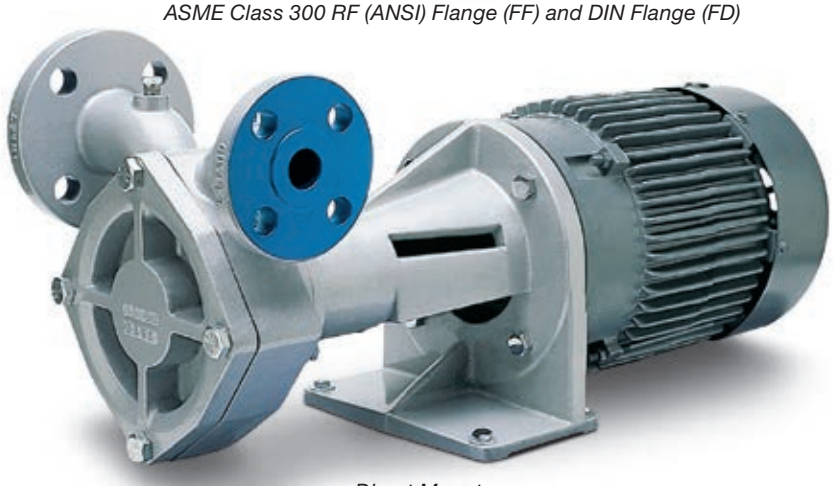
Installation, Operation & Maintenance Manual

Regenerative Turbine Pumps

for LPG, NH_3, and Many Other Liquefied Gases and Thin Liquids

All Models 060, 075, and 150

Frame Mount
ASME Class 300 RF (ANSI) Flange (FF) and DIN Flange (FD)



Direct Mount
ASME Class 300 RF (ANSI) Flange (DLF) and DIN Flange (DLD)

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.

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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, INC. 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, INC., 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

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 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 _____

Table of Contents

Principles of the Coro-Flo® Pump

The Corken Coro-Flo® is a special type of pump known as a regenerative turbine. The liquid flows through the inlet nozzle and passageways on each side of the impeller (the rotating element) and is recirculated constantly between the teeth of the impeller and passageways as the impeller rotates. The fluid makes a complete revolution inside the pump case before it is diverted through the outlet nozzle. As the differential pressure increases, the horsepower required to drive the pump increases but the capacity decreases. Differential pressure is the difference between the pressure at the inlet and outlet of the pump.

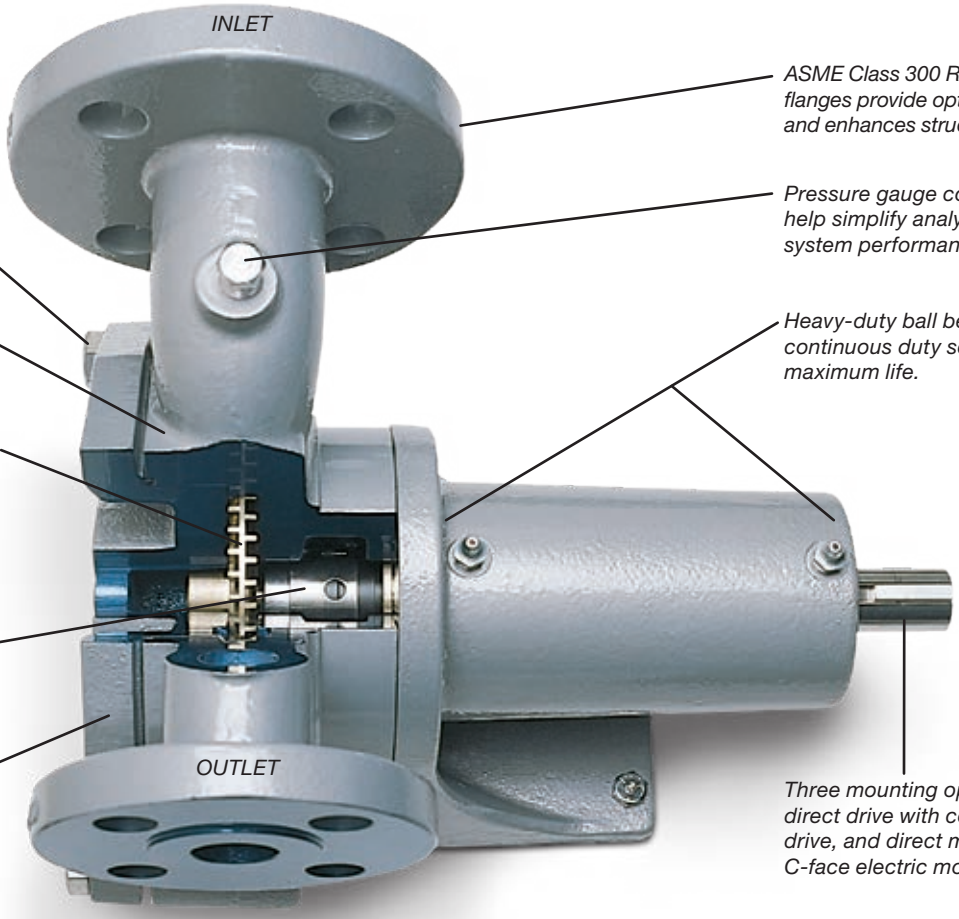
The impeller is the only moving part and does not contact the pump casing. Consequently, there is very little impeller wear when pumping volatile liquids with little to no lubricating qualities such as LP-Gas and ammonia.

Exclusive Features of the Coro-Flo® Pump

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

In addition to being well suited for handling volatile liquids, the Coro-Flo® pump has several other features that make it easier to operate and maintain.

- The pump models listed in this manual are mounted directly to an electric motor (direct mount) or to a separate frame (frame mount) that connects to the motor using a flexible coupling.
- Underwriters' Laboratories, Inc. has tested and inspected all of the pumps listed in this manual and approved them for use in LP-Gas and ammonia applications. The nameplate on the pump shows the UL label.
- Ductile iron, a metal with the strength of steel, is used for all parts under pressure of the liquid.
- The impeller floats on a shaft and can be easily replaced without disturbing the piping or driver by simply removing the pump cover. No special tools are needed.
- The mechanical seal assembly can be replaced without disturbing the piping or driver and no special tools are required.
- Pressure gauge connections with 1/4" pipe thread are located on the inlet and outlet nozzles.



ASME Class 300 RF (ANSI) and DIN flanges provide optimal leak control and enhances structural integrity.

High strength metric fasteners.

Pressure gauge connections help simplify analysis of system performance.

Case and cover of ASTM A536 ductile iron, providing maximum thermal shock protection.

Heavy-duty ball bearings rated for continuous duty service provide maximum life.

Self-aligning, free-floating, precision machined impeller, incorporating proprietary design, optimizes flow and provides quiet non-pulsating transfer.

Maximum sealing provided by a single balanced, precision lapped, mechanical seal.

Designed for ease of service. Seal can be replaced in minutes by simply removing the cover.

Three mounting options available: direct drive with coupling, belt drive, and direct mounted with C-face electric motor.

Chapter 1—Installation

1.1 Location

NOTE: Must be installed in a well ventilated area.

The installation of a Coro-Flo® pump is a simple matter. However, in order for the pump to deliver the performance expected, the principles discussed in this book must be followed exactly. The piping instructions in Appendix H illustrate methods proved by hundreds of installations. Different installations may require slight variations but should not compromise the method.

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 does not meet the demand of the pump, expect trouble!

The pump must be located as near the storage tank as possible. The complete inlet line, including the vertical line from the tank must not exceed 12 feet in length. The bottom of the tank should not be less than two feet above the pump inlet nozzle. Four feet above the pump nozzle is standard.

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 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.)

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. To minimize damage to the paint, web slings are preferred over metal slings.

Pump Weights

Model	Shipping Weight in lbs (kg)
Frame mount	63 (28.6)
Direct mount	75 (34.0)

1.2 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 or internal valve.
4. A “Y” type strainer with a 20 mesh screen should be placed on the inlet line of the pump.
5. To accommodate piping strains, a flexible connection should be used on the pump inlet and outlet.
6. To change line size, an eccentric swage at the pump inlet nozzle is recommended (flat side up, to avoid vapor formation.)
7. The inlet line must be level or slope downward to the pump.

1.3 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 shows how the pump is operating on the inside so be sure to 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 in length, a check valve should be installed near the pump outlet.

1.4 The Bypass System Must Include the Following

1. A bypass system for the pump must be installed. Without this system, the pump has little chance of performing.
2. A Corken B166 bypass valve allows the pump to vent vapors from the pump and act as a differential relief valve making it ideal for the bypass system.
3. The bypass line must rise uninterrupted to an opening in the vapor section of the storage tank. The tank fitting must be either an excess flow valve or a vapor return valve. It should never be a filler or back check valve.
4. To meet the specifications for Underwriters

Laboratories (UL), 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 should be set according to the latest UL guidelines.

1.5 Pump Foundation for Frame Mounted Models

The pump assembly must be secured to a concrete foundation using all of the mounting holes in the baseplate. 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 frost line in the region. There are many ways to construct a foundation so the example in figure 1.5 is only a suggestion.

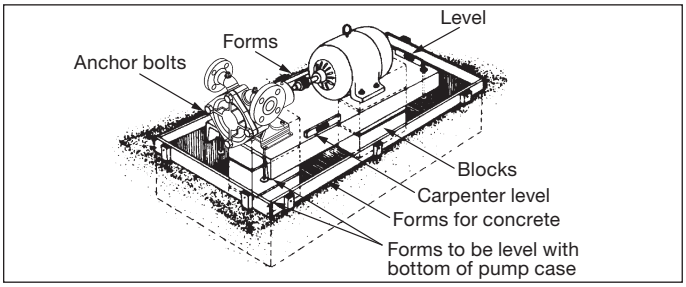


Figure 1.5

1.6 Level Base

After the concrete has set, confirm the pump mounting is level. If necessary place metal shims under the baseplate near the anchor bolts as shown in figure 1.6. Tighten the anchor bolts once again and confirm the base is level. Repeat this process until the pump mounting is level side to side and front to back.

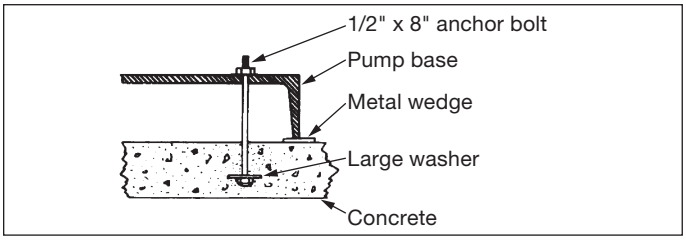


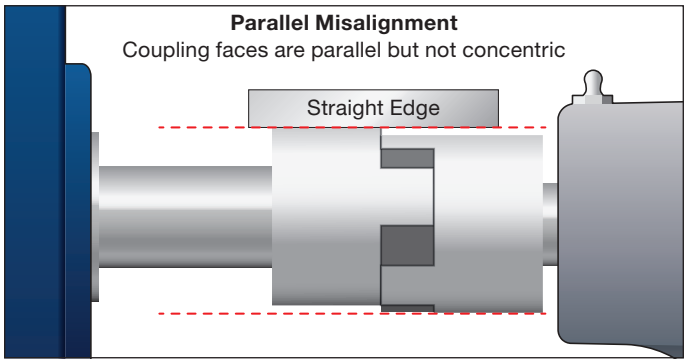
Figure 1.6

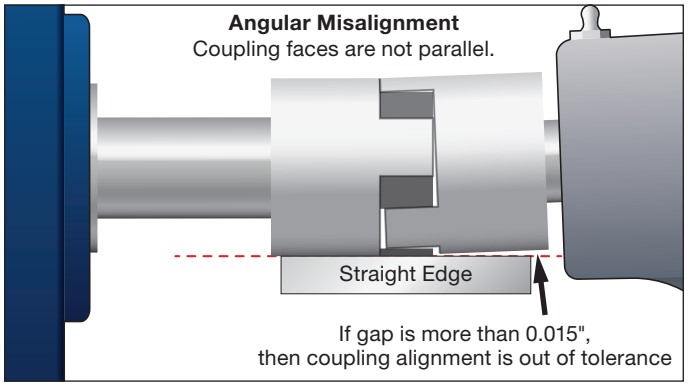
1.7 Coupling Alignment—F-Models

For a long service life, the coupling alignment must be near perfect. **The shafts of the pump and driver are carefully aligned at the factory but should always be checked after the pump is installed and before the initial operation.**

Lay a straight edge across both coupling halves on the top and side. For proper alignment, both coupling faces must be parallel and concentric (figure 1.7).

If misalignment exists, adjust the shims between the pump and baseplate until exact alignment is accomplished.





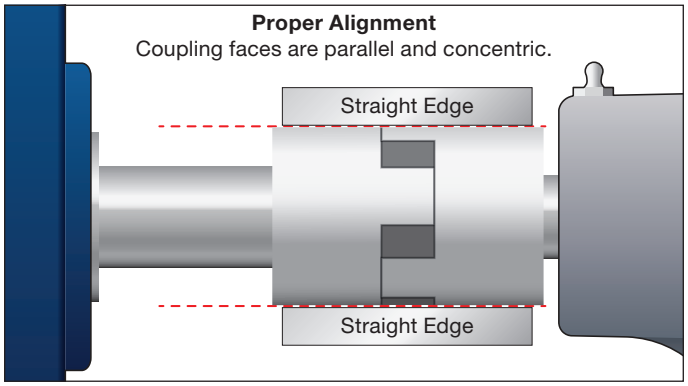


Figure 1.7

Scan QR Code and refer to the maintenance video titled "How to Align the Coupling Between the Motor and Pump".

1.8 Driver Installation

Wiring the electric motor correctly is extremely important. An improperly wired motor causes expensive motor difficulties so a competent electrical contractor is recommended. The wire sizing chart indicates the minimum standards for wire sizes.

Wiring the motor for the proper voltage is critical as well. If low voltage is suspected, call the local power company and confirm the voltage provided and wire accordingly. Connecting to improper voltage will completely destroy the motor.

With explosion-proof motor applications in humid climates, the normal breathing and alternating temperatures of the motor (i.e. warm during operation and cold when stopped) often cause moist air to be drawn into the motor housing. The moist air condenses and may eventually add enough free water to the inside of the motor causing it to fail. To prevent this, make a practice of running the motor and pump at least once a week on a bright, dry day for at least an hour using the pump's bypass system. During this time, the motor heats up and vaporizes the condensed moisture. No motor manufacturer guarantees an explosion-proof or totally enclosed motor against damage from moisture.

