CHEMPUMP
A DIVISION OF TEIKOKU USA INC.

Instruction Manual

for: Installation,Operation, & Maintenance

CHEMPUMP

Sealless Leakproof Canned Motor Pump

GT SERIES

9/05

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SECTION 1. GENERAL INFORMATION

1-1. General Design and Operation

Series GT Chempumps have only one moving part, a combined rotor-impeller assembly which is driven by the magnetic field of an induction motor. Bearing lubrication and motor cooling for these units are provided by the pumped fluid circulating in the rotor chamber. The fluid is isolated from the stator windings by a non-magnetic, corrosion-resistant liner placed in the stator air gap and welded to the end bells. It is kept at the proper temperature for cooling by (1) the thermal barrier provided by the necked-down area between the pump casing and motor section, and (2) by the constant circulation of the rotor chamber fluid through an integral heat exchanger by means of an auxiliary impeller mounted on the rotor shaft.

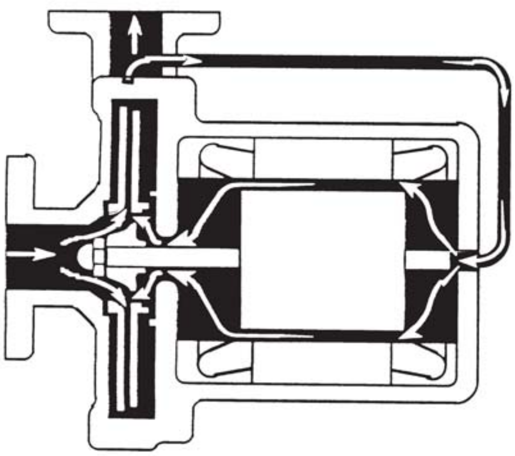


Figure 1-1. Series GT Chempump Schematic Diagram, Standard Circulation Single Stage

The integral heat exchanger, consisting of corrosion resistant tubing wrapped around the motor section and enclosed in a steel jacket, or as a stand-alone design, is designed so that it can be easily removed for inspection purposes, when necessary, without having to disassemble the pump.

The Jacket is provided with pipe couplings for connection to the plant water supply or other cooling medium.

The Chempump sealless pump is a precision-built unit that, with proper care, will give years of trouble-free, leakproof service. This manual, containing basic instructions for installation, operation and maintenance of Chempumps, is designed to assist you in obtaining this service.

It is important that the persons responsible for the installation, operation and maintenance of the pump read and understand the manual thoroughly. Trouble-free Chempump performance begins with proper pump selection and application. If the selected pump does not have the required performance characteristics, or if the materials of construction are not properly specified for the fluid being handled, unsatisfactory operation may result. No amount of maintenance can compensate for this.

If you are in doubt on Chempump selection or application, write or call your Chempump engineering representative or the factory for assistance and advice.

Additional copies of this manual are available from the Chempump field representatives or from the factory.

The GT Series Chempump is a combination centrifugal pump and a squirrel cage induction electric motor, built together into a single hermetically sealed unit. The pump impeller is of the closed type, and is mounted on one end of the rotor shaft which extends from the motor section into the pump casing. The rotor is submerged in the fluid being pumped and is therefore "canned" to isolate the motor parts from contact with the fluid. The stator winding is also "canned" to isolate it from the fluid being pumped. Bearings are submerged in system fluid and are therefore continuously lubricated.

The entire unit is mounted on a fabricated steel base plate. Operation is unaffected by the mounting or operating position, eliminating the need for any costly alignment procedures. See Figure 1-2, Page 2, 1-3, Page 2, 1-4, Page 3.

1-2. Stator Assembly

The stator assembly consists of a set of three-phase windings connected in a one circuit wye arrangement. Stator laminations are of low-silicon grade carbon steel. Laminations and windings are mounted inside the cylindrical stator band. End bells, welded to the stator band, close off the ends of the stator assembly. Back up sleeves are provided to strengthen those areas of the stator liner not supported by the stator laminations. The stator liner is, in effect, a cylindrical "can", placed under the stator bore and welded to the end bell shrouds to hermetically seal off the windings from contact with the liquid being pumped. Terminal leads from the windings are brought out through a pressure tight lead connector, mounted on the stator

1-3. Rotor Assembly

The rotor assembly is a squirrel cage induction rotor constructed and machined for use in the Series G Chempump. It consists of a machined corrosion resistant shaft, laminated core with aluminum bars and end rings, two corrosion resistant end covers, and a corrosion resistant can. The shaft is provided with flats or with an impeller key arrangement at one end to receive the impeller and is threaded at the same end to receive the impeller nut which retains the impeller, or impellers in the case of two-stage models.

The two rotor end covers are welded to the shaft and also to the rotor can which surrounds the outside of the rotor, thus hermetically sealing off the rotor core from contact with the liquid being pumped.

1-4. Bearings

The bearings for the unit are metal sleeved or sleeveless and have a molded carbon/graphite insert as standard (other materials are furnished depending on the application), and are machined with a special helix groove through the bore to assure adequate fluid circulation at the journal area. Each bearing is manufactured to close tolerances for a high degree of concentricity, and is held in a bearing housing by a retaining screw and lock washer. Bearings are easily replaced by removing the retaining screw and sliding the bearing from its housing. See Figure 1-4. Single-stage models may be provided with two bearings in the motor end, while two-stage models may be provided with two bearings in the motor end plus another bearing (idler bearing) in the pump casing for additional shaft support.

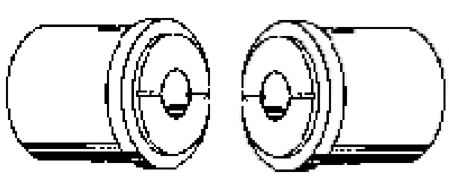


Figure 1-2. Bearings - Series GT Chempump Sleeved Type

1-5. Cooling Flow

Cooling for stator, rotor, and bearings, as well as bearing lubrication, is provided by circulation of the pumped fluid. A small flow circulates through the circulation tube, through the rear bearing housing, across the rear journal, over and around the rotor, across the front journal and front bearing housing, through the eye of the impeller, and returns to the main stream flow. See Figure 1-1, Page 1-1.

1-6. Automatic Thrust Balance

A) Single Stage Models GAT, GBT, GCT, GVBST and GVDT.

Based on hydraulic principles, Chempump's automatic thrust balance is accomplished by the pressure of the pumped fluid itself, operating in a balance chamber just to the rear of the impeller.

When a change in load tends to change the position of the impeller away from the balance condition, there is an equalizing change of hydraulic pressure in the balance chamber which immediately returns the impeller- rotor assembly to the balanced position. See Figure 1-3.

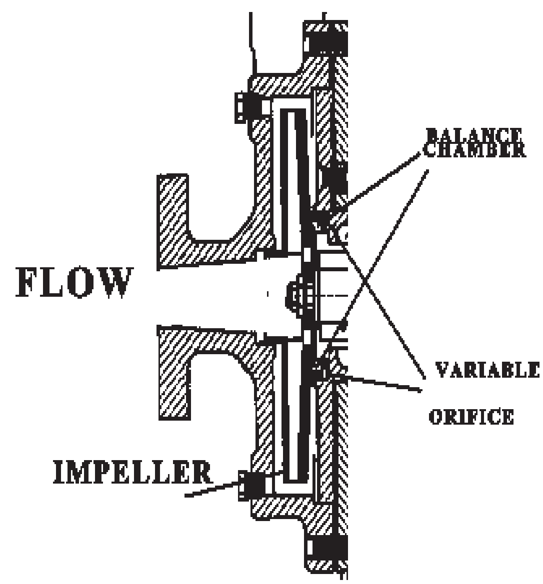


Figure 1-3. Automatic Thrust Balance, Single Ring

B) Single Stage Models GVET, GVHST, GGT, and GVMT.

Automatic thrust balance on these models operates on the same principle as noted above except that balance chambers are provided on the front as well as the rear of the impeller to absorb the additional axial thrust loading of these larger models. See Figure 1-4.

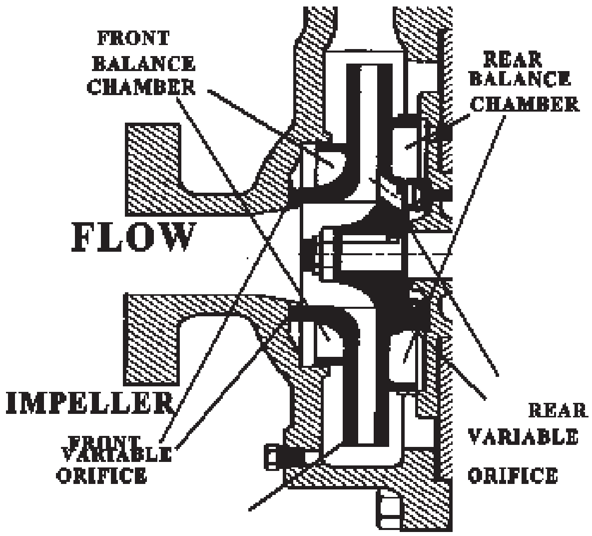


Figure 1-4. Automatic Thrust Balance, Double Ring.

SECTION 2. INSTALLATION

2-1. Receipt Inspection

1. Visually inspect the shipping container for evidence of damage during shipment.
2. Check unit to see that suction and discharge and any other connections are sealed.
3. Inspect the suction and discharge gasket seating surface to be certain that they are clean of foreign matter and free from nicks, gouges and scratches.
4. Visually inspect the unit for evidence of shipping damage.
   a. Circulation line bent or compressed.
   b. Flange faces nicked or scratched.
   c. Junction box and nipple in stator assembly bent or compressed.
   d. Vent and drain plugs not properly installed.
5. Megger resistance to ground of the motor windings. Refer to Table 4-5, Page 4-9.
6. Check all nameplate data against shipping papers.
7. Caution should be observed during handling so as not to bend the circulation line.

2-1.1. Storage Note

In situations where a Chempump is to be stored for a period of time prior to installation, and where the climate experiences wide temperature changes and high humidity, the terminal box must be sealed to prevent moisture from entering the motor winding area.

2-2. Structural

The pump design and construction eliminates the necessity of aligning the pump and motor. The pump should be supported from the mountings provided. It should be mounted in such a way as to have its weight properly supported. Suction and discharge piping must be properly supported and aligned so that no strain is placed on the pump casing.

General

1. Remove burrs and sharp edges from flanges when making up joints.
2. When connecting flanged joints, be sure inside diameters match within 1/16" diametrically so as not to impose a strain on the pump casing.
3. Use pipe hangers or supports at intervals as necessary.

2-2.1. Pump Location

Locate the pump as close as possible to the fluid supply with a positive suction head. Installations with suction lift are possible but not recommended.

Since standard pumps are not self-priming, provide for initial priming and for maintaining a primed condition. Location of the pump and arrangement of the system should be such that sufficient NPSH (Net Positive Suction Head) is provided over vapor pressure of the fluid at the pump inlet. NPSH requirements at the design point are stated on the pump order copy. For additional design points, refer to the corresponding performance curves placed in the Appendix of this manual.

NOTE

Experience has proved that most pump troubles result from poor suction condition including insufficient NPSH. The suction line must have as few pressure drops as possible and available NPSH MUST be greater than required NPSH.

Depending on job conditions, available NPSH can sometimes be increased to suit that required by the pump for satisfactory operation. NPSH can be “tailored” by changes in the piping, in liquid supply level, by pressurizing the suction vessel and by several other methods. Refer to Section 4 Table 4-4, Trouble Shooting, Page 4-4.

2-2.2. Mounting and Alignment

The Chempump combines a pump and motor in a single hermetically sealed unit. No tedious coupling alignment is required because the pump has no external coupling between pump and motor. All models can be mounted in any position except the two-stage Model GLDT, GNDT, & GVDT which must be mounted with suction and discharge “up” unless otherwise allowed. For mounting with suction and discharge on the side or in any other position, modifications must be made to the standard internal venting arrangement.

Standard Models GAT, GBT, GCT and GVBST Chempumps can be pipeline mounted. However,

bases are offered on all models. You merely have to set the pumps on a foundation strong enough to support their weight. There is no need to bolt down or grout in a Chempump. All Series GT models are provided with a specially made base designed to facilitate inspection and repair. See Figure 2-2.
Be sure that suction and discharge piping are properly aligned so that no strain is placed on the pump casing by out-of-line piping.

2-2.3. Piping Data

Observe the standards of the Hydraulic Institute when sizing and making up suction and discharge piping.

Follow these procedures:

1. Remove burrs and sharp edges when making up joints.
2. When using flanged joints, be sure inside diameters match properly. When gasketing flanged joints, DO NOT cut flow hole smaller than flange opening.
3. Use pipe hangers or supports at necessary intervals.
4. Provide for pipe expansion when required by fluid temperature.
5. When welding joints, avoid possibility of welding shot entering line, and thereby entering pump. Do not weld pipe while connected to pump.
6. When starting up a new system, place a temporary 3/16" mesh screen at or near suction port of pump to catch welding shot, scale or other foreign matter. SCREEN SHOULD NOT REMAIN IN LINE LONGER THAN 24 HOURS AFTER START-UP. Avoid the possibility of a clogged screen starving the pump. The screen should have a net area of at least three times the area of the suction pipe.
7. Do not spring piping when making up any connections.
8. Make suction piping as straight as possible, avoiding unnecessary elbows. Where necessary, use 45 degree or long-sweep 90 degree fittings.
9. Make suction piping short, direct, and never smaller in diameter than suction opening of pump. Suction piping should be equal to or larger than pump suction port, depending on pipe length.
10. Insure that all joints in suction piping are airtight.
11. When Installing valves and other fittings position them to avoid formation of air pockets.
12. Permanently mounted suction filters are not recommended.

It is extremely important to size and layout the suction system to minimize pressure losses and to be sure that the pump will not be “starved” for fluid during operation. NPSH problems are a result of improper suction systems.

If suction pipe length is short, pipe diameter can be the same size as the pump suction port diameter. If suction piping is long, the size should be one or two sizes larger than pump suction port, depending on piping length. Use the largest pipe size practical on suction piping and keep piping short and free from elbows, tees or other sources of pressure drops. If elbows or tees must be used, locate them from 10 to 15 pipe diameters upstream from suction. When reducing to pump suction port diameter, use eccentric reducers with eccentric side down to avoid air pockets.

When operating under conditions where pump prime can be lost during off cycles, a foot valve should be provided in the suction line to avoid the necessity of priming each time the pump is started. This valve should be of the flapper type rather than the multiple spring type and of ample size to avoid undue friction in the suction line.

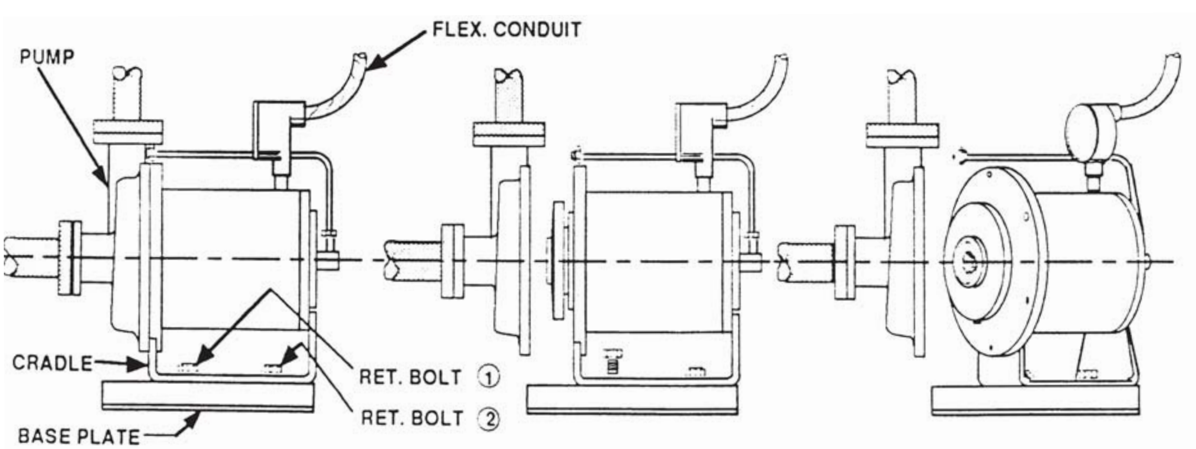


Figure 2-1. Easy Maintenance Base

When foot valves are used, or when there are other possibilities of fluid hammer, it is important to close the discharge valve before shutting down the pump.

When necessary to connect two or more pumps to the same suction line, provide gate valves so that any pump can be isolated from the line. Install gate valves with stems horizontal to avoid air pockets. Globe valves should be avoided, particularly where NPSH is critical. If discharge pipe length is normal, pipe diameter can be the same size as the pump discharge port diameter. If discharge piping is of considerable length, use larger diameter pipe (one or two sizes larger).

