User manual

DELTA

HOMBURG
DRAINCLEANERS
holland

Exactly what is needed

HOMBURG HOLLAND

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Amendments

This edition is based on current data at the time of publication. Because HOMBURG HOLLAND pursues a policy of continuous product improvement, this edition is subject to change without prior notice.

Liability

This edition has been compiled with great care, but can contain errors. HOMBURG HOLLAND is not liable for any errors in this edition or any consequences thereof.

Preface

We hereby thank you for purchasing the homburg drain cleaner type Delta, you have purchased a machine of high quality. In order to achieve this high quality throughout the lifetime of the machine, it is necessary that all instructions in this user manual are followed precisely.

This user's manual provides you with all the information you need for the optimal and safe use and maintenance of the machine, and provides instructions to prevent accidents with the machine. This user manual is only intended for users and maintenance personnel of the Homburg drain cleaner type Delta.

That is why we strongly advise you to read and understand this user manual completely before you start using the machine. If you have any questions about the machine, then contact your supervisor, importer or manufacturer as soon as possible.

Table of Contents

1. Introduction

The Homburg drain cleaner type Delta is exclusively intended for cleaning drainage pipes in agricultural land with water. Any other use of the machine is not permitted. The manufacturer is not responsible for damage caused by use that is not described in this user manual. If the machine must nevertheless be used for another purpose, prior written permission from the manufacturer must have been given.

- The guide arm must never be used as a hoist.
- The machine may not be used by persons under the age of 18.

The machine may only be operated and maintained by suitably trained persons who have fully read and understood the manual. To facilitate the use of the user manual, the user manual is provided with a;

- Table of Contents
- List of illustrations
- Conversion table SI – ANSI and ANSI – SI units

All units listed in this user guide are SI units.

All non-SI units are listed in parentheses.

The numbered operating instructions must also be executed in that numerical order.

Operating and maintenance instructions as supplied by manufacturers of components such as a water pump and PTO shafts are supplied with this user manual. Ask for them if these are missing or are not supplied.

HOMBURG HOLLAND accepts no liability whatsoever for damage that has arisen as a result of information specified in the operating and maintenance instructions written by manufacturers of these components.

The Homburg Drainage cleaner type DELTA is referred to as ‘machine’ throughout this user manual.

‘Enter’ means; entering the rinse hose into the drainage pipe.

‘Exit’ means; exiting the rinse hose form the drainage pipe.

The indications left, right, front and rear are viewed from the driver’s seat in the forward driving direction.

Contact HOMBURG HOLLAND if you want to know anything about the machine that is not mentioned in this user manual. You can find the contact details at the front of this user manual and can also be found on our website; www.homburg-holland.com

When contacting us, make sure you have the following information close by;

- Machine type
- Serial number
- Construction year
- Water pump type

Always keep this user manual on the machine in the therefor designated storage case (see figure 1). If the user manual is missing or damaged, or if pages are missing, a new copy must be ordered directly from the manufacturer.

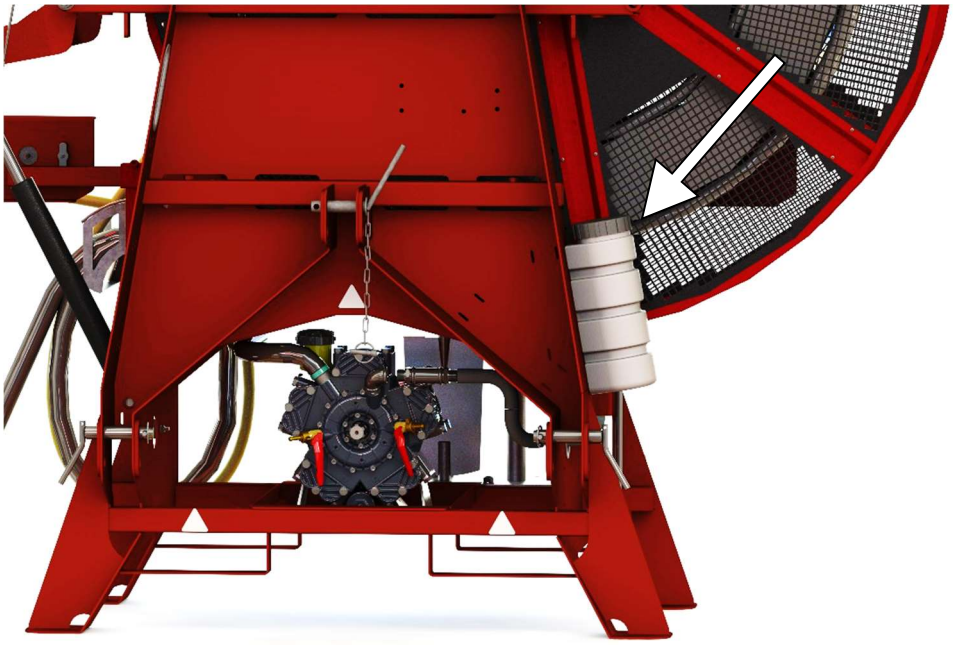


Figure 1 - Case for machine documentation

1.1 Documentation

The following documentation is available with the Homburg Drain cleaner type DELTA;

- 13475 – User manual DELTA (Dutch)
- 13476 – User manual DELTA (English)
- 13477 - Betriebsanleitung DELTA (German)
- 13478 - Manuel d'utilisation DELTA (French)

- User manual Walterscheid PTOassen (included)
- User manual Imovilli Pompe water pump (included)
- Parts manual Imovilli Pompe water pump (included)

1.2 Warranty

You are entitled to a warranty if a defect occurs despite correct operation and prescribed maintenance.

You are not entitled to a warranty if the defect can be traced to;

- Normal wear and tear
- Ignoring instructions on the drain cleaner
- Ignoring instructions in this manual
- Inadequate maintenance
- The use of non-original parts
- Abnormal external influences
- A modification not authorized by HOMBURG HOLLAND

HOMBURG HOLLAND follows the warranty conditions applicable in accordance with the Metaal unie conditions. An overview of the general terms and conditions of HOMBURG HOLLAND is available online on our website.

On the last page, you will find a form in which you can enter your suggestion, questions and comments regarding this user manual. If you think something needs to be changed about this user manual, please let u know.

1.3 Machine identification

All HOMBURG HOLLAND machines are equipped with the type plate below. This plate can be found next to the mounting of the top link of the three-point lifting device.

Enter the machine identification data;

Type: _____

Year: _____

Serial no.: _____

For additional information regarding your machine you can also enter the following data;

Dealer: _____

Delivery date: _____

Dealer stamp:

_____

2. Declaration of Conformity

CE

CE-Declaration of Conformity.

Manufacturer:

(visiting address)
HOMBURG HOLLAND
It Noarderfjild 21
9051 BM Stiens
The Netherlands

(Mailing address)
HOMBURG HOLLAND
It Noarderfjild 21
9051 BM Stiens
The Netherlands

Manufacturer:

HOMBURG holland

Declares that the Homburg Drain cleaner type DELTA;

- Complies with all applicable conditions of the Machinery Directive 2006/42/ EC and
- All applicable conditions of Directive 2004/108/ EC (EMC)

Stiens, 2 DECEMBER 2019

Jack Thibaudier
Managing Director
HOMBURG HOLLAND

3. Safety

Read this manual before using the machine. Follow the instructions to prevent injury or material damage. Do not hesitate to contact Homburg Holland if you have any questions.

It is recommended that you also follow a short course in operating and maintaining the machine, to be provided by the manufacturer, another company or importer that has been approved for this by the manufacturer.

As the operator or technician of the machine, you are the one who decides whether or not to operate the machine in accordance with this user manual.

Always observe the operating instructions for the tractor, PTO shaft and water pump when using the machine.

In this user manual, the following icons frequently appear. They indicate an increasing degree of danger, which is explained below.

CAUTION!

Indicates a hazardous situation that, if not avoided, could result in death or serious physical injury.

CAUTION!
Failure to follow the instructions given here may result in damage to the machine, surroundings or be harmful to the environment.

TIP!

TIP
The instruction given here represent an efficient method that can result in time savings or a better result.

BE CAREFUL! IT'S ALL ABOUT YOUR SAFETY AND THE SAFETY OF OTHERS.

3.1 Safety inscriptions (stickers)

The machine is equipped with various symbols intended to alert you to a potentially hazardous situation, the use of personal protective equipment or a reference to a prescribed action from this manual. A sheet with the necessary safety stickers can be ordered by part number: 230-12202.

Sticker Manual

Read the manual before using the machine

Sticker Eye protection

Wear adequate eye protection when working with this machine

Sticker Rotating parts

Warning for mechanical danger, retraction due to moving parts.

Sticker Lifting and lifting points

Designation hitching- and/or lifting point

Sticker Watch your hands

Warning for a dangerous situation where your hand can get trapped.

Sticker general danger

Warning for a potentially dangerous situation that is not described through the standard defined stickers.

3.2 Before starting work

Before starting work, the following rules must be observed.

- Warning-, safety provisions or guards on the machine must regularly be checked for presence and performance.
- The machine may only be used if it is technically in perfect condition. Do not operate the machine if it has worn parts.
- The machine may only be used with a suitable tractor that is in perfect technical condition.
- Do not activate the water pump when it can be expected that the water in the pump is frozen.
- Make sure there are no children and/or animals near the machine when it is being operated. All bystanders should not be in the working range of the machine.
- Always check the working environment in which the machine is to be used (height, width, carrying capacity of banks, verges, floors, bridges, explosion hazard, etc.).
- Ensure good eye protection (goggles). With the flushing water leaving the drain pipe under pressure, small hard objects can shoot away at high speed.
- Always check the machine for loose bolts and nuts, damage, leakage or defects and the correct operation (including the work tools and accessories).
- Check all security, warnings and safety devices for presence and proper functioning.
- Do not operate the machine if you are tired or use alcohol, medication and/or drugs.
- Beware of dangerous clothing, long hair and/or jewelry that can get stuck somewhere.
- Keep the controls free of food, oil, dirt, dust, snow, and ice.
- If the machine is operated at ambient temperatures below zero degrees Celsius, there is a risk of water pump damage when the pump is switched on.
- Use a tractor with a safety cab or roll bar as prescribed by the law.

3.3 Coupling and uncoupling

The following safety instructions must be taken in to account for coupling and uncoupling.

- The machine may only be coupled to the tractor with the designated 3-point suspension in accordance with the safety requirements.
- Caution must be taken when connecting and disconnecting the machine.
- When coupling and uncoupling the machine, make sure that the operating lever of the tractor is not positioned in a way that it can be operated unintentionally.
- Ensure that the diameters of the coupling pins of the machine match the hole diameters of the point suspension of the tractor.

WARNING
In the area of the 3-point suspension of the tractor, there is a risk of crushing and physical injury.

- Tighten the stabilizer bars before driving on public roads. This is to prevent unintended lateral movement of the machine.
- The machine will only work if it is coupled behind a suitable agricultural tractor by means of;
  - 3-point suspension
  - PTO Driveshaft
  - Hydraulic hoses (2) with shortcut
  - Electrical 7-pin connection for the rear lighting
  - Electrical 3-pin connection for the control box

3.4 Drive machine

The following must be observed when connecting and/or running the PTO shaft.

- Only use the universal PTO shaft provided with the machine or prescribed by the manufacturer.
- The protection of the PTO shaft must always be mounted and in good condition.
- Ensure that the universal drive shaft protection tube is completely protected in both the working position and the transport position.
- Stop the tractor engine and remove the ignition key before the PTO shaft is assembled or disassembled.
- If the PTO shaft is equipped with a slip coupling or a freewheel coupling, then mount it on the side of the machine.
- Always ensure that the universal PTO shaft is correctly assembled and secured.
- Always ensure that the universal PTO shaft's protection tube is immovably locked in the direction of rotation by using the locking chains.
- Select the correct rpm of the PTO before turning on the PTO shaft.

- Ensure that no persons and/or animals are near the machine before the PTO shaft is switched on.
- Switch off the PTO shaft if the angle of the PTO shaft with the machine or tractor becomes bigger than the manufacturer's instructions.

WARNING
After the PTO shaft has been turned off, the pump can continue to run for some time. Never touch this while it is still turning.

