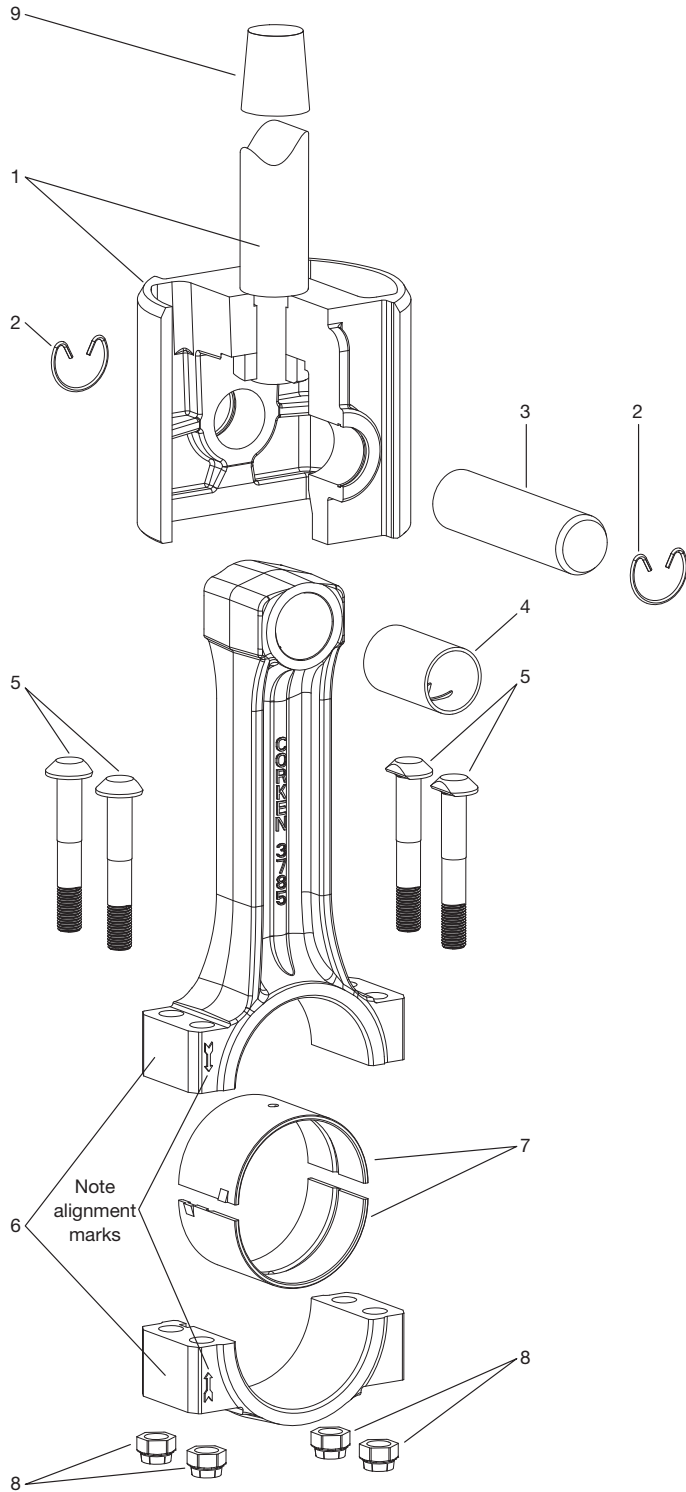
CAUTION: Always relieve pressure in the unit before attempting any repairs.

NOTE:

Packing barrel installation:

1. Use packing installation cone #3905 on the piston rod.
2. Insert small barrel first, use finger holes to align slinger ring on to the rod. Slip the packing barrel into place.
3. Align pin with slot in large packing barrel.
4. Slip large packing barrel in place.

Appendix D—Connecting Rod and Crosshead Assemblies Parts Details for All Models



Connecting Rod—Bill of Materials

Ref No.	Part No.	Description	Qty. per Compressor
1.	3544-X3	Crosshead assembly (D791, FD891)	2
	3544-X9	Crosshead assembly (T791, FT891)	2
2.	3590	Retainer ring	4
3.	3540	Wrist pin	2
4.	3541-X ^{a,c}	Wrist pin bushing	2
5.	1726 ^a	Bolt	8
6.	3785-X1	Connecting rod assembly	2
7.	3542 ^a	Connecting rod bearing (pair)	2
8.	1727 ^{a,b}	Nut	8

Tool to Assist Packing Ring Installation

Ref No.	Part No.	Description	Quantity
9.	3905	Packing installation cone	1

^a Included with connecting rod assembly

^b Torque connecting rod nut to 40 ft. lbs.