If the pump is to discharge into a closed system or an elevated tank, place a gate valve or check valve in the discharge line close to the pump. The pump can then be opened for inspection without fluid loss or damage to the immediate area.

RECOMMENDED: Install properly sized pressure gauges in suction and discharge lines near the pump ports so that operation of the pump and system can be easily observed. Should cavitation, vapor binding, or unstable operation occur, widely fluctuating discharge pressures will be observed. Such gauges provide a positive means of determining actual system conditions and can be used to great advantage in evaluating system problems.

2-3. Electrical

2-3.1. General

Except where indicated, all Chempumps are started with full line voltage. Connections for high and low voltage are shown on the voltage connection portion of the nameplate (Figure 2-2); phase sequence also is shown. Refer to Paragraph 3-3, Page 3-1 for checking direction of rotation. Also, see Figures 2-3, 2-4, or 2-5 on page 2-5, depending on electrical source characteristics.

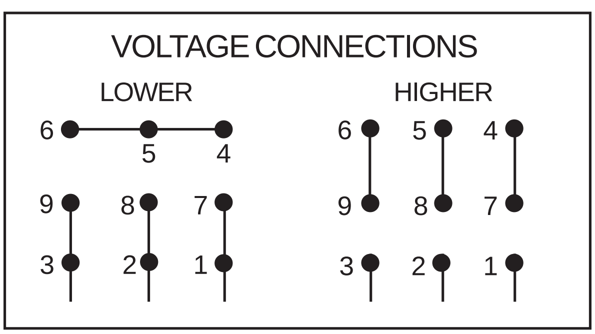


Figure 2-2. 3-Phase Dual-Voltage Connections

2-3.2. Thermal Cut-Out

Unless otherwise specified, all Chempumps are fitted with thermal cutouts. The cutout is a heat-sensitive bimetallic switch, mounted in intimate contact with the stator windings. It is to be wired in series with the holding coil in the starter box by removing a jumper as shown in Figures 2-3, 2-4, or 2-5. Refer to Table 2-1 for TCO maximum holding coil currents.

Table 2-1. TCO Maximum Holding Coil Currents

115 Volt	3.1 Amps
230 Volt	1.6 Amps
460 Volt	0.8 Amps

IMPORTANT: For maximum TCO contact life, it is recommended the 115 volt holding coil circuit be used where possible and that the holding coil current be kept to a minimum. Maximum holding coil currents are listed above.

WARNING

Do not connect TCO in series with main power lead. Excessive heat building in the winding area opens the normally closed thermal switch, which in turn opens the holding coil circuit, shutting off power to the pump. Be sure to connect the thermal cutout as required.

Thermal cutouts in Class R insulated motors are set to open at 425 degrees F. Depending on the application, specially set TCO's are sometimes provided. The pump order data sheet indicates the TCO setting. If the motor cuts out because of TCO action, there will be a time delay before the motor can be restarted. The motor must be restarted manually. DO NOT RESTART UNTIL YOU DETERMINE THE SOURCE OF THE OVER-HEATING.

WARNING

The thermal cutout switch does not provide protection against fast heat buildup resulting from locked rotor conditions, single phasing or heavy overloads. This protection must be provided for by the current overload relay heaters in the magnetic starter. The rating of the heaters should be high enough to avoid nuisance cut outs under running loads, but must not be oversized. Refer to Table 2-2, Page 2-5 for starting and running electrical characteristics. It is recommended that “quick trip” type heaters be used.

2-3.3. Starting Equipment

Motor starters (normally not supplied with Chempump) should be sized to handle the load required. Start KVA, Full Load KW, Full Load amps and Full Load KVA data are listed in Table 2-2.

Heaters in the starters should be sized for the amperage shown on the Chempump nameplate. DO NOT size heaters in excess of 10% of full load amp rating. In order to provide complete protection for Chempump motors under all conditions, it is recommended that “quick trip” (Class 10) type heaters be used in the starters where available. Standard type heaters can be used if these “quick Trip” type heaters are not available. Standard heaters provide adequate protection for Chempump motors under starting or normal running conditions, but require a greater length of time than “quick trip” type heaters to cut out, if the motor is subject to locked rotor or overload conditions. Also, see Tables 2-3, 2-4, or 2-5, Pages 2-6 and 2-7 for additional electrical wiring data for the most common Chempump motor sizes to assist in the electrical installation of the unit.

2-3.4. UL Labeled Pumps

If the pump you purchased from Chempump is UL Labeled for Class 1, Group D, Div. 1 or for Class 1, Group C & D, Div. 1 you should follow the instructions on this page in addition to those listed in this Series G instruction manual. Series G pumps which are UL labeled have been designed, manufactured, and tested to the specifications of Underwriters Laboratories, Inc. In order to comply with the UL Label requirements the motor thermal cut off switch (TCO) must be wired into the motor circuit to prevent the motor from overheating, and the pump must have a device installed to detect the loss of fluid in the motor cavity. Loss of fluid detection can be accomplished by installing any or all of the following items:

a. A low amp detector that monitors at least two of the three phase leads may be installed. When loss of fluid occurs, the resulting reduction in amp draw is detected by the device, and the motor is de-energized.

b. A flow switch may be installed to detect lack of fluid movement. When this occurs, the motor must be de-energized.

c. A pressure switch may be installed in either the discharge line or the recirculation line. When the pressure drops due to loss of fluid, the motor must be de-energized.

These devices, when installed, must be connected in such a fashion as to de-energize the motor should fluid loss in the motor cavity occur. These devices may be purchased as options from Chempump.

When Class 1, Group C and/or D, Division 1 is specified, only UL listed motors may be used. The motor TCO is set to prevent the surface temperature of the motor stator from exceeding the limits specified by UL.

Identification Code	Motor Stator Temperature Limit
T2A	536 F/280 C
T2D	419 F/215 C
T3C	320 F/160 C

CASE I - 230/460 VOLT, 3-PHASE CHEMPUMP See Figures 2-2 and 2-3.

Typical 3-phase across-the-line magnetic starter with start-stop push button station shown.

Thermoswitch (thermal cutout inside Chempump motor) is wired in series with holding coil circuit by removing jumper between over load cutouts as shown.

Be sure to size heaters properly. Rating should be as close as possible to current draw noted on pump nameplate. Refer to Figure 2-2 for voltage connections.

CASE II - 575 VOLT, 3-PHASE CHEMPUMP See Figure 2-4.

Use transformer with 575 volt primary and 115 or 230 volt secondary. Use properly rated holding coil (115 or 230 volt). Wire Thermoswitch as for 230 or 460 volt systems described in Case I above.

CASE III - SINGLE PHASE, 115 OR 230 VOLT SPECIAL CHEMPUMPS. See Figure 2-5

Typical single phase across-the-line magnetic starter with start device not shown.

Thermoswitch is wired in series with holding coil circuit after removing jumper as in Case 1. Start relay is supplied by Chempump.

NOTE: MOTOR LEAD “L” MAY BE SINGLE WIRE OR TWO WIRES TIED TOGETHER AT FACTORY.

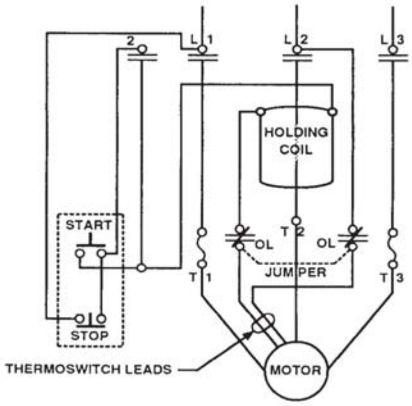


Figure 2-3. Wiring Diagram 230/460 Volt, 3 Phase

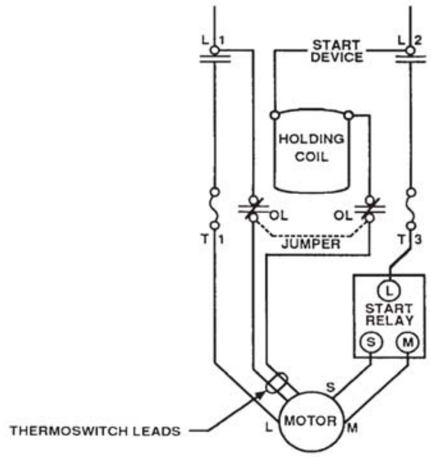


Figure 2-5. Wiring Diagram 115/230 Volt, 1 Phase

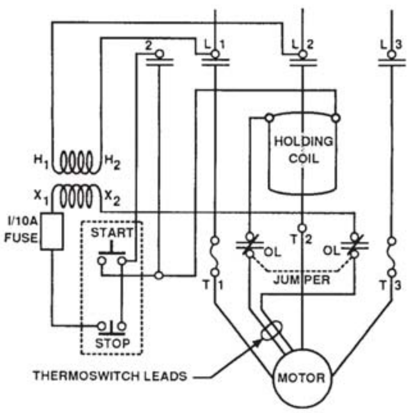


Figure 2-4. Wiring Diagram 575 Volt, 3 Phase

Table 2-2. Series GT Electrical Data

Chempump Model	Motor Size	Start KVA	Full Load Ratings				
			KVA	KW	Amperes 230V	460V	575V
GAT	1 K	5.1	1.9	1.5	4.6	2.3	1.8
GAT, GBT, GCT	1-1/2 K	10.4	3.1	2.5	7.7	3.8	3.1
GBT, GCT, GVBST, GLDT	3K	20.8	5.3	4.4	13.4	6.7	5.4
GBT, GCT, GVBST, GLDT	5K	28.4	7.0	5.9	17.6	8.8	7.0
GVDT, GVET, GVHST, GGT	5K	34.6	9.9	8.5	24.8	12.4	9.9
GVDT, GVET, GVHST, GGT	7-1/2 K	52.0	12.5	11.0	31.6	15.8	12.6
GVDT, GVET, GVHST, GGT	10 K	69.2	17.5	15.5	44.0	22.0	17.6
GVDT, GVET, GVHST, GGT	5 K	104.3	22.2	20.0	55.6	27.8	22.2
GVDT, GVET, GVHST, GGT	20 K	138.8	30.8	27.0	77.6	38.8	30.9
GVMT (1150 rpm)	5P	25.0	7.15	5.0	17.7	8.8	7.1
GVMT (1750 rpm)	7-1/2 L	38.5	10.7	7.5	27.0	13.5	10.8
	10 L	48.5	13.1	10.0	33.4	16.7	13.4
	15 L	62.7	16.5	13.5	41.2	20.6	16.5

Table 2-3. Electrical Wiring Data for 230 Volt, 3 Phase, 60 Hz Chempumps

Chempump Model	Motor Size	Full Load Speed (rpm)	Switch Size Amps	Breaker Size Amps	Starter NEMA Size	Conductor Size for Motor Leads	Conduit Size for Motor Leads Only	Conduit Size for Motor, PB & TCO Leads	Fuse Size Code and Current Limiting Amps	Fuse Size Dual Element Amps	Max. Setting of Time Limit Overload Protection Amps
GAT	1K	3450	30	15	0	14	1/2	3/4	15	7	5.3
GAT, GBT, GCT	1-1/2 K	3450	30	20	0	14	1/2	3/4	25	12	8.9
GBT, GCT, GVBST, GLDT	3K	3450	60 (30)	40	1	12	1/2	3/4	45	20	15.4
GBT, GCT, GVBST, GLDT	5K	3450	60 (30)	50	1	10	3/4	1	50	25	20.2
GVDT, GVET, GVHST, GGT	5K	3450	100 (60)	70	2	10	3/4	1	80	40	28.5
GVDT, GVET, GVHST, GGT	7-1/2 K	3450	100 (60)	100	2	6	1	1-1/4	90	45	36.3
GVD, GVE, GVHS, GG, N2S	10 K	3450	200 (100)	125	3	6	1	1-1/4	125	70	50.6
GVDT, GVET, GVHST, GGT	5 K	3450	200 (100)	150	3	4	1-1/2	1-1/4	175	80	63.9
GVDT, GVET, GVHST, GGT	20 K	3450	200 (150)	200	3	2	1-1/2	1-1/2	200	100	89.29
GVMT (1150 rpm)*	5P	1150	60 (30)	40	1	12	1/2	3/4	50	25	20.3
GVMT (1750 rpm)*	7-1/2 L	1750	100 (60)	70	1	8	3/4	1	90	45	31.05
	10 L	1750	100 (60)	100	1	8	3/4	1	100	50	38.41
	15 L	1750	200 (60)	125	2	6	1	1-1/4	125	60	47.38

* ( ) Brackets indicate reduction in switch size when dual-element fuses are used for motor branch circuits. (Except where noted, the switch sizes are the same for all types of fuses.)
Select "quick trip" heaters on the basis of start KVA with a 12 second maximum time.

Table 2-4. Electrical Wiring Data for 460 Volt, 3 Phase, 60 Hz Chempumps

Chempump Model	Motor Size	Full Load Speed (rpm)	Switch Size Amps	Breaker Size Amps	Starter NEMA Size	Conductor Size for Motor Leads	Conduit Size for Motor Leads Only	Conduit Size for Motor, PB & TCO Leads	Fuse Size Code and Current Limiting Amps	Fuse Size Dual Element Amps	Max. Setting of Time Limit Overload Protection Amps
GAT	1K	3450	30	15	0	14	1/2	3/4	15	3-1/2	2.75
GAT, GBT, GCT	1-1/2 K	3450	30	15	0	14	1/2	3/4	15	7	4.45
GBT, GCT, GVBST, GLDT	3K	3450	30	15	1	14	1/2	3/4	20	10	7.7
GBT, GCT, GVBST, GLDT	5K	3450	30 (15)	20	1	14	1/2	3/4	30	15	10.1
GVDT, GVET, GVHST, GGT	5K	3450	60 (30)	40	1	12	1/2	3/4	40	20	14.3
GVDT, GVET, GVHST, GGT	7-1/2 K	3450	60 (30)	40	2	10	3/4	1	50	25	19.2
GVDT, GVET, GVHST, GGT	10 K	3450	100 (60)	60	2	10	3/4	1	70	35	25.3
GVDT, GVET, GVHST, GGT	5 K	3450	100 (60)	70	3	6	1	1-1/4	80	40	32.0
GVDT, GVET, GVHST, GGT	20 K	3450	200 (100)	100	3	6	1	1-1/4	125	60	44.7
GVMT(1150 rpm)	5P	1150	30	30	1	12	1/2	3/4	30	15	10.2
GVMT (1750 rpm)	7-1/2 L	1750	60 (30)	40	1	12	3/4	1	45	25	15.6
	10 L	1750	60 (30)	50	1	10	3/4	1	60	30	19.2
	15 L	1750	60 (30)	50	2	10	3/4	1	60	30	23.7

2-3.5. Oil Filled Stator

Chempumps are designed to give long, trouble free service without having their stator cavities oil filled. Solid filled or non oil-filled options are available for many applications. In order to facilitate the dissipation of heat from the motor section, the stator cavity on standard Series G Chempumps can be filled at the factory with a heat conductive dielectric oil. This oil filling provides better conductivity and allows the heat generated in the motor section to be conducted to the outside of the unit, thereby maintaining a lower temperature in the motor section than would be possible if the stator cavity were not oil filled. When storing or installing oil filled stators, be sure that the motor lead or connection box nipple is maintained in an upright vertical position.

This nipple is furnished with a special potting compound designed to minimize the leakage of oil through the nipple, but wicking of oil through the lead wires can occur if the stator is laid on its side for any length of time. Oil relief valves are provided on Chempumps having oil-filled stators, and are furnished with a combination breather and flame arrestor. The relief valve is preset at the factory to relieve at pressures of 17 psi or greater.

If a volume of oil in excess of that recommended is put in the stator section, the increased stator temperature which results from the pump being in operation will expand the oil, and the excess oil will be released through the oil relief valve. This emission of oil is in no way harmful to the operation of the unit. In subsequent operation of a unit, further, very small emissions of oil may be released through the relief valve if the temperature inside the stator cavity increases for some reason. Here again, there is no cause for alarm. Refer to Table 2-6 for oil volume in Chempump stators.

