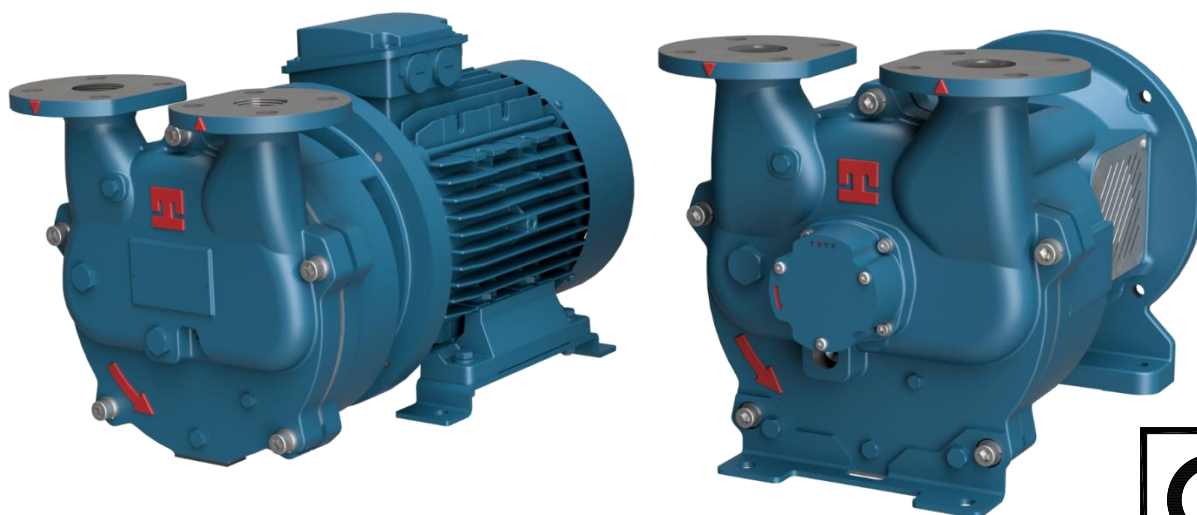


**DISASSEMBLY AND
ASSEMBLY INSTRUCTIONS
FOR
LIQUID RING VACUUM PUMPS
SINGLE STAGE
WITH MECHANICAL SEAL

TRMX 400 ÷ 500
TRVX 400 ÷ 500**



INTRODUCTION

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

TRMX 403 – 405 – 407

TRVX 403 – 405 – 407

TRMX 503

TRVX 503

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 2014/34/EC 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 2014/34/EC directive it is available a dedicated integrative manual.

Nel redigere il presente manuale è stato fatto ogni sforzo per aiutare al meglio l'utilizzatore nell'uso più corretto della pompa o del sistema per evitare qualsiasi possibile utilizzo inopportuno o danno accidentale. Qualora ci fossero incomprensioni, difficoltà od errori, vogliate cortesemente segnalarceli.

1.1 – DISASSEMBLY OF PUMP SERIES “TRMX”

Remove the socket head screws VDMA 914.1 that connect the suction/discharge casing VDMA 101 to the impeller casing, that so could be removed from the rest of the pump together with the port plate VDMA 137.

Remove the locking screw VDMA 900 to separate the port plate VDMA 137 from the casing VDMA 101. Check that the internal side of the suction/discharge casing does not have defects (wear, corrosion, cracks, etc.). Unscrew the two socket head screws VDMA 914 to remove the reed valve VDM 409 checking for integrity and the valve plate VDMA 272. It is possible to remove the centering pins VDMA 562.

Using an appropriate wrench unscrew the impeller locking slotted locknut VDMA 923A or the two locknuts VDMA 923 for stainless steel version, holding the impeller still. Remove the impeller VDMA 230 from the shaft checking that no damages or wear are present and be careful that the mechanical seal locating ring VDMA 485 may come back.

Remove the key VDMA 940, the locating ring VDMA 485 and the rotating part of the mechanical seal.

Remove from the motor flange the screws VDMA 901 that keep together the impeller casing VDMA 168 and remove it from the shaft being careful for the stationary part of the mechanical seal.

If any remove the screws VDMA 900.1 that fixed the motor flange coupling VDMA 347. It is now possible to remove the guard VDMA 681 loosening the screws VDMA 914B.

From the impeller casing apply a light pressure to remove the stationary part of the mechanical seal and the pin VDMA 562.1 if any.

Proceed with the inspection of the parts to check the wear level and integrity of each component that may have to be changed (use only POMPETRAVAINI original spare parts).

It is a good practice to change all the components (mechanical seal, seals, o-rings, etc.) that show any wearing sign.

1.2 – DISASSEMBLY OF PUMP SERIES “TRVX 400”

After removing the electric pump unit from the system, proceed, if necessary, to dismantle the motor.

Remove the screws VDMA 901.1 that hold the motor with the motor lantern VDMA 341, with the motor will come out the half coupling command side VDMA 861.1.

If present unscrew the screws VDMA 900.1 that keep the motor coupling flange VDMA 347. It is now possible to remove the coupling guards VDMA 681.B loosening the screws VDMA 914B.

To proceed, we recommend positioning the pump vertically, placing the support flange on a suitable surface.

Unscrew the socket head screws VDMA 914.1 which join the suction/pressure casing VDMA 101 to the impeller cover, which can thus be detached from the rest of the pump together with the plate VDMA 137.

Remove the hex socket countersunk head cap screw VDMA 900 to separate the VDMA 137 port plate from the VDMA 101 casing.

Check that the internal part of the suction/pressure casing does not present any anomalies (wear, corrosion, breakages, etc.). Unscrew the two VDMA 914 socket head screws to remove the VDM 409 reed valve, checking that it is intact, and the VDMA 272 valve guard plate. It is also possible to remove the VDMA 562 centering pins.

Using the appropriate wrench, unscrew the VDMA 923A impeller locknut (or the 2 VDMA 923 locknut if in stainless steel version), holding the impeller still. Remove the VDMA 230 impeller from the shaft, checking that it too does not present any anomalies and/or wear and paying attention that the VDMA 485 mechanical seal locating ring could also move back. Remove the key VDMA 940, the locating ring VDMA 485 and the rotating part of the mechanical seal.

Unscrew the hex screws VDMA 901 holding the impeller cover to the motor lantern VDMA 341 and remove it from the shaft, paying attention to the fixed part of the mechanical seal.

It is then possible to remove the VDMA 681 guard by unscrewing the hex socket button head screws VDMA 914B when present.

From the impeller cover, using light pressure, remove the fixed part of the mechanical seal and the retaining pin VDMA 562.1 if present.

Place the pump horizontally and on the drive side loosen the grub screw VDMA 904B.1 of the coupling half and remove the half coupling and the VDMA 904B.1 grub screw. Proceed to unscrew the socket head screws VDMA 914.2 and then the nuts VDMA 920 from the grub screws VDMA 904B. By initially screwing in the VDMA 904B grub screws and manually pushing the VDMA 210 shaft from the impeller side, it is possible to remove the entire shaft and bearing assembly from the support in the direction of the motor.

From the support it is possible to remove the lower guard VDMA 681B.1 by unscrewing the two screws 914B and remove the guard 681B.2 by unscrewing its screws VDMA 914B.

