

VERDERFLEX[®]

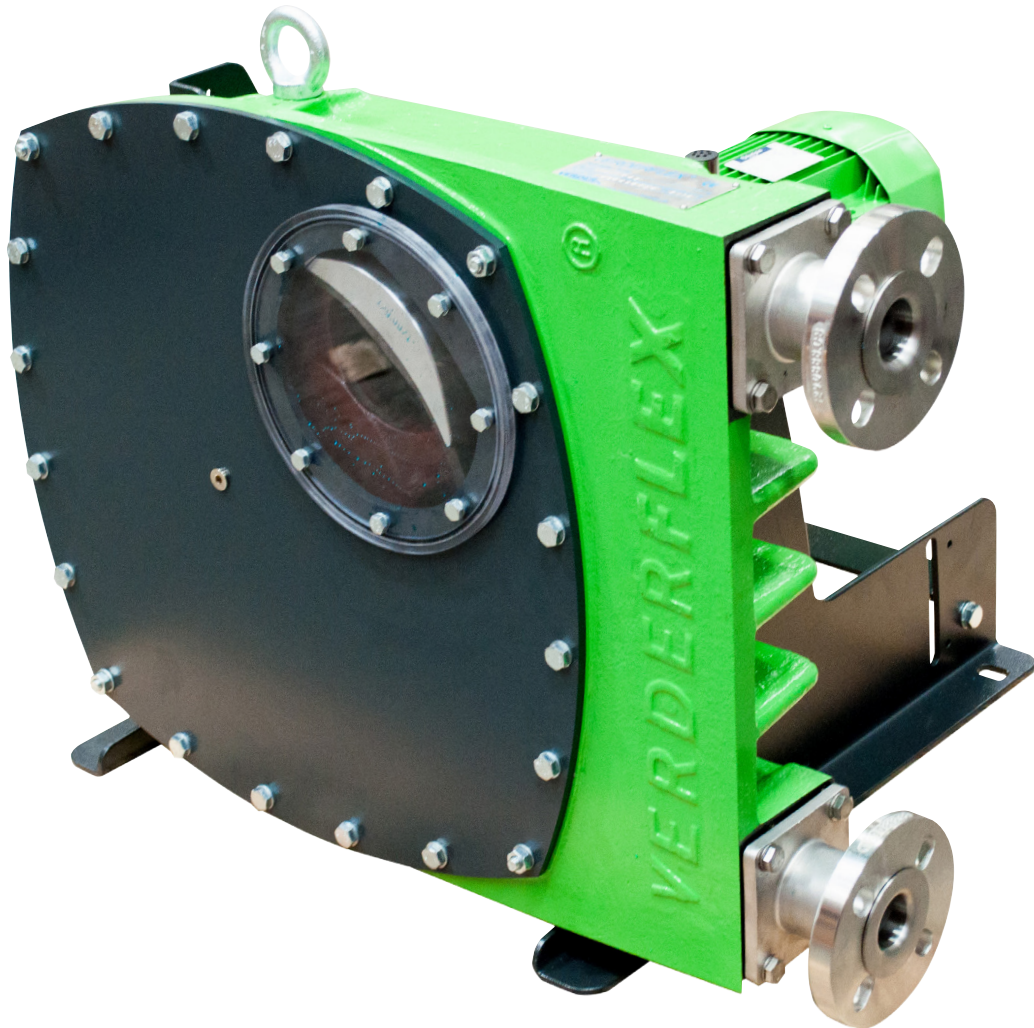
Peristaltic Industrial Hose Pump

Operating Manual

VF 5, 10, 15, 25, 32, 40, 50, 65, 80

Version 9.1v-04/2017

Print-No. 01



VERDER
passion for pumps

Version 9.1v-04/2017
Print-No. 01

VF 5, 10, 15, 25, 32, 40, 50, 65, 80



The information in this document is essential for the safe operation and servicing of Verderflex® VF range of pumps. This document must be read and understood thoroughly prior to installation of unit, electrical connection and commissioning.

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1. About this document





The VF 5-80 Verderflex range of Peristaltic pumps, has been developed according to the latest technology and subject to continuous quality control. These operating instructions are intended to facilitate familiarization with the pump and its designated use. The relevant information will act as a guideline for you in operating the pump; alternative courses of action are also described should you be unable, for any reason, to follow those procedures initially given. You are advised to follow these guidelines to achieve maximum efficiency. These operating instructions do not take into account local regulations; the operator must ensure that such regulations are strictly observed by all, including the personnel called in for installation.

1.1 Target groups



Target groups	Duty
Operating company	<ul style="list-style-type: none"> ▶ Keep this manual available at the operation site of the equipment, also available for later reference. ▶ Ensure that personnel read and follow the instructions in this manual and the other applicable documents, especially all safety instructions and warnings. ▶ Observe any additional rules and regulations referring to the system.
Qualified personnel, fitter	<ul style="list-style-type: none"> ▶ Read, observe and follow this manual and the other applicable documents, especially all safety instructions and warnings.

Tab. 1 Target groups and their duties

1.2 Warnings and symbols


Warning	Risk Level	Consequences of disregard
	Immediate acute risk	Death, serious bodily harm
	Potential acute risk	Death, serious bodily harm
	Potential hazardous situation	Minor bodily harm
	Potential hazardous situation	Material damage

Tab. 2 Warnings and consequences of disregarding them

Symbol	Meaning
	Safety warning sign in accordance with DIN 4844 - W9 <ul style="list-style-type: none"> ▶ Take note of all information highlighted by the safety warning sign and follow the instructions to avoid injury or death.
▶	Instruction
1., 2.,	Multiple-step instructions
√	Precondition
→	Cross-reference
	Information, recommendation

Tab. 3 Symbols and their meaning

2. Safety

 The manufacturer does not accept any liability for damage resulting from disregard of this documentation.


2.1 Intended use

- Only use the pump to handle compatible fluids as recommended by the manufacturer (→ 10.1 Technical specifications).
- Adhere to the operating limits.
- Consult the manufacturer regarding any other use of the pump.
- Pumps delivered without a motor must be fitted with a motor in accordance with the provisions of EC Machine Directive 2006/42/EC.

Prevention of obvious misuse (examples)

- Note the operating limits of the pump with regard to temperature, pressure, flow rate and motor speed (→ 10.1 Technical specifications).
- Do not operate the pump while the inlet/outlet valve is closed.
- Only install the pump as recommended in this manual. For example, the following are not allowed:
 - Installing the pump without proper support.
 - Installation in the immediate vicinity of extreme hot or cold sources.

2.2 General safety instructions

 Observe the following regulations before carrying out any work.

2.2.1 Product safety

These operating instructions contain fundamental information which must be complied with during installation, operation and maintenance. Therefore this operating manual must be read and understood both by the installing personnel and the responsible trained personnel / operators prior to installation and commissioning, and it must always be kept easily accessible within the operating premises of the machine.

Not only must the general safety instructions laid down in this chapter on “Safety” be complied with, but also the safety instructions outlined under specific headings.

- Operate the pump only if the pumping unit and all associated systems are in good functional condition.

- Only use the pumping system as intended, fully aware of safety and risk factors involved, and in adherence to the instructions in this manual.
- Keep this manual and all other applicable documents complete, legible and accessible to personnel at all times.
- Refrain from any procedure or action that would pose a risk to personnel or third parties.
- In the event of any safety-relevant faults, shut down the pump immediately and have the malfunction corrected by qualified personnel.
- The installation of the pump, associated pipe work and electrical fittings must comply with the requirements of installation given in this manual and any local national or regional health and safety regulations.

2.2.2 Obligation of the operating company

Safety-conscious operation

- Ensure that the following safety aspects are observed and monitored:
 - Adherence to intended use
 - Statutory or other safety and accident-prevention regulations
 - Safety regulations governing the handling of hazardous substances if applicable
 - Applicable standards and guidelines in the country where the pump is operated
- Make personal protective equipment available pertinent to operation of the pump; as required.

Qualified personnel

- Ensure that all personnel tasked with work on the pump have read and understood this manual and all other applicable documents, including the safety, maintenance and repair information, prior to use or installation of the pump.
- Organize responsibilities, areas of competence and the supervision of personnel.
- Have all work carried out by specialist technicians only.
- Ensure that trainee personnel are under the supervision of specialist technicians, at all times, when working on the pumping system.

Safety equipment

- Provide the following safety equipment and verify its functionality:
 - For hot, cold and moving parts: safety guarding should be provided by the operating company.
 - For potential build up of electrostatic charge: ensure appropriate grounding if and when required.

Warranty



The warranty is voided if the customer fails to follow any and all instructions, warnings and cautions in this document. Verder has made every effort to illustrate and describe the product(s) in this document. Such illustrations and descriptions are, however, for the sole purpose of identification and Do not express or imply a warranty that the products are merchantable or fit for a particular purpose, or that the products will necessarily conform to the illustration or descriptions.

Obtain the manufacturer's approval prior to carrying out any modifications, repairs or alterations during the warranty period. Only use genuine parts or parts that have been approved by the manufacturer.

