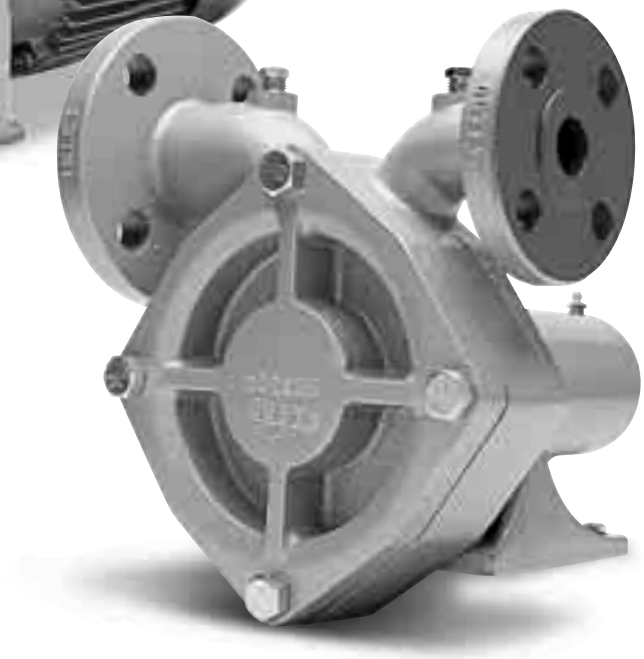
Installation, Operation & Maintenance Manual

Coro-Flo® Pumps 150 Models

Direct Mount



Frame Mount

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 (such as NFPA Pamphlet 58 for LP-Gas and ANSI K61. 1-1972 for Anhydrous Ammonia). (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®

IDEX®

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 LIMITED WARRANTY

Corken, Inc. warrants that its products will be free from defects in material and workmanship for a period of 12 months following date of purchase from Corken. Corken products which fail within the warranty period due to defects in material or workmanship will be repaired or replaced at Corken's option, when returned freight prepaid to CORKEN, INC., 3805 N.W. 36th Street, Oklahoma City, Oklahoma 73112.

Parts subject to wear or abuse, such as mechanical seals, blades, piston rings, packing and other parts showing signs of abuse 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 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 warranty 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. Such substances should be handled by experienced, trained personnel in compliance with governmental and industrial safety standards.

IMPORTANT NOTES RELATING TO THE EUROPEAN UNION (EU) MACHINERY DIRECTIVE

Pumps delivered without electric motors are not considered as machines in the EU Machinery Directive. These pumps will be delivered with a Declaration of Incorporation. The fabricator of the machinery must assure and declare full compliance with this Directive before the machine in which the pump will be incorporated, or of which it is a part, is put into service.

CONTACTING THE FACTORY

Before you contact the factory, note the Model Number and Serial Number of your pump. The Serial Number directs us to a file containing all information on material specifications and test data applying to your specific pump. When ordering parts, the Corken Service Manual or Instruction Book 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 _____

TABLE OF CONTENTS

PRINCIPLES OF THE CORKEN CORO-FLO® PUMP

The Corken Coro-Flo® pump is a special type of pump known as a turbine or regenerative pump. The liquid flows into the inlet nozzle and into the passageway on each side of an impeller (the rotating element) and is recirculated constantly between the vanes or teeth of the impeller and this passageway as the impeller rotates. The fluid makes a complete revolution in the pump case and is diverted out the outlet nozzle. The horsepower required to drive the pump increases as the differential pressure increases, but the capacity decreases at the same time. Differential pressure is the difference between the pressure at the inlet of the pump and at the outlet of the pump.

The impeller is the only moving part and has no contact with the casing. Consequently, practically no wear occurs to the impeller, even when pumping volatile liquids such as LP-gas or ammonia which have little lubricating qualities.

EXCLUSIVE FEATURES OF YOUR CORKEN CORO-FLO® PUMP

The pumping of volatile liquids is one of the most difficult of all pumping applications. Unlike other pumping applications, more attention must be given to the design, manufacture, installation and operation of the pump.

In addition to being a pump type especially suited for handling volatile liquids, your CORO-FLO® pump has a number of features which help to make it more easily operated and maintained.

The CORO-FLO® pumps of this series are manufactured to be directly connected to an electric motor (direct mount) or with their own frame for connection by means of a flexible coupling (frame mount).

UNDERWRITERS' LABORATORIES, INC. have tested and inspected the CORO-FLO® pumps of this series and have listed them for use in the handling of LP-gas and ammonia fluids. The nameplate on the pump includes the UL registration.

DUCTILE IRON has been used in the manufacture of this pump for parts under pressure.

THE IMPELLER floats on a shaft and may be replaced easily without disturbing the piping or driver by simply removing the cover. No special tools are needed.

THE MECHANICAL SEAL ASSEMBLY may be replaced easily by removing the cover and impeller without disturbing the piping or driver. No special tools are needed.

THE PUMP NOZZLES MAY BE ROTATED into four different positions, 180 degrees apart, if desired.

PRESSURE GAUGE CONNECTIONS, 1/4" FNPT, are provided on the inlet and outlet nozzles.

INSTALLATION OF YOUR CORKEN CORO-FLO® PUMP

THE INSTALLATION OF A CORO-FLO® pump is simple. However, in order for the pump to deliver optimum performance, the principles discussed in this book should be followed. The piping details are furnished to illustrate methods proved by hundreds of installations. Your own needs may require slight variations, but every effort should be made to follow the recommendations identified in this manual.

For the transfer of flammable liquids like LPG, the pump assembly must be installed according to the applicable local safety and health regulations. The installer and/or the user must take into account the following:

- Potential risk due to local conditions regarding the installation and operation (e.g. poor ventilation and additional risks due to other elements in the vicinity, etc.).
- Qualification of the personnel.
- Type of liquid being transferred.
- Specific safety measures to be applied (e.g. gas detection, automatic shut-off valves, personal protection equipment etc.).

For more detailed piping arrangements, refer to pages 14 - 20. For outline dimensional drawings, refer to Appendix D & E (pages 24-25).

The following table shows the weight of the bare pump for each model. For handling a bare pump, lifting slings should be placed around the inlet and outlet flange neck of the pump. Web slings are preferred over metal slings to minimize damage to the paint.

Model	Shipping Weight	
	lb	kg
Frame Mount	63	28.6
Direct Mount	75	34.0

IF IT IS DESIRABLE TO ROTATE THE NOZZLES of the pump, remove the four cap screws on the pump case and rotate pump casing to desired position. Be careful to do this without moving the case away from the mounting frame; otherwise, the mechanical seal may be damaged.

NO PUMP CAN DISCHARGE MORE LIQUID THAN IT RECEIVES, so the location and the inlet piping must be given careful attention. If the inlet piping is inadequate to supply the demand of the pump, you may expect trouble! The inlet line size should be the same size as the pump suction or next size larger. Pressure loss between the storage tank and the pump should be minimized.

THE PUMP SHOULD BE LOCATED AS CLOSE TO THE STORAGE TANK as possible. The complete inlet line, including the vertical line from the tank, should not exceed 12 feet (3.6 m) in length. The bottom of the tank should be at least two feet (0.6 m) above the pump inlet nozzle, and four feet (1.2 m) should be considered standard.

The inlet should include the following:

1. The tank excess flow valve (EFV) should have a flow rate of 1-1/2 to 2 times the capacity of the pump. Do not use an EFV without knowing its flow capacity.

2. Pressure gauge at pump suction nozzle.

3. The tank shutoff valve should be a full port ball valve or an internal valve.

4. A strainer of the "Y" type, with a 20 mesh screen, should be on the inlet line of the pump.

5. A flexible connection should be used on the pump inlet or outlet to accomodate piping strains.

6. An eccentric swage should be used at the pump inlet nozzle to change line size (flat side up).

7. The inlet line must be level or slope downward to the pump.

The outlet piping should include the following:

1. A pressure gauge should be installed in the opening provided on the outlet nozzle or in the outlet piping near the pump. This pressure gauge will tell you the complete story of the operation inside your pump. Be sure you have one installed.

2. A hydrostatic relief valve is required to be installed in the outlet piping.

3. If the outlet piping exceeds 50 feet (15.2 m) in length, a check valve should be installed near the pump outlet.

The bypass system must include the following:

1. The pump bypass system must be installed. Without this system, the pump has little chance of performing.

2. A CORKEN B166 BYPASS VALVE (a special valve to vent the pump of vapors and to act as a differential relief valve) is ideal.

3. The bypass line should rise uninterrupted to an opening in the vapor section of the storage tank. The tank fitting should be either an excess flow valve or a vapor return valve; it should never be a filler valve or a back check valve.

4. To meet Underwriters' Laboratories (UL) specifications, an external bypass valve must be connected in the piping between the pump discharge nozzle and the supply tank for pump recirculation. When bypassing the full output of the pump, the external bypass valve must limit the differential pressure to 125 pounds per square inch.

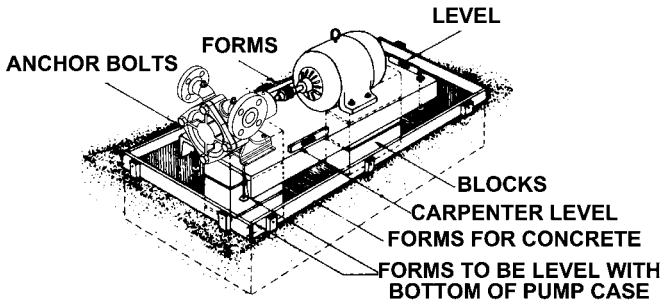
DESIGN CRITERIA FOR UNDERGROUND TANK APPLICATIONS:

- Minimize suction frictional losses:
  - Locate pump as close as possible to the tank's liquid outlet connection.
  - Eliminate strainer, since the tank itself acts as a sump to collect foreign materials.
  - Use full-port ball valves, or low restrictive valves.
  - Use 2-inch (51 millimeter) pipe.
- Minimize the net static suction lift, to 14 feet (4.3 m) maximum.
- Use vapor eliminator valves.
- Use back-pressure check valves downstream the pump.
- Limit the capacity of the pump to a maximum of 1.5% of the tank's capacity. For example, with a 1,000-gallon (3,785 liter) tank, limit the capacity of the pump to 15 gallons per minute (56.8 liters per minute).

Pump foundation for frame mounted models

The pump assembly must be securely attached to a concrete foundation using all the available holes in the pump assembly footing. The total weight of the concrete foundation should be approximately twice the weight of the pump assembly. The foundation must be level and deep enough to get below the ground frost line in the location. There are many ways to construct a foundation, and the example in figure 1 is only a suggestion.

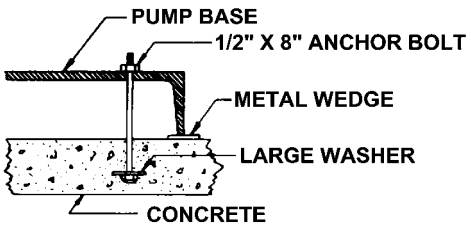
Figure 1



Level base

After the concrete has set, check the pump base for level. Drive metal shims under the base near the anchor bolts as below. Tighten anchor bolts and recheck the base for level (see figure 2).

