

Maintenance manual

Vertical centrifugal pumps
series: V(C/S) Design Version B

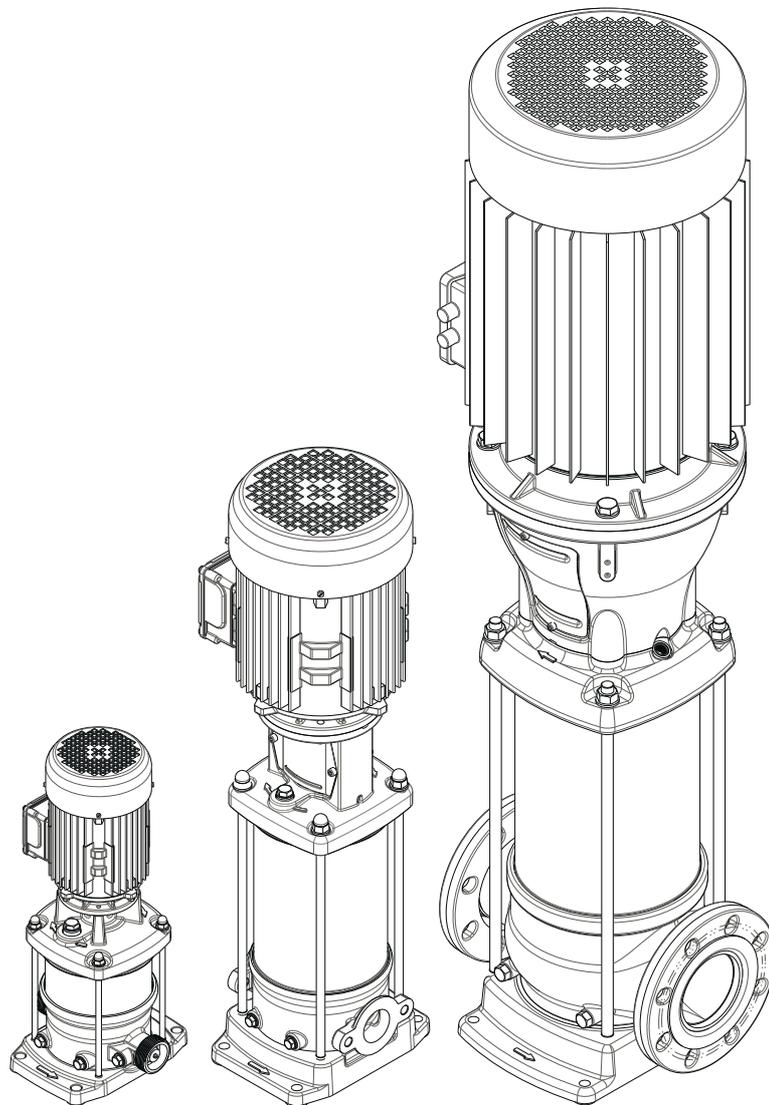


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1 Assembling and disassembling V(C/S) 2 - 25 series

1.1 General

The starting point of the following procedure is a pump taken out of an installation. The hydraulic assembly of a V(C/S) pump is to be assembled or disassembled with the coupling side of the shaft facing downwards. A simple aid for this method is a jaw bench, provided with tension plates. For larger series a special mounting plate can be used, see figure: 1Mounting plate V01 isometric view. The shaft (coupling side) is to be placed in the bush and locked with a pin (diameter 5 mm) through the coupling hole.

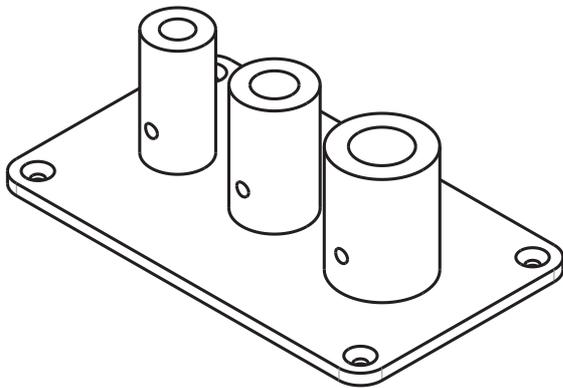


Figure 1: Mounting plate V01 isometric view

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1.2 Disassembling

1. First drain the pump by removing the 1/4" plugs and 3/8" plugs (903.02/ 903.01).
2. To remove the coupling guards (681) loosen the bolts two turns and pull out the coupling guards.
3. Remove hexagon socket head cap screws (914.01) (and the nuts (920.01)) from the coupling shells (862)
4. Remove the coupling shells (862) and pin (560) from the shaft (210).
5. Remove motor hexagon screws (901.02).
6. Remove the motor (800) from the motor stool (341.01).
7. If a fixed seal is installed, go to step 10. If a cartridge or easy access seal is installed, go to the next step.
8. Disassembling the seal:
 1. Disassemble with cartridge seal: thoroughly clean the top end of the shaft (210), loosen the three grub screws (904) two turns and remove the four hexagon socket head cap screws (914.03). Lift the cartridge seal out of the motor stool (341) using two screwdrivers.
 2. Disassemble with easy access seal: thoroughly clean the top end of the shaft (210), Remove the four hexagon socket head cap screws (914.03). Lift the easy access seal out of the motor stool (341) using two screwdrivers.
9. To lift the rotor seal, place the seal puller 12 mm (see figure: 2Seal puller) under the seal extension sleeve (see figure: 3Spacer extension sleeve (525.06) V(C/S)). Remove the seal extension sleeve (525.06) and seal rotor at once by using a screwdriver and seal puller lifting step by step.

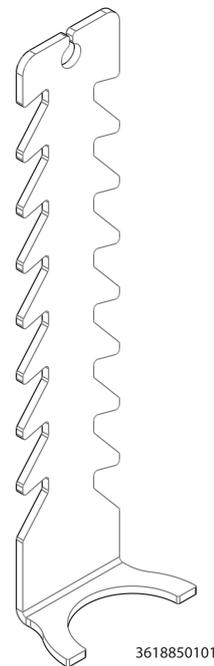


Figure 2: Seal puller

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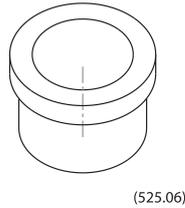


Figure 3: Spacer extension sleeve (525.06) V(C/S)

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10. Loosen the 4 nuts (920.03) fitted on the tie-bolts (905) crosswise and equally. If mounted, remove the sticker plate holder (89-11.05).
11. Lift the motor stool (341) from the pump shroud (10-6).
12. Lift the cover (160) of the pump shroud.
13. When a fixed seal is mounted, take out the stator of the seal and thoroughly clean the seal stator housing.
14. Lift the hydraulic parts from the pump casing (101) by means of a pin \varnothing 5 [mm] through the coupling pinhole at the top of the shaft (210).
15. Place the shaft with the top end facing downwards in a jaw bench or place and lock it into a shaft support accessory, see figure: 1 Mounting plate V01 isometric view.
16. Remove the lock nut with non-metallic insert (920.02) from the shaft (210) and take all hydraulic parts from the shaft. It is recommended to number the different parts in sequence of disassembling.
17. For V(S) 2, 4, 6 B remove the pump casing (101) from the base plate (890).

1.3 Assembling

A V(C/S) 2 -25 series pump consists of three sub-assemblies. First prepare the subassemblies before commencing the complete assembly.

To assemble: The pump casing see chapter: 1.3.1 Assembling the pump casing or 1.3.2 Assembling the pump casing.

The hydraulic parts see chapter: 1.3.3 Assembling the hydraulic parts.

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To install the motor and adjust the shaft height see chapter: 1.4 Motor assembly and adjustment of the pump shaft

1.3.1 Assembling the pump casing

1. Place the pump casing (101) on top of the base plate (890). The connection for the screwed plugs (903.02) should be directed to the arrow on the base plate (890).
2. Slide the o-ring (412.04) on the screwed plugs (903.02).
3. Mount the screwed plugs (903.02) into the pump casing (101) according to chapter "torques".
4. Insert the o-ring (412.01) with water or a soap solution in the o-ring chamber. When necessary, use acid free vaseline to stick the o-ring into the shroud o-ring chamber of the pump casing.
5. Mount 4 tie bolts (905) in the base plate (890).

1.3.2 Assembling the pump casing

1. Place the pump casing (101) on the work bench.
2. Slide the o-rings (412.04) on the screwed plugs (903.02).
3. Mount the screwed plugs (903.02) into the pump casing (101) according to chapter: 3 Torques.
4. Insert the o-ring (412.03) with water or a soap solution in to the o-ring chamber. When necessary, use acid free vaseline to stick the o-ring into the shroud o-ring chamber of the pump casing (101).
5. Mount 4 tie bolts (905) in the base plate (890).

1.3.3 Assembling the hydraulic parts

1. Place the shaft (210) with the top end facing downwards, into a shaft support accessory (20060100) or clamp the top end in a jaw bench fitted with tension plates.
2. Slide the seal bus (525.05) on the shaft (210) and lock it with the circlip (932). The circlip (932) should be completely covered by the spacer sleeve (525.05). If necessary a piece of pipe, slightly larger in diameter than the shaft (210), can be used to apply a force to the spacer sleeve (525.05).

