Translation of the manual

English	To get the translation of the manual in your language, use the disc or scan the QR code.
Nederlands	Gebruik de schijf of scan de QR code om de vertaling van de handleiding in uw taal te krijgen.
Deutsch	Um die Übersetzung des Handbuchs in Ihrer Sprache zu erhalten, verwenden Sie die Disk oder scannen Sie den QR-Code.
Português	Para obter a tradução do manual no seu idioma, use o disco ou faça a leitura do código QR.
Español	Para obtener la traducción del manual en su idioma, utilice el disco o escanee el código QR.
Français	Pour accéder à la traduction du manuel dans votre langue, utilisez le disque ou scannez le code QR.
Italiano	Per ottenere la traduzione del manuale nella propria lingua, utilizzare il disco o acquisire il codice QR.
Česky	Chcete-li získat překlad příručky ve vašem jazyce, použijte disk nebo naskenujte QR kód.
Magyar	Ha a kézikönyvet saját nyelvén szeretné, akkor használja a lemezt vagy szkennelje be a QR kódot.
Polski	Aby pobrać instrukcję przetłumaczoną na Państwa język, prosimy skorzystać z płyty lub zeskanować kod QR.
Русский	Для получения руководства на своем языке установите диск или отсканируйте QR-код.
Dansk	For at se en oversættelse af vejledningen på dit sprog, skal du bruge disken eller scanne QR-koden.
Suomi	Saadaksesi käyttöoppaan omalla kielelläsi, käytä levykettä tai skannaa QR-koodi.
Norsk	For å lese håndboken oversatt til ditt eget språk, bruk platen eller scan QR-koden.
Svenska	För att få en översättning av handboken på ditt språk, använda skivan eller skanna QR-koden.
中国	要获取本手册以您的语言呈现的译本，使用光盘或扫描QR代码。

Available documents

For the models APEX28 and APEX35, the following documents are available on disc and website:

- User manual in multiple languages
- Quick reference instructions for the replacement of the pump hose

	The replacement instructions are only for users that are familiar with the replacement procedures in the user manual.

System requirements

Source	Hardware	Software
Disc	PC with CD drive	- internet browser - PDF reader
Website	PC or tablet	- internet browser - PDF reader
QR code	Smartphone or tablet with camera	- internet browser - PDF reader - App that can scan QR codes

How to use the disc

1 Put the disc in the disc drive.
The disc will start automatically.
2 Select the required language.
The PDF reader program shows the selected user manual.

How to use the website

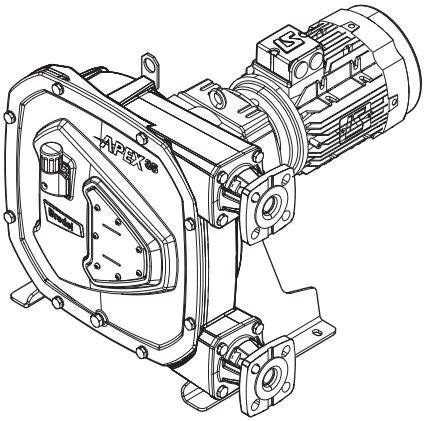
1 Go to the website www.wmftg.com.
2 Select ‘Bredel’, ‘Manual’ and then the required language.
3 Open or save the user manual.
The PDF reader program shows the selected user manual.

How to use the QR code

1 Scan the QR code with your smartphone or tablet.
The app forwards you to the webpage that contains the required language.
2 Open or save the user manual.
The PDF reader program shows the selected user manual.

Hose pump series
APEX28 and APEX35

Installation, Operation and Maintenance Manual



ISO 9001 Quality Management
ISO 14001 Environmental Management

CONTENTS

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.

The manual on the internet
You can find the most recent version of the manual and translations on www.wmftg.com/literature. On this page, select ‘Bredel’, ‘Manual’ and the required language.

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 the gearbox, the motor and the frequency controller is not included in this manual. However, 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 Bredel representative. Make sure you have the following data at hand:

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

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

1.5 Environment and disposal of waste

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

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

2 SAFETY

2.1 Symbols

In this manual the following symbols are used:

	**WARNING** Procedures which, if not carried out with the necessary care, may result in serious bodily harm.

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

	Remarks, suggestions and advice.

2.2 Intended use

The hose pump is exclusively designed for pumping suitable products. Every other or further use is not in conformance with the intended use.
Flammable fluids are not suitable products to be pumped by this hose pump. This pump is not intended to operate in potentially explosive atmospheres.
The "Intended use" as laid down in EN 292-1 is "... the use for which the technical product is intended in accordance with the specifications of the manufacturer, inclusive of his indications in the sales brochure". In case of doubt it is the use, which appears to be its intended use judging from the construction, execution and function of the product, and its description in the user's documentation.
Only use the pump in conformance with the intended use described above. The manufacturer cannot be held responsible for damage or harm resulting from use that

is not in conformance with the intended use. If you want to change the application of your hose pump, contact your Bredel representative first.

2.3 Use in potentially explosive atmospheres

The pumphead and drive mentioned in this manual may be configured to be suitable for use in a potentially explosive atmosphere. Such a pump meets the requirements as stated in the European Directive 94/9/EC (ATEX Directive). Such a pump belongs to: Group II appliances, category 2 GD bck T4.

	Use in potentially explosive atmospheres requires special configuration of the pump. Contact your Bredel representative for use in explosive atmospheres.

See Bredel's ATEX Instruction manual which is supplied with pumps configured as mentioned above.

2.4 Responsibility

The manufacturer does not accept any responsibility for damage or harm caused by not observing the safety regulations and instructions in this manual and other 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 Bredel representative if you notice a potential danger while using your hose pump.

	**WARNING** The user of the hose pump is fully responsible for observing local 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 should only be performed by well-trained and qualified users. Temporary staff and persons in training may use the hose pump only under the supervision and responsibility of trained and qualified users.

2.6 Regulations and instructions

- Everyone who works with the hose pump must be aware of the contents of this manual and observe the instructions with great care.
- Never change the order of the actions to be carried out.
- Always store the manual near the hose pump.

3 WARRANTY CONDITIONS

The manufacturer offers a two-year warranty on all parts of the hose pump. This means that all parts will be repaired or replaced free of charge, with the exception of consumables such as pump hoses, ball bearings, wear rings, seals and compression rings, or parts which have been used wrongly or have been misused, whether or not they have been intentionally damaged. If genuine Watson-Marlow Bredel B.V. (hereafter called Bredel) parts are not used, any warranty claim is void.

Damaged parts which are covered by the applicable warranty conditions can be returned to the manufacturer. The parts must be accompanied by a fully filled in and signed safety form as present in the back of this manual. The safety 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 safety form which specific cleaning procedure has been followed, and that the equipment has been decontaminated. The safety form is required even if the parts have not been used.

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

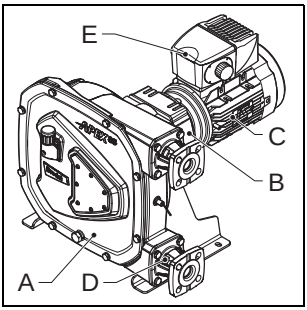
4 DESCRIPTION

4.1 Identification of the product

4.1.1 Identification of the product

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

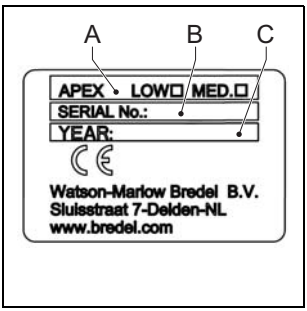
A: Pumphead
B: Gearbox
C: Electric motor
D: Pump hose
E: Frequency controller (option)



4.1.2 Identification of the pump

The identification plate on the pumphead contains the following data:

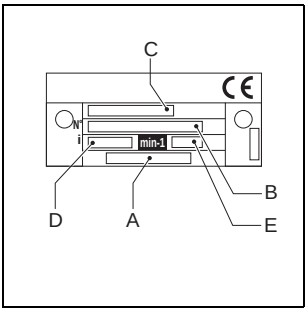
A: Pump type and rotor type (low or medium pressure)
B: Serial number
C: Year of manufacture



4.1.3 Identification of the gearbox

The identification plate on the gearbox contains the following data:

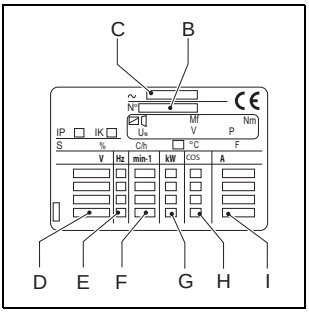
A Article number
B Serial number
C Type number
D Reduction ratio
E Number of revolutions per minute



4.1.4 Identification of the electric motor

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

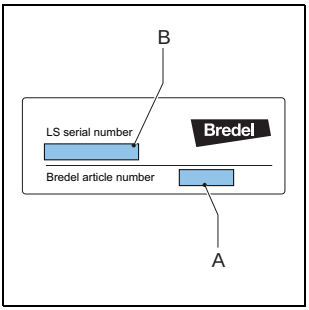
B Serial number
C Article number
D Mains
E Frequency
F Speed
G Power
H Power factor
I Current



4.1.5 Identification of the frequency controller

The identification of the Bredel Variable Frequency Drive (VFD) can be found inside the VFD. Remove the cover by loosening the two screws. The identification sticker contains the following data:

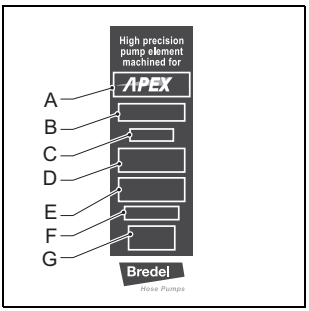
A Article number
B Serial number



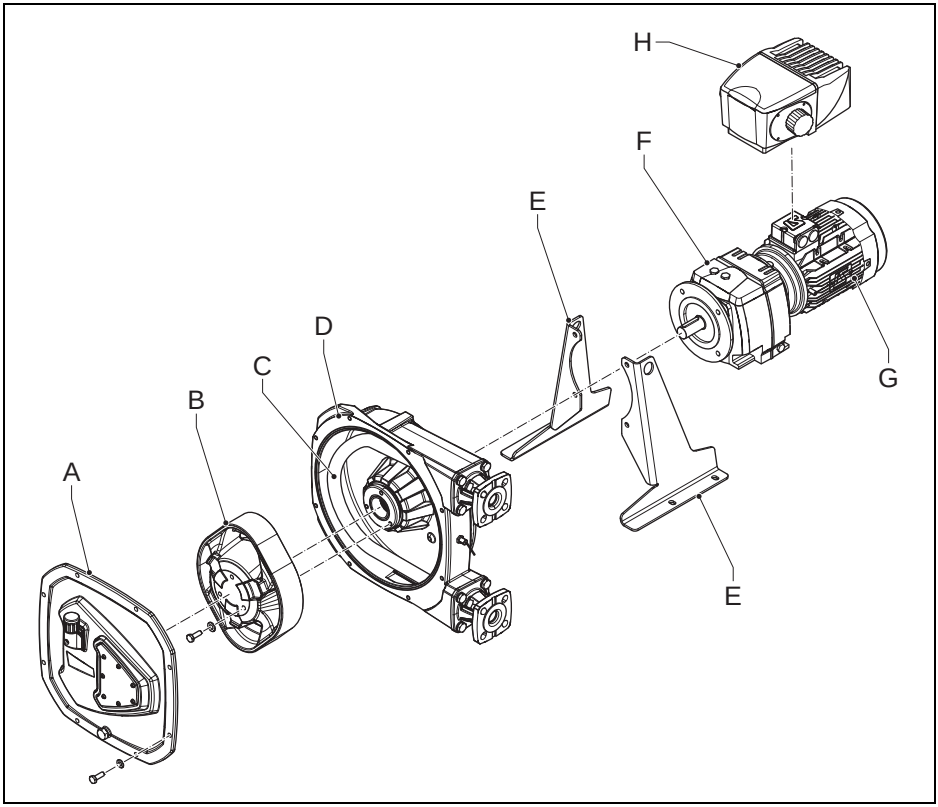
4.1.6 Identification of the pump hose

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

A: Pump type
B: Part code
C: Internal diameter
D: Type of material of inner liner
E: Remarks, if applicable
F: Maximum permissible working pressure
G: Production code



