

## MANUAL VERTICAL PUMPS

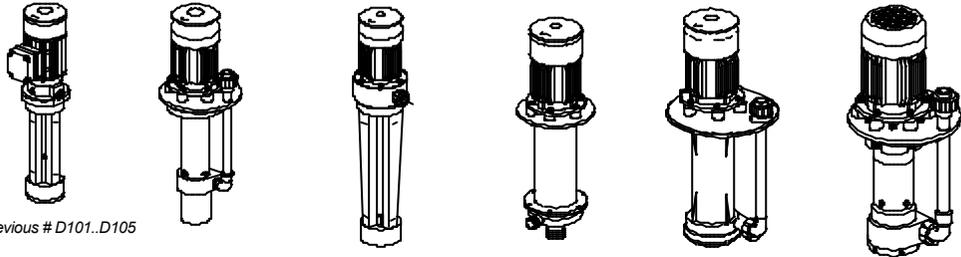


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### 1. Productidentity

D9\*     D110     D12\*     D150     D170     D201     D240



Previous # D101..D105

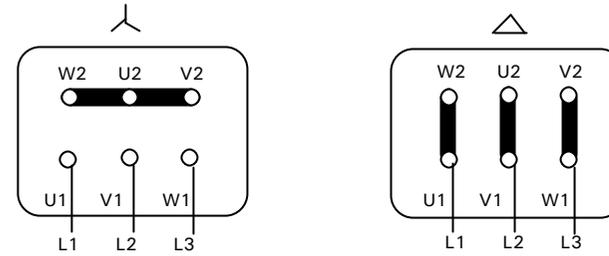
### OUT OF TANK MODEL

D9\*     D110     D12\*     D150     D170     D201     D240

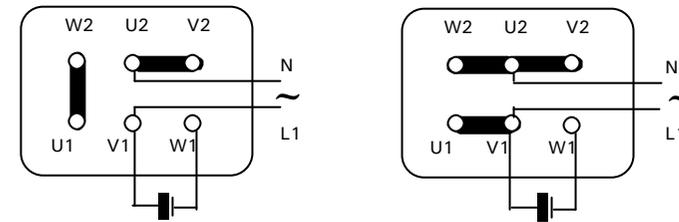


## 12. Motorwiring

### three phase

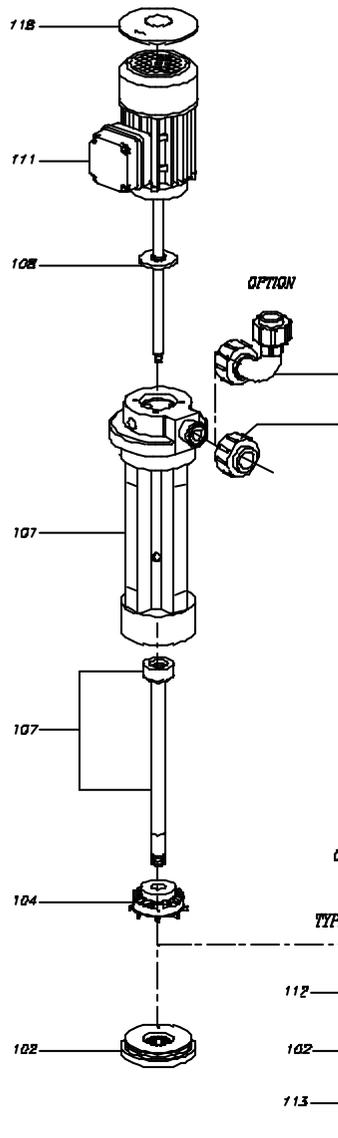


### single phase



## 2. Exploded view

**D 9\* PP** (previous #D101..D105)

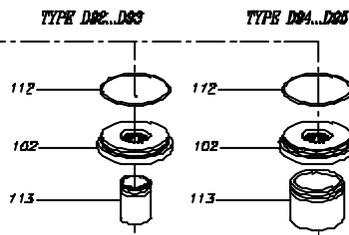


## 3. Partslist

- 101 Volute
- 102 Volute cover + strainer
- 104 Impeller
- 106 Union complete
- 107 Shaft protection pipe
- 108 Splash guard
- 111 Electric motor
- 112 O-ring \*)
- 113 Suction extension pipe \*)
- 118 Motor drip cover

\*) Option

OPTION: WITH SUCTION EXTENSION PIPE



When ordering parts always quote pump type and serial number

## 12. EEC-Declaration

### EEC-DECLARATION OF CONFORMITY FOR MACHINERY

(Directive 89/392/EEC, Annex II, sub A)

Manufacturer: **hendor pompen b.v.**

Address: P.O Box 9, 5530 AA Bladel ( NL)  
Leemskuilen 15, 5531 NK Bladel (NL)  
(www.hendor.com Email: info@hendor.com)

Herewith declares that the product ;

- is in conformity with the provisions of the MachineryDirective, as amended, and with national implementing legislation; (Directive 98/37/EEC)
- is in conformity with the provisions of the following other EEC directives :
  - Low Voltage Directive (Directive 73/23/EEC)

Confirmed at Bladel,



Signature

Technical director **H.F.G. Bohncke.**

**10. Disassembly and Reassembly of submersible pumps # D 201 / D241 (2/2)**


The motor (and motor parts ) and pump body must be reassembled in the same configuration. Do line up the marks before reassembly (see page before).

CAUTION

**Motor**

- Refit the support ring on the rotor and mount the new bearings.
- Place the pumpshaft into the front motorcover and fasten the 3 bolts of the supporting plate with an Allen key.
- Put new sealing gasket on the motorflange ensuring all traces of old gaskets are removed.
- Refit the back motorcover to the stator (Gasket!) Replace the whole on a flat surface with a clearance hole to accept the fan stub shaft.
- Carefully refit (screwdriver) the waved washer in the rear bearing cavity.
- Mount the front motor cover with pumpshaft on to the stator (pay attention to the marks placed for proper reassembly), ensuring the rear bearing fits squarely into the rear bearing housing.
- Check the easy rotation of the shaft and that the end play is < 0.03 mm
- Refit the rubber seal with the sealing lip to the motorflange with fresh application of a small amount of grease.

