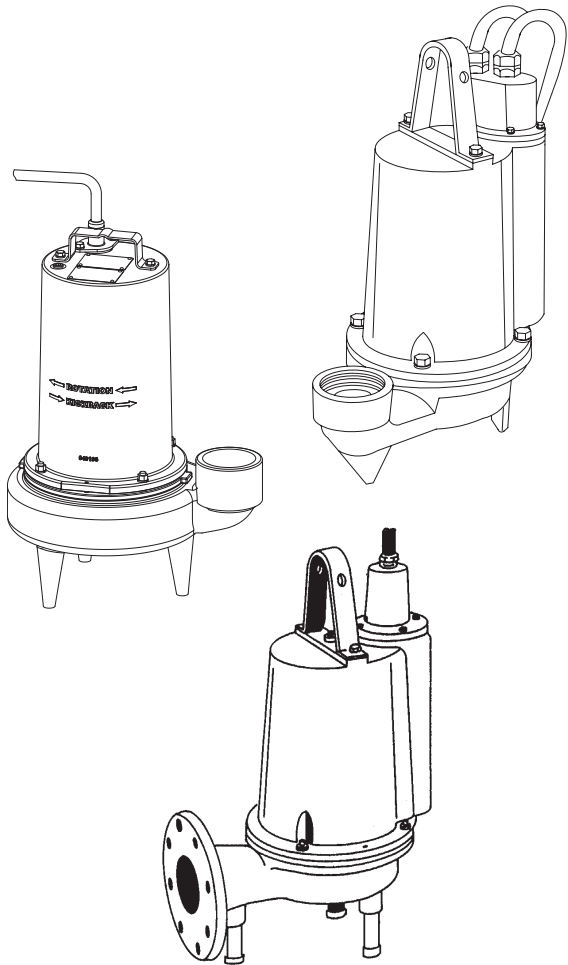


BARNES®

SEAL KIT P/N 130182
SERVICE KIT P/N 130209
Submersible Pump



Series: 3SE-HD

Series: 3SE-L

3 HP, 3450 RPM, 60 Hz.

Series: 3SE-L

3 HP, 1750 RPM, 60 Hz.

Series: 4SE-SS

5 HP, 3450 RPM, 60 Hz.

Series: 4SE-SS

2.8 HP, 1150 RPM, 60 Hz.

Series: 4SE-SS

2.8 - 5 HP, 1750 RPM, 60 Hz.

(Single Seal)

IMPORTANT!

Read all instructions in this manual before operating pump.

As a result of Crane Pumps & Systems, Inc., constant product improvement program, product changes may occur. As such Crane Pumps & Systems reserves the right to change product without prior written notification.

CRANE

A Crane Co. Company

PUMPS & SYSTEMS

420 Third Street
Piqua, Ohio 45356
Phone: (937) 778-8947
Fax: (937) 773-7157
www.cranepumps.com

83 West Drive, Brampton
Ontario, Canada L6T 2J6
Phone: (905) 457-6223
Fax: (905) 457-2650



Form No. 130186-Rev. D

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SPECIAL TOOLS AND EQUIPMENT

INSULATION TESTER (MEGGER)

DIELECTRIC TESTER

SEAL TOOL KIT (107271)

PRESSURE GAUGE KIT (085343)

This manual covers the following models, there may be extra parts not needed for your specific model. If additional parts not included in this kit are required, please consult the explicit manual for your pump at:

http://www.cranepumps.com/downloadables/CATALOGS_OIPMs/PARTBOOK/BARNES.pdf

Series: 3SE-HD - Manual 107948, 133460

Series: 3SE-L - Manual 088774, 133410

Series: 4SE-SS - Manual 088688

Seal Repair Kit P/N - 130182 (†)
Service Kit..... P/N - 130209 (♦)

PARTS INCLUDED IN KIT

QTY	PART NO.		DESCRIPTION
1	017026	†♦	O-Ring
1	062641	†♦	Pull Washer
1	061829	†♦	"V"-Ring
2	033730	†♦	Square Ring
1	062435	†♦	Mech Seal
3	079318	♦	Wire Connector
1	057882	♦	Retaining Ring
1	035589	♦	Shaft Key
1	038132	♦	Jam Nut
1	20-24-1	♦	Washer
1	053746	♦	Ball Bearing
6	055844	♦	Wire Connector
6	052990	♦	Wire Connector
1	070320	♦	Impeller Washer
1	105149A	♦	Jumper Wire
1	105150	♦	Wire Crimp Connector
1	111951	♦	Barrel Crimp Terminal
1	2-31051-224	†♦	O-Ring
1	105197	♦	Retaining Ring

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 1999, 2002, 11/03, 6/05, 4/06 , 9/06, 2/07

SAFETY FIRST!