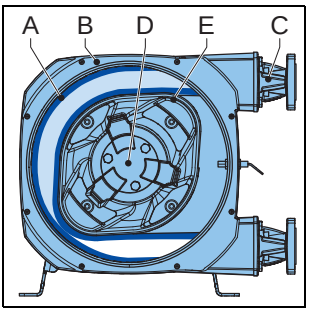
4.2 Construction of the pump



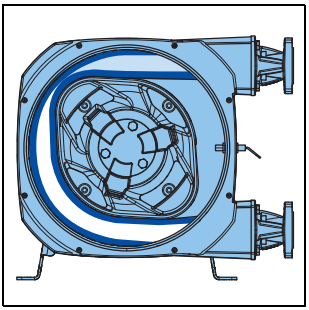
A: Cover
B: Rotor
C: Pump hose
D: Pump housing
E: Supports
F: Gearbox
G: Electric motor
H: Frequency controller

4.3 Operation of the pump

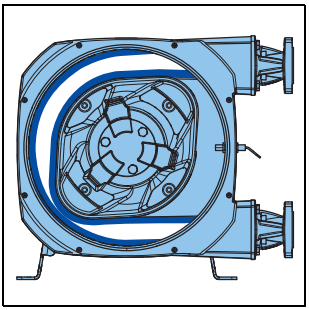
The heart of the pumphead consists of a specially constructed pump hose (A) which lies against the inside of the pump housing (B). The ends of the hose are connected to the suction and discharge lines (C). A bearing-mounted rotor (D) with two facing integral pressing shoes (E) is in the centre of the pumphead. It rotates clockwise.



In phase 1 the lower shoe compresses the pump hose by the rotational movement of the rotor, forcing fluid through the hose. As soon as the shoe has passed, the hose recovers to its original shape due to the mechanical properties of the material and fluid is drawn into the hose.
In phase 2 fluid is drawn through the hose by the (continuous) turning motion of the rotor.



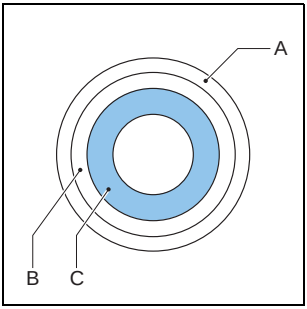
In phase 3, the second integral pressing shoe compresses the pump hose. Due to the continuous rotating movement of the rotor new fluid is sucked in and fluid that is previously drawn in is pressed out by the shoe. When the first shoe leaves the pump hose, the second shoe has already occluded the pump hose and fluid is prevented from flowing back. This method of liquid displacement is known as the "positive displacement principle".



4.4 Pump hose

4.4.1 General

A: Extruded outer layer made of natural rubber
B: Four nylon reinforcement layers
C: Extruded inner liner



The pump hose liner material should be chemically resistant to the product being pumped. For each pump model various hose types are available. Choose the most appropriate for your application.
The material of the inner liner of the pump hose determines the hose type. Each hose type is marked by a unique colour code.

Hose type	Material	Colour code
NR	Natural rubber	Purple
NBR	Nitrile rubber	Yellow
EPDM	EPDM	Red

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

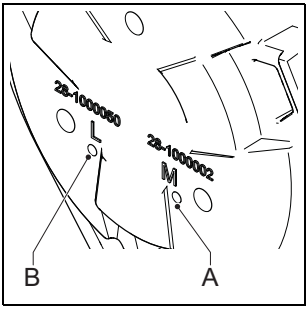
Bredel pump hoses have been carefully machined to achieve minimum tolerances in wall thickness. It is very important to guarantee the correct compression of the pump hose, because:

- When the compression is too high, it creates an excessive load on the pump and pump hose, which may reduce the life of the pump hose and bearings.
- When the compression is too low, it cuts capacity and causes backflow. Backflow reduces the life of the pump hose.

4.4.2 Hose compression force adjustment

The compression force on the pump hose can be adjusted by installing a rotor with a different dimension between the tips of the integral pressing shoes. The rotor is chosen to achieve an optimal life of the pump hose for the intended use of the hose pump. Two rotor sizes are available: a low-pressure rotor and a medium pressure rotor.

Low-pressure rotors and medium-pressure rotors can be recognized by a marked hole near the 'M' for medium-pressure (A) or 'L' for low-pressure (B) on the rotor.
Refer to the table for the correct rotor per required discharge pressure.



Discharge pressure	Rotor size
0 - 400 kPa	Low-pressure
0 - 800 kPa*	Medium-pressure

* Preferably 400 - 800 kPa

If you want to change the application of your hose pump, contact your Bredel representative.

4.4.3 Lubrication and cooling

The pumphead is filled with Bredel Genuine Hose Lubricant. This lubricant lubricates the shoes and dissipates the heat generated by the movement of the pressing shoes against the pump hose.
The lubricant is food grade. The user is responsible to ensure the chemical compatibility of the lubricant with the fluid to be pumped. Refer to § 11.1.4 for the required quantity and NSF registration.
Refer to § 7.5 for the consequences of a hose failure.

i	Consult your Bredel representative for lubrication recommendations when operating the hose pump below 2 rpm.

4.5 Gearbox

The hose pump types described in this manual use helical gearbox units. Other gearbox types are available as option. The gearboxes are fitted with a flange connection. The standard fasteners are bolts, but studs and nuts are packed separately for your convenience. Refer to § 11.3 for specifications.
Refer to the documentation supplied with the gearbox for installation and maintenance information. In case of doubt, consult your Bredel representative.

4.6 Electric motor

The standard electric motor is a completely enclosed three-phase asynchronous motor. The motor connection must meet the local applicable regulations. Refer to the documentation supplied with the electric motor for installation and maintenance information. In case of doubt consult your Bredel representative. Refer to § 5.3.4 and § 6.1 for installation and connection information.

4.7 Available options

The following options are available for the hose pump:

- High level float switch
- Revolution counter
- Medium- or low-pressure rotor (depending on the discharge pressure)
- Frequency controller[1]
- Three hose types
- Special configuration for use in explosive atmospheres

1 Refer to the supplier's documentation and § 11.5.

5 INSTALLATION

5.1 Unpacking

Follow the unpacking instructions on the packaging or on the hose pump, the gearbox and the electric motor.

5.2 Inspection

Check that your delivery is correct and check it for any transport damage. When replacing parts, check that the delivery is correct and check these parts for any transport damage. Refer to § 4.1.1. Report any damage immediately to your 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 °C and not higher than +40 °C.

5.3.2 Setup

- The pump materials and protective layers are suitable for indoor setup and a protected outdoor setup. Under certain conditions the pump is suitable for limited outdoor setup or a salty or aggressive atmosphere. Consult your Bredel representative for more information.
- Make sure that the floor surface has a maximum slope of 10 mm per metre.
- Make sure that there is sufficient room around the pump to carry out the necessary maintenance.
- Make sure that the room is sufficiently ventilated, so that the heat developed by the pump and drive can be dissipated. Keep some distance between the ventilation cover of the electric motor and the wall to allow the supply of cooling air.

5.3.3 Pipework

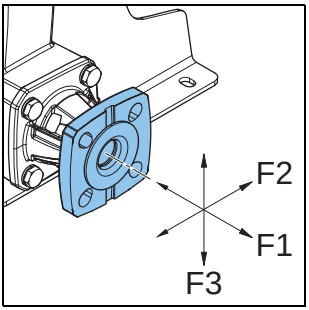
When determining and connecting suction and discharge lines consider the following points:

- It is recommended that the bore size of the suction and discharge lines is larger than the bore size of the pump hose. For more information consult your Bredel representative.
- Limit the presence of sharp bends in the discharge line. Make sure that the radius of any bend is as large as possible. Use Y-connections instead of T-connections.
- Keep the delivery and suction lines as short and direct as possible.
- It is recommended to use a minimum of three quarters (3/4) of the hose length as flexible hose in the suction or discharge line. This avoids the need to remove the connection lines when changing a pump hose.
- Select the correct mounting material for flexible hoses and make sure that the installation is suited for the design pressure of the system.
- Do not exceed the maximum working pressure of the hose pump. Refer to § 11.1.1. If necessary fit a pressure relief valve.

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 [N] on the pump connections	
Force	**APEX28, 35**
F1	600
F2	500
F3	500



5.3.4 Motor

The motor connection must meet the local applicable regulations. A thermal safety device should reduce the risk of a motor overload. For connecting PTC thermistors (if present) a special thermistor relay must be used. In case of doubt, contact your Bredel representative for advice. Refer to § 11.4 for specifications.

Refer to the documentation supplied with the electric motor for information on how to connect the motor to your power supply.

5.3.5 Frequency controller

⚠	**WARNING** A frequency controller that is fitted *without manual control* can start the pump automatically when power is applied.

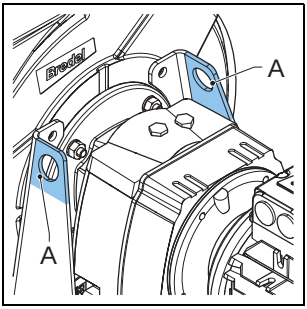
If the hose pump is fitted with a frequency controller, consider the following points:

- Take precautions so the motor does not restart automatically after an unscheduled stop.
  In the event of a power or mechanical failure, the frequency controller stops the motor. When the cause of the failure is removed, the motor can restart automatically. The automatic restart can be dangerous in certain pump installations.

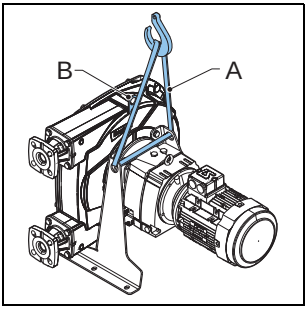
- All control cables outside the enclosure must be shielded and have a cross sectional area between 0.22 mm^2 and 1 mm^2. The shielding must be connected to earth at just one end. In case of doubt, consult your Bredel representative.

5.4 Lifting and moving the pump

The pump supports each have a lifting eye (A) for lifting and moving the hose pump.



The complete hose pump, i.e. pumphead, gearbox and electric motor, must be lifted using the lifting eyes and suitably rated straps or slings (A). For the weights, refer to § 11.1.5.



The pumphead can be lifted by using the lifting lug (B).

⚠	**WARNING** If the pump is to be lifted ensure that all standard lifting practices are adhered to and carried out by qualified personnel only.

5.5 Placing the pump

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

6 COMMISSIONING

6.1 Preparations

	**WARNING** A frequency controller that is fitted *without manual control* can start the pump automatically when power is applied.

	**WARNING** Disconnect and lock the power supply to the pump drive before any work is carried out. In case the motor is fitted with a frequency controller and has a single-phase power supply, wait two minutes to make sure that the capacitors have discharged.

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 and § 5.3.5. Have the electrical installation work carried out by qualified personnel.

