

General Manual



Automatic Greasing System BreakAlube-3

F600677R00



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General information

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1. *PREFACE*

This general manual gives a description of the BreakAlube-3 Automatic Greasing System. It aims at giving insight in the system's operation and possibilities. Furthermore, in this manual you will find the technical data of several components of the BreakAlube-3 Automatic Greasing System.

In this manual the following icons are used to inform or warn the user:



ATTENTION

Draws the user's attention to important information meant to avoid problems.



WARNING

Warns the user for physical injuries or serious damage to the equipment caused by improper actions.

2. GENERAL INFORMATION

2.1 Introduction

With a Groeneveld automatic greasing system, the hydraulic hammer is automatically lubricated with exactly the right amount of grease at just the right moment. In addition, optimum grease distribution is attained over the whole surface to be lubricated, this is possible because the hydraulic hammer is lubricated while it is operational. All actions are automatically performed by the system. The operator needs only to ensure the periodic topping up of the grease reservoir.

Groeneveld's automatic greasing system has been thoroughly tested to guarantee a long and trouble-free service life, even under severe operating conditions.

Besides correct installation and the use of the prescribed type of grease, a periodic check of the operation is a condition for the continued good functioning of the system. This periodic check is easy to carry out and can be done together with the usual maintenance of the machine. Partly through a careful choice of materials, the automatic greasing system proper is practically maintenance-free.

ATTENTION

The use of an automatic greasing system eliminates a large proportion of the time-consuming work of manual lubricating. Do not forget, however, that there are still lubrication points that do have to be lubricated by hand.

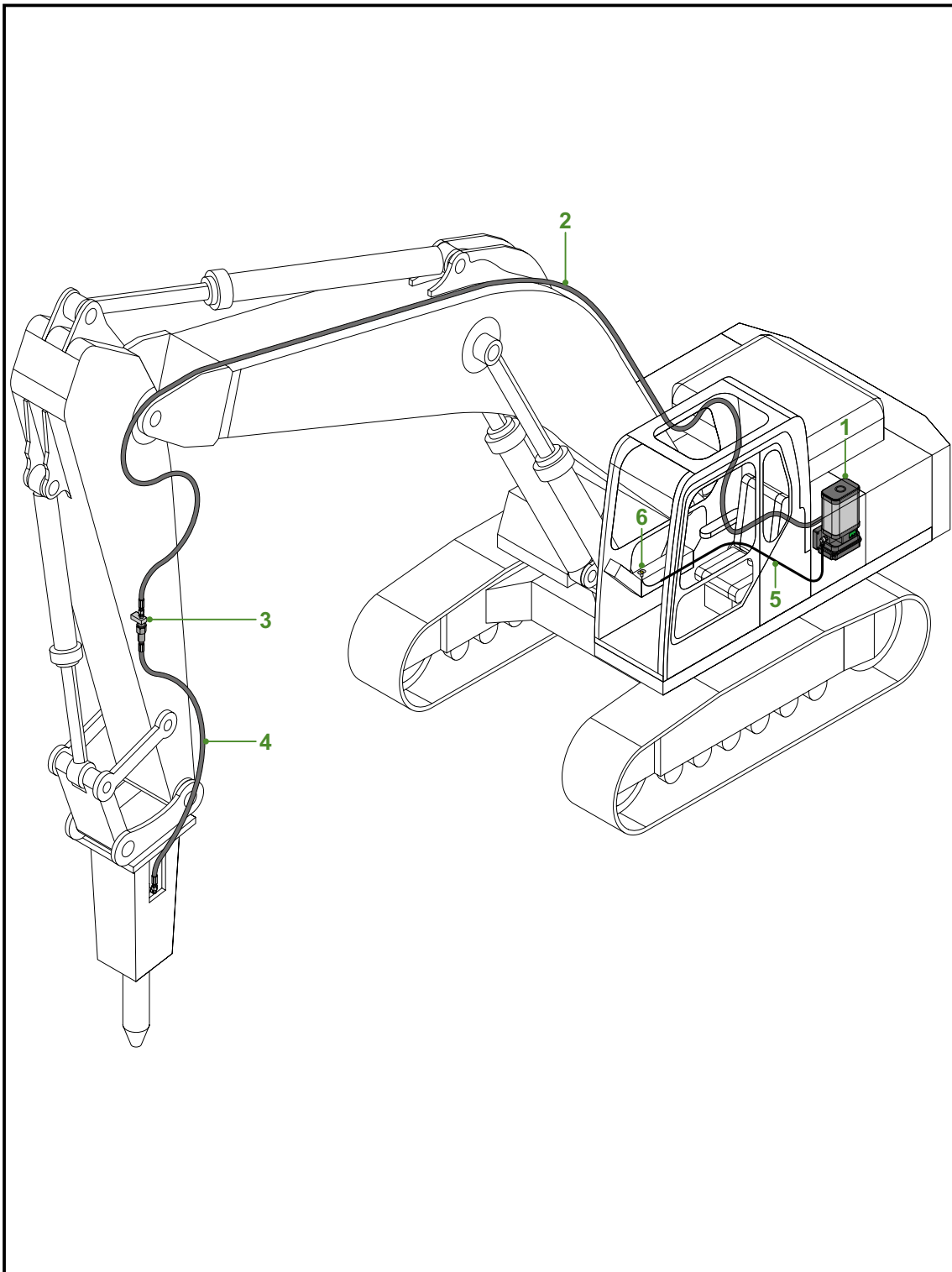


2.2 The BreakAlube-3 automatic greasing system

The BreakAlube-3 pump is designed for use on excavators equipped with a hydraulic hammer. The pump is installed on the excavator and the grease is delivered to the hydraulic hammer by means of a hydraulic high pressure hose. The pump is activated by switching on the hydraulic hammer and pumps a quantity of grease to the hydraulic hammer, either at brief intervals or continuously, depending on the settings.