**Pumpbody**

- Refit the pumpimpeller into the pumpbody and fasten the protection plate.
- Place the motor vertically with cooling fan shaft stub in the vice.
- Refit the pumpbody on to the motor and shaft. Rotate the pump body so the pump discharge tube is opposite the junction box.
- Fasten the pumpimpeller to the pumpshaft (internal thread) Pay attention there is sufficient clearance between the rear impeller side (4 mm, to check with a 4 mm Allen key) and the volute as well as the front impeller blades and the suction cover (1.5 mm). Check for free rotation of the impeller.
- Mount the suction cover and the strainer
- Remove the motor and pump from the vice and turn it back over
- Fasten the 8 bolts and washers in diagonal pairs until all are secured (but not overtightened).
- Smear a small amount of grease on the rubber seal before replacing it on the shaft with the lip seal to the back motor cover.
- Refit the cooling fan (and if equipped, secure it with the cotterpin). Finally refit motor fan cover.
- Before proceeding recheck the free rotation by briefly switching on the motor

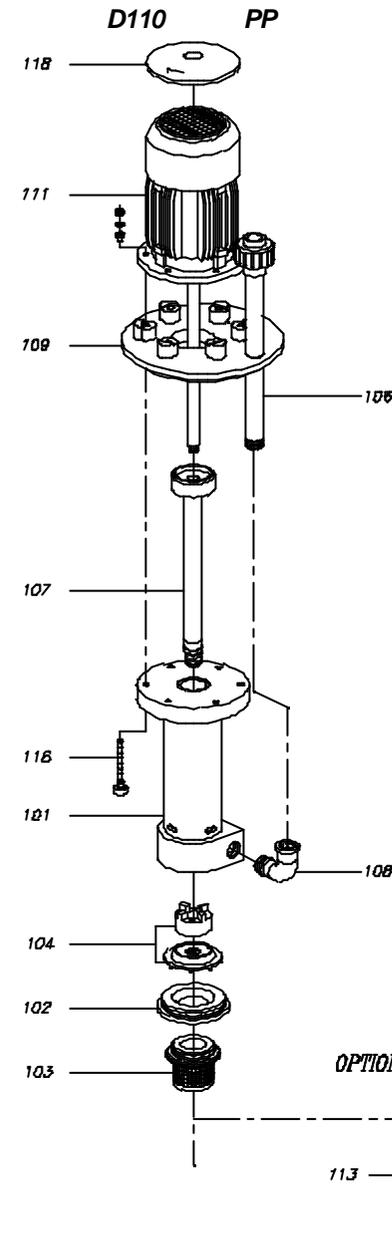
**(Extra) Mounting vapour lock device:**

- Put the pumphousing upright on a workbench,
- Put the flat PP ring on top of the pumphousing, and the vapour lock ring on top of it, upside down,
- Put the V-ring on the shaft side of the impeller, mind position (flap of V-ring is mounted towards motor side).



**CHECK THE CORRECT DIRECTION OF PUMP ROTATION BEFORE REMOUNTING THE PUMP IN THE PROCESS SOLUTION (SEE PROCEDURE 7, INSTALLATION !!!)**

CAUTION

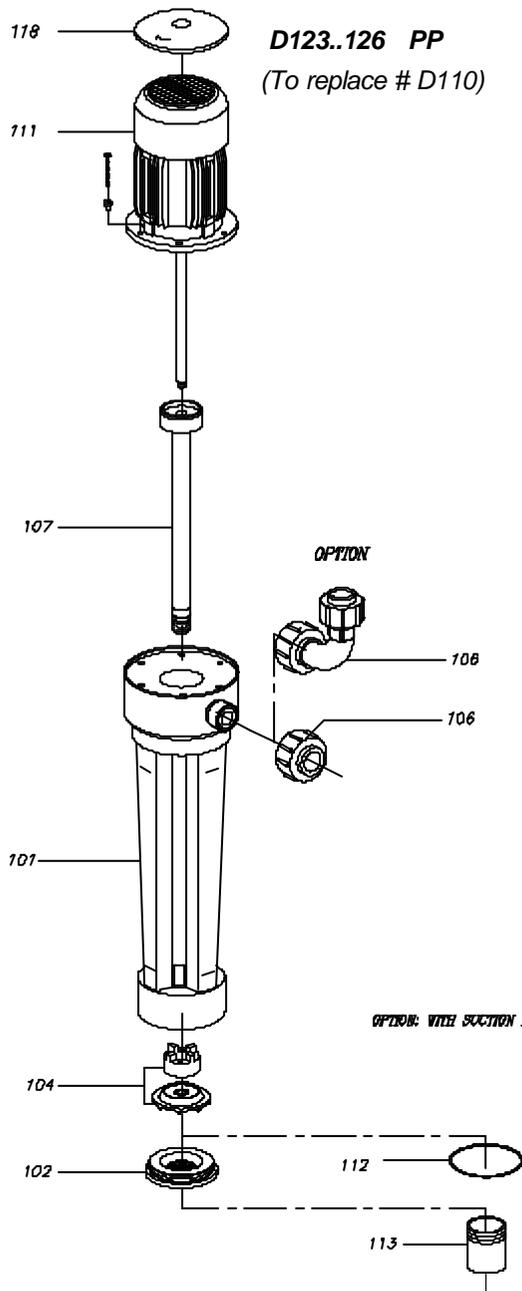
**2. Exploded view**

**3. Partslist**

- 101 Volute
- 102 Volute cover
- 103 Strainer
- 104 Impeller
- 106 Discharge complete
- 107 Protection pipe
- 108 Discharge elbow
- 109 Mounting plate
- 111 Electric motor
- 113 Suction extension pipe \*)
- 116 Encapsulated bolt complete
- 117 Isolation plug
- 118 Motor drip cover

\*) = option

When ordering parts always quote pump type and serial number

## 2. Exploded view



## 3. Partslist

- 101 Volute
- 102 Volute cover + strainer
- 104 Impeller
- 106 Union complete
- 107 Shaft protection pipe
- 111 Electric motor
- 112 O-ring \*)
- 113 Suction extension pipe \*)
- 118 Motor drip cover

\*) Option

## 10. Disassembly and Reassembly of submersible pumps # D 201/D241

(1/2)

**Motor fan cover**

- Remove four retaining screws and lift off the fan cover.

**Cooling fan**

- Remove the locking pin (if any).
- Ease the fan blade off carefully (using two screwdrivers).

**Impeller**

- Secure the pump mounting plate in a vice to hold the pump in a horizontal position presenting the end of the volute for easy access.
- Unscrew the volute cover with the radius key (clockwise).  
Secure pump vertically with cooling fan shaft stub in vice, taking precautions not to damage the shaft
- Unscrew impeller with impeller key (counter-clockwise) Then unscrew the protective plate from the impeller and protection tube and remove the impeller.