Figure 2



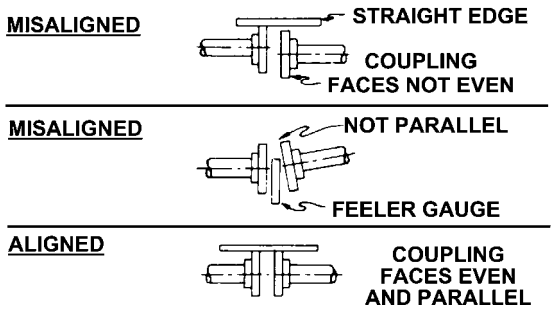
Coupling alignment for frame mount models

The coupling must be properly aligned to give quiet, long-life service to the pump and driver. The pump and driver shafts are carefully aligned at the factory but should always be checked after the pump is installed and before the initial operation.

Place a straight edge across coupling halves, top and side; both positions must line up to be correct.

If misalignment exists, adjust the shims between the pump base and the foundation until exact alignment is accomplished (see figure 3).

Figure 3



Driver installation

A qualified electrician, in accordance with all the local standards and regulations, must undertake the electrical installation. The wire size chart on page 7, figure 4 indicates the minimum standards for wire sizes.

Improper motor wiring may cause you to experience expensive motor difficulties from low voltage. If you suspect you have low voltage, call your power company. Wiring your motor for the voltage you have available is important. Be sure your motor is connected to the proper voltage. Connecting to improper voltage will completely destroy your motor.

With explosion-proof motor applications in humid climates, the normal breathing and alternating temperatures of the motor (warm during operation and cold when stopped) will often cause moist air to be drawn into the motor housing. This moist air will condense and may eventually add enough free water to the inside of the motor to cause it to fail. To prevent this, make a practice of running the motor and pump at least once a week on a dry day for an hour or so (pump through the bypass system). This allows the motor to heat and vaporize the condensed moisture. No motor manufacturer will guarantee an explosion-proof or totally enclosed motor against damage from moisture.

ENGINE DRIVERS require special consideration; the manufacturer's instructions must be followed. When the Coro-Flo® pump is equipped with an engine from the factory, the engine speed should normally not exceed 3600 rpm. Excessive engine speed will overload the engine and cause early failure. The engine loses 3% of its power for every 1000 feet above sea level, so if your installation is at a higher altitude than normal, consult the factory.

Figure 4
WIRE SIZE CHART FOR WIRING ELECTRIC MOTOR[1]

MOTOR				RECOMMENDED WIRE SIZE, AWG		
HP	MOTOR PHASE	VOLTS	APPROX. FULL LOAD AMPERES	LENGTH OF RUN IN FEET		
				0-100	TO 200	TO 300
Pump must rotate clockwise when viewed from the motor. If not, switch any two of the three incoming 3 phase lines.						
3	1	115	34.0	6	4	2
		230	17.0	12	8	8
	3	230	9.6	12	12	12
		460	4.8	12	12	12
5	1	115	56.0	4	1	1/0
		230	28.0	10	6	4
	3	230	15.2	12	12	10
		460	7.6	12	12	12
7-1/2	1	230	40.0	8	6	4
	3	230	22.0	10	10	8
		460	11.0	12	12	12
10	3	230	28	8	6	4
		460	14	12	12	10
15	3	230	42	6	4	4
		460	21	10	10	8
20	3	230	54	6	6	4
		460	27	10	10	10

[1] Each country may use a different form of wire size measurement (AWG, SWG, mm^2 etc.). The above wiring size chart is based on the United States National Electrical Code (NEC) guidelines for America Wire Gauge (AWG) sizes. These wire sizes and distances are based on nominal supplied voltages. Additional derating is necessary when the voltage is less than that shown. Consult your local standards and regulation for specific wiring requirements.

OPERATION OF YOUR CORO-FLO® PUMP

It is absolutely essential that the operator be fully informed of the pump's recommended operation procedures and safety precautions. See Appendix B & C, pages 22 & 23 for operating specifications and performance. The operator must be made aware of the specific risks generated by the product handled and be familiar with the purpose and function of all piping, valves, and instrumentation, etc. of the installation.

The following steps should be performed for the initial pumping operation:

1. Close shutoff valve on the end of the delivery hose.
2. Open the storage tank bottom shutoff valve.
3. Open the shutoff valve in the pump bypass system.
4. Check the motor for the proper voltage (see instructions under driver installation).
5. Record pressure gauge readings on suction of pump.
6. Start the pump and circulate liquid through the bypass system.
7. Adjust the B166 bypass valve by turning the adjusting screw counterclockwise until the pump pressure gauge shows nearly the same pressure it did before you started the pump. Screw the adjusting screw clockwise until the pressure gauge indicates the required pressure or until the pump starts to lose discharge pressure (you will know this by the rapid fluctuating of the pointer), then back the adjusting screw out a turn or two until the pressure gauge again indicates a steady pressure. Lock the lock nut and permit the pump to circulate liquid for a half hour or more. If the motor overload protection device stops the motor during this period, this indicates the bypass system valve is set too high and should be readjusted by turning the adjusting screw out until the motor will run for this period.

When properly installed and operated, Coro-Flo® pumps do not exceed a 80 dBA noise level at a distance of one meter (3.281 ft.) from the surface of the pump.

FILLING NEW CYLINDERS AND TANKS

All new containers are full of air and since air will not liquefy under reasonable filling pressures, it must be purged. To ensure proper gas supply to burners and carburetors, purging air from new containers is essential. A Coro-Vac® unit may be used to perform this function. Some cylinders are difficult to fill because they are equipped with a fill tube that extends down into the liquid portion of the container. If possible, these cylinders should be refitted so the incoming liquid enters the vapor section of the cylinder. If refitting is impossible or impractical, rock the cylinder as it is being filled so that liquid will splash up into the vapor section – this will help keep the cylinder filling pressure down to a reasonable limit. A properly fitted cylinder and filling manifold will permit filling a cylinder at no more than 50 to 60 psi differential pressure. When the pump is new, it is recommended to record the flow rate, discharge pressure and suction pressure.

Figure 5
PREVENTIVE MAINTENANCE CHART
CORO-FLO® LPG PUMPS

Item to Check	Daily	Monthly	3 Months	6 Months
1. Visual Inspection; leaks, hoses, pipes, etc.	●			
2. Clean Inlet Strainer Screen			●	
3. Inspect Drive Coupling and Guard		●		
4. Lubricate Pump's Bearing [1]			●	
5. Lubricate Motor's Bearing [2]				
6. Performance Test				●
7. Re-tighten Bolts				●
8. Inspect Motor Starter Points				●

[1] If the pump runs continuously, it should be lubricated more frequently.
[2] Follow the motor manufacturer's recommendations.

PREVENTIVE MAINTENANCE PROGRAM FOR CORKEN CORO-FLO® LPG PUMPS

Purpose

By following an effective preventive maintenance program, unscheduled downtime can be eliminated. This program should be used by the Operation Manager to get a maximum utilization of manpower and equipment as well as to prevent possible unsafe situations and/or production delays due to equipment breakdown.

Scope

The Preventive Maintenance chart in figure 5 includes the items to be regularly checked and inspected with a recommended time schedule. These are basic maintenance recommendations, and each company should develop their own comprehensive preventive maintenance program schedule, tailor-made to their individual operational procedures and requirements.

Maintenance must only be performed by a properly trained and qualified individual that follows all the applicable safety procedures.

Procedures

Every procedure herein recommended must be performed in a safe manner (utilize tools and/or equipment which are free of hazards) and follow the safety codes of practice set by the authorities having jurisdiction. These are general guidelines and are not intended to cover all the safety aspects that must be considered and followed while performing these procedure.

1. Visual Inspection:
   This includes checking for leaks, corroded areas, condition of hose, piping and fittings, and any unsafe condition which may hinder the safety of the personnel and/or the facility.

2. Clean Inlet Strainer Screen:
   A clogged strainer screen will create too much flow restriction and vapor will be formed causing the

pump to cavitate. This reduces the pump's capacity and accelerates the wear of the internal parts.

3. Inspect Drive Coupling and Guard:
   Check the coupling alignment and the condition of the coupling's rubber insert for cuts, broken sections and wear.

4. Lubricate Pump Bearings:
   Use only ball bearing grease, applied with a manual lubrication pump or gun. Always clean the grease openings thoroughly before greasing.

5. Lubricate Motor Bearing:
   Follow the recommendations of the electric motor manufacturer for the type of grease to use and the lubrication frequency.

6. Performance Test:

   A. While transferring liquid with the pump, check the pressure at the pump's inlet port. The pressure drop in the inlet piping should not be greater than 3 psi.

   B. While transferring liquid with the pump, close the discharge valve(s) so the full flow will be directed back to the storage tank through the by-pass valve. Then slowly close the valve downstream of the by-pass valves. The discharge pressure of the pump should increase to the maximum differential pressure of the pump at no flow conditions (see page 23, Appendix C: Performance Curves).

   C. If the maximum differential pressure is not obtained, the pump must be serviced. Visually inspect the pump's impeller (refer to instructions on page 10 and 11, steps 1 through 10):

      Replace the impeller if damaged, broken, warped or worn.

      A uniform wear of the impeller will not be visually detected. If the impeller has no visible damages, it can be re-used. The impeller's wear can be compensated by removing the adjustment shims on the pump's cover. Remove one shim at a time, tighten the pump's cover and assure that the pump's shaft rotates. If the pump is locked, re-install the last shim and make sure the shaft rotates easily. For additional help, refer to Appendix F, page 26 Troubleshooting guide.

7. Re-tighten all holdown bolts.

8. Inspect Motor Starter Contact Points:
   This must be performed by an authorized and qualified electrician, based on the electric motor manufacturer's guidelines.

9. See Appendix G, page 27 for extended storage procedures.

REPAIR AND SERVICE ON YOUR CORO-FLO® PUMP

All repairs to the pump must be performed by qualified personnel in a safe manner, utilizing tools and/or equipment that are free of hazards, and follows the applicable safety codes of practice set by the local authorities having jurisdiction. Make sure the system pressure has been relieved before attempting any repair to the pump.

After a long service life, repairs are limited to replacing the impeller or mechanical seal.

The only wearing part influencing the pumping action is the impeller, so we suggest the pump be given an "efficiency" test before any attempt is made to repair it. The trouble may lie in the piping system rather than in the pump. If the pump will still produce as much differential pressure when circulating through the bypass system as it did when new, you can be sure that your problem is in the system and not with the pump. If the pump does not produce as much pressure as it did originally, remove the cover and inspect the impeller. If visual inspection indicates the impeller is in good condition, remove the thin shim gasket and replace the cover. Many times this procedure will adjust for slight impeller wear. If the impeller is badly worn or damaged, it should be replaced. For additional help, refer to Appendix F, page 26, Troubleshooting guide.

REPLACING THE IMPELLER is a matter of removing the cover and removing the old impeller from the shaft. If the old impeller is tight on the shaft, threaded bolt holes are provided in the impeller to use for pulling. The new impeller must be a good slip fit on the shaft; it should "float" on the shaft, so it may be necessary to lightly sand the shaft. Clean the pump prior to reassembly (refer to steps 1, 2 and 10, pages 10 and 11).