For further details regarding warranty, please refer terms and conditions.

2.2.3 Obligation of personnel



It is imperative that the instructions contained in this manual are complied with by the operating personnel at all times.

Pump and associated components:

- Do not lean or step on them or use as climbing aid
- Do not use them to support boards, ramps or beams

- Do not use them as a fixing point for winches or supports
- Do not de-ice using gas burners or similar tools
- Do not remove the safety guarding for hot, cold or moving parts during operation.

- Reinstall the safety equipment on the pump as required by regulations after any repair / maintenance work on the pump.

2.3 Specific hazards

2.3.1 Hazardous pumped liquids

Follow the statutory safety regulations when handling hazardous pumped liquids (e.g. hot, flammable, poisonous or potentially harmful).

Use appropriate personal protective equipment when carrying out any work on the pump.

2.3.2 Lubricants

Ensure that the lubricant and pumped liquid are compatible with each other. This is a precautionary measure in case of accidental hose burst whereby the pumped liquid comes in contact with the lubricant.

(Refer datasheet for lubricant to ensure compatibility)

2.3.3 Sharp edges

- Pump parts, such as the shims, can be sharp
 - Use protective gloves when carrying out any work on the pump

3. Layout and function

i Peristaltic hose pump, Verderflex VF, is simple by design in its construction and operation. The medium to be pumped does not come into contact with any moving parts and is totally contained within a robust, heavy-duty hose, which usually consists of an inner layer, two – six reinforcement layers and an outer layer. A rotor passes along the length of the hose, compressing it. This motion forces the contents of the hose directly in front of the rotor to move forward along the length of the hose in a ‘positive displacement’, peristaltic movement. In the wake of the rotor’s compressing action, the natural elasticity of the polymer reinforced rubber forces the hose to open and regain its round profile, creating suction pressure, which recharges the pump.

3.1 Labelling

3.1.1 Name Plate

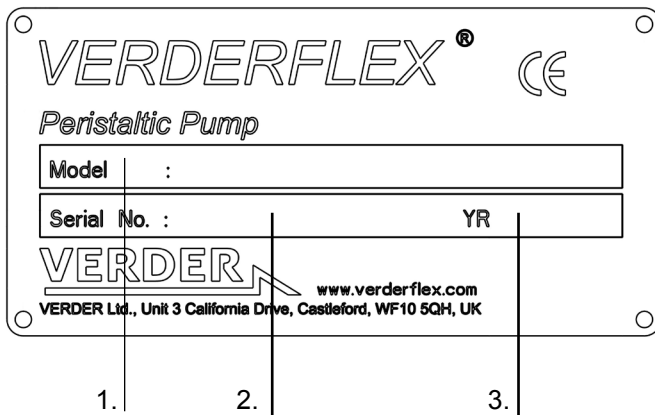


Figure 1 Name plate

1. Pump type
2. Serial number
3. Year of manufacture

Note: When requesting spares, the model and serial number should always be quoted.

3.1.2 ATEX Name Plate

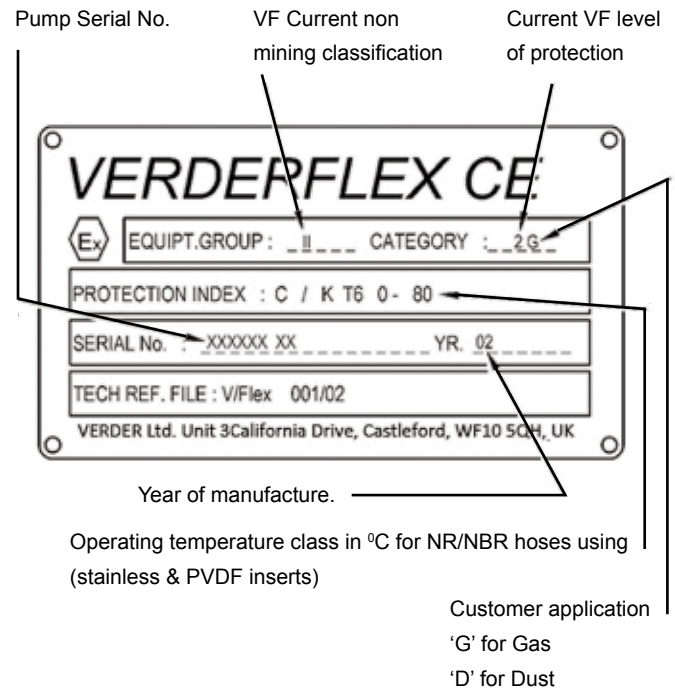
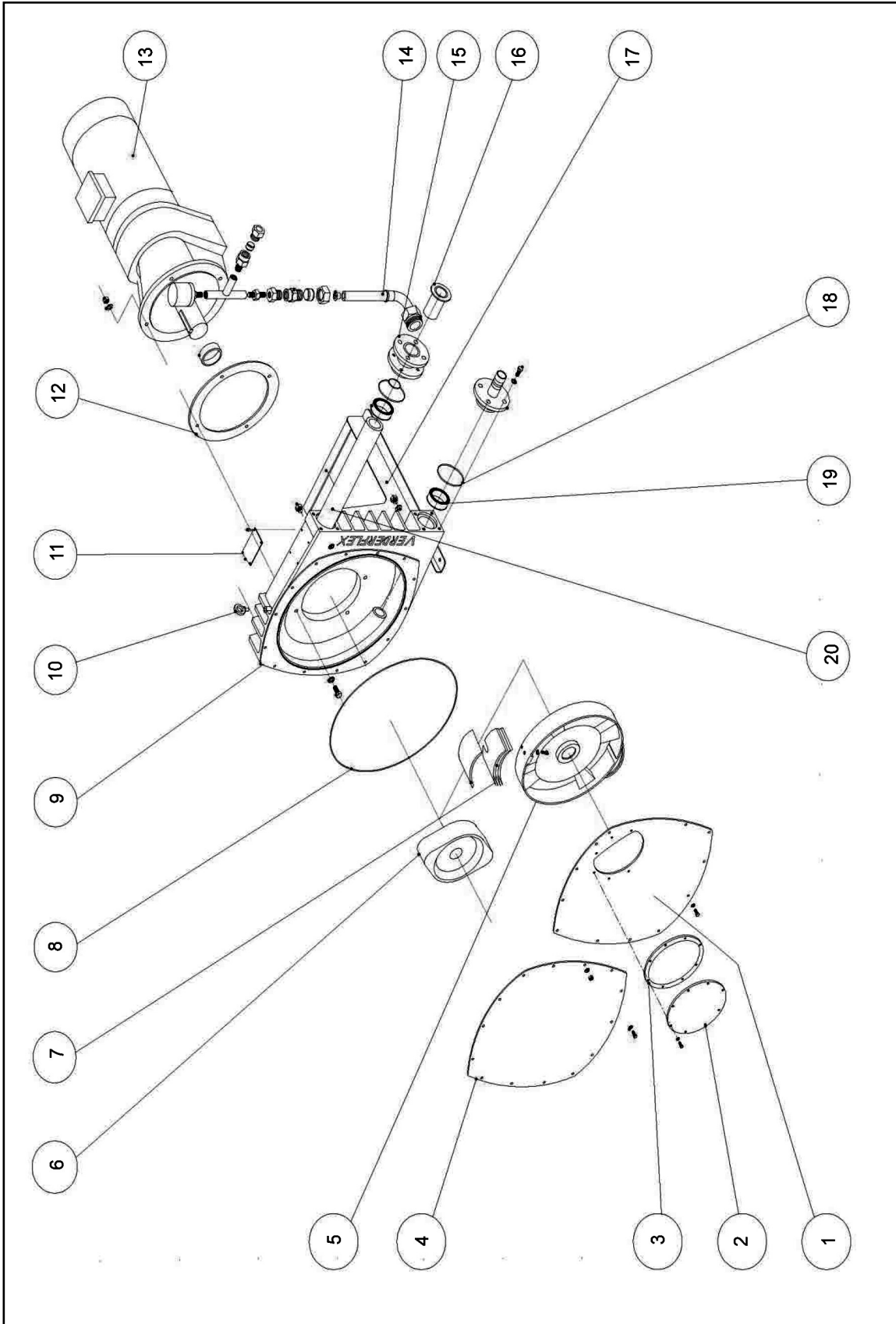


Figure 2 ATEX name plate

3.2 Layout




1	FRONT COVER (VF25 - 80)	5	ROTOR SHIMMED (VF25-80)	9	CASING	13	GEAR BOX AND MOTOR UNIT (GMU)	17	FRAMES
2	INSPECTION WINDOW	6	ROTOR (VF 5-15)	10	LIFTING EYE	14	HOSE BURST KIT (OPTIONAL)	18	O-RING
3	INSPECTION WINDOW GASKET	7	SHIMS & SHOES	11	NAME PLATE	15	FLANGE	19	SEALING RING
4	FRONT COVER (VF 5-15)	8	FRONT COVER O-RING	12	DRIVE GASKET	16	INSERT	20	HOSE

Figure 3 Exploded view (Generic)

4. Transport, storage and disposal

4.1 Transport

 Always transport the unit in an upright position and ensure that the unit is securely attached to the pallet.