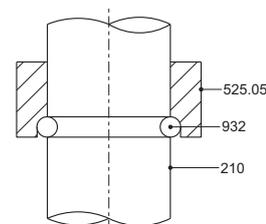
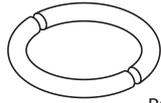


Figure 4: circlip position

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POS 932

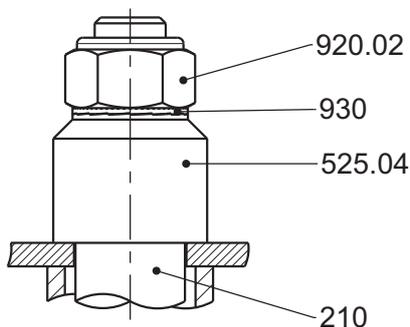
Figure 5: Circlip

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3. First slide the seal bush (525.05) on the shaft (210). Next slide an impeller (230.01/ 230.02) on the shaft (210). The inlet of the impeller (230) should be facing upwards.
4. Depending on the number of stages, the positions of the bearing(s) are specified. See figure 6 up to 10 to specify the positions.
 1. For a stage casing without bearing (108.01), slide the spacer sleeve long (525.03) on the shaft. Go to step 5.
 2. For a stage casing with bearing, first slide a spacer sleeve short (525.01) and then a bearing sleeve tungsten (529) on the shaft (210).
5. Slide the stage casing (108.01/ 108.02) on the shaft (210)
6. Slide an impeller (230.01/ 230.02) on the shaft.
7. Repeat step 4, 5, and 6 until the needed number of stages is reached.
8. Slide the spacer sleeve end (525.04) and then the safety device nord lock M10 (930) on the shaft (210).

Make sure you mate the similar sides of the safety device nord-lock (930) and the spacer sleeve end (525.04).

9. Before fastening the hydraulic assembly, make sure that the shaft is radially blocked with a $\varnothing 5$ [mm] pin in the shaft (210). Tighten the nut lock with non-metallic insert M10 (920.02) according to table: 3Torques.



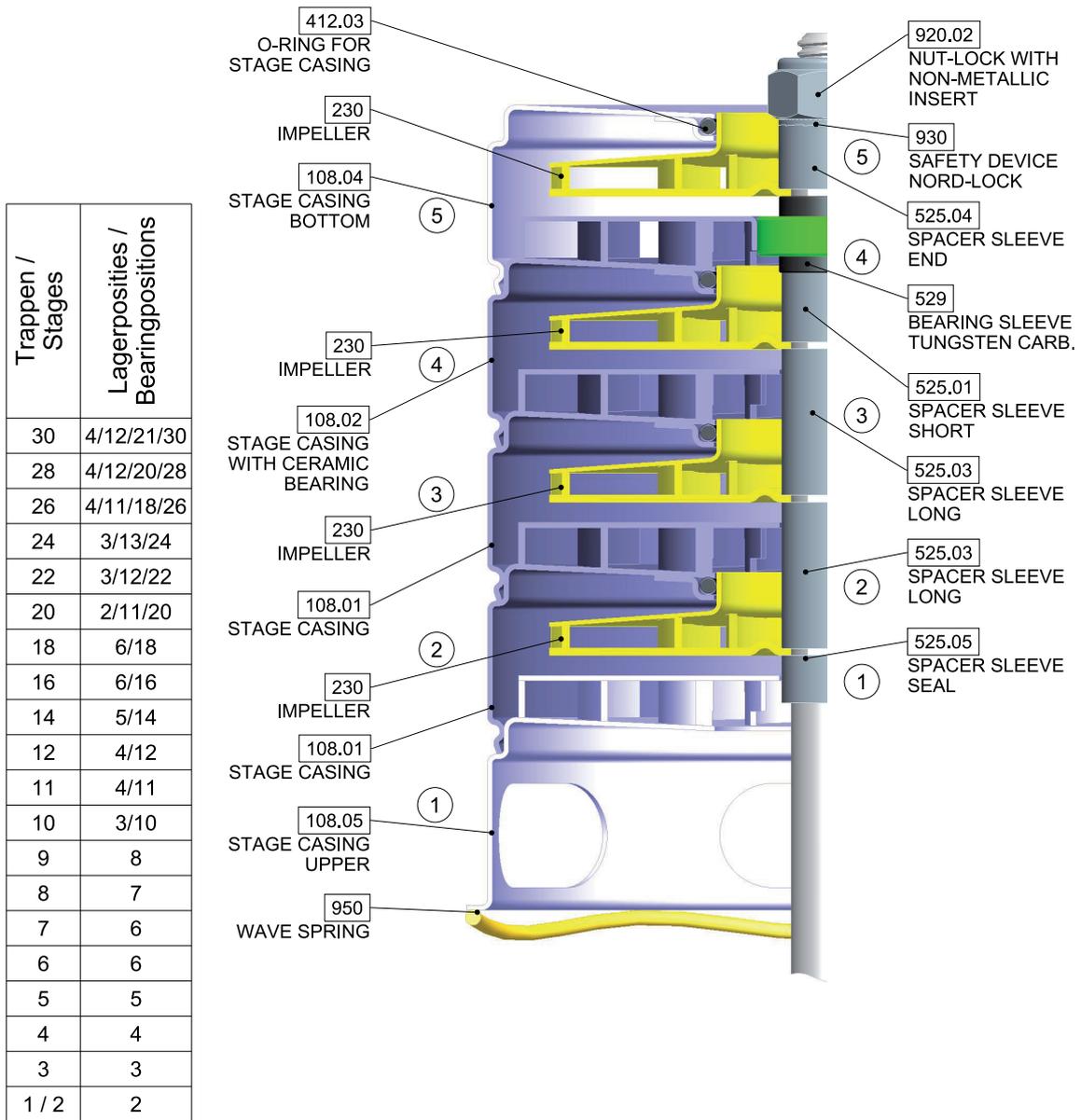


Figure 6: Bearing position V(C/S) 2, 4, and 6

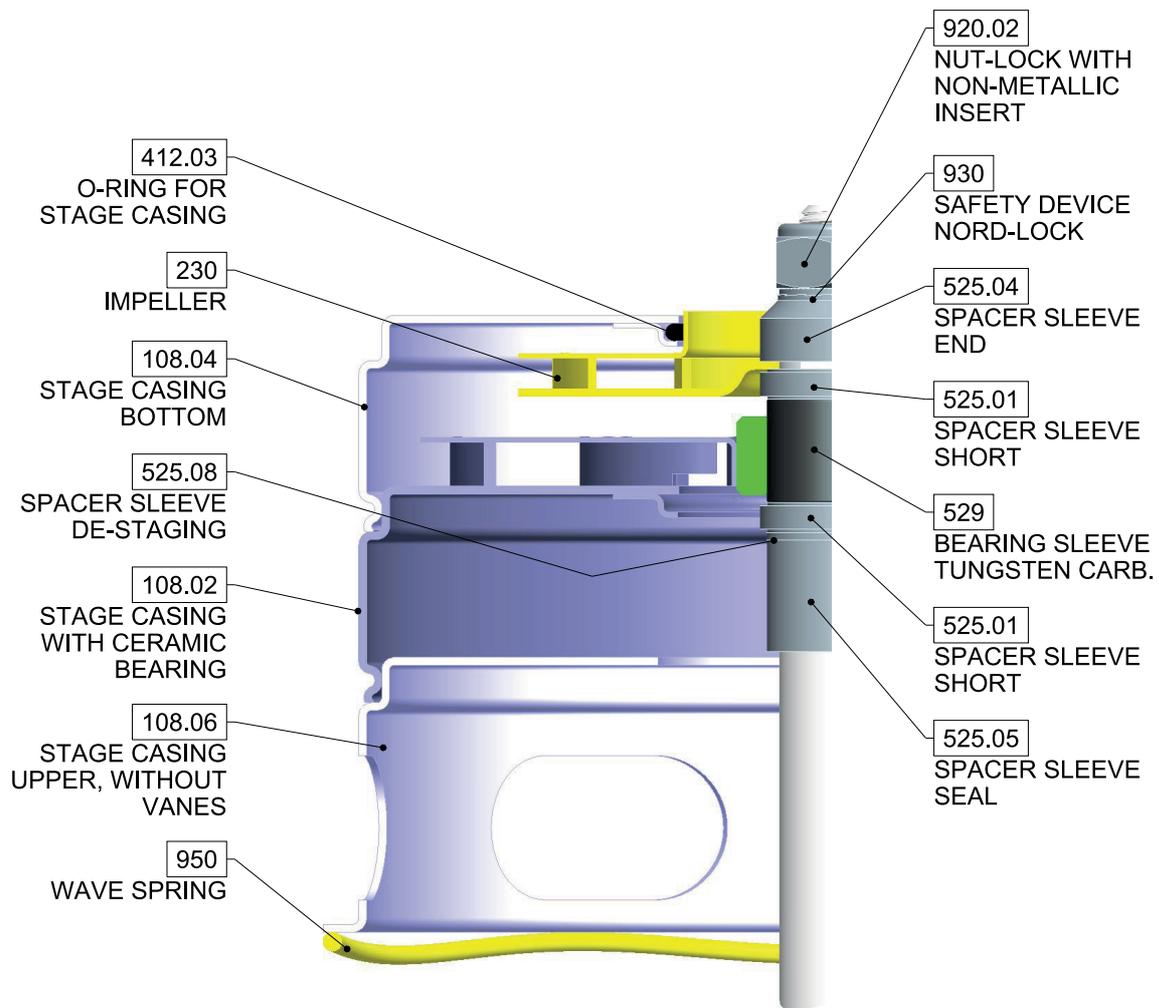


Figure 7: Bearing position V(C/S) 10 /1 (one stage only)