Table 2-5. Electrical Wiring Data for 575 Volt, 3 Phase, 60 Hz Chempumps

Chempump Model	Motor Size	Full Load Speed (rpm)	Switch Size Amps	Breaker Size Amps	Starter NEMA Size	Conductor Size for Motor Leads	Conduit Size for Motor Leads Only	Conduit Size for Motor, PB & TCO Leads	Fuse Size Code and Current Limiting Amps	Fuse Size Dual Element Amps	Max. Setting of Time Limit Overload Protection Amps
GAT	1K	3450	30	15	0	14	1/2	3/4	15	3	2.2
GAT, GBT, GCT	1-1/2 K	3450	30	15	0	14	1/2	3/4	15	7	3.6
GBT, GCT, GVBST, GLDT	3K	3450	30	20	1	14	1/2	3/4	20	15	6.2
GBT, GCT, GVBST, GLDT	5K	3450	30 (15)	20	1	14	1/2	3/4	25	12	8.1
GVDT, GVET, GVHST, GGT	5K	3450	30	30	2	12	1/2	3/4	30	15	11.5
GVDT, GVET, GVHST, GGT	7-1/2 K	3450	60 (30)	40	2	12	1/2	3/4	40	20	15.4
GVDT, GVET, GVHST, GGT	10 K	3450	100	50	3	10	3/4	1	60	35	20.3
GVDT, GVET, GVHST, GGT	5 K	3450	100 (60)	70	3	6	1	1-1/4	80	40	25.6
GVDT, GVET, GVHST, GGT	20 K	3450	100 (60)	100	3	6	1	1-1/4	90	45	35.8
GVMT (1150 rpm)	5P	1150	30	20	1	12	1/2	3/4	25	15	8.2
	7-1/2 L	1750	30	30	1	12	1/2	3/4	30	15	8.2
GVMT (1750 rpm)	10 L	1750	60 (30)	40	1	12	1/2	3/4	45	20	15.4
	15 L	1750	60 (30)	50	2	10	3/4	1	60	30	20.2

Table 2-6. Oil Volume in Chempump Stators

Chempump Model	Motor Size	Volume of Oil (Fluid Ounces)
GAT	1 K	20
GAT, GBT, GCT	1-1/2 K	30
GBT, GCT, GVBST, GLDT	3K	30
GBT, GCT, GVBST, GLDT	5K	30
GVDT, GVET, GVHST	5K	70
GVDT, GVET, GVHST	7-1/2 K	70
GVDT, GVET, GVHST, GGT	10 K	70
GVDT, GVET, GVHST, GGT	5 K	70
GVDT, GVET, GVHST, GGT	20 K	70
	5 P, 7-1/2 L	95
GVMT	10 L	95
	15 L	95

-2-3.6. Direction of Rotation Indicator

The Chempump is a sealless, leakproof, canned motor pump that combines the pump and motor into a single unit. Because of this design, no rotating parts are exposed to view. This makes it difficult to determine the direction of rotation of the pump.

The exclusive Chempump Direction of Rotation Indicator, (D.R.I.), indicates if the pump is rotating in the correct direction. The Chempump D.R.I. eliminates the use of phase sequence indicators, discharge gauges and other bothersome methods used by plant engineers to insure proper pump rotation.

The Chempump D.R.I. is the easy positive way to check on pump rotation. The entire unit is a compact, unobtrusive part of the normal electrical junction box. No additional installation work is required, just wire the pump and the D.R.I. is ready to work. When the direction of rotation is correct, an amber light, located on the unit is lit. If the pump is energized and the light does not go on, reverse the two leads and start the unit again. This will reverse the direction of the rotation and the light will glow. The bulb in the D.R.I. has a rated life of 2-1/2 years.

2-4. Special Conditions and Features

2-4.1. Backflushing

For normal clear fluid applications, Series G Chempumps are cooled and lubricated by the fluid being pumped. For slurry and other “dirty” applications, a system of back flushing is recommended. Backflushing is noted on the order when recommended. See Figure 2-6 for a typical back flush installation.

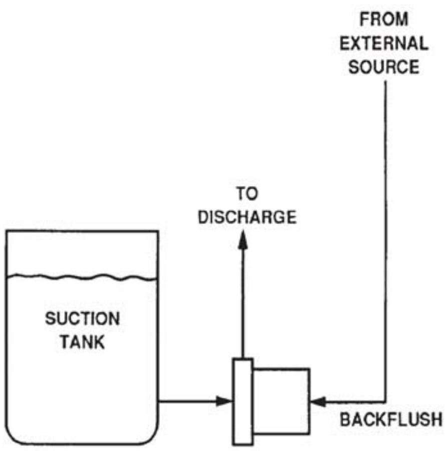


Figure 2-6. Back Flush System

Chempumps to be used with back flush are normally supplied without circulating tubes. Clear fluid is brought to the fitting at the rear of the motor section by customer’s piping as shown in Figure 2-6. The amount of clear base fluid introduced in this manner should approximate the standard flow rates listed in Table 2-7, below.

Table 2-7. Standard Recirculation Flow Rates

Model	Recirculation Flow Rate (gpm)
GAT GBT GCT GVBST	1-2 1-1/2-2-1/2 1-1/2-2-1/2 1-1/2-2-1/2
GVDT, GVET, GVHST GGT	2-4 1-1/2-3
GVMT GLDT	1-3 4-5

Back flush pressure should be suction pressure plus 20-30% of the pressure developed by the pump itself for single stage Models GAT, GBT, GCT, GVBST, GVDT, GVET, GVHST, GGT and GVMT, and suction pressure plus 60-80% of the pressure developed by the pump itself for two stage Model GLDT. Excessive back flush pressure will destroy the thrust balanced operation built into Series GT Chempumps by causing excessive forward thrust.

Procedure:

1. Remove the circulation tube and plug off the port in the discharge neck of the pump casing used for the circulating tube front fitting. (This is done at the factory).
2. Pipe in the clear liquid to the port in the rear bearing housing used for the circulating tube rear fitting. See Table 2-8 below for proper circulating tube sizes.
3. If the back flushing liquid is hot, auxiliary cooling methods, such as water jacketing the stator must be employed. The temperature of the back flush fluid should not be close to its boiling point and should not exceed 300 degrees Fahrenheit.

Table 2-8. Ciculating Tube Sizes

Model	Tube Size
GAT, GBT, GCT, GVBST, GLDT	1/4" O.D. x .035 wall
GVDT, GVET, GVHST, GGT, GVMT	3/8" O.D. x .035 wall

2-4.2 Electrical Isolation

To eliminate electrolytic corrosion when handling solutions during an electrolysis or plating operation, Chempumps should be electrically isolated. Insulated couplings or nonconductive plastic piping must be used in the primary suction and discharge lines. The Chempump must be isolated electrically from the tank, and separately grounded as shown in Figure 2-9.

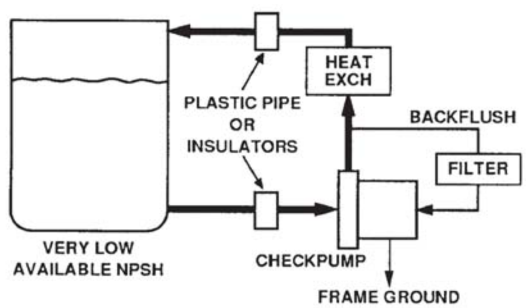


Figure 2-7. Back Flush Installation with Electrical Isolation

2-4.3. Heat Exchanger

Similar to the water jacket in every respect except for the provision of corrosion resistant tubing, heat exchangers, whether removable, welded-on, or stand-alone are provided on Chempumps in applications that require heating or cooling the fluid before it enters the rotor chamber. Heat exchangers are especially recommended for liquids with low specific heat characteristics.

All Series GT Chempumps can be provided with removable wraparound heat exchangers when specified. This type jacket is easily removable from the stator band to allow for inspection and possible replacement. These heat exchangers are suitable for maximum inlet pressure of 50 psi and maximum temperature of 150°F. See Figure 2-11.

Welded on heat exchangers are available on all Series GT Chempumps. These heat exchangers are suitable for steam pressure of 50 psi and liquid medium pressures to 100 psi, where maximum temperatures vary depending upon existing motor insulation and TCO setting as indicated on the pump nameplate.

2-4.4. High Pressure Lead Connector

The high pressure lead connector is provided as a standard item for Chempumps in 600 psi design and above. Usually, these high pressure pumps are not furnished with an oil relief valve since the high pressure lead connector can contain up to 5000 psi and since the stator pressure boundary walls are designed to contain the design pressure while the relief valve contains pressure to only 17 psi.

Since the high pressure lead connector can only be produced with single voltage motor leads, the customer must specify his single voltage requirement as 230, 460 or 575 or other.
In the event of a stator liner rupture, this device eliminates the possibility of the pumped fluid escaping outside the unit or into the conduit line.
The high pressure lead connector can be supplied on 150 and 300 psi design pumps, however for maximum protection the standard nipple and connector require special threading and welding. See Figure 2-13.

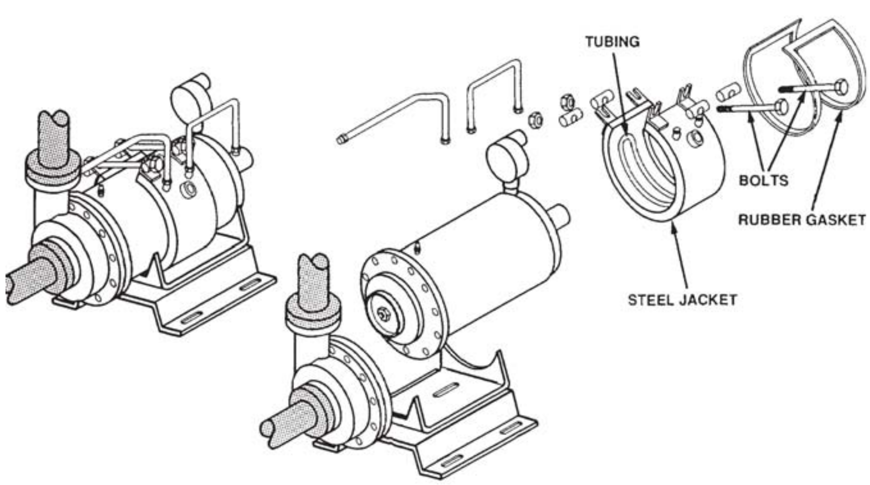


Figure 2-8. Removable Heat Exchanger

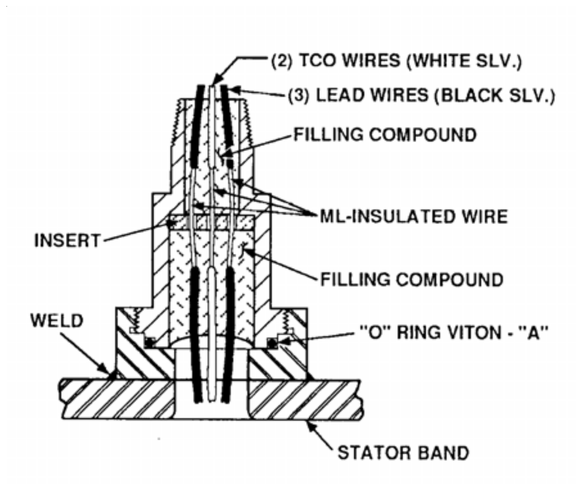


Figure 2-9. High Pressure Lead Connector

2-4.5. Leakproof Junction Box

The leakproof junction box is available on all Chempumps to 600 psi. Its purpose is to prevent fluid from seeping into the conduit line in the event of a stator liner rupture. Since it is wired for single voltage use, customer's voltage requirement must be specified when ordering.

Screw-type connections permit easy field installation on existing stator nipple. See Figure 2-14.

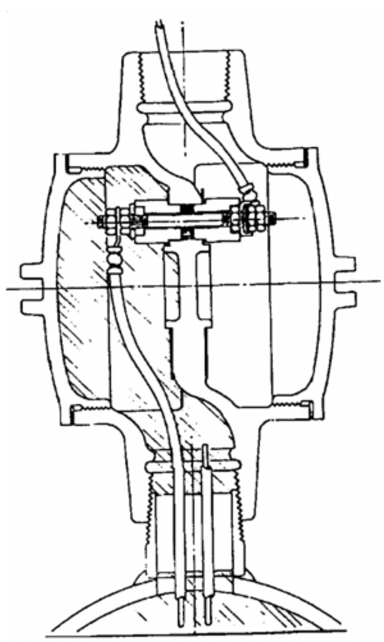


Figure 2-10. Leakproof Junction Box

2-4.6. Bearing Wear Detector

Due to the design of the Chempump, no rotating wetted parts are visible during normal pump operation. To inspect the bearing for wear, a standard unit must be taken out of service. However, if the pump is equipped with a Bearing Wear Detector, specific bearing wear can be detected. See Figure 2-15.

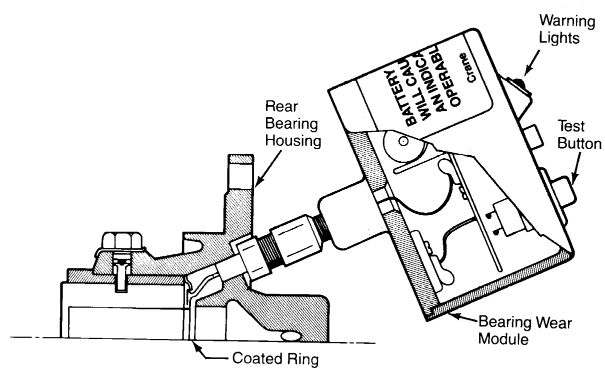


Figure 2-11. Bearing Wear Detector

The device consists of a module externally mounted on the back of the rear bearing housing. A Teflon coated ring is affixed to the rear sleeved bearing in the rear bearing housing and is wired to the detector module. When approximately 70% of the maximum allowable bearing wear occurs, the driven assembly shaft wears through the Teflon coating thus contacting the inner metal ring. This completes a low voltage electrical circuit which activates three red lights on the bearing wear module. The flashing lights which are oriented to provide for maximum visibility even in bright light, provide visual indication that the bearings should be replaced. The warning lights are powered by a long life battery which may be tested periodically by using the test button mounted on the module. Units are also available for remote installations.

The Bearing Wear Detector can be easily disassembled by performing the following steps:

1. Remove the two screws holding the bearing wear module to the Bearing Wear Detector body by using a 5/32" Allen wrench.
2. Lift the bearing wear module away from the Bearing Wear Detector body and disconnect the black wire from the Fahnstock spring clip in the cap. The bearing wear module and O-ring are now free of the body and should be placed in a safe area.

3. The Bearing Wear Detector body can be removed by unthreading it from the Conax connector. It may be necessary to hold the Conax connector with a 1/2" open end, box wrench.

   If the rear bearing is to be removed, please follow the disassembly procedures listed in section 4-4 and then proceed with the following steps:

4. The Conax connector assembly must be disassembled to remove the rear bearing. (NOTE: The Conax connector is a pressure retaining part. The pump must be isolated from the system and drained prior to disassembly). This assembly consists of four parts: the body, a Teflon sealant, a stainless steel follower and cap. To disassemble, hold the body with a 1/2" open end, box wrench and unthread the cap with another 1/2" open end, box wrench. The Conax body can also be removed from the rear bearing housing but this step is not necessary to remove the rear bearing. Once disassembled, the bearing assembly can be removed by feeding the wire through the body of the Conax connector.

5. Reassemble the Bearing Wear Detector assembly by reversing the disassembly procedure. If the Conax assembly has been completely removed from the rear bearing housing be sure that the sealant tapered end of the Conax assembly is rethreaded into the rear bearing housing.

NOTE: The Bearing Wear Detectors for pumps that are supplied with explosion proof motors (Class 1, Group D or C & D, Division I) have an epoxy compound between the Conax connector and the bearing wear module. For this reason, the rear bearing and rear bearing housing must be returned to the factory for bearing replacement.

SECTION 3. OPERATION

3-1. Procedure Before Initial Start-up

Before starting the pump for the first time, make sure suction and discharge piping are free of tools, nuts, bolts, or other foreign matter. Save time and money by checking before startup.

RECOMMENDED: Install a temporary 3/16" mesh screen near the suction port to trap scale and other foreign particles. The screen can be installed for 24 hours of operation, but watch closely that the pump does not become starved for fluid because of a clogged screen. REMOVE SCREEN AFTER 24 HOURS OF RUNNING.

3-2. Priming and Venting

3-2.1. Pump

The pump must be fully primed (pump casing and suction pipe completely filled with the liquid to be pumped before operating). Depending of the service, one of the following methods may be used:

A. Flooded Suction - Venting to Atmosphere

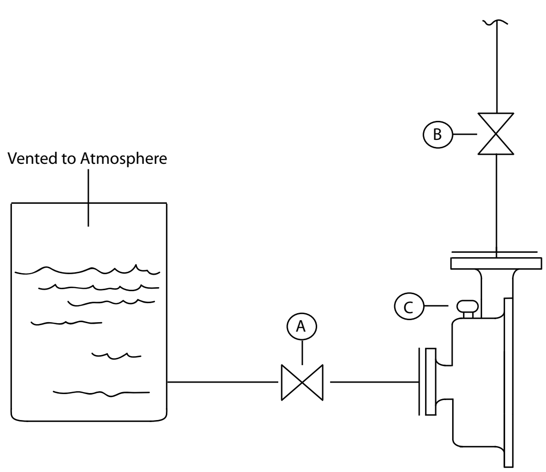


Figure 3-1

When there is a positive suction head on the pump, priming can be accomplished by opening suction valve, and loosening the upper vent plug in the pump casing. This will allow the liquid to fill the casing. Re-tighten vent plug as soon as all trapped air has been displaced. Pump is now primed and will remain primed for future starting, provided suction tank is never empty.

