

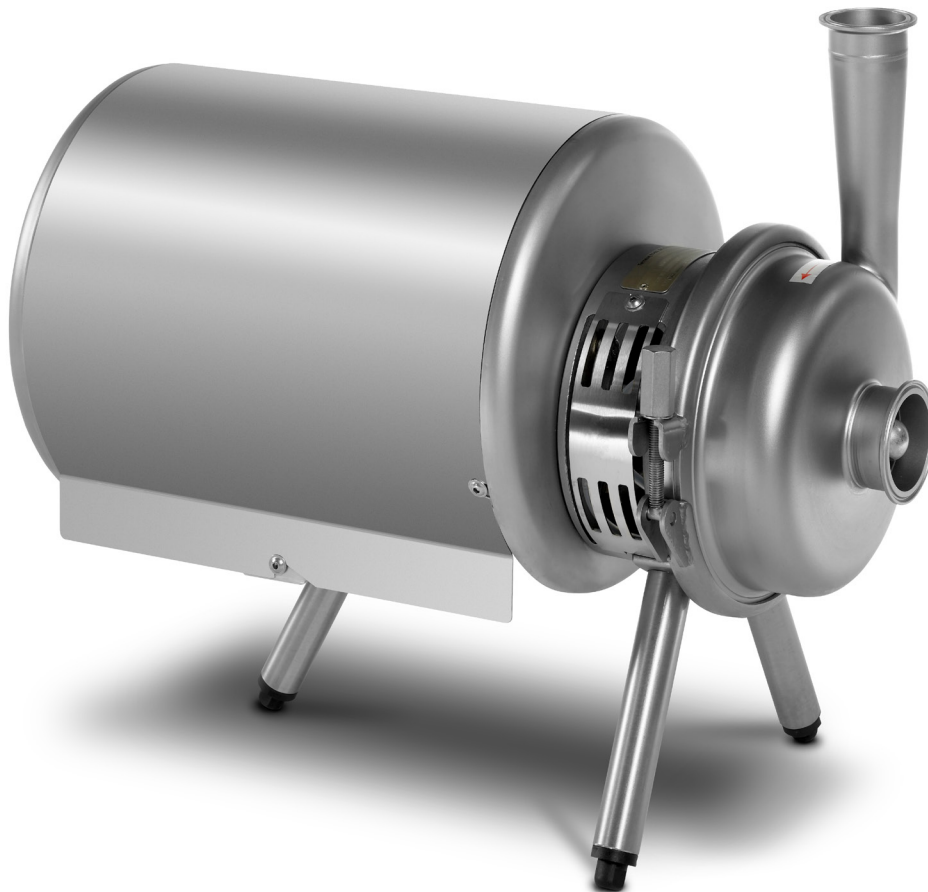
# W+

## CENTRIFUGAL PUMP

FORM NO.: L453147GB

REVISION: 06/2013

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.



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For spare parts, see separate spare parts list.

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## 1. General description

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This operating manual should be read carefully by the competent operating and maintenance personnel.

It must be pointed out that we will not accept any liability for damage or faults resulting from failing to comply with this operating manual.

Descriptions and data given herein are subject to technical changes.

### 1.1 Intended use

The W+ centrifugal pump is exclusively intended for pumping liquids, especially in food and beverage installations.

Refrain from using the pump in a manner which exceeds the scope and specifications stated below.

Any use exceeding the margins and specifications set forth is considered to be not intended.

The manufacturer is not liable for any damage resulting from such activities.

The user will bear the full risk.