Engine drivers require special consideration so 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 1,000 feet above sea level, so if the installation is at a higher altitude than normal, consult the factory.

1.9 Wire Sizing Chart

Motor				Recommended wire size, AWG[1]		
Hp	Motor Phase	Volts	Approximate Full Load Amperes	Length of Run (ft)		
				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	28.0	8	6	4
		460	14.0	12	12	10
15	3	230	42.0	6	4	4
		460	21.0	10	10	8
20	3	230	54.0	6	6	4
		460	27.0	10	10	10

[1] Each country may use a different form of wire size measurement (AWG, SWG, mm² 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 local standards and regulation for specific wiring requirements.

Chapter 2—Operation

The pump operator should be fully informed of the recommended operation procedures and safety precautions. See Appendix B and Appendix C for operating specifications and performance curves. The operator must be made aware of the specific risks generated by the product handled and familiar with the purpose and function of all piping, valves, and instrumentation of the installation.

The following steps should be performed before and during 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 storage tank shutoff valve of the bypass system.
4. Check the motor for the proper voltage. (See instructions in section 1.8 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 out until the pump pressure gauge shows nearly the same pressure it did prior to starting the pump. Screw the adjusting screw in until the pressure gauge indicates the pump is starting to lose discharge pressure and the pointer is rapidly fluctuating. Then back the adjusting screw out a turn or two until the pressure gauge again indicates a steady pressure. Tighten 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 can run constantly for this period of time.

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

2.1 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 containers are filled easily and the proper amount of gas is supplied to burners and carburetors, purging the air is essential.

Some cylinders are difficult to fill when 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.

2.2 Pumping From Underground Tanks

Pumping boiling liquids, like LPG and other liquefied gases, offers a unique set of challenges for underground tank installations. When the piping system is designed to function with a pump, Coro-Flo pumps offer superior performance in these applications. Liquefied gases are stored at exactly their boiling points. Any increase in temperature, as well as any decrease in pressure, cause the product to boil and form vapor. To minimize the amount of vapor formation at the pump's suction, properly designed suction piping is critical. For boiling liquids, the net positive suction head available (NPSHA) of an installation is reduced to the height of the liquid level above the pump minus the frictional losses. With an underground tank where the pump is located above the liquid level, the net static suction head becomes the net suction lift, which is negative not positive. This means the installation NPSHA is always negative so the pump will always have vapor in the liquid stream.

Coro-Flo regenerative turbine pumps are designed to handle some vapor without the damaging effects of cavitation. They are designed with a free floating impeller that helps minimize wear and noise in this type of application. When properly installed, Coro-Flo pumps provide excellent service in underground tank applications.

Design Criteria for Underground Applications

- Minimize frictional losses:
  - — Pump should be as close as possible to the tank's liquid outlet connection.
  - — Use a minimal number of fittings and elbows.
  - — No strainer is necessary since the tank itself acts as a gravity collector.
  - — Use full-port ball or low restriction valves.
  - — Use adequate piping sizes and do not go below the inlet and outlet size of the pump.
- Limit the net static suction lift to approximately 14 feet (4.3 meters) maximum.
- Use vapor eliminator valves and return to the vapor space of the tank. A Corken B166 bypass valve has this feature.
- An excess flow valve should be used in parallel for additional vapor elimination.
- Always use back-pressure check valves downstream of 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 Gal (3,785 L) tank, limit the capacity of the pump to 15 gpm (56.8 L/min).

For more details on underground piping systems, see Appendix H.

Chapter 3—Preventative Maintenance

Purpose

An effective preventive maintenance program minimizes downtime and manpower requirements while maximizing the performance of the equipment.

Scope

The preventive maintenance chart in figure 3.1 includes items to be inspected with a recommended time schedule. These are basic maintenance recommendations so each company should develop a comprehensive preventive maintenance schedule based on operational requirements for the application.

Only a properly trained technician that follows all of the applicable safety procedures should perform maintenance.

Procedures

Every procedure herein recommended must be performed in a safe manner utilizing tools and/or equipment free of hazards. Be certain to 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 procedures.

1. Visual inspection:

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

2. Clean inlet strainer screen:

   A clogged strainer screen restricts flow causing vapor to form and leads to cavitation. The presence of cavitation reduces the pump's capacity and accelerates wear on internal parts.

Item to Check	Daily	Monthly	Three Months	Six 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.

Figure 3.1: Preventive Maintenance Chart for Coro-Flo® Pumps

3. Inspect drive coupling and guard:

   Check the coupling alignment and realign if necessary. Inspect the rubber spider gear for cuts, broken sections, excessive wear and replace if necessary.

4. Lubricate pump bearings:

   Use only ball bearing grease, applied with a manual lubrication pump or gun. Always clean the grease openings thoroughly before inserting any grease.

   NOTE: A low temperature ball bearing grease with a minimum rating of at least -25°F to 250°F is recommended. The lubricant used by the factory is Mystik JT-6 Low Temperature Extreme Grease.

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. Again, 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 bypass valve. Then slowly close the valve downstream of the bypass valves. The discharge pressure of the pump should increase to the maximum differential pressure of the pump at zero flow conditions (see Appendix C).

   C. If the maximum differential pressure is not obtained, the pump should be serviced. Refer to the seal replacement instructions in this manual and visually inspect the pump's impeller.

      Replace the impeller if damaged, warped, or shows signs of excessive wear.

      Uniform wear of the impeller is not visually detected. If the impeller has no visible damage, it can be re-used as long as the pump's performance has not fallen off.

7. Re-tighten all hold down bolts.

8. Inspect motor starter contact points:

   Note: This must be performed by an authorized electrician according to the guidelines of the electric motor manufacturer.

9. See Appendix G, for extended storage procedures.

Chapter 4—Repair Service

CAUTION: Relieve system pressure before performing any maintenance to the pump. All maintenance must be performed in a safe manner by qualified personnel. Maintenance personnel should utilize tools and/or equipment free of hazards and follow the applicable safety codes of practice set by the local authorities having jurisdiction.

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

Since the only wear part influencing the pumping action is the impeller, perform pumping efficiency test prior to attempting any repairs. The trouble may lie in the piping system rather than with the pump. If the pump produces as much differential pressure when circulating through the bypass system as it did when it was new, the problem is elsewhere. Conversely, if the pump does not produce as much pressure as it did new, remove the cover and inspect the impeller.

Generally, uniform wear of the impeller is not visually detected. If the impeller has no visible damage, it can be re-used. Newer models starting with serial number prefix YU no longer use a shim for clearance. The impeller is locked in place with two retainer clips: one in front and one behind the impeller. Generally, the only time the impeller is replaced is when foreign material enters the pump casing causing damage to the impeller or performance is less than what it was new.

NOTE: On older models prior to serial number prefix YU, undetected impeller wear is compensated by removing the adjustment shim between the pump casing and cover. This tightens the tolerance between the pump's casing, impeller, and cover. If the pump is not performing like it did when new, remove the adjustment shim and re-tighten the pump cover. If the pump rotates freely, this should improve performance. If the pump does not rotate freely after removing the shim, install a new impeller for better performance.

If visual inspection indicates the impeller is in good condition, remove the shim and reinstall the cover and make sure the pump spins freely. Many times this procedure adjusts for slight impeller wear. If the pump does not spin freely or the impeller is badly damaged or scored, it must be replaced.

This is a matter of removing the cover and the old impeller from the shaft. If the old impeller does not slide off the shaft, the threaded bolt holes in the impeller can be used for jacking/pulling. The new impeller should slide freely over the shaft. If it does not “float” on the shaft, sand the shaft lightly to achieve the proper fit.

Replacing the mechanical seal is simple procedure. The pumps are configured with a variety of O-rings. Selection of O-ring materials is based on the product being transferred. The most compatible 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 identification code on the nameplate indicates the materials of construction. Refer to Appendix A and Appendix B for details.

Chapter 5—Seal Replacement Instructions (NOTE: Models Beginning with Serial Number Prefix YU)

Scan QR code to view list of maintenance videos.

Caution

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

Cleanliness

The smallest amount of dirt on a new seal can cause premature seal failure. Keep all parts, tools, and hands clean while handling the seal. Avoid touching the smooth lapped faces of the carbon rotor or seal seat. When pumping LP-gas, anhydrous ammonia, and similar light liquids, the fluid is five to ten times thinner than water so the new seal needs to be as clean as possible.

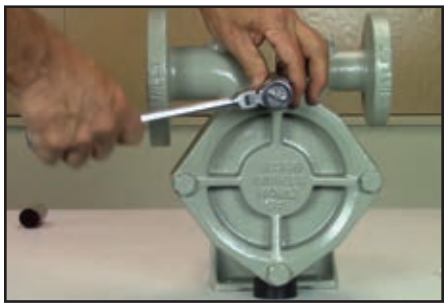
Workmanship

This pump is a precision piece of equipment with very close tolerances so treat it with care and never use excessive force during disassembly and re-assembly.

DISASSEMBLY:

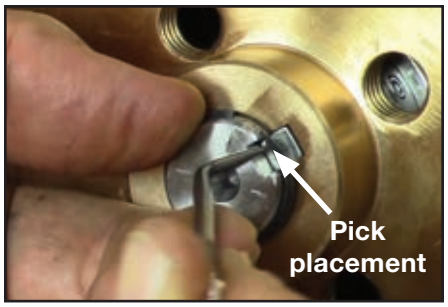
STEP 1

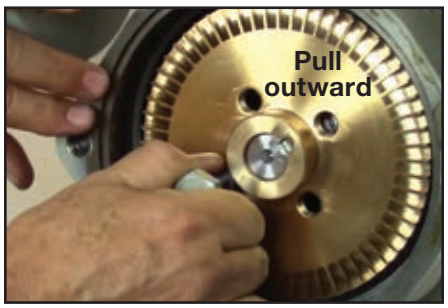
Remove the pump cover: Remove the bolts and pull the pump cover and O-ring from the pump case. NOTE: On older models there is a clearance shim as well. This is a close tolerance fit so if the cover does not slide out easily, use two flathead screwdrivers to carefully pry the cover from the pump casing.



STEP 2

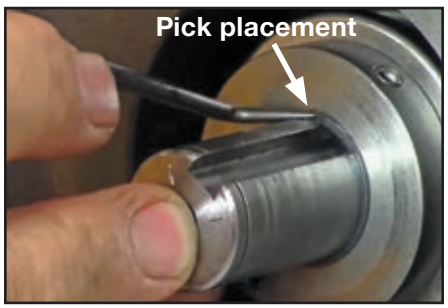
Remove the retainer ring, impeller, and impeller key: Using a pick or small flathead screwdriver, carefully remove the retainer ring from the pump shaft. NOTE: A retainer ring is not used on older models prior to serial number 226858AG. If the impeller does not slide off the shaft freely, insert two cover bolts in the threaded holes and gently pull outward as shown. Forceful removal can warp the impeller or damage the case O-ring groove so use care during this step. Lastly, remove the impeller key. If the impeller key does not slide off the shaft freely, use a pair of side cutters, pick, or small screwdriver to pry the key out of the key way at the end of the pump shaft.





STEP 3

Remove retainer ring: Using a flathead screwdriver or pick, pry up the rear retainer ring from the groove and slide off the shaft. Do not damage the shaft while removing the retainer ring.

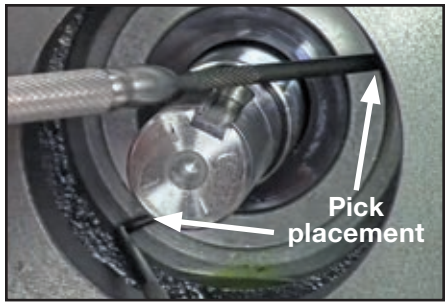


STEP 4

Remove seal sub assembly: Slide the seal sub assembly (seal and seal sleeve) off the shaft and remove the seal sleeve O-ring from the shaft.

STEP 5

Remove seal housing: Using a 90° pick or hook tool inserted behind the face of the seal housing, slowly pull out around the circumference of the seal housing until it can removed from the pump casing.



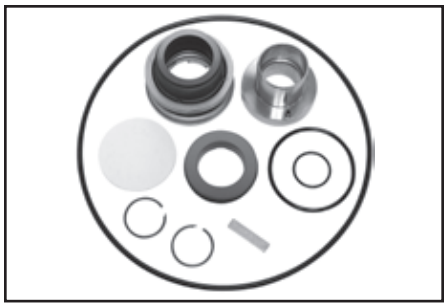
STEP 6

Remove seal housing O-ring and inspect the bearings: Use a pick to remove the old seal housing O-ring inside the pump casing. Clean the O-ring groove and shaft and remove any burrs around the keyway. Inspect the pump shaft bearings for wear by applying up and down and in and out movement. Since the seal assembly resides on the pump shaft, excess movement can cause a seal leak. Lastly, turn the shaft and check the bearings for any roughness. Change the bearings if roughness or movement is present.

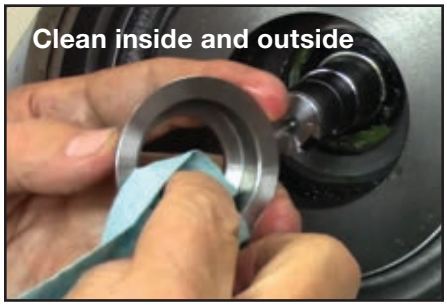
STEP 7

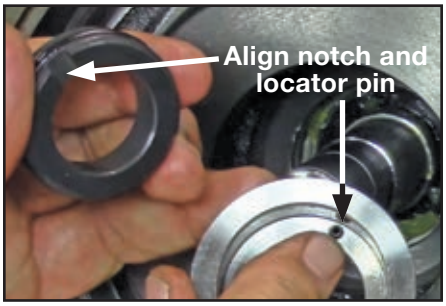
Remove seal seat: The seal seat is located inside of the seal housing and is removed using a pick or small screwdriver. Enter the inner circumference on the back side of the seal housing assembly and gently pry out the seal seat evenly as shown. NOTE: Clean the seal housing assembly before inserting the new seal seat.

ASSEMBLY
STEP 8
Verify the contents of the new 3189-1X_6 seal assembly and clean pump shaft before installation.
NOTE: Install the two locator pins before proceeding to STEP 9. One goes into the seal sleeve and one goes into the seal housing. Use the old seal assembly for reference.