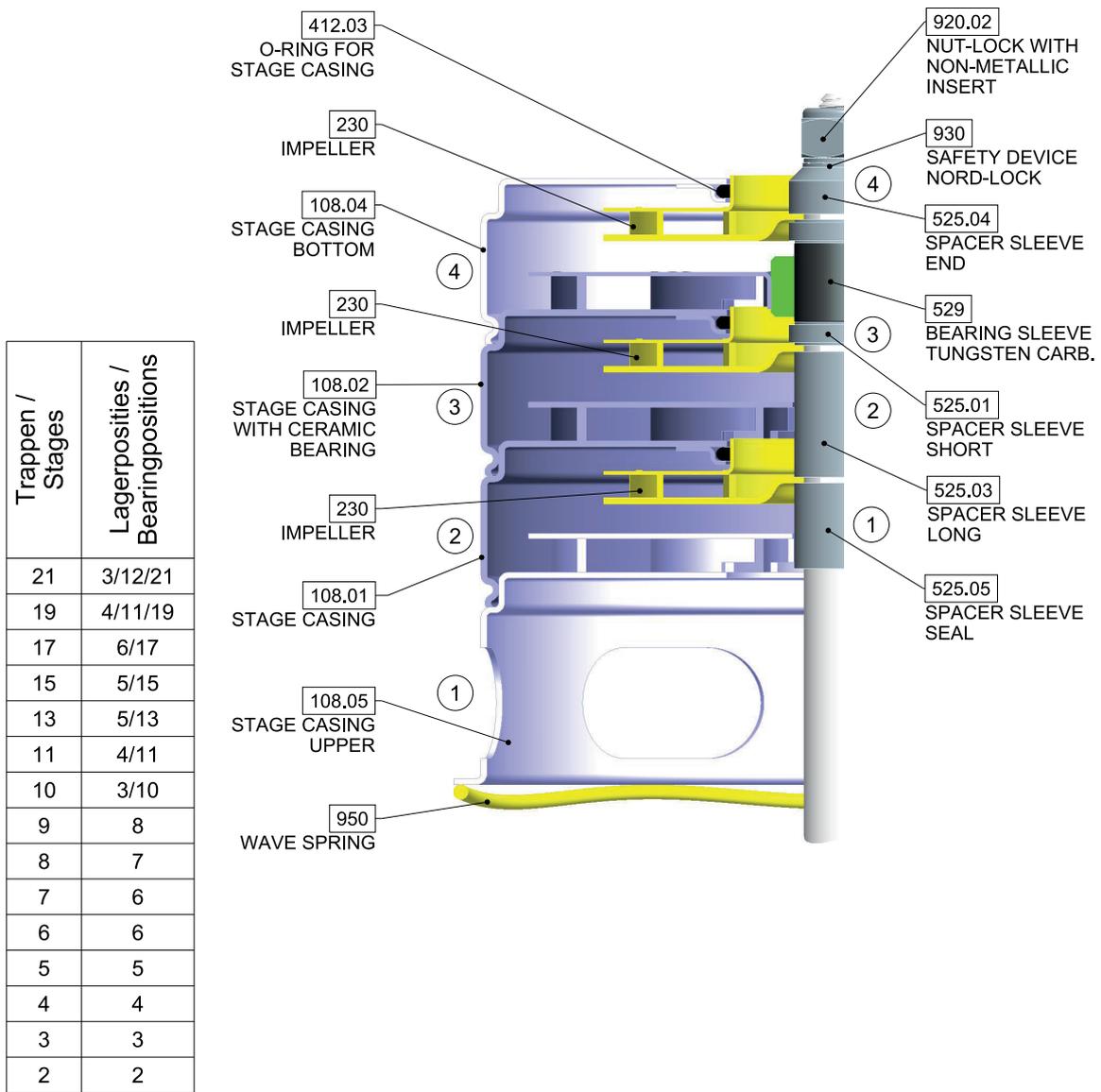


Figure 8: Bearing position V(C/S) 10

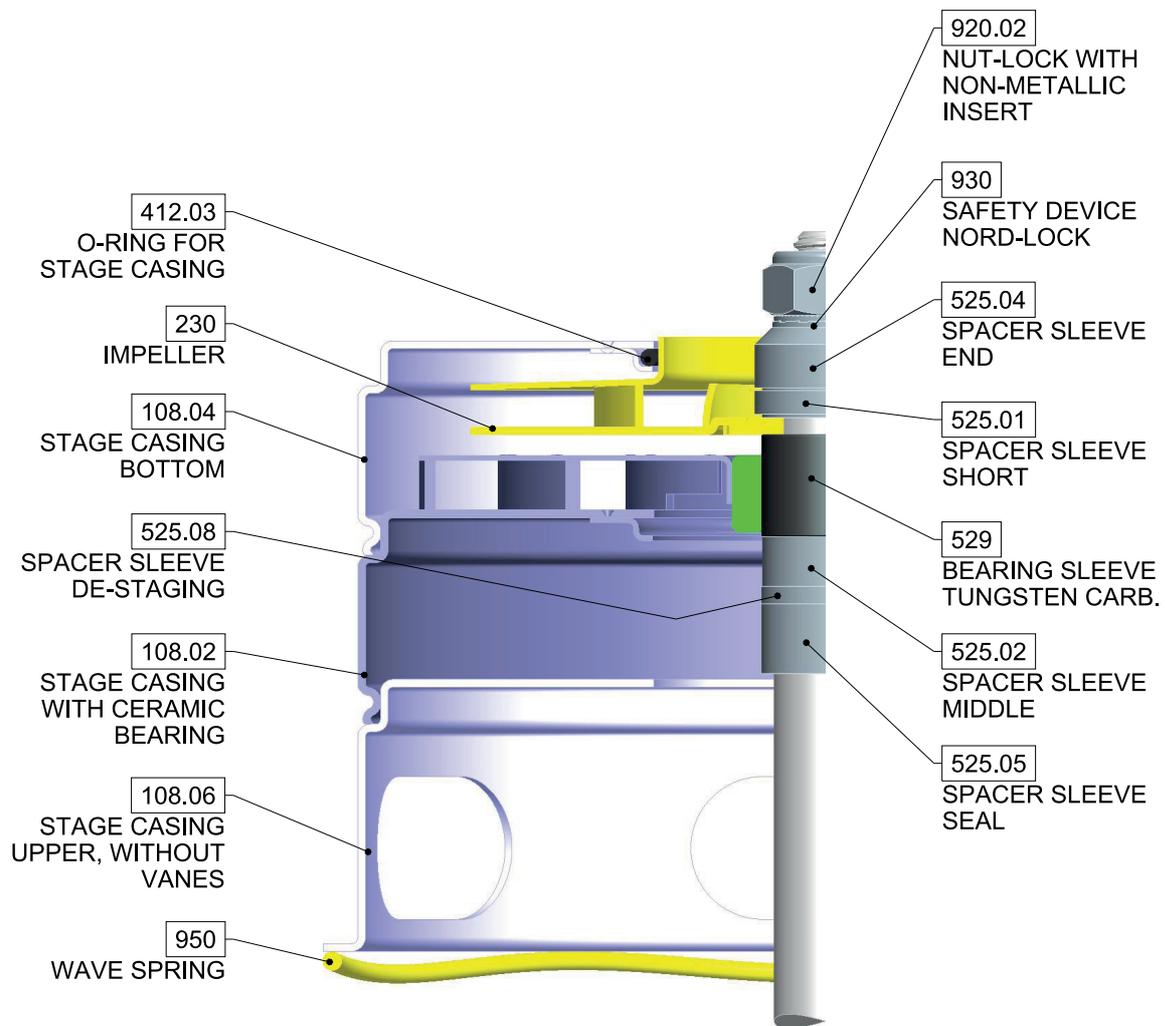


Figure 9: Bearing position V(C/S) 15 /1 (one stage only)

| Trappen / Stages | Lagerpositio- nen / Bearingpositions |
|---------------------|--|
| 17 | 2/7/12/17 |
| 15 | 2/6/11/15 |
| 13 | 2/7/13 |
| 11 | 2/6/11 |
| 10 | 2/6/10 |
| 9 | 2/5/9 |
| 8 | 2/8 |
| 7 | 2/7 |
| 6 | 2/6 |
| 5 | 5 |
| 4 | 4 |
| 3 | 3 |
| 2 | 2 |

