

VERDERFLEX[®]



Peristaltic Hose Pump

Operating Manual

Verderflex Rollit

10 - 50 T

Version 1.1v-09/2019

Print-No. 01



VERDER
passion for pumps

Version 1.1v-09/2019
Print-No. 01

Verderflex Rollit 10 - 50 T



The information in this document is essential for the safe operation and servicing of Verderflex® Rollit 10-50 T pumps. This document must be read and understood thoroughly prior to installation of unit, electrical connection and commissioning.

Table of contents

- 1. About this document**
 - 1.1 Target groups
 - 1.2 Warnings and symbols
- 2. Safety**
 - 2.1 Intended use
 - 2.2 General safety instructions
 - 2.2.1 Product safety
 - 2.2.2 Obligation of the operating company
 - 2.2.3 Obligation of personnel
 - 2.3 Specific hazards
 - 2.3.1 Hazardous pumped liquids
 - 2.3.2 Grease
 - 2.3.3 Sharp edges
 - 2.4 Safety instructions for hose pumps in hazardous locations
- 3. Layout and function**
 - 3.1 Design details
 - 3.2 Labelling
 - 3.2.1 Name Plate
 - 3.3 Layout
 - 3.4 Description of pump and accessories
 - 3.5 Detector for hose leakages
- 4. Transport, storage and disposal**
 - 4.1 Transport
 - 4.1.1 Unpacking and inspection on delivery
 - 4.1.2 Lifting
 - 4.2 Treatment for storage
 - 4.3 Interim storage before installation
 - 4.4 Disposal
- 5. Installation and connection**
 - 5.1 Installation of pumps in hazardous locations
 - 5.2 Preparing for installation
 - 5.2.1 Checking the ambient conditions
 - 5.2.2 Preparing the installation site
 - 5.2.3 Preparing the foundation and surface
 - 5.3 Installation at site
 - 5.4 Planning the pipes
 - 5.4.1 Specifying supports and flange connections
 - 5.4.2 Specifying nominal diameters
 - 5.4.3 Optimizing cross-section of pipe work
 - 5.5 For the conveyance of media containing solids
 - 5.6 Installing the Pump Hose
 - 5.7 Connecting the pipes
 - 5.7.1 Installing the piping
- 6. Operation**
 - 6.1 Pre-commissioning the pump
 - 6.1.1 Checking the direction of rotation with dry pump
 - 6.1.2 Starting the pump
 - 6.1.3 Switching off
 - 6.2 Operation
 - 6.2.1 Switching on
 - 6.2.2 Switching off (Refer to → 6.1.3)
 - 6.3 Shutting down the pump
 - 6.4 Start-up following a shutdown period
 - 6.5 Operating the stand-by pump
- 7. Maintenance**
 - 7.1 Inspections
 - 7.2 Maintenance
 - 7.2.1 Cleaning the pump
 - 7.2.2 Maintenance schedule
 - 7.3 Repairs
 - 7.3.1 Preparations for dismantling
 - 7.3.2 Returning the pump to the manufacturer
 - 7.3.3 Rebuild / Repair
 - 7.4 Hose change
 - 7.4.1 Dismounting the hose
 - 7.4.2 Re-installing the pump hose
 - 7.5 Ordering spare parts
- 8. Storing pumps and hoses**
 - 8.1.1 Pre-Storage Actions
 - 8.1.2 Storage Conditions
 - 8.1.3 Cleaning the pump
- 9. Troubleshooting**
 - 9.1 Pump malfunctions
- 10. Appendix**
 - 10.1 Technical Specifications
 - 10.1.1 Pump Specifications
 - 10.1.2 Ambient conditions
 - 10.1.3 Tightening torques
 - 10.1.4 Preservatives
 - 10.1.5 Cleaning agents (After hose is removed)
 - 10.2 Diagram of the leakage detector
 - 10.3 Diagram of the leakage detector
 - 10.4 Hose Monitor Type 'SPS'
- 11. List of Figures and Tables**
 - 11.1 List of Figures
 - 11.2 List of Tables
- 12. Declaration of conformity according to EC Machine Directive**

1. About this document

Verderflex Peristaltic pump, Rollit 10 - 50 T, 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.

Table 1 Target groups and their duties

1.2 Warnings and symbols




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

Table 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
	This sign is used to mark instructions of the manual which are safety relevant when operating the pumps in hazardous locations.

Table 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 Grease

Ensure that the grease 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 grease.

(Refer datasheet for grease to ensure compatibility)

2.3.3 Sharp edges

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

2.4 Safety instructions for hose pumps in hazardous locations



Priming and pumping of combustible gases or fumes is prohibited. Start up and close down operations which require this should only be rarely and kept as short as possible. A dry run of the pump has to be avoided generally. Appropriate measures have to be taken by operator.

- Explosive gas mixture or dust concentration can cause serious or even fatal injuries in conjunction with hot, voltaged, pressurized and moved parts of the pump
- Only qualified technical personnel is authorized to effect installation, connection, operation as well as maintenance and repair works in consideration of:
 - provided instructions
 - danger signs and/or decal information
 - every other provided instructions for the user
 - the system-dependent regulations and requirements
 - the currently valid regulations concerning explosion protection and safety as well as rules for accident prevention
- **The pump in connection with the mobile base plate only fulfils the ATEX directive (EC Directive 94/9/EC) in a stationary condition.**

In case of moving the pump the operator has to make sure that no explosive environment exists!

Before placing the pump into operation the operator must make sure that:

- the pump and all other components were not damaged during the carriage.
- the information on the nameplate concerning equipment group and category, zone, temperature class and explosion group accords with the permissible use in the particular hazardous location.
- the air temperature of the ambience of the pump is observed.
- the maximum temperature of the pumping media is not exceeded.
- there is a sensor of the leakage detector assembled which meets the ATEX requirements.
- pump hose, clamping rings and connecting sockets are mounted properly and the pump hose is greased sufficiently with Verderflex special grease.

3. Layout and function



Peristaltic hose pump, Verderflex Rollit, 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. 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 Design details



Rollit Hose Pumps are a self-priming positive displacement pumps without any glands or valves. The pumping medium only comes in contact the inner surface of the pump hose, but not with the moving parts of the pump. Therefore the pumps are particularly suitable for pumping aggressive, abrasive and viscous liquids, but as well for pumping liquids containing coarse-grained solids and sensitive materials which require to be pumped gently.