STEP 9
Assemble the seal housing and seal seat: Make certain the locator pin is installed inside the hole on the seal housing. Clean the seal housing inside and out before inserting the new seal seat. 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 inside the seal housing as shown. To protect the seal seat during installation, cover the seal seat with the small cardboard disk that came with the new seal assembly. Make sure the cardboard disk is clean. Gently push on the cardboard disc to install the seal seat. NOTE: Make sure the locator pin is aligned with the notch in the seal seat.

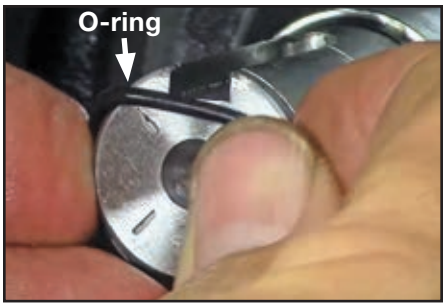


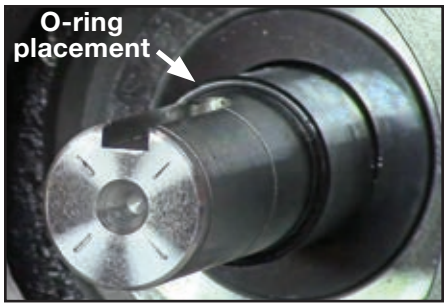


STEP 10
Install the seal housing O-ring and seal housing: Apply a thin coat of oil to the new seal housing O-ring before installation. NOTE: Insert the O-ring into the groove of the pump casing and hold in place with one finger. With a pick or small screwdriver in one hand, use the other hand to seat the O-ring using a circular motion. Apply a thin coat of oil to the seal housing and press evenly into the pump casing until it snaps into the groove.

STEP 11

Install the seal sleeve O-ring: Clean the pump shaft and install the new seal sleeve O-ring. Make sure it is seated on the shoulder of pump shaft.

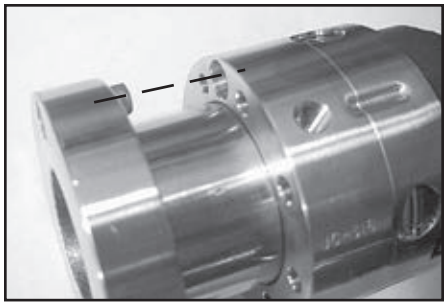




STEP 12

Assemble the seal and seal sleeve: Apply a thin coat of oil to the face of the rotating carbon and the O-ring that goes behind the rotating carbon. Insert the seal sleeve into the seal by aligning the locating pin on the seal sleeve with the notch/hole on the seal. NOTE: The current and previous seal assemblies are shown to the right. Although the installation photos show the new seal design, the assembly instructions are the same for the previous design.

Current design: Part #3189-1X_6



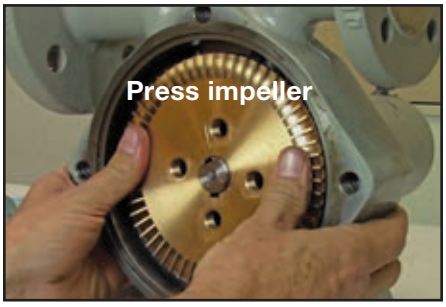
Previous design: Part #5264-X_6

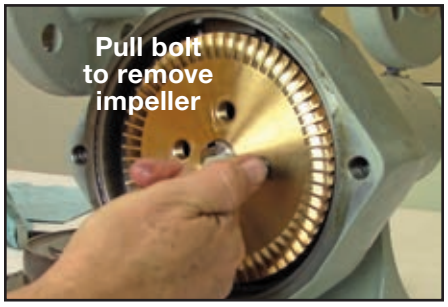
STEP 13

Install the seal: Before installing the new seal, make sure hands are clean. Small debris or contamination can cause the seal to leak. Align the seal drive pin with the pump shaft keyway and slide the seal assembly onto the shaft until the seal assembly snaps into place.

STEP 14

Install the first retainer ring: Install the first retainer ring at the rear of the shaft near the seal sleeve. NOTE: In order to seat the retainer ring inside the retainer ring groove, use the impeller to compress the seal assembly. Place the impeller on the shaft backwards (**hub side in**) and push inward until the retainer ring snaps into the groove on the pump shaft. After the retainer ring is seated into the groove, remove the impeller. For quick removal, insert one of the cover bolts into the impeller and remove it from the shaft.



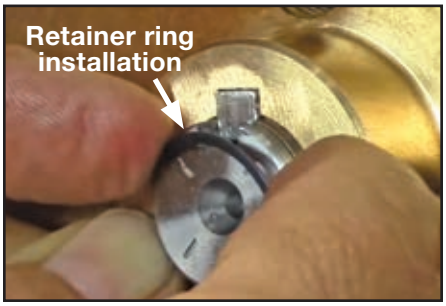


STEP 15

Install the rear impeller key: Install a new impeller key into the keyway slot located at the front end of the pump shaft. Next, install the impeller with the **hub side out**. The impeller should slide freely on the shaft. If it does not slide freely, carefully remove any burrs from the impeller key and/or keyway using a small file. Remove all fillings from the pump shaft and casing.

STEP 16

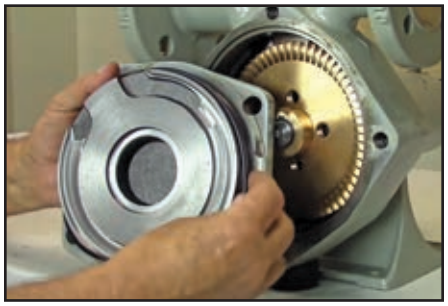
Secure the impeller and key with the second retainer ring: Make certain the impeller is pushed back to the pump casing. To ensure the impeller and key stay in place, install the second retainer ring into the groove located at the front of the pump shaft.

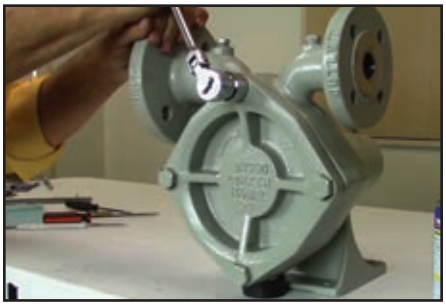


STEP 17

Install the cover: Install the O-ring, and pump cover. Torque each cover bolt to 60 ft•lbs. Be certain the Corken label on the cover is horizontal and right side up. Rotate the pump shaft and ensure the impeller turns freely. NOTE: On older models prior to serial number YU, it may be necessary to install a clearance shim if the pump does not turn after installing the cover.

Before operating the pump, pressurize the pump case with vapor. After the pump has been pressurized, slowly add liquid.





Scan QR code to view list of maintenance videos.

Appendix A—Model Number Identification Code and Available Options

Model 060 Coro-Flo® Pumps

Base Model Number	Frame Mount		Direct Mount	
	FF060	FD060	DLF060	DLD060
Inlet	1½" ASME [a]	40 mm DIN [b]	1½" ASME [a]	40 mm DIN [b]
Outlet	1" ASME [a]	25 mm DIN [b]	1" ASME [a]	25 mm DIN [b]
Weight, bare pump lbs (kg)	63 (28.6)	63 (28.6)	75 (34.0)	75 (34.0)
Description	Frame mounted	Frame mounted	Direct mount pump with C-face frame [c]	Direct mount pump with C-face frame [c]

Model Number
Base X X X X

Specification Fields

Motor	No integral motor	Standard	NEMA C-face frame (3–10 hp)[d]	C
		Not available	IEC/132 C-face frame (2.2–7.5 kW)[d]	M
Impeller, Seal Sleeve, Seal Housing, and Shaft Material	Bronze impeller Stainless steel seal sleeve Stainless steel seal housing Steel shaft	Standard		D
	Stainless steel impeller Stainless steel seal sleeve Stainless steel seal housing Stainless steel shaft	Charge option		E
	Steel impeller Stainless steel seal sleeve Stainless steel seal housing Steel shaft	Charge option		F
	Steel impeller Stainless steel seal sleeve Stainless steel seal housing Stainless steel shaft	Charge option		G
Seal Seat Material	Silicon carbide	Standard		6
O-ring Material	Buna-N	Standard		A
	Neoprene®[e]	No charge option		B
	Viton®[e]	Charge option		D
	Ethylene propylene	Charge option		G
	Kalrez®[e]	Charge option		K

Mounting Options

Description	Model Reference Number	Part Number	Maximum Motor Frame Size	Ship Weight lbs (kg)
Mounting setup for **direct drive.** Includes steel baseplate, flexible coupling, and coupling guard. **PUMP AND MOTOR NOT INCLUDED.**	FF060 FD060	101-14 [f]	184T 215T 256T	128 (58)

Part Options

Part Number	Description
1345-2X	Coupling for DLF060 (182/184 TC NEMA frame size)
1345-1X	Coupling for DLF060 (213/215 TC NEMA frame size)

[a] Class 300 RF (ANSI) flange.
[b] Part number 40 DIN 2635.
[c] This direct mount will accommodate NEMA motors up to and including 10 hp (215 TC frame size). Special frame or adapter required for IEC motors over 7.5 kW. Consult factory for assistance.
[d] Motor is not included.
[e] Registered trademark of the DuPont company.
[f] Motor frame size.

Appendix A—Model Number Identification Code and Available Options

Model 075 Coro-Flo® Pumps

Base Model Number	Frame Mount		Direct Mount	
	FF075	FD075	DLF075	DLD075
Inlet	1½" ASME [a]	40 mm DIN [b]	1½" ASME [a]	40 mm DIN [b]
Outlet	1" ASME [a]	25 mm DIN [b]	1" ASME [a]	25 mm DIN [b]
Weight, bare pump lbs (kg)	63 (28.6)	63 (28.6)	75 (34.0)	75 (34.0)
Description	Frame mounted	Frame mounted	Direct mount pump with C-face frame [c]	Direct mount pump with C-face frame [c]

Model Number
Base X X X X

Specification Fields

Motor	No integral motor	Standard	NEMA C-face frame (3–10 hp)[d]	C
		Not available	IEC/132 C-face frame (2.2–7.5 kW)[d]	M
Impeller, Seal Sleeve, Seal Housing, and Shaft Material	Bronze impeller Stainless steel seal sleeve Stainless steel seal housing Steel shaft	Standard		D
	Stainless steel impeller Stainless steel seal sleeve Stainless steel seal housing Stainless steel shaft	Charge option		E
	Steel impeller Stainless steel seal sleeve Stainless steel seal housing Steel shaft	Charge option		F
	Steel impeller Stainless steel seal sleeve Stainless steel seal housing Stainless steel shaft	Charge option		G
Seal Seat Material	Silicon carbide	Standard		6
O-ring Material	Buna-N	Standard		A
	Neoprene®[e]	No charge option		B
	Viton®[e]	Charge option		D
	Ethylene propylene	Charge option		G
	Kalrez®[e]	Charge option		K

Mounting Options

Description	Model Reference Number	Part Number	Maximum Motor Frame Size	Ship Weight lbs (kg)
Mounting setup for **direct drive.** Includes steel baseplate, flexible coupling, and coupling guard. **PUMP AND MOTOR NOT INCLUDED.**	FF075 FD075	101-14 [f]	184T 215T 256T	128 (58)

Part Options

Part Number	Description
1345-2X	Coupling for DLF075 (182/184 TC NEMA frame size)
1345-1X	Coupling for DLF075 (213/215 TC NEMA frame size)

[a] Class 300 RF (ANSI) flange.
[b] Part number 40 DIN 2635.
[c] This direct mount will accommodate NEMA motors up to and including 10 hp (215 TC frame size). Special frame or adapter required for IEC motors over 7.5 kW. Consult factory for assistance.
[d] Motor is not included.
[e] Registered trademark of the DuPont company.
[f] Motor frame size.

Appendix A—Model Number Identification Code and Available Options

Model 150 Coro-Flo® Pumps

Base Model Number	Frame Mount		Direct Mount	
	FF150	FD150	DLF150	DLD150
Inlet	1½" ASME[a]	40 mm DIN[b]	1½" ASME[a]	40 mm DIN[b]
Outlet	1" ASME[a]	25 mm DIN[b]	1" ASME[a]	25 mm DIN[b]
Weight, bare pump lbs (kg)	63 (28.6)	63 (28.6)	75 (34.0)	75 (34.0)
Description	Frame mounted	Frame mounted	Direct mount pump with C-face frame[c]	Direct mount pump with C-face frame[c]

Model Number
Base X X X X

Specification Fields

Motor	No integral motor	Standard	NEMA C-face frame (3–10 hp)[d]	C
		Not available	IEC/132 C-face frame (2.2–7.5 kW)[d]	M
Impeller, Seal Sleeve, Seal Housing, and Shaft Material	Bronze impeller Stainless steel seal sleeve Stainless steel seal housing Steel shaft	Standard		D
	Stainless steel impeller Stainless steel seal sleeve Stainless steel seal housing Stainless steel shaft	Charge option		E
	Steel impeller Stainless steel seal sleeve Stainless steel seal housing Steel shaft	Charge option		F
	Steel impeller Stainless steel seal sleeve Stainless steel seal housing Stainless steel shaft	Charge option		G
Seal Seat Material	Silicon carbide	Standard		6
O-ring Material	Buna-N	Standard		A
	Neoprene®[e]	No charge option		B
	Viton®[e]	Charge option		D
	Ethylene propylene	Charge option		G
	Kalrez®[e]	Charge option		K

Mounting Options

Description	Model Reference Number	Part Number	Maximum Motor Frame Size	Ship Weight lbs (kg)
Mounting setup for **direct drive.** Includes steel baseplate, flexible coupling, and coupling guard. **PUMP AND MOTOR NOT INCLUDED.**	FF150 FD150	101-14[f]	184T 215T 256T	128 (58)

Part Options

Part Number	Description
1345-2X	Coupling for DLF150 (182/184 TC NEMA frame size)
1345-1X	Coupling for DLF150 (213/215 TC NEMA frame size)
CF	Coupling for FF/FD150 (254/256 TC NEMA frame size)

[a] Class 300 RF (ANSI) flange.
[b] Part number 40 DIN 2635.
[c] This direct mount will accommodate NEMA motors up to and including 10 hp (215 TC frame size). Special frame or adapter required for IEC motors over 7.5 kW. Consult factory for assistance.
[d] Motor is not included.
[e] Registered trademark of the DuPont company.
[f] Motor frame size.