B. Flooded Suction - When Venting to Atmosphere is not desirable

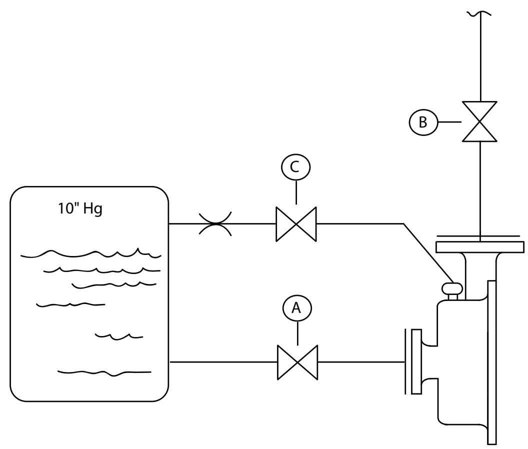


Figure 3-2

1. Suction under vacuum
2. Liquid to be pumped is very corrosive, toxic or volatile.

To prime, connect by-pass lines as shown in Figure 2. With the discharge valve (B) closed, open by-pass valve (C) and suction valve (A). Allow sufficient time for the casing to fill. Close by-pass valve (C) before starting the pump.

3-2.2. Motor Section

The motor section of the series GT Chempump must be properly vented before the pump is placed into operation. This is extremely important; as trapped air will prevent proper circulation of the rotor cavity fluid, resulting in over heating of the motor and rapid bearing wear. There are several different methods to accomplish motor venting. Choose the one best suited to your system. However, carefully observe all caution notes. This will insure against possible damage.

Method A. Flooded Suction - Venting to Atmosphere

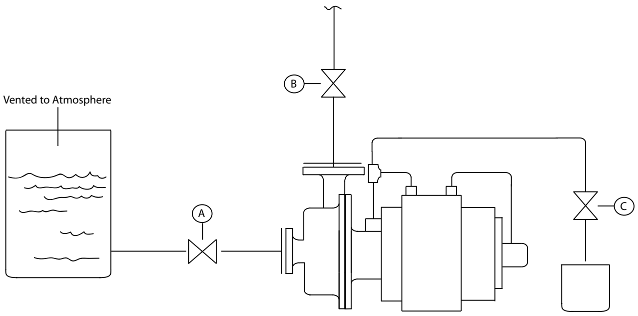


Figure 3-3

1. After priming pump casing (Figure 1), close discharge valve (B). Suction valve (A) is open.
2. Open motor vent valve © (drawing into a bucket or suitable container) and allow liquid to flow until free of air bubbles.
3. Close vent valve ©.
4. Energize pump for approximately five (5) seconds.
5. De-energize pump and repeat step #2.
6. Repeat Steps #3 and #4.
7. Continue Steps #2 through #5 until a solid liquid stream is obtained. (Generally, three (3) cycles will be sufficient.) Pump is now ready for service.

Method B. Non-flooded Suction with Foot Valve

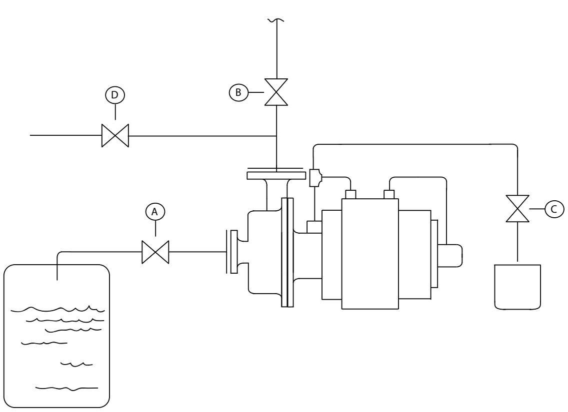


Figure 3-4

1. Open suction valve (A) and vent valve (C).
2. Remove upper vent plug in pump casing.
3. Fill entire suction line and casing with hand pump through fill line and valve (D).
4. When solid liquid stream flows from casing vent, replace plug and continue hand filling until solid liquid stream flows form motor vent line.
5. Close motor vent © and valve (D).
6. Open discharge valve (B) one turn.
7. Energize pump for approximately five (5) seconds.
8. De-energize pump and repeat Steps #5 and #7 until a solid liquid stream is obtained from motor vent line. Close vent valve (C). Pump is now ready for service.

Method C. Flooded Suction - When Venting to Atmosphere is not desirable

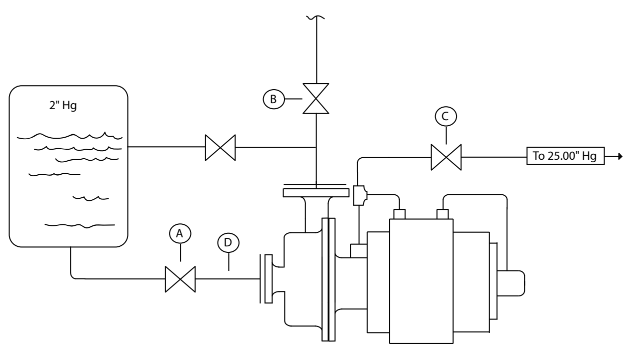


Figure 3-5

Since many hot oil systems use vacuum, it is good practice to use this for venting. (A vacuum of at least 25.00 in. Hg is recommended.) Connect the motor vent line to the vacuum source and proceed as follows:

1. Close suction and discharge valves (A) and (B).
2. Evacuate entire pump by

opening vent valve (C) for approximately five (5) minutes. (A compound gauge fitted to suction line (D) would show positively when the maximum vacuum has been reached.)

3. Close vent valve (C).
4. Open suction (A) and allow remaining as such for five (5) minutes.
5. Energize motor and open discharge valve (B) placing pump into service.

CAUTION

1. **A discharge gauge is recommended to assure that priming has been accomplished.**
2. **It is also recommended that the line going from the motor vent valve (C) to the vacuum source be disconnected after use.**

If vacuum to 25.00 in. Hg is not available; the following procedure can be employed:

Method D. Vacuum to 25.00 in. Hg not available

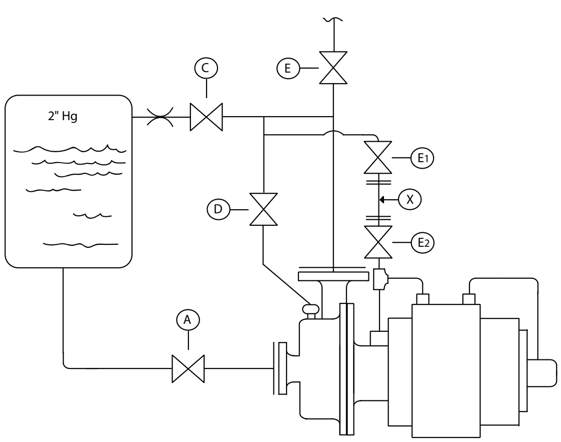


Figure 3-6

1. After priming pump casing (Figure 2), open vent valves (E1- E2).
2. Leave open for approximately three (3) minutes.
3. Close valves (E1) and (E2).
4. Energize pump for approximately five (5) seconds.
5. Stop pump.
6. Repeat Steps #2 through #6 three (3) times.
7. Energize pump and slowly open discharge valve (B) until pump is fully on stream.
8. Close by-pass valve(C).

CAUTION

1. **Discharge gauge is recommended to assure that priming has been accomplished.**
2. **It is imperative that the flange section of pipe between motor vent line valves (E1) and (E2) is removed after venting cycle.**

III. External Wrap Around Heat Exchanger

When pumping a liquid having a freezing point higher than the cooling water in the jacket portion of the heat exchanger, special precaution must be taken. To insure that the cooling water is not turned on until the pump is started, a solenoid valve connected to the starter is recommended.

Stopping Procedure

Follow this procedure when stopping the pump:

1. Close discharge gate valve to prevent water hammer.
2. Shut off power to pump.
3. Close the gate valve in suction line.

CAUTION

If the pump is to be shut down for a long period of time or if there is danger of freezing, stop pump, shut all suction and discharge valves, and drain the entire pump and connection piping.

3-3. Rotation Check

Centrifugal pump impellers must rotate in the proper direction to deliver rated head and capacity. The impeller must rotate in the same direction as the arrow cast in the pump casing. All new Chempumps are supplied with a Direction of Rotation Indicator. Refer to section 2-3.6 for a complete description of the D.R.I.

If you pump is not equipped with a Direction of Rotation Indication correct rotation can be checked as follows:

1. Wire Chempump motor for correct voltage (high or low) as shown on the nameplate. (See Paragraph 2-3, starting on Page 2-3.)
2. With main power leads connected, check direction of impeller rotation. If direction of impeller rotation is incorrect, change two power leads. Impeller rotation can be checked by one of two ways:
   a) After the Chempump has been installed and primed, use a phase sequence meter on the electrical connections. The readings from the phase sequence meter (which is relatively inexpensive and is available from a number of manufacturers) can be checked against the phase sequence indicated on the Chempump nameplate.
   b) After the Chempump is properly primed and vented, start the unit with the discharge pressure valve almost closed and note the discharge pressure at a pressure gauge which must be installed between the pump casing and discharge valve. Reverse any two leads and read the pressure gauge again. The higher pressure is the correct direction of rotation. It is recommended that the unit be run as little as possible with a closed discharge valve in order to prevent excessive overheating of the fluid circulating within the unit.

NOTE

If a discharge valve is not available an alternate method is to use a flow meter and determine higher flow rate. Wrong direction of rotation is indicated by a low discharge pressure or flow rate. At shut-off, head is about 2/3 of the head produced by correct rotation. Continued operation in reverse can result in the impeller's becoming loose or completely detached from the rotor shaft. If reverse rotation has occurred, it is wise to shut down and tighten the impeller nut before correct start-up.

3. Tag correctly connected main power leads 1-2-3, in accordance with motor lead markings.

SECTION 4. MAINTENANCE

NOTE
To assist in determining remedies for various problems, see Table 4-4 Troubleshooting, Page 4-4.

4-1. Periodic Inspection

Initial inspection of the unit must be made at 1500 running hours or three months, whichever occurs first after initial starting. Subsequent inspection periods will be dependent on the wear rate as indicated in Paragraph 4-1.2, but in no case should any inspection period extend beyond three years. Each inspection should include attention to the points noted in each of the following paragraphs.

4-1.1. Recommended Tools

1. Dial Indicator (.200" travel) for determining end play.
2. Verniers and 5/16-to-3" telescopic gauges for inspection of bearings, I.D. shaft clearance hole, and O.D. of rotor shaft journals.

4-1.2. Bearing Inspection

Since the bearings in this pump are lubricated by the process fluid, it is essential that bearing inspection and replacement periods be based on experience in each particular installation. Bearing life will depend, to some extent, on variable factors including lubrication quality, temperature, number of starts and stops, viscosity, and suspension content of the fluid being pumped, as well as ambient temperature and atmospheric conditions of the operational area. Each time one of these factors is changed, compensation must be applied in bearing inspection periods.

As noted above, initial inspection of the bearings must be made at 1500 running hours, or three months, whichever occurs first after initial starting. This inspection is necessary to determine the rate of bearing wear, thereby enabling the setting up of a proper inspection and replacement schedule. See Table 4-1 for the maximum wear allowable.

If the inspection indicates that bearings are not wearing or are wearing very slightly, the next inspection may be put off for an additional 1500 running hours, or three months of operation, whichever occurs first. If inspection, then, still indicates only slight wear, the interval may be lengthened.
If however, bearings must be changed at the initial inspection, they will need to be changed again in the time period which necessitated a change at the initial inspection, i.e., 1500 running hours.

Frequency of periodic bearing inspection can best be determined by experience, and from these inspections, the time for replacement can best be indicated.

Bearings can be inspected and replaced without removing the pump casing from the line. No main piping connections need be broken. Refer to Paragraph 4-4, Disassembly and Reassembly on Page 4-5.

To test for bearing wear:

1. Measure the inside diameters of the front and rear bearings and compare with the diameter of the rotor shaft journal. If the difference in diameters is greater than that indicated in Table 4-1, replace the bearings.
2. Inspect the thrust faces of the front and rear bearings. If any scoring wear is visualized, measure the length of the bearings. Replace the bearing if the measured length is less than that indicated in Table 4-1.

Table 4-1. Bearing and Journal Dimensions

Model	Shaft Outside Dia. New	Bearings Inside Dia. New	Diametrical Clearance Bearings to Journal		Bearing Lengths (Inches)		
			New	Max. Allow.	Front Bearing	Rear Bearing	Thrust Surface
GAT, GBT, GCT GVBST, GLDT	0.9143"-0.9150"	0.9175"-0.9185"	.0025"-.0042"	.013"	1-3/4"	1-3/4"	2.609" (Frt Brg)
GVET, GVDT GVHST, GGT	1.1833"-1.1840"	1.1880"-1.1890"	.0048"-.0057"	.014"	4"	2"	0.406"
GVMT	1.4893"-1.4900"	1.4950"-1.4960"	.0050"-.0067"	.014"	4-3/8"	3-1/4"	-

3. Examine the bearings for any grooving or scoring, particularly on the inside diameter and thrust faces. The existence of grooving or scoring indicates the presence of solids or foreign matter in the system which should be eliminated prior to again beginning operation.

4-1.3. Rotor Assembly Inspection

The complete rotor assembly should be visually inspected for cracks, breaks, pitting, or corrosion which might destroy the effectiveness of the hermetically sealed rotor end covers and sleeve.

The rotor assembly shaft should also be visually inspected at the bearing contact area for general appearance and uniform wear. Excessive undercutting, pitting, or scoring is cause for rotor replacement. Minimum allowable shaft diameter is noted in Table 4-1.

4-1.4. Automatic Thrust Balance and End Play Inspection

The provision of automatic thrust balance design in the Series GT Chempump, with its close running seal faces and wearing rings to insure proper balance chamber pressures, requires that a close visual inspection be made of the impeller, front bearing housing, front bearing and front rotor end cover at the time bearing inspection is made.

During disassembly for bearing inspection, measure the unit end play as follows:

1. For all models, after removing the rear bearing housing from the unit and with all other parts in place, measure the total axial (front to back) movement of the shaft, or,

2. In the case of Models GAT, GBT, GCT and GVBST or pumps equipped with thrust surfaces after the unit has been separated from the pump casing, measure the total axial (front to back) movement of the impeller assembly.

If the measured end play somewhat exceeds end play (new) noted in Table 4-2, then remove the impeller from the shaft and the bearings from within the rotor chamber, visually examine the impeller seal faces, front bearing housing seal face, and the front rotor end cover for noticeable wear; also measure the length of the front bearing, See Table 4-1. (The rear bearing, because of its position, will not usually experience axial wear). Should the front bearing length be somewhat below the unit when new dimension, replace with a new bearing and then calculate if the new bearing length will put end play back in tolerance. If end play still exceeds the maximum allowable, then the impeller or front bearing housing seal faces (and in the case of Models GVDT, GVET, GVHST and GGT the pump casing seal faces) must be worn beyond a tolerable limit and must be repaired or replaced. (It should be noted that under proper operating conditions, wear on these parts due to axial thrust forces will be negligible and will normally not, therefore, require replacement.) At the time the impeller seal face is inspected for wear, also visually inspect the wearing rings and front impeller hub for any noticeable signs of wear. If excessive grooving or scoring of the wear rings or impeller hub is noticed, the impeller must be replaced.

Table 4-2. Series GT End Play

Model	Total End Play - New
GAT, GBT, GCT	.086"-.102"
GDT, GVET	.101"-.137"
GVHST	.032"-.068"
GGT	.102"-.138"
GFDT, GHDT	.120"-.130"
GVMT	.068"-.096"
GVBST	.084"-.106"
GLDT	.067"-.073"

4-1.5. Stator Assembly Inspection

The complete stator assembly should be visually inspected for cracks, breaks, pitting, or corrosion in the stator liner which might destroy the effectiveness of the barrier. Inspect the wiring of the stator assembly by checking the visible portion of the connector leads for cracked, broken, or frayed insulation, then check the condition of the motor windings by taking resistance readings with an ohmmeter and a megger. If the ohmmeter readings are not within 20% of the values shown in Table 4-5, the stator assembly must be replaced.

4-1.6. General Inspection

1. Inspect the impeller nut threads on the rotor shaft to insure they are not cut, pressed, or stripped. Models GAT, GBT, GCT, GVBST and GLDT have left-hand threads. Models GVDT, GVET, GVHST, GGT, and GVMT have right-hand threads.

2. Be sure that all mating faces are free of nicks and burrs so that they will present a smooth face, insuring a good seal. Clean off any traces of old gasket material.