REPLACING THE MECHANICAL SEAL is simple and replacement parts are immediately available.

The pumps can be configured with various types of seals and O-rings. Selection of the seals and O-ring materials are based on the product that is being transfered. The most compatible seals and O-ring materials must be selected. Consult the factory or distributor for recommendations if the pump is not handling the product for which it was initially purchased. The model code in the identification plate of the pump indicates the materials in the pump. Refer to page 21 and 22, Appendix A and B, for the material in your pump.

SEAL REPLACEMENT INSTRUCTIONS

CAUTION

Bleed all pressure from the pump and piping before installing your new seal assembly.

CLEANLINESS

Even the smallest amount of dirt on your new seal can cause early failure. Keep all parts, tools and your hands clean while installing the seal. Never touch the smooth lapped faces of the carbon rotor or seal seat. For LP-gas, anhydrous ammonia and similar liquids, you are trying to seal a fluid that is 5 to 10 times thinner than water! Your new seal needs every chance it can get, so keep it clean.

WORKMANSHIP

Your CORKEN pump is a precision piece of equipment with very close clearances. Treat it as such. Never use force during assembly or disassembly (see steps 1 through 10, pages 10 and 11).

1. Remove the cover cap screws and remove the cover from the case. If the cover does not pull away by hand, use two screwdrivers to pry the cover from the case.

2. Remove the impeller. It should slide freely. If the impeller does not slide off the shaft freely, insert two cover screws in the threaded holes provided and pry off carefully. Be careful not to warp the impeller or damage the case O-ring groove.

3. Remove the impeller key with side cutters or by tapping with a punch or screw driver. Force the key up and out of the keyway, taking care not to damage the shaft.

4. Remove the retainer ring and slide the seal sleeve, seal sleeve O-ring and seal assembly off the shaft.

5. Through the exposed holes in the mounting bracket, engage a screw driver behind the seal housing. Carefully pry out the seal housing. Do not damage the interior of the seal housing.

6. Carefully pry the old seal seat out of the seal housing using a small screwdriver.

7. Clean the seal housing and apply a light coat of oil on the inside surfaces. Remove the new seal seat from its package and place a light coat of oil on the seal seat O-ring. Insert the seal seat with the notch pointing down and in line with the locator pin in the back of the seal housing. Place the small round piece of cardboard found in the seal package (making sure it is very clean) on the seal seat lapped face. Either use your fingers or a hammer handle with the cardboard disc to push the seal seat into place. Make sure the locator pin is in the seal seat notch.

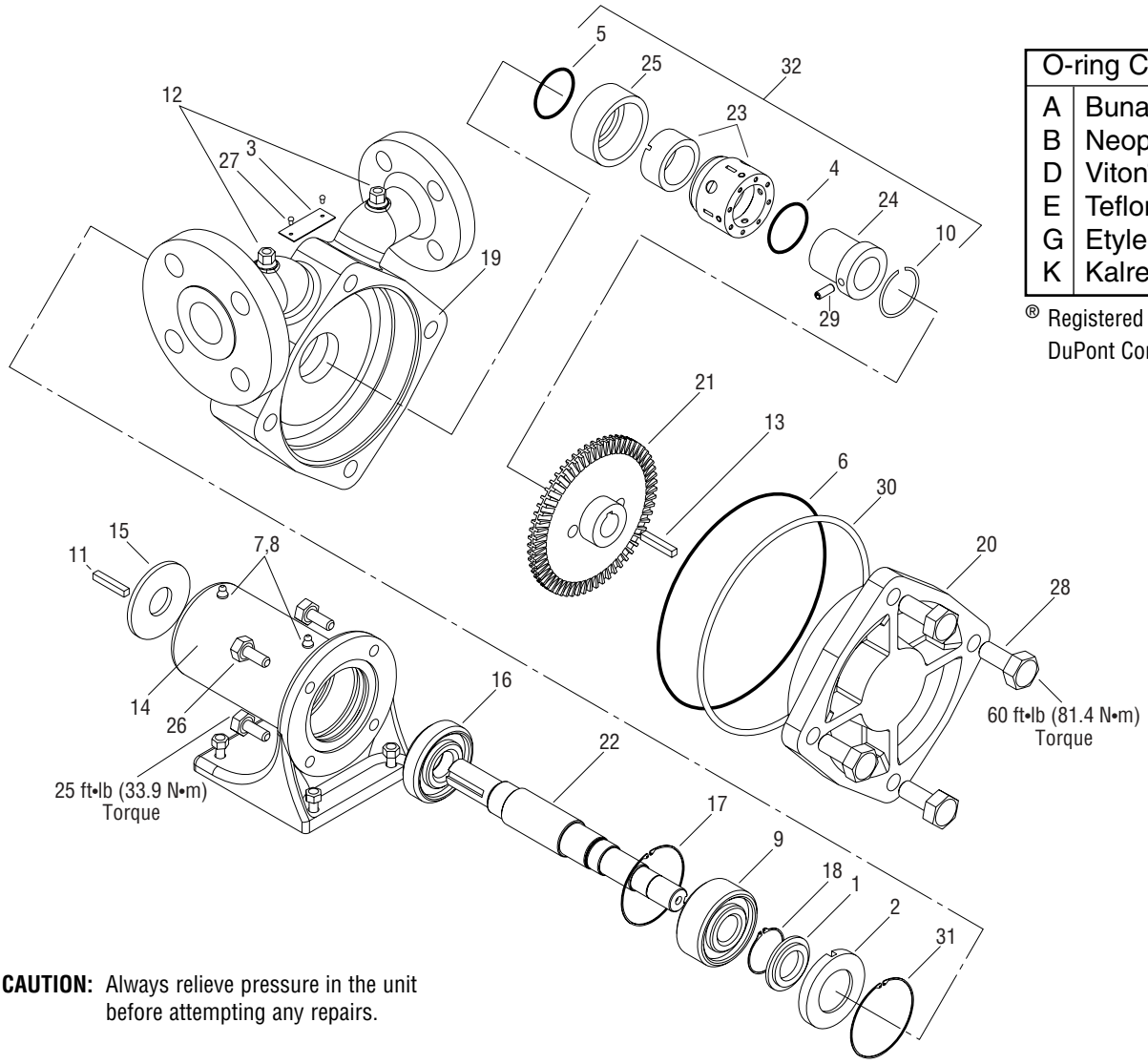
8. Using a probe or pick, remove the old seal housing O-ring and install a new O-ring after applying a thin coat of oil. Clean the shaft and remove any burrs around the keyway. Apply a light coat of oil to the outside surfaces of the seal housing. Reinstall the seal housing by pressing into place by hand. Carefully unwrap the remainder of your new seal assembly, which includes the new retainer shell, carbon rotor and seal sleeve assembly. Apply a thin coat of oil to the carbon face and the O-ring behind the carbon.

9. Slide the seal assembly onto the shaft by aligning the seal drive pin to the impeller keyway. Install the retainer ring by compressing the seal assembly into the pump, thus revealing the retainer ring groove on the shaft. Install the new impeller key into the keyway slot. The impeller must slide on the shaft very freely. If it is tight, carefully remove any burrs from the keyway or key with a small file. Be certain to clean all filings off of the impeller before reinstallation.

10. Replace the cover O-ring and case clearance shim. If the pump will not turn after installation of the cover, install another case clearance shim.

NOTE:
Pressurize the pump case with vapor first. After the pump has been pressurized with vapor, then allow liquid to slowly enter the pump.

PARTS DETAILS
CORO-FLO® PUMPS – 150 MODELS
FRAME MOUNT
ANSI FLANGE (FF) AND DIN FLANGE (FD)



O-ring Code	
A	Buna-N
B	Neoprene®
D	Viton®
E	Teflon®
G	Etylene-Propylene
K	Kalrez®

® Registered trademarks of the DuPont Company

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

NO	PART NO	DESCRIPTION	QTY
1	1006	GREASE SEAL	1
2	1238	BEARING CAP	1
3	1914-1	NAMEPLATE	1
4	2-018__	SEAL SLEEVE O-RING[1, 2]	1
5	2-133__	SEAL HOUSING O-RING[1, 2]	1
6	2-260__	CASE O-RING[1, 2]	1
7	2158	GREASE ZERK	2
8	2159	LUBRICAP	2
9	2758	DOUBLE ROW BALL BEARING	1
10	2760-88	7/8" RETAINER RING[2]	1
11	3226	SHAFT KEY	1
12	3442	1/4" PIPE PLUG	2
13	4244	IMPELLER KEY[2]	1
14	1010-3	MOUNTING FRAME	1
15	3227	BEARING PLATE[3]	1
16	2759	SINGLE ROW BALL BEARING	1

