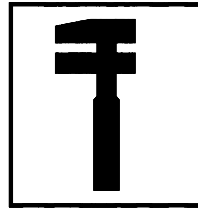


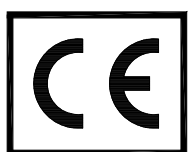
pompetravaini

(Rev. 3.0_03-2013)



DISASSEMBLY AND ASSEMBLY INSTRUCTIONS FOR SINGLE STAGE LIQUID RING VACUUM PUMPS WITH MECHANICAL SEALS

TRVX 650 – 1000 – 1250



INTRODUCTION

These are repair instructions for Travaini pumps series TRVX 650 – 1000 - 1250.

Only qualified staff should carry out disassembly and assembly procedures and should be fully knowledgeable of the data outlined in this manual prior to start working on the pump(s).

Instructions relating to safe operation, installation and maintenance will be found in the “TRAVAINI OPERATING MANUAL FOR VACUUM PUMPS” that is usually shipped with pump or it can be requested from your local POMPETRAVAINI representative or downloaded from the company’s website.

Proper attire is suggested prior to begin any work on the pumps. For your safety always wear safety hat, eyeglasses, gloves, safety shoes, etc. and be sure to have proper tools necessary for the work.

Do not subject pump or any of its components to sudden shocks or violent impact. Do not damage mechanical seal faces, engagement surfaces and sealing areas with markings and/or scratches. Do not damage gaskets and O-Rings. Do not leave any kind of foreign matter such as screws, nuts, bolts, washers, rags, etc in the pump.

When requesting spare parts or technical information for the pump, always provide the pump model number and serial number, which can be found on the pump nameplate. It is recommended not to remove the pump nameplate or in case this action is necessary, write the serial number on the pump (for example on the flange).

Should additional information be required, always contact POMPETRAVAINI or authorised local representative. Should there be any difficulties in repairing the pump, it is recommended to send pump for repair to POMPETRAVAINI or to authorised local representative.

POMPETRAVAINI will not be responsible for work done on the pump by unauthorised personnel.

NOTE: Pump parts are identified with item numbers (VDMA). Item numbers can be found in the parts list, under chapter 10 and cross-referenced on pump sectional drawing.
Any missing VDMA references are available on the sectional drawings at the very end of this manual.

All drawings appearing in these instructions are only schematics and not certified.

Torque values of various bolt sizes are listed on fig.20.

This latest issue of this manual is also available from our website www.pompetravaini.it. The latest existing version may not be suitable for the earlier pump designs because of the continuing pump development. However – Assembly & Disassembly manual provided along with your pump is always suitable and matched to the pump itself.

For any further information, please do not hesitate to contact POMPETRAVAINI.

INDEX

- 1 - Preparation prior to pump disassembly**
- 2 - Disassembly for bearings and/or mechanical seals replacement**
 - 2.1 - *Disassembly of Non-drive end – pumps series TRVX 650*
 - 2.2 - *Disassembly of Drive end - pumps series TRVX 650*
 - 2.3 - *Disassembly of Non-drive end – pumps series TRVX 1000 & 1250*
 - 2.4 - *Disassembly of Drive end - pumps series TRVX 1000 & 1250*
- 3 - Mechanical seals assembly**
 - 3.1 - *Fitting seal stationary part in bearing housing*
 - 3.2 - *Assembly of the rotating part on the shaft*
- 4 - Bearings assembly**
 - 4.1 - *Installation of bearing at Drive end – ALL pumps series TRVX*
 - 4.2 - *Installation of bearing at Non-drive end – pumps series TRVX 650*
 - 4.3 - *Installation of bearing at Non-drive end – pumps series TRVX 1000 & 1250*
- 5 - Bearings lubrication**
- 6 - Total pump disassembly**
- 7 - Machining the pump parts**
- 8 - Pump assembly**
- 9 - Recommended spare parts**
- 10 - Parts list**
- 11 - Typical sectional drawing**



Hazardous liquids and gases handled by the pumps and their parts could be potentially dangerous for persons and environment: Ensure their handling and disposal conforms to applicable local laws and proper environment management,



This manual is not to be used for pumps compliant to ATEX 94/9/CE standards. In case the pump is for environments regulated by the ATEX 99/92/CE directive or in case the pump has a nameplate indicating the ATEX stamp, it is strictly forbidden to start the pump but it is necessary to consult POMPETRAVAINI for clarifications and directions.
Pumps compliant to ATEX 94/9/CE standards are provided with a special operating 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 – PREPARATION PRIOR TO PUMP DISASSEMBLY

In the event pump repair is necessary, it is important to be familiar with work to be carried out. Also see attached “Operating Manual for Vacuum Pumps”.



FOLLOW THE SAFETY PRECAUTIONS LISTED IN CHAPTER 2 OF ABOVE MANUAL.

Prior to working on the pump it is important to:

- Procure and wear safety attire (hat, glasses, gloves, shoes, etc.)
- Disconnect electrical power and, if required, disconnect electrical cable from motor terminal box
- Close valves at pump suction and discharge side
- Allow pump to cool down if it has been handling hot liquids
- Follow safety precautions if the pump has handled hazardous fluids
- Drain pump casing of any handled liquid through the drain connections and if required, rinse the pump with neutral liquid.

If it is necessary to remove pump and motor from installation, proceed as follows:

- Remove flange bolts from pump suction and discharge connections
- Remove the coupling guard
- Remove the spacer coupling, if applicable
- If it is required to remove the motor, remove the anchor bolts from the motor feet or from the motor flange (for Monoblock design) prior to removing the motor.
- Remove the anchor bolts from the pump feet
- Remove the pump and/or motor from the base plate.

2 – DISASSEMBLY FOR BEARINGS AND/OR MECHANICAL SEALS REPLACEMENT

Pumps are designed to allow replacement of ball bearings and mechanical seals without total pump disassembly. Therefore it is possible to leave the pump in place without disconnecting the piping or removing the pump from the installation.

Follow disassembly steps as outlined for the specific type of pump model.

NOTE: Adopt extra care to prevent damaging of mechanical seal faces and seal components during disassembly.

2.1 – DISASSEMBLY OF NON-DRIVE END – pumps series TRVX 650

(See fig. 1 for parts identification numbers)

Remove screws VDMA 914.6 and bearing cover VDMA 360.1, remove screws VDMA 914.1 and grub screws VDMA 904 together with nuts and washers VDMA 554.4.

Remove bearing nut VDMA 923; remove mechanical seal/bearing housing VDMA 357.1 off the shaft VDMA 210, by tightening 2 screws M12x60 through the dedicated holes located on the housing box body. Removal of mechanical seal/bearing housing includes: double ball bearing VDMA 321, radial seal ring VDMA 421, seal bushing VDMA 542 (A3 construction only), O-Ring VDMA 412, and stationary part of mechanical seal VDMA 433.1

Remove rotating part of mechanical seal VDMA 433.1 from shaft VDMA 210; then take double ball bearing VDMA 321 out of mechanical seal/bearing housing VDMA 357.

2.2 – DISASSEMBLY OF DRIVE END – pumps series TRVX 650

(See fig. 2 for parts identification numbers)

Remove key VDMA 940 from shaft VDMA 210, unscrew VDMA 914.4 and remove bearing shield VDMA 365.

Remove V-Ring VDMA 411, snap ring VDMA 932 and screws VDMA 914.1.

Remove mechanical seal/bearing housing VDMA 357 by tightening 2 screws M12x60 through the dedicated holes located on the housing box body. Removal of mechanical seal/bearing housing includes: shoulder ring VDMA 505, radial seal ring VDMA 421, seal bushing VDMA 542 (A3 construction only), O-Ring VDMA 412, and stationary part of mechanical seal VDMA 433.2 Remove rotating part of mechanical seal VDMA 433.2 from shaft VDMA 210; then take double ball bearing VDMA 320 or 322.1 out of mechanical seal/bearing housing VDMA 357.