4.1.1 Unpacking and inspection on delivery

1. Unpack the pump/pump unit upon delivery and inspect it for transport damage.
2. Report any transport damage to the manufacturer/distributor immediately.
3. Retain the pallet if any further transport is required.
4. Dispose all packaging material according to local regulations.

4.1.2 Lifting

 **DANGER**

Death or crushing of limbs can be caused by falling loads!

1. Use lifting gear appropriate for the total weight to be transported.
2. Fasten the lifting gear to the lifting eye as shown in the following illustration.
3. Do not stand under suspended loads.

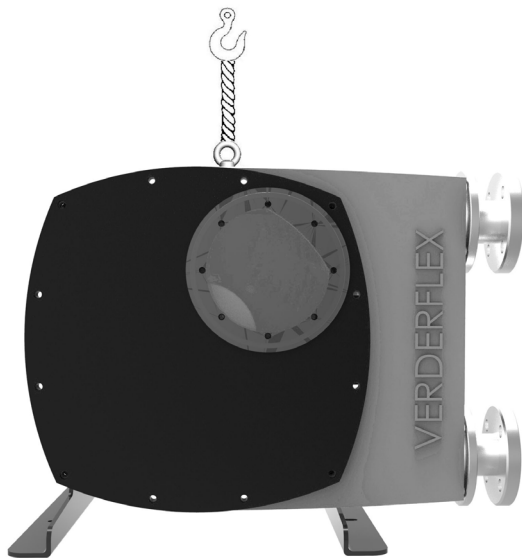



Figure 4 Fastening lifting gear to pump unit

4.2 Treatment for storage

 Unpainted steel surfaces should be coated with rust inhibitor and the unit should be stored in a dry, dust free environment not exceeding 60°C

NOTE

Material damage due to inappropriate treatment for storage!

- ▶ Treat all internal and external bare metal pump parts for storage.
- ▶ Renew treatment if necessary.

4.3 Interim storage before installation

NOTE

Material damage due to inappropriate storage!

- ▶ Treat the pump with preservatives compatible with pumped media (precaution in case of spillage).

1. Close all openings with blanks, plugs or plastic covers.
2. Make sure the storage room meets the following conditions:
 - Dry, humidity not to exceed 80%
 - Out of direct sunlight
 - Frost-free; temperature range 0 to 40°C
 - Vibration-free; minimize
 - Dust-free; minimize

**Storage information for pumps withdrawn from use is listed in section 8, Storing pumps and hoses.*

4.4 Disposal



With prolonged use, pump parts can get contaminated by poisonous or radioactive pumped liquids to such an extent that cleaning may be insufficient.



WARNING

Risk of poisoning and environmental damage by the pumped liquid or oil!

- ▶ Use suitable personal protective equipment when carrying out any work on the pump.
- ▶ Prior to disposal of the pump:
 - Drain and dispose of the lubricant in accordance with local regulations.
 - Collect and dispose of any leaking pumped liquid or oil in accordance with local regulations.
 - Neutralize residues of pumped liquid in the pump.
- ▶ Dispose of the pump unit and associated parts in accordance with statutory regulations.

5. Installation and connection

NOTE

Material damage due to unauthorized modification on pump unit!

- ▶ Do not make any structural modifications to the pump unit or pump casing
- ▶ Do not carry out any welding work on the pump unit or pump casing

NOTE

Material damage caused by ingress!

- Do not remove any protective flange covers until immediately before connecting the pipes to the pump

5.1 Preparing for installation

5.1.1 Checking the ambient conditions

1. Make sure that the operating conditions are complied with (→ 10.1.1 Pump specifications)
2. Make sure the required ambient conditions are fulfilled (→ 10.1.2 Ambient conditions)

5.1.2 Preparing the installation site

- ▶ Ensure the installation site meets the following conditions:
 - Pump is freely accessible from all sides
 - Sufficient space is available for the installation/removal of the pipes and for maintenance and repair work, especially for the removal and installation of the hose.

5.1.3 Preparing the foundation and surface

- ▶ Make sure the foundation and surface meet the following conditions:
 - Level
 - Clean (no oil, dust or other impurities)
 - Capable of bearing the weight of the pump unit and all operating forces
 - Ensure the pump is stable and cannot tip over
 - Concrete foundation: Standard concrete strong enough to support the pump unit under load.

5.2 Installation at site


1. Lift the pump unit (→ 4.1.2 Transport)
2. Put the pump unit down at the installation site.
3. Bolt the pump down; use all 4 holes.

5.3 Planning the pipes

5.3.1 Specifying supports and flange connections

- When planning pipe runs take every possible operating condition into account:
 - Cold/warm medium
 - Empty/full
 - Unpressurized/pressurized
 - Positional change of the flanges
- Ensure that the pipe supports are designed to accommodate any movement from environmental or pressure imposed forces.

5.3.2 Specifying nominal diameters

-  Keep the system losses in the pipes as low as possible. Pipe work immediately connected to both inlet and outlet port of the pump should be straight runs for at least 1 meter. Ensure that nominal pipe diameter is at least 1.5 times nominal pump-hose diameter to reduce pulsation.

5.3.3 Specifying pipe lengths


- Keep pipe work as short and direct as possible.
- To allow easy access when changing hoses, include a short, removable section adjacent to the port flanges.

5.3.4 Optimizing cross-section of pipe work

- Avoid bending radii of less than 10 times the nominal pipe diameter.
- Avoid abrupt changes of cross-section along the piping.

5.3.5 Providing safety and control devices (recommended)

Making provisions for isolating and shutting off pipes

-  For maintenance and repair work.

- ▶ Provide shut-off valves in the suction and discharge lines.

Allowing safe removal of product

- ▶ Include drainage taps in suction and discharge lines at the lowest point.



WARNING

Drain down precautions

- ▶ Always follow the safety procedures for handling the product being pumped.
- ▶ If the hose has ruptured, the lubricant may be contaminated with product and the pump casing maybe pressurized – care must be taken to handle the mixture appropriately and appropriate measures taken to relieve any pressure build up.

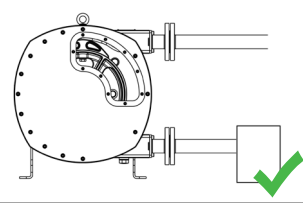
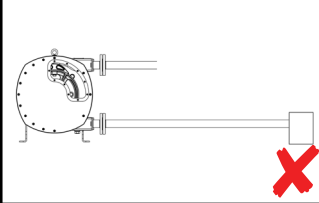
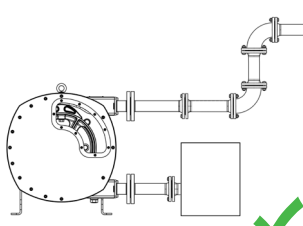
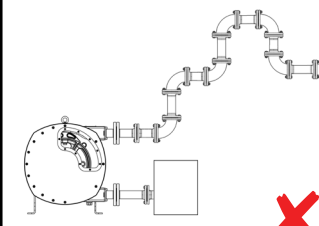
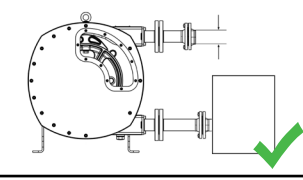
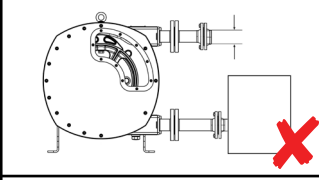
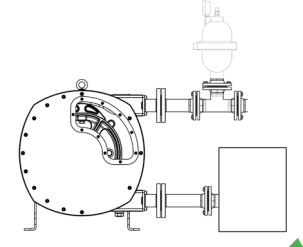
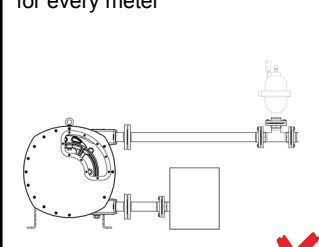
Do's	Don'ts
<p>1. Short pipe run to suction side</p> 	<p>Long pipe run to suction side</p> 
<p>2. Reduced Joints/Bends</p> 	<p>Multiple Joints/Bends</p> 
<p>3. Connecting pipe with diameter 1.5 times pump hose diameter</p> <p>Pipe ID 1.5 times hose ID</p> 	<p>Connecting pipe with smaller than pump hose diameter</p> <p>Pipe ID < pump hose ID</p> 
<p>4. Pulsation damper connected close to the pump</p> <p>Pulsation Damper</p>  <p>Bellocs</p>	<p>Pulsation damper connected away from pump</p> <p>10% loss in damper efficiency for every meter</p> 

Table 4 Do's and Don'ts

5.4 Assembling the pump

5.4.1 Frame Assembly built



Assembly of the VF5-VF80 pump is similar across the range; the build of a VF25 is used in this document.



Figure 5 Fitting the filler tube

1. Fit the blanking plugs to the pump casing with plastic washers where supplied and the filler tube with PTFE.
2. If no central hole exists fit the breather instead of the upper drain plug.

