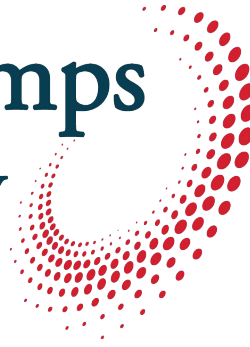
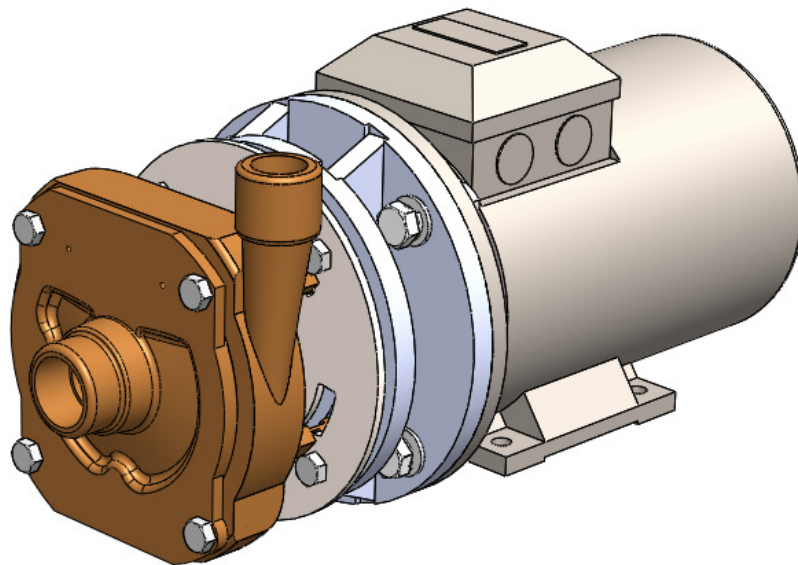


Ampco Pumps Company



K-Series: Metric Components **Service Manual**



This service manual includes installation, operation, and maintenance instructions for Ampco Pump Company's K-Series with IEC frame motor. Failure to learn the correct procedures for installing and servicing the pump from this manual could result in equipment failure.



PUMP INSTALLATION

Receiving pumps:

Visually inspect shipping crate(s)/pallet(s) for damage. Ampco pumps will be shipped in boxes labeled Ampco Pumps or in crates. If there is any damage it is imperative to notify the driver at the time of delivery. Failure to do so will make it difficult, if not impossible, to file a damage claim and Ampco Pumps will not be held accountable. Please contact Ampco Pumps shipping department with damage details ASAP.

Once unpacked, carefully inspect the pump for any damage that may have occurred during shipping. Attempt to turn the impeller, it should turn freely. There should be a little noise from the seal which is normal. If there is metal-to-metal contact when the impeller is turned then shipping damage is likely. Leave the protective covers on the inlet and discharge connections until the pump is installed and is ready to be connected to the piping to stop debris from getting into the pump.

Pump Location

Use the following pump location guidelines to help ensure proper pump performance:

- Locate the pump so that the shortest and most direct possible suction piping can be used.
- To facilitate priming, ensure a steady flow, and provide positive suction head, locate the pump below system level, when possible.
- Ensure the NPSH available to the suction end is always equal-to or greater-than the specified NPSH required on the pump performance curve by considering the pump's location in relation to the entire system.

Foundation (if applicable)

The base attached to the pumping unit has pre-drilled mounting holes so that the pumping unit can be fixed to a foundation, providing a permanent rigid support. The foundation is necessary in order to absorb vibration, strain, and shock on the pumping unit. The foundation should be about 6 inches longer and wider than the pump base and have a depth of about 20 times the diameter of the foundation bolts.



General Piping Notes

- Pipe hangers or other supports must be used at proper intervals to ensure proper piping support near the pump. **Do not use the pump to support piping!**
- When flange bolts are tightened no strain should be transmitted to the pump, thus suction and discharge piping should be supported independent of the pump and care should be taken that the pump and piping are properly aligned.
- Piping must be as straight as possible. Avoid all unnecessary bends and fittings. When bends are necessary use 45° or long-sweep 90° pipe fittings in order to decrease minor friction losses.
- Make sure all flanged joints have matching inside diameters and properly aligned mounting holes – especially close to the pump.
- **Do not force piping when making connections. This can cause the impeller to rub on the casing or premature seal failure.**

Suction Piping

It is very important that suction piping be selected and installed such that it minimizes pressure loss and allows sufficient liquid flow into the pump. A proper suction piping system design can eliminate many NPSH problems. The following precautions should be followed to ensure a proper suction piping system.