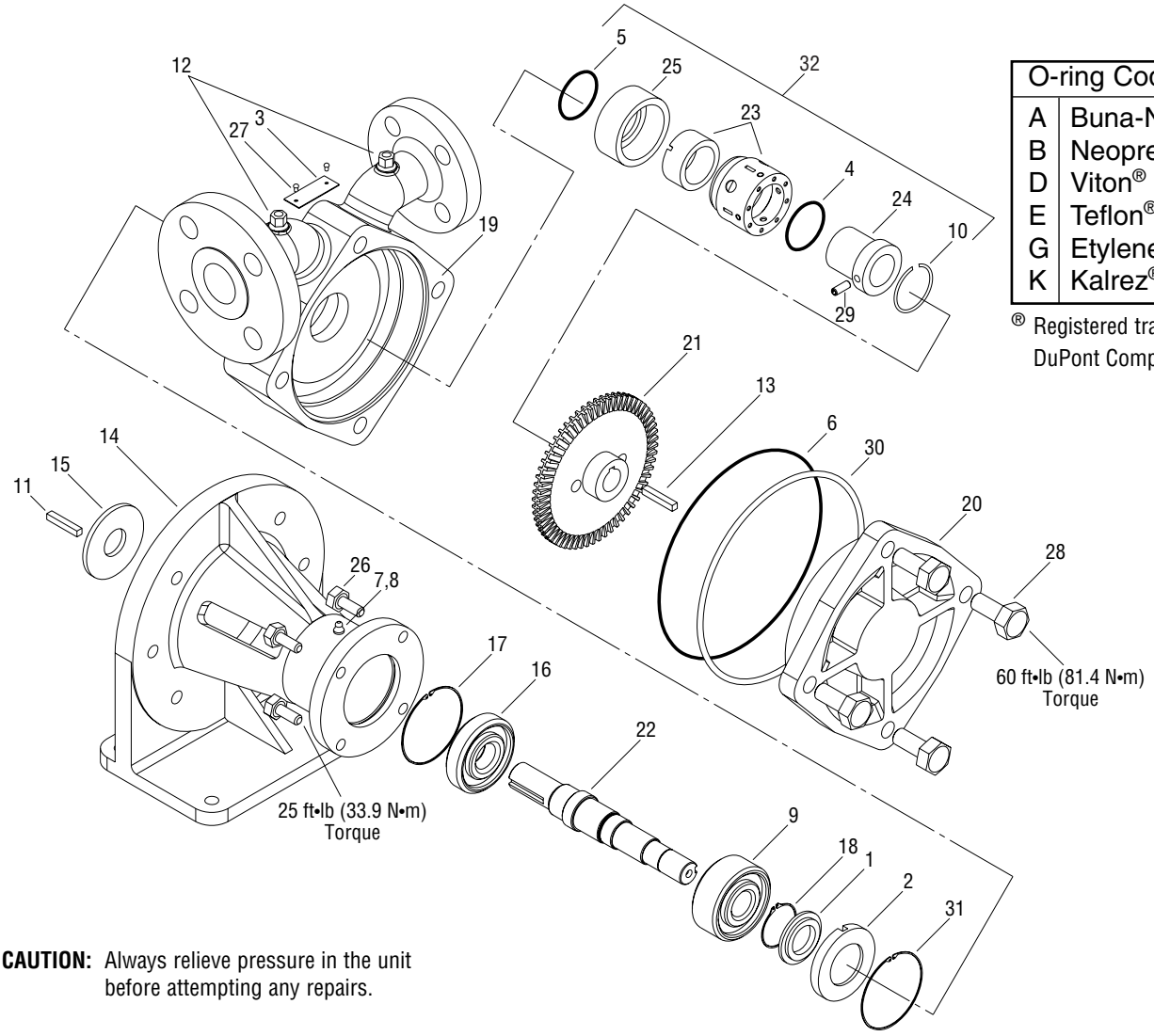
[1] __ denotes O-ring code

[2] Included in seal assembly 5264-X__3

NO	PART NO	DESCRIPTION	QTY
17	5000-281	RETAINER RING	1
18	5102-118	RETAINER RING	1
19	5238	CASE - ANSI FLANGE (FF)	1
19	5238-1	CASE - DIN FLANGE (FD)	1
20	5239	COVER	1
21	5240	IMPELLER	1
22	5241-1	SHAFT	1
23	5242-X	SEAL[2,3]	1
24	5243	SEAL SLEEVE[2]	1
25	5244	SEAL HOUSING	1
26	7302-100MC020A	M10-1.5 x 22MM ALLEN HEAD BOLT	4
27	7012-0065F019E	NAMEPLATE SCREW	2
28	7301-140MC040A	M14-2 x 40MM HEX HEAD BOLT	4
29	4984	SEAL DRIVE PIN[2]	1
30	5248	CASE CLEARANCE SHIM[2]	1
31	5002-281	RETAINER RING	1
32	5264-X_3	SEAL ASSEMBLY[1]	1

[3] Not sold separately

PARTS DETAILS
CORO-FLO® PUMPS – 150 MODELS
DIRECT MOUNT
ANSI FLANGE (DLF) AND DIN FLANGE (DLD)



O-ring Code	
A	Buna-N
B	Neoprene®
D	Viton®
E	Teflon®
G	Etylene-Propylene
K	Kalrez®

® Registered trademarks of the DuPont Company

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

NO	PART NO	DESCRIPTION	QTY
1	1006	GREASE SEAL	1
2	1238	BEARING CAP	1
3	1914-1	NAMEPLATE	1
4	2-018__	SEAL SLEEVE O-RING[1, 2]	1
5	2-133__	SEAL HOUSING O-RING[1, 2]	1
6	2-260__	CASE O-RING[1, 2]	1
7	2158	GREASE ZERK	1
8	2159	LUBRICAP	1
9	2758	DOUBLE ROW BALL BEARING	1
10	2760-88	7/8" RETAINER RING[2]	1
11	3226	SHAFT KEY	1
12	3442	1/4" PIPE PLUG	2
13	4244	IMPELLER KEY[2]	1
14	4298	MOUNTING FRAME - NEMA	1
14	4298-1	MOUNTING FRAME - IEC	1
15	4377	BEARING PLATE[3]	1
16	4378	SINGLE ROW BALL BEARING	1

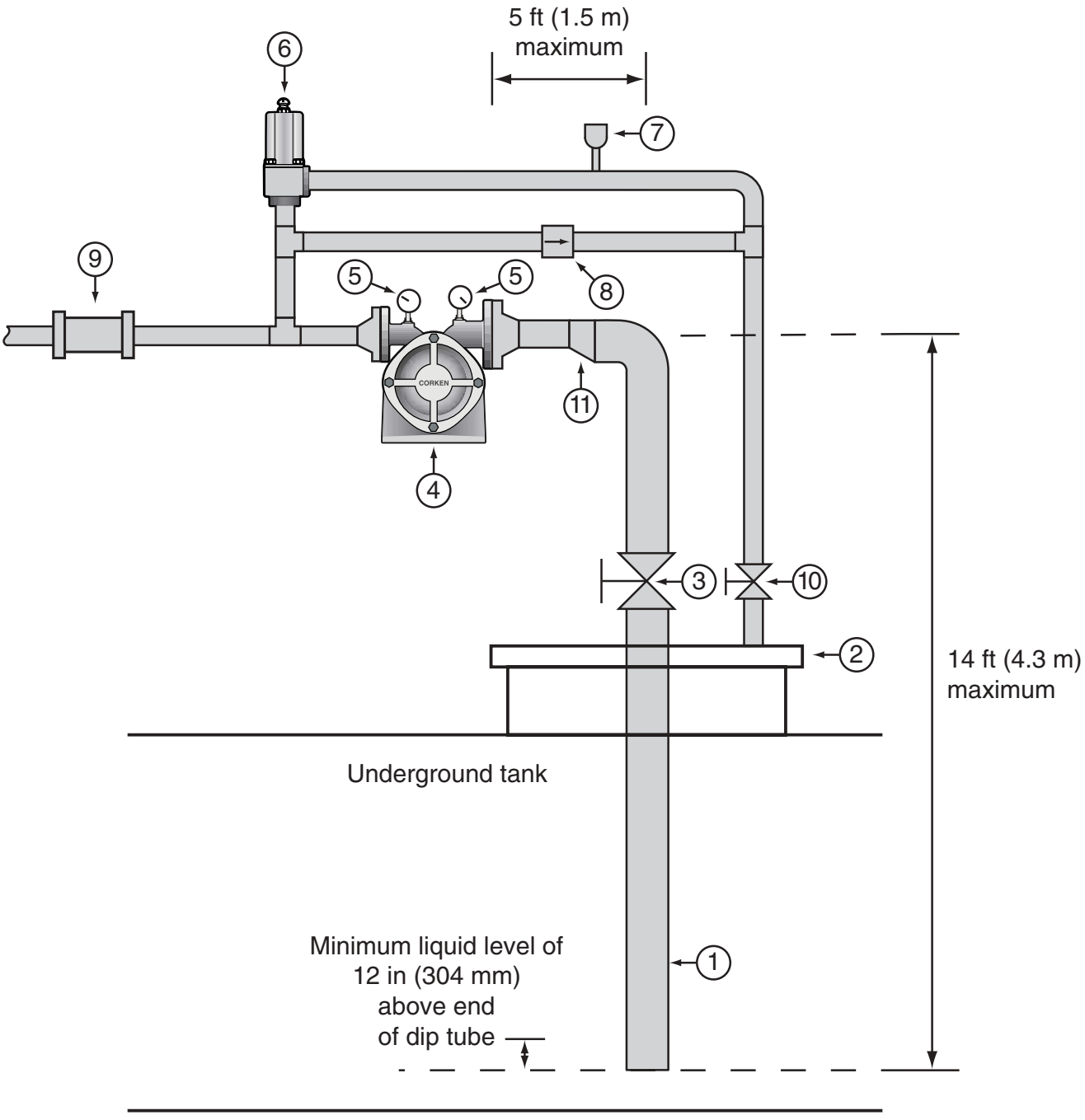
NO	PART NO	DESCRIPTION	QTY
17	5000-281	RETAINER RING	1
18	5102-118	RETAINER RING	1
19	5238	CASE - ANSI FLANGE (DLF)	1
19	5238-1	CASE - DIN FLANGE (DLD)	1
20	5239	COVER	1
21	5240	IMPELLER	1
22	5241-2	SHAFT	1
23	5242-X	SEAL[2,3]	1
24	5243	SEAL SLEEVE[2]	1
25	5244	SEAL HOUSING	1
26	7301-100MC025A	M10-1.5 x 25MM HEX HEAD BOLT	4
27	7012-0065F019E	NAMEPLATE SCREW	2
28	7301-140MC040A	M14-2 x 40MM HEX HEAD BOLT	4
29	4984	SEAL DRIVE PIN[2]	1
30	5248	CASE CLEARANCE SHIM[2]	1
31	5002-281	RETAINER RING	1
32	5264-X__3	SEAL ASSEMBLY[1]	1