3.2 Labelling

3.2.1 Name Plate



Figure 1 Name plate

1. Pump Type
2. Maximum Pressure
3. Pump Number and Year of Manufacture
4. ATEX Coding
5. Ambient Temperature Limit in EX-Zone
6. Customer Number - Order Number

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

3.3 Layout

Pump Layout – Exploded view Rollit 10 T

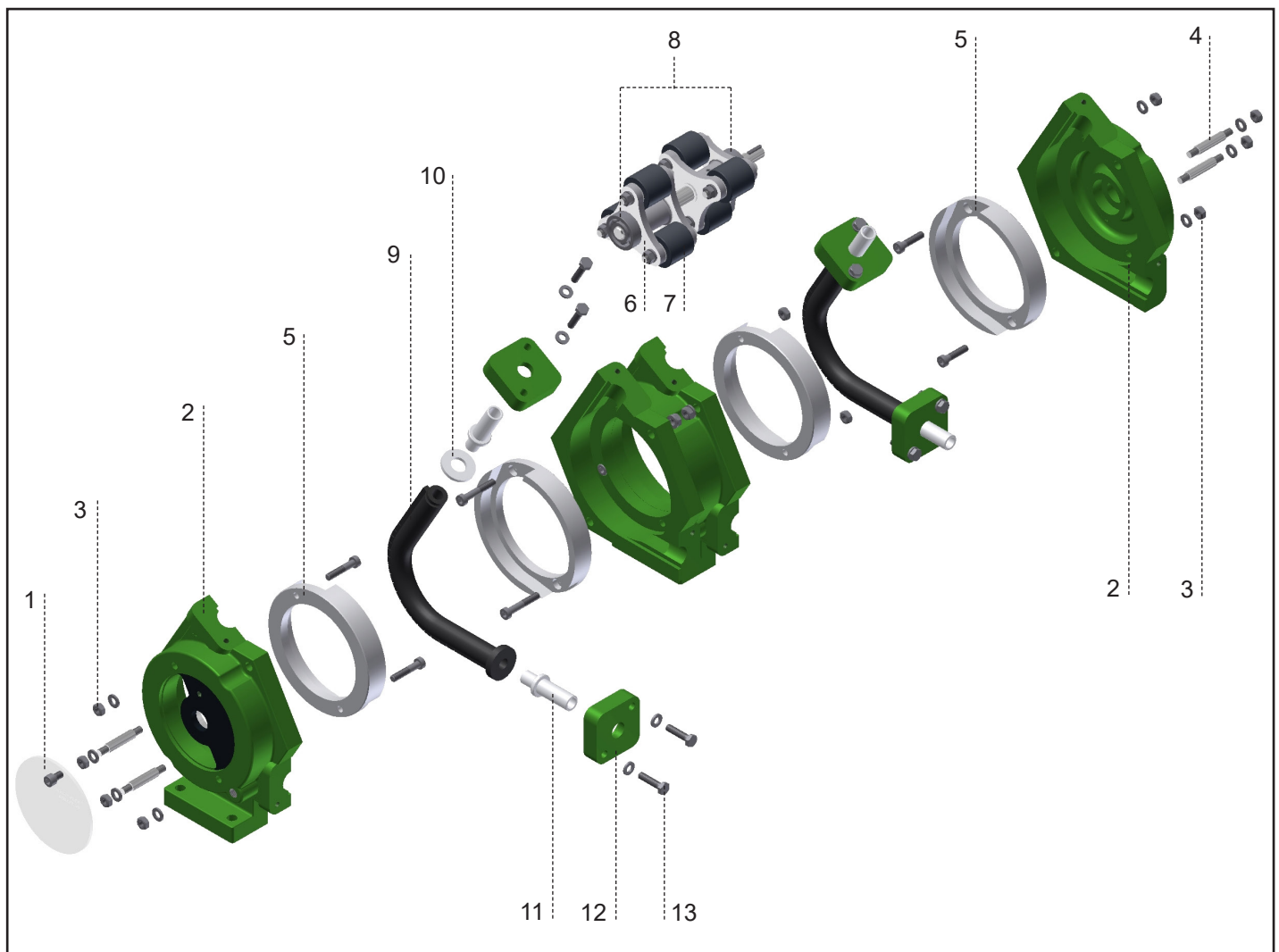


Figure 2 Layout - Rollit 10 T exploded view

- | | | | | | |
|---|-----------------------------------|----|-------------------|----|-------------------------|
| 1 | Casing cover | 6 | Rotor complete | 11 | Hose tail |
| 2 | Pump casing | 7 | Rollers complete | 12 | Counter flange |
| 3 | Casing fasteners | 8 | Bearing | 13 | Counter flange fastener |
| 4 | Centering pin with male thread M6 | 9 | Pump hose | | |
| 5 | Teflon inserts complete | 10 | Snap Closure Ring | | |