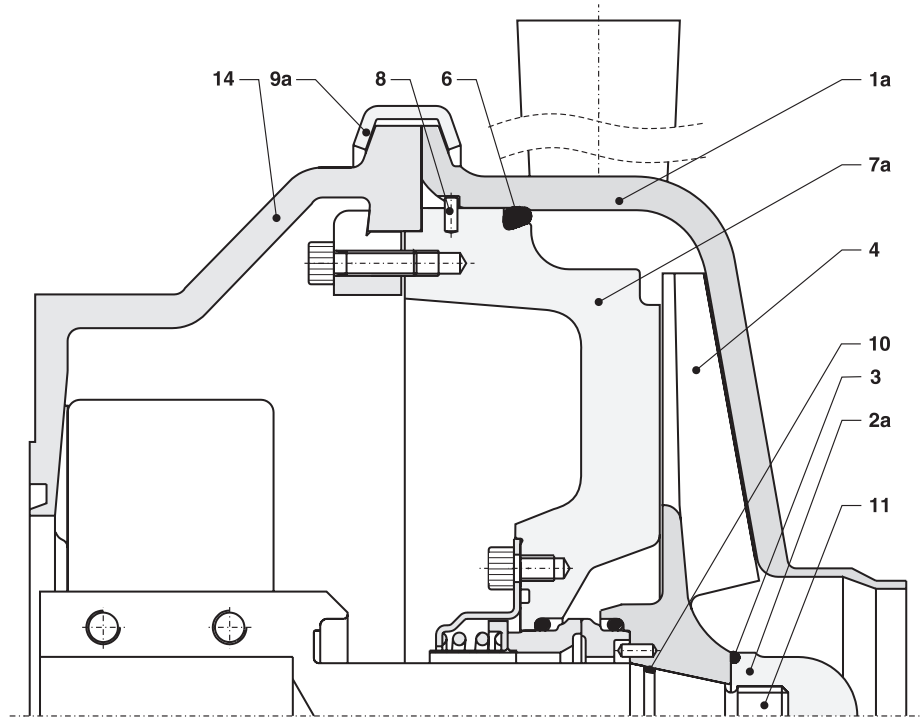
#### **Caution!**

Improper use of the pump leads to:

- damage
- leakage
- destruction
- potential failures in the production process

## 2. Sectional drawing

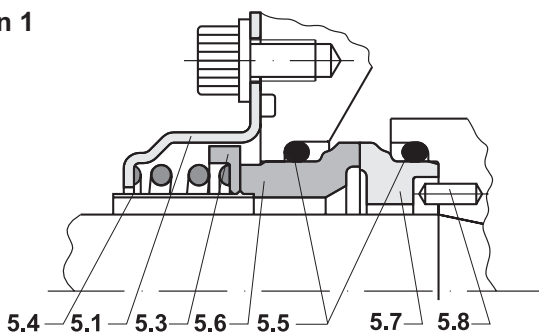
- 1a Pump housing
- 2a Cap nut
- 3 O-ring
- 4 Impeller
- 6 O-ring
- 7a Back plate
- 8 Locating pin
- 9a Clamp ring
- 10 O-ring
- 11 Shaft
- 14 Extension frame



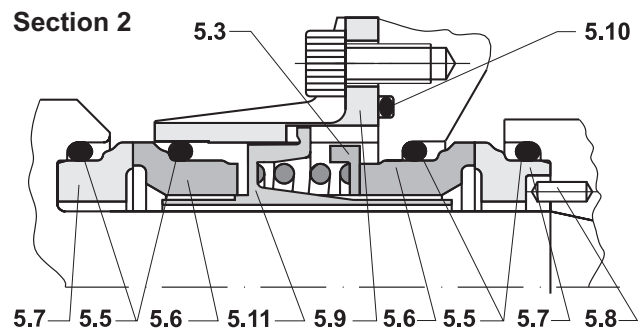
- 5.1 Fastening kit for single mech. seal
- 5.3 Pressure ring
- 5.4 Drain pipe
- 5.5 O-ring
- 5.6 Stationary seal face
- 5.7 Rotary seal face
- 5.8 Pin
- 5.9 Fastening kit for double mech. seal
- 5.10 O-ring
- 5.11 Pressure ring

Section 1: Single mechanical shaft seal for shafts of Ø25 and Ø35  
 Section 2: Double mechanical shaft seal for shafts of Ø25 and Ø35  
 Section 3: Single mechanical shaft seal for shafts of Ø55  
 Section 4: Double mechanical shaft seal for shafts of Ø55

