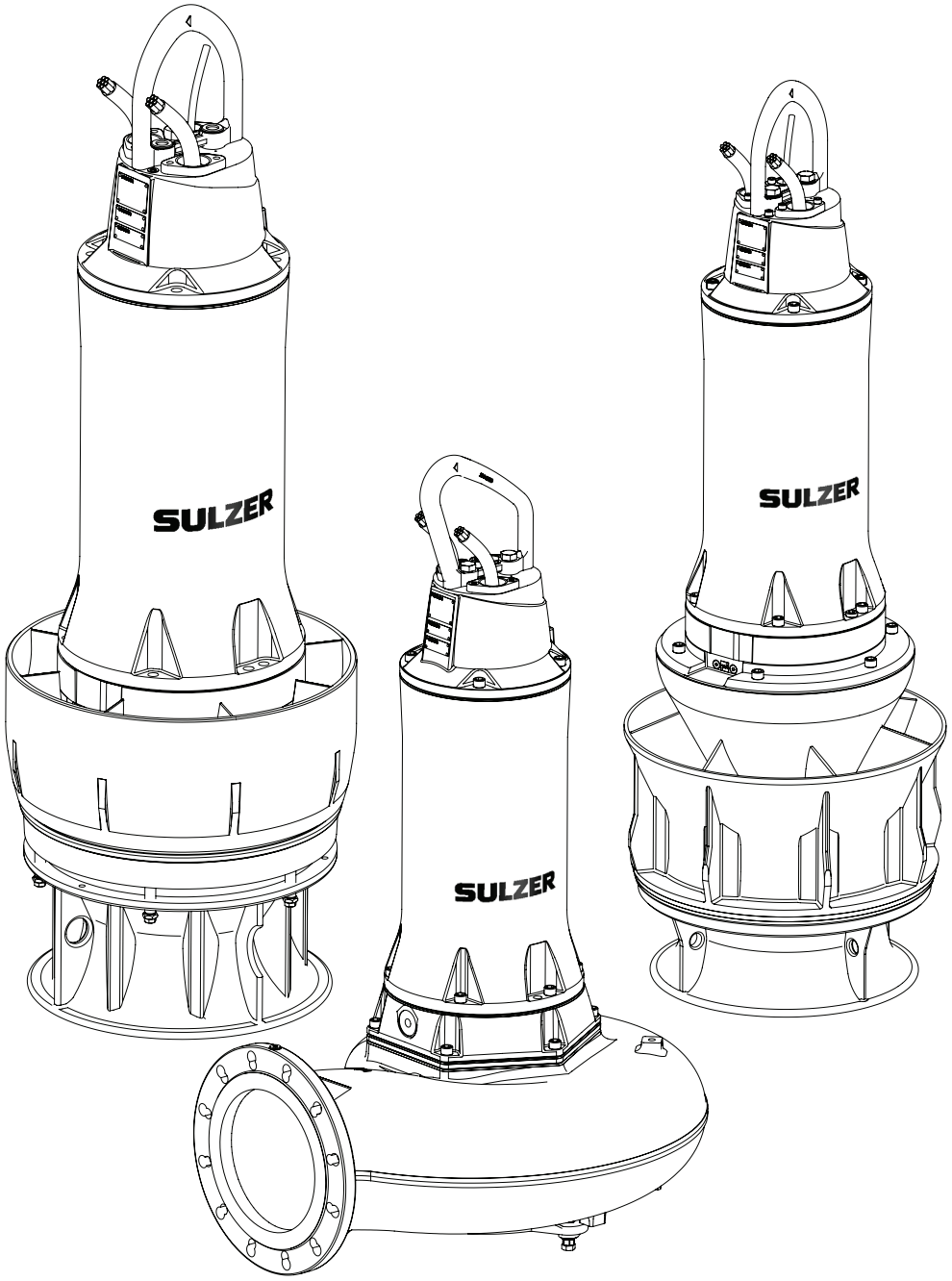
SULZER

Submersible Sewage Pump Type ABS XFP-PE4 [NG2]
Submersible Mixed Flow Column Pump Type ABS AFLX-PE4 [NG2]
Submersible Propeller Pump Type ABS VUPX-PE4 [NG2]



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Workshop Manual

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Workshop Manual
Submersible Sewage Pump Type ABS XFP-PE4
Submersible Mixed Flow Column Pump Type ABS AFLX-PE4
Submersible Propeller Pump Type ABS VUPX-PE4

XFP CB	XFP CH	AFLX	VUPX
100J	100J	601	402
105J	150J	701	403
155J	200J		501
206J	300J		502
250J			503
255J			601
305J			602

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1 Health and Safety Instructions

When carrying out any repair work the instructions in the “Safety Instructions for Sulzer Products Type ABS” brochure and “Installation and Operating Instructions” must be observed.
Prior to starting with any maintenance work the Sulzer units must be completely disconnected from the mains by a qualified person and protected from being inadvertently switched back on.

Prior to maintenance, any units that have been used in contaminated media, e.g. wastewater containing faeces, must always be cleaned, and if necessary, thoroughly decontaminated. The specific hygiene regulations of the respective application countries must be observed.

When carrying out any repair or maintenance work, the safety regulations covering working in enclosed areas of sewage installations, as well as “**good technical practice**”, must be observed!

WARNING: DANGEROUS GASES

Before removal of units in hazardous areas, the sump and surrounding area must be adequately vented to avoid the danger of an explosion caused by a spark.

Observe all accident prevention measures and regulations!
Please use a safety belt and a life line when getting into the sump and work together with supervisory staff.

Ensure adequate venting

ATTENTION ***Repair on explosion-proof motors may only be carried out by workshops or persons authorised for this. During repair work only original parts supplied by the manufacturer must be used. Lifting equipment such as hoists, shackles, wire ropes and wire clamps etc. must undergo a visual examination at regular intervals (approx. every 3 months) for wear and corrosion and if necessary must be replaced. Installation accessories (in particular for mixers and aerators) must undergo a visual examination at regular intervals for wear and corrosion etc. and if necessary must be replaced.***

Changing the direction of rotation at control panels without a changeover switch should only be carried out by a qualified person and for this reason this procedure is not allowed for cleaning hydraulics or propellers.

The coolant in the chambers of XFP pumps may be under pressure. Before opening the drain plug, please always put a cloth over the filler screw, loosen it to release any pressure and screw it down again! The regulations covering oil and grease or cooling liquids must be observed. Any waste oil, grease or cooling liquid should be correctly disposed of.

To avoid the possibility of injury from expelled objects when using a hydraulic press to assemble components that require compression fit, ensure that the placed components are squarely aligned beneath the hydraulic ram and are behind a protective screen.

2 General

NOTE: *Before dismantling, always use a paint marker to draw a line down the full length of the pump to aid with the correct alignment of parts during re-assembly.*

NOTE: *Apply rust inhibitor to machined surfaces before re-assembly.*

NOTE: *Before all re-assembly procedures always inspect o-rings for damage and replace if necessary.*

2.1 Dimensions and weights

ATTENTION ***Note the entire weight of the Sulzer unit and attached components. The dimensions of the unit can be found on the relevant dimensional sheet on the Downloads page of the Sulzer website. The hydraulic curves and impeller types can be found on the hydraulics curve sheet. The technical data and weight of the base unit can be found on the nameplate.***

The Sulzer units are prepared for transportation by placing them on an adequately strong horizontal surface. Care should be taken that they cannot fall over. The hoist must be adequately dimensioned for the total weight of the Sulzer units, the lifting chain and shackle, and all accessories which may be fitted, and must comply with local valid safety regulations. Do not stay or work in the swivel area of a suspended load. The lifting hook height must take into consideration the height of the Sulzer units as well as the length of the lifting chain.

2.2 Tightening torques

Stainless steel screws:

M6	7 Nm
M8	17 Nm
M10	33 Nm
M12	56 Nm
M16 grade A4-70	126 Nm
M16 grade A4-80	136 Nm
M16 Bumax 88 grade A4-316L	145 Nm
M16 Bumax 88 grade A4-316L (impeller screw - Pos 144)*	210 Nm
M20	267 Nm
M24	460 Nm

*The higher torque value is allowed ONLY for the impeller screw Pos 144.

2.3 Equipment and tools

The procedures outlined in this manual require the use of specified equipment and tools. Before proceeding with maintenance or repair work please ensure that your workshop is equipped with the following:

Equipment:

- Hydraulic press.
- Hoist.
- High voltage tester.
- Pressure tester (compressed air).
- Hydraulic hand pump (for connection to stator extraction tool).

Tools:

- Bearing press tools.
- Bearing pullers.
- Mechanical seal hand press tools.
- Shaft sleeve tools - to aid fitting of mechanical seals and bearings on shaft.
- Stator extraction tool.
- Stator pullers - fits to extraction tool.
- Stator press tool.
- Pressure test tools.
- Hose clamp pliers

The above tools, with exception of bearing pullers and hose clamp pliers, are specific to Sulzer pump maintenance and repair, and must be manufactured locally. Dimension drawings for that purpose can be found at the end of this booklet.

3 Explosion approved motor

Explosion approved motors may only be repaired or maintained by authorized Sulzer personnel or other personnel authorized by Sulzer. The personnel and /or your workshop may also require authorisation by your local government.

EN 60079-19:2019 and EU ATEX Directive 2014/34/EU are valid for all maintenance and repair work carried out on products used in hazardous locations.

To ensure that the motor complies with the regulations and approval of the authorities, use only genuine Sulzer spare parts when carrying out repair work.

Always check the dimensions of vital parts before assembly (Sec 3.5).

The assembled pump shall always be insulation tested and test run before delivery.

3.1 General

In an explosion approved motor (Ex), the gaps between different parts, for example between the motor housing and the connection chamber, shall prevent any sparks from the interior of the motor from escaping and igniting surrounding gases.

All flame path lengths and gaps shall be measured with accurate and calibrated instruments. All gap surfaces shall be inspected. No scratches, tool marks etc. are permissible.

Failure to meet the above requirements may render the explosion approval invalid. Note that the work requires experienced and specially trained personnel.

3.2 Workshop repair

The parts for which dimensions must be checked are shown in section 3.5. It is important to ensure that the gap surfaces for these parts are not damaged during dismantling.

The product must be thoroughly examined and a report must be prepared on all findings. Any measurements, dimensional checks, test readings; and details of materials, parts or windings which are found to require attention should be carefully noted.
It is required to affix a repair nameplate on the product after repair.

If the products have been modified and do not comply with original approval, the owner must be informed and further information on the application must be requested.

If there are any doubts during the repair as to the results of measurements, tests, the continued integrity of parts, or the possible reclamation of damaged parts, reference must be made to your local Ex co-ordinator.

3.3 Guidelines for repair

Care must be taken when dismantling Ex approved products, as damage to flame-proof faces can easily occur. For instance, if difficulties are found in separating spigot gaps, draw studs should be used wherever possible rather than trying to wedge the components apart, as not only will damage occur at the point of wedging, but the wedges are liable to be driven through and damage the flame path surface of the spigot.

Similarly, care should be exercised when removing the main bearing assembly and bearing housing to ensure that damage does not occur on the part of the shaft that constitutes the flame path.
Once the motor has been completely dismantled, detailed examination of all parts should be made and a concise record kept of all findings.

When assembling an Ex approved product, measure the gaps and the flame path length. Inspect the flame path surfaces and smear them with grease to prevent corrosion.

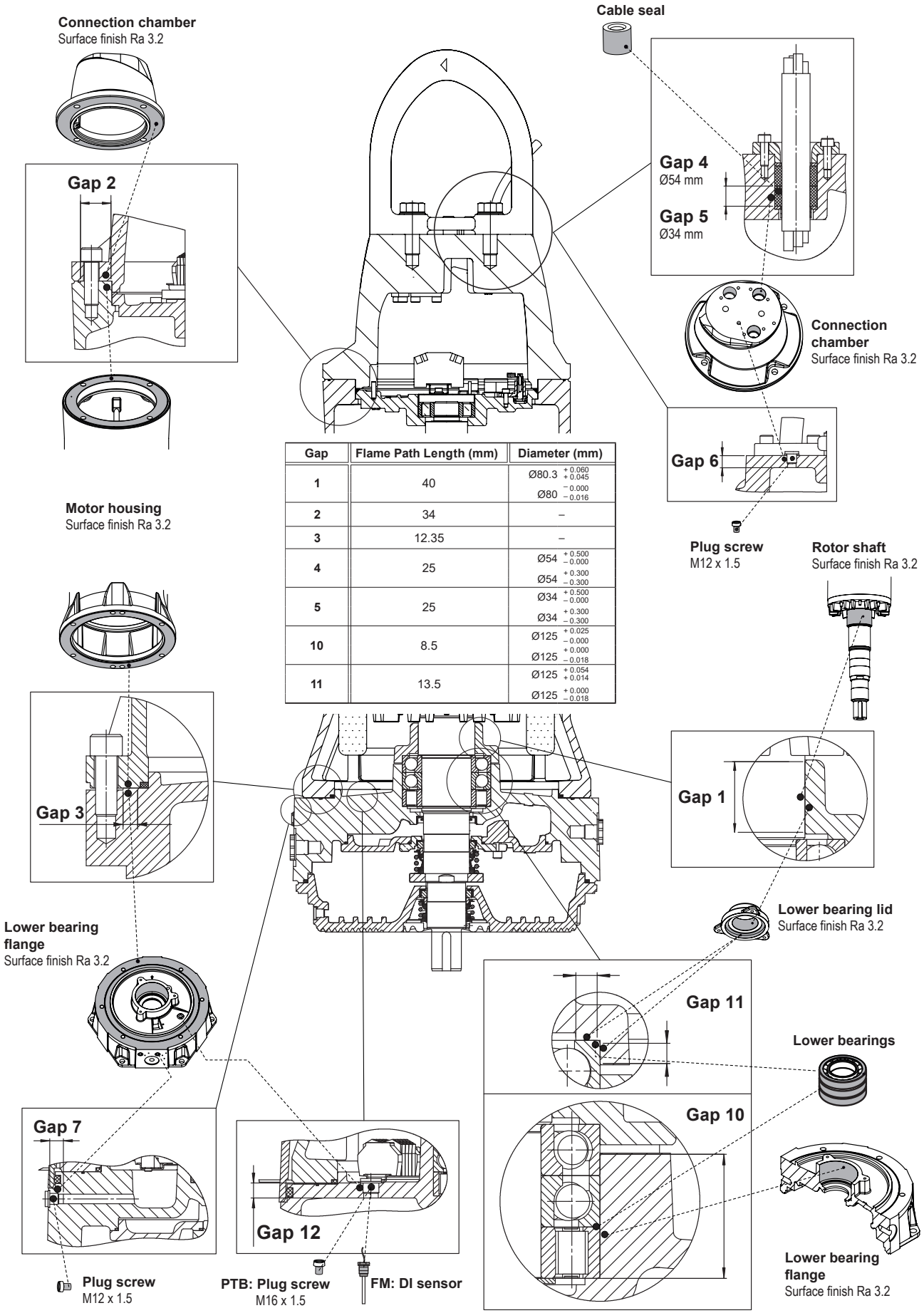
If a part does not meet the requirements on dimensional accuracy or surface finish, it must be discarded and a new specially approved part ordered. The new part must also be inspected. Observe caution during assembly to prevent damage to the flame path surfaces.

3.4 Flame paths

The flame paths should be examined for any corrosive pitting or damage which may have occurred.

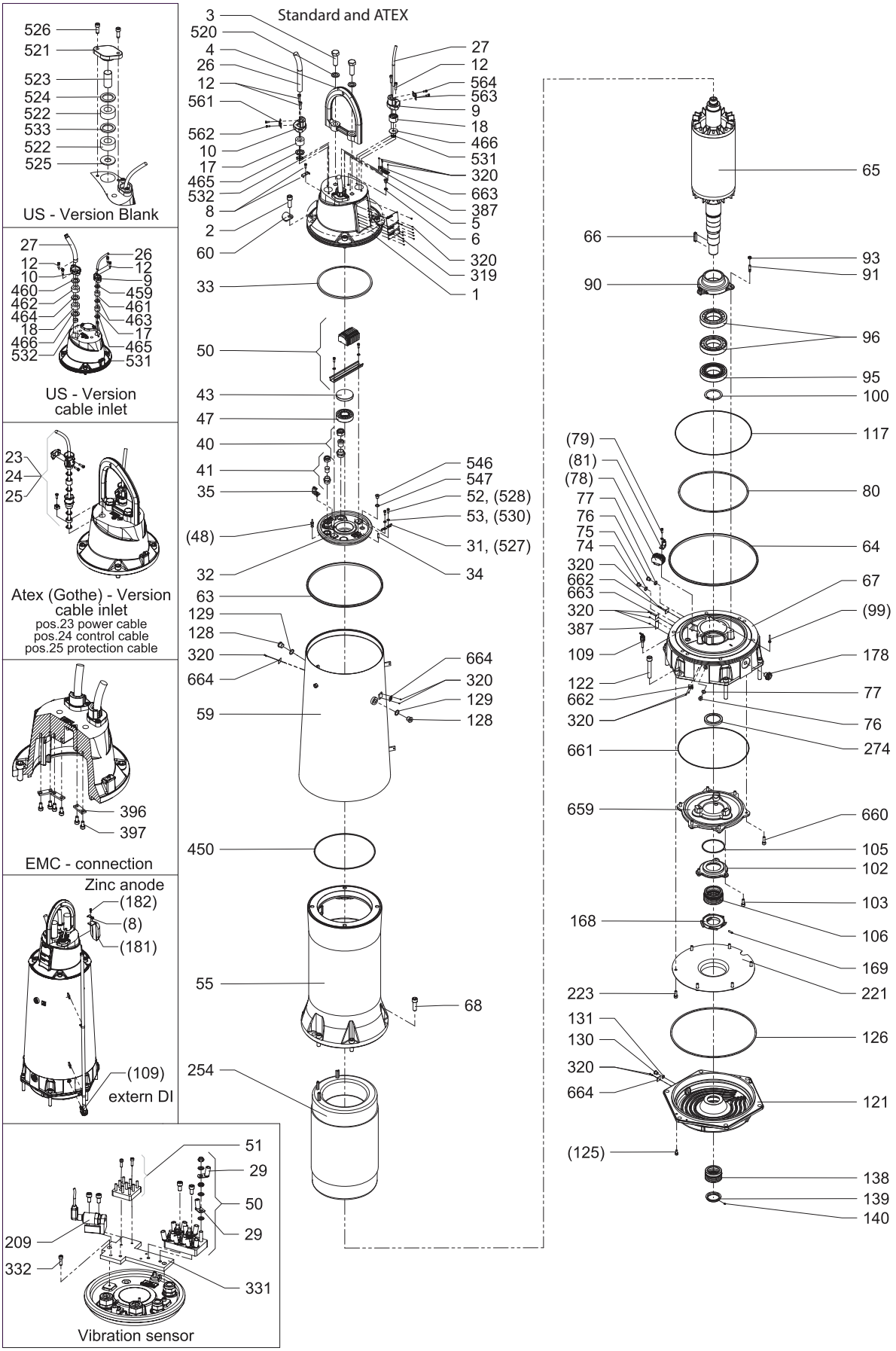
All castings should be examined for blow holes or hairline cracks. If there is evidence that there has been an internal explosion of gases, this may be confirmed by the user and will probably be evident by smoke and debris tracking across the flame paths.

3.5 Dimensional checks drawing for explosion approved motors PE4



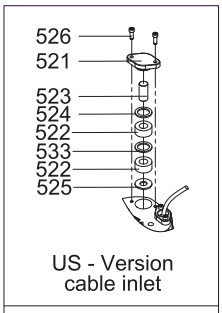
Gap	Flame Path Length (mm)	Diameter (mm)
1	40	Ø80.3 $^{+0.060}_{+0.045}$ Ø80 $^{-0.000}_{-0.016}$
2	34	–
3	12.35	–
4	25	Ø54 $^{+0.500}_{-0.000}$ Ø54 $^{+0.300}_{-0.300}$
5	25	Ø34 $^{+0.500}_{-0.000}$ Ø34 $^{+0.300}_{-0.300}$
10	8.5	Ø125 $^{+0.025}_{-0.000}$ Ø125 $^{+0.000}_{-0.018}$
11	13.5	Ø125 $^{+0.054}_{+0.014}$ Ø125 $^{+0.000}_{-0.018}$

4 Motor Unit XFP - PE4 with cooling jacket

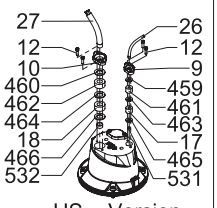


Position	Description
1	Connection chamber
2	Screw cyl. M16x50 DIN912 1.4401
3	Screw ex. M20x60 DIN933 1.4401
4	Lifting bracket
5	Plug screw M12 DIN908 1.4401
6	Seal ring A12x16x2 VF DIN7737
8	Potential equalization clamp
9	Cable cap
10	Cable cap
12	Screw cyl. M10x30 DIN912 1.4401
17	Cable gland
18	Cable gland
23	Power cable
24	Control cable
25	Protection cable
26	Cable
27	Cable
29	Cable connector shoe
31	Cable terminal
32	Upper bearing flange
33	O-ring 248x5 NBR70 DIN3771
34	Rivet 6x24-ISO 8739-STVZ
35	DI leakage sensor
40	Cable gland (power cables)
41	Cable gland (control cables)
43	Screw cap 80x12 NBR
47	Bearing
48	Temperature sensor
50	Terminal block
51	Terminal block
52	Screw cyl. M6x12 DIN912 8.8 GV
53	Washer 6.4 BRASS DIN125-B
55	Motor housing
59	Cooling jacket
60	Cooling jacket clamp
63	O-ring 320x9 NBR50
64	O-ring 380x9 NBR50
65	Rotor shaft
66	Impeller key AB12x8x54 DIN6885 4571
67	Lower bearing flange
68	Screw cyl. M16x45 DIN912 1.4401
74	Plug screw M12 DIN908 1.4401
75	Seal ring A12x16x2 VF DIN7737
76	Plug screw M12 DIN908 1.4401
77	Seal ring A12x16x2 VF DIN7737
78	Terminal block
79	Cap screw and washer
80	O-ring 310x5.0 NBR70
81	DI leakage sensor
90	Bearing lid
91	Stud bolt M8x25 DIN939 1.4401
93	Hex. nut M8 DIN934 1.4401
95	Roller bearing
96	Ball bearings
..99	Temperature sensor 99
100	Circlip 70x2.50 DIN983
102	Transition piece
103	Screw cyl. M10x25 DIN912 1.4401
105	O-ring 96x3 NBR70 DIN3771
106	Mechanical seal 65 mm
109	DI probe
117	O-ring 350x2 NBR70
121	Seal holding plate
122	Screw cyl. M8x16 DIN912 1.4401
125	Socket head cap screw
126	O-ring 385x5.0 NBR70
128	Plug screw M20x1.5 DIN908 A4
129	Seal ring A20x26x2 VF DIN7737
130	Plug screw M12 DIN908 1.4401
131	Seal ring A12x16x2 VF DIN7737
138	Mechanical seal 55 mm
139	Mechanical seal support ring
140	Grub screw M5x6 DIN916 1.4401
168	Coolant impeller
169	Grub screw M6x20 DIN916 1.4401
178	Hex. screw M20x30-ISO4017-A4-70
181	Zinc anode
182	Cap screw
209	Sensor
221	Cover plate
223	Screw cyl. M10x25 DIN912 1.4401
254	Stator
274	Lipseal
319	Nameplates
320	Round head rivet D3x4 ISO8746
331	Mounting plate
332	Socket head cap screw
387	Warning label
396	Clamp
397	Socket head cap screw
450	O-ring 330x2 NBR70
459	Washer 54.0x38.5x4.0 1.4301
460	Washer 34.0x20.0x4.0 1.4301
461	Seal cable D54xD30.0x30 NBR
462	Seal cable D34xD14.0x30 NBR
463	Washer 54.0x42.5x4.0 1.4301
464	Washer 34.0x24.0x4.0 1.4301
465	Washer 54.0x38.5x4.0 1.4301
466	Washer 34.0x20.0x4.0 1.4301
520	Washer 21.0 1.4401 DIN125-A
521	Cable gland
522	Cable seal D54xD32.0x30 NBR
523	Round bar cable inlet
524	Washer 54.0x38.5x4.0 1.4301
525	Washer 54.0x23.0x4.0 1.4301
526	Screw cyl. M10x30 DIN912 1.4401
527	Cable terminal
528	Screw cyl. M6x12 DIN912 8.8 GV
530	Washer 6.4 BRASS DIN125-B
531	Strain relief (shrink sleeve US, hose clip Std. and ATEX)
532	Strain relief (shrink sleeve US, hose clip Std. and ATEX)
533	Washer 54.0x42.5x4.0 1.4301
546	Threaded plug
547	Seal ring
561	Cable entry clamp
562	Screw cyl. M5x12 DIN912 1.4401
563	Cable entry clamp
564	Screw cyl. M5x12 DIN912 1.4401
659	Intermediate cover
660	Screw cyl. M10x30 DIN912 1.4401
661	O-ring 271x3 NBR70 DIN3770
662	Oil fill hole nameplate
663	Inspection hole nameplate
664	Glycol fill hole nameplate

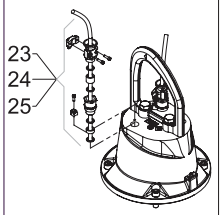
5 Motor Unit XFP - PE4 without cooling jacket



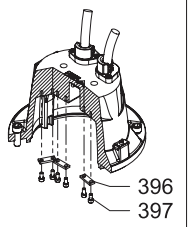
US - Version
cable inlet



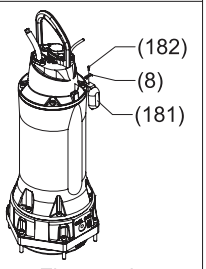
US. - Version
cable inlet



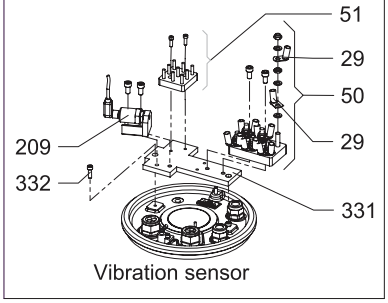
Atex (Gothe) - Version
cable inlet
pos.23 power cable
pos.24 control cable
pos.25 protection cable