**Removing the pump body**

- Remove the 8 nuts and washers (parts 16) securing the motor to the pump mountingplate.
- Carefully lift off the pumpbody.



The motor and pump body must be reassembled in the same configuration. Therefore before further disassembly mark the motor parts accordingly to ensure they are reassembled in exactly the same position.

**CAUTION****Replacing the motor bearings** (Caution, see here above)

- Mount the motor vertically, fan cover and fan removed, in a vice securing the motor by the cooling fan stub shaft. Take precautions not to damage the shaft.
- Unscrew and remove the 4 bolts with an Allen key.
- Remove motor from the vice, position it on a bench and carefully tap the motor mountingflange with a plastic headed hammer to break the paint seals.
- Ease the shaft and the motor mounting flange together out of the stator carefully by tapping with a plastic headed hammer on the motorshaft (fanside).
- Remove the rubber seal (side motor mounting flange) from the shaft with care.
- Use a press or a lathe to ease the shaft complete with bearing out of the motor mounting flange (evenly).
- To remove the front bearing from the motorflange unscrew the 3 bolts with an Allen key. Then remove the support ring and use a bearing puller to remove the front bearing.
- Unscrew the 4 bolts from the back motor cover (marks!) and remove it from the stator. Take out the waved washer from the bearing housing.
- If necessary detach the back bearing from the shaft with a bearing puller.
- Clean stator, rotor and bearing houses thoroughly.
- Check bearing housings for wear.



- While (dis-) assembling be careful not to damage the stator winding
- Before reassembly check that all parts are clean and free of corrosion or rust deposits

**CAUTION**

## 10. Disassembly and Reassembly of submersible pumps # D 170

(2/2)



CAUTION

The motor (and motor parts ) and pump body must be reassembled in the same configuration. Do line up the marks before reassembly (see page before.)

**Motor**

- Refit the support ring on the rotor and mount the new bearings
- Place the pumpshaft into the front motorcover and fasten the 3 bolts of the supporting plate with an Allen key
- Put new sealing gasket on the motorflange ensuring all traces of old gaskets are removed
- Refit the back motorcover to the stator (Gasket!) Replace the whole on a flat surface with a clearance hole to accept the fan stub shaft
- Carefully refit (screwdriver) the waved washer in the rear bearing cavity
- Mount the front motor cover with pumpshaft on to the stator (pay attention to the marks placed for proper reassembly), ensuring the rear bearing fits squarely into the rear bearing housing
- Check the easy rotation of the shaft and that the end play is < 0.03 mm
- Refit the rubber seal with the sealing lip to the motorflange with fresh application of a small amount of grease.

**Pumpbody**

- Refit the pumpimpeller into the pumpbody and fasten the protection plate
- Place the motor vertically with cooling fan shaft stub in the vice
- Refit the pumpbody on to the motor and shaft. Rotate the pump body so the pump discharge tube is opposite the junction box.
- Fasten the pumpimpeller to the pumpshaft (internal thread) Pay attention there is sufficient clearance between the rear impeller side (4 mm, to check with a 4 mm Allen key) and the volute as well as the front impeller blades and the suction cover (1.5mm) Check for free rotation of the impeller
- Mount the suction cover and the strainer
- Remove the motor and pump from the vice and turn it back over
- Fasten the 6 bolts and washers in diagonal pairs until all are secured (but not overtightened)
- Smear a small amount of grease on the rubber seal before replacing it on the shaft with the lip seal to the back motor cover
- Refit the cooling fan (and if equipped, secure it with the cotterpin).  
Finally refit motor fan cover.
- Before proceeding recheck the free rotation by briefly switching on the mc

**(Extra) Mounting vapour lock device:**

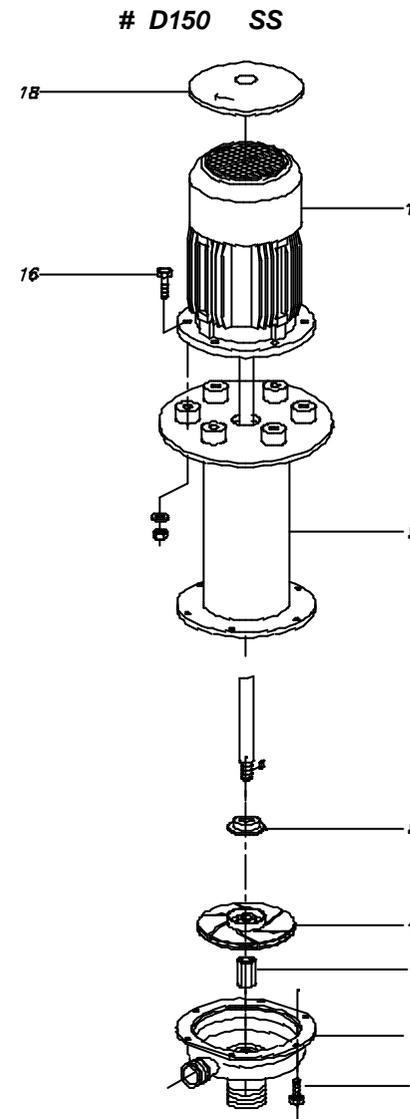
- Put the pumphousing upright on a workbench,
- Put the flat PP ring on top of the pumphousing, and the vapour lock ring on top of it, upside down,
- Put the V-ring on the shaft side of the impeller, mind position (flap of V-ring is mounted towards motor side).



CAUTION

**CHECK THE CORRECT DIRECTION OF PUMP ROTATION BEFORE REMOUNTING THE PUMP IN THE PROCESS SOLUTION (SEE PROCEDURE 7, INSTALLATION !!!)**

## 2. Exploded view

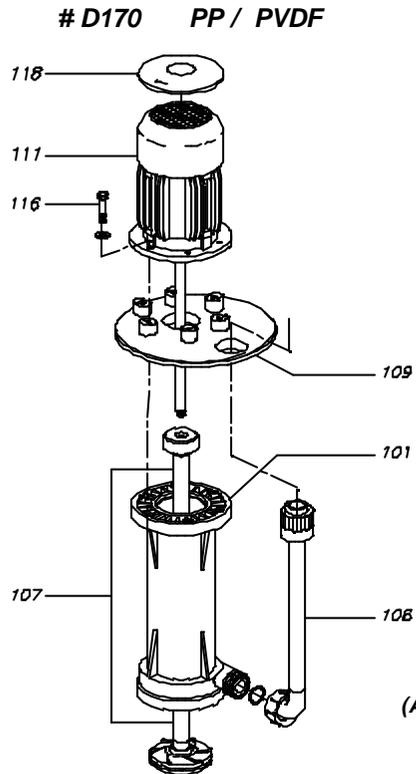


## 3. Partslist

- 1 Volute
- 3 Bolt
- 4 Impeller
- 5 Retaining nut
- 8 Damping ring
- 9 Mounting flange + bracket
- 11 Electric motor
- 16 Bolt(complete)
- 18 Motor drip cover