TRVX 650

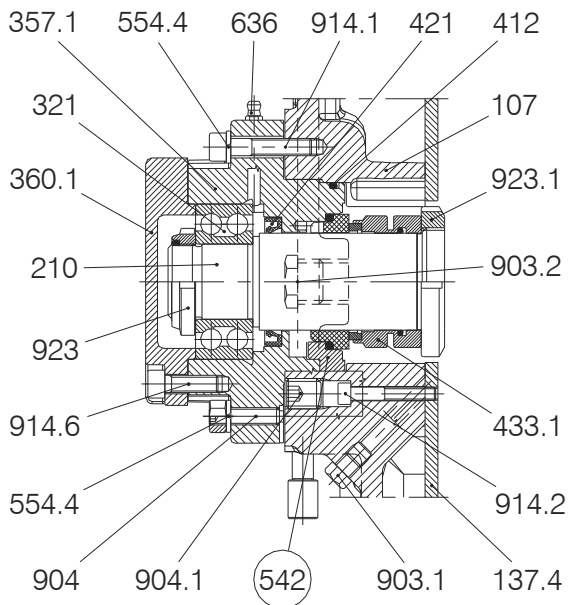


Fig. 1 – Non-drive end

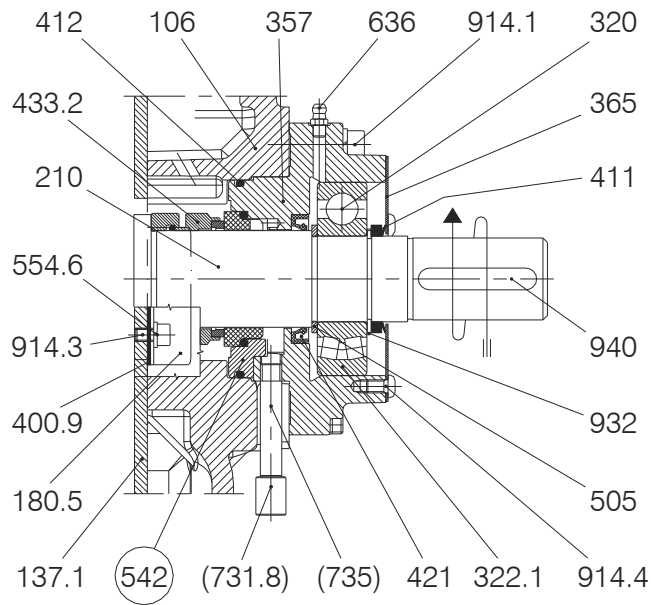


Fig. 2 – Drive end

STANDARD DESIGN
BELT DRIVE DESIGN

○ A3 construction only

() On request only

2.3 – DISASSEMBLY OF NON-DRIVE END – pumps series TRVX 1000 & 1250

(See figs. 3-5 for parts identification numbers)

Remove screws VDMA 914.5 and bearing shield VDMA 365.2, remove screws VDMA 914.6 and bearing cover 360.1, remove screws VDMA 914 and grub screw VDMA 904 together with nuts and washers VDMA 554.4.

Remove bearing nut VDMA 923 and shoulder ring VDMA 505 (TRVX 1000 only), remove bearing housing VDMA 358 inclusive of double ball bearing VDMA 321 or 322: do that using a three-arms extractor with 3 screws M10 (TRVX 1000) or M12 (TRVX 1250), to be torqued simultaneously into the three threaded VDMA 904 holes on the bearing housing body itself.

Remove shoulder ring VDMA 505 (TRVX 1000 only).

Unscrew VDMA 914.1 and remove mechanical seal/bearing housing VDMA 357 (levering with .2 screwdrivers into the dedicated lateral slots on the bearing housing body itself), inclusive of: radial seal ring VDMA 421, seal bushing VDMA 542 (A3 construction only), O-Ring VDMA 412, and stationary part of mechanical seal VDMA 433.1.

Remove rotating part of mechanical seal VDMA 433.1 from shaft VDMA 210.

2.4 – DISASSEMBLY OF DRIVE END – pumps series TRVX 1000 & 1250

(See figs. 3-5 for parts identification numbers)

Remove key VDMA 940 from shaft VDMA 210, unscrew VDMA 914.4 and remove bearing shield VDMA 365.

Remove V-Ring VDMA 411, snap ring VDMA 932 and screws VDMA 914.1.

Remove mechanical seal/bearing housing VDMA 357 (which includes: shoulder ring VDMA 505, radial seal ring VDMA 421, seal bushing VDMA 542, A3 construction only, O-Ring VDMA 412, and stationary part of mechanical seal VDMA 433.2).

Using a three-arms extractor engaging the mechanical seals/bearing housing body itself (with 3 screws M10 for TRVX 1000 or M12 for TRVX 1250), while pushing on the shaft VDMA 210.

Remove rotating part of mechanical seal VDMA 433.2 off the shaft VDMA 210; then take double ball bearing VDMA 320 or 322.1 off the mechanical seal/bearing housing VDMA 357.

TRVX 1000

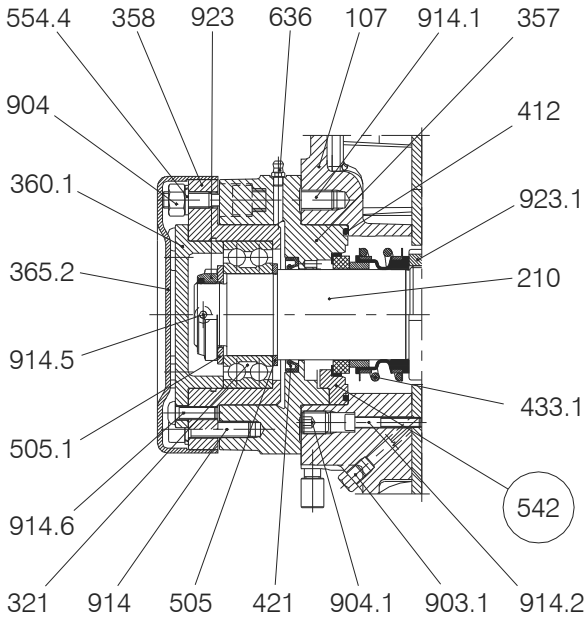


Fig. 3 – Non-drive end

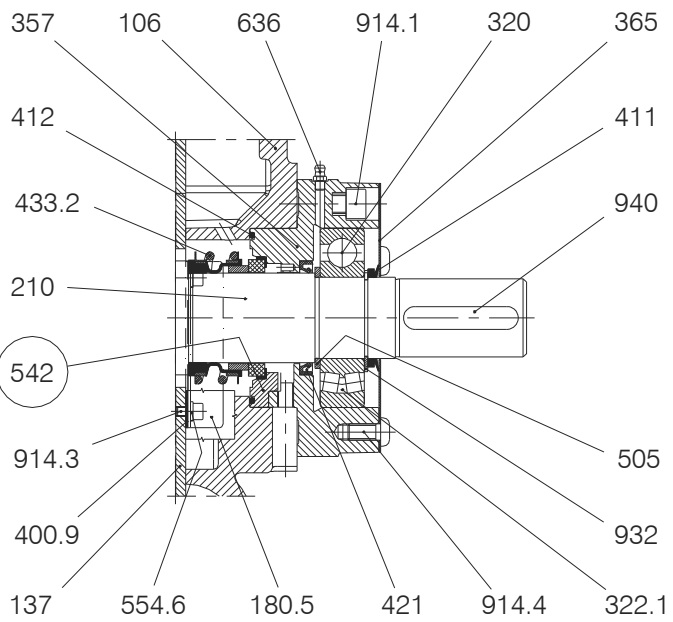


Fig. 4 – Drive end

STANDARD
DESIGN

BELT DRIVE
DESIGN

○ A3 construction only

() On request only

TRVX 1250

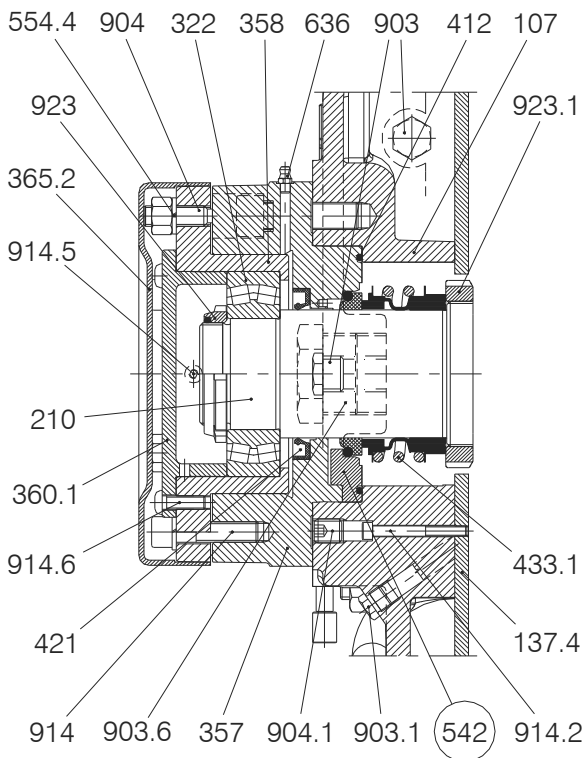


Fig. 5 – Non-drive end

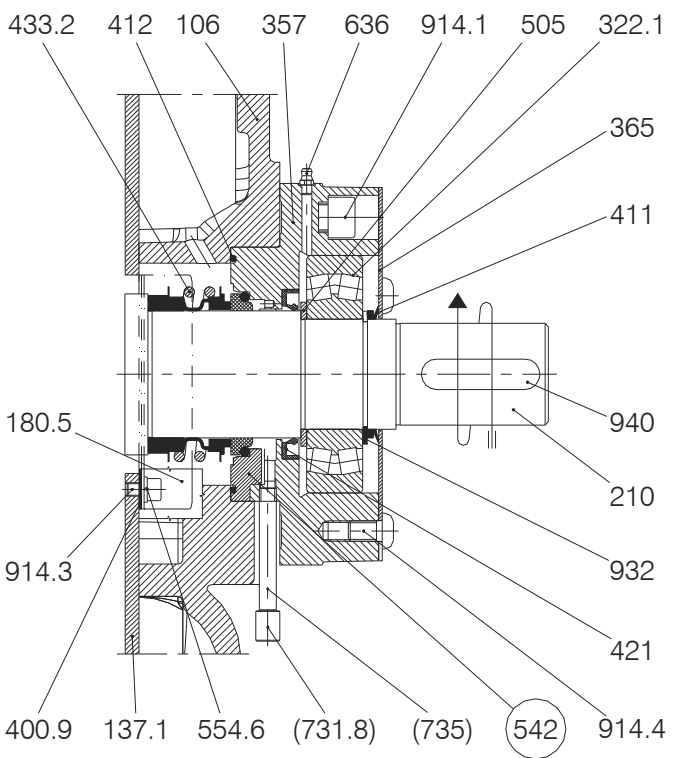


Fig. 6 – Drive end

STANDARD
DESIGN

3 - INSTALLATION OF MECHANICAL SEALS

NOTE: The mechanical seals fitted in the pumps, are of standard type according to ISO 3069 – UNI EN 12756 (with short working length “L”), see fig. 7.

