

KINNEY®

Kinney®
Liquid Ring Vacuum Pumping Systems

Manual 4816 Rev B p/n 004816 0000

WARNING: Do Not Operate Before Reading Manual

Liquid Ring Vacuum Pumping Systems OPERATOR'S MANUAL

Models

DRSP DRDP OFRP ACRP



TROUBLESHOOTING

CONDITION	CAUSE	POSSIBLE REMEDY
Seals Leaking	Seal incorrectly installed	Reinstall seal
	Seal worn or damaged	Replace seal
Reduced capacity	Rotational speed too low	Check supply voltage
	Vacuum leak	Locate and repair
	High sealant temperature	Check coolant flow and temperature Check heat exchanger cleanliness
	Incorrect sealant flow rate	See "Sealant flow rate" section in KLRC manual
Excessive noise	Defective bearing	Replace bearing
	Too much sealant liquid	Decrease flow rate
	Coupling misaligned	Align coupling
	Cavitation	Open attenuating valve or reset vacuum relief valve to increase flow
Overheating	Defective bearing	Replace bearing
	High sealant temperature	Check coolant flow and temperature
	Suction open to atmosphere	Adjust isolation valve
Excessive vibration	Coupling misaligned	Realign coupling
	Pump not properly anchored	Anchor
	See excessive noise	Check inlet pressure and gas flow
Motor overloaded	Excessive back pressure	Reduce height of pump discharge
	Too much sealant liquid	See table in KLRC manual for proper flow rate
	Misalignment	Realign motor and pump
	Defective bearing	Replace bearing
Abnormal bearing wear	Misaligned pump assembly	Realign pump and motor
Impeller binding or will not turn	Accumulation of rust or scale	See "Operation and Maintenance" section of KLRC manual
	Foreign object in pump	Dismantle pump and remove foreign object
Mechanical Seals squeal	Insufficient cooling liquid	Increase coolant flow to seal, check compatibility of sealant

NOTES:

PROPERTIES OF SEALANTS

Water is the most commonly used sealant in liquid ring vacuum pumps. Other fluids may be used to obtain process compatibility. In these applications special consideration should be given to the properties of the sealant, which may affect pump performance. Some of the properties of sealant which should be considered, are:

- Specific Gravity
- Specific Heat
- Viscosity
- Vapor Pressure

Additionally, the solubility of process gas in the sealant can be of significance and should be evaluated especially if the partial or full recovery system is used. When water is the sealant its chemical content should be evaluated since certain conditions will affect the service life of the pump. Generally if water is suitable to drink it is suitable for pump use. Hardness greater than 500 PPM will result in internal plating and fouling of pump parts. Service with hardness of less than 500 PPM depends upon operating temperature and the nature of the salt deposit. Naturally occurring well water with organic acid of pH-5 or higher is generally suitable, however pH of 7 or higher is preferred. Chemically treated water with sulfur content requires pH-7 or more. Water, which has a pH less than 5 should be treated, or the pump should have special materials of construction. If internal scaling affects performance, a water treatment specialist should be consulted. TVBS recommends that sealants and sealant systems be carefully evaluated and we invite you to discuss them with your TVBS Sales Professional or our Application Engineers.

Sealant Temperature

The rated volumetric capacity (ACFM) of a pump is based upon the use of incoming seal water at 60° F (15° C) . Seal water temperature affects the pump capacity. Table 2 provides data which when applied to the below formula will give the pumping capacity on dry air at water temperature other than 60° F (15° C) . To calculate volumetric pumping capacity (ACFM) or to approximate the capacity when using water at other than 60° F (15° C) the following formulas apply:

$$S_a = \frac{(S_{60})(P_1 - P_c)}{(P_1 - 13.3)}$$

Where: S_a = Actual capacity in ACFM, at P_1

S_{60} = Pump capacity with 60° F (15° C) sealant at P_1 This data is shown on our Liquid Ring Vacuum Pump Brochure #4120.

P_1 = Inlet pressure in Torr

P_c = Vapor pressure of sealant at actual sealant temperature

Table 2 on the facing page shows the vapor pressures of water at various temperatures.