- Place the PTO shaft in the specially designed PTO shaft holder if it is no longer in use. Letting the lock chain hang is not permitted.
- After disconnecting the universal PTO shaft, the protection cover must be mounted on the PTO shaft of the tractor.
- Damage and/or defect PTO shafts must be replaced immediately. Only use original parts.
- Never stand on the PTO shaft or the protection shaft of the PTO shaft.
- Always observe the operating instructions of the PTO shaft when using the machine.
- Make sure that the PTO shaft is shortened in the prescribed manner.
- If the PTO shaft is too long, it can seriously damage the 3-point suspension and the machine during lifting.

3.5 Working with the machine

The following safety instructions must be observed before starting work with the machine.

- The machine may not be used by persons under the age of 18
- The guide arm must never be used as a hoist.
- Always put the tractor on the parking brake before working with the machine or when you leaf the tractor seat.
- Take into account the space required when operating the machine's guide arm.
- Take into account the electricity cables and pipes when working with the guide arm. It can result in death!
- Never play games with the machine.
- Ensure good eye protection (goggles). With the flushing water leaving the drain pipe under pressure, small hard objects can shoot away at high speed.
- Only operate the machine from the designated location.
- Only operate the tractor from the designated location.
- Always ensure you have a good view of the working situation.
- Always switch off the machine when you leave the machine and take the ignition keys of the tractor with you.

WARNING

There is a risk of crushing and physical injury in the machine's guide arm zone.

- If working from the public road take other road users into account. And switch on the rotating beacon or flashlight.
- The maximum permissible loads such as; engine speed, hydraulic pressure, and water pressure, etc. of the machine must not be exceeded.
- If the machine is running, the noise produced by the machine is lower than 70 dB (A). Use hearing protection depending on the sound produced by the tractor.
- If the machine is running, the mechanical vibration energy value will be lower than;
    - $a_{vhw} < 2{,}5\ m/s^2$
- In case of a thunderstorm while working on the land, directly take place in the cab of the tractor if the tractor is equipped with one.
- Never leave the machine if the tractor ignition keys are still in the ignition.
- Always follow the operating manual of the tractor when using the machine.

EMERGENCY

If during the use of the machine the tractor's diesel engine 'runs wild' due to poor maintenance of the air filter or crankcase ventilation system, the machine, and the tractor engine can be severely damaged due to a very high RPM. If this happens, the air supply to the tractor engine must be shut off to stop the engine.

EMERGENCY

If the tractor has fallen over with the machine, the tractor engine must be switched off immediately to prevent damage to the tractor engine and water pump of the machine.

- The machine must never touch the tractor cab or the tractor window during lifting.

3.6 Transport (behind the tractor)

The following instructions must be observed before driving with the machine mounted behind the tractor.

- If the machine coupled onto the tractor must be driven on public roads, then every part must comply with the applicable road traffic laws. If the machine is mounted on the tractor, the original rear lighting of the tractor is often no longer visible. This means that a properly functioning light bar must be mounted on the rear of the machine, which is provided with;
    - Rear lights
    - Brake lights
    - Direction indicators
    - License plate lighting (possibly)
    - License plate holder (possibly)
    - Holder for triangle "Slow traffic" NL
    - Reflectors

  These components are optionally available

- Make sure that a rotating beacon or flashlight mounted on the tractor is clearly visible to road users approaching the tractor with the machine from behind. The use of flashing lights is only permitted it the tractor/machine is wider than 2.6 meters.
- Always ensure that the maximum allowable dimensions of the tractor and the machine are in accordance with road traffic laws when driving on public roads.
- Ensure that the machine has been brought into the transport position in the manner prescribed by the manufacturer if the tractor and machine are to be driven on public roads.

- It is not permitted to transport people, animals or goods with the machine.
- Keep in mind that the driving characteristics of the tractor change when the machine is coupled to the tractor.
- Check whether the front axle of the tractor has enough axle pressure on the road before driving. If not, place ballast weights as prescribed by the tractor manufacturer.
- Ensure that the maximum permitted axle loads or axle load distribution of the tractor are never exceeded.
- Take the protruding rear length into account when cornering and reversing if the machine has been coupled to the tractor. If there is not enough space when cornering, the entire machine and 3-point suspension can be irreparably damaged.
- If the machine is transported in the highest position behind the tractor, block the control lever of the 3-point hitch.
- Take into account that the machine can come into contact with the ground if the tractor is driven over rough terrain. This can severely damage both the 3-point suspension and the machine itself.
- Turn off all work lights when driving on public roads.

3.7 Transport (other than behind the tractor)

Before driving the machine, other than mounted behind the tractor, the following instruction must be observed.

- Be aware of the total height during transportation (bridges, viaducts, etc.).
- Be aware of the total weight during transportation.
- Never stand under the machine when it is lifted.
- Only use the intended lifting points if the machine is to be lifted. The location of the lifting point is indicated with stickers (see figure 2).

Figure 2 - Hitching point

- Lift the machine only under the places indicated by the stickers below (figure 3)

Figure 3 - Forklift pick-up point

3.8 Service, maintenance and repair

Before any form of service, maintenance and/or repair to the machine will take place, the following instructions must be observed.

- Maintenance and repairs may only be carried out by trained, designated and authorized personnel. Who are not under the influence of alcohol, medication or drugs.
- Operators may only carry out the maintenance and repairs described in this user manual.
- The adjustments and accesses sealed by the manufacturer must not be broken.
- In case of a broken seal, the product liability for the manufacturer automatically expires.
- Always use the tools, spare parts, materials and operating procedures specified by the manufacturer.
- Never use defective tools.
- Use tools for the purpose for which they are made.
- Do not leave any tools in the machine after maintenance.

CAUTION!
During the maintenance and repairs to the machine, ensure that the machine is on a firm surface, the ignition key has been removed and that the PTO shaft has been disconnected.

- Be aware of exhaust gasses in closed rooms, danger of carbon monoxide poisoning!
- Never weld on the machine without written permission from the manufacturer.
- Disconnect the machine from the tractor if welding is required.
- Support the machine through suitable support, if the machine needs maintenance in a raised position.
- The guide arm may not be folded out if the machine is not connected to the tractor. The machine can fall.
- Always follow the safety regulations of the suppliers of battery acid, fuels, lubricants, coolant, and oil.
- Deposit used oil, used grease and oil filters in the designated environmentally responsible places.
- None of the substances present on or in the machine are suitable for internal use.
- Disconnect the battery or the electrical connection from the tractor if work is to be done on the electrical system of the machine.
- Never remove popes, hoses or valves from hot and/or pressurized liquids.
- Never remove the protective case of an operating machine.

- The machine may not be modified without written permission from the manufacturer. Modifying includes:
    - Removing parts.
    - Breaking seals such as those on the pump, hydraulic control valve block and water pressure regulator.
    - Adding parts or equipment to or on the machine that are not described in this user manual.

3.9 Hydraulic system

- Warning; the hydraulic system is under pressure. Hydraulic oil under pressure can cause serious injury if it comes into contact with the skin. In this case, consult a doctor immediately, as there is a risk of infection.
- Mark the quick couplings of both the tractor and the machine to prevent the quick couplings from being connected incorrectly. If the quick couplings are not connected correctly, the machine won't work.
- Work on the hydraulic system must only be carried out by personnel with special training.
- Regularly check the hoses. Damaged and/or defective hoses must be replaced immediately. When mounting new hoses, these must satisfy the specifications prescribed by the manufacturer.
- If the hydraulic system has a leak, all necessary precautions must be taken to prevent accidents and/or damage to the environment.
- Before starting to replace hydraulic hoses or other components, the entire hydraulic system must be depressurized at all times.
- Cylinder functions are performed with blocking valves. Loosening hoses between valve block and hydraulic cylinders can lead to uncontrolled movements. Support the arm construction in advance and depressurize the hydraulic functions by using the controls.

3.10 Safety warnings on the machine

- Inscriptions must be sustainable, indelible, readable and a permanent presence on the machine throughout the machines service life. If the warnings have been removed or have become illegible, they must be replaced immediately. The meaning of all stickers has been described in the above text. Below is shown were all warnings should be on the machine.
- Missing or damaged stickers can be ordered from the manufacturer.

