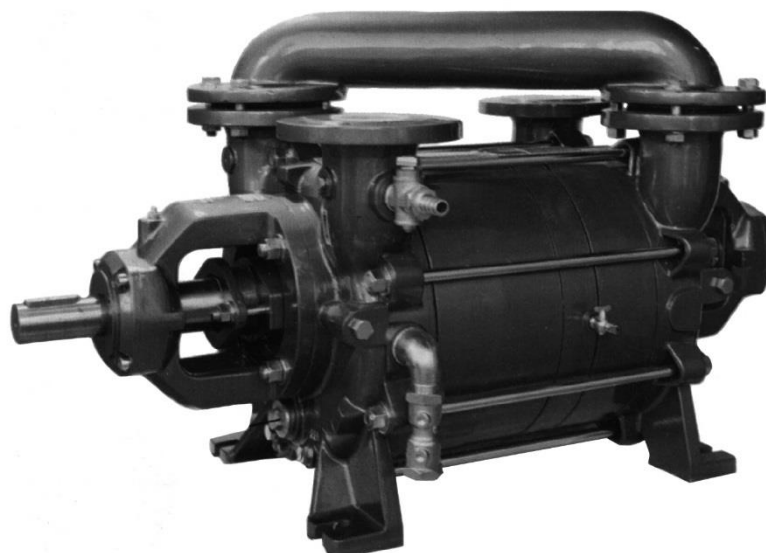


ADDENDUM to

**ADJUSTMENT,
DISASSEMBLY AND ASSEMBLY
INSTRUCTIONS FOR
LIQUID RING VACUUM PUMPS
WITH PACKING SEALS**

TRH - TRS 40 ÷ 125

TRV 65



INTRODUCTION

These instructions are for the maintenance staff in case of repair for the following pumps:

TRHC 40-110	TRSC 40	TRVA 65
TRHE 40-110	TRSE 40	
TRHC 40-140 & 190	TRSC 50	
TRHE 40-140 & 190	TRSE 50	
TRHB 50	TRSB 100	
TRHC 80	TRSC 100	
TRHE 100	TRSE 125	

These instructions explain the adjustment, the disassembly and assembly for the replacement of the PACKING SEALS: for the other operations refer to the enclosed "DISASSEMBLY AND ASSEMBLY INSTRUCTIONS FOR LIQUID RING VACUUM PUMPS WITH MECHANICAL SEALS".

They are supplied and integrated 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 instructions of safety listed in chapters 2 and 15 of the last manual, and is absolutely important to:

- wear safety clothing, hard hat, safety shoes, safety eye glasses
- disconnect the electrical power
- close suction valves and service liquid valves
- remove pump from installation without damaging other system components
- assume all safety measures if pump has been handling dangerous 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 others will not be guaranteed by POMPETRAVAINI.

NOTE: VDMA numbers identify all pump components. Refer to parts list in chapter 3 and to the section drawings in chapter 4.

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

For further information please consult POMPETRAVAINI or its closest representative.

WARRANTY: All products manufactured by POMPETRAVAINI are guaranteed to meet the conditions listed on the general terms & conditions of sales and/or conditions listed on the order confirmations.

Failure to strictly adhere to the instructions and recommendations listed in this manual, will void the manufacturer's warranty.

INDEX

- 1 Typical lubrication plans of packing seals**
- 2 - Adjusting the packing seals**
- 3 - Parts list**
- 4 - Typical sectional drawing**
- 5 - Disassembly to replace the packing seals**
- 6 - Packing seals assembly**



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.

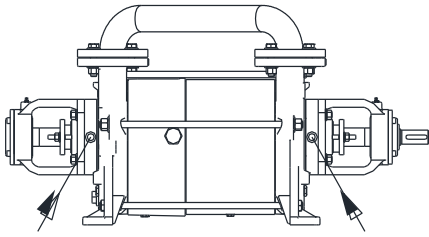


The present manual is not assigned for pumps subjected to the ATEX 94/9/CE directive. In case the pump is assigned in environments subjected to the application ATEX 99/92/CE directive or in case the pump is provided with a nameplate indicating the ATEX stamp, it is strictly forbidden proceed to start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

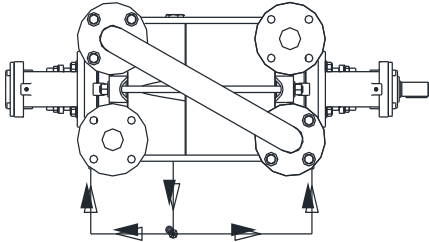
For pumps subjected to the ATEX 94/9/CE directive it is available a dedicated integrative manual.