- Suction piping must be kept as direct as possible. It is suggested that any elbows be kept at least 5 pipe diameters away from the pump's suction flange.
- Suction piping length should be at least ten times the pipe diameter overall.
- When suction piping has a larger diameter than the pump suction opening an eccentric reducer must be used, with the taper oriented down. (Note: Do not use a concentric reducer)
- Suction piping must never have a smaller diameter than the pump suction opening.
- When possible, horizontal suction piping should follow an even gradient.



- For suction lift conditions it is recommended that the suction piping have a gradual upward slope approaching the pump. For positive suction head the suction piping should have a gradual downward slope approaching the pump.
- High point such as loops or arcs must be avoided as they may create air pockets, throttle the system, and produce erratic pumping.
- A valve must be installed in the suction piping in order to isolate the pump during shutdown and maintenance, and to facilitate pump removal. If two or more pumps are connected to a single suction line, each pump should be isolated by a separate valve.
- Gate valves need to be positioned so that air pockets are not produced. If NPSH is critical, globe valves should not be used. (**Note: During operation all valves installed on the suction line must be at full open**)
- To enable the pump operator to monitor pump performance, properly sized pressure gauges may be installed in gauge taps on pump suction and discharge nozzles. Pressure gauges will also indicate the presence of cavitation, vapor binding, or other unstable operation by showing wide fluctuations in suction and discharge pressures. For these reasons Ampco highly recommends gauges.

Discharge Piping

To ensure proper pump performance the following precautions regarding discharge piping should be followed:

- If the discharge piping distance is short the piping can be the same diameter as the pump discharge opening.
- Long horizontal lengths of discharge piping should maintain an even gradient.
- A valve needs to be installed near the pump's discharge opening to prime and start the pump, as well as to isolate the pump during shutdown, maintenance, and to facilitate pump removal.
- High points should be avoided in discharge piping as they can entrap air or gas and retard pump operation.
- If liquid hammer might exist, such as when check valves are used, the discharge gate valve should be closed prior to pump shutdown.



Priming

The K-Series pump is not a self-priming pump and must be completely filled with the pumping liquid before operation. If the system has a positive suction head priming can be done by opening the valve in the suction piping as well as the pump's air vents to allow the liquid to enter the pump casing. Rotate the shaft by hand to free entrapped air from the impeller and then ensure that all air has been forced out by the liquid before closing the air vents. If the pump has a suction lift, priming must be done by using foot valves, ejectors or manual filling of the pump casing.

CAUTION!

Running the pump dry will result in serious damage to the mechanical seal.

Pre-Start Checklist

Before operating the K-Series pump ensure that all of the following requirements are met

- Check that all motor and starting device wirings match the wiring diagram.
- Make sure the shaft rotates clockwise when viewed from behind the motor.
- Refer to motor instructions before starting if the motor has not been operated over an extended period of time.
- Make sure that that voltage, phase, and line circuit frequency match what is specified on the motor data plate.
- Turn shaft by hand to make sure it rotates freely.
- Tighten all gauge and drain tap plugs. When not in use, close the gauge cocks on pumps fitted with pressure gauges.
- Check that all flange bolts are tightened and the suction and discharge piping is not leaking.

Pump Operation

WARNING

Operating the pump without an approved coupling guard installed could result in operating personnel injury.

Start Up Instructions

1. Set the suction line gate valve to full open and close the discharge line gate valve.
2. Fill the suction line and prime the pump.



3. Start the motor and immediately check the pump and suction piping for leaks.
4. As soon as the pump reaches operating speed, open the discharge gate slowly until complete system flow is achieved. There may be valve chatter during transient period during valve adjustment. Be aware that the pump's motor is specified for the flow and pressure specified by the customer and that higher flow rates could damage the motor.
5. Check for leaks in the discharge piping.
6. (For pumps with pressure gauges) Open gauge cocks and record pressure reading. Check that the pump is performing as specified by the performance curve.

Shut Down Instructions

(Note: If the pump will be shut down for an extended period refer to the Extended Duration Shutdown)

1. Slowly close the discharge piping gate valve. (Closing valve too quickly can cause hydraulic shock)
2. Turn off power supply to the pump.

Short Duration Shutdown

For short shutdown periods the pump can remain filled but make sure the pump is fully primed prior to restarting. If the pump is subject to freezing conditions then the pump exterior should be insulated or heated and the fluid within the pump casing must be kept moving in order to prevent freezing.

Extended Duration Shutdown

For extended duration shutdowns close the suction piping gate valve or if no suction valve is installed then drain the suction line to stop liquid flow to the suction nozzle. Remove pump drain and vent tap plugs as required and completely drain the pump casing. If the pump will be subjected to freezing conditions during shutdown then all liquid must be completely blown out of all passages and pockets using compressed air or the pump must be filled with an antifreeze solution to prevent damage.

