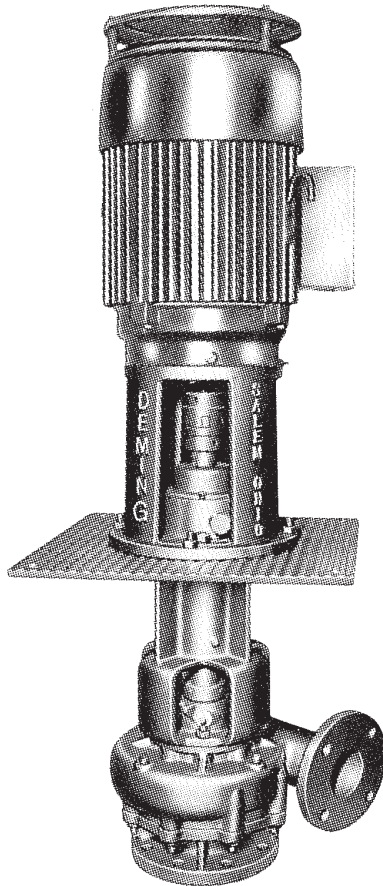


# DEMING®

## INSTALLATION, OPERATION & MAINTENANCE MANUAL Vertical Process Pumps



Series: 5411  
5421  
5421-H

**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**<sup>®</sup>

A Crane Co. Company

### PUMPS & SYSTEMS

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Form No. 120023-Rev. D

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# 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 can cause hazardous pressure, eruptions or explosions could cause personal injury or property damage.*

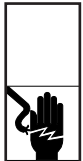


*Rotating machinery Amputation or severe laceration can result.*



*Hazardous voltage can shock, burn or cause death.*

Only qualified personnel should install, operate and repair 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. Improper grounding voids warranty.



**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.



**CAUTION!** 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 moving parts.



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



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.



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.

## A - GENERAL INFORMATION

### TO THE PURCHASER:

Congratulations! You are the owner of one of the finest pumps on the market today. These pumps are products engineered and manufactured of high quality components. With years of pump building experience along with a continuing quality assurance program combine to produce a pump which will stand up to the toughest applications.

Check local codes and requirements before installation. Servicing should be performed by knowledgeable pump service contractors or authorized service stations.

### RECEIVING:

Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the crating, do not lose or misplace.

### STORAGE:

**Short Term** - Pumps are manufactured for efficient performance following long inoperative periods in storage. For best results, pumps can be retained in storage, as factory assembled, in a dry atmosphere with constant temperatures for up to six (6) months.

**Long Term** - Any length of time exceeding six (6) months, but not more than twenty four (24) months. The units should be stored in a temperature controlled area, a roofed over walled enclosure that provides protection from the elements (rain, snow, wind blown dust, etc.), and whose temperature can be maintained between +40 deg. F and +120 deg. F. Pump should be stored in its original shipping container and before initial start up, rotate impeller by hand to assure seal and impeller rotate freely.

### SERVICE CENTERS:

For the location of the nearest Deming Service Center, check your Deming representative or Crane Pumps & Systems Service Department in Piqua, Ohio, telephone (937) 778-8947 or Crane Pumps & Systems Canada, Inc., Bramton, Ontario, (905) 457-6223.

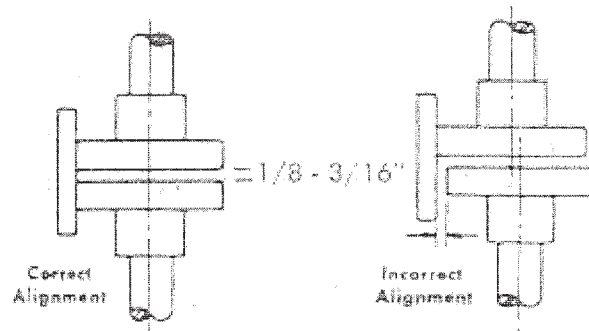
## B - INSTALLATION

Standard pumps are completely assembled, carefully adjusted and lubricated at the factory before shipment.

1. Carefully lower the pump into position. The base plate (023) must be level and rest evenly at all points where it will be bolted. If necessary, use metal shims as required to level plate.