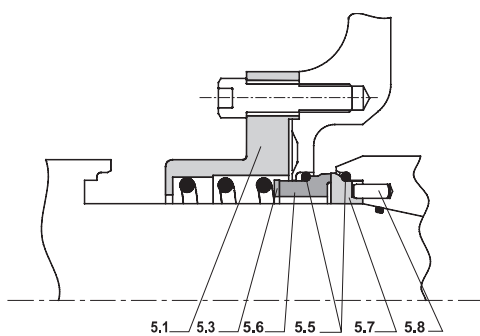
### Section 1



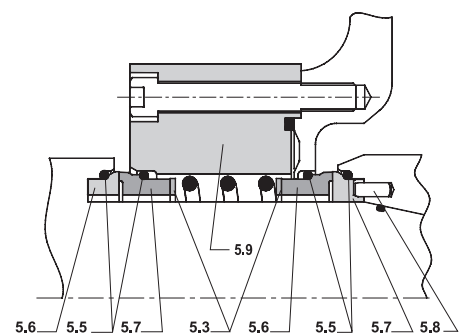
### Section 2



### Section 3



### Section 4



### 3. Warnings



1. Read through the instructions before installing the pump and starting it up. If in doubt, contact your local SPX Flow Technology representative.
2. Check that the specifications of the motor and motor control unit are correct. This applies in particular to applications which carry a risk of explosion.
3. Observe that a pump may be unstable and may tilt to the fore onto its inlet port when having a relatively small motor and being assembled on brackets instead of being equipped with a frame with adjustable feet. Be careful during the installation of such a pump. (For this reason, the W+50/600 pump is equipped with an anti-tilting unit.)
4. Do not start the pump before all pipe connections have been fitted carefully and tightened. Special precautions must be taken when the pump is used to pump hot and/or hazardous liquids. In such cases follow the local regulations for personal safety when working with these products.
5. Do not start the pump before the motor shroud or shaft guard has been securely fitted.
6. The pump contains rotating parts. Never put your hands, fingers or objects into a pump while it is in operation.
7. Never touch the shroud during operation, as it can become very hot.
8. Never touch the pump body during operation if the pump is being used for hot media, as there is a risk of being burnt.
9. If the pump is operating with liquid media but has no circulation, the liquid will heat up and may turn into vapour, which could cause an explosion.
10. Always remove all assembly and auxiliary tools from the pump before starting it up.
11. Never hose down or clean the electric motor directly with water or cleaning fluid.
12. Never lift the pump at the shroud, as it is not designed to carry the weight of the motor. Remove the shroud before lifting the pump. Always use securely fitted lifting straps when lifting with a crane or similar lifting gear.
13. Never dismantle the pump before the motor has been disconnected from the power supply. Remove the fuses and disconnect the cable from the motor terminal box.
14. The installation of all electrical parts must be carried out by qualified personnel.

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### 3. Warnings

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**15.** Never dismantle the pump until the pipe system has been drained. Remember that liquid will always collect in the pump body. If the pump is to be used for hot and/or hazardous liquids, special precautions must be taken. In such cases follow the local regulations for personal safety when working with these products.

**16.** The following values specified for the permissible pressure must not be exceeded:

Max. 18 bar      W+10/8, W+22/20, W+30/80, W+35/55, W+35/35,  
W+110/130

Max. 14 bar      W+25/210, W+30/120, W+50/600, W+50/8,  
W+55/35, W+55/60, W+60/110, W+65/350,  
W+70/40, W+80/80

The a.m. values are also valid for the corresponding models in the Wa+ and Wi+ ranges. It is important to remember that the maximum outlet pressure values apply when water is at a temperature of 20°C.

## 4. Introduction

### 4.1 The W+ range

This manual covers the standard versions of the W+ pump as well as the aseptic versions: Wa+ and pumps with an inducer (Wi+). Check the pump's nameplate to determine whether you have one of these models. The WHP+ and W+140/50 are described in a separate manual which is supplied with the pump. The WK+ (pedestal pump version) is described in a supplementary manual.

### 4.2 The W+ pump, standard and auxiliary equipment

Standard options:

- With or without motor cover.
- With frame and feet or firm supports.
- With shaft seal in carbon/SiC or SiC/SiC.
- With o-rings in EPDM or FPM (Viton).
- With single mechanical or double mechanical seal, fitted for water-flushed or steam-flushed shaft seal (Wa+)

Additional options:

- Heating/cooling jacket.
- Casing drain.
- Sound absorbing motor cover.
- Pump cart.
- Inducer (Wi+).
- Double O-ring seal for pump housing, fitted for sterile flushing purposes.
- Heavy duty clamp ring which increases the pump's maximum permissible outlet pressure to 25 bar (available for W+30/120, W+55/35, W+55/60, W+60/110, W+70/40) or to 20 bar (available for W+80/80).
- W+ pumps can be supplied with all standard welded ferrules, e.g. unions, clamp rings, flanges.

### 4.3 Identification of pump models

A nameplate as shown in Fig. 1 is fitted on the extension frame.

#### Example

Type W+22/20: Specifies the pump model (W+22/20).  
 125: Indicates the diameter of the impeller.  
 Serial no.: Indicates the pump ID number.  
 Order no.: Specifies the SPX FT order number.  
 Year: Shows the year of manufacture.  
 The empty field can be used to identify the pump within an overall system.