[1] __ denotes O-ring code

[2] Included in seal assembly 5264-X__3

[3] Not sold separately

UNDERGROUND TANK APPLICATION



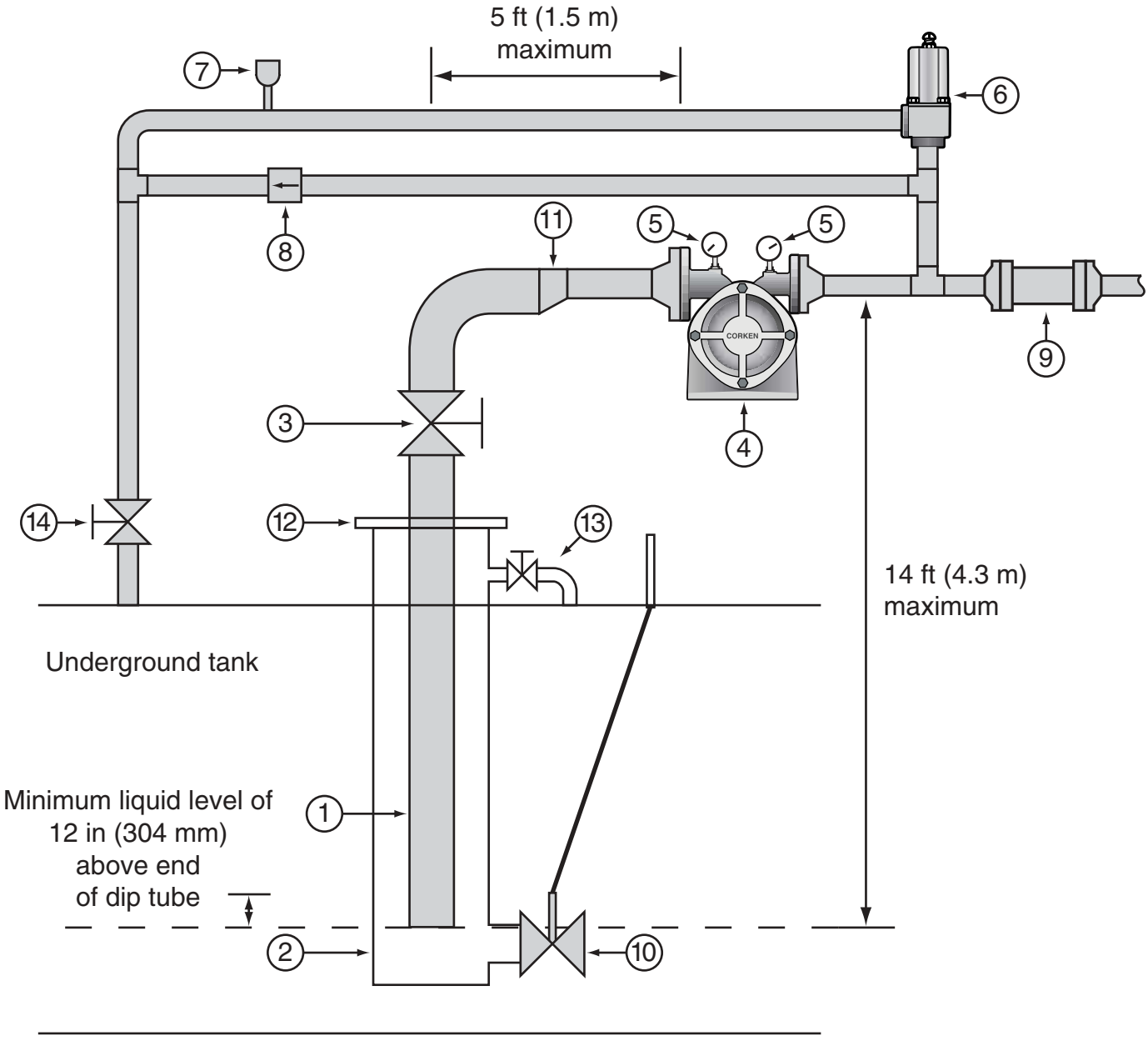
BILL OF MATERIALS

REF. NO.	DESCRIPTION	REMARKS
1	2”, schedule 80 pipe	
2	Man way Cover	Existing
3	2” ball valve, full port	Manual or remote control
4	Corken 150 Series pump	With 7.5 hp (5.5 kW) electric motor
5	1/4” NPT pressure gauge	0-400 psig (0-28 bar g)
6	Corken B166 By-Pass Valve 1” NPT	With spring code C
7	1/4” NPT hydrostatic relief valve	Set at 450 psig (31 bar g)
8	In-line excess flow valve	Closing flow of 10-15 gpm (37-57 L/min)
9	Back pressure check valve	Like Corken’s Flo-Chek valve
10	By-pass return line’s valve	Existing
11	2” x 1-1/2” eccentric reducer	

WARNING:

1. No excess flow valves on the tank’s liquid outlet connections are shown in these schematics. If local regulations require the use of excess flow valves, its closing flow should be approximately 1.5 times higher than the pump’s rated capacity for the operational conditions.
2. Periodic inspection and maintenance of Corken products is essential.
3. Only experienced, trained and qualified personnel are to make inspection, maintenance and installation of Corken products.
4. Maintenance, use and installation of Corken products must comply with Corken instructions, applicable laws and safety standards such as NFPA 58 for LP-Gas and ANSI K6.1-1972 for Anhydrous Ammonia.
5. Transfer of toxic, dangerous, flammable or explosive substances using Corken equipment is at the user’s risk. Only qualified personnel should operate Corken equipment according to the applicable laws and safety standards.

UNDERGROUND TANK WITH MANIFOLD FOR SUBMERSIBLE PUMP



BILL OF MATERIALS

REF. NO.	DESCRIPTION	REMARKS
1	2”, schedule 80 pipe	
2	5” manifold	Existing
3	2” ball valve, full port	Manual or remote
4	Corken 150 Series pump	With 7.5 hp (5.5 kW) electric motor
5	1/4“ NPT pressure gauge	0-400 psig (0-28 bar g)
6	Corken B166 By-pass Valve 1” NPT	With spring code C
7	1/4“ NPT hydrostatic relief valve	Set at 450 psig (31 bar g)
8	In-line excess flow valve	Closing flow of 10-15 gpm (37-57 L/min)
9	Back pressure check valve	Like Corken’s Flo-Chek valves
10	2” ball valve	Existing
11	2” x 1 1/2” eccentric reducer	
12	5” flange	Existing
13	Pressure equalizing line	Part of existing 5” manifold. Must be open for pump to operate properly.
14	By-pass return line’s valve	Existing

WARNING:

1. No excess flow valves on the tank’s liquid outlet connections are shown in these schematics. If local regulations require the use of excess flow valves, its closing flow should be approximately 1.5 times higher than the pump’s rated capacity for the operational conditions.
2. Periodic inspection and maintenance of Corken products is essential.
3. Only experienced, trained and qualified personnel are to make inspection, maintenance and installation of Corken products.
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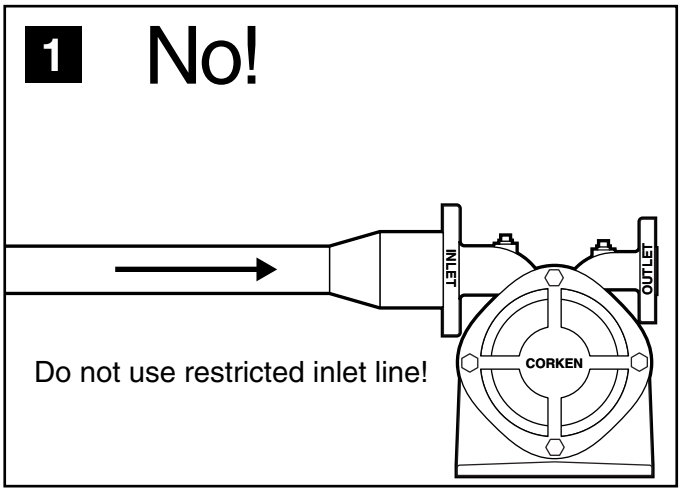
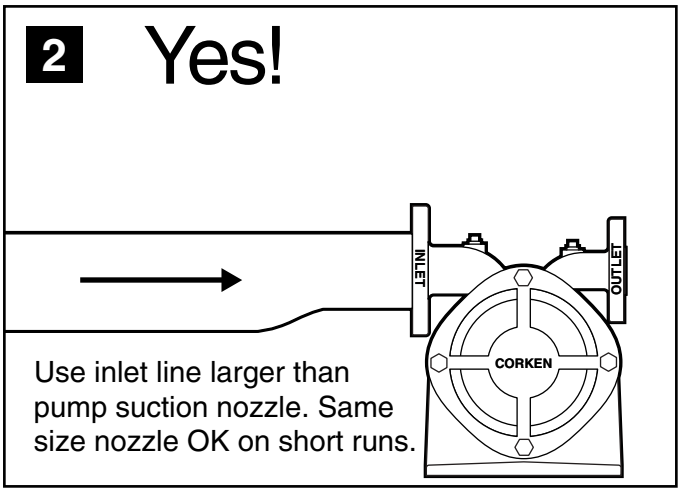
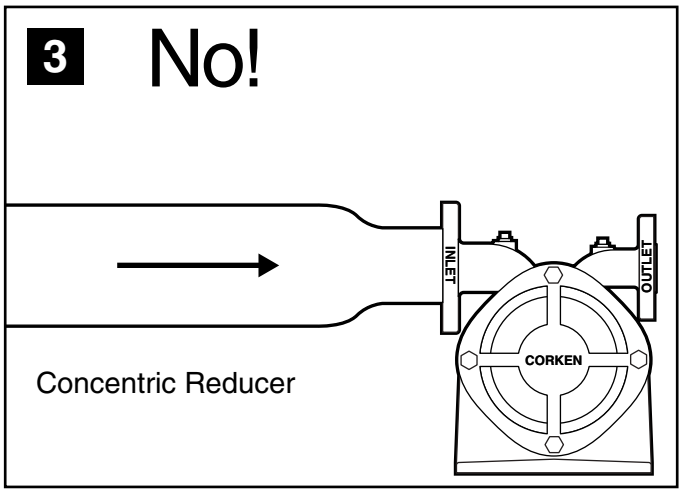
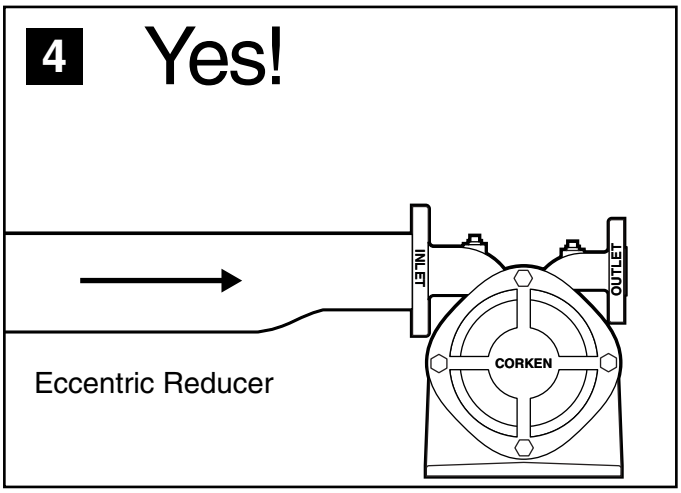
ABOVE GROUND INSTALLATION TIPS



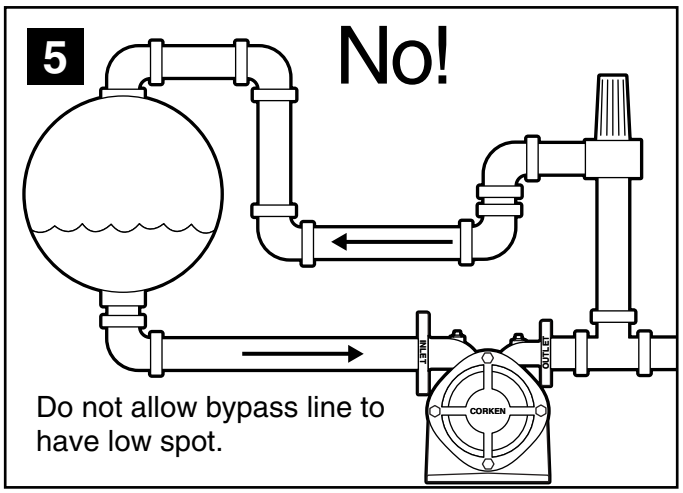


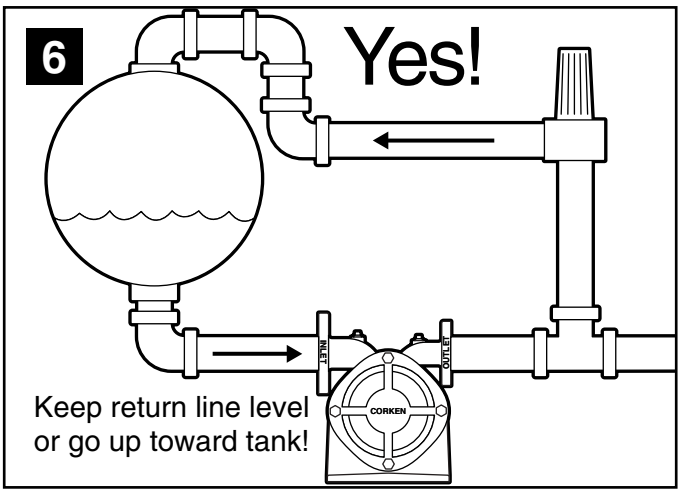
Pressure drop caused by restriction in suction line will cause vaporization and cavitation.





