

CD-ROM

The CD-ROM, which is inserted in the cover, contains the user manual of the SPX25 and SPX32 hose pumps. The CD-ROM also contains a replacement instruction for the pump hose. This replacement instruction is only for users that are familiar with the replacement procedures in the user manual.

System requirements

The program on CD-ROM requires a PC with the following minimum system requirements:

- Pentium I 100 MHz
- 64 MB internal memory
- 256 colors

The following software must be installed on the PC:

- Adobe Acrobat Reader
- Internet Explorer

How to use the CD-ROM

- 1 Put the CD-ROM in the CD drive.
- 2 Close the CD drive.
The CD-ROM will start automatically.
- 3 Wait until the various language versions appear on screen.
- 4 Select the required language (click 1x with the left mouse button).
The program Adobe Acrobat Reader will automatically start and the required user manual appears on screen.

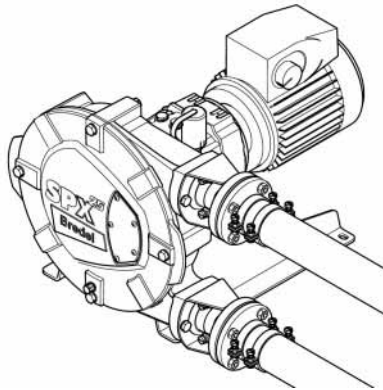
Shortcuts

In the left margin you will find the various chapters and paragraphs. These can be accessed directly by clicking on the required chapter or paragraph.

In the text you will find hyperlinks to chapters or paragraphs. These hyperlinks are linked with the required chapters or paragraphs. By clicking a shortcut the required chapter or paragraph appears on screen.

Hose pump series SPX25 and SPX32

Manual



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CONTENTS

1 GENERAL

1.1	<i>How to use this manual</i>	8
1.2	<i>Original instructions</i>	8
1.3	<i>Other supplied documentation</i>	8
1.4	<i>Service and support</i>	8
1.5	<i>Used products and the environment</i>	9

2 SAFETY

2.1	<i>Pictograms</i>	10
2.2	<i>Intended use</i>	10
2.3	<i>Use in potentially explosive atmospheres</i>	11
2.4	<i>Responsibility</i>	11
2.5	<i>Qualification of the user</i>	11
2.6	<i>Regulations and instructions</i>	12

3 WARRANTIES

4 DESCRIPTION

4.1	<i>Identification of the product</i>	14
4.1.1	<i>Identification of the product</i>	14
4.1.2	<i>Identification of the pump</i>	14
4.1.3	<i>Identification of the gearbox</i>	14
4.1.4	<i>Identification of the electric motor</i>	15
4.1.5	<i>Identification of the frequency controller</i>	15
4.1.6	<i>Identification of the pump hose</i>	15
4.2	<i>Construction of the pump</i>	16
4.3	<i>Operation of the pump</i>	17
4.4	<i>Pump hose</i>	18
4.4.1	<i>General</i>	18
4.4.2	<i>Hose compression force adjustment (shimming)</i>	20
4.4.3	<i>Lubrication and cooling</i>	20
4.5	<i>Gearbox</i>	20
4.6	<i>Electric motor</i>	21
4.7	<i>Motor frequency controller</i>	21
4.8	<i>Available options</i>	21

5	INSTALLATION	
5.1	<i>Unpacking</i>	22
5.2	<i>Inspection</i>	22
5.3	<i>Installation conditions</i>	22
5.3.1	Ambient conditions	22
5.3.2	Set-up	22
5.3.3	Pipework	23
5.3.4	Variable Frequency Drive	25
5.4	<i>Lifting and moving the pump</i>	26
5.5	<i>Placing the pump</i>	26
6	COMMISSIONING	
6.1	<i>Preparations</i>	27
6.2	<i>Commissioning</i>	28
7	MAINTENANCE	
7.1	<i>General</i>	29
7.2	<i>Maintenance and periodic inspections</i>	29
7.3	<i>Cleaning pump hose</i>	31
7.4	<i>Changing lubricant</i>	32
7.5	<i>Changing oil in gearbox</i>	32
7.6	<i>Replacing pump hose</i>	33
7.6.1	Removing pump hose	33
7.6.2	Cleaning the pump head	36
7.6.3	Fitting the pump hose	37
7.7	<i>Exchanging replacement parts</i>	40
7.7.1	General	40
7.7.2	Replacing pressing shoes	40
7.7.3	Replacing seal ring, bearings and wear ring	42
7.8	<i>Adjusting hose compression force (shimming)</i>	46
7.9	<i>Fitting options</i>	48
7.9.1	Fitting a high-level float switch	48
7.9.2	Fitting a high and low level float switch	49
7.9.3	Fitting revolution counter	50
8	STORAGE	
8.1	<i>Hose pump</i>	52
8.2	<i>Pump hose</i>	52

9 TROUBLESHOOTING

10 SPECIFICATIONS

10.1	<i>Pump head</i>	58
10.1.1	Performance	58
10.1.2	Materials	59
10.1.3	Surface treatment	60
10.1.4	Lubricant table pump	60
10.1.5	Weights	61
10.1.6	Torque figures	62
10.1.7	Shims specifications	64
10.2	<i>Lubricant table gearbox</i>	65
10.3	<i>Gearbox</i>	67
10.4	<i>Electric motor</i>	67
10.5	<i>Frequency controller</i>	67
10.6	<i>Parts list</i>	68
10.6.1	Overview	68
10.6.2	Cover assembly	69
10.6.3	Rotor assembly	70
10.6.4	Pump housing assembly	71
10.6.5	Support assembly	72
10.6.6	Flange assembly	73
10.6.7	Lubricants	74

1 GENERAL

1.1 How to use this manual

This manual is intended as a reference book by means of which qualified users are able to install, commission and maintain the hose pumps mentioned on the front cover.

1.2 Original instructions

The original instructions for this manual have been written in English. Other language versions of this manual are a translation of the original instructions.

1.3 Other supplied documentation

Documentation of components such as electric motors, gearboxes, etc. is normally not included in this manual. But if additional documentation is supplied, you must follow the instructions in this additional documentation.

1.4 Service and support

For information with respect to specific adjustments, installation, maintenance or repair jobs which fall beyond the scope of this manual, contact your Watson-Marlow Bredel representative. Make sure you have the following data at hand:

- Serial number hose pump
- Article number pump hose
- Article number gearbox
- Article number electric motor
- Article number frequency controller

You will find these data on the identification plates or stickers of the pump head, the pump hose, the gearbox and the electric motor. Refer to § 4.1.1.

1.5 Used products and the environment

**CAUTION**


Always observe the local rules and regulations with respect to processing (non reusable) parts of the hose pump.


Inquire with your local government about the possibilities for reuse or environment friendly processing of packaging materials, (contaminated) lubricant and oil.


2 SAFETY


2.1 Pictograms

In this manual the following symbols are used:

	WARNING Procedures which, if not carried out with the necessary care, may result in serious damage to the hose pump or in serious bodily harm.
--	--

	CAUTION Procedures which, if not carried out with the necessary care, may result in serious damage to the hose, the pump, the surrounding area or the environment.
--	--

	Remarks, suggestions and advice.
---	----------------------------------

	WARNING Procedures, remarks, suggestions or advice, which refer to use in potentially explosive atmospheres in accordance with the ATEX Directive 94/9/EC.
--	--

2.2 Intended use

The hose pump is exclusively designed for pumping suitable products in defined applications.

The manufacturer cannot be held responsible for damage or harm resulting from misapplication or negligence. If you want to change the application of your hose pump from its originally intended service, contact your Watson-Marlow Bredel representative first to confirm suitability.

2.3 Use in potentially explosive atmospheres

The *pump head* and *gearbox* mentioned in this manual are suitable for use in a potentially explosive atmosphere. The pumps mentioned meet the requirements as stated in the European Directive 94/9/EC (ATEX Directive).

The pumps belong to:

- Group II Appliances, category 2 GD c k T4

2.4 Responsibility

The manufacturer does not accept any responsibility for damage or harm caused by not (strictly) observing the safety regulations and instructions in this manual and the also supplied documentation, or by negligence during installation, use, maintenance and repair of the hose pumps mentioned on the front cover. Depending on the specific working conditions or accessories used, additional safety instructions can be required.

Immediately contact your Watson-Marlow Bredel representative, if you noticed a potential danger while using your hose pump.

**WARNING**

The user of the hose pump is always fully responsible for observing the local valid safety regulations and directives. Observe these safety regulations and directives when using the hose pump.

2.5 Qualification of the user

The installation, use and maintenance of the hose pump is only reserved for well trained and qualified users. Temporary staff and persons in training may only use the hose pump under the supervision and responsibility of well trained and qualified users.

2.6 Regulations and instructions

- Everyone who will work with the hose pump must be familiar with the content of this manual and observe the instructions carefully.
- The user must ensure that this manual, as well as all other documentation relating to pump components, is made readily accessible to anyone who is expected to work with or service the hose pump.

3 WARRANTIES

The manufacturer offers a 2-year warranty on proper workmanship of all parts of the hose pump. Exclusion is made for normal wear and tear of consumables, such as pump hoses, lubricant, hose clamps, pressing shoes, ball bearings, wear ring, and seals, or parts which have been misused or damaged through negligence.

This manufacturer's warranty is null and void for any user who has substituted the parts of an alternate manufacturer into a Watson-Marlow Bredel hose pump.

Damaged parts may be returned to the manufacturer for warranty analysis. If failure was determined caused by faulty workmanship, the manufacturer will repair or replace the faulty component.

The parts must be accompanied by a fully completed and signed health and safety form, as present in the back of this manual. The form must be applied to the outside of the shipping carton.

Parts which have been contaminated or which have been corroded by chemicals or other substances, which can pose a health risk, must be cleaned before they are returned to the manufacturer. Furthermore, it should be indicated on the health and safety form, which specific cleaning procedure has been followed, and it should be indicated that the equipment has been decontaminated. The safety form is required at all items, even if the parts have not been used.

Warranties purporting to be on behalf of Watson-Marlow Bredel B.V. made by any person, including representatives of Watson-Marlow Bredel B.V., its subsidiaries, or its distributors, which do not accord with the terms of this warranty shall not be binding upon Watson-Marlow Bredel B.V. unless expressly approved in writing by a Director or Manager of Watson-Marlow Bredel B.V.

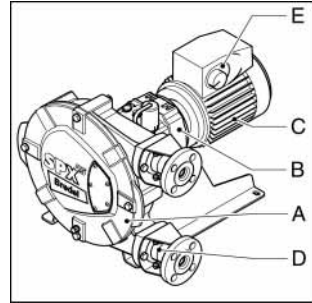
4 DESCRIPTION

4.1 Identification of the product

4.1.1 Identification of the product

The hose pump can be identified based on the identification plates or stickers on:

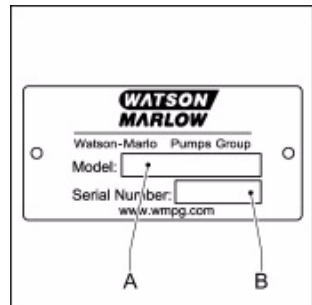
- A:** Pump head
- B:** Gearbox
- C:** Electric motor
- D:** Pump hose
- E:** Frequency controller (option)



4.1.2 Identification of the pump

The identification plate on the pump head contains the following data:

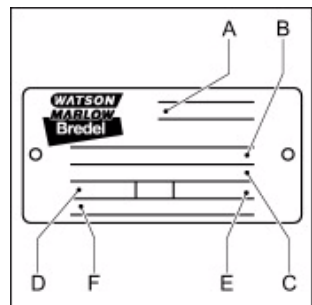
- A:** Pump model
- B:** Serial number



4.1.3 Identification of the gearbox

The identification plate on the gearbox contains the following data:

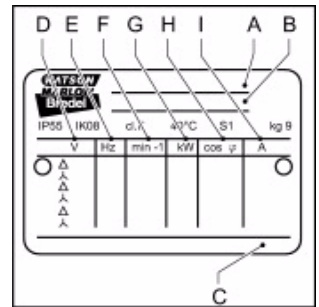
- A:** Article number
- B:** Serial number
- C:** Type number
- D:** Reduction
- E:** Number of revolutions per minute
- F:** Oil type upon delivery



4.1.4 Identification of the electric motor

The identification plate on the electric motor contains the following data:

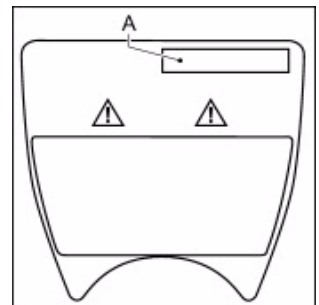
- A:** Type number
- B:** Serial number
- C:** Article number
- D:** Mains
- E:** Frequency
- F:** Speed
- G:** Power
- H:** Power factor
- I:** Current



4.1.5 Identification of the frequency controller

The identification plate on the Watson-Marlow Bredel Variable Frequency Drive (VFD) contains the following data:

