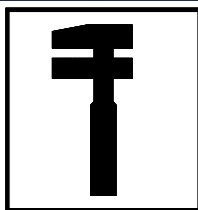




AMCAL
INDUSTRIAL PUMP SOLUTIONS

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**DISASSEMBLY AND
ASSEMBLY INSTRUCTIONS
FOR
LIQUID RING VACUUM PUMPS
SINGLE STAGE
WITH MECHANICAL SEAL
TRMB 25-30 to 50-300
TRVB 40-110 to 50-300**



INTRODUCTION

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

TRMB 25-30 & 25-60
TRMB 32-50 & 32-75
TRMB & TRVB 40-110/40-150/40-200
TRMB & TRVB 50-300

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 instructions of safety listed in chapters 2 and 15 of the above manual, as well 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 4 and to the section drawings in chapter 5.
All drawings are schematic only and are not certified for construction.
For further information please consult POMPETRAVAINI or its closest representative.
Torque values for various bolt sizes and tie-bolts are listed on fig. 5.

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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.

1.1 – DISASSEMBLY OF PUMP SERIES “TRMB”

Remove the screws VDMA 914, remove the pump casing VDMA 101 from the rest of the pump.

Remove the screws VDMA 914.1 that hold the metal cover VDMA 180.6 on the inspection port of the pump casing (for pump series “25” remove threaded plug VDMA 903.1).

Check that the components of the special valve VDMA 180.5 and Teflon flapper VDMA 400.9 are in good working conditions.

Verify that the internals of suction/discharge casing VDMA 101 are free of defects (wear, corrosion, cracks, etc.).

Remove the locking nut(s) VDMA 920 or 922 or the shaft nut(s) VDMA 923 or 923.1.

Remove the impeller VDMA 230 from the shaft and verify that the impeller is also free from defects and wear.

Remove the shaft key VDMA 940.1 and the spacer VDMA 485.

Remove the rear casing VDMA 120 from the electric motor VDMA 801 by removing the screws VDMA 901.1 or 914.2.

The rotating part of the mechanical seal VDMA 433.2 will also slide out of the shaft.

The stationary part of the mechanical seal can now be pushed out of the back cover.

For pump series “32”, be sure to check the integrity of the thread locking ring Elicel (self-locking insert) that is inserted in the axial threaded bore of the motor shaft.

Proceed with the inspection of all components, replace bad and/or worn put parts with POMPETRAVAINI's original parts. It is good practice to replace, as a minimum, all wear parts such as mechanical seal, gaskets, etc.

1.2 – DISASSEMBLY OF PUMP SERIES “TRVB”

After the pump/motor assembly has been removed from the installation, remove the electric motor from the pump, if required.

The motor can be removed by removing the bolts VDMA 901.8 and VDMA 901.2.

The coupling guard VDMA 685 can be removed thereafter.

Remove the screws VDMA 914 and remove the pump casing VDMA 101 from the rest of the pump

Remove the impeller nut(s) VDMA 922 or 923 while holding the impeller VDMA 230, remove the impeller from the shaft VDMA 210.

Remove the shaft key VDMA 940.1 and the spacer VDMA 485.

Remove the rotating part of the mechanical seal VDMA 433.2 from the shaft VDMA 210 and the stationary seal part from the bearing frame VDMA 330 or 353.

To disassemble the bearing frame, remove the screws VDMA 914.3 and, while applying a slight pressure, push the shaft VDMA 210 out of the bearing frame VDMA 330 or 353 toward the drive end.

With a gear puller remove the half coupling from the shaft end and remove then the coupling key VDMA 940 from the shaft.

Remove the thrower VDMA 907, the circlip VDMA 932.2 and the shoulder ring VDMA 505.2.

Remove the seal cover VDMA 360 and the elastic ring VDMA 935. Remove the V-ring VDMA 411.

Secure the shaft in a vise and remove the bearing nut VDMA 923, then remove the circlip VDMA 932.

With the help of a gear puller, remove the ball bearings VDMA 320 and 320.1.

Proceed with the inspection of all components, replace bad and/or worn out parts with POMPETRAVAINI's original parts. It is good practice to replace, as a minimum, all wear parts such as mechanical seal, bearings, gaskets, etc.

2 - PUMP ASSEMBLY

2.1 – ASSEMBLY OF PUMP SERIES “TRMB”

Start the pump assembly by inserting the stationary part of the mechanical seal VDMA 433.2 in the rear casing VDMA 120.

Lubricate the seal O-Ring with compatible liquid, (mechanical seal dimensions are listed in tab. 1, see fig. 1 or 2).

Fig. 1 - Typical mechanical seal drawing for
TRMB 25 – 32 and 40-110 & 150
TRVB 40-110 & 150

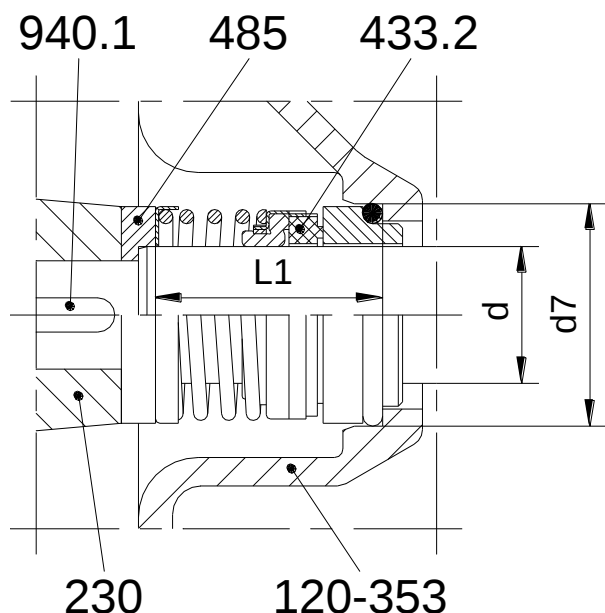
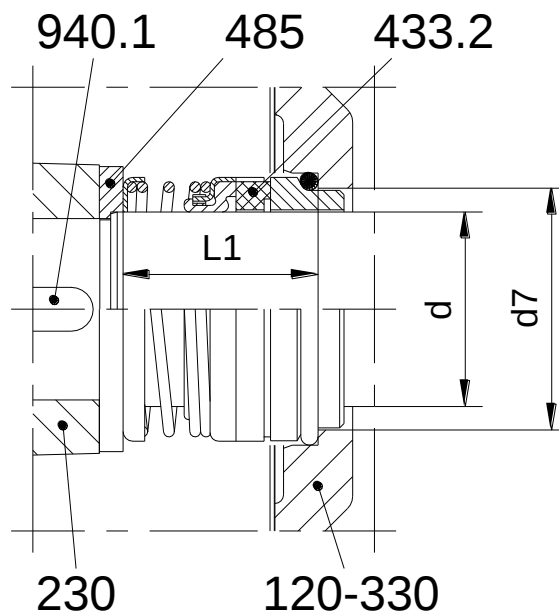


Fig. 2 - Typical mechanical seal drawing for
TRMB 40-200 & 50-300
TRVB 40-200 & 50-300



Place the electric motor VDMA 801 in the vertical position, attach the pump back cover to the motor flange with the screws VDMA 901 or 914.2.