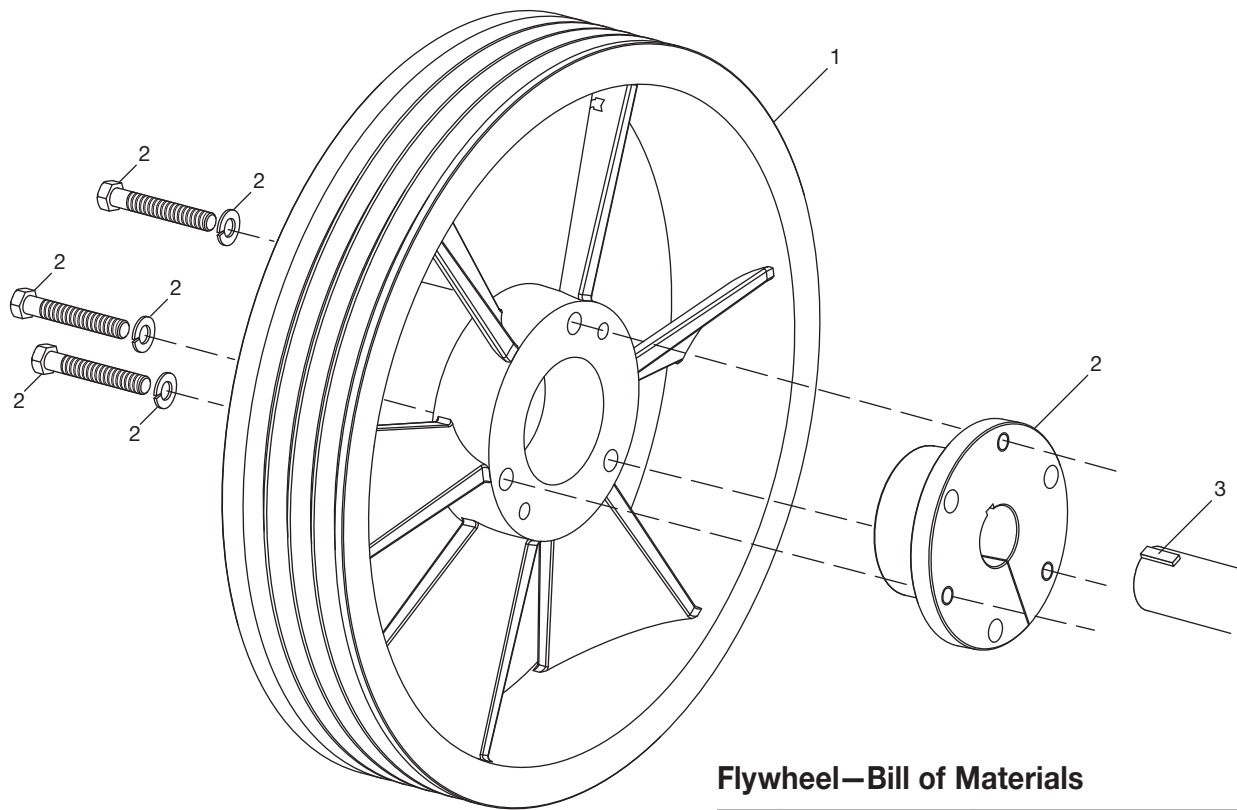
^c After the wrist pin bushing has been pressed into the connecting rod, it must be honed to 1.1263/1.1259. A hydraulic press and honing machine are recommended for this step.

Never attempt to separate the piston rod and crosshead. When repair becomes necessary, the entire crosshead assembly must be replaced.