2. Check that the lubricant level is above the minimum level line in the inspection window. If necessary refill with Bredel Genuine Hose Lubricant via the breather plug. Also refer to § 8.4.

6.2 Commissioning

1. Connect the pipework.

2. Make sure that there are no obstructions such as closed valves.

3. Switch on the hose pump.

4. Check the rotation of the rotor.

5. Check the capacity of the hose pump. If the capacity differs from your specification, follow the instructions in chapter 10 or consult your Bredel representative.

6. If a frequency controller is present, check the capacity range. In case of any deviations consult the supplier's documentation.

7. Check the hose pump in accordance with points 2 to 4 of the maintenance table at § 8.2.

7 OPERATION

7.1 Temperature

The pump will heat up during normal operation. Heat is generated as the pump hose is compressed and released. The heat is removed by the lubricant and transported to the pump housing and cover. This will result in a temperature higher than the ambient temperature.

	**WARNING** Avoid contact with the casing and cover under conditions of high pressure and running speed.

7.2 Power rating

The pump requires a certain amount of power for the specified operating condition(s). The gearbox and motor should be capable of handling that power at the given revolution speeds. Refer to § 7.3 to determine the required power.

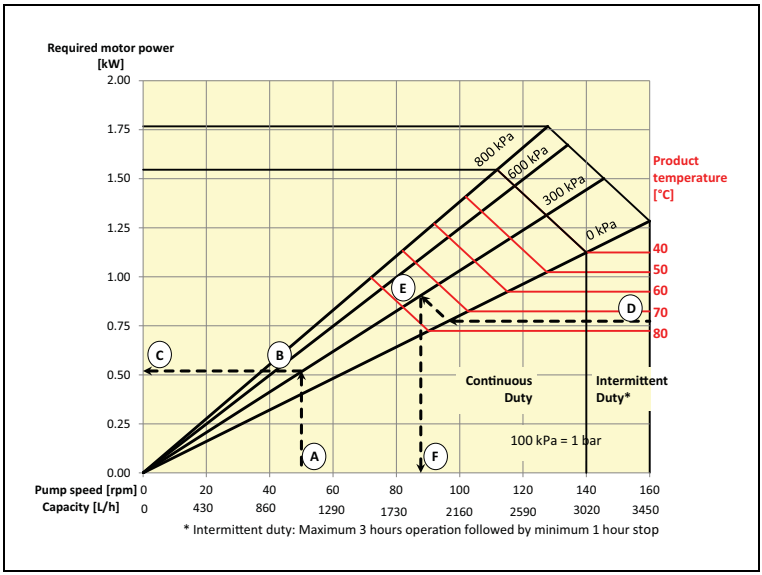
	**WARNING** Overloading the motor can lead to serious motor damage. Do not exceed the maximum power rating of the motor.

	**WARNING** Overloading the gearbox leads to increased tooth wear and shortened bearing life. This can lead to serious gearbox damage. Do not exceed the maximum power rating of the gearbox.

7.3 Performance graphs

Useful operating duties can be found in the performance graphs in which discharge-pressure curves are displayed in a speed-power diagram.
Even at 0 kPa discharge pressure a certain torque is required to let the pump rotor rotate. The pump and hose are designed to handle a discharge pressure up to 800 kPa. The triangular area between the 0 kPa and the 800 kPa lines describes the allowed performance area. The required duty points have to fall within this area.
In the direction of higher speeds and powers, pump operation is limited by the heat generated, the product temperature and the ambient temperature. Product-temperature lines determine a distinction between areas of continuous operation and intermittent operation in the graphs. The graphs apply for a maximum ambient temperature of 40 °C.
If the duty for an application is specified in the area of intermittent operation, let the pump stand still to cool down for at least one hour after three hours of operation.

7.3.1 How to use the graphs



A: Required flow or pump speed
B: Required discharge pressure
C: Required motor power
D: Product temperature
E: Required discharge pressure
F: Maximum allowed pump speed

Refer to the graph to understand how to use the graphs to determine the required motor power or the maximum allowed pump speed.

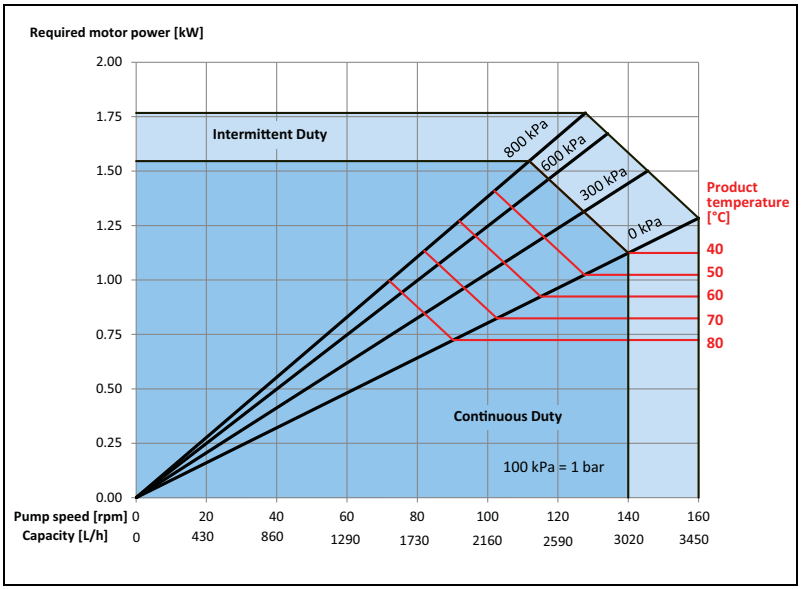
To determine the required motor power:

1 Start at the required flow or pump speed (A).
2 Meet the line of the required discharge pressure (B).
3 Read the required motor power (C).

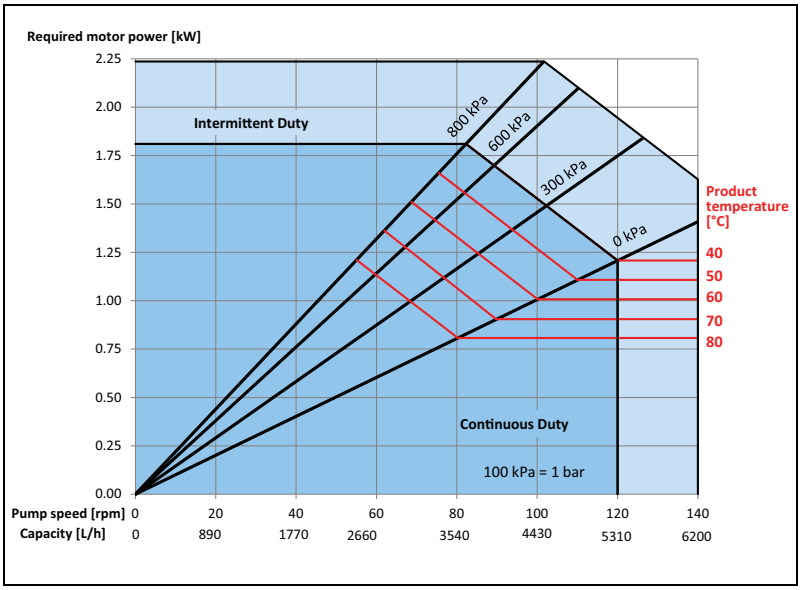
To determine maximum allowed pump speed:

1 Start at the product temperature (D)
2 Meet the line of the required discharge pressure (E).
3 Read the maximum allowed pump speed (F).

7.3.2 Performance graph APEX28:



7.3.3 Performance graph APEX35:



7.4 Dry running

Dry running is a running condition of the pump when no fluid is flowing through the pump hose. Bredel hose pumps are very suitable for dry running.
Dry running imposes an additional thermal load on the pump hose, because a part of the internal heat associated with repetitive hose compression is normally removed by the process fluid. So dry running increases the wear on the hose. The thermal load depends on the running speed of the pump, as well as the rotor type (low pressure or medium pressure). To minimise the extra wear, it is advisable to minimise dry running periods.

7.5 Hose failure

Cause of a hose failure
The hose in a peristaltic pump has to withstand many load cycles of considerable magnitude. The repetitive stress cycles will cause the hose to deteriorate and eventually fail.

Result of a hose failure
A hose failure will result in direct contact between the pumped fluid and the pump lubricant, the internal parts, and the dynamic seal.

Consequences of a hose failure
In general, this will not cause a hazardous situation because the Bredel Genuine Hose Lubricant is harmless (approved by the United States Food and Drug Administration). However, there is an exception in case of pumping a strong oxidiser or a strong acid.
Refer to § 11.1.4 about chemical compatibility.

- Hazardous situations

	**WARNING** Avoid direct contact between a strong oxidiser or a strong acid and Bredel Genuine Hose Lubricant. This can cause unwanted chemical reactions. Use an alternative lubricant to avoid hazardous situations. Contact your Bredel representative for more details.

- Additional downtime
  Hose failure will result in additional downtime, because you must clean the pump before a new hose installation.

	Regularly replace the hose to avoid hose failure and additional downtime. Hose life depends on the operating condition, process fluid and hose material. The end-user should be aware of this and establish the frequency of preventive hose replacement. Contact your Bredel representative for advice.

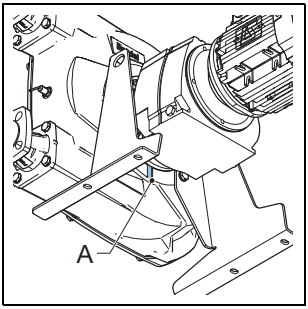
- Large spill of product
  In case the pressure in the process line (reservoir) is above the pressure in the pump housing (ambient pressure), the process fluid can enter the pump housing. If there is no check valve in the process line a serious amount of fluid can flow from the reservoir into the pump housing and escape through the breather onto the floor. This could lead to a large spill of product outside the pump. Reversed flow protection is advised. This is not part of the scope of delivery.
  A high-level float switch can be applied to detect fluid escaping through the breather. Refer to § 8.7.1.

7.6 Fluid leakage

The APEX pump uses a lubricated rotor to compress the hose. This means the pumphead must be filled with sufficient lubricant during operation. This lubricant is contained in the pump housing by the front cover and by a dynamic seal on the back. The gearbox is filled with gearbox lubricant.

Seal damage can occur due to normal wear in time, but is seriously accelerated if the seal gets in contact with contaminated lubricant. Thorough cleaning of the pump housing after a hose failure and regular replacement of the lubricant is strongly advised.

The pumphead and gearbox are directly coupled to each other. A special feature is included in the pumphead to allow early detection of seal damage of the pump or gearbox.
This feature is called the leakage zone (A). Drops of lubricant visible at the back of the pump indicate likely seal failure. To avoid consequential damage, the pump must be stopped and lubricant levels of the pumphead and gearbox must be checked. The damaged seal should be replaced.



	Regularly inspect the pump for fluid leakage.

	WARNING Risk of injury from falling! Process fluid mixed with pump lubricant that is leaking from the pump can make floors slippery.

8 MAINTENANCE

8.1 General

	**WARNING** Disconnect and lock the power supply to the pump drive before any work is carried out. In case the motor is fitted with a frequency controller and has a single-phase power supply, wait two minutes to make sure that the capacitors have discharged.

	**WARNING** Do not remove the pump cover if the power cable is connected to the motor. Do not connect the power cable to the motor if the pump cover is removed.

Only use original Bredel parts when maintaining the hose pump. Bredel cannot guarantee correct operation and any consequential damage that occurs from the use of non-original Bredel components. Also refer to chapters 2 and 3.
Check that your delivery of original parts is correct and check it for any transport damage. If parts are damaged, consult your Bredel representative.