The holes for locating pin VDMA 562 should be located at the lower part of the pump (toward the motor feet) for pump series “25 & 32” and at the upper part of the pump (away from the motor feet) for pump series “40 & 50”.

Be sure that the seal stationary seat does not come out of its seat. Do not tighten the 4 bolts VDMA 901.

Check the impeller length against the depth of casing VDMA 101 in which the impeller must fit (see fig. 3 for allowed tolerance). In the event the impeller is too long it will be required to machine it down.

A **pre-assembly** of spacer VDMA 485 and impeller VDMA 230 on the motor shaft is required.

If needed, add shims between the spacer and the impeller so that the latter is 0,10 to 0,20 mm (depending upon the pump series) from the rear casing VDMA 120 (this will provide an even clearance on both sides of the impeller) see fig. 4. Remove the impeller and the spacer with the shims, if previously added.

Proceed with the final pump assembly; lubricate the O-ring and shaft then insert on the shaft the rotating part of the mechanical seal VDMA 433.2.

Be sure to keep both seal faces clean. Insert on the shaft the spacer VDMA 485 with shims (if needed). Push the spacer to compress the seal spring and insert the shaft key VDMA 940.1 in the keyway.

Insert the impeller and lock it on the shaft with the impeller nut(s) VDMA 920 or 922 or 923 or 923.1. Torque values are listed in fig. 5.

Fit the 2 locating pins VDMA 562 in their respective seats.

Apply on the face of the pump casing VDMA 101, a coat of “Loctite 510” gasket material. Place the pump casing on the rear casing VDMA 120 using the locating pins for guide.

Insert the screws VDMA 914 with lock washers VDMA 554.5 and adjust torque to the values given in fig. 5.

Place the pump in the horizontal position, using a level, check the flanges on the suction/discharge casing for horizontal accuracy.

Then torque the bolts VDMA 901 or VDMA 914.2 that attach the back cover to the electric motor.

Check the free rotation of the pump impeller by inserting a temporary screw on the motor shaft at the fan side.

To check the pump assembly and sealing it is required to test the pump hydrostatically.

Tab. 1
MECHANICAL SEAL DIMENSIONS (IN MM)

PUMP MODEL	d h6	D7 H8	L1 ±0,5
TRMB 25-30	22	37	37,5
TRMB 25-60	24	39	40
TRMB 32-50			
TRMB 32-75	28	43	42,5
TRMB & TRVB 40-110	35	50	
TRMB & TRVB 40-150			
TRMB & TRVB 40-200	45	63	45
TRMB & TRVB 50-300			

0,20-0,30 mm (series “32”)
0,30-0,40 mm (series “40 & 50”)

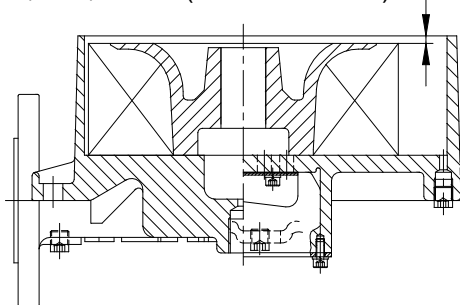


Fig. 3

Allow the pump gasket to cure for approximately two hours after assembly, apply then hydrostatic pressure to a max of 3 bar to see if there are any leaks.

2.2 – ASSEMBLY OF PUMP SERIES “TRVB”

(See fig.1 or 2 and tab.1 and 2 for mechanical seal and ball bearing dimensions).

Thoroughly clean every pump part with suitable tools and liquids compatible with the pump and elastomers materials.

The ball bearings should be washed with a degreaser (like naphtha), dry them and afterwards oil them.

To help with the assembly of the ball bearings on the shaft, they should be pre-heated to approximately 80°C.

Place the shaft VDMA 210 in a vise, insert the ball bearing at drive end VDMA 320 and lock it in place with bearing nut VDMA 923, insert the V-ring VDMA 411.

Insert the elastic ring VDMA 935 in the bearing cover VDMA 360, slide the shaft with the ball bearing through the bearing cover. Insert the shoulder ring VDMA 505.2, apply pressure to the shaft to compress the elastic ring so that the circlip VDMA 932.2 can be placed in its seat.

If needed, install the shoulder ring VDMA 505.1 at the opposite side of the shaft (impeller side).

Then place the ball bearing VDMA 320 or 320.1 over the shaft, introduce the circlip VDMA 932 and the thrower VDMA 507.

Introduce the shaft assembly in the bearing frame VDMA 330 or 353 and lock in place with screws VDMA 914.3.

Lubricate the stationary part of mechanical seal VDMA 433.2 with suitable liquid and insert this in the bearing frame (or in the back cover VDMA 120 previously located on the bearing frame, for pump construction “A3”), then lubricate the rotating part of the mechanical seal and slide it on the shaft.

Check the impeller length against the depth of casing VDMA 101 in which the impeller must fit (see fig. 3 for allowed tolerance).

In the event the impeller is too long it will be required to machine it down.

Insert the impeller/mechanical seal spacer VDMA 485, place the shaft key VDMA 940.1 in the keyway, then the impeller VDMA 230 and lock with impeller nut VDMA 923 or 923.1.

The clearance between the impeller and the suction/discharge casing VDMA 101 can be set from the outside, moving axially the bearing cover VDMA 360 with the grub screws VDMA 904.

Therefore adjust the impeller position by loosening the screws 914.3 and nut VDMA 920 and tightening the grub screws VDMA 904 until the back face of the impeller is 0,10-0,20 mm from the face of bearing frame (or from the back plate VDMA 120 for pumps in materials “A3”).

At this time tighten the nut VDMA 920 and the screws VDMA 914.3. Apply on the face of the pump casing VDMA 101 a coat of “Loctite 510” gasket material.