If mechanical seals are unidirectional pay attention to install seal having right rotation spring at the drive end side and seal with left hand rotation spring on non-drive end side.

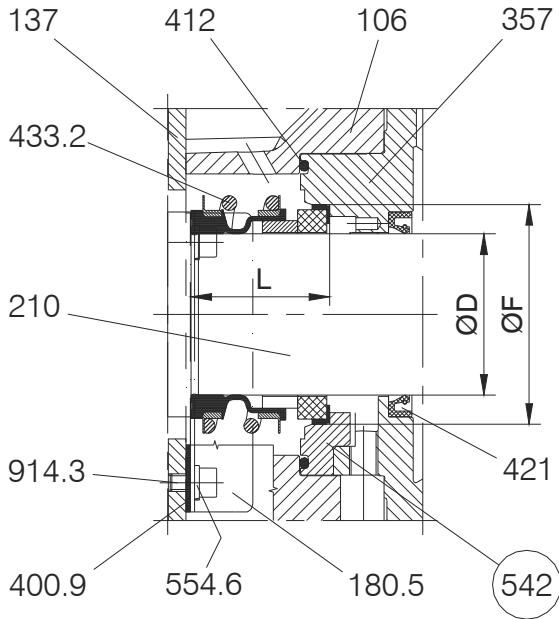


Fig. 7 – Typical mechanical seal with locating dimensions for either pump end (Drive and Non-Drive end)

Pumps Series	Ø D h6	Ø F H8	L ±0,5
TRVX 650	45	63	45
TRVX 1000	55	75	47,5
TRVX 1250	75	97	60

○ A3 construction only

3.1 - FITTING SEAL STATIONARY PART IN BEARING HOUSING

Seating area for seal stationary part in mechanical seal/bearing housing VDMA 357 and other installation/connection parts must be perfectly cleaned free of machining tool grooves or scratches.

Lightly moisten the seating area and the O-Ring for the seal stationary part with water, soapy fluid, Vaseline, etc., avoid use of oils in case the O-R material is not suitable for hydrocarbons. Press the seal stationary part (with O-Ring in place) in the seal housing seating area with the help of a plug having the face protected with a soft material such as plastic or paperboard.

Applied force should be vertical to the axis of the part. A harbour press or the shaft of a drill press can be used to help this operation, see fig. 8.

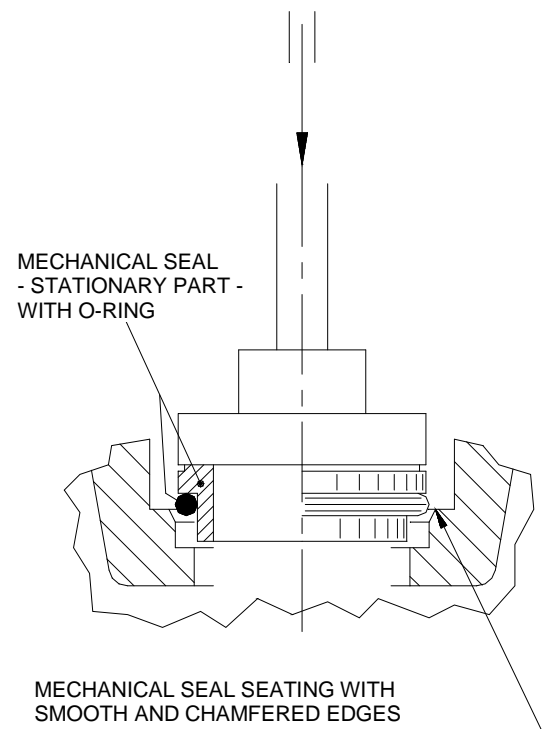


Fig. 8

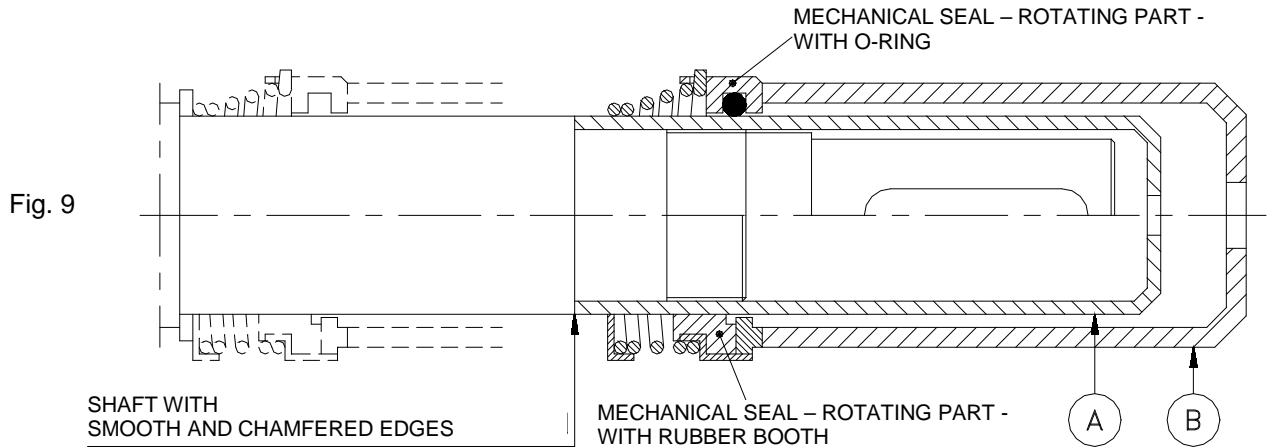
3.2 - ASSEMBLY OF THE ROTATING PART ON THE SHAFT

The area of the shaft VDMA 210 where the seal fits shall be smooth, clean, without sharp edges and moistened (using water, liquid soap, etc, but avoid use of oils in case the seal rubber material is not suitable for hydrocarbons). Even if the shaft has been ground, it shall be polished again with extra fine sand paper or emery cloth.

Slide the whole rotating part of the mechanical seal on the conic sleeve "A", or any similar tool (see fig. 9). The surface of the sleeve should be smooth and moistened (using water or liquid soap etc. but avoiding the use of oils in case the seal rubber material is not suitable for hydrocarbons).

Carefully push the seal rotating part over the temporary sleeve "B", or similar tool, until it rests against the shaft shoulder or spacer.

NOTE: Mechanical seals that are designed for specific direction of rotation must be fitted on the pump shaft end having that particular direction of rotation.



Install to the seal housing VDMA 357 the radial seal ring VDMA 421 (see fig. 10), seal bushing VDMA 542 (where applicable), stationary seal seat VDMA 433.1 or 433.2 and O-Ring VDMA 412, then install the assembled VDMA 357 to the pump.

N.B.: Draining hole or slot located on the housing VDMA 357 must be at the bottom while the grease nipple VDMA 636 is on top or side

Bolts VDMA 914.1 should be tightened to pump casing VDMA 106 and/or 107.

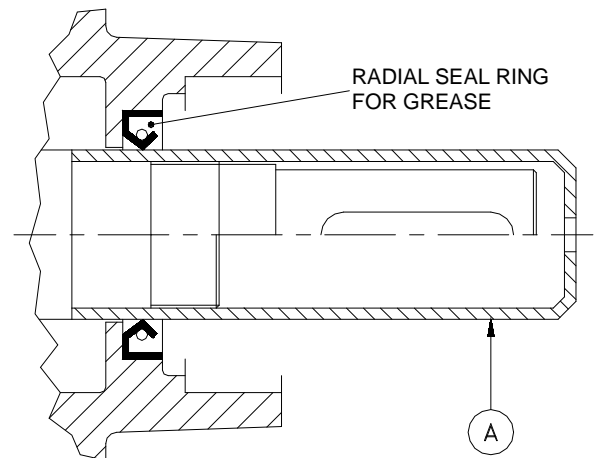


Fig. 10

Bearings can only be fitted after the mechanical seals are in place and the bearing housings are secured per chapter 3.