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. Should you find errors, misunderstandings or discrepancies please do not hesitate to bring them to our attention.

1 – TYPICAL LUBRIFICATION PLANS OF PACKING SEALS

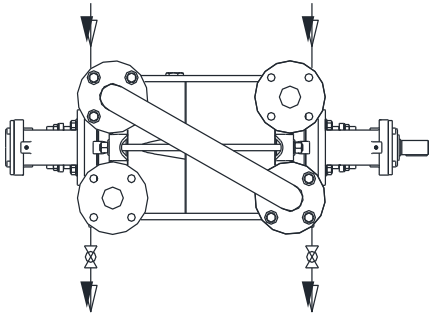


Typical plan of the lubrication holes position on the center line of the pump (Side View)



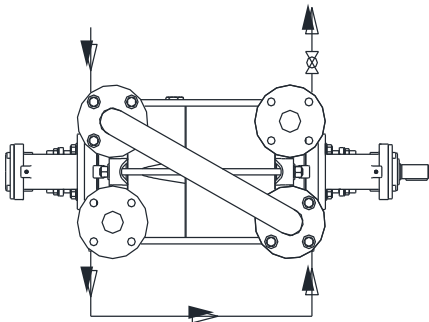
INTERNAL FLUSHING (Top View)

No feeding from external source, no temperature reduction and no adjustment of the fluid flow.



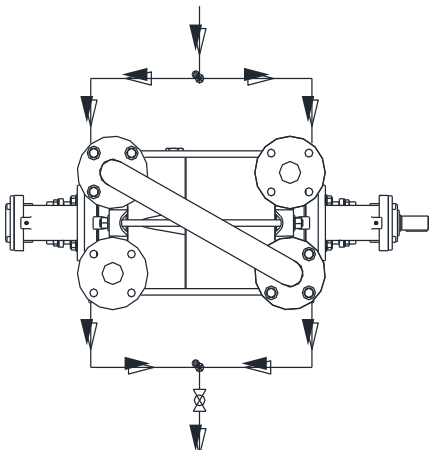
DOUBLE EXTERNAL FLUSHING (Top View)

Optimal temperature reduction and better control of the fluid flow on the single packing.



EXTERNAL FLUSHING SINGLE CIRCUIT (Top View)

Good lubrication but not accurate control of of the fluid flow on the single packing.



EXTERNAL PARALLEL SINGLE FLUSHING (TOP VIEW)

Better temperature reduction, optimal lubrication not accurate control of of the fluid flow on the single packing.

2 – ADJUSTING THE PACKING SEALS

Pumps fitted with packed stuffing boxes require packing flushing either from an external source or directly from the pumped media through pump internal passages. This liquid is necessary to remove the friction heat generated between the shaft and the packing.

The steady dripping quantity is a function of the pump size and of the pressure in the stuffing box housing: approximately lubrication fluid flow quantity required is between 2 and 5 l./1', approx. pressure 1 bar.

In any event the liquid drops coming out of the stuffing box should not exceed a temperature of 60 - 70°C in relation to handling a liquid at ambient temperature.

All adjustment operations must be performed with the **PUMP NOT RUNNING** following the safety measures given in chapter 2 of the "OPERATING MANUAL LIQUID RING VACUUM PUMPS AND COMPRESSORS".

After completion of the work ALWAYS re-install the safety guards previously removed.

At first start up loosen the nuts of the packing gland allowing a steady flow of liquid to drain out (see figure 1). After obtaining a steady flow of leakage gradually tighten the gland nuts until attaining a steady dripping within the limit of the above recommended temperature.

A few hours time span may be required to establish a steady dripping at low temperatures.

Packing adjustment is required when the liquid leakage increases.

When adjustment is no longer possible, the packing material should be replaced with new one.