Pump Layout – Exploded view Rollit 15-50 T

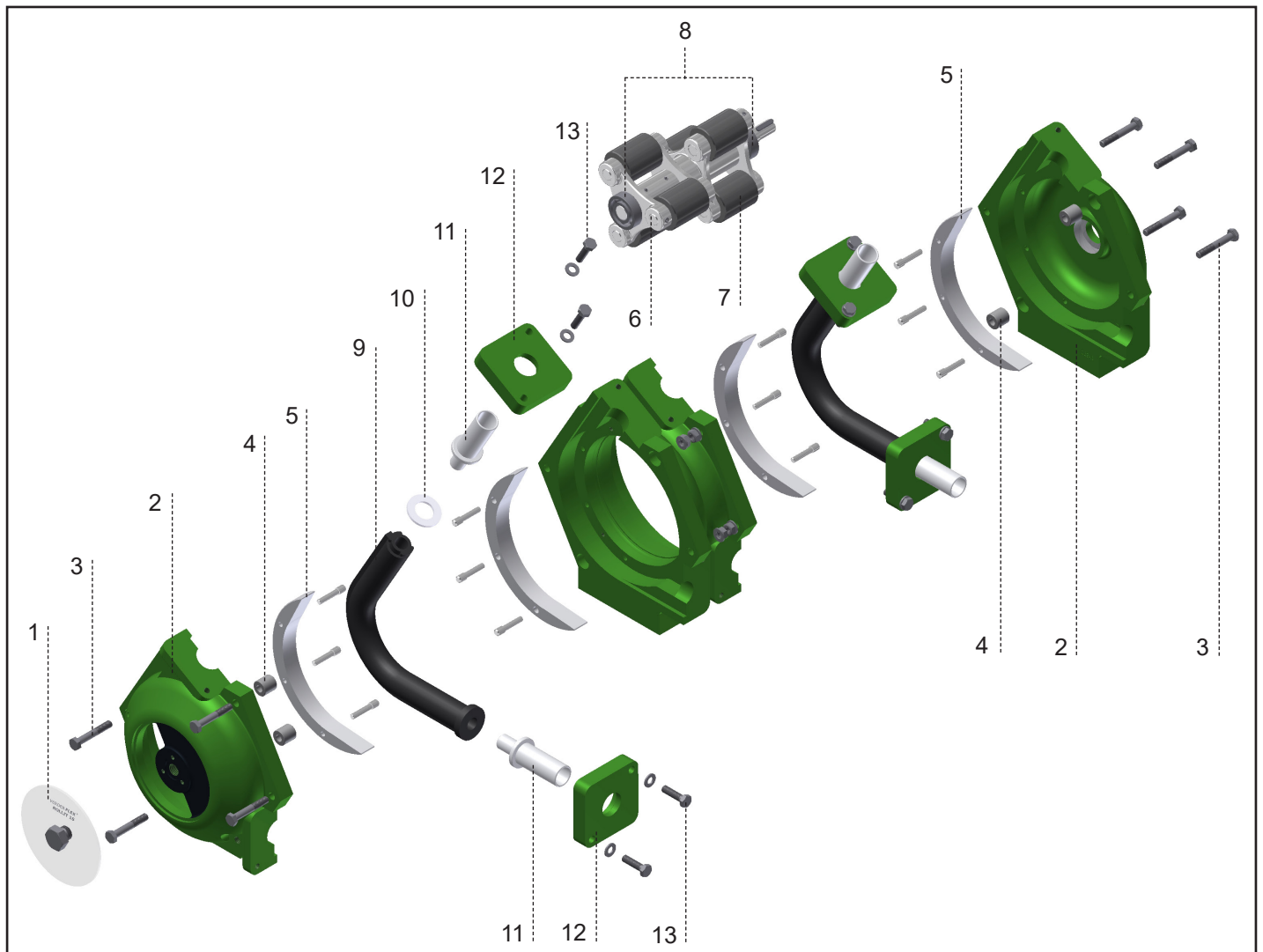


Figure 2 Layout - Rollit 15-50 T exploded view

- | | | | | | |
|---|-------------------------|----|-------------------|----|-------------------------|
| 1 | Casing cover | 6 | Rotor complete | 11 | Hose tail |
| 2 | Pump casing | 7 | Rollers complete | 12 | Counter flange |
| 3 | Casing fasteners | 8 | Bearing | 13 | Counter flange fastener |
| 4 | Centering bush | 9 | Pump hose | | |
| 5 | Teflon inserts complete | 10 | Snap closure ring | | |

3.4 Description of pump and accessories

The pump head is connected with the drive by a coupling. Pump head and drive are completely mounted on a base plate. Construction "0" means that the pump head is supplied with bare shaft extension.

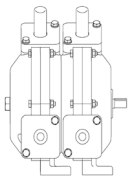
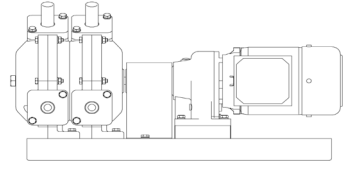
	Construction	Description
	- 0	- pump head with bare shaft extension, without drive
	- GM - GM / FU - GM / FUC - GM / FL	- pump with gear motor - pump with gear motor incl. thermistors for frequency converter use - pump with gear motor with integrated frequency converter - pump with gear motor with additional forced fan


Table 4 Description of pump and accessories

3.5 Detector for hose leakages

The hose leakage detector is for a continuous monitoring in order to avoid unnoticed hose leakages (Refer Appendix III)

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

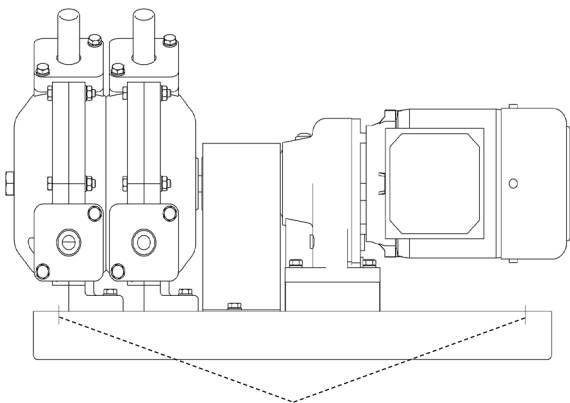
1. Unpack the pump/pump unit upon delivery and inspect it for transport damage.
2. Report any transport damage to the manufacturer/distributor immediately.
3. Retain the pallet if any further transport is required.
4. Dispose all packaging material according to local regulations.

4.1.2 Lifting



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.



(resp. to fix the base plate of stationary pumps)

Figure 3 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:
 - 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

 The installation of the pump depends on the pump type and can be made stationary or movable (on wheels).

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 Installation of pumps in hazardous locations



When pumps have to be installed in hazardous locations the instructions in chapter 2.4 must be strictly observed.

- Verderflex Rollit 10-50 T Pump series for hazardous location use (optional!) meet the construction requirements of equipment group II, category 2G. They are intended for use in zone 1.

- Hose pumps for hazardous location use in construction “0” (see chapter 3.4)
 - are in accordance with temperature class T4.
 - are intended for use at an ambient temperature between +2°C and +40°C (permissible temperature of place of installation).
 - are suitable for pumping media with a maximum temperature of:
 - +60°C in continuous operation
 - +80°C in short-time operation
 - fulfill the requirements for non-electrical devices of the type of protection C - protection by constructional safety - according to EN 13463-1 and EN 13463-5.
 - are allowed for the explosion group IIB.

5.2 Preparing for installation

5.2.1 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).

5.2.2 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.

5.2.3 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.