Appendix B—Material and Mechanical Specifications for Models 060, 075, and 150 Coro-Flo® Pumps

Equipment Type and Options

Regenerative turbine pump
Foot mounted (FF060, FF075, FF150, FD060, FD075, or FD150)
Direct mounted (DLF060, DLF075, DLF150, DLD060, DLD075, or DLD150)
Available with ASME Class 300 RF or DIN flanges

Applications

Under and aboveground autogas dispensing
Multiple cylinder filling stations
Vaporizer feed—high pressure
Direct, high pressure asphalt burner feed

Features and Benefits

Regenerative turbine type:	Able to handle liquefied gases without flashing
High flows and differential pressures:	Ideal for dual hose dispensers and multiple dispensers
Heavy duty bearings:	Long bearing life
Single mechanical seal:	Silicon carbide seal seat requires less maintenance
Floating impeller:	Minimizes wear and lasts longer
ASME or DIN, metric fasteners optional:	Usability for US or overseas applications
Runs at 50 or 60 cycle (Hz):	Usability for US or overseas applications
Two mounting options:	Installation versatility

Operating Specifications

Inlet: 1-1/2" ASME Class 300 RF (DIN optional)	Max. diff. press. for Model 060: 150 psig (10.3 bar) @ 60 Hz[1]
Outlet: 1" ASME Class 300 RF (DIN optional)	Max. diff. press. for Model 075: 200 psig (13.8 bar) @ 60 Hz[1]
RPM: 3450 @ 60 Hz, 2880 @ 50 Hz	Max. diff. press. for Model 150: 250 psig (17.2 bar) @ 60 Hz[1]
Maximum working pressure: 400 psig (27.6 bar)	Flow range for Model 060: 7–22 gpm (26.5 to 83.3 L/min)
Maximum driver: 20 hp (15 kW)	Flow range for Model 075: 10–40 gpm (37.9 to 151.4 L/min)
Temperature range: -25° to 225°F (-32° to 107°C)	Flow range for Model 150: 12–58 gpm (45.4 to 219.6 L/min)

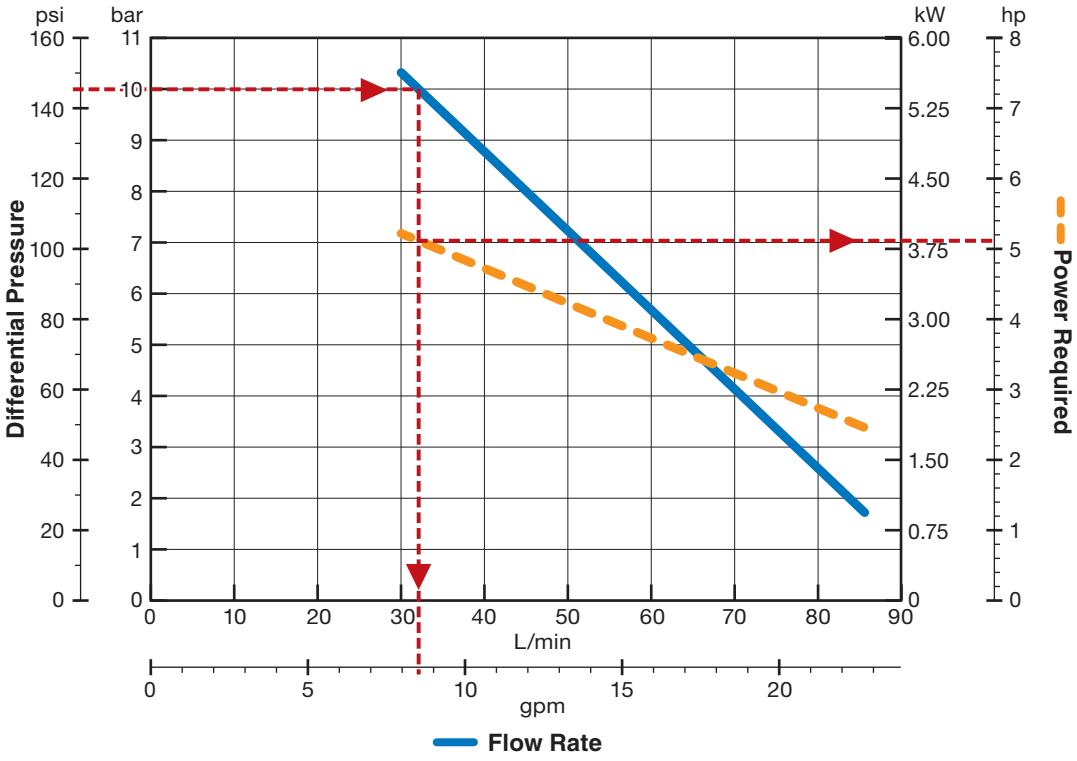
Material Specifications

Part	Model	Standard Material	Optional Material
Case, cover	All	Ductile iron ASTM A536	
Impeller	All	Copper alloy CA-836	Steel, stainless steel
Impeller key	All	Steel, zinc plated	
Seal seat	All	Silicon carbide	
Seal rotor	All	Carbon	
Seal metal parts	All	Stainless steel	
Seal sleeve	All	Stainless steel	
Seal housing	All	Stainless steel	
Shaft	All	Steel	Stainless steel
Frame	FF/FD	Ductile iron ASTM A536	
	DLF/DLD	Ductile iron ASTM A536	
Bearing cap	All	Ductile iron ASTM A536	
O-rings	All	Buna-N	Neoprene®, Viton®, ethylene propylene, Kalrez®[2]
Retainer rings	All	Steel	
Bearings	All	Ball	

[1] Maximum discharge pressure should be limited to the maximum system pressure rating.
[2] Registered trademark of the DuPont company.

Appendix C—Performance Curves

Model 060 Coro-Flo® Pumps[1]

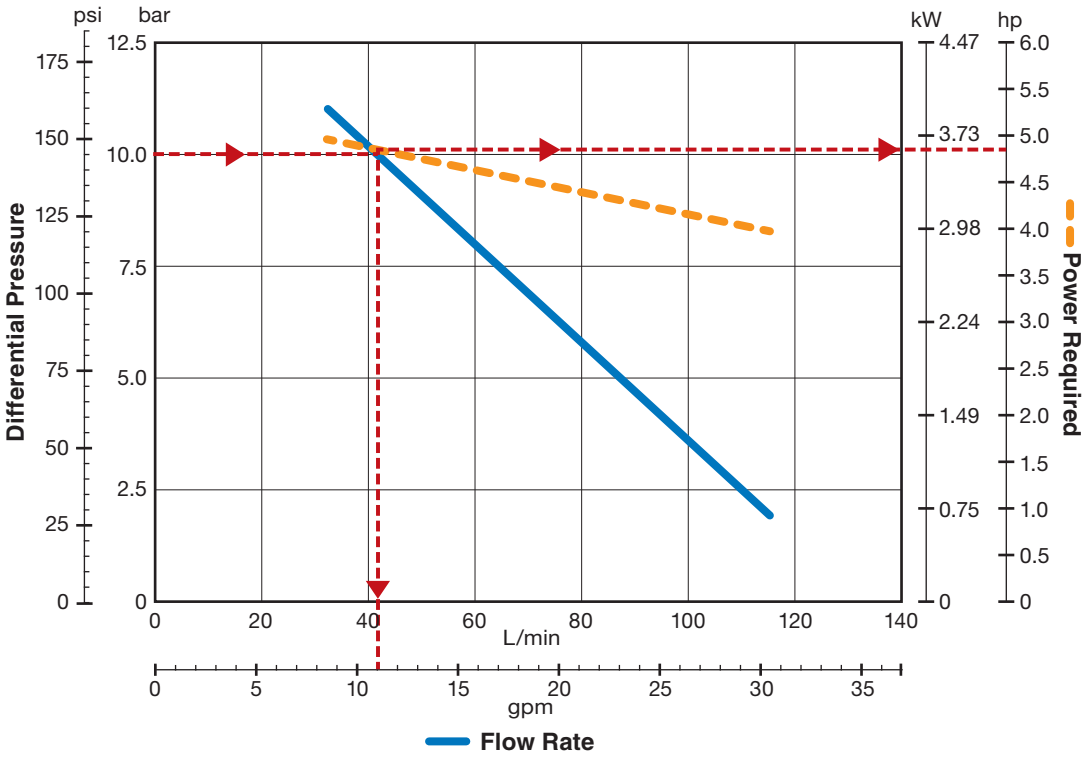


3450 RPM @ 60 Hz
Differential pressure:
10.0 bar
145.0 psi
Flow:
32.2 L/min
8.5 gpm
Power required:
3.8 kW
5.15 hp

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

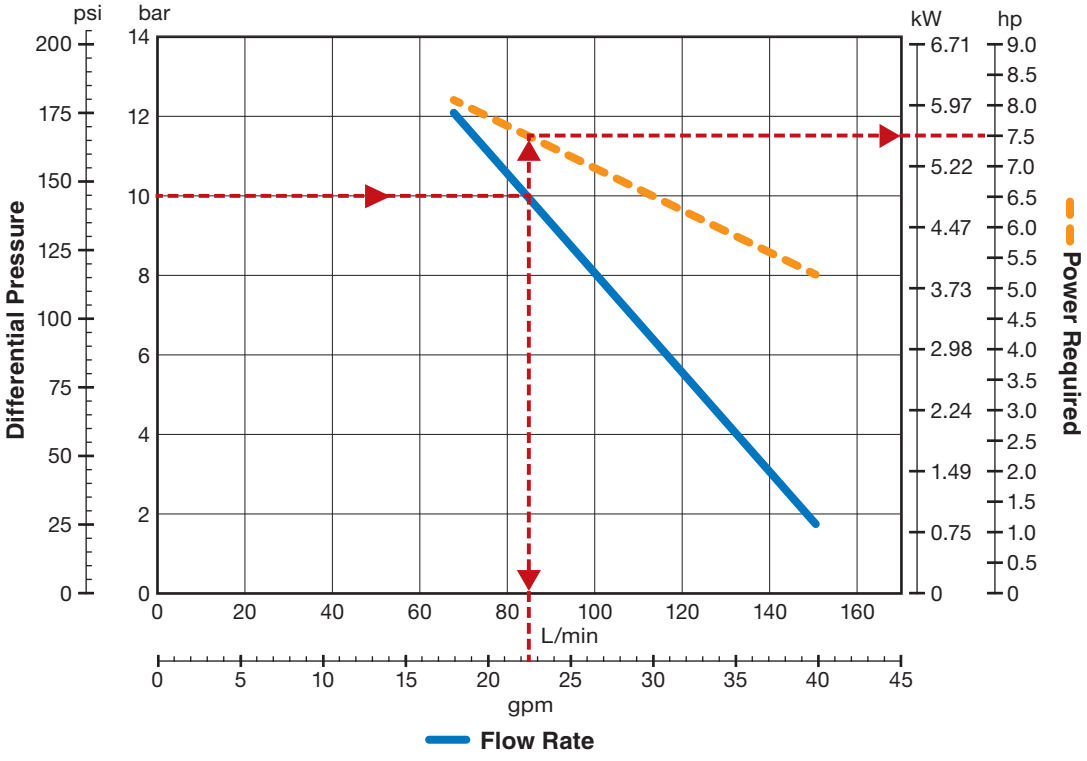
Appendix C—Performance Curves

Model 075 Coro-Flo® Pumps[1]



2880 RPM @ 50 Hz

Differential pressure:
10.0 bar
145.0 psi
Flow:
42 L/min
11 gpm
Power required:
3.65 kW
4.9 hp



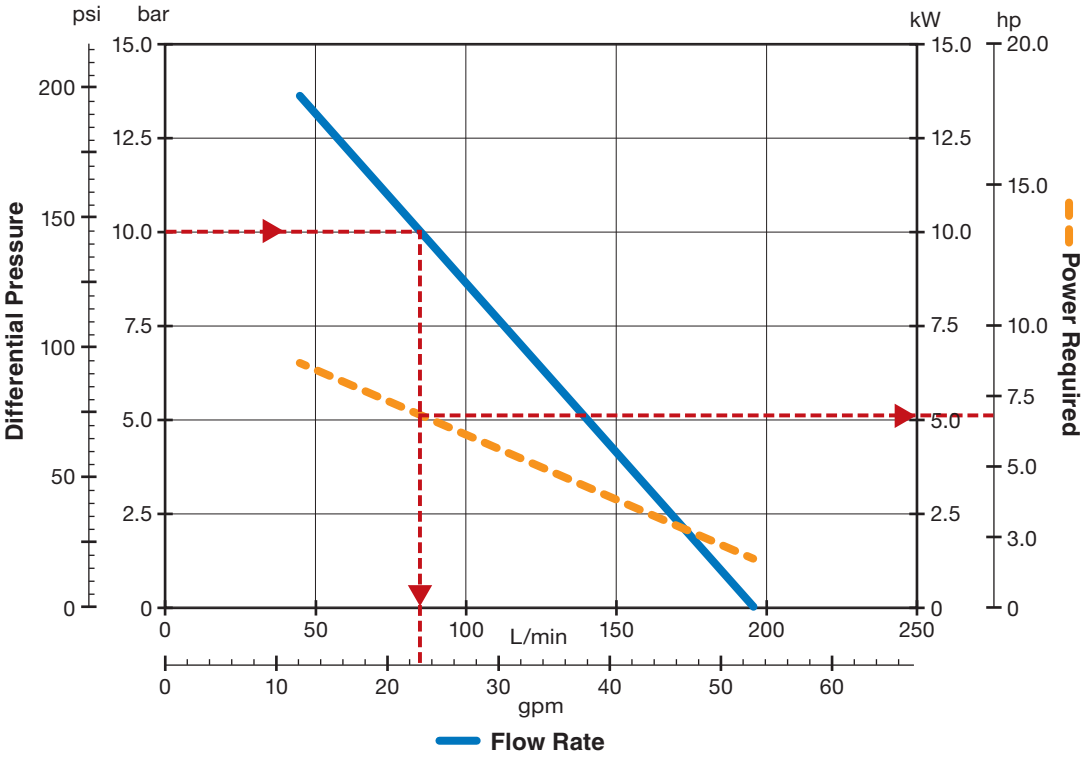
3450 RPM @ 60 Hz

Differential pressure:
10.0 bar
145.0 psi
Flow:
85 L/min
22.5 gpm
Power required:
5.59 kW
7.5 hp