Please Read This Before Installing Or Operating Pump.
This information is provided for **SAFETY and to PREVENT EQUIPMENT PROBLEMS**. To help recognize this information, observe the following symbols:



IMPORTANT! Warns about hazards that can result in personal injury or Indicates factors concerned with assembly, installation, operation, or maintenance which could result in damage to the machine or equipment if ignored.

CAUTION ! Warns about hazards that can or will cause minor personal injury or property damage if ignored. Used with symbols below.

WARNING ! Warns about hazards that can or will cause serious personal injury, death, or major property damage if ignored. Used with symbols below.



Hazardous fluids can cause fire or explosions, burns or death could result.



Extremely hot - Severe burns can occur on contact.



Biohazard can cause serious personal injury.



Hazardous fluids, hazardous pressure, eruptions or explosions could cause personal injury or property damage.



Rotating machinery Amputation or severe laceration can result.



Hazardous voltage can shock, burn or cause death.

Only qualified personnel should install, operate and repair the pump. Any wiring of pumps should be performed by a qualified electrician.



WARNING ! - To reduce risk of electrical shock, pumps and control panels must be properly grounded in accordance with the National Electric Code (NEC) or the Canadian Electrical Code (CEC) and all applicable state, province, local codes and ordinances.



WARNING! - To reduce risk of electrical shock, always disconnect the pump from the power source before handling or servicing. Lock out power and tag.



WARNING! Operation against a closed discharge valve will cause premature bearing and seal failure on any pump, and on end suction and self priming pump the heat build may cause the generation of steam with resulting dangerous pressures. It is recommended that a high case temperature switch or pressure relief valve be installed on the pump body.



CAUTION ! Never operate a pump with a plug-in type power cord without a ground fault circuit interrupter.



CAUTION! Pumps build up heat and pressure during operation-allow time for pumps to cool before handling or servicing.



WARNING! - DO NOT pump hazardous materials (flammable, caustic, etc.) unless the pump is specifically designed and designated to handle them.



Do not block or restrict discharge hose, as discharge hose may whip under pressure.



WARNING! - DO NOT wear loose clothing that may become entangled in the impeller or other moving parts.



WARNING! - Keep clear of suction and discharge openings. **DO NOT** insert fingers in pump with power connected.



Always wear eye protection when working on pumps.



Make sure lifting handles are securely fastened each time before lifting. **DO NOT** operate pump without safety devices in place. Always replace safety devices that have been removed during service or repair. Secure the pump in its operating position so it can not tip over, fall or slide.



DO NOT exceed manufacturers recommendation for maximum performance, as this could cause the motor to overheat.



DO NOT remove cord and strain relief. Do not connect conduit to pump.



WARNING! Cable should be protected at all times to avoid punctures, cut, bruises and abrasions - inspect frequently. Never handle connected power cords with wet hands.



WARNING! To reduce risk of electrical shock, all wiring and junction connections should be made per the NEC or CEC and applicable state or province and local codes. Requirements may vary depending on usage and location.



WARNING! Submersible Pumps are not approved for use in swimming pools, recreational water installations, decorative fountains or any installation where human contact with the pumped fluid is common.



WARNING! Products Returned Must Be Cleaned, Sanitized, Or Decontaminated As Necessary Prior To Shipment, To Insure That Employees Will Not Be Exposed To Health Hazards In Handling Said Material. All Applicable Laws And Regulations Shall Apply.



Bronze/brass and bronze/brass fitted pumps may contain lead levels higher than considered safe for potable water systems. Lead is known to cause cancer and birth defects or other reproductive harm. Various government agencies have determined that leaded copper alloys should not be used in potable water applications. For non-leaded copper alloy materials of construction, please contact factory.