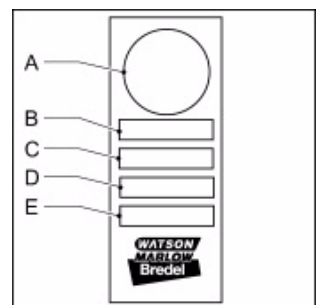
- A:** Article number

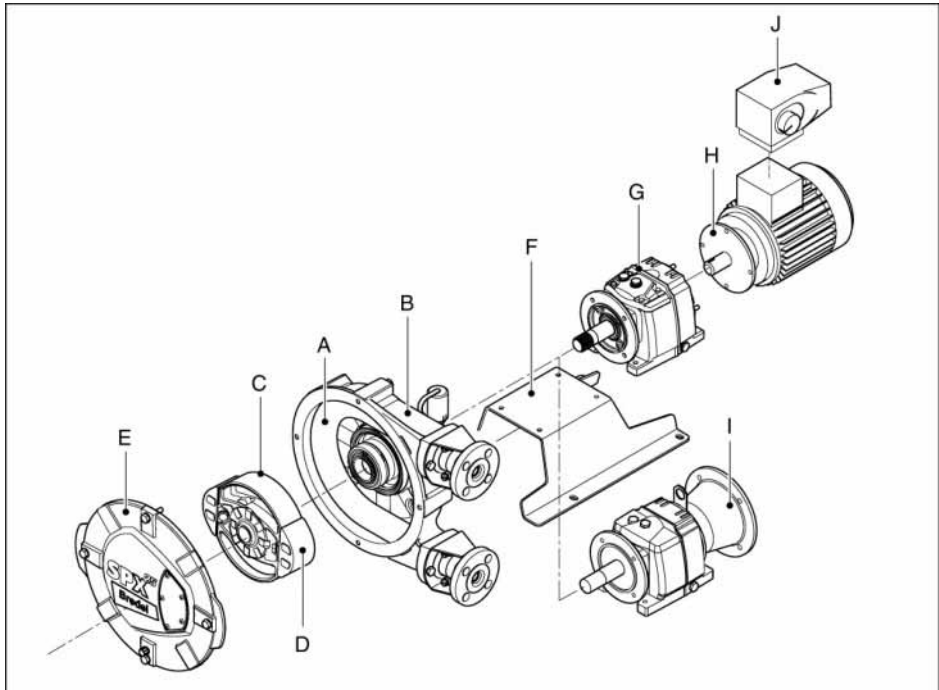


4.1.6 Identification of the pump hose

The identification sticker on the pump hose contains the following data:

- A:** Reorder number
- B:** Internal diameter
- C:** Type of material of inner liner
- D:** Maximum permissible working pressure
- E:** Production code



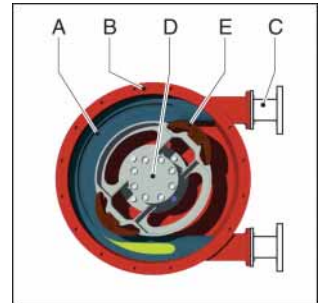
4.2 Construction of the pump

- A:** Pump hose
- B:** Pump housing
- C:** Rotor
- D:** Pressing shoes
- E:** Cover
- F:** Support
- G:** Gearbox
- H:** Electric motor
- I:** Adapter without motor (option)
- J:** Frequency controller (option)

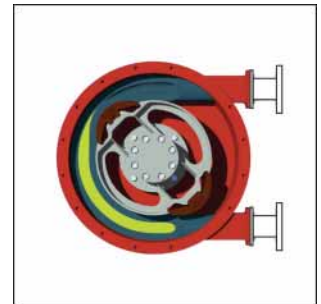
4.3 Operation of the pump

The heart of the pump head consists of a specially constructed pump hose (A), which lies at the inside of the pump housing (B) against the track. Both ends of the hose are connected to the suction and discharge lines by means of a flange construction (C). A bearing-mounted rotor (D) with two facing pressing shoes (E) is in the center of the pump head.

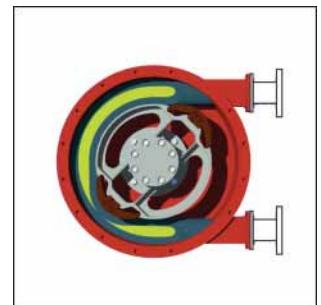
In phase 1 the lower pressing shoe compresses the pump hose by the rotational movement of the rotor, forcing the fluid through the hose. As soon as the pressing shoe has passed, the hose recovers to its original shape due to the mechanical properties of the material.



In phase 2 the product is drawn into the hose by the (continuous) turning motion of the rotor.



In phase 3, the second pressing shoe will subsequently compress the pump hose. Due to the continuous rotating movement of the rotor not only new product is sucked in, but also the already present product is pressed out by the pressing shoe. When the first pressing shoe runs from the pump hose, the second pressing shoe has already closed the pump hose and the product is prevented from flowing back. This method of liquid displacement is also known as the "positive displacement principle".

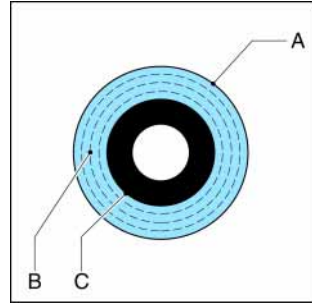


4.4 Pump hose

4.4.1 General

The pump hose is made of special rubbers, reinforced with nylon cords and is constructed as follows:

- A:** Outer extruded layer made of natural rubber
- B:** Four nylon reinforcement layers
- C:** Inner extruded liner



The pump hose liner material should be chemically resistant with the product to be pumped. Dependent on the specific requirements of your application a corresponding pump hose must be selected. For each pump model various hose types are available.

The material of the inner liner of the pump hose determines the hose type. Each hose type is marked by a unique color code.

Hose type	Material	Color code
NR	Natural rubber	Purple
NBR	Buna N	Yellow
EPDM	EPDM	Red
CSM	Hypalon [®]	Blue

Natural Rubber*

Always the first choice hose. A highly dynamic material, which has excellent abrasion resistance and mechanical strength, and is generally resistant to diluted acids and alcohols.

Max. liquid temperature 80 °C (175 °F).

Min. temperature -20 °C (-5 °F).

Buna N*

A highly abrasion proof and wear resistant material that is generally resistant to oils, fats, alkaline, and detergents. Suitable for a wide range of food handling and meets FDA and 3A standards.

Max. liquid temperature 80 °C (175 °F).

Min. temperature -10 °C (15 °F).

EPDM*

Good chemical resistance especially to concentrated acids, ketones, and alcohols.

Max. liquid temperature 90 °C (195 °F).

Min. temperature -10 °C (15 °F).

Consult Watson-Marlow Bredel technical services for details on higher temperature operation, up to 90 °C with EPDM.

Hypalon® *

Good chemical resistance for strong oxidizing products like concentrated acids and oxygen generating substances.

Max. liquid temperature 80 °C (175 °F).

Min. temperature -10 °C (15 °F)

Consult Watson-Marlow Bredel technical services for RPM limitations when using Hypalon®.



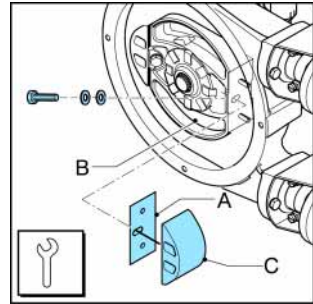
* Consult your Watson-Marlow Bredel representative for more detailed information about the chemical and temperature resistance of pump hoses.

The Watson-Marlow Bredel pump hoses have been carefully machined, therefore there are minimum tolerances in wall thickness. This is very important to guarantee the correct compression of the pump hose, because:

- When the compression is too high, it creates a too high load of the pump and pump hose, which may result in a reduction of the life of the pump hose and bearings.
- When the compression is too low this will result in high velocity backflow (slip). Backflow results in a reduction of pump performance, hydraulic efficiency, and negatively impact the life of the pump hose.

4.4.2 Hose compression force adjustment (shimming)

In order to achieve optimal life of the pump hose, the compression force of the pump hose can be adjusted by placing a number of shims under the pressing shoes. The shims (A) are fitted between the rotor (B) and the pressing shoe (C). The number of shims will vary for each discharge pressure situation.




The paragraph 7.8 describes how to select and install the shims.

4.4.3 Lubrication and cooling

The pump head, in which the rotor and pump hose can be found, is filled with Watson-Marlow Bredel Genuine Hose Lubricant. This lubricant lubricates the movement between the hose and the pressing shoes and dissipates the generated heat via the pump housing and the cover.

The lubricant is food grade. Refer to § 10.1.4 for the required quantity and NSF registration.

	Consult your Watson-Marlow Bredel representative for lubrication recommendations when operating the hose pump below 2 rpm.
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4.5 Gearbox

The hose pump types described in this manual use co-axial gearbox units.

The gearboxes are fitted with a foot rest. The outgoing shaft has been fitted with a spline.

4.6 Electric motor

If the electric motor has been standard supplied by the manufacturer, it is an integrated standardized squirrel-cage motor. Refer to § 10.3 for specifications. If the pump is to be used in potentially explosive atmospheres, contact your Watson-Marlow Bredel representative.

4.7 Motor frequency controller

Refer to the also supplied documentation of the supplier and § 10.5. If the pump is to be used in potentially explosive atmospheres, contact your Watson-Marlow Bredel representative.

4.8 Available options

The following options are available for the hose pump:

- High (lubricant) level float switch
- Low (lubricant) level float switch
- Revolution counter
- Epoxy pressing shoes
- Stainless steel 316 flanges, flange brackets, hose clamps, supporting and mounting articles
- Special configuration for use in potentially explosive atmospheres.



The high level float switch is mandatory for use in potentially explosive atmospheres. If the pump is to be used in potentially explosive atmospheres, contact your Watson-Marlow Bredel representative.

5 INSTALLATION

5.1 Unpacking

When unpacking carefully follow the instructions as given on the packaging or on the hose pump.

5.2 Inspection

Check that your delivery is correct and check it for any transport damage. Refer to § 4.1.1. Report any damage immediately to your Watson-Marlow Bredel representative.

5.3 Installation conditions

5.3.1 Ambient conditions

Make sure that the hose pump is in an area where the ambient temperature during operation is not lower than $-20\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$) and not higher than $+45\text{ }^{\circ}\text{C}$ ($+113\text{ }^{\circ}\text{F}$). Note that some motors may not be suitable for this entire range of temperature. Consult your motor manufacturer's documentation for suitability of the motor in your ambient conditions.

5.3.2 Set-up

- The pump materials and protective layers are suitable for indoor set-up and a protected outdoor set-up. Under certain conditions the pump is suitable for limited outdoor set-up or a salty or aggressive atmosphere. Consult your Watson-Marlow Bredel representative for more information.
- Make sure that the floor surface is horizontal and has a maximum slope of 1 mm per meter (0.012" per foot). Bolt the pump down using the mounting points provided.
- Make sure that there is sufficient room around the pump to carry out the necessary maintenance activities.

- Make sure that the room is sufficiently ventilated, so that the heat developed by the pump and drive can be discharged. Keep some distance between the ventilation cover of the electric motor and wall to enable the supply of necessary cooling air.
- A qualified electrician who is fully conversant with the appropriate regulations should connect the electric motor.
- Motor wiring: Follow the guidelines issued by the motor manufacturer. A current overload relay should be fitted to a contact breaker. Connect the motor in accordance with the manufacturer's instructions. When a thermal protection switch is fitted in the motor, the leads will be found in the motor terminal box. They should be connected to stop the pump if the switch changes state.
- A qualified electrician who is fully conversant with the appropriate regulations should connect liquid level switches and/or revolution counter.

5.3.3 Pipework

When determining and connecting suction and discharge lines consider the following points:

- **Do** keep delivery and suction lines as short and direct as possible.
- Keep the piping at a minimum equal to or greater than the bore size of the pump. Increase the bore size of the pipe work when the duty fluid has a high velocity or inertia. This will help keep friction and impulse losses to a minimum. Where critical velocities are a concern consult your Watson-Marlow Bredel representative.
- **Do** limit the presence of sharp bends in the process lines. Make sure that the radius of any bends is as large as possible ($R=4d$ to $5d$). It is recommended to use Y-connections instead of T-connections.

- Consult your Watson-Marlow Bredel representative for recommendations on mounting pulsation dampening devices. A pulsation dampener and/or inlet pulse accumulator may be necessary if the relative density and pump speed is high and the line lengths are long.
- The self-priming and positive displacement nature of peristaltic pumps means that valves are not required. If for whatever reason, valves are fitted into the system, they must have a straight fluid path and cause minimum restriction to flow in the pumping circuit. Note that check valves directly in the process stream may increase pulsation and negatively impact hose life.
- For ease of hose changing and some pulsation suppression, it is recommended to use a segment of flexible hose between the pump flange and hard piping of the suction and/or discharge line. A segment of three quarters (3/4) of the pump hose length for the flexible pipe work is recommended. Watson-Marlow Bredel also recommends installing an isolation valve and pipe-drain in the suction and discharge pipe work to allow fluid isolation and drainage from the pump during maintenance. Following these recommendations will help minimize process fluid exposure by maintenance personnel.
- For the flexible hoses select compatible materials and ensure the installation is suited for the design pressure of the system.
- Prevent any possibilities of exceeding the maximum working pressure of the hose pump. Refer to § 10.1.1. If necessary install a pressure

relief valve or shutdown switch. Consult your Watson-Marlow Bredel representative for more detailed information.

