DISASSEMBLY AND ASSEMBLY INSTRUCTIONS FOR MAGNETIC DRIVE MULTISTAGE SELF-PRIMING CENTRIFUGAL PUMPS

TBK - TBAK
INTRODUCTION

These instructions are for the maintenance personnel for maintenance and/or repair of the indicated pump series. Disassembly and assembly procedures should be carried out by qualified personnel. Prior to working on the pumps the maintenance person should be fully knowledgeable of the material outlined in this manual. Instructions relating to safety of operation, installation and maintenance will be found in the “OPERATING MANUAL FOR CENTRIFUGAL PUMPS” and in the “DISASSEMBLY AND ASSEMBLY INSTRUCTIONS FOR SELF-PRIMING MULTISTAGE CENTRIFUGAL PUMPS” which is usually supplied with the pump or it can be requested from your POMPETRAVAINI representative.

CAUTION!

Pumps series TBK and TBAK create a high magnetic field. Personnel should take proper precautions if they are wearing pace-makers or if they are using instrumentation sensitive to magnetic fields.

The listed below minimum distances must be kept:

- When the magnetic rotor parts are disassembled:
  
  - users of pace-maker = 2 meters
  - floppy disk; magnetic cards, etc. = 1 meter

- When the magnetic rotor is mounted in the pump:
  
  - users of pace-maker = 1 meter
  - floppy disk; magnetic cards, etc. = 0.5 meter

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

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

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. POMPETRAVAINI will not and cannot be responsible for work done on the pump by the customer or non-authorised personnel.

NOTE: Pump parts are identified by item numbers (VDMA). Item numbers can be found in the parts list under chapter 10 and cross-referenced with the sectional drawings under chapter 11.

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4 - “TBK” and “TBAK” pump series support disassembly
5 - Complete disassembly for pumps series “TBK”
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8 - Assembly of “TBK” and “TBAK” pumps series
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The liquids and gas 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 strictly forbidden proceed to start up the pumps but necessary to consult POMPETRAVAINI for clarifications.

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

In preparing this manual, every possible effort has been made to help the customer and operator with the proper installation and operation of the pump. Should you find errors, misunderstandings or discrepancies please do not hesitate to bring them to our attention.
1 – ACTION TO BE TAKEN PRIOR PUMP DISASSEMBLY

Prior starting disassembly activities it is required:
- Shut down the pump following usual shut down procedures.
- Disconnect electric motor from electric supply in order to make sure that it may accidentally start up.
- Close valves installed on pump suction and discharge.
- Wait and make sure that temperature is equal to ambient temperature prior to start any activity.
- Unlock the drain plug in order to drain completely the spiral casing.

Follow extra carefully this procedure in case pumped liquid is dangerous by contact or by inhalation. At this regard it is mandatory to be provided with proper safety wear.
- Disassembly pipes and auxiliary connections in case connected to pump.
- Remove coupling guard and, if present, spacer coupling.
- Loosen the support foot VDMA 183 and, depending on needs, it is possible take away pump casing from piping and baseplate and/or remove the electric motor.

2 – “TBK” PUMP SERIES DISASSEMBLY TO REPLACE BUSHING

Loosen screws VDMA 901 and extract the bushing support VDMA 355 and its bushing VDMA 310 or 310.3 (in function if pump execution is /1 or /2) by means, if necessary, of the same screws as extractors in the threaded holes available in the support self. Later on, by means of a suitable extractor, extract the bushing support (see fig. 1 or 2).

In case of execution /2 also check the wear of ceramic coated bushing VDMA 521 and if necessary replace it loosening the screw VDMA 914.5 and removing the washer VDAM 554.

3 – “TBK” PUMP SERIES BUSHING SUPPORT ASSEMBLY

Check wear of bushing VDMA 310 or 310.3 (in function of execution /1 or /2) and, if necessary, replace it with a spare one: check the bushing internal diameter is the right one for pump type indicated in object (see fig. 1 or 2 and tab. 1), then press it in the bushing support VDMA 355.