EMC - connection

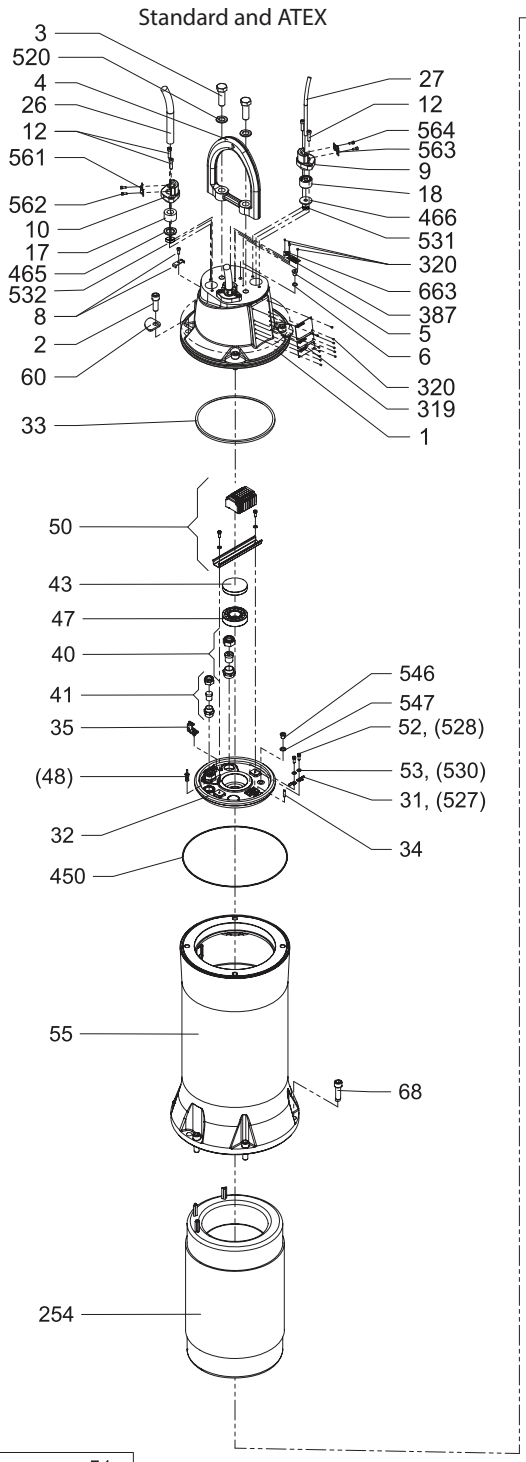


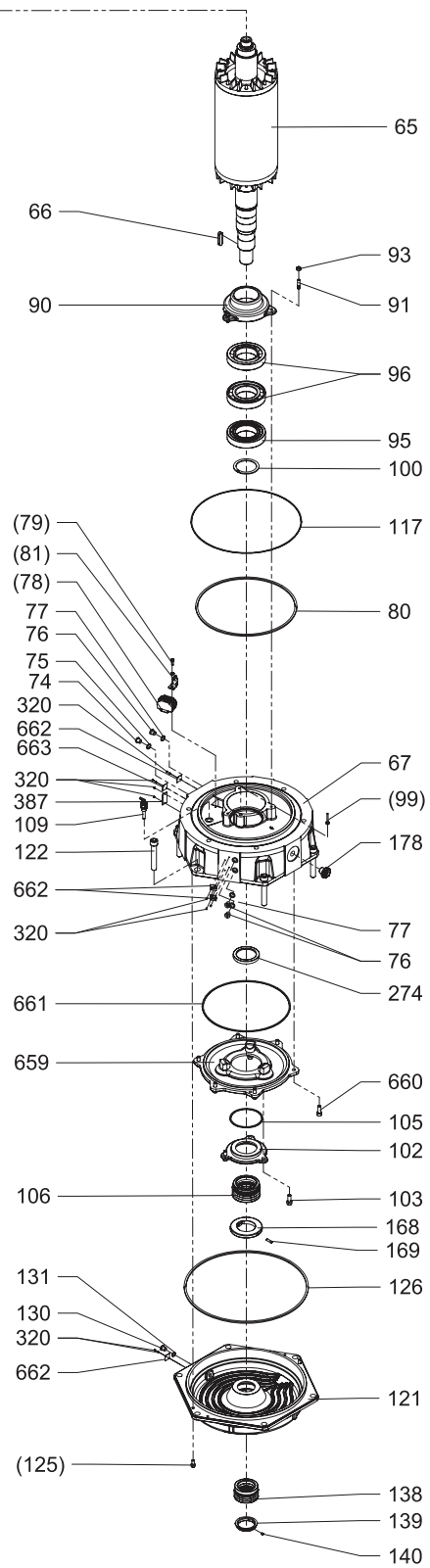
Zinc anode



Vibration sensor

Standard and ATEX





Position	Description
1	Connection chamber
2	Screw cyl. M16x50 DIN912 1.4401
3	Screw ex. M20x60 DIN933 1.4401
4	Lifting bracket
5	Plug screw M12 DIN908 1.4401
6	Seal ring A12x16x2 VF DIN7737
8	Potential equalization clamp
9	Cable cap
10	Cable cap
12	Screw cyl. M10x30 DIN912 1.4401
17	Cable gland
18	Cable gland
23	Power cable
24	Control cable
25	Protection cable
26	Cable
27	Cable
29	Cable connector shoe
31	Cable terminal
32	Upper bearing flange
33	O-ring 248x5 NBR70 DIN3771
34	Rivet 6x24-ISO 8739-STVZ
35	DI leakage sensor
40	Cable gland (power cables)
41	Cable gland (control cables)
43	Screw cap 80x12 NBR
47	Bearing
48	Temperature sensor
50	Terminal block
51	Terminal block
52	Screw cyl. M6x12 DIN912 8.8 GV
53	Washer 6.4 BRASS DIN125-B
55	Motor housing
65	Rotor shaft
66	Impeller key AB12x8x54 DIN6885 4571
67	Lower bearing flange
68	Screw cyl. M16x45 DIN912 1.4401
74	Plug screw M12 DIN908 1.4401
75	Seal ring A12x16x2 VF DIN7737
76	Plug screw M12 DIN908 1.4401
77	Seal ring A12x16x2 VF DIN7737
78	Terminal block
79	Cap screw and washer
80	O-ring 310x5.0 NBR70
81	DI leakage sensor
90	Bearing lid
91	Stud bolt M8x25 DIN939 1.4401
93	Hex. nut M8 DIN934 1.4401
95	Roller bearing
96	Ball bearings
99	Temperature sensor
100	Circlip 70x2.50 DIN983
102	Transition piece
103	Screw cyl. M10x25 DIN912 1.4401
105	O-ring 96x3 NBR70 DIN3771
106	Mechanical seal 65 mm
109	DI probe
117	O-ring 350x2 NBR70
121	Seal holding plate
122	Screw cyl. M8x16 DIN912 1.4401
125	Socket head cap screw
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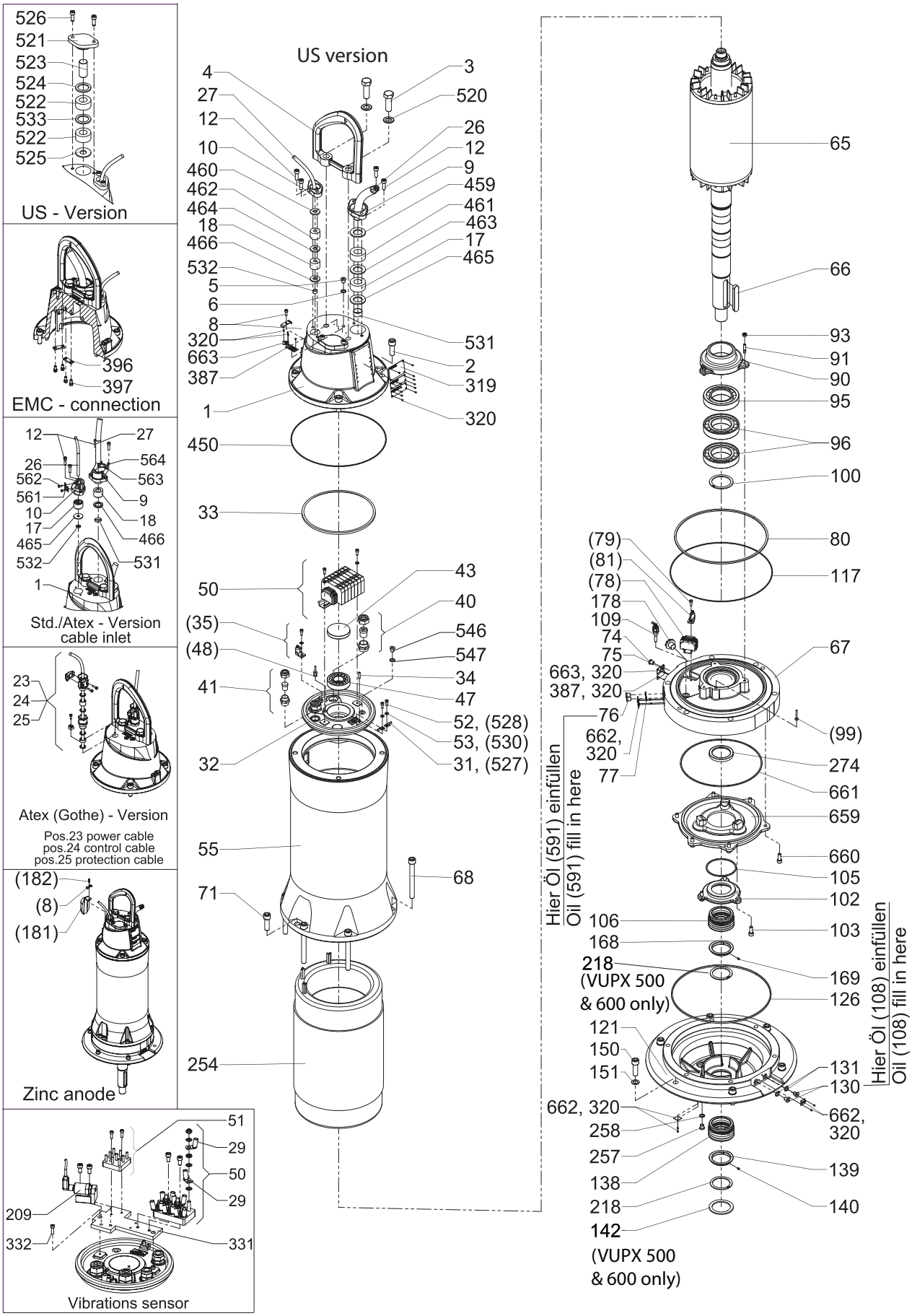
130	Plug screw M12 DIN908 1.4401
131	Seal ring A12x16x2 VF DIN7737
138	Mechanical seal 55 mm
139	Mechanical seal support ring
140	Grub screw M5x6 DIN916 1.4401
168	Mechanical seal support ring
169	Grub screw M6x20 DIN916 1.4401
178	Hex. screw M20x30-ISO4017-A4-70
181	Zinc anode
182	Cap screw
209	Sensor
254	Stator
274	Lipseal
319	Nameplates
320	Round head rivet D3x4 ISO8746
331	Mounting plate
332	Socket head cap screw
387	Warning label
396	Clamp
397	Socket head cap screw
450	O-ring 330x2 NBR70
459	Washer 54.0x38.5x4.0 1.4301
460	Washer 34.0x20.0x4.0 1.4301
461	Seal cable D54xD30.0x30 NBR
462	Seal cable D34xD14.0x30 NBR
463	Washer 54.0x42.5x4.0 1.4301
464	Washer 34.0x24.0x4.0 1.4301
465	Washer 54.0x38.5x4.0 1.4301
466	Washer 34.0x20.0x4.0 1.4301
520	Washer 21.0 1.4401 DIN125-A
521	Cable gland
522	Cable seal D54xD32.0x30 NBR
523	Round bar cable inlet
524	Washer 54.0x38.5x4.0 1.4301
525	Washer 54.0x23.0x4.0 1.4301
526	Screw cyl. M10x30 DIN912 1.4401
527	Cable terminal
528	Screw cyl. M6x12 DIN912 8.8 GV
530	Washer 6.4 BRASS DIN125-B
531	Strain relief (shrink sleeve US, hose clip Std. and ATEX)
532	Strain relief (shrink sleeve US, hose clip Std. and ATEX)
533	Washer 54.0x42.5x4.0 1.4301
546	Threaded plug
547	Seal ring
561	Cable entry clamp
562	Screw cyl. M5x12 DIN912 1.4401
563	Cable entry clamp
564	Screw cyl. M5x12 DIN912 1.4401
659	Intermediate cover
660	Screw cyl. M10x30 DIN912 1.4401
661	O-ring 271x3 NBR70 DIN3770
662	Oil fill hole nameplate
663	Inspection hole nameplate
664	Glycol fill hole nameplate

6 Motor Unit VUPX - PE4



Position	Description
1	Connection chamber
2	Screw cyl. M16x50 DIN912 1.4401
3	Screw ex. M20x60 DIN933 1.4401
4	Lifting bracket
5	Plug screw M12 DIN908 1.4401
6	Seal ring A12x16x2 VF DIN7737
8	Potential equalization clamp
9	Cable cap
10	Cable cap
12	Screw cyl. M10x30 DIN912 1.4401
17	Cable gland
18	Cable gland
23	Power cable
24	Control cable
25	Protection cable
26	Cable
27	Cable
29	Cable connector shoe
31	Cable terminal
32	Upper bearing flange
33	O-ring 248x5 NBR70 DIN3771
34	Rivet 6x24-ISO 8739-STVZ
35	DI leakage sensor
40	Cable gland (power cables)
41	Cable gland (control cables)
43	Screw cap 80x12 NBR
47	Bearing
48	Temperature sensor
50	Terminal block
51	Terminal block
52	Screw cyl. M6x12 DIN912 8.8 GV
53	Washer 6.4 BRASS DIN125-B
55	Motor housing
65	Rotor shaft
66	Impeller key AB12x8x54 DIN6885 4571
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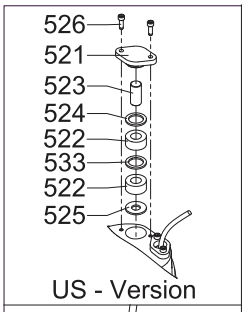
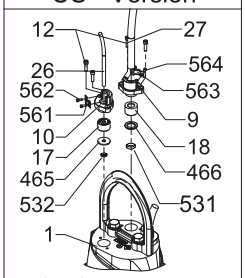
68	Screw cyl. M16x45 DIN912 1.4401
71	Socket head cap screw
74	Plug screw M12 DIN908 1.4401
75	Seal ring A12x16x2 VF DIN7737
76	Plug screw M12 DIN908 1.4401
77	Seal ring A12x16x2 VF DIN7737
78	Terminal block
79	Cap screw and washer
80	O-ring 310x5.0 NBR70
81	DI leakage sensor
90	Bearing lid
91	Stud bolt M8x25 DIN939 1.4401
93	Hex. nut M8 DIN934 1.4401
95	Roller bearing
96	Ball bearings
99	Temperature sensor
100	Circlip 70x2.50 DIN983
102	Transition piece
103	Screw cyl. M10x25 DIN912 1.4401
105	O-ring 96x3 NBR70 DIN3771
106	Mechanical seal 65 mm
109	DI probe
117	O-ring 350x2 NBR70
121	Seal holding plate
125	Socket head cap screw
126	O-ring 385x5.0 NBR70
130	Plug screw M12 DIN908 1.4401
131	Seal ring A12x16x2 VF DIN7737
138	Mechanical seal 55 mm
139	Mechanical seal support ring
140	Grub screw M5x6 DIN916 1.4401
142	Support washer
150	Cylinder screw
151	Washer
168	Mechanical seal support ring
169	Grub screw M6x20 DIN916 1.4401
178	Hex. screw M20x30-ISO4017-A4-70
181	Zinc anode
182	Cap screw
209	Sensor
218	Circlip
254	Stator
257	Plug screw
258	Seal ring
274	Lipseal
319	Nameplates
320	Round head rivet D3x4 ISO8746
331	Mounting plate
332	Socket head cap screw
387	Warning label
396	Clamp
397	Socket head cap screw
450	O-ring 330x2 NBR70
459	Washer 54.0x38.5x4.0 1.4301
460	Washer 34.0x20.0x4.0 1.4301
461	Seal cable D54xD30.0x30 NBR
462	Seal cable D34xD14.0x30 NBR
463	Washer 54.0x42.5x4.0 1.4301
464	Washer 34.0x24.0x4.0 1.4301
465	Washer 54.0x38.5x4.0 1.4301
466	Washer 34.0x20.0x4.0 1.4301
520	Washer 21.0 1.4401 DIN125-A
521	Cable gland
522	Cable seal D54xD32.0x30 NBR
523	Round bar cable inlet
524	Washer 54.0x38.5x4.0 1.4301
525	Washer 54.0x23.0x4.0 1.4301
526	Screw cyl. M10x30 DIN912 1.4401
527	Cable terminal
528	Screw cyl. M6x12 DIN912 8.8 GV
530	Washer 6.4 BRASS DIN125-B
531	Strain relief (shrink sleeve US, hose clip Std. and ATEX)
532	Strain relief (shrink sleeve US, hose clip Std. and ATEX)
533	Washer 54.0x42.5x4.0 1.4301
546	Threaded plug
547	Seal ring
561	Cable entry clamp
562	Screw cyl. M5x12 DIN912 1.4401
563	Cable entry clamp
564	Screw cyl. M5x12 DIN912 1.4401
659	Intermediate cover
660	Screw cyl. M10x30 DIN912 1.4401
661	O-ring 271x3 NBR70 DIN3770
662	Oil fill hole nameplate
663	Inspection hole nameplate
664	Glycol fill hole nameplate

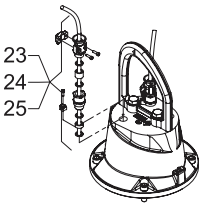
7 Motor Unit AFLX 0600 - PE4



US - Version

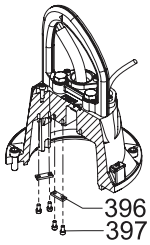


Std./Atex - Version
cable inlet

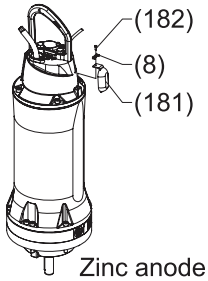


Atex (Gothe) - Version

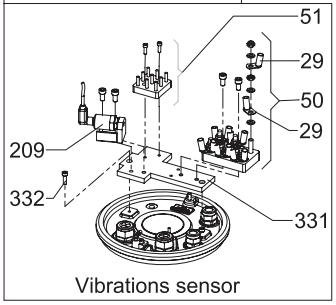
Pos.23 power cable
pos.24 control cable
pos.25 protection cable



EMC - connection

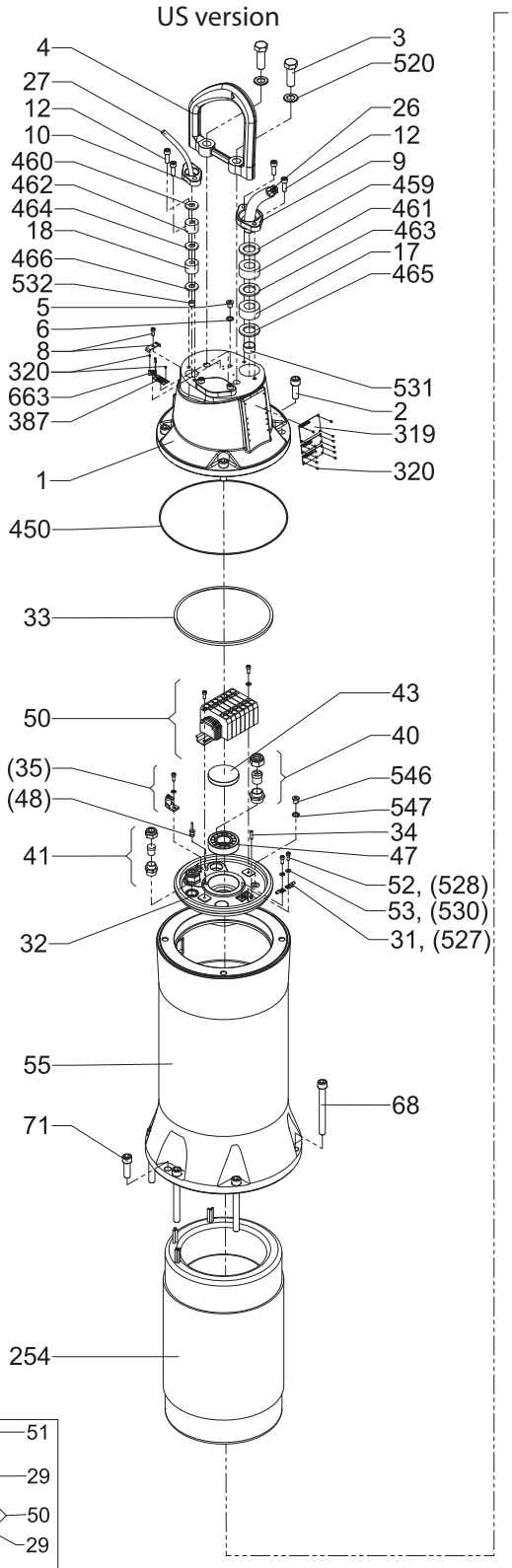


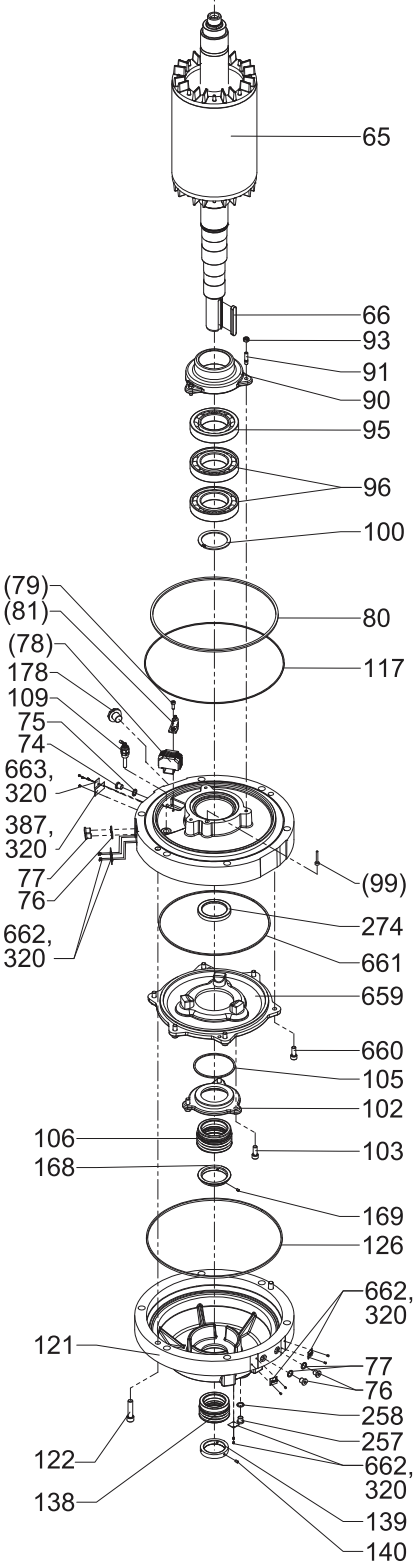
Zinc anode



Vibrations sensor

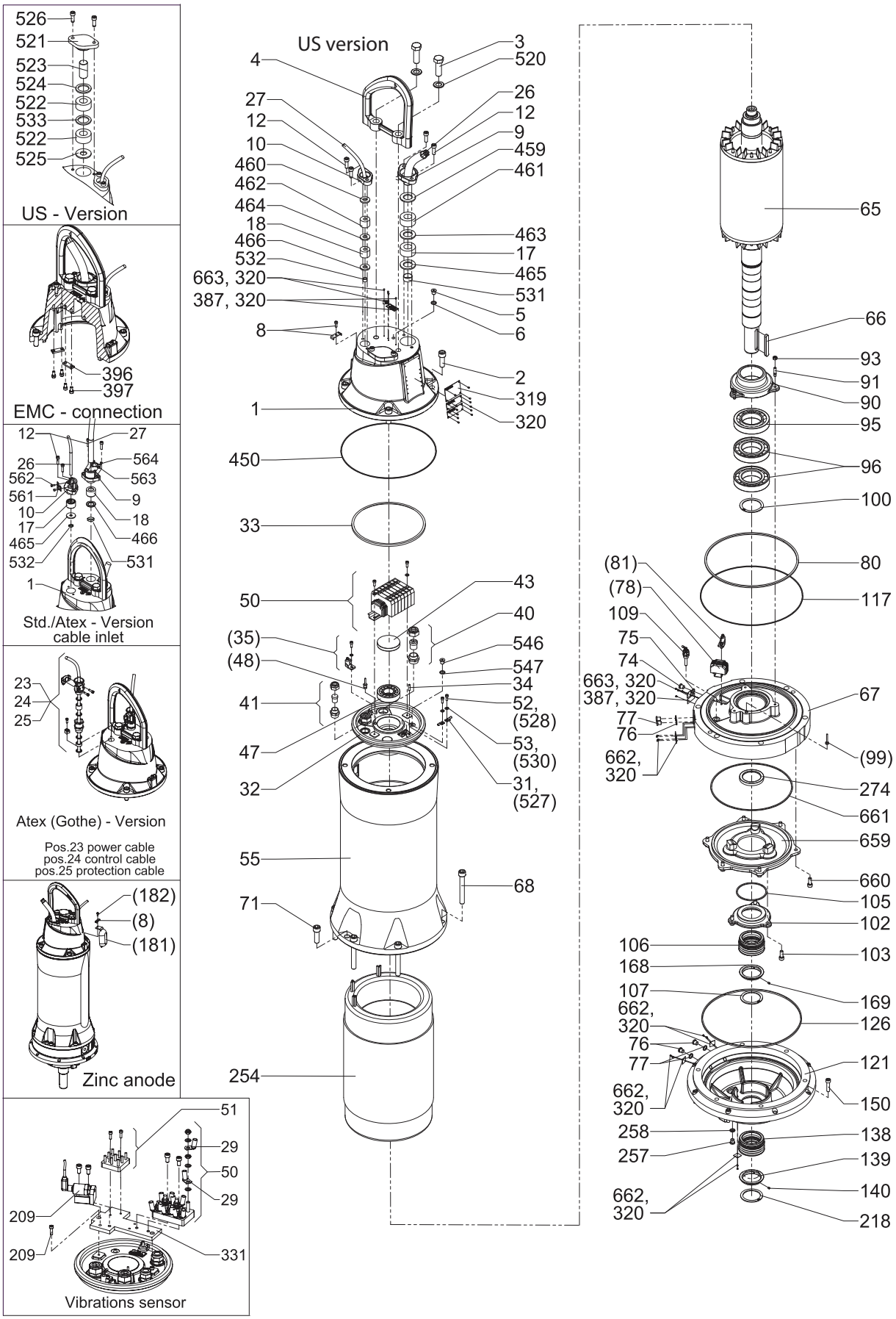
US version





Position	Description
1	Connection chamber
2	Screw cyl. M16x50 DIN912 1.4401
3	Screw ex. M20x60 DIN933 1.4401
4	Lifting bracket
5	Plug screw M12 DIN908 1.4401
6	Seal ring A12x16x2 VF DIN7737
8	Potential equalization clamp
9	Cable cap
10	Cable cap
12	Screw cyl. M10x30 DIN912 1.4401
17	Cable gland
18	Cable gland
23	Power cable
24	Control cable
25	Protection cable
26	Cable
27	Cable
29	Cable connector shoe
31	Cable terminal
32	Upper bearing flange
33	O-ring 248x5 NBR70 DIN3771
34	Rivet 6x24-ISO 8739-STVZ
35	DI leakage sensor
40	Cable gland (power cables)
41	Cable gland (control cables)
43	Screw cap 80x12 NBR
47	Bearing
48	Temperature sensor
50	Terminal block
51	Terminal block
52	Screw cyl. M6x12 DIN912 8.8 GV
53	Washer 6.4 BRASS DIN125-B
55	Motor housing
65	Rotor shaft
66	Impeller key AB12x8x54 DIN6885 4571
67	Lower bearing flange
68	Screw cyl. M16x45 DIN912 1.4401
71	Socket head cap screw
74	Plug screw M12 DIN908 1.4401
75	Seal ring A12x16x2 VF DIN7737
76	Plug screw M12 DIN908 1.4401
77	Seal ring A12x16x2 VF DIN7737
78	Terminal block
79	Cap screw and washer
80	O-ring 310x5.0 NBR70
81	DI leakage sensor
90	Bearing lid
91	Stud bolt M8x25 DIN939 1.4401
93	Hex. nut M8 DIN934 1.4401
95	Roller bearing
96	Ball bearings
99	Temperature sensor
100	Circlip 70x2.50 DIN983
102	Transition piece
103	Screw cyl. M10x25 DIN912 1.4401
105	O-ring 96x3 NBR70 DIN3771
106	Mechanical seal 65 mm
109	DI probe
117	O-ring 350x2 NBR70
121	Seal holding plate
122	Screw cyl. M8x16 DIN912 1.4401
125	Socket head cap screw
126	O-ring 385x5.0 NBR70
130	Plug screw M12 DIN908 1.4401
131	Seal ring A12x16x2 VF DIN7737
138	Mechanical seal 55 mm
139	Mechanical seal support ring
140	Grub screw M5x6 DIN916 1.4401
151	Washer
168	Mechanical seal support ring
169	Grub screw M6x20 DIN916 1.4401
178	Hex. screw M20x30-ISO4017-A4-70
181	Zinc anode
182	Cap screw
209	Sensor
254	Stator
257	Plug screw
258	Seal ring
274	Lipseal
319	Nameplates
320	Round head rivet D3x4 ISO8746
331	Mounting plate
332	Socket head cap screw
387	Warning label
396	Clamp
397	Socket head cap screw
450	O-ring 330x2 NBR70
459	Washer 54.0x38.5x4.0 1.4301
460	Washer 34.0x20.0x4.0 1.4301
461	Seal cable D54xD30.0x30 NBR
462	Seal cable D34xD14.0x30 NBR
463	Washer 54.0x42.5x4.0 1.4301
464	Washer 34.0x24.0x4.0 1.4301
465	Washer 54.0x38.5x4.0 1.4301
466	Washer 34.0x20.0x4.0 1.4301
520	Washer 21.0 1.4401 DIN125-A
521	Cable gland
522	Cable seal D54xD32.0x30 NBR
523	Round bar cable inlet
524	Washer 54.0x38.5x4.0 1.4301
525	Washer 54.0x23.0x4.0 1.4301
526	Screw cyl. M10x30 DIN912 1.4401
527	Cable terminal
528	Screw cyl. M6x12 DIN912 8.8 GV
530	Washer 6.4 BRASS DIN125-B
531	Strain relief (shrink sleeve US, hose clip Std. and ATEX)
532	Strain relief (shrink sleeve US, hose clip Std. and ATEX)
533	Washer 54.0x42.5x4.0 1.4301
546	Threaded plug
547	Seal ring
561	Cable entry clamp
562	Screw cyl. M5x12 DIN912 1.4401
563	Cable entry clamp
564	Screw cyl. M5x12 DIN912 1.4401
659	Intermediate cover
660	Screw cyl. M10x30 DIN912 1.4401
661	O-ring 271x3 NBR70 DIN3770
662	Oil fill hole nameplate
663	Inspection hole nameplate
664	Glycol fill hole nameplate