**IMPORTANT!** - *The alignment between the motor and pump must be carefully checked before pump is started.*

In spite of careful assembly at the factory, alignment may change during shipment due to handling. Hold a straight edge on the coupling so that it extends over both halves. The straight edge should rest evenly across both rims of the coupling halves. Any misalignment may be corrected by adjusting the set screws in the lugs under the chair bracket, or possibly metal shims under the motor feet. Chair bracket mounted units should be checked for alignment every other day during the first week of operation, then once a week until alignment remains constant.



2. The weight of the suction and discharge pipes and fittings must be supported independently of the pump to eliminate any strain on the pump support plate or pipe. A check valve and gate valve should be installed in the discharge line close to the pump.
3. Rotate shaft by hand checking for impeller rubbing on high spots. If either is noted check for (A) pipe strain, (B) caps misalignment, (C) improper impeller adjustment.
4. Connect discharge line to pump discharge pipe and close gate valve. Connect power line to motor in accordance with wiring diagram on the motor. Jog motor control to test for rotation, standard pumps rotate clockwise looking down on the motor. (Left hand pumps operate in reverse direction.)
5. The pump should operate smoothly. If the pump vibrates, there is severe distortion of the pump as a result of excessive installation strain of the support plate, pipe strain or misalignment between motor and pump, improper impeller adjustment or a combination of these.

## C - LUBRICATION

1. Pump bearings are properly lubricated at the factory before shipment. Periods of subsequent lubrication depend on local conditions, hours of operation, load, speed, temperature, etc. It is recommended that bearings (016) and (018) be periodically inspected and lubricated.

2. A lithium base grease of medium consistency with corrosion resistant inhibiting properties must be used for the ball bearings. Shell Alvania #2 or equivalent is recommended.

## GENERAL REPAIRS

### D - FOR INSPECTION & REPAIR OF LIQUID END

1. Close the gate valve in the discharge line and **LOCK THE ENTRANCE DISCONNECT SWITCH IN THE OFF POSITION.**
2. Remove power leads from the motor. Disconnect the discharge pipe at the pump base plate. Unscrew foundation bolts in the base plate then lift pump and plate as a unit from the pit to the floor.
3. The motor is to be lubricated as per the motor manufacturers recommendations.
4. If the pump is furnished with combination elbow, remove cap screws and nuts at the pump discharge flange, then continue with step 5.  
If pump is furnished with screwed fittings, remove the flange or coupling from the top end of the pump discharge pipe. Also remove top pipe nut and screw bottom pipe nut down to allow clearance for removing discharge pipe.
5. Remove cap screws (215), suction head (009) and gasket (073).
6. Bend and remove the cotter pin and the castellated impeller nut (024). Hold shaft with a wrench at the coupling (042) and unscrew the impeller nut (24) by turning counter clockwise.
7. To remove impeller from the shaft it will be necessary to make 3 special jackscrews as follows: 1", 1½" or 2½" pumps use 3/8" x 16NC, 1¾" long. For all other sizes use 1/2" x 13NC, 3" long. Thread the jackscrews into the 3 tapped holes in the impeller shroud and tighten alternating jackscrews, until the impeller and impeller washer, is forced from the shaft. Lift impeller key (032) from its seat.
8. Remove cap screws (212), casing (001) and throttle housing (099).
9. Throttle bushing (252) can now be pressed from the throttle housing (099) and a new one installed. Make sure new throttle bushing is seated in bottom of housing.
10. Loosen set screw and remove deflector (040) from the shaft.

### E - TO INSPECT OR REPLACE BALL BEARINGS & SEAL

1. Remove electric wires from motor. Then remove 4 bolts and lift drive pedestal (081) motor and top half of coupling (042) from frame (019). Take spider and lower half of coupling (042) off the shaft (006). Shaft key should also come off at this time.
2. Dismantle Liquid end as described in section "A".
3. Remove split bearing cover (037).
4. Pull the shaft and bearing out of frame (019). To remove bearing locknut (066) bend and turn nut (066) counterclockwise. Lift off bearing lock washer.
5. To remove ball bearing assembly (018) from shaft, loosen the set screw in the bearing collar and turn the collar in the **opposite direction** of the normal shaft rotation, then pull the bearing assembly from the shaft. Remove grease retainer (051) from shaft, if shaft or grease retainer is to be replaced. Loosen the two machine or set screws and slide retainer from shaft.
6. When installing new bearings, seal (047) should also be replaced. To remove this seal, insert a piece of pipe or tubing, slightly larger than the diameter of the shaft, into the frame (019) from the motor end and push seal out.