Moving on to the shaft assembly, it is possible to remove the VDMA 427 seal ring and the shaft circlip VDMA 932 from the impeller side and then remove the VDMA 320 bearing from the impeller side.

Remove the bore circlip VDMA 936 and the shoulder ring VDMA 505 from the seat in the bearing cover, remove the bearing cover VDMA 360 and remove the sealing v-ring VDMA 427.1. Using the appropriate wrench, unscrew the VDMA 923A.1 locknut which blocks the VDMA 320 bearing and remove it.

Proceed with the inspection of the parts to check the wear level and integrity of each component that may have to be changed (use only POMPETRAVAINI original spare parts).

It is a good practice to change all the components (mechanical seal, seals, o-rings, etc.) that show any wearing sign.

1.3 – DISASSEMBLY OF PUMP SERIES “TRVX 500”

After removing the electric pump unit from the system, proceed, if necessary, to dismantle the motor.

Unscrew the VDMA 901.1 screws that hold the motor mounted to the pump support and remove it. The VDMA 861.1 motor side half coupling will also be removed with the motor.

If present, unscrew the VDMA 900.1 hex screws that mount the VDMA 347 adapter flange to the motor. It is then possible to remove the guards from the VDMA 681.B lantern by unscrewing the VDMA 914B screws.

To proceed, we recommend positioning the pump vertically, placing the support flange on a suitable surface.

Unscrew the retaining screws VDMA 914B.1 and remove the bearing cover VDMA 365. Remove the circlip VDMA 932.

Unscrew the socket head screws VDMA 914.3 from the bearing housing VDMA 357 and use them in the threaded holes in the housing to remove the bearing assembly VDMA 320.1, the support washer VDMA 505.2 and the stationary part of the mechanical seal from the pump shaft. Removes the rotating part of the mechanical seal from the shaft.

Unscrew the socket head screws. VDMA 914.1 which join the suction/pressure casing VDMA 101 to the impeller cover, which can thus be detached from the rest of the pump together with the plate VDMA 137.

Remove the grub screw VDMA 904A and the socket head screw VDMA 914.2 to separate the VDMA 137 port plate from the VDMA 101 pump casing. Check that the internal part of the suction/discharge casing does not present any anomalies (wear, corrosion, breakages, etc.). Unscrew the two VDMA 914 socket head screws to remove the VDM 409 valve gasket, checking that it is intact, and the VDMA 272 valve plate. It is also possible to remove the VDMA 562 centering pins.

Using the appropriate wrench, unscrew the VDMA 923A impeller locknut (or the 2 VDMA 923 locknuts if in stainless steel version), holding the impeller still. Remove the VDMA 230 impeller from the shaft, checking that it too does not present any anomalies and/or wear and paying attention that the VDMA 485 mechanical seal locating ring could also move back.

Remove the key VDMA 940, the locating ring VDMA 485 and the rotating part of the mechanical seal.

Unscrew the hex screws VDMA 901 holding the impeller cover from the support and remove it from the shaft, paying attention to the fixed part of the mechanical seal.

It is then possible to remove the VDMA 681 guard by unscrewing the VDMA 914B screws when present.

From the impeller cover, apply a light pressure and remove the fixed part of the mechanical seal and the retaining pin VDMA 562.1 if present.

Place the pump horizontally and from the drive side loosen the grub screw VDMA 904B.1 of the half coupling and remove the it and the key VDMA 904B.1. Proceed to unscrew the socket head screws VDMA 914.2 and then the nuts VDMA 920 from the grub screws VDMA 904B. By initially screwing in the VDMA 904B grub screws and manually pushing the VDMA 210 shaft from the impeller side, it is possible to remove the entire shaft and bearing assembly from the support in the direction of the motor.

From the support it is possible to remove the lower guard VDMA 681B.1 by unscrewing the two socket head screws 914B and remove the guard 681B.2 by unscrewing its screws VDMA 914B.

Moving on to the shaft assembly, applying light pressure to overcome the force of the VDMA 951 wave ring, it is possible to remove the VDMA 936 circlip ring and the VDMA 505 ring from the seat in the bearing cover, then remove the shaft from the VDMA 360 bearing cover.

From the drive side, remove the sealing v-ring VDMA 427 and the wave ring VDMA 951, using the appropriate wrench, unscrew the locknut VDMA 923A.1 which blocks the VDMA 320 bearing and remove it.

Proceed with the analysis of the parts to be replaced (only with original POMPETRAVAINI spare parts) after having checked the degree of wear and integrity of each component.

It is good practice to replace all components (mechanical seal, gaskets, etc.) that show obvious signs of wear.

2.1 – ASSEMBLY OF THE PUMPS SERIES TRMX 400 & 500

Carefully clean all dismantled parts that are to be reused with suitable equipment and liquids compatible with the pump and elastomer material. Start assembly by screwing 2 G1/4 VDMA 903 plugs, 1 G1/8 VDMA 903.1 plu and 1 G3/8 VDMA 903.2 plu onto the VDMA 101 suction/discharge casing using sealant (such as Superbond 525) and gluing the VDMA 892A anti-vibration shim with instant adhesive (such as Loctite 480). Screw a G1/4 VDMA 903 plug into the VDMA 168 impeller cover. Remember to remove the excess sealant.

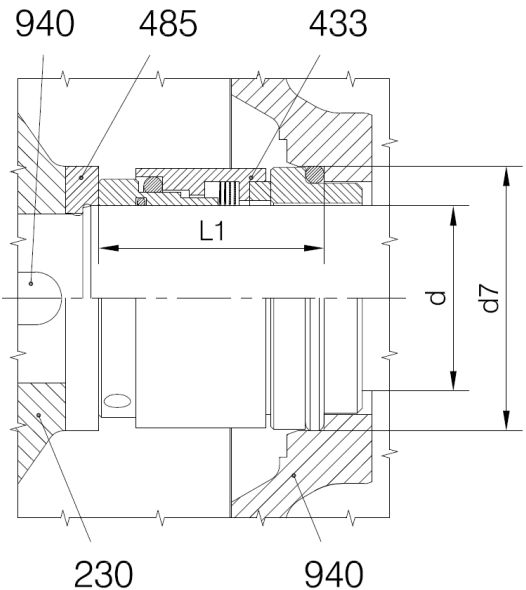
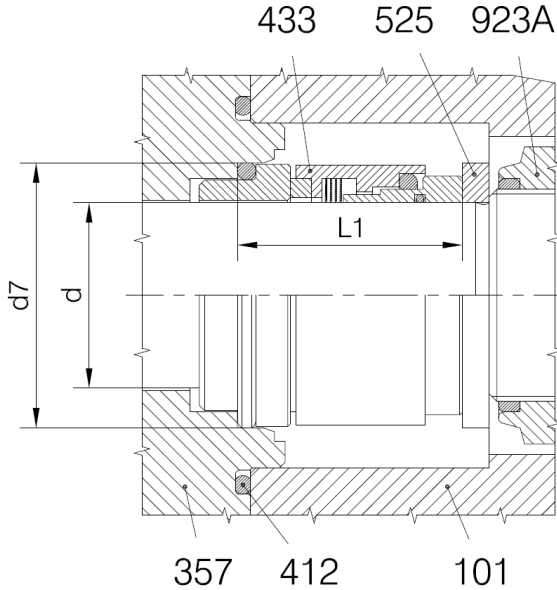
Proceed by inserting the fixed part of the VDMA 433.2 mechanical seal into the VDMA 168 impeller covers after having lubricated the o-ring with a compatible liquid; if the seal is of the long tail type, also fit the VDMA 562.1 pin (for the dimensions of the mechanical seals see Fig. 1 and Fig. 2 and Tab. 1).