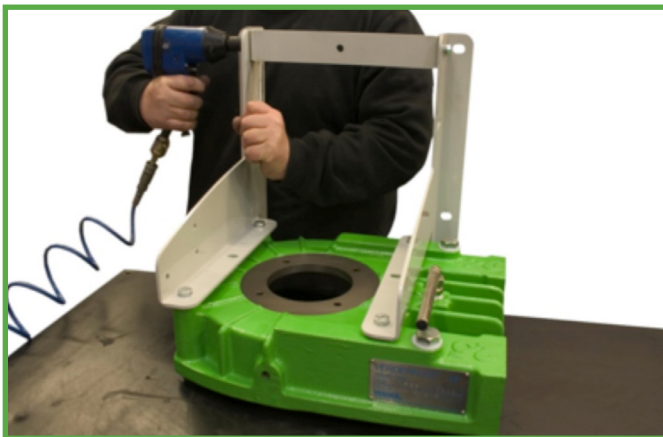


Figure 6 Installing frames

3. We recommend that the pump is assembled onto a suitable pallet or wheeled bogie to facilitate movement.
4. Mount the framework to the pump casing using the fixing kit (Refer 10.1.7 Tightening torques).

5.4.2 Motor and Gearbox Installation

1. Fit the drive gasket to the pump casing prior to fitting the Geared Motor Unit (GMU).
2. Use a small amount of grease to hold the gasket in place.
3. Mount the GMU to the pump casing and secure with the fixing kit.

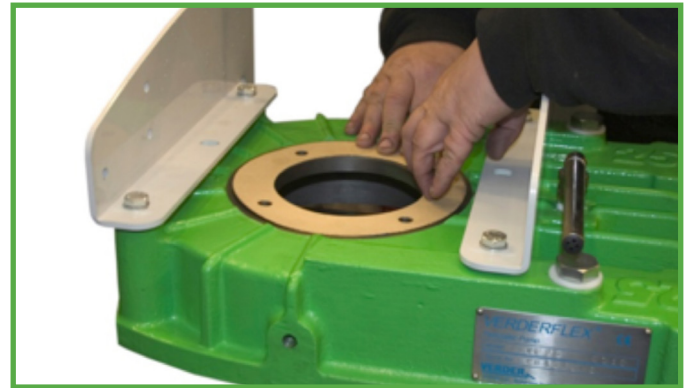


Figure 7 Fitting the drive gasket

4. It is recommended that the fasteners are rechecked after tightening to ensure that the GMU is flush against the casing (to prevent any leakage).

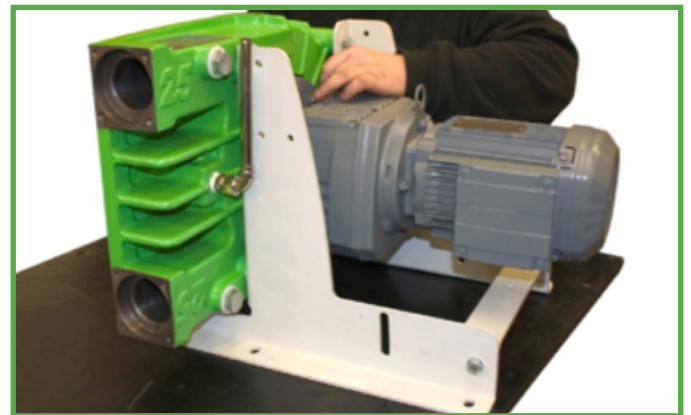


Figure 8 Mounting the Gear motor unit (GMU)

5.4.3 Rotor Installation

1. Fit one pin on each side of the rotor to locate the shoes correctly onto the rotor



Figure 9 Mounting rotor shims on the rotor (Step 1)

2. Fasten the shoes and shims on each side of the rotor.
3. Secure the taper lock bush to the rotor using the two set screws.



Figure 10 Mounting rotor shoes on the rotor (Step 2)

4. It is best practice to fit the shim slotted end facing the pump casing. This will enable the removal of shims in situ, should this be required.
5. Note: VF 05-15 uses a fixed rotor without shoes and shims.
6. Mount the rotor onto the GMU drive shaft and measure the correct distance from the rotor to the edge of the pump casing (refer fig. 11)
7. Tighten the set screws then re-check the distance, re-adjust as necessary.
8. Refer to 10.1.8 Rotor setting distance



Figure 11 Setting the rotor distance

5.4.4 Front cover installation

1. Fit the lifting eye to the casing.
2. Fit the 'O' ring to the front cover using grease to hold it in place.
3. Secure the front cover to the pump casing with the fixing kit (Refer 10.1.7 tightening torques).
4. When fitting the front cover, the cap head screw nearest to the inspection window, is fitted without a washer (Figure 12 Installing the front cover).
5. Fit rest of the cap head screws with washers and torque-tighten (Refer table 11 tightening torques)

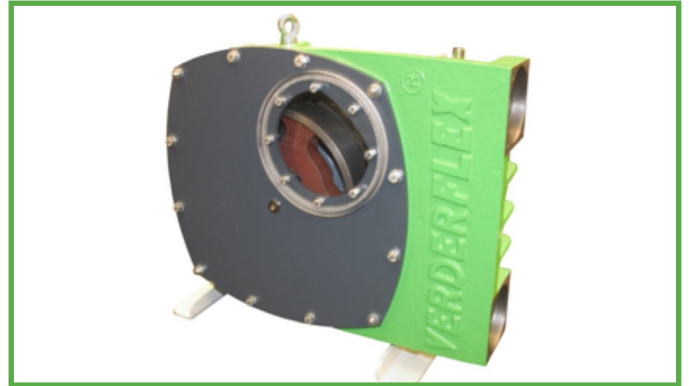


Figure 12 Installing front cover

6. Fit the inspection window gasket to the front cover.
7. Secure the inspection window to the front cover with cap head screws. Care must be taken not to over tighten the screws, as this may damage the inspection window (Refer 10.1.7 Tightening torques).

5.4.5 Electrical power installation

1. Connect motor to the rated power supply. Ensure the correct gland is used and that the earth connection is made and secured. Wiring information is available on the cover plate of the junction box.
2. Run the pump slowly to ensure correct rotation.



Figure 13 Connecting the motor

5.5 Assembling the pump

5.5.1 Electrical power installation

- ✓ Fully lubricate the outer wall of the hose with lubricant to aid installation.
1. Insert one end of the hose into the mouth of the suction port (the hose should be fed into the pump in the direction of normal operation).
 2. Once the hose reaches the rotor, the drive can be inched forward slowly to feed in the remainder of the hose into the pump housing.

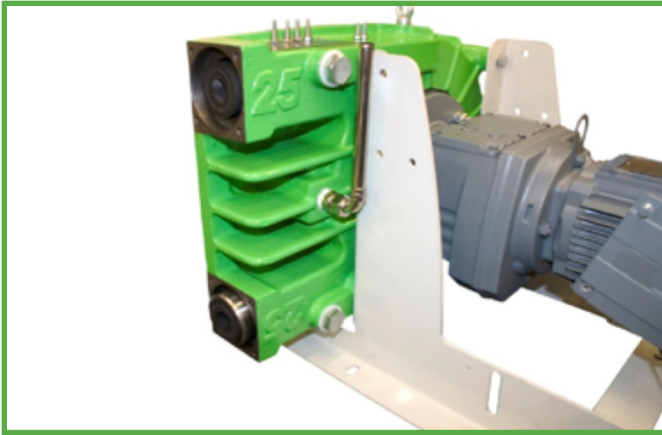


Figure 14 Inserting the hose

3. Leave enough of the hose protruding out of the suction port to fit the sealing ring.
4. Fit the sealing ring to the hose; allow the hose to slightly protrude past the sealing ring.

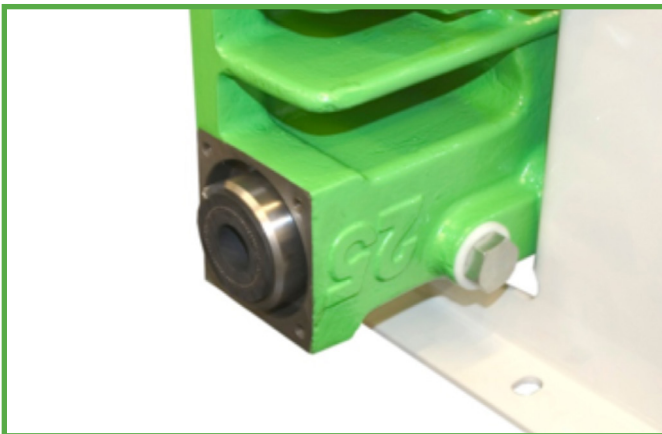


Figure 15 Fitting the sealing ring

5. Fit the inner and outer 'O' rings to the port flanges.



Figure 16 Port flange assembly & insert

6. Load the insert into the port flange, then apply a small amount of lubricant to the flange to aid fitting. Fit the flange to the suction port by holding on to the flange-insert unit, pushing it in together.
7. Tighten the bolts in a 1-3-4-2 sequence, repeating the sequence until each flange is evenly fitted. All 4 bolts should be fitted to each flange to avoid compromising the performance of the pump.