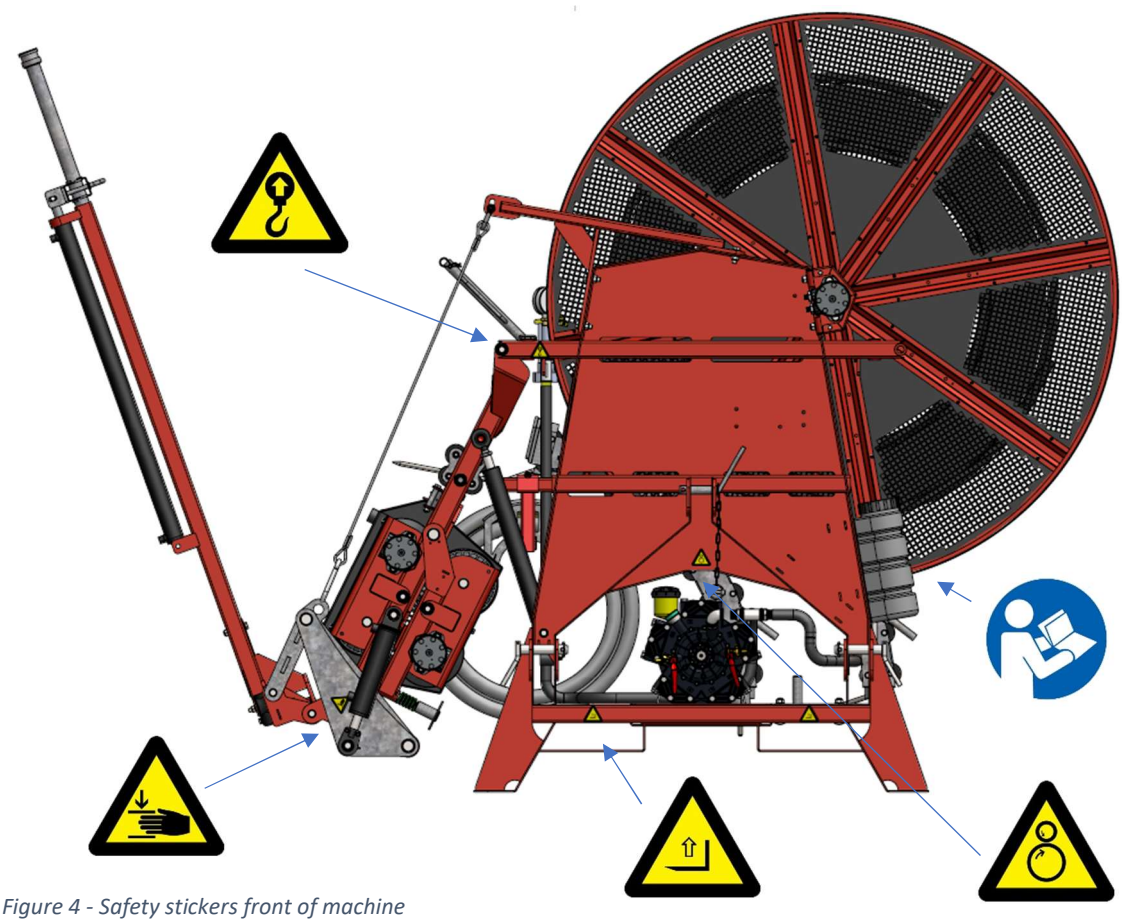


Figure 4 - Safety stickers front of machine

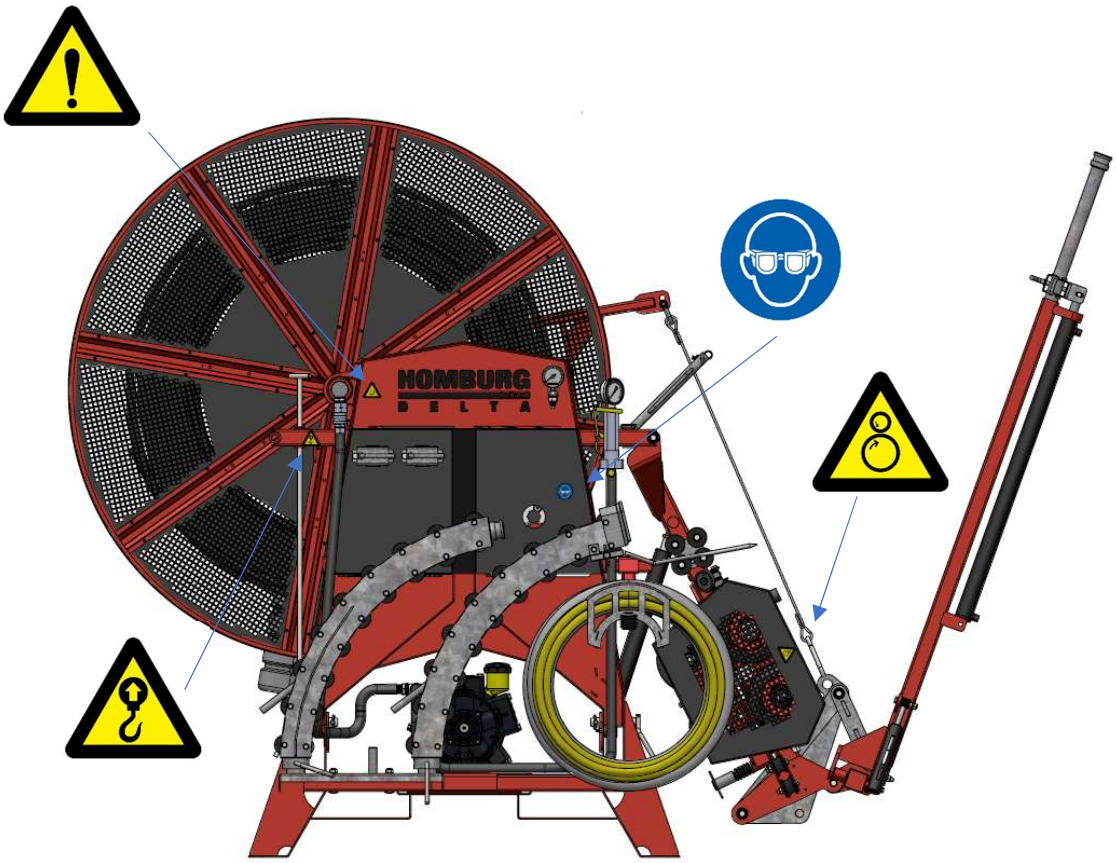


Figure 5 - Safety stickers back of machine

3.11 Safety features

A. Stickers, see figures 4 and 5.
B. Pressure gauge. Indicates the flushing water pump pressure in bar. (see figure 6)

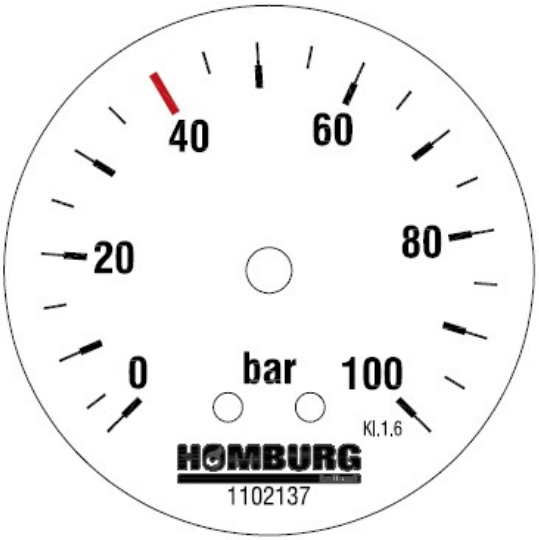


Figure 6 - Flush water pressure gauge

C. Safety mesh in reel.
Prevents limbs from getting caught in the rotating reel.

D. Flush water pressure regulator.
Prevents the pressure from exceeding 3,5MPa (35 bar). (See figure 7)

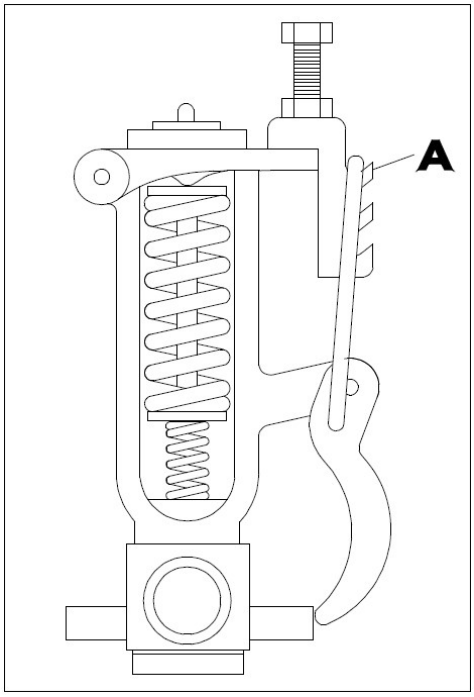


Figure 7 - Flush water pressure regulator

E. Protective cover reel drive. Prevents limbs from getting caught in the drive.
F. Protective cover drive rubber wheels. Prevents limbs from getting caught in the drive.
G. Protective sleeve PTO shaft. Prevents limbs from getting caught in the rotating PTO shaft.
H. Support PTO shaft. Prevents damage to the PTO shaft or its protective sleeve.
I. User manual (see chapter “preface”).
J. Lighting beam for use on public roads. Prevents traffic accidents.
K. Triangle “slow traffic”. Prevents traffic accidents.

WARNING!

Never remove or deactivate safety provisions. Any defective safety provisions must directly be repaired in a correct manner. Never use the machine with one of the safety provisions removed, defective or deactivated.

4. General description of the machine

4.1 Main components

The Homburg Drain Cleaner type Delta is a machine for cleaning drainage systems as found in agricultural land using water when they get clogged up, for instance with clay slit, roots or iron.

The machine exists out of the next main component:

- Frame
- Reel
- Arm
- Drive
- PTO shaft
- Diaphragm pump
- Pressure regulator
- Suction filter
- Suction hose
- Overflow hose
- Rinse hose
- Flexible hose end
- Nozzle

4.1.1 Frame

The frame has a lilting point for parking with a forklift. The frame is coupled to the three-point linkage of your tractor.

4.1.2 Reel

The reel is mounted on top of the frame. This provides space for the flushing hose up to a length of 500 meters.

4.1.3 Arm

The arm is mounted on the right side of the machine. Its function is to support the drive and guide the flushing hose.

4.1.4 Drive

The drive is mounted on the first part of the arm. This is available in a 2 and 4-wheel version. The drive drives the hose through the roller bend into the drainage pipe.

4.1.5 PTO drive shaft

The machine is delivered together with a PTO drive shaft. This ensures the drive of the pump by the tractor.

4.1.6 Diaphragm pump

The water pump on the machine is a piston diaphragm pump. This is driven by the tractor via the PTO shaft. The recommended speed of the pump is 350 to 540 rpm. The maximum permissible speed is 540 rpm.

4.1.7 Pressure regulator

The water pressure can be regulated with the pressure regulator. The pump can be relieved with a lever on the regulator, for example during the positioning of the guide arm for the drain pipe. The optimum working pressure is standard set to 35 bar.

The table below provides an overview showing the ratio of the desired yield to hose length, with pressure on the nozzle of approximately 10 bar. You can set the pump pressure to the desired pressure with the rotary knob on top of the pressure regulator.

Yield (L/min)	Pump pressure (bar) 300m hose	Pump pressure (bar) 400m hose	Pump pressure (bar) 500m hose
40	18	20,5	23
50	21,5	25,5	29
60	26	31,5	36,5
70	31	38	45
80	36,5	45,5	X
90	43	X	X

Figure 8 - Table yield and pump pressure

Please note that the above table only applies to new machines. During use, wear occurs on pump parts and nozzles, so the pressures and yields shown may deviate from this table.

4.1.8 Suction filter or suction strainer

The suction hose is equipped with a standard suction filter. This filter ensures that no parts larger than ø2mm can enter the pump. When a defect occurs on the suction filter, the pump and pressure regulator can be seriously damaged or the nozzle can become clogged.

4.1.9 Suction hose

A standard 10m suction hose is fitted between the suction filter and the pump. This hose is transparent so that it can be seen immediately whether there is a defect in the suction system.

4.1.10 Overflow hose

When the pump has reached the set pressure on the pressure regulator, the excess water is drained through the overflow hose. This excess water is used to rinse the hose while the coil hose is being reeled up.

4.1.11 Rinse hose

Homburg standard implements its machines with a special HPE flushing hose of ø27 mm and a wall thickness of 3.5 mm. This hose is used for cleaning the drainage pipes and is therefore made of a material with good sliding properties and low wear.

4.1.12 Flexible hose end

The flexible hose part between the flushing hose and nozzle ensures that the nozzle remains in the middle of the drainage pipe. It also makes it easier for the rinsing hose to enter the drainage pipe.

4.1.13 Nozzles

The standard nozzle has 13 holes of ø2mm: 1 hole directed straight forward and 12 holes directed backwards at an angle of 25°.

Several variants are available which are suitable for different types of pollution. (see figure 9.)

- 13544 Standard nozzle 1 facing forward and 12 rearward
- 13546 Nozzle special 5 facing forward and 8 rearward
- 13606 Nozzle double torpedo 1 facing forward and 24 rearward

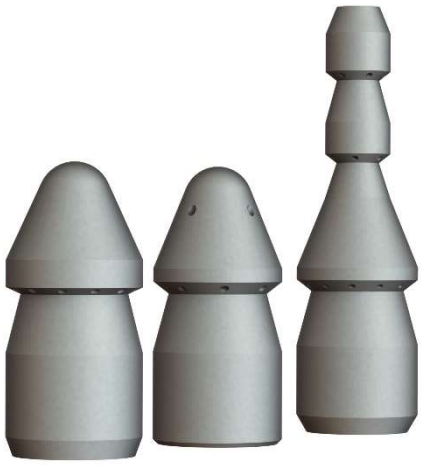


Figure 9 - Nozzles

The main components of this machine are (see figure 8):

1. Forklift facility for lifting the machine
2. Appendage support
3. Water pump
4. Documentation sleeve
5. Hose support
6. Taillights
7. Sign “slow traffic”
8. Rotary coupling
9. Retaining pin for roller bends
10. Extension tube for roller bends
11. Reel
12. hydraulic input pressure gauge
13. rinse water pressure gauge
14. Hose guide
15. Hydraulic speed adjustment knob
16. Hose guide on the arm
17. Meter counter
18. Protectioncap drive
19. Tensioner for pressure of drive wheels
20. Attachment of steel cable for mechanical folding
21. Swing cylinder
22. 2nd part of the arm
23. Sliding part 2nd arm
24. Connection roller bend overflow hose
25. Roller bend
26. Suction filter
27. Nozzle
28. Flexible hose end
29. Coupling sleeve ø27mm x 1/2” BSP
30. Rinsing hose ø27 x 3.5mm

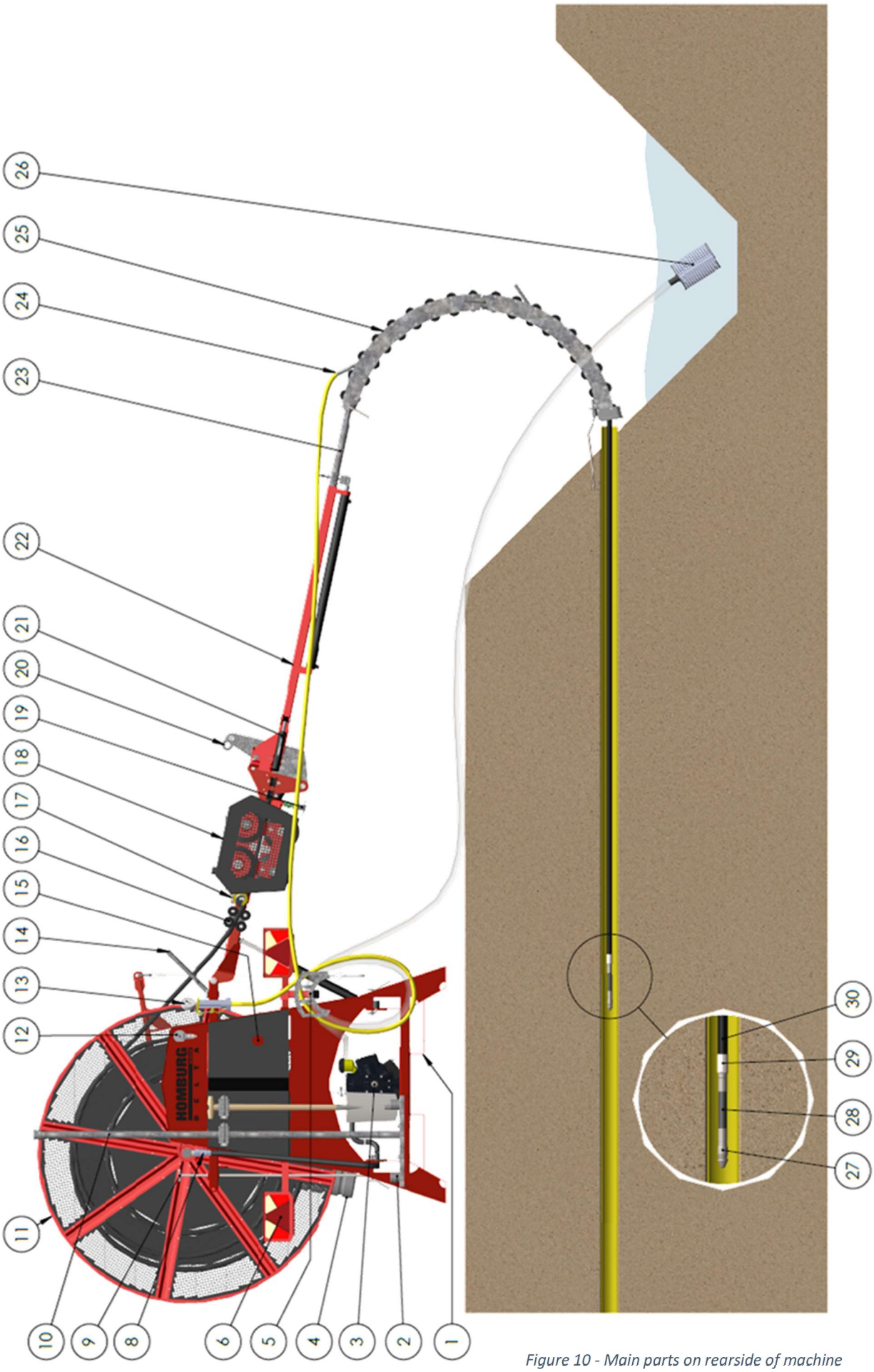


Figure 10 - Main parts on rearside of machine

The main components of these machines are: (see figure x)

