

**DISASSEMBLY AND  
ASSEMBLY INSTRUCTIONS  
FOR  
LIQUID RING VACUUM PUMP  
DOUBLE STAGE  
WITH MECHANICAL SEAL**

**TRHE 32-4**



# INTRODUCTION

These instructions are for the maintenance staff to repair the following pump:

## TRHE 32-4

These instructions are supplied together with the manual of "INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS FOR LIQUID RING VACUUM PUMPS".

They provide a reference for safe operation, installation, maintenance and repairing of the pumps.

Prior to working on the pump, it is recommended to follow the safety instructions listed in chapters 2 and 15 of the above manual, as well is absolutely important to:

- wear safety clothing, hard hat, safety shoes, safety eyeglasses
- disconnect the electrical power
- close suction valves and service liquid valves
- remove pump from installation without damaging other system components
- take all safety measures if pump has been handling hazardous fluids
- drain pump casings through the draining connections and flush the pump with clean liquid, if required.

When requesting spare parts or technical information for the pump, always quote the pump model number and serial number which is printed on the pump nameplate: therefore, it is recommended not to remove the pump nameplate or, in case this action will be necessary, write the serial number on the pump (for example on the flange).

Should additional information be required, please do not hesitate to contact POMPETRAVAINI or the closest representative. Should there be any difficulties in repairing the pump, it is recommended to send the pump for repair to POMPETRAVAINI or the local authorised representative.

Any pump repairs and/or system work carried out by unauthorized persons will not be guaranteed by POMPETRAVAINI.

NOTE: VDMA (ITEM) numbers identify all pump components.

Refer to the parts list in chapter 4 and to the section drawing in chapter 5.

All drawings are schematics only and are not certified for construction.

For further information please consult POMPETRAVAINI or its closest representative.

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The liquids and the gases handled by the pumps and also their parts could be potentially dangerous for persons and environment: provide their eventual disposal in conformity with the laws into force and a proper environment management.



The present manual is not assigned for pumps subjected to the ATEX 94/9/CE directive. In case the pump is assigned in environments subjected to the application ATEX 99/92/CE directive or in case the pump is provided with a nameplate indicating the ATEX stamp, it is strictly forbidden proceed to start up the pumps but necessary to consult POMPETRAVAINI for clarifications.

For pumps subjected to the ATEX 94/9/CE directive it is available a dedicated integrative manual.

In preparing this manual, every possible effort has been made to help the customer and operator with the proper installation and operation of the pump and/or system. Should you find errors, misunderstandings or discrepancies please do not hesitate to bring them to our attention.

## 1 - PUMP DISASSEMBLY

Place the pump in the vertical position resting on the suction casing VDMA 106, remove the shaft key VDMA 940, circlip VDMA 932.3, bearing cover VDMA 365 and then remove the circlip VDMA 932.

Remove the 4 screw VDMA 914.1 and with the help of a gear puller remove the bearing and mechanical seal housing VDMA 357. Remove the ball bearing VDMA 320, radial seal ring VDMA 421 and the stationary part of the mechanical seal VDMA 433.2 from the bearing and mechanical seal housing. Remove the rotating part of the mechanical seal VDMA 433.2 from the shaft VDMA 210. Remove the pump tie-bolts VDMA 905. Now that the parts are free to be separated proceed with the removal of discharge casing VDMA 107, last stage impeller VDMA 230 and its key VDMA 940.1, remove intermediate element VDMA 140, first stage impeller VDMA 230 and its key and finally the shaft is now free. If necessary, remove the bearing bushing VDMA 310 from the suction casing VDMA 106.

Proceed with the inspection of all components, replace defective and/or worn parts with POMPETRAVAINI's original parts. Thoroughly clean, sand blast if required, all parts. Polish with fine emery cloth all sealing areas, avoid making deep scratches especially at the gasketing surfaces and at shaft in the mechanical seal area.

It is recommended to replace, as a minimum, all wear parts such as mechanical seal, ball bearing, bearing bushing and gaskets.

## 2 - PUMP ASSEMBLY

Begin the assembly by installing with Loctite 542, the 2 ¼" plugs VDMA 903 in the discharge casing VDMA 107, also install with Loctite 542 the ¼" plug in the suction casing VDMA 106.

Press fit the bearing bushing VDMA 310, using Loctite 542, in the suction casing VDMA 106.

NOTE: For cast iron-bronze fitted pumps (GH) the bearing bushing is in Bronze, for stainless steel pumps (A3) this item is in Carbon.  
The groove should be located 45° towards the bottom.