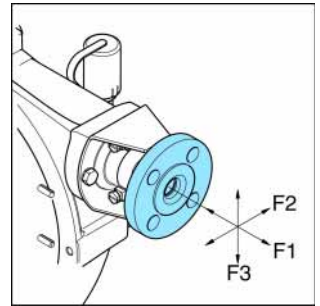


CAUTION

Consider the maximum permissible working pressure on the discharge side. Exceeding the maximum working pressure may lead to serious damage to the pump.

- Make sure that the maximum forces on the flanges are not exceeded. The permissible loads are given in the following table.

Maximum permissible loads on the pump flange			
Force	Unit	SPX25	SPX32
F1	N	600	600
	lbf	135	135
F2	N	500	500
	lbf	112	112
F3	N	200	200
	lbf	45	45



5.3.4 Variable Frequency Drive



WARNING

A Watson-Marlow Bredel VFD that is fitted *without the control switch* starts automatically when power is applied.

If the hose pump is fitted with a Watson-Marlow Bredel Variable Frequency Drive (VFD), consider the following points:

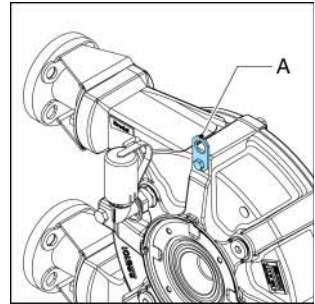
- Take precautions so the motor does not re-start automatically after an unscheduled stop. In the event of a power or mechanical failure, the Watson-Marlow Bredel VFD controls the motor to stop. When the cause of the failure is

removed, the motor can restart automatically. The automatic restart is dangerous to certain installations of the pump.

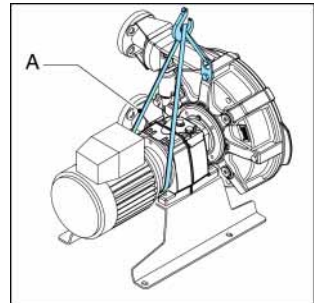
- All control cables outside the enclosure must be shielded and have a cross sectional area between 0.22 and 1 mm². The shielding must be connected to earth at both ends.

5.4 Lifting and moving the pump

For lifting and moving the *pump head*, it has been fitted with a lifting strip. This lifting strip (A) is fitted on the rear of the pump head. For the weights, refer to § 10.1.5.



The complete hose pump, i.e. pump head, gearbox and electric motor, must be lifted using the lifting strip of the pump head plus additional support using suitably rated straps or slings (A). For the weights, refer to § 10.1.5.



	<p>WARNING</p> <p>If the pump is to be lifted ensure that all standard lifting practices are adhered to and carried out by qualified personnel only.</p>
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5.5 Placing the pump

Position the pump on a horizontal surface. Use suitable anchor bolts to attach the pump to the floor surface.

	SPX25	SPX32
Thread	7/16-14 UNC	7/16-14 UNC

6 COMMISSIONING

6.1 Preparations

**WARNING**

A Watson-Marlow Bredel VFD that is fitted *without the control switch* starts automatically when power is applied.

**WARNING**

Disconnect and lock the power supply to the pump drive before any work is carried out.

Wait two minutes to make sure that the capacitors have discharged. This is necessary when the motor is fitted with a Variable Frequency Drive (VFD) and has single phase power supply.

1. Connect the electric motor and, if present, the frequency controller in conformance with the locally applicable rules and regulations. Refer to § 5.3.4. Have the electrical installation work be carried out by qualified personnel.
2. Check that the lubricant level is above the minimum level line in the inspection window. If necessary refill Watson-Marlow Bredel Genuine Hose Lubricant via the breather/vent plug. See also § 7.4.
3. Check the rotation of the rotor. The rotational direction of the rotor must match the configuration of suction and discharge piping.
4. Check that the correct number of shims corresponds with your application. Refer to § 10.1.7.
For adjusting the compression force of the hose, refer to § 7.8.

6.2 Commissioning

1. Connect the pipework. Make sure that there are no obstructions such as closed valves.
2. Switch on the hose pump.
3. Check the rotation of the rotor.
4. Check the capacity of the hose pump. If the capacity differs from your specification, follow the instructions in chapter 9 or consult your Watson-Marlow Bredel representative.
5. Check the capacity range of the frequency controller. In case of any deviations consult the documentation of the supplier.
6. Check the hose pump in accordance with points 2 to 4 of the maintenance table from § 7.2.

7 MAINTENANCE

7.1 General

**WARNING**

Disconnect and lock the power supply to the pump drive before any work is carried out.

Wait two minutes to make sure that the capacitors have discharged. This is necessary when the motor is fitted with a Watson-Marlow Bredel Variable Frequency Drive (VFD) and has single phase power supply.

**WARNING**

Only use original Watson-Marlow Bredel parts when maintaining the hose pump. Watson-Marlow Bredel cannot guarantee correct operation and any consequential damage that occurs from the use of non-original Watson-Marlow Bredel components. See also chapters [2](#) and [3](#).

7.2 Maintenance and periodic inspections

The following diagram shows the maintenance and periodic inspections that need to be carried out on the hose pump to guarantee an optimal safety, operation and life of the pump.

Point	Action	To be carried out	Remark
1	Check the lubricant level.	Before startup of the pump and on a scheduled interval during operation.	Make sure that the lubricant level is above the minimum level line in the inspection window. If necessary refill the lubricant. See also § 7.4.
2	Check the pump head for any leakage of lubricant around the cover, the flanges and the rear of the pump head.	Before startup of the pump and on a scheduled interval during operation.	See § 9.
3	Check the gearbox on any leakage.	Before startup of the pump and on a scheduled interval during operation.	In case of leakage consult your Watson-Marlow Bredel representative.
4	Check pump for deviating temperature or strange noises.	On a scheduled interval during operation.	See § 9.
5	Check pressing shoes for excessive damage.	When replacing the pump hose.	See § 7.6.
6	Internal cleaning of the pump hose.	Cleaning of the system or product change.	See § 7.3.
7	Replacing pump hose.	Preventive, this means after 75% of the hose life of the first hose.	See § 7.6.
8	Changing lubricant.	After every 2 nd hose change or after 5,000 service hours, whichever comes first or after hose rupture.	See § 7.4
9	Changing oil in gearbox.	Refer to lubricant table in § 10.2.	See § 7.5.
10	Replacing pump seal.	If necessary.	See § 7.7.3.
11	Replacing wear ring.	If necessary.	See § 7.7.3.

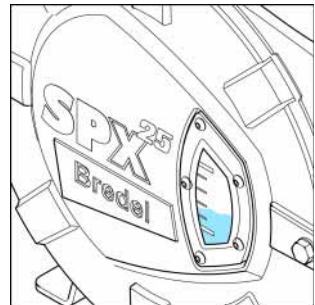
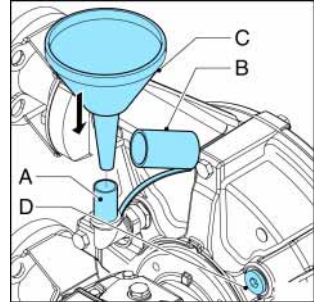
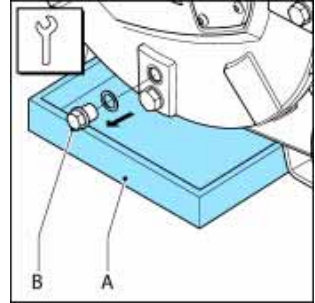
Point	Action	To be carried out	Remark
12	Replacing pressing shoes.	Wear on the running surface.	See § 7.7.2.
13	Replacing bearings.	If necessary.	See § 7.7.3.
		In potentially explosive atmospheres preventive after 20,000 hrs. service or when damage is suspected.	See § 7.7.2. Exclusively applicable in potentially explosive atmospheres (Group II Appliances, category 2 GD c k T4).
14	Cleaning the hose pump.	In potentially explosive (dust) atmospheres, the dust must be removed regularly.	Exclusively applicable in potentially explosive atmospheres (Group II Appliances, category 2 GD c k T4).

7.3 Cleaning pump hose

Running the pump with clean water can clean the inside of the pump hose. If a cleaning fluid is added to the water, attention must be given to its compatibility with the hose liner material, and also the temperature at which the cleaning procedure will be performed. Sometimes a cleaning sponge can be very helpful. With many products, it is necessary to clean the pump hose immediately once the pump is stopped to avoid sedimentation and/or hardening of the product within the hose that can cause damage upon restart.

7.4 Changing lubricant

1. Place a tray (A) under the drain plug in the cover of the pump. Remove the drain plug (B). Catch the lubricant from the pump housing in the tray. Position the drain plug and tighten it firmly.
2. The pump housing can be filled with lubricant via the breather/vent (A) on the rear of the pump housing. For this purpose remove the breather cap (B) and position a funnel (C) in the breather. In order to facilitate the filling with lubricant the breather cap (D) on the rear of the pump housing can be removed. Pour the lubricant in the pump housing via the funnel.
3. Keep on pouring until the lubricant level has risen at least until just above the minimum level line in the inspection window.

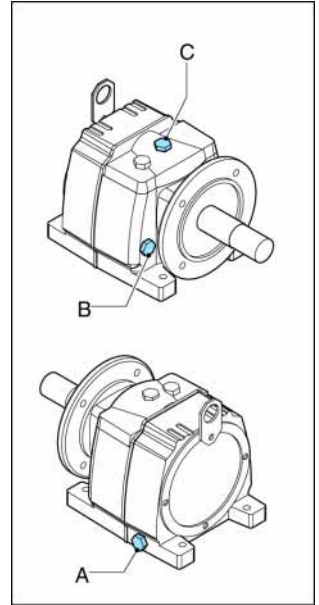


i	For the required quantity of lubricant, refer to § 10.1.4.
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7.5 Changing oil in gearbox

1. Isolate the pump from the electrical supply.

2. Remove plug (A) and let the oil run out of the gearbox.
3. The plug (A) is magnetically loaded. In this way metal particles in the oil are pulled to the plug. Clean the plug and remove any metal particles if necessary. Check that the sealing ring is not damaged and replace it if necessary. Place the plug back in the gearbox and tighten it firmly.
4. Remove level plug (B) and filling plug (C) and position a funnel in the hole and fill the gearbox with oil until the oil just comes out of the level plug hole (B). Wait shortly to let out any entrapped air. Place plug (B) and filling plug (C) back and tighten them firmly.



For the required lubricant, refer to § 10.2.



WARNING

To prevent damage to the gears, do not operate the pump unless proper volume of oil is filled into the gearbox.

5. Switch on the electrical supply to the pump.

7.6 Replacing pump hose

7.6.1 Removing pump hose



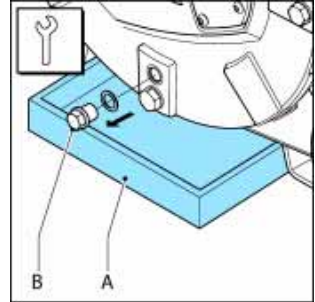
CAUTION

For all weight and torque adjustment, please refer to the technical information section at the rear of this manual.

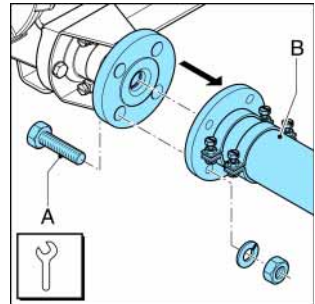
1. Isolate the pump from the electrical supply.

2. Close any shut-off valves in both the suction and discharge line to minimize product loss.

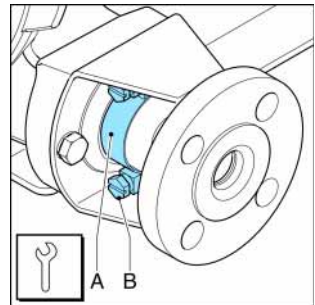
3. Place a tray (A) under the drain plug in the bottom of the pump head. The tray must be large enough to contain the lubricant, possibly contaminated with product fluid, from the pump head. Remove the drain plug (B). Catch the lubricant from the pump housing in the tray. Check that the breather vent mounted on the rear is not obscured. Position the drain plug and tighten it firmly.



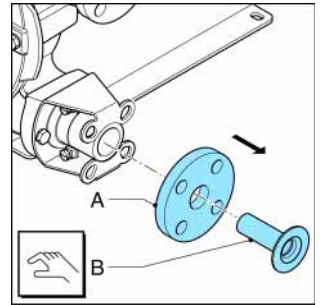
4. Loosen the retaining bolts (A) of both the suction and discharge line (B). Disconnect the suction and discharge lines.