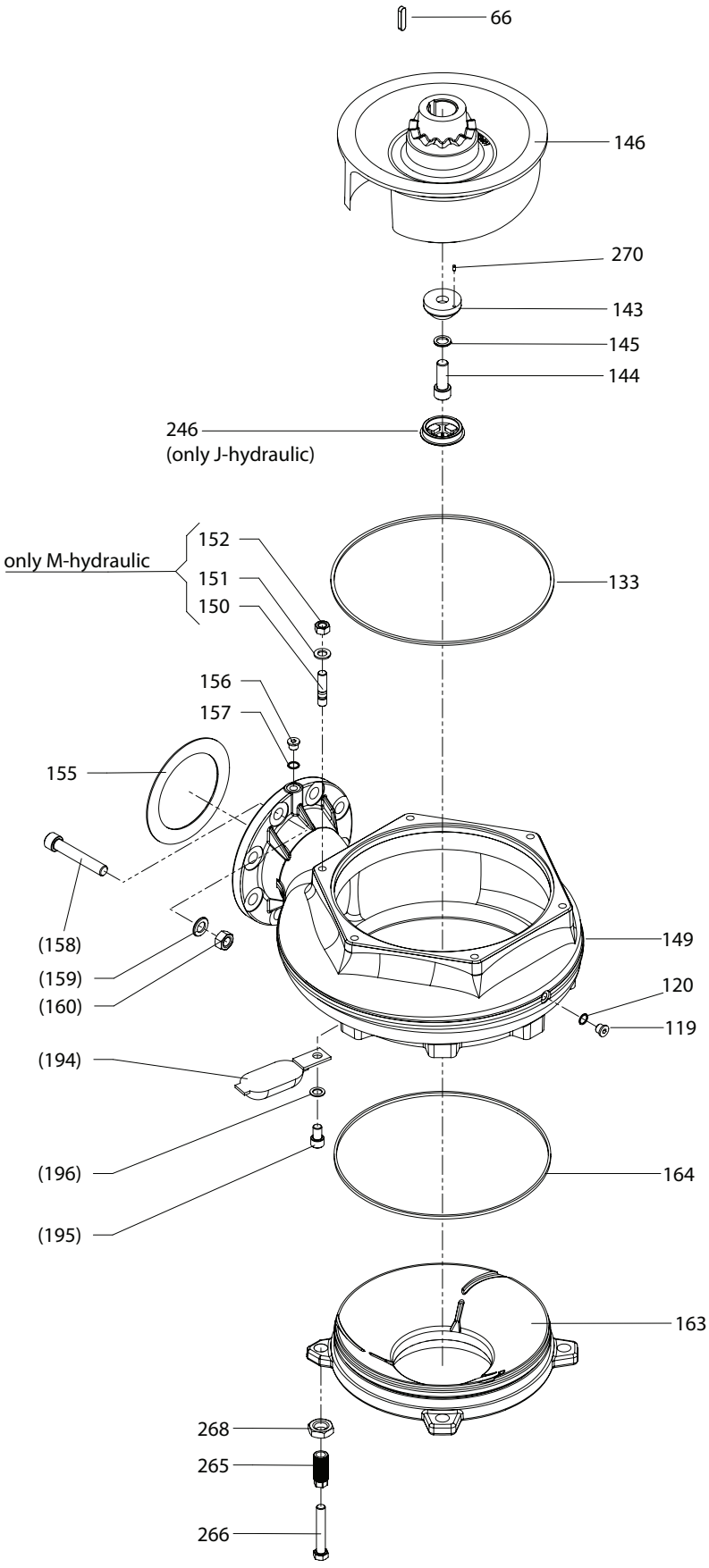
8 Motor Unit AFLX 0700 - PE4



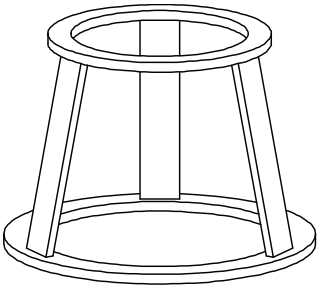
Position	Description
1	Connection chamber
2	Screw cyl. M16x50 DIN912 1.4401
3	Screw ex. M20x60 DIN933 1.4401
4	Lifting bracket
5	Plug screw M12 DIN908 1.4401
6	Seal ring A12x16x2 VF DIN7737
8	Potential equalization clamp
9	Cable cap
10	Cable cap
12	Screw cyl. M10x30 DIN912 1.4401
17	Cable gland
18	Cable gland
23	Power cable
24	Control cable
25	Protection cable
26	Cable
27	Cable
29	Cable connector shoe
31	Cable terminal
32	Upper bearing flange
33	O-ring 248x5 NBR70 DIN3771
34	Rivet 6x24-ISO 8739-STVZ
35	DI leakage sensor
40	Cable gland (power cables)
41	Cable gland (control cables)
43	Screw cap 80x12 NBR
47	Bearing
48	Temperature sensor
50	Terminal block
51	Terminal block
52	Screw cyl. M6x12 DIN912 8.8 GV
53	Washer 6.4 BRASS DIN125-B
55	Motor housing
65	Rotor shaft
66	Impeller key AB12x8x54 DIN6885 4571
67	Lower bearing flange
68	Screw cyl. M16x45 DIN912 1.4401
71	Socket head cap screw
74	Plug screw M12 DIN908 1.4401
75	Seal ring A12x16x2 VF DIN7737
76	Plug screw M12 DIN908 1.4401
77	Seal ring A12x16x2 VF DIN7737
78	Terminal block
79	Cap screw and washer
80	O-ring 310x5.0 NBR70
81	DI leakage sensor
90	Bearing lid
91	Stud bolt M8x25 DIN939 1.4401
93	Hex. nut M8 DIN934 1.4401
95	Roller bearing
96	Ball bearings
99	Temperature sensor
100	Circlip 70x2.50 DIN983
102	Transition piece
103	Screw cyl. M10x25 DIN912 1.4401
105	O-ring 96x3 NBR70 DIN3771
106	Mechanical seal 65 mm
109	DI probe
117	O-ring 350x2 NBR70
121	Seal holding plate
125	Socket head cap screw
126	O-ring 385x5.0 NBR70
130	Plug screw M12 DIN908 1.4401
131	Seal ring A12x16x2 VF DIN7737
138	Mechanical seal 55 mm
139	Mechanical seal support ring
140	Grub screw M5x6 DIN916 1.4401
151	Washer
168	Mechanical seal support ring
169	Grub screw M6x20 DIN916 1.4401
178	Hex. screw M20x30-ISO4017-A4-70
181	Zinc anode
182	Cap screw
209	Sensor
218	Circlip
254	Stator
257	Plug screw
258	Seal ring
274	Lipseal
319	Nameplates
320	Round head rivet D3x4 ISO8746
331	Mounting plate
332	Socket head cap screw
387	Warning label
396	Clamp
397	Socket head cap screw
450	O-ring 330x2 NBR70
459	Washer 54.0x38.5x4.0 1.4301
460	Washer 34.0x20.0x4.0 1.4301
461	Seal cable D54xD30.0x30 NBR
462	Seal cable D34xD14.0x30 NBR
463	Washer 54.0x42.5x4.0 1.4301
464	Washer 34.0x24.0x4.0 1.4301
465	Washer 54.0x38.5x4.0 1.4301
466	Washer 34.0x20.0x4.0 1.4301
520	Washer 21.0 1.4401 DIN125-A
521	Cable gland
522	Cable seal D54xD32.0x30 NBR
523	Round bar cable inlet
524	Washer 54.0x38.5x4.0 1.4301
525	Washer 54.0x23.0x4.0 1.4301
526	Screw cyl. M10x30 DIN912 1.4401
527	Cable terminal
528	Screw cyl. M6x12 DIN912 8.8 GV
530	Washer 6.4 BRASS DIN125-B
531	Strain relief (shrink sleeve US, hose clip Std. and ATEX)
532	Strain relief (shrink sleeve US, hose clip Std. and ATEX)
533	Washer 54.0x42.5x4.0 1.4301
546	Threaded plug
547	Seal ring
561	Cable entry clamp
562	Screw cyl. M5x12 DIN912 1.4401
563	Cable entry clamp
564	Screw cyl. M5x12 DIN912 1.4401
659	Intermediate cover
660	Screw cyl. M10x30 DIN912 1.4401
661	O-ring 271x3 NBR70 DIN3770
662	Oil fill hole nameplate
663	Inspection hole nameplate
664	Glycol fill hole nameplate

9 Hydraulics XFP - PE4

9.1 CB impeller



Position	Description
66	Impeller key
146	Impeller
270	Pin
143	Collar washer
145	Lock washer
144	Cylinder screw (impeller bolt)
246	Impeller cap
152	Hex nut
151	Spring ring
150	Cylinder screw (stud with M-hydraulic type)
133	O-ring
156	Plug screw
157	Seal ring
155	Flat gasket
158	Cylinder screw
159	Spring washer
160	Hex nut
149	Volute
120	Seal ring
119	Plug screw
194	Zinc anode
196	Spring washer
195	Screw
164	O-ring
163	Bottom plate
268	Hex nut
265	Adjusting screw
266	Cylinder screw



mounting pedestal

Dismantling and assembly of the hydraulic

NOTE: For professional and safe dismantling or assembly we recommend to change the asymmetric lifting hoop of the XFP to M12 attachment swivel part no. 14990096, or to the symmetric lifting hoop version used for VUPX/AFLX part no. 32062500. Only this measure enables the motor unit to hang in a vertical upright position when lowering.

Dismantling of the motor unit

- Unscrew screws (150) and lift off motor unit carefully with the aid of an adequately dimensioned hoist.

IMPORTANT: observe the total weight of the pump (see name plate)!

- Place motor unit carefully on its side, taking care that it cannot roll over. Do not place it on the cooling jacket!

Assembly of the motor unit

- Clean the surface of the centring seat of motor unit and volute (149).
- Insert new o-ring (133).
- Bring motor unit into line to volute. The marking arrow on flange of the cooling or oil chamber must be in line with discharge flange of volute.
- For M-hydraulic insert stud (150) into volute.
- Lower motor unit with care onto volute.
- Fit and tighten screws (150), or hex nut with M-hydraulic.

IMPORTANT: to ensure the impeller is adequately secured, the correct tightening torque MUST be applied to the impeller screw (144). Before fitting select the required torque setting from Section 2.2, Page 5.

Dismantling of the impeller when suspended by a hoist

- With volute removed, hang motor unit in a vertical upright position above a suitable solid mounting pedestal.
- Lower motor unit carefully until impeller is supported on mounting pedestal.
- Loosen impeller screw (144) and screw it out together with securing washers (145).

IMPORTANT: the impeller screw and washer must be replaced once removed. Failure to do so will invalidate the warranty.

- Remove collar washer (143) and grooved pin (270).
- Raise motor unit a few centimeters and withdraw impeller (146), if necessary with the aid of two levers.

Dismantling of the impeller in a horizontal position

- With volute removed, place motor unit carefully on its side, taking care that it cannot roll over. Do not place it on the cooling jacket!
- Remove impeller screw (144) together with securing washers (145), collar washer (143) and grooved pin (270).

IMPORTANT: the impeller screw and washer must be replaced once removed. Failure to do so will invalidate the warranty.

- Withdraw and lift off impeller (146) from shaft end with the aid of two levers or impeller puller at the gap between shroud of the impeller, and cooling/oil chamber.

Assembly of the impeller

- Prior to assembling the impeller, the shaft end and key (66) should be cleaned and checked for any damage. Any damaged or worn parts should be replaced.
- The impeller bore and the shaft end should be lightly lubricated with graphite grease or a suitable mounting paste.
- Fit key (66) into motor shaft and push impeller onto motor shaft.

Suspended by a hoist:

- Place impeller (146) to mounting pedestal and bring it into line.
- With hoist, suspend motor unit above impeller.
- Bring shaft end and key into line with impeller bore and lower motor unit with care until shaft is fully home.

In horizontal position:

- Push impeller onto shaft.

Suspended or horizontal

- Insert collar washer (143) together with grooved pin (270).
- Screw in impeller screw (144) together with securing washers (145).
- Tighten impeller screw (144) with the correct tightening torque (depending on the screw dimension).

IMPORTANT: to ensure the impeller is adequately secured, the correct tightening torque MUST be applied to the impeller screw (144). Before fitting select the required torque setting from Section 2.2, Page 5.

- Where applicable refit cooling jacket and refill with coolant (see pages 34 and 39).

Dismantling of the bottom plate

- Lift off pump carefully with the aid of an adequately dimensioned hoist.
- Support pump safely in a horizontal position. Make sure that pump cannot roll over!
- Screw out screws (266).
- Remove bottom plate (163) with the aid of two levers.
-

Assembly of the bottom plate

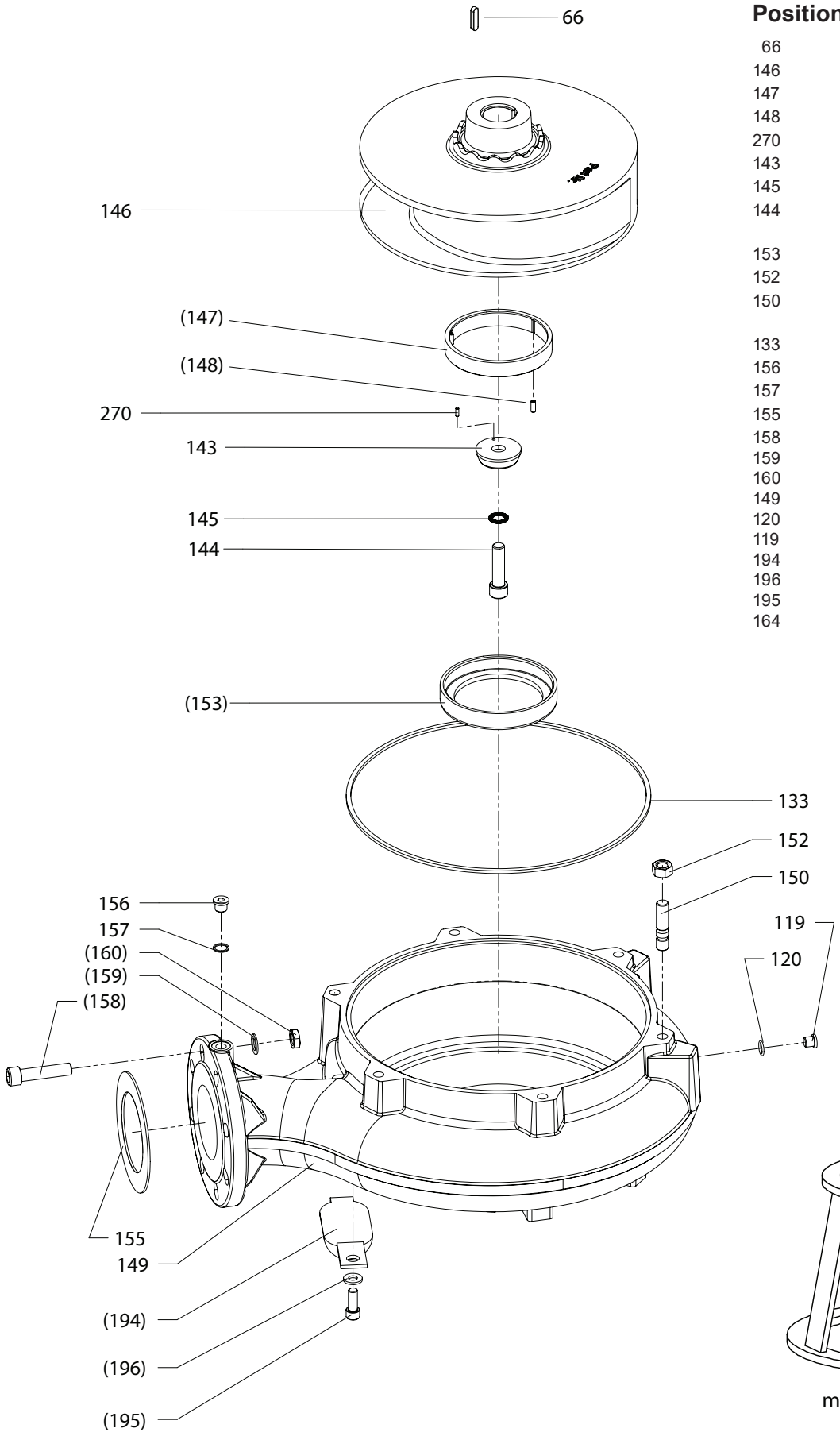
- Fit o-ring (164) into groove of bottom plate.
- Remove adjusting screws (265) and locking nuts (268).
- Press bottom plate (163) against shearing edge of impeller.
-

Adjusting the gap between impeller and bottom plate.

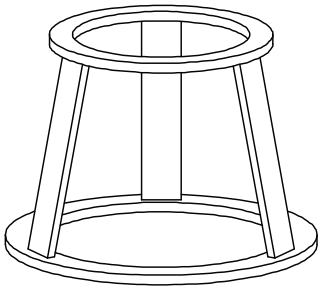
- Screw in adjusting screws (265) sufficiently until the smallest possible gap is present all around between bottom plate and shearing edge of impeller.
- Screw in and tighten screws (266).
- Tighten locking nuts (268).
- Bring pump to an upright position and turn impeller a few turns by hand.

ATTENTION: Prior to installation and commissioning of the pump a check should be made that the impeller can rotate contact-free to the bottom plate! If the impeller cannot be rotated by hand the gap has to be adjusted and checked again.

9.2 CH impeller



Position	Description
66	Impeller key
146	Impeller
147	Wear ring
148	Spring pin
270	Grooved pin
143	Collar washer
145	Lock washer
144	Cylinder screw (impeller bolt)
153	Wear ring
152	Hex nut
150	Cylinder screw (stud with M-hydraulic type)
133	O-ring
156	Plug screw
157	Seal ring
155	Flat gasket
158	Cylinder screw
159	Spring washer
160	Hex nut
149	Volute
120	Seal ring
119	Plug screw
194	Zinc anode
196	Spring washer
195	Screw
164	O-ring



mounting pedestal

Dismantling and assembly of the hydraulic

NOTE: For professional and safe dismantling or assembly we recommend to change the asymmetric lifting hoop of the XFP to M12 attachment swivel part no. 14990096, or to the symmetric lifting hoop version used for VUPX/AFLX part no. 32062500. Only this measure enables the motor unit to hang in a vertical upright position when lowering.

Dismantling of the motor unit

- Unscrew screws (150) and lift off motor unit carefully with the aid of an adequately dimensioned hoist.

IMPORTANT: observe the total weight of the pump (see name plate)!

- Place motor unit carefully on its side, taking care that it cannot roll over. Do not place it on the cooling jacket!

Assembly of the motor unit

- Clean the surface of centring seat of motor unit and volute (149).
- Insert new o-ring (133).
- Bring motor unit into line with volute. The marking arrow on flange of cooling or oil chamber must be in line with discharge flange of volute.
- For M-hydraulic insert stud (150) into volute.
- Lower motor unit with care onto volute.
- Fit and tighten screws (150), or hex nut with M-hydraulic.

IMPORTANT: to ensure the impeller is adequately secured, the correct tightening torque MUST be applied to the impeller screw (144). Before fitting select the required torque setting from Section 2.2, Page 5.

Dismantling of the impeller when suspended by a hoist

- With volute removed, hang motor unit in a vertical upright position above a suitable solid mounting pedestal.
- Lower motor unit carefully until impeller is supported on mounting pedestal.
- Loosen impeller screw (144) and screw it out together with securing washers (145).

IMPORTANT: impeller screw and washer must be replaced once removed. Failure to do so will invalidate the warranty.

- Remove collar washer (143) and grooved pin (270).
- Raise motor unit a few cm and withdraw impeller (146), if necessary with the aid of two levers.

Dismantling of the impeller in a horizontal position

- With volute removed, place motor unit carefully on its side, taking care that it cannot roll over. Do not place it on the cooling jacket!
- Remove impeller screw (144) together with securing washers (145), collar washer (143) and grooved pin (270).

IMPORTANT: impeller screw and washer must be replaced once removed. Failure to do so will invalidate the warranty.

- Withdraw and lift off impeller (146) from shaft end with the aid of two levers or an impeller puller at the gap between the shroud of the impeller and cooling/oil chamber.

Assembly of the impeller

- Prior to assembling the impeller, the shaft end and key (66) should be cleaned and checked for any damage. Any damaged or worn parts should be replaced.
- The impeller bore and shaft end should be lightly lubricated with graphite-grease or a suitable mounting paste.
- Fit key (66) into motor shaft and push impeller onto motor shaft.

Suspended by a hoist:

- Place impeller (146) to mounting pedestal and bring it into line.
- With a hoist, suspend motor unit above impeller.
- Bring shaft end and key into line with impeller bore and lower motor unit with care until shaft is fully home.

In horizontal position:

- Push impeller onto shaft.

Suspended or horizontal

- Insert collar washer (143) together with grooved pin (270).
- Screw in impeller screw (144) together with securing washers (145).
- Tighten impeller screw (144) with the correct tightening torque (depending on the screw dimension).

IMPORTANT: to ensure the impeller is adequately secured, the correct tightening torque MUST be applied to the impeller screw (144). Before fitting select the required torque setting from Section 2.2, Page 5.

- Where applicable refit cooling jacket and refill with coolant (see pages 34 and 39).

Dismantling of the bottom plate

- Lift off pump carefully with the aid of an adequately dimensioned hoist.
- Support pump safely in a horizontal position. Make sure that pump cannot roll over!
- Screw out screws (266).
- Remove bottom plate (163) with the aid of two levers.
-

Assembly of the bottom plate

- Fit o-ring (164) into groove of bottom plate.
- Remove adjusting screws (265) and locking nuts (268).
- Press bottom plate (163) against shearing edge of impeller.
-

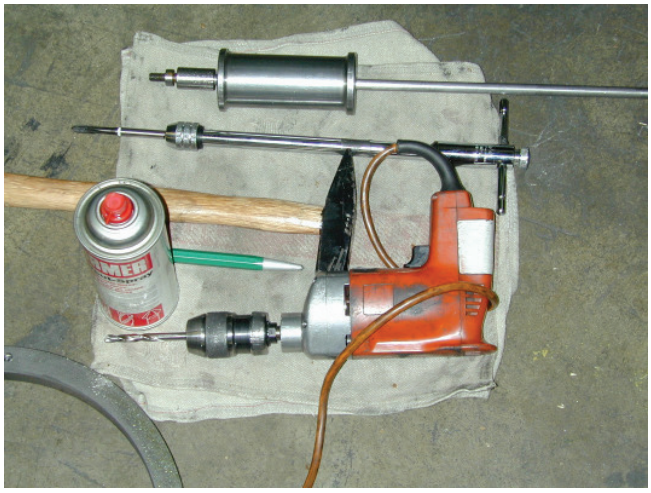
Adjusting the gap between impeller and bottom plate.

- Screw in adjusting screws (265) sufficiently until the smallest possible gap is present all around between bottom plate and shearing edge of impeller.
- Screw in and tighten screws (266).
- Tighten locking nuts (268).
- Bring pump to an upright position and turn impeller a few turns by hand.

ATTENTION: Prior to installation and commissioning of the pump a check should be made that the impeller can rotate contact-free to the bottom plate! If the impeller cannot be rotated by hand the gap has to be adjusted and checked again.

Changing of the volute wear ring

TOOLS:
Hammer
Centre punch
Drill
Drill bit Ø 6,8
Thread-cutting tap M8
Cutting oil
Wear ring removal tool (sec. 15.1)
Gas burner (not shown)



Dismantling of the volute wear ring

- Punch mark the old wear ring at 120° intervals.
- Drill holes to about 15 mm deep and tap to M8.
- Heat the wear ring with the flame of a gas burner.

IMPORTANT: use heat protecting gloves and wear goggles!

- Screw the wear ring removal tool into the threaded holes (see fig. 1).
- Loosen and release the old wear ring (148) with firm blows of a hammer. The removal tool is screwed into each hole in turn and the procedure repeated.

Figure 1

Assembly of the volute wear ring

- Clean the outside of the new wear ring and the inside of volute with Teroson cleaner (part number 9 510 1265).
- Rub down the wear ring seating of the volute with paper to ensure that the graphite residues of the cast iron are removed. Otherwise the adhesive will not work.
- Wet the surface of the volute with Loctite 764 (part number
- 1 595 0010). The activator will accelerate the hardening process.
- Spread Loctite industrial adhesive 15250 (part number 1 595 0009) evenly on the surface of the wear ring.
- Place the wear ring into the volute making sure that the entry chamfer enters first.
- Allow the adhesive at least 12 hours to set.

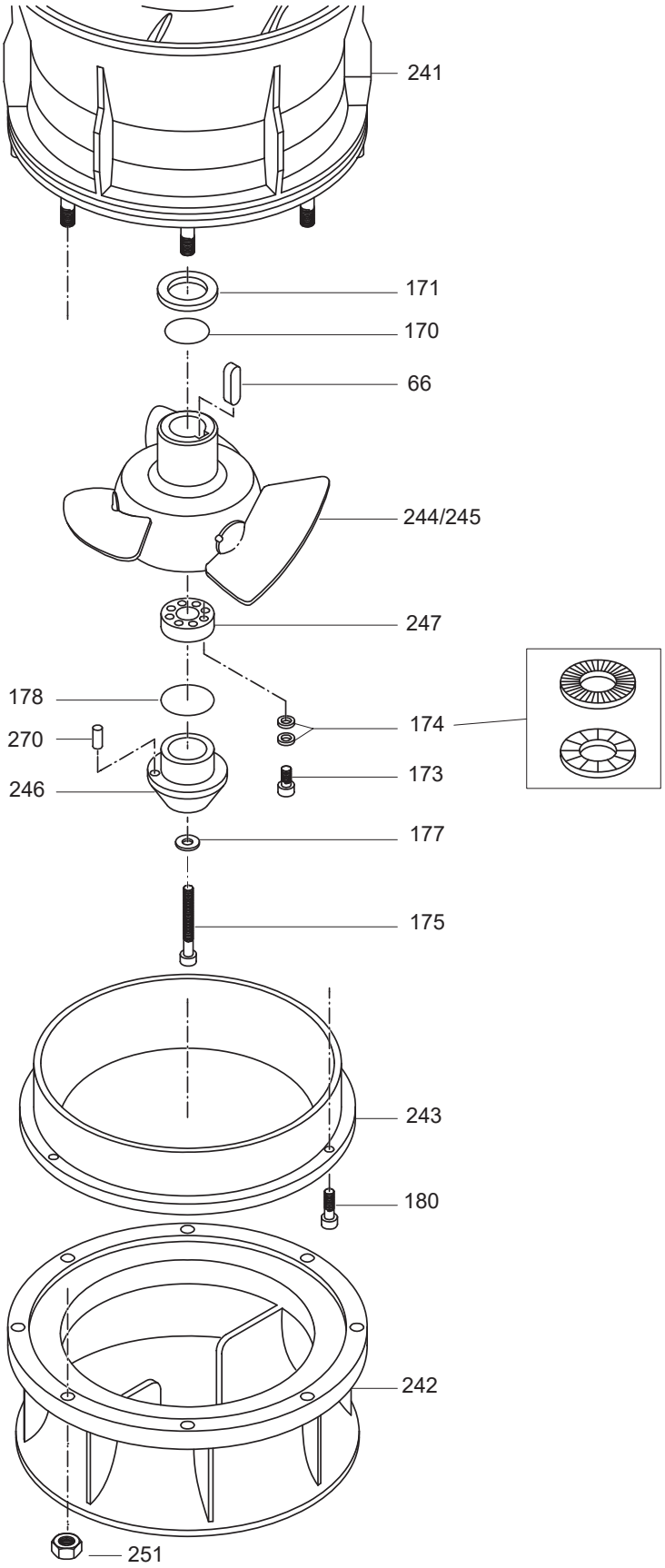
Changing of the impeller wear ring (option)

The wear ring (147) for the impeller (option) is shrink-fitted and secured by heavy duty dowel pins. The wear ring can be exchanged if necessary. Please contact your Sulzer Service Organisation.