3. Make sure all parts are clean. Inaccessible areas may be cleaned with a small brush or suitably pointed tool. The circulation line should be blown out with filtered, oil-free compressed air.

4-2. Lubrication

The Series GT Chempump requires no external lubrication. Bearing surfaces and other parts are lubricated and cooled by the fluid being pumped.

CAUTION:
Between cycles of pumping fluids which may solidify, such as caustic soda, flush the system with steam, water or the proper solvent to prevent the piping and internal passages of the pump from plugging up. Where the Chempump is fitted with a discharge filter, flush pump during off cycles and check discharge filter for plugging.

4-3. Disassembly and Reassembly

4-3.1. Models GAT, GBT, GCT and GVBST: Recommended Tools for Disassembly

Sizes (Inches)	Description
1/2 and 9/16	Open end, box end wrench for circulation tube fitting.
5/16	Allen wrench for pump casing socket head bolts.
5/8	Socket for impeller nut.
1/2	Open end, box end wrench for rear bearing housing bolts.
5/32 and 3/16	Allen wrench for front bearing housing screws.
3/8	Open end, box end wrench for stator assembly retaining screws (WHIZLOCK).
3/4	Open end, box end wrench for base cradle retaining bolt (WHIZLOCK).
5/8	Open end, box end wrench for relief valve top.
7/16	Open end, box end wrench for bearing assembly retaining screw.
Pipe Wrench	For Pump casing bull plug drain.

4-3.2. Models GDT, GGT, GVMT, GVET, GVHST: Recommended Tools for Disassembly

Sizes (Inches)	Description
5/8 and 11/16	Open end, box end wrench for circulation tube fitting.
3/8	Hexwrench for pump casing socket head bolts.
1-1/8	Socket for impeller nut.
3/4	Open end, box end wrench for rear bearing housing a bolts (WHIZLOCK).
5/32	Hexwrench Socket flat head cap screw for front bearing housing retaining screws.
3/8	Open end, box end wrench for stator assembly retaining screws (WHIZLOCK).
3/4	Open end, box end wrench for base cradle retaining bolt (WHIZLOCK).
5/8	Open end, box end wrench for relief valve top.
Pipe Wrench	For pump casing bull plug drain.
7/16	Open end, box end wrench for bearing assembly retainer screws.

4-3.2.1. Models GAT, GBT, GCT, GVBST, GDT, GGT, GVMT, GVET and GVHST: Disassembly/Reassembly Procedures

1. Close discharge valve, shutdown pump, and then close the suction valve.
2. Disconnect the power cables from the connection box prior to disassembly (WARNING: PERSONNEL SAFETY HAZARD WILL EXIST IF THIS STEP IS NOT FOLLOWED.)
3. Drain pump.
4. Begin disassembly, carefully examining each part for corrosion or wear.
5. Remove heat exchanger cooling inlet and drain connections.
6. Remove bolts holding pump casing to motor section.
7. Loosen, do not remove the large bolt which holds together the upper an lower sections of the base assembly (Models GVDT, GVET, GVHST, GGT, GVMT are provided with two bolts on the base assembly which requires loosening of one bolt and removal of the other). Next, pull the motor section, resting on the upper half or cradle portion of the base assembly, away from the pump casing until the impeller hub is clear of the casing. Then,

Table 4-4. Trouble Shooting

Trouble	Cause	Remedy
I. Failure to Deliver Required Capacity	a. Pump not primed. b. Air leaks in suction piping. c. Motor not energized. d. Motor windings burnt-out or grounded. e. Low suction head. f. Discharge head too high. g. Discharge valve closed or partially opened. h. Impeller clogged. i. Wrong direction of rotation. j. Damaged impeller.	a. Reprime pump in accordance with Paragraph 3-2, Page 3-1. b. Locate leaks and eliminate. c. Check motor wiring. See Paragraph 2-3, Page 2-3. d. Check electrical continuity of windings and if negative response, stator assembly needs to be replaced. e. Correct suction side of system to insure availability of design NPSH. f. Correct discharge side of system to insure proper operating conditions. g. Open discharge valve until rated discharge pressure is obtained. h. Remove obstructions in impeller. i. Reverse any two motor leads and check with phase sequence meter. See Paragraph 2-3 starting on Page 2-3. j. Impeller must be replaced.
II. Insufficient Pressure	a. Pump not primed. b. Air leaks in suction piping. c. Motor not energized. d. Motor windings burnt-out or grounded. e. Low suction head. f. Discharge valve open too wide. g. Impeller clogged. h. Wrong direction of rotation. i. Damaged impeller.	a. Reprime pump in accordance with Paragraph 3-2, Page 3-1. b. Locate leaks and eliminate. c. Check motor wiring. See Paragraph 2-3, starting on Page 2-3. d. Check electrical continuity of windings and if negative response, stator assembly needs to be replaced. e. Correct suction side of system to insure availability of design NPSH. f. Close down discharge valve until rated discharge pressure is obtained. g. Remove obstructions in the impeller. h. Reverse any two motor leads and check with phase sequence meter. See Paragraph 2-3, starting on Page 2-3. i. Impeller must be replaced.
III. Pump Loses Prime After Starting	a. Pump not properly primed at starting. b. Air leaks in suction piping. c. Air or gas in fluid. d. Low suction head.	a. Reprime pump in accordance with Paragraph 3-2, starting on Page 3-1. b. Locate leaks and eliminate. c. Locate source of gas or air entrainment and correct. d. Correct suction side of system to insure availability of design NPSH.
IV. Pump Takes Too Much Power	a. Shaft bent. b. Rotating element binds. c. Electrical short. d. Wrong direction of rotation.	a. Rotor assembly must be replaced. b. Replace bearings (see Paragraph 4-1-2, Page 4-1) as a result of excessive wear, or check for presence of foreign material in rotor chamber. c. Check electrical continuity of all phases of the motor winding and replace stator assembly if necessary. d. Reverse any two motor leads and check with phase sequence meter. See Paragraph 2-3, starting on Page 2-3.
V. Pump Vibrates	a. Foundation not sufficiently rigid. b. Impeller partially clogged, causing unbalance. c. Shaft bent. d. Worn bearings. e. Rotating element rubbing stator liner.	a. Tighten all bolts involved with the pump base and base supporting structure. b. Impeller partially clogged, causing unbalance - Remove obstructions in the impeller. c. Replace rotor assembly or straighten shaft if bend is not too great. d. Replace bearings (see Paragraph 4-1-2, Page 4-1). e. Replace bearings (see Paragraph 4-1-2) as a result of excessive wear or check for presence of foreign material in rotor chamber.
VI. Motor Running Hot	a. If jacketed, no coolant flow circulating through jacket. b. Jacket clogged, preventing full circulation of coolant flow. c. Motor operating at overload condition. d. Plugged discharge filter (if pump is equipped with filter). e. Circulation tube crimped or bent.	a. Turn on coolant flow. b. Shut down pump and flush jacket. (If jacket is removable type, remove from stator and flush.) c. Make sure pump is operating at design point and conditions specified when purchased. d. Remove pump from line and flush filter.

rotate the motor section and cradle to a point which will allow further disassembly of the unit. This specially constructed base, which is furnished as standard on all Series GT Chempump models, allows inspection or maintenance to be performed on the unit without having to be moved to a workbench or without the motor section having to be set on the floor or ground. If desired, motor section can be removed from lower base section and taken to another area for inspection. In this case, the upper half of the base is used as a stand to protect the parts.

8. For GAT, GBT, GCT, and GVBST models, check end play as indicated in Paragraph 4-1-4. For GVDT, GGT, and GVMT models, step 10 should proceed step 6 and end play then checked.
9. Remove impeller nut, (left hand thread on models GAT, GBT, GCT, GVBST, and right hand thread on models GVDT, GGT, GVMT) and remove impeller.
10. Remove rear circulation tube, rear bearing housing bolts, and then remove rear bearing housing.
11. Remove rear bearing retaining screw and then remove bearing from housing.
12. Withdraw the rotor assembly from rear of motor section taking care not to allow rotor to hit stator liner.
13. On models GAT, GBT, GCT, and GVBST, remove the bolts holding adapter to motor section. Then remove adapter. On models GVDT, GGT, GVMT, GVET and GVHST, remove bolts holding front bearing housing to the motor section.
14. Remove front bearing from adapter or front bearing housing and check for bearing wear.
15. When the gasketed-type removable heat exchanger is furnished, it should be periodically removed from the motor assembly and inspected. This can be easily done by (1) after disconnecting the coolant lines and front and rear circulation tubes from the heat exchanger, remove the bolt assemblies used to clamp the heat exchanger shell on the outside of the motor, and then (2) slip the complete heat exchanger off the motor. The heat exchanger tubing (which is stainless steel as standard), the gasket, and the inside of the shell can then be inspected for corrosion or other problems. Replacement parts for these heat exchangers, or complete heat exchanger kits are available from the factory. Reassemble by slipping the heat exchanger over the outside of the motor (check the gasket to be sure that it is properly positioned), and then, installing and tightening the bolt assemblies until the gasket is sufficiently compressed to prevent the possibility of leakage of the coolant medium.
16. Reassemble pump by reversing the disassembly procedure, replacing old gaskets with new ones. BE SURE TO TAKE UP EVENLY ON BOLTS SECURING BEARING HOUSING. Otherwise, the housing may cock and misalignment will cause rapid bearing wear.
17. Complete reassembly. However, before bolting the adapter to the pump casing, spin the impeller by hand to insure that it does not bind. End play for the GAT, GBT, GCT, and GVBST models should again be checked at this time. End play for the GVDT, GVET, GGT, and GMT models should be checked after bolting of pump casing to adapter, but before bolting rear bearing housing to motor assembly and installing rear curculating tube.

4-3.3. Model GFDT, GHDT, GLDT : Recommended Tools for Disassembly

Sizes (Inches)	Description
5/8 and 11/16	Open end, box end wrench for circulation tube fitting.
3/8	Hexwrench for pump casing socket head bolts.
1/2	Drive, 1 Socket for impeller nut.
3/4	Open end, box end wrench for rear bearing housing a bolts (WHIZLOCK).
5/32	Hexwrench Socket flat head cap screw for front bearing housing retaining screws.
3/8	Open end, box end wrench for stator assembly retaining screws (WHIZLOCK).
3/4	Open end, box end wrench for base cradle retaining bolt (WHIZLOCK).
5/8	Open end, box end wrench for relief valve top.
9/16 and 5/8	Open end, box end wrench for pump casing drain plugs.
7/16	Open end, box end wrench for bearing assembly retainer screws.

4-3-3.1. Model GFDT, GHDT, GLDT: Disassembly/Reassembly Procedure

Unlike the other Series GT models covered by this manual, the Model GFDT, GHDT, AND GLDT are two-stage models and as a result disassembly and reassembly instructions are a bit different. The step by step procedure is as follows:

1. Close discharge valve, shutdown pump, and then close the suction valve.

2. Disconnect the power cables from the connection box prior to disassembly (WARNING: PERSONNEL SAFETY HAZARD WILL EXIST IF THIS STEP IS NOT FOLLOWED).
3. Drain pump.
4. Begin disassembly, carefully examining each part for evidence of corrosion or wear.
5. Remove heat exchanger cooling inlet and drain connections
6. Remove rear circulating tube, rear bearing housings, and bearing retaining screw. Then remove bearing from housing.
7. Check end play as indicated in Paragraph 4-1-4, starting on Page 4-1.
8. Remove pump casing cover plate.
9. Remove the impeller nut (left hand thread) and then impeller, and key (second stage impeller). Second stage impeller has tapped pull holes for easy removal and for holding impeller when removing impeller nut.
10. Remove the spacer sleeve from the shaft.
11. Remove bolts holding motor section to pump casing.
12. a.) If a base is provided, loosen one bolt and remove the other which holds together the upper and lower sections of the base assembly. Next, pull the motor section, resting on the upper half or cradle portion of the base assembly, away from the pump casing until the front end of the rotor shaft is clear of the casing. Then, rotate the motor section and cradle to a point which will allow further disassembly of the unit. This specially constructed base, which is furnished as standard on all Series GT Chempump models, allows inspection or maintenance to be performed on the unit without its having to be removed to a workbench or without the motor having to be set on the floor or ground. If desired, the motor section can be removed from the lower base section and taken to another area for inspection. In this case, the upper half of the base is used as a stand to protect the parts.
    b) If a base is not supplied, remove the motor section, and if necessary, disconnect the power cable from the connection box if the unit is to be taken to a workbench.
13. Slip off the first stage impeller and remove the key from the shaft.
14. Withdraw the rotor assembly from the rear of the motor section, taking care not to allow the rotor or shaft to hit the stator liner.
15. Remove the front bearing housing from the motor and then remove bearing from housing.
16. Slip out the idler bearing from the pump casing.
17. A check for bearing wear can be made at this point. See Paragraph 4-1.2, Page 4-1.
18. Reassemble pump by reversing the disassembly procedure, replacing old gaskets with new ones. BE SURE TO TAKE UP EVENLY ON ALL BOLTS SECURING BEARING HOUSING. Otherwise, misalignment may occur, which would cause rapid bearing wear.
19. Complete reassembly. However, before bolting the pump casing cover plate to the pump casing, spin the rotor-impeller assembly by hand to insure that it does not bind. Also, check end play again as noted in Paragraph 4-1.4, starting on Page 4-1, before reassembling the rear bearing housing to the stator assembly.

4-4. Service Policy

Any Chempump, damaged or inoperative for any reason, will be repaired at the factory at minimum cost and returned to the customer as quickly as possible.

CAUTION

Before returning units to the factory for examination or repair, CLEAN AND DECONTAMINATE THE PUMP OR PARTS THOROUGHLY TO PREVENT CORROSIVE ATTACK DURING SHIPMENT OR INJURY TO PERSONNEL HANDLING RETURNED EQUIPMENT. TAG PUMP WITH INFORMATION REGARDING THE FLUID IT WAS HANDLING AND OPERATING CONDITIONS AT THE TIME OF FAILURE. Proper service will be facilitated with the proper submittal of a Chempump Field Service Report Form. These forms are available from the factory, from the Chempump field representatives, and from this instruction manual Appendix.

4-5. Spare Parts

Have on hand at least two extra sets of bearings, two extra sets of gaskets, and one extra rotor assembly for each Series G Chempump that is installed. When ordering spare parts, give the serial number and model designation; then give the part name which is noted on the Exploded View Parts Diagram, Figure 4-1.

When ordering an impeller, include the diameter which can be noted from the pump order acknowledgment or from the pump nameplate.

It is recommended that the following parts be maintained as "on-hand" spare parts for each Chempump model installed:

1. Models GAT, GBT, GCT and GVBST

Part	Quantity
Pump Casing Gasket	2
Rear Motor Gasket	2
Front & Rear Bearings	2 Sets
Rotor Assembly	1
Bearing Housing Screw	4
Bearing Housing Screw Lockwasher	4

2. Models GVDT, GVET, GGT, GMT, GVET, GVHT

Part	Quantity
Pump Casing Gasket	2
Rear Motor Gasket	2
Front & Rear Bearings	1 Set
Impeller Nut	1
Impeller Key	1
Rotor Assembly	1
Bearing Housing Screw	4
Bearing Housing Screw Lockwasher	4

3. Models GLDT, GFDT, GHDT

Part	Quantity
Coverplate Gasket	2
Pump Casing "O" Ring Gasket	2
Rear Motor Gasket	2
Front & Rear Bearings	1 Set
Impeller Nut	1
Impeller Key	2
Idler Bearing	1
Impeller Spacer	1
Rotor Assembly	1
Bearing Housing Screw	4
Bearing Housing Screw Lockwasher	4

Table 4-5. Coil Resistance Values

MODEL	MOTOR SIZE	ELECT. CONN.	INSUL. CLASS	*RESIS. (OHMS)	MAX OHM VAR. PER MOTOR
GAT	1K	230	R	6.80	0.51
	1K	460	R	27.20	2.04
	1K	575	R	42.50	3.12
GAT, GBT, GCT	1-1/2K	230	R	3.40	0.26
	1-1/2K	460	R	13.60	1.04
	1-1/2K	575	R	21.25	1.63
GBT, GCT GVBST, GGT	3K	230	R	1.73	0.04
	3K	460	R	6.92	0.26
	3K	575	R	10.80	0.26
	5K	230	R	1.02	0.03
	5K	460	R	4.08	0.12
	5K	575	R	6.38	0.19
GVDT, GVET, GVHST, GGT	10K	230	R	0.30	0.02
	10K	460	R	1.20	0.08
	10K	575	R	1.88	0.13
	15K	230	R	0.21	0.02
	15K	460	R	0.85	0.06
	15K	575	R	1.33	0.01
	20K	230	R	0.16	0.01
	20K	460	R	0.64	0.05
	20K	575	R	1.00	0.08
GVMT	5P	230	R	0.80	0.06
	5P	460	R	3.20	0.24
	5P	575	R	5.00	0.38
	7-1/2L	230	R	0.58	0.06
	7-1/2L	460	R	2.31	0.25
	7-1/2L	575	R	3.61	0.38
	10L	230	R	0.05	0.06
	10L	460	R	2.03	0.24
	10L	575	R	3.17	0.38
	15L	230	R	0.04	0.06
	15L	460	R	1.40	0.20
	15L	575	R	2.20	0.30

*Resistence Values at 25°C

APPENDIX

CHEMPUMP
A DIVISION OF TEIKOKU USA INC.