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

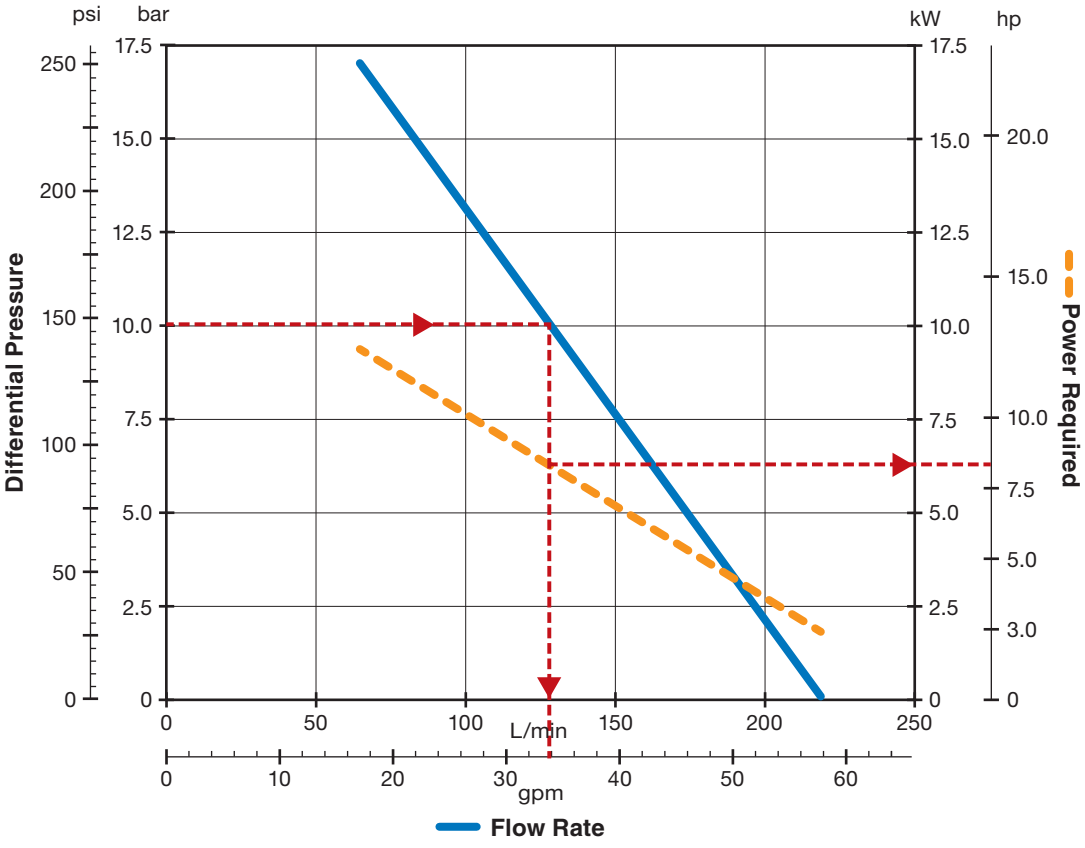
Appendix C—Performance Curves

Model 150 Coro-Flo® Pumps[1]



2880 RPM @ 50 Hz

Differential pressure:
10.0 bar
145.0 psi
Flow:
85 L/min
22.5 gpm
Power required:
5.1 kW
6.8 hp



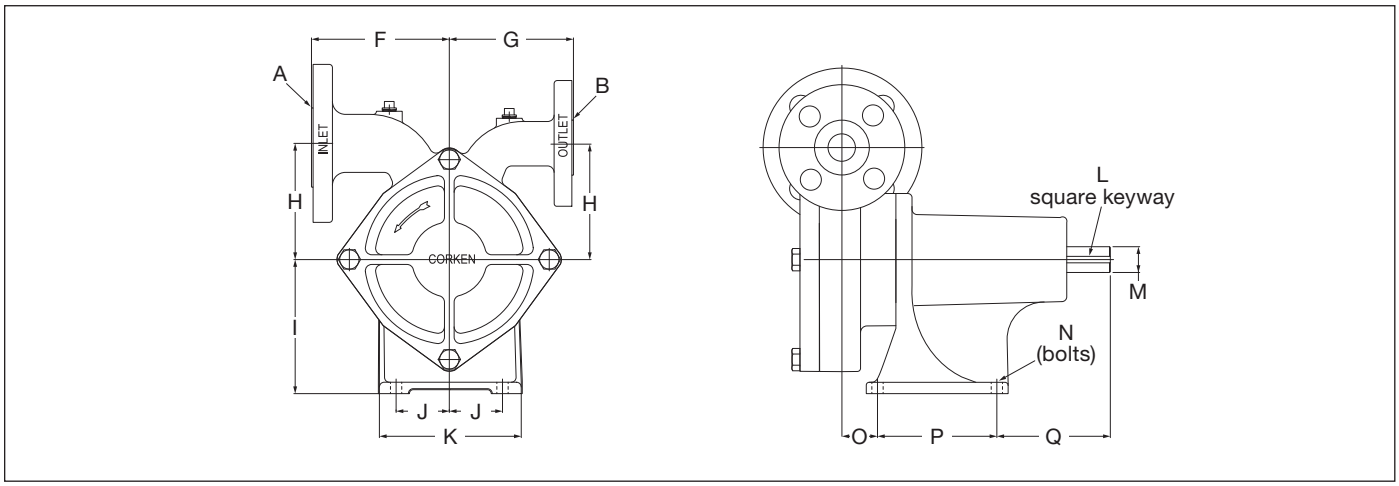
3450 RPM @ 60 Hz

Differential pressure:
10.0 bar
145.0 psi
Flow:
128 L/min
33.8 gpm
Power required:
6.3 kW
8.4 hp

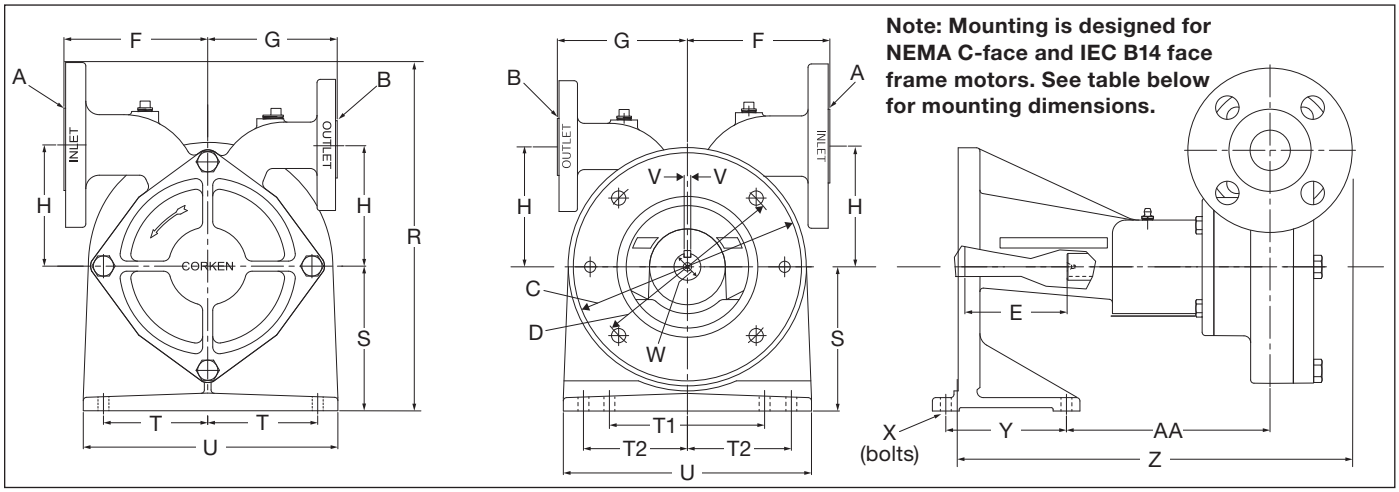
[1] *The performance curves are based on aboveground LPG installations. Performance curves for underground LPG tanks will vary based on the specific installation. Consult factory.*

Appendix D—Outline Dimensions for Models 060, 075, and 150 Coro-Flo® Pumps

Frame Mount ASME Class 300 RF (ANSI) Flange (FF) and DIN Flange (FD)



Direct Mount ASME Class 300 RF (ANSI) Flange (DLF) and DIN Flange (DLD)



Flange Dimensions		
Model	A (inlet)	B (outlet)
All models FF and DLF	1-1/2" ASME Class 300 RF	1" ASME Class 300 RF
All models FD and DLD	DIN 2635, 40 PN, 40 mm	DIN 2635, 40 PN, 25 mm

Motor Mounting Dimensions			
Type	C	D	E
NEMA	8-1/2"	7-1/4"	3-13/16"
IEC	165 mm	130 mm	90.75 mm

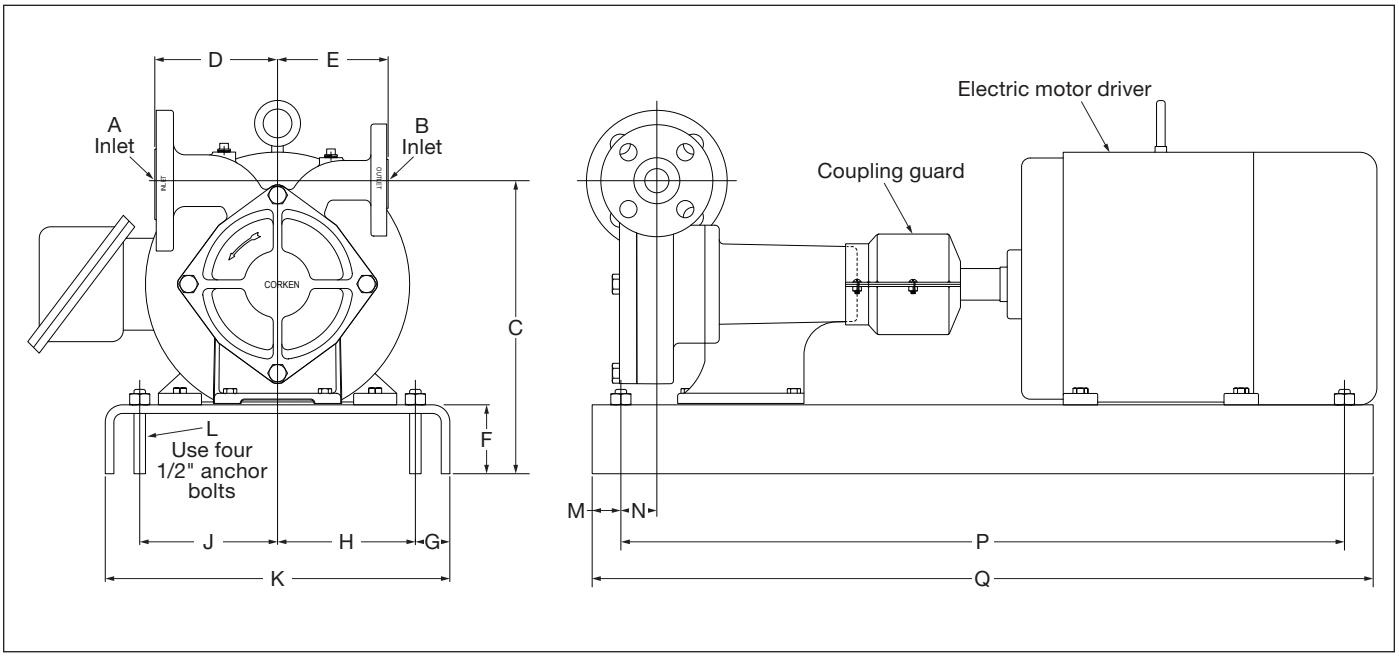
F	G	H	I	J	K	L	M	N	O	P
5-5/16 (135.7)	4-13/16 (122.3)	4-1/2 (114.3)	5-13/64 (132.0)	2-1/16 (52.4)	5-1/2 (139.7)	1/4 (6.3)	1 diameter (25.4)	5/16 bolts (7.9)	1-3/8 (35.0)	4-5/8 (117.5)

Q	R	S	T1	T2	U	V	W	X	Y	Z	AA
4-3/8 (111.8)	12-15/16 (328.6)	5-3/8 (136.5)	4-3/4 (120.6)	3-7/8 (98.4)	9-1/4 (235.0)	1/4 (6.3)	1 (25.4)	5/16 bolts (7.9)	4-1/2 (114.2)	14-3/8 (365.1)	7-19/32 (192.7)

All dimensions are in inches (millimeters).