Assembly – KC2 w/ IEC80 MOTOR

*Refer to the parts list in Table 1 appended to this manual for the part name and quantity.

- 1) Begin with the bare motor. Ensure that the shaft and C-face areas are clean. Attach the motor adapter (1) to the motor using the supplied hardware.
- 2) Attach the stub shaft (2) and shaft locking collar (3) to the motor and the motor adapter (1) as shown in Figure 1. Leave the shaft collar loose until Step 5.

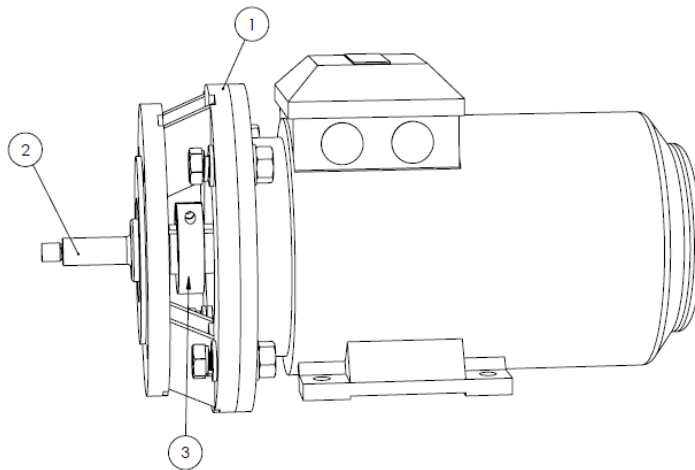


Figure 1: Motor Adapter Installation

- 3) Place the rear cover (5) into the adapter plate (4) and rotate clockwise to lock into place.

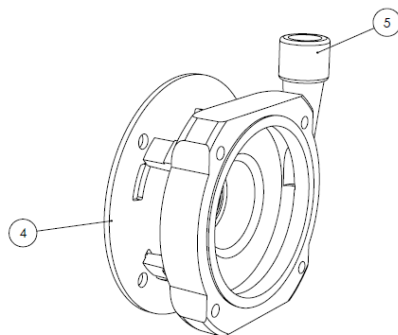


Figure 2: Rear cover to Adapter Plate

- 4) Install the adapter plate (4) and rear cover (5) onto the front of the motor adapter (1) using the supplied hardware. Apply Loctite to the screws before tightening to 15 ft-lbs.

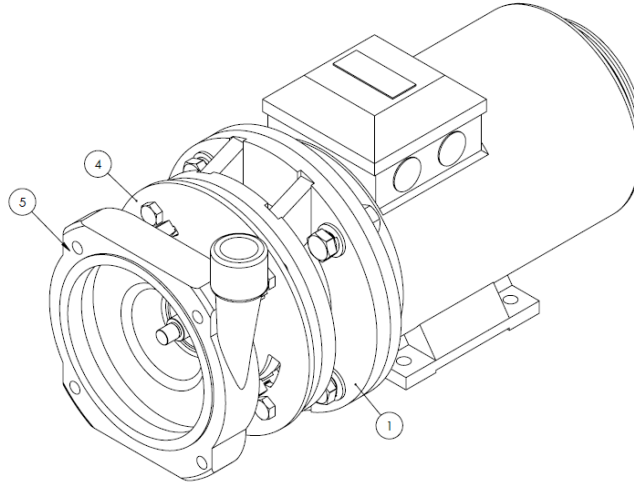


Figure 3: Attach Rear Cover to Adapter

- 5) Next, the impeller will be installed and the clearance set. Begin by placing a .875" thick shim into the rear cover. Now, screw the impeller (6) onto the stub shaft (2) and tighten until fully seated. Ensure the impeller is flush with the shim and finally, tighten the shaft collar (3) to 15 ft-lbs.

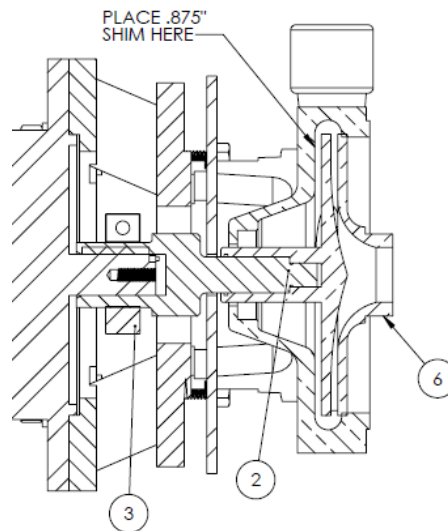


Figure 4. Setting Impeller Clearance

- 6) Next, the seal will be installed. Remove the impeller and take out the shim used for setting the clearance. Lightly oil the rear cover (5) bore and finger press the stationary ceramic component into the rear cover. The ceramic face will be orientated to the front and visible once installed. Make sure it is fully seated.