4.1 – INSTALLATION OF BEARING AT DRIVE END - ALL pumps series TRVX

(See figs. 12-15-17 and tabs. 1-2-3)

Put grease into mechanical seal/bearing housing VDMA 357 (see chapter 5), place shoulder ring VDMA 505 (if present) on shaft VDMA 210, warm up at 90°C the inner side of bearing VDMA 320 or 322.1 and fit it on shaft VDMA 210 all the way along it.

Fit snap ring VDMA 932 and V-Ring VDMA 411 on shaft VDMA 210, place bearing shield VDMA 365 and tighten screws VDMA 914.4, then push key VDMA 940 into the shaft drive slot.

4.2 – INSTALLATION OF BEARING AT NON DRIVE END - pumps series TRVX 650

(See fig. 11 and tab. 1)

Fit mechanical seal/bearing housing VDMA 357.1 into discharge casing VDMA 107, tighten screws VDMA 914.1 and grub screws VDMA 904 together with nuts and washers VDMA 554.4.

Put grease into mechanical seal/bearing housing VDMA 357.1 (see chapter 5), warm up at 90°C the inner side of bearing VDMA 321 and fit it on shaft VDMA 210 all the way along it, tighten bearing nut VDMA 923.

Place bearing cover VDMA 360.1, fixing it by screws VDMA 914.6.

Act alternately on grub screws VDMA 904 and all the screws VDMA 914.1 in order to determine the total clearance from the shaft VDMA 210-impeller VDMA 230 assembly to the suction/discharge intermediate casing VDMA 103; and after that adjust and lock the shaft-impeller assembly so that it will be placed exactly in the middle of the intermediate casing itself. Do this adjustment placing a dial gauge against the drive end of the shaft VDMA 210 (see fig. 13).

If total clearance exceeds the tolerance listed in the tab. 4, the pump needs to be serviced.

Make sure that pump easily turns by hand-driving and there is no noise of rubbing parts.

TRVX 650

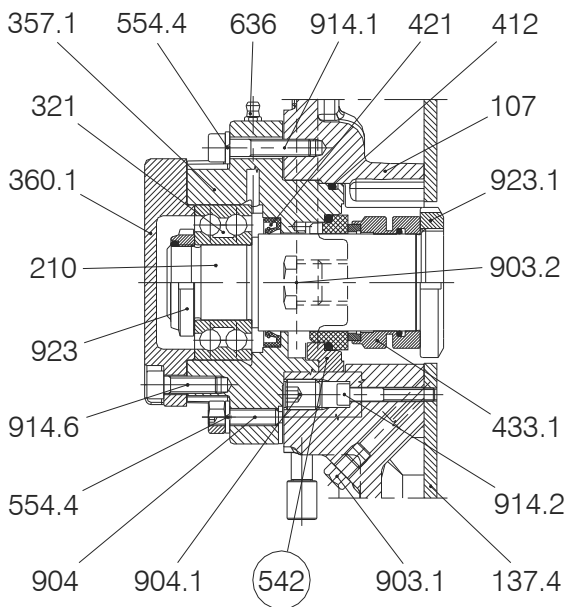


Fig. 11 – Non-drive end

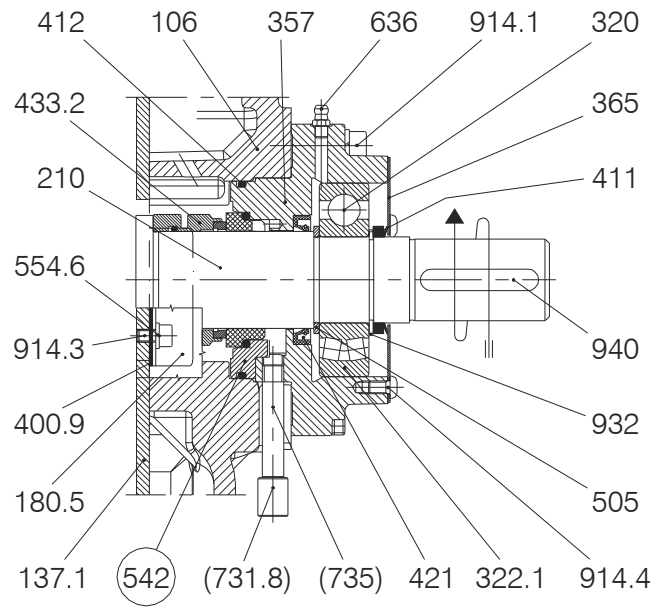


Fig. 12 – Drive end

STANDARD DESIGN
—
BELT DRIVE DESIGN

○ A3 construction only

() On request only

Tab. 1 - DIMENSIONS AND DETAILS OF BEARING - pumps series **TRVX 650**

LOCATION	BEARING DIMENSIONS				QUANTITY OF GREASE FOR BEARING in grams
	∅ INT.	∅ EXT.	HEIGHT	BEARING TYPE	
Non-drive end (Double BALL BEARING)	35	72	27	3207B	40
Drive end (Single BALL BEARING)	40	90	23	6308-C3	
Drive end (Double ROLLER BEARING *)				21308E (*)	

(*) Belt drive design

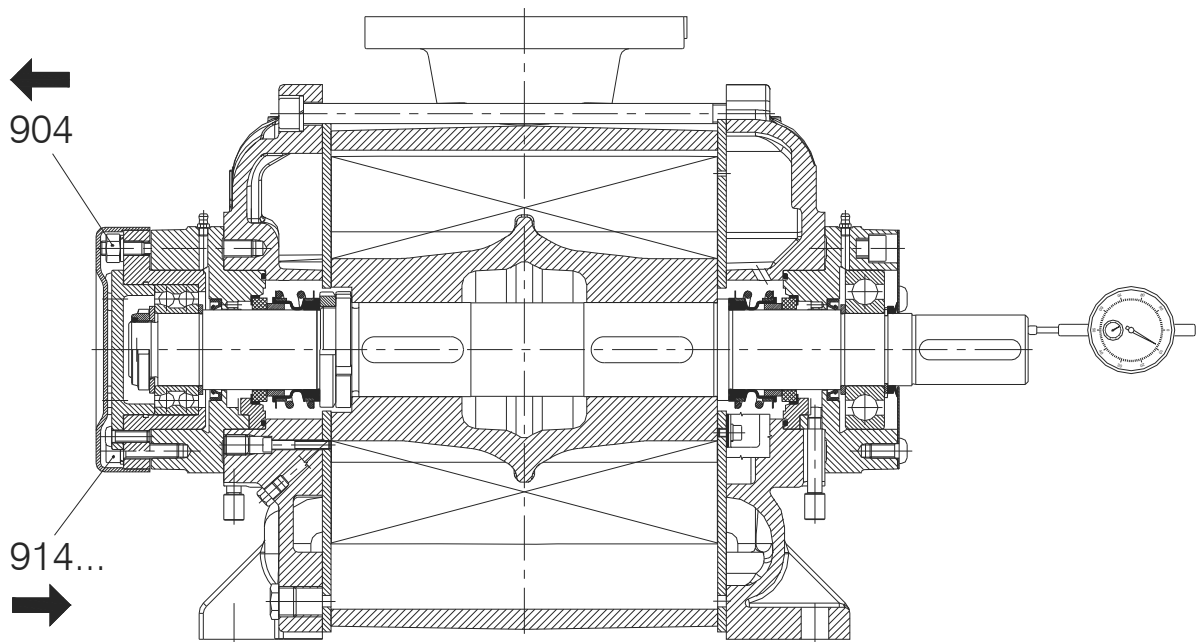


Fig. 13

4.3 – INSTALLATION OF BEARING AT NON-DRIVE END - pumps series TRVX 1000 & 1250

(See figs. 14-16 and tabs. 2-3)

Place bearing housing VDMA 358 into mechanical seal/bearing housing VDMA 357.

Tighten screws VDMA 914 and grub screws VDMA 904 together with nuts and washers VDMA 554.4.

Fit shoulder ring VDMA 505 (if present) on the shaft.

Put grease (see chapter 5) into the bearing housing VDMA 358, warm up at 90°C the inner side of the double ball bearing VDMA 321 or 322 and fit it on shaft VDMA 210 all the way along it.

Fit shoulder ring VDMA 505 on the shaft (only for TRVX 1000) and tighten bearing nut VDMA 923.

Place bearing cover VDMA 360.1, fixing it by screws VDMA 914.6.

Act alternately on grub screws VDMA 904 and all the screws VDMA 914 in order to determine the total clearance from the shaft VDMA 210-impeller VDMA 230 assembly to the suction/discharge intermediate casing VDMA 103; and after that adjust and lock the shaft-impeller assembly so that it will be placed exactly in the middle of the intermediate casing itself. Do this adjustment placing a dial gauge against the drive end of the shaft VDMA 210 (see fig. 13).

If total clearance exceeds the tolerance listed in the tab. 4, the pump needs to be serviced.

Make sure that pump easily turns by hand-driving and there is no noise of rubbing parts; then place bearing shield VDMA 365.2 fixing it with screws VDMA 914.5.