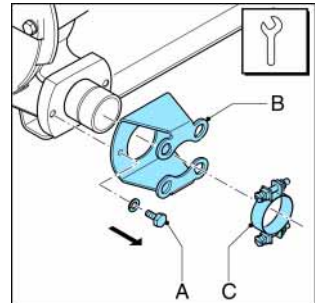
5. Loosen hose clamp (A) of both the inlet and outlet ports by loosening retaining bolt (B).



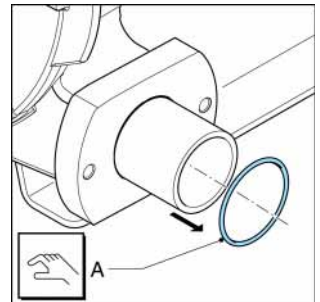
6. Pull the insert (B) from the hose and remove the flanges (A). Carry out this procedure both for the inlet and outlet ports.



7. Loosen the retaining bolts (A) of the flange bracket (B) and remove the bolts. Slide the flange bracket and the hose clip (C) off the hose. Carry out this procedure both for the inlet and outlet ports.



8. Slide off the sealing ring (A). Check that the sealing ring is not deformed or damaged and replace it if necessary. Carry out this procedure both for the inlet and outlet ports.

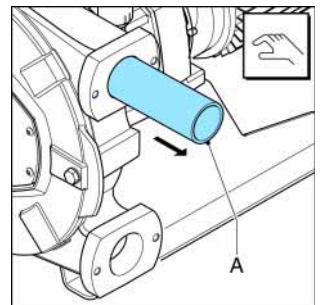


9. Switch on the electrical supply.



WARNING

Removal of the hose is a powered process and requires rotation of the pump. Ensure body and tools are clear from moving parts prior to proceeding with hose removal.

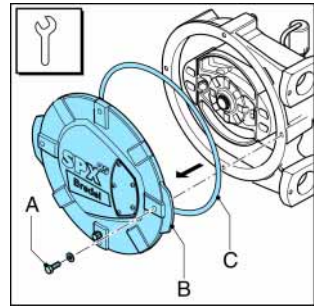


10. Power out the hose (A) from the pump chamber by jogging the drive motor.

	<p>WARNING</p> <p>During jogging the drive:</p> <ul style="list-style-type: none"> - Do not stand in front of the pump ports. - Do not try to guide the hose by hand.
--	--

7.6.2 Cleaning the pump head

1. Isolate the pump from the electrical supply.
2. Remove the cover (B) by loosening the retaining bolts (A).
3. Check the sealing ring (C) and replace it if necessary.
4. Rinse the pump head with clean water and remove all residues. Make sure that no rinsing water remains in the pump head.
5. Check the pressing shoes for wear or damage and replace them if necessary. Refer to § 7.7.2. Also see the maintenance diagram in § 7.2.



	<p>CAUTION</p> <p>When the pressing shoes are worn the compression force of the hose decreases. If the compression force is too low, this results in a loss of capacity by the backflow of the liquid to be pumped. Backflow results in a reduction of the life of the pump hose.</p>
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6. Replace the cover and fasten the retaining bolts with the correct torque. Refer to § 10.1.6.
7. Switch on the electrical supply to the pump.

7.6.3 Fitting the pump hose



WARNING

Fitting the pump hose is a powered process and requires pump rotation. Ensure the pump cover is properly fitted and that body and tools are clear from moving parts.



WARNING

For all weight and torque adjustment, please refer to the technical information section at the rear of this manual.

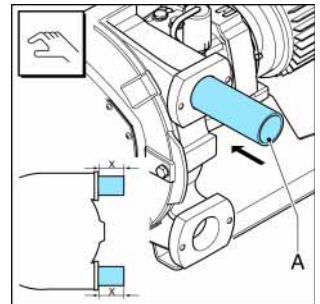
1. Clean the (new) pump hose on the outside and fully lubricate it with Watson-Marlow Bredel Genuine Hose Lubricant.
2. Turn on the pump and note the direction of the pump rotation.
3. Fit the pump hose (A) via one of the ports – whichever is the suction based on rotation direction. Feed the hose into the port and allow the pressing shoe to draw the hose in the pump housing. The rotor will move the hose.



WARNING

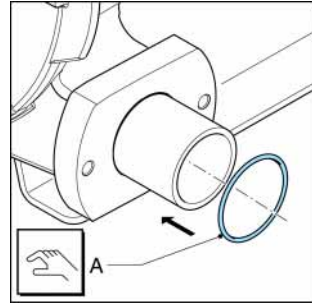
During jogging the drive:

- Do not stand in front of the pump ports.
- Do not try to guide the hose by hand.

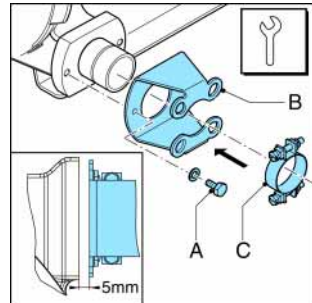


4. Stop the motor when the hose sticks out equally from both sides of the pump housing.

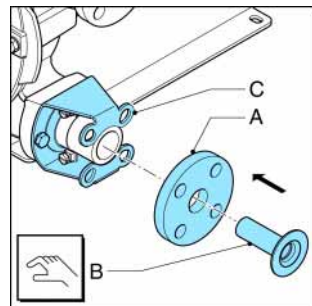
5. First fit the inlet port. Fit the sealing ring. Before mounting, check that the sealing ring (A) is not deformed or damaged and replace it if necessary.



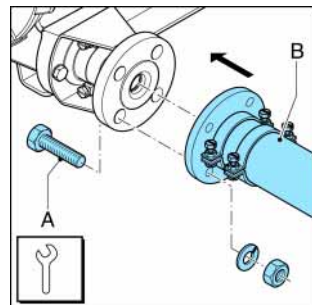
6. Before fitting check that the hose clamp is not damaged and replace it if necessary. Slide the flange bracket (B) and the hose clamp (C) over the hose together. Align the holes in the flange bracket with the ones at the front of the port. Position the two retaining bolts (A) and tighten them until they are approx. 5 mm (3/16") from the port, so that the gap between the flange bracket and the port remains.



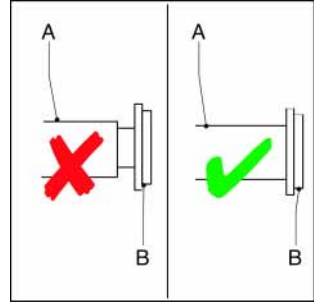
7. Slide insert (B) in flange (A) and press the insert in the hose. If necessary lubricate the insert with Watson-Marlow Bredel Genuine Hose Lubricant in order to simplify mounting. Make sure that the holes in flange (A) are aligned with the holes in flange bracket (C). Check that the insert is in the correct place. If the insert is not positioned correctly the product to be pumped may leak or the lubricant may leak.



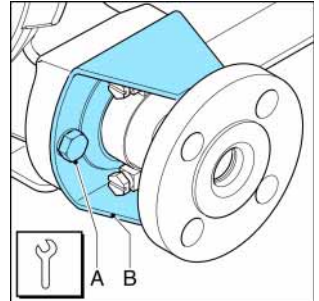
8. Fit the suction line (B) and the retaining bolts (A). Tighten the retaining bolts with the correct torque. Refer to § 10.1.6.



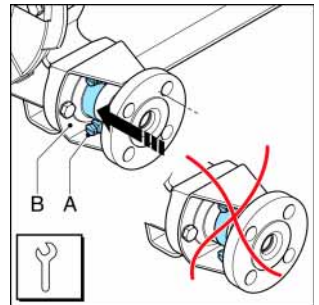
- 9. Turn the rotor in such a way that the hose (A) is pressed firmly against the flange surface (B).



- 10. Now fully tighten the retaining bolts (A) of the flange bracket (B). Make sure the bolts are tightened with the correct torque. Refer to § 10.1.6.



- 11. Position hose clamp (A) against O-ring chamber of the flange bracket (B) and fasten the retaining bolt. Make sure the bolts are tightened with the correct torque. Refer to § 10.1.6.



- 12. Now fit the other port. For this port proceed in the same way as described above for the inlet port.

- 13. Fill the pump housing with Watson-Marlow Bredel Genuine Hose Lubricant. Refer to § 7.4.

7.7 Exchanging replacement parts

7.7.1 General

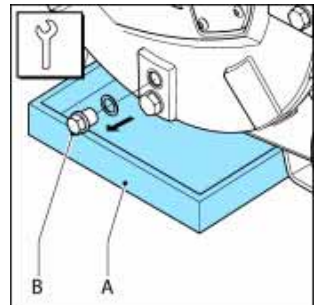
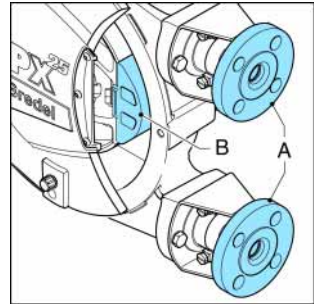


CAUTION

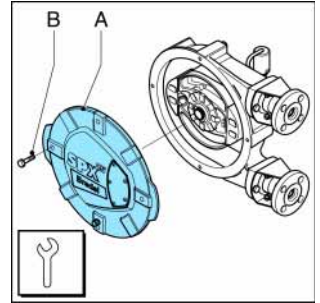
Items may be heavy. For all weight and torque adjustments for replacement procedures under this section, please refer to the technical information in chapter 10.

7.7.2 Replacing pressing shoes

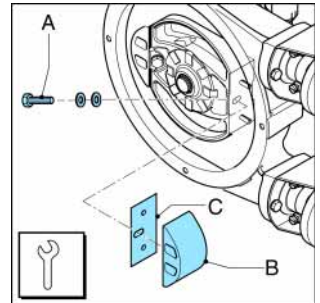
1. Jog the motor until the pressing shoe (B) is positioned between the inlet and outlet port (A).
2. Isolate the pump from the electrical supply.
3. Place a tray (A) under the drain plug in the cover of the pump. Remove the drain plug (B). Catch the lubricant from the pump housing in the tray. Position the drain plug and tighten it firmly.



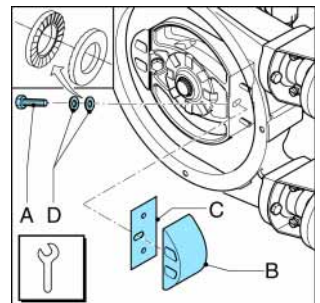
4. Remove the cover (A) by loosening the four retaining bolts (B).



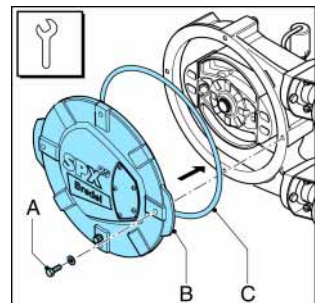
5. Loosen the retaining bolt (A) of the pressing shoe (B) and remove the shoe. Remove the shims (C) if present.



6. Fit the removed shims (C) again. Position the (new) pressing shoe (B), check that the Nord-Lock® rings (D) have been positioned correctly and tighten the retaining bolt(s) (A) a few turns. Refer to § 10.1.6.



7. Check the gasket (C) for damage and replace if necessary. Refit the cover (B). Make sure that the 4 bolts (A) are refitted and that they are tightened in the correct order, diagonally opposite each other. Refer to § 10.1.6.

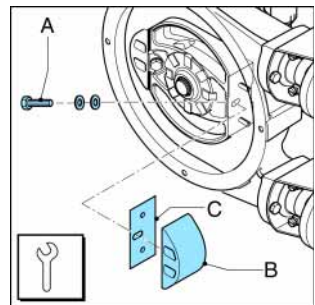
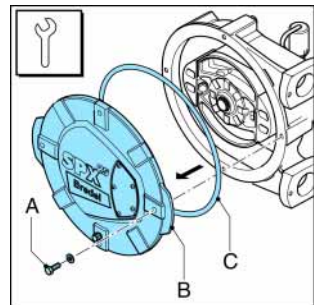


8. Switch on the electrical supply.
9. Jog the motor until the second pressing shoe is positioned between the inlet and outlet port.

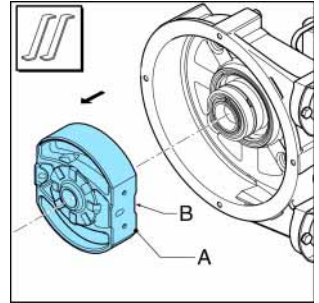
10. Isolate the pump from the electrical supply.
11. Repeat the procedure for removing and fitting this second pressing shoe by repeating steps 4 through 8.
12. Refill the lubricant. Refer to § 7.4.

7.7.3 Replacing seal ring, bearings and wear ring

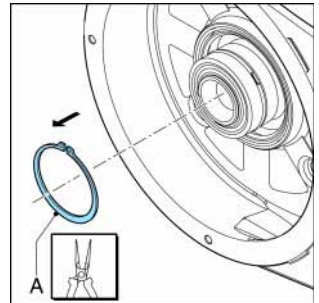
1. Remove the pump hose. Refer to § 7.6.1.
2. Isolate the pump from the electrical supply.
3. Remove the cover (B) by loosening the retaining bolts (A).
4. Check the sealing ring (C) and replace it if necessary.
5. Loosen the retaining bolt (A) of both pressing shoes (B). Remove the shims (C) if present.