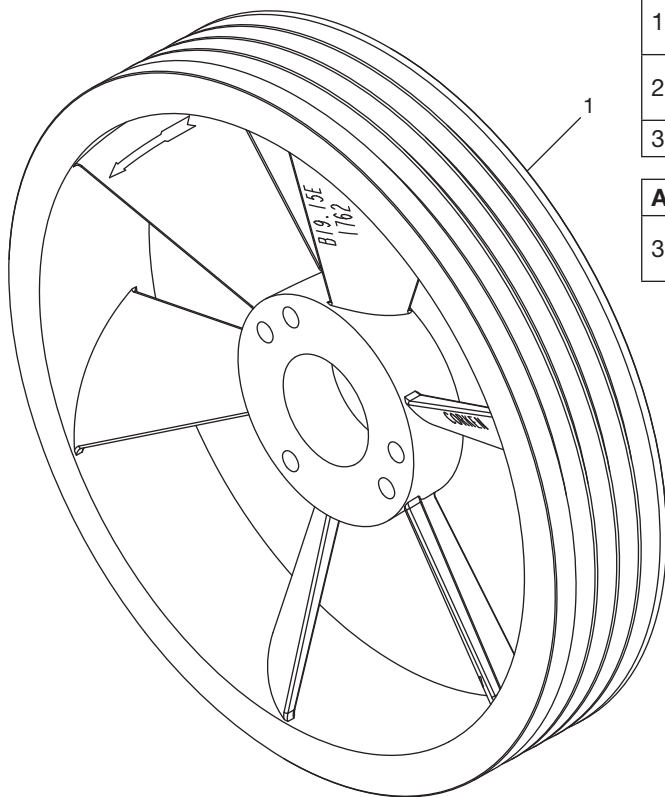


CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix D—Flywheel Assembly Parts Details for All Models