Take the VDMA 137 suction/discharge port plate and place it on a surface with the suction opening (the larger one) on the left. Secure reed valve VDMA 409 and valve guard plate VDMA 272 in place over the discharge opening on the right with socket head screws VDMA 914 with the VDMA 557 grover washers.

It is advisable to tighten the screws with the established torque (Tab. 4) to avoid deformation of the valve and to use an anaerobic adhesive or a medium strength threadlocker (such as Superbond 320). Check that the valve blades rest correctly on the plate surface and close the passage holes well. If the screws are tightened too much, the valve blades tend to lift.

Check that the ends of the two screws do not protrude from the other face of the plate. If this is the case, the two screws must be shortened or changed.

If a reduction flange VDMA 347 is provided, mount the VDMA 681 guard in the flange with the rounded socket screws VDMA 914B. Then fix the reduction flange to the VDMA 168 impeller cover using the socket countersank head cap screws VDMA 900.1.

Fig. 1 - Typical design of drive side mechanical seal TRMX 400 & 500 TRVX 400 & 500 (*)	Fig. 2 - Typical design of non-drive side mechanical seal TRVX 500
	
(*)The TRVX 500 series pump has a construction with bilateral impeller support and therefore 2 mechanical seals. One also on the opposite side of the control. See Fig.2.	

Place the VDMA 801 electric motor in a vertical position, mount the VDMA 892 feet with the hexagonal head screws. VDMA 901.1, VDMA 920 nuts, VDMA 554.1 washers and VDMA 557 grover washers.

Fix the impeller cover to the flange using the hexagonal head screws. VDMA 901 and related VDMA 554 washers, keeping the holes for the VDMA 562 pins oriented towards the opposite side to the feet of the electric motor and avoiding shift of the fixed part of the mechanical seal.

Do not completely tighten the 4 hexagonal head screws. VDMA 901.

Check that the VDMA 230 impeller is lower than the height of the housing in the VDMA 168 impeller cover into which it will be inserted (for tolerances see Fig. 3). If the impeller is higher, it will be necessary to reduce it by machining.

Lightly lubricate the shaft and the internal part of the mechanical seal with silicone grease to facilitate sliding.

Clean the faces of the stationary and rotating parts of the mechanical seal with compatible thinner and cellulose paper. Fit the rotating part of the mechanical seal and push it against the stationary part. Check that the spring is free to compress and relax.

Fit seal locating ring VDMA 485 and key VDMA 940. Fit impeller VDMA 230 onto the shaft and tighten locknuts VDMA 923A.

Place the pump horizontally and check with a depth gauge that the distance between the front face of the VDMA 230 impeller and the support surface of the VDMA 137 port plate on the VDMA 168 impeller cover complies with table 2. Repeat the measurement at least 3 times, rotating the impeller approximately 120° each time.

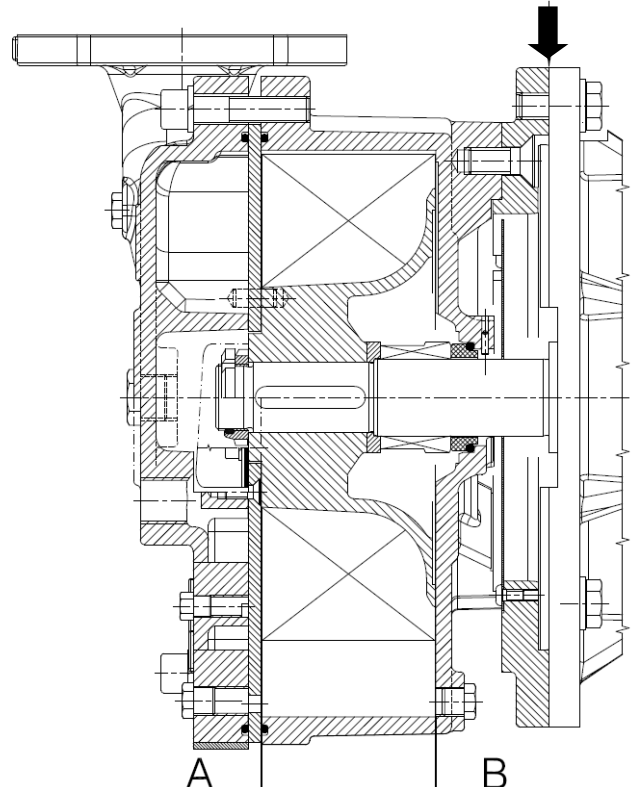
If necessary it is possible to increase or decrease the air between the VDMA 230 impeller and the VDMA 137 port plate. To increase the air, position the motor vertically. Loosen the VDMA 901 screws that join the impeller cover to the motor and place the appropriate shims in the support sections between the impeller cover and the motor. Tighten the VDMA 901 screws again, place the motor horizontally and repeat the measurement to verify the correct result.

To reduce the air, position the motor vertically. Loosen the VDMA 923A impeller locknut and remove the VDMA 230 impeller, the VDMA 940 key and add a ring of the appropriate thickness on the surface of the VDMA 485 locating ring. Refit the VDMA 940 key, the VDMA 230 impeller and secure it again with the VDMA 923A locknut (or with 2 VDMA 923 locknuts and Superbond 320 type sealant on the second ring nut, if execution A3). Put the motor back horizontally and repeat the measurement to verify the correct result.

Place the VDMA 101 pump casing on a surface with the internal side facing up. Insert the 2 pins VDMA 562 and fit the VDMA 412 o-ring in its seat. Place the VDMA 137 port plate on the casing with the non-valved side facing upwards and fit it onto the VDMA 562 pins. Fix the port plate to the casing with the hex socket countersunk head cap screw VDMA 900, tightening with the recommended torque (see Tab. 4) and applying a drop of medium strength adhesive or threadlocker (such as Superbond 320). Make sure that the screw head does not protrude from the surface of the plate. Fit the VDMA 412 o-ring in its seat in the VDMA 168 impeller cover; if needed to keep the o-ring in position it is possible to apply a minimum quantity of compatible grease in the o-ring seat.

Apply the VDMA 101 casing and VDMA 137 plate assembly to the VDMA 168 impeller cover, centering it on the VDMA 562 pins. You can help yourself by lifting the casing with bands appropriately positioned around the suction and discharge ports. To fix the VDMA 101 casing to the VDMA 168 impeller cover, use 5 socket head screws VDMA 914.1 and corresponding grower washers VDMA 557.1. Before completely tightening the screws, check the correct orientation of the VDMA 101 pump casing by placing a level on the flanges and checking that it is horizontal, then tighten, the tightening torque is indicated in Tab.4.

Check that the pump turns freely by hand by acting on the motor shaft from the fan side, inserting a screw into the shaft itself that serves the purpose. To check the hydraulic tightness of the pump, carry out a hydrostatic test with a maximum pressure of 3 bar, approximately 2 hours later to let the glue dry.