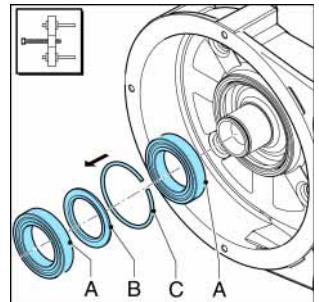
6. Use two crow bars to remove the rotor (A). Position both crow bars behind the recesses (B) in the rotor and push the rotor from the hub.



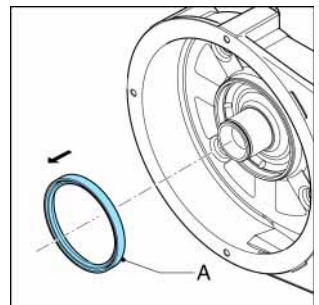
7. Remove the retaining circlip (A) with the correct tool.



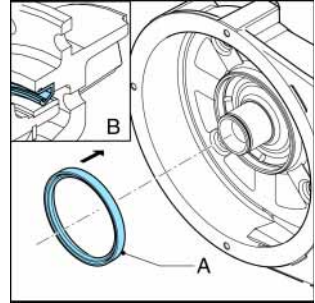
8. Remove the bearings (A) with the correct tool, the spacer ring (B) and the retaining circlip (C).



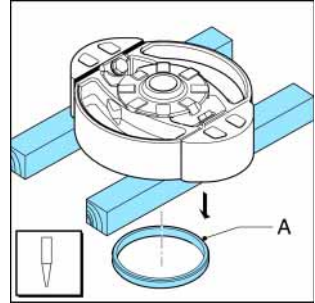
9. Remove the seal (A). Clean and degrease the bore.



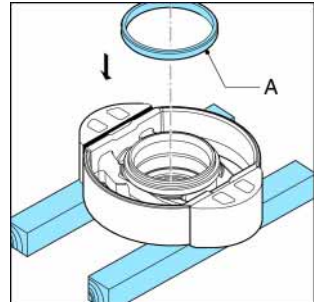
10. Fit a new seal (A) using a wooden block and hammer. Carefully hit the seal crosswise and with equal strength in the bore until it touches the hub. The seal must be fitted in the correct orientation (B). Make sure that the open side points to the pump cover.



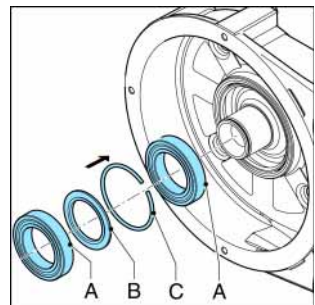
11. Support the rotor with wooden blocks at 90° to the spokes, with the ring (A) facing down. Position a suitable punch against the rear of the glued wear ring. Prevent damage to the wear ring seat or other parts.



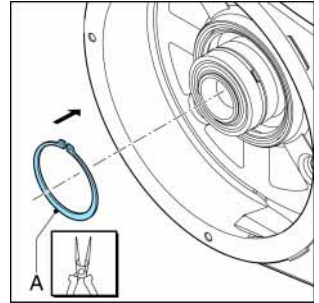
12. Turn the rotor over. Make sure that the seats of the new wear ring (A) and rotor are clean, dry and free of grease. Apply Loctite® type 641 or 603 both on the rotor and the wear ring. Position the new wear ring with the tapered edge facing up. Use a plastic hammer to fit the ring on the rotor until it touches the rotor completely.



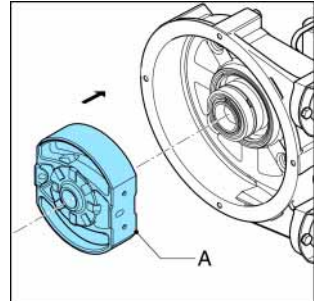
13. Check that the hub is clean and free of grease. Fit the bearings and the rings now. The bearings are placed on the hub with a slight interference fit. Use a pressing tool to press the bearings on the hub.



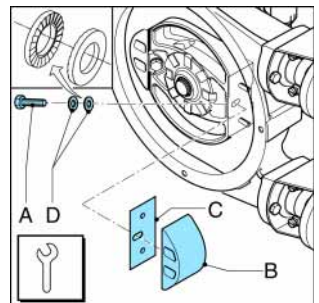
14. Mount the retaining circlip (A).



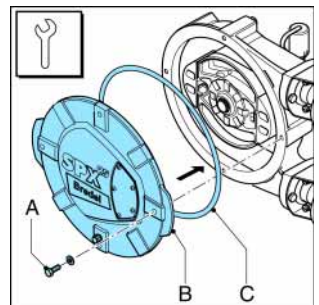
15. Fit rotor (A). The rotor is placed on the bearings with a loose fit. Press the rotor on the hub until it sticks.



16. Fit the removed shims (C) again. Position the (new) pressing shoe (B), check that the Nord-Lock® rings (D) have been positioned correctly and tighten the retaining bolt(s) (A) a few turns. Refer to § 10.1.6.



17. Check the gasket (C) for damage and replace if necessary. Refit the cover (B). Make sure that the 4 bolts (A) are refitted and that they are tightened in the correct order, diagonally opposite each other. Refer to § 10.1.6.



18. Switch on the electrical supply to the pump.
19. Fit the (new) pump hose. Refer to § 7.6.3.

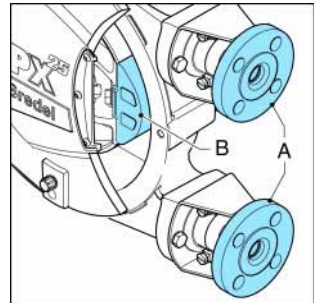
7.8 Adjusting hose compression force (shimming)

Remove the pump cover before fitting and removing shims. In order to determine the correct number of shims for your specific application refer to § 10.1.7.

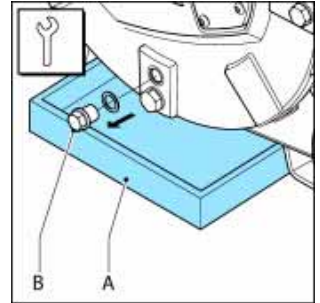
	<p>CAUTION</p> <p>Too many shims, this means a too high compression force on the pump hose, will create a too high load on the pump head and pump hose, which may result in a reduction of the life of the pump hose and bearings.</p>
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	<p>CAUTION</p> <p>Too few shims, this means a too low compression force on the pump hose, create a loss of yield and slip or backflow. Backflow results in a reduction of the life of the pump hose.</p>
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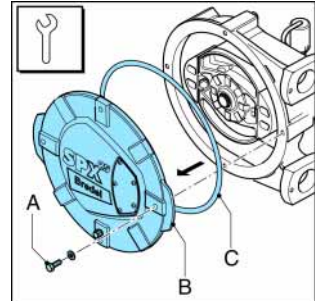
1. Jog the motor until the pressing shoe (B) is positioned between the inlet and outlet port (A).
2. Isolate the pump from the electrical supply.



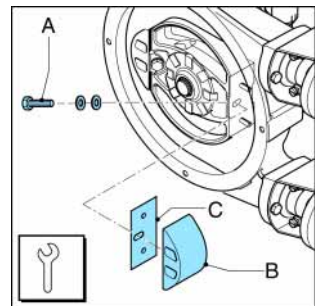
3. Place a tray (A) under the drain plug in the cover of the pump. Remove the drain plug (B). Catch the lubricant from the pump housing in the tray. Position the drain plug and tighten it firmly.



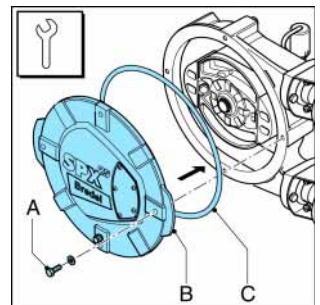
4. Remove the cover (B) by loosening the retaining bolts (A).



5. Loosen the retaining bolt (A) of the pressing shoe (B). Fit the shims (C) or remove them, until the correct number of shims is present. Refer to § 10.1.7. Fasten the retaining bolt of the pressing shoe with the correct torque. Refer to § 10.1.6.



6. Refit the cover (B). Check the gasket (C) for damage and replace if necessary. Make sure that all bolts (A) are refitted and that they are tightened in the correct order, diagonally opposite each other. Refer to § 10.1.6.



7. Switch on the electrical supply.
8. Jog the rotor until the second pressing shoe is positioned between the inlet and outlet port.

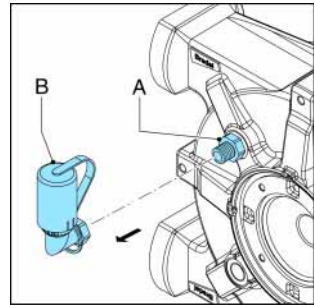
9. Isolate the pump from the electrical supply.
10. Repeat the procedure for this pressing shoe by repeating steps 4, 5, 6 and 7.
11. Refill the lubricant via the breather. Refer to § 7.4.

7.9 Fitting options

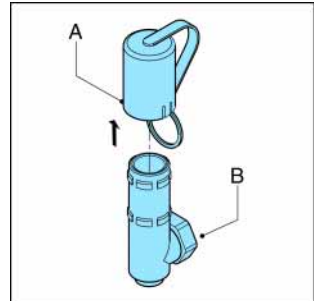
7.9.1 Fitting a high-level float switch

Switch rating: 230 VAC, 2 A, max. power load 40 VA.

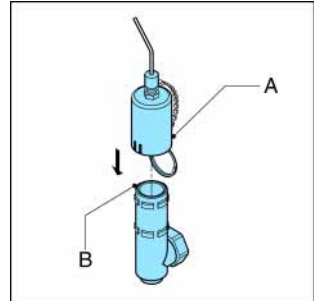
1. Remove the standard breather (B) on the rear of the pump, by removing it from crimp connector (A).



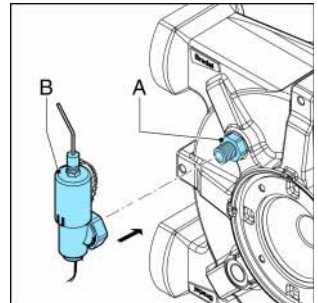
2. Slide the standard breather cap (A) from breather (B).



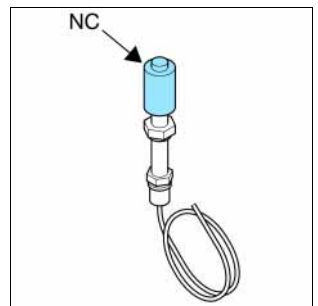
- Replace the standard breather cap with the breather cap with high level float switch (A) and slide it over breather (B).



- Mount the breather (B) on the rear of the pump, by mounting it on crimp connector (A).



- Connect the high-level float switch to the auxiliary power circuit via the 1.5 meter long PVC cable (2 x 0.24 mm²). Bear in mind that the electrical contact of the float switch is normally closed (NC). When the lubricant level is (too) high the contact will open.



Specifications

Voltage:	Max. 230 V AC/DC
Current:	Max. 2 A
Power:	Max. 40 VA

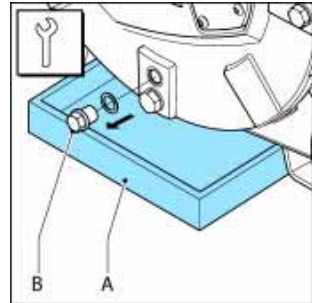


Where the floater is constructed to stop the equipment, operating has to be arranged so that the stop function locks-out, preventing the equipment from being re-started without re-setting. Check if the floater is mounted with the NC sign at the top.

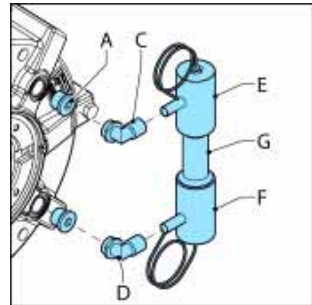
7.9.2 Fitting a high and low level float switch

Switch rating: 230 VAC, 2 A, max. power load 40 VA.

1. If the pump is filled with lubricant this must be removed first. Place a tray (A) under the drain plug in the cover of the pump. Remove the drain plug (B). Catch the lubricant from the pump housing in the tray. Position the drain plug and tighten it firmly.



2. Remove the plugs (A) and (B) on the rear of the pump head. Position the quick couplings (C) and (D) in both openings. Clamp both connection tubes (E) and (F) on the riser pipe (G) and the quick links (C, D).



3. Connect the high and low-level float switch to the electrical supply. Bear in mind that the electrical contact of the float switch is normally closed (NC).

This means that:

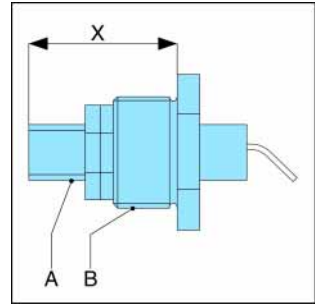
- the contact of the high level float switch opens at a (too) high lubricant level;
- the contact of the low level float switch opens at a (too) low lubricant level.