Place the pump casing on the bearing frame using the locating pins VDMA 562 for guide, tighten the bolt VDMA 914 uniformly.

Check the free rotation of the pump rotor by hand to ascertain that there is no metal contact.

To check the pump assembly and sealing it is required to test the pump hydrostatically.

Allow the pump gasket to cure for approximately two hours after assembly, apply then hydrostatic pressure to a max of 3 bar to see if there are any leaks.

Shims to be added, if needed

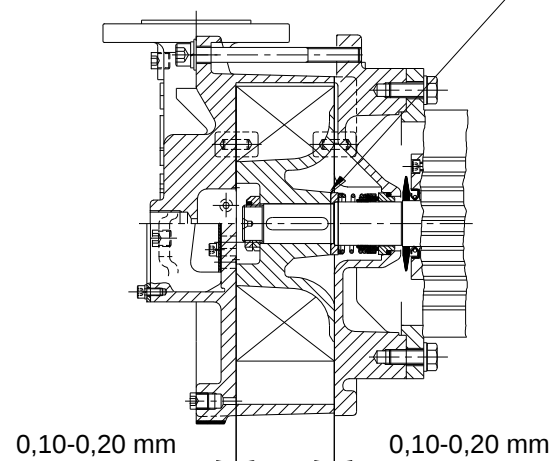


Fig. 4

Tab. 2 - BALL BEARINGS, MODELS AND DIMENSIONS

PUMP MODEL	BALL BEARING MODEL	
	NON-DRIVE END	DRIVE END
TRVB 40-110	No 1 6208-2ZR	No 1 6208-2ZR
TRVB 40-150	(40x80x18)	(40x80x18)
TRVB 40-200	No 1 6210-2ZR	No 1 6208-2ZR
TRVB 50-300	(50x90x20)	(40x80x18)

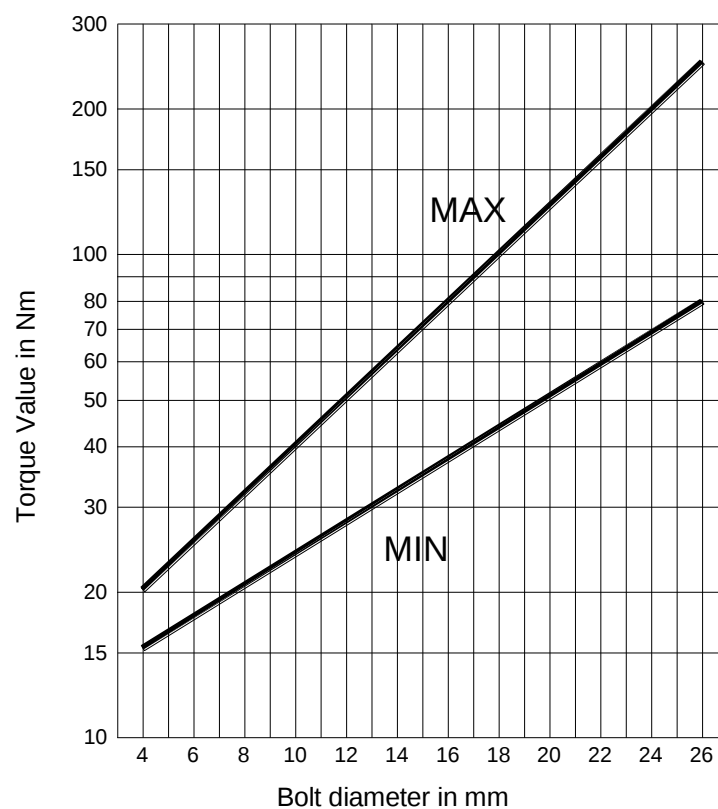


Fig. 5 - TORQUE VALUES FOR BOLTS AND NUTS OF VARIOUS DIAMETERS

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:

Pump series "TRMB"

- 1 Impeller
- 1 Mechanical seal
- 1 Electric motor
- 1 Gasket compound
- 1 Thread locking ring Elicel (for pump series "32")

Pump series "TRVB"

- 1 Impeller
- 1 Shaft assembly
- 2 Ball bearings
- 1 Mechanical seal
- 1 V-Ring
- 1 Gasket compound
- 1 Set of coupling inserts

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 type, parts item number (VDMA) and description, as per the parts list on chapter 4 and pump sectional drawings on chapter 5, are useful information that helps to supply and ensure 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
101	Suction/discharge casing
110	Impeller casing
120	Rear casing
180.5	Valve plate
180.6	Metal cover
183	Foot
185	Motor flange
230	Impeller
320...	Ball bearing
330	Bearing frame
341	Motor lantern
353	Bearing frame
360	Bearing cover
400.9	Flapper
411	V-Ring
412	O-Ring
421	Radial seal ring
433.2	Mechanical seal
485	Impeller and mechanical seal spacer
505...	Shoulder ring
507	Thrower
554	Washer
554.1	Washer

VDMA NO	DESCRIPTION
554.3	Lock washer
554.5	Lock washer
554.6	Lock washer
554.8	Lock washer
562...	Locating pin
672.S	Anti-cavitation valve
685	Guard
801	Electric motor
861...	Half coupling
892...	Raising pad
900	Screw
901...	Screw
901.8	Bolt
903...	Plug
904...	Grub screw
914...	Screw
920...	Nut
922	Impeller nut
923...	Bearing nut
932...	Circlip
935	Elastic ring
940...	Key
Z	Liquid supply inlet

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.