Tab. 1 DIMENSIONS FOR MECHANICAL SEALS (IN MM)		Fig. 3 AIR IN THE PUMPS AND POSITION OF SHOULDERS	
PUMP TYPE	Dimensions		
TRMX 403 TRMX 405 TRMX 407 TRMX 503 TRVX 403 TRVX 405 TRVX 407 TRVX 503	L1 = 42,5mm d = 35mm d7 = 50mm (Fig.1)		
TRVX 503	L1 = 42,5mm d = 35mm d7 = 50mm (Fig.2)		
Tab. 2 ALLOWABLE AIR IN THE PUMPS			
PUMP TYPE	Gap (tolerance 0/+0,05mm)		
TRMX 403 TRMX 405 TRMX 407 TRMX 503 TRVX 403 TRVX 405 TRVX 407 TRVX 503	A = 0,1mm B = 0,2mm		
TRVX 503	A = 0,15mm B = 0,25mm		
		The arrow indicates the insertion position of the shoulders.	

Tab.3 BEARING TYPES AND DIMENSIONS			
PUMP TYPE	DRIVE SIDE	OPPOSITE DRIVE SIDE	
TRVX 400	N° 2 6208-2Z (40x80x18)	--	
TRVX 500	N°1 6306-2RS (72x30x19)	N°1 6208-2Z (40x80x18)	

2.2 – ASSEMBLY OF THE PUMPS SERIES TRVX 400

Carefully clean all dismantled parts that are to be reused with suitable equipment and liquids compatible with the pump and elastomer material. Start assembly by screwing 2 G1/4 VDMA 903 plugs, 1 G1/8 VDMA 903.1 plug and 1 G3/8 VDMA 903.2 plug onto the VDMA 101 suction/discharge casing using sealant (such as Superbond 525) and gluing the VDMA 892A anti-vibration shim with instant adhesive (such as Loctite 480). Screw a G1/4 VDMA 903 plug into the VDMA 168 impeller cover. Remember to remove the excess sealant.

Proceed by inserting the fixed part of the VDMA 433.2 mechanical seal into the VDMA 168 impeller cover after having lubricated the o-ring with a compatible liquid; if the seal is of the long tail type, also fit the VDMA 562.1 pin (for the dimensions of the mechanical seals see Fig. 1 or 2 and Tab. 1).

Take the VDMA 137 suction/discharge plate and place it on a surface with the suction opening (the larger one) on the left. Secure reed valve VDMA 409 and valve guard plate VDMA 272 in place over the discharge opening on the right with socket head screws VDMA 914 with the VDMA 557 grover washers.

It is advisable to tighten the screws with the established torque (Tab. 4) to avoid deformation of the valve and to use an anaerobic adhesive or a medium strength threadlocker (such as Superbond 320). Check that the valve blades rest correctly on the plate surface and close the passage holes well. If the screws are tightened too much, the valve blades tend to lift.

Check that the ends of the two screws do not protrude from the other face of the plate. If this is the case, the two screws must be shortened or changed.

Move on to preparing the support.

Place the shaft of the VDMA 210 pump in a vice with the drive side accessible. If new bearings are to be fitted then the bearings must be washed with a degreaser, left to dry and then oiled.

To facilitate their reassembly on the shaft it is advisable to heat them separately to around 80°C.

Start from the drive side bearing VDMA 320 (note: the two bearings are the same) and insert it onto the shaft until it comes into contact with the internal washer. If necessary you can use a tube tool to push on the internal fifth wheel. Once at the stop, lock in position with the VDMA 923A.1 locknut using the appropriate key. Then insert the sealing ring VDMA 427.1. Place the VDMA 951 spring wave ring in the VDMA 360 adjustment cover and place the shaft with the bearing on top of it. Add the VDMA 505 adjustment washer and the VDMA 936 circlip. Compress the snap ring with the shaft until the VDMA 936 circlip ring can be fitted into the seat in the VDMA 360 bearing cover. If necessary, a press can be of assistance.

If provided, insert the VDMA 505.1 shoulder ring into the opposite side of the shaft (impeller side).

Then introduce the VDMA 320 bearing, position the VDMA 932 circlip ring and insert the VDMA 507 splash guard ring. Insert the shaft with the ball bearings into the VDMA 331 support from the drive side and tighten the socket head screws VDMA 914.2. Place the support with the shaft in a vertical position with the side opposite the control upwards and mount the VDMA 681B sheet metal guard on the shaft passage, fixing it with the rounded socket head screws VDMA 914B, then mount the other VDMA 681B and 681B sheet metal guards. 1 always fixing them with VDMA 914B screws.

Lubricate the seat with a compatible liquid (for example silicone grease or vaseline), fit the fixed part of the mechanical seal into the VDMA 168 impeller cover by applying light pressure and checking that it is fully seated. If the seal is of the long tail type ensure that the VDMA 562.1 retaining pin is centered. Clean the face of the fixed part of the mechanical seal with a suitable detergent and cellulose paper. Mount the VDMA 168 impeller cover on the support, taking care not to hit the shaft with the fixed part of the mechanical seal. Secure it with hexagonal head screws VDMA 901 and VDMA 554 washers.

Clean the face of the rotating part of the mechanical seal with suitable detergent and cellulose paper.

Lubricate the pump shaft and the inside of the rotating part of the mechanical seal with compatible liquid, then fit it onto the shaft until it comes into contact with the stationary part. Be careful not to damage the mechanical seal.

Once at the stop, check that the tail of the rotating part of the mechanical seal is free to slide on the shaft.

Insert the mechanical seal locating ring VDMA 485 and the key VDMA 940 into the seat on the shaft. Mount the VDMA 230 impeller on the shaft and secure it with the VDMA 923A locknut (or with 2 VDMA 923 locknuts and Superbond 320 type sealant on the second ring nut, if version A3).

Loosen the socket head screws VDMA 914.2 of the VDMA 360 adjustment cover until they can be turned manually, then screw the VDMA 904B grub screws until the back of the VDMA 230 impeller comes into contact with the surface of the VDMA 168 impeller cover. Fit on the VDMA 904B grub screws. the VDMA 920 retaining nuts with their VDMA 557.2 grover washers.

Place the VDMA 101 pump casing on a surface with the internal side facing up. Insert the 2 VDMA 562 pins and fit the VDMA 412 o-ring in its seat (the two o-rings are the same). It may be useful to apply a little compatible grease to the O-ring seat to hold it in place. Position the VDMA 137 plate on the casing with the side without the valve facing upwards and fit it onto the VDMA 562 pins and secure it to the VDMA 101 pump casing with the countersunk flat head screw VDMA 900, applying a drop of medium-strength adhesive or threadlocker (such as Superbond 320), the recommended tightening is in Tab.4. Make sure that the screw head does not protrude from the surface of the plate.

Fit the VDMA 412 o-ring in its seat in the VDMA 168 impeller cover; if necessary, to keep the o-ring in position, you can apply a minimum quantity of compatible grease in the o-ring seat.

Apply the VDMA 101 casing and VDMA 137 port plate assembly to the VDMA 168 impeller cover, centering it on the VDMA 562 pins. You can help yourself by lifting the casing with bands appropriately positioned around the suction and discharge ports. To fix the VDMA 101 casing to the VDMA 168 impeller cover, use 5 socket head screws VDMA 914.1 and corresponding grower washers VDMA 557.1. Before completely tightening the screws, check the correct orientation of the VDMA 101 pump casing by placing a level on the flanges and checking that it is horizontal, then tighten, the tightening torque is indicated in Tab.4.