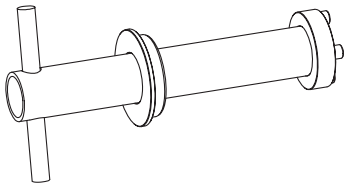
10 Hydraulics VUPX - PE4

10.1 Hydraulic

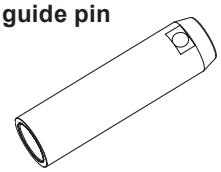
Position	Description
Hydraulics:	
241	Diffuser
171	Support washer
170	O-ring
66	Impeller key
244/245	Propeller
247	Propeller nut
174	Nord-Lock® securing washers
173	Locknut screw
178	O-ring
270	Pin
246	Propeller cap
177	Seal washer
175	Socket head screw
243	Wearl ring
180	Socket head screw
242	Bellmouth
251	Hex. nut
Diffuser:	
68	Socket head screw
199	Socket head screw
198	Adapter flange
241	Diffuser
184	O-ring



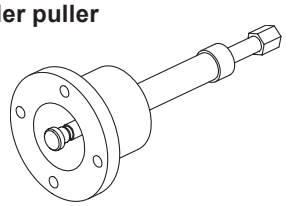
Propeller nut spanner



Propeller guide pin



Propeller puller



Dismantling and assembly of the hydraulic

Dismantling of the hydraulic

- Unscrew nuts (251) and lift off motor unit with diffuser (241) carefully with the aid of an adequately dimensioned hoist.

IMPORTANT: observe the total weight of the pump (see name plate)!

- Place motor unit carefully on its side, taking care that it cannot roll over. Do not place it on cooling jacket!

ATTENTION: if damage is visible on the wear ring (243) or deposits have caused grooves to be worn on to the propeller blades then the wear ring should be exchanged.

- Screw out counter-sunk socket head screws (180) and remove wear ring (243) with a suitable hoist (eyebolt and shackle).

ATTENTION: if it is difficult to loosen the wear ring (243) then it can be pressed off with the aid of screws (M8 x 50) which are screwed into the threaded holes provided.

- Screw out socket head screw (175) together with (USIT®) seal washer (177).
- Remove propeller cap (246) together with pin (270) and o-ring (178).
- Remove fixing screws (173) and (Nord-Lock®) securing washers (174).
- Screw off propeller nut (247) using propeller nut spanner (part no's 96990071/72/73 for VUPX 0400/0500/ 0600 respectively). If necessary use counter-pressure on propeller blades (245).

HINT: in the majority of cases the propeller (244/245) can be removed manually. Otherwise it may be drawn off the shaft using the propeller puller tool (part no's 96990549/96990085/96990546 for VUPX 0400/0500/ 0600 respectively). During dismantling and assembly the guide pin tool should be used (part no's 96990079 for VUPX 0400, and 96990080 for VUPX 0500 and 0600).

ATTENTION: handle the propeller carefully. The blade setting angle should never be changed. Do not place the propeller on the ground on the propeller blades or allow it to roll along on the blades.
The propeller with blades may only be exchanged as a complete unit. If individual propeller blades have to be exchanged then it is necessary for a Sulzer authorized workshop to turn the outside of the propeller with the new blades fitted ,and re-balance.

Assembly of the hydraulic

Assembly takes place in the reverse order, whereby care should be taken that the support washer (171) and the o-ring (170) are assembled first.

ATTENTION: the o-ring (170) must always be replaced!

- The propeller should slide easily on shaft. If necessary key (66) should be reworked or replaced. For ease of assembly we recommend that shaft end and key should be lightly lubricated with graphite grease.
- Mount propeller, push it fully home on shaft and tighten down fully using propeller nut (247).

ATTENTION: the propeller nut should only be tightened sufficiently that the o-ring (170) is not pinched!

- Fit wear ring (243) and fasten using socket head screws (180).
- After wear ring has been fitted the propeller nut should be opened sufficiently that a gap occurs between propeller blades and wear ring.
- The gap is present over the full circumference. Using a feeler gauge, check that the prescribed gap of 0.4 mm for VUPX 0400, 0.5 mm for VUPX 0500, or 0.6 mm for VUPX 0600, is present all round, and if necessary reset it.
- Screw in fixing screws (173) together with securing washers (174) and tighten screws with the prescribed tightening torque.

ATTENTION: observe that the securing washers are in the correct mounting position! (see detail in the drawing).

10.2 Diffuser

Dismantling and refitting of the diffuser

Dismantling of the diffuser

- Dismantle bellmouth and remove impeller (sec. 10.1).
- Using suitable hoist lift pump into a vertical position and place on a suitable horizontal surface e.g. pallet.
- Screw out socket head screws (68).

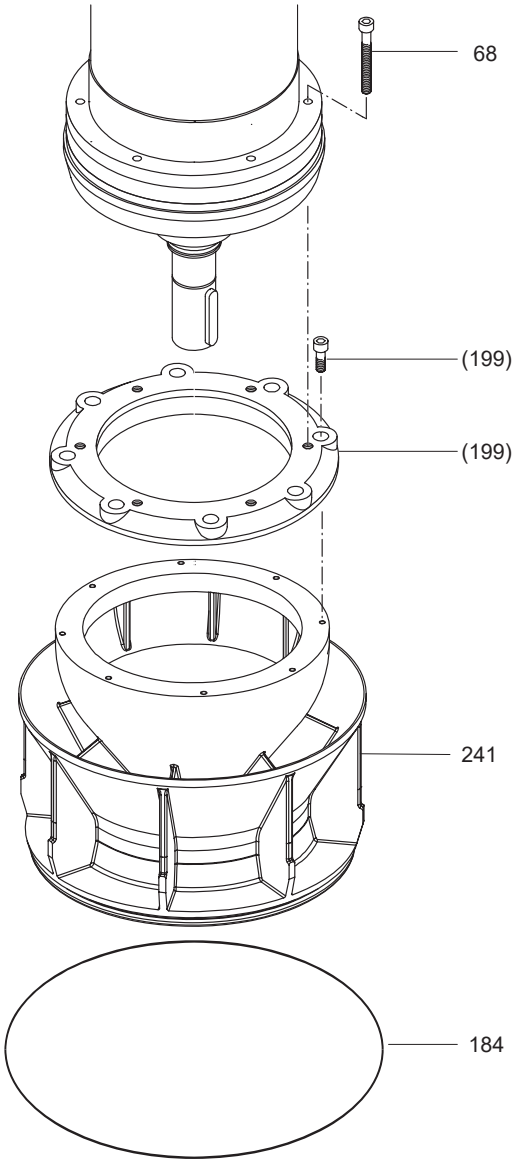
NOTE: some VUPX pumps have an adapter (198) between the diffuser (241) and the oil chamber. After unscrewing the socket head screws (68) this remains fastened with screws (199) to the diffuser.

- Raise motor and if necessary tap diffuser (241) loose using plastic hammer.

Assembly of the diffuser

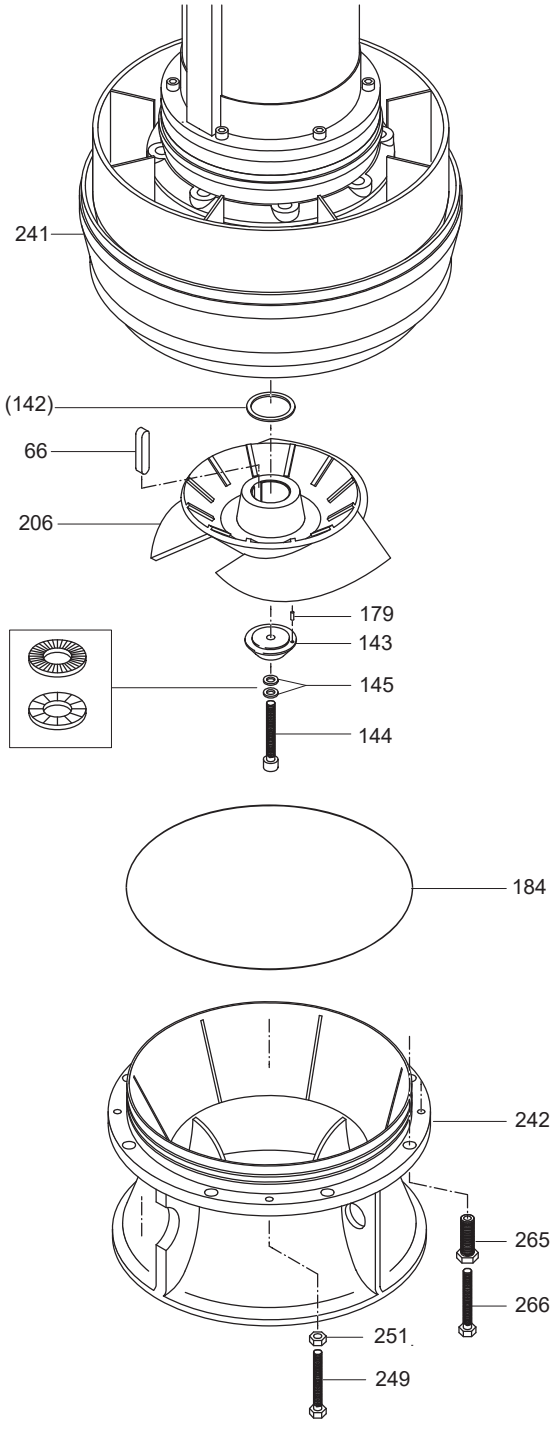
- Place motor carefully in a central position over diffuser (241) and lower, taking care that the holes in the parts are in line.
- Screw in socket head screws (68) and by this means tighten diffuser (241).
- Replace o-ring (184), lightly grease it and place it in the groove of the diffuser.

ATTENTION: all screws should be tightened in accordance with the prescribed torque.

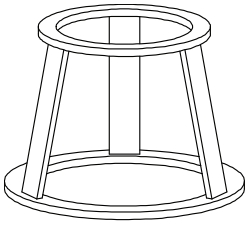


11 Hydraulics AFLX - PE4

11.1 Hydraulic



Mounting pedestal



Position Description

Hydraulics:

241	Diffuser
142	Support washer
66	Impeller key
206	Impeller
179	Pin
143	Impeller cap
145	Nord-Lock® securing washers
144	Impeller screw
184	O-ring
242	Bellmouth
265	Adjusting screws
266	Hex head screw
251	Hex nut
249	Hex head screw

Diffuser:

68	Socket head screw
199	Socket head screw
198	Adapter flange
241	Diffuser
184	O-ring

Dismantling and assembly of the hydraulic

Dismantling of the bellmouth

- Remove hex head screws (266).
- Lift off pump carefully a few cm with the aid of an adequately dimensioned hoist.

IMPORTANT: observe the total weight of the pump (see name plate)!
NOTE: If the bellmouth (242) does not come loose from its seat when lifting the pump, usually it will loosen after some blows with a plastic hammer. If that does not work it can be released by screwing in the hex head screws (249).

- Place pump carefully on its side, taking care that it cannot roll over.
- With this manner of dismantling, bellmouth (242) must be secured with a hoist.

Assembly of the bellmouth

- Renew o-ring (184), lightly grease it and place it in groove of bellmouth (242)..
- Screw out adjusting screws (265) a few turns.
- Place hanging pump above bellmouth (242) so that drill holes are in line.
- Lower pump so far that wall of bellmouth has contact with impeller blades.
- Screw in adjusting screws (265) just so far in that the prescribed gap (see table page 26) is present over the full circumference.
- Using feeler gauge, check that the prescribed gap is present all round and if necessary reset it.
- Screw in hex screws (266) and tighten.
- Do a final check by rotating impeller (206) by hand.
- Tighten hex screws (249).
- Tighten hex nuts (251).

ATTENTION: observe that the securing washers are in the correct mounting position (see detail in the drawing).

Dismantling and refitting of the impeller

Dismantling of the impeller

- Dismantle bellmouth (242).

NOTE: hang the pump above a suitable solid mounting pedestal and lower the pump carefully, so far that the impeller will be supported by the mounting pedestal.

- Screw out impeller screw (144) together with securing washers (145).
- Remove impeller cap (143) together with pin (179).
- Lift pump a few centimeters with care and withdraw impeller (206), if necessary with the aid of two levers.

Assembly of the impeller

Prior to assembling the impeller, the shaft end and key (66) should be cleaned and checked for any damage. Any damaged or worn parts should be replaced. In the case of the version with the support washer (142) care should be taken that this is fitted before the key. Before mounting the impeller the bore of the impeller hub and the shaft end should be lightly lubricated with graphite grease.

- Insert key (66).
- Place impeller (206) to mounting pedestal and bring it into line.
- Hang pump above impeller using a hoist.
- Bring shaft end with impeller bore and key with key groove into line and lower motor unit with care until shaft is fully home.
- Fit impeller cap (143) together with pin (179).
- Screw in impeller screw (144) together with securing
- washers 145).

ATTENTION: In the case of screws fastened with securing washers (e.g. impeller screws) the increased tightening torque must be observed.

ATTENTION: Observe the correct fitting orientation of the securing washers (145) as detailed in the assembly drawing.

ATTENTION: Prior to installation and commissioning of the pump a check should be made that the impeller can rotate contact-free to the wall of the bellmouth. If the impeller cannot be rotated by hand the gap has to be adjusted and checked again.

Gap between impeller and wall

Hydraulics	Gap (all around)	Tolerance
AFLX 0600	0.6 mm	- 0.2 mm
AFLX 0700	0.7 mm	

11.2 Diffuser

Dismantling and refitting of the diffuser

Dismantling of the diffuser

- Dismantle bellmouth and remove impeller as described in section 11.1.
- Using suitable hoist lift pump into a vertical position and place on a suitable horizontal surface e.g. pallet.
- Screw out socket head screws (68).

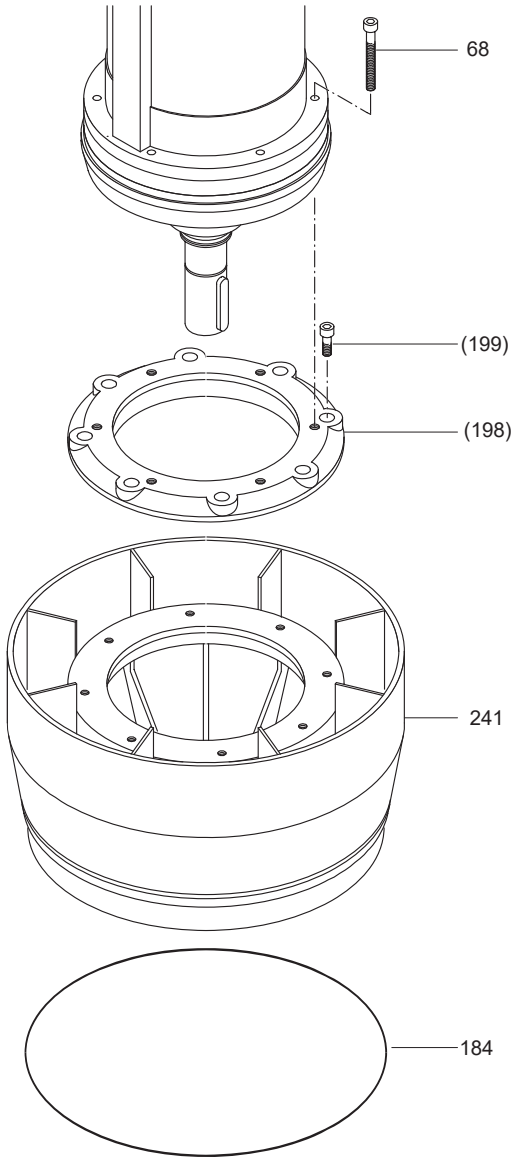
NOTE: some AFLX pumps have an adapter (198) between the diffuser (241) and the oil chamber. After unscrewing the socket head screws (68) this remains fastened with screws (199) to the diffuser.

- Raise motor and if necessary tap diffuser (241) loose using plastic hammer.

Assembly of the diffuser

- Place motor carefully in a central position over diffuser (241) and lower, taking care that the holes in the parts are in line.
- Screw in socket head screws (68) and by this means tighten diffuser (241).
- Replace o-ring (184), lightly grease it and place it in the groove of the diffuser.

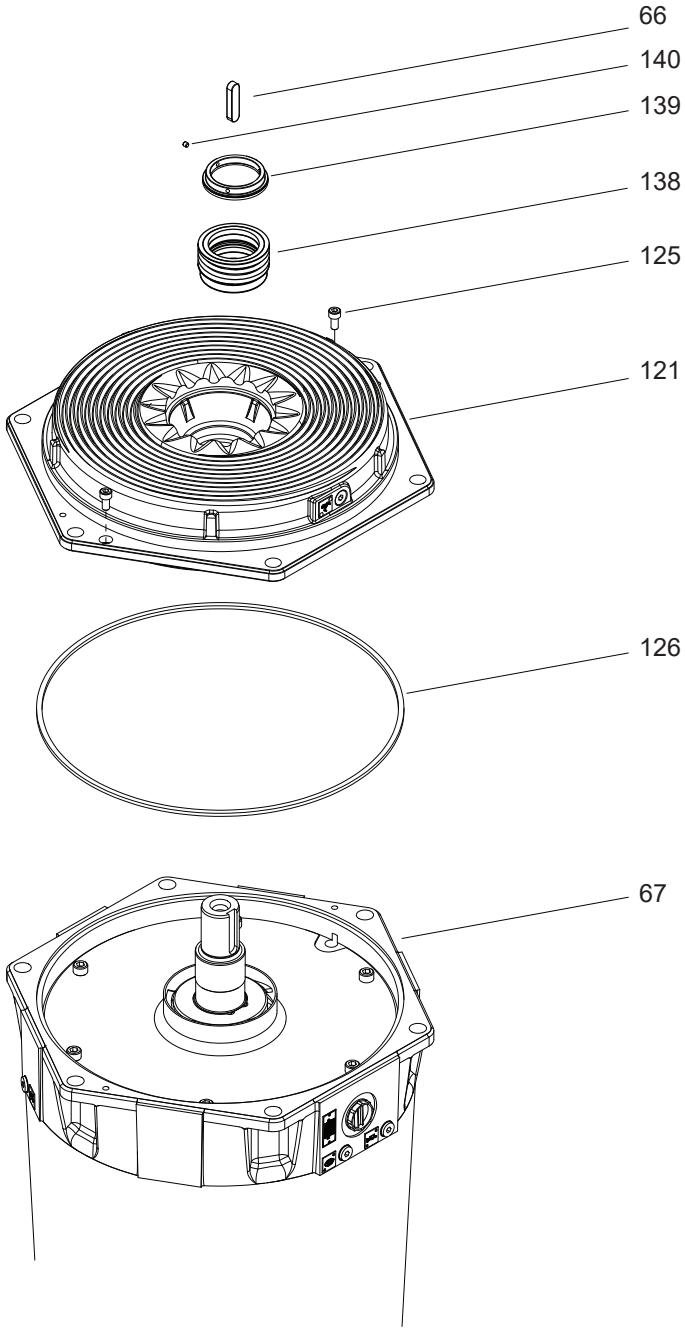
ATTENTION: all screws should be tightened in accordance with the prescribed torque.



10 Mechanical seals - removal and fitting

10.1 Primary seal - hydraulic side (cooled and non-cooled versions)

Position	Description
66	Impeller key
140	Grub screw
139	Mechanical seal support ring
138	Mechanical seal
125	Socket head cap screw
121	Seal holding plate
126	O-ring
67	Lower bearing flange



Removal

- Remove impeller key (66)
- Remove volute, bottom plate and impeller (see pages 18 - 22).

Note: drain coolant before removal of the mechanical seal (see pages 38 and 39).

- Loosen grub screws (140) and remove the seal support ring (139).
- Using two levers, suitably angled to reach down into the seal holding plate, prise rotational section of seal (138) from shaft.
- Using two levers, prise the seal holding plate from lower bearing flange (67) and slide from shaft (65).
- Push stationary section of seal (138) from the seal holding plate.

Fitting new seal

- Inspect o-ring (126) for damage and if necessary replace.
- Lubricate o-ring with oil and fit onto the seal holding plate.
- Apply rust inhibitor to machined surfaces and fit the seal holding plate to the lower bearing flange.
- Secure with screws (122).
- Lubricate seal bore with soapy water.
- Fit stationary part of mechanical seal into the seal holding plate, with rubber boot sitting in bore and polished seal surface facing outwards.
- Press fully home with seal press tool (sec. 15.2).

Note: ensure first that working edge of press tool is clean so as not to contaminate or damage seal surface.

- Remove tool and clean seal surface with paper towel.
- Lubricate shaft and inside rubber bellow of rotating part of seal with soapy water.
- Place rotating part of seal over shaft, ensuring polished seal surface is facing inwards (to meet with same on stationary part).
- Place the seal support ring (139) over the seal and shaft.
- Fit seal tool (sec. 15.3) to shaft end and screw fully into position.
- With Allen key tighten three grub screws (140).
- Remove the insertion tool and visually inspect the assembly, checking that the support ring is securely in position and flush with the step on the shaft.
- Carry out pressure test (see page 43).

- Refit impeller key
- Refit volute, impeller and bottom plate, and adjust if necessary (pages 18 - 22).
- Re-fill with coolant (pages 38 and 39)

⚠ ENSURE WORK AREA AND TOOLS ARE CLEAN.

10.2 Secondary seal and lipseal - motor side (cooled and non-cooled versions)

Position	Description
223	Socket head screws
221	Cover plate (pump with cooling jacket only)
169	Grub screw
168	Coolant impeller (pump with cooling jacket) / Support ring (non-cooled pump)
106	Mechanical seal
103	Socket head screws
102	Transition piece
105	O-ring
660	Socket head screws
659	Intermediate cover
661	O-ring
274	Lipseal
67	Lower bearing flange

Removal

- Remove volute, bottom plate and impeller (see pages 18 - 22).

Note: drain coolant before removal of the mechanical seal (see pages 38 and 39).

- Remove primary mechanical seal and seal holding plate (see page 23).
- If version with cooling jacket; remove screws (223) and cover plate (221).
- Remove grub screw (169) from coolant impeller (168) if cooling jacket version pump, or support ring if non-cooled version.

IMPORTANT: identify and note the side of the impeller/ support ring facing the mechanical seal to ensure correct orientation when refitting.

- Remove rotational section of seal (106) from shaft.
- Remove screws (103)
- Remove transition piece (102) and o-ring (105) from intermediate cover (659).

Note: if necessary tap the lugs of the transition piece sideways to loosen it before prising out with screwdriver.

- Prise stationary section of seal from transition piece.
- Remove screws (660), intermediate cover (659) and o-ring (661).
- Prise lipseal (274) from lower bearing flange.

Fitting new seals

- Fit shaft sleeve tool (sec. 15.4).
- Spray rotor shaft, sleeve tool and bore of bearing flange with soapy water.
- Fit lip seal (274) to lip seal press tool (sec. 15.5). The spring on the lip seal should face into the tool.
- Fit compression fitting (sec. 15.6) to press tool and press lipseal into it's final position.

Note: it is essential that the seal is fully seated and square to the shaft to ensure a proper seal is established.

- Fit o-ring (661) to intermediate cover (659). First, inspect o-ring for damage and if necessary replace.
- Fit intermediate cover to lower bearing flange (67) and secure with screws (660).

Note: to fit correctly the arrow embossed on the intermediate cover must be lined up with the arrow embossed on the bearing flange.

- Spray internal bore of transition piece (102) with soapy water.
- Fit stationary part of mechanical seal into transition piece with rubber boot sitting in bore and polished seal surface facing outwards.
- Press fully home with seal press tool (sec 15.7) using hydraulic press.

Note: check the reverse side of the assembly to ensure that the seal is pressed in evenly.

- Fit o-ring (105) to transition piece. First, inspect o-ring for damage and if necessary replace.
- Fit transition piece into intermediate cover and secure with screws (103).
- Clean seal surfaces with paper towel.
- Lubricate shaft and inside rubber bellow of rotating part of seal with soapy water.
- If sleeve tool was removed after inserting lip seal place it back on shaft prior to assembling the mechanical seal.
- Place rotating part of seal over shaft, ensuring polished seal surface is facing inwards (to meet with same on stationary part).
- Using seal press tool (sec 15.8) push seal over shaft sleeve tool into final position on shaft.
- Fit compression fitting (sec. 15.6) to press tool and press seal until the tool bottoms out. This ensures the rubber boot is past the shoulder on the shaft.
- Remove press and shaft sleeve tools.
- Refit support ring or coolant impeller, whichever applies, by placing over end of shaft, aligning flat area with flat surface on shaft.

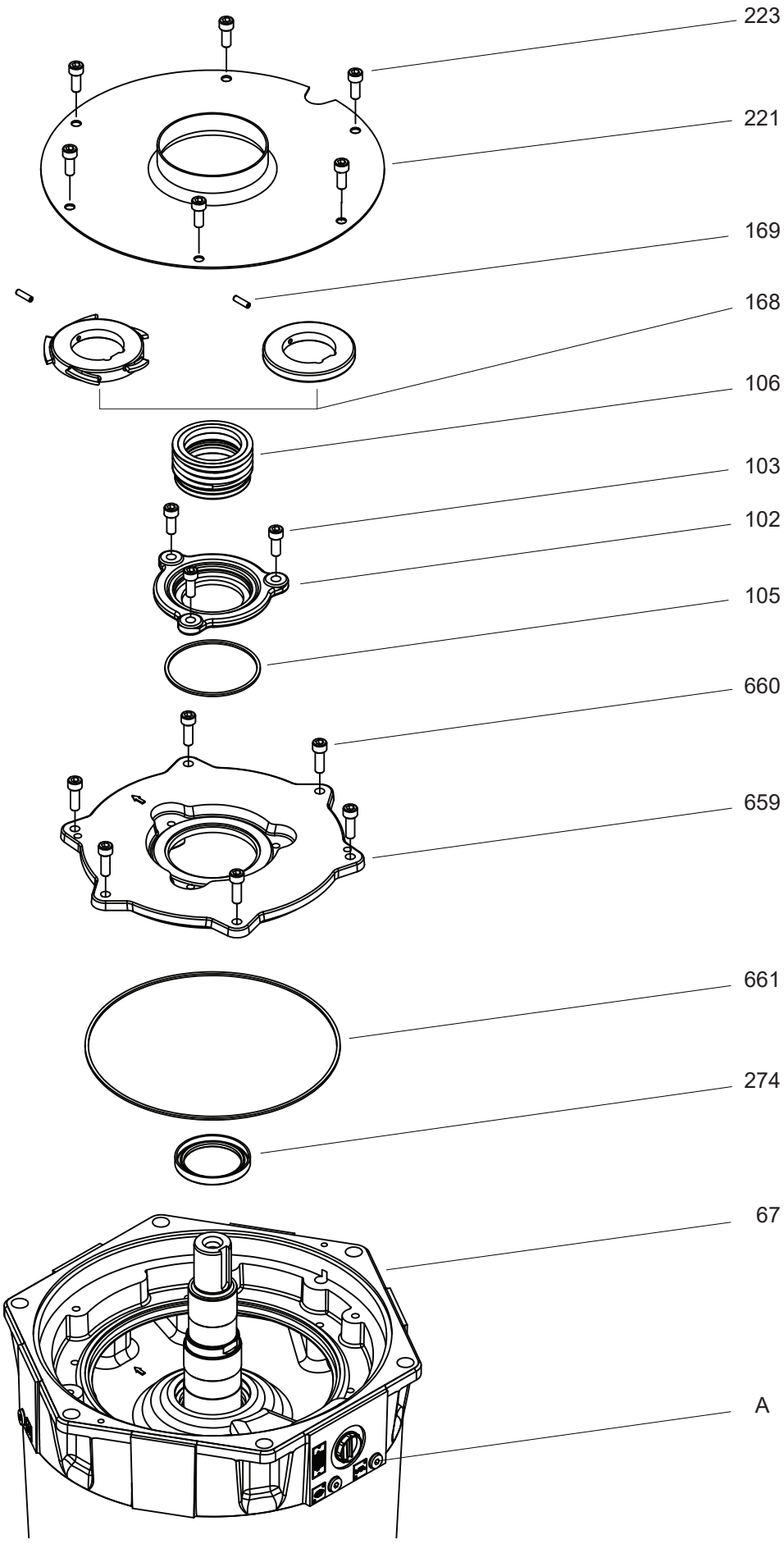
IMPORTANT: ensure the correct side of the impeller/support ring faces the mechanical seal as identified when removing it.