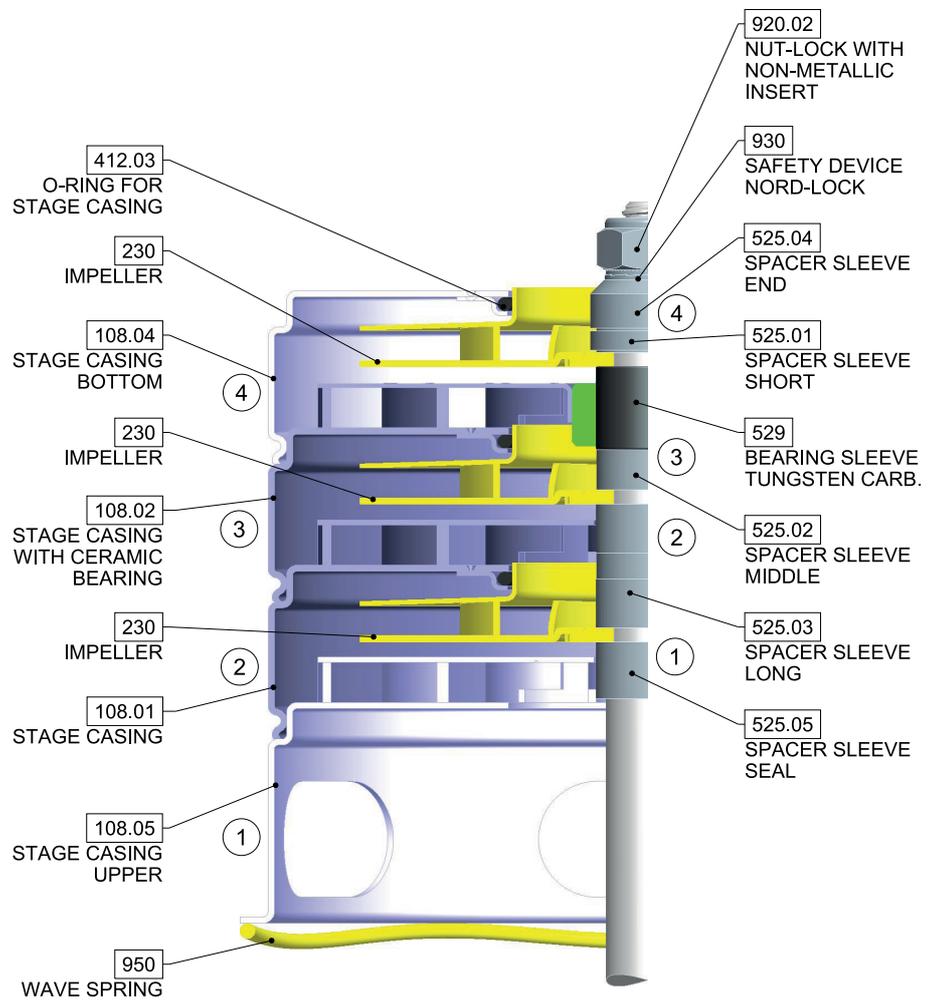


Figure 10: Bearing position V(C/S) 15

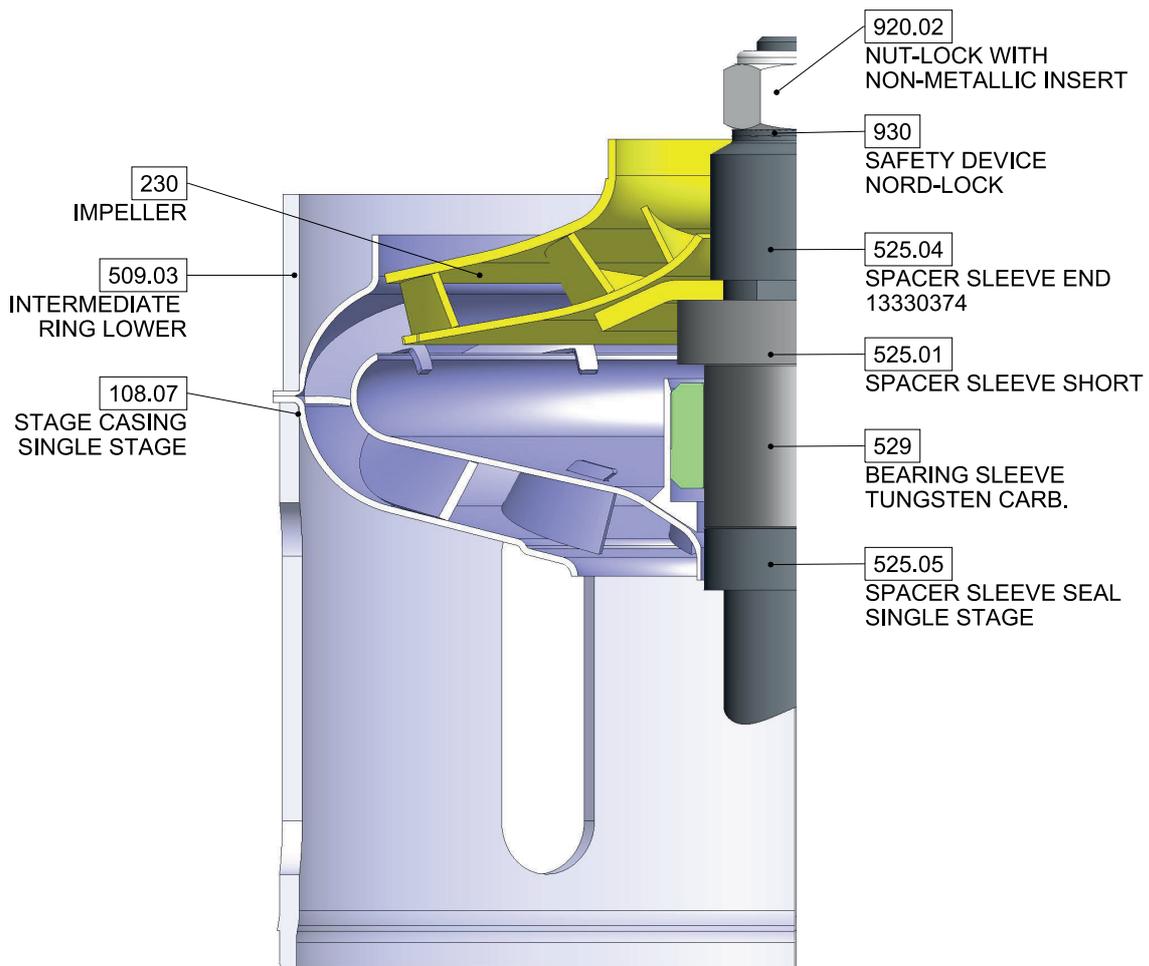


Figure 11: Bearing position V(C/S) 25 (only single stage)

| Trappen / Stages | Lagerpositions / Bearingpositions |
|------------------|-----------------------------------|
| 12 | 2/6/12 |
| 11 | 2/6/11 |
| 10 | 2/5/10 |
| 9 | 2/6/9 |
| 8 | 2/5/8 |
| 7 | 2/7 |
| 6 | 2/6 |
| 5 | 2/5 |
| 4 | 4 |
| 3 | 3 |
| 2 | 2 |
| 1 | 1# |

See 20110501

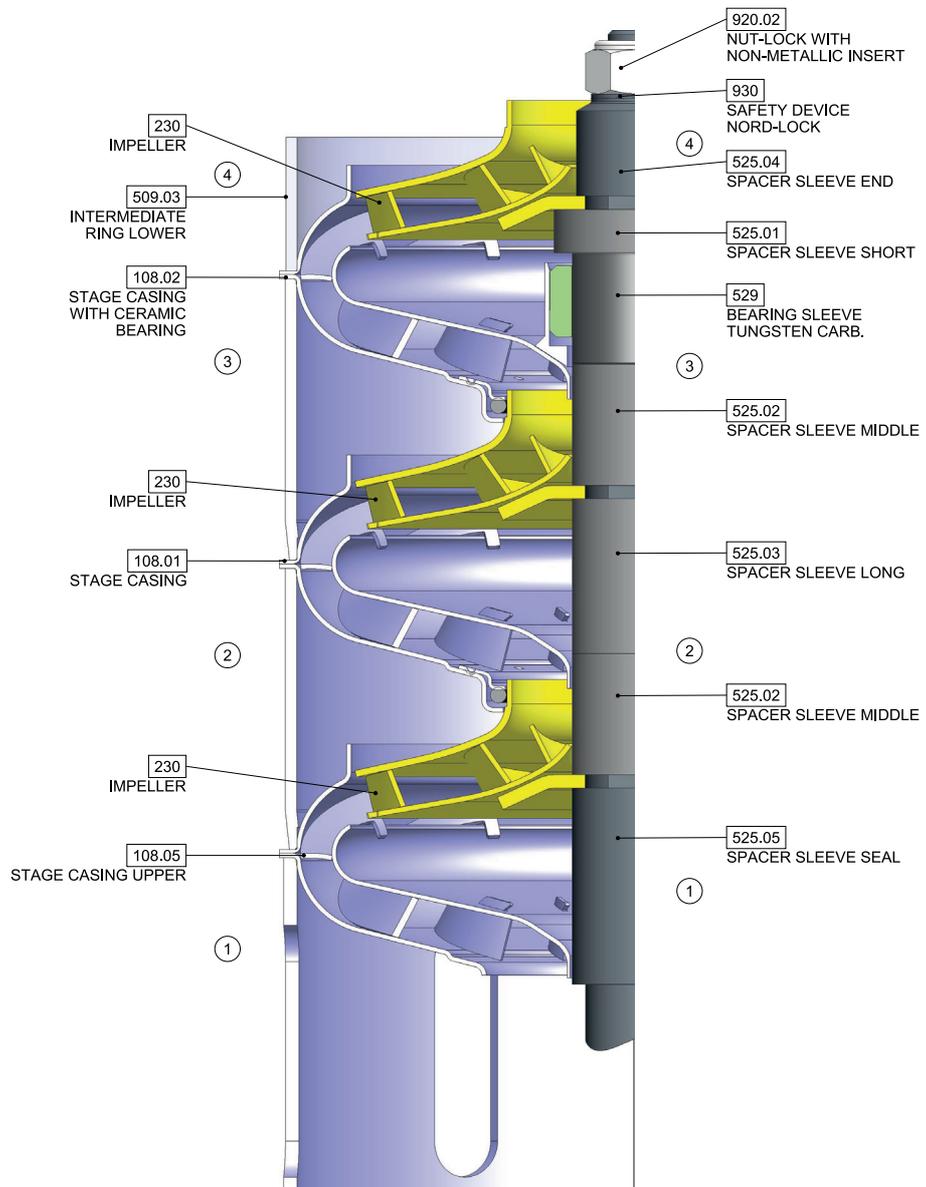


Figure 12: Bearing position V(C/S) 25

1.3.4 Assembling pump with Fixed Seal.

1. To assemble:
 1. **VCF**, got to: step 2
 2. **V(S)**, place the baseplate (890) on the work bench
2. Put down the assembled pump casing (101)
3. Insert the stage casing bottom (108.04) into the pump casing (101).
4. Insert the hydraulic assembly.
5. Slide the seal extension bush (525.05) on the shaft (210).
6. Slide the rotary part of the seal (433) on the shaft with water or a soap solution.
7. Mount 4 tie-rods (905) into the base plate (890).
8. Insert the pump shroud (10-6) in the pump casing (101) with the weld of the shroud hidden behind the left-rear tie-rod.
9. Place the cover up side down on the work bench and mount the stationary part of the seal (433) with water or a soap solution.
10. Place the assembled cover (160) on the pump shroud (10-6). Make sure the cover (160) is adjoined to the shroud (210).
11. Place the motor stool (341) on the cover (160) and tighten the hexagon cap nut bolts (920.03) with washers (554.02) crosswise according to chapter 3Torques.