Fig. 1

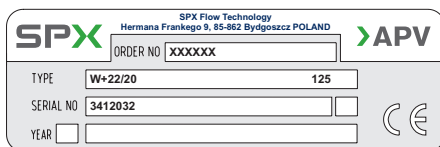


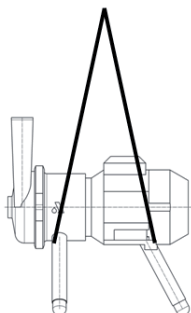
Fig. 2

<b>ABB</b>		IE2		CE	
3-Motor M3AA 100 LB 2		CL.F		IP 55	
3GAA101312-ASE					
N°: E101110P9165				2011	
V	Hz	r/min	kW	A	Cos φ
230 D	50	2920	3,00	10,00	0,86
400 Y	50	2920	3,00	5,80	0,86
460 Y	60	3530	3,00	5,10	0,84
IE2-50Hz-86,4(100%)-86,0(75%)-83,9(60%)					
IE2-60Hz-87,5(100%)					
6306-2Z/C3		6205-2Z/C3		24 kg	

### 4.4 Identification of motor models

The plate indicates the motor type and height of construction (item 2), motor capacity (kW; item 1), speed, etc.

## 4. Introduction

**Fig. 3**


### 4.5 Handling and Transport

Act with caution when lifting the pump. All parts with a weight of more than 20 kg must be handled with a suitable hoisting device. Use a crane, forklift truck or other suitable lifting gear, and always use 2 hoisting belts in conjunction with this. (Fig. 3).

Place the hoisting belts around the rear part of the motor and around the extension frame. Take care that the belts are evenly loaded when the pump is lifted.

**Caution!** Always use 2 hoisting belts and never fasten at the front of the pump body.

### 4.6 Weights

Pump type	Motor										
	80 0.75 kW 1.1 kW	90 1.5 kW 2.2 kW	100 3.0 kW	112 4.0 kW	132 5.5 kW 7.5 kW	160 11.0 kW 15.0 kW 18.5 kW	180 22.0 kW	200 30.0 kW 37.0 kW	225 45.0 kW	250 55.0 kW	280 75.0 kW 90.0 kW
W+10/8	20 20	---	---	---	---	---	---	---	---	---	---
W+22/20	28 29	33 36	41	46	57 62	---	---	---	---	---	---
W+30/80	---	53 56	61	66	77 82	117 127 138	---	---	---	---	---
W+25/210*	---	---	---	---	---	169 184 194	212	282 295	349	---	---
W+35/35	---	36 39	44	49	60 65	100 109 117	---	---	---	---	---
W+35/55	---	51 51	59	64	75 80	114 123 133	---	---	---	---	---
W+30/120	---	59 62	67	71	83 88	125 135 145	170	236 249	---	---	---
W+50/600	---	---	---	---	---	---	295	360 381	426	485	570 605
W+50/8	---	45 48	53	58	69 73	---	---	---	---	---	---
W+55/35	---	54 59	66	71	82 87	127 136 147	---	---	---	---	---
W+55/60	---	61 64	71	76	88 93	127 136 146	171	226 251	---	---	---
W+60/110	---	68 71	76	82	94 99	132 141 151	176	225 250	295	---	---
W+65/350	---	---	---	---	132 137	171 180 190	220	295 330	363	420	505 540
W+70/40	---	75 78	83	87	99 104	138 148 158	183	238 263	---	---	---
W+80/80	---	83 83	89	95	107 112	146 155 165	190	265 280	335	395	---
W+110/130	---	---	105	109	118 123	160 173 183	218	276 300	355	415	500 535

\* 1500 rpm only

The weights may vary depending on accessories and fittings, and are therefore intended only as a reference value for handling, transport and packaging activities.



## 5. Installation of pump

### 5.1 Positioning

The following must be observed:

The pump must be positioned so that the suction pipe is as short as possible and there is a sloping gradient towards the suction port of the pump.

Keep the number of valves, bends and tee-pieces on the suction side to an absolute minimum.

There must be sufficient space around the pump for piping and access for maintenance.

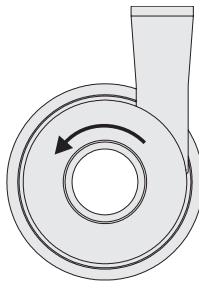
### 5.2 Lining up the pipe system

Ensure that the pipe system is adequately underpinned with pipe supports so that the pump body is not subject to strain from or the weight of the pipe system.