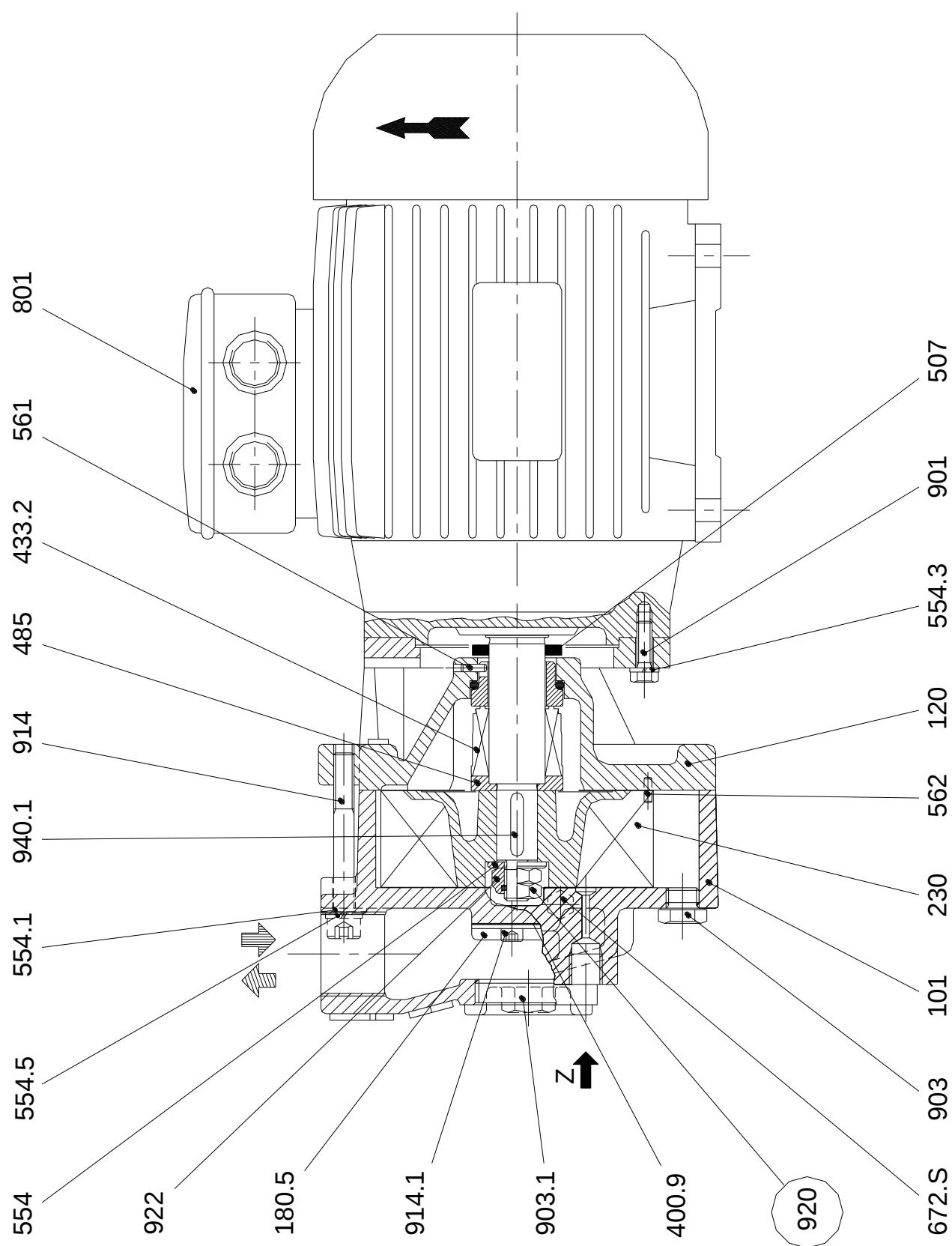
The electrical pump assembly supplied by Pompetravaini Spa that should be discontinued from use must not be disposed with common waste because it is composed of different materials that can be recycled at the appropriate facilities. If it is not intended to proceed autonomously at the management of the 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.

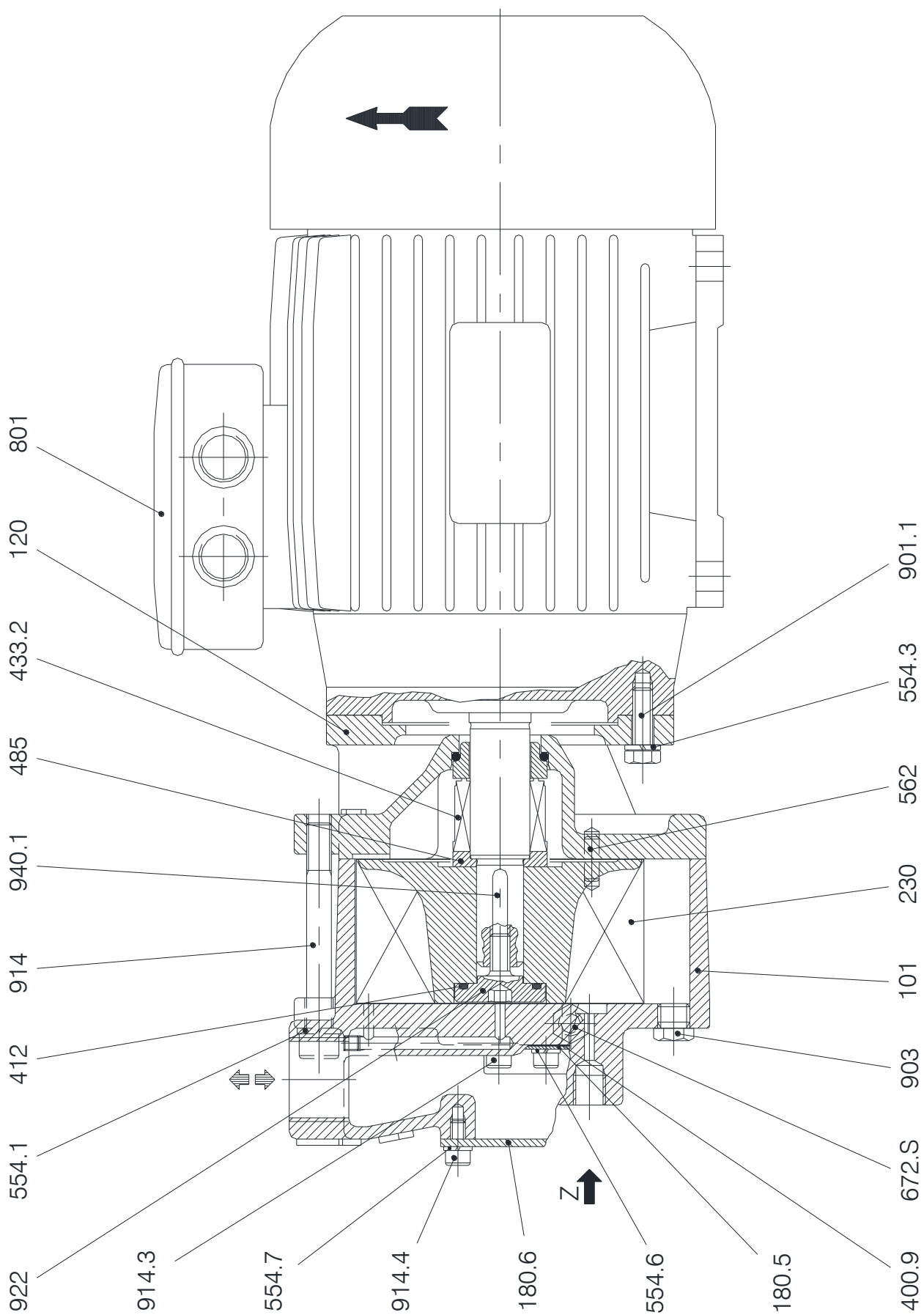
Sending the electrical pump assembly to an adequate process of disposal and recovery of materials protect the environment and help to limits consumption of available resources with effective recycling of materials.