1. Sliding part 2nd arm
2. 2nd part of the guide arm
3. Meter counter
4. Cable for mechanical folding
5. Hose guide
6. Arm for mechanical folding
7. Hydraulic motor for reel drive
8. Reel
9. Hydraulic cylinder for telescopic arm
10. Mounting point of cable for mechanical folding
11. 1st part of the guide arm
12. Drive wheels
13. Heftruck lifting facility points
14. Frame
15. Water pump
16. Lifting point top linkage
17. Lifting point carrying arms
18. Case for documentation

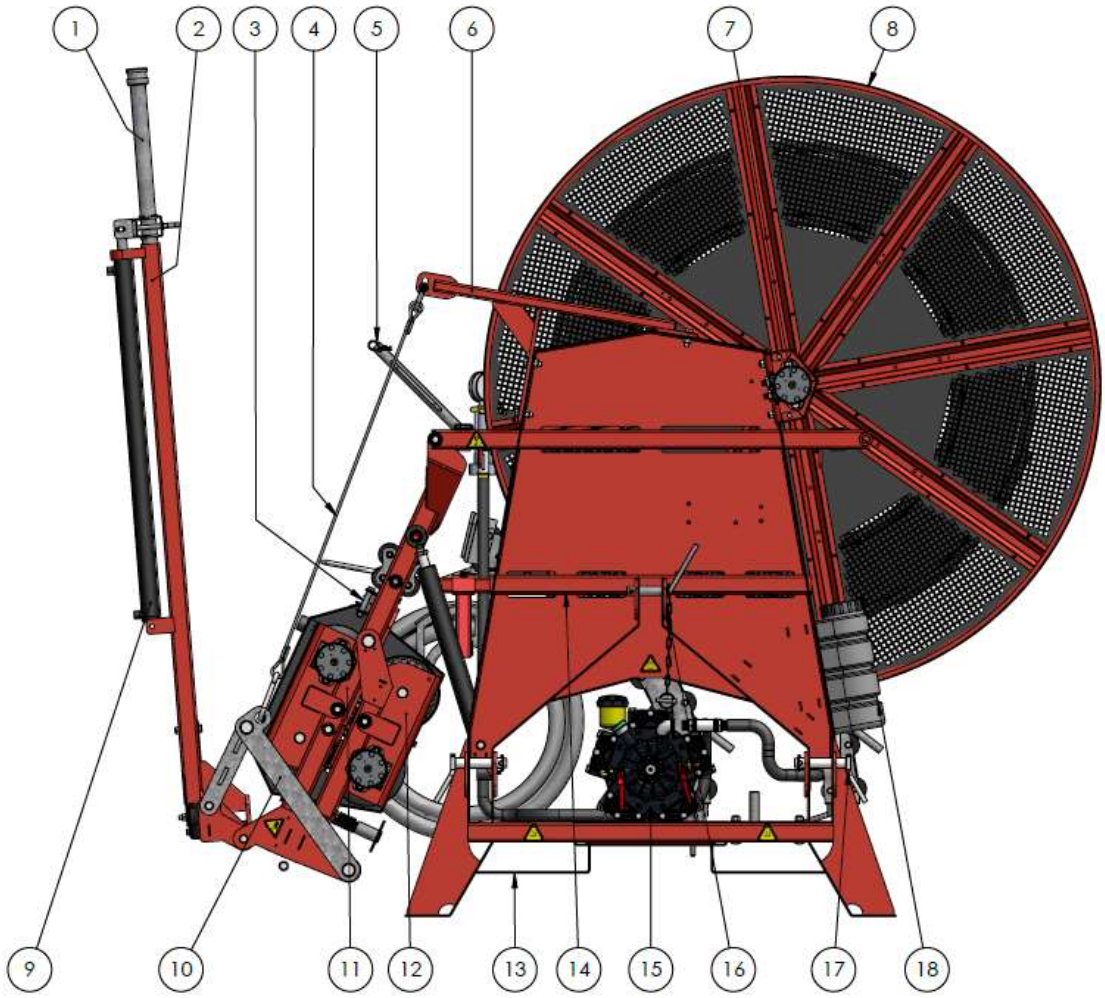


Figure 11 - Main components machine front

4.2 Operation

The tractor drives the diaphragm water pump, through the suction basket and the suction hose water is sucked in from a water reservoir. Then the water is sent through a pressure regulator (the excess pressure is sent back through an overflow hose to the water reservoir) and an optional electric water valve (choice of return or rinsing hose) and then through the rotating centre of the rinse hose reel, after which it sprays out of the nozzle and performs its cleaning action in the drainpipe. The flushing hose runs from the reel with the drive mechanism through the guide arm and roller bend into the drainpipe.

The guide arm can be folded in an out with the aid of a hydraulic cylinder from vertical to horizontal position and back. The guide arm can be extended and retracted with the aid of a second cylinder. The flushing hose. The hydraulic system is designed in such a manner that both during feeding in and feeding out the reel wants to roll up under slight pressure, so the flushing hose always winds tightly around the reel. The second section of the roller bend can be turned to enable cleaning drainpipes in the own bank as well as in the opposite bank.

The hydraulic system of the machine features a pressure compensation valve that sends the excess oil from the tractor directly back to the hydraulic reservoir of the tractor. That reduces the heat generation of the hydraulic oil.

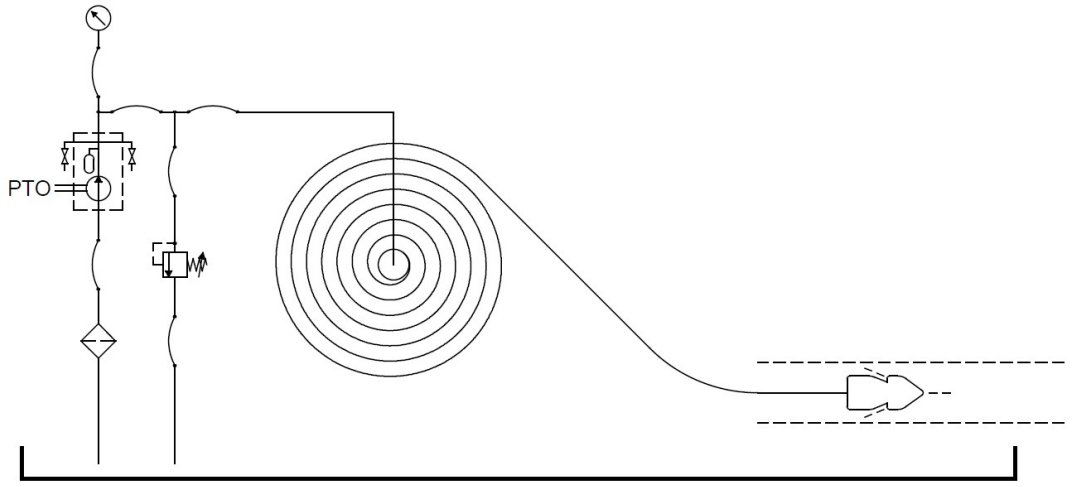


Figure 12 - Water schedule flushing system, DELTA

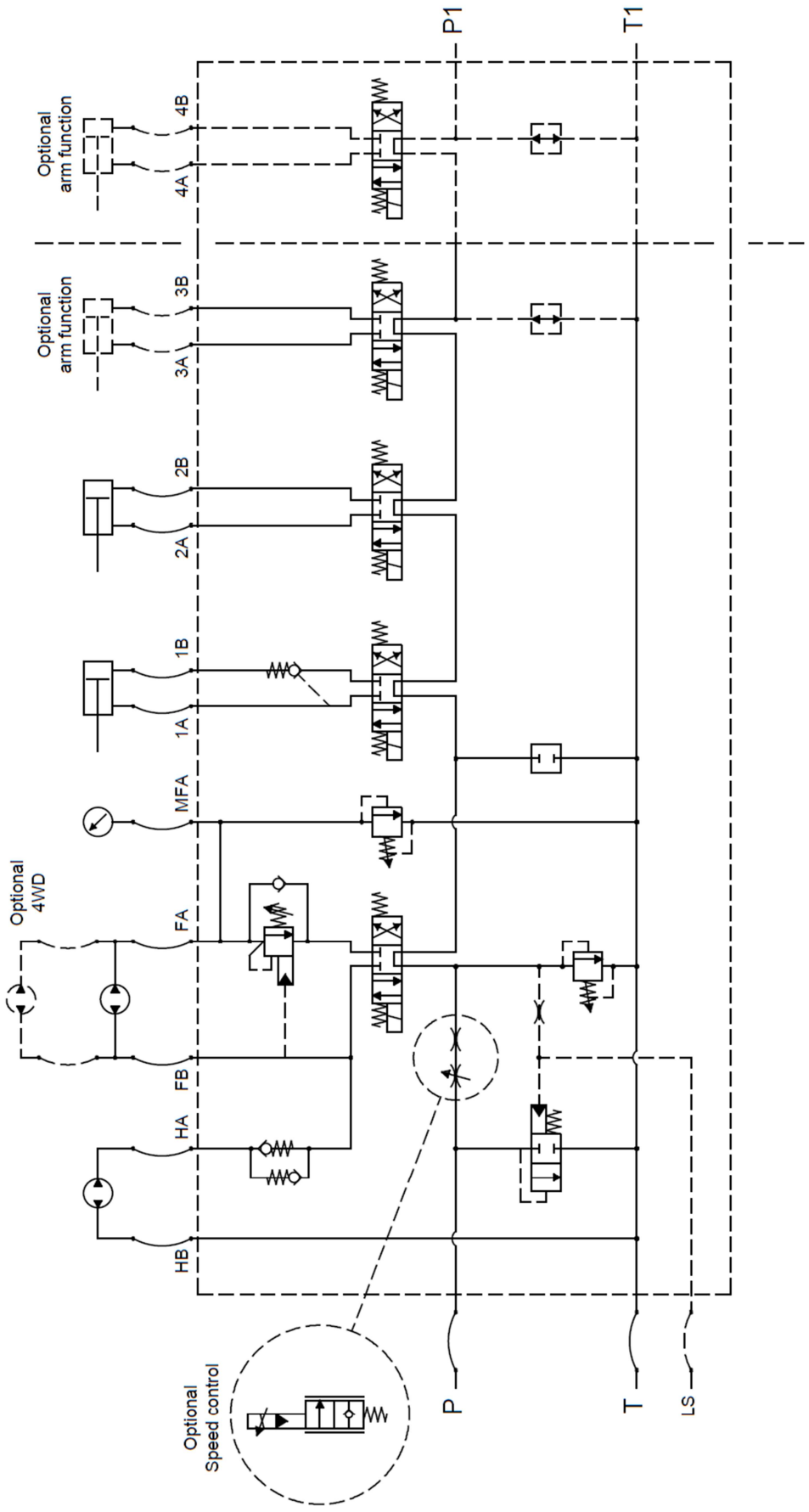


Figure 13 - Hydraulic schedule Delta

The front of the machine is the side that couples the machine to the tractor. The guide arm is folded out in the standard configuration on the right side of the machine. Therefore, the drain pipes that need to be cleaned must always be kept on the right side of the tractor and the machine. Optionally, the machine can be mounted with the guide arm on the left. Logically, the drain pipes to be cleaned should then be located on the left side of the machine.