#### Caution!

During the suction process, the pump may tend to vibrate. A pipe support should be placed close to the pump suction to prevent pipework vibration creating excessive noise.

Fig. 4



### 5.3 Power supply

The motor must be connected via a control cabinet to the network in compliance with the local regulations. Moreover, the motor must be connected in accordance with the instructions indicated in the inner side of the connecting box lid of the motor.

The motor should be connected in such a way that the motor and therefore the impeller are anti-clockwise when viewed from the front in the direction of the suction port of the pump body. (Fig. 4).

### 5.4 Liquid supply for flushed shaft seal

Pumps with a flushed shaft seal are fitted with two PTFE hose connectors on the sealing flange. The hose connectors are 1/8 inch and fit 6.0 mm hoses. The required flow quantity amounts to 15–30 l/h. The maximum permissible pressure is 7 bar.

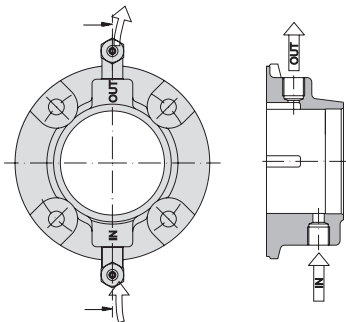
The hose connection should always be positioned vertically with the fluid inlet below and the outlet above (Fig. 5).

Fluid consumption can be limited by installing a solenoid valve on the supply side. The open/close function of the solenoid valve can be controlled by the pump's start/stop sequence.

Do not use steam or steam condensate on the connection for flushing liquids. If you wish to use steam as a sealant, a special aseptic pipe connector must be used.

For connectors see 5.5.

Fig. 5



### 5.5 Connecting steam and steam condensate for aseptic use

When static double seals are used, the connection for steam or steam condensate at the pump body is provided with fittings for 8 mm stainless steel pipes.

Steam of up to 150°C and 5 bar can be used.

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## 6. Start-up and operation

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Before starting the pump, dismantle and clean the suction pipe. Any foreign material in the pump should be removed.

### 6.1 Checking the pump for foreign material

Remove the pump body as described below. The sectional drawing (page 3) is to be used for reference purposes.

1. Disconnect the power supply.
2. Remove the pump body (items 1a, 1b) by unscrewing the clamp ring (item 9a) or body screws, and carefully extract from the body.
3. Turn the impeller (item 4) to ensure that there is no foreign material behind it.
4. Remove any foreign material from inside the pump.
5. When the pump body is clean and free of foreign material, reassemble the pump.

Mount the pump body as described below:

6. Check that the locating pin (item 8), which is installed in the top of the back plate, fits with the detent in the pump body and carefully (to avoid damage to the O-ring) press the pump body (item 1a, 1b) in so it covers the O-ring (item 6). Then fasten with the clamp ring (item 9a) or body screws and apply the correct tightening torque.

M10:                      max. 35 Nm (25 ft-lb)

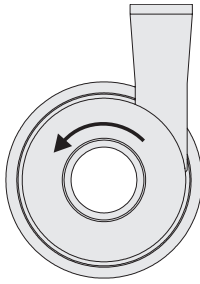
7. Check that the pipe unions have been tightened properly and that the pipe supports have been fitted.



To facilitate the fitting of the front cover and pump housing, we recommend that the O-ring is lubricated with a thin layer of food-friendly, acid-free grease or soap.

## 6. Start-up and operation

Fig. 6



### 6.2 Checking the pump

To check that the pump is working satisfactorily, pour water into the pump and start it momentarily. Check the direction of rotation. Fig. 6. Listen for any unusual noises. In pumps with water-flushed or steam-flushed shaft seals, the seal chamber must be filled with water/steam.

**Caution!**

Never allow the pump to run without liquid, as this will ruin the shaft seal.

### 6.3 Starting the pump

Check the following before starting the pump:

- That the shaft guard has been fitted properly.
- That there is unobstructed access for liquid and that the pump is primed.
- That the valve on the discharge side is closed.

The valve on the discharge side is closed during start-up to prevent the motor from overloading, but should be opened again as soon as the pump has been started.



**Note!**

The pump should not be left running too long without pumping (typically 15 minutes if the pumped liquid is not hot), because it will get warm and the priming liquid will evaporate.

### 6.4 Flushing liquid



In pumps with a flushed shaft seal, check that the supply inlet for the flushing medium is open and that the flow of the medium is adequate (approx. 15-30 litres/hour).