### F - TO REASSEMBLE BALL BEARINGS AND SEAL

1. With the spring side of seal (047) towards the impeller, press seal into bearing cover (035), from impeller end, until flush. Apply sufficient grease to top of seal to fill space below ball bearing (016).
2. Press bearing (016) on the shaft until the inner bearing race is against the shaft shoulder.
3. Slide the grease retainer (051) with large flange facing the coupling end onto the shaft until the lower portion of the retainer is in line with the score mark. This score mark is used to locate the grease retainer on the shaft for proper running clearance between the retainer and upper bearing. Replace the machine or set screw and **SECURELY LOCK GREASE RETAINER TO THE SHAFT.** Position bearing (018) and collar on the shaft in its approximate location, but do not lock on shaft.
4. Place the bearing lock washer (069) and bearing lock nut (066) on the shaft but do not adjust. Insert shaft into frame (019) from motor end, threaded end first. Be careful not to damage seal (047) when inserting shaft.

## G - ASSEMBLY OF LIQUID END

1. Slide deflector (040) over shaft, but do not adjust.
2. Place throttle housing (099) over end of the shaft and against flange of frame (019). Align bolt holes with those of frame.
3. Position casing (001) against flange with discharge in proper position and tighten nuts securely.
4. Replace impeller key (032) in the shaft and properly position the impeller (002) on the shaft. Place impeller washer (270) on shaft, then the impeller nut (024). Tighten securely. Replace cotter pin in shaft to prevent impeller nut from coming off. **DO NOT USE NUT TO DRAW IMPELLER ONTO SHAFT.** The nut is a locking device only.
5. Place gasket (073) on suction head (009) and position suction head on casing (001). Tighten cap screws (215) on suction head.
6. Reassemble the discharge pipe and tighten pipe nuts being careful not put a strain on casing discharge flange.
7. Adjust deflector (04) so that the lower side of deflector is about 1/8" above bearing housing (099). With unit in vertical position and liquid end completely assembled.