If the packing rings, instead of dripping, show a tendency to fume, it is necessary to loosen immediately the nuts of the studs of the gland until dripping starts again. Even a short period of dry running can cause a serious wear of the packing rings and of the shaft.

In the event the pump remains out of service for more than 2 months it is recommended to replace the packing rings, prior to start-up.

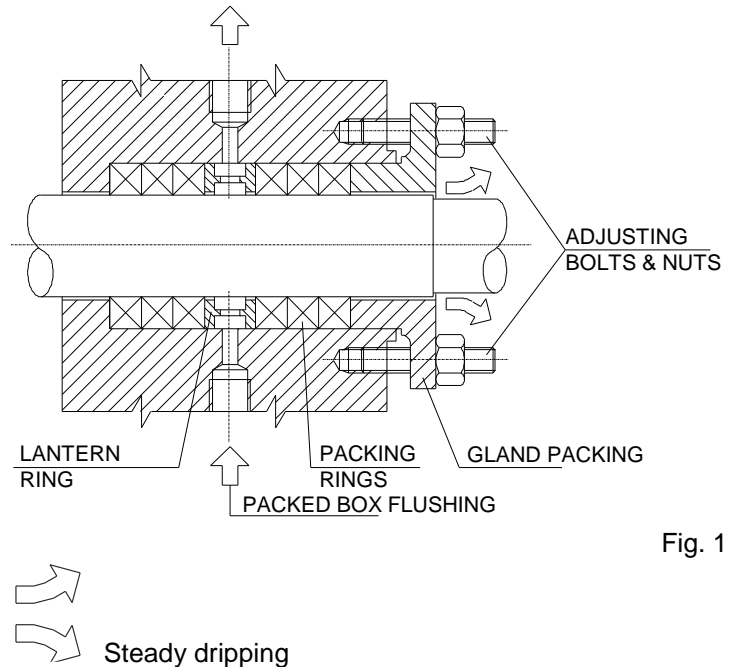


Fig. 1

3 – PARTS LIST

VDMA No	COMPONENT
106	Suction casing
107	Discharge casing
110...	Impeller casing
140...	Intermediate element
147	Manifold
210	Shaft
230...	Impeller
320	Ball bearing
350	Bearing housing
360...	Bearing cover
365...	Bearing cover
400...	Gasket
450	Packing seal housing bush
451	Packing seal housing
452	Gland
458	Lantern ring
461	Packing seal
505...	Shoulder ring
507	Thrower
521	Impeller spacer sleeve

VDMA No	COMPONENT
636	Greaser
672	Anticavitation valve
701	Pipe
731...	Fitting
734	Nipple
735	Nipple
901...	Screw
901.8	Bolt
902...	Stud
903...	Plug
905	Tiebolt
914...	Screw
922...	Nut
923	Nut
932...	Circlip
935	Elastic ring
940...	Key
Z	Liquid supply inlet

5 – DISASSEMBLY TO REPLACE THE PACKING SEALS

The pumps are manufactured in such a manner as to make possible the replacement of the packing seals without disassembling the pump completely, but only by acting on the bearing housings.

DANGER!



Danger due to collision, crushing or abrasions. Possible contact with hazardous fluids, cold or warm. Wait for the complete pump stopping before handling the unit. If the pump still contains some fluid it may suddenly start to rotate once again. Take precautionary measures by draining the pump or closing the pipes by mean of a valve. Remove protections only in case of maintenance. Operate only provided with apposite protective devices.

Disassembling is carried out by following the indications given on tables 1 and 2, which show, on the line of the pump concerned, the sequence and the numeric amount of the details to be disassembled.

In order to extract the bearing housings, use an adequate puller.