In areas where there are no ditches in which the drainage pipes flow, concrete wells will be used to drain the drainage pipes. The machine must be equipped with a well set as additional equipment. This well consists of a 2-meter long tube and a 30° knee that is placed between the top and the bottom roller bend.

5. Technical specifications

5.1 Machine

Manufacturer	Homburg
Type	Delta
Length	1,35 m
Width	2,20 m (arm folded)
	6,20 m (arm extended)
Height	2,25 m (fully folded)
	2,95 m (fully folded with a roller bend over the machine)
Mass empty	650 kg
Mass with water	764 kg
Material rinse hose	HPE (Hard Poly Ethylene)
Length rinse hose	300 m
Diameter rinse hose	ø27 mm
Wall thickness flushing hose	3,5 mm
Drive rinse hose	Hydraulic
Working speed	30 m/min (max.)
Water pressure regulator	4 MPa (max.) (40 bar)
Water pressure at nozzle	1 MPa (10 bar)
Nozzle	1 + 12 gats ø2mm
Length suction hose	10 m
Diameter suction hose	38 mm
Mesh size suction hose	ø2 mm
Length overflow hose	10 m
Diameter overflow hose	3/4 inch
Varnish	2-layer powder coat system
	RAL 3020 (red parts)
	RAL 9005 (black parts)
Hydraulic system	2 hydraulic motors
	2 double-acting cylinders
	1 valve block with speed control valve and pressure compensated valve
Electric system	Wireless remote control
Required hydraulic power	15 L/min and 150 bar (min.)
Required electrical power	12 VDC ±10%, 25A (max.)
Noise level	< 70dB(A)
Mechanical vibrations	$a_{vhw} < 2,5 m/s^2$
Well set (option)	Knee piece 30°, extension tube length 2m
Machine operating range	See figure 14 and 15

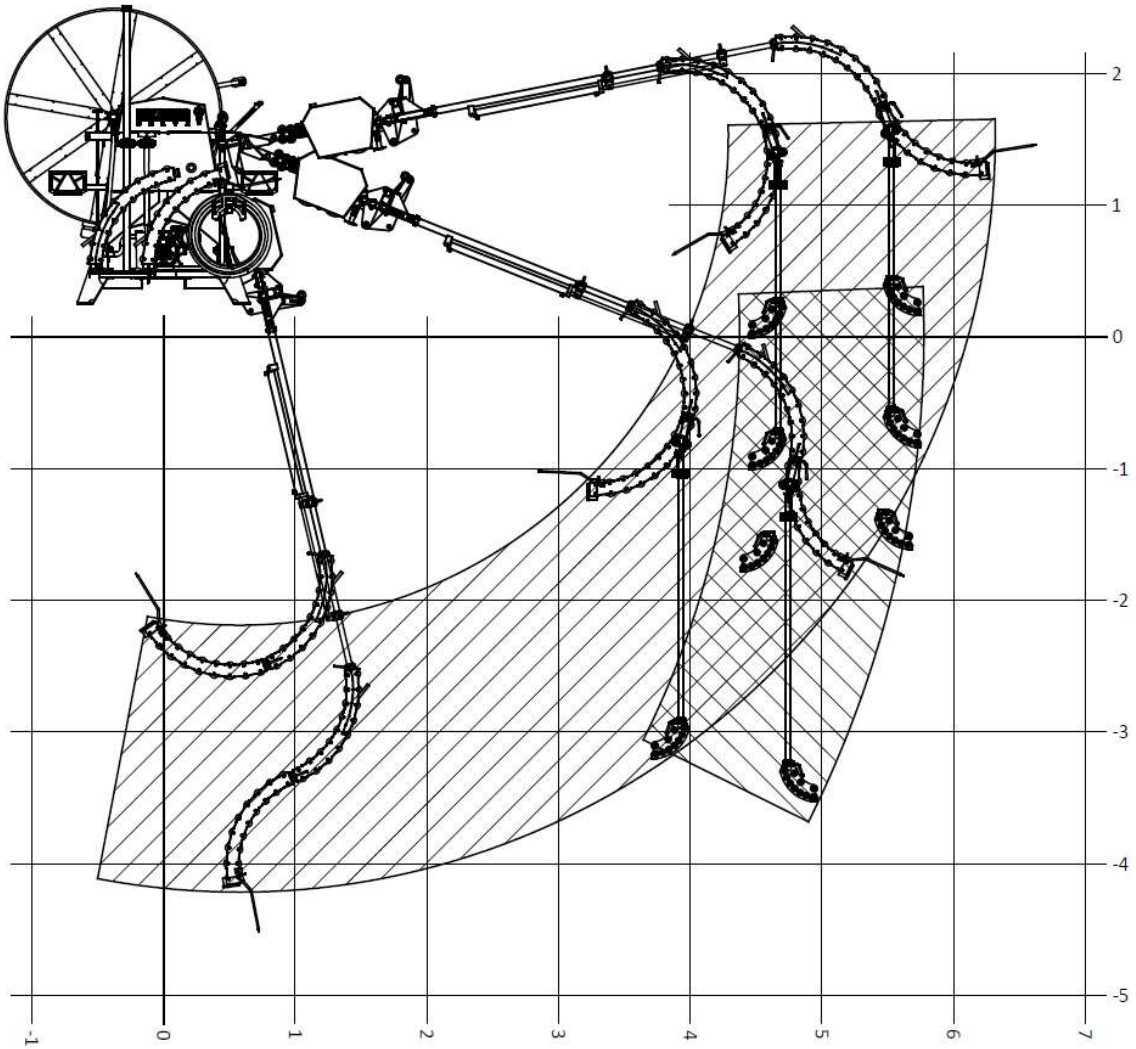


Figure 14 - Working range machine

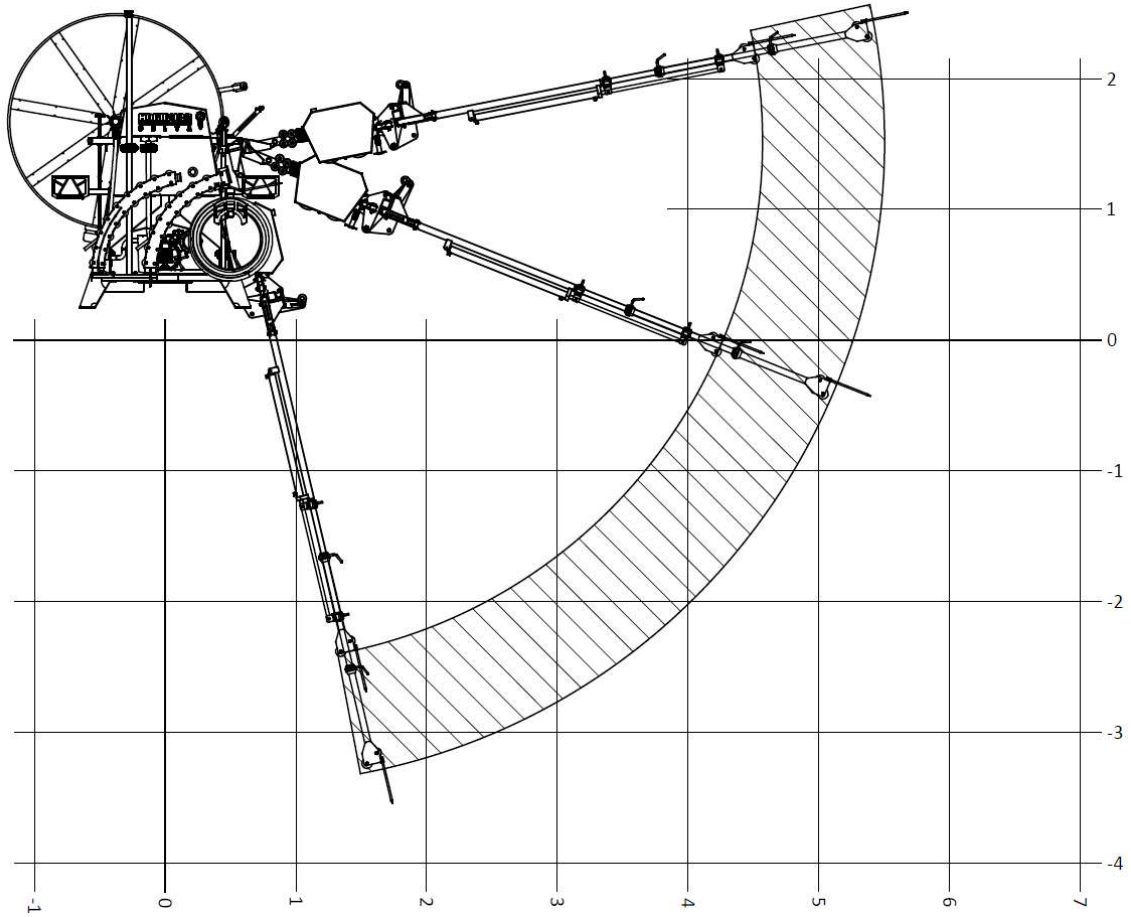


Figure 15 - Working range machine with extension tube straight

5.2 PTO drive shaft

Manufacturer	Walterscheid
Type	W2100-SD05-660-10100-10100 (14kW 19hp)
Maximum angle	25° (measured from the centerline of the PTO shaft)

5.3 Rinse water pump

Manufacturer	Imovilli Pompe
Type	M135
Drive	PTO shaft, PTO tractor
Capacity maximum of	115 L/min
Capacity nominal	80 L/min
Pressure accumulator	0,7 MPa (7 bar)
RPM	350 - 540 rpm (550 rpm max.)
Input power	13,3 kW (18 hp)
Mass	27,5 kg
Oil	1,85 L (SAE20/30)
Maximum suction lift	3 m

5.4 Technical requirements tractor

The tractor must at least meet the following technical requirements in order to work safely and responsibly with the machine.

- Three-point suspension Category 2 in accordance with DIN9674 and ISO730;
- Sufficient counterweight;
- PTO connection 350-550 rpm. 1 3/8" 6 splines according to DIN9611 and ISO500;
- Hydraulic supply 15 l/min15 MPa (150 bar);
- Electrical supply 12 VDC ±10% and 25A.
- Hydraulic quick-connect couplings 1/2" -bi SAE according to ISO7241-1 Series A or ISO-5675 or SAE1036;
- Electric connection rear/working lighting according to DIN72577;
- Loose rear lighting beam according to international law or optional mounted lighting on the machine.

5.5 Permissible operating conditions of the machine

- Ambient temperature from 0°C to 50°C
- Humidity from 10% to 90%
- Both inside and outside dust and/or gas explosion non-hazardous environment

5.6 Conversion table

SI-units	ANSI-units	ANSI-units	SI-units
1kg	2.2046 lbs	1 lb	0,453592 kg
1m	3.28 ft	1 ft	0,3048 m
1mm	0.03937 in	1 in	25,4 mm
1km	0.62 mile	1 mile	1.609 km
1 liter	0.264 gallon (US)	1 gallon (US)	3,785 liter
1 MPa (10 bar)	145 psi (=145 lbs)	1 psi (=1 lbs)	0,0068966 MPa (0,0689 bar)
1 kW	1.36 hp	1 hp	0,736 kW
1°C	0.555 x (ºF - 32)	1°F	(1,8 x ºC) + 32

Figure 16 - Conversion table

6. Transport

The machine is always transported completely assembled. This means that the machine does not have to be assembled after arrival. The machine is equipped with 2 lifting points. Make sure that during lifting the reel is not squeezed together by the lifting straps or lifting cables! This can be accomplished through the use of an equator.

Warning
Only hoist the machine on the indicated hoisting eyes.

Warning
The machine may only be picked up by forklift trucks under the lower horizontal bars of the base frame. Beware of tipping hazard by forklift transport.

The machine may only be fastened on the frame using lashing and tensioners (for instance in a container and on a truck loading platform) to prevent toppling during transport. Failure to do so may damage parts of the machine.