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

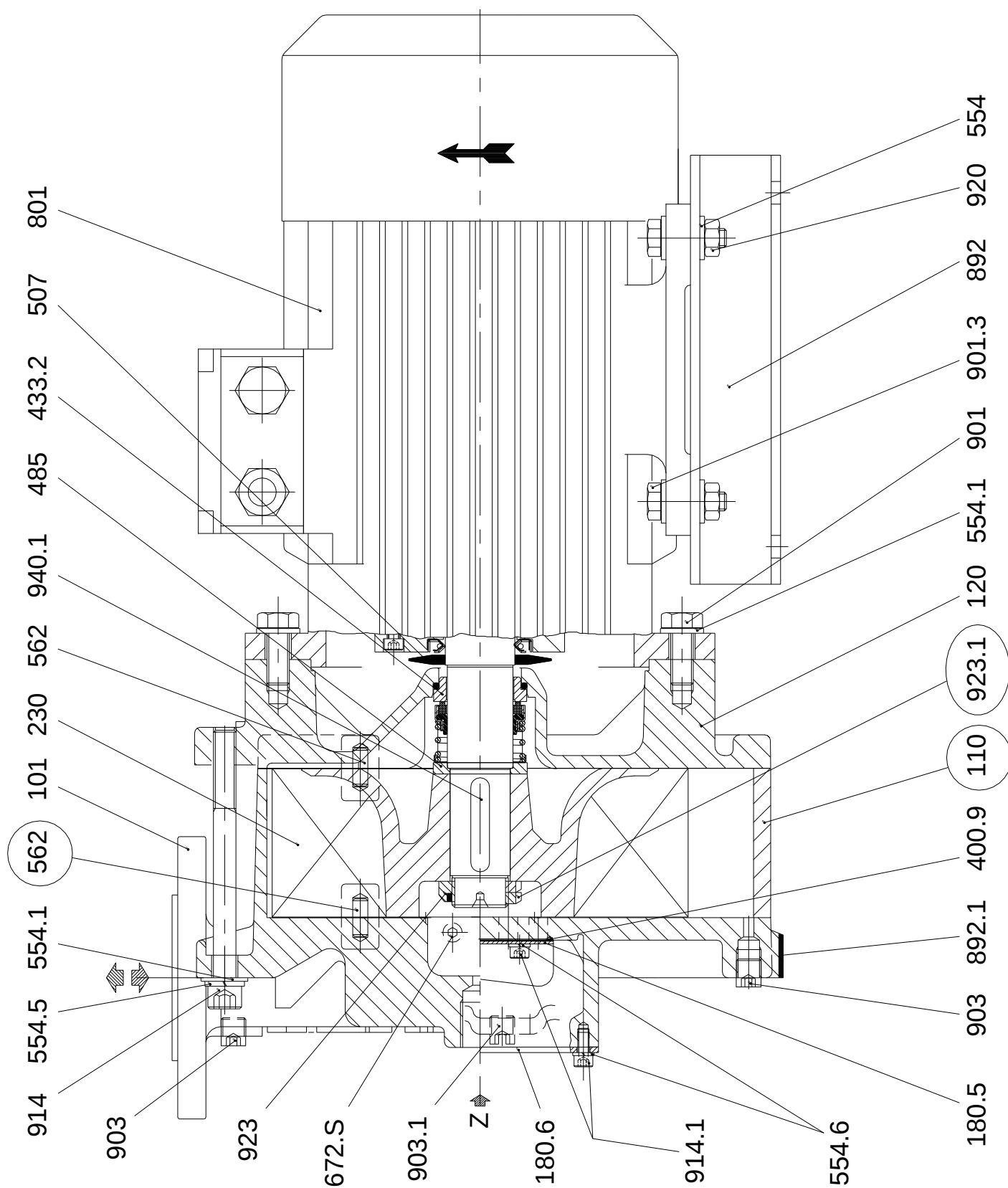


TRMB 25-30 & 25-60 (Motor frame: 80 & 90)

○ Applicable only for Stainless Steel "A3"