IMPORTANT! - Crane Pumps & Systems, Inc. is not responsible for losses, injury, or death resulting from a failure to observe these safety precautions, misuse or abuse of pumps or equipment.

SECTION: SERVICE AND REPAIR

1) Lubrication:

Anytime the pump is removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination.

1.1) Checking Oil:

Motor Housing - To check oil, set unit upright. Remove pipe plug from motor housing. With a flashlight, visually inspect the oil in the motor housing to make sure it is clean and clear, light amber in color and free from suspended particles. Milky white oil indicates the presence of water. Oil level should be just above the motor when pump is in vertical position.

1.2) Testing Oil:

- 1.) Place pump on it's side, remove pipe plug, from motor housing and drain oil into a clean, dry container.
- 2.) Check oil for contamination using an oil tester with a range to 30 Kilovolts breakdown.
- 3.) If oil is found to be clean and uncontaminated (measuring above 15 KV. breakdown), refill the motor housing as per paragraph 1.4.
- 4.) If oil is found to be dirty or contaminated (or measures below 15 KV. breakdown), the pump must be carefully inspected for leaks at the shaft seal, cord assemblies, square ring and pipe plug, before refilling with oil. To locate the leak, perform a pressure test as per paragraph 1.3. After leak is repaired, dispose of old oil properly, and refill with new oil as per paragraph 1.4.

1.3) Pressure Test:

Pumps that have been disassembled, Motor Housing - If the pump has been disassembled, the oil should be drained before a pressure test, as described in paragraph 1.2. Remove pipe plug from motor housing. Apply pipe sealant to pressure gauge assembly and tighten into hole (See Figure 1). Pressurize motor housing to 10 P.S.I. Use soap solution around the sealed areas and inspect joints for "air bubbles". If, after five minutes, the pressure is still holding constant, and no "bubbles" are observed, slowly bleed the pressure and remove the gauge assembly. Replace oil as described in section 1.4. If the pressure does not hold, then the leak must be located and repaired.

Pumps that have NOT been disassembled, Motor Housing- The pressure test may be done with the oil at its normal level. Remove pipe plug from motor housing. Apply pipe sealant to pressure gauge assembly and tighten into hole (See Figure 1). Pressurize motor housing to 10 P.S.I. Use soap solution around the sealed areas above the oil level and inspect joints for "air bubbles".

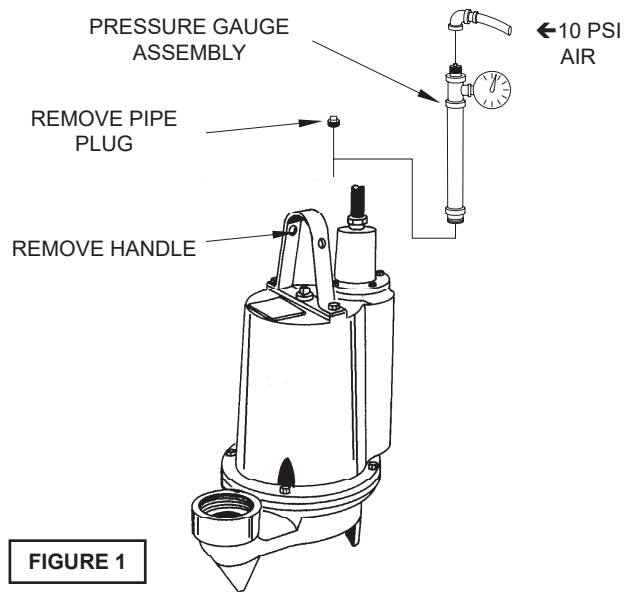


FIGURE 1

For sealed areas below the oil level, leaks will seep oil. If, after five minutes, the pressure is still holding constant, and no "bubbles"/oil seepage is observed, slowly bleed the pressure and remove the gauge assembly. If the pressure does not hold, then the leak must be located and repaired.



CAUTION ! Pressure builds up extremely fast, increase pressure by "tapping" air nozzle. Too much pressure will damage seal. DO NOT exceed 10 P.S.I.