1.3.5 Assembling pump with Easy Access Seal

1. To assemble:
 1. **VCF**, go to step 2.
 2. **V(S)**, place the baseplate (890) on the work bench
2. Put down the assembled pump casing (101)
3. Insert the stage casing bottom (108.04) into the pump casing (101).
4. Insert the hydraulic assembly.
5. Slide the seal extension bush (525.05) on the shaft (210).
6. Slide the rotary part of the seal (433) on the shaft with water or a soap solution.
7. Mount 4 tie-rods (905) into the base plate (890).
8. Insert the pump shroud (10-6) in the pump casing (101) with the weld of the shroud hidden behind the left-rear tie-rod (905).
9. Place the cover (160) on the pump shroud (10-6) and make sure the cover (160) is adjoined to the shroud (210).
10. Place the motor stool (341) on the cover (160) and tighten the hexagon cap nut bolts (920.03) with washers (554.02) crosswise according to chapter: 3Torques.

11. Place the seal cover (471) up side down on the work bench and mount the stationary part of the seal (433) with water or a soap solution.
12. Mount the O-ring (412.06) on the seal cover (471)
13. Mount the seal cover (471) in the motor stool (341).
14. Screw the four hexagon socket head cap screws (914.03) into the motor stool (341). For maximum torque see chapter: 3Torques.

1.3.6 Assembling with Cartridge Seal.

1. To assemble:
 1. **VCF**, go to step 2.
 2. **V(S)**, place the baseplate (890) on the work bench
2. Put down the assembled pump casing (101).
3. Insert the stage casing bottom (108.04) into the pump casing (101).
4. Insert the hydraulic assembly.
5. Insert the pump shroud (10-6) in the pump casing (101) with the weld of the shroud hidden behind a tie-rod.
6. Place the cover (160) on the pump shroud (10-6) and make sure the cover (160) is adjoined to the shroud (210).
7. Place the motor stool (341) on the cover (160) and tighten the hexagon cap nut bolts (920.03) with washers (554.02) crosswise according to chapter 3Torques.
8. Wet the top end of the shaft (210) with water or a soap solution.
9. Check if O-ring (412.06) is present in seal cover (471) of mechanical seal (433)
10. Slide the mechanical seal (433) on the shaft (210) into the motor stool (341).
11. Screw the four hexagon socket head cap screws (914.03) into the motor stool (341). For maximum torque see chapter 3Torques.
12. With the pump shaft in the lowest position tightly mount the cartridge ring with three grub screws (904) on the shaft (210). The cartridge seal is now correctly assembled.

1.4 Motor assembly and adjustment of the pump shaft

Mount the motor to the motor stool with four hexagon head bolts (901.02) and washers (554.02). After assembling the motor (800), the shaft (210) has to be carefully adjusted to prevent damage to the pump.

If present remove the key from the motor shaft. Replace the key with a machined key to fill the key way.

1. Loosely fasten the coupling shells (862) with the coupling pin (560) on the shaft (210). Use the hexagon socket head cap screw (914.01).
2. Tighten the lower bolts of the coupling shells (862) so far that the coupling slightly clamps around the motor shaft.
3. Lift the shaft (210) up to 1,5 [mm]. For this purpose put a special tool under the coupling. Make sure the coupling can move smoothly over the motor shaft, so that the shaft will not be lifted out of the bearing.
4. Fully tighten the couplings to the correct torque mentioned in chapter 3 Torques. Make sure that the gaps between the couplings are equally divided on both sides (see figure 13 Tighten the coupling).

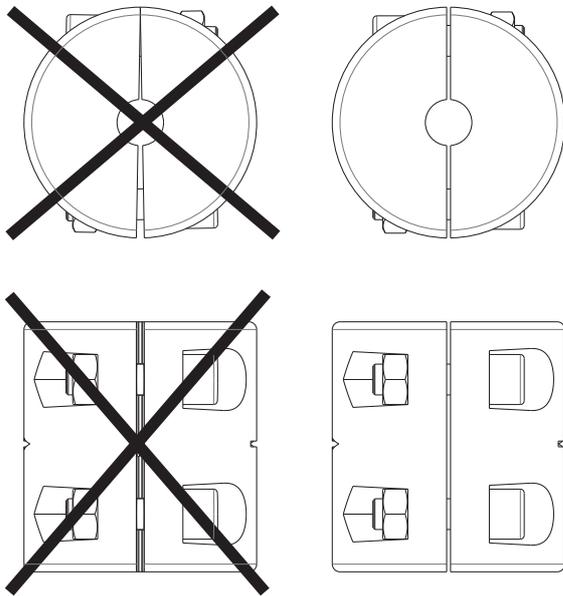


Figure 13: Tighten the coupling

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5. Attach the coupling guards (681) with the hexagon head bolts (901.01) to the motor stool upper (341.01).
6. Connect the pump to the electrical power and put the pump into operation according to the procedures stated in the operating manual.



ATTENTION

For motors of 11 kW or higher, block the rotor when adjustments are made to the coupling. This ensures that the rotor will not come out of its bearings.

2 Assembling and disassembling V(C/S) 85 series

2.1 General

The starting point of the following procedure is a pump taken out of an installation. The hydraulic assembly of a V(C/S) pump is to be assembled or disassembled with the coupling side of the shaft facing downwards. A simple aid for this method is a jaw bench, provided with tension plates. For larger series a special mounting plate can be used, see figure 14 Mounting plate V01 isometric view. The shaft (coupling side) is to be placed in the bush and locked with a pin (diameter 5 mm) through the coupling hole.

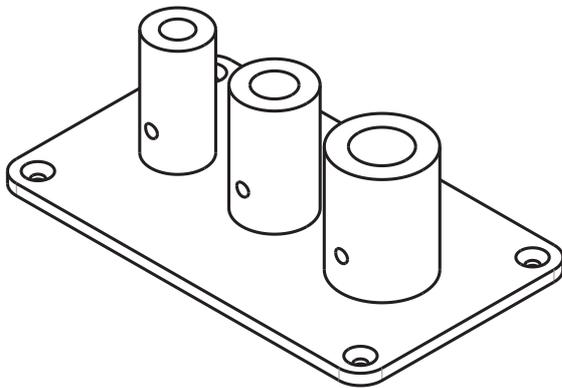


Figure 14: Mounting plate V01 isometric view

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2.2 Disassembling

1. First drain the pump by removing the 1/4" plugs and 3/8" plugs (903.02/ 903.01).
2. To remove the coupling guards (681) loosen the bolts two turns and pull out the coupling guards.
3. Remove hexagon socket head cap screws (914.01) from the coupling shells (862) and take the coupling shells (862) and pin (560) from the shaft (210).
4. Remove motor bolts (901.04) and washers (554.04).
5. Remove the motor (800) from the motor stool (341.01).
6. When no taper piece (722) is installed go to step 8
7. When a taper piece (722) is installed remove the taper piece (722) by removing the hexagon socket head cap screws (914.02) and remove the taper piece (722) from the motor stool upper (314.01).
8. Remove the hexagon socket head cap screws (914.02) from the motor stool upper/ lower (314.01/ 314.02) and remove the motor stool upper (314.01) from the motor stool lower (314.02).
9. Disassembling the seal
 1. **Disassembly with cartridge seal:** thoroughly clean the top end of the shaft (210), loosen the three grub screws (904) partly and remove the four hexagon socket head cap screws (914.03). Place a screwdriver under the lips on the seal cover (471) lift the cartridge seal out of the motor stool (341) from the shaft (210).
 2. **Disassembly with easy access seal:** thoroughly clean the top end of the shaft (210), and remove the four hexagon socket head cap screws (914.03). Place a screwdriver under the lips on the seal cover (471) and lift the seal cover out of the motor stool (341.02) from the shaft (210). To lift the seal, place the seal puller 22 mm (see figure: 15 Seal puller) under the seal extension sleeve see figure 16 Spacer extension sleeve (525.06) V(C/S). Remove the seal extension sleeve (525.06) and seal rotor at once by using a screwdriver and seal puller lifting step by step.