*When ordering parts always quote pump type and serial number*

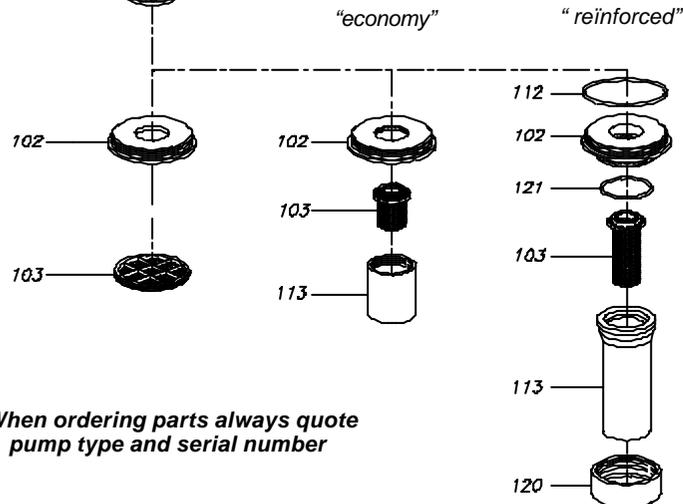
## 2. Exploded view



## 3. Partslist

- 101 Volute
- 102 Volute cover
- 103 Strainer
- 106 Discharge pipe complete
- 107 Impeller complete
- 109 Mounting plate
- 111 Electric motor
- 112 O-ring
- 113 Suction extension pipe
- 116 Bolt (complete)
- 118 Motor drip cover
- 120 PP-ring

(Always use strap wrench to attach suction extension pipe)



When ordering parts always quote pump type and serial number

## 10. Disassembly and Reassembly of submersible pumps # D 170

(1/2)

**Motor fan cover**

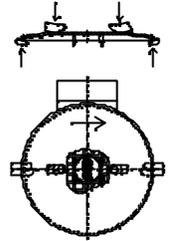
- First lift off the motor drip cover, if any (see image)
- Remove four retaining screws or simply unclick and lift off the fan cover

**Cooling fan**

- Remove the locking pin (if any)
- Ease the fan blade off carefully (using two screwdrivers)
- Remove the rubber seal (without damaging it)

**Impeller**

- Secure the pump mounting plate in a vice to hold the pump in a horizontal position presenting the end of the volute for easy access
  - Unscrew the volute cover with the radius key (clockwise)
  - Secure pump vertically with cooling fan shaft stub in vice, taking precautions not to damage the shaft
  - Unscrew impeller with impeller key (counter-clockwise)
- Then unscrew the protective plate from the impeller and protection tube and remove the impeller

**Removing the pump body**

- Remove the six nuts and washers securing the motor to the pump mounting plate.
- Carefully lift off the pump body

**CAUTION**

The motor and pump body must be reassembled in the same configuration. Therefore before further disassembly mark the motor parts accordingly to ensure they are reassembled in exactly the same position.

**Replacing the motor bearings** (Caution, see here above)

- Mount the motor vertically, fan cover and fan removed, in a vice securing the motor by the cooling fan stub shaft. Take precautions not to damage the shaft.
- Unscrew and remove the 4 bolts with an Allen key
- Remove motor from the vice, position it on a bench and carefully tap the motor mounting flange with a plastic headed hammer to break the paint seals.
- Ease the shaft and the motor mounting flange together out of the stator carefully by tapping with a plastic headed hammer on the motor shaft (fanside)
- Remove the rubber seal (side motor mounting flange) from the shaft with care
- Use a press or a lathe to ease the shaft complete with bearing out of the motor mounting flange (evenly)
- To remove the front bearing from the motor flange unscrew the 3 bolts with an Allen key Then remove the support ring and use a bearing puller to remove the front bearing
- Unscrew the 4 bolts from the back motor cover (marks!) and remove it from the stator. Take out the waved washer from the bearing housing
- If necessary detach the back bearing from the shaft with a bearing puller
- Clean stator, rotor and bearing houses thoroughly
- Check bearing housings for wear

**CAUTION**

- While (dis-) assembling be careful not to damage the stator winding
- Before reassembly check that all parts are clean and free of corrosion or rust deposits

**10 Disassembly and Reassembly of submersible pumps # D 150**

(1/1)

**WARNING**

Before any work is carried out on this pump and associated equipment all means of electrical supply must be disconnected.  
Clean the pump thoroughly and if possible place it on a clean workbench before dismantling.

**Disassembly****Motor fan cover**

- Simply unclick to remove motor drip cover (see image).
- Remove four retaining screws or simply unclick and lift off the fan cover.

**Cooling fan**

- Remove the locking pin (if any).
- Ease the fan blade off carefully (using two screwdrivers).
- Remove the rubber seal (without damaging it).

**Impeller**

- Secure the pump mounting plate in a vice to hold the pump in a horizontal position presenting the end of the volute for easy access.
- Remove the volute cover (pos 1.), by unscrewing the 6 x M6 bolts.
- Unscrew the retaining nut holding the impeller.
- Lift off the impeller using two screwdrivers.

**Disassembly of the motor to replace motor bearings**

The motor and pump body must be reassembled in the same configuration. Therefore before further disassembly mark the motor parts accordingly to ensure they are reassembled in exactly the same position.

- Unscrew the six M6 bolts from the motorflange, thus the motor can be lifted from the pumpbody.
- Dismount the motorflange (front-side), by using an Allen key.
- Remove the rotor together with the motorflange.
- Remove the front bearing locking.
- Press the rotor out of the motor flange.
- Use a bearing puller to remove the bearings from the motorshaft.
- Clean stator, rotor and bearing housings thoroughly (Preferably with compressed air).
- Check bearings and bearing housings for wear.

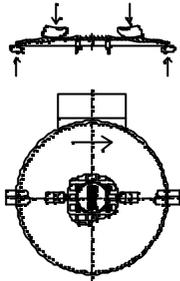
While (dis-) assembling be careful not to damage the stator winding. Before reassembly check that all parts are clean and free of corrosion or rust deposits.