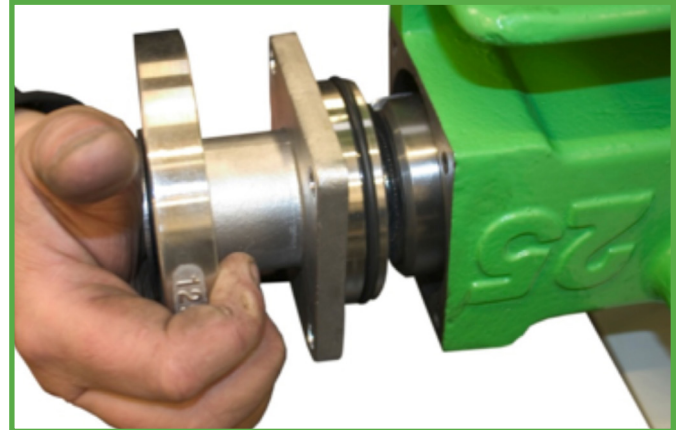


Figure 17 Inserting the port flange assembly & insert

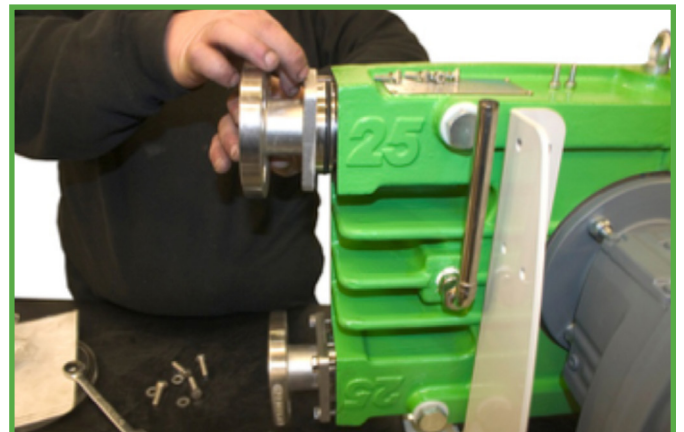



Figure 18 Inserting the port flange assembly & insert

5.5.2 Filling the pump with lubricant

 The safety data sheets for both Verderlube and Verdersil are available from the manufacturer for compatibility check.

1. Provide a suitable container to collect split lubricant.
2. Ensure compatibility of lubricant with the pumped liquid.
3. Remove the front cover inspection window and fill the pump with lubricant. (→ 10.1.5 Lubricants).



Figure 19 Filling Lubricant

5.5.3 Installing the inspection window

1. Refit the front cover inspection window. Take particular care not to over tighten the fasteners, as this may crack the inspection window.
2. The pump is now ready for commissioning.

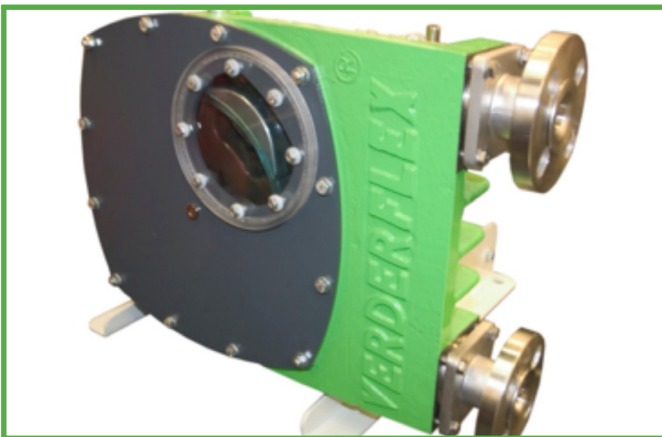


Figure 20 Assembled VF Pump

5.6 Connecting the pipes

NOTE

Contamination of pumped media due to impurities in the pump!

- ▶ Care should be taken to avoid ingress of contaminants into the pumped media.

1. Clean all piping parts and fittings prior to assembly.
2. Ensure that the flange seal do not protrude inwards occluding the flow path.
3. Remove flange covers on both the suction and discharge side prior to installation.

5.6.1 Installing the piping

1. Check all fasteners are tightened (→ 10.1.7 Tightening torques)
2. Remove the transport and sealing covers from the pump.
3. Before connecting any piping to the pump: Ensure that the hose is properly secured by running the pump dry for 10–20 revolutions in both the directions.
4. Run the pipes in a continuous upward or downward slope to avoid air pockets
5. Connect the piping

6. Operation

6.1 Pre-commissioning the pump

6.1.1 Checking the direction of rotation with dry pump

1. Ensure the pump has lubricant in it
2. Switch the motor on and check the direction of rotation; switch immediately off again.
3. If the direction of rotation is different: swap two of the phases (*check with electrician)

6.1.2 Starting the pump



Risk of injury and poisoning due to pumped liquid spraying out!

- ▶ Use personal protective equipment when carrying out any work on the pump.



Risk of injury and poisoning due to hazardous pumped liquids!

- ▶ Safely collect any leaking pumped liquid and dispose of it in accordance with environmental rules and requirements.



Equipment damage due to excess pressure!

- ▶ Do not operate the pump with the discharge-side fitting closed.
- ▶ Operate the pump only inside the tolerances specified by the manufacturer (→ 10.1 Technical specifications)

- ✓ Pump set up and connected properly
- ✓ Motor set up and connected properly
- ✓ All connections stress-free and sealed
- ✓ Pump housing lubricant level correct (→ 10.1.5 Lubricants).
- ✓ All safety equipment installed and tested for functionality

1. Close all drainage taps.
2. Open the suction-side and the discharge-side fittings.
3. Switch on the motor and make sure it is running smoothly.
4. Run the pump, flushing with water first (cold commissioning) to check for leaks.

5. Verify that neither the pump unit nor the pipe connections are leaking.
6. Perform a second flush by running the pump, 10–20 revolutions with pumped liquid, to remove residue and water inside the pump.

6.1.3 Switching off

NOTE

Risk of dead heading and hose burst due to closed suction or discharge!

- ▶ Keep the suction and discharge side fittings opened till the rotor has come to a complete stop.



Risk of injury due to hot pump parts!

- ▶ Use personal protective equipment when carrying out any work on the pump.

NOTE

Equipment damage due to sediments!

- ▶ If the pumped liquid crystallizes, polymerizes or solidifies:
 - Flush pump
 - Make sure that the flushing liquid is compatible with the pumped liquid.

1. If necessary: Flush and empty the pump.
2. Switch off power to the motor.
3. Close the discharge side fitting.
4. Check all tie bolts and tighten them if necessary (only after putting the pump into service for the first time).

6.2 Operation

6.2.1 Switching on

DANGER

Risk of injury due to running pump!

- ▶ Do not touch the moving parts of a running pump.
- ▶ Do not carry out any repair/ maintenance work on the running pump.
- ▶ Allow the pump to cool down completely before starting any work on the unit.

DANGER

Risk of injury and poisoning due to pumped liquid spraying out!

- ▶ Use personal protective equipment when carrying out any work on the pump.

NOTE

Risk of pulsation when throttling down the suction flow rate!

- ▶ Fully open the suction-side fitting and **DO NOT** use it to adjust the flow as this could damage the hose.

- ✓ Pump pre-commissioned (→6.1)
- ✓ Pump prepared and filled

1. Open the suction-side and the discharge-side fittings.
2. Switch on the motor and make sure it is running smoothly.

6.2.2 Switching off (Refer to → 6.1.3)

WARNING

Risk of injury due to hot pump parts!

- ▶ Use personal protective equipment when carrying out any work on the pump.

NOTE

Damage to hose due to sediments!

- ▶ If the pumped liquid crystallizes, polymerizes or solidifies
 - Flush the hose
 - Make sure that the flushing liquid is compatible with the pumped liquid.

6.3 Shutting down the pump

- ▶ Take the following measures whenever the pump is shut down:

Pump is	Measure
shut down	▶ Take measures according to the pumped liquid (→ Table 6 Measures depending on the behaviour of the pumped liquid).
...dismounted	▶ Isolate the motor from its power supply and secure it against unauthorized switch-on.
...put into storage	▶ Follow the storage instructions (→ 8 Storage).

Tab. 5 Measures to be taken if the pump is shut down

Behaviour of the pumped liquid	Duration of shutdown (depending on process)	
	Short	Long
crystallized or polymerized, Solids sedimenting	▶ Flush the pump.	▶ Flush the pump, remove the hose.
Solidifying non-corrosive	▶ Heat up or empty the pump	▶ Empty the pump
Solidifying corrosive	▶ Heat up or empty the pump	▶ Empty the pump. ▶ Treat the pump with preservative.
Liquid, non-corrosive	-	-
Liquid, corrosive	▶ Empty the pump	▶ Empty the pump. ▶ Treat the pump with preservative.