4. Make sure the lubricant returns to the prescribed level. Refer to § 7.4.

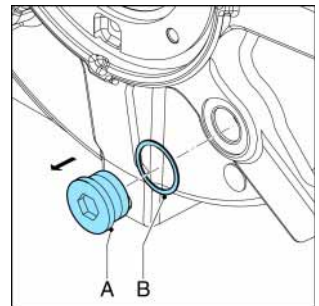
7.9.3 Fitting revolution counter

1. Fit the inductive sensor (A) in stop (B) and adjust it to dimension "X" as indicated in the table below. Tighten the adjusting nuts with a torque of 25 Nm (220 lbf in).

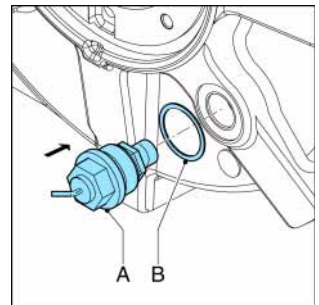
Dimension "X" ± 0.1 mm	
SPX25	SPX32
26 mm	28.5 mm



2. Remove stop (A) which is on the horizontal center line at the rear of the pump housing. Check that the sealing ring (B) is not damaged and replace it if necessary.



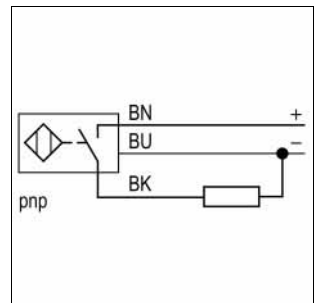
3. Fit the stop with the inductive sensor (A) together with sealing ring (B) on the pump housing.



4. Connect the sensor via the 2 meter long PVC cable (3 x 0.34 mm²).

Specifications	
Voltage:	10...30 VDC
Current:	Max. 200 mA

5. Make sure the lubricant returns to the prescribed level. Refer to § 7.4.



8 STORAGE

8.1 Hose pump

- Store the hose pump or pump parts in a dry area. Make sure that the hose pump or pump parts are not exposed to temperatures lower than $-40\text{ }^{\circ}\text{C}$ ($-104\text{ }^{\circ}\text{F}$) or higher than $+70\text{ }^{\circ}\text{C}$ ($158\text{ }^{\circ}\text{F}$).
- Cover the openings of the inlet and outlet ports.
- Prevent corrosion of untreated parts. For this purpose use the correct protection or packaging means.
- After a long period of standstill or storage (i.e. pump is idle for a period of longer than one continuous month), the static load on the pump hose may cause permanent deformation, which will reduce the life of the pump hose and may cause difficulty in starting.


To prevent deformation of the hose, pump motor should be jogged on a monthly basis to allow repositioning of the shoe on the hose.

If motor jogging is not possible and long term shutdown is expected, remove a pressing shoe and turn the rotor so far that the second pressing shoe is in front of the inspection window. In this way there is no load put on the pump hose. When startup is again expected, replace the pressing shoes, the proper number of shims, and the lubricant.

8.2 Pump hose

- Store the pump hose in a cool and dark room. After 2 years the hose material will age, which will reduce the life of the hose.

9 TROUBLESHOOTING

	<p>WARNING</p> <p>Disconnect and lock the power supply to the pump drive before any work is carried out.</p> <p>Wait two minutes to make sure that the capacitors have discharged. This is necessary when the motor is fitted with a frequency controller and has single phase power supply.</p>
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If the hose pump does not function (correctly), consult the following checklist to see if you can remedy the error yourself. If this is not the case, contact your Watson-Marlow Bredel representative.

Problem	Possible cause	Correction
Failure to operate.	No voltage.	Check that the supply power switch is on.
		Check the electrical supply is available at the pump.
		Check current limit of electrical source to pump.
	Stalled rotor.	Check that hose and lubricant are loaded properly and pressing shoes are shimmed properly.
	Lubricant level monitoring system has been activated.	Check that the lubricant level monitoring system has stopped the pump. Check the lubricant level and proper functioning of the level switch(es).

Problem	Possible cause	Correction
High pump temperature.	Non-standard hose lubricant used.	Consult the Watson-Marlow Bredel representative for the correct lubricant.
	Low lubricant level.	Add Watson-Marlow Bredel Genuine Hose Lubricant. For the required amount of lubricant refer to § 10.1.4.
	Product temperature too high.	Consult the Watson-Marlow Bredel representative about the maximum temperature range of the product.
	Internal friction on the hose caused by blocked or poor suction characteristics.	Check pipework/valves for blockages. Ensure that the suction pipework is as short as possible and that the diameter is large enough.
	Over-shimming of the pump rotor shoes.	Consult the diagram. Refer to § 10.1.7. Remove excess shims.
	High pump speed.	Reduce pump speed to a minimum. Consult with your Watson-Marlow Bredel pump representative for advice on optimum pump speeds.

Problem	Possible cause	Correction
Low capacity / pressure.	Shut-off valve in the suction line (partly) closed.	Fully open the shut-off valve.
	Under shimming of the pressing shoes.	Check shimming. Refer to § 10.1.7. Fit the correct number of shims.
	Hose failure or badly worn hose.	Replace hose. Refer to § 7.6.
	Partial blockage of the suction line or too little product on the suction side.	Ensure that the suction line is clear of blockages and that sufficient product is available.
	Connections and hose clamps not correctly mounted, which allows the pump to draw in air.	Tighten connections and hose clamps.
	You are starving the pump because the speed is too high for your suction pressure.	Consult your Watson-Marlow Bredel representative for a recommendation.
Vibration of the pump and pipework.	Suction and discharge lines are not secured correctly.	Check and secure pipework.
	High pump speed with long suction and discharge lines or high relative density or a combination of these factors.	Reduce pump speed. Reduce the line lengths on both suction and discharge where possible. Consult your Watson-Marlow Bredel representative for a recommendation.
	Too narrow diameter of suction and/or discharge line.	Increase the diameter of the suction/discharge lines.

Problem	Possible cause	Correction
Short hose life.	Chemical attack of the hose.	Check the compatibility of the hose material with the product to be pumped. Consult your Watson-Marlow Bredel representative for correct hose selection.
	High pump speed.	Reduce pump speed.
	High discharge pressures.	It is recommended that the pressure on the discharge of the pump does not exceed 1600 kPa (232 psi). Check that the discharge line is not blocked, the shut-off valves are fully opened and the pressure relief valve functions properly (if present in the discharge line).
	High product temperature.	Consult your Watson-Marlow Bredel representative for correct hose selection.
	High pulsations.	Restructure the discharge and inlet conditions.
Hose pulled into the pump.	Insufficient or no hose lubricant in the pump head.	Add extra lubricant. Refer to § 7.4.
	Incorrect lubricant: no Watson-Marlow Bredel Genuine Hose Lubricant in the pump head.	Consult the Watson-Marlow Bredel representative for the correct lubricant.
	Extremely high inlet pressure - larger than 300 kPa (43.5 psi).	Reduce the inlet pressure.

Problem	Possible cause	Correction
Lubricant leakage at flange bracket.	Hose blocked by an incompressible object in the hose. The hose cannot be compressed and will be pulled into the pump housing.	Remove hose, check for blockages and replace if necessary.
	Bolts of flange bracket loose.	Tighten to the specified torque settings. Refer to § 10.1.6.
	Bolts of hose clamps loose.	Tighten to the specified torque settings. Refer to § 10.1.6.
Leakage from the rear of the pump housing "Buffer zone".	Damaged sealing ring.	Replace sealing ring.

10 SPECIFICATIONS

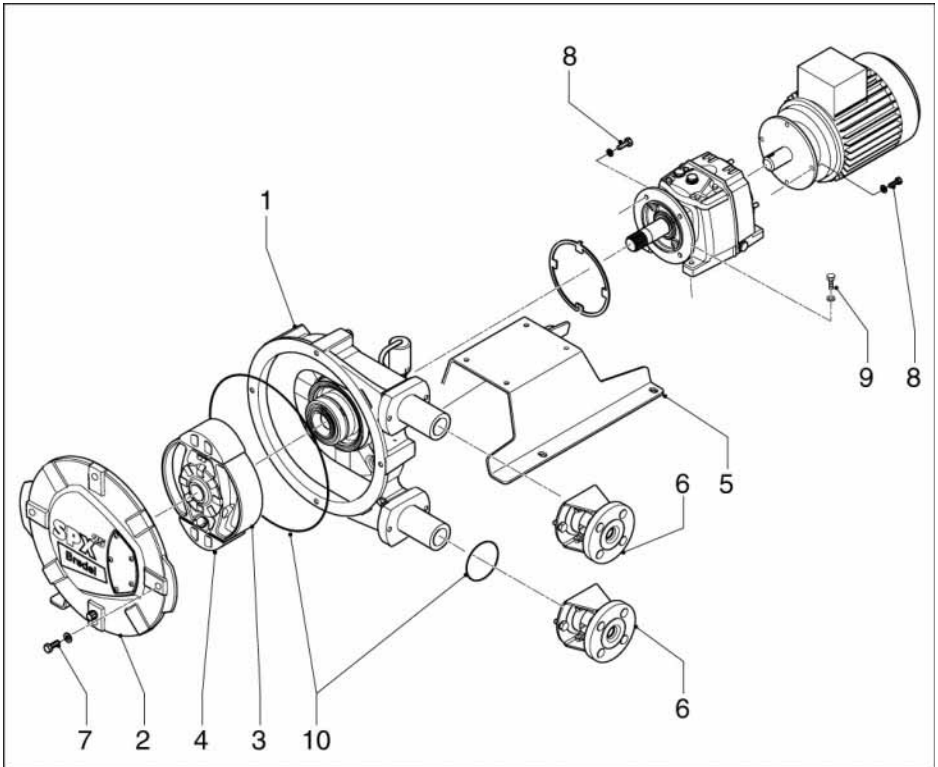
10.1 Pump head

10.1.1 Performance

Description	Unit	SPX25	SPX32
Max. capacity, continuous	m ³ /h	1.80	3.25
	GPM	7.92	14.31
Max. capacity, intermittently *	m ³ /h	2.88	5.25
	GPM	12.68	23.12
Capacity per revolution	l/rev	0.300	0.625
	Gal/rev	0.079	0.165
Max. permissible discharge	kPa	1600	
	PSI	232	
Permissible ambient temperature	°C	-20 to +45	
	°F	-4 to +113	
Permissible product temperature	°C	-10 to +80	
	°F	+14 to +176	
Sound level on 1 m	dB(A)	70	

* Intermittent duty: "Let the pump stand still to cool down for at least 1 hour after 2 hours of operation".

10.1.2 Materials



Pos	Description	Material
1	Pump housing	Cast-iron
2	Cover	Cast-iron
3	Pump rotor	Cast-iron
4	Pressing shoe	Aluminum
5	Pump support	Mild steel, galvanized*
6	Flange bracket	Mild steel, galvanized*
7	Mounting material of pump cover	Mild steel, galvanized*
8	Mounting material of drive system	Mild steel, galvanized*
9	Mounting material of pump support	Mild steel, galvanized*
10	Seals	Neoprene or Nitrile

* Available in Stainless Steel upon request.

10.1.3 Surface treatment


- After surface preparation, one layer of two-component acrylate is used for surface protection. Standard color is RAL 3011, however other colors are optional. Contact your Watson-Marlow Bredel representative for details on surface treatment.
- All galvanized parts, exclusive of mounting articles, have been provided with an electrolytic zinc layer of 15 - 20 microns.

10.1.4 Lubricant table pump

	Unit	SPX25	SPX32
Lubricant	-	Watson-Marlow Bredel Genuine Hose Lubricant	Watson-Marlow Bredel Genuine Hose Lubricant
Required quantity	Liters	2	3.5
	Gallons	0.5	0.9

Watson-Marlow Bredel Genuine Hose Lubricant is registered at NSF: NSF Registration N° 123204; Category Code H1. See also: www.NSF.org/USDA.