	Before installation, always check the condition of the supplied parts. Do not install damaged parts. In case of doubt, contact your Bredel representative.

8.2 Maintenance and periodic inspections

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

Point	Action	To be carried out	Remark
1	Checking the lubricant level.	Before starting the pump and at scheduled intervals at stand still.	Make sure that the lubricant level is above the minimum level line in the inspection window. If necessary refill the lubricant. Also refer to § 8.4.
2	Checking the pump-head for any leakage of lubricant around the cover, the brackets and the rear of the pump-head.	Before starting the pump and at scheduled intervals during operation.	Refer to § 10.
3	Checking the gearbox for any leakage.	Before starting the pump and at scheduled intervals during operation.	In case of leakage consult your Bredel representative.
4	Checking the pump for deviating temperature or strange noises.	At scheduled intervals during operation.	Refer to § 10.
5	Checking the rotor with integral pressing shoes for excessive wear.	When replacing the pump hose.	Refer to § 8.5.
6	Internal cleaning of the pump hose.	Cleaning of the system or fluid change.	Refer to § 8.3.
7	Replacing the pump hose.	Preventive, this means after 75% of the hose life of the first hose.	Refer to § 8.5.
8	Changing lubricant.	After every second hose change or after 5,000 service hours, whichever comes first, or after hose rupture.	Refer to § 8.4
9	Replacing the seal ring.	If necessary.	Refer to § 8.6.2.

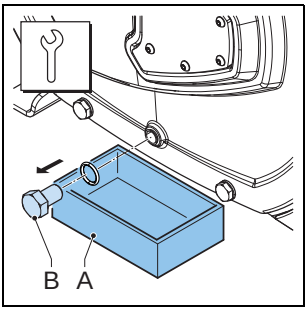
Point	Action	To be carried out	Remark
10	Replacing the rotor with integral pressing shoes.	Wear on the running surface of the pump hose and/or seal ring.	Refer to § 8.6.1.
11	Replacing the bearing.	If necessary.	Refer to § 8.6.2.

8.3 Cleaning the pump hose

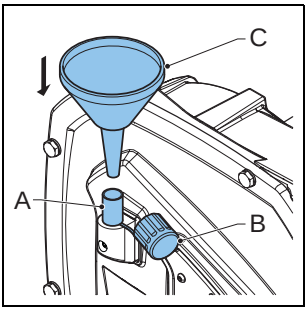
The inside of the pump hose can be easily cleaned by rinsing the pump with clean water. If a cleaning fluid is added to the water, check if the hose liner material is resistant to it. Also check if the pump hose can resist the cleaning temperature. Special cleaning balls are also available. Contact your Bredel representative for more details.

8.4 Changing lubricant

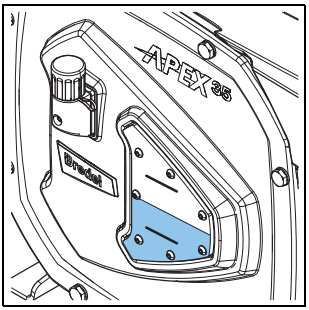
1. Place a tray (A) under the drain plug, which is in the cover of the pump. Remove the drain plug (B). Drain the lubricant from the pump housing into the tray. Place back the drain plug and tighten it.



2. The pump housing can be filled with lubricant via the breather (A) on the cover. For this purpose remove the breather cap (B) and position a funnel (C) in the breather. Pour the lubricant into the pump housing through the funnel.



3. Keep on pouring until the lubricant level has risen above the low level line in the inspection window. Place back the breather cap.



ℹ	For the required quantity of lubricant, refer to § 11.1.4.

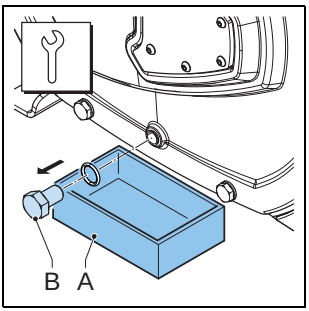
8.5 Replacing the pump hose

8.5.1 Removing the pump hose

1. Isolate the pump from the electrical supply.

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

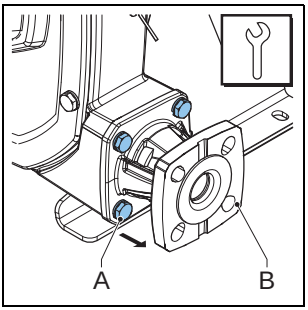
3. Place a tray (A) under the drain plug in the bottom of the pumphead. The tray must be large enough to contain the lubricant, possibly contaminated with process fluid, from the pumphead. Remove the drain plug (B). Catch the lubricant from the pump housing in the tray. Check that the breather mounted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



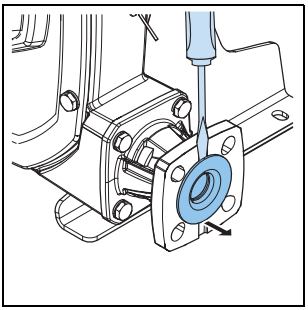
4. Disconnect the suction and discharge lines from the brackets.

⚠	**WARNING** When disconnecting the suction and discharge lines, process fluid can escape. The pump hose may still contain process fluid, after the suction and discharge lines are disconnected.

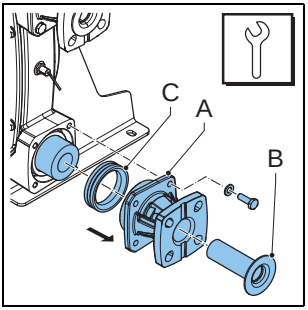
5. Loosen the four bolts (A) of the bracket (B) and remove the bolts and the washers. The bracket will be pushed back slightly while removing the bolts.



6. Pull the insert out of the hose. If necessary, insert the tip of a screwdriver behind the flange of the insert.

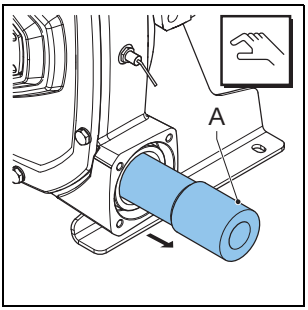


7. With the insert (B) removed, pull the bracket (A) off the hose. If the compression ring (C) stays on the hose, remove it from the hose.
Do steps 5 to 7 for both the inlet and outlet ports.



8. Switch on the electrical supply.

9. Drive out the hose (A) from the pump housing by jogging the drive motor.

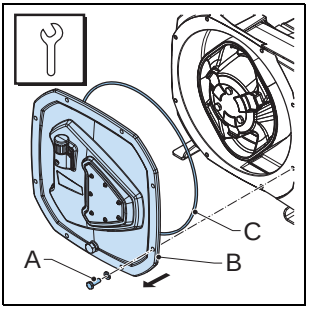


⚠	**WARNING** During jogging the drive: - Do not stand in front of the pump ports. - Do not try to guide the hose by hand.

8.5.2 Cleaning the pumphead

1. Isolate the pump from the electrical supply.

2. Remove the cover (B) by loosening the bolts (A).



3. Check the cover seal (C) and replace it if necessary.

4. Rinse the pumphead with clean water and remove all residues. Clean the pockets in the pump housing. Make sure that no rinsing water remains in the pumphead.

5. Check the rotor for wear or damage and replace the rotor if necessary. Also refer to the maintenance diagram in § 8.2.

	**CAUTION** When the rotor is worn the compression force of the hose decreases. A compression force that is too low results in a loss of capacity due to the backflow of the process fluid. Backflow results in a reduction of the life of the pump hose.

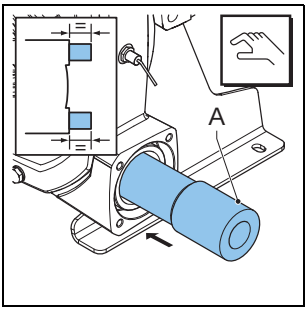
6. Place back the cover and fasten the retaining bolts to the correct torque. Refer to § 11.1.6.

7. Switch on the electrical supply to the pump.

8.5.3 Fitting the pump hose

1. Clean the (new) pump hose on the outside and fully lubricate the outside with Bredel Genuine Hose Lubricant.

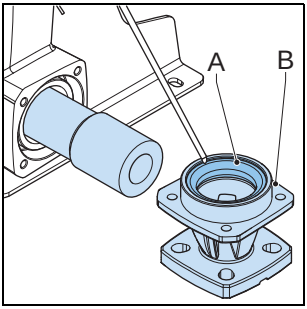
2. Fit the pump hose (A) via one of the ports.



3. Run the motor so that the rotor pulls the hose into the pump housing. Stop the motor when the hose sticks out equally from both sides of the pump housing.

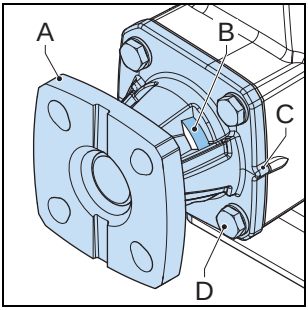
⚠	**WARNING** During jogging the drive: - Do not stand in front of the pump ports. - Do not try to guide the hose by hand.

4. Check that the rubber compression rings (A) are not deformed or damaged and replace them if necessary.



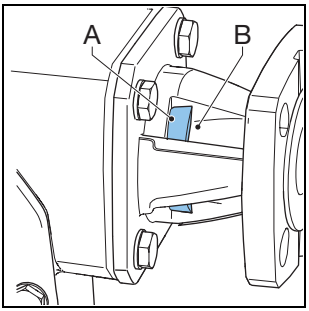
5. First fit the inlet port.
Fit the compression ring (A) in the bracket (B) and lubricate both the ring (as shown) and the hose end with Bredel Genuine Hose Lubricant. Using lubricant enables a smooth assembly.

6. Slide the bracket (A) with the compression ring over the hose (B). Be aware that the bracket has an asymmetric shape and that the cam (C) must point to the back side of the pump.

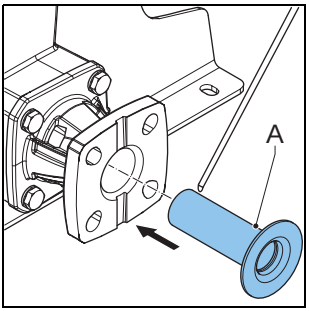


7. Insert the four bolts (D) and tighten them only with hand force. Make sure that the compression ring is not already compressed.

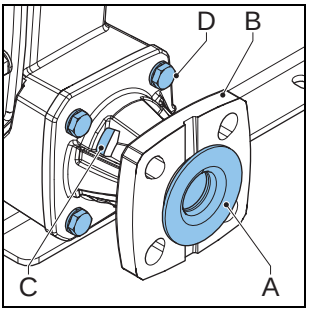
8. If the hose is not yet at its end position, then turn the rotor in such a way that the hose (A) is pressed against its end position in the bracket (B).



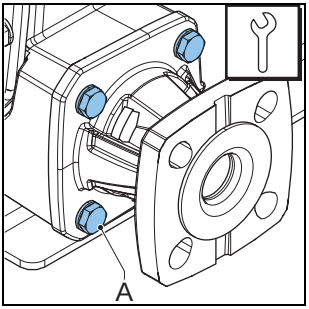
9. Lubricate the insert (A) with Bredel Genuine Hose Lubricant. Manually spread the lubricant over the insert.