1.4) Replacing Oil:

Motor Housing- Set unit upright and refill with new cooling oil as per Table 1. Fill to just above motor as an air space must remain in the top of the motor housing to compensate for oil expansion. Apply pipe thread compound to threads of pipe plug then assemble to motor housing.



Important ! - For single phase units, oil level should be below capacitor



Warning ! - Do not overfill oil. Overfilling of motor housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard. Overfilling oil voids warranty.

TABLE 1 - COOLING OIL - Dielectric	
SUPPLIER	GRADE
Sohio / Standard	SE 40, Energol HL22 or HL32
Shell	Turbo Oil 32
Texaco	Rando HD32, 522
Sun Petroleum	Supar 110, Sunvis 816WR, 911 or 916
Mobile	D.T.E. Oil Light or Rubrex 200
G&G	Circu Oil 22
Allegheny Petroleum	Altrapar 22
Woco	Premium 100



Caution! - Pressure builds up extremely fast, increase pressure by "tapping" air nozzle. Too much pressure will damage seal. Do Not exceed 10 P.S.I. in motor housing.

2) Impeller and Volute Service:

2.1) Disassembly and Inspection:

To clean out volute, disconnect power, remove hex nuts and lockwashers, vertically lift motor and seal assembly from volute. Clean out body if necessary. Clean and examine impeller for pitting or wear, replace if required. Inspect square ring and replace if cut or damaged. If impeller requires replacing, remove jam nut and washer, by placing a flat screwdriver in the slot of the end of the shaft to hold the shaft stationary while unscrewing the impeller. Once impeller is removed, remove pull washer and exclusion seal if damaged or cut.

2.2) Reassembly:

Position exclusion seal on shaft until it seats against the stationary portion of seal. Place pull washer on shaft until it seats against exclusion seal. To install impeller, apply a thin film of oil to motor shaft and slide impeller straight onto shaft, keeping keyways lined up, drive key into keyway. Locate washer, apply Loctite to shaft threads, thread hex nut to shaft

and torque to 40 ft. lbs. Rotate impeller to check for binding. Position o-ring on volute flange and position impeller and motor housing assembly over studs and onto volute. Apply thread locking compound to each stud. Thread nut onto studs and torque to 20 ft. lbs. Check for free rotation of motor and impeller.

3) Motor, Bearing and Seal Service

3.1) Disassembly and Inspection:

To examine or replace the motor, bearing and shaft seal, disassemble volute and impeller as outlined in paragraph 2.1. Drain oil from motor as outlined in paragraph 1.2.

Position unit upright, using blocks to avoid resting unit on shaft. After removal of cord motor housing remove cable lead wires from motor lead wires and temperature sensor wires (if equipped) from sensor cord, by disconnecting wire connectors. Also disconnect ground screw from motor. The wiring connections should be noted to insure correct connections when reassembling.

Motor - Remove the motor bolts and lift motor stator from motor rotor and seal plate. Unscrew conduit bushing from seal plate and lift motor rotor, shaft, bearing, rotating portion of seal, washer and conduit bushing from seal plate.

Inspect windings for shorts and check resistance values. Check rotor for wear, if rotor or the stator windings are defective, the complete motor must be replaced. To test the temperature sensor (if equipped), check the continuity between the black and white wires. If found to be defective contact a motor service station or Barnes Service Department. Check motor capacitor on single phase units and replace if defective.