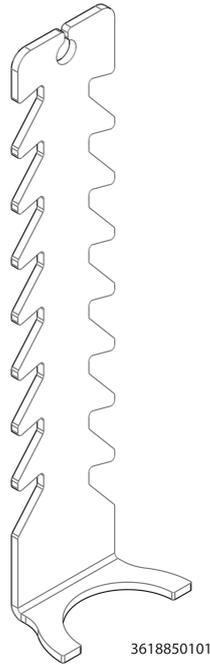


Figure 15: Seal puller

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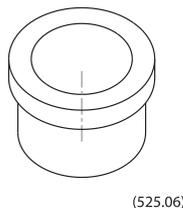


Figure 16: Spacer extension sleeve (525.06)
V(C/S)

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10. Loosen the 4 nuts (920.03) fitted on the tie-bolts (905) crosswise and equally.
 1. **For V(S)** lift the motor stool (341.02) and the cover (160) from the pump-shroud (10-6).
 2. **For VC** lift the motor stool (314.02) from the pump-shroud (10-6).
11. Lift the pump shroud (10-6) from the pump casing (101).
12. Lift the hydraulic parts from the pump casing (101) by means of a pin \varnothing 5 [mm] through the coupling pinhole at the top of the shaft (210).
13. Place the shaft with the top end facing downwards in a jaw bench or place and lock it into a shaft support accessory (mounting plate) see figure: 1Mounting plate V01 isometric view.
14. Remove the lock nut with non-metallic insert (920.02) from the shaft (210) and take all hydraulic parts from the shaft. It is recommended to number the different parts in sequence of disassembling.

15. For V(C/S), remove the pump casing (101) from the base plate (890).

2.3 Assembling

A V(C/S) 85 pump consists out of three sub-assemblies. First prepare the subassemblies before commencing with the complete assembly.

Assembling the pump casing see chapter: 2.3.1

Assembling the pump casing V(S) or

2.3.2Assembling the pump casing VC.

For the subassembly of the hydraulic parts see chapter: 2.3.3Assembling the hydraulic parts V(C/S)

For the subassembly of the motor stool assembly see chapter: 2.3.4Assembling motor stool lower V(C/S)

To install the motor and adjusting the shaft see chapter: 2.4Motor assembly and adjustment of the pump shaft

2.3.1 Assembling the pump casing V(S)

1. Place the pump casing (101) on top of the base plate (890). The connection for the screwed plugs (903.02) should be directed towards the arrow on the base plate.
2. Slide the o-rings (412.04) on the screwed plugs (903.02).
3. Mount the screwed plugs (903.02) into the pump casing (101) according to chapter "torques".
4. Insert the o-ring (412.03) with water or a soap solution in to the o-ring chamber meant for the impeller.
5. Insert the o-ring (412.01) with water or a soap solution in the o-ring chamber. When necessary, use acid free Vaseline to stick the o-ring into the shroud o-ring chamber of the pump casing.
6. Mount 4 tie bolts (905) in the base plate (890).
7. Place the o-ring on the ¼" drain plugs (903.02) and tighten the plugs (903.02) according to chapter "torques" in the pump casing (101).
8. The pump casing is provided with a fixation hole against rotation. Make sure the hole is fixed with the cylindrical pin (560.02), see figure 17
Fixation pin in stage casing

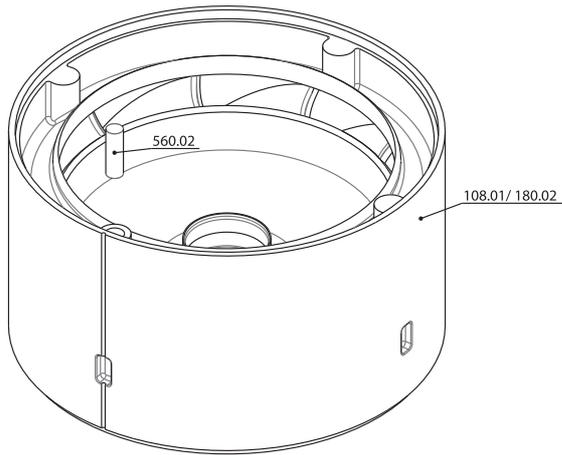


Figure 17: Fixation pin in stage casing

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2.3.2 Assembling the pump casing VC

1. Place the pump casing (101) on the table.
2. Slide the o-rings (412.04) on the screwed plugs (903.02).
3. Mount the screwed plugs (903.02) into the pump casing (101) according to chapter 3Torques.
4. Insert the o-ring (412.03) with water or a soap solution in to the o-ring chamber meant for the impeller.
5. Insert the o-ring (412.01) with water or a soap solution in the o-ring chamber. When necessary, use acid free Vaseline to stick the o-ring into the shroud o-ring chamber of the pump casing.
6. Mount 4 tie bolts (905) in the base plate (890).
7. Place the o-ring on the ¼" drain plugs (903.02) and tighten the plugs (903.02) according to chapter "torques" in the pump casing (101).
8. The pump casing is provided with a fixation hole against rotation. Make sure the hole is fixed with the cylindrical pin (560.02), see figure 17 Fixation pin in stage casing

2.3.3 Assembling the hydraulic parts V(C/S)

1. Place the shaft (210) with the top end facing downwards, into a shaft support accessory (mounting plate), see figure: 1Mounting plate V01 isometric view or clamp the top end in a jaw bench fitted with tension plates.
2. Slide the spacer sleeve seal (525.05) on the shaft (210) and lock it with the circlip (932), the circlip (932) consists out of two parts. The circlip (932) should be completely covered by the spacer sleeve (525.05). If necessary a piece of pipe, slightly larger in diameter than the shaft (210), can be used to apply a force to the spacer sleeve (525.05).

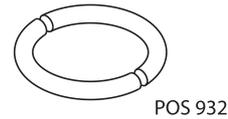


Figure 18: Circlip

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3. For single stage go to step 9.
Spacer sleeve combination for 2 or more stages follow step 3 to 8.
4. For a stage casing without bearing (108.01), first slide the spacer sleeve middle (525.02), second the spacer sleeve long (525.03) on the shaft. Go to step 5.
For a stage casing with bearing, first slide a spacer sleeve middle (525.03) and second a bearing sleeve tungsten (529) and third a spacer sleeve short (525.01) on to the shaft (210).
5. Slide the stage casing (108.01/ 108.02) on to the shaft (210).
6. Slide an impeller (230.01/ 230.02) on to the shaft.
7. All stage casings are provided with a fixation hole against rotation. Make sure every hole¹ at the vertical line out side of the stage casing (108.01/ 108.02) is fixed with the cylindrical pin (560.02). See figure 17Fixation pin in stage casing
8. Repeat step 4, 5, 6 and 7 till the required number of stages is reached. Than go to step 11.
9. Spacer sleeve-combination for single stage.

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1. Only the bottom stage casing (108.01) (this is on the moment the upper stage casing (108.01) because the hydraulic assembly is built up side down) is not yet provided with a cylindrical pin (560.02)

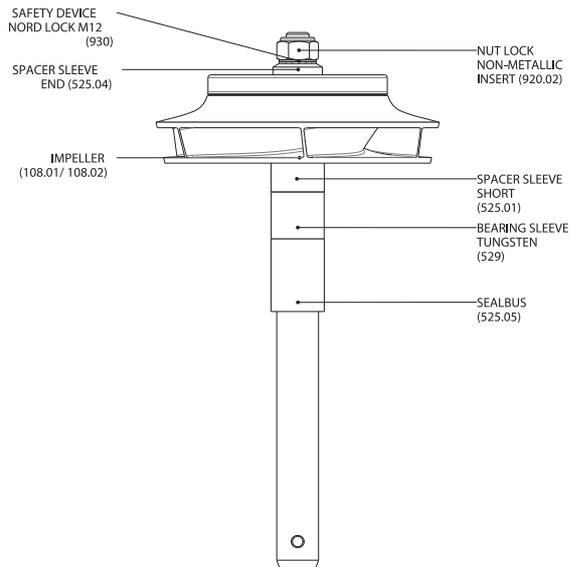


Figure 19: Single stage approved

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Single stage pumps always have a stage casing with bearing, first slide a bearing sleeve tungsten (529) and second a spacer sleeve short (525.01) on to the shaft (210), see figure: 19Single stage approved.

10. Slide an impeller (230.01/ 230.02) on to the shaft. The inlet of the impeller (230) should be facing upwards.
11. Slide on the spacer sleeve end (525.04) and next the safety device nord lock M12 (930) on the shaft (210). Make sure you mate the similar sides of the safety device nord-lock (930) and the spacer sleeve end (525.04).
12. Make sure before fastning the hydraulic assembly, the shaft is radially blocked with a $\varnothing 5$ [mm] pin in the shaft (210). Tighten the lock nut with non-metallic insert M12 (920.02).