5.3 Installation at site

1. Lift the pump unit (→ 4.1.2 Lifting).
2. Put the pump unit down at the installation site.
3. Bolt the pump down.

5.4 Planning the pipes

5.4.1 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.

5.4.2 Specifying nominal diameters



The nominal width of the tubing at the suction and the discharge side should be approx. 25 % bigger than the nominal width of the pump hose.

The size of the hose pump is concurrent to the width of the pump hose.

The tubing on the suction side must be vacuum proof (reinforced) and the tubing on the discharge side must withstand the maximum pressure of the pump. By using a pole changing switch the tubing on suction and discharge side must withstand the maximum pressure of the pump.

5.4.3 Optimizing cross-section of pipe work

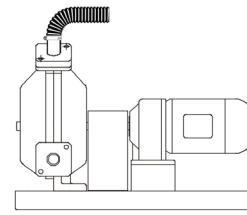
- Keep the flow resistance in the pipes as low as possible. Always use flexible tubing to connect the pump with the pipework of your application. The length of the tubing should be at least 1 m (see Table 5, Figure 1).
- Avoid abrupt changes of cross-section along the piping.

The standard way of connection is flexible tubing (fitting the connecting sockets of the pump), fixed with hose band clamps. Other options (e.g. threaded connections, Kamlok couplings, standard flanges) are available on request.

In order to avoid pressure peaks, which can cause damages of the pump hose, there should no pipe bends or 90° elbows be installed directly after the pump on the discharge side (see Table 5, Figure 2 and 3). Furthermore the cross section of the pipework on the discharge side should not be reduced (see Table 5, Figure 4).
- In case of connecting of suction resp. discharge pipes please consider that the cross section of the continuative pipes are as large as necessary. The transition to the continuative pipe must be big enough (see Table 5, Figure 5).

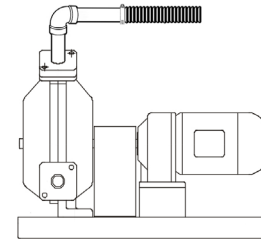
CORRECT CONNECTION

1

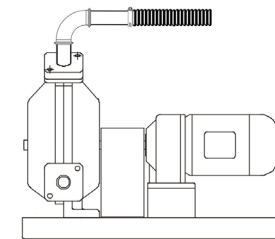


WRONG CONNECTION

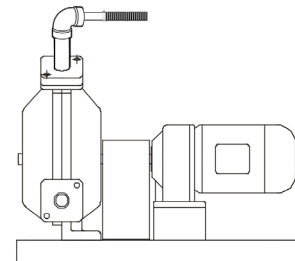
2



3

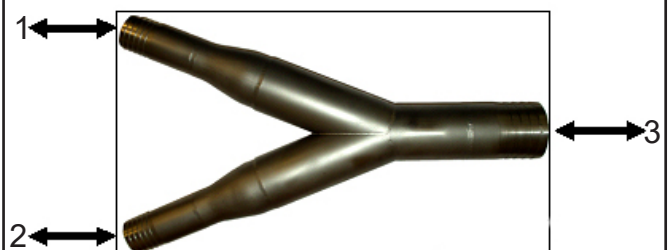


4



DISCHARGE CONNECTION

5



1. from / to the pump
2. from / to the pump
3. continuative pipe

Table 5 Do's and Don'ts

5.5 For the conveyance of media containing solids

i There is a risk of sedimentation of solids which can settle in the pump while the pump is stopped. Hereby a lump of solids can be formed in the upper section of the hose.

If the upper connecting socket of the pump is the outlet (discharge side), the lump blocks the pump when it is re-started (see Figure 4). This may cause damages to the pump.

To avoid any damages we recommend to reverse the direction of rotation of the pump and to connect the discharge line to the lower, horizontal connecting socket. To get a further advantage a flexible hose should be used to connect the pump and a kind of trap should be created in which the solids settle out (see Figure 5).



WARNING

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).

In case of longer downtimes it is also recommended to flush the complete piping including the pump sufficiently.



DANGER



Risk of leaking gases!

- ▶ If flammable liquids or gases may leak, the affected area of emission must be free of ignition sources!



WARNING

Emission from pump to be discharged in a safe direction!

- ▶ When using overflow valves or burst disks it must be observed that the overpressure always will be discharged in a safe direction. i.e., neither people nor tangible assets may be endangered because of emissions of the pumping medium.

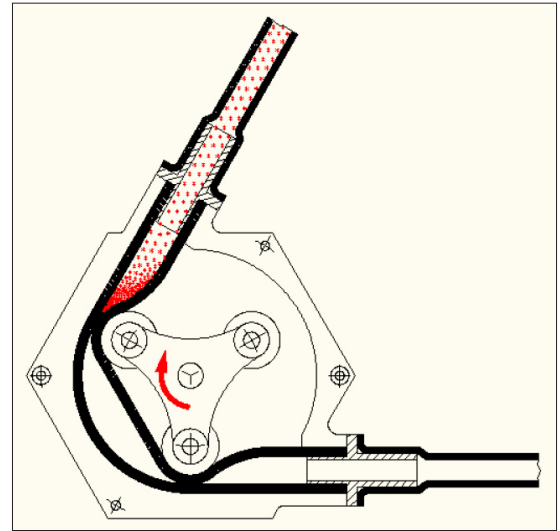


Figure 4 For the conveyance of media containing solids

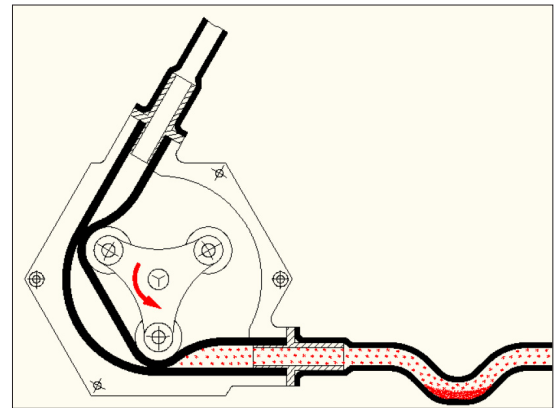


Figure 5 For the conveyance of media containing solids

5.6 Installing the Pump Hose

DANGER

Risk of electricution

- ▶ Remove power from the pump by removing the main fuses before doing any cleaning / maintenance / assembly operations.