## H - IMPELLER ADJUSTMENT & FINAL ASSEMBLY

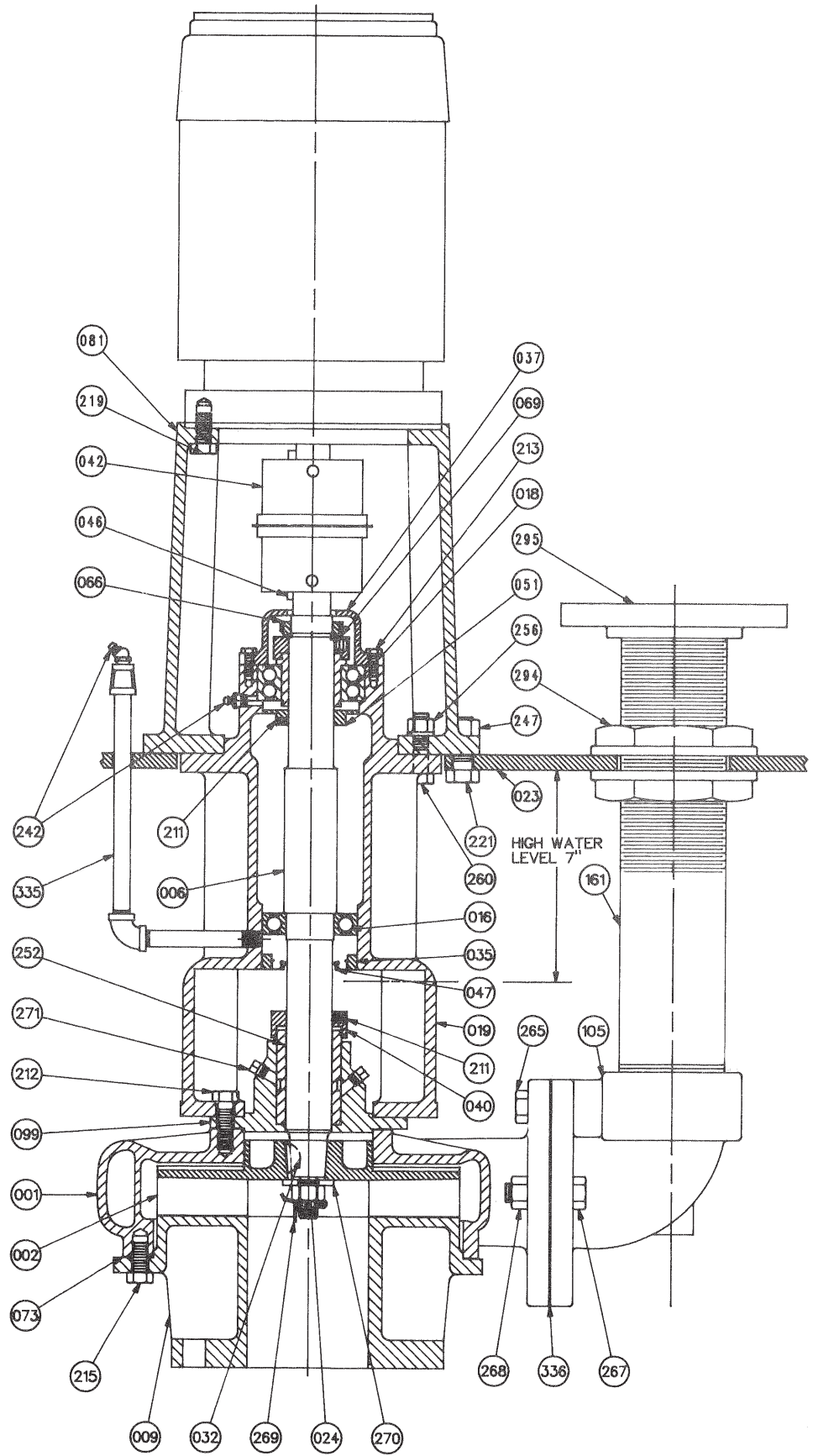
1. Lower unit into position in tank or sump and bolt base plate down. Replace lower half coupling and shaft key.
2. Mate cam of bearing (018) with cam of bearing inner ring. Pressing collar lightly against inner ring, turn collar in direction of shaft rotation until engaged.
3. Tighten bearing lock nut (066) hand tight and until shaft just turns freely by hand. Turn nut 1/2 additional turn and bend tang of lock washer into slot of nut.
4. with drift pin in collar hole, strike in direction of shaft rotation to lock tighten set screw in bearing collar.
5. Turn shaft again by hand and make certain shaft and impeller turn freely. If shaft binds or impeller rubs check for pipe strain and if required, raise impeller an additional 1/4 turn. The correct clearance between impeller and suction face is .020 - .030 normally 1/2 turn of nut.

6. Replace bearing cover, motor and coupling. Align coupling and proceed with installation as described in that section

## I - LOCATING TROUBLE

1. No water delivered
  - a. Wrong direction of rotation
  - b. Impeller or pipes plugged
  - c. Discharge head too high
  - d. No water in pit
  - e. Pump suction too close to bottom of pit
2. Not enough water delivered
  - a. Discharge head higher than expected
  - b. Impeller or pipes partly plugged
  - c. Improper impeller adjustment
  - d. Low water level in pit
  - e. Mechanical defects
    1. Impeller worn or damaged
    2. Casing worn
  - f. Wrong direction of rotation
3. Not enough pressure
  - a. Air in water
  - b. Mechanical defects
  - c. Impeller diameter too small
  - d. Wrong direction of rotation
  - e. Impeller not properly adjusted
  - f. Discharge head (line friction) lower than expected
4. Pump takes too much power
  - a. Speed too high for required head and capacity
  - b. Head lower than rating; pumps too much water
  - c. Liquid either viscous or heavier than water or both
  - d. Mechanical defects
    1. Shaft bent
    2. Impeller binds in casing
  - e. Strain on pump caused by piping misalignment
  - f. Impeller not adjusted properly