Back Side



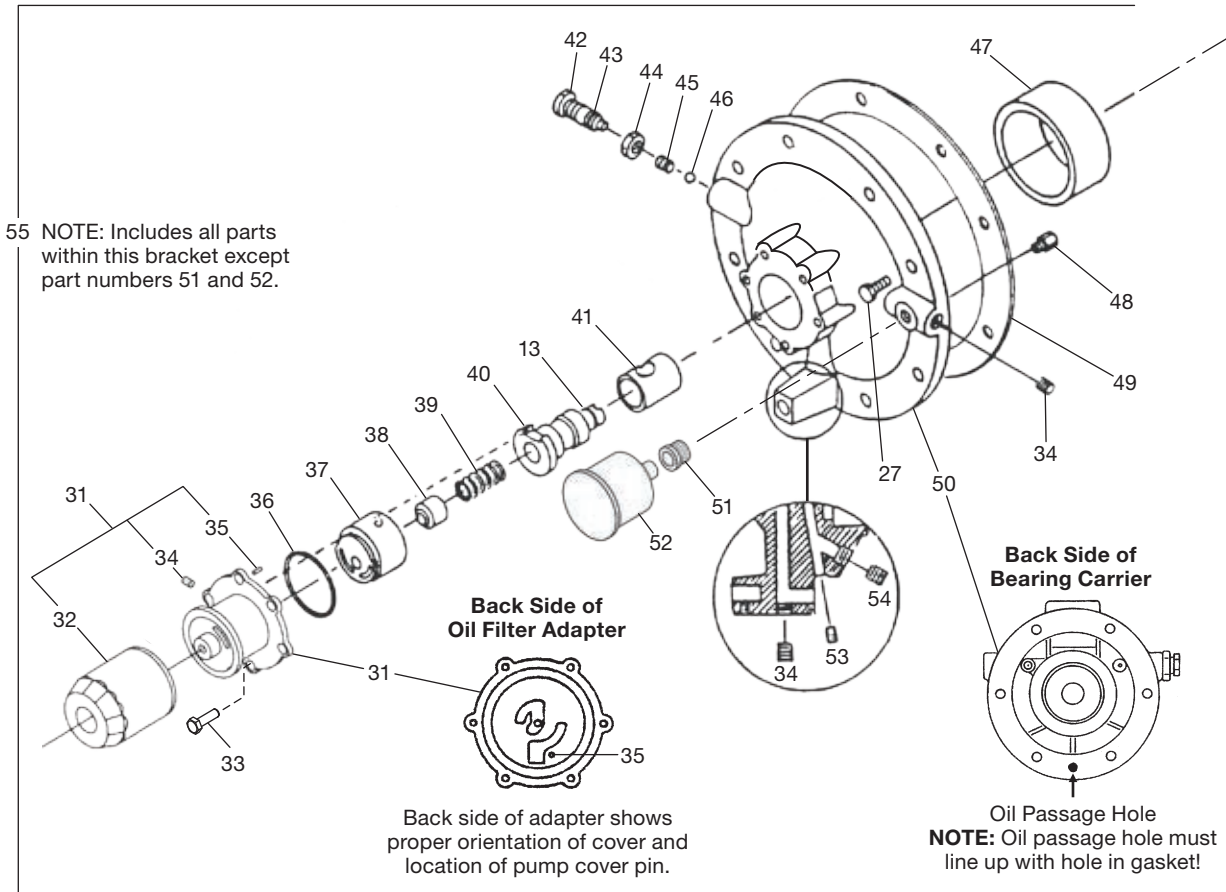
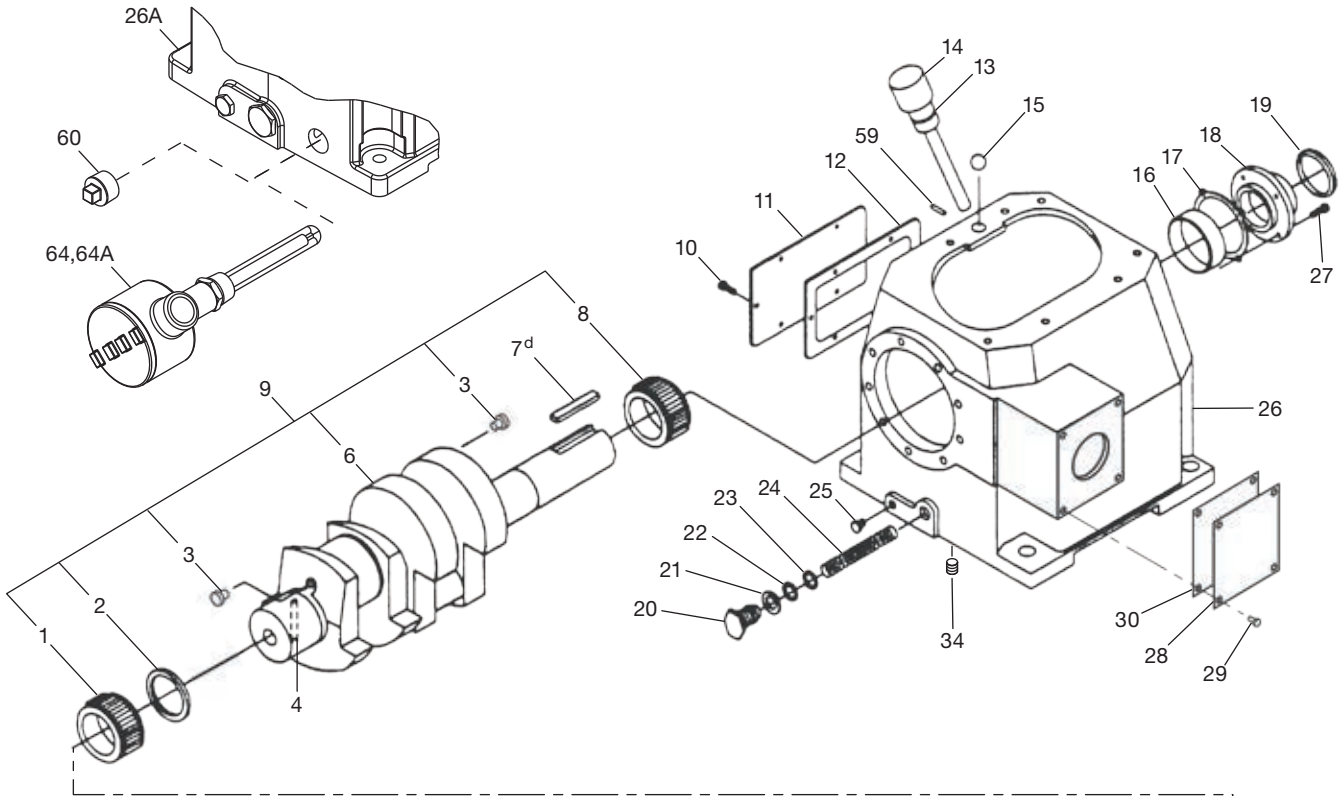
Front Side