- Using seal press tool (sec 15.8) and compression fitting (sec. 15.6) tighten until support ring/impeller is firmly against the shoulder on the shaft.
- Tighten the grub screw in the support ring/impeller.
- If version with cooling jacket fit cover plate (221) and secure with screws (223), tightening in a criss-cross sequence.

IMPORTANT: ensure the opening in the side of the cover plate is lined up with the coolant bypass hole in the lower bearing flange.

- Insert air pressure test piece (sec 15.15) at location (A) and connect air hose to the assembly.
- Carry out pressure test at 0.5 bar to check integrity of both lip seal and mechanical seal.
- Refit primary mechanical seal and seal holding plate (see page 23).
- Carry out pressure test (see page 14).
- Refit volute, bottom plate and impeller (see pages 18 - 22).
- Re-fill with coolant (pages 38 and 39).

ENSURE WORK AREA AND TOOLS ARE CLEAN.


223
221
169
168
106
103
102
105
660
659
661
274
67
A

9 Bearings - removal and fitting

Position	Description
1	Connection chamber
1 a	Alignment slot
33	O-ring
50	Terminal block and mounting rail
43	Bearing cap
47	Bearing
40	Cable glands (power cables)
41	Cable glands (control cables)
34	Rivet
32	Bearing flange
63	O-ring
55	Motor housing

Upper bearing

Removal

- Remove screws (2), and where fitted cooling jacket clamps (60), and using hoist, slowly remove connection chamber (1) from motor housing (55), far enough to have access to upper bearing flange (32).
- Disconnect cables from terminal block (50).

Note: Take note of connection arrangements for future reconnection.

- Where fitted, remove cooling jacket (see page 34) after first draining coolant (see page 39). For pump without cooling jacket, draining of the coolant does not apply.
- Remove and inspect o-ring (33) for damage and if necessary replace.
- Remove terminal block (50) from mounting rail.
- Remove cable glands and seals (40 & 41) from bearing flange and cables.
- Using terminal block mounting rail for leverage pull bearing flange and outer ring of bearing from motor housing (55).
- Remove and inspect o-ring (63) for damage and if necessary replace.
- Remove terminal block mounting rail.
- Remove bearing cap (43).
- Push out outer part of bearing (47) from bearing housing.
- Remove inner ring part of bearing (47) from rotor shaft with the aid of a bearing puller.

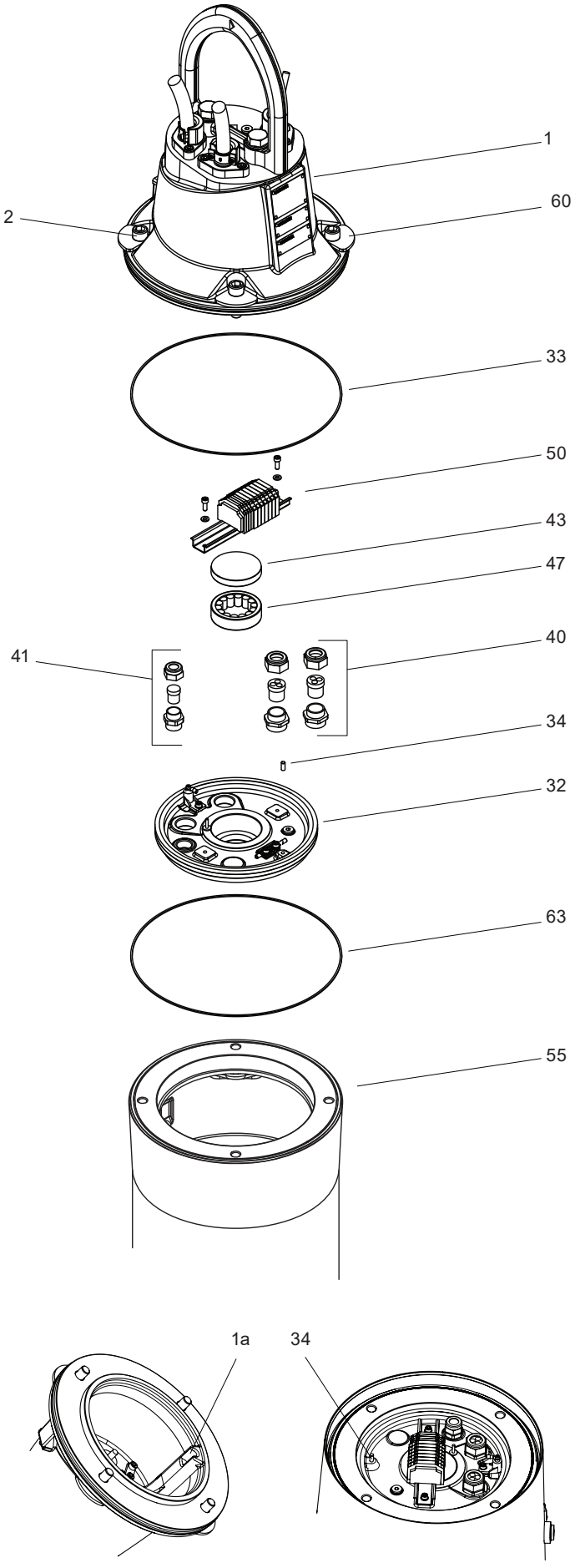
Note: to protect the shaft bore threads from damage by the bearing puller, place an adequately sized metal blank or washer at the opening of the shaft bore against which the bearing puller can be tightened.

Fitting

IMPORTANT: BEARINGS MUST BE COLD PRESSED INTO PLACE.

- Refit o-ring (63).
- Position bearing flange with cable bores directly above cable side of stator.
- Pull cables through and refit bearing flange.
- For final positioning of flange, fit alignment tool (sec. 15.13) with plug ends in threaded holes in motor housing, and centre sleeve fitting over rivet in flange.
- Apply oil to outer casing of bearing to assist fitting into bearing flange bore.
- Apply 8.4 cc of grease in track of thin edge of bearing. Level grease as required.
- Position bearing over shaft end and into bearing flange bore.
- Press bearing fully into place with bearing press tool (sec. 15.10) and mallet.
- Fit bearing cap and tap into place using bearing press tool (sec. 15.10) and mallet.
- Refit cable glands and seals.
- Refit terminal block.
- Reconnect cables
- Refit connection chamber, ensuring alignment slot (1a) fits over rivet (34) in bearing flange.
- Carry out pressure test (see page 43).

ENSURE WORK AREA AND TOOLS ARE CLEAN.


1
2
60
33
50
43
47
41
40
34
32
63
55
1a
34

Position	Description
67	Bearing flange
64	O-ring (cooling jacket version only)
80	O-ring
117	O-ring
100	Circlip
95	Roller bearing
96	Ball bearings
90	Bearing lid
93	Hex nuts
65	Rotor shaft
55	Motor housing
68	Cylinder screws
1 a	Alignment slot in connection chamber
34	Rivet

Lower bearings

Removal

- Remove volute, bottom plate and impeller (see pages 18 - 22).
- Carefully stand pump on upper end of motor housing.

Note: if motor housing is not already removed following on from removing the upper bearing, then in order to provide a stable base on which to stand the pump follow the steps for the removal of the upper bearing down to and including the terminal block (but not the terminal block rail, this is needed to support the upper bearing and cover).

- Remove mechanical seals and lipseal (see pages 27 and 28).

Note: leave a mark on the motor housing and bearing flange to ensure correct alignment when refitting.

- Remove screws (68).
- Fit M10 G80 lifting bolts to bearing flange (67) and using hoist and chain pull bearing flange up approx 50 mm from motor housing. The DI lead and plug is now accessible and must be disconnected from the probe connected to the bearing flange.
- If fitted with bearing temperature monitor disconnect from terminal block (78).

Note: Take note of connection arrangements for future reconnection.

- Lift bearing flange and shaft assembly fully from the motor housing, taking care not to damage the stator windings.

Note: be very careful not to damage shaft or Ex surfaces.

- Remove o-rings (80 and 117), check for damage and replace if necessary. Cooling jacket version has an additional o-ring (64).
- Remove circlip (100) from shaft.
- Remove screws (68) and remove bearing flange from motor housing.
- Remove bearing lid (90) and bearings (95 & 96) from shaft using bearing puller.
- Tap out bearing from bearing lid.

ENSURE WORK AREA AND TOOLS ARE CLEAN.

Fitting

IMPORTANT: BEARINGS MUST BE COLD PRESSED INTO PLACE.

- Lower shaft into motor housing.

Note: for Ex/FM pumps inspect the flame path surfaces on the rotor shaft, bearing lid, bearings, immediately prior to assembly to ensure they are defect-free. No scratches, tool marks etc. are permissible.

- Fit bearing lid onto shaft.
- Select two angular contact ball bearings (96) and place on a clean bench with thin edge of ball bearing outer race facing up.
- Apply 27.6 cc of grease in track of thin edge of each ball bearing. Level grease as required.
- Turn over second ball bearing and place directly on top of first bearing so that thin edges are facing each other.
- Select roller bearing (95) and place on a clean bench.
- Apply 19.2 cc of grease in track of the roller bearing. Level grease as required.
- Place roller bearing on top of the two ball bearings.
- Insert alignment sleeve (sec. 15.11) into stack of bearings.
- Lower the three bearings and alignment sleeve over end of shaft.
- Fit bearing press tool (sec. 15.12) over shaft and press bearings into place.
- Remove alignment sleeve from shaft.
- Secure bearings in place by fitting circlip (100).

Note: ensure circlip clicks into final position in groove.

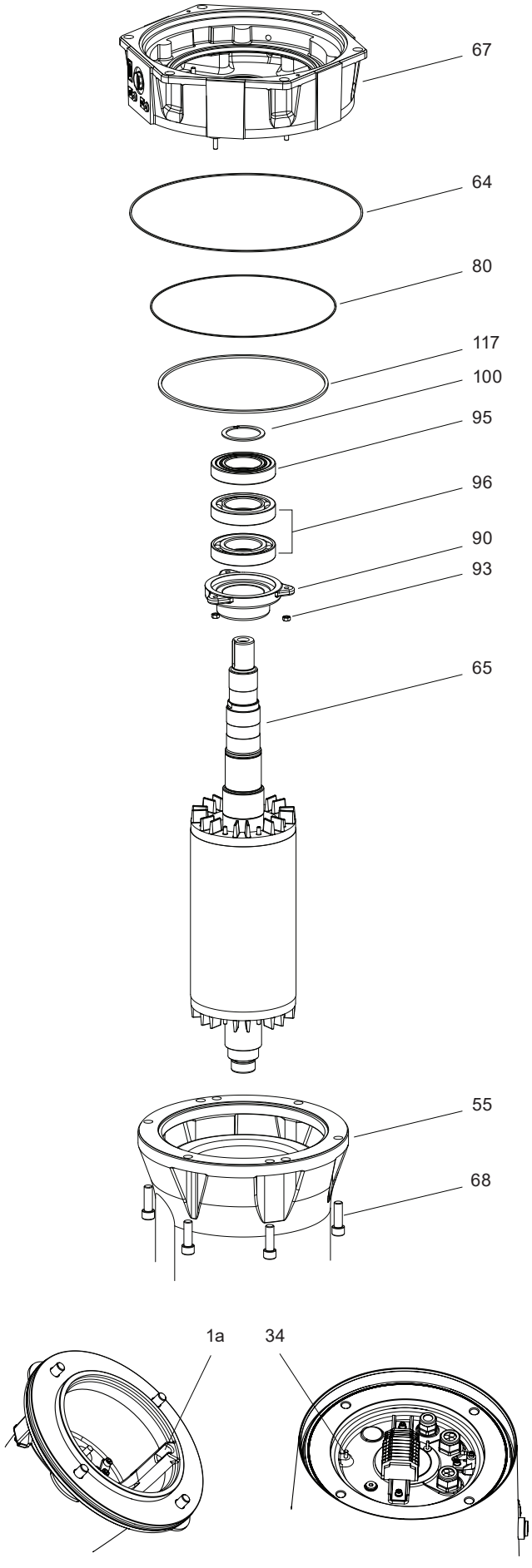
- Lower rotor shaft into the bearing flange and align the bearing lid with the three screws.

Note: if the pump has bearing temperature monitoring take care that the wire is not pinched by the bearing lid.

- Fit three nuts (93) and use ratchet to fully tighten the bearing lid in place.

Note: when the bearing lid is fully clamped in position there is still a gap of approximately 1.5 mm between the bearing lid and the bearing flange.

- Replace volute, bottom plate and impeller (see pages 18 - 22).
- Replace bearing cap, cable glands and seals
- Refit terminal block.
- Reconnect cables.
- Refit connection chamber, ensuring alignment slot (1a) fits over rivet (34) in upper bearing flange.
- Carry out pressure test (see page 14).


67
64
80
117
100
95
96
90
93
65
55
68
1a
34

10 Cooling jacket - removal and fitting

Position Description

2	Screw cyl.
60	Cooling jacket clamp
1	Connection chamber
33	O-ring
63	O-ring
A	Lifting nut
59	Cooling jacket
450	O-ring
64	O-ring
55	Motor housing
67	Lower bearing housing

Removal

- Drain coolant (see page 39).
- Remove screws (2) and cooling jacket clamps (60) from motor housing (55).
- Add alignment marks to connection chamber, cooling jacket and lower bearing housing to ensure correct re-alignment of parts during re-assembly.
- Using hoist, slowly remove connection chamber (1) from motor housing (55), far enough to have access to upper bearing flange (32) and terminal block (50).
- Disconnect cables from terminal block.

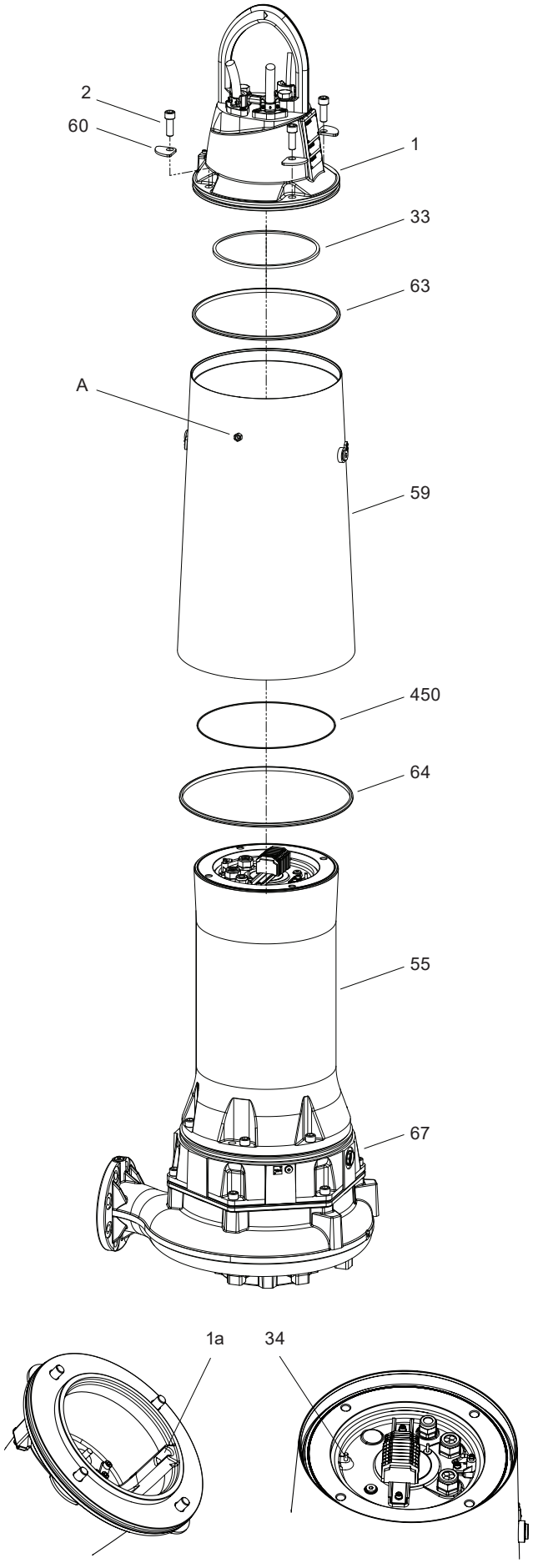
Note: Take note of connection arrangements for future reconnection.

- Remove and inspect o-rings (33) and (450) for damage and if necessary replace.
- Fit M12 eyebolts to lifting nuts (A).
- Secure hoist to eyebolts and lift cooling jacket from pump.
- Remove o-ring (63) from top of motor housing (55) and o-ring (64) from top of lower bearing housing (67).

Fitting

- Check o-rings for damage and replace if necessary.
- Lubricate o-ring (63) and fit to motor housing, and o-ring (64) and fit to lower bearing housing.
- Using hoist, lower cooling jacket slowly into position over pump, ensuring correct alignment.
- Fit cooling jacket assembly tool (sec. 15.18) and tighten screws in a criss cross action to push cooling jacket into final position.
- Refit connection chamber, ensuring alignment slot (1a) fits over rivet (34) in upper bearing flange.
- Refit cooling jacket clamps and screws to secure connection chamber and cooling jacket in place.
- Remove eyebolts from cooling jacket.
- Refit seal rings and screw plugs.
- Refill with coolant (see page 39).

ENSURE WORK AREA AND TOOLS ARE CLEAN.


2
60
1
33
63
A
59
450
64
55
67
1a
34

11 Stator - removal and fitting

Position Description

2	Screw cyl.
60	Cooling jacket clamp
1	Connection chamber
33	O-ring
40/41	Cable glands - power and control leads
450	O-ring
55	Motor housing
68	Screw cyl.
67	Lower bearing housing
254	Stator
117	O-ring
80	O-ring

Removal

Note: the stator is held in by a compression fit only, so therefore it can only be removed by pulling it out by force.

- Apply alignment marks to connection chamber, cooling jacket where fitted, motor housing and lower bearing flange before removing either part.
- Remove screws (2), and where fitted cooling jacket clamps (60), and using hoist, slowly remove connection chamber (1) from motor housing (55), far enough to have access to upper bearing flange (32).
- Disconnect cables from terminal block (50).

Note: Take note of connection arrangements for future reconnection.

- Remove and inspect o-rings (33 and 450) for damage and if necessary replace.
- Where fitted, remove cooling jacket (see page 34) after first draining coolant (see page 39). For non-cooled versions draining of the coolant is not necessary.
- Remove upper bearing flange and bearing (see page 30).
- Loosen screws (68) to release motor housing (55) from lower bearing housing (67). .
- Fit two eyebolts to motor housing and lift assembly approx 50 mm from lower bearing housing. The monitoring cables are now accessible and must be disconnected.

Note: Where lower bearing flange is fitted with a terminal block take note of connection arrangements for future reconnection.

- Withdraw monitoring cables from channel between stator and motor housing. Take care as they can be easily damaged or cut against the stator laminations while doing this.
- Lift motor housing assembly fully from shaft and lower bearing housing.
- Remove and inspect o-rings (117 and 80) for damage and if necessary replace.
- Mark position of stator leads on motor housing for aignment when fitting replacement
- Measure and take note of the stator cable lengths. Replacement stator cables must be cut to the same length. This is essential for correct connection to the terminal block. Take care that the ID tags remain in place while doing this.
- Stand motor housing on connection chamber end.
- Fit stator extraction tools (sec 15.16 & 15.17) to motor housing.
- Apply tool pressure, while simultaneously heating the motor housing, until the stator begins to pull free.

Note: heat and pressure must be applied at the same time. This ensures that the stator releases as the motor housing expands but before the stator itself expands.

Fitting

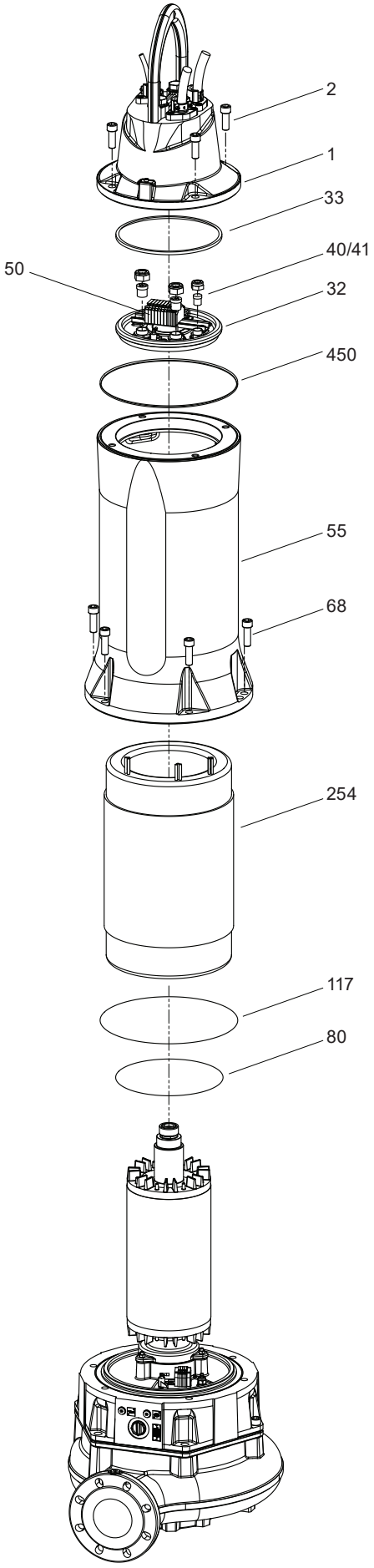
Note: refitting of stator can only be done by means of a heavy hydraulic press and insertion tool.
A pressure of min.70 bar and max.160 is required.
Note: if it requires less that 70 bar to insert the stator it is too loose and the parts need to be checked.
Motor housing must be square to hydraulic ram when the stator is being pressed in.

- Lightly grease inside the top of motor housing to aid with insertion of stator.
- Lower stator into initial position in motor housing, with leads aligned to mark on motor housing as applied earlier.
- Fold leads into stator bore to avoid damage by insertion tool.
- Fit two M12 eyebolts into insertion tool (sec 15.14) and, using hoist, lift into place until seated on stator core, taking care not to make contact with stator windings.
- Remove eyebolts from insertion tool and press stator fully home into motor housing.
- Refit eyebolts and remove insertion tool.
- Lower motor housing assembly over shaft to a point at which the DI and other monitoring leads can be re-connected.

Note: When reassembling stator and rotor, the air gap is set by the tolerances of the machined parts and is not changeable.

- Lower motor housing fully and secure with screws (68) to lower bearing housing.
- Refit upper bearing flange and bearing (see page 30).
- Where applicable refit cooling jacket and refill with coolant.

ENSURE WORK AREA AND TOOLS ARE CLEAN.

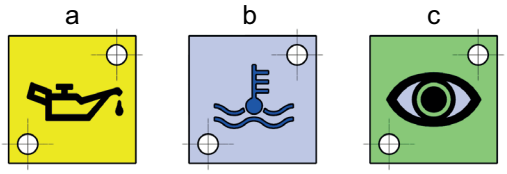

2
1
33
40/41
50
32
450
55
68
254
117
80

12 Oil and coolant changing

ATTENTION ***Only use products that are approved by the manufacturer!***

Before loosening, place a cloth over plug screws to contain any possible spray of oil or glycol as the pump de-pressurises.

Symbols:



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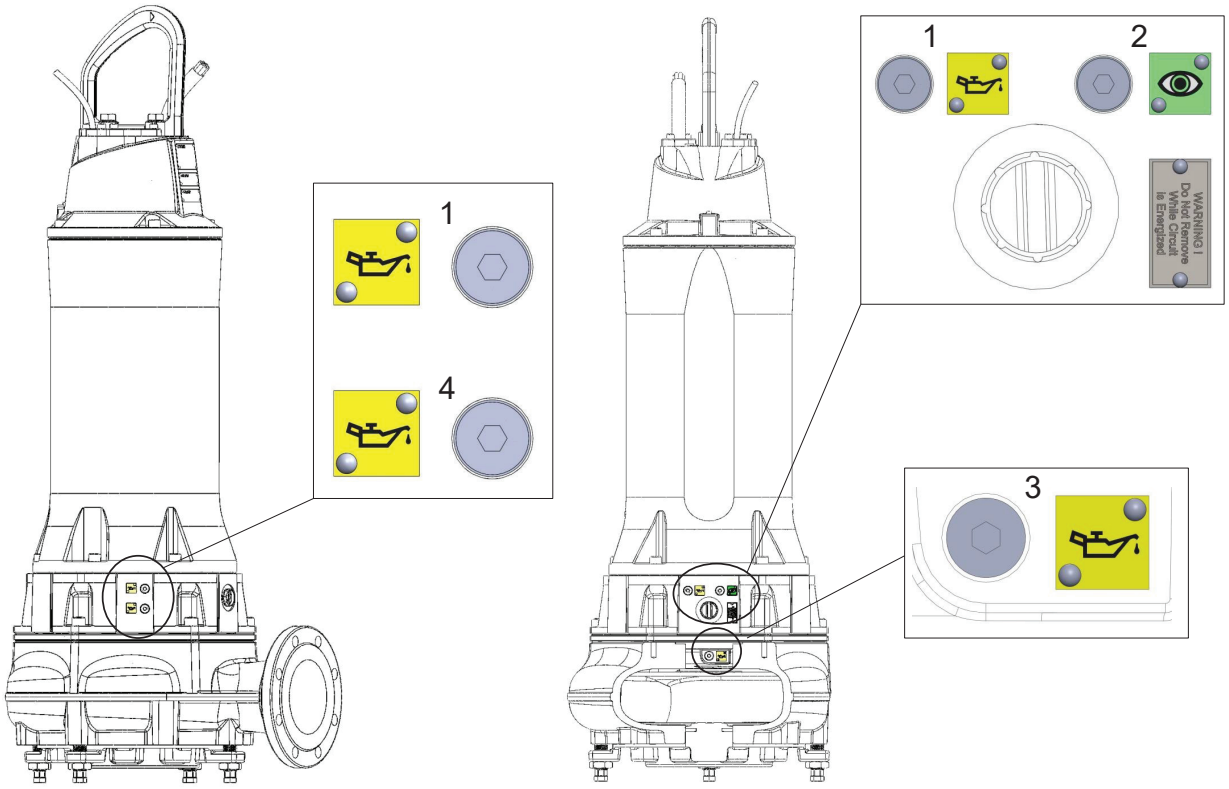
Legend

a Fill with or drain oil.
b Fill with or drain coolant.
c Visual inspection

Oil filling without cooling jacket

2500-0003



1 Oil draining/filling inspection chamber. Pump should be in a horizontal position.
2 Inspection port for motor housing.
3 Oil draining seal chamber.
4 Oil filling seal chamber. Pump should be in a horizontal position (quantities see Table 1, page 39).