At the end of assembly, the axial position of the impeller inside the pump must be adjusted.

Tab. 4 - TIGHTENING TORQUE OF THE SCREWS		
Type	VDMA	Torque (Nm)
Hexagonal head screws M12	901	80
Socket head cap screws M12	914.1	80
Socket head cap screws M6	914 & 914.3	7
Socket head cap screws M8	914.2	24
Hex socket button head cap screws M6	914B	10
Hex socket countersank head cap screws M6	137	10

2.2.1 SETTING OF THE PUMPS SERIES TRVX 400

The pumps of the TRVX 400 series are equipped with a VDMA 230 impeller axial position adjustment system within the space between the VDMA 168 impeller cover and the VDMA 137 pressing suction plate. The axial adjustment must be carried out to allow correct operation of the pump and develop the best performance.

Place the pump on a horizontal surface and remove the VDMA 681B side guards to have easy access to the adjustment screws.

Loosen the 2 VDMA 904B grub screws and screw the 2 socket head screws VDMA 914.2 evenly together until the VDMA 230 impeller starts to rub on the VDMA 137 plate. The impeller must not be completely blocked, manual rotation of the shaft must be allowed.

Mount a comparator on the pump by fixing the magnet on one side of the VDMA 331 support and resting the tip on the head of the pump shaft VDMA 210 on the drive side, zero the instrument.

Screw the VDMA 904B screws until the movement of the impeller corresponds to the air required by the pump between the VDMA 230 impeller and the VDMA 137 port plate according to Tab.3.

Now tighten the socket head screws VDMA 914.2 and the stud retaining nuts VDMA 920 well.

To check that the axial adjustment has taken place successfully, act on the drive side shaft by turning it clockwise and at the same time exerting a push towards the opposite drive side and a pull towards the drive side to exclude rubbing of the impeller.

To check the effectiveness of the assembly and the hydraulic seal of the pump after approximately 2 hours, to let the glue dry, carry out a hydrostatic test with a maximum pressure of 3 bar.

2.3 ASSEMBLY OF THE PUMPS SERIES TRMX 500

Carefully clean all dismantled parts that are to be reused with suitable equipment and liquids compatible with the pump and elastomer material. Start assembly by screwing 2 plugs G1/4 VDMA 903, 1 plug G1/8 VDMA 903.1 and 1 plug G3/8 VDMA 903.2 onto the VDMA 101 suction/pressure casing using sealant (such as Superbond 525) and gluing the VDMA 892A anti-vibration shim with instant adhesive (such as Loctite 480). Screw a G1/4 VDMA 903 plug into the VDMA 168 impeller cover. Remember to remove the excess sealant.

Proceed by inserting the fixed part of the mechanical seal VDMA 433.2 into the VDMA 168 impeller covers after having lubricated the o-ring with a compatible liquid; if the seal is of the long tail type, also fit the VDMA 562.1 pin (for the dimensions of the mechanical seals see Fig. 1 or 2 and Tab 1.

Take the VDMA 137 suction/discharge plate and place it on a surface with the suction port (the larger one) on the left. Secure reed seal VDMA 900 and valve guard plate VDMA 272 in place over the right discharge port with socket head screws. VDMA 914 with the grover washers VDMA 557. It is advisable to tighten the screws with the established torque (Tab. 4) to avoid deformation of the valve and to use an anaerobic adhesive or a medium strength threadlocker (such as Superbond 320). Check that the valve blades rest correctly on the plate surface and close the passage holes well. If the screws are tightened too much, the valve blades tend to lift.

Check that the ends of the two screws do not protrude from the other face of the plate. If this is the case, the two screws must be shortened or changed.

Move on to preparing the support.

Place the shaft of the VDMA 210 pump in a vice with the drive side accessible. If new bearings are to be fitted then the bearings must be washed with a degreaser, left to dry and then oiled.

To facilitate their reassembly on the shaft it is advisable to heat them separately to around 80°C.

Start from the VDMA 320 drive side bearing and slide it onto the shaft until it comes into contact with the internal washer. If necessary you can use a tube tool to push on the internal fifth wheel. Once at the stop, lock in position with the VDMA 923A.1 locknut using the appropriate key. Then insert the sealing ring VDMA 427.1. Place the VDMA 951 spring wave ring in the VDMA 360 adjustment cover and place the shaft with the bearing on top of it. Add the VDMA 505 adjustment washer and the VDMA 936 circlip. Compress the spring ring with the shaft until the VDMA 936 circlip ring can be fitted into the seat in the VDMA 360 bearing cover. If necessary, a press can be of assistance.

If provided, insert the VDMA 505.1 shoulder ring into the opposite side of the shaft (impeller side).

Insert the shaft with the ball bearings into the VDMA 341 lantern on the drive side and tighten the socket head screws. VDMA 914.2. Place the lantern with the shaft in a vertical position with the side opposite the control upwards and mount the VDMA 681B and 681B.1 sheet metal guards, securing them with the socket button head screws VDMA 914.B.

Lubricate the seat with a compatible liquid (for example silicone grease or vaseline), fit the fixed part of the mechanical seal into the VDMA 168 impeller cover, applying light pressure and checking that it is fully seated. If the seal is of the long tail type ensure that the VDMA 562.1 retaining pin is centered. Clean the face of the fixed part of the mechanical seal VDMA 433.2 with a suitable detergent and cellulose paper. Mount the VDMA 168 impeller cover on the support, taking

care not to hit the shaft with the fixed part of the mechanical seal. Secure it with hex head screws VDMA 901 and VDMA 554 washers.

Clean the face of the rotating part of the mechanical seal VDMA 433.2 with suitable detergent and cellulose paper.

Lubricate the pump shaft and the inside of the rotating part of the mechanical seal with compatible liquid, then fit it onto the shaft until it comes into contact with the stationary part. Be careful not to damage the mechanical seal.

Once at the stop, check that the tail of the rotating part of the mechanical seal is free to slide on the shaft.

Insert the mechanical seal locating ring VDMA 485 and the key VDMA 940 into the seat on the shaft. Mount the VDMA 230 impeller on the shaft and secure it with the VDMA 923A locknut (or with 2 VDMA 923 locknuts and Superbond 320 type sealant on the second nut, if version A3).

Apply the VDMA 101 casing and VDMA 137 plate assembly to the VDMA 168 impeller cover, centering it on the VDMA 562 pins. You can help yourself by lifting the casing with bands appropriately positioned around the suction and discharge ports. To fix the VDMA 101 casing to the VDMA 168 impeller cover, use 5 socket head screws VDMA 914.1 and corresponding grover washers VDMA 557.1. Before completely tightening the screws, check the correct orientation of the VDMA 101 pump casing by placing a level on the flanges and checking that it is horizontal, then tighten, the tightening torque is indicated in Tab.4.

On the VDMA 357 bearing housing, fit the o-ring VDMA 421.1 (or the mechanical seal housing bush VDMA 547 and the o-ring VDMA 421.1, if in A3 version). Clean the face of the fixed part of the mechanical seal with suitable detergent and cellulose paper. Lubricate the seat of the mechanical seal VDMA 433.1, fixed part, in the bearing housing VDMA 357 and fit the fixed part ensuring that it is correctly in position and the retaining pin VDMA 562.1 if present.