Water Sealant Temperature ° F (° C)	Vapor Pressure Torr (mbar)
50 (10)	9.2 (12.3)
52 (11)	9.9 (13.2)
54 (12)	10.7 (14.3)
56 (13)	11.5 (15.3)
58 (14)	12.3 (16.4)
60 (15)	13.3 (17.7)
62 (17)	14.2 (18.9)
64 (18)	15.3 (20.4)
66 (19)	16.4 (21.9)
68 (20)	17.5 (23.3)
70 (21)	18.8 (25.1)
72 (22)	20.1 (26.8)
74 (23)	21.5 (28.7)
76 (24)	22.9 (30.5)
78 (26)	24.5 (32.7)
80 (27)	26.2 (34.9)

Table 2 Vapor Pressures of Water

WARRANTY – VACUUM PRODUCTS

Subject to the terms and conditions hereinafter set forth and set forth in General Terms of Sale, Kinney (the Seller) warrants products and parts of its manufacture, when shipped, and its work (including installation and start-up) when performed, will be of good quality and will be free from defects in material and workmanship. This warranty applies only to Seller's equipment, under use and service in accordance with Seller's written instructions, recommendations and ratings for installation, operating, maintenance and service of products, for a period as stated in the table below. Because of varying conditions of installation and operation, all guarantees of performance are subject to plus or minus 5% variation. (Non-standard materials are subject to a plus or minus 10% variation).

PRODUCT TYPE	WARRANTY DURATION
New (Non-Piston Pumps)	15 months after date of shipment or 12 months after initial startup date, whichever occurs first
New (Piston Pumps)	30 months after date of shipment, on all units sold after June 1, 2014.
Repair	6 months after date of shipment or remaining warranty period, whichever is greater
Remanufactured	9 months after date of shipment or 6 months after initial startup date, whichever occurs first

THIS WARRANTY EXTENDS ONLY TO BUYER AND/OR ORIGINAL END USER, AND IN NO EVENT SHALL THE SELLER BE LIABLE FOR PROPERTY DAMAGE SUSTAINED BY A PERSON DESIGNATED BY THE LAW OF ANY JURISDICTION AS A THIRD PARTY BENEFICIARY OF THIS WARRANTY OR ANY OTHER WARRANTY HELD TO SURVIVE SELLER'S DISCLAIMER.

All accessories furnished by Seller but manufactured by others bear only that manufacturer's standard warranty.

All claims for defective products, parts, or work under this warranty must be made in writing immediately upon discovery and, in any event within one (1) year from date of shipment of the applicable item and all claims for defective work must be made in writing immediately upon discovery and in any event within one (1) year from date of completion thereof by Seller. Unless done with prior written consent of Seller, any repairs, alterations or disassembly of Seller's equipment shall void warranty. Installation and transportation costs are not included and defective items must be held for Seller's inspection and returned to Seller's Ex-works point upon request.

THERE ARE NO WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OF PURPOSE.

After Buyer's submission of a claim as provided above and its approval, Seller shall at its option either repair or replace its product, part, or work at the original Ex-works point of shipment, or refund an equitable portion of the purchase price.

The products and parts sold hereunder are not warranted for operation with erosive or corrosive material or those which may lead to build up of material within the product supplied, nor those which are incompatible with the materials of construction. The Buyer shall have no claim whatsoever and no product or part shall be deemed to be defective by reason of failure to resist erosive or corrosive action nor for problems resulting from build-up of material within the unit nor for problems due to incompatibility with the materials of construction.

Any improper use, operation beyond capacity, substitution of parts not approved by Seller, or any alteration or repair by others in such manner as in Seller's judgment affects the product materially and adversely shall void this warranty.

No employee or representative of Seller other than an Officer of the Company is authorized to change this warranty in any way or grant any other warranty. Any such change by an Officer of the Company must be in writing.

The foregoing is Seller's only obligation and Buyer's only remedy for breach of warranty, and except for gross negligence, willful misconduct and remedies permitted under the General Terms of Sale in the sections on CONTRACT PERFORMANCE, INSPECTION AND ACCEPTANCE and the PATENTS Clause hereof, the foregoing is BUYER'S ONLY REMEDY HEREUNDER BY WAY OF BREACH OF CONTRACT, TORT OR OTHERWISE, WITHOUT REGARD TO WHETHER ANY DEFECT WAS DISCOVERED OR LATENT AT THE TIME OF DELIVERY OF THE PRODUCT OR WORK. In no event shall Buyer be entitled to incidental or consequential damages. Any action for breach of this agreement must commence within one (1) year after the cause of action has occurred.

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