**Reassembly**

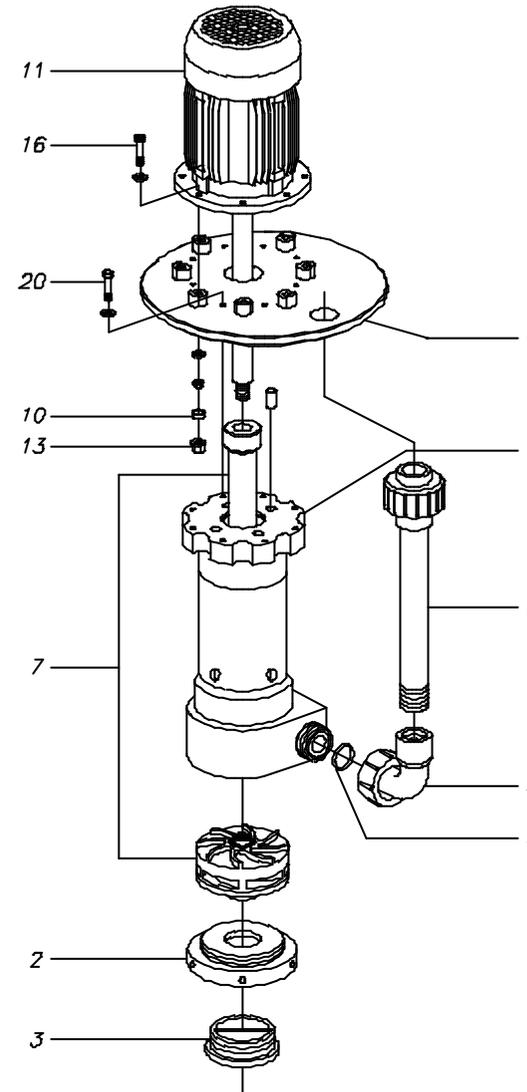
The motor (and motor parts) and the pumpbody must be reassembled in the same configuration.

- Replace the rotor into the motorflange (do not forget the bearing locking).
- Mount the motorflange on to the motor.
- Before further reassembly check the easy rotation of the shaft and be sure that the end play is < 0.03 mm.
- Mount the motor assembly (pos.11) on to the pumpbody.
- Refit the impeller.
- Mount the impeller retaining nut.
- Remount the volute on to the pumpbody.
- Check the concentricity of the pumpshaft within the pump volute.
- Smear a small amount of grease on the rubber seal before replacing it on the shaft with the lip seal to the back end of the motor.
- Refit the cooling fan (do not forget the locking pin, if available) and the fan cover.

**CHECK THE CORRECT DIRECTION OF PUMP ROTATION BEFORE REMOUNTING THE PUMP IN THE PROCESS SOLUTION (SEE PROCEDURE 7, INSTALLATION)**

**2. Exploded view**

# D201 /D241 PP

**3. Partslist**

- 1 Volute cover
- 2 Volute cover
- 3 Vortex breaker
- 5 O-ring
- 6 Discharge complete
- 7 Impeller complete
- 8 Discharge elbow
- 9 Mounting plate
- 10 Insulation plug
- 11 Electric motor
- 13 Encapsulated nut
- 16 Bolt (complete)
- 18 Motor drip cover
- 20 Bolt (complete)

*When ordering parts always quote pump type and serial number*

#### 4. Introduction

Thank you for choosing a Hendor product. Before you start to use it Hendor strongly recommends you read this owner's manual carefully and follow the instructions as closely as possible, so your product will function properly for years to come.

This owner's manual contains all obligatory safety- instructions and it should be furnished to the end-user of this product. This owner's manual should be present at site, so operator or maintenance crew can use this manual

#### 5. Safety instructions

##### NOTICE

The following symbols are safety alert symbols. When you see the symbol(s) on the product or in the manual, be alert to the potential for personal injury



DANGER

This label warns that failure to observe the precautions involve a **risk of electric shock**



DANGER

This label warns about hazards that **will** cause **serious personal injury**, death or major property damage if ignored. Remind the product contains chemical liquids;



CAUTION

This label warns about hazards that **can** cause **serious personal injury**, death or major property damage if ignored



WARNING

This label warns about hazards that **will** or **can** cause **minor** personal injury or property damage if ignored.

The label **NOTICE** indicates special instructions which are important but not related to hazards

**Carefully read and follow all safety instructions in this manual and on the pump.**

Keep safety labels in good condition. Replace missing or damaged safety labels

#### 6. receipt

At receipt of the product, the identity of the product (by checking the nameplate data), the completeness of delivery as well as the absence of visible damage should be ascertained. Any problems arising from these checks, should be stated in writing and preferably signed by the forwarding agent for evidence.

#### 10. Disassembly and reassembly of submersible pumps # D 123..D126 (1/1)

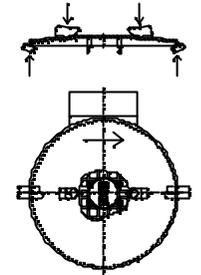
##### Disassembly

##### Removing fan cover and cooling fan.

- Lift off motor drip cover
- Unclick and lift fan cover
- Ease cooling fan off by using 2 screwdrivers
- Remove rubber seal and retaining bushing

##### Impeller

- Secure pump in a vice in horizontal position
- Unscrew volute cover by turning clockwise (using radius key)
- Lock rear end of motor shaft and remove impeller by turning anti-clockwise (using impeller key)



(fig 1)

##### Pump body

- Remove the six torx screws and remove pumpbody carefully

##### Reassembly

##### Pump body

- Secure motor in vertical position rear stub shaft in a vice
- Refit shaft protection pipe (clockwise) only by hand
- Refit pump body onto motor (pay attention to position of junction box); turn the assembly upside down
- Mounting the six torx screws (replacing plastic bushings is preferable) and tighten them firmly
- Check concentricity of motor shaft within volute
- Check also for free rotation

##### Impeller

- With motor fan stub secured in a vice mount the impeller by turning clockwise (using impeller key)
- Refit volute cover by turning anti clockwise (using radius key), refit also strainer if applicable
- Smear a small amount of grease on rubber seal, mount retaining bushing and rubber seal
- Refit cooling fan by tapping with plastic headed hammer

## 10. Disassembly and Reassembly of submersible pumps # D 110 (2/2)

### Reassembly

#### Motor

- Press the new bearing onto the motor shaft at the fan end of the shaft.
- Refit the new bearing into the motor flange and secure it with a circlip.
- Press the motorshaft into the motorflange.
- Put new sealing gasket on the motorflange ensuring all traces of old gaskets are removed.
- Refit the back motorcover to the stator. Place the whole on a flat surface with a clearance hole to accept the fan stub shaft.
- Carefully replace the waved washer in the rear bearing cavity.
- Mount the front motor cover with pumpshaft on to the stator (pay attention to the marks placed for proper reassembly), ensuring the rear bearing fits squarely into the rear bearing housing.
- Check the easy rotation of the shaft and that the end play is < 0.03 mm.
- Refit the rubber seal with the sealing lip to the motoflange with fresh application of a small amount of grease.