## 7. Service and maintenance

### 7.1 Checking the shaft seal

Check the pump's shaft seal for leaks on a regular basis. If the shaft seal is leaking, replace it or its relevant parts as described below.

### 7.2 Replacing the shaft seal

The sectional drawing (page 3) shows the position and construction of the shaft seal (applying both to ordinary seals and seals with liquid/steam flushing).

#### Dismantling the pump

To replace the shaft seal it is necessary to dismantle the pump. Follow the steps described below and refer to the sectional drawing (page 3).



1. Disconnect the power supply in the motor isolator by removing the fuses and disconnecting the cables.
2. Turn off the steam and flushing liquid supply.
3. Close the pump suction and discharge point and drain the pump housing. If the pump is used for hot and/or aggressive liquids, special precautions must be taken. In such cases, observe the local regulations for personal protection when working with these products.
4. Open the clamp ring (item 9a) or the housing screws once the inlet and outlet pipes have been properly isolated.  
Dismantle the pump housing (item 1a, 1b) and remove the impeller (item 4).
5. Take the stationary seal face (item 5.6) installed in the back plate (item 7a, 7b) out with your fingers.
6. Remove the o-ring (item 5.5) from the stationary seal face.
7. Use your fingers to remove the rotary seal face (item 5.7) fitted in the impeller (item 4).
8. Remove the o-ring (item 5.5) from the rotary seal face.
9. Clean the chambers of the stationary and rotary seal face with air or water.
- 9a The rear stationary seal face (item 5.6) is mounted on the pressure ring\* (item 5.11). The rotary seal face (item 5.7) is mounted on the shaft (item 11). These are removed in the same way as the front seal components.  
\*The W+50/600 pump has 2 identical pressure rings.

#### Dismantling the shaft seal

## 7. Service and maintenance

### Checking parts for wear



- 10.** Check the O-rings for signs of stiffness, lack of elasticity, brittleness and/or chemical corrosion. Replace worn or damaged parts.
- 11.** Check the stationary ring (item 5.6) and rotary ring (item 5.7) for signs of wear. Wear surfaces must be completely free of cracks. If this is not the case, both the stationary ring and the rotary ring must be replaced.
- 11a** In the case of water-flushed shaft seals and aseptic shaft seals, check the rear seal rings (item 5.6, 5.7) for wear, and replace if necessary.

- 12.** Fit the new o-rings on the stationary seal face and rotary seal face.

**Caution!** Remember to moisten these with water.

### Fitting

- 13.** Fit the rotary seal face on the impeller without using tools.

**Note!** The notch in the rotary seal face must be installed so that it fits with the driving pin (item 5.8) in the impeller hub.

- 13a** In the case of double mechanical shaft seals, also fit a rotary seal face (item 5.7) with o-ring (item 5.5) in the location on the shaft – again without using tools.

- 14.** Fit the stationary seal face in the back plate without using tools.

**Note!** Install the stationary seal face so that it fits with the pin in the back plate. Check that the stationary seal face is positioned so that it slides back and forth easily within the back plate.

- 14a** When fitting new double mechanical shaft seals, remove the drain pipe (item 5.4) before fitting them in the pressure ring (item 5.9) or back plate (item 7a, 7b).

\* The W+50/600 pump is not equipped with a drain pipe.

- 15.** After fitting, clean the surfaces subject to wear.

- 15a** For double mechanical shaft seals, re-mount the back plate (item 7a, 7b).

- 16.** Fit the impeller (item 4). Remember to use the proper tightening torque.

M10:	45 Nm (33 ft-lb)
M14:	70 Nm (52 ft-lb)
M20:	200 Nm (148 ft-lb)

- 17.** Check that the locating pin (item 8) in the top of the back plate fits with the detent in the pump body. To prevent damage to the O-ring, carefully press the pump body (item 1a, 1b) in so that it covers the O-ring (item 6). Then fasten the clamp ring (item 9).