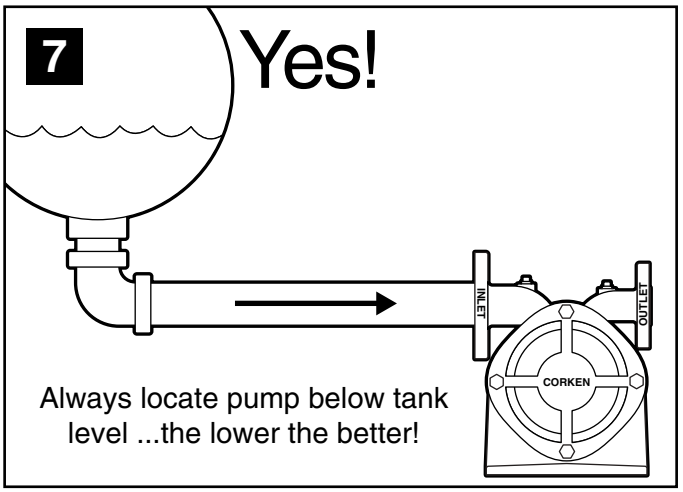
An eccentric reducer should always be used when reducing into any pump inlet where vapor might be encountered in the pumpage. The flat upper portion of the reducer prevents an accumulation of vapor that could interfere with pumping action.





Low spots in bypass line can collect liquid which prevents normal vapor passage for priming purposes just like the P trap in the drain of a kitchen sink. This is not a problem for bypass lines where vapor elimination is not required.

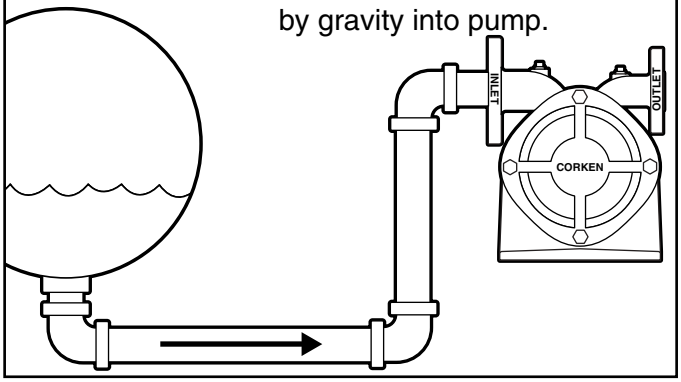
7 Yes!



Always locate pump below tank level ...the lower the better!

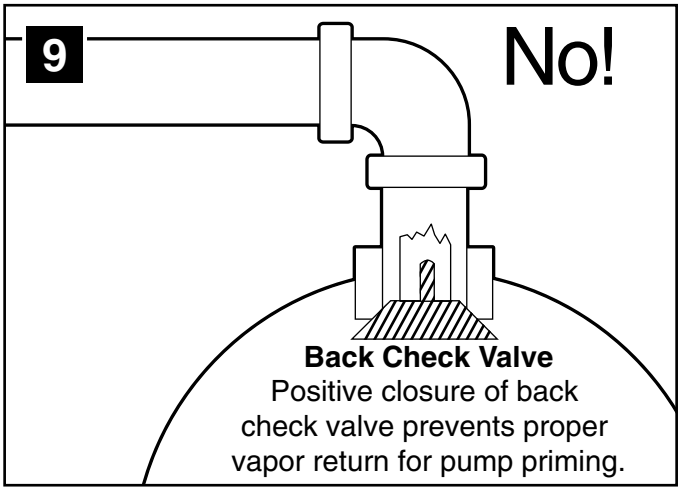
8 No!

Never locate pump above level of liquid feeding pump. Product must be able to flow by gravity into pump.



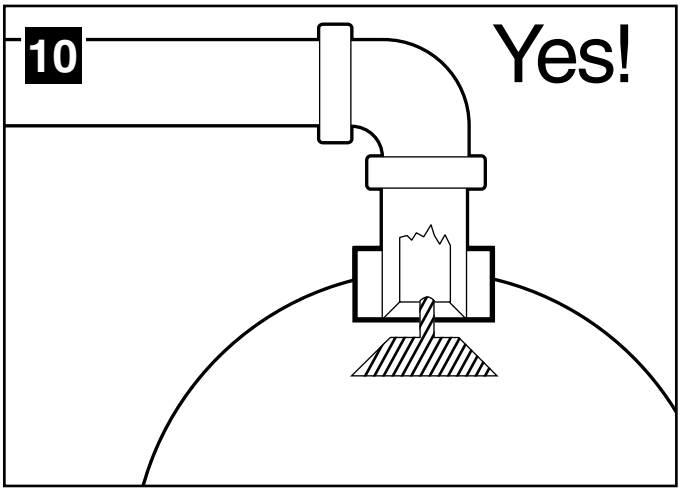
Since liquefied gases boil when drawn into a pump by its own suction, the pump must be fed by gravity flow to give stable, trouble-free operation.

9 No!

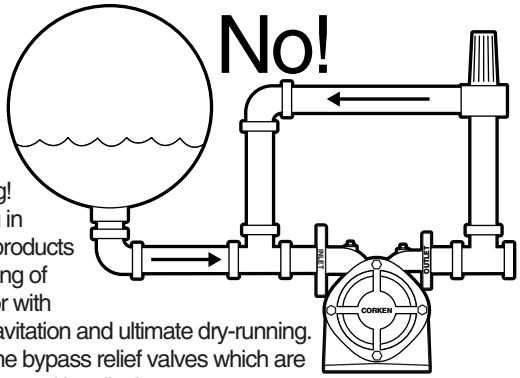


Back Check Valve
Positive closure of back check valve prevents proper vapor return for pump priming.

10 Yes!

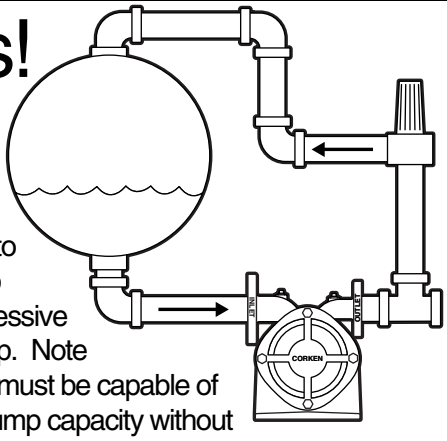


11 No!



Do not pipe bypass line back into suction piping! Heat building in recirculated products causes flashing of liquid to vapor with immediate cavitation and ultimate dry-running. This is why the bypass relief valves which are built into many positive displacement pumps should not be used for normal bypass action when handling liquefied gases. The internal valve should be considered to be a back-up safety relief in addition to a back-to-tank bypass valve and should be set to relieve at a pressure 10 to 20 psi higher than the working bypass. Some built-in bypass valves have the capability of being piped back-to-tank so check with the pump manufacturer.

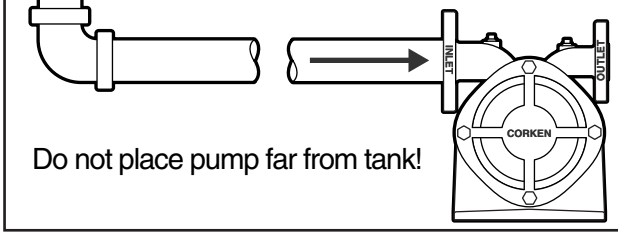
12 Yes!



Always pipe bypass back to tank! Make sure bypass line is large enough to handle full pump flow without excessive pressure build-up. Note that bypass line must be capable of bypassing full pump capacity without excessive pressure build-up. High pressure rise can cause bypass valve to chatter and vibrate.

13

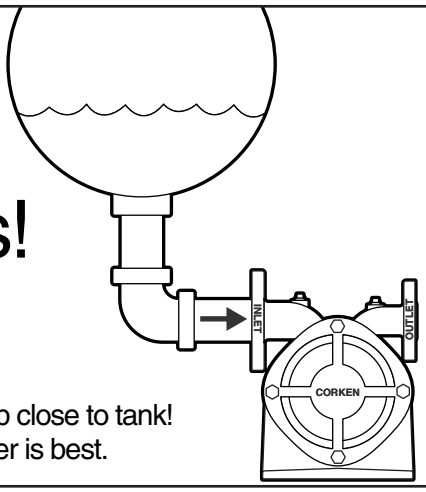
No!



Do not place pump far from tank!

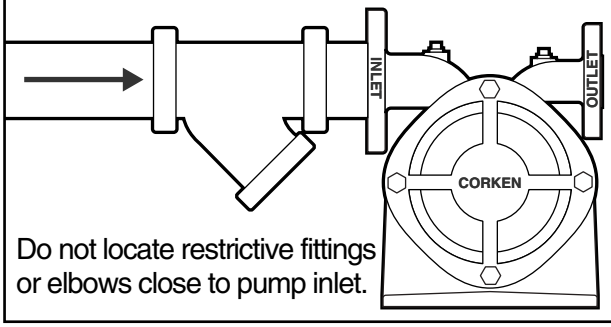
14

Yes!



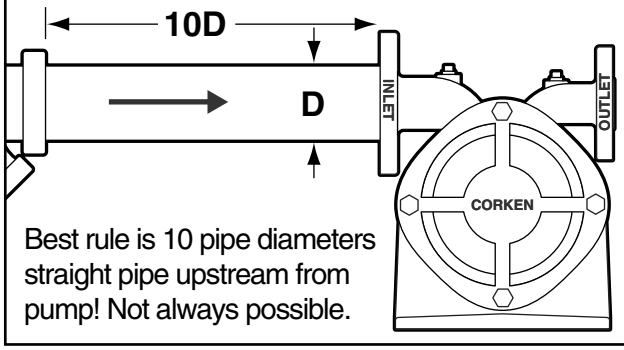
Locate pump close to tank!
Directly under is best.

15 No!



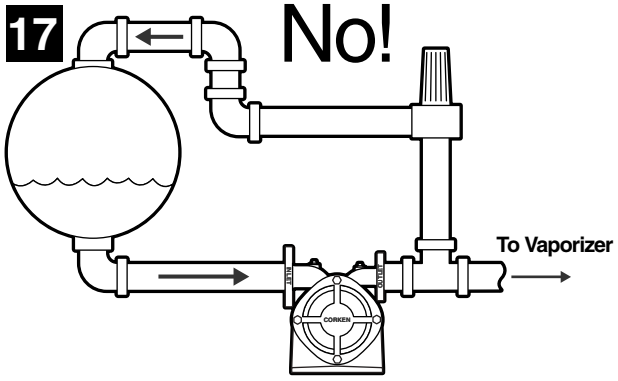
Do not locate restrictive fittings or elbows close to pump inlet.

16 Yes!



Best rule is 10 pipe diameters straight pipe upstream from pump! Not always possible.

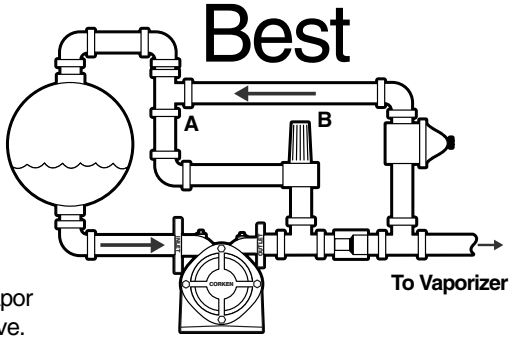
17 No!