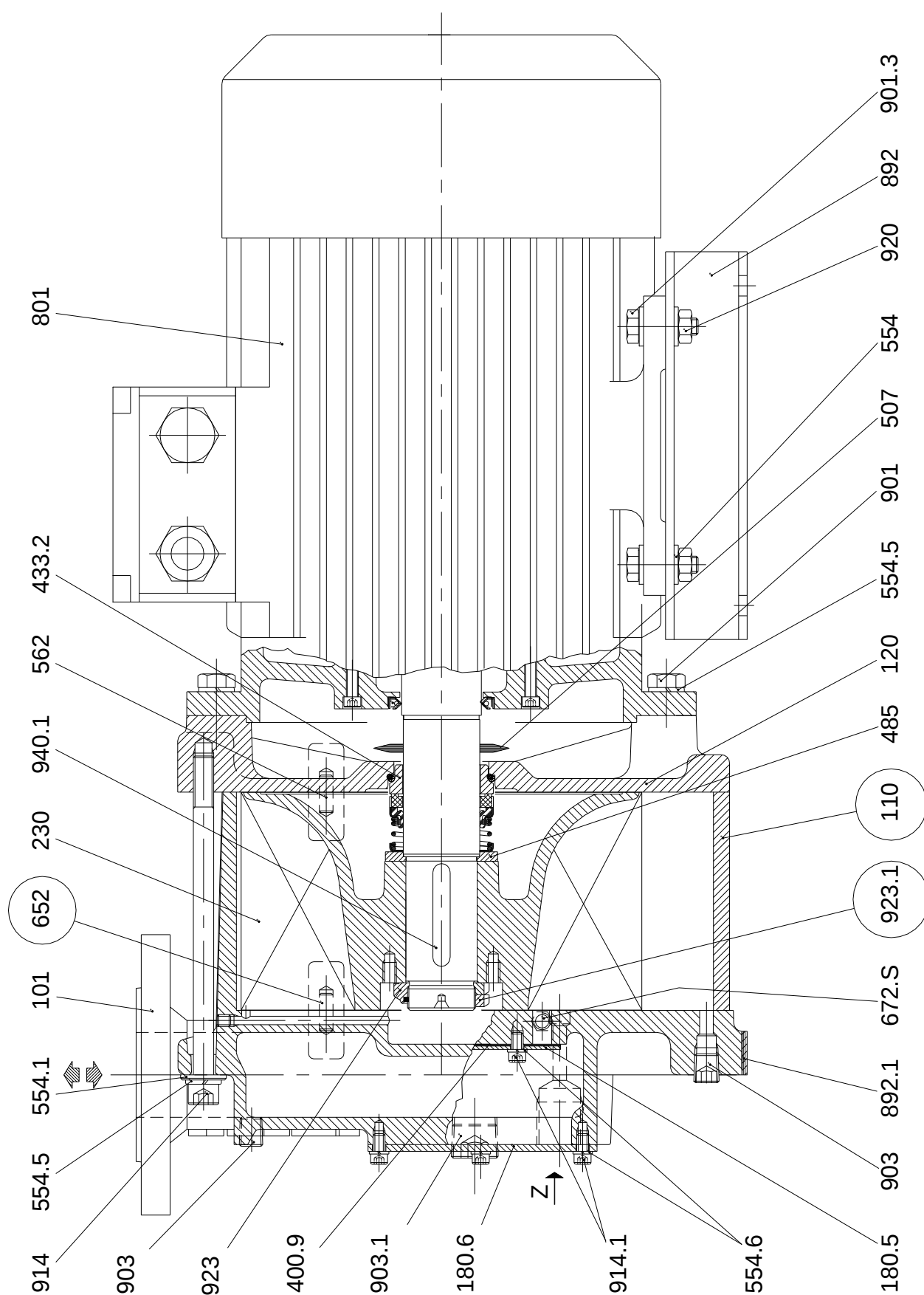


TRMB 32-50 & 32-75 (Motor frame: 90 & 100)



TRMB 40-110 & 40-150 (Motor frame: 110 & 112)

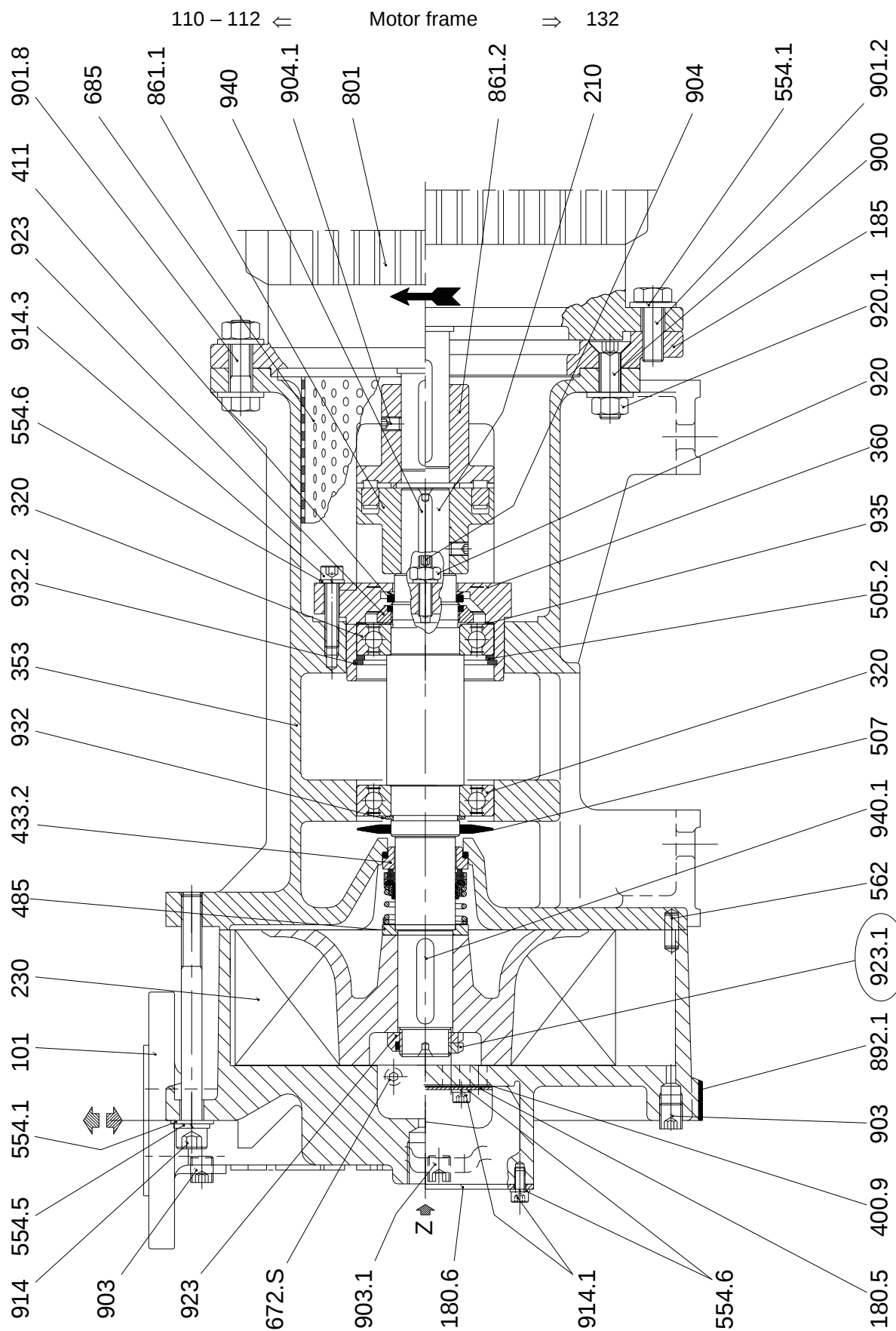
○ Applicable only for Stainless Steel "A3"



TRMB 40-200 & 50-300 (Motor frame: 132)