NOTE

- ▶ The outer surface of the pump hose must be lubricated sufficiently with Verderflex Rollit Special Grease before assembling it.

1. Unscrew the flanges on the suction and discharge side of the pump. Lubricate the pump hose with Verderflex Rollit Special Grease.

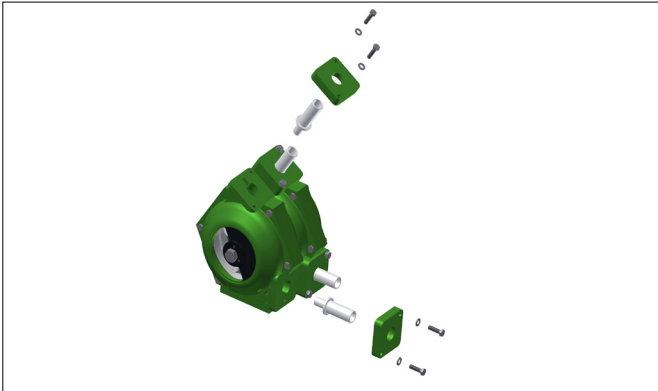


Figure 6 Installing the pump hose

Do not wear gloves during these operations because they may be pulled in!

2. Switch on the drive. The rotating pump pulls in the pump hose. When the hose appears on the other discharge side of the casing switch the drive off again and interrupt the power from supply.

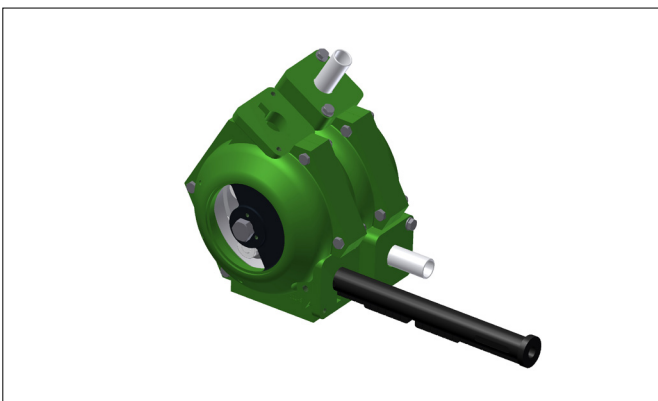


Figure 7 Installing the pump hose

3. Put the snap closure ring onto the end of the hose and put the connecting socket into the end of the hose at suction and discharge side. For the second pump head please repeat steps 1 and 2, see Figures 6 and 7.

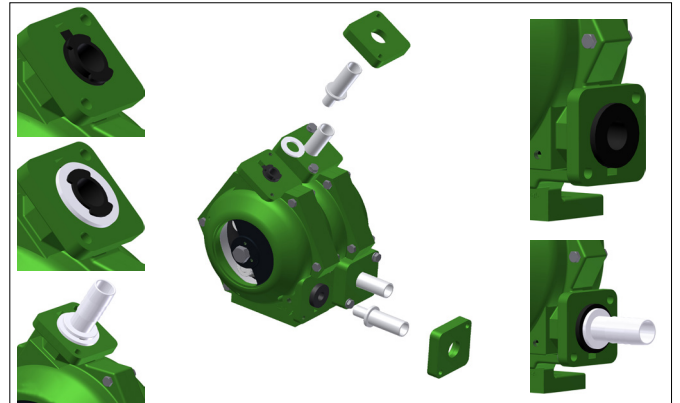


Figure 8 Installing the pump hose

4. Screw the flanges on suction and discharge side.

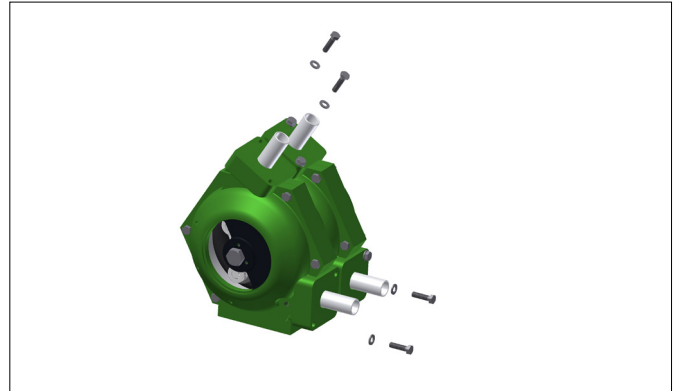


Figure 9 Installing the pump hose

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.
- ▶ If the pump is equipped with a hose leakage detector it must be secured that the sensor is unpolluted because deposits on the sensor could cause malfunctions of the detector.

WARNING

Risk of injury!

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

5.7 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.

5.7.1 Installing the piping

1. Check all fasteners are tightened (→ 10.1.3 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. Make sure the pump hose is greased.
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

- ✓ Pump set up and connected properly
- ✓ Motor set up and connected properly
- ✓ All connections stress-free and sealed
- ✓ All safety equipment installed and tested for functionality



DANGER

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

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



WARNING

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.



DANGER

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).

1. Open the suction-side and the discharge-side fittings.
2. Switch on the motor and make sure it is running smoothly.
3. Run the pump, flushing with water first (cold commissioning) to check for leaks.
4. Verify that neither the pump unit nor the pipe connections are leaking.
5. 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



WARNING

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

- ✓ Pre-commissioned the pump (→6.1)
- ✓ Pump prepared and filled



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.

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 7 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 Storing pumps and hoses).

Table 6 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	▶ Flush the pump	▶ Empty the pump, remove the hose
Solidifying corrosive	▶ Empty and flush the pump	▶ Empty the pump, remove the hose ▶ Treat the pump with preservative.
Liquid, non-corrosive	-	▶ Flush the pump, remove the hose
Liquid, corrosive	▶ Empty the pump	▶ Empty the pump, remove the hose ▶ Treat the pump with preservative

Table 7 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 (→ 7.4 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

- ▶ Operate the stand-by pump at least once a week to avoid formation of permanent dents/setting on the hose.

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.

DANGER

Risk of injury due to pressure buildup!


- ▶ Do not carry out any repairs/maintenance work on a pump in operation.

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:
 - No leaks
 - No unusual running noises or vibrations
 - Hose in position

7.2 Maintenance

-  The pumps are generally maintenance free. There should be only inspections and regreasing of the pump hose; This may need to be performed more frequently in dusty and / or a warm 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 Storing pumps and hoses).