Tab. 6 Measures depending on the behaviour of the pumped liquid


6.4 Start-up following a shutdown period

1. After a prolonged shutdown period, re-commission the pump as follows:
 - Replace the seals.
 - Install or change hose (→ 5.5 Hose change).
2. Carry out all steps as for the initial start-up (→ 6.1 Pre commissioning the pump).

6.5 Operating the stand-by pump

- ✓ Stand-by pump is filled with lubricant (→5.5.2 Filling pump with lubricant)
- ▶ Operate the stand-by pump at least once a week to avoid hose setting, which may cause initial startup overloads.

7. Maintenance

 Only trained service technicians should be employed for fitting and repair work. Present a pumped medium certificate (DIN safety data sheet or safety certificate) when requesting service.

 **DANGER**

Risk of injury due to running pump or hot parts!


- ▶ Do not carry out any repair/maintenance work on a pump in operation.
- ▶ Allow the pump to cool down completely before starting any repair work.

 **WARNING**

Risk of injury and poisoning due to hazardous pumped liquids!


- ▶ Use protective equipment when carrying out any work on the pump.

7.1 Inspections

 The inspection intervals depend on the pump operating cycle.

1. Check at appropriate intervals:
 - Normal operating conditions unchanged
2. For trouble-free operation, always check the following:
 - Lubricant level
 - No leaks
 - No unusual running noises or vibrations
 - Hose in position

7.2 Maintenance

 These pumps are generally maintenance free and any work should normally be limited to inspections and pump lubricant changes as required; these may be more frequent in dust and/or hot condition.

 **DANGER**

Risk of electrocution!

- ▶ Have all electrical work carried out only by qualified electricians.

7.2.1 Cleaning the pump

NOTE

High water pressure or spray water can damage motors!

- ▶ Do not clean motors with water or steam jet.
 1. Clean large-scale grime from the pump.
 2. Rinse the hose carefully to remove chemicals (follow the cleaning protocol as listed in → 8.1.2 Cleaning protocol for hoses).

7.2.2 Maintenance schedule

Task	Frequency	Action
Check pump and gearbox for leaks and damage	<ul style="list-style-type: none"> – Before pump start up – Daily visual inspection – Scheduled intervals during operation 	<ul style="list-style-type: none"> ▶ Repair leaks and damage before operating the pump ▶ Replace components as necessary. ▶ Clean up any spillage.
Check pump housing lubrication level	<ul style="list-style-type: none"> – Before pump start up – Daily visual inspection – Scheduled intervals during operation 	<ul style="list-style-type: none"> ▶ Make sure that lubricant level is visible in the inspection window between the lower sill and the first pair of bolts. ▶ Do <u>not</u> operate the pump if the level is too low or too high. Refill lubricant as required (→5.6.2 Lubricant refill)
Check geared motor unit lubrication level	<ul style="list-style-type: none"> – Before pump start up – Daily visual inspection – Scheduled intervals during operation 	<ul style="list-style-type: none"> ▶ → Motor instruction manual.
Check pump for unusual temperatures or noise in operation	<ul style="list-style-type: none"> – Daily visual inspection – Scheduled intervals during operation 	<ul style="list-style-type: none"> ▶ Check pump, gearbox and bearing housing for damage. ▶ Replace worn components.
Replace pump housing lubricant	<ul style="list-style-type: none"> – At every hose change or every six months – After inspection when required 	<ul style="list-style-type: none"> ▶ Refill lubricant (→5.5.2 Lubricant refill)
Replace hose	<ul style="list-style-type: none"> – After inspection when required – When flow has dropped by 25% of nominal value – When the hose is burst/damaged 	<ul style="list-style-type: none"> ▶ Replace hose (→ 7.4 Hose change) ▶ Replace flange sealing kit
Check pump housing, rotor, rotor shoes and inserts internally	<ul style="list-style-type: none"> – Annually – On replacing the hose 	<p>Worn and damaged surfaces give rise to premature hose failure</p> <ul style="list-style-type: none"> ▶ Replace worn components. ▶ Check bearing play and function.

Tab. 7 Maintenance schedule

7.3 Repairs

 **DANGER**

Risk of death due to electric shock!

- ▶ Have all electrical work carried out by qualified electrician only

 **WARNING**

Risk of injury due to heavy components!

- ▶ Pay attention to the component weight. Lift and transport heavy components using suitable lifting gear.
- ▶ Set down components safely and secure them against overturning or rolling away.

7.3.1 Preparations for dismounting

 **WARNING**

Risk of injury while dismounting the pump!

- ▶ Use protective equipment when carrying out any work on the pump.
- ▶ Observe manufacturer's instructions (e.g. for Motor, coupling, gearbox).

- √ Safely release any pressure build up in the pump housing. (There may be significant built up of pressure in the discharge line or possible suction side vacuum).
- √ Pump completely emptied, flushed and decontaminated
- √ Electrical connections disconnected and motor locked out against being switched on again
- √ Pump cooled down
- √ Auxiliary systems shut down, depressurized and emptied
- √ Before dismounting the pump, mark the precise orientation and position of all components before dismounting them.

7.3.2 Returning the pump to the manufacturer

- √ Pump unpressurized
- √ Pump and hose completely emptied and decontaminated.
- √ Pump cooled down
- √ Hose dismounted (→7.4.1 Dismounting the hose)


Obtain prior authorization before repair or return of the pump.

- ▶ Enclose a completed document of compliance when returning pumps or components to the manufacturer

Repairs	Measure for return
...at the customer's premises	<ul style="list-style-type: none"> – Return the defective component to the manufacturer. – Decontaminate if necessary.
...at the manufacturer's premises	<ul style="list-style-type: none"> – Flush the pump and decontaminate it if it was used for hazardous pumped liquids.
...at the manufacturer's premises for warranty repairs	<ul style="list-style-type: none"> – Only in the event of hazardous pumped liquid, flush and decontaminate the pump

Tab. 8 Measures for return

7.3.3 Rebuild / Repair

 Reinstall the components, in accordance with the marks applied.

NOTE

Material damage due to unsuitable components!

▶ Always replace lost or damaged bolts with bolts of the same strength and material.


1. Observe the following during the installation:
 - Replace worn parts with genuine spare parts.
 - Maintain the prescribed tightening torques (→ 10.1.7 Tightening torques)
2. Clean all parts (→ 10.1.4 Cleaning agents). Do not remove any markings which have been applied.
3. Reassemble the pump (→ refer sectional drawing).
4. Install the pump in the system (→ 5 Installation and connection)

7.4 Hose change

 **WARNING**

Risk of injury!

▶ Always isolate the power supply before working on the pump.

 The hose change involves removal and re-installing the port flanges.

7.4.1 Dismounting the hose

▶ Draining lubricant

 **WARNING**

Slip hazard due to spilt lubricant!

- ▶ Care must be taken when lubricant is drained into a container.
- ▶ Dispose of used lubricant in accordance with local laws and good environmental practices.

- ✓ Motor isolated.
- ✓ System secured against being switched back on again.

1. Remove the lower port flange.
2. Drain the lubricant into a suitable container.

▶ Removing the hose

 **CAUTION**

Risk of injury if the hose is expelled too quickly


▶ Slowly remove the hose by running the motor at a reduced speed

1. Remove both the flanges.
2. Use the motor to drive out the old hose. If no power is available, remove the fan cover and turn the fan shaft by hand or using suitable leverage.
3. Clean the pump housing.
4. Inspect the flanges for damage and signs of wear.

7.4.2 Re-installing the hose, port flanges, lubricant refill and fitting the inspection window


- Follow step by step, the instructions listed in section → 5.5 (Installing the hose)

7.5 Ordering spare parts

 For trouble-free replacement in the event of faults, we recommend keeping spare parts available on site.


- ▶ The following information is mandatory when ordering spare parts (→ Name plate):
 - Pump model
 - Year of manufacture
 - Part number / Description of part required
 - Serial number
 - Quantity

7.6 Accessories

 There are a number of accessories available to complement the Verder hose pumps, all of which are available pump accessories refer VF spare parts list.

- ▶ The following accessories are available for the VF range of pumps:
 - Revolution sensor
 - Hose burst detection kit
 - Hygienic hose connections
 - Pulsation dampener

8. Storing pumps and hoses

 Verderflex pumps are designed for continuous use, however, there may be instances when pumps are withdrawn from use and stored for extended periods. We recommend certain pre-storage actions and precautions be taken whilst pumps and their components are not in use.

Similarly, hoses and lubricants may be held in stock to service working pumps and their recommended storage conditions are advised.

8.1.1 Pre-Storage Actions

- The hose should be removed from the pump and lubricant drained out from the pump casing.
- The pump casing should be washed out allowed to dry and any external build up of product removed.

8.1.2 Cleaning Protocol for hoses

VERDERFLEX hoses should be cleaned with the following protocol –

NBRF Hoses:

- ▶ VERDERFLEX NBRF food grade hoses should be cleaned with the following protocol:
 1. First flush 0.5% Nitric Acid (HNO₃) solution at up to 60°C
 2. Second flush 4% Caustic soda (NaOH) solution and eventually steamed open ends for 15 minutes at up to 110°C
 3. Final flush: flush with clean water to remove all traces of cleaning solutions

Under no circumstances should VERDERFLEX NBRF food grade hoses be cleaned with Sodium hypochlorite (NaOCl) based cleaning solutions, neither should the above concentrations, exposure, durations or temperatures be exceeded.