7. Operating instructions

7.1 Daily inspection list

Every day the checklist below must be completed before starting work with the machine. The list is used to check the correct and safe operation of the machine. Copy this list so it can be entered every day. The fully completed lists can be stored in a folder that can be used as a technical record for the machine.

Check carried out by: _____

Date check: _____

Time start check: _____

Check:	**OK**	**Not OK**
General damage and leakage machine	☐	☐
Presence and operations safety provisions:		
Stickers	☐	☐
Pressure gauge	☐	☐
Safety mesh in reel	☐	☐
Water pressure controller	☐	☐
Protective cover reel drive	☐	☐
Protective cover drive rubber wheels	☐	☐
Protective cover hydraulic steering	☐	☐
Protective sleeve PTO shaft	☐	☐
Suspension bracket PTO shaft	☐	☐
User manual	☐	☐
Lighting beam for use on public roads	☐	☐

WARNING!

Never remove or deactivate safety provisions. Any defective safety provision must directly be repaired in a correct manner. Never use the machine with one of the safety provisions removed, defective or deactivated.

Check:	OK	Not OK
Water pump:		
Oil level	☐	☐
Accumulator pressure 7 bar (Check and correct with an air compressor and pressure gauge if necessary!)	☐	☐
Presence suction basket	☐	☐
Presence float	☐	☐
Check that the two shut-off valves are closed	☐	☐
Presence and operation of:		
Roller bends (2)	☐	☐
Wells set pipe (option)	☐	☐
Wells set knee 30° (option)	☐	☐
Suction hose	☐	☐
Overflow hose	☐	☐
End piece	☐	☐
Nozzle	☐	☐
Centering basket (option)	☐	☐
PTO shaft	☐	☐
Fixing pin	☐	☐

Take care of information showing where exactly the drainpipes are situated and how old all drainpipes of the system to be cleaned are. (For instance, drawings, obtained from your superior or the client.)

7.2 Cleaning drainpipes: When and how often?

When to clean the drainpipes depends on the weather conditions, soil type, and soil

structure, on the diameter, type and condition of the drainpipe, and on how accurate the pipe is laying in the ground. The following test, which should be carried out in or after a wet period with a lot of rain, preferably in autumn, provides a guideline:

1. Find a drainpipe in the edge of the ditch.
2. Collect the water in a one-liter graduated beaker.
3. Measure how many seconds (T) it takes to collect 1 liter.
4. Fill out the following formula: $\frac{86400}{(L\ x\ A\ x\ T)} = M$

   L = Length drainpipe (meters)
   A = Drainpipe spacing in (meters)
   T = Measured time (seconds)
   M = Number of millimeters discharged per day

For grassland, maize land, and arable land this discharge must be 7 millimeters. (Note, this applies to drainpipes with single-sided discharge). If it is less, it must first be checked whether the drainpipes are situated correctly. If so, the drainpipes must be cleaned. Do this for a number of drainpipes in the field, to determine an average.

It is recommended to clean the drainpipes during a wet period when the drainpipes are already discharging water. For more detailed agricultural knowledge and recommendations on the use and maintenance of drainpipes, you should consult the relevant institutions and/or literature. Agricultural science is not within the scope of this user manual.

7.3 Taking into operation

7.3.1 Hitching the machine to the tractor

1. Observe all safety instructions as described in the safety chapter of this user manual.
2. If necessary, equip the tractor with sufficient front weights.
3. Make sure the machine is on a level surface.
4. If necessary, place guide shells on the lower link pins of the machine.
5. Couple the lower lift arms of the three-point to the lower link pins of the machine.
6. Lock the lower lift arms.
7. Couple the top rod of the three-point to the top link pin of the machine and, if necessary, set the correct length.
8. Lock the top link pin.

7.3.2 Matching the PTO shaft and the tractor

1. Lift the machine to minimize the distance between the tractor PTO and the water pump shaft.
2. Support the machine in a sensible manner if the machine is not on the ground after carrying out the previous action.
3. Check that the PTO shaft matches the manufacturer's specifications.
4. Check whether the PTO shaft can be mounted without modifying its length.
5. If not, shorten the PTO shaft.

7.3.3 Shortening the PTO shaft

(Also refer to the instructions that came with the PTO shaft)

WARNING!

Apply the tractor parking brake, switch off the tractor engine and take the tractor ignition key from the lock.

1. Slide the PTO shaft over the water pump shaft while holding the thinnest side of the protective sleeve down.
2. Check that the spring-tensioned catch of the PTO shaft sits in the recess of the pump shaft.
3. Slide the PTO fully in.
4. Measure the distance from the rear of the tractor PTO to the front of the foremost steel part of the PTO shaft (= for instance, 15 cm).
5. Add 1 cm to this distance (= 16 cm).
6. Remove the PTO shaft from the water pump.
7. Take the front section of the PTO shaft (and protective sleeve) from the rear section.

8. Cut 16 cm off:
    - Front PTO shaft section.
    - Rear PTO shaft section.
    - Front protective sleeve section.
    - Rear protective sleeve section.

Note! The above values are only examples.

9. Deburr the cut sections and round off sharp edges.
10. Remove the synthetic and steel sawdust and filings.
11. Coat the sliding splines with lubricating grease.
12. Slide the two PTO shaft sections (and the protective sleeve) back together.
13. Be sure to slide the sections together in their original orientation!
14. Other modifications to the PTO shaft are not permitted.

WARNING!

Make sure that the two PTO shaft sections are at least half the total sliding length of the PTO shaft into each other when the distance between the PTO and the water pump shaft is at its maximum!

7.4 Working with the machine

7.4.1 Coupling the PTO shaft between the tractor and the machine

DANGER!

Apply the tractor parking brake, switch off the tractor engine and take the tractor ignition key from the lock.

1. Slide the PTO shaft over the water pump shaft while holding the thinnest side of the protective sleeve down.
2. Check that the spring-tensioned catch of the PTO shaft sits in the recess of the pump shaft.
3. Slide the PTO shaft fully in.
4. Slide the PTO shaft over the PTO while holding the thickest side of the protective sleeve upward.
5. Check that the spring-tensioned catch of the PTO shaft sits in the recess of the PTO.
6. Prevent the protective sleeve of the PTO shaft from rotating with the two lock chains.

7.4.2 Coupling the hydraulic quick-connect couplings to the tractor

CAREFUL

Take measures to prevent environmental pollution due to spilling hydraulic oil.

1. Connect the hydraulic quick-connect coupling for the tank (Blue to tank)
2. Connect the hydraulic quick-connect coupling for the pressure (Red to pressure)

7.4.3 Connecting (electrically) and mounting the rear lighting beam

(Only for driving on public roads)

1. Mount the lighting beam on the machine.
2. Insert the machine plug into the tractor outlet.
3. Check the correct operation of the lighting beam.
4. Lift the machine into transport position.
5. Check that the rotating light or flashing light (if mounted) for traffic approaching from behind is clearly visible.
6. Check the presence of the triangle "Slow traffic".

7.4.4 Wireless remote control

The machine is standard equipped with a wireless remote control. With this remote control, you can operate the entire machine. The remote control has 10 buttons on the front and an on/off switch on the back.

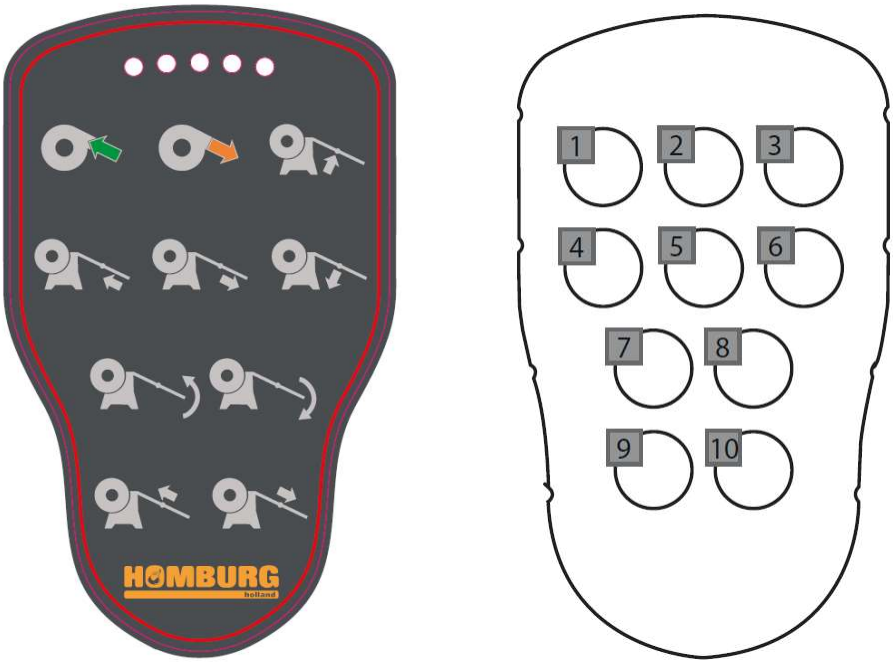


Figure 17 - Wireless remote control

Function:

1. Winding up the flushing hose on the machine
2. Inserting the flushing hose into drainage
3. Raise guide arm
4. Retract guide arm
5. Extend guide arm
6. Lower down guide arm
7. Swing forward
8. Swing backward
9. Lift 2nd arm (kink up)
10. 2nd arm pockets (kink down)

In combination with a water valve or HDD, the machine is mounted with a different remote control. Here, buttons 9 and 10 have been changed to the following functions. See figure 17.

11. HDD on / off (optional)
12. Water valve on / off (optional)

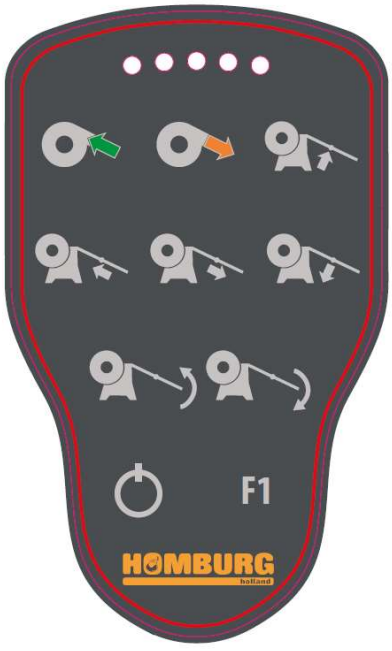


Figure 18 - Wireless remote control with water valve / HDD

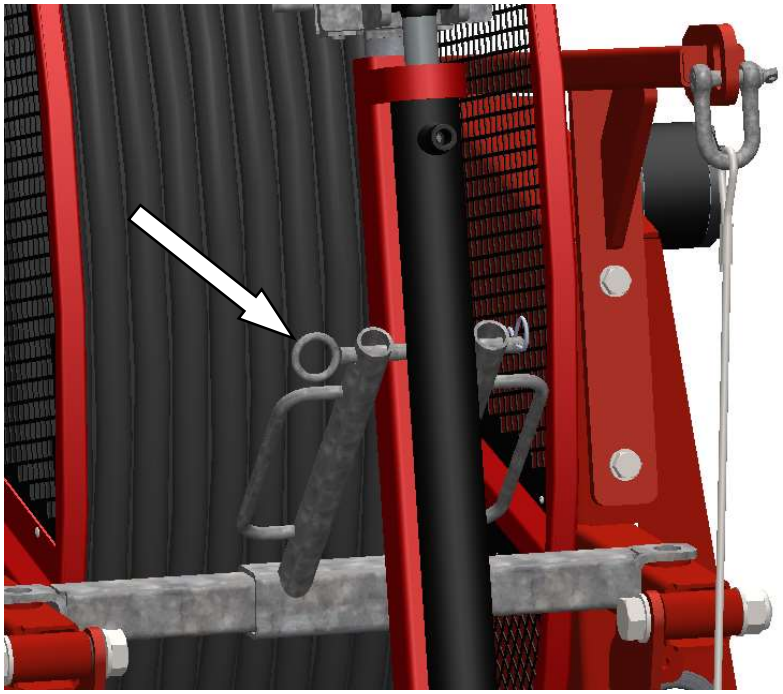
7.4.5 At the working location

1. Observe all safety instructions as described in the safety chapter of this user manual.
2. Switch on the working lights if you have to work in the dark.
3. Take the plug of the lighting beam from the tractor outlet (if mounted).
4. Lift the machine some 10 cm off the ground.
5. Place the machine at a suitable distance from the drainpipe to be cleaned.
6. Apply the tractor parking brake.
7. Connect the transparent suction hose to the pump suction side and fix it.