Oil filling inspection chamber XFP, AFLX and VUPX

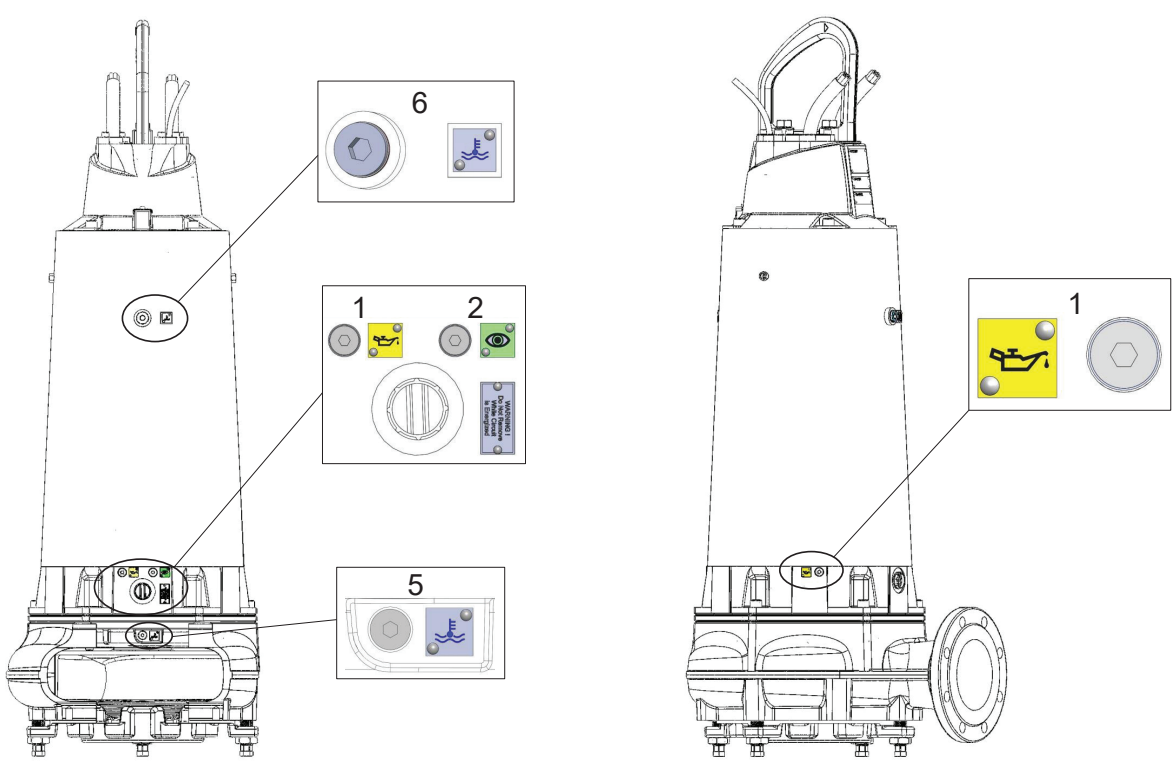
NOTE ***The oil quantity for the inspection chamber specified here is for versions with and without cooling jacket.***

Hydraulic oil quantity: 2.5 litres (VG 32 HLP-D, part no. 11030021)

Oil filling quantity seal chamber XFP, AFLX and VUPX

XFP	XFP	VUPX Axial hydraulics		AFLX Axial hydraulics	
CB-hydraulics	**CH-hydraulics**	**0400**	**0500 / 0600**	**0600**	**0700**
8.0	11.5	3.7	3.5	3.7	3.6
Filling volumes in Litres. part number 11030021					

Coolant/oil filling XFP with cooling jacket



1 Oil emptying/filling inspection chamber. Pump should be in a horizontal position.
2 Inspection port for motor housing.
5 Glycol emptying.
6 Glycol filling (quantities see Table 2, page 40).

Initial filling ex-factory:

Fill or drain coolant at position 6.

Glycol: Caflon HTF-PG, part number 11030056.

Alternative coolant released by Sulzer:

Propylenglykol Code 27; (Houghton Deutschland GmbH); DOWCAL 20-G HEAT TRANSFER FLUID (Dow Deutschland GmbH & Co. OHG); DOWCAL brand of - The Dow Chemical Companyy

Data is only valid for coolant used ex-factory (additional product information and safety data sheet are available on request).

When dealing with Caflon HTF-PG the general protective measures for chemicals must be observed. The information and hints in the safety data sheets covering this must be observed!

Reference values for antifreeze behaviour

Concentration (vol.%)		Antifreeze in °C
Caflon HTF-PG	Water	
10	90	to -3
20	80	to -8
30	70	to -13
40	60	to -23
50	50	to -35
60	40	to -52
33*	67*	to -16*

* default

Coolant filling quantities PE4

Motor PE4		XFP 105J, 155J, 206J, 250J, 255J, 305J	XFP 100J, 150J, 200J, 300J
50 Hz	60 Hz	CB-hydraulics	CH-hydraulics
PE 220/4*	PE 250/4*	20	23,5
PE 300/4*	PE 350/4*	20	23,5
PE 370/4**	PE 430/4**	22	25,5
PE 450/4**	PE 520/4**	22	25,5
PE 185/6*	PE 210/6*	20	23,5
PE 220/6*	PE 250/6*	20	23,5
PE 300/6**	PE 350/6**	22	25,5
PE 370/6**	PE 430/6**	22	25,5
PE 150/8*	PE 170/8*	20	23,5
PE 185/8**	PE 210/8**	22	25,5
PE 220/8**	PE 250/8**	22	25,5
PE 300/8**	PE 350/8**	22	25,5
Filling volumes in litres. part no.: 11030083			

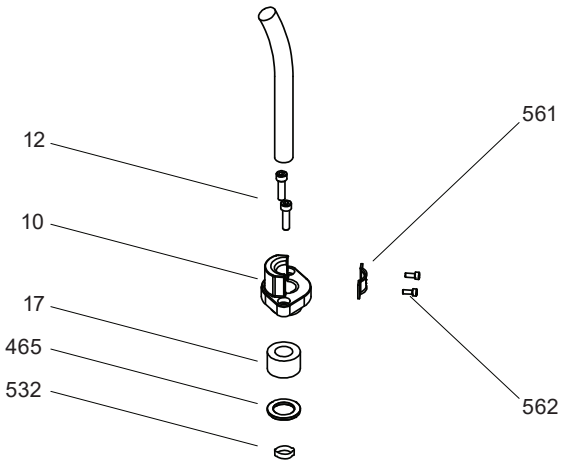
Motor size: A*; B**

13 Cable - removal and fitting

13.1 Standard and ATEX cable inlet

Position Description

12	Cylinder screw
10	Cable cap
561	Cable clamp
562	Cylinder screw
17	Cable gland
465	Washer
532	Strain relief (hose clamp)
1	Connection chamber
2	Cylinder screw
60	Cooling jacket clamp
33	O-ring
50	Terminal block
32	Upper bearing flange



Replace cable

Removal

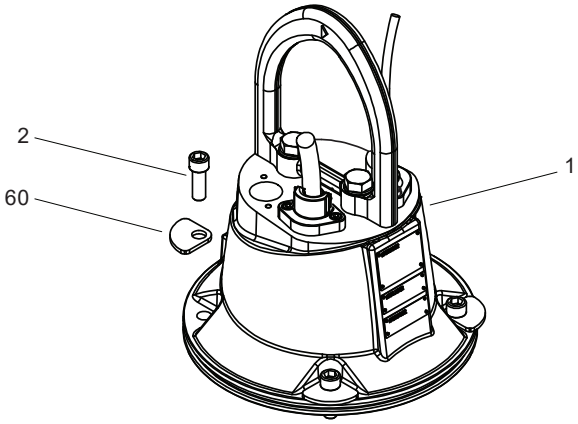
- Remove screws (2), and where fitted cooling jacket clamps (60), and using hoist, slowly remove connection chamber (1) from motor housing, far enough to have access to upper bearing flange (32).
- Disconnect leads from terminal block (50).

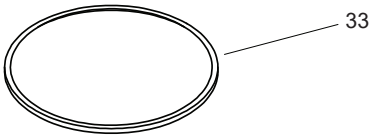
Note: take note of power lead and terminal connections.

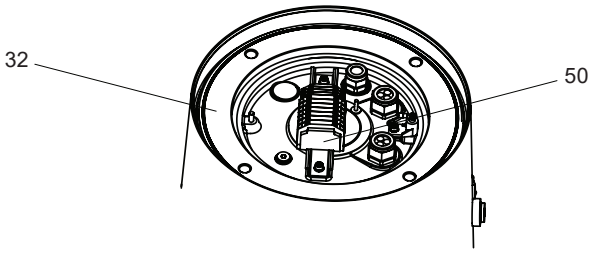
- Remove and inspect o-ring (33) for damage and if necessary replace.
- Remove cable cap securing screws (12).
- The cable assembly, can now be pulled clear of the connection chamber.

Note: take note of length that outer sheath and leads protrude through cable cap.

- Remove strain relief clamp (532), washer (465), and cable gland (17) from cable.
- Remove cable clamp (562) from cable cap.







Fitting

Fitting is the reverse of the procedure above using a new strain relief clip.

The same procedure applies to the second power cable and the control cable

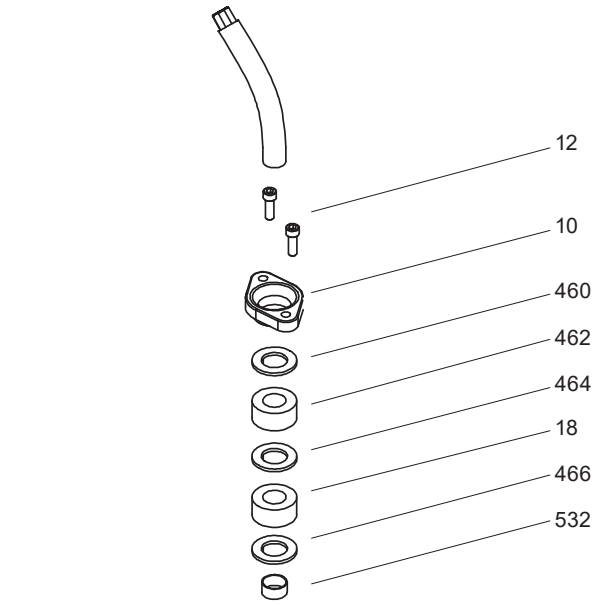
NOTES:

1. Ensure the cable cap is fitted so that the cable clamp is positioned facing inwards towards the lifting hoop. This prevents flexing of the cable against the clamp edge and possible damage.
2. Apply rubber lubricant to outer sheath of cable to ease fitting of cable gland.
3. Fit strain relief 50 mm from cable end using clamping pliers.
4. Apply rubber lubricant to outside surface of cable gland to ease fitting into connection chamber.
5. Lubricate o-ring before refitting.

13.2 US cable inlet

Position Description

12	Cylinder screw
10	Cable cap
460	Washer
462	Cable gland
464	Washer
18	Cable gland
466	Washer
532	Strain relief (shrink hose)
1	Connection chamber
2	Cylinder screw
60	Cooling jacket clamp
33	O-ring
50	Terminal block
32	Upper bearing flange



Replace cable

Removal

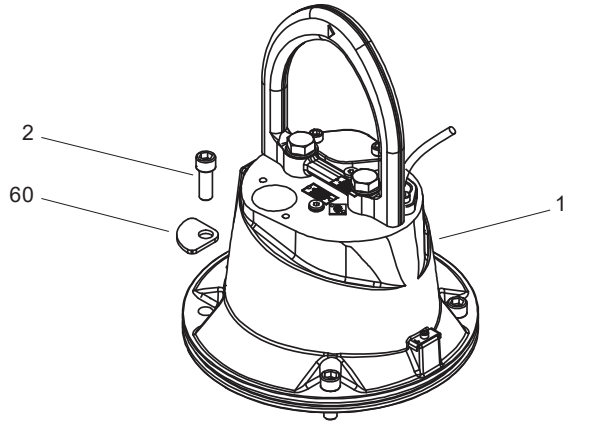
- Remove screws (2), and where fitted cooling jacket clamps (60), and using hoist, slowly remove connection chamber (1) from motor housing, far enough to have access to upper bearing flange (32).
- Disconnect leads from terminal block (50).

Note: take note of power lead and terminal connections.

- Remove and inspect o-ring (33) for damage and if necessary replace.
- Remove cable cap securing screws (12).
- The cable assembly, can now be pulled clear of the connection chamber.

Note: take note of length that outer sheath and leads protrude through cable cap.

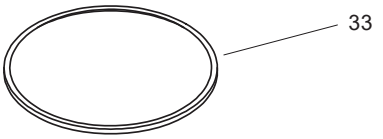
- Remove strain relief (532), washers (460, 464 and 466), and cable glands (462 and 18) from cable.



Fitting

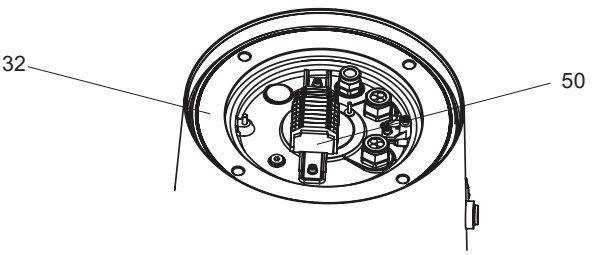
Fitting is the reverse of the procedure above using a new strain relief shrink hose.

The same procedure applies to the second power cable if fitted and the control cable



NOTES:

1. Apply rubber lubricant to outer sheath of cable to ease fitting of cable glands.
2. Fit strain relief hose 5 mm from end of outer sheath and 5 mm from washer (466).
3. Apply rubber lubricant to outside surface of cable gland to ease fitting into connection chamber.
4. Lubricate o-ring before refitting.



14 Test procedures

High voltage test

A high voltage test is recommended, if the pump has been repaired or reassembled, to detect any breakdown of insulation.
Link all power leads together and apply a voltage between earth and power leads of 1500 V, with trip level at 10 mA, for one second.

Earth check

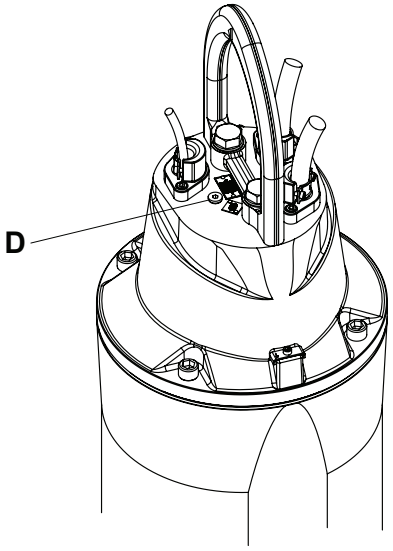
An earth check is recommended if the pump has been repaired or reassembled. This involves checking the continuity between earth lead and the motorhousing (where earth lead is connected). This can be done with a resistance meter.

Pressure test

This is performed to check sealing of the unit and is recommended if the pump has been repaired, and before reassembly of hydraulic parts. All pressure testing must be carried out without coolant in the pump. Firstly drain the coolant.

NOTE: ***In order to prevent dislodging of the seals it is absolutely essential that the stated testing pressure limits are not exceeded.***

Dry test:
Remove pressure test screws and seal rings from test holes A, B and C, and fit pressure test tool (see. 15.15) to each.



Lipseal test:
Connect U-tube containing a small quantity of water in the bend to pressure test tool B. Apply pressure of 0.5 bar (7 psi) to pressure test tool A. If the water displaces then there is a leak. This process will check the sealing between the inspection chamber and motor chamber.

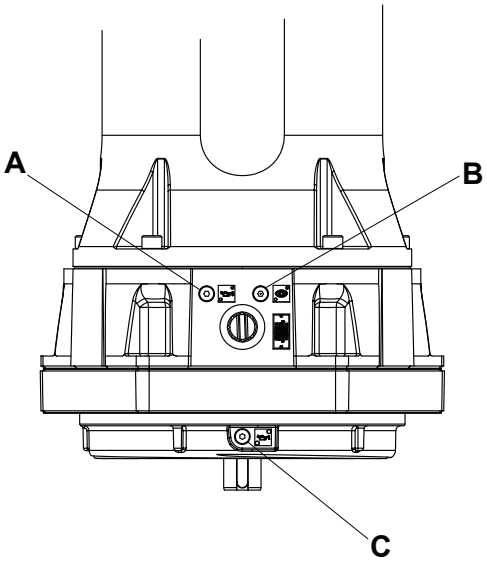
Secondary mechanical seal test:
Connect U-tube containing a small quantity of water in the bend to pressure test tool A. Apply pressure of 0.5 bar (7 psi) to pressure test tool C. The U-tube should contain a small quantity of water in the bend, if it displaces then there is a leak. This process will check the sealing between the inspection chamber and oil chamber.

Cooling jacket test:
Connect U-tube containing a small quantity of water in the bend to pressure test tool B. Apply pressure of 0.5 bar (7 psi) to pressure test tool C. If the water displaces then there is a leak. This process will check the sealing between the cooling jacket cavity and motor chamber, i.e. motor housing porosity.

Submerged leak test:
Remove pressure test screws and seal rings from test holes A, B, C and D, and fit pressure test tool (see. 15.15) to each.

Submerge pump and allow time for bubbles from naturally trapped air to dissipate.

Apply pressure of 0.5 bar (7 psi) to all test holes and visually inspect for air bubbles.



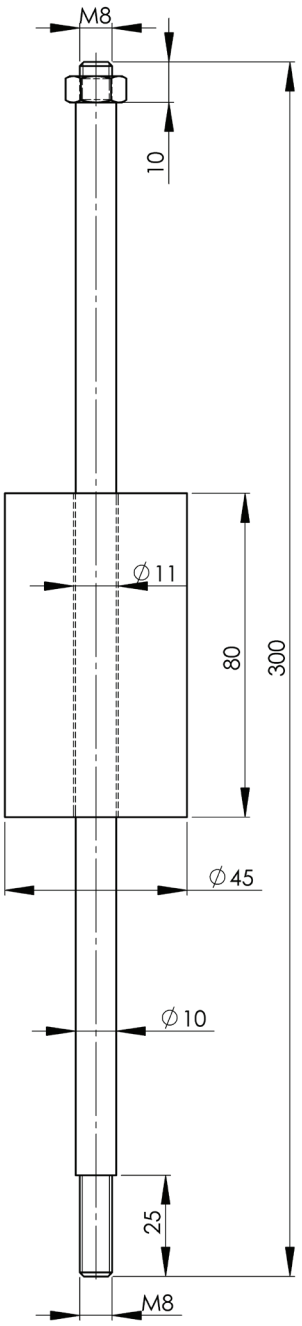
Run test

A dry run test should be run to check the amps, voltage, and power drawn against rated data (see ABSEL or Technical Data Sheet for rated data).

15 Tool drawings

15.1 Wear ring removal tool

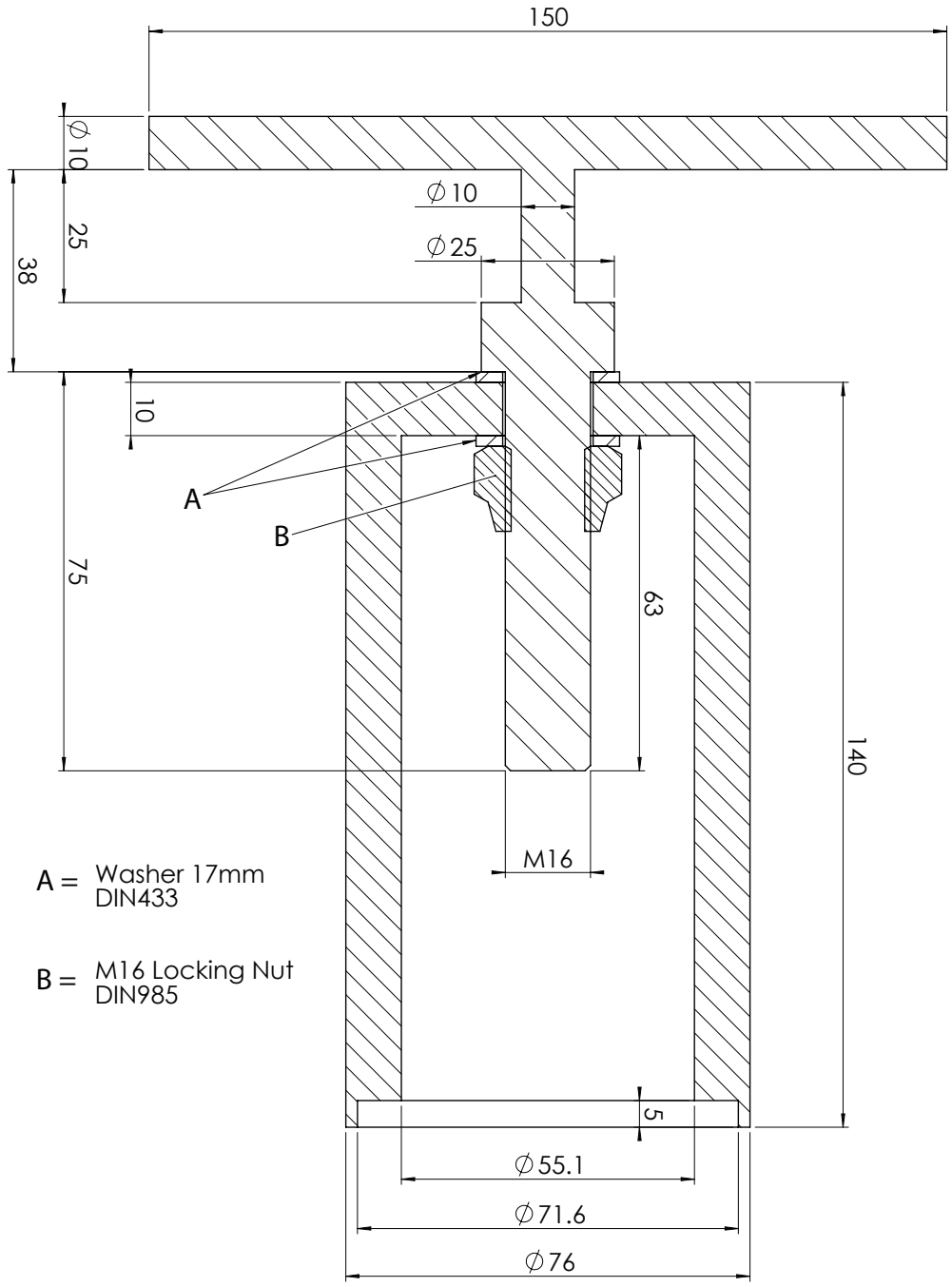
Material: STEEL
Dimensions in mm
All unspecified chamfers 1 mm



Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.2 Mechanical seal press tool - primary static seal

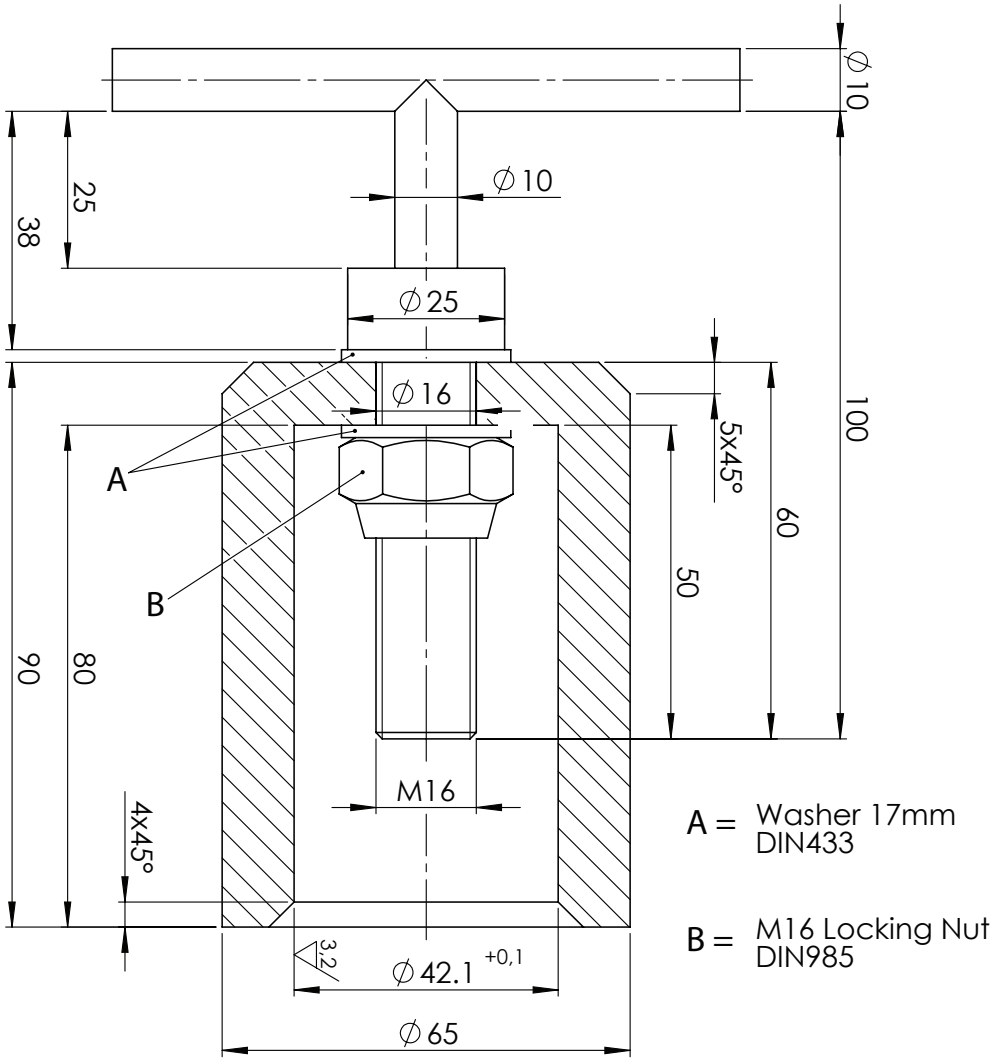
Material: Body: NYLON; Handle/Screw:SS
Dimensions in mm
All unspecified chamfers 1 mm



Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.3 Mechanical seal press tool - primary dynamic seal

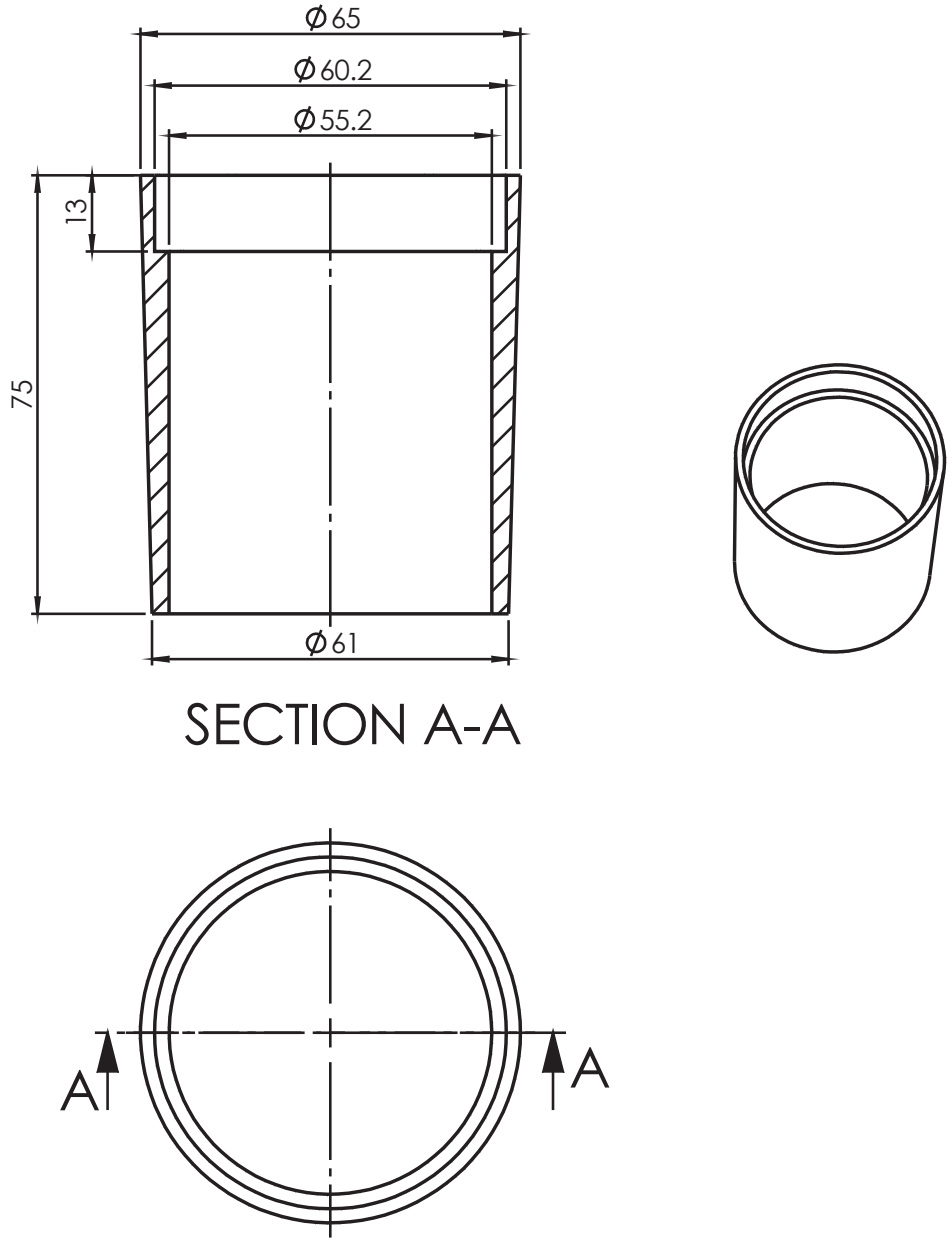
Material: Body: NYLON; Handle/Screw:SS
Dimensions in mm
All unspecified chamfers 1 mm



Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.4 Shaft sleeve too - secondary seals

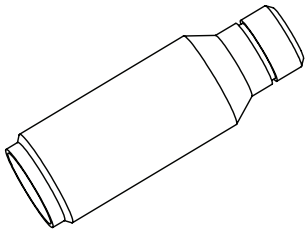
Material: STEEL
Dimensions in mm

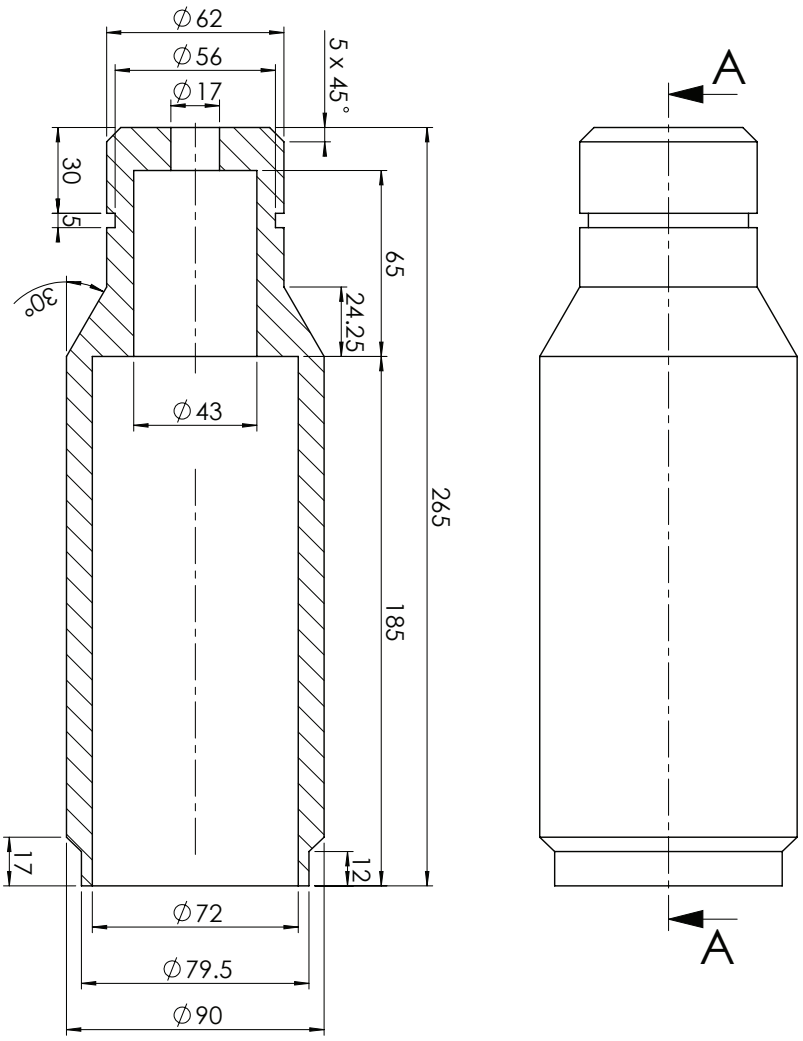


Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.5 Lipseal press tool

Material: NYLON
Dimensions in mm



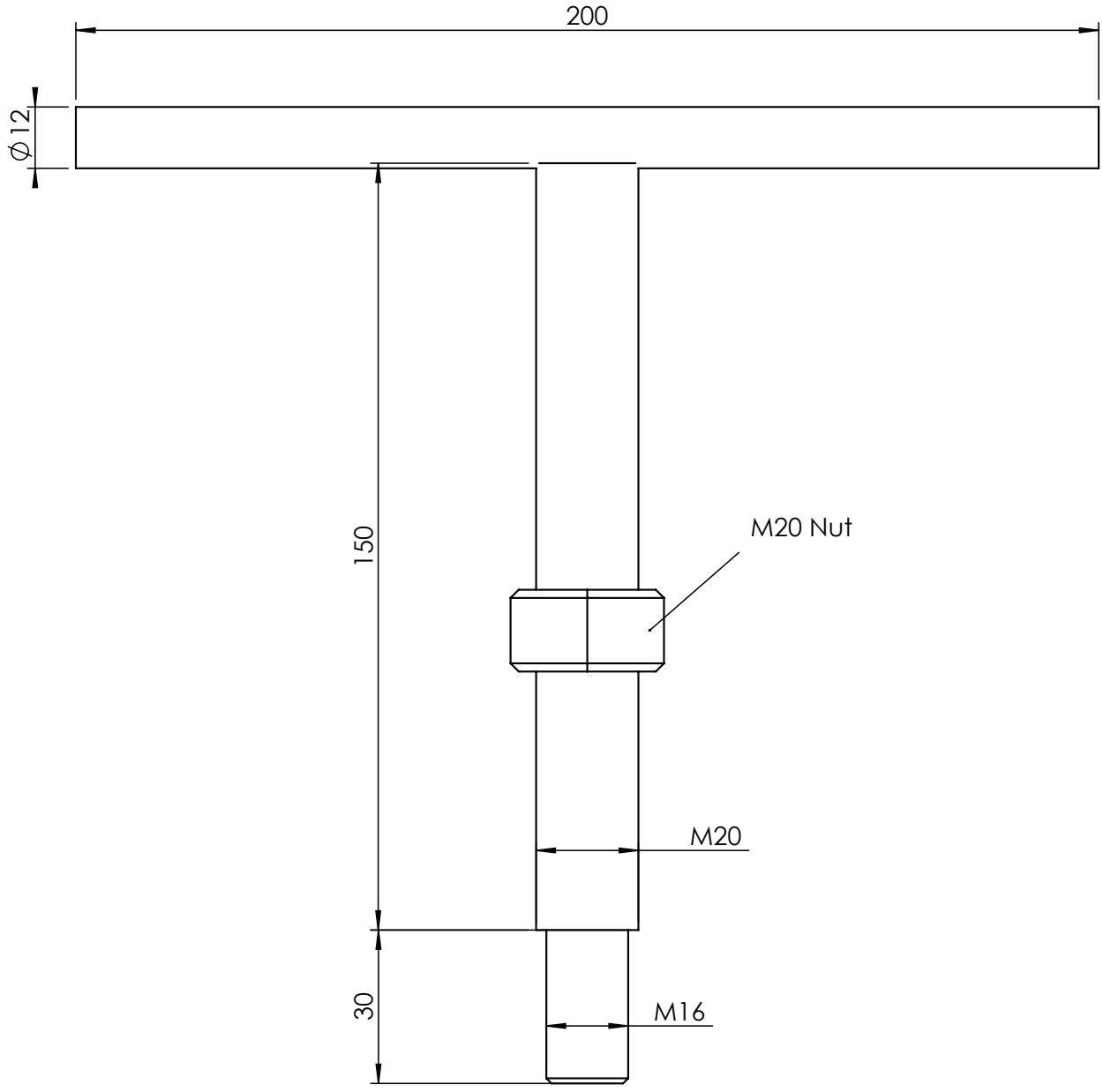


SECTION A-A

Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.6 Press tool - compression fitting

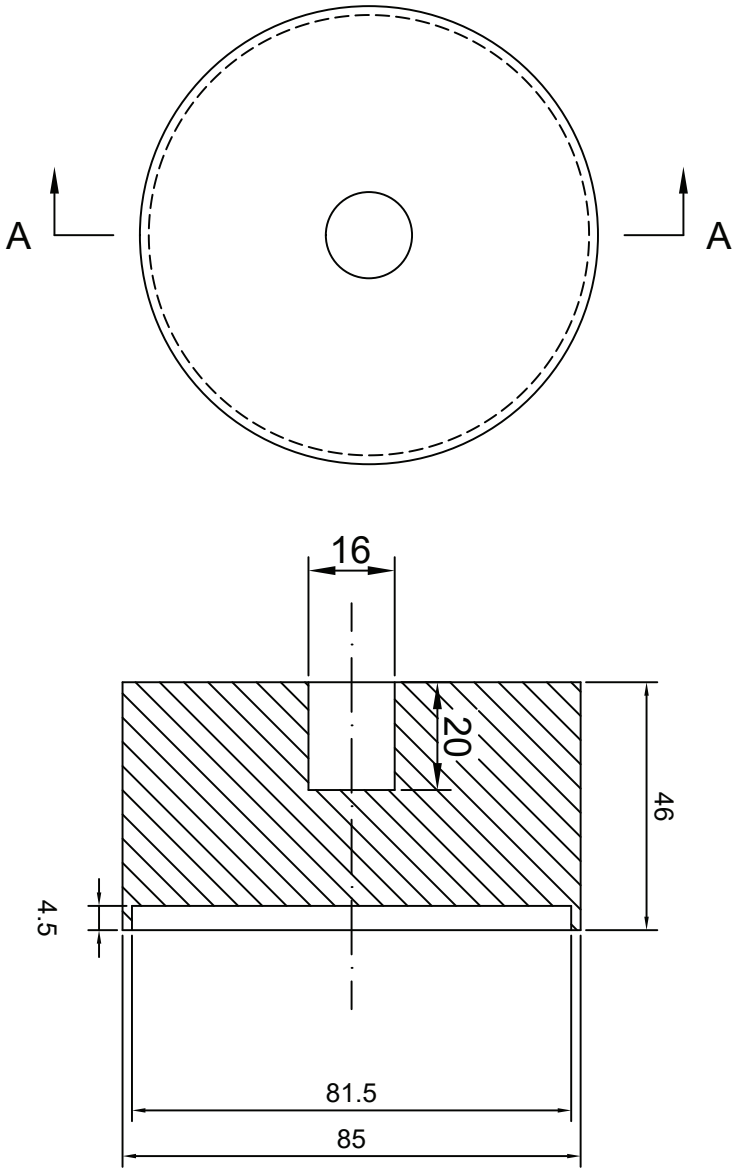
Material: STEEL
Dimensions in mm



Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.7 Mechanical seal press tool - secondary static seal

Material: NYLON
Dimensions in mm

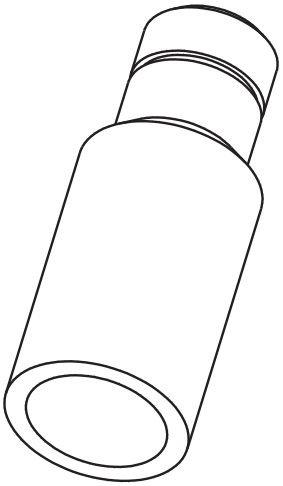


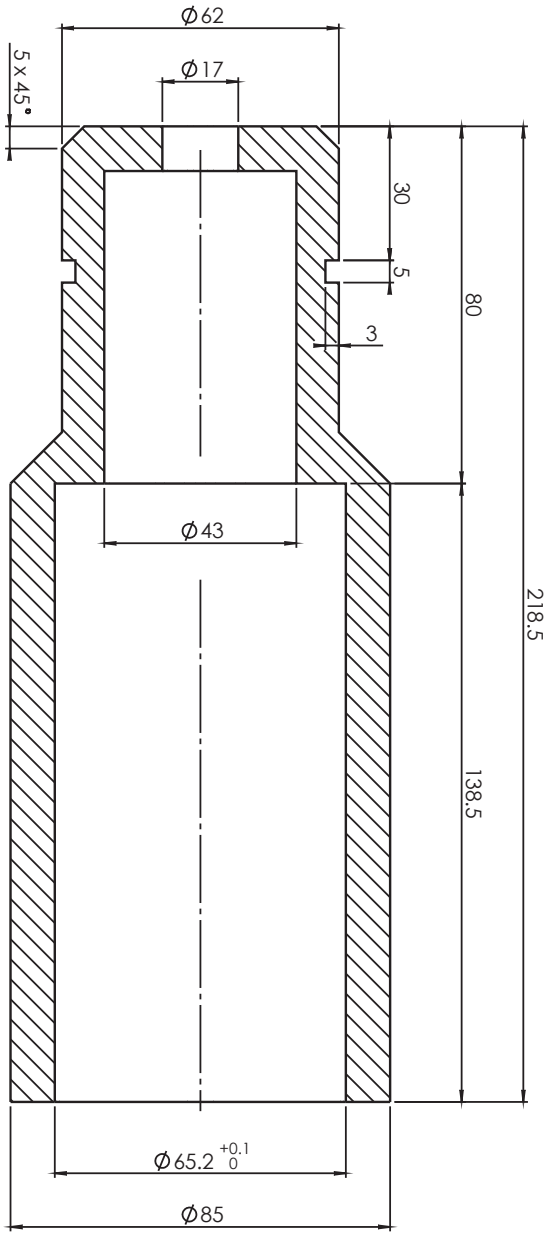
SECTION A-A

Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.8 Mechanical seal press tool - secondary dynamic seal

Material: NYLON
Dimensions in mm

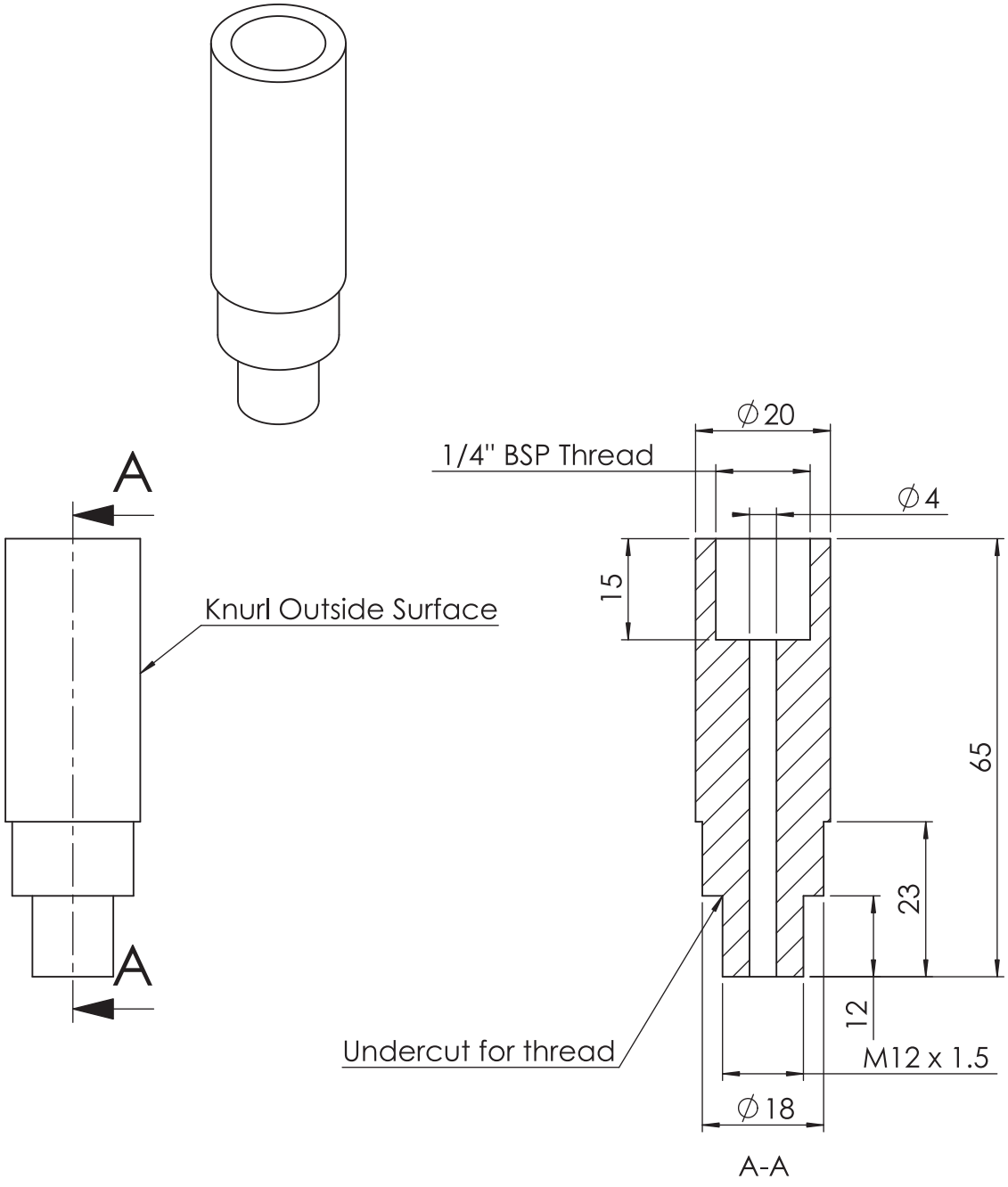




Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.9 Air pressure test piece

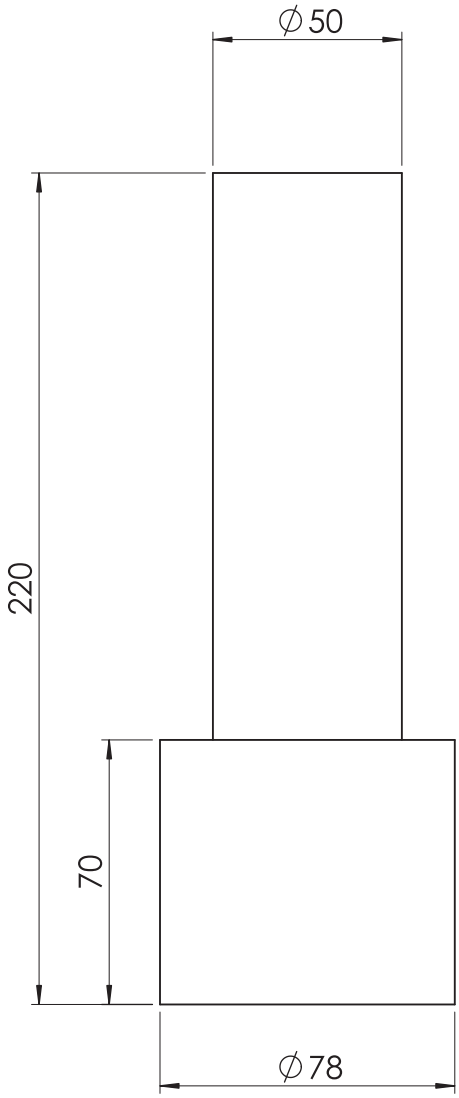
Material: STEEL
Dimensions in mm
All unspecified chamfers 1 mm



Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.10 Upper bearing press tool

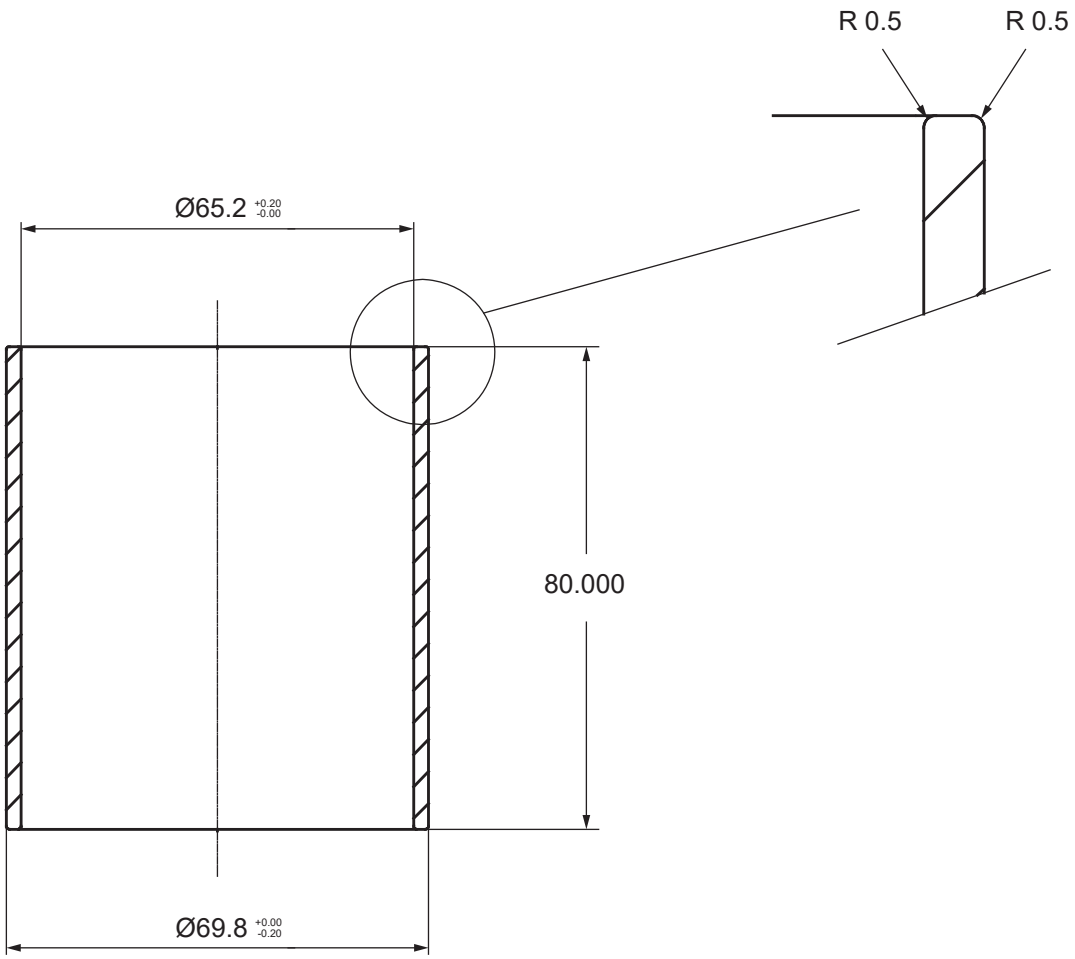
Material: NYLON
Dimensions in mm



Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.11 Bearing alignment sleeve

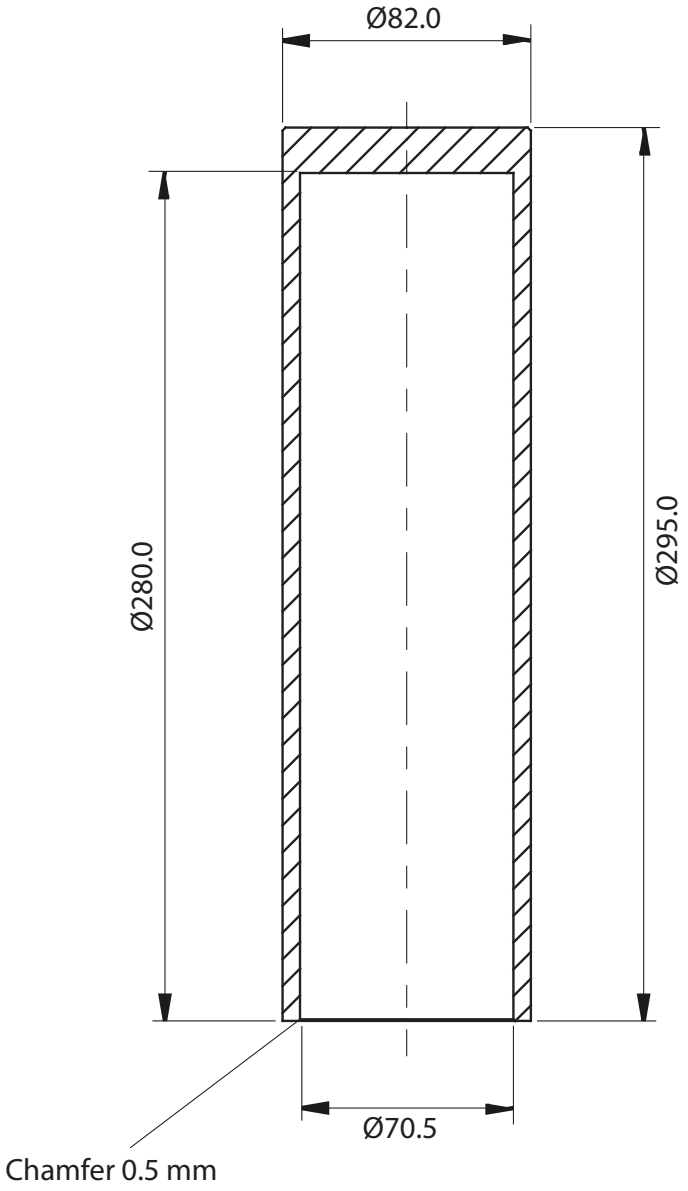
Material: STEEL
Dimensions in mm



Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.12 Bottom bearings press tool