On vaporizer feed pumps, a back check valve should be installed between the pump and to prevent back-flow of vapor from entering pump.

18 Best

Where A is a constant pressure bypass control valve and B is Corken B166 bypass and vapor elimination valve.



Valve A is a fixed pressure bypass like the Fisher 98H which limits the feed pressure into the vaporizer to a specific value regardless of system vapor pressure. A differential bypass valve like the Corken B166, T166, or B177 controls a fixed difference in pressure between the pump discharge and the tank. Differential valve B must be set to the maximum acceptable differential of the pump while fixed pressure valve A is set for the vaporizer pressure requirement.

APPENDIX A
MODEL NUMBER AND MOUNTING IDENTIFICATION CODE FOR CORO-FLO® – 150 MODELS

Models involved	Description	Code	Feature
FF150	Frame mounted pump with ANSI flanges	FF	Pump Type
FD150	Frame mounted pump with DIN flanges	FD	
DLF150	Direct mounted pump with c-face frame and ANSI flanges	DLF	
DLD150	Direct mounted pump with c-face frame and DIN flanges	DLD	
FF150 FD150 DLF150 DLD150		150	Pump size single seal
FF150 FD150	No integral motor included	C	Motor
DLF150	NEMA c-face frame (182TC to 215TC)(3-10 hp) Motor not included	C	
DLD150	E90L flanged motor frame/E132C c-face frame (2.2/5.5-7.5 kW) – Motor not included	M	
ALL	Bronze impeller Aluminum seal sleeve Bronze seal housing Steel shaft	D	Impeller seal sleeve and housing shaft material
ALL	Ni-resist (standard)	3	Seal seat material
ALL	Buna N (standard) Neoprene®[1]	A B	O-ring material

EXAMPLE

MODEL NUMBER

FF 150 C D 3 A

[1]Neoprene® is a registered trademark of DuPont.

APPENDIX B
MATERIAL AND MECHANICAL SPECIFICATIONS FOR CORO-FLO® – 150 MODELS

Material Specifications

Part	Standard		Optional
	Model	**Material**	**Material**
Case, cover	All	Ductile iron ASTM A536	
Impeller	All	Nickel-aluminum-bronze UNS-C95400	Steel Stainless steel
Impeller key	All	Steel, zinc plated	
Seal seat	All	Ni-resist	Stainless steel
Seal rotor	All	Carbon	
Seal metal parts	All	Stainless steel	
Seal sleeve	All	Aluminum	Stainless steel
Seal housing	All	Nickel-aluminum-bronze UNS-C95400	Stainless steel
Shaft	All	Steel	Stainless steel
Frame	FF / FD DLF / DLD	Gray iron ASTM A48, class 30 Ductile iron ASTM A536	
Bearing cap	All	Ductile iron	
O-rings	All	Buna-N	Neoprene®, Viton®, Teflon® Ethylene-propylene, Kalrez®[1]
Retainer rings	All	Steel	
Bearings	All	Ball	

[1]Neoprene®, Viton®, Teflon® and Kalrez® are registered trademarks of the DuPont company.

Operating Specifications

Specification	**Coro-flo® - 150 models**
Inlet	1-1/2" – ANSI 300# r.f. flange (DIN 2635, 40 PN, 40mm optional)
Outlet	1" – ANSI 300# R.F. flange (DIN 2635, 40 PN, 25mm optional)
RPM	3450 @ 60 hz or 2880 @ 50 Hz
Maximum working pressure	27.6 bar g (400 psig)
Maximum differential pressure	17.2 bar (250 psi)
Maximum / minimum temperature	107°C (225°F) / -32°C (-25°F)
Maximum driver	15 kW (20 hp)
Flow range	45.4 - 219.6 L/min (12 - 58 gpm)
Type of electric motor[2]	Rigid-base (frame mount) and c-face (direct mount)

[2] Consult factory regarding other types of motors.

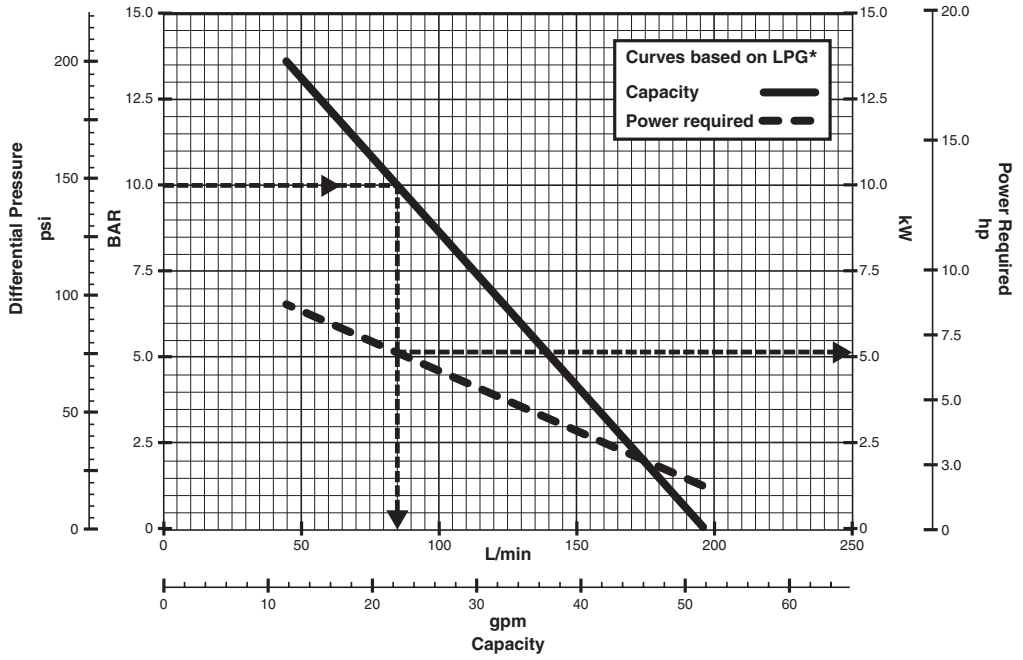
APPENDIX C
PERFORMANCE CURVES
CORO-FLO® – 150 MODELS (2880 AND 3450 RPM)

Example @ 2880 RPM

Differential Pressure
10.0 bar
145.0 psi

Flow
85 L/min
22.5 gpm

Power Required
5.1 kW
6.8 hp

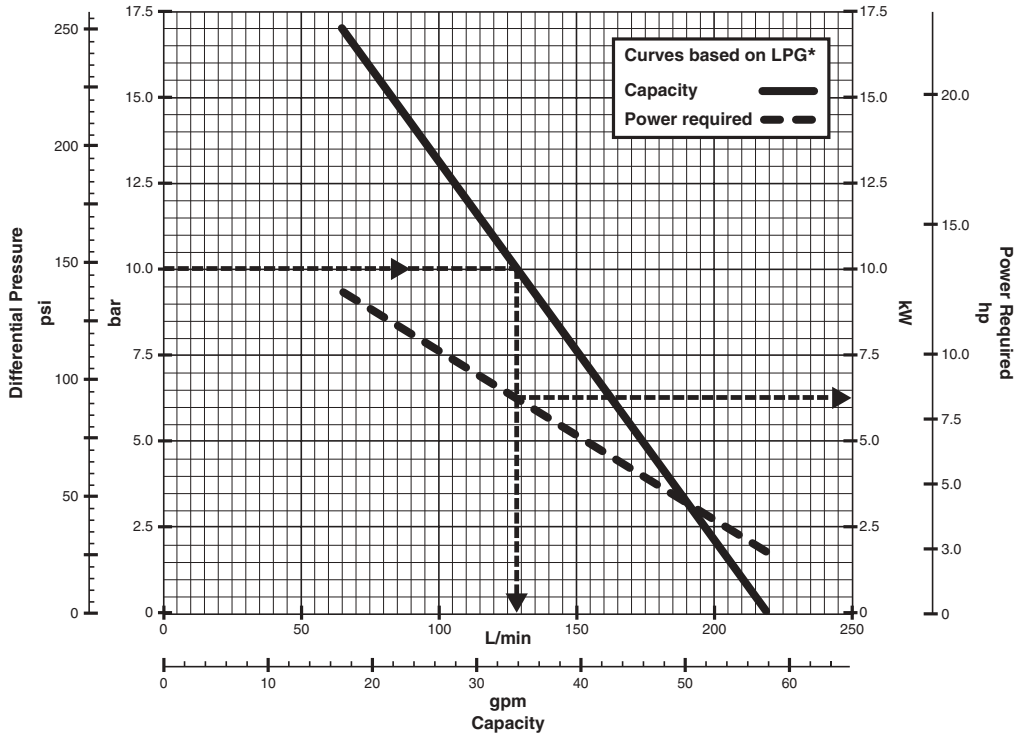


Example @ 3450 RPM

Differential Pressure
10.0 bar
145.0 psi

Flow
128 L/min
33.8 gpm

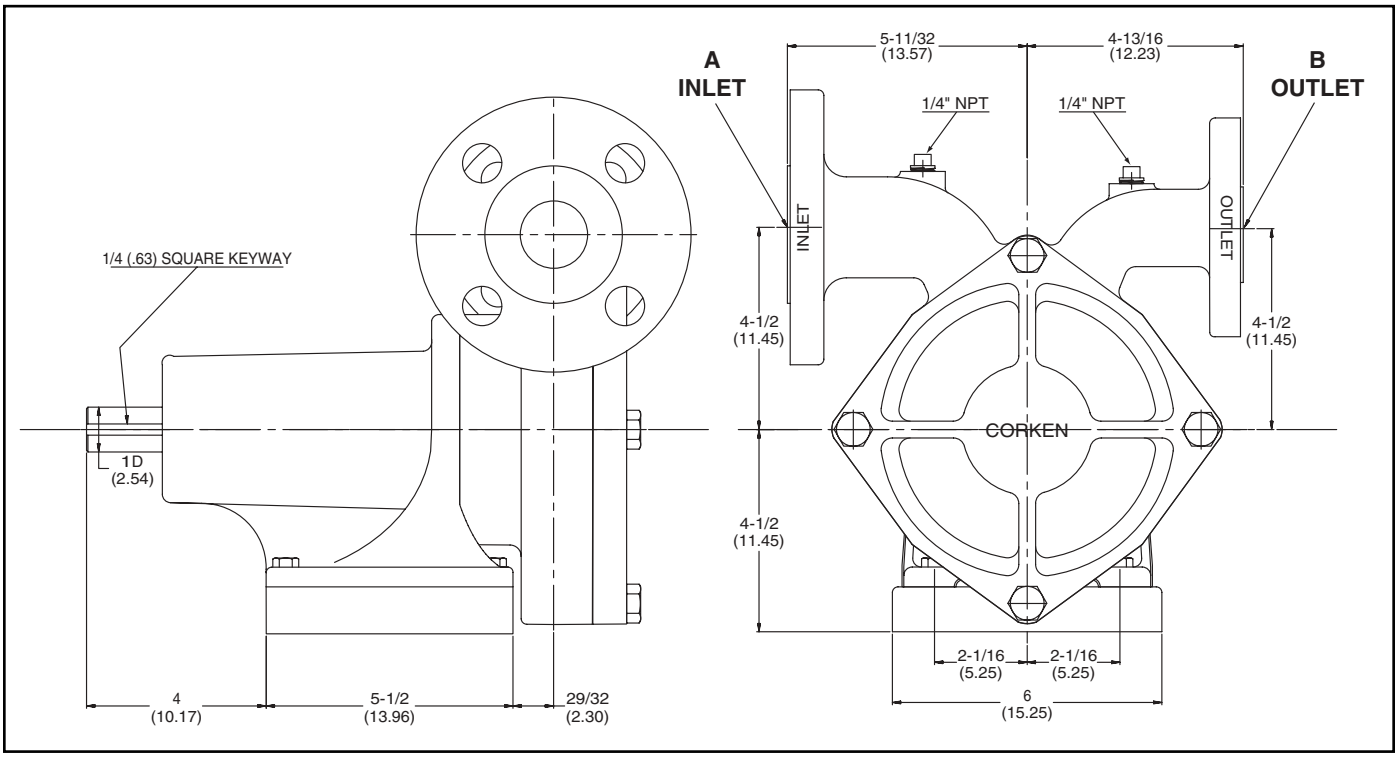
Power Required
6.3 kW
8.4 hp



***The performance curves are based on aboveground LPG installations. Performance curves for underground LPG tanks will vary based on the specific installation. Consult factory.**