▶ EHEDG Approval

VERDERFLEX NBRF food grade hoses can be used with suitably specified VERDERFLEX pumps to form an EHEDG accredited hygienic pumping system. To comply with this certification both the approved particle velocity must be maintained during the cleaning cycle and the appropriate hygienic port flanges fitted. Should a pump to this specification be required, it should be agreed with your local VERDERFLEX distributor before the pump is supplied.

▶ Food Grade Approval

All VERDERFLEX NBRF food grade hoses' inner liners are certified as compliant to FDA – CFR 21 Parts 170 to 189 – Item 177.2600

▶ Hose Description

All VERDERFLEX NBRF food Grade hoses consist of a smooth black inner food grade liner bonded to a non-food grade outer. The inner liner is a taste-free and odourless.

▶ Hose Installation

All VERDERFLEX NBRF food Grade hoses must be installed in accordance with the procedures defined in the VERDERFLEX Operating and Maintenance manual.

► **Identification**

VERDERFLEX NBRF food Grade hoses can be identified by:

- a) Both an external Yellow Coding / Identification tape and an additional white longitudinal stripe
- b) On supply as a spare part, they will have their endssealed with Aluminium foil

► **Pump Installation**

VERDERFLEX pumps using VERDERFLEX NBRF Food Grade hoses must be installed in accordance with recommendations made by the pump’s supplier. In particular, special care must be given to the suction and discharge line conditions and that the hose is shimmed in accordance with VERDERFLEX’s recommendations. Should there be any doubt about any installation details, these must be discussed with the pumps’ supplier.

► **Particle Release**

All hoses will release small quantities of rubber into the product stream, especially immediately after the hose installation and just prior to hose failure. Whilst the rubber released will be food grade particles, these may cause end-user concerns about contamination and so we recommend suitable particle capturing devices such as filters are fitted into the pump’s discharge line.

8.1.3 Storage Conditions

- Pumps should be stored in a dry environment, out of direct sunlight. Depending on these conditions, it may be advisable to place a moisture-absorbing product, such as Silica gel, inside the pump’s casing or to coat the pump’s inner surfaces with moisture-repelling oil, such as WD40, whilst the pump is stored.
- Gearboxes may require intermittent attention as indicated by the gearbox manufacturer’s recommendations.
- Hoses should be stored as supplied in their wrapper and should be stored away from direct sunlight, flat without any bends or kinks and at room temperature, with end caps fitted.
- Lubricants should be stored under normal warehouse conditions with their caps securely fastened.

9. Troubleshooting

9.1 Pump malfunctions

If malfunctions occur which are not specified in the following table or cannot be traced back to the specified causes, please consult the manufacturer.

Possible malfunctions are identified and respective cause and remedy are listed in the table.

Abnormally high pump temperature	Low flow/pressure	Pump and pipe-work vibrating	Hose pulled in to pump housing	Possible Cause	Remedy
X	-	-	-	Incorrect lubricant	▶ Consult the manufacturer to obtain correct lubricant.
				Low lubricant level	▶ Add required amount.
				Damaged /contaminated lubricant (has it gone black?)	▶ Change lubricant
				Product ambient temperature too high	▶ Consult the manufacturer regarding maximum temperature.
				Over shimming of the pump	▶ Check for and remove excess shims.
X	X	X	X	Blocked suction / bad suction characteristics / no product	▶ Check pipe-work and valves for blockages. ▶ Check that the suction pipe-work is as short and as large in diameter as feasible. ▶ Correct the piping layout. ▶ Consult the manufacturer.
X	-	X	-	High pump speed	▶ Reduce speed to a minimum. ▶ Consult the manufacturer.
-	X	-	-	Suction/discharge valve closed	▶ Open suction/discharge valve.
				Hose failure	▶ Replace hose(→ 7.4 Hose change)
				Poor pump selection, incorrect shoe shimming	▶ Consult the manufacturer to check pump selection.
				Suction line too long	▶ Consult the manufacturer.
				Pump speed too high	▶ Consult the manufacturer.
				Suction line bore too small	▶ Consult the manufacturer.
				High product viscosity	▶ Consult the manufacturer.
				Suction/discharge lines not secured properly	▶ Check and secure suction/discharge lines.
-	-	X	-	Long suction/discharge lines / Damper malfunction	▶ Shorten long suction/discharge lines wherever possible. ▶ Verify operation of dampner. ▶ Consult the manufacturer.
				High product specific gravity / viscosity	▶ Consult the manufacturer.
				Under-sized suction/discharge diameter	▶ Increase suction/discharge pipe-work diameter. ▶ Fit damper.
				Insufficient lubricant in the casing	▶ Check lubrication chart and add the required amount of lubrication.
-	-	-	X	Inlet pressure too high	▶ Reduce the inlet pressure / suction side losses
				Blocked hose / incorrectly fitted	▶ Check the hose and remove any blockages.
				Large particles in the product	▶ Mount sieve or filter in suction line to avoid very large particles from entering the hose. <u>Do not</u> allow filters to limit suction below accepted levels.

Tab. 9 Pump troubleshooting list

10. Appendix


10.1 Technical Specifications

10.1.1 Pump Specifications

Size	Value	
Max. delivery pressure	VF 05	7.5 bar
	VF 10 - 15	12 bar
	VF 25 - 80	16 bar
Temperature of pumped liquid	< 100 °C (212 °F)	
Max. continuous operation pump speeds	*(refer pump datasheet)	
Dimensions	*(refer pump datasheet)	

Tab. 10 Pump Specifications

10.1.2 Ambient conditions

 Operation under any other ambient condition would require approval from the manufacturer


Operating conditions

- 1 Ambient temperature -5 °C to +45 °C
- 2 Relative humidity – long—term ≤ 85 %
- 3 Setup height above sea level ≤ 1000

Storage conditions

- 4 Ambient temperature +10 °C to +50 °C
- 5 Relative humidity – long—term ≤ 85 %

10.1.3 Preservatives


 Use e.g. RUST-BAN 335 or similar preservatives on bare metal.

10.1.4 Cleaning agents (After hose is removed)

Cleaning agents
Wax solvents, diesel paraffin, alkaline cleaners, Warm Water

Tab. 11 Cleaning agents

10.1.5 Lubricants


 Recommended lubricants for longer hose life are VERDERLUBE or VERDERSIL.

Pump type	Amount of Lubricant
VF 05	0.25 Ltrs (0.07 US Gallons)
VF 10	0.25 Ltrs (0.07 US Gallons)
VF 15	0.50 Ltrs (0.13 US Gallons)
VF 25	2.0 Ltrs (0.53 US Gallons)
VF 32	2.5 Ltrs (0.70 US Gallons)
VF 40	5.0 Ltrs (1.30 US Gallons)
VF 50	10.0 Ltrs (2.60 US Gallons)
VF 65	25.0 Ltrs (6.60 US Gallons)
VF 80	35.0 Ltrs (9.24 US Gallons)

Tab. 12 Amount of Lubricant cover.

*The pump is filled to the lowest screw hole on the window.


10.1.6 Rotor options

 Verderflex VF 5-80 range has standard and high pressure rotor options:

Pump type	Rotor option (bars)	
	Standard	High Pressure
VF 05	7.5 bar	
VF 10	7.5 bar	12 bar
VF 15	7.5 bar	12 bar
VF 25	Shimmed	
VF 32	Shimmed	
VF 40	Shimmed	
VF 50	Shimmed	
VF 65	Shimmed	
VF 80	Shimmed	

Tab. 13 Rotor options

10.1.7 Tightening torques

 Tightening torques should be applied at the below mentioned torque values:

Position	Torque values (Nm)								
	VF 05	VF 10	VF 15	VF 25	VF 32	VF 40	VF 50	VF 65	VF 80
Mounting Frame	6	6	14	26	34	34	34	55	55
Cross member	N/A	N/A	N/A	26	26	45	45	45	45
Rotor shoe	N/A	N/A	N/A	37	65	90	115	115	115
Front cover	3	3	3	24	24	35	35	55	55
Inspection Window	N/A	N/A	N/A	3	5	6.5	6.5	6.5	6.5
Gear box	12	12	27	26	50	50	55	55	55
Flange	7	7	7	24	24	40	40	55	60
Taper Lock Bush	20	20	20	20	30	50	90	115	115

Tab. 14 Pump fastener tightening torques

10.1.8 Rotor Setting Distance

Pump model	Rotor Setting Distance (mm)								
	VF 05	VF 10	VF 15	VF 25	VF 32	VF 40	VF 50	VF 65	VF 80
mm	4	4	4	12	11	11.5	11	18.5	21.5


Tab. 15 Rotor setting distance (mm)

10.1.9 Pump sizes and weights

Pump size	Weight CC (kg)	Built Weight CC (kg)
VF 05	10	25
VF 10	10	25
VF 15	19	35
VF 25	73	110
VF 32	106	160
VF 40	196	250
VF 50	240	320
VF 65	750.	975
VF 80	850	1100

Tab. 16 Pump size and weights

10.2 Explosive Operation & Risk Preventative Measures

 Table 17 lists possible malfunctions of the pump and its components during explosive operation; and preventative measures in place to avoid any malfunctions.