Flywheel—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3852	Flywheel (5V21.2" O.D., 5 V-groove)	1
2.	H J-2.125	Hub with three bolts and lockwashers	1
3.	3503	Key	1

Assembly Number	Assembly Name
3852-X	Flywheel assembly (flywheel, hub, key, and three bolts)

Appendix D—Crankcase Assembly Parts Details for All Models



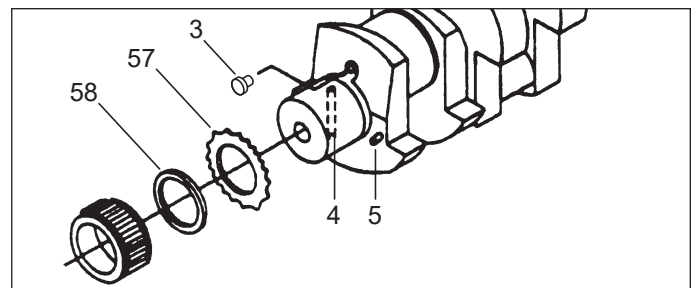
Appendix D—Crankcase Assembly Parts Details for All Models

Crankcase Assembly Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	1737	Bearing cone	1
2.	3638-1 ^a	Spacer, without lubricator	1
3.	1284	Crankshaft orifice	2
4.	2135	Drive pin	1
5.	2933 ^a	Link pin	1
6.	3786	Crankshaft	1
7.	3503 ^d	Flywheel key	1
8.	3580	Bearing cone	1
9.	3786-X1	Crankshaft assembly, without lubricator	1
9A.	3786-X2	Crankshaft assembly, with lubricator	1
10.	7001-031NC075A	Bolt (hex head, 5/16"–18 x 3/4")	6
11.	2122	Inspection cover	1
12.	2123	Gasket (inspection cover)	1
13.	2-112A	O-ring (Buna-N)	2
14.	3225-X1	Oil bayonet assembly (with O-ring)	1
15.	2126	Breather ball	1
16.	3579	Bearing cup	1
17.	3589-X1	Bearing shim kit, 591M, HG600	1
18.	3539	Bearing cover	1
19.	3526	Oil seal	1
20.	1280	Filter screw	1
21.	1281	Gasket (filter)	1
22.	2-116A	O-ring (Buna-N)	1
23.	1276	Washer	1
24.	1275	Oil filter screen	1
25.	3443	Pipe plug (1/2" NPT, steel)	1
26.	3221	Crankcase	1
26A.	3221-1	Crankcase with heater drilling	1
27.	7001-037NC100A	Bolt (hex head, 3/8"–16 x 1", grade 5)	12
28.	7003-025NC037E	Screw (1/4"–20 x 3/8")	4
29.	3875	Access cover	1
30.	3874	Gasket (access cover)	1
31.	4222-X ^b	Oil filter adapter assembly (with pin)	1
32.	4225	Filter	1
33.	7001-025NC050A	Bolt (hex head, 1/4"–20 x 1/2")	6
34.	3289	Pipe plug (1/4" NPT, flush seal)	4
35.	2798	Pump cover pin (included with 4222-X)	1
36.	2-228A	O-ring (Buna-N)	1
37.	2849-1X ^b	Oil pump assembly	1
38.	2851	Spring guide	1
39.	2852	Oil pump spring	1
40.	3219	Pump shaft adapter	1
41.	2805-X ^c	Pump shaft bushing	1
42.	1290	Relief valve adjusting screw	1
43.	2-011A	O-ring (Buna-N)	1

Ref No.	Part No.	Description	Qty.
44.	1291	Adjusting screw locknut	1
45.	1292	Relief valve spring	1
46.	1293	Relief valve ball	1
47.	1736	Bearing cup	1
48.	2961-X	Air release valve assembly	1
49.	2131	Bearing carrier gasket	1
50.	3220-2	Bearing carrier	1
51.	1044	Bushing (1/8" x 1/4" NPT)	1
52.	1302	Oil pressure gauge	1
53.	1629	Pipe plug (1/16" NPT, flush seal)	1
54.	2590	Pipe plug (1/8" NPT, flush seal)	1
55.	3220-2X	Bearing carrier assembly, M3 style	1
56.	3643	Pipe plug, 1" NPT (for MR option)	1
57.	3635	Drive sprocket	1
58.	3638	Spacer, with lubricator	1
59.	2197	Groove pin, 3/16" x 1"	1
60.	3450	Crankcase heater, 110 VAC	1
60A.	3450-1	Crankcase heater, 240 VAC	1