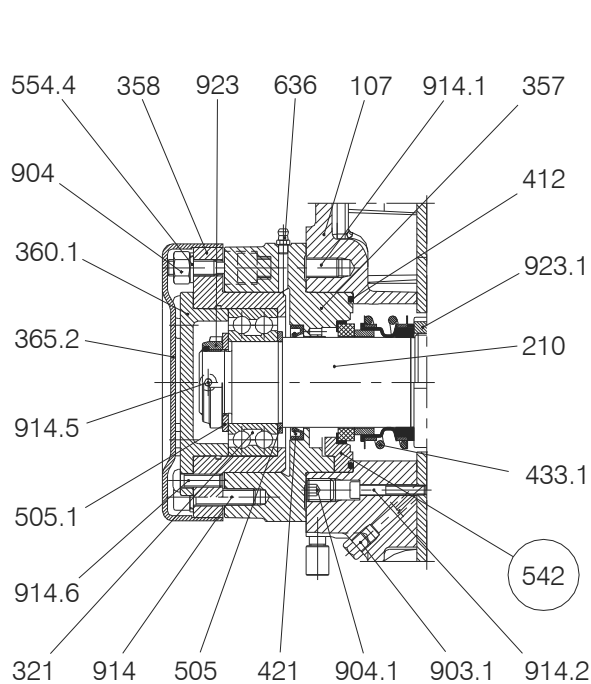


Fig. 14 – Non-drive end

TRVX 1000

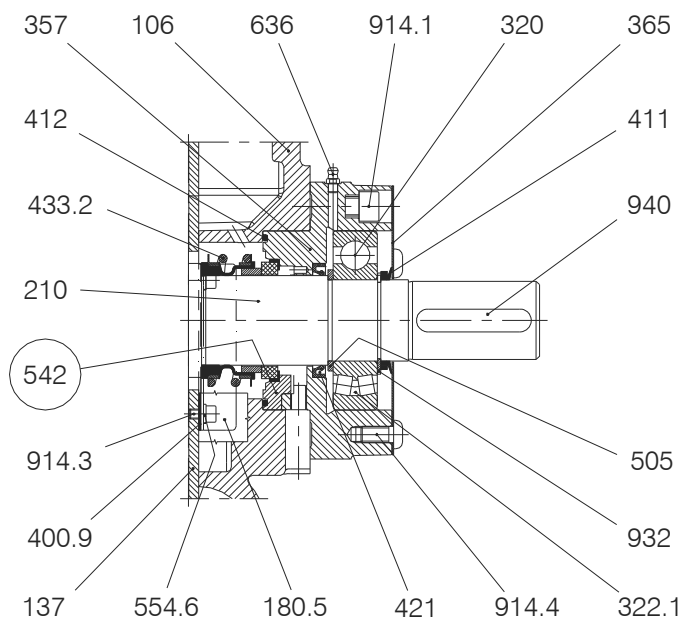


Fig. 15 – Drive end

○ A3 construction only

Tab. 2 - DIMENSIONS AND DETAILS OF BEARING - pumps series **TRVX 1000**

LOCATION	BEARING DIMENSIONS				QUANTITY OF GREASE FOR BEARING in grams
	∅ INT.	∅ EXT.	HEIGHT	BEARING TYPE	
Non-drive end (Double BALL BEARING)	50	90	30,2	3210B	70
Drive end (Single BALL BEARING)		110	27	6310-C3	
Drive end (Double ROLLER BEARING *)				21310E (*)	55

(*) Belt drive design

TRVX 1250

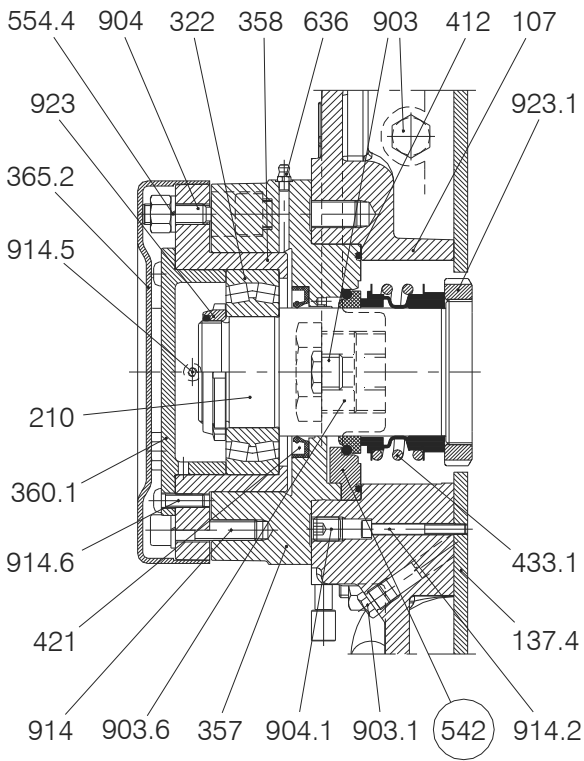


Fig. 16 – Non-drive end

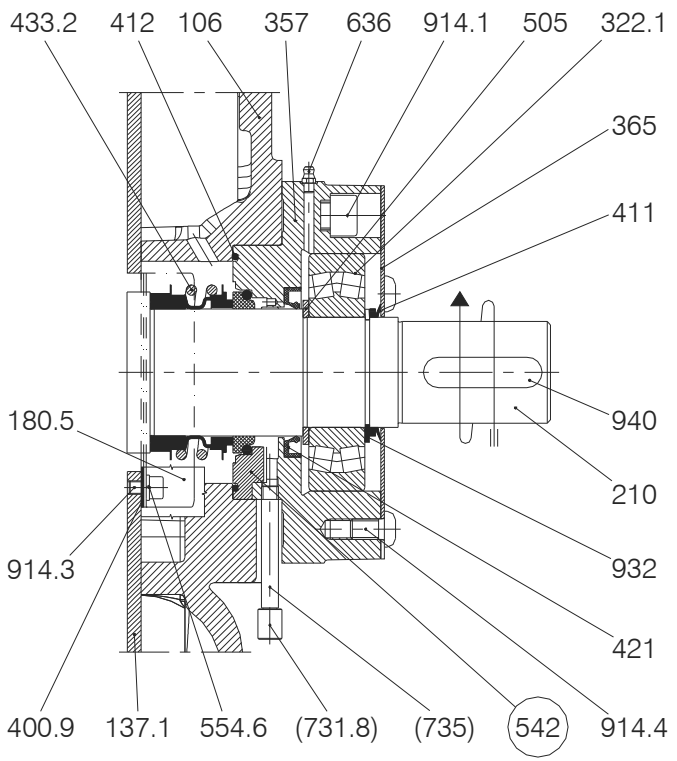


Fig. 17 – Drive end

STANDARD DESIGN

○ A3 construction only

() On request only

Tab. 3 - DIMENSIONS AND DETAILS OF BEARING - pumps series **TRVX 1250**

LOCATION	BEARING DIMENSIONS				QUANTITY OF GREASE FOR BEARING in grams
	∅ INT.	∅ EXT.	HEIGHT	BEARING TYPE	
Non-drive end (Double ROLLER BEARING)	65	120	31	22213E	100
Drive end (Double ROLLER BEARING)		140	33	21313E	140

5 – BEARINGS LUBRICATION

Lubrication of greased bearings must be done in compliance with the instructions of the bearing manufacturer. Pumps with standard operating conditions should have their bearings lubricated after maximum 1000 working hours. In any case, always check bearing's operation for unusual high temperature (max. 80°C), noise level and vibrations. When considering reusing the bearings, it is recommended to remove the old grease and any dirt from the bearing running faces and seal rings, and fill with new lubricating grease.

The lubricant type used by us is type "EP 3", grease with temperature range from -30 °C to +140 °C. It is recommended not to mix different types of grease.

Equivalent grease or grease with greater performances can be used.

Before starting the pump, it is good practise to grease the bearings with a suitable grease gun.

When required, maximum bearing grease quantity allowance is listed on tabs. 1-2-3.

Lubrication intervals may be increased depending upon the operating temperatures and the bearing loads.

6 – TOTAL PUMP DISASSEMBLY

Complete pump disassembly becomes necessary if, for example, there is an excessive wear of impellers, which would prevent the pump from performing as expected or if the shaft is excessively damaged in the seal areas causing leakage of the pumped liquid.

Disassembly work should be carried out with proper tools and using suitable disassembly sequence to prevent further damage to the pump parts.

NOTE: In the event the mechanic assigned to this work is not very skilled, it is suggested to mark the location (rotation and assembly sequence) for the various parts prior to starting the disassembly. However, most parts have a locating marking at 12 o'clock position that can be used as a reference for their position.

A wrong location of the parts can cause a partial or even a total lack of pump performance.

In this chapter we discuss disassembly of pump without seal housing VDMA 357, seals VDMA 433.1 and 433.2 (see fig. 18). Installation of seals and bearings are discussed in chapters 3 and 4.