Remember to use the proper tightening torque:  
M10: max. 35 Nm (25 ft-lb)

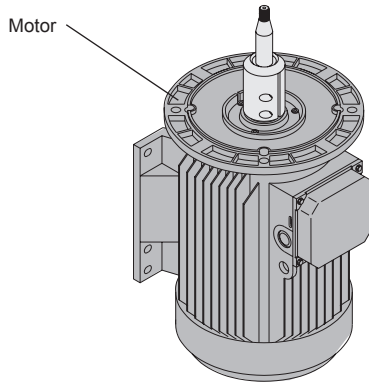
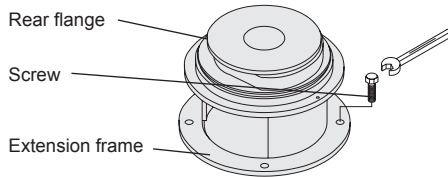
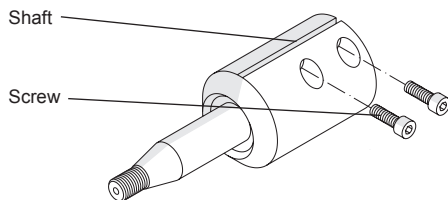
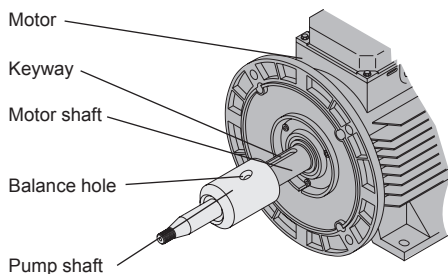
## 7. Service and maintenance

### 7.3 Replacing the motor

The standard motor of the W+ pump has a locked front bearing. If the motor is replaced, the new motor must also have a locked front bearing. The motor bearing is enclosed and permanently lubricated.

A "small flange" (B34) for frame sizes and a "large flange" (B35) in case of large constructions.

When replacing the motor, follow the instructions below. For the replacement of bearings, see the motor supplier's service instructions.

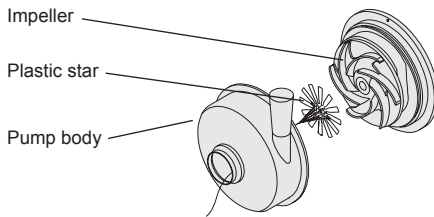
**Fig. 7**

**Fig. 8**

**Fig. 9**


1. Switch off the power supply, and then disconnect the pump and motor from the system.
2. Remove the pump body. See 7.2, paragraph 1-4.
3. Dismantle the impeller.
4. Remove the motor shroud and, if possible, place the pump vertically on the motor's fan cover. Fig. 7.
5. Release the four motor flange screws and remove them (Fig.7).
6. Lift the back plate (item 7) and extension frame (which are still bolted together) off the shaft. See Fig. 10. Remove the spacer flange (item 17) (where fitted).
7. See Fig. 8. Loosen the screws at the base of the shaft, remove the shaft and replace the motor.
8. See Fig. 9. Before mounting the new pump shaft, remove any dirt and grease from the motor shaft and the base's internal clamping surfaces. Loosely mount the pump shaft. Position the balance hole over the keyway.
9. Fit the back plate and extension frame over the shaft.
10. Tighten the bolts.
11. Stand the pump back on its legs/brackets.
12. Fit the impeller and secure it with the cap nut/inducer.

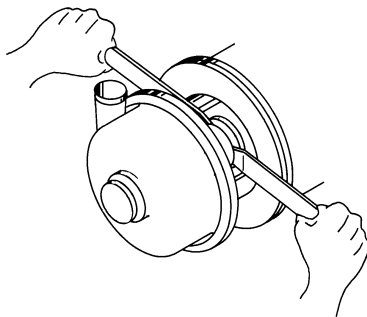
Remember to use the proper tightening torque:

M10:	45 Nm (33 ft-lb)
M14:	70 Nm (52 ft-lb)
M20:	200 Nm (148 ft-lb)

## 7. Service and maintenance

**Fig. 10**


13. Place the plastic star against the impeller. Fig. 10.
14. Fit the pump/screw housing and fasten with the clamp ring.
15. Push the shaft forward until the impeller is touching the plastic star. See Fig. 11.
16. Tighten the shaft screws (item 11).  
Remember to use the proper tightening torque:  
M8: 30 Nm (22 ft-lb)  
M10: 55 Nm (41 ft-lb)  
M12: 80 Nm (59 ft-lb)  
M16: 180 Nm (132 ft-lb)
17. Remove the star by pulling it out through the inlet.

**Fig. 11**


### 7.4 Recommended inventory of spare parts

#### Seal kits

The seal kit for the W+ pump consists of the wear parts for the pump as specified in the spare parts list.

	Number of pumps in service		
	0–5	5–20	>20
Seal kits	number	number	kits/10 pumps
Normal operation	2	3	1
Special needs	3	6	2

#### Service kits

The service kit consists of several main pump components which are not considered wear parts but may nevertheless need to be replaced: the shaft, impeller, cap nut and fixing kit.