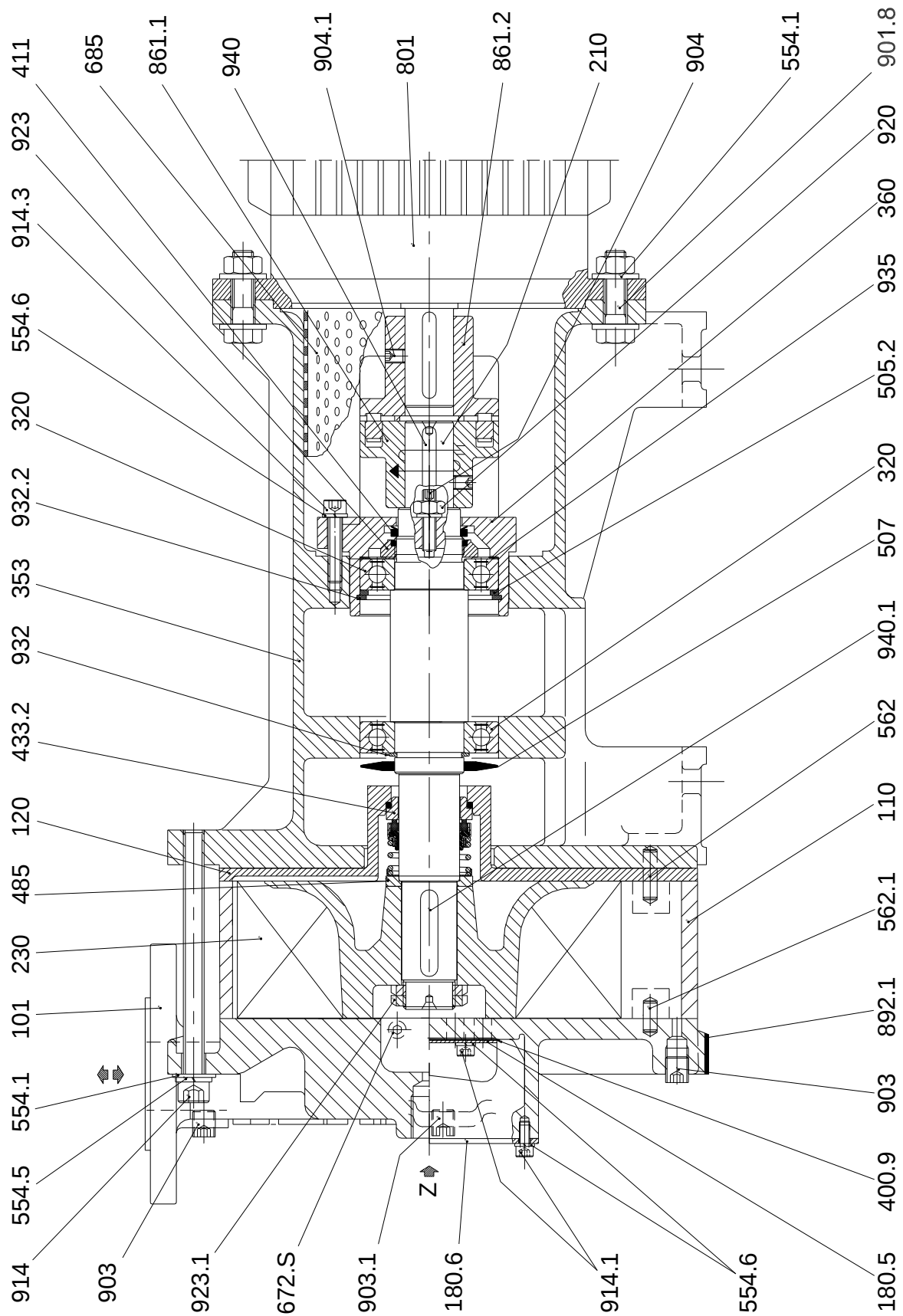


Applicable only for Stainless Steel "A3"

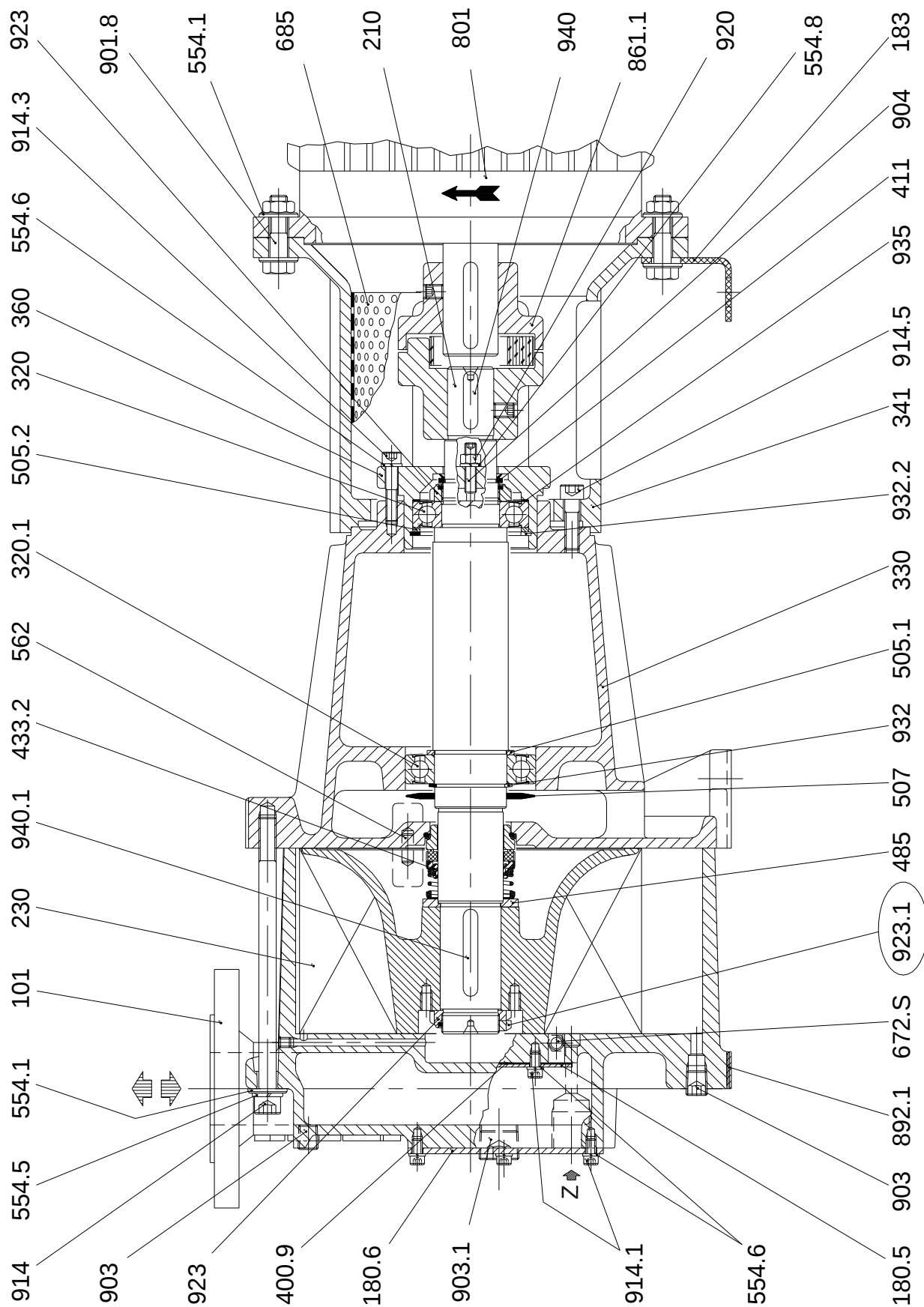


TRVB 40-110 & 150 / C-M in materials "GH - F - RA" (Motor frame: 110 - 112 - 132)