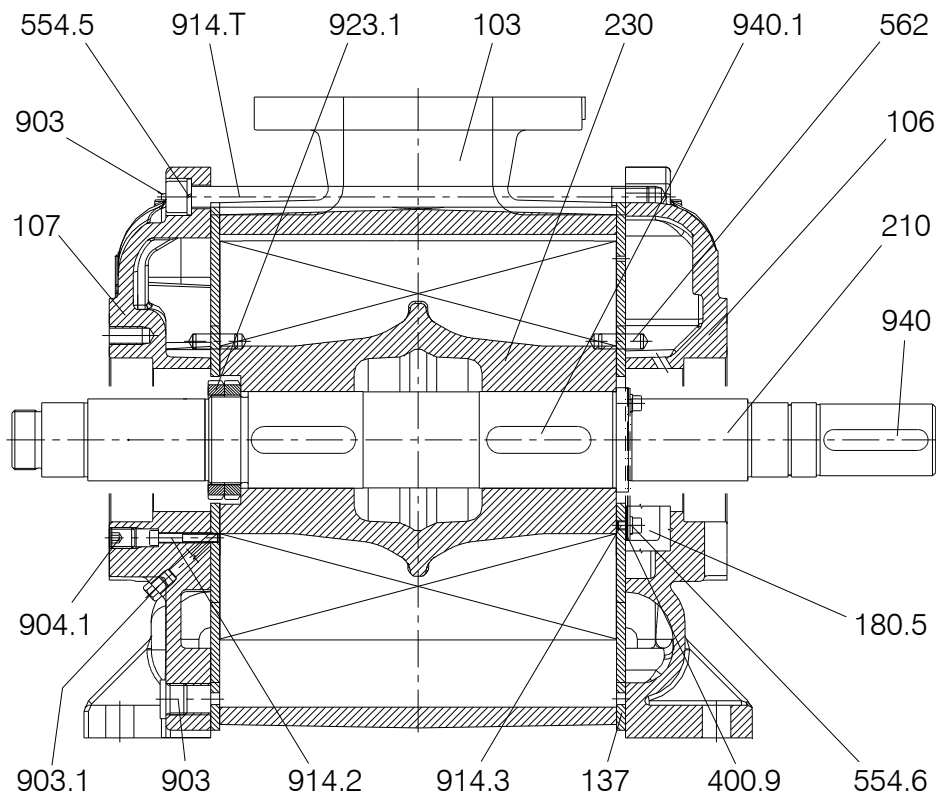


Fig. 18

Place pump in vertical position on a strong pedestal capable of holding pump weight; with drive end side towards the ground.

Remove tie-bolts VDMA 905 and washers VDMA 554.7 (and screws VDMA 914.T/washers VDMA 554.5 for TRVX 1000 series). Split discharge casing VDMA 107 from suction/discharge intermediate casing VDMA 103, and remove shaft VDMA 210 together with impeller VDMA 230.

Separate the intermediate casing VDMA 103 from suction casing VDMA 106.

Remove port plates VDMA 137 from casings VDMA 106 and 107 by removing setscrew VDMA 904.1 and screw VDMA 914.2.

Remove locating pins VDMA 562 from the casings VDMA 106 and 107.
 Remove the flat valve plates VDMA 400.9 and plates VDMA 108.5 from port plates VDMA 137 by removing 2 screws VDMA 914.3 and washers VDMA 554.6.
 To remove the impeller VDMA 230, remove 2 impeller nuts VDMA 923.1, heat the impeller for this operation (it has been interference fitted on the shaft) and slide it out from shaft VDMA 210 with the aid of a hydraulic press.
 Remove the 2 keys VDMA 940.1 from the shaft.

7 - MACHINING THE PUMP PARTS

Liquid ring vacuum pumps achieve their best efficiency when the tolerance between the impeller and the port plates are within certain limits. Lower tolerances could lead to pump seizing while higher tolerances could result in loss of pump capacity and vacuum level.

When strictly necessary, due to scratches/grooves/deformations occurred, restoring machining of internal parts and surfaces must be carried out with extreme precision, and paying special attention to machining starts and tolerances recommended in tab. 4.

Fig. 19 and tab. 4 show ideal dimensions and clearances of a serviced pump (measurement unit: mm).

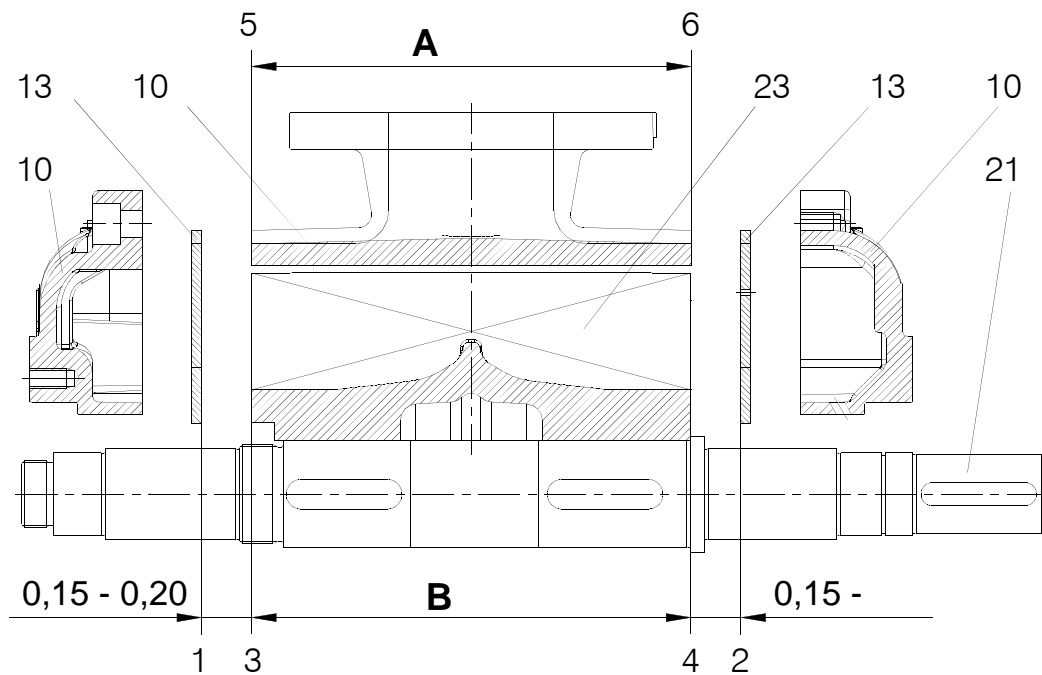


Fig. 19

Tab. 4

Pump Type	A ⁺⁰ / _{+0,2}	B
TRVX 653	155,4	155
TRVX 657	225,4	225

Pump Type	A ⁺⁰ / _{+0,2}	B
TRVX 1003	215,4	215
TRVX 1005	266,4	266
TRVX 1007		

Pump Type	A ⁺⁰ / _{+0,3}	B
TRVX 1253	260,4	260
TRVX 1255	330,4	330
TRVX 1257	400,4	400

If necessary, skim surfaces 1 and 2 for port plates VDMA 137 and sides of impeller VDMA 230.

NOTE: NEVER machine the outside diameter of the impeller.

Depending on how much will impeller VDMA 230 be shortened (B), suction/discharge intermediate casing VDMA 103 must be shorten too (A), machining surfaces 5 and 6 so that A (casing length) and B (impeller length) ratio will respect tolerances listed in tab. 4.

In order not to compromise mechanical seals VDMA 433.1 and 433.2 correct working dimensions, total machining must not exceed 0,4-0,5 mm.

Total clearance allowed is up to 1 mm, however be aware that this may affect pump maximum flow by approx.15%.

Prior to starting the assembly operations, carefully study these instructions to become familiar with the assembly procedures, the sequence of operations and the procurement of the required tools.

Replacing or machining the worn out parts will be a question of economics and/or time available to complete the repair. After pump disassembly inspect all parts for their integrity. If they are in sound condition, clean the parts and remove the gasket material from the sealing faces with nitro-cellulose thinner.

If parts require machining, follow the instructions given on chapter 7.

When original spare parts are used, check they are compatible with the new dimensions obtained by machining the parts. For the recommended spare parts see chapter 9.

For mechanical seals assembly see chapter 3.

For identification of components see parts list in chapter 10 and sectional drawing in chapter 11.

Before proceeding with pump assembly it is necessary to heat up impeller VDMA 230 to 180/200°C, fit it on shaft VDMA 210, leave it cooling down and lock it with bearing nut VDMA 923.1.

Also fit flat valves gaskets VDMA 400.9 (inclusive of: valve plate VDMA 180.5, screws VDMA 914.3 and washers VDMA 554.6) and attach them to their plates VDMA 137.