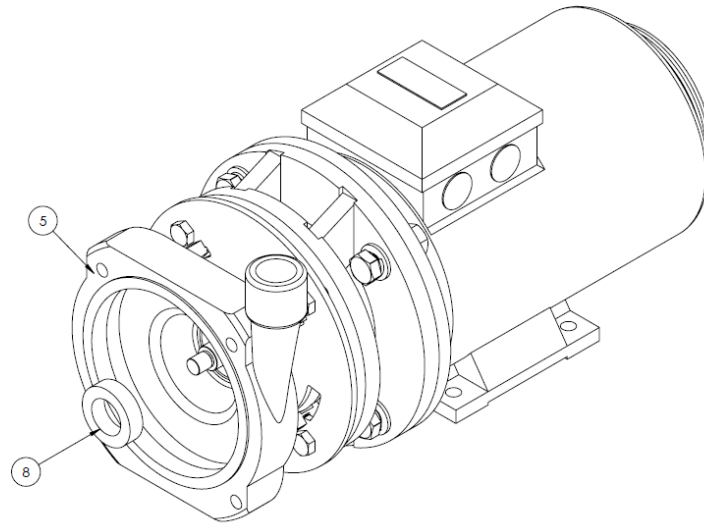


Figure 5: Stationary Seal Seat Installation

- 7) Insert the impeller o-ring (13) into the stem of the impeller (6).

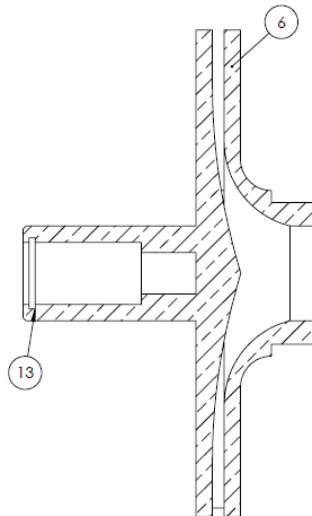


Figure 6. Impeller O-ring Installation

- 8) Place the cup (11) around the back of the impeller (6) stem with the flat side against the impeller. Next, install the spring (10) around the impeller stem. Lastly, the rotating seal (9) is placed onto the stem with the seal face directed towards the rear of the pump. Seal may be lightly oiled to facilitate sliding into the impeller stem. (Use soap, glycerin, etc. if oil is not permitted i.e. EPDM).

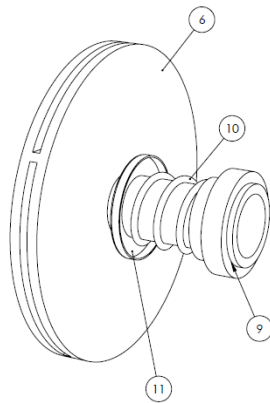


Figure 7: Rotating Seal to Impeller Stem

- 9) Re-install the impeller and tighten onto the sub shaft (2). Lubricate the stub shaft and impeller o-ring (13) as required for smooth installation. Next, install the front cover (7).
- 10) The last step is to install the shaft guard (12) around the motor adapter (1).

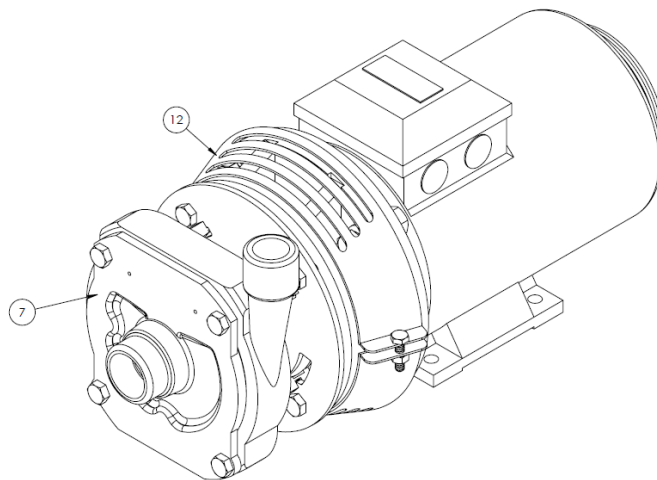


Figure 8. Install Front Cover and Shaft Guard

Table 1. Parts List

Number	Description	Qty. per pump
1	Motor Adapter	1
2	Stub Shaft	1
3	Shaft Collar	1
4	Adapter Plate	1
5	Rear Cover	1
6	Impeller	1
7	Front Cover	1
8	Seal: Stationary	1
9	Seal: Rotating	1
10	Seal: Spring	1
11	Seal: Cup	1
12	Shaft Guard	2
13	Impeller O-ring	1