○ Applicable only for material "RA"

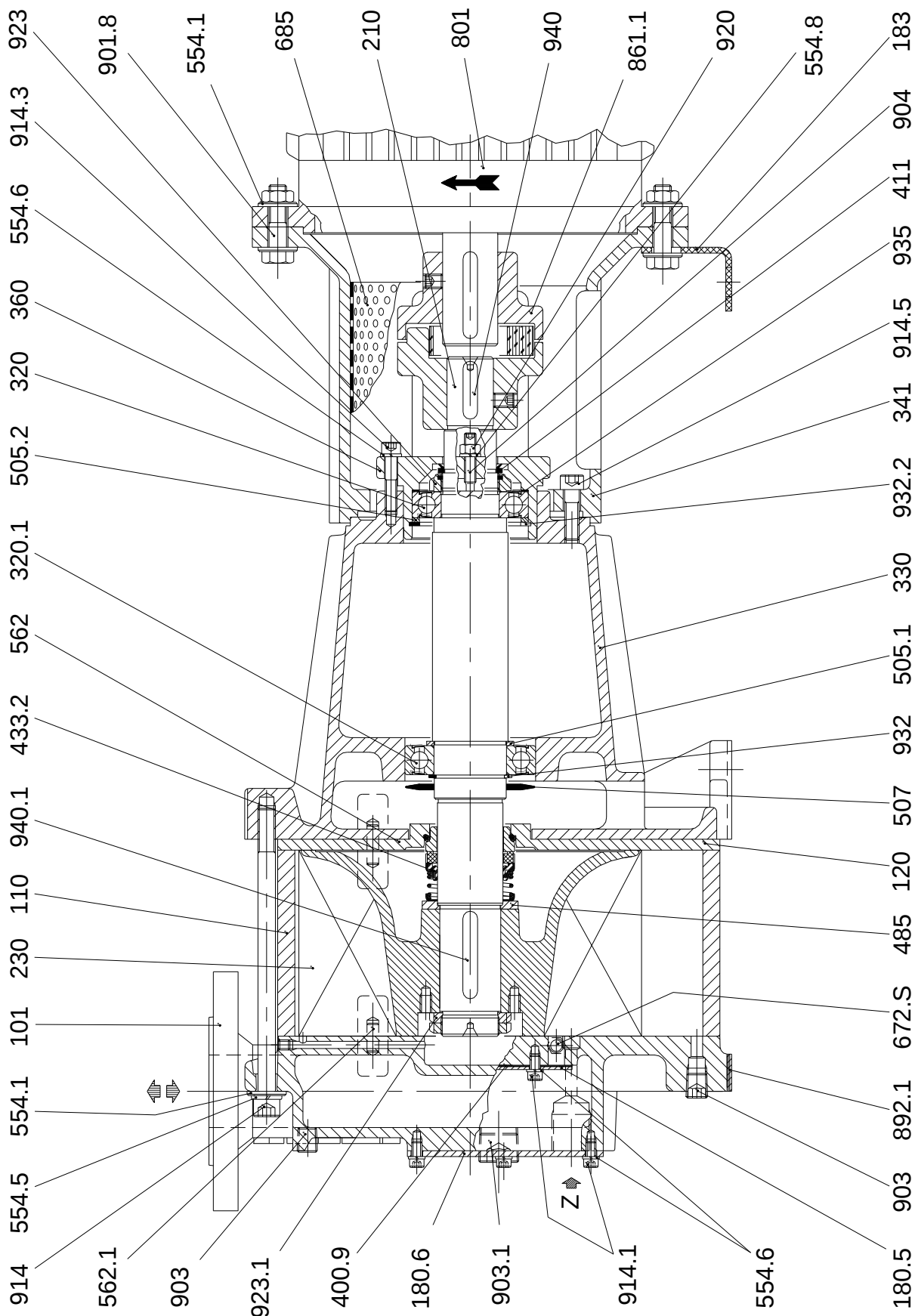


TRVB 40-110 & 150 / C-M in material "A3"



TRVB 40-200 & 50-300 / C-M in materials "GH - F - RA" (Motor frame: 132)

○ Applicable only for material "RA"



TRVB 40-200 & 50-300 / C-M in material "A3"

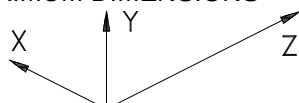
NOTES

PUMP model	Serial Number	Computer Number	Year of manuf.
---------------------	------------------------	--------------------------	-------------------------

GAS handled	Capacitym ³ /h	Suction Pressurembar	Discharge Press.mbar	Temperature°C
☐ Lethal ☐ Toxic ☐ Noxious ☐ Corrosive ☐ Malodorous ☐				

Service LIQUID	Capacitym ³ /h	Temperature°C
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TOTAL WEIGHTKGS.

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	No Poles	No RevolutionsRPM	Absorbed powerAmp	Installed powerkW /HP
FrequencyHz	SupplyVolt	Enclosure IP.....	Insulation class	Absorbed powerkW /HP

COMMENTS

MONOSTAGE CENTRIFUGAL PUMPS

**MAGNETIC DRIVE
MONOSTAGE CENTRIFUGAL PUMPS**

SELF-PRIMING CENTRIFUGAL PUMPS

**MAGNETIC DRIVE
SELF-PRIMING CENTRIFUGAL PUMPS**

MULTISTAGE CENTRIFUGAL PUMPS

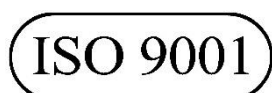
LIQUID RING VACUUM PUMPS

LIQUID RING COMPRESSORS

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

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Smontaggio TRMB-TRVB Inglese

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



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