On the shaft add the shoulder ring VDMA 505. Clean the face of the rotating part of the mechanical seal VDMA 433.1 with suitable detergent and cellulose paper. Lubricate the pump shaft and the inside of the rotating part of the mechanical seal with compatible liquid and insert it onto the shaft, check that it is free to slide.

Mount the bearing housing VDMA 367 on the pump casing VDMA 101 and secure it with the 4 socket head screws VDMA 914.3 and their grover washers VDMA 557.3. Fit the radial shaft seal ring VDMA 421.1 into the bearing housing and the adjusting ring VDMA 505.2 onto the shaft. Heat the non-drive side bearing VDMA 320.1 and fit it on the shaft, centering it in the bearing box VDMA 357. Lock it in place with the circlip ring VDMA 932.

2.3.1 AXIAL SETTING OF THE PUMPS SERIES TRVX 500

The pumps of the TRVX 500 series are equipped with an impeller axial position adjustment system within the space between the VDMA 168 impeller cover and the VDMA 137 pressing suction plate. The axial adjustment must be carried out to allow correct operation of the pump and develop the best performance.

Place the pump on a horizontal surface and remove the VDMA 681B side guards to have easy access to the adjustment screws.

Loosen the 2 VDMA 904B grub screws and screw the 2 socket head screws VDMA 914.2 evenly together until the VDMA 230 impeller starts to rub on the VDMA 137 plate. The impeller must not be completely blocked, manual rotation of the shaft must be allowed.

Mount a comparator on the pump by fixing the magnet on the pump and placing the tip on the head of the VDMA 210 pump shaft on the side opposite the control and zero the instrument.

Loosen the 2 socket head screws VDMA 914.2 and together screw in the 2 grub screws VDMA 904B until the impeller rubs on the internal face of the VDMA 168 impeller cover. The impeller must not be completely blocked, manual rotation of the shaft must be allowed. In this way the total air inside the pump will be read on the dial indicator, position the impeller at the allowed distances according to Tab.2 by acting on the VDMA 914.2 socket head screws and the VDMA 904B grub studs. Then fully tighten the VDMA 920 nuts located on the grub screws.

To check that the axial adjustment has taken place successfully, act on the drive side shaft by turning it clockwise and at the same time exerting a push towards the opposite drive side and then a pull towards the drive side to exclude rubbing of the impeller.

Fit the VDMA 365 bearing cover to the VDMA 357 bearing housing using screws VDMA 914B.1.

The VDMA 681B guards can then be mounted, fixed with the VDMA 914B screws on the VDMA 341 motor lantern.

To check the effectiveness of the assembly and the hydraulic seal of the pump after approximately 2 hours, to let the sealant dry, carry out a hydrostatic test with a maximum pressure of 3 bar.

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 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 “TRMX”

- 1 Impeller
- 1 Mechanical seal
- 1 Electric motor
- 2 O-rings

Pump series “TRVX”

- 1 Impeller
- 1 Shaft assembly
- 2 Ball bearings
- 1 Mechanical seal (2 for TRVX 500)
- 1 V-Ring
- 2 O-rings
- 1 Set of coupling inserts

For better parts management, the VDMA 24296 standards suggest to stock a 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 – NOMENCLATURE OF PUMPS COMPONENTS

VDMA N°	NAME
101	Suction/discharge casing
137	Suction/discharge port plate
168	Impeller casing
183	Support foot
210	Schaft
230	Impeller
272	Reed valve guard plate
320...	Bearing
330	Bearing bracket
341	Motor lantern
347	Motor coupling flange
357	Mechanical seal and bearing housing
360	Bearing cover
365	Bearing shield
409	Reed valve
412...	O-ring seal
421...	Radial schaft seal ring (angus)
427	V-ring seal
485	Mechanical seal locating ring
505...	Shoulder ring

VDMA N°	NAME
547	Mechanical seal housing bush
554	Flat washer
557	Rondella Grower
562	Parallel pin
681...	Coupling guard
861	Half coupling
892...	Raising pad
900	Hex socket countersunk head cap screw
901...	Hex head screw (TE)
903...	Threaded plug
904...	Grub screw
914...	Hex socket head cap screw (TCEI)
914B	Hex socket button head screw (TBEI)
920	Hex nut
923	Slotted locknut
923A	GUK Slotted locknut
932	Circlip for shaft
936	Circlip for bore
940...	Key
951	Spring wave ring

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.



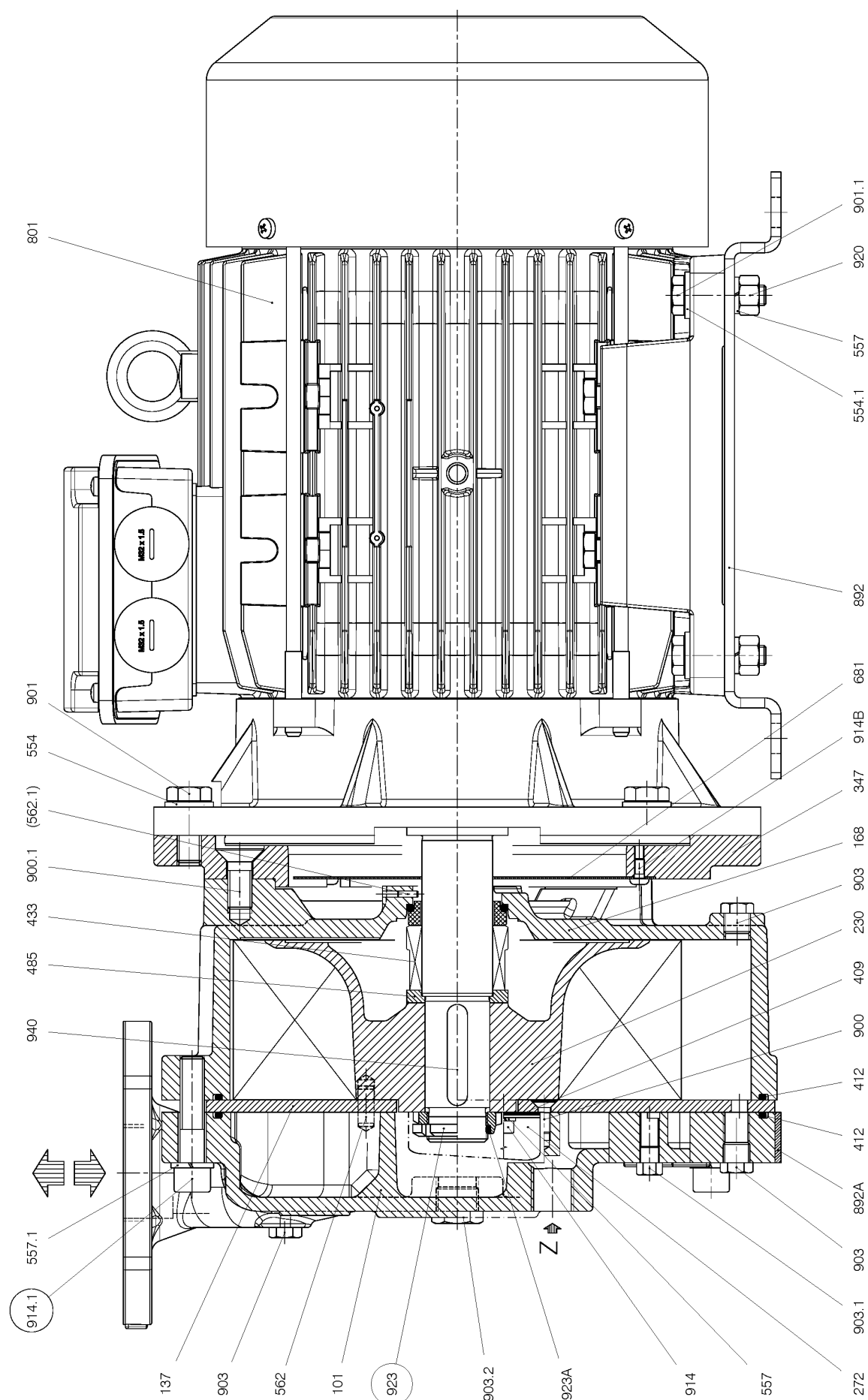
The electrical pump assembly supplied by Pompetravaini Spa that should be discontinued from use must not be disposed with common waste because it is composed of different materials that can be recycled at the appropriate facilities. If it is not intended to proceed autonomously at the management of the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