Torque values (Nm)			
Normal Operation	Malfunction	Preventative Measures	Ignition Protection
Frictional heat of moving parts inside the gearbox		The moving parts inside the gearbox are submersed in oil/ grease which acts as a lubricant, spark quenching agent & coolant	Liquid immersion `K`
	Unacceptable loss of oil from gearbox	A level plug is provided on the gearbox. The oil level has to be checked for low level and signs of contamination	Instruction Manual
Guarding	Mechanical contact	Ensure secure and aligned correctly, use brass plate	Non sparking and Instruction manual
	Dust deposits on gearbox	Guarding or regular cleaning is needed to prevent deposits deeper than 5mm accumulating	Instruction Manual
Static Discharge	Hose Failure	The hose inside the casing is covered and / or submersed in oil which acts as a lubricant, spark quenching agent and coolant	Liquid Immersion `K`
	Liquid transfer through pump outlets	Metal parts are supplementary bonded to provide an electrically conductive path less 100 Ohm. This also is particular to pvdf & polypropylene inserts	National standards for electrostatic requirements plus user instruction
	Rubbing/cleaning of plastic inspection window	Supplementary bonding may be required, also clean in place where possible using non nylon cloth	National standards for electrostatic use and manual. Discharge of component before refit if Removed for cleaning.
	Overfilling & discharge of pump media through filler tube	Earth clamp can be fitted or an optional level sensor fitted. Alternatively an optional burst pressure sensor can be fitted both of which shut down the drive motor	Instruction Manual. Control of ignition source `B` if second option fitted
Pump operation in an explosive atmosphere	H&S in an explosive environment	Ensure during pump operation a warning triangle with black letters `Ex` on a yellow background is displayed at points on entry to work area	EN 13463-1

Tab. 17 Explosive Operation Assessment

10.2 Explosive Operation & Risk Preventative Measures (continued...)

Torque values (Nm)			
Normal Operation	Malfunction	Preventative Measures	Ignition Protection
Frictional heat of moving parts inside the casing	Risk of sparking	The moving parts inside the casing are covered and / or submersed in oil which acts as a lubricant, spark quenching agent and coolant	Liquid immersion `K`
	Unacceptable loss of lubricant from casing through leaks or suction	A level plug is/can be provided on the front cover. The oil level and sealing joints have to be checked weekly. Alternatively, a low level sensor can be fitted and set BELOW normal operating level, taking into account level fluctuations	Instruction manual or control of ignition source `B` if monitoring is fitted
Front Cover	High surface temperature	As above plus ensure shimming is correct and pump does not run dry for long periods	
Change in duty by reduction of rpm	Over Temp	Add forced fan cooling or thermistors	Contact drive manufacturer to control ignition source
Optional Hose burst pressure sensor	Explosion risk from spark	Current Huba 625 sensor must not be used for explosive operation. An alternative Exd / EExd component should be used	Instruction manual plus control of ignition source `B` if option used
Mechanical coupling	Mechanical slippage / breakage	Carry out routine maintenance to check for security	Instruction manual
Closed liquid internal circuit	Excess temperature	Fit temp probe to front cover or continuous temp. monitoring can be fitted and set to trip the drive power at 10k above normal running temp	Instruction manual and control of ignition source `B` if monitoring is fitted
Closed valve condition	Excess temperature and pressure	Carry out routine maintenance checks to ensure controlled temp & gauge pressures	Instruction manual

Tab. 18 Explosive Operation Assessment (continued...)

10.2.1 Explosion proof labelling

Below figure is an example of explosion proof labelling and is only fitted onto pumps supplied as ATEX compliant at the time of order.

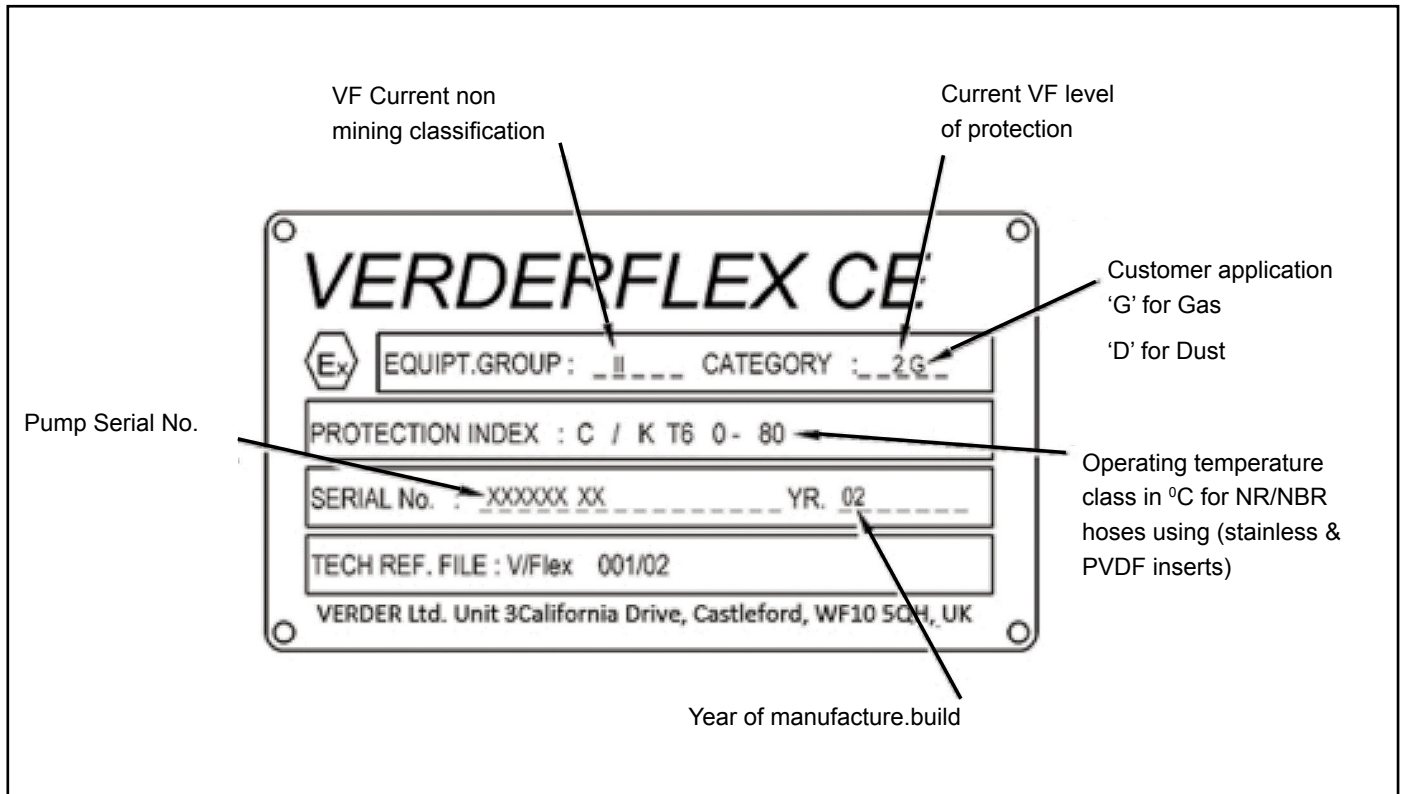


Figure 21 Explosion proof labeling

10.2.2 Glossary of terms

Below is a glossary of terms for 10.2

Safety `C`	Refers to the integral from standard constructional design
Ignition source `B`	Refers to protection incorporated to control an ignition source
Liquid Immersion `K`	Refers to protection of ignition due to use of spark quenching agent
Eexd/Exd	Refers to explosion proof electrical components with flameproof protection

Tab. 19 EN 13463-1 European norm standards for Non Electrical equipment in explosive atmospheres

10.3 List of Figures and Tables



10.3.1 List of figures

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10.4 Declaration of conformity according to EC Machine Directive

<p>EC declaration of conformity according to machine directive, appendix II A</p> <p>We, VERDER Ltd., Unit 3 California Drive, Castleford hereby declare that the following machine adheres to the relevant EC directives detailed below</p> <p>Designation VF 05, 10, 15, 25, 32, 40, 50, 65, 80</p> <p>EC directives:</p> <ul style="list-style-type: none"> • Machine Directive (2006/42/EC) • Low-voltage directive (2006/95/EC) • EMC directive (2004/108/EC) <p>Applicable harmonized norms:</p> <ul style="list-style-type: none"> • EN ISO 12100: 2010 		
Responsible for the documentation	VERDER Ltd. Unit 3 California Drive Castleford WF10 5QH UK	
Date: 01/ 04/ 2017	Company stamp / signature:  Ben Allmond Head of Development/Construction	Company stamp / signature:  David Hoyland Head of Quality

Tab. 20 Declaration of conformity according to EC Machine Directive