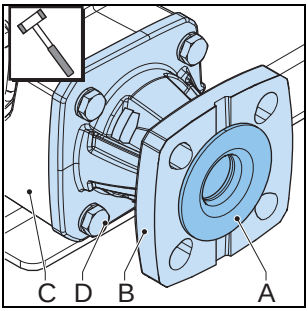
10. Push the insert (A) in the bracket (B) and the hose (C). Use hand force only. If the bolts (D) were tightened too much in step 7, loosen them a little to make the insertion easier.



11. Tighten the bolts (A). Normally, it is sufficient to tighten two bolts that are diagonally opposite each other. The other two bolts can be tightened when the bracket is at its end position. Make sure the bolts are tightened to the correct torque. Refer to § 11.1.6.



12. Although the insert (A) stays at its position when the bracket (B) is in the end position, the insert may be pushed out slightly while the bracket is pulled against the pump port (C). In that case, use a plastic hammer to gently drive in the insert to its end position while tightening the bolts (D).



13. Now fit the other port in the same way.

14. Fill the pump housing with Bredel Genuine Hose Lubricant. Refer to § 8.4.

15. Connect the suction and discharge lines.

16. If applicable: before the pump is put into operation, open any shut-off valves in the suction and discharge lines.

8.6 Exchanging replacement parts

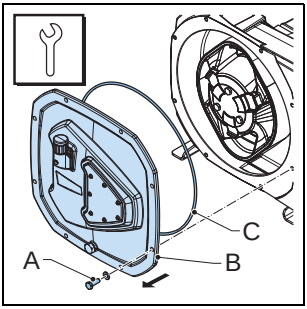
8.6.1 Replacing the rotor

1. Remove the pump hose. Refer to § 8.5.1.

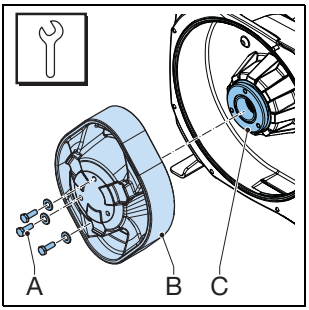
2. Isolate the pump from the electrical supply.

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

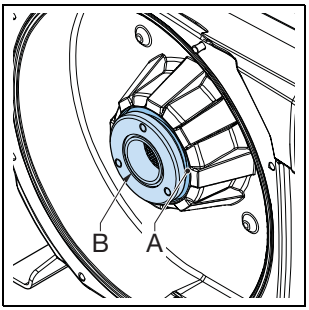
4. Check the cover seal (C) and replace it if necessary.



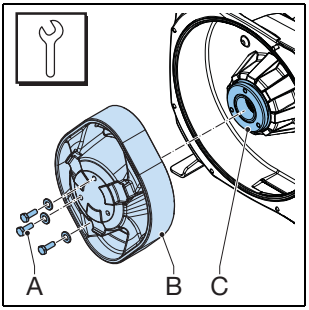
5. Remove the three retaining bolts and washers (A) and take the rotor (B) off the pump shaft (C).



6. Check the outside of the dynamic seal (A) for deformation or damage as far as possible. The dynamic seal is partly covered by the pump shaft. Replace the dynamic seal if necessary. Refer to § 8.6.2.
Replace the O-ring (B), if necessary.



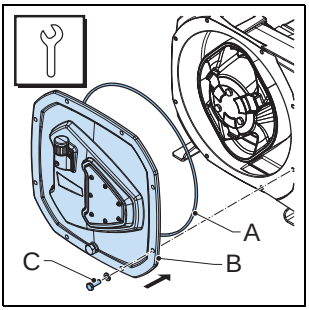
7. Fit the (new) rotor (B) on the pump shaft (C). Install the retaining bolts and washers (A) and tighten them to the correct torque. Refer to § 11.1.6.



8. Refit the cover (B) and the seal (A) (if it was removed). Make sure that the eight bolts (C) are refitted and that they are tightened in the correct order, diagonally opposite each other. Refer to § 11.1.6.

9. Switch on the electrical supply to the pump.

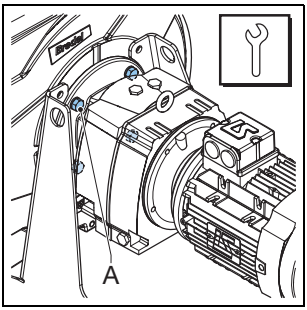
10. Fit the (new) pump hose. Refer to § 8.5.3.



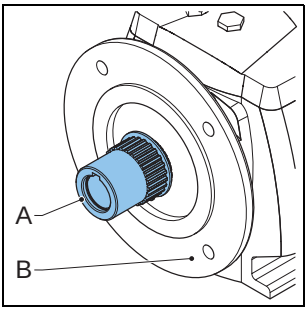
8.6.2 Replacing the bearing, seal ring, shaft and coupling bush

1. Remove the hose, the cover and the rotor. Refer to § 8.6.1, steps 1 to 5.

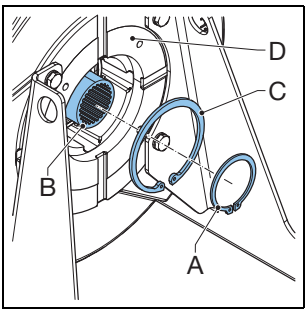
2. Remove the four bolts (A) and washers and remove the pump drive from the pump housing.



3. Check the teeth on the coupling bush (A) that is on the output shaft of the gearbox (B) for wear and damage. Replace the coupling bush if necessary.

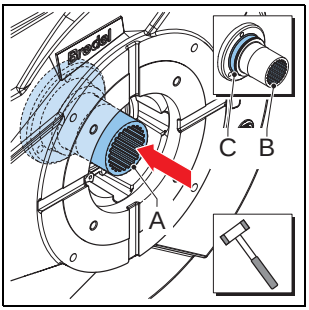


4. Use circlip pliers to remove the circlip (A) from the pump shaft (B) and, if the bearing must be replaced, to remove the circlip (C) from the pump housing (D).



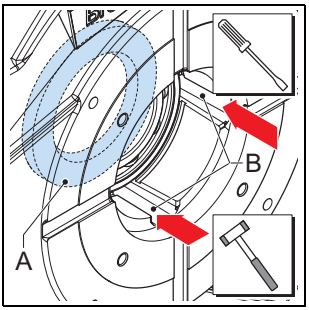
i	Circlip (A) locks the inner ring of the bearing. Circlip (C) locks the outer ring of the bearing.

5. At the back of the pump housing, gently drive out the pump shaft (A). Use a plastic hammer.



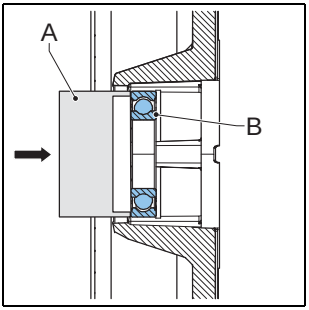
6. Check the teeth (B) and the contact surface (C) for the dynamic seal for wear and damage. Replace the pump shaft if necessary.

7. At the back of the pump housing, drive out the dynamic seal (A) via the paths of the leakage zone (B). Use a driver and a plastic hammer.



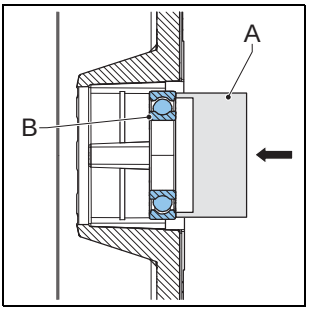
8. If it is not necessary to replace the bearing, go to step 13.

9. At the front of the pump housing, place a suitable bush (A) against the outer ring (B) of the bearing. The outer diameter of the bush (A) must be 103 ±1 mm. Use a plastic hammer to gently drive out the bearing.

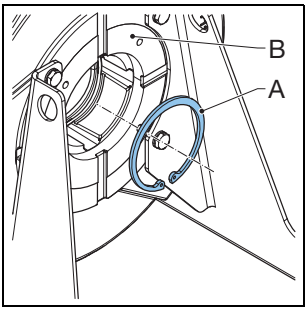


10. Make sure that all parts are clean before assembly.

11. At the back of the pump housing, position the (new) bearing in the bore. Place a suitable bush (A) against the outer ring (B) of the bearing. The outer diameter of the bush (A) must be 109 ±1 mm. Use a plastic hammer to gently drive in the bearing, until it is in its end position against the edge in the pump housing.

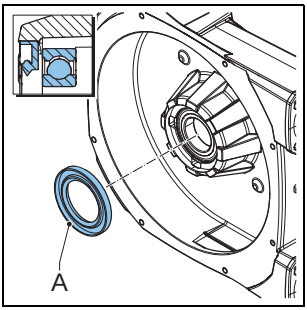


12. From the back side of the pump housing, use circlip pliers to install the circlip (A) in the groove of the pump housing (B).

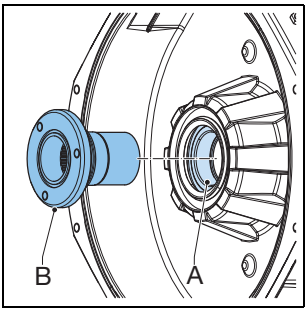


	Circlip (A) locks the outer ring of the bearing.

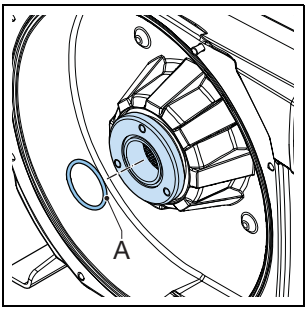
13. Slightly grease the sealing lip of the (new) dynamic seal (A). Do not grease the outside surface of the dynamic seal. Fit the dynamic seal from the front side in the pump housing, using good engineering practices. The seal ring must be fitted in the correct orientation. Make sure that the open side points towards the pump cover.



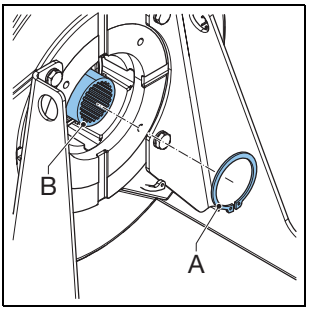
14. Slightly lubricate the contact surface of the inner ring of the bearing (A) and the pump shaft (B). Position the pump shaft in the bearing. Gently tap on the pump shaft until the collar touches the bearing. Use a plastic hammer.



15. Install the (new) O-ring (A) in the pump shaft.



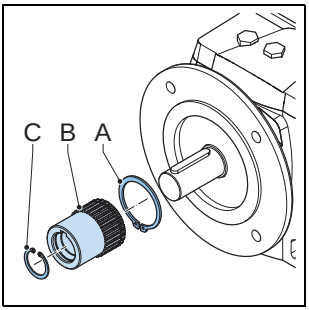
16. At the back of the pump housing, use circlip pliers to install the circlip (A) in the groove of the pump shaft (B).



	Circlip (A) locks the inner ring of the bearing.

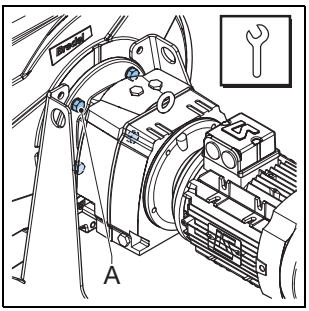
17. Make sure that the (new) coupling bush (A) has an inner circlip (C) at the front end and an outer circlip (A) at the back end.

18. If necessary, slightly grease the output shaft of the gearbox and position the (new) coupling bush on it. Use a plastic hammer to gently tap the coupling bush until the inner circlip touches the front end of the output shaft.