Tab. 1 - DISASSEMBLING OF BEARING AND PACKING SEAL - DRIVE END

⇒ (to be continued)

COMPONENT VDMA No	PIPE	CIRCLIP	SCREW	SCREW	BEARING COVER		CIRCLIP	NUT	SCREW	STUD	BEARING HOUSING	BEARING		ELASTIC RING
					365	360						320	323	
PUMPS SERIES	701	932.3	914	901	365	360	932	923	901.1	902.1	350	320	323	935
TRHC 40-110 TRSC 40	1		4			1	1		4		1	1		
TRHE 40-110 TRSE 40	1	1			1		1		4		1	1		
TRHC 40-140 & 190 TRSC 50	1		4			1	1		4		1	1		
TRHE 40-140 & 190 TRSE 50	1		4			1	1		4		1	1		
TRHB 50	1		4			1		1		4	1	1		
TRSB 100	1		4			1		1		4	1	1		
TRHC 80 TRSC 100	1		4			1		1		4	1	1		
TRHE 100 TRSE 125	1			4		1		1		4	1		1	1
TRVA 65	1		4			1		1		4	1	1		

(continuation) ⇒

COMPONENT VDMA No	SHOULDER RING		THROWER	STUD	GLAND	PACKING SEAL HOUSING	PACKING SEAL	LANTERN RING	GASKET
	505	505.1							
PUMPS SERIES	505	505.1	507	902	452	451	461	458	400.2
TRHC 40-110 TRSC 40	1		1	2	1	1	4+2	1	1
TRHE 40-110 TRSE 40	1		1	2	1	1	4+2	1	1
TRHC 40-140 & 190 TRSC 50	1		1	2	1	1	4+2	1	1
TRHE 40-140 & 190 TRSE 50	1		1	2	1	1	4+2	1	1
TRHB 50	1		1	2	1	1	3+3	1	1
TRSB 100	1		1	2	1	1	3+3	1	1
TRHC 80 TRSC 100	1		1	2	1	1	3+3	1	1
TRHE 100 TRSE 125		1	1	2	1	1	3+3	1	1
TRVA 65	1		1	2	1	1	3+3	1	1

Tab. 2 - DISASSEMBLING OF BEARING AND MECHANICAL SEAL - NON DRIVE END

⇒ (to be continued)

COMPONENT VDMA No	PIPE	CIRCLIP	SCREW	SCREW	BEARING COVER		ELASTIC RING	NUT	SCREW	STUD	BEARING HOUSING	BEARING	SHOULDER RING	THROWER	STUD
PUMPS SERIES	701	932.3	914	901	365.1	360.1	935	923	901.1	902.1	350	320	505	507	902
TRHC 40-110 TRSC 40	1		4			1		1	4		1	1	1	1	2
TRHE 40-110 TRSE 40	1	1			1		1	1	4		1	1	1	1	2
TRHC 40-140 & 190 TRSC 50	1		4			1		1	4		1	1	1	1	2
TRHE 40-140 & 190 TRSE 50	1		4			1		1	4		1	1	1	1	2
TRHB 50	1		4			1		1		4	1	1	1	1	2
TRSB 100	1		4			1		1		4	1	1	1	1	2
TRHC 80 TRSC 100	1		4			1		1		4	1	1	1	1	2
TRHE 100 TRSE 125	1			4		1		1		4	1	1	1	1	2
TRVA 65	1		4			1		1		4	1	1	1	1	2

(continuation) ⇒

COMPONENT VDMA No	GLAND	PACKING SEAL HOUSING	PACKING SEAL	LANTERN RING	GASKET
PUMPS SERIES	452	451	461	458	400.2
TRHC 40-110 TRSC 40	1	1	4+2	1	1
TRHE 40-110 TRSE 40	1	1	4+2	1	1
TRHC 40-140 & 190 TRSC 50	1	1	4+2	1	1
TRHE 40-140 & 190 TRSE 50	1	1	4+2	1	1
TRHB 50	1	1	3+3	1	1
TRSB 100	1	1	3+3	1	1
TRHC 80 TRSC 100	1	1	3+3	1	1
TRHE 100 TRSE 125	1	1	3+3	1	1
TRVA 65	1	1	3+3	1	1

Check the conditions of disassembled components and procure all possible original spare parts (such as bearings, packing rings, gaskets, etc.).

Any spare parts that are not original, shall be compatible with the sizes and performances of the original ones.

Carefully clean all details that are still in good conditions.

In order to disassemble the packing seal, see instructions on chapter 2.

6 – PACKING SEALS ASSEMBLY

Before starting to assemble, check the condition of the shaft VDMA 210 in the working zone of the packing seals taking care to polish it with fine abrasive cloth if it has slight scoring.