For execution /1 drill in the bushing 3 radial holes Ø5 mm at 120°, having care that one hole is located in upper position.

For execution /2 drill in the bushing 1 crossing hole Ø3 mm located in upper position in correspondence of the hole present in the bushing support VDMA 355.

After having located the gasket VDMA 400.2, assembly the bushing support on the discharge casing VDMA 107 and tight the screws VDMA 901.

<table>
<thead>
<tr>
<th>PUMPS SERIES</th>
<th>Construction /2</th>
<th>Construction /1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ØD VDMA 310.3</td>
<td>ØD VDMA 310</td>
</tr>
<tr>
<td>TBK 200</td>
<td>---</td>
<td>16 D7 +0,068</td>
</tr>
<tr>
<td>TBK 290 ÷ 310</td>
<td>24 E8 +0,073</td>
<td>22 D7 +0,086</td>
</tr>
<tr>
<td>TBK 400</td>
<td>30 E8 +0,040</td>
<td>---</td>
</tr>
<tr>
<td>TBK 500</td>
<td>---</td>
<td>28 D7 +0,086</td>
</tr>
<tr>
<td>TBK 650</td>
<td>30 E8 +0,073</td>
<td>---</td>
</tr>
</tbody>
</table>
4 – “TBK” and “TBAK” PUMP SERIES SUPPORT DISASSEMBLY

(See fig. 5 and typical sectional drawings under chapter 11).

Remove stud nuts VDMA 902 and separate the support VDMA 330 from casing cover VDMA 161 overcoming the magnets attraction force avoiding to damage the external rotor magnets VDMA 818.2.

To disassemble the external magnetic rotor with small size dragging (sealing container Ø 75, see fig. 6 and 10) is necessary to remove the adaptor ring VDMA 502 loosening the grub screw VDMA 904.

Loosen screw VDMA 900.1 and remove the junk ring VDMA 550.1.

Extract then the fly wheel VDMA 132 with the external magnetic rotor VDMA 818.2.

Remove the half elastic coupling from pump drive end and, unscrewing the screws VDMA 914.4, remove the external bearing cover VDMA 360.1, the elastic ring VDMA 935 and circlip VDMA 932.1.

Loosen screws VDMA 900 and extract the internal bearing cover VDMA 360.2.

Apply now a strong pressure on the primary shaft VDMA 210 drive end to extract the bearing VDMA 320 and remove the same shaft with bearing VDMA 320.1 from the support VDMA 330.

Remove circlip VDMA 932 and if necessary remove from shaft also bearing VDMA 320.1.

Verify that all parts are undamaged and wear or tear scratches are not present: if necessary replace those parts with original spare parts before starting assembly, executing each step reverse to disassembly steps.

5 - COMPLETE DISASSEMBLY FOR PUMPS SERIES “TBK”

Complete pump disassembly becomes necessary if, for example, the pump does not perform as expected due to an excessive wear of impellers VDMA 230 and/or suction and discharge elements VDMA 109 and 114.

Replacing or machining the worn-out parts will be a question of economics and/or time available to complete the repair.

This chapter will consider the disassembly of a pump without non-drive end sleeve bearing housing and drive end bearing and mechanical seal housing (see fig. 3): disassembly and assembly of these components have been addressed in chapters 2 – 3 – 4.

NOTE: where the mechanic is not familiar with the pump, it is advisable to draw a reference line along the pump. Mark each part with its location, rotation and assembly sequence; however the main components are already marked at the external upper part with reference logs to provide the proper position (see the attached “Disassembly and assembly instructions for self-priming multistage centrifugal pumps”).