19. Grease the outer teeth (B) of the coupling bush with graphite grease.

20. Position the gearbox on the pumphead. Make sure that the spline coupling engages correctly. Position the four washers and bolts (A) and tighten the bolts to the correct torque. Refer to § 11.1.6.

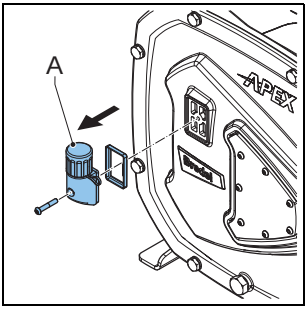


21. Install the rotor, the cover and the hose. Refer to § 8.6.1, steps 6 to 10.

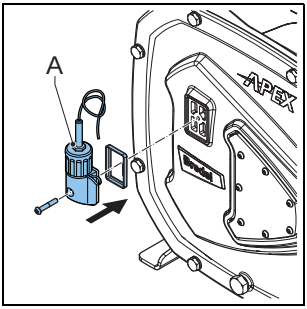
8.7 Fitting options

8.7.1 Fitting a high-level float switch

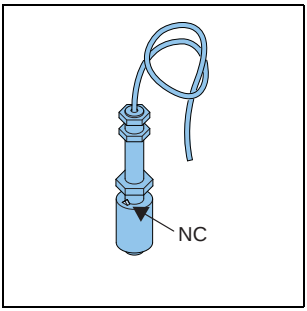
1. Dismount the standard breather (A) on the cover of the pumphead.



2. Mount the breather (A) with high-level float switch.



3. Connect the high-level float switch to the auxiliary power circuit via the 1.5 metre long PVC cable (2 x 0.34 mm^2). Bear in mind that the electrical contact of the float switch is normally closed (NC). The knob is upwards for normally closed operation. When the lubricant level is (too) high the contact will open.



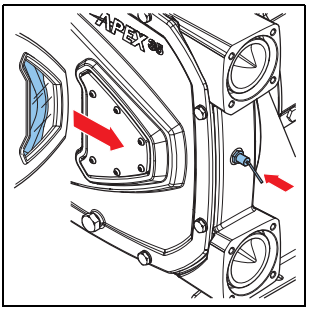
Specifications*	
Voltage:	Max. 230 V AC/DC
Current:	Max. 2 A
Power:	Max. 40 VA

* For use in non-explosive atmospheres.

	Where the float switch 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 float switch is mounted with the NC sign at the top.

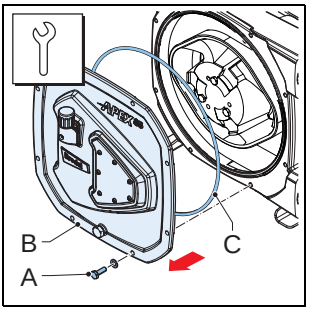
8.7.2 Replacing the revolution counter

1. Jog the rotor until the pressing shoe is clearly visible through the inspection window. Now the pressing shoe faces the position of the sensor.

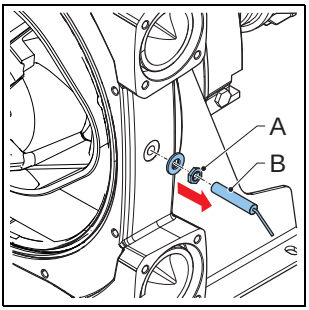


2. Remove the lubricant. Refer to 8.4.

3. Remove the cover (B) and the O-ring (C) by loosening the retaining bolts (A).

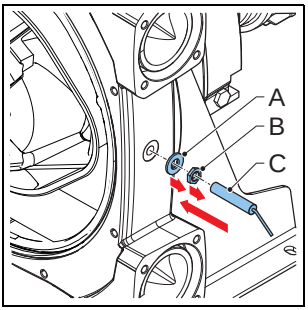


4. Remove the nut (A) and the old sensor (B).

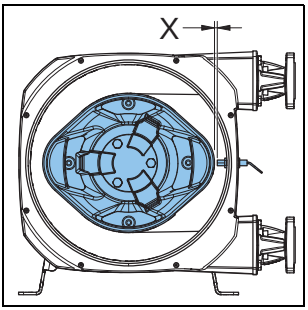


5. Mount the nut (B) and the sealing ring (A) on the new sensor (C).

6. Install the sensor (C) in the pump housing.

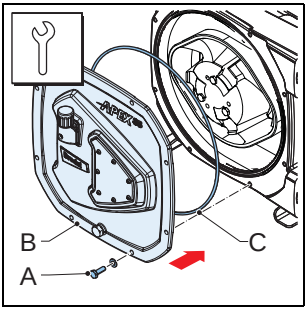


7. Turn the sensor so that the distance between the sensor and the rotor (X) is between 0.75 mm and 1.25 mm. Tighten the nut.



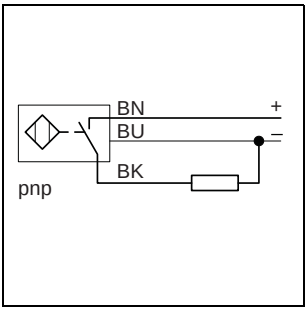
8. Check if the revolution counter works properly:
   1 The sensor needs to send signals.
   2 The rotor should be able to rotate freely.

9. Replace the O-ring (C) if necessary. Refit the cover (B) and the O-ring (C). Make sure that the eight bolts (A) are refitted and that they are tightened in the correct order, diagonally opposite each other. Refer to § 11.1.6.



10. Refill the pump housing with lubricant. Refer to 8.4.

11. Connect the sensor electrically via the 2 metre long PVC cable (3 x 0.34 mm^2). Refer to the connection scheme, right.



Specifications*	
Voltage	10 ... 30 V DC
Current	Max. 200 mA

* For use in non-explosive atmospheres.

9 STORAGE

9.1 Hose pump

- Store the hose pump and pump parts in a dry area. Make sure that the hose pump and pump parts are not exposed to temperatures lower than -40 °C or higher than +70 °C.
- Cover the openings of the inlet and outlet ports.
- Prevent corrosion of untreated parts. For this purpose use the correct protection or packaging.
- After a long period of standstill or storage, the static load on the pump hose may have caused permanent deformation, which will reduce the life of the pump hose. To prevent this, remove the pump hose when the pump is not going to be used for more than one month.

9.2 Pump hose

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

10 TROUBLESHOOTING

WARNING
Disconnect and lock the power supply to the pump drive before any work is carried out.
In case the motor is fitted with a frequency controller and has a single-phase power supply, wait two minutes to make sure that the capacitors have discharged.

If the hose pump does not function (correctly), consult the following checklist to see if you can remedy the error yourself. If you cannot, contact your Bredel representative.

Problem	Possible cause	Correction
Failure to operate.	No voltage.	Check if the power supply switch is on.
		Check if the electrical supply is available at the pump.
	Stalled rotor.	Check if the pump is stalled by incorrect fitting of the hose.
		Check the VFD settings, if applicable.
	Lubricant level monitoring system has been activated.	Check if the lubricant level monitoring system has stalled the pump. Check the functioning of the lubricant level monitoring system, and check the lubricant level.

Problem	Possible cause	Correction
High pump temperature.	Non-standard hose lubricant used.	Consult your Bredel representative for the correct lubricant.
	Low lubricant level.	Add Bredel Genuine Hose Lubricant. For the required amount of lubricant refer to § 11.1.4.
	Fluid temperature too high.	Consult your Bredel representative about the maximum temperature range of the fluid.
	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.
	High pump speed.	Reduce pump speed to a minimum. Consult your Bredel 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.
	Hose rupture or badly worn hose.	Replace the hose. Refer to § 8.5.
	(Partial) blockage of the suction line or too little fluid on the suction side.	Ensure that the suction line is clear of blockages and that sufficient fluid is available.
	Connections not correctly mounted, which makes the pump suck air.	Check the connections. Tighten if necessary.
	The filling degree of the pump hose is too low, because the speed is too high in relation to the viscosity of the product to be pumped and the inlet pressure. The suction line can be too long or too narrow or a combination of these factors.	Consult your 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 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 fluid to be pumped. Consult your Bredel representative for correct hose selection.
	High pump speed.	Reduce pump speed.
	High discharge pressures.	Maximum working pressure 800 kPa. 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 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 pumphead.	Add extra lubricant. Refer to § 8.4.
	Incorrect lubricant: no Bredel Genuine Hose Lubricant in the pumphead.	Consult your Bredel representative for the correct lubricant.
	Extremely high inlet pressure - larger than 200 kPa.	Reduce the inlet pressure.

Problem	Possible cause	Correction
Lubricant leakage at 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 bracket loose.	Tighten to the specified torque settings. Refer to § 11.1.6.
Leakage from the rear of the pump housing "Buffer zone".	Damaged seal ring.	Replace seal ring.
Lubricant leakage at cover.	Damaged seal ring.	Replace seal ring.
	Bolts not tightened to the correct torque.	Tighten to the specified torque settings. Refer to § 11.1.6.

11 SPECIFICATIONS

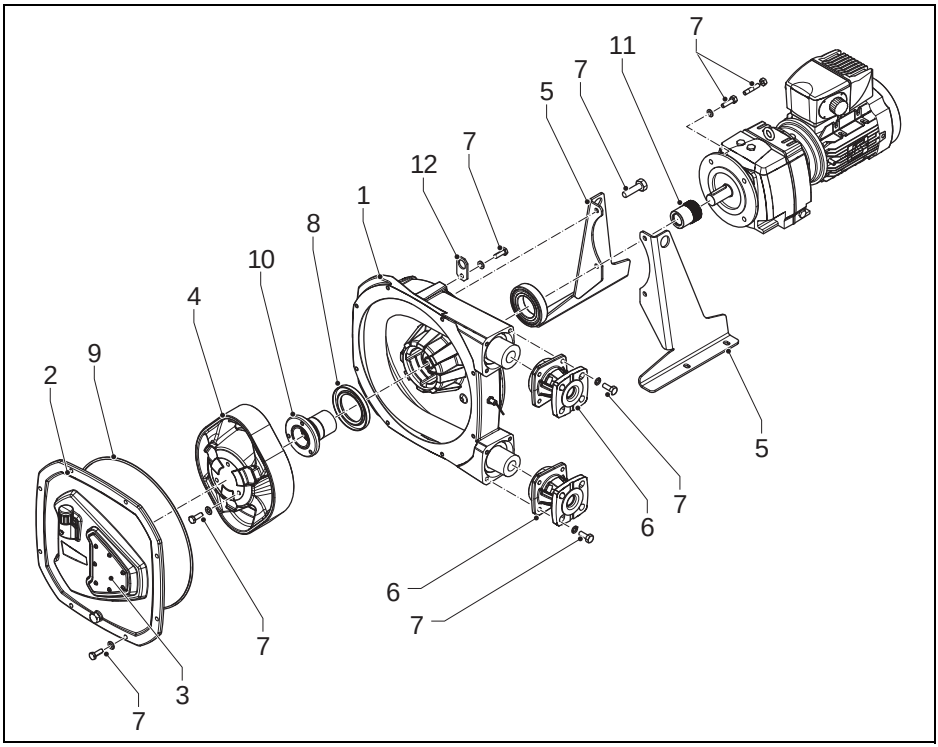
11.1 Pumphead

11.1.1 Performance

Description		APEX28	APEX35
		∅ 28 mm	∅ 35 mm
Max. capacity, continuous [m^3/h]		3.0	5.3
Max. capacity, intermittent [m^3/h] *		3.4	6.2
Capacity per revolution [l/rev]		0.36	0.74
Max. permissible working pressure [kPa]	with low-pressure rotor	400	400
	with medium-pressure rotor	800	800
Permissible ambient temperature [°C]		-20 to +40	
Permissible fluid temperature [°C]		-10 to +80	
Sound level at 1 m [dB(A)]		70	

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

11.1.2 Materials



Pos	Description	Material
1	Pump housing	Cast-iron
2	Cover	Aluminium
3	Cover window	PMMA
4	Pump rotor	Aluminium
5	Pump supports	Galvanised steel (AISI 316 optional)
6	Brackets	Cast iron
7	Fasteners	Galvanised steel (AISI 316 optional)
8	Dynamic seal behind the rotor	NBR
9	Cover seal	NBR
10	Pump shaft	Steel
11	Coupling bush	Steel
12	Lifting lug	AISI 316

11.1.3 Surface treatment

- After surface preparation, one layer of two-component acrylate is used for surface protection.
- All galvanised parts have been provided with an electrolytic zinc layer of 15 - 20 microns.