7.2.2 Maintenance schedule

 To guarantee a constant elasticity of the pump hose it must be lubricated with Verderflex Special Grease every 300 hours of operation. To do this remove the casing cover and put some grease through the opening onto the running surface of the pump hose (e.g. by using a screw driver).

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 on the grease film (enough grease on the running surface of the hose?)	<ul style="list-style-type: none"> - every 300 hours of operation 	<ul style="list-style-type: none"> ▶ <u>Do not</u> operate the pump if the grease has not been applied or is too low
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
Check Teflon rollers	<ul style="list-style-type: none"> - Every 500 hours of operation - After inspection when required 	<ul style="list-style-type: none"> ▶ Check on proper seat (no seized, not worn out)
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)
Check pump housing 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
Check rotor bearings	<ul style="list-style-type: none"> - Every time when changing the pump hose - When damage is suspected 	<ul style="list-style-type: none"> ▶ Check on proper seat of bearings (no radial play!)

Table 8 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

- ✓ 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.



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).

7.3.2 Returning the pump to the manufacturer

- ✓ Pump unpressurized
- ✓ 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.

Table 9 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 (→ 10.1.3 Tightening torques).
2. Clean all parts (→ 10.1.5 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.

7.4.1 Dismounting the hose

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

1. Unscrew the flanges on suction and discharge side.

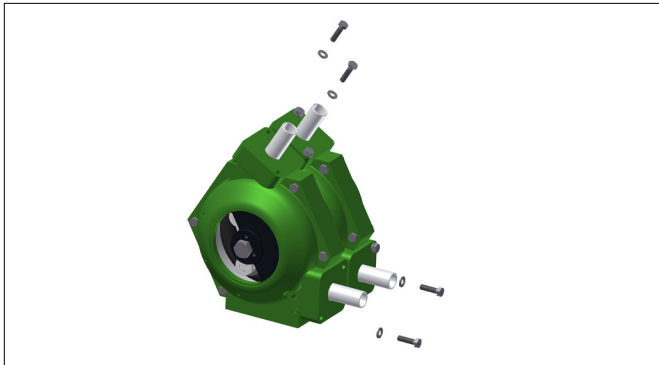


Figure 10 Dismounting the hose

2. Pull connecting sockets out of the end of the hose on suction and discharge side. Remove snap closure ring from the end of the hose.

Do not wear gloves during these operations because they may be pulled in!

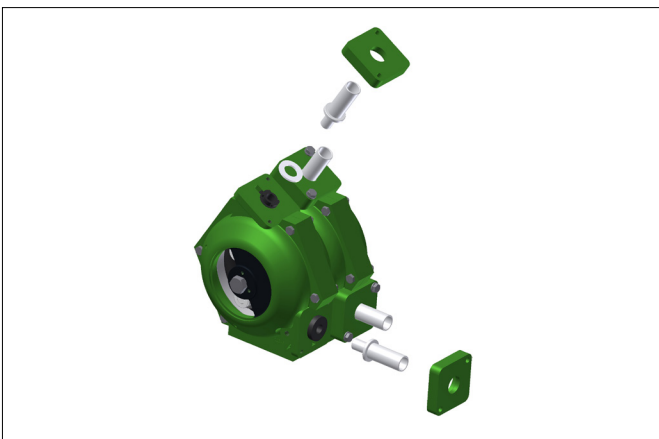


Figure 11 Dismounting the hose

3. Pull out the defect hose. The extraction of the hose will be eased by changing the direction of the drive (pole changing switch) and starting of the motor.

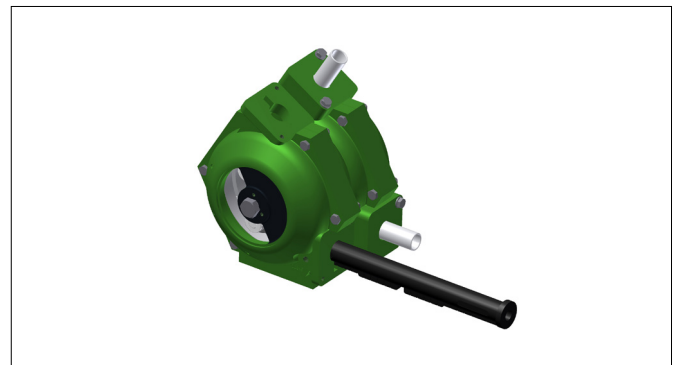


Figure 12 Dismounting the hose

CAUTION


Risk of injury if the hose is expelled too quickly

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

7.4.2 Re-installing the pump hose

- Follow step by step, the instructions listed in section → 5.6 Installing the pump 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 (→ 3.2.1 Name plate):
 - Pump model
 - Year of manufacture
 - Part number / Description of part required
 - Serial number
 - Quantity

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

▶ Identification

VERDERFLEX NRF food Grade hoses can be identified by an external embossed marking 'F'.

▶ Pump Installation

VERDERFLEX pumps using VERDERFLEX NRF 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. 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.

8.1.2 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.

8.1.3 Cleaning the pump

After pumping media which tend to deposit, the pump hose must be rinsed out when pumping is finished.

When changing the pump hose the inside of the pump casing should be cleaned properly.

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	-	-	-	Insufficient grease on hose	▶ Consult the manufacturer to obtain correct grease.
				Product ambient temperature too high	▶ Consult the manufacturer regarding maximum temperature.
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	▶ 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. ▶ 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 grease on hose	▶ Consult the manufacturer to obtain correct grease.
-	-	-	X	Inlet pressure too high	▶ Reduce the inlet pressure.
				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.