Assembly Number	Assembly Name
3221-X1	Crankcase assembly (M) without lubrication (not shown)
3221-X3	Crankcase assembly with lubrication for 891 models (L)



^a If crankshaft assembly includes item 57, then replace item 2 with item 58 and item 5 will be required to be included in the assembly.

^b Caution: To avoid damage during assembly, refer to installation Instruction Manual IE400.

^c Must be rebored and honed after replacing (0.876"/0.875" diameter).

^d Part included with crankcase, but not included with crankshaft assembly.



CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Troubleshooting

In most cases, problems with a Corken compressor can be solved quite simply. This chart lists some of the more frequent problems that occur with reciprocating compressors along with a list of possible causes. If there is a problem not listed below, or if the source of the problem cannot be identified, consult the factory.

Problem	Possible Cause
Low capacity	1, 2, 3, 4
Overheating	1, 2, 3, 5, 6, 11, 15
Knocks, rattles and noise	1, 7, 9, 10, 11, 14
Oil in cylinder	8, 14
Abnormal piston-ring wear	1, 3, 5, 6, 11, 14, 15
Product leaking through crankcase breather	8, 14
Product leakage	4, 8, 14
Oil leakage around compressor base	16, 17
No oil pressure	18, 19
Excessive vibration	1, 7, 9, 10, 11, 12, 13, 25, 27
Motor overheating or starter tripping out	20, 21, 22, 23, 24, 25, 26, 27

Ref. No.	Possible Causes	What To Do
1.	Valves broken, stuck or leaking	Inspect and clean or repair
2.	Piston ring worn	Inspect and replace as necessary
3.	Inlet strainer clogged	Clean or replace screen as necessary
4.	Leaks in piping	Inspect and repair
5.	Inlet or ambient temperature too high	Consult factory
6.	Compression ratio too high	Check application and consult factory
7.	Loose flywheel or belt	Tighten
8.	Worn piston-rod packing	Replace
9.	Worn wrist pin or wrist-pin bushing	Replace
10.	Worn connecting-rod bearing	Replace
11.	Unbalanced load	Inspect valve or consult factory
12.	Inadequate compressor base	Strengthen, replace or grout
13.	Improper foundation or mounting	Tighten mounting or rebuild foundation
14.	Loose valve, piston or packing	Tighten or replace as necessary
15.	Dirty cooling fins	Clean weekly
16.	Leaking gas blowing oil from crankcase	Tighten packing
17.	Bad oil seal	Replace
18.	No oil in crankcase	Add oil
19.	Oil-pump malfunction	See oil-pressure adjustment
20.	Low voltage	Check line voltage with motor nameplate. Consult power company.
21.	Motor wired wrong	Check wiring diagram
22.	Wire size too small for length or run	Replace with correct size
23.	Wrong power characteristics	Voltage, phase and frequency must coincide with motor nameplate. Consult with power company.
24.	Wrong size of heaters in starter	Check and replace according to manufacturer's instructions
25.	Compressor overloading	Reduce speed
26.	Motor shorted out	See driver installation
27.	Bad motor bearing	Lubricate according to manufacturer's instructions

Appendix F—Extended Storage Procedures

Performing a few simple procedures greatly minimizes the risk of the compressor becoming corroded and damaged. The following precautions will protect it from corrosion during storage:

1. Drain the oil from the crankcase and refill it with a rust inhibiting oil.
2. Operate for a few minutes while fogging oil into the compressor suction.
3. Relieve the tension on the V-belt.
4. Plug all openings to prevent entry of insects and moisture. The cylinders may also be protected by the use of a vapor phase inhibitor, silica gel, or dry nitrogen gas. NOTE: If a silica gel is used, place a tag on the compressor stating “Silica Gel Must Be Removed Prior To Start-up.”
5. Store in a dry area and off the ground. A temperature controlled room is recommended but not mandatory.
6. For best results rotate the flywheel every two weeks.

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