#### Pumpbody



- Secure the motor vertically with the cooling fan stub shaft in a vice, taking precautions not to damage the shaft.
- Refit the shaft protection tube screwing on by hand (clockwise) Do not use pliers or grips which may distort the tube.

#### CAUTION

- Refit the pumpbody on to the motor and shaft. Rotate the pump body so the pump discharge tube is opposite the junction box.
- Locate the studs into motor flange holes and refit washers and nuts fingertight.
- Check the concentricity of the pump shaft within the pump volute.
- Tighten down the securing nuts in diagonal pairs until all are secured; but not overtightened)
- Recheck the shaft alignment in the volute.

#### Impeller

- With the motor fan stub shaft still secured in the vice screw the impeller onto the shaft by hand (clockwise) Be sure to put the impeller on the correct way round with the impeller blades facing the pump volute inlet
- Make sure the impeller is screwed correctly into position as there should be a distance of 13 mm from the top of the volute (no volute cover) to the top of the impeller blades.
- Refit volute end covers screwing on by hand (anti clockwise), finally tightening with a radius key, refit strainer assembly.
- Remove the pump/motor assembly from the vice and rest on a bench for refitting the motor fan and fan cover.
- Smear a small amount of grease on the rubber seal before replacing it on the shaft with the lip seal to the back motor cover.
- Refit the cooling fan (if necessary secure it with the cotterpin).
- Finally refit motor fan cover.
- Before proceeding recheck the easy rotation by briefly switching on the motor.



CAUTION

**CHECK THE CORRECT DIRECTION OF PUMP ROTATION BEFORE REMOUNTING THE PUMP IN THE PROCESS SOLUTION (SEE PROCEDURE 7 , INSTALLATION)**

## 7. Installation of submersible pumps



DANGER



DANGER



CAUTION



WARNING

### Electrical

1. The pump may only be connected by a qualified electrician, in conformity with the requirements of your local electricity supply company.
2. Ground motor before connecting to electrical power supply; failure to ground motor can cause severe or fatal electrical shock hazard. Do not ground to a gas supply line.
3. Check that the mains voltage corresponds to the voltage stated on the motor plate Incorrect voltage can cause fire or seriously damage motor and voids warranty. If any doubt, consult licensed electrician.(See electrical diagrams on last page )
4. Avoid unexpected or accidentally starting of the motor by disconnect and lock out powersupply
5. The pump contains parts, which are under electric tension; in case of repair or maintenance disconnect and lock out power supply.
6. Do not point a jet of water at the motor of the pump to avoid personal injury as a result of dangerous voltage
7. Check the dimension of the used electrical wiring in accordance to the power of the motor
8. Check the fuses of the power supply.
9. It is recommended that you fit the pump with a thermally safe-guarded switch, which is to be adjusted in accordance with the value stated on the motor plate.
10. **To avoid damage to the cord line:**
  - do not hoist the pump on the cord line
  - be sure the cord line is not jammed
  - do not guide the cord line along sharp edges

### Plumbing (by hose or by piping)

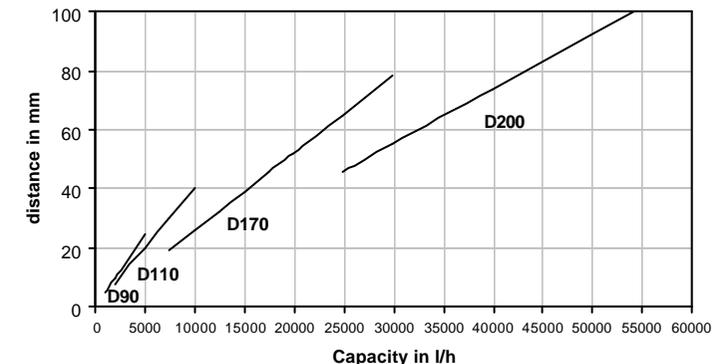
The connection to the discharge side of the pump should be provided with reliable, persistent (also for pressure) material; for hoses take care of the use of correct hoseclamps. Use the correct O-rings for connections. Check the tightness of the connections before starting up; hoses and piping should be clean inside before starting up.

Thermoplastic pumps will not tolerate plumbing stress; to prevent distortion of the pumpbody and damage to the pump, be sure your plumbing is properly aligned and supported.

**Motor shaft rotation** is clockwise (CW) viewed from top of the motor (**the correct direction of rotation is also marked on the motor (see arrow on junction box). Testing the rotation of the shaft has to be done outside the liquid; (running the pump backwards may loosen the impeller and damage the pump.)**

Briefly switch on the power to verify the rotation direction BEFORE installing the pump in the liquid. The pump may be seriously damaged if the direction of rotation is verified with the pump already installed in the liquid.

minimum bottom distance submersible pumps



### While installing the pump:

- In order to secure correct pump suction conditions it is absolutely necessary to respect a minimum distance between pump inlet and tank bottom. This curve shows the min distance in relation to the pump flow for the different pump types.

## 7. Installation of submersible pumps (2)

### While installing the pump:

#### IN-TANK-MODEL

- be sure to leave enough space for easy access and/or maintenance
- do not place the pump close to any heater or heating coils
- do not install the pump where solution can be spilled on the motor
- To ensure proper stress-free assembly of the pipework, the pump should be attached to a sturdy base.
- check the minimal and maximum liquid level of the tank, as marked on the pumpbody
- While installing submersible pumps in smaller tanks there is a risk of temperature rising generated by the pump itself
- do not install the pump directly over air agitation pipes as this may cause break down of pump-function .
- eliminate any stress on the pump discharge pipe (Preferably use a flexible hose coupling between the pump outlet and the rigid piping)
- Be sure there's no air remaining in the pump, as this will distort the pump/pumpfunction

#### OUT OF-TANK-MODEL (OT)

Since the pump has been designed as submerged pump, special attention should be given to the following points:

##### - Positioning of the pump

- Overflow should be installed horizontally back to the tank
- Place the pump as close as possible to the tank
- Check maximum liquid level in the tank in relation to the position of the pump
- Pay attention to minimum liquid level to prevent vortex (intake of air into the pump)

Be aware when stopping the pump, liquid level in pump remains the same as tank level.  
Pay attention when opening for example filter chambers in line (also liquid level will be the same).