	Number of pumps in service		
	0–5	5–20	>20
Service kits	number	number	kits/10 pumps
Normal operation	0	1	1
Special needs	1	2	1

## 8. Technical data

### 8.1 Sound pressure and sound effect level

Measurements have been carried out in accordance with ISO 3743, Grade 2 and ISO 3746, Grade 3. Tolerance:  $\pm 3$  dB.

LpA in dB refers to the sound pressure level at a distance of one metre from the surface of the pump at a height of 1.6 m above floor level (cf. EC Directive (89/392/EEC)).

LwA indicates the sound power level.

Operating conditions A, B and C are defined as follows:

- a) Nominal flow and max. permissible operating pressure
- b) Nominal flow and 60% operating pressure
- c) 60% flow and max. permissible operating pressure

The nominal flow and max. permissible operating pressure in the case of the W+55/60, for example, are 60 m<sup>3</sup>/hr at an operating pressure of 5.5 bar, and so on.

This information only applies if the motor used is an ABB aluminium motor and the size of the motor matches the power requirement of the pump.

The noise level may increase considerably if reducers (reduction/expansion fittings) are mounted on the inlet/outlet.

The values shown apply when the pumps operate at 2900 rpm and there is a shroud over the motor. If the pumps operate at 1450 rpm, the values are reduced by approx. 20 dB. The values for the W+25/210 apply at 1450 rpm.

Operating conditions	LpA			LwA		
	A	B	C	A	B	C
W+10/8	65	62	60	79	77	74
W+22/20	67	65	61	81	79	75
W+30/80	75	73	68	89	87	82
W+25/210	69	68	64	83	82	78
W+35/35	69	67	64	83	81	78
W+35/55	72	70	67	86	84	81
W+30/120	76	74	72	90	88	86
W+50/8	69	68	64	83	82	78
W+50/600	75	75	73	89	89	87
W+55/35	69	68	68	83	82	82
W+55/60	74	70	68	88	84	82
W+60/110	76	74	72	87	85	84
W+65/350	86	88	82	100	102	98
W+70/40	75	69	69	89	83	83
W+80/80	75	73	72	89	87	86
W+110/130	79	76	76	93	90	90

Please note that the sound emitted by a pump may vary considerably. It depends on the pump design (size/speed/shroud/installation) as well as on the liquid type and pumping conditions.



## 8. Technical data

### 8.2 Maximum permissible outlet pressure for W+ pumps

The maximum pump outlet pressure specified below must not be exceeded (applies to water at 20 °C).

**Max. 18 bar:** W+10/8, W+22/20, W+30/80, W+35/55, W+35/35, W+110/130

**Max. 14 bar:** W+25/210, W+30/120, W+50/600, W+50/8, W+55/35, W+55/60, W+60/110, W+65/350, W+70/40, W+80/80

The above values also apply to the corresponding Wa+ and Wi+ models.

### 8.3 Tightening torques

Required torques to tighten the pump shaft on the motor shaft:

M8:	30 Nm (22 ft-lb)
M10:	55 Nm (41 ft-lb)
M12:	80 Nm (59 ft-lb)
M16:	180 Nm (132 ft-lb)

#### Caution!

Ensure that the key groove in the motor shaft can be seen through the hole in the stub shaft. Fig. 12.

Required torque to tighten the cap nut and the inducer:

M10:	45 Nm (33 ft-lb)
M14:	70 Nm (52 ft-lb)
M20:	200 Nm (148 ft-lb)

Required torque to tighten the clamp connection at the pump body and body cover:

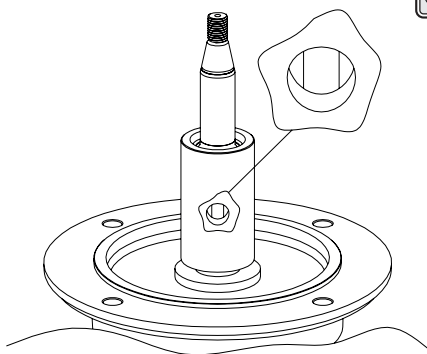
M10:	max. 35 Nm (25 ft-lb)
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### 8.4 Cleaning recommendation

The parts of the pumps which become wet as a result of media are cleaned using the cleaning agent in the connected pipelines. Cleaning agents, times and cycles must be modified according to individual application depending on the degree and nature of contamination.

Verify the compatibility of the individually selected cleaning processes and agents with the seal materials being used.

Fig. 12



Subject to change.

W+

CENTRIFUGAL PUMP



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