TROUBLE ANALYSIS SHEET

CUSTOMER: ___________________________________

ADDRESS: ___________________________________

____

CONTACT: ___________________________________

E-MAIL: ___________________________________

DATE: ______________________________

PHONE: ______________________________

FAX: ______________________________

S/N #: ______________________________

Proper analysis of the trouble you have been experiencing requires an accurate description of operating conditions and the system in which the pump is installed.

DATE INSTALLED:________________ DATE REMOVED:________________ HOURS USED: ________________

1.) LIQUID OR SOLUTION HANDLED
(Include impurities or % if mixture): ____

IS DISSOLVED GAS PRESENT?____

ARE SOLIDS IN SUSPENSION PRESENT?____

IF SO, STATE NATURE:____

2.) ACTUAL OPERATING CONDITIONS: TRANSFER CIRCULATION

FLOW: _______________________________________GPM

DISCHARGE PRESSURE: ______________________PSIG

PUMPING TEMPERATURE: ________________________F

SUCTION PRESSURE: ____________________PSIG

DIFFERENTIAL: _______________________PSI/FT.

SP. GR. @ P.T.: _________________________

VISCOSITY AT:

PUMPING TEMPERATURE: ______________________CPS

AMBIENT: __________________________________CPS

VAPOR PRESSURE AT:

PUMPING TEMPERATURE:____________PSIA/MMHG

AMBIENT: _________________________PSIA/MMHG

3.) PLEASE SEND A SKETCH OF YOUR SYSTEM. GIVE A BRIEF DESCRIPTION, INCLUDING A ROUGH FLOW SHEET. INDICATE WHAT CHEMICAL OR PHYSICAL ACTION OCCURS BEFORE THE PUMP. SHOW COOLING OR HEATING SERVICES ON LINES DIRECTLY AFFECTING THE PUMP. SHOW WHAT CONTROLS ARE USED AND WHAT THEY OPERATE. IF MORE THAN ONE PUMP OPERATES ON A COMMON SUCTION, SHOW HOW THEY ARE BALANCED.

YOUR ATTENTION TO THIS REPORT IS GREATLY APPRECIATED.
UPON RECEIPT AT CHEMPUMP, WE WILL EVALUATE THE FACTS SHOWN AND RETURN OUR RECOMMENDATIONS TO YOU.

RETURN COMPLETED FORM TO:

CHEMPUMP FACTORY SERVICE CENTER
959 MEARNS ROAD, WARMINSTER, PA 18974
PHONE: (215) 343-6000 FAX: (267) 486-1037

CHEMPUMP
A DIVISION OF TEIKOKU USA INC.

DECONTAMINATION CERTIFICATION AND FLUSHING PROCEDURE

CUSTOMER ________________________________ **DATE:** __________________________

ADDRESS: ________________________________ **PHONE:** __________________________

________________________________ **FAX:** __________________________

CONTACT: ________________________________ **RMA #:** __________________________

Please complete the items below. By providing this information, you will allow us to work as quickly and safely as possible.

PUMP MODEL: ________________________________ **SERIAL NUMBER:** ____________________

PART NUMBER:________________________________ **DATE INSTALLED:**____________________

DATE PURCHASED: ____________________________ **INDOOR / OUTDOOR:**_____________________

REASON FOR RETURN: ☐ WARRANTY REQUEST ☐ FACTORY SERVICE

FAILURE INFORMATION:

- ☐ Failure To Deliver Required Capacity
- ☐ Loses Prime After Starting
- ☐ Axial Wear Due To Thrust
- ☐ Vibration
- ☐ Bearing Failure
- ☐ Insufficient Pressure
- ☐ Motor Burnout
- ☐ Other: ____________________

BRIEF DESCRIPTION OF PUMP FAILURE: ____

____

____

DECONTAMINATION INFORMATION

All pumps/parts must be completely decontaminated and all information in this section must be completed prior to shipment to our factory or service center. Shipments received without this documentation will not be accepted and will be returned to the point of shipment.

CHECK ONE OF THE FOLLOWING:

☐ The pump has been flushed by following steps A through A3 of the Chempump Flushing Procedure on page 2 of this form. No liner rupture is suspected.

☐ Both the complete pump and the stator assembly have been flushed by following steps A through B3 of the Chempump Flushing Procedure on page 2 of this form. The motor must be rewound.

FLUID PUMPED: ____________________________ **FLUSHING FLUID:** ____________________________

Attach completed material safety data sheets (MSDS) for these fluids. *If either fluid is proprietary, please attach a description of any characteristics that will assist Chempump in safe handling. Without detailed and complete information on the pumped fluid, we will not be able to process your order.*

PROTECTION EQUIPMENT RECOMMENDED FOR SAFE HANDLING OF THE PROCESS FLUID:

____

____

DECONTAMINATION CERTIFIED BY: ______________________________ **DATE:**_______________

TITLE: ____ **PHONE:**_____________

RETURN COMPLETED FORM AND PUMP/PART TO:

☐ CHEMPUMP
FACTORY SERVICE CENTER
959 MEARNS ROAD
WARMINSTER, PA 18974
PHONE: (215) 343-6000
FAX: (267) 486-1037

☐ CHEMPUMP
MIDWEST SERVICE CENTER
STATE ROUTE 2
BELMONT, WV 26134
PHONE: (304) 684-2459
FAX: (304) 684-7593

☐ TEXAS PROCESS EQUIPMENT
5880 BINGLE ROAD
HOUSTON, TX 77092
PHONE: (713) 460-5555
FAX: (713) 460-4807

FLUSHING PROCEDURES FOR CHEMPUMP PRODUCTS

THE FOLLOWING FLUSHING PROCEDURES ARE REQUIRED TO ALLOW FOR MAXIMUM REMOVAL OF PROCESS FLUIDS.

PART "A" — COMPLETE PUMP

A) WITH THE SUCTION FLANGE DOWN, INTRODUCE AN APPROPRIATE NEUTRALIZING FLUID THROUGH THE DISCHARGE FLANGE. FLUSH THE PUMP IN THIS MANNER FOR A SUFFICIENT TIME TO ALLOW FOR THE REMOVAL OF ALL PROCESS FLUID.

A2) AGAIN, WITH THE SUCTION FLANGE DOWN, REMOVE THE CIRCULATION LINE (AND FITTING IF NECESSARY) AND INTRODUCE AN APPROPRIATE NEUTRALIZING FLUID TO THE REAR OF THE PUMP. FLUSH THE PUMP IN THIS MANNER FOR A SUFFICIENT TIME TO ALLOW FOR THE REMOVAL OF ALL PROCESS FLUID. ALSO FLUSH THE CIRCULATION LINE AND/OR HEAT EXCHANGER TUBING, AS REQUIRED.

A3) AFTER FLUSHING AS SPECIFIED ABOVE, REMOVE AS MUCH OF THE NEUTRALIZING FLUID AS POSSIBLE USING COMPRESSED AIR OR INERT GAS.

PART "B" — STATOR ASSEMBLY (if equipped with a relief valve)

IF A STATOR LINER RUPTURE IS SUSPECTED, FOLLOW THIS SECTION TO FLUSH THE STATOR CAVITY.
CAUTION: IF THIS STEP IS FOLLOWED, THE MOTOR MUST BE REWOUND.

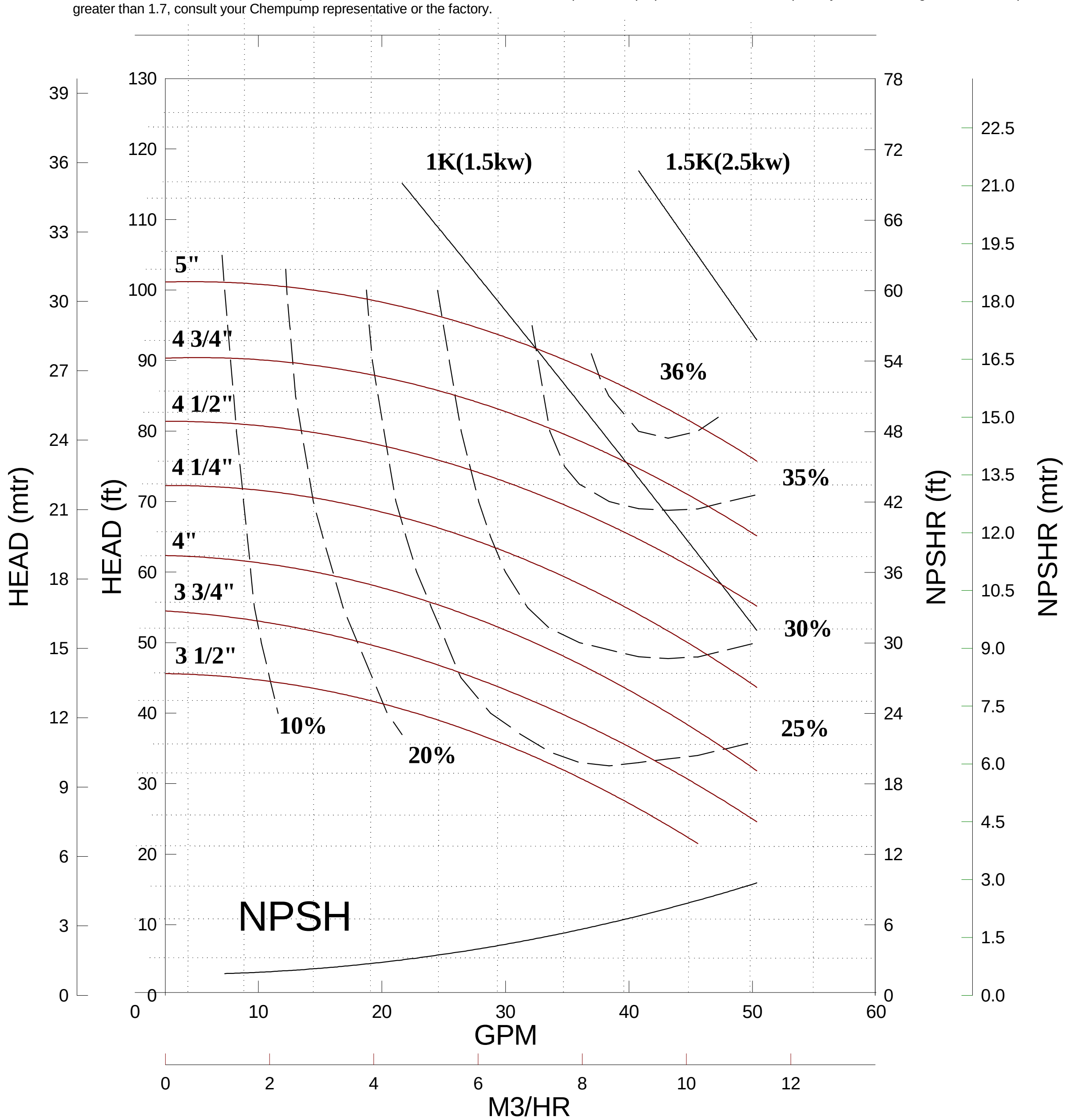
B1) REMOVE THE RELIEF VALVE. INSERT A SCREWDRIVER INTO THE RELIEF VALVE ADAPTER AND PRY THE LISK FILTER TO ONE SIDE. REMOVE THE CONNECTION BOX FROM THE LEAD NIPPLE AND CHIP AWAY THE POTTING COMPOUND FROM THE LEAD NIPPLE.

B2) POSITION THE STATOR ASSEMBLY WITH THE LEAD NIPPLE DOWN AND INTRODUCE AN APPROPRIATE NEUTRALIZING FLUID TO THE RELIEF VALVE ADAPTER. THE FLUID WILL EXIT THROUGH THE LEAD NIPPLE. FLUSH THE STATOR CAVITY IN THIS MANNER FOR A SUFFICIENT TIME TO ALLOW FOR THE REMOVAL OF ALL PROCESS FLUID AND STATOR OIL.

B3) REMOVE A MUCH OF THE NEUTRALIZING FLUID AS POSSIBLE BY PURGING THE STATOR CAVITY WITH COMPRESSED AIR OR INERT GAS FOR 3 - 5 MINUTES.

PUMP CASING D-38205	SIZE 1 x 3/4 x 5	MODEL GA(T)
IMPELLER C-37670	IMP. DIA.	RPM 3450
SERIAL #	REVISION DATED 9/92: COMPUTER GENERATED	

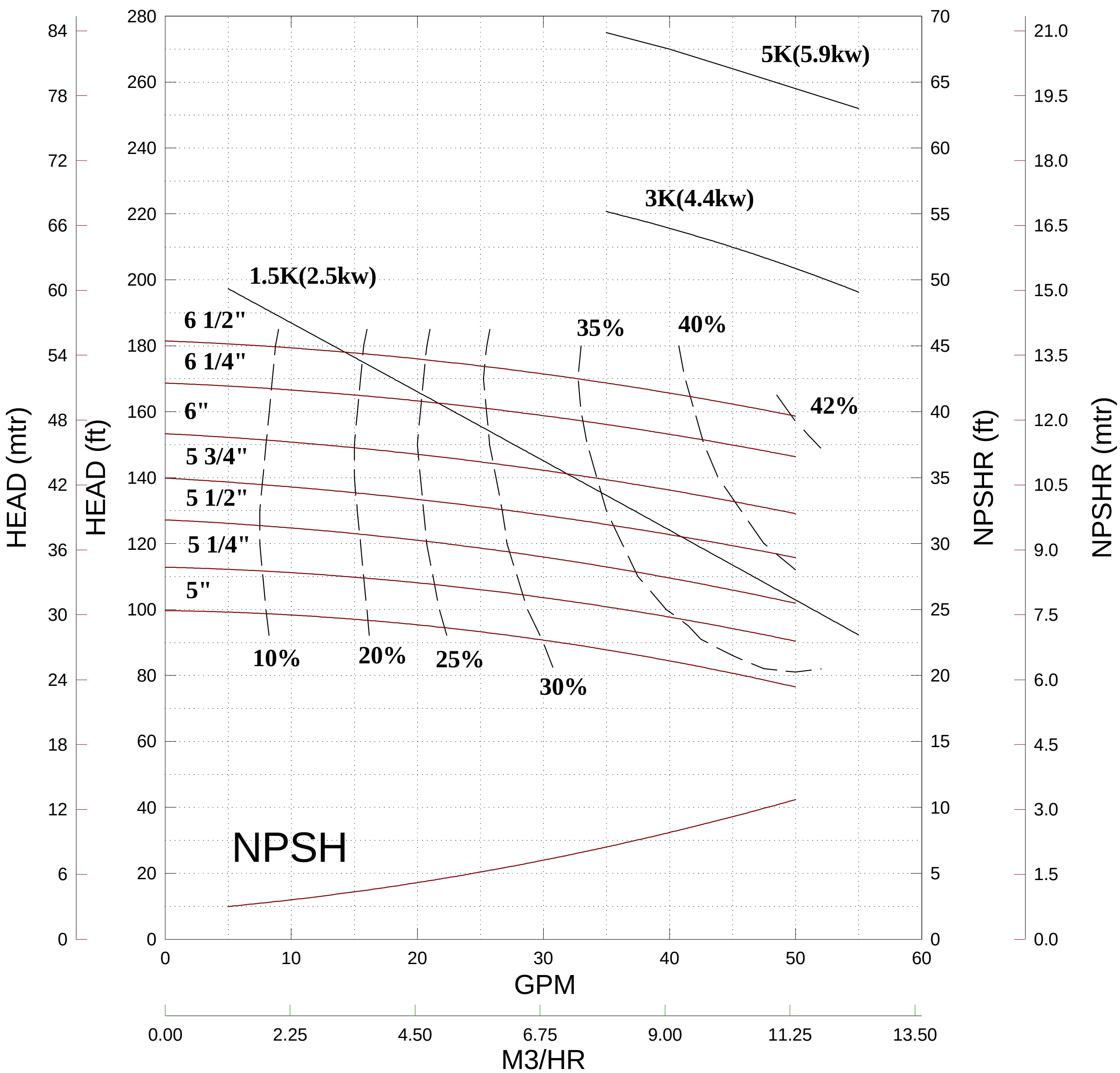
Curves are based on shop test while handling clean water at 20ºC and at sea level. Performance guarantees apply at rating point only. Efficiencies shown are overall wire to water. Numbers beneath model designations indicate full load kilowatt ratings for the referenced motor load lines. When pumping fluids with specific gravities other than 1.0, select pump model (see load line) to handle load equivalent in feet of water. e.g, 40 feet of fluid of Sp. Gr.=1.5 is load equivalent of 60 feet (1.5x40) of water. Please note that this is merely a short cut method to estimate the model required. For proper model selection, especially when handling a fluid with a Sp. Gr. greater than 1.7, consult your Chempump representative or the factory.