NOTE!

Know the maximum pump head. If it is too high, the pump will not suck in any water.

8. Put the suction basket on the float in a ditch (upstream so the suction basket does not suck in used flushing water) or in a water tanker. If the head is too high, or if there is no suction basket or if it is not clean, the pump must not be activated.
9. Make sure the filter is fully submerged and does not suck in any dirt or air.
10. Connect the yellow overflow hose to the water pressure controller and fix it.
11. Remove the transport lock pin from the guide arm.



12. Manually lower the second section of the guide arm until the steel cable is taut.

13. Switch on the hydraulic control valve of the tractor.
14. Bring the guide arm into a stretched horizontal position with the wireless remote control (figures 17 and 18).
15. Put the top roller bend on the end of the guide arm and fasten it.
16. Attach the lower roller bend to the upper roller bend and fasten it.
17. The guide arm can additionally be extended another 35 cm using the clamp that can be placed on the tube.
18. Wear adequate eye protection (goggles). The flushing water leaving the drainpipe under pressure may carry off small hard objects at high speed.
19. Position the end of the second roller bend in front of the outlet opening of the drainage pipe. If the steel cable is taut, while the guide arm has to be lowered further, the steel cable can be disconnected with the carabiner. Do not forget to secure the steel cable with the carabiner as soon as possible!
20. Put the end of the second roller bend in front of the drainpipe discharge opening. If the steel cable is taut while the guide arm has to be moved further down, the steel cable can be uncoupled using the carabine hook. Do not forget to couple the steel cable, using the carabine hook, as soon as that is possible again!
21. If the drainpipe is underwater, positioning the roller bend requires more attention.
22. Drive the tractor a little forward or backwards if the roller bend cannot be placed in front of the drainpipe.
23. Apply the tractor parking brake.
24. Manually guide the flushing hose through the flushing hose guide and through the drive wheels and pressure rolls.
25. Adjust the pressure roll clamping pressure using the adjusting lever. Do not set the clamping pressure too high.
26. Mount the end piece with guide basket and nozzle if necessary.

Note! Do not mount these until the hose has been fed through both roller bends.

27. Fix the roller bend using the supplied fixing pin, when the roller bend has been positioned in front of the drainpipe. That will prevent the roller bend from shifting while the flushing hose is being fed in and out.
28. When working on the opposite bank, the pin that is fixed on the second roller bend can be pushed into the bank to fix the end of the roller bend.
29. Put the wheel of the meter counter on top of the hose.
30. Turn the rotary knob of the hydraulic speed control valve fully clockwise until it is closed.
31. Operate button 2 with the remote control (enter).
32. Turn the rotary knob of the hydraulic speed control valve counter-clockwise till the machine slowly feeds the flushing hose into the drainpipe.
33. Feed the flushing hose up to 2 meters into the drainpipe.
34. Stop the machine by pushing the again button 2 (enter).
35. Set the meters counter to zero.
36. Slowly take all tension off the water pressure controller by taking loose the hook clamp.

37. Switch on the PTO shaft (tractor).
38. Set the PTO shaft speed. About 400 rpm (tractor).
39. Wait until all air has disappeared from the transparent suction hose.

If the air does not disappear, the pump does not suck properly or the suction hose leaks or the head is too high.

Note! The pump must not run dry for longer than 5 min to prevent damage to the pump.

40. Set the hook clamp off the water pressure controller to its highest position.
41. Check that the flushing water pressure does not exceed 3.5 MPa (35 bar) on the pressure gauge.

CAREFUL!

The water pressure must never exceed 5MPa (50 bar).

42. Set the PTO shaft speed to achieve the smallest possible water flow from the overflow hose. This saves energy.

Make sure that the pressure indicated on the pressure gauge remains between 2.5 MPa and 3 MPa (25 bar and 30 bar).

7.4.6 Feeding the flushing hose into the drainpipe

1. Observe all safety instructions as described in the safety chapter of this user manual.
2. Operate button 2 on the remote control (enter).
3. Slowly turn the rotary knob of the hydraulic speed control valve counter-clockwise until the machine slowly starts to feed the flushing hose.

That controls the feeding-in speed of the flushing hose into the drainpipe.

4. Make sure the drive wheels do not slip on the hose. This could damage the hose. When the drive wheels are slipping, the resistance is too high.
5. Set a feeding-in speed of about 25 meters per minute.
6. Watch the meter counter to know when the flushing hose has reached the end of the drainpipe (feeding in 300 m takes 12 min)!
7. When the nozzle hits an obstacle during feeding in, for instance, a blockage, the flushing hose must be moving back and forth at a lower speed in the drainpipe, using buttons 1 and 2 on the remote control.
8. Turn the rotary knob of the hydraulic speed control valve clockwise (almost closed) when the nozzle enters the end of the drainpipe. By this, the feed speed is reduced.
9. Directly put the water pressure controller open at the moment in the nozzle doesn't go any further. Also, do that in the event of problems such as blockages.
10. Operate button 2 on the remote control to stop the feeding (enter).

7.4.7 Feeding out the flushing hose from the drainpipe (reeling in)

TIP! By manually moving the flushing hose guide (fig. 22B) back and forth during feeding out, the flushing hose can evenly be wound on the reel.

TIP! Be sure to reel in the flushing hose as clean as possible to prevent slip and drive problems with the flushing hose. Proceed as follows to achieve this:

WARNING!

The water pressure must never exceed 5MPa (50 bar).

1. Slide the end of the overflow hose over the upturned end of the roller bend. As a result, the excess water from the overflow hose is used to clean the flushing hose.
2. Set the PTO shaft speed to keep pressure on the pressure gauge of no more than 3.5 MPa (35 bar) while water flows out of the cleaning tube.
3. Close the speed control valve completely.
4. Operate button 1 on the remote control.
5. Slowly turn the speed control valve until the feeding-out speed of the flushing hose is about 20 meters per minute.

Note: Make sure the drive wheels do not slip on the hose. That could damage the hose. When the drive wheels are slipping, the drive-speed is too high.

The meters counter to know when the flushing hose has reached the start of the drainpipe (feeding out 300 m takes 15 min!).

6. Close the speed control valve when the nozzle approaches the beginning of the drain pipe. This will stop the pulling of the flushing hose.
7. Operate button 1 on the remote control.
8. Carefully (open) the tension hook clamp off the water pressure controller.
9. Switch off the PTO shaft (tractor).
10. Operate button 1 on the remote control.
11. Slowly turn the speed control valve open (counter-clockwise). That way the flushing hose can completely be removed from the drainpipe.
12. Slowly close the speed control valve (clockwise) when the flushing hose has been retracted far enough between the rubber wheels.
13. Operate button 1 on the remote control again, the drive will now stop.
14. Pull the roller bend fixing pin out of the ground.
15. Operate button 3 on the remote control to lift the guide arm a little.
16. Roll up the suction hose with the suction basket and float, and hang them on the machine.
17. Roll up the overflow hose and hang it on the machine.

18. Drive with unfolded but fully retracted guide arm, to the next drainpipe.

This is the only situation in which driving with an unfolded guide arm is permitted.

DANGER!

In all other transport situations, particularly when transporting over public roads, the machine must be put completely into transport position.

7.4.8 Preparing the machine for transportation on public roads

1. Observe all safety instructions as described in the safety chapter of this user manual and ensure that the flushing hose is fully retracted between the rubber wheels as described above.
2. Carefully take the tension (open) off the hook clamp of the water pressure control.
3. Switch off the PTO shaft.
4. Attach the steel cable with the carabine hook, if it is not attached.
5. Fully retract the guide arm using the lever at the right; operate button 3 on the remote control.
6. Remove the lower roller bend, put it on the roller bend transport support and lock it.
7. Remove the top roller bend, put it on the roller bend transport support and lock it.

WARNING!

When folding the guide arm there is a risk of limbs getting caught.

8. Fold in the guide arm by operating knob 6 off the remote control.
9. Fold the second guide arm section fully in by hand.
10. Put the guide arm transport lock pin in the arm lock support and lock it with the hairpin lock pin.
11. Switch off the hydraulic control valve of the tractor.

WARNING!

First, switch off the hydraulic control valve of the tractor, then operate on the remote control hydraulic functions, before connecting or disconnecting the hydraulic quick-connect couplings of the machine to/from the tractor.

12. Disconnect the hydraulic quick-connect coupling for the supply (Red).
13. Disconnect the hydraulic quick-connect coupling for the return (Blue).
14. Roll up the suction hose with the suction basket and float, and hang them on the machine.
15. Roll up the overflow hose and hang it on the machine.
16. Mount the lighting beam on the machine.
17. Insert the machine plug into the tractor outlet.
18. Check the correct operation of the lighting beam.
19. Lift the machine into transport position (lifted 25 cm off the ground).
20. Switch off the working lights of the machine (if they are on).
21. Check that the rotating light or flashing light (if mounted) for traffic approaching from the rear is clearly visible.
22. Check the presence of the triangle "Slow traffic".
23. Release the tractor parking brake.
24. Drive to the new destination.

7.4.9 Unhitching the machine from the tractor

1. Make sure the machine is on a level surface.

WARNING!

Apply the tractor parking brake, switch off the tractor engine and take the tractor ignition key from the lock.

2. Take the plug of the lighting beam from the tractor outlet (if mounted).

CAREFUL!

Take measures to prevent environmental pollution due to spilling hydraulic oil.

3. Disconnect the hydraulic quick-connect coupling for the supply (Red).
4. Disconnect the hydraulic quick-connect coupling for the return (Blue).
5. Loosen the two lock chains of the protective sleeve of the PTO shaft.
6. Push in the spring-tensioned catch of the PTO shaft and slide the PTO shaft off the tractor PTO.
7. Hang the PTO shaft on its special support on the machine.
8. Uncouple the top rod of the three-point suspension from the machine.
9. Uncouple the lower lift arms of the three-point suspension.
10. If applicable, remove the front weights from the tractor.

7.4.10 Storing the machine

1. Uncouple the central reel coupling.
2. Remove the nozzle.
3. Use pressurized air to purge all water from the flushing hose.
4. Open both valves of the flushing water pump and let the pump run to remove all water.
5. Fill a 10-liter bucket with a mixture of water and anti-freeze with protection up to -25°C.

TIP! Use biodegradable antifreeze to prevent environmental pollution.

6. Close both valves of the flushing water pump.
7. Put the end of the suction hose, the end of the overflow hose and the water supply hose of the reel in the bucket.
8. Switch on the PTO shaft and let the flushing water pump take up the antifreeze mixture to prevent frost damage and internal corrosion of the pump and to prevent the diaphragms from drying out.
9. Roll up the suction hose with the suction basket and float, and hang them on the machine.
10. Roll up the overflow hose and hang it on the machine.
11. Unhitch the machine from the tractor.
12. Protect the black flushing hose from intense sunlight, particularly in the summer or in tropical areas. This will increase the service life of the flushing hose.
13. Fill the two reel bearing grease nipples with grease
14. Coat all exposed steel parts with grease.
15. Check flushing water pump oil level. The level must be at the mark of the sticker on the oil filler port on the flushing water pump.

8. Homburg Dynamic Drive (HDD 1.0)

Characteristics Homburg Dynamic Drive 1.0 (HDD 1.0)

8.1 AutoDrive

Automatic input of set meters and return to the starting point.

The input length “METER” can be changed in the MENU. The factory setting is the hose length on the machine, this is adjustable from 15 meters to the maximum hose length of your machine.

8.2 AutoRepeat

In the event of an obstacle, the drive unit will stop, retreat slightly and try again to clean the obstacle. This is called the AutoRepeat mode.

When the AutoRepeat is active, will this become visible through red LED’s that light up on the control panel by: HDD-Cycle.

The hydraulic input pressure with which the hose is pushed into the drain is indicated by BAR.

The input pressure “BAR” can be changed in the MENU. The factory setting is 60 bars, it is adjustable from 30-100 bar.

Repeat length is the distance the hose is retracted before it makes a new attempt to rinse the obstacle.

The “REPEAT CM” can be changed in the MENU. The factory setting is 50 CM, this can be adjustable from 50-2500 cm.

The “REPCYCLES” can be changed in the MENU. The factory setting is 3 times. This is freely adjustable.

8.3 SlipControl

It is continuously measured whether the hose is experiencing slip during feeding. With a 3% difference between the meter counter and the drive wheels, will the drive shift down and go in repeat mode. If there is still slip after this, the drive will stop. The amount of slip cannot be adjusted in the menu.