Appendix D—Outline Dimensions for Models 060, 075, and 150 Coro-Flo® Pumps

Frame Mount ASME Class 300 RF (ANSI) Flange (FF) and DIN Flange (FD) with –101 Mounting



Flange Dimensions		
Model	A (inlet)	B (outlet)
FF060, FF075, and FF150	1-1/2" ASME Class 300 RF	1" ASME Class 300 RF
FD060, FD075, and FD150	DIN 2635, 40 PN, 40 mm	DIN 2635, 40 PN, 25 mm

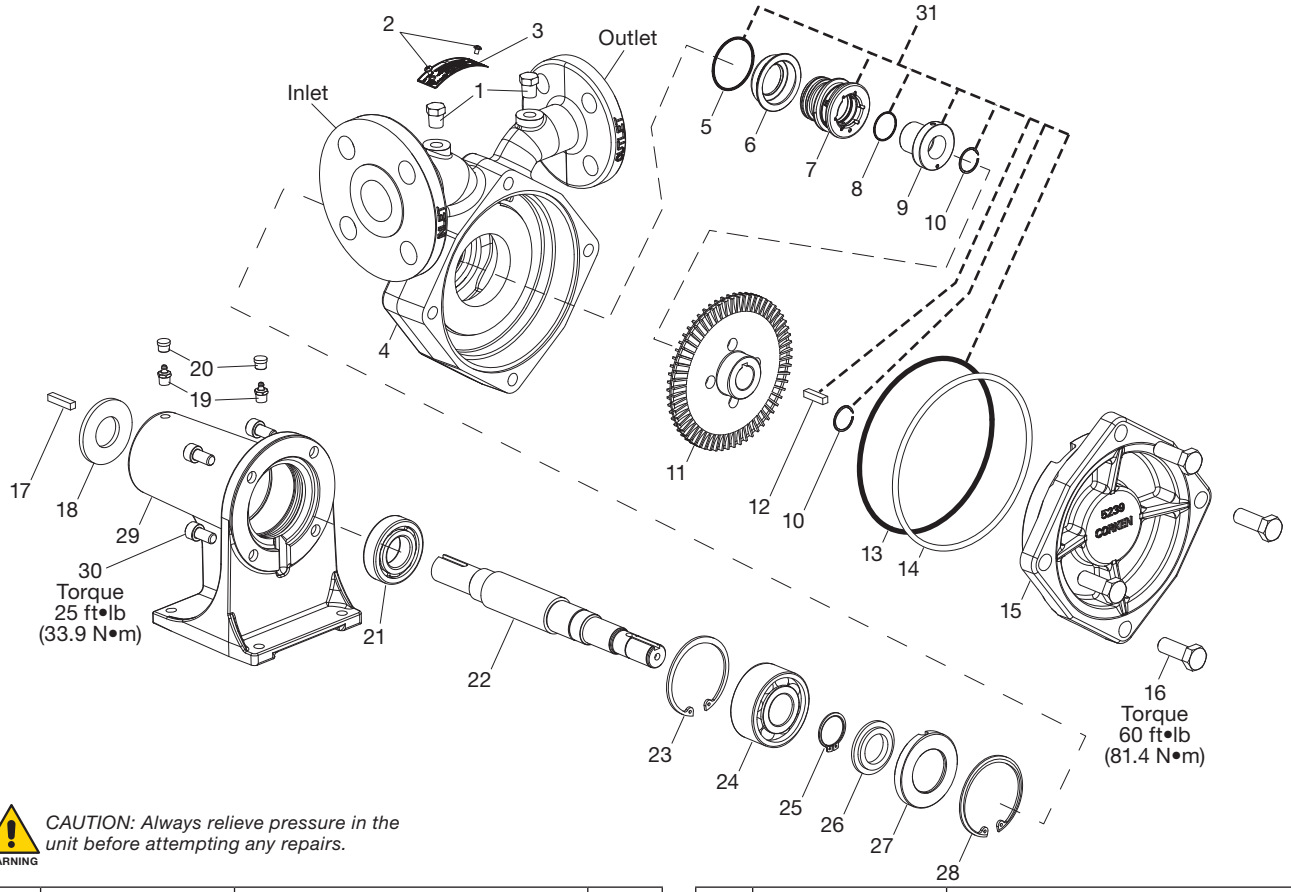
C Dimensions All Models	
182T–215T Frame	12-3/4" (32.40)
254T–256T Frame	13-3/4" (34.94)

Outline Dimensions for 182T–256T Frame											
D	E	F	G	H	J	K	L	M	N	P	Q
5-11/32 (135.7)	4-13/16 (122.3)	3 (76.2)	1-1/2 (38.1)	6 (152.4)	6 (152.4)	15 (381.0)	1/2 bolts (12.7)	1-1/4 (31.7)	1-9/16 (39.7)	31-1/2 (800.1)	34 (863.6)

All dimensions are in inches (millimeters).

Appendix E—Parts Details for Models 060, 075, and 150 Coro-Flo® Pumps

Frame Mount ASME Class 300 RF (ANSI) Flange (FF) and Din Flange (FD)



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

Ref No.	Part No.	Description	Qty.
1.	3442	Pipe plug, 1/4"	2
2.	7012-0065F019E	Nameplate screw	2
3.	1914-1	Nameplate	1
4.	5238-060	Case—model 060, ASME Class 300 RF flange (FF)	1
	5238-75	Case—model 075, ASME Class 300 RF flange (FF)	1
	5238	Case—model 150, ASME Class 300 RF flange (FF)	1
	5238-061	Case—model 060, DIN flange (FD)	1
	5238-751	Case—model 075, DIN flange (FD)	1
	5238-1	Case—model 150, DIN flange (FD)	1
5.	2-133_ [a, b]	Seal housing O-ring	1
6.	5244-1X	Seal housing assembly	1
7.	Not sold separately [b]	Seal sub assembly	1
8.	2-018_ [a, b]	Seal sleeve O-ring	1
9.	Not sold separately [b]	Seal sleeve assembly	1
10.	2760-883	Retainer ring, 7/8"	1
11.	5240-060	Impeller, bronze—model 060	1
	5240-75	Impeller, bronze—model 075	1
	5240	Impeller, bronze—model 150	1
	5240-061	Impeller, stainless steel—model 060	1
	5240-751	Impeller, stainless steel—model 075	1
	5240-1	Impeller, stainless steel—model 150	1
	5240-062	Impeller, steel—model 060	1
	5240-752	Impeller, steel—model 075	1
	5240-2	Impeller, steel—model 150	1
12.	42443	Impeller key	1

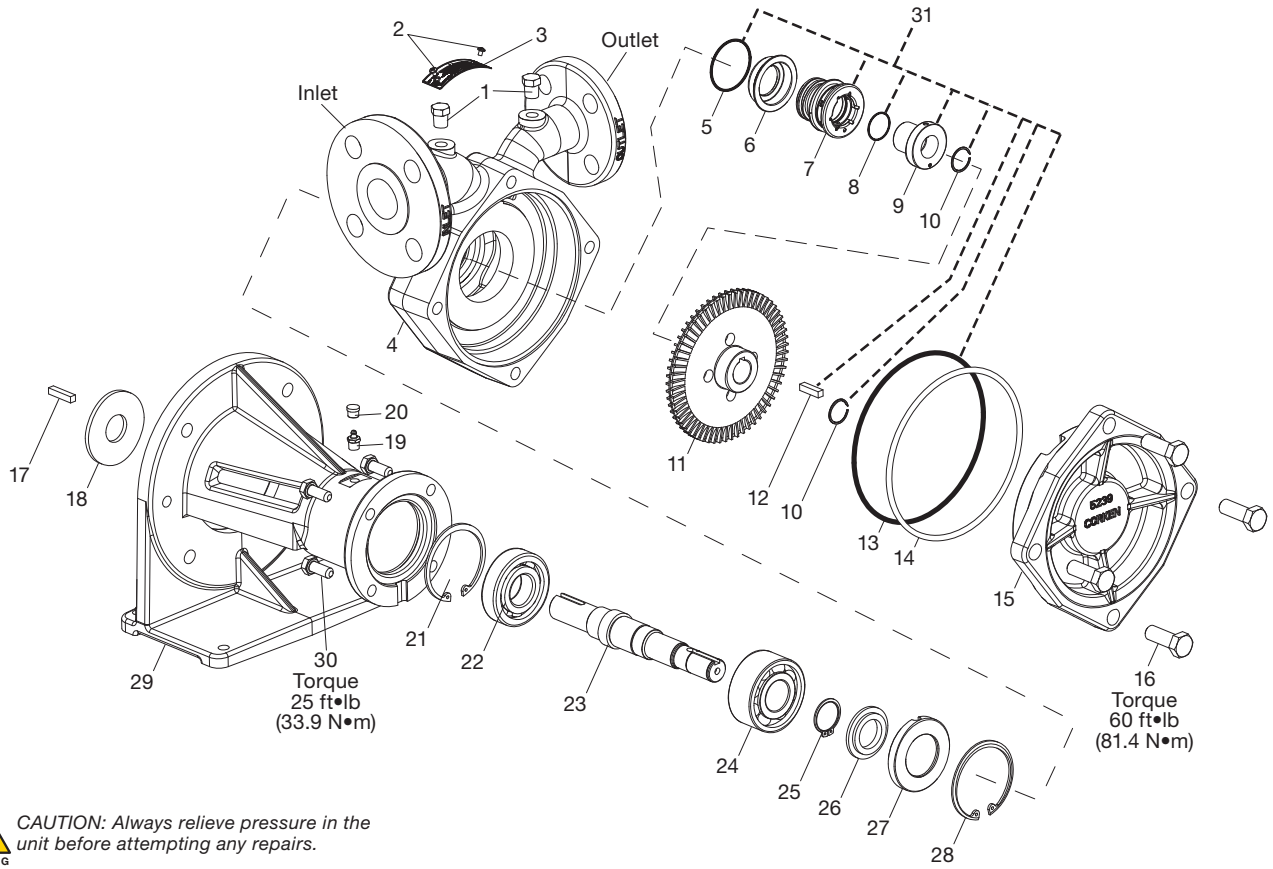
Ref No.	Part No.	Description	Qty.
13.	2-260_ [a, b]	Case O-ring	1
14.	5248 [c]	Case clearance shim	1
15.	5239-060	Cover—model 060	1
	5239-75	Cover—model 075	1
	5239	Cover—model 150	1
16.	7301-140MC040A	Bolt (hex head, M14-2 x 40 mm)	4
17.	3226	Shaft key	1
18.	3227	Bearing plate	1
19.	2158	Grease zerk	2
20.	2159	Lubricap	2
21.	2759	Single row ball bearing	1
22.	5241-1	Shaft	1
23.	5000-281	Retainer ring	1
24.	2758	Double row ball bearing	1
25.	5102-118	Retainer ring	1
26.	1006	Grease seal	1
27.	1238	Bearing cap	1
28.	5002-281	Retainer ring	1
29.	1010-3	Mounting frame	1
30.	7302-100MC020A	Bolt (allen head, M10-1.5 x 22 mm)	4
31.	3189-1X_6 [a]	Seal assembly	1

[a] Denotes material code
[b] Included in seal assembly 3189-1X_6 [a]
[c] The case clearance shim only applies to models prior to serial number prefix YU. For a complete explanation of Corken's serial number prefix codes, see page A400 (latest version) located in the "Policy and Prices" section of the sales catalog or service manual.
[d] Registered trademark of the DuPont company

Material Code	
A	Buna-N
B	Neoprene [®d]
D	Viton [®d]
G	Ethylene propylene
K	Kalrez [®d]

Appendix E—Parts Details for Models 060, 075, and 150 Coro-Flo® Pumps

Direct Mount ASME Class 300 RF (ANSI) Flange (DLF) and Din Flange (DLD)



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

WARNING

Ref No.	Part No.	Description	Qty.
1.	3442	Pipe plug, 1/4"	2
2.	7012-0065F019E	Nameplate screw	2
3.	1914-1	Nameplate	1
4.	5238-060	Case—model 060, ASME Class 300 RF flange (FF)	1
	5238-75	Case—model 075, ASME Class 300 RF flange (FF)	1
	5238	Case—model 150, ASME Class 300 RF flange (FF)	1
	5238-061	Case—model 060, DIN flange (FD)	1
	5238-751	Case—model 075, DIN flange (FD)	1
	5238-1	Case—model 150, DIN flange (FD)	1
5.	2-133_ [a, b]	Seal housing O-ring	1
6.	5244-1X	Seal housing assembly	1
7.	Not sold separately [b]	Seal sub assembly	1
8.	2-018_ [a, b]	Seal sleeve O-ring	1
9.	Not sold separately [b]	Seal sleeve assembly	1
10.	2760-883	Retainer ring, 7/8"	1
11.	5240-060	Impeller, bronze—model 060	1
	5240-75	Impeller, bronze—model 075	1
	5240	Impeller, bronze—model 150	1
	5240-061	Impeller, stainless steel—model 060	1
	5240-751	Impeller, stainless steel—model 075	1
	5240-1	Impeller, stainless steel—model 150	1
	5240-062	Impeller, steel—model 060	1
	5240-752	Impeller, steel—model 075	1
	5240-2	Impeller, steel—model 150	1
12.	42443	Impeller key	1
13.	2-260_ [a, b]	Case O-ring	1

Ref No.	Part No.	Description	Qty.
14.	5248 [c]	Case clearance shim	1
15.	5239-060	Cover—model 060	1
	5239-75	Cover—model 075	1
	5239	Cover—model 150	1
16.	7301-140MC040A	Bolt (hex head, M14-2 x 40 mm)	4
17.	3226	Shaft key	1
18.	4377	Bearing plate	1
19.	2158	Grease zerk	1
20.	2159	Lubricap	1
21.	5000-281	Retainer ring	1
22.	4378	Single row ball bearing	1
23.	5241-2	Shaft	1
24.	2758	Double row ball bearing	1
25.	5102-118	Retainer ring	1
26.	1006	Grease seal	1
27.	1238	Bearing cap	1
28.	5002-281	Retainer ring	1
29.	4298	Mounting frame—NEMA	1
	4298-1	Mounting frame—IEC	1
30.	7301-100MC025A	Bolt (hex head, M10-1.5 x 25 mm)	4
31.	3189-1X_6 [a]	Seal assembly	1

[a] Denotes material code
[b] Included in seal assembly 3189-1X_6 [a]
[c] The case clearance shim only applies to models prior to serial number prefix YU. For a complete explanation of Corken's serial number prefix codes, see page A400 (latest version) located in the "Policy and Prices" section of the sales catalog or service manual.
[d] Registered trademark of the DuPont company

Material Code	
A	Buna-N
B	Neoprene ®[d]
D	Viton ®[d]
G	Ethylene propylene
K	Kalrez ®[d]

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

Symptom	Probable Cause	Remedy
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.
	Bypass valve stuck open or set too low	Readjust, repair, or replace the bypass 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 or is locked	Foreign matter in the pump	Clean out the pump and inspect the strainer screen.
	Bearing seized	Replace the bearings and grease every three months using a low temperature ball bearing grease with a minimum rating of at least -25°F to 250°F. The lubricant used by the factory is Mystik JT-6 Low Temperature Extreme 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 and clean filter screen. The suction pipe might be too small or restricted. Remove restrictions and/or increase pipe size.
	Bypass valve set too low	Set the valve for higher pressure (see valve’s instructions).
	Too much impeller clearance	Conduct a performance test on the pump (see preventive maintenance program).
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 and lubricate every three months.

Symptom	Probable Cause	Remedy
Noise or vibration in the pump (continued)	Defective or wrong size bypass valve	Confirm the size of the bypass valve required for the 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 bypass 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 or heater is 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 (TEFC) electric motors and explosion proof electric motors are subject to moisture condensation inside when used intermittently. To eliminate moisture and prevent buildup, run the motor at least once a week until it gets hot enough to evaporate moisture.
Leaks	Failed O-rings or mechanical seal assembly	Inspect and replace the mechanical seal and O-rings if needed.