APPENDIX D
OUTLINE DIMENSIONS FOR FRAME MOUNT
150 MODEL

ANSI FLANGE (FF) AND DIN FLANGE (FD)



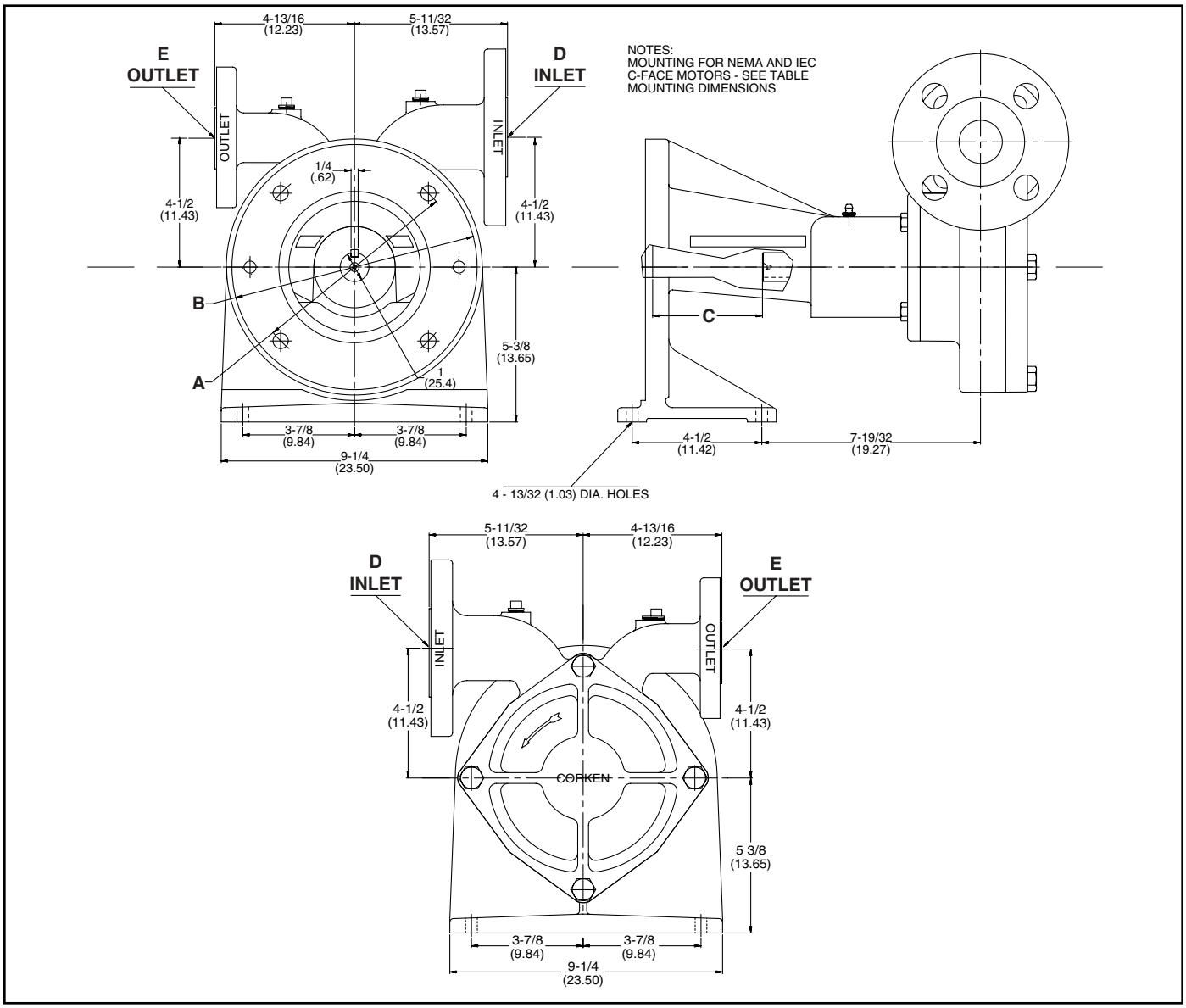
DIMENSIONS IN INCHES (CENTIMETERS)

FLANGE SIZES

MODEL	DIMENSION A (INLET)	DIMENSION B (OUTLET)
FF150	1-1/2” ANSI 300 lb	1” ANSI 300 lb
FD150	DIN 2635, 40 PN, 40 mm	DIN 2635, 40 PN, 25 mm

APPENDIX E
OUTLINE DIMENSIONS FOR AND DIRECT MOUNT
150 MODEL

ANSI FLANGE (DLF) AND DIN FLANGE (DLD)



DIMENSIONS IN INCHES (CENTIMETERS)

MOTOR MOUNTING DIMENSIONS

	DIMENSION A	DIMENSION B	DIMENSION C
NEMA	8-1/2”	7-1/4”	3-13/16”
IEC	165 mm	130 mm	90.75 mm

FLANGE SIZES

MODEL	DIMENSION D (INLET)	DIMENSION E (OUTLET)
DLF150	1-1/2” ANSI 300 lb	1” ANSI 300 lb
DLD150	DIN 2635, 40 PN, 40 mm	DIN 2635, 40 PN, 25 mm

APPENDIX F
TROUBLESHOOTING GUIDE

In diagnosing pump and "system" troubles, the following information is essential:

1. Pump model and serial number
2. Electric motor; hp and RPM
3. Product specific gravity
4. Product temperature
5. Pressure at pump's suction port
6. Pressure at pump's discharge port
7. Pressure in the storage tank
8. Pressure in the tank being filled
9. Size and length of the discharge pipe and hose

Problem	Cause	What To Do
Low Capacity	Pump speed too low Wrong electric motor	Check the RPM of the electric motor.
	High differential pressure	Remove the restrictions in the discharge piping / hose, or increase their sizes.
	Vapor lock	Regenerative turbine pumps "vapor- lock" when reaching their maximum differential pressure capability. See above for high differential pressure.
	By-Pass valve stuck open or set too low	Readjust, repair or replace the by-pass valve
	Clogged strainer	Clean strainer screen.
	Worn impeller	Replace the impeller.
	Suction pipe too small or restricted	Indicated by pump's inlet pressure dropping when the pump is started. Remove restrictions and/or increase pipe size.
Pump runs but no flow	Valve closed	Check valves and make sure they are in the open position.
	Excess flow valve slugged or closed	Stop pump until the excess flow valve opens. If the problem continues, install a new or larger capacity excess flow valve.
	Wrong rotation	Check the rotation of the electric motor and change the rotation.
	Suction pipe too small or restricted	Indicated by pump's inlet pressure dropping when the pump is started. Remove restrictions and/or increase pipe size.
Pump will not turn – locked	Foreign matter in the pump	Clean out the pump – inspect the strainer screen.
	Bearing seized	Replace the pump's bearings - grease bearing every three months, using a ball bearing grease.
	Moisture in the pump	Thaw and break loose carefully. Check with the product supplier if the product contains water. Properly remove the moisture from the product.
Pump will not build pressure	Poor suction conditions	Check the storage tank excess flow valve – Clean filter screen. The suction pipe might be too small or restricted. Remove restrictions and/or increase pipe size.
	By-Pass valve set too low	Set the valve for higher pressure (see valve's instructions).
	Too much impeller's clearance	Do a Performance Test on the pump (see Preventive Maintenance Program).

APPENDIX F (CONTINUED)
TROUBLESHOOTING GUIDE

Problem	Cause	What To Do
Noise or vibration in the pump	Cavitation from poor suction conditions	Make sure all valves are open, look for restrictions on the suction piping and clean the strainer screen.
	Coupling misaligned	Align the coupling.
	Coupling or coupling guard loose	Tighten the coupling and its guard.
	Coupling rubber insert worn or damaged	Replace the rubber insert and check coupling alignment.
	Worn bearings	Replace if necessary – Lubricate every three months.
	Defective or wrong size By-Pass valve	Confirm the size of the by-pass valve required for your application. Inspect, repair or replace the valve.
	Loose anchor bolts	Tighten all pump's anchor bolts.
Electric motor gets hot or overload protection kicks out	High differential pressure	Check the motor's full load amperage. Adjust the by-
		pass valve setting to a lower setting. See recommendations for low capacity due to high differential pressure.
	Low line voltage	Check line voltage when in operation. Be sure motor is wired for the proper voltage. Check the electric motor's nameplate.
	Starter overload Heaters too small	Check the motor load with an ammeter and confirm the heater size with the starter's manufacturer.
	Motor shorted	Totally Enclosed Fan-Cooled electric motors (TEFC) and explosion proof electric motors are subject to moisture condensation inside when used intermittently. To eliminate moisture you might allow the motor to operate at least once a week until it get sufficiently hot to evaporate the moisture.
Leaks	Failed O-rings or mechanical seal assembly	Inspect and replace the seals and O-rings, if needed.

APPENDIX G
EXTENDED STORAGE PROCEDURES

If your Coro-Flo pump is to be removed from service for some time, the pump must be protected, as propane, butane and anhydrous ammonia all leave the metal "bare" and open to corrosion. Piping and tanks not in service should also be protected, as the rust that forms can destroy the pump's seals almost immediately after startup.

1. Fill or thoroughly flush the pump with a light rust-inhibiting oil. (If the pump is flushed with oil, placing some desiccant packets inside the pump will provide added protection.)
2. Plug all pump openings.
3. Store in a dry location.
4. Before placing the pump back into service, drain the oil and remove any desiccant packets.
5. Refer to "Operation of your Coro-Flo® pump" on page 8.

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Corken, Inc. • A Unit of IDEX Corporation

P.O. Box 12338, Oklahoma City, OK 73157 U.S.A.
3805 N.W. 36th St., Oklahoma City, OK 73112
Phone (405) 946-5576 • Fax (405) 948-7343

Visit our website at http://www.corken.com
e-mail us at info.corken@idexcorp.com

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