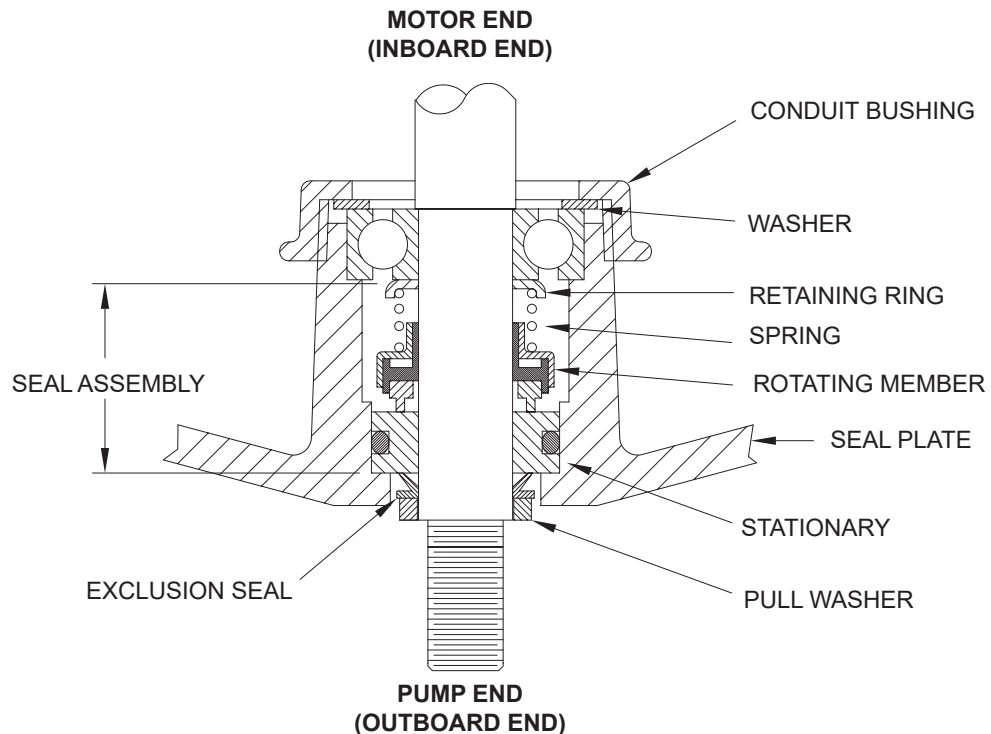




FIGURE 2

 **Important! - Handle seal parts with extreme care. Do Not scratch or mar lapped surfaces.**

Seal - Remove rotating member, spring and retaining ring from shaft. (see Figure 2). Examine all seal parts and especially contact faces. Inspect seal for signs of wear such as uneven wear pattern on stationary members, chips and scratches on either seal face. **DO NOT** interchange seal components, replace the entire shaft seal. If replacing seal, remove stationary from seal plate by prying out with flat screwdriver.

Bearing - Examine bearing and replace if required. If replacement is required, remove bearing from motor shaft using a wheel puller. Washer, retaining ring and conduit bushing can now be removed from motor shaft.

 **Important! - All parts must be clean before reassembly.**

3.2) Reassembly:

Bearing - When replacing bearing, be careful not to damage the rotor or shaft threads. Clean the shaft thoroughly. Slide conduit bushing and washer over motor shaft. Insert retaining ring into groove on shaft. Apply adhesive compound to the shaft and press bearing on the motor shaft, position squarely onto shaft applying force to the inner race of the bearing only, until bearing seats against retaining ring.

Seal - Clean and oil seal cavity in seal plate. Press stationary member firmly into seal plate, using a seal pusher, nothing but the seal pusher is to come in contact with seal face (see Figure 3). Make sure the stationary member is in straight.

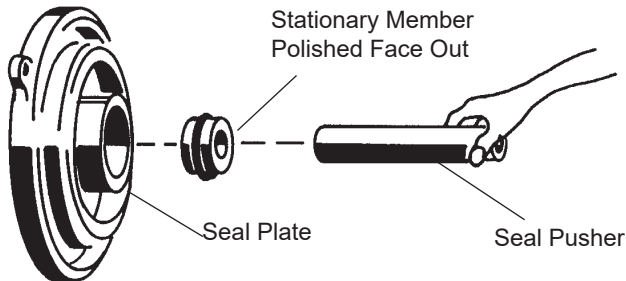




FIGURE 3

 **Important! - Do Not hammer on the seal pusher. It will damage the seal face.**

Slide retaining ring over shaft and let rest on bearing. Place spring over shaft and let rest on retaining ring. Lightly oil (**DO NOT use grease**) shaft, bullet and inner surface of bellows on rotating member, (see Figure 4), with lapped surface of rotating member facing outward, slide over bullet and onto shaft using seal pusher, making sure spring is seated in retaining ring and spring is lined up on rotating member and not cocked or resting on bellows tail.