Finger press the radial seal ring VDMA 421 in the bearing and mechanical seal housing VDMA 357. The bearing and mechanical seal housing VDMA 357 for stainless steel pump (A3) is fitted with stainless steel seal bush VDMA 542.

Place the shaft VDMA 210 vertically in a bench vise with the drive end upward. Lubricate the rotating part of the mechanical seal (Ø16 according to ISO 3069/DIN 24960 standards) and the shaft itself with soapy water or lubricant compatible with the mechanical seal Elastomer, slide the mechanical seal over the shaft until it rests against the shaft shoulder. Lubricate the O-ring of the mechanical seal stationary part and finger press this item into the bearing and mechanical seal housing VDMA 357. Clean the 2 mechanical seal faces with soft tissue. Slide the bearing and mechanical seal housing VDMA 357 over the shaft putting pressure compressing the mechanical seal to the bottom. Install the 1.5 mm shoulder ring VDMA 505 over the shaft, then place the elastic ring VDMA 935 on the bearing and mechanical seal housing VDMA 357. Install the ball bearing until it bottoms against the shoulder ring then slide the spacer over the shaft and fix the ball bearing with the circlip VDMA 932. Place the bearing cover VDMA 365 against the ball bearing, with the help of the gear puller compress the ball bearing and elastic ring into the bearing and mechanical seal housing and lock the bearing cover in place with the circlip VDMA 932.3. Remove the gear puller and place the shaft key VDMA 940 on to the shaft keyway.

Place the gasket VDMA 400.2 on the bearing and mechanical seal housing VDMA 357, remove the shaft from the vise and slide it through the discharge casing. Lock the bearing and mechanical seal housing to the discharge casing with the 4 screw VDMA 914.1; be sure to position the bearing and mechanical seal housing with the mechanical seal draining hole at the bottom (pointing to the feet of the casing).

Put the assembly in the vertical position in the bench vise gripping the shaft at the drive end side. Press the first key VDMA 940.1 in the shaft keyway, slide the first impeller over the shaft with the impeller hub on top. Moisten 1 gasket VDMA 400 of 0.1 mm thickness with a few drops of oil, place this gasket onto the female part of the intermediate element VDMA 140 (see fig. 1 and tab. 1 for recommended ORIGINAL clearances), slide the intermediate element through the shaft placing it against the pump casing with the reference mark meeting that on the discharge casing.

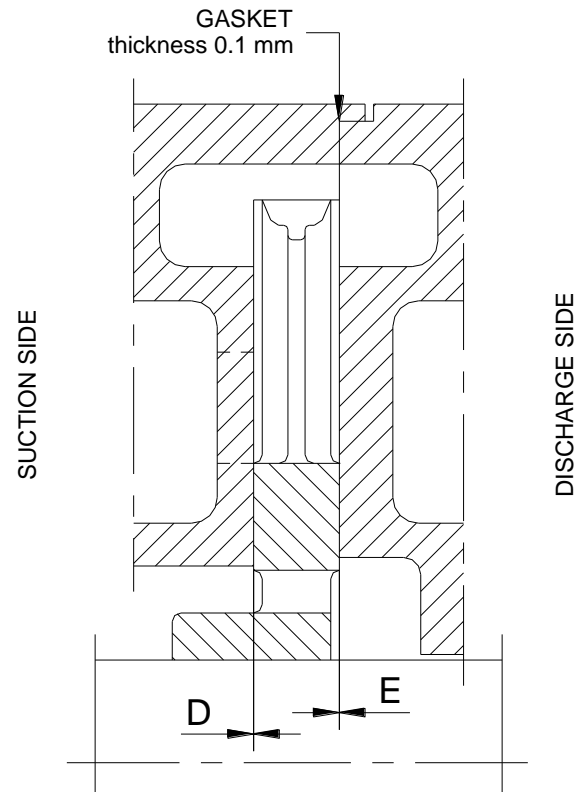
Press the second key VDMA 940.1 in the shaft keyway, slide the second impeller over the shaft with the impeller hub on top.

Moisten 1 gasket VDMA 400 of 0.1 mm thickness with a few drops of oil, place this gasket onto the female part of the suction casing VDMA 106. Install the suction casing against the intermediate element. Introduce the 3 tie-bolt finger tight. Remove the pump from the vise, place it on a flat plate with the flanges down to guarantee the perfect alignment of the 2 flanges. Lock the 3 tie-bolt with 4 kgm torque.

Check that the pump shaft rotates freely by hand.

Proceed with hydrostatic pressure test of 3 bar (45 PSIG) to verify that there are no leaks.