Table 10 Pump troubleshooting list

10. Appendix

10.1 Technical Specifications


10.1.1 Pump Specifications

Size	Value
Max. delivery pressure	2 bar
Temperature of pumped liquid	< 80 °C ¹⁾
Max. continuous operation pump speeds	165 RPM
Dimensions	→ Setup drawing

¹⁾ 60 °C continuous use, 80 °C intermittent use

Table 11 Pump Specifications

10.1.2 Ambient conditions

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

Operating conditions

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

Storage conditions

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

10.1.3 Tightening torques

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


Position	Torque values (Nm)				
	R 10 T	R 15 T	R 25 T	R 35 T	R 50 T
Port Flange	8.3	20	40	49	49
Acrylic Glass Cover ¹⁾	2	2	2	2	2
Housing	8.3	20	20	20	20
Housing / Baseplate	20	20	40	49	49
Gear Box / Baseplate	20	20	20	40	40
Coupling Protection	20	20	20	20	20
Coupling Clamping Bolt	4	4	10	10	10
Role Axis Clamping Bolt ²⁾	8	7	7	7	7

¹⁾ Tighten by hand

²⁾ Bolt adhesive (Loctite)

Table 12 Pump fastener tightening torques

10.1.4 Preservatives

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

10.1.5 Cleaning agents (After hose is removed)

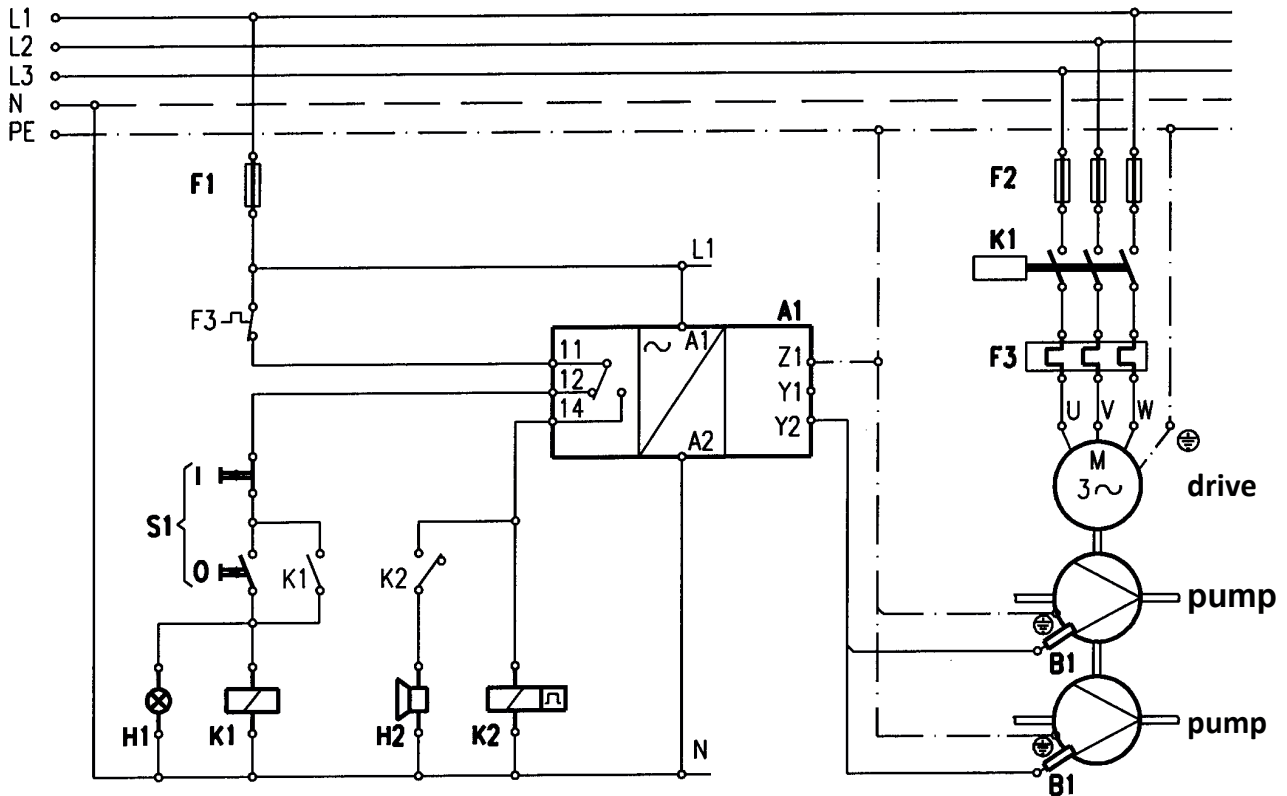
Cleaning agents
Wax solvents, diesel paraffin, alkaline cleaners, Warm Water

Table 13 Cleaning agents

10.2 Diagram of the leakage detector for operating the pumps in non-hazardous locations

The following diagram is only valid for the leakage detector consisting of:

- 2 sensors for leakage detector (make Verderflex Rollit, standard)
- switch amplifier (make: Disibeint, type DNSA)



A1 - level control, type DNSA

B1 - sensor

F1 - fuse

F2 - motor fuse

F3 - motor overloads

H1 - run light

H2 - signal horn, signal lamp

K1 - motor contactor

K2 - flasher (0,5 sec.)

M - motor (pump drive)

S1 - push button



The connections must only be made by qualified and authorized personnel!



The switch amplifier must not be used in hazardous locations.

It has to be strictly installed outside of these areas.