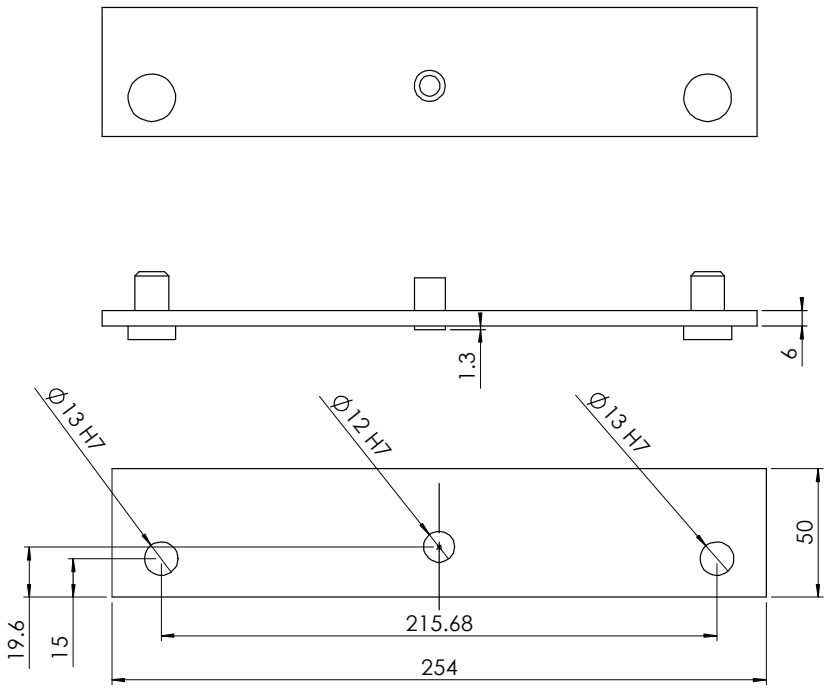
Material: STEEL
Dimensions in mm

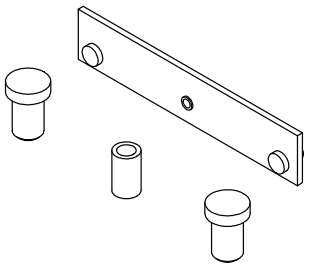


Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

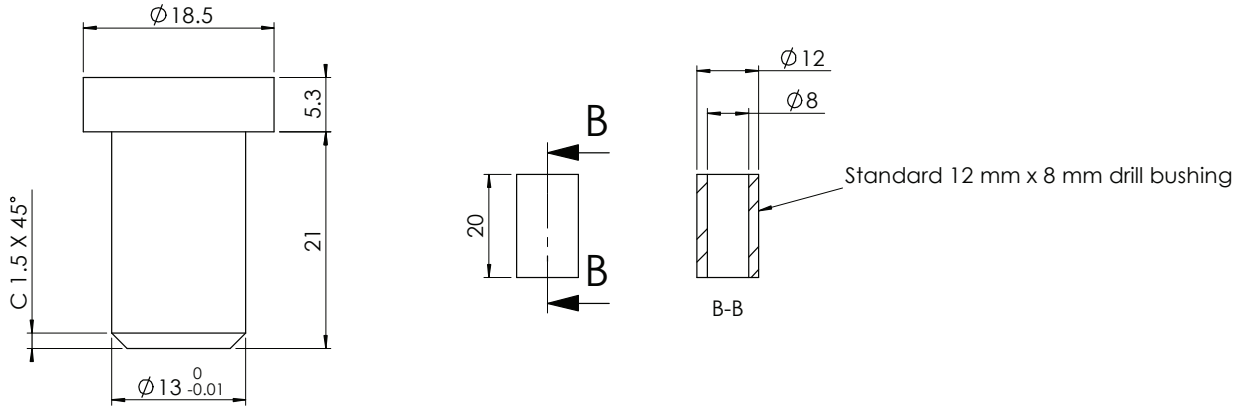
15.13 Upper bearing lid alignment tool

Material: STEEL
Dimensions in mm





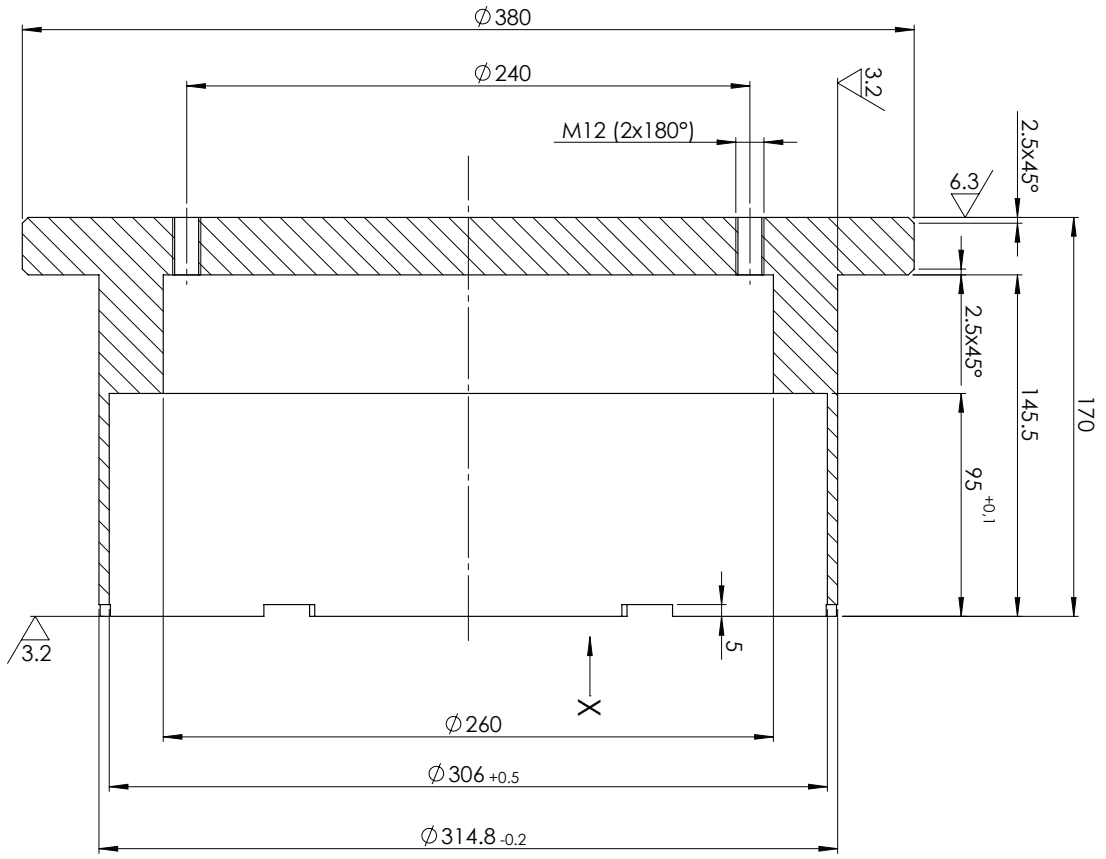
Three parts pressed into plate and glued in position with Loctite



Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

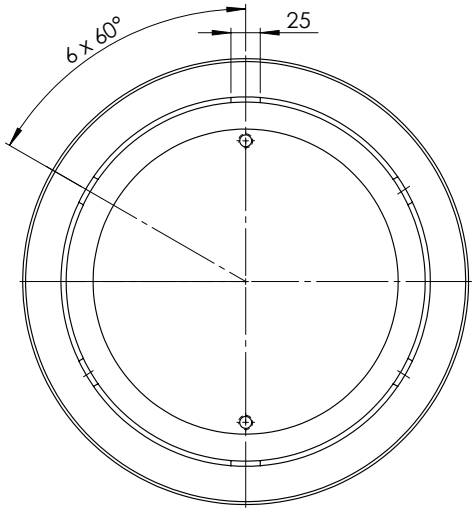
15.14 Stator press tool

Material: TOOL STEEL 1.2312
Dimensions in mm



X (1:4)

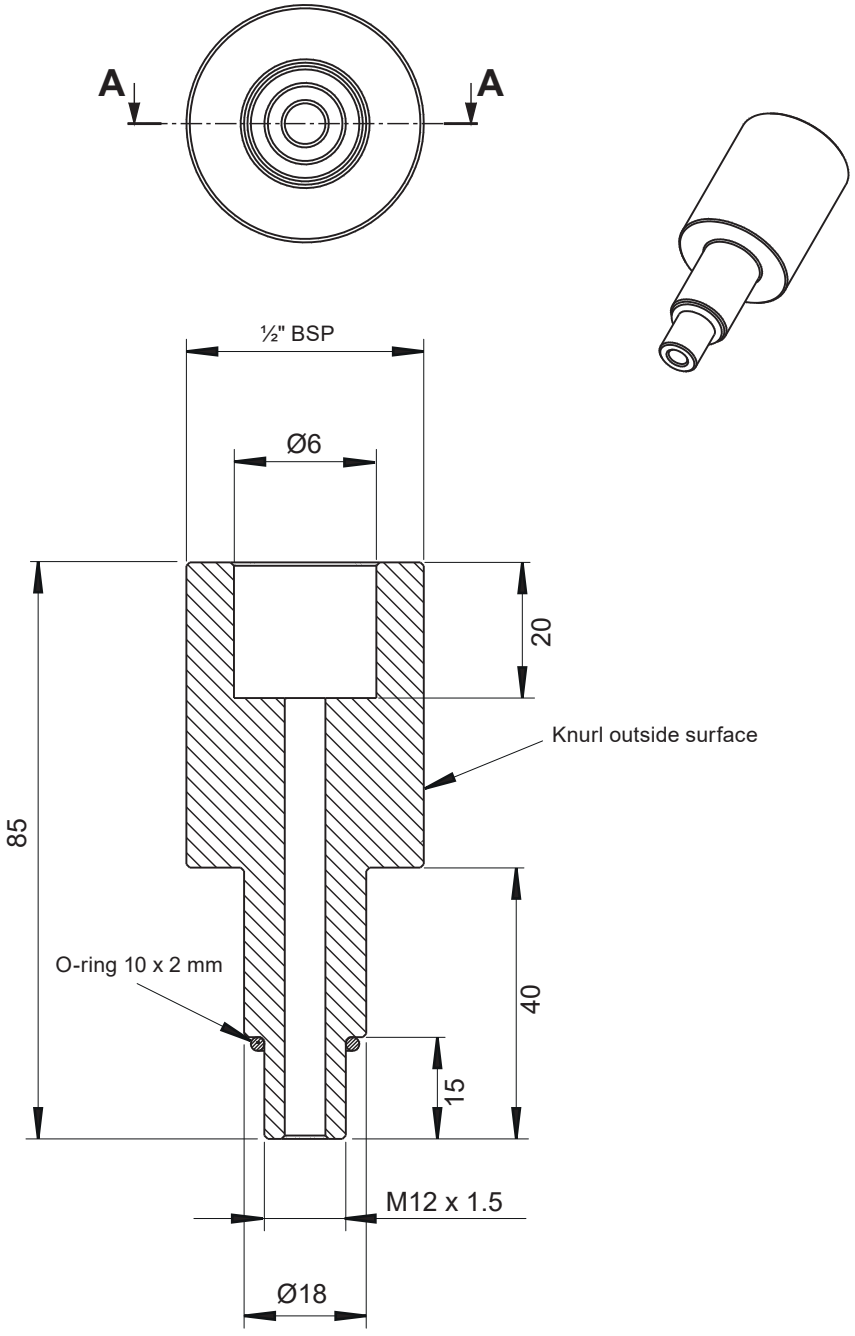
12.5 (6.3 3.2)



Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

15.15 Pressure test tool

Material: MILD STEEL
Dimensions in mm



SECTION A-A

Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

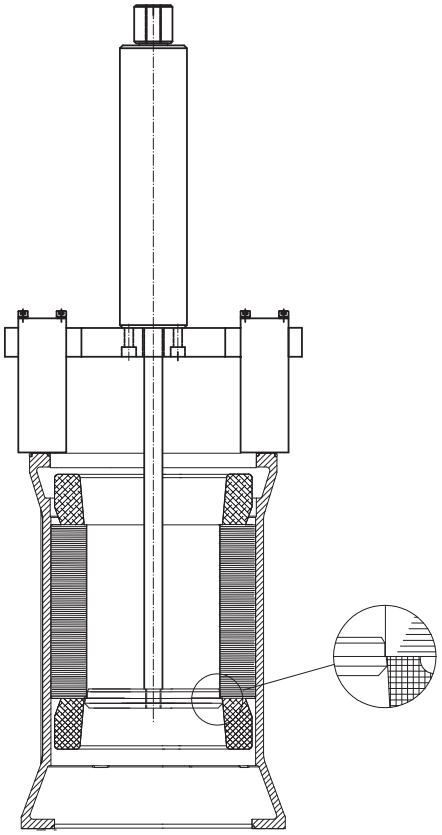
15.16 Stator extraction tool

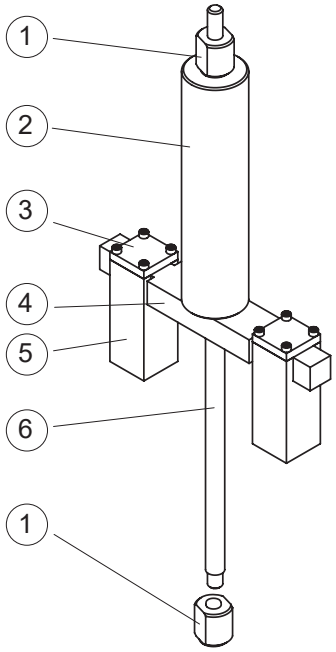
Material: MILD STEEL
Dimensions in mm

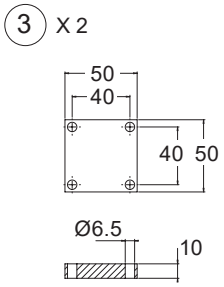
Notes:
Part no. 2 is a single-acting, hollow cylinder, with a minimum cylinder stroke of 290 mm (connects to a hydraulic hand pump).

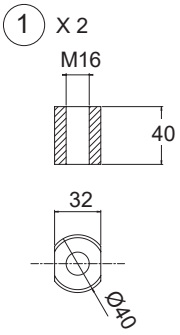
Before applying hydraulic pressure, engage the disc tool into position against the stator core by tightening the adjusting nut (1).

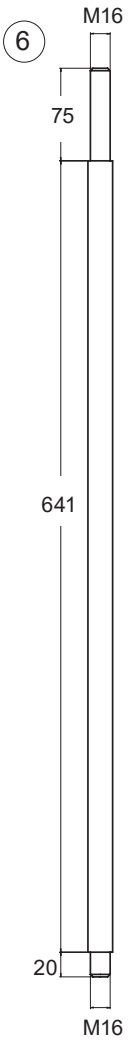
The puller rod (6) is extended to adapt to varying stator stack heights by using a second adjusting nut to join it to an M16 threaded bar of required length.

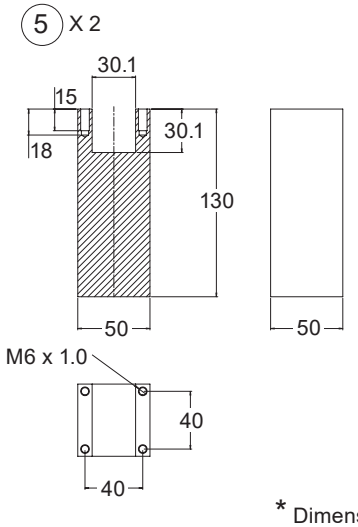


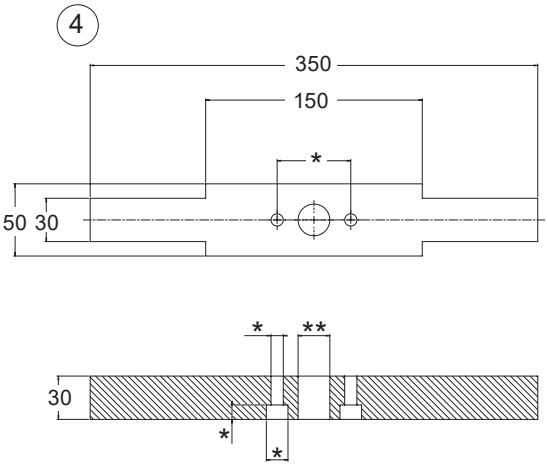










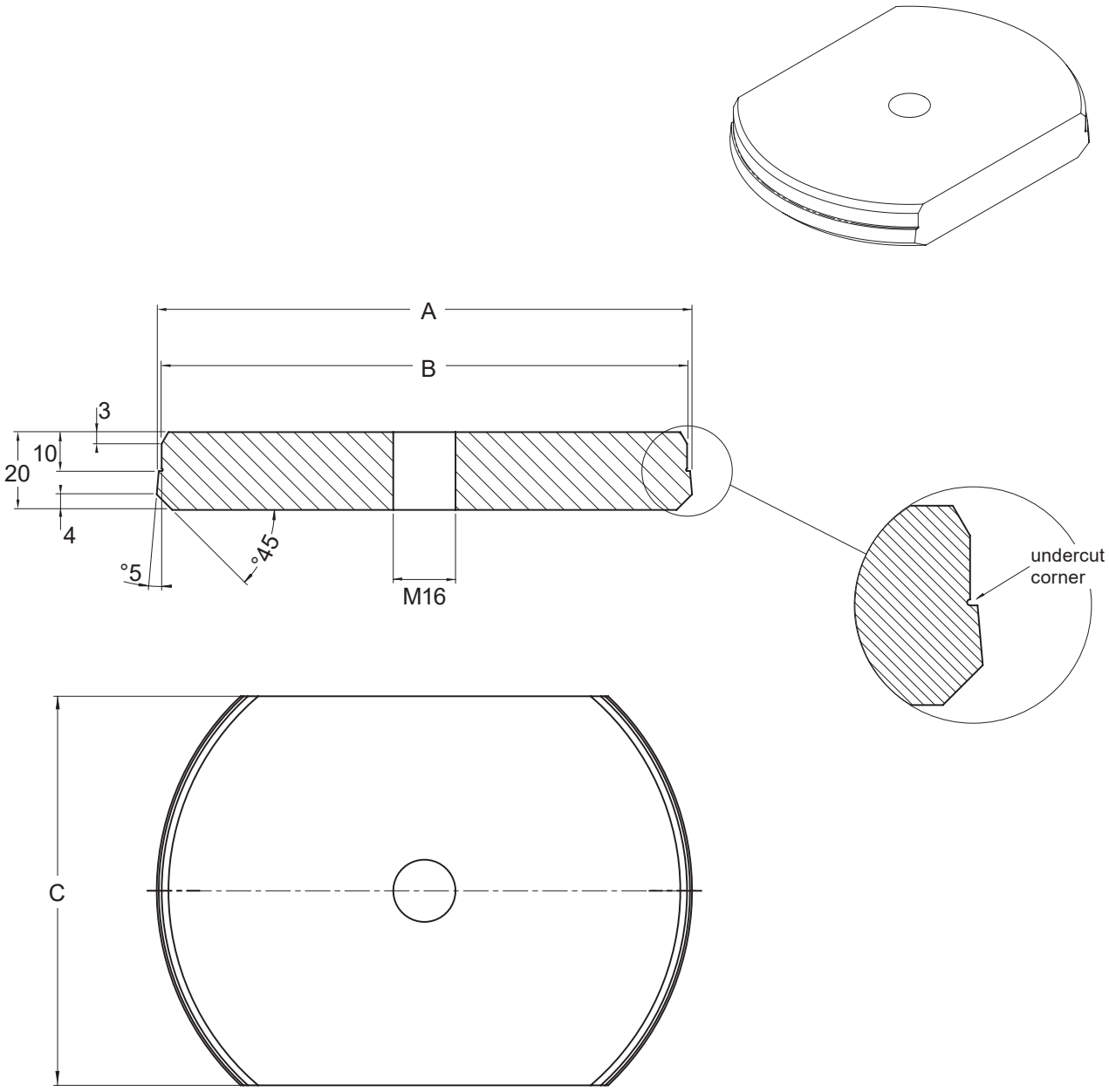


* Dimensions determined by hydraulic cylinder.

** Cross-beam bore and puller rod diameters determined by hydraulic cylinder inner diameter.

15.17 Stator puller disc tool

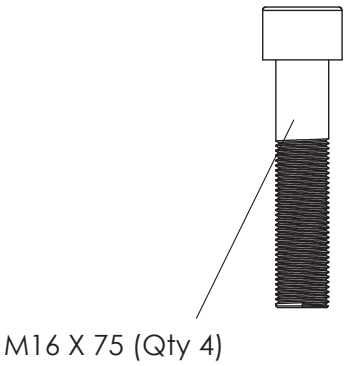
Material: MILD STEEL
Dimensions in mm



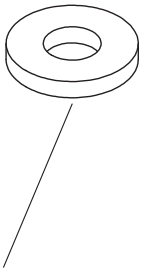
XFP motor 50 Hz	XFP motor 60 Hz	A	B	C
220/4, 300/4, 370/4, 450/4	250/4, 350/4, 430/4, 520/4	Ø207.5	Ø206	130
185/6, 220/6, 300/6, 370/6	210/6, 250/6, 350/6, 430/6	Ø221.5	Ø220	140
150/8, 185/8, 220/8, 300/8	170/8, 210/8, 250/8, 350/8			

15.18 Cooling jacket fitting tool

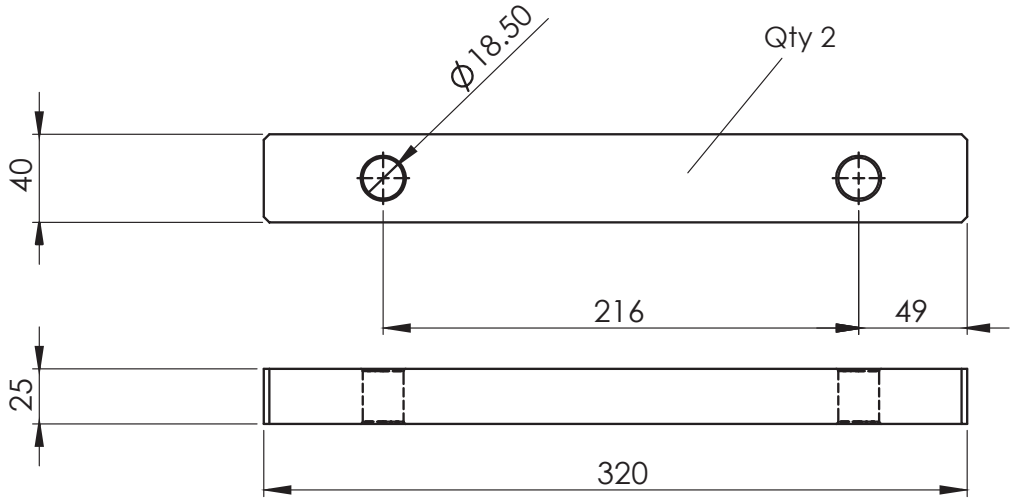
Material: MILD STEEL
Dimensions in mm



M16 X 75 (Qty 4)



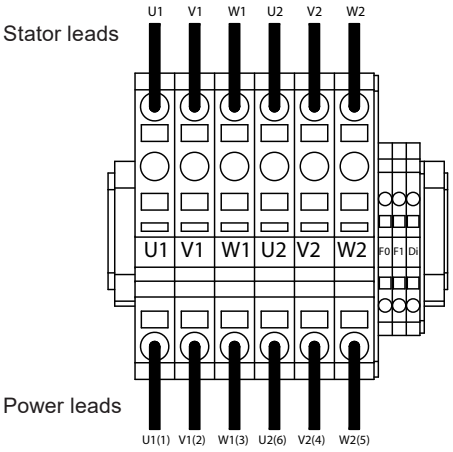
40 X 17.5 x 6 (Qty 4)



Untoleranced machined dimensions to DIN 7168 m							
Nominal size	0 to 6	Over 6 to 30	Over 30 to 120	Over 120 to 400	Over 400 to 1000	Over 1000 to 2000	Over 2000 to 4000
Deviation	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2.0

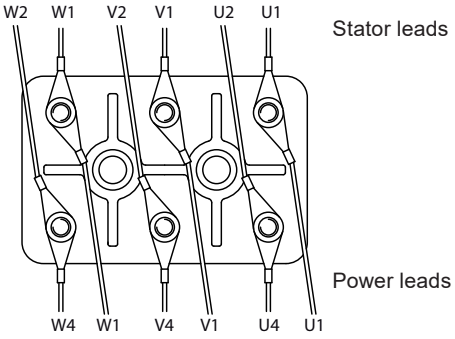
16 Terminal block wiring

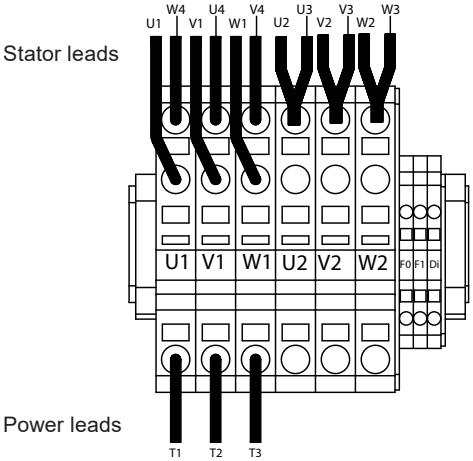
16.1 230/3/50 YΔ, 400/3/50 YΔ, 500/3/50 YΔ, 460/3/60 DOL, 600/3/60 DOL



50 Hz

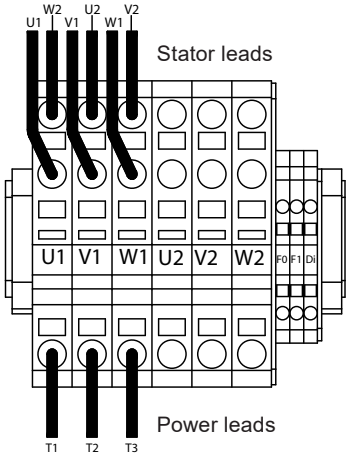
230/3/50 YΔ
400/3/50 YΔ
500/3/50 YΔ

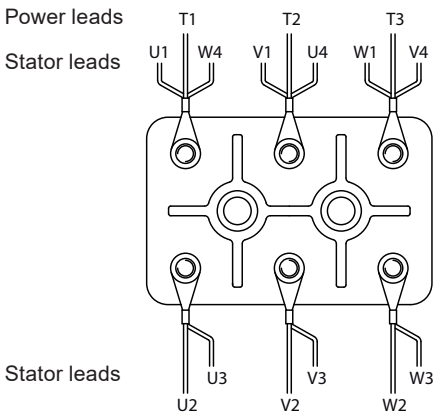




60 Hz

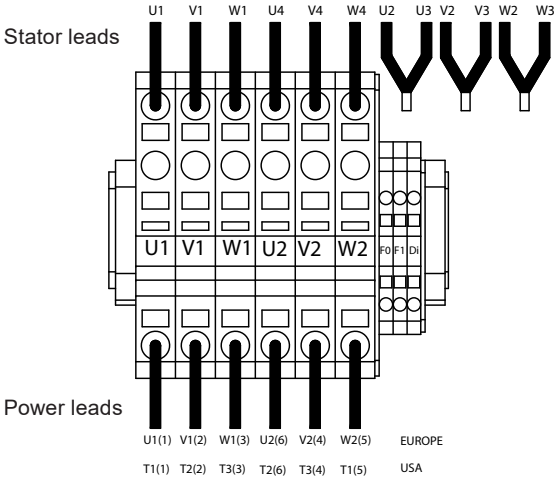
460/3/60 DOL
600/3/60 DOL



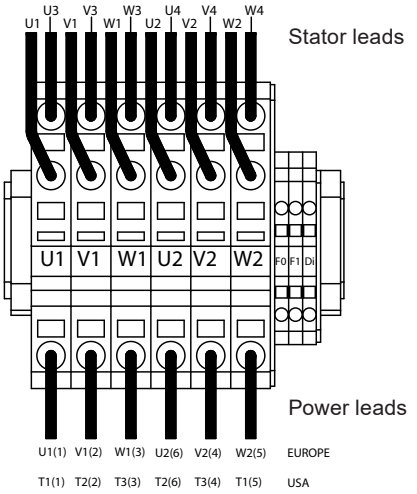


16.2 380/3/60 YΔ, 220/3/60 YΔ, 208/3/60 DOL, 220/3/60 DOL, 230/3/60 DOL

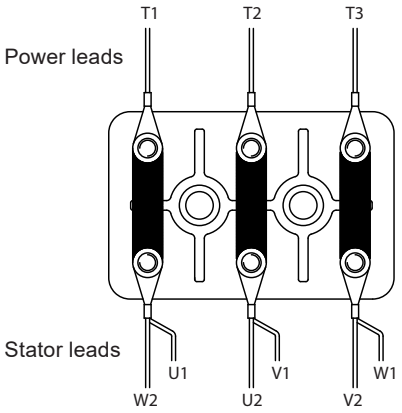
60 Hz
380/3/60 YΔ



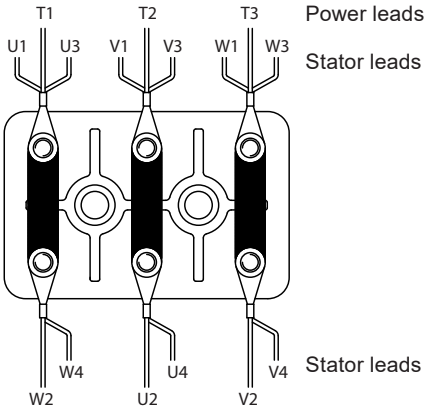
60 Hz
220/3/60 YΔ



60 Hz
208/3/60 DOL



60 Hz
220/3/60 DOL
230/3/60 DOL



Explosion-proof pumps may only be used in explosive zones with the thermal sensors connected (leads FO & F1).

SERVICE LOG

Pump Type:	Serial No:

Date	Hours of Operation	Comments	Sign

SERVICE LOG

Pump Type:	Serial No:

Date	Hours of Operation	Comments	Sign

SERVICE LOG

Pump Type:	Serial No:

Date	Hours of Operation	Comments	Sign

SERVICE LOG

Pump Type:	Serial No:

Date	Hours of Operation	Comments	Sign

Sulzer Pump Solutions Ireland Ltd. Clonard Road, Wexford, Ireland
Tel. +353 53 91 63 200. www.sulzer.com