##### - Connection of pipework

- Dimension (inner diameter) of suction pipe should be calculated to prevent cavitation
- Hendor could advise right dimensioning based on situation at site (please ask for it)
- Suction pipe should be as short as possible and installed with a minimum number of fittings/valves
- When using bends minimum bend radius required is 2 times inner diameter
- When possible use butt-welded pipe connections

Special attention when installing pipework back to the tank (instead of tank connection directly)

- Depending on situation at site Hendor recommends a minimal dimensioning of pipe
- For priming purposes , put a vent on top of pipework

Avoid situations of closed discharge pipe continuously because overflow will be a fair amount of displaced liquid by the pump. Overflow has to take the liquid back to the tank by natural flow.

## 10. Disassembly and Reassembly of submersible pumps # D 110 (1/2)

### Disassembly

#### Motor fan cover

- First lift off Motor drip cover (see image),
- Remove four retaining screws or simply unclick and lift off the fan cover.

#### Cooling fan

- Remove the locking pin (if any).
- Ease the fan blade off carefully (using two screwdrivers).
- Remove the rubber seal (without damaging it).

#### Impeller

- Secure the pump mounting plate in a vice to hold the pump in a horizontal position presenting the end of the volute for easy access.
- Unscrew the volute cover with the radius key (clockwise).
- Secure pump vertically with cooling fan stub shaft in vice.
- Unscrew impeller with impeller key (anti-clockwise) whilst doing this prevent the shaft from rotating by holding a 6 mm dia. peg in an opening in the protective plate at the end of the protective pipe.

#### Removing the pump body - pump tube

- Remove the six nuts and washers (parts 14/15) securing the motor to the pump mountingplate.
- Carefully lift off the pumpbody.

#### Replacing the motor bearings

- Mount the motor vertically, fan cover and fan removed, in a vice securing the motor by the cooling fan stub shaft. Take precautions not to damage the shaft.
- Unscrew the shaft protection tube by hand (anti-clockwise).
- Unscrew and remove the socket head bolts with an Allen key.



The motor must be reassembled in the same configuration. Therefore before further disassembly mark the motor parts accordingly to ensure they are reassembled in exactly the same position.

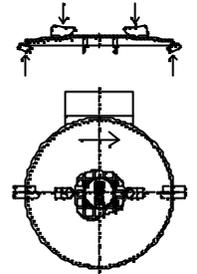
**CAUTION** - Remove motor from the vice, position it on a bench and carefully tap the motor mounting flange with a plastic headed hammer to break the paint seals.

- Ease the shaft and the motor mounting flange together out of the stator carefully by tapping with a plastic headed hammer on the motorshaft (fanside).
- Unscrew the 4 bolts from the back motor cover (marks!) and remove it from the stator. Take out the waved washer from the bearing housing.
- Remove the rubber seal (side motor mounting flange) from the shaft with care.
- Release the internal circlip from the bearing housing.
- Use a press or a lathe to ease the shaft complete with bearing out of the motor mounting flange (The bearing must be removed evenly)
- If necessary detach the back bearing from the shaft with a bearing puller
- Clean stator, rotor and bearing houses thoroughly
- Check bearing housings for wear



**CAUTION**

- While (dis) assembling be careful not to damage the stator winding
- Before reassembly check that all parts are free of corrosion or rust deposits



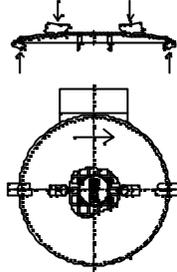
## 10. Disassembly and reassembly of submersible pumps # D 92...D95

(1/1)

### Disassembly

Remove the motor drip cover (see pict1)

- Carefully remove the cooling fan cover by tapping with a plastic headed hammer.
- Remove the cooling fan using a screwdriver.
- Remove the rubber seal (without damaging it).
- Loosen the pumphouse cover by turning it clockwise (Pos.2).
- Remove the 2 socket head bolts holding the motor (by using an Allen key), remove the stator (Make sure you do not damage the windings).
- Hold the rotor in one hand, remove the impeller (Pos 4) by turning it counter clockwise.
- Using a Philister head screwdriver, remove the 4 mounting screws.
- Remove the shaft protection pipe by turning it counter-clockwise (Pos. 7/8).
- Replace the bearings. Make sure not to damage the rotor or the pump shaft.



pict 1.



#### CAUTION

- While (dis) assembling be careful not to damage the stator winding.
- Before reassembly check that all parts are free of corrosion or rust deposits.
- Before reassembly, check the easy rotation of the shaft and be sure that the end play is  $< 0.03\text{mm}$ .

### Reassembly

- Clean stator, rotor and bearings thoroughly, check the bearing housings for wear.
- Place the motor shaft in the front motorshield.
- Attach the shaft protection pipe (Pos. 7/8) onto the shaft, be careful not to overtighten (Hand tight only).
- Place assembly on the pump housing. Fasten all 4 screws, **DO NOT OVERTIGHTEN**.
- Turn the assembly upside down to check the concentricity of the pump shaft within the pump volute.
- Hold the rotor in one hand and turn the impeller (Pos. 4) clockwise until firmly attached. (By hand only, pliers or grips may distort the protection pipe).
- Reattach the stator by fastening the two socket head bolts with an Allen key.
- Smear a small amount of grease on the rubber seal before replacing it on the shaft with the lip seal to the back end of the motor.
- Refit the cooling fan and the fan cover with the help of a plastic headed hammer.



#### CAUTION

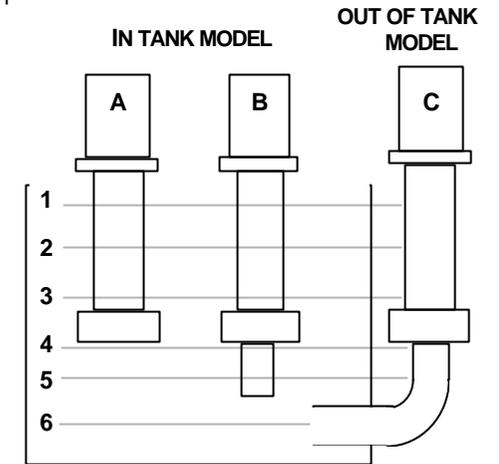
**CHECK THE CORRECT DIRECTION OF PUMP ROTATION BEFORE REMOUNTING THE PUMP IN THE PROCESS SOLUTION ( SEE PROCEDURE 7, INSTALLATION ) !!!!!**

## 7. Installation of submersible pumps (3)

Check the liquid level in the tank before starting up.