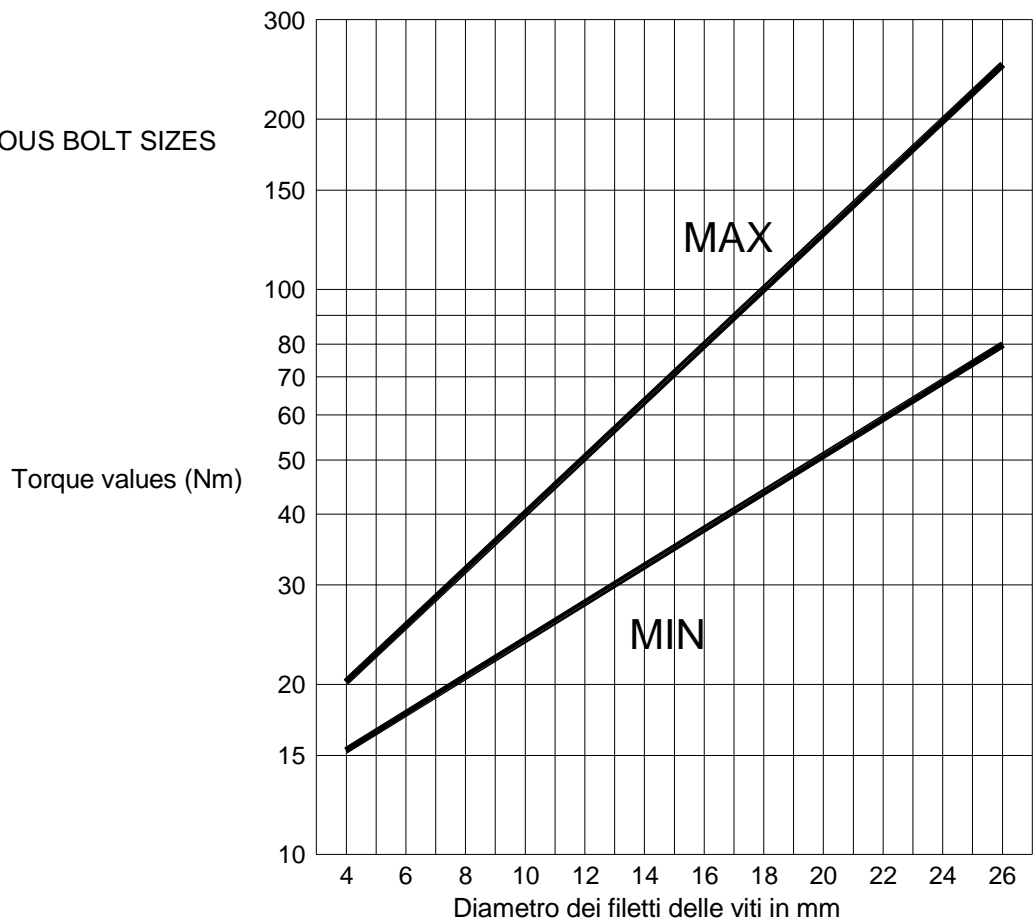
All sealing surfaces must be sealed against each other's by means of Superbond 529 or equivalent sealant material.

Correct assembly procedure must be carried out per following main steps: shaft group assembly (inclusive of shaft VDMA 210, impeller VDMA 230, plates VDMA 137 and casings VDMA 103-106-107); mechanical seals VDMA 433.1 and 433.2 assembly (see chapter 3); and mechanical seals/bearing housing VDMA 357 assembly (see chapter 4).

For this, strictly follow disassembly procedure backwards (see chapter 6), and after that proceed with operations described on chapters 3 and 4.

Give rest time for sealing compound to cure and finally pressure test the assembled pump at approximately 3 bar pressure (max. 3,5 bar) to verify there are no leaks through the sealing faces and/or mechanical seals.

Fig. 20
TORQUE VALUES FOR VARIOUS BOLT SIZES



9 – 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 minimise unnecessary down times in the event of pump failures or routine maintenance.

Therefore it is recommended to stock the following spare parts per each pump:

1	Impeller
1	Port plates set
1	Complete shaft assembly
1	Bearing set
1	Mechanical seal set
2	Flat valve insert
1	Gasket sets
1	Gasket sealing liquid
1	Bearing spacer ring set
1	Coupling insert 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 pump model, year of manufacture and pump serial number. Always provide this information when ordering spare parts.

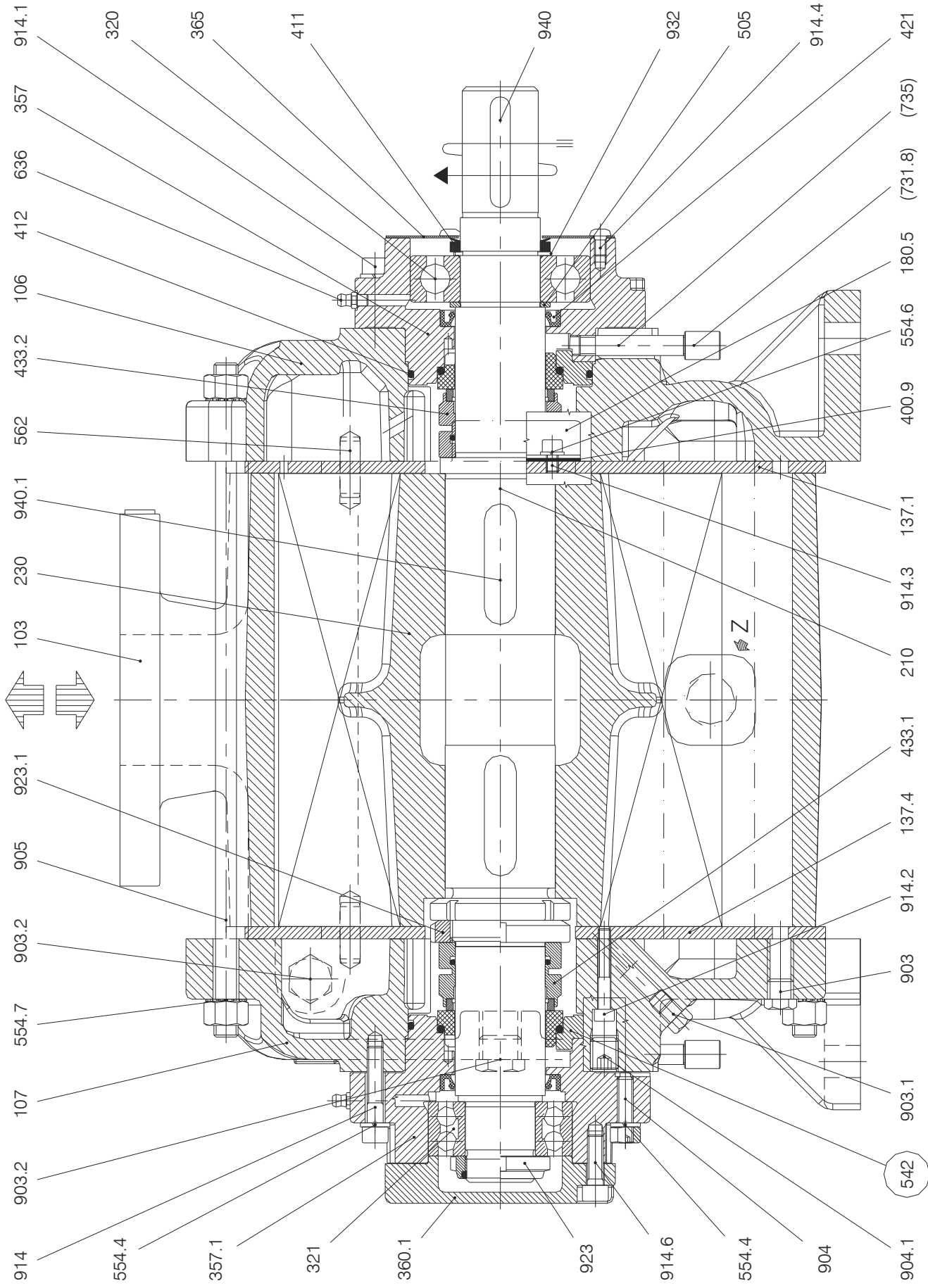
Pump type, parts item number (VDMA) and description, as per the parts list on chapter 10 and pump sectional drawing on chapter 11, this is useful information that helps supplying correct spare parts for your pump.

We recommend the use of original parts: in case of deviation, POMPETRAVAINI declines any responsibility for eventual damages caused by duplicate spare parts.