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

Disassembly and assembly instructions for magnetic drive multistage self-priming centrifugal pumps
Loosen and remove the tie-bolts VDMA 905, place the pump in vertical position onto a suitable base with the discharge casing VDMA 107 on the top.
Remove once for all the tie-bolts (VDMA 905) nuts and washers and loosen the tie-bolts from the casing cover VDMA 161.
Remove the discharge casing VDMA 107 and its gasket VDMA 400.1, the discharge element VDMA 114 and its gasket, the open impeller VDMA 230, the key VDMA 940.2 the suction element VDMA 109 and its gasket. Go on following the same sequence as many times as is the number of stages of the pump. Remove the suction casing VDMA 106 and its gasket.
Take precautions not the damage the shaft VDMA 210.1 and place it in a bench vice vertically and with the drive side upward in order to disassemble the internal magnetic coupling assembly (see chapter 7).

6 - COMPLETE DISASSEMBLY FOR PUMPS SERIES ”TBAK”

Complete pump disassembly becomes necessary if, for example, the pump does not perform as expected due to an excessive wear of impellers VDMA 230 and/or suction and discharge elements VDMA 109 and 114. Replacing or machining the worn-out parts will be a question of economics and /or time available to complete the repair. This chapter will consider the disassembly of a pump without drive end bearing and mechanical seal housing (see fig. 4): disassembly and assembly of this component have been addressed in chapter 4.

NOTE: where the mechanic is not familiar with the pump, it is advisable to draw a reference line along the pump. Mark each part with its location, rotation and assembly sequence; however the main components are already marked at the external upper part with reference logs to provide the proper position (see the attached “Disassembly and assembly instructions for self-priming multistage centrifugal pumps”).

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

Fig. 4
Pumps series TBAK
A particular attention it is required during disassembly because silicon carbide inserts, that are very fragile, may break, chip off or going out of their seats.

Undo VDMA 914 screws and remove the VDMA 813.3 cover and its sealing VDMA 412 O-Ring, undo the VDMA 920 nut and the VDMA 550 washer.
Remove the internal magnet rotor VDMA 818.1 with the external cover VDMA 818.5.
Remove the body VDMA 161 with the rotor support bush VDMA 818: If it is necessary to separate these two components, undo VDMA 914.1 screws.
Remove VDMA 940.1 shaft key, slip off the VDMA 818.6 rotor bush and the internal cover VDMA 818.4.
Look carefully the magnet bushes for scratches or beginning of seizure marks, eventually replace with original spare parts.
Clean all the components and proceed to assembly them reversing the step for the disassembly. The values for the torque wrench for the magnet screws are reported on the Tab. 2.
It is fundamental to lubricate all silicon carbide components that are in contact.

### Tab. 2
Maximum torque wrench setting for magnet component screws.

<table>
<thead>
<tr>
<th>Screw Diameter</th>
<th>In contact with pumped liquid</th>
<th>Dry</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5</td>
<td>4 Nm</td>
<td>4,5 Nm</td>
</tr>
<tr>
<td>M6</td>
<td>7 Nm</td>
<td>7,5 Nm</td>
</tr>
<tr>
<td>M8</td>
<td>16 Nm</td>
<td>18 Nm</td>
</tr>
<tr>
<td>M10</td>
<td>32 Nm</td>
<td></td>
</tr>
<tr>
<td>M12</td>
<td>55 Nm</td>
<td></td>
</tr>
<tr>
<td>M16</td>
<td>65 Nm</td>
<td></td>
</tr>
</tbody>
</table>
Disassembly and assembly instructions for magnetic drive multistage self-priming centrifugal pumps

Check that all the pump components are in good condition, clean them with the proper clearing product. If hydraulic components (VDMA 230 and 230.2 impellers, VDMA 109 e 114, elements.) could be re-installed but require machine tooling, please follow the included “Assembly and Disassembly of self-priming centrifugal pumps” instructions. In case of assembly of old components with new original spare part sit is necessary to check full compatibility no matter if old components have been machined or not.

For suggested spare parts please read chapter 9.