### LIQUID-LEVEL

- 1 Maximum liquidlevel for A , B and C
- 2 Normal working level for A , B and C
- 3 Minimal starting level for A, B and C
- 4 Pump A will stop (sucks air); if liquidlevel will raise to 3, A will automatically restart B and C continue working
- 5 A cannot work at this liquidlevel B and C will continue to work, provided it is not switched off intermittently (will then suck air and stop pumping)
- 7 B and C will now stop pumping (suck air)



### 8. Operation



#### CAUTION

Check in the first place if the recommendations, noted in the installation instructions are followed. Check the connections for tightness (hose or piping) before starting up. Any failure on mechanical or electrical components may cause personal injury.

Hendor **submersible pumps** are designed to allow dry running, however, do not run the pump partially dry because of shockloads and unbalance of the impeller. Check if the strainer is free from any restrictions. These can reduce the performance of the pump.

In case your pump is equipped with an overload switch which is tripped:

- In case the pump stops because of overload, do not start the pump right away, but check if there is any technical problem with the pump or motor; first identify the cause of the failure before restarting;
- in case the failure cannot be identified, contact the manufacturer

### Maintenance

To avoid dangerous or fatal electrical shock hazard, and to avoid injury from motor unexpectedly starting, disconnect and lock out power supply to motor before working on the pump. To assure a good performance, always use genuine (spare) parts.

After repair or maintenance always pay attention to the safety requirements.

### Check direction of rotation before restarting

Check hose piping for tightness, damage or rupture.

Check all electrical connections and wiring for damage or rupture.

Check if the overload switch is set to the right value.

**Inspection** (During normal operation, the pump should be checked periodically.)

1. Check the flow. (Check the front strainer regularly)
2. Check the piping (also for air pockets), tubes and tube clamps.
3. Periodically check the amperage, if the pump cannot be equipped with a thermally safeguarded switch.

## 9. Troubleshooting

- 1. Pump discharge rate is low or none at all**
  - Too much resistance in the pipework system
  - Filter, pump impeller inlet or strainer is blocked (Foreign particles)
  - Pump volute not immersed sufficiently in the liquid
  - Valve in the pipework system may be closed
  - Motor failure (Thermal cut due to electrical overload)
  - Impeller is worn due to abrasive particles or dirt within the solution being pumped
  - Pump discharge pipe broken or has come away from the volute
  - Liquid has crystallised within the pump volute
- 2. Noisy pump operation or excessive vibration**
  - Motor bearings are worn out
  - Impeller damaged and out of balance
  - Pump discharge pipe under tension (incorrect plumbing and/or support)
  - Foreign matter trapped within the pump volute
  - Corrosion of motor fan spindle (liquid spillage)
  - Cooling fan blocked
- 3. Motor is overheating**
  - Cooling fan blocked (fan broken/loose)
  - Specific gravity of the liquid is too high
  - Rotating parts obstructed
- 4. Motor cuts out** (thermal trip operates)
  - Motor down on a phase
  - Motor bearings seizing and overloading the motor (Bearings jammed)
  - Incorrect voltage applied to the pump motor
  - Pump rotating parts have jammed (fan/impeller)
  - Pump overload incorrectly set - check setting

## 10. Disassembly of submersible pumps (All types)



**WARNING**

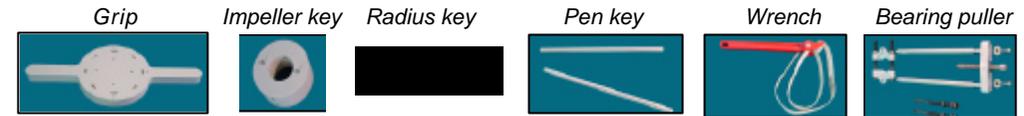
Before any work is carried out on the pump and associated equipment all means of electrical supply must be disconnected. Clean the pump thoroughly and if possible place it on a clean workbench before dismantling.

### General description for replacing bearings on the motor

- Dismantle front- and rear motor shield
- take off front bearing by using a special bearing puller on extended shaftside (available in toolkit)
- While replacing the bearings take care not to damage the new bearings
- refit front and rear motor shield
- check free rotation by turning the shaft by hand.

## 10. Disassembly and reassembly of submersible pumps (all types)

**Tools:** For efficient maintenance of Hendor vertical pumps some special tools are available. Specify relative article number when ordering these tools.



For disassembly of:	Use:	Pump type	Article nr *)
<b>1. Suction extension pipe (if applicable)</b>	Wrench	All types	9999-000-000-037
<b>2. Strainer (if applicable)</b>	Flat strainer	D17*	9011-000-001-499
	High strainer	All types	9062-600-999-002
<b>3. Pump house cover</b>	Grip	D9*/D110/D12*	9011-000-001-551
	Grip	D17*	9011-000-001-499
	Pen key	D2**	9999-000-000-036
<b>4. Impellor</b>	Grip	D9*/D110/D12*	9011-000-001-551
	Grip	D17*	9011-000-001-499
	+ Impellor key		9011-891-001-080
	Pen key	D2*	9999-000-000-036
<b>5. Motor bearings</b>	+ Impellor key		9011-891-001-080
	Complete bearing puller set	All types	9999-000-000-031
	Bearing puller	D9* only	9999-000-000-023
	Bearing puller	D110 only	9999-000-000-024
	Bearing puller	D12*/D170/D2* only	9999-000-000-025
<b>6. PU Paint</b>	20 CC can (Hendor brown)	All motors	9999-000-000-041

\*) Comparing article numbers show, that some tools have multiple functions

Type	kW	Motor size	Bearing	
			front	rear
<b>D9*</b>	0,12/0,18/0,25/0,37	63	2RS 6202	2RS 6201
<b>D110</b>	0,18/0,25	63	2RS 6203	2RS 6201
	0,37/0,55	71	2RS 6204	2RS 6202
<b>D12*</b>	0,18/0,25/0,37/0,55	71	2RS 6304	2RS 6203
<b>D17*</b>	0,37/0,55	71	2RS 6204	2RS 6202
	0,75/1,11	80	2RS 6205	2RS 6204
	1,50/2,20	90	2RS 6206	2RS 6204
	3,00	100L	2RS 6206	2RS 6206
<b>D2**</b>	4,00	112M	2RS 6307	2RS 6206
	5,00/7,50	132S	2RS 6308	2RS 6206