ITEM No.	DESCRIPTION
001	Casing
002	Impeller
006	Shaft
009	Suction Cover
*016	Ball Bearing (Inboard)
*018	Ball Bearing (Outboard)
019	Frame
023	Base Plate
*024	Impeller Nut
032	Impeller Key
035	Bearing Cover (Inboard)
037	Bearing Cover (Outboard)
040	Deflector
042	Coupling
046	Coupling Key
*047	Bearing Cover Seal
051	Grease Retainer
066	Shaft Adjusting Nut
069	Bearing Lock Washer
*073	Gasket
081	Drive Pedestal
099	Throttle Housing
105	Discharge Elbow

ITEM No.	DESCRIPTION
161	Discharge Pipe
211	Set Screw
212	Cap Screw
213	Cap Screw
215	Cap Screw
219	Cap Screw
221	Cap Screw
242	Grease Fitting
247	Hex Nut
252	Throttle Bushing
256	Hex Nut
260	Cap Screw
265	Cap Screw
267	Cap Screw
268	Cap Screw
*269	Cotter Pin
270	Impeller Washer
271	Pipe Plug
294	Pipe Nut
295	Discharge Flange
335	Lube Pipe Assembly
*336	Gasket

(\*) Recommended Spare Parts



BARNES®



burks®

WEINMAN®

DEMING®

PROSSER®

## *Limited 24 Month Warranty*

Crane Pumps & Systems warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for twenty-four (24) months after manufacture date, when installed and maintained in accordance with our instructions. This warranty gives you specific legal rights, and there may also be other rights which vary from state to state. In the event the product is covered by the Federal Consumer Product Warranties Law (1) the duration of any implied warranties associated with the product by virtue of said law is limited to the same duration as stated herein, (2) this warranty is a LIMITED WARRANTY, and (3) no claims of any nature whatsoever shall be made against us, until the ultimate consumer, his successor, or assigns, notifies us in writing of the defect, and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply. **THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY AND ALL WARRANTIES WITH RESPECT TO ANY PRODUCT SHALL BE TO REPLACE OR REPAIR AT OUR ELECTION, F.O.B. POINT OF MANUFACTURE OR AUTHORIZED REPAIR STATION, SUCH PRODUCTS AND/OR PARTS AS PROVEN DEFECTIVE. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE.** Unless expressly stated otherwise, guarantees in the nature of performance specifications furnished in addition to the foregoing material and workmanship warranties on a product manufactured by us, if any, are subject to laboratory tests corrected for field performance. Any additional guarantees, in the nature of performance specifications must be in writing and such writing must be signed by our authorized representative. Due to inaccuracies in field testing if a conflict arises between the results of field testing conducted by or for user, and laboratory tests corrected for field performance, the latter shall control. **RECOMMENDATIONS FOR SPECIAL APPLICATIONS OR THOSE RESULTING FROM SYSTEMS ANALYSES AND EVALUATIONS WE CONDUCT WILL BE BASED ON OUR BEST AVAILABLE EXPERIENCE AND PUBLISHED INDUSTRY INFORMATION. SUCH RECOMMENDATIONS DO NOT CONSTITUTE A WARRANTY OF SATISFACTORY PERFORMANCE AND NO SUCH WARRANTY IS GIVEN.**

This warranty shall not apply when damage is caused by (a) improper installation, (b) improper voltage (c) lightning (d) excessive sand or other abrasive material (e) scale or corrosion build-up due to excessive chemical content. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective parts. Neither will we accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. **UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, RENTED EQUIPMENT, OUTSIDE CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.



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**IMPORTANT!  
WARRANTY REGISTRATION**

Your product is covered by the enclosed Warranty.  
To complete the Warranty Registration Form go to:

<http://www.cranepumps.com/ProductRegistration/>

If you have a claim under the provision 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.**