CHEMPUMP A DIVISION OF TEIKOKU USA INC. www.chempump.com www.teikoku-usa.com	DRAWN	DATE	CURVE	REV.
	JFK	10-16-79	A-70059	3

PUMP CASING	D-38203	SIZE 1 x 3/4 x 6 1/2	MODEL	GB(T)
IMPELLER	C-37669	IMP. DIA	RPM	3450
SERIAL #		REVISION DATED 9/92: COMPUTER GENERATED		

Curves are based on shop test while handling clean water at 20°C and at sea level. Performance guarantees apply at rating point only. Efficiencies shown are overall wire to water. Numbers beneath model designations indicate full load kilowatt ratings for the referenced motor load lines. When pumping fluids with specific gravities other than 1.0, select pump model (see load line) to handle load equivalent in feet of water. e.g, 40 feet of fluid of Sp. Gr.=1.5 is load equivalent of 60 feet (1.5x40) of water. Please note that this is merely a short cut method to estimate the model required. For proper model selection, especially when handling a fluid with a Sp. Gr. greater than 1.7, consult your Chempump representative or the factory.



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PUMP CASING	**D-38208**	SIZE	**2 x 1 1/2 x 5**	MODEL	**GC(T)**
IMPELLER	**C-39427**	IMP. DIA.		RPM	**3450**
SERIAL #		REVISION DATED 9/92: COMPUTER GENERATED			

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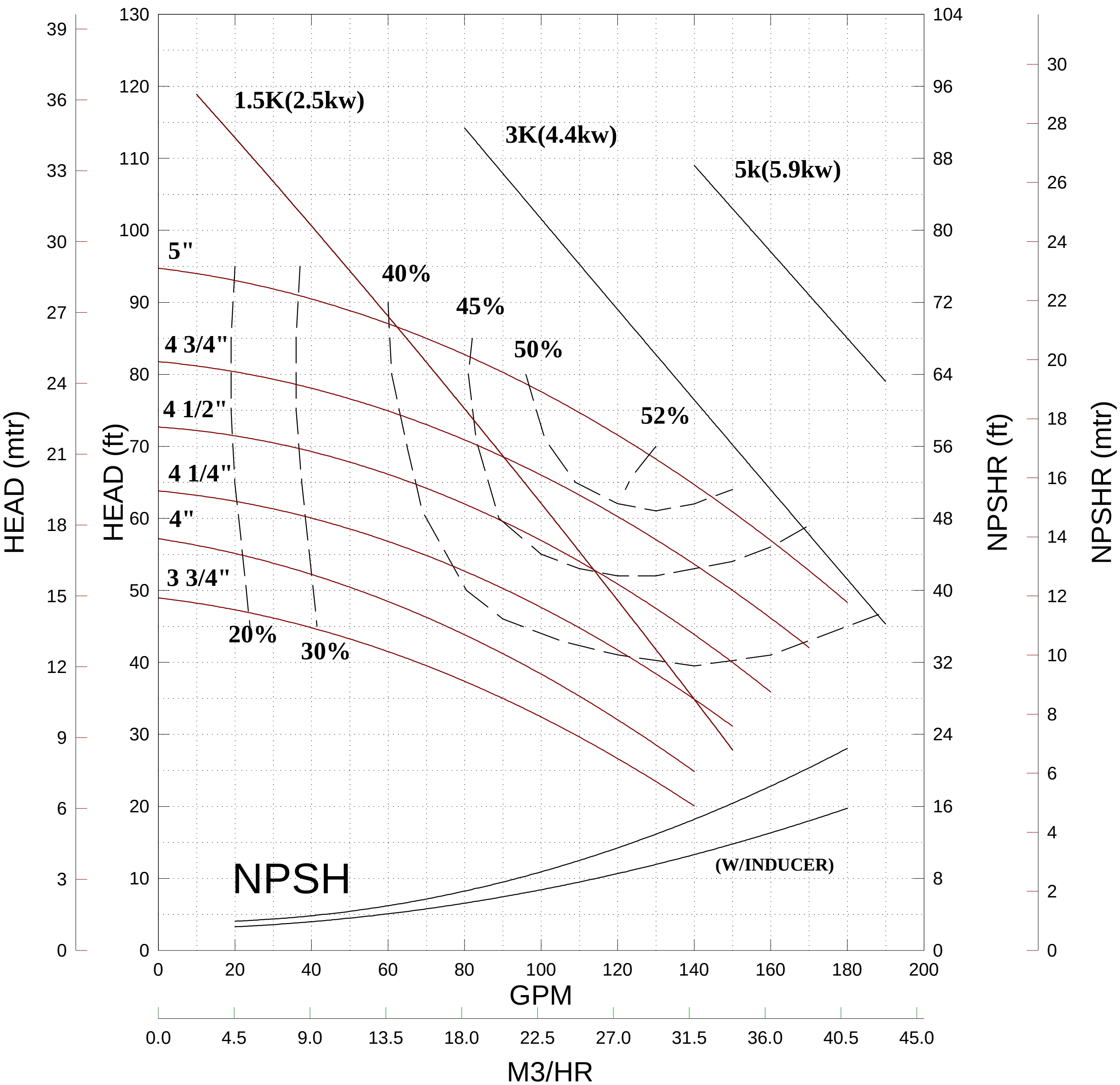
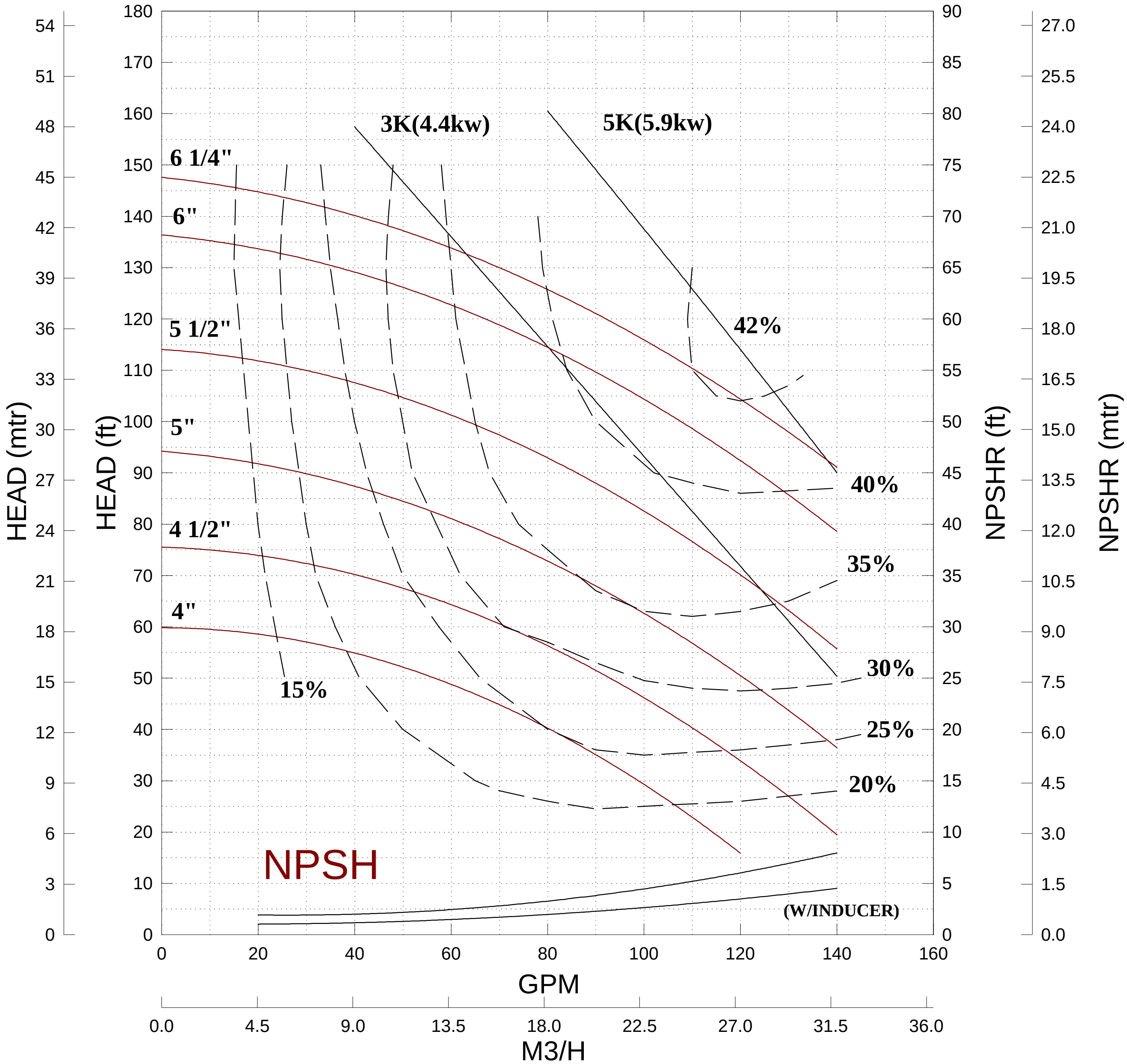


	DRAWN	DATE	CURVE	REV.
CHEMPUMP A DIVISION OF TEIKOKU USA INC. www.chempump.com www.teikoku-usa.com	JFK	12-12-79	A-70060	2

PUMP CASING **D-38201**	SIZE **3 x 1 1/2 x 6 1/4**	MODEL **GVBS(T)**
IMPELLER **C-24463**	IMP. DIA.	RPM **3450**
SERIAL #	REVISION DATED 9/92: COMPUTER GENERATED	

Curves are based on shop test while handling clean water at 20ºC and at sea level. Performance guarantees apply at rating point only. Efficiencies shown are overall wire to water. Numbers beneath model designations indicate full load kilowatt ratings for the referenced motor load lines. When pumping fluids with specific gravities other than 1.0, select pump model (see load line) to handle load equivalent in feet of water. e.g, 40 feet of fluid of Sp. Gr.=1.5 is load equivalent of 60 feet (1.5x40) of water. Please note that this is merely a short cut method to estimate the model required. For proper model selection, especially when handling a fluid with a Sp. Gr. greater than 1.7, consult your Chempump representative or the factory.



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	WF	11-18-86	A-70066	2

PUMP CASING D-38197	SIZE 3 x 1 1/2 x 8	MODEL GVD(T)
IMPELLER C-38196	IMP. DIA	RPM 3450
SERIAL #	REVISION DATED 9/92: COMPUTER GENERATED	

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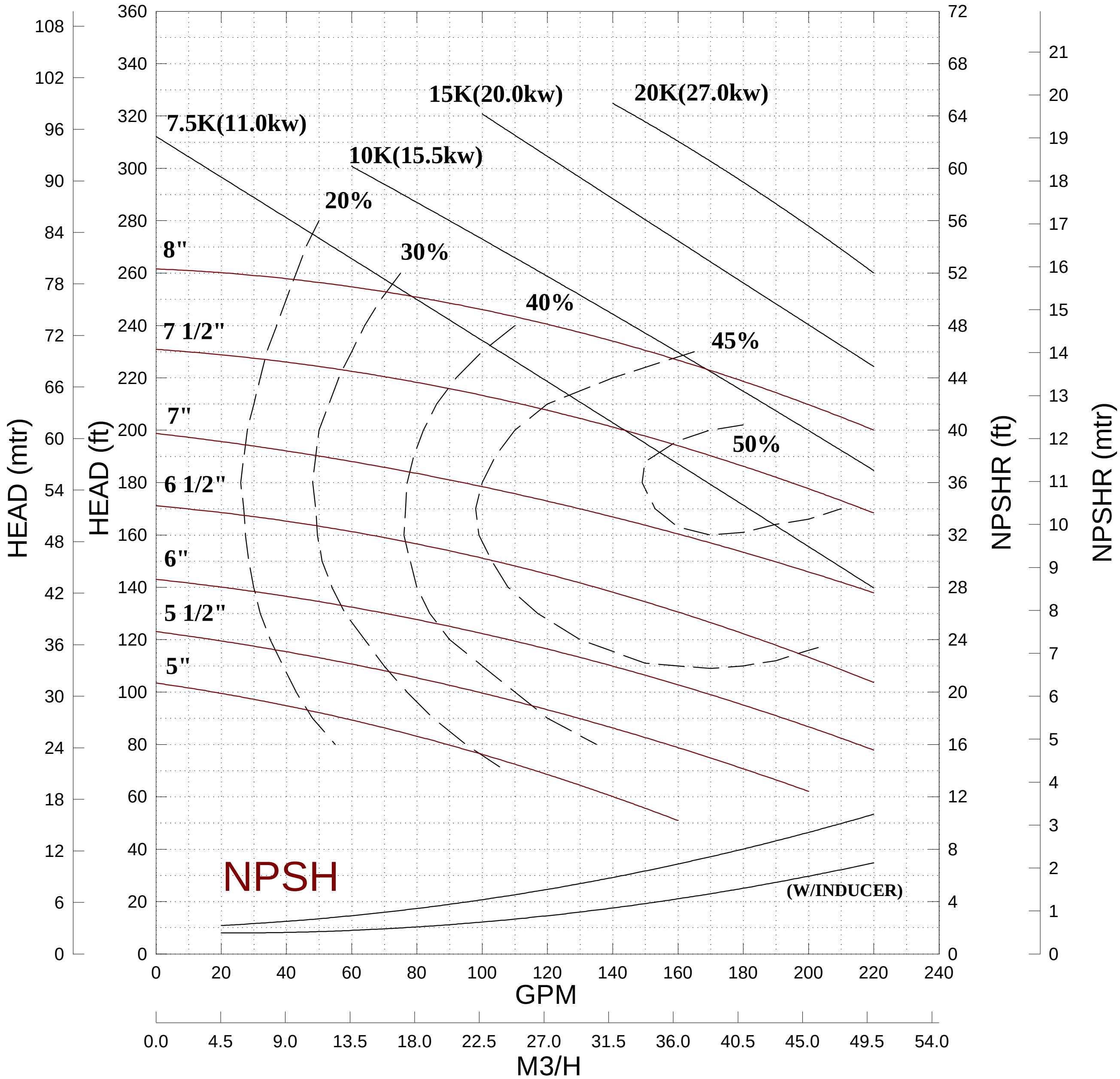

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PUMP CASING **D-38783**	SIZE **3 x 2 x 8**	MODEL **GVE(T)**
IMPELLER **C-39373**	IMP. DIA.	RPM **3450**
SERIAL #	REVISION DATED 9/92: COMPUTER GENERATED	

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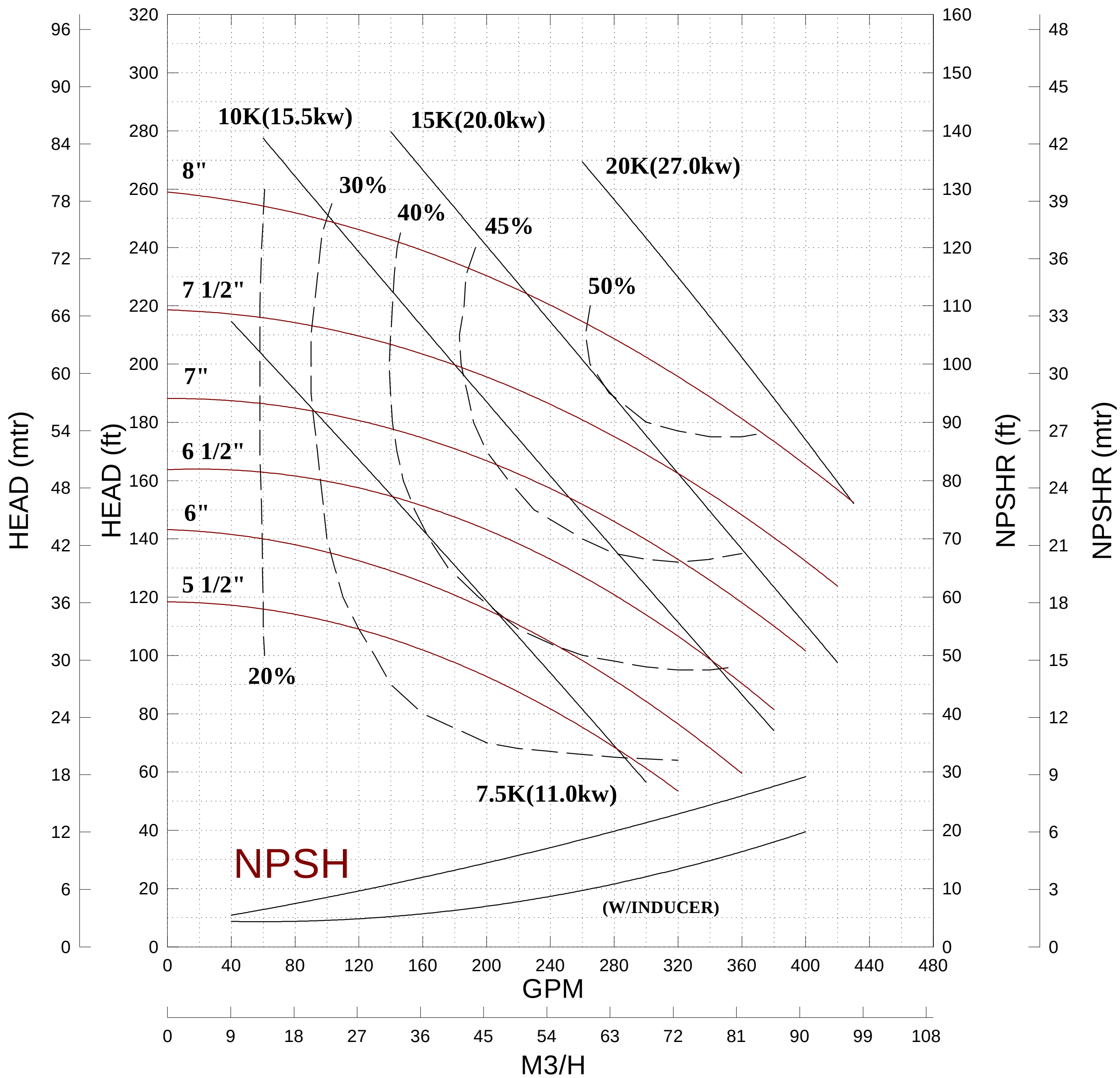