About bush inner diameter please refer to tab 3 values considering pump type and bush VDMA number. Proceed to assembly the pump following the “Assembly and Disassembly of self-priming centrifugal pumps” instructions reversing the indicated steps of disassembly. Be careful about sequential steps and components reference point for assembly position.

Once pump assembly is completed, connect the pump to supporting assembly completed with external magnetic rotor, being aware of the strong attraction between the two parts.

Finally make the pump rotating by acting by hand on VDMA 210 drive shaft. Pump should rotate freely without generating any noise and or crackling.

<table>
<thead>
<tr>
<th>PUMPS SERIES</th>
<th>ØD VDMA 310</th>
<th>ØD1 VDMA 310.1</th>
<th>ØD2 VDMA 310.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBK &amp; TBAK 200</td>
<td>---</td>
<td>18 B9 +0,212</td>
<td>18</td>
</tr>
<tr>
<td>TBK &amp; TBAK 290 + 310</td>
<td>24 E8</td>
<td>24 B9 +0,160</td>
<td>28 +0,20</td>
</tr>
<tr>
<td>TBK &amp; TBAK 400</td>
<td>30 E8 +0,073</td>
<td>30 B9 ---</td>
<td>--- +0,25</td>
</tr>
<tr>
<td>TBK &amp; TBAK 500</td>
<td>32 B9 +0,232</td>
<td>32 +0,20</td>
<td></td>
</tr>
<tr>
<td>TBK &amp; TBAK 650</td>
<td>36 B9 +0,170</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

Tab. 3
Bush internal diameter (VDMA 310 or 310.1 or 310.2) already pressed on VDMA 109 or 149 elements (see fig. 3 or 4)

9 - SPARE PARTS

When ordering the pump it is good practice to also order the necessary spare parts, especially when there are no standby pumps in the installation. This will minimise unnecessary down times in the event of pump failure or routine maintenance. Following spare parts are suggested for each pump size:

1 or more Impellers
1 or more Suction plates
1 or more Discharge plates
1 Shaft assembly
1 Bearing set
2 Sets gaskets
1 Set of bearing spacer rings

However for proper parts management, consult the VDMA 24296 standard that recommends the quantity of spare parts to be stocked in relation to the number of pumps installed.

On the pump nameplate are printed the pump model, the year of manufacture and the pump serial number: always provide this information when requesting spare parts.

Specify also the VDMA number of the required part, as seen on the pump sectional drawing (chapter 11) and parts list (chapter 10) for proper identification of spare parts.