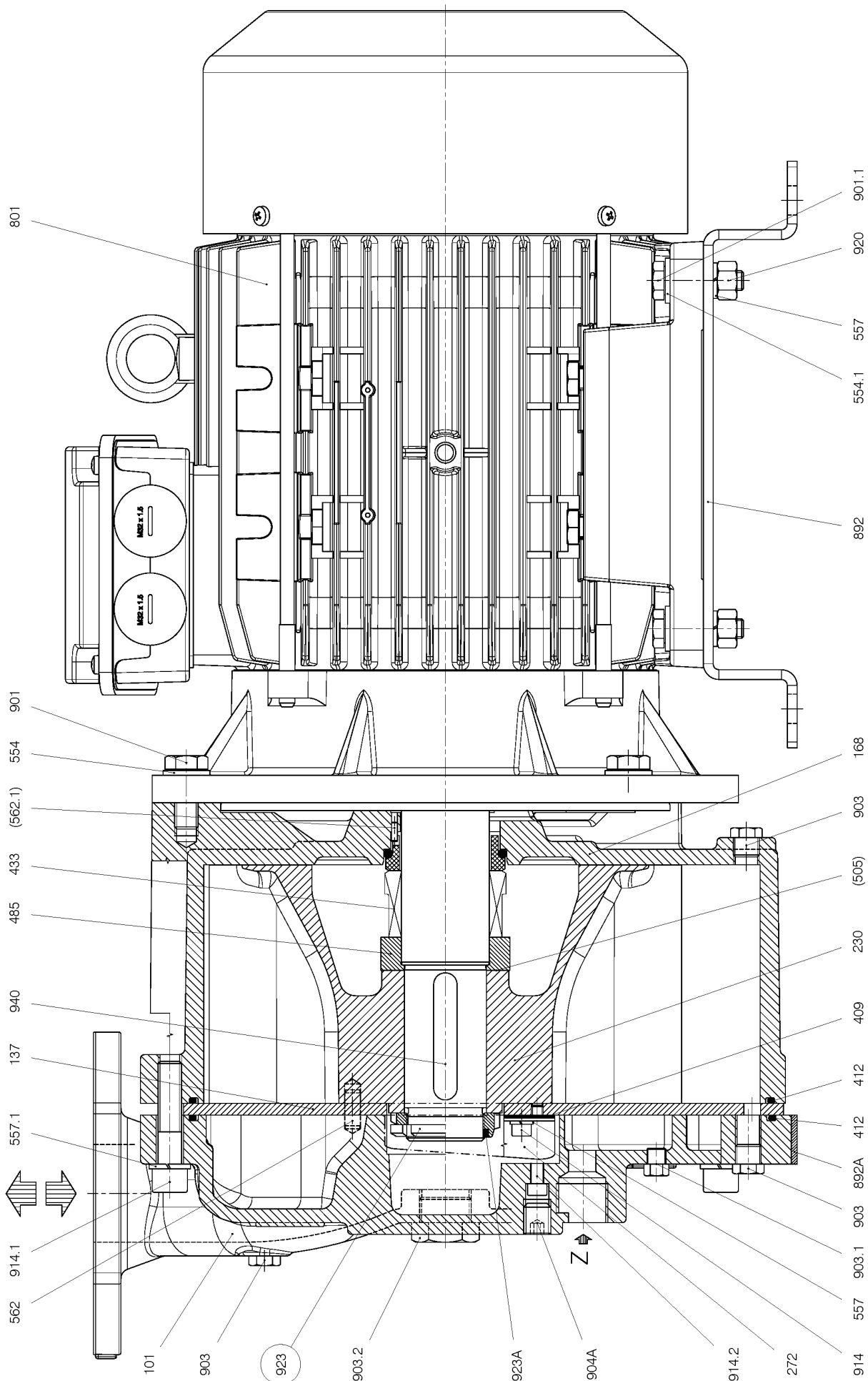
Sending the electrical pump assembly to an adequate process of disposal and recovery of materials protect the environment and help to limits consumption of available resources with effective recycling of materials.

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



TRMX 403,405,407 (Motor frame 110,112,132)

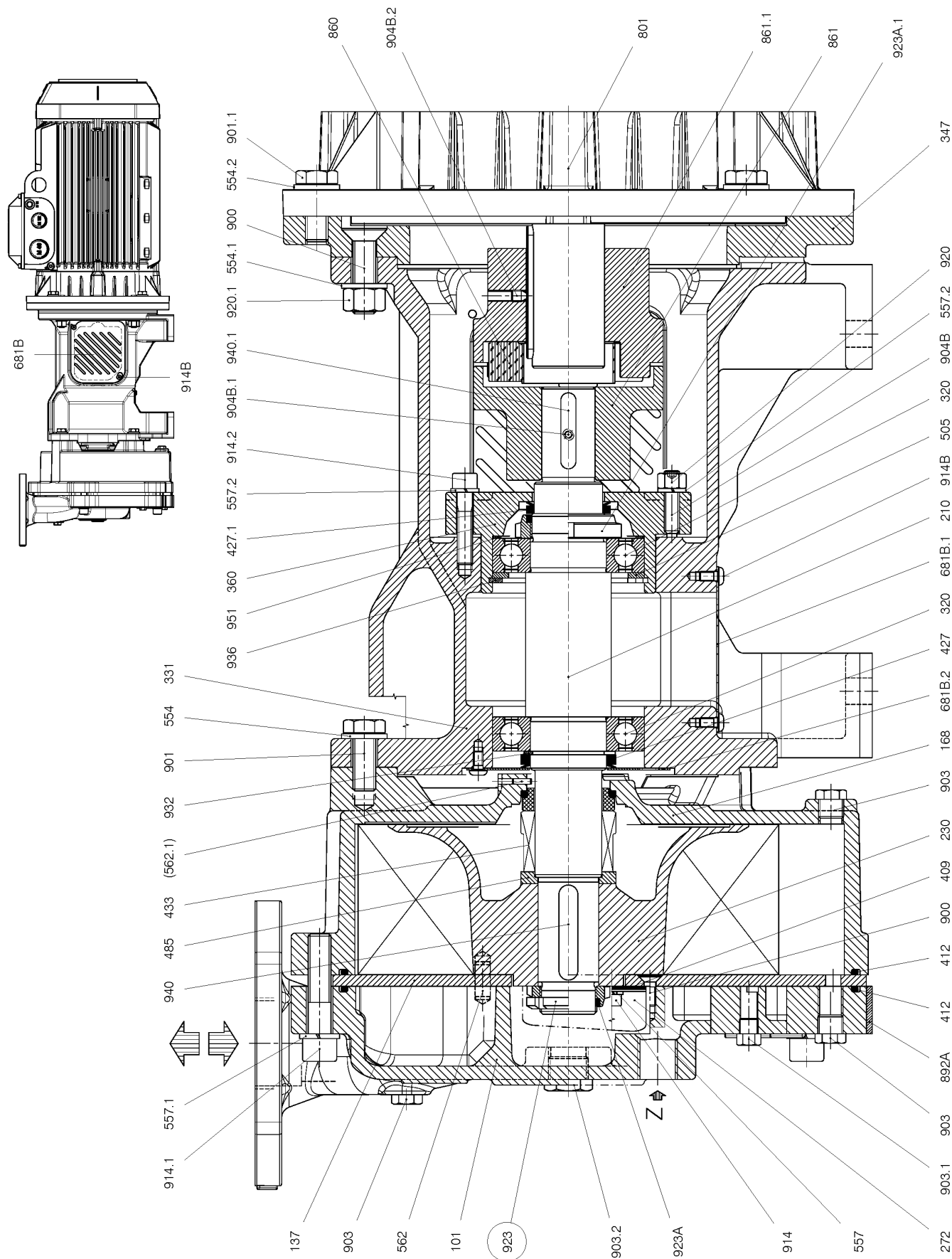
○ Applicable only for stainless steel (A3)