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PUMP CASING	D-38281	SIZE	2 x 1 x 9 1/2	MODEL	GVHS(T)
IMPELLER	C-38508	IMP. DIA.		RPM	3450
SERIAL #		REVISION DATED 9/92: COMPUTER GENERATED			

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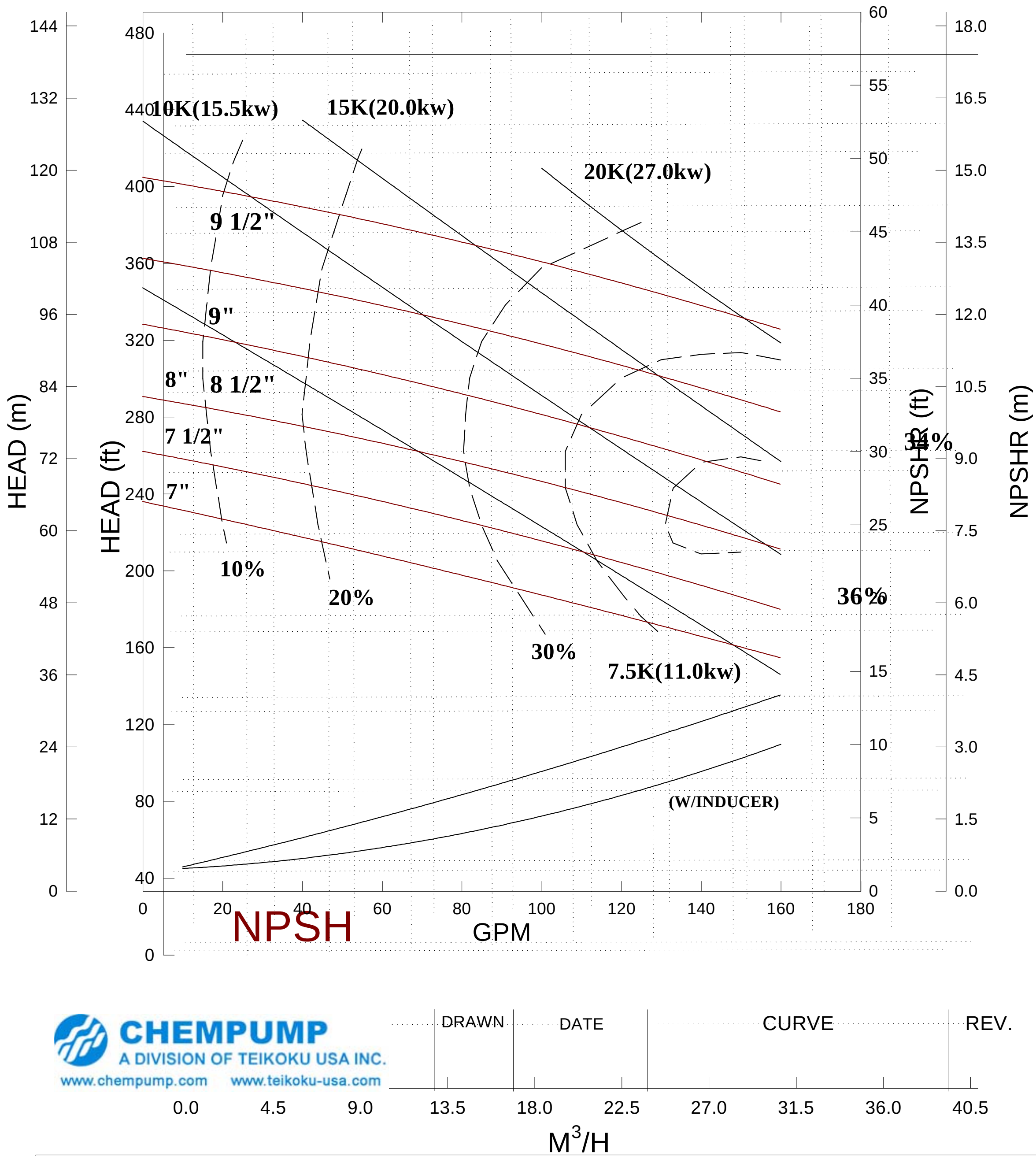

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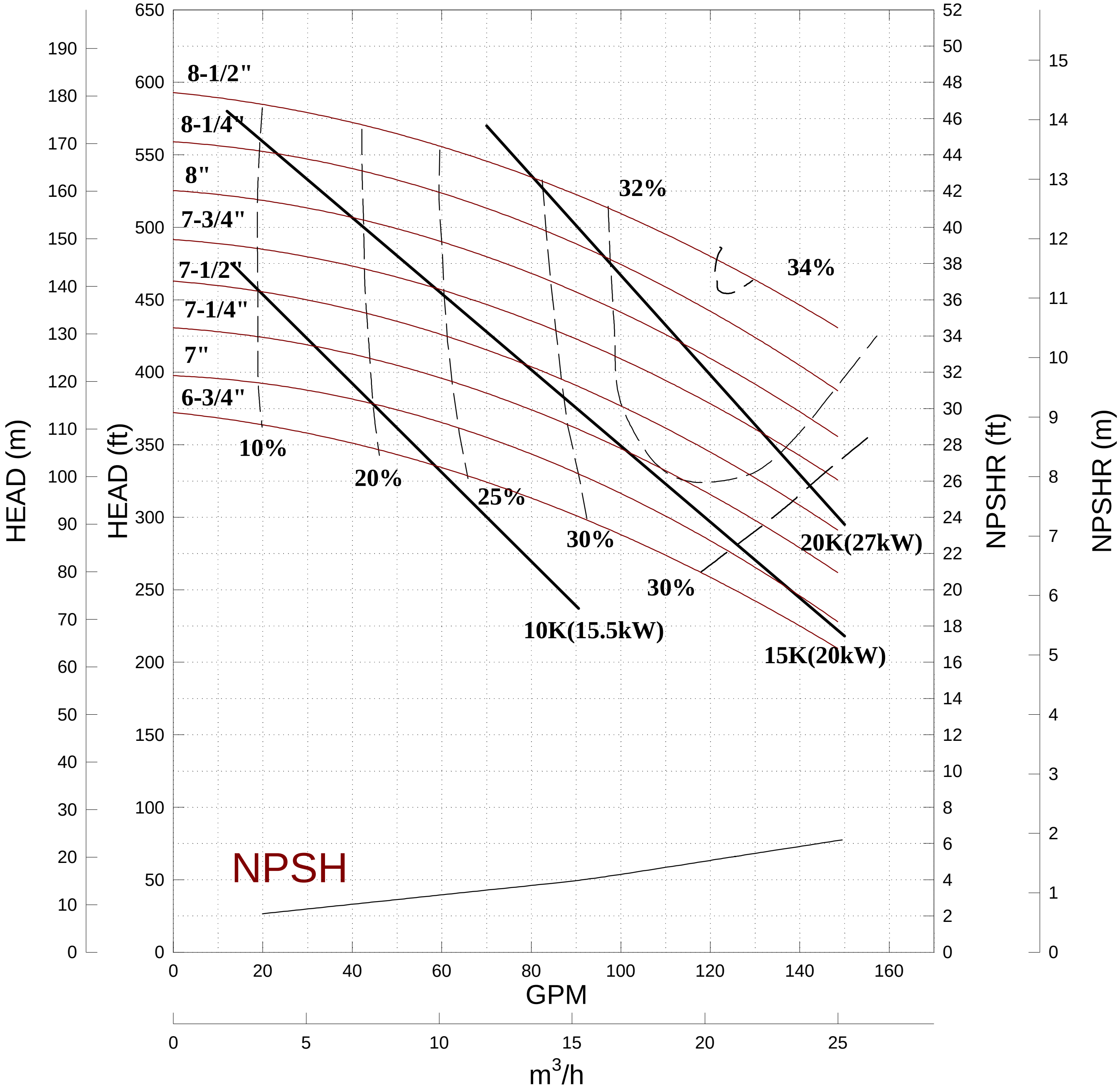
DRAWN	DATE	CURVE	REV.
JFK	09-16-75	A-70057	3

PUMP CASING	D-38113	SIZE	3 x 1-1/2	MODEL	N2S-10, 15 & 20K
IMPELLER 1st Stage	C-38222	IMP. DIA.		RPM	3450
IMPELLER 2nd Stage	C-38110	Revision Dated 08/03: Computer Generated			

Curves are based on shop test while handling clean water at 20ºC and at sea level. Performance guarantees apply at rating point only. Efficiencies shown are overall wire to water. Numbers beneath model designations indicate full load kilowatt ratings for the referenced motor load lines. When pumping fluids with specific gravities other than 1.0, select pump model (see load line) to handle load equivalent in feet of water. e.g, 40 feet of fluid of Sp. Gr.=1.5 is load equivalent of 60 feet (1.5x40) of water. Please note that this is merely a short cut method to estimate the model required. For proper model selection, especially when handling a fluid with a Sp. Gr. greater than 1.7, consult your Chempump representative or the factory.



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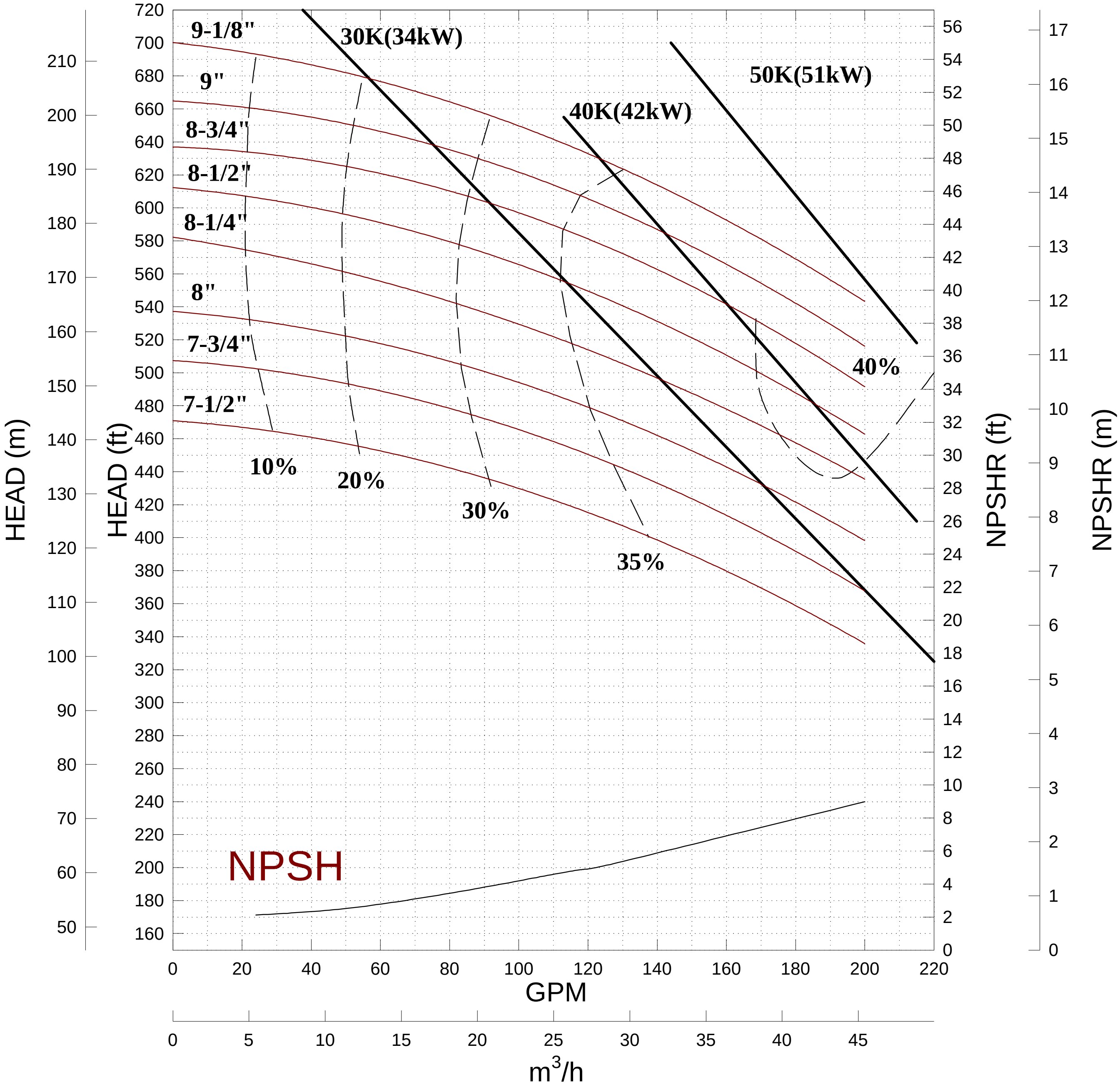
Rev 2 - Computer Generated Curve

PUMP CASING	D-38113	SIZE 3 x 1-1/2	MODEL N2S-30, 40 & 50K
IMPELLER 1st Stage	C-38222	IMP. DIA.	RPM 3450
IMPELLER 2nd Stage	C-38110	Revision Dated 08/03: Computer Generated	

Curves are based on shop test while handling clean water at 20ºC and at sea level. Performance guarantees apply at rating point only. Efficiencies shown are overall wire to water. Numbers beneath model designations indicate full load kilowatt ratings for the referenced motor load lines. When pumping fluids with specific gravities other than 1.0, select pump model (see load line) to handle load equivalent in feet of water. e.g, 40 feet of fluid of Sp. Gr.=1.5 is load equivalent of 60 feet (1.5x40) of water. Please note that this is merely a short cut method to estimate the model required. For proper model selection, especially when handling a fluid with a Sp. Gr. greater than 1.7, consult your Chempump representative or the factory.



CHEMPUMP A DIVISION OF TEIKOKU USA INC. www.chempump.com www.teikoku-usa.com	DRAWN	DATE	CURVE	REV.
	WF	04-23-86	A-70068	2

Rev 2 - Computer Generated Curve

MODEL	MINIMUM FLOW (GPM)	REAR BEARING HOUSING (IN-LBS)
GA	6	60 - 70
GB	7.5	60 - 70
GC	20	60 - 70
GVBS	20	60 - 70
GVD	25	110 - 120
GVE	45	110 - 120
GVHS	22	110 - 120
GG	65	110 - 120
GKS	55	110 - 120
GK	90	110 - 120
GVM	60	110 - 120
GN	75	FACTORY
GP	120	
GPS	140	
GRS	250	

MIMIMUM FLOW: The values stated above are the recommended mimimum flow models at 3450 rpm and standard circulation.
These flows are based on the radial loading and normal heat in in the motor section.
If an application falls below these values please contact the fa

TORQUE VALUES: These values are for the standard Chempump product line usir teflon envlope gaskets, standard bolting and 150 or 300 psi de

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A DIVISION OF TEIKOKU USA INC.
959 Mearns Road, Warminster, PA 18974 Phone: (215) 343-6000 Fax: (267) 486-1037 Website: www.chempump.com E-mail: chempump@chempump.com