Fig. 1



Tab. 1 – RECOMMENDED ORIGINAL CLEARANCES

PUMPS DESIGN		GH-F-RA	A3
Total clearance D + E	MIN mm	0.08	0.13
	MAX mm	0.13	0.18

### 3 - RECOMMENDED SPARE PARTS

When ordering the pump, it is good practice to also order the necessary spare parts, especially when there are no stand-by pumps in the installation.

This will minimize unnecessary down times in the event of pump failures or routine maintenance.

It is therefore, recommended to stock the following spare parts for each pump size:

- 2 Impeller
- 1 Shaft assembly
- 1 Ball bearing
- 1 Bearing bushing
- 1 Mechanical seal
- 1 Gasket set

For better parts management, the VDMA 24296 standards suggest to stock the number of parts as a function of the number of pumps being used in the plant.

On the pump nameplate are printed the pump model, year of manufacture and pump serial number. When ordering spare parts always refer to this information.

Pump model, parts item number (VDMA) and description, is useful information that helps us supplying the correct spare parts for your pump.

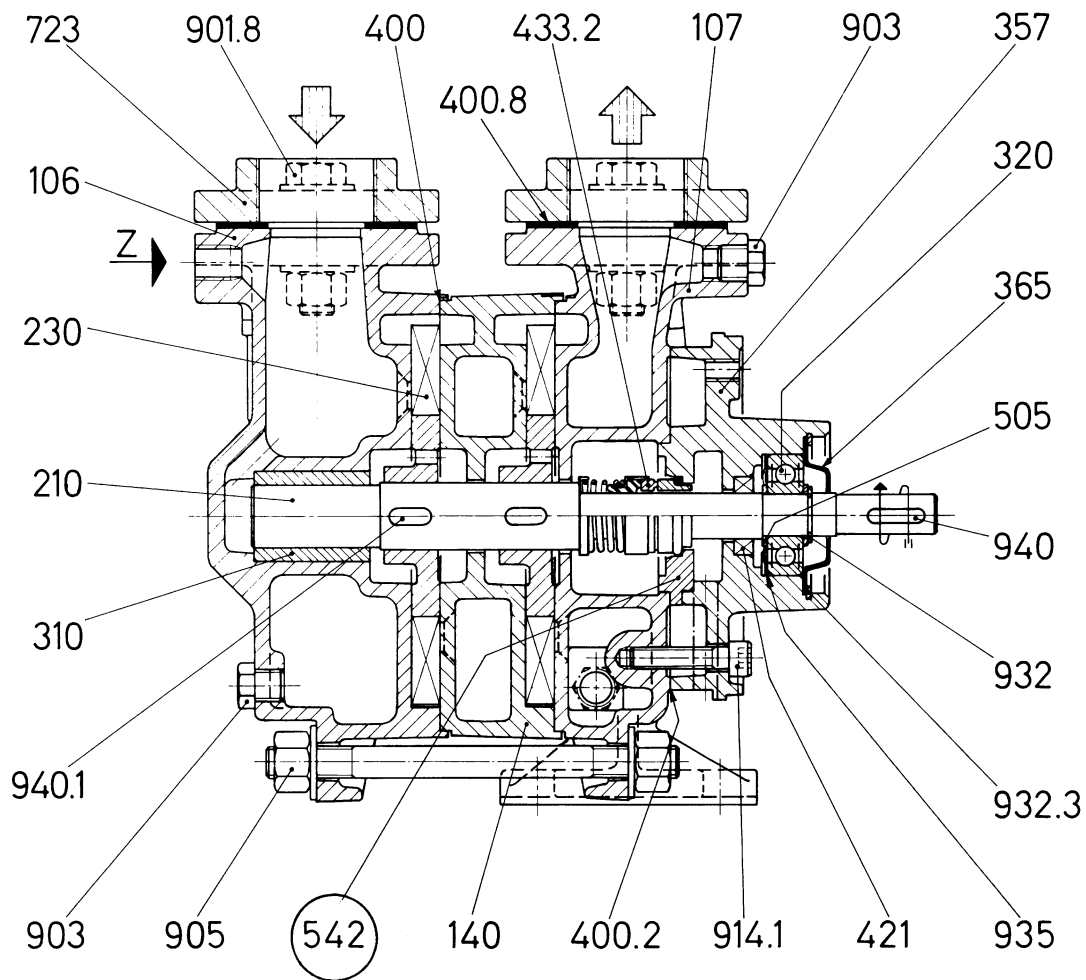
We recommend the use of original parts: in case of deviation, POMPETRAVAINI declines any responsibility for damages that may be derived from the use of non original spare parts.