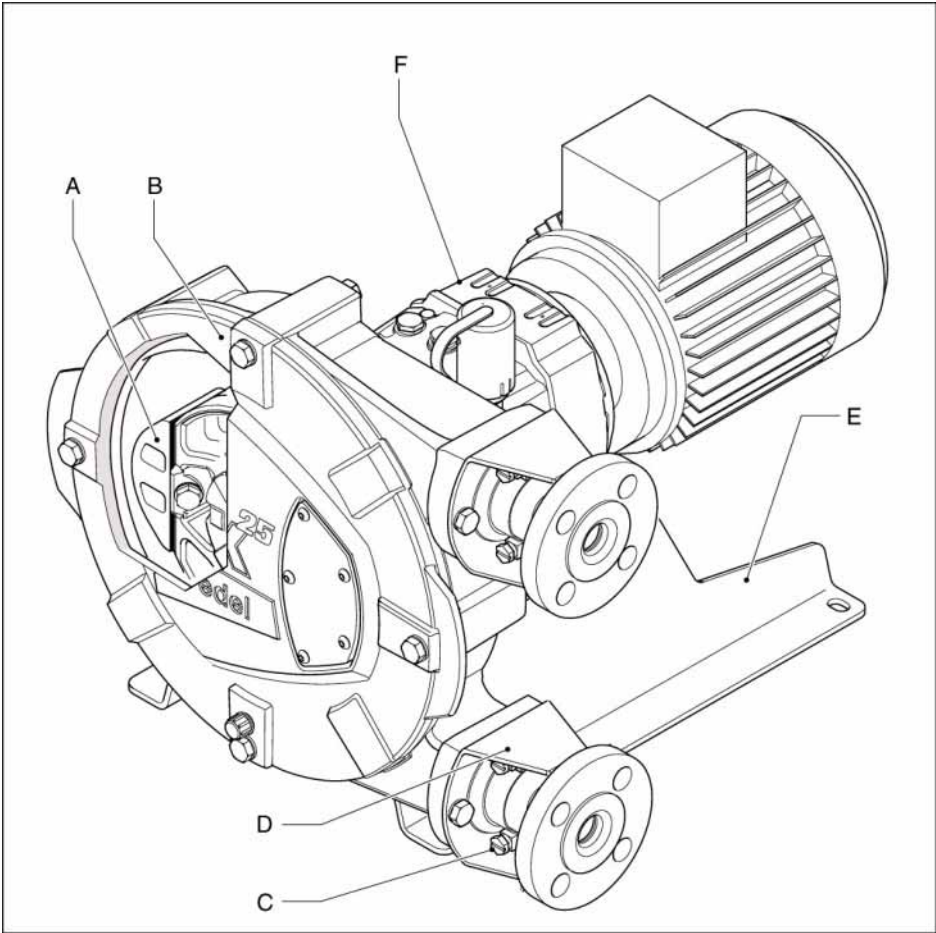
The relative density of Watson-Marlow Bredel Genuine Hose Lubricant is 1.245.

	Should you require additional information with respect to the safety data sheet, consult your Watson-Marlow Bredel representative.
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10.1.5 Weights

Description	Weight [kg/lbs]			
	SPX25		SPX32	
Pump head	39	86	58.5	129
Flange connection (2x), without inserts	3.72	8	5.52	12.2
Stainless steel insert (2x)	0.26	0.6	0.36	0.8
Hose	2	4.4	3	6.6
Lubricant	2.5	5.5	4.4	9.7
Sub total pump head	47.5	104.5	71.8	158.3
Pump support	5.7	12.6	7.1	15.7
Mounting material gearbox-pump head	0.3	0.7	0.3	0.7
Gearbox (model B3-B5)	15.5	34.2	21	46.3
Electric motor	17.3	38.1	25.7	56.7
Varmeca	3	6.6	3	6.6
Total weight of unit	89.3	196.9	128.9	284.2
Pump cover (with inspection window)	9.4	20.7	12.5	27.6
Rotor	5.4	11.9	8.3	18.3
Pressing shoe	0.4	0.9	0.7	1.5

10.1.6 Torque figures



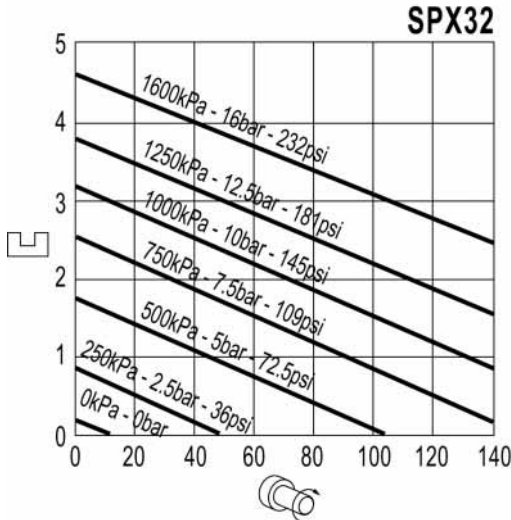
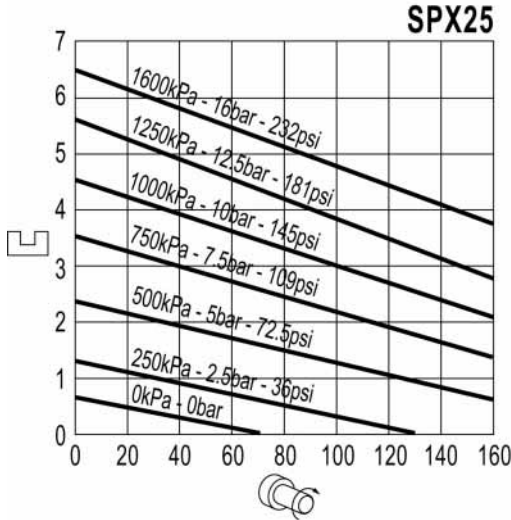
Pos	Description	Unit	SPX25	SPX32
A	Pressing shoe	Nm	64	64
		lbs	566	566
B	Cover	Nm	50	50
		lbs	442	442
C	Hose clamp	Nm	25	25
		lbs	220	220

Pos	Description	Unit	SPX25	SPX32
D	Flange bracket	Nm	50	50
		lbs	442	442
E	Support	Nm	25	85
		lbs	221	752
F	Gearbox	Nm	25	50
		lbs	221	442

Pos	Description	Thread, A/F	
		SPX25	SPX32
A	Pressing shoe	M10 17 mm	M10 17 mm
B	Cover	M10 17 mm	M10 17 mm
C	Hose clamp	M8 13 mm	M8 13 mm
D	Flange bracket	M10 17 mm	M10 17 mm
E	Support	M8 13 mm	M12 19 mm
F	Gearbox	M8 13 mm	M10 13 mm

10.1.7 Shims specifications

- When the temperatures are above 60 °C (140 °F) always use one shim less than indicated in the diagrams.
- Always round up the number of shims.



10.2 Lubricant table gearbox

Below is an overview of some of the recommended lubricants for the *co-axial gearbox*. In the majority of the cases, a mineral oil ISO VG 220 is recommended. In case of extreme ambient temperatures or a relatively wide range of ambient temperatures, a synthetic oil is recommended. Contact your Watson-Marlow Bredel representative for advice.

Recommended lubricants for the Watson-Marlow Bredel co-axial gearboxes			
Oil type	Mineral oil	Synthetic oil	
Change oil every	5000 hours	20,000 hours	
Ambient temperature	-10 °C to +40 °C	-40 °C to +80 °C	-30 °C to +60 °C
	14 °F to 104 °F	-40 °F to 176 °F	-22 °F to 140 °F
DIN (ISO)	CLP (CC)	CLP HC	CLP HC
ISO, NLGI	VG220	VG220	VG150
Mobil	Mobilgear 630	Mobil SHC 630	Mobil SHC 629
Shell	Shell Omala 220	Shell Omala 220 HD	
Klüber	Klüberoil GEM 1-220	Klübersynth GH4-220	Klübersynth EG 4-150
Aral	Aral Degol BG 220	Aral Degol PAS220	
BP	BP Energol GR-XP 220		
Tribol	Tribol 1100/220	Tribol 1510/220	
Texaco	Meropa 220	Pinnacle EP220	Pinnacle EP150
Optimol	Optigear BM 220	Optigear Synthetic A220	
Fuchs	Renolin CLP 220	Renolin Unisyn CLP220	

Recommended lubricants for the Watson-Marlow Bredel co-axial gearboxes			
Oil type	Synthetic oil		
Change oil every	20,000 hours		
Ambient temperature	-30 °C to -10 °C	-30 °C to +60 °C	-30 °C to +40 °C
	-22 °F to 14 °F	-22 °F to 140 °F	-22 °F to 104 °F
DIN (ISO)	CLP HC	HCE	E
ISO, NLGI	VG32	VG460	VG460
		Foodgrade*	Biology**
Mobil	Mobil SHC 624		
Shell		Shell Cassida Fluid GL 460	
Klüber	Klüber-Summit HySyn FG32	Klüber oil 4UH1-460	Klüberbio CA2-460
Aral		Aral Eural Gear 460	Aral Degol BAB 460
Texaco	Cetus PAO 46		
Optimol		Optileb GT 460	Optisynt BS460


* For use in the foodstuffs industry. Meets the requirements of the USDA (United States Department of Agriculture): lubricant is suited for unforeseen contact with foodstuffs.

** Lubricant for use in agricultural areas and nature reserves.

10.3 Electric motor

Standard electric motor design is an enclosed three-phase asynchronous motor. A thermal safety device to prevent motor overload is optional.

Protection class	IP55/IK08
Insulation class	F
Increase in temperature	Within class B
Voltage/frequency	230/400 V - 3 phases - 50 Hz

	In case of doubt about the local applicable regulations for the drive connection, contact your Watson-Marlow Bredel representative.
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10.4 Gearbox

Co-axial gearbox with helical gears. Standard as a 2 and 3 stage version.

Mounting position	IM 2001 (IM B35) foot flange gearbox with splined shaft in horizontal position.
Motor adapter	Electric motor has been integrated in the gearbox housing, by which the smallest possible dimension is achieved.
Optional motor adapter	Adapters in conformance with IEC-B5 or NEMA TC.

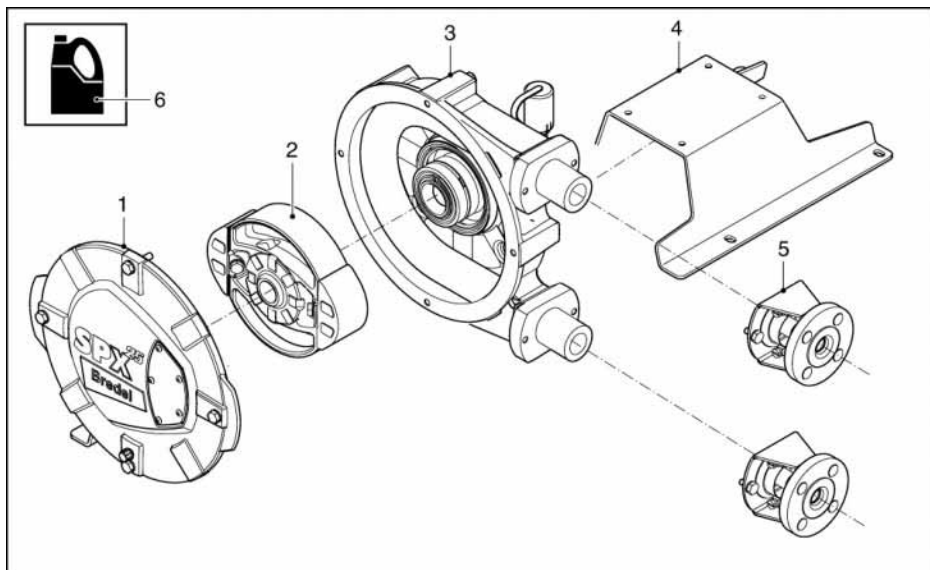
10.5 Frequency controller

The frequency controller has been preprogrammed and only needs to be connected to the mains.

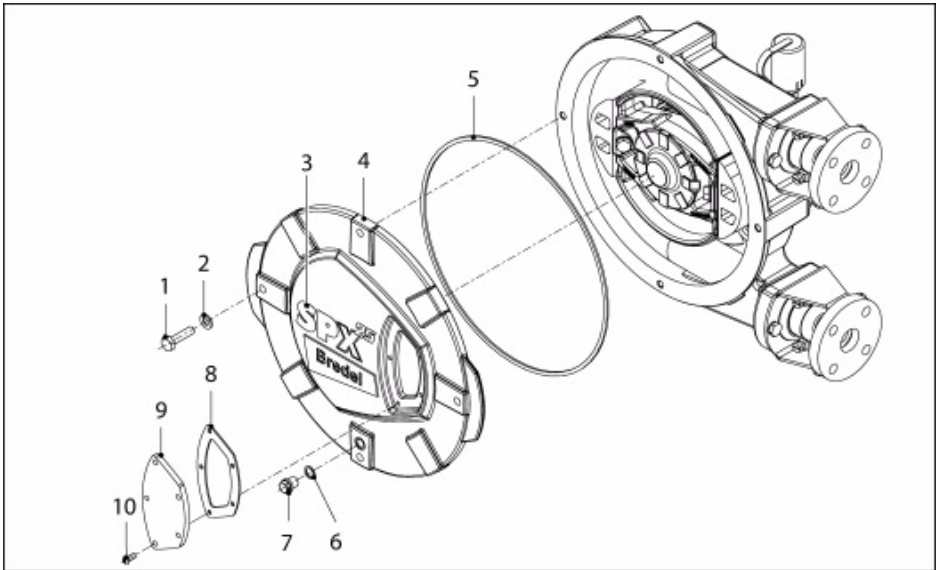
RFI filter	Integrated RFI filter B (industrial applications).
Control	Rotary knob for setting the speed and the keys for starting forward, stop and starting reverse.
Protection class	IP65
Mains power supply	There are 3 types available; the choice depends on the local electricity grid: <ul style="list-style-type: none">• 200-240 V \pm 10%; 50/60 Hz \pm 5%; 1 ph• 200-240 V \pm 10%; 50/60 Hz \pm 5%; 3 ph• 400-480 V \pm 10%; 50/60 Hz \pm 5%; 3 ph