Appendix G—Extended Storage Procedures

If the pump is removed from service for some time, it must be protected. Propane, butane, and anhydrous ammonia all leave the metal "bare" and open to corrosion. Piping and tanks not in service should also be protected.

1. Fill or thoroughly flush the pump with a light rust-inhibiting oil. If the pump is flushed with oil, place some desiccant packets inside the pump for added protection.

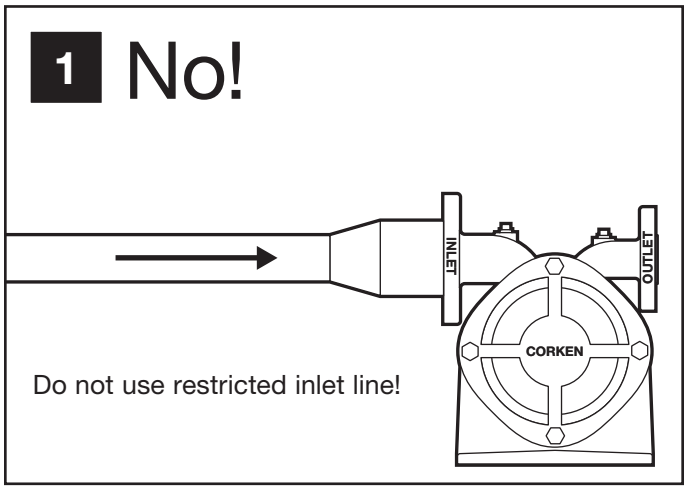
2. Plug all openings of the pump.

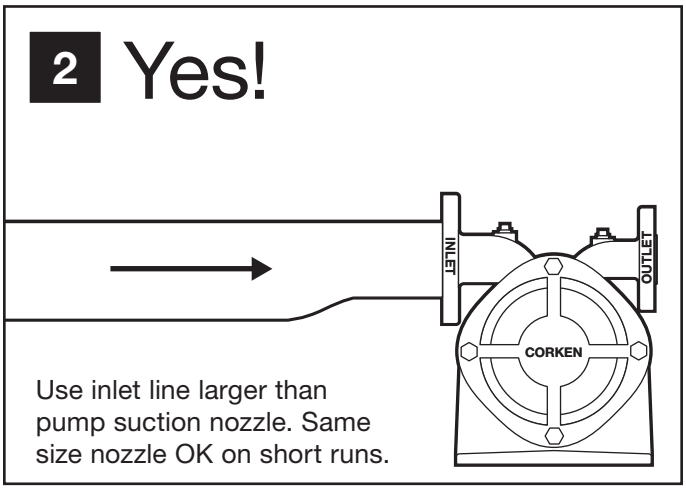
3. Store in a dry location.

4. Before placing the pump back into service, drain the oil and remove all desiccant packets.

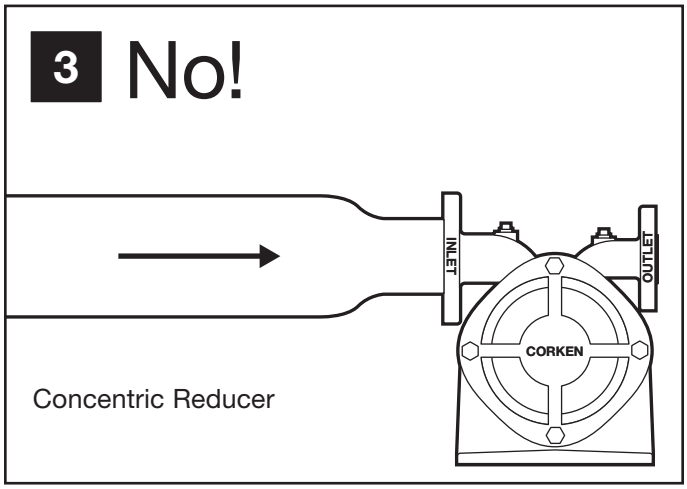
5. Refer to "Operation" on page seven.

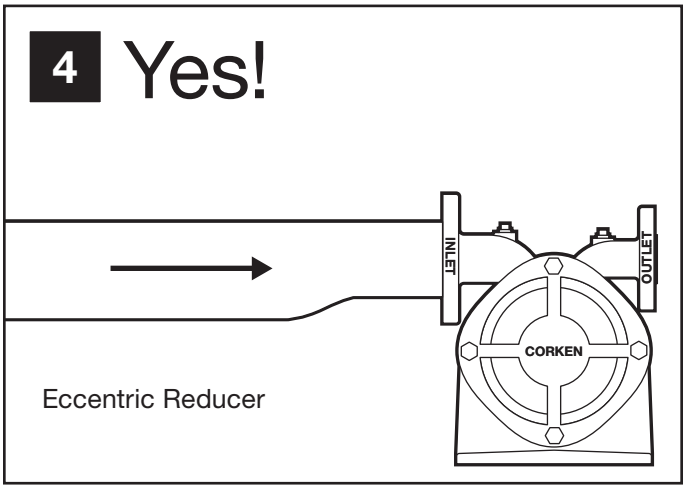
Appendix H—Aboveground Installation and Piping Instructions



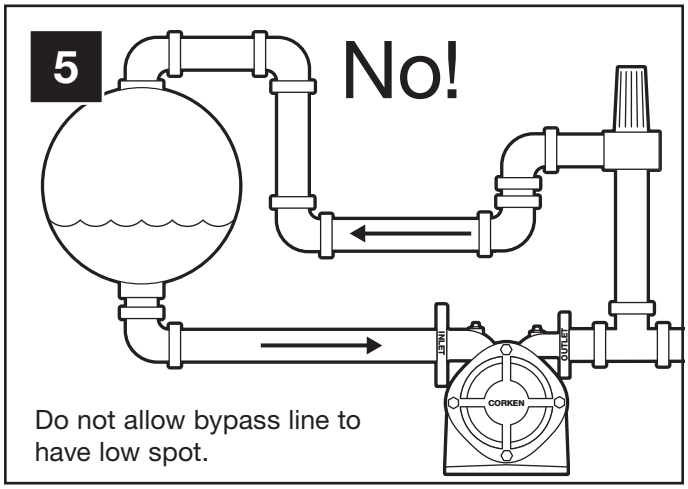


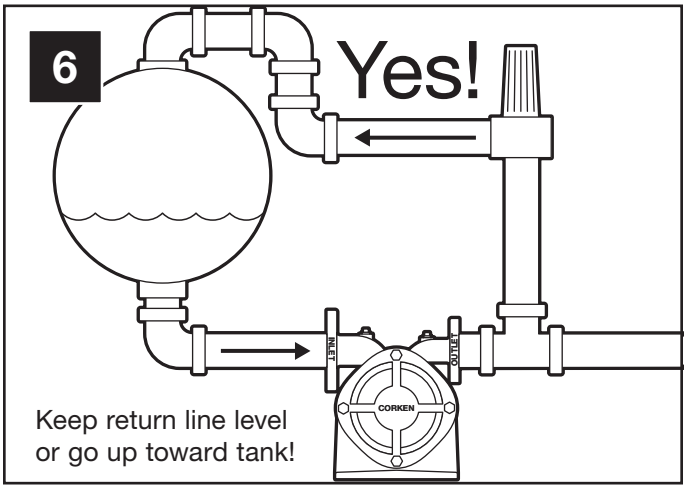
Pressure drop caused by restriction in suction line will cause vaporization and cavitation.





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.

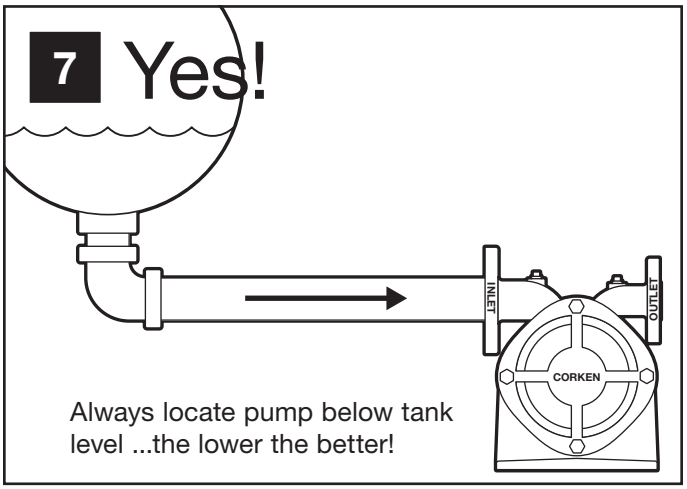




Low spots in bypass line can collect liquid which prevents normal vapor passage for priming purposes just like the P trap in the drain of a kitchen sink. This is not a problem for bypass lines where vapor elimination is not required.

Appendix H—Aboveground Installation and Piping Instructions

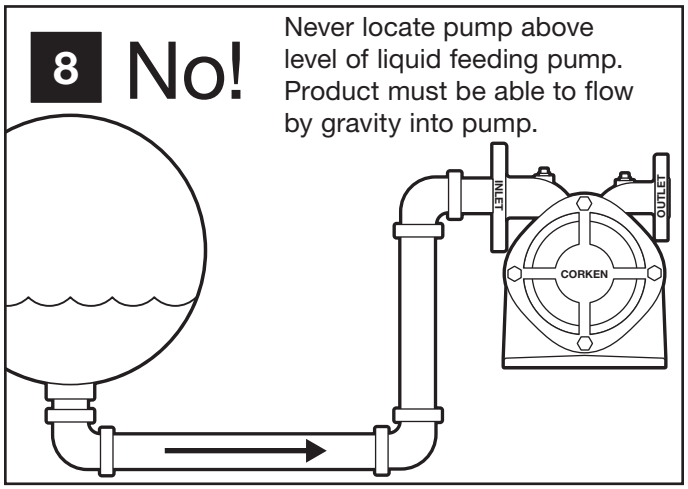
7 Yes!



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

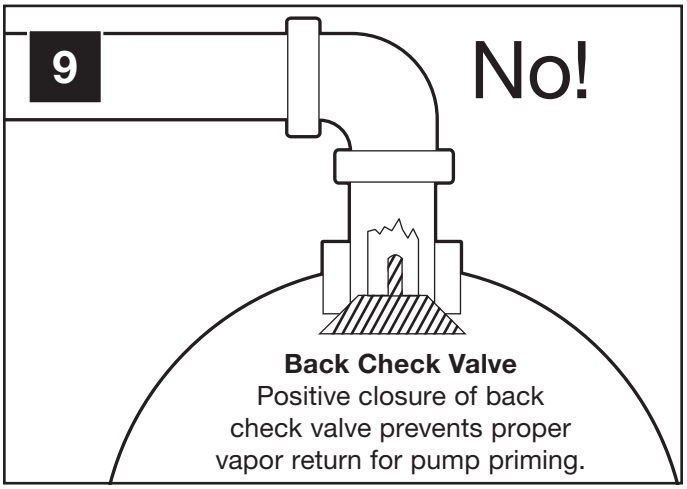
8 No!

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



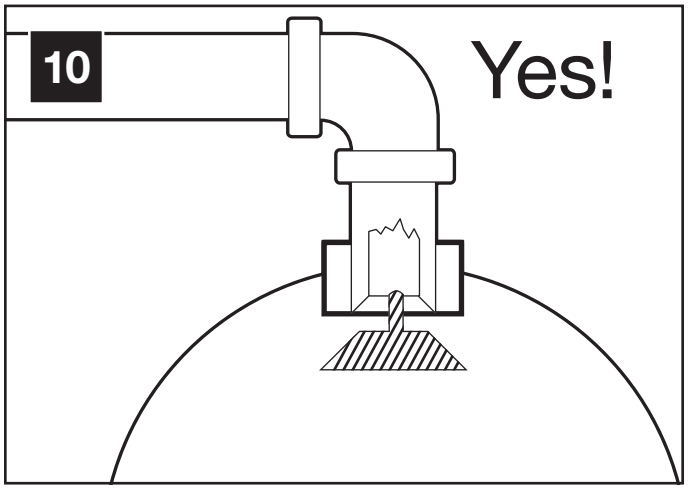
Since liquefied gases boil when drawn into a pump by its own suction, the pump must be fed by gravity flow to give stable, trouble-free operation.

9 No!

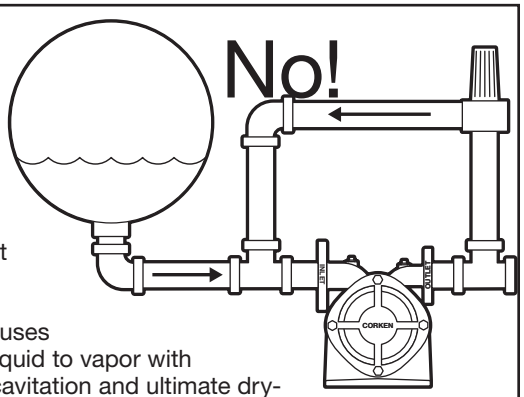


Back Check Valve
Positive closure of back check valve prevents proper vapor return for pump priming.

10 Yes!

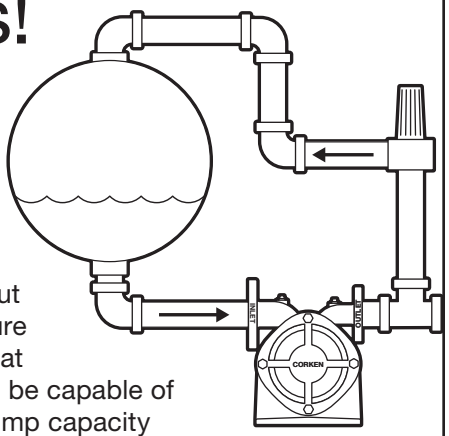


11 No!



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.

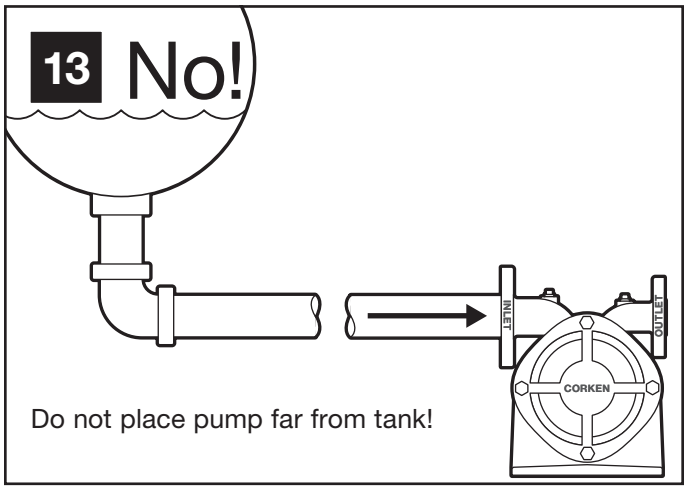
12 Yes!