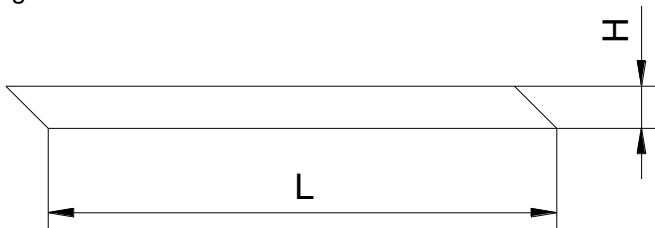
If the shaft has deep scoring, it is advisable to arrange for a repetition of the machining by means of a machine tool after having completely disassembled the pump.

If the packing rings VDMA 461 have not been previously formed, cut them at 45° according to the drawing of figure 2 paying attention to the length which must cover the whole circumference of the shaft (for the dimensions see table 3).

Tab. 3 – DIMENSIONS OF PACKING RINGS

PUMPS SERIES	QUANTITY	H	L
TRHC 40-110 TRSC 40	12	8	152
TRHE 40-110 TRSE 40	12	8	128
TRHC & TRSE 40-140 & 190 TRSC e TRSE 50	12	8	152
TRHB 50	10	10	173
TRHC 80 TRSB & TRSC 100	12	10	225
TRHE 100 TRSE 125	12	12	290
TRVA 65	10	10	173

Fig. 2



Separately, carry out the preliminary assembling of the packing rings VDMA 461, of the lantern ring VDMA 458 (when required), of the gland VDMA 452 and of the studs with the nuts VDMA 902 in the packing seal housing VDMA 451, as it is shown in figure 3. Do not forget that the cut section of one packing ring must be arranged under an angle of 90° one with respect to the other, as it is shown in figure 4.

Fig. 3

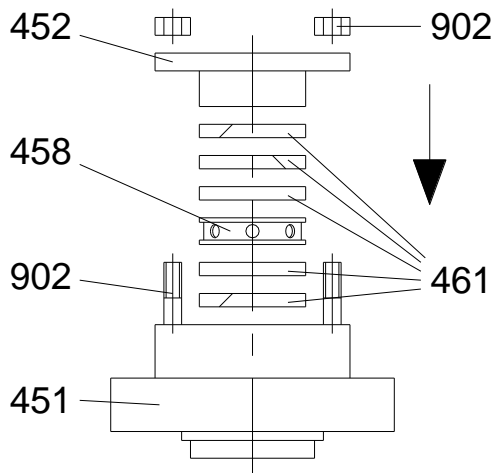
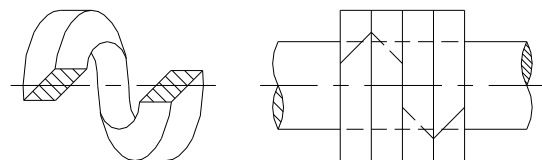


Fig. 4



For the pumps on which this operation is required, insert the correct number of packing rings VDMA 461 in the packing seal housing VDMA 451 so that the lantern ring VDMA 458, when it is inserted, is in correspondence with the washing holes provided in the packing seal housing.

Insert the remaining packing rings until a space of about 5 mm. is obtained, which will be used as a guide to the gland VDMA 452. Screw the nuts on the studs VDMA 902 without tightening them.

Insert the group thus obtained on the shaft VDMA 210 after having placed the gasket VDMA 400.2 between the casing VDMA 106 or 107 and the packing seal housing. Also insert on the shaft the thrower VDMA 507.

Assemble the bearing housing VDMA 350 on the packing seal housing by locking them both with the screws VDMA 901.1 or with the studs VDMA 901.2.

Reposition the thrower VDMA 507 as near as possible to the bearing housing, having it slide on the shaft.

Where required, assemble the circulation pipe VDMA 701 again.

In case of PARTIAL REPLACEMENT of the packing rings VDMA 461, without disassembling the packing seal housing VDMA 451 and the bearing housing VDMA 350, it is sufficient to remove the nuts of the studs VDMA 902, have the gland VDMA 452 slide as much as possible on the shaft towards the bearing housing, extract the worn out packing rings with an adequate tool (generally these are located near the gland), insert the new ones, place the gland in the original position again and screw the stud nuts again.

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