 **Important! - It is EXTREMELY important to keep seal faces clean during assembly. Dirt particles lodged between these faces WILL cause the seal to leak.**

Motor - Slide motor rotor with conduit bushing, washer, bearing and seal parts into seal plate until bearing seats in seal plate. Center washer on bearing and tighten conduit bushing on seal plate.

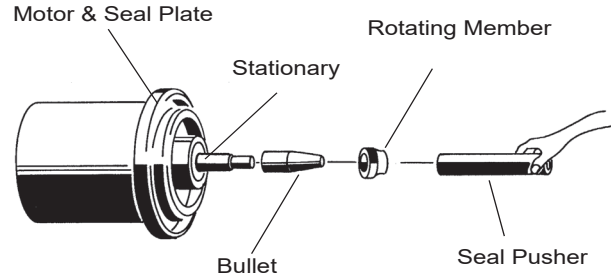


FIGURE 4

Lower motor stator over rotor until seated in seal plate, while aligning holes for motor bolts. Insert motor bolts and torque to 22 in-lbs. If pump is a single phase unit place bracket on one of the motor bolts. Insert capacitor in bracket, attach motor leads with terminals to capacitor and place terminal boot over terminals (if used).

Place all motor leads above motor. Position o-ring on seal plate and lower motor housing over motor and into pilot. Place socket head cap screws through seal plate into motor housing and torque to 60 in-lbs. Make wire connections per paragraph 3.3. Assemble impeller and volute per paragraph 2.2.

3.3) Wiring Connections:

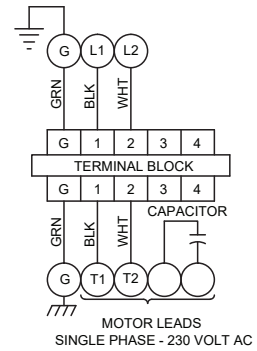
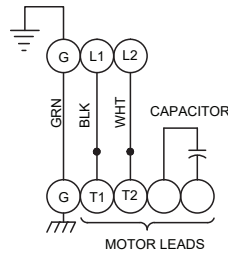
Check power cord and sensor cord for cracks or damage and replace if required.

Conduit Box Design:

Bring motor wires through wire opening in top of motor housing, position square ring in conduit housing and reconnect motor leads to power cord and moisture and temperature sensor leads to sensor cord (if equipped) using connectors as shown in Figure 7.

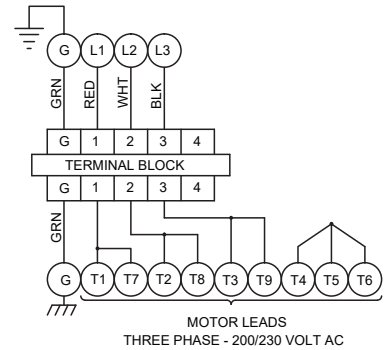
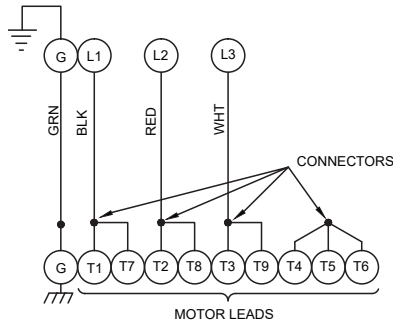
SINGLE PHASE, 230 VOLT AC

Power Cable (10a)	Motor Lead Number
Green (Ground)	Green
Black	1
White	2
Flag Terminal	Capacitor
Flag Terminal	Capacitor



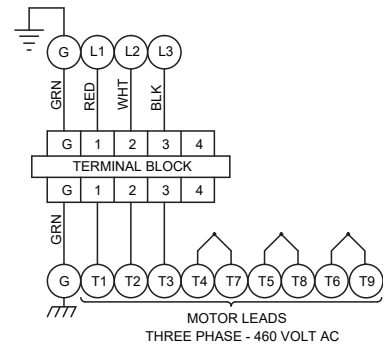
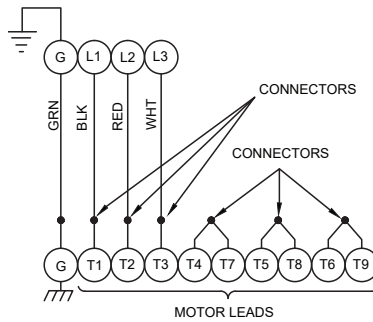
THREE PHASE, 200/230 VOLT AC