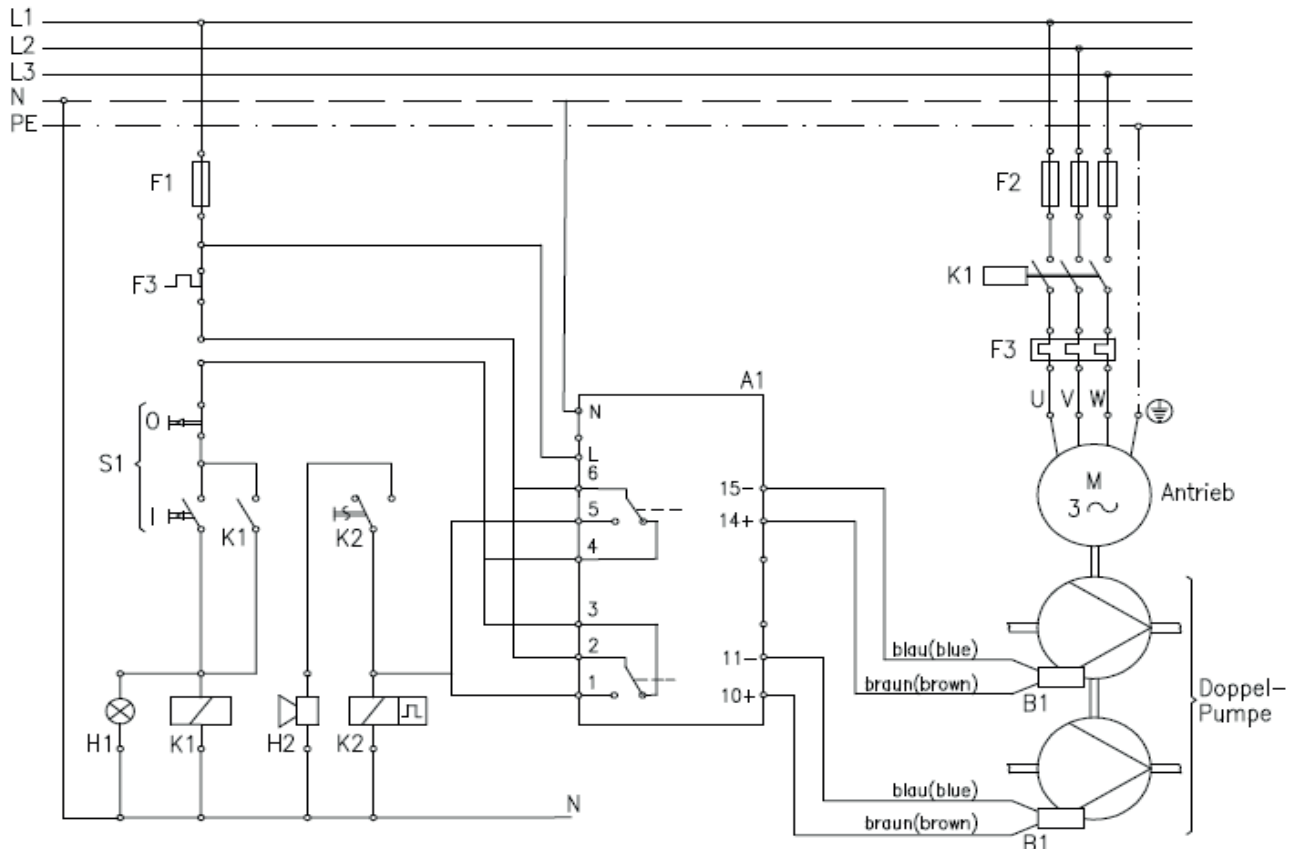
The standard detector for hose leakages is not suitable for use in hazardous locations and non-conductive media.

10.3 Diagram of the leakage detector for operating the pumps in hazardous locations



The following diagram is only valid for the leakage detector consisting of:

- capacitive proximity switch (make: Rechner, Typ KAS-40-14-N-M12)
- switch amplifier (make: Rechner, Typ N-132/2-01)



- A1** - switch amplifier Typ N-132/2-01
B1 - capacitive sensor (2-wire NAMUR)
F1 - control fuse
F2 - motor fuse
F3 - motor protection relays
H1 - control lamp-operation
H2 - signal horn, signal lamp
K1 - motor contactor
K2 - flasher relays 0,5 sec.
M - motor (pump drive)
S1 - double push button



The connections must only be made by qualified and authorized personnel!



The switch amplifier must not be used in hazardous locations. It has to be strictly installed outside of these areas.



The standard detector for hose leakages is not suitable for use in hazardous locations and non-conductive media.

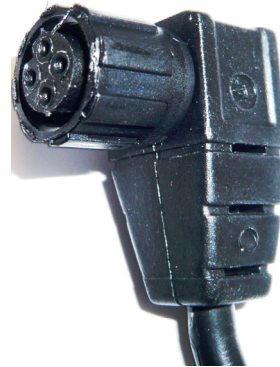
10.4 Hose Monitor Type 'SPS'

The following diagrams are only valid for use in non-hazardous areas and for non-electrically conductive media consisting of :

- Hose break monitoring 'PLC'
- Capacitive proximity switches
- Operating voltage: 12...30 VDC
- Switching output: PNP (NO or NC)



- Cable connector for PLC sensor
(electrical connection on site)



11 List of Figures and Tables

11.1 List of figures

Figure 1	Name plate	3.2.1
Figure 2	Layout	3.3
Figure 3	Fastening lifting gear to pump unit	4.1.2
Figure 4	For the conveyance of media containing solids	5.5
Figure 5	For the conveyance of media containing solids	5.5
Figure 6	Installing the pumps hose	5.6
Figure 7	Installing the pumps hose	5.6
Figure 8	Installing the pumps hose	5.6
Figure 9	Installing the pumps hose	5.6
Figure 10	Dismounting the hose	7.4.1
Figure 11	Dismounting the hose	7.4.1
Figure 12	Dismounting the hose	7.4.1

11.2 List of tables

Table 1	Target groups and their duties	1.1
Table 2	Warnings and consequences of disregarding them	1.2
Table 3	Symbols and their meaning	1.2
Table 4	Description of pump and accessories	3.4
Table 5	Do's and Don'ts	5.4.3
Table 6	Measures to be taken if the pump is shut down	6.3
Table 7	Measures depending on behaviour of the pumped liquid	6.3
Table 8	Maintenance schedule	7.2.2
Table 9	Measures for return	7.3
Table 10	Pump troubleshooting list	9.1
Table 11	Pumps specifications	10.1.1
Table 12	Pump fastener tightening torques	10.1.3
Table 13	Cleaning agents	10.1.5
Table 14	Declaration of conformity according to EC Machine Directive	12

12 Declaration of conformity according to EC Machine Directive



<p>EC declaration of conformity according to machinery directive, appendix II A</p> <p>We, PONNDORF Gerätetechnik GmbH, Leipziger Strasse 374, 34123 Kassel, Germany hereby declare that the following machine adheres to the relevant EC directives detailed below</p> <p>Designation Verderflex Rollit 10-50 T</p> <p>EC directives:</p> <ul style="list-style-type: none"> • Machinery Directive (2006/42/EC) • Low-voltage directive (2014/35/EU) • EMC directive (2014/30/EU) <p>Applicable harmonized norms:</p> <ul style="list-style-type: none"> • EN 809 A1/AC 		
<p>Manufacturer</p>	PONNDORF Gerätetechnik GmbH Leipziger Strasse 374, 34123 Kassel, Germany	
<p>Date: 01/ 09/ 2019</p>	<p>Company stamp / signature:</p>  <p>Till Völker Head of Development/Construction</p>	<p>Company stamp / signature:</p>  <p>Till Völker Head of Quality</p>

Table 14 Declaration of conformity according to EC Machine Directive