TRMX 503 (Motor frame 132)

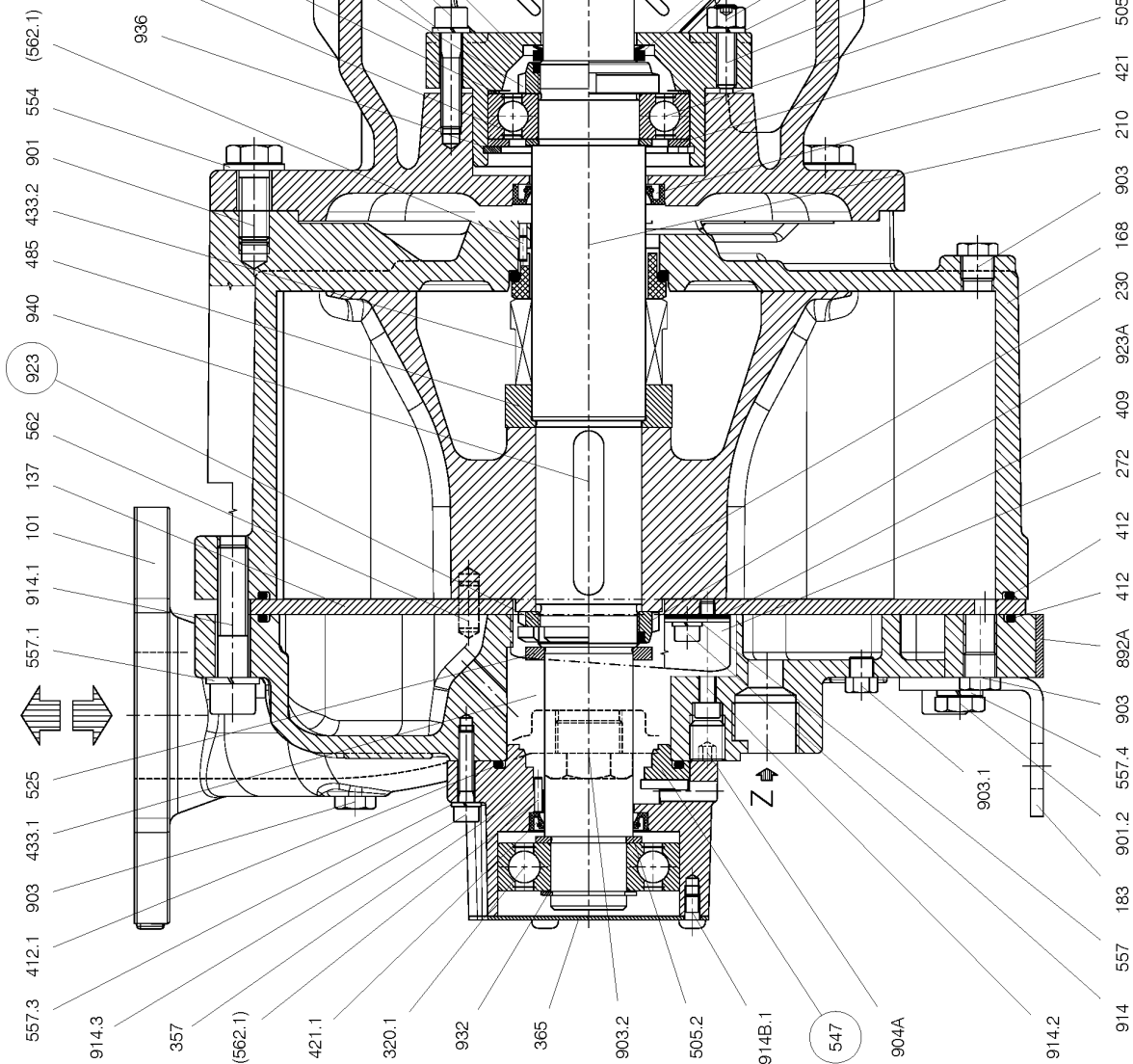
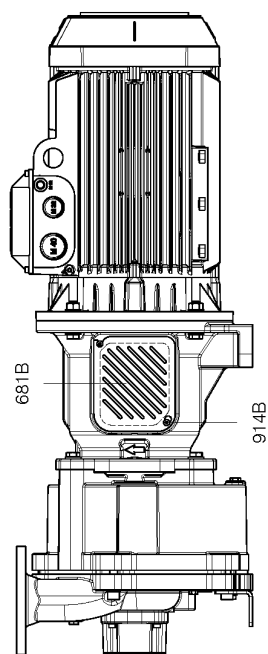


Applicable only for stainless steel (A3)



TRVX 403,405,407 (Motor frame 110,112,132)

○ Applicable only for stainless steel (A3)



TRVX 5030 (Motor frame: 132)

○ Applicable only for stainless steel (A3)

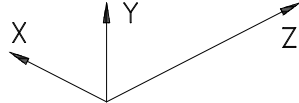
NOTES

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 WEIGHTKG.

MAXIMUM DIMENSIONS 	X =cm Y =cm Z =cm
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NOISE (measured at 1m)	
Pressure	=dB(A)
Power	=dB(A)

INSTALLATION	
☐ Inside	☐ Outside
☐ Explosive area	☐

SERVICE	
☐ Continuous	☐ Intermittent
☐	

MOTOR type / Frame	N° Poles	N° 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

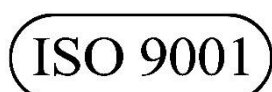
LIQUID RING VACUUM PUMPS

LIQUID RING COMPRESSORS

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

NA5.SM.TRMV.I000 / STAMPATO IN ITALIA
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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