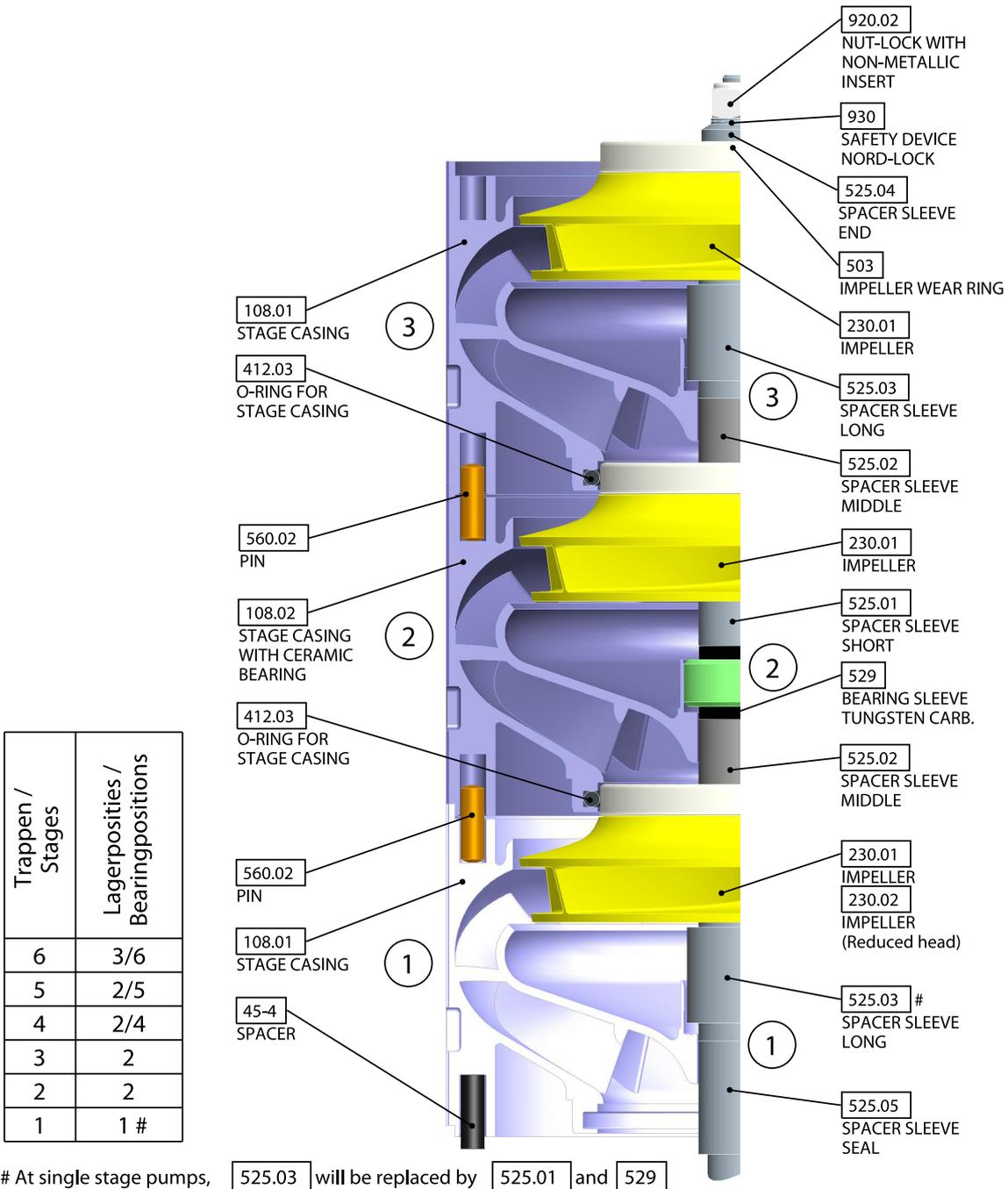
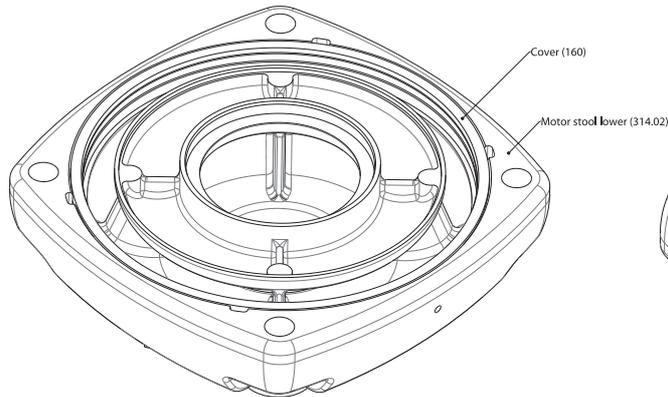


Figure 20: Bearing position V(C/S) 85

2.3.4 Assembling motor stool lower V(C/S)

1. Insert the o-ring (412.01) with water or a soap solution in to the o-ring chamber of the cover (160). When necessary, use acid free Vaseline to stick the o-ring into the cover (160).
2. Place the motor stool lower (314.02) in up side down position on the workbench.



3. Insert the cover (160) in to the motor stool lower (314.02) in such a way that the bottom of the cover (160) and the motor stool lower (314.02) are parallel. Make sure the filling gap of the cover (160) is centred in the motor stool lower (314.02). Like shown in figure 13.
4. Place the o-ring (412.04) on the filling plug (903.01) and tighten the filling plugs according to chapter 3 Torques.

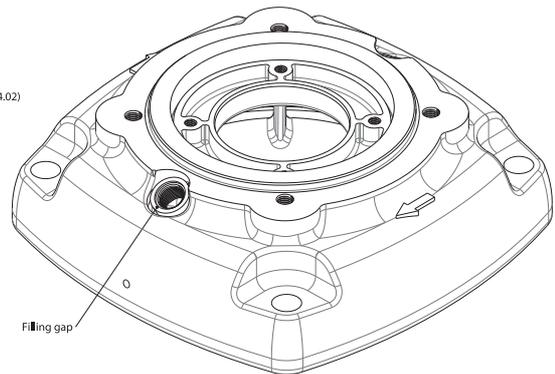


Figure 21: V(S) 85 B motor stool lower

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2.3.5 Assembling motor stool lower V(C/S)

1. Insert the o-ring (412.01) with water or a soap solution in to the o-ring chamber of the motor stool lower (314.02). When necessary, use acid free Vaseline to stick the o-ring in to the cover (160).

2.3.6 Preparing the easy access seal cover V(C/S)

1. Place the o-ring on the seal stator (433).
2. Press the seal stator (433) with water or a soap solution into the seal cover (412.06).

2.3.7 Assembling pump

1. Insert the hydraulic assembly in the pump casing (101), make sure the vertical in cast line in the stage casing (108.01/ 108.02) is positioned at the cylindrical hole against rotation.
2. Insert the pin against rotation (560.02) at the vertical in cast line in the stage casing (108.01/ 108.02).
3. Insert the upper stage casing (108.01/ 108.02).
4. Insert the pump shroud (10-6) in the pump casing (101) with the welding of the shroud in position 1 according to 22Position shroud welding

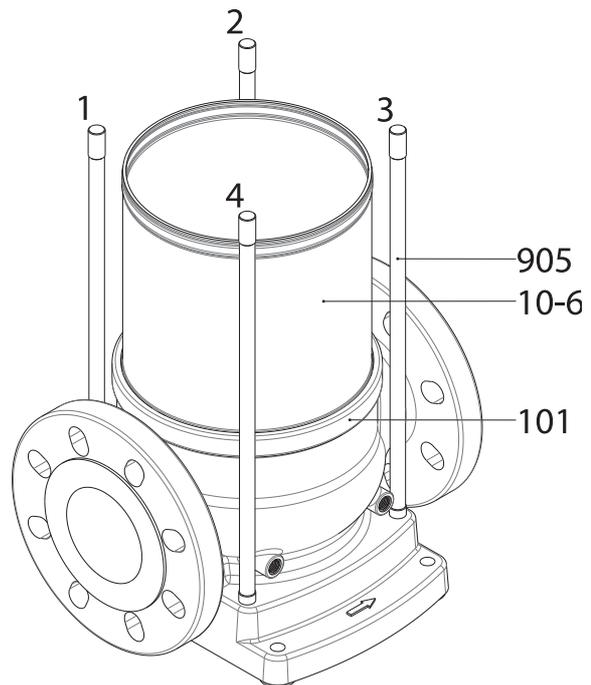


Figure 22: Position shroud welding

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5. For assembling with easy access seal, slide the seal extension bus (525.05) on the shaft (210). Next the rotary part of the seal (433).
6. Place a spacer in each hole in the upper stage casing (108.01/ 108.02) in each (4 pieces) hole a spacer (45-4).

7. Place the assembled cover (160) on the pump shroud (10-6) and tie bolts (905). Make sure the cover (160) is adjoined to the shroud (210).
8. Crosswise tighten the tie bolt bolts (920.03) and washers (554.01) according to chapter 3 Torques.
9. For V(C/S) with cartridge seal go to step 11. For V(C/S) with easy access seal go to step 10.
10. Insert the assembled seal cover (412.06) in the cover (160) and tighten the four hexagon socket head cap screws (914.03) according to chapter 3 Torques and go to step 13.
11. Insert the assembled cartridge seal (433) in the cover (160) and tighten the four hexagon socket head cap screws (914.03) according to chapter 3 Torques.
12. Pull down the shaft (210) and tighten the three grub screws (904).
13. Place the motor stool upper (314.01) on the motor stool lower (314.02) and crosswise tighten the four hexagon socket head cap screws according to chapter 3 Torques.
14. When a taper piece (722) is needed go to step 15, when mounting the motor (801) direct on the motor stool upper (314.01) go to step 16.
15. Place the taper piece (722) on the motor stool upper (314.01) and tighten the four hexagon socket head cap screws according to chapter 3 Torques
16. Place the motor on the motor stool upper (314.01)/ taper piece (722) and tighten the bolts (901.04) and washers (554.04) crosswise according to chapter 3 Torques.

2.4 Motor assembly and adjustment of the pump shaft

After assembling the motor (800), the shaft (210) has to be carefully adjusted because improper adjustment can cause damage to the pump.