8.4 The control cabinet

The HDD 1.0 system exists out of a control cabinet with 9 buttons and 1 display.

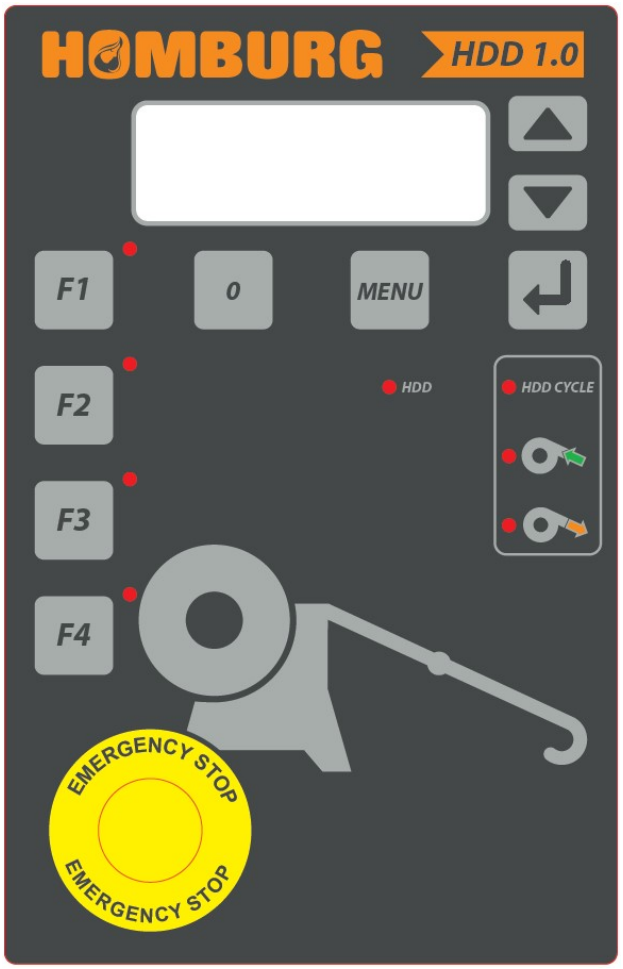


Figure 19 - Front of HDD 1.0 cabinet

Legend:

▲	Up	
▼	Down	
↵	Enter	
MENU	Menu	
0	Reset length	
F1	Function key F1	*Water valve open/close*
F2	Function key F2	*Work lamp on/off*
F3	Function key F3	*Lower 2^{e} arm*
F4	Function key F4	*Lower 2^{e} arm*

If the machine is equipped with the HDD 1.0 it will be equipped with a remote control with which the HDD and the water valve can be operated. See chapter “wireless remote control”. If the machine is equipped with a hydraulic kink function on the 2nd arm in combination with HDD 1.0, this kink function of the 2nd arm is operated with the function buttons F3 and F4 on the HDD control box.

8.5 Screen information and menu structures

When the HDD 1.0 is booted, the HDD performs a self-test. Each output is tested for the correct operation of the connected component. The HDD will notify you if there is an “OK” or an “FA” present. When the HDD indicated “FA” during the self-test, contact your dealer or the manufacturer.

The main screen is automatically displayed after the start-up.

METER	=	0.00	(position hose in meters)
BAR	=	00.00	(required input pressure of drive wheels in bar)
M/min	=	00.00	(speed rinse hose in m/min)

The Homburg Dynamic Drive MENU has 3 screens where different values can be adjusted and viewed.

8.5.1 Screen 1:

>	PIPE METER	=	499	Length drainage hose
	REPEAT CM	=	50	Length retreat during repeat
	BAR	=	60	Input pressure drive wheels

8.5.2 Screen 2:

>	F3/4 mode	=	direct	Switching mode buttons F3 and F4
	F3/4 TIME	=	5	if mode “time” number of seconds
	REPCYCLES	=	3	Number of times repeat

8.5.3 Screen 3:

Counter	=	0	Trip number in meters
T Counter	=	0	Total counter in meters
T Time	=	0	Total counter in hours

8.6 Adjust settings in the menu

Before starting work, enter the length of the drainage pipe. You also set the input pressure to the desired value.

To set these values correctly, follow these steps;

- Press “MENU”, the following accurse on the display;

>	PIPE METER	=	130	*Length drainage hose*
	REPEAT CM	=	50	
	BAR	=	60	*Input pressure drive wheels*

- Press “▲” or “▼” until you are at the value you want to adjust.
- Press “↵” to confirm your choice. The arrow “>” will now change to a “[“
- With “▲” and “▼” you can change the value until you have reached the desired value.
- Press “↵” to confirm the value. The arrow “[” changes back to “> “

The value has now been changed.

- Now press “MENU” to get to the 2nd screen.
- Press “MENU” again to get into the counter screen.
- Press “MENU” again to return to the main screen.

8.7 Automatically clean the drainage pipes

When you have correctly set the HDD with the desired length, input pressure, repetitions and repeat length, you can start cleaning the drain pipe.

Slowly feed the rinsing hose through the roller bend to the entrance of the drain pipe and stop it.

1. Turn on the HDD on your remote control. This can be done with button 9 on the remote control.

   The LED of HDD is now red. If this is not the case, press button 9 again on your remote control.

2. Press “0” on the HDD to reset the travelled kilometers on the main screen.
3. Press button 2 of the remote control to start the cycles.
   a. The rinsing hose will enter
   b. The water valve (if present) will open
   c. The machine will try to reach the set length
   d. When the set length has been reached, the hose will automatically be retreated.
   e. The water valve (if present) will close automatically when the hose is almost completely retreated
   f. The machine will stop when the rinsing hose reaches the set “0” point.

It is possible that the machine comes across an obstacle during its cycles. As explained earlier, the machine will then repeat a set length a number of times to get through the obstacle. The repeat function will also be activated if any slip occurs.

9. Maintenance instructions

9.1 General

Observe all safety instructions as described in the safety chapter of this user manual.

To make the most out of this machine's high quality throughout its service life, it is necessary to accurately follow all maintenance instructions below.

Operators are only allowed to carry out the maintenance and repair described in this user manual. Other maintenance must be carried out by specialized personnel.

Maintenance must only be carried out by trained and appointed personnel that does not use alcohol, medicines or drugs.

None of the substances on or in the machine are suitable for internal use.

Make sure during maintenance that no oil or grease is spilled on the flushing hose or the drive wheels and the pressure rolls. That will cause slip when feeding in or out.

Sealed settings and accesses must not be broken. If a seal is broken, the manufacturer's warranty and product liability automatically expire.

Only hoist the machine on the special hoisting points.

Make sure that nobody can start the machine during maintenance and repairs. Therefore, you should fully unhitch the machine from the tractor.

Never weld on the machine without the manufacturer's written permission.

Always observe the safety precautions from suppliers of battery acid, fuels, lubricants, cooling fluid and hydraulic oil.

When working with grease, battery acid, fuel, lubricants, cooling fluid, and hydraulic oil, make sure these substances do not end up in the environment.

Never remove a protective casing of an operating machine.

If the machine is used under special operating conditions (for instance: 24 hours a day, 7 days a week, with very dirty flushing water, a modified maintenance schedule must be observed. Consult your supplier in that case.

9.2 Varnish damage

Varnish damage, due to rust or mechanical causes, must be repaired in the following manner:

1. Sand the location in question to the plain metal.
2. Remove all dust and grease.
3. Apply a zinc-bearing primer.
4. Let it dry completely.
5. Sand the surface lightly.
6. Apply a coat of varnish in the original color of the machine.
7. Let it dry completely.

9.3 Cleaning the machine

The machine can be cleaned with a high-pressure sprayer or a steam cleaner with tap water not warmer than 40°C. Do not use detergent, for that will cause the flushing hose drive wheels to slip.

9.4 Oil change water pump

The oil of the flushing water pump must be changed annually.

Be sure there is no air left in the cylinder head after changing the oil of the flushing water pump. The air can be removed by tilting the pump forward and simultaneously rotating the shaft. That way the air between the piston and the diaphragms will disappear (also refer to the manufacturer's instructions that came with the pump).

9.5 Maintenance schedule

Part	8 hours or daily	40 hours or weekly	250 hours or monthly	Quantity per machine	Material / Method
Water Coupling	Lubricate			1	Grease Mollub-Alloy 777-1
Reel bearing	Lubricate			2	Grease Mollub-Alloy 777-1
Hose guide	Grease			1	Grease Mollub-Alloy 777-1
Chain hose drive		Grease	Check chain tension	1	Grease Mollub-Alloy 777-1
Chain reel Drive		Grease		1	Grease Mollub-Alloy 777-1
Swivel point pressure controller		Grease		6	Engine oil 5W30
Swivel point guide arm		Grease		4	Grease Mollub-Alloy 777-1
PTO shaft	Check protection tube	Grease		3	Grease Mollub-Alloy 777-1
PTO tractor		Grease		1	Grease Mollub-Alloy 777-1
Water pump shaft		Grease			Grease Mollub-Alloy 777-1
Water pump		Check / refill		1,85 liter	Engine oil SAE30/40 Change after 1000 hours
Suction basket	Clean		Check	1	Brush
Nylon rollers		Grease		20	Engine oil 5W30
Pressure regulator		Grease		1	Engine oil 5W30
Nose wheel clamp		Grease		2	Engine oil 5W30

Figure 20 - Table maintenance schedule (pt. 1)

Part	8 hours or daily	40 hours or weekly	250 hours or monthly	Quantity per machine	Material / Method
Dust covers quick-connect coupling		Check		2	Check presence and condition
Hydr.system			Check	1	Check for leakage
Water system			Check	1	Check for leakage
Accumulator		Check		1	0,7mPa (7 bar)

Figure 21 - Table maintenance schedule (pt. 2)

9.6 Technical support

If you want to know what your nearest address is for minor and major maintenance and repairs, ordering parts and getting technical advice, you can ask the manufacturer for the telephone number of the current importer in your country. This importer can then refer you to the nearest dealer or service provider.

You can also get information from the dealer from who you bought the machine.

10. Fault table

Operators are only allowed to carry out the maintenance and repairs described in this user manual.

Other malfunctions must be solved by specialized personnel.

Maintenance and repair must only be carried out by trained and appointed personnel that does not use alcohol, medicines or drugs.

Malfunction	Cause	Solution
Pump sucks irregularly	Suction basket is not submerged Suction basket is fouled Suction basket connection defective Pump valves do not close properly Pressure in accumulator incorrect	Submerge suction basket Clean suction basket Repair connection Repair pump Change accumulator pressure
Maximum flushing pressure is not reached	Pump valves do not close properly Suction basket is fouled Leakage water pressure Controller worn Nozzle	Repair pump Clean suction basket Replace pressure plate or seat Replace nozzle
Pump lose oil	Oil level too high Diaphragm failure	Lower oil level Repair pump

Figure 22 - Fault table

If you find a thick and white emulsion of water and oil in the pump oil reservoir, or if you see oil stains in the ditch, a diaphragm has failed. Immediately perform the following actions:

Operate button 1 on the remote control to stop the reel drive. If this does not happen, press button 1 again.

1. Carefully take the tension (open) off the hook clamp or the water pressure controller.
2. Switch off the PTO shaft of the tractor
3. Switch off the hydraulic control valve of the tractor
4. Switch off the tractor engine
5. Uncouple the PTO shaft from the tractor and the pump
6. Clean the pump internally with diesel or petrol to prevent corrosion of the pump
7. Check the diaphragm
8. Replace the defective diaphragm

Important; Be sure there is no air left in the cylinder head after changing the diaphragms. The air can be removed by tilting the pump forward and simultaneously rotating the shaft. That way the air between the piston and the diaphragms will disappear.

11. Disposing of the machine

If the machine has reached the end of its technical service life and is to be disposed of, the following should be taken into consideration in relation to the environment and safety:

Oil and grease (in the water pump):

Dispose these in an environmentally responsible manner as directed by local authorities.

Accumulator (in the water pump):

The gas pressure in the accumulator is high. Only specialized personnel with specialized equipment are allowed to discharge the accumulator.

Rinsing hose:

The rinsing hose is made of HPE (Hard Poly Ethylene) synthetic. Send the rinsing hose to a recycling facility specialized in synthetics.

The rest is mainly made out of steel and can be sent off to a scrap iron processing company.

12. List of illustrations

13. Keywords

P

Q

R

S

T

U

V

W

14. Comment form

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