10.6 Parts list

10.6.1 Overview

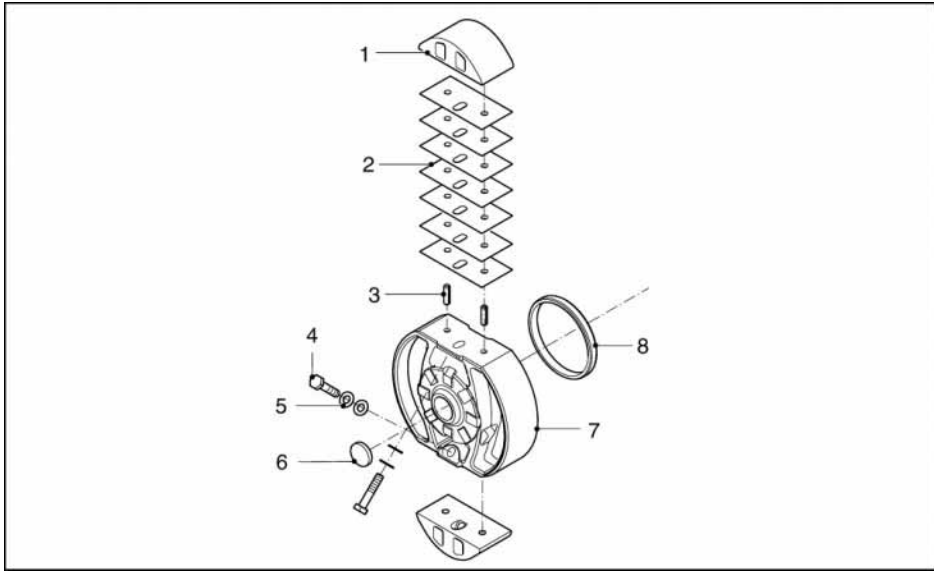


Pos.	Description
1	Cover assembly. Refer to § 10.6.2.
2	Rotor assembly. Refer to § 10.6.3.
3	Pump housing assembly. Refer to § 10.6.4.
4	Pump support assembly. Refer to § 10.6.5.
5	Flange assembly. Refer to § 10.6.6.
6	Lubricants. Refer to § 10.6.8.

10.6.2 Cover assembly


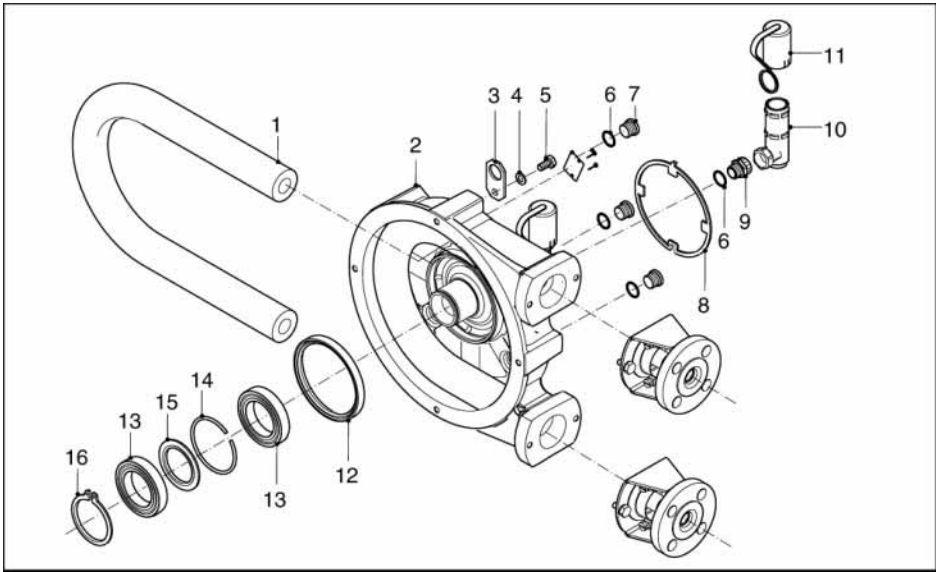
Pos.	Qty.	Description	Product codes for parts of pump type	
			SPX25	SPX32
1	4	Bolt, hex. head	F101058	F101058
2	4	Washer	F322013	F322013
3	1	Sticker	225238	232238
4	1	Cover	225102	232102
5	1	Quad ring	225123	232123
6	1	Gasket	F342019	F342019
7	1	Drain cap	F911502	F911502
8	1	Gasket	225156	232156
9	1	Inspection window	225155	232155
10	5	Round head screw	F552036	
	6			F552036

10.6.3 Rotor assembly



Pos.	Qty.	Description	Product codes for parts of pump type	
			SPX25	SPX32
1	2	Pressing shoe	225110	232110
2	14	Shim	225107	
	10			232107
3	4	Spiral clamping bush	F415084	F415084
4	2	Bolt, hex. head	F101060	F101060
5	2	Nord-Lock ring	F349006	F349006
6	1	Sealing cap	S417007	S417007
7	1	Rotor	225103	232103
8	1	Wear ring	29120202	29120202

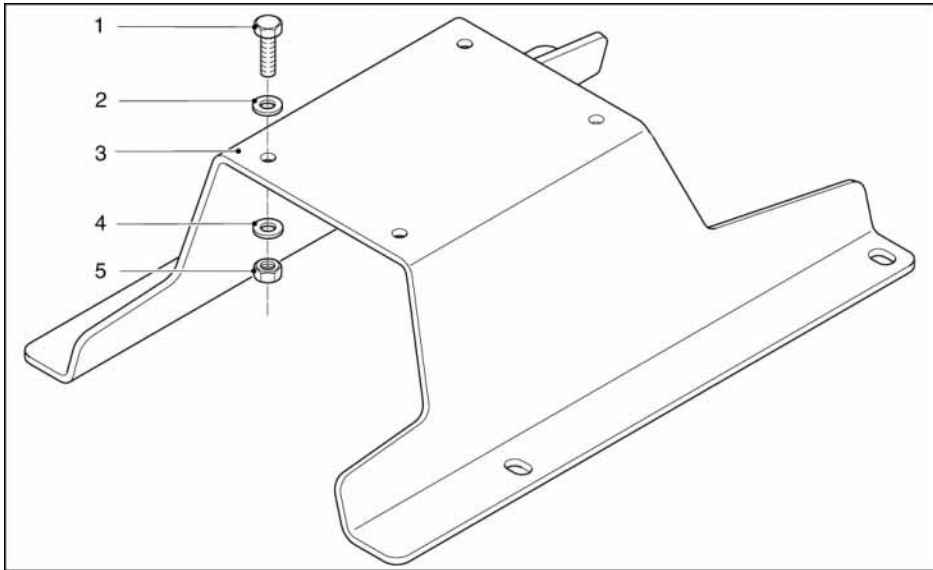
10.6.4 Pump housing assembly



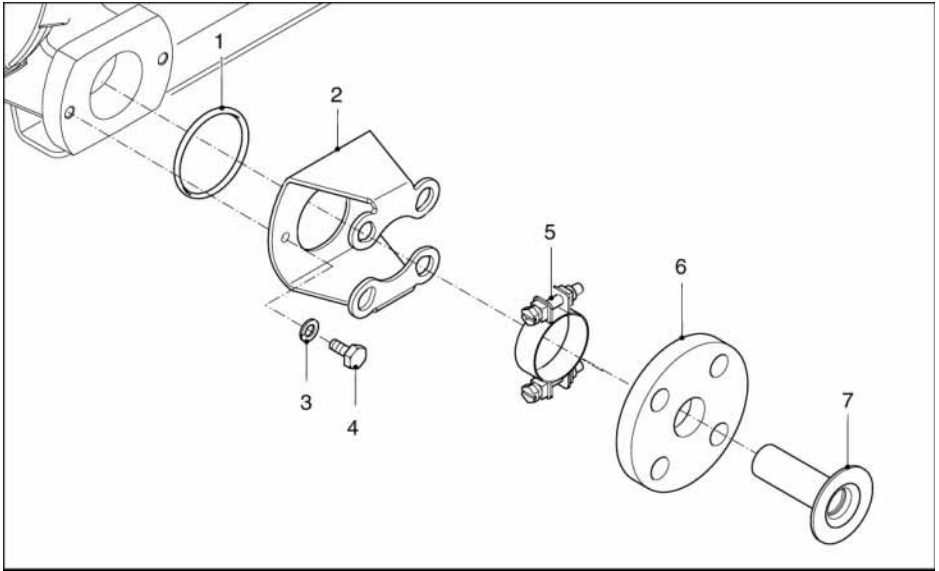
Pos.	Qty.	Description	Product codes for parts of pump type	
			SPX25	SPX32
1	1	NR	025020	032020
	1	NBR	025040	032040
	1	CSM	025070	032070
	1	EPDM	025075	032075
2	1	Pump housing	225101	232101
3	1	Lifting strip	29065361	29065361
4	1	Washer, Spring Lock	F336012	F336012
5	1	Bolt	F111096	F111096
6	4	Gasket	F342027	F342027
7	3	Stop	F901004	F901004
8	1	Seal	225114	232114
9	1	Crimp connector	F602504	F602504
10	1	Breather	29095146	29095146
11	1	Breather cap	29065223	29065223
12	1	Seal	S212411	S212411

Pos.	Qty.	Description	Product codes for parts of pump type	
			SPX25	SPX32
13	2	Bearing	B141260	B141260
14	1	Retaining circlip	29095297	29095297
15	1	Spacer ring	29085201	29085201
16	1	Retaining circlip	F343049	F343049

10.6.5 Support assembly

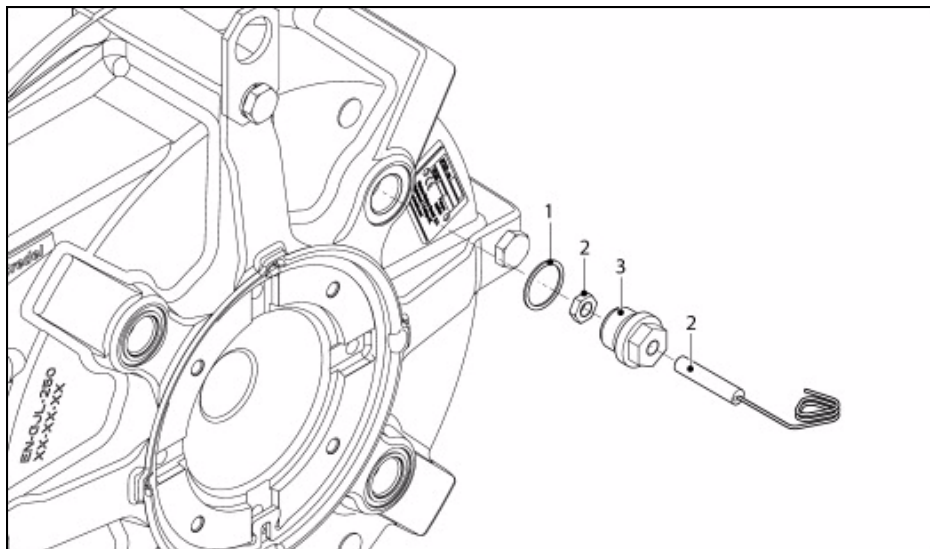


Pos.	Qty.	Description	Product codes for parts of pump type	
			SPX25	SPX32
1	4	Bolt	F101038	F101080
2	4	Washer	F322012	F322015
3	1	Pump support	225106	232106
4	4	Spring washer	F336011	F336013
5	4	Nut	F301006	F301008

10.6.6 Flange assembly


Pos.	Qty.	Description	Product codes for parts of pump type	
			SPX25	SPX32
1	2	O-ring	S112231	S112271
2	2	Flange bracket, Steel	225197	232197
	2	Flange bracket, SS	225197A	232197A
3	4	Washer, Spring Lock	F336012	F336012
4	4	Bolt	F111096	F111096
5	2	Hose clamp	C122005	C122005
6	2	Flange, DIN Steel	025198	032198
	2	Flange, DIN SS	025199	032199
	2	Flange, ANSI Steel	025198A	032198A
	2	Flange, ANSI SS	025199A	032199A
7	2	Insert Stainless steel	025186	032186
	2	Insert, PVC	025187	032187
	2	Insert, PP	025189	032189
	2	Insert PVDF	025190	032190

10.6.7 Revolution counter assembly



Pos.	Qty.	Description	Product codes for parts of pump type	
			SPX25	SPX32
1	1	Gasket	F342027	F342027
2	1	Revolution counter	29040462	29040462
3	1	Adapter	29027248	29027248

10.6.8 Lubricants

Pos.	Qty.	Description	Product codes for parts of pump type	
			SPX25	SPX32
1	1	2 l (0.5 gal) can Watson-Marlow Bredel Genuine Hose Lubricant	902143	-
	1	3 l (0.8 gal) can Watson-Marlow Bredel Genuine Hose Lubricant	-	908143

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