If present remove the key from the motor shaft and replace the key for a machined key that fills the key hole, to prevent vibrations.

1. Loosely fasten the coupling shells (862) with the coupling pin (560) on the shaft (210). Use the hexagon socket head cap screw (914.01)
2. Tighten the lower bolts of the coupling shells (862) so far that the coupling slightly clamps around the motor shaft.

3. Lift the shaft (210) up to 1,5 [mm]. For this purpose put a tyre lever under the coupling. Make sure the coupling can move smoothly over the motor shaft, so that the shaft will not be lifted out of the bearing.



ATTENTION

For motors of 11 kW or higher, block the rotor when adjustments are made to the coupling. This ensures that the rotor will not come out of its bearings.

4. Fully tighten the couplings to the correct torque mentioned in chapter Torques. Make sure that the gaps between the couplings are equally divided on both sides (see figure 23 Tighten the coupling DPV(S) 85 B).

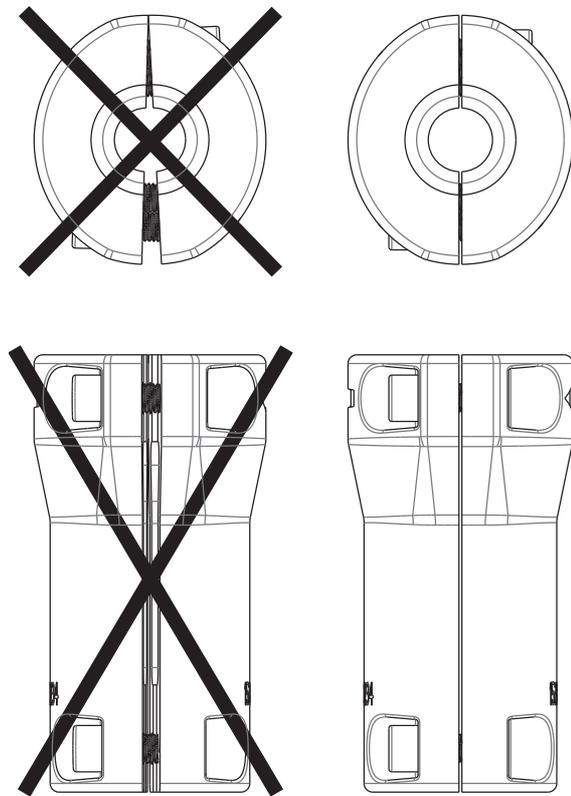


Figure 23: Tighten the coupling DPV(S) 85 B

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5. Attach the coupling guards (681) with the hexagon head bolts (901.01) to the motor stool upper (341.01).
6. Connect the pump to the electrical power and put the pump into operation according to the operating manual.

3 Torques

3.1 Torques



WARNING

The torques given in the table below are valid for materials at 20° C, therefore it is essential that pumps are assembled at 20° C ambient temperature.



WARNING

Never tighten nuts and bolts to the required amount of torque at once. Always make sure to increase torque using at least 3 attempts before reaching the required amount.



WARNING

Always make sure to tighten nuts and bolts crosswise!



WARNING

The torques given in the tables below already take into account possible frictional resistance of windings and materials. Therefore, never use grease, copper paste or oil on the nuts and bolts when applying the torques!

Table 1: Shafts (pos. 920.02)

| Pump | Bolt or nut | Shaft diameter | Bolt size | Torque |
|--------|-------------|----------------|-----------|--------|
| V(C/S) | Lock nut | | M10 | 28 Nm |
| | Lock nut | | M12 | 50 Nm |

Table 2: Tie bolts (pos. 920.03)

| Pump | Torque |
|--------------|--------|
| V(C/S) 2,4,6 | 12 Nm |
| V(C/S) 10,15 | 25 Nm |
| V(C/S) 25 | 50 Nm |
| V(C/S) 85 | 70 Nm |

Table 3: Coupling shells (pos. 914.01)

| Type | Bolt size | Torque |
|---------------------|-----------|--------|
| Steel | M6 | 16 Nm |
| Steel and cast iron | M8 | 30 Nm |
| Aluminium | M8 | 22 Nm |
| Cast iron | M10 | 70 Nm |

Table 4: Screwed plugs, drain (pos.903.02)

| Pump | Bolt size | Torque |
|------------------------|-----------|--------|
| V(C/S) 2,4,6,10,15, 25 | G 1/4 | 15 Nm |
| V(S) 85 | G 1/4 | 15 Nm |
| VCF 85 | G 1/4 | 25 Nm |

Table 5: Screwed plugs, fill(pos.903.01)

| Pump | Bolt size | Torque |
|------------------------|-----------|--------|
| V(C/S) 2,4,6,10,15, 25 | G 3/8 | 15 Nm |
| V(S) 85 | G 3/8 | 15 Nm |
| VCF 85 | G 3/8 | 25 Nm |

Table 6: Motor stool (pos. 341.01)

| Pump | Bolt size | Torque |
|------------------------|-----------|--------|
| V(C/S) 85 B | | |
| Motorstool upper/lower | M10 | 50 Nm |
| Motorstool taper piece | M12 | 70 Nm |
| Coupling guard bolts | M6 | 15 Nm |

Table 7: Motor (pos. 914.02/901.04)

| Pump | Bolt size | Torque |
|------------------------|-----------|--------|
| VM 2,4,6 | M6 | 10 Nm |
| V(C/S) 85 5.5 / 7.5 kW | M12 | 70 Nm |
| V(C/S) 85 11 / 45 kW | M16 | 70 Nm |

Table 8: Seal Cover (pos. 914.03/901.05)

| Pump | Bolt size | Torque |
|--------------------|-----------|--------------------|
| V(C/S) 2,4,6,10,15 | M5 | 4 ⁺² Nm |
| V(C/S) 25 B | M6 | 10 Nm |
| V(C/S) 85 B | M8 | 10 Nm |

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4 Service tools

4.1 Service tool kits

| Pump de-aeration kit K368000140 | |
|---------------------------------|-----------|
| Vacuum de-aeration kit: | Quantity: |
| Hand pump | 1 |
| Clamp | 2 |
| Hose pipe 25 mm | 1 m |
| Hose connection 1" X 25 mm | 1 |
| Adapter piece 1" X 22 mm | 1 |
| Pipe 22 mm | 20 cm |
| Knee coupling 3/4" X 22 mm | 1 |
| Reducing ring 3/4" X 1/2 mm | 1 |
| Reducing nipple 1/4" X 1/2" | 1 |

| Pump (dis)assembling kit K368000141 | |
|-------------------------------------|-----------|
| Coupling adjustment: | Quantity: |
| Socket head wrench screwdriver 3 mm | 1 |
| T-grip socket head wrench 5 mm | 1 |
| T-grip socket head wrench 6 mm | 1 |
| T-grip socket head wrench 8 mm | 1 |
| Tyre lever 300 | 1 |
| Socket wrench screw driver | 1 |
| De-aeration and draining: | Quantity: |
| Wrench 17 mm | 1 |
| Motor mounting: | Quantity: |
| Wrench 10 mm | 1 |
| Wrench 13 mm | 1 |
| Wrench 19 mm | 1 |
| Wrench 22 mm | 1 |
| Wrench 24 mm | 1 |
| (Dis)assembling of hydraulic parts: | Quantity: |
| Mounting plate | 1 |
| Davel pin 5 X 70 mm | 1 |
| Torque wrench: | Quantity: |
| Torque wrench 10-100 Nm | 1 |
| Socket 13 mm | 1 |
| Socket 17 mm | 1 |
| Socket 24 mm | 1 |

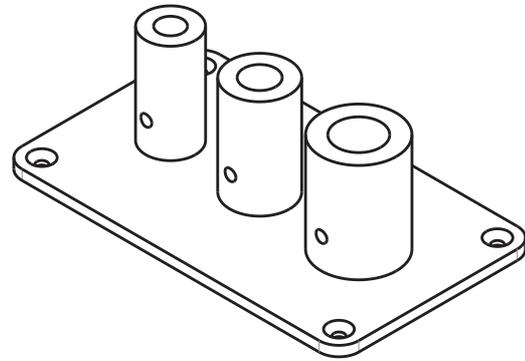


Figure 24: Mounting plate V01 isometric view

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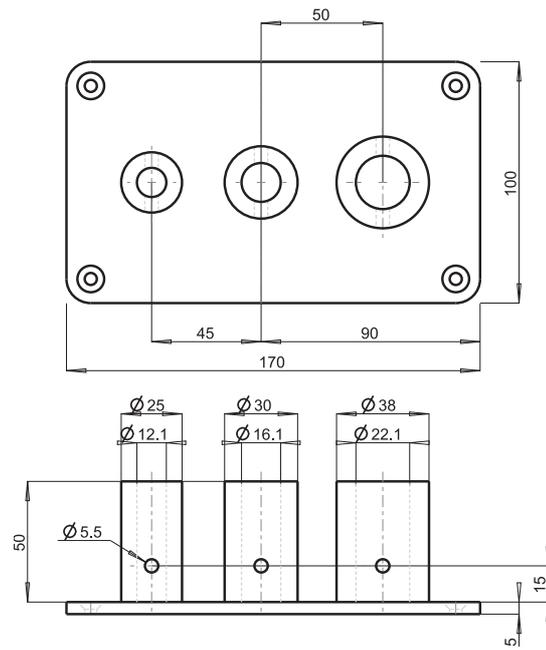


Figure 25: Mounting plate V01 dimensions

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Original instructions

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