11.1.4 Lubricant table pump

	APEX28	APEX35
Lubricant	Bredel Genuine Hose Lubricant	Bredel Genuine Hose Lubricant
Required quantity [litres]	2.0	4.0

Bredel Genuine Hose Lubricant is registered at NSF: NSF Registration N^{o} 123204; Category Code H1. Also refer to: www.NSF.org/USDA.

Components:		
Glycerol	($C_3H_8O_3$)	50-100% w/w
Glycol	($C_2H_6O_2$)	2.5-10% w/w
Water	(H_2O)	

	Consult your Bredel representative if you require additional information with respect to the safety data sheet.

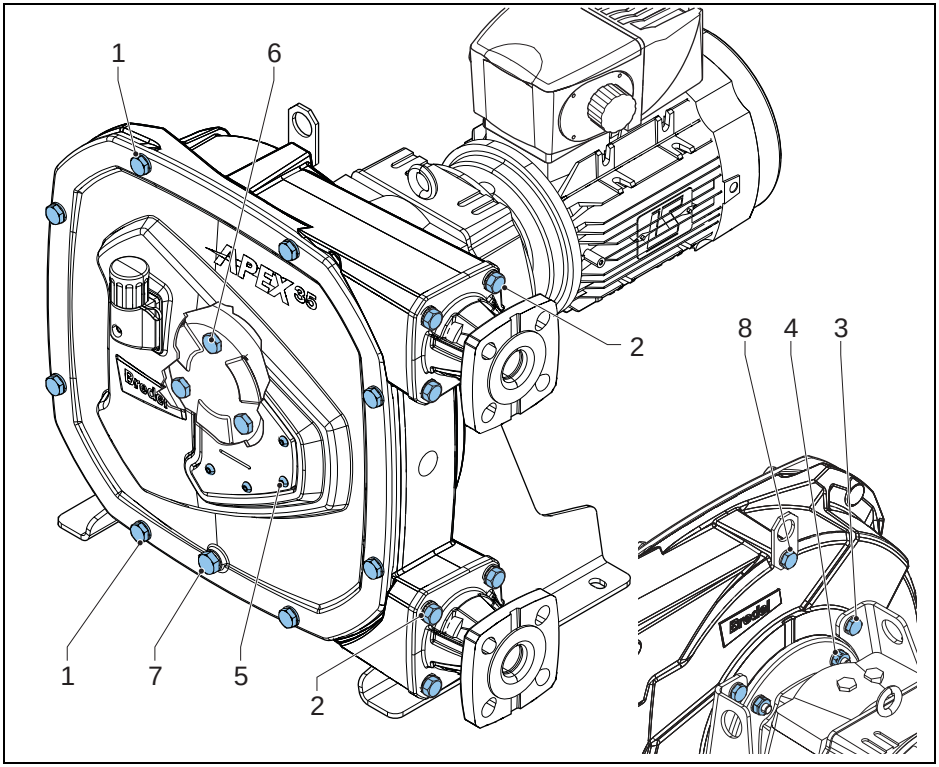
	**WARNING** It is the users responsibility to ensure the chemical compatibility of the fluid to be pumped with the lubricant in the pumphead. Obey the local Health and Safety regulations.

An alternative lubricant is available based on silicone. Also compatibility with this lubricant must be checked if applied. Refer to the chemical compatibility chart at www.wmftg.com/chemical or contact your Bredel representative for guidance.

11.1.5 Weights

Description	Weight [kg]	
	APEX28	APEX35
Pumphead (inclusive of hose, lubricant and pump supports)	51	75
Pump supports (total weight for 2 supports)	4.5	5.5
Rotor	3.8	5.8
Hose	1.9	2.6
Pump cover (complete)	3.5	4.2
Shaft and coupling	2.1	2.1
Gearbox	13.3	18.7
Electric motor	11.7 ... 22	11.7 ... 25.7

11.1.6 Torque figures



Pos	Description	Torque [Nm]*	
		APEX28	APEX35
1	Cover	20	35
2	Bracket	25	50
3	Supports	25	50
4	Gearbox	25	50
5	Inspection window	2.0	2.0
6	Rotor	50	50
7	Drain plug	4	4
8	Lifting lug	50	50

* All steel bolts are class 8.8.

11.2 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 Bredel representative for advice.

Recommended lubricants for the 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	-30 °C to -10 °C	-30 °C to +60 °C	-30 °C to +40 °C
DIN (ISO)	CLP (CC)	CLP HC	CLP HC	CLP HC	HCE	E
ISO, NLGI	VG220	VG220	VG150	VG32	VG460	VG460
					Foodgrade**	Biology***

* For a complete overview of the recommended lubricants contact your Bredel representative.

** 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.

11.3 Gearbox

Type	Coaxial gearbox with helical gears*
Number of stages	Two or three
Mounting position	IM 3001 (IM B5) flanged gearbox with keyed shaft in horizontal position.
Motor adapter	Integrated
Optional motor adapter	Adapter in conformance with IEC-B5 or NEMA C.

* Other gearbox types are available as option.

11.4 Electric motor

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

	In case of doubt about the local applicable regulations for the drive connection, contact your Bredel representative.

Protection class	IP55/IK08
Insulation class	F
Increase in temperature	Within class B
Voltage/frequency	Refer to identification plate on motor.

11.5 Variable Frequency Drive (VFD) (optional)

The Bredel Variable Frequency Drive (VFD) has been preprogrammed and only needs to be connected to the mains.

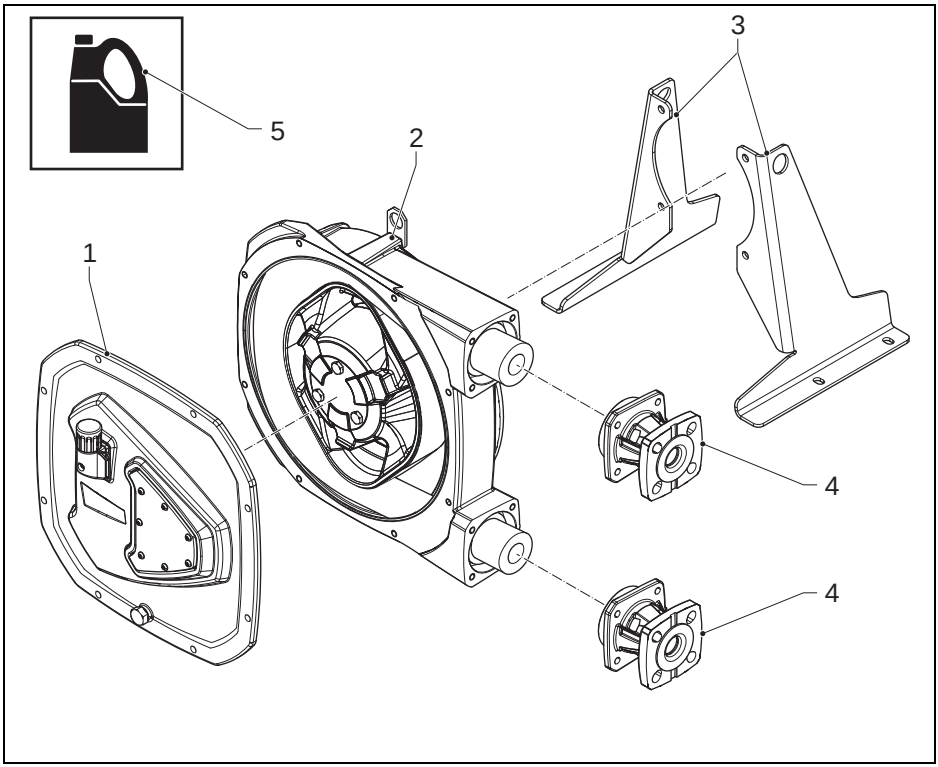
RFI filter	Integrated RFI filter B (industrial applications).
Control	Manual control for setting the speed and the keys for starting forward, stop and starting reverse. More options are available.
Protection class	IP65
Mains power supply	Three types are available; the choice depends on the local electricity grid: • 200-240 V ± 10%; 50/60 Hz ± 5%; 1 ph • 200-240 V ± 10%; 50/60 Hz ± 5%; 3 ph • 400-480 V ± 10%; 50/60 Hz ± 5%; 3 ph

11.6 Parts list

11.6.1 Ordering parts

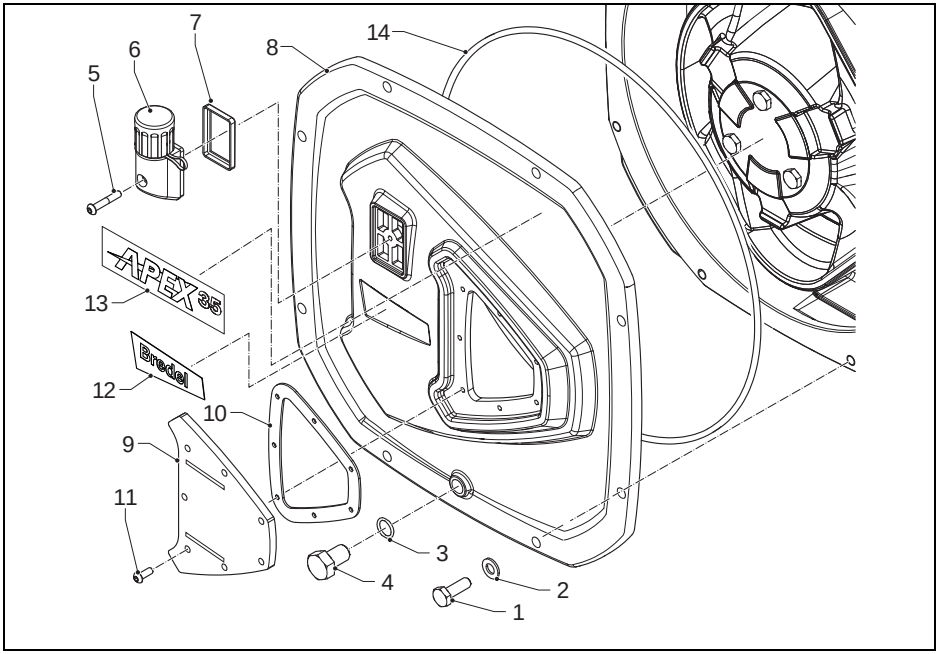
Specify the item number, description and pump size (APEX28 or APEX35) to identify the component you need. Also specify the quantity you need.