10 – PARTS LIST

ITEM No.	DESCRIPTION
103	Suction/discharge intermediate casing
106	Suction casing
107	Discharge casing
137...	Plate
180.5	Valve plate
210	Shaft
230	Impeller
320	Single ball bearing
321	Double ball bearing
322...	Double roller bearing
357	Mechanical seal and bearing housing
358	Bearing housing
360.1	Bearing cover
365...	Bearing shield
400.9	Flat valve insert
411	V-Ring
412	O-Ring
421	Radial seal ring
433...	Mechanical seal

ITEM No.	DESCRIPTION
505	Shoulder ring
542	Seal bushing (A3 construction only)
554...	Washer
562	Cylinder pin
636	Grease cup
731.8	Fitting (on request only)
735	M.M. Fitting (on request only)
903...	Plug
904...	Grub screw
905	Tie-bolt
914...	Screw
914.T	Screw
920	Nut
923...	Bearing nut
932...	Snap ring
940...	Key
Z	Liquid supply inlet

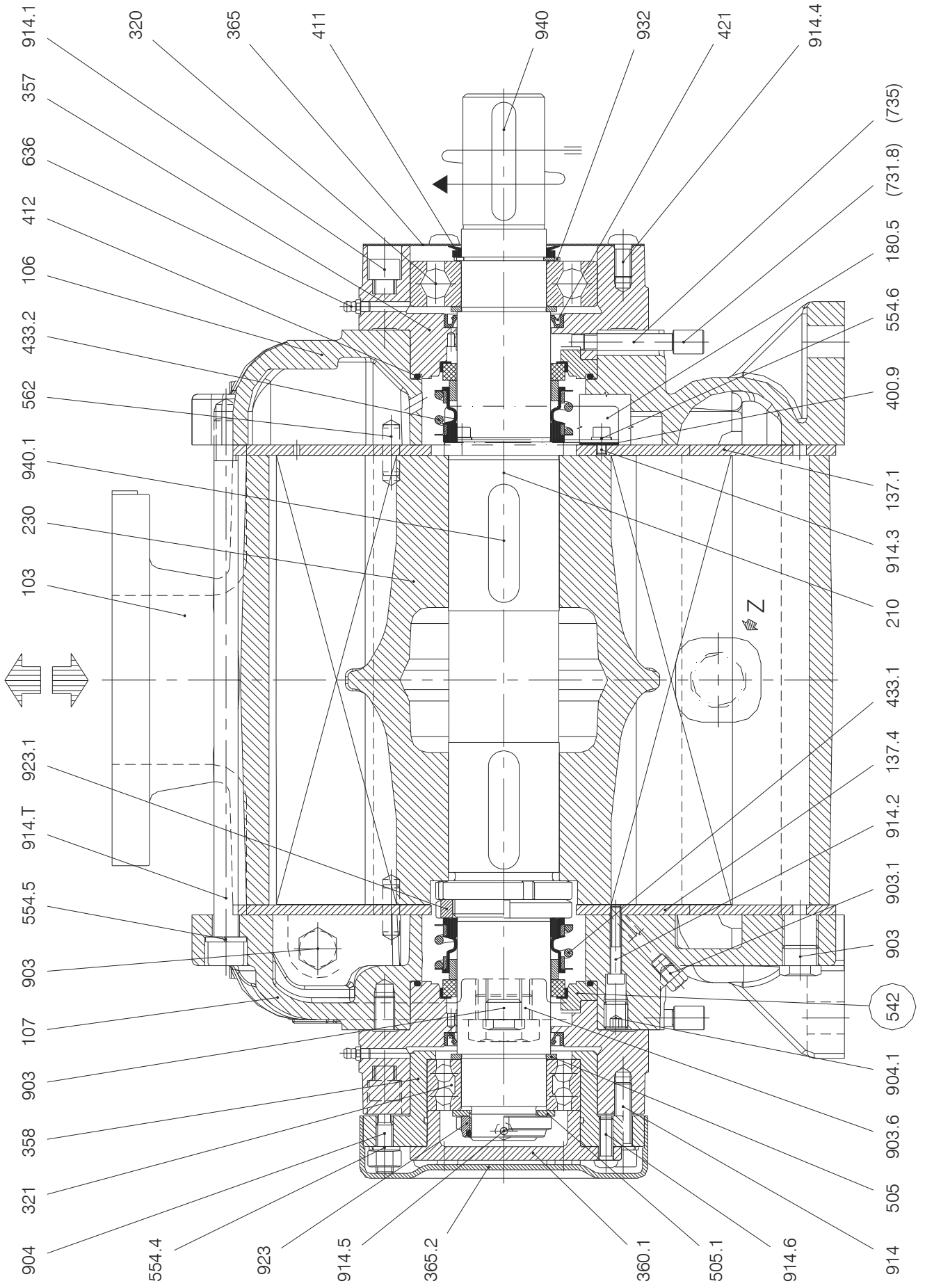


TRVX 650

○ A3 construction only

() On request only

Fig. 21



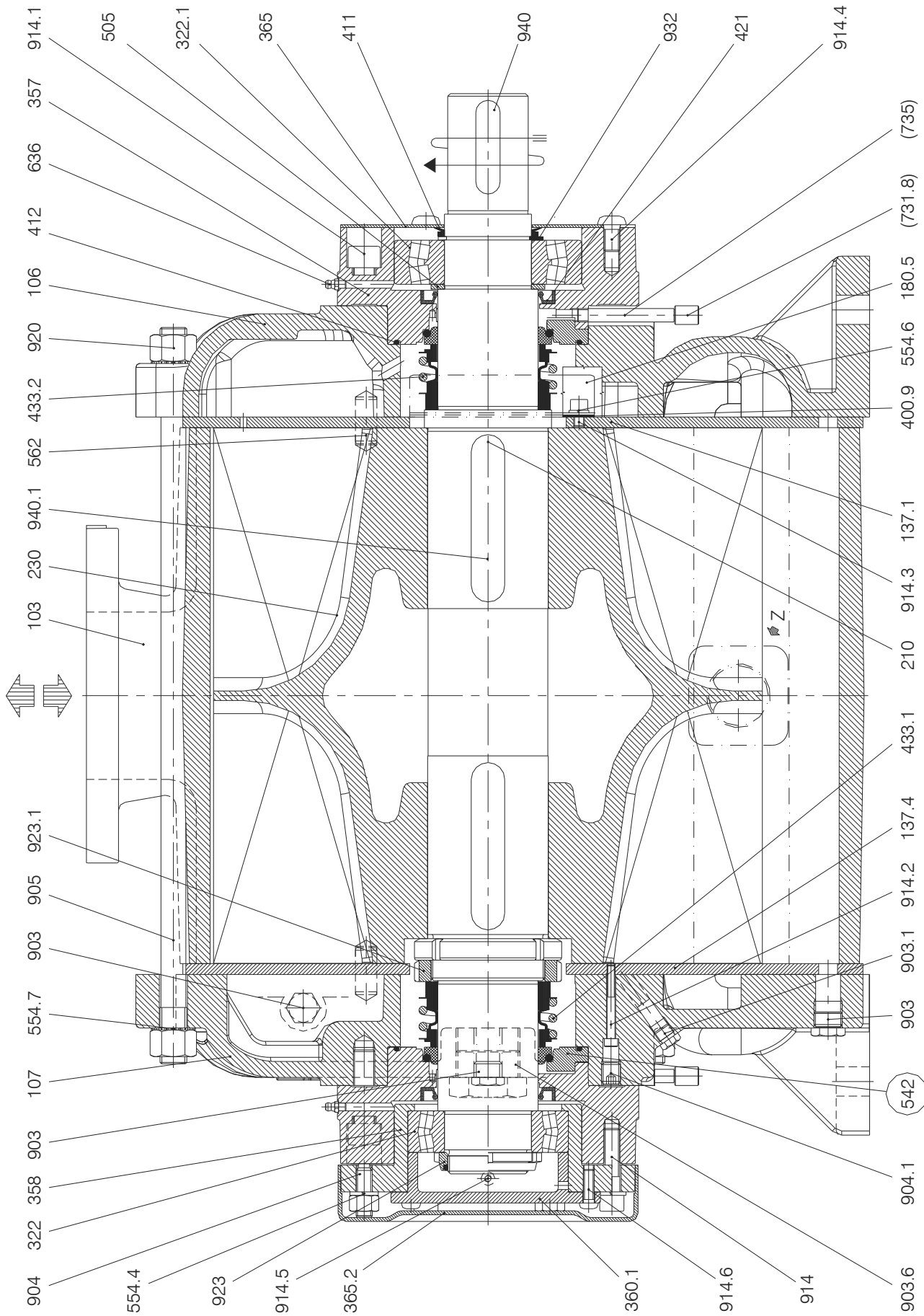
TRVX 1000



A3 construction only

() On request only

Fig. 22



TRVX 1250

○ A3 construction only

() On request only

Fig. 23

(blank page)

MONOSTAGE CENTRIFUGAL PUMPS

**MAGNETIC DRIVE
MONOSTAGE CENTRIFUGAL PUMPS**

SELF-PRIMING CENTRIFUGAL PUMPS

**MAGNETIC DRIVE
SELF-PRIMING CENTRIFUGAL PUMPS**

MULTISTAGE CENTRIFUGAL PUMPS

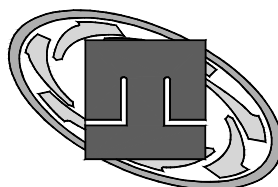
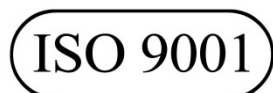
LIQUID RING VACUUM PUMPS

LIQUID RING COMPRESSORS

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

NA5.SM.TRVX.GB00 / PRINTED IN ITALY
Smontaggio TRVX 650-1000-1250 Inglese

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



pompetravaini S.p.A.
20022 CASTANO PRIMO (Milano) ITALY
Via per Turbigio, 44 – Zona Industriale
Tel. 0331 889000 – Fax 0331 889090
www.pompetravaini.it