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.

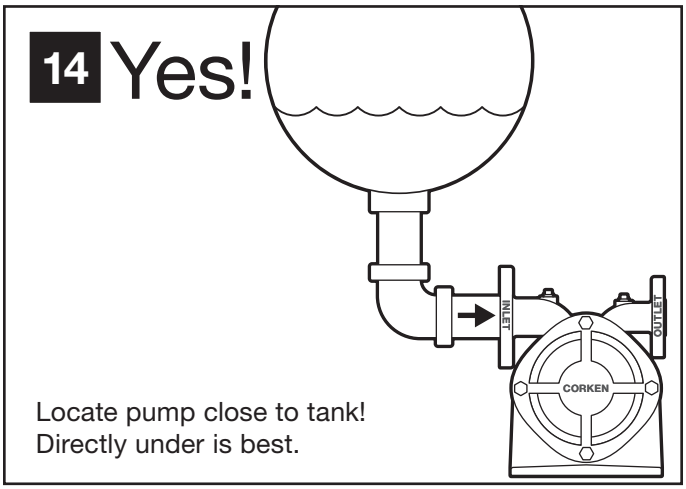
Appendix H—Aboveground Installation and Piping Instructions

13 No!



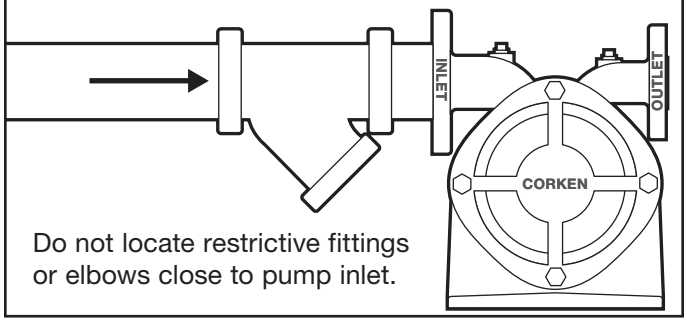
Do not place pump far from tank!

14 Yes!



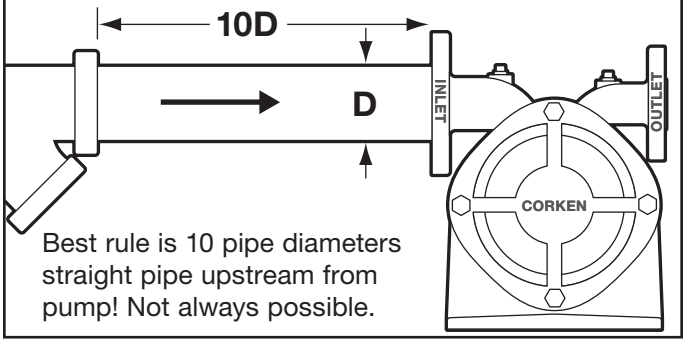
Locate pump close to tank!
Directly under is best.

15 No!



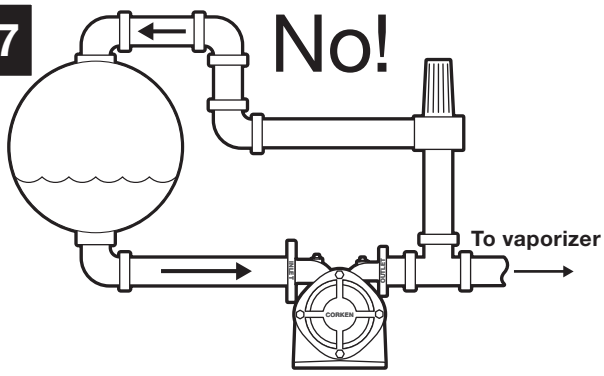
Do not locate restrictive fittings or elbows close to pump inlet.

16 Yes!



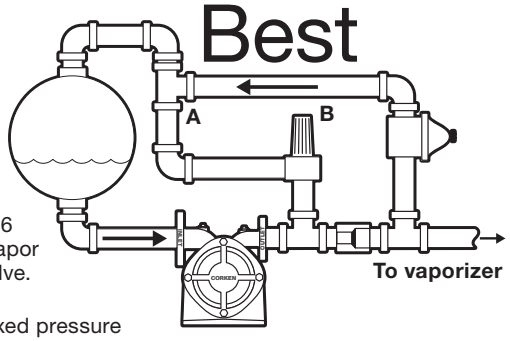
Best rule is 10 pipe diameters straight pipe upstream from pump! Not always possible.

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.

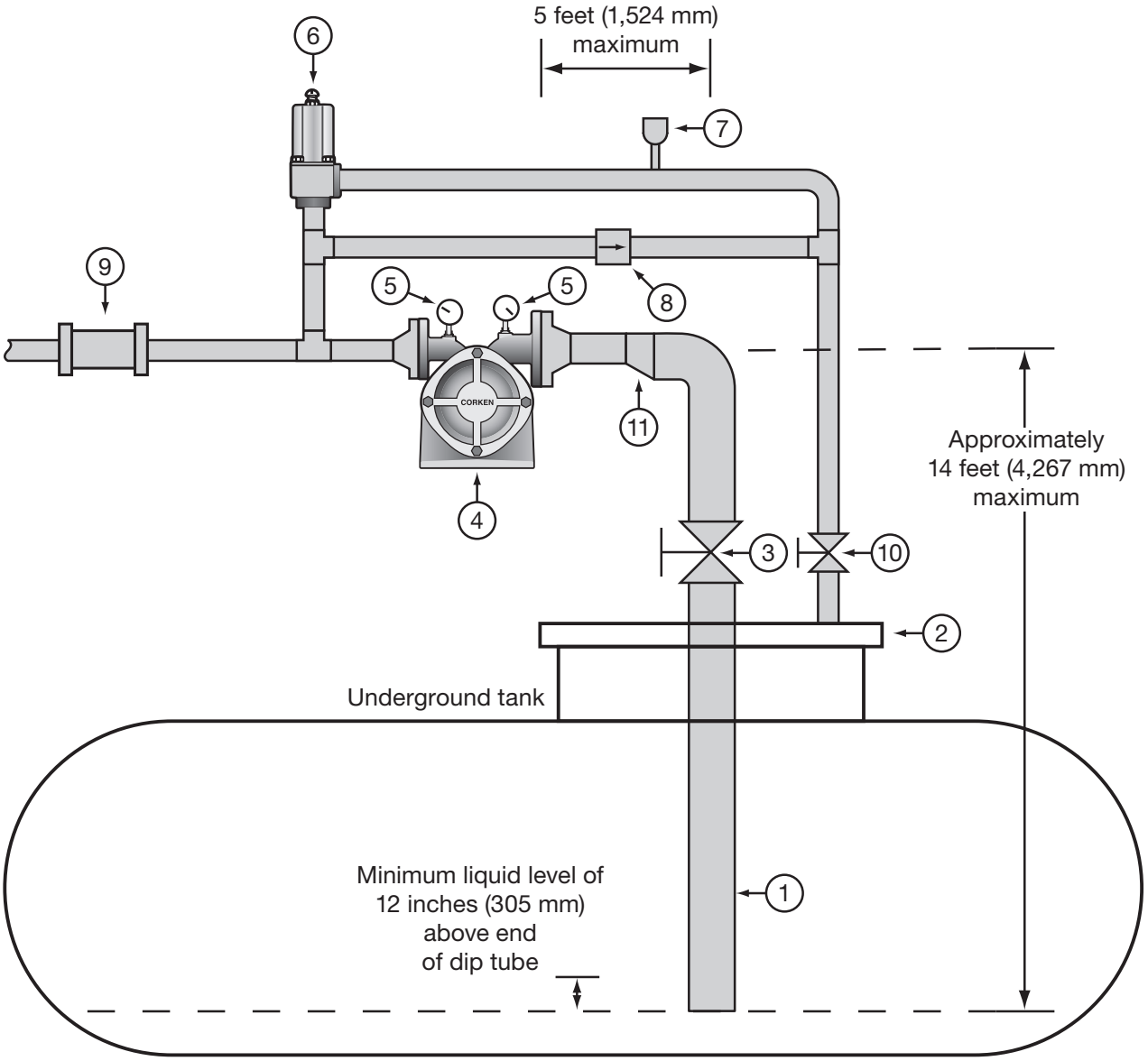
18 Best



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 H—Underground Installation and Piping Instructions



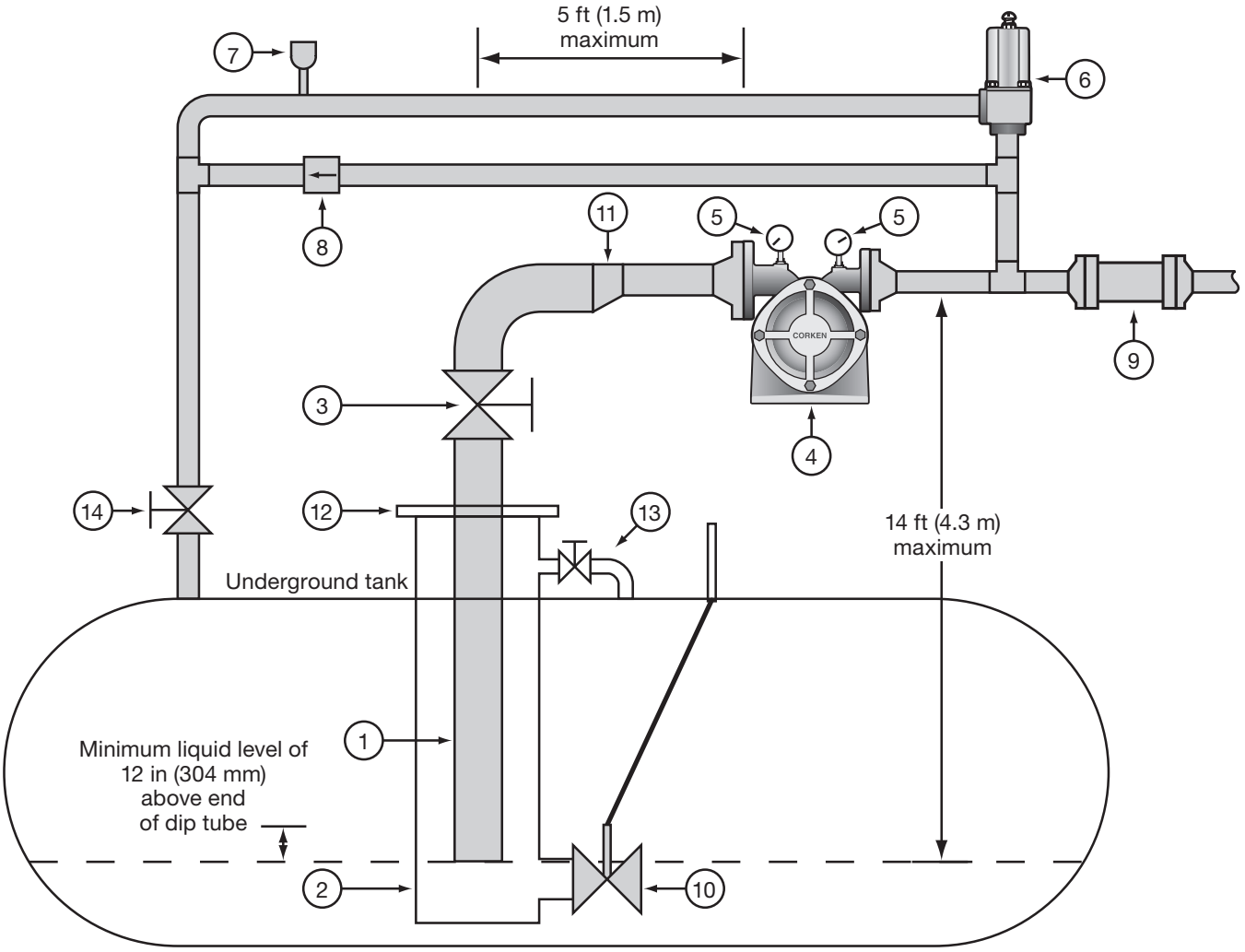
Typical Bill of Materials

Ref No.	Description	Remarks
1.	Pipe, 1" schedule 80	With model 060 pump
	Pipe, 1-1/2" schedule 80	With model 075 pump
	Pipe, 2" schedule 80	With model 150 pump
2.	Man way cover	Existing
3.	Ball valve, 2" full port	Manual or remote control
4.	Pump, model 060	With 5.0 hp (3.7 kW) electric motor
	Pump, model 075	With 7.5 hp (5.5 kW) electric motor
	Pump, model 150	With 10 hp (7.5 kW) electric motor
5.	Pressure gauge, 1/4" NPT	0–400 psig (0–28 bar g)
6.	B166 bypass valve, 1" NPT	With spring code C
7.	Hydrostatic relief valve, 1/4" NPT	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	
10.	Bypass return line's valve	Existing
11.	Eccentric reducer, 2" x 1-1/2"	

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.

Appendix H—Underground Installation and Piping Instructions Utilizing a Submersible Manifold



Typical Bill of Materials

Ref No.	Description	Remarks
1.	Pipe, 1" schedule 80	With model 060 pump
	Pipe, 1-1/2" schedule 80	With model 075 pump
	Pipe, 2" schedule 80	With model 150 pump
2.	Manifold, 5"	Existing
3.	Ball valve, 2" full port	Manual or remote
4.	Pump, model 060	With 5.0 hp (3.7 kW) electric motor
	Pump, model 075	With 7.5 hp (5.5 kW) electric motor
	Pump, model 150	With 10 hp (7.5 kW) electric motor
5.	Pressure gauge, 1/4" NPT	0–400 psig (0–28 bar g)
6.	B166 bypass valve, 1" NPT	With spring code C
7.	Hydrostatic relief valve, 1/4" NPT	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	
10.	Ball valve, 2"	Existing
11.	Eccentric reducer, 2" x 1-1/2"	
12.	Flange, 5"	Existing
13.	Pressure equalizing line	Part of existing 5" manifold. Must be open for pump to operate properly.
14.	Bypass 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.
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.

Solutions beyond products...

CORKEN®

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