Power Cable (10A)	Motor Lead Number
Green (Ground)	Green
Black	1 & 7
Red	2 & 8
White	3 & 9
	4, 5 & 6 Together



THREE PHASE, 460/575 VOLT AC

Power Cable (10A)	Motor Lead Number
Green (Ground)	Green
Black	1
Red	2
White	3
	4 & 7 Together (460V)
	5 & 8 Together (460V)
	6 & 9 Together (460V)



TEMPERATUR SENSOR (Optional)

Control Cable (10e)	Lead Number
Black	P1 (Temp Sensor)
White	P2 (Temp Sensor)

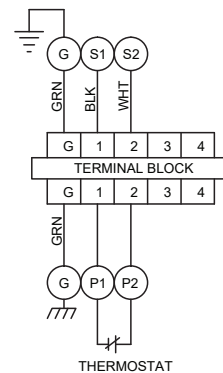
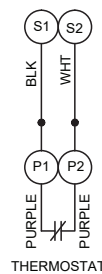


FIGURE 5

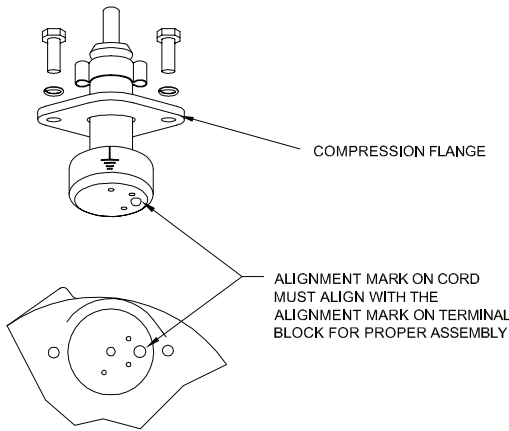


FIGURE 6

Terminal Block Design:

Make internal wiring connections which are independent of the terminal block as shown in Figure 3 using connectors and wire assemblies as required. Do not use wire nuts. Slip motor leads and ground wire into bearing bracket while aligning holes and stringing motor leads through the cord entry bore(s). (Slipping cords inside a 1 ft. length of .5" conduit makes this easier). Place a socket head cap screws through seal plate into motor housing and torque to 75 in-lbs. Install inner seal assembly as outlined in paragraph 4.2. Install square ring, bearing bracket and square ring in position on pump. Place socket head cap screws through seal plate and torque to 75 in-lbs.

Reconnect motor and sensor leads to the underside of the terminal blocks, as shown in Figure 5. Note that the pins are numbered underneath the terminal block. Place o-ring into groove in terminal block and lubricate with dielectric oil. Press the terminal block into the housing so it seats completely below the retaining ring groove. Place retaining ring into groove in cord entry bore of housing. Repeat terminal block installation for sensor cord, if equipped.

3.4) Conduit Box and Cord Assembly:

Conduit Box Design:

Refill with cooling oil as outlined in paragraph 1.4. Position conduit box and square ring over opening. Place lockwashers on cap screws, apply Loctite to cap screws threads and torque to 16 ft lbs. Remove gland nuts, friction rings, and grommets from conduit box inspect and replace if required. (See Figure 7) Insert one friction ring, grommet, one friction ring and gland nut into conduit box for power cable. For control cable (if used), insert grommet, friction ring and gland nut. Torque gland nuts to 15 ft. lbs to prevent water leakage.

Terminal Block Design:

Power/Control Cable - Refill the cooling oil as outlined in paragraph 1.4. Make wire connections as outlined in paragraph 3.3. Insert female end of cord plug into housing bore aligning timing mark with hole in terminal block, (See Figure 6). Compress cord plug with compression flange by tightening hex bolts into the motor housing. Torque to 132 in-lbs.