We recommend the use of original spares: in case this is not respected, POMPETRAVAINI declines any responsibility for eventual damages caused by not original spare parts.
<table>
<thead>
<tr>
<th>VDMA No.</th>
<th>DESCRIPTION</th>
<th>VDMA No.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>106</td>
<td>Suction casing</td>
<td>554.6</td>
<td>Elastic washer</td>
</tr>
<tr>
<td>107</td>
<td>Discharge casing</td>
<td>554.7</td>
<td>Washer</td>
</tr>
<tr>
<td>109</td>
<td>Suction plate</td>
<td>562</td>
<td>Pin</td>
</tr>
<tr>
<td>114</td>
<td>Discharge plate</td>
<td>730</td>
<td>Elbow</td>
</tr>
<tr>
<td>132</td>
<td>Fly-wheel</td>
<td>731.8</td>
<td>Fitting</td>
</tr>
<tr>
<td>149</td>
<td>Centrifugal diffuser</td>
<td>735</td>
<td>M.M. fitting</td>
</tr>
<tr>
<td>161</td>
<td>Casing cover</td>
<td>818</td>
<td>Rotor bearing housing</td>
</tr>
<tr>
<td>183</td>
<td>Support foot</td>
<td>818.1</td>
<td>Internal magnetic rotor</td>
</tr>
<tr>
<td>210</td>
<td>Primary shaft</td>
<td>818.2</td>
<td>External magnetic rotor</td>
</tr>
<tr>
<td>210.1</td>
<td>Secondary shaft</td>
<td>818.3</td>
<td>Sealing can</td>
</tr>
<tr>
<td>230</td>
<td>Stellar impeller</td>
<td>818.4</td>
<td>Internal cover</td>
</tr>
<tr>
<td>230.2</td>
<td>Centrifugal impeller</td>
<td>818.5</td>
<td>External cover</td>
</tr>
<tr>
<td>310</td>
<td>Bearing</td>
<td>818.6</td>
<td>Rotor sleeve</td>
</tr>
<tr>
<td>310.1</td>
<td>Plate bearing</td>
<td>818G</td>
<td>Magnetic coupling assembly</td>
</tr>
<tr>
<td>310.3</td>
<td>Housing bearing</td>
<td>900</td>
<td>Screw</td>
</tr>
<tr>
<td>310.5</td>
<td>Bearing holder sleeve</td>
<td>900.5</td>
<td>Eyebolt</td>
</tr>
<tr>
<td>320</td>
<td>Single row ball bearing</td>
<td>901</td>
<td>Screw</td>
</tr>
<tr>
<td>320.1</td>
<td>Single row ball bearing</td>
<td>902</td>
<td>Stud wit nut</td>
</tr>
<tr>
<td>330</td>
<td>Ball bearings housing</td>
<td>903</td>
<td>Plug</td>
</tr>
<tr>
<td>355</td>
<td>Bearing housing</td>
<td>904</td>
<td>Grub screw</td>
</tr>
<tr>
<td>360.1</td>
<td>External ball bearing cover</td>
<td>905</td>
<td>Tie-bolt with nuts and washers</td>
</tr>
<tr>
<td>360.2</td>
<td>Internal ball bearing cover</td>
<td>914</td>
<td>Screw</td>
</tr>
<tr>
<td>400.1</td>
<td>Plate gasket</td>
<td>920</td>
<td>Nut</td>
</tr>
<tr>
<td>400.2</td>
<td>Bearing housing gasket</td>
<td>925</td>
<td>Cap nut</td>
</tr>
<tr>
<td>412</td>
<td>O-Ring</td>
<td>932</td>
<td>Circlip</td>
</tr>
<tr>
<td>502</td>
<td>Reduction ring</td>
<td>935</td>
<td>Elastic ring</td>
</tr>
<tr>
<td>521</td>
<td>Ceramic sleeve</td>
<td>940</td>
<td>Key</td>
</tr>
<tr>
<td>550</td>
<td>Rotor bottom ring</td>
<td>STM</td>
<td>Thermometric probe</td>
</tr>
<tr>
<td>550.1</td>
<td>Fly-wheel bottom ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>554</td>
<td>Shaft bottom ring</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fig. 6 - Pumps series TBK/2

Fig. 7 - Pumps series TBK/1

With sealing can (VDMA 818G) Ø75

Only for construction with Thermometric Probe
With sealing can (VDMA 818G) Ø110 o 135

Only for construction with Thermometric Probe
Fig. 10 - Pumps series TBAK
With sealing can (VDMA 818G) Ø75

Only for construction with Thermometric Probe
Disassembly and assembly instructions for magnetic drive multistage self-priming centrifugal pumps

NOTES

PUMP model

Serial Number

Computer Number

Year of manuf.

LIQUID handled

Capacity

Suction Pressure

Discharge Press.

Temperature

□ Lethal □ Toxic □ Noxious □ Corrosive □ Irritant □ Malodorous □

□ Clean □ Dirty □ With suspended parts □ Spec. Gravity

□ Viscosity □ PH

TOTAL WEIGHT

□ Kgs.

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 Revolutions

Absorbed power

Installed Power

Frequency

Supply

Enclosure

Insulation class

Absorbed Power

□ kW / □ HP

COMMENTS

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

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