11.6.2 Overview



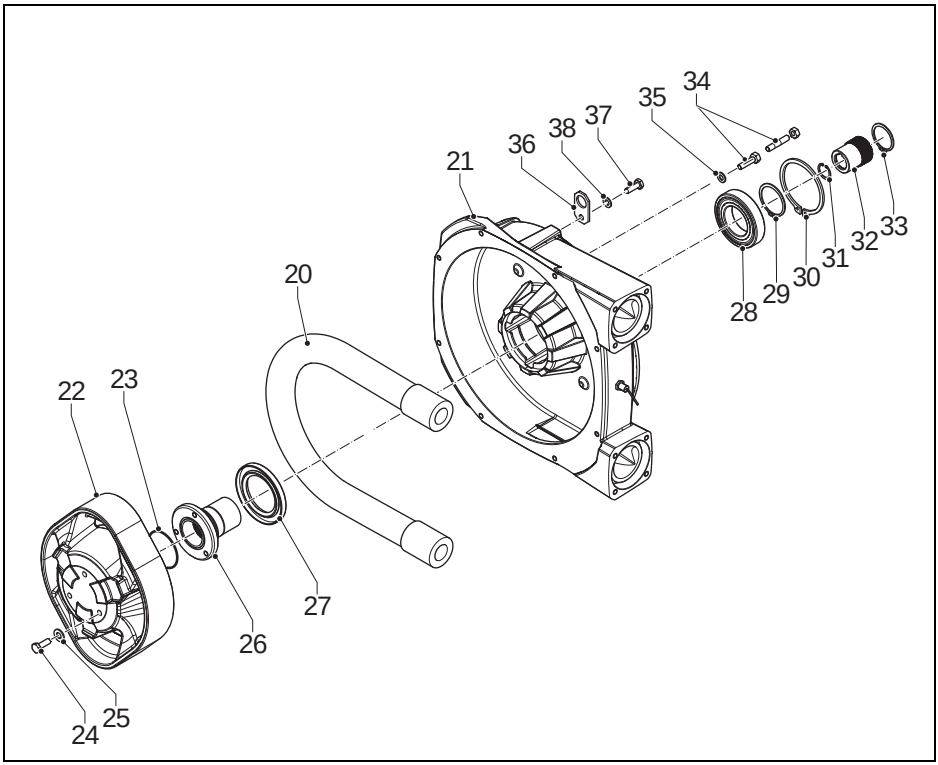
Pos.	Description
1	Cover assembly. Refer to § 11.6.3.
2	Pumphead assembly. Refer to § 11.6.4.
3	Pump supports assembly. Refer to § 11.6.5.
4	Flange assembly. Refer to § 11.6.6.
5	Lubricant. Refer to § 11.6.7.

11.6.3 Cover assembly



Pos.	Qty.	Description	APEX28	APEX35
1	8	Cover bolt	M8x20	M10x30
2	8	Cover bolt washer		
3	1	Drain plug O-ring		
4	1	Drain plug		
5	1	Breather screw	M6x40	M6x40
6	1	Breather		
7	1	Breather gasket		
8	1	Cover		
9	1	Inspection window		
10	1	Inspection window gasket		
11	6	Inspection window screw	M6x16	M6x16
12	1	Sticker ‘Bredel’		
13	1	Sticker ‘APEX’ (pump size specific)		
14	1	Cover seal		

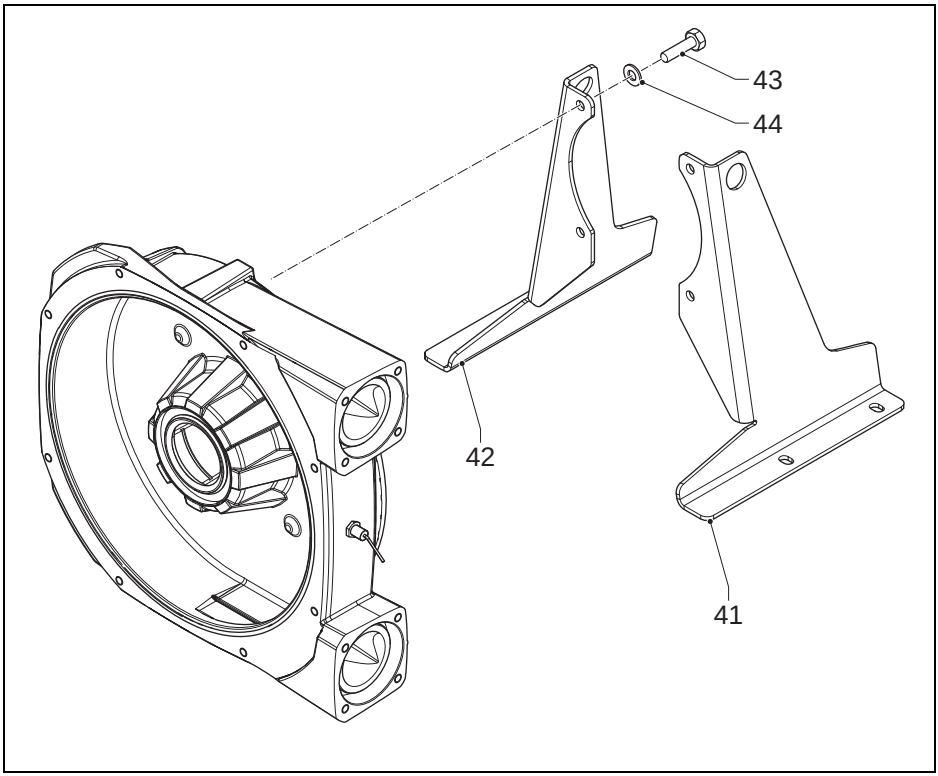
11.6.4 Pumphead assembly



Pos.	Qty.	Description	APEX28	APEX35
20	1	Hose NR		
	1	Hose NBR		
	1	Hose EPDM		
21	1	Pump housing		
22	1	Rotor, low-pressure (L)		
		Rotor, medium-pressure (M)		
23	1	Pump shaft O-ring		
24	3	Rotor screw	M10x30	M10x30
25	3	Rotor washer		
26	1	Pump shaft		
27	1	Dynamic seal		

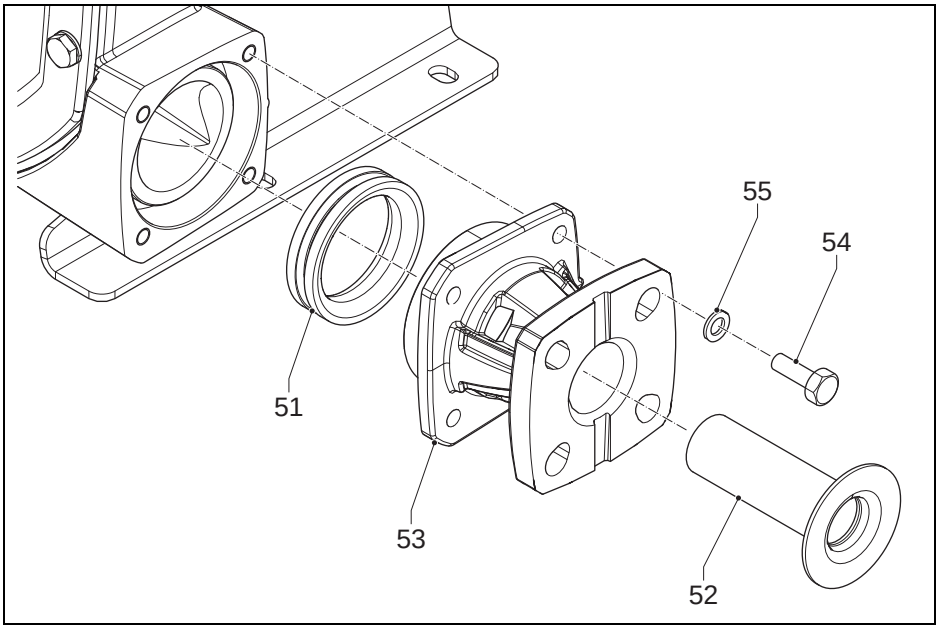
Pos.	Qty.	Description	APEX28	APEX35
28	1	Bearing		
29	1	Circlip, inner bearing		
30	1	Circlip, outer bearing		
31	1	Circlip, inner, coupling bush		
32	1	Coupling bush		
33	1	Circlip, outer, coupling bush		
34	4	Gearbox bolt (standard mounted) or stud + nut (alternative, refer to § 4.5)	M8x30	M10x30
35	4	Gearbox washer		
36	1	Lifting lug		
37	1	Lifting lug bolt	M10x20	M10x30
38	1	Lifting lug washer		

11.6.5 Support assembly



Pos.	Qty.	Description	APEX28	APEX35
41	1	Pump support, left		
42	1	Pump support, right		
43	4	Support bolt	M8x20	M10x30
44	4	Support bolt washer		

11.6.6 Flange assembly



Pos.	Qty.	Description	APEX28	APEX35
51	2	Compression ring		
52	2	Insert stainless steel		
53	2	Bracket		
54	8	Bracket bolt	M8x30	M10x30
55	8	Bracket bolt washer		

11.6.7 Lubricant

Bredel Genuine Hose Lubricant is available in 0.5, 1, 2, 3, 5, 10 and 20 litre cans. Refer to § 11.1.4 for specifications of this lubricant.

EC DECLARATION OF CONFORMITY OF THE MACHINERY

(according to Annex II.1.A. of Directive 2006/42/EC on machinery)

We,

Watson-Marlow Bredel B.V.
Sluisstraat 7
P.O. Box 47
NL-7490 AA Delden
The Netherlands

herewith declare, on our own responsibility, that the machinery:

Peristaltic hose pump: **APEX28-35** series,

for the transportation of various kinds of fluids,

fulfils all the relevant provisions of Directive 2006/42/EC.

and, where appropriate, the machinery complies with the harmonised standard(s), other standards or technical specifications, applicable requirements of these standards and/or specifications as listed below:

EN 809
EN-ISO 12100-2
NEN-EN-IEC60204-1

Authorised to compile the technical file:
J. van den Heuvel, Sluisstraat 7, 7491GA, Delden, The Netherlands

The Netherlands, Delden
1 February 2015

J. van den Heuvel
Managing Director

SAFETY FORM

Product Use and Decontamination Declaration

In compliance with the **Health and Safety Regulations**, the user is required to declare those substances that have been in contact with the item(s) you are returning to Watson-Marlow Bredel B.V. or any of its subsidiaries or distributors. Failure to do so will cause delays in servicing the item or in issuing a response. Therefore, **please complete this form** to make sure we have the information before receipt of the item(s) being returned. A completed copy must be attached to **the outside of the packaging** containing the item(s). You, the user, are responsible for cleaning and decontaminating the item(s) before returning them.

Please complete a separate Decontamination Certificate for each item returned. **RGA/KBR no**.....

1 Company ....

Address ....

Postal code.....

Telephone ..... Fax number .....

2 Product .....

2.1 Serial Number .....

2.2 Has the Product been used?

YES ☐ NO ☐

If yes, please complete all the following paragraphs.

If no, please complete paragraph 5 only

3 Details of substances pumped

3.1 Chemical Names

a) .....

b) .....

c) .....

d) .....

3.2 Precautions to be taken in handling these substances:

a) .....

b) .....

c) .....

d) .....

3.3 Action to be taken in the event of human contact:

a) .....

b) .....

c) .....

d) .....

3.4 Cleaning fluid to be used if residue of chemical is found during servicing;

a) .....

b) .....

c) .....

d) .....

4 I hereby confirm that the only substances(s) that the equipment specified has pumped or come into contact with are those named, that the information given is correct, and the carrier has been informed if the consignment is of a hazardous nature.

5 Signed .....

Name .....

Position .....

Date .....

Note:

To assist us in our servicing please describe any fault condition you have witnessed.

.....

.....

.....

.....

.....

Watson-Marlow Bredel B.V.
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Fax: +31 (0)74 3761175

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