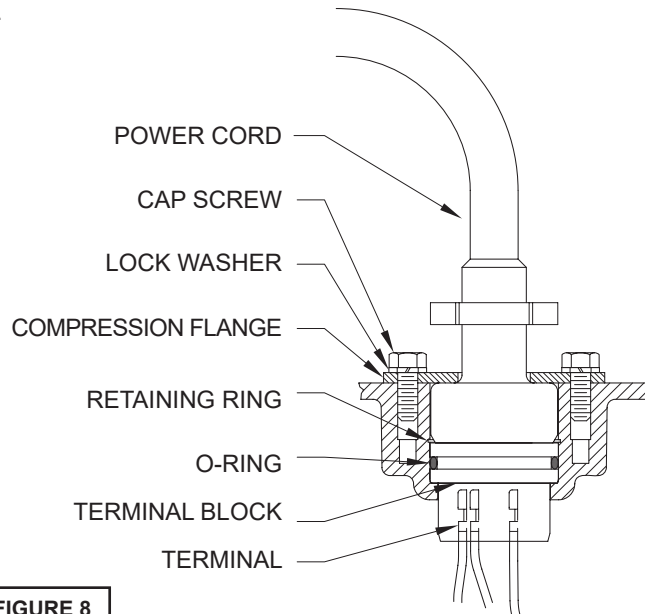


FIGURE 8

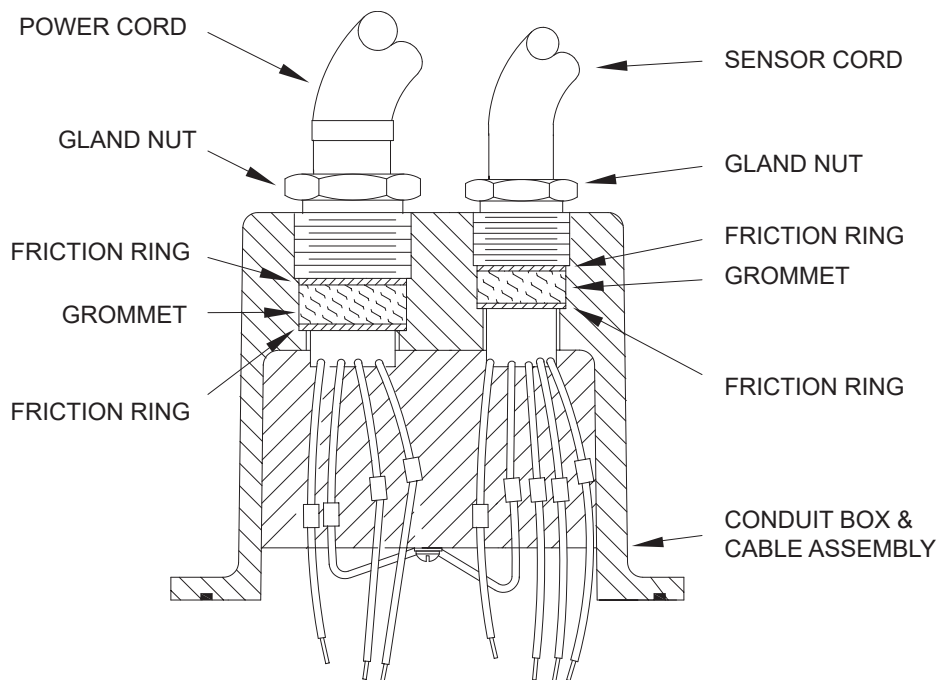


FIGURE 7

IMPORTANT! WARRANTY REGISTRATION

Your product is covered by a warranty:

www.cranepumps.com/downloadables/CATALOGS_OIPMs/Warranty/24MonthWarranty.pdf

If you have a claim under the provisions of the warranty, contact your local Crane Pumps & Systems, Inc. Distributor.

RETURNED GOODS

**RETURN OF MERCHANDISE REQUIRES A "RETURNED GOODS AUTHORIZATION".
CONTACT YOUR LOCAL CRANE PUMPS & SYSTEMS, INC. DISTRIBUTOR.**



**Products Returned Must Be Cleaned, Sanitized,
Or Decontaminated As Necessary Prior To Shipment,
To Insure That Employees Will Not Be Exposed To Health
Hazards In Handling Said Material. All Applicable Laws
And Regulations Shall Apply.**