## 4 - PARTS LIST

VDMA NO	DESCRIPTION
106	Suction casing
107	Discharge casing
140	Intermediate element
210	Shaft
230	Impeller
310	Bearing bushing
320	Ball bearing
357	Bearing and mechanical seal housing
365	Bearing cover
400	Gasket
400.2	Gasket
400.8	Gasket
421	Radial seal ring
433.2	Mechanical seal

VDMA NO	DESCRIPTION
505	Shoulder ring
542	Seal bush
723	Companion flange
901.8	Bolt
903	Plug
905	Tie-bolt
914.1	Screw
932	Circlip
932.3	Circlip
935	Elastic ring
940	Key
940.1	Key
Z	Liquid supply inlet

## 5 - TYPICAL SECTIONAL DRAWING



○ Only for "A3" construction



According to what expected from 2012/19/UE Directive on Waste Electric and Electronic Equipment the electrical pump assembly from us supplied (pump coupled with an electrical motor of Pompetravaini supply or customer supply) placed on the market after the 15th of August 2018 fell within the limits of application of the Directive. As a consequence, conforming to article 14 of the 2012/19/UE Directive of the European Parliament of the 4th of July 2012, Pompetravaini Spa is registered on the Italian list of EEE manufacturer. The electrical pump assembly supplied by Pompetravaini Spa that should be discontinued from use must not be disposed with common waste because it is composed of different materials that can be recycled at the appropriate facilities. If it is not intended to proceed autonomously at the management of the electrical pump assembly at authorized disposal companies it is possible to contact the Pompetravaini branch closer to you that will give you the necessary information on a proper disposal in accordance with mandatory laws. The pump unit must be previously cleaned up by the pumped product upon disposal.

After reclamation the electrical pump assembly is not potentially dangerous for human health and environment, not containing harmful substances according to 2011/65/UE (RoHs) Directive, but if abandoned in the environment will have a negative impact on the ecosystem.

Sending the electrical pump assembly to an adequate process of disposal and recovery of materials protect the environment and help to limits consumption of available resources with effective recycling of materials.

**The abandonment in the environment of the apparatus or the illegal disposal of the same are punished by law.**

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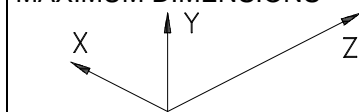
**NOTES**

PUMP model .....	Serial Number .....	Computer Number .....	Year of manuf. .....
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LIQUID handled .....	Capacity .....m <sup>3</sup> /h	Suction Pressure .....m	Discharge Press. .....m	Temperature .....°C
<input type="checkbox"/> Lethal <input type="checkbox"/> Toxic <input type="checkbox"/> Noxious <input type="checkbox"/> Corrosive <input type="checkbox"/> Irritant <input type="checkbox"/> Malodorous <input type="checkbox"/> .....				
<input type="checkbox"/> Clean <input type="checkbox"/> Dirty <input type="checkbox"/> With suspended parts		Spec. Gravity.....	Viscosity.....	PH.....

**TOTAL WEIGHT**  
..... Kg

**MAXIMUM DIMENSIONS**



X = .....cm  
Y = .....cm  
Z = .....cm

**NOISE (measured at 1 m)**  
Pressure = .....dB(A)  
Power = .....dB(A)

**INSTALLATION**

Inside                       Outside  
 Explosive area            .....

**SERVICE**

Continuous                   Intermittent  
 .....

MOTOR type / frame .....	N° Poles .....	N° Revolutions .....RPM	Electric Current .....A	Installed Power .....kW / .....hp
Frequency .....Hz	Supply .....Volt	Enclosure IP.....	Insulation Class .....	<b>Absorbed Power</b> .....kW / .....hp

**COMMENTS**

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**MONOSTAGE CENTRIFUGAL PUMPS**

**MAGNETIC DRIVE  
MONOSTAGE CENTRIFUGAL PUMPS**

**SELF-PRIMING CENTRIFUGAL PUMPS**

**MAGNETIC DRIVE  
SELF-PRIMING CENTRIFUGAL PUMPS**

**MULTISTAGE CENTRIFUGAL PUMPS**

**LIQUID RING VACUUM PUMPS**

**LIQUID RING COMPRESSORS**

**PACKAGE VACUUM UNITS WITH PARTIAL OR TOTAL  
SERVICE LIQUID RECIRCULATION**

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Smontaggio TRHE 32-4 Inglese

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Continuing research of POMPETRAVAINI results in product improvements: therefore, any specifications may be subject to change without notice.

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