A Groeneveld automatic greasing system consists of the following components:

1. An electric plunger pump with integral grease reservoir and control unit with database.
2. Grease line between pump and quick coupler.
3. Quick coupler.
4. Grease hose between quick coupler and hydraulic hammer.
5. Electrical wiring harness.
6. Signal lamp.



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3. **COMPONENT DESCRIPTION**

3.1 **Properties**

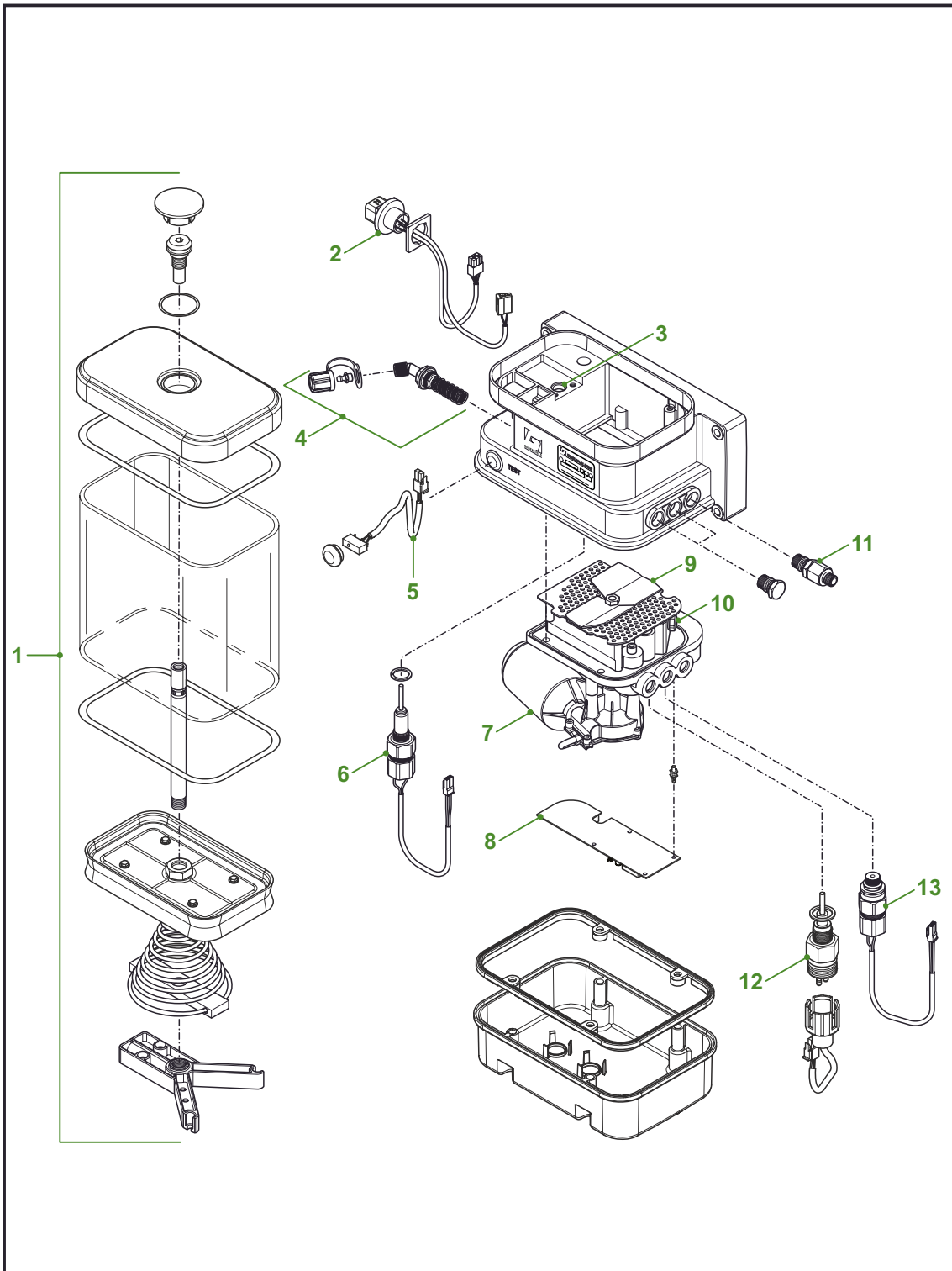
The Groeneveld BreakAlube-3 pump unit has been specially developed for use on an excavator equipped with a hydraulic hammer.

Characteristics:

- Variable grease delivery between 0.2cc and 4cc per minute with an activated hydraulic hammer;
- Monitoring of the grease delivery by the pump;
- Monitoring of any exceeding of the maximum admissible grease pressure (300 bar);
- Monitoring a minimum threshold grease pressure (20 bar) each grease cycle;
- Monitoring of the minimum grease level in the reservoir;
- Monitoring of the electrical connections and components;
- Possibility of switching off the hydraulic hammer if the greasing system is no longer functioning, e.g. due to an empty reservoir.

3.2 **Composition of the BreakAlube-3 pump unit**

1. Grease reservoir with follower plate.
2. Electrical connector.
3. De-aerating and grease overflow outlet.
4. Filler coupling with grease filter.
5. Test push-button.
6. Minimum level switch.
7. Electro-motor with reduction gear and signal transducer for measuring the number of revolutions of the pump drive shaft.
8. Control unit.
9. Stirring gear.
10. Plunger pump.
11. Grease outlet 1.
12. Grease pressure switch for monitoring the minimum required grease pressure (20 bar) per greasing cycle.
13. Relief valve (300 bar) with return channel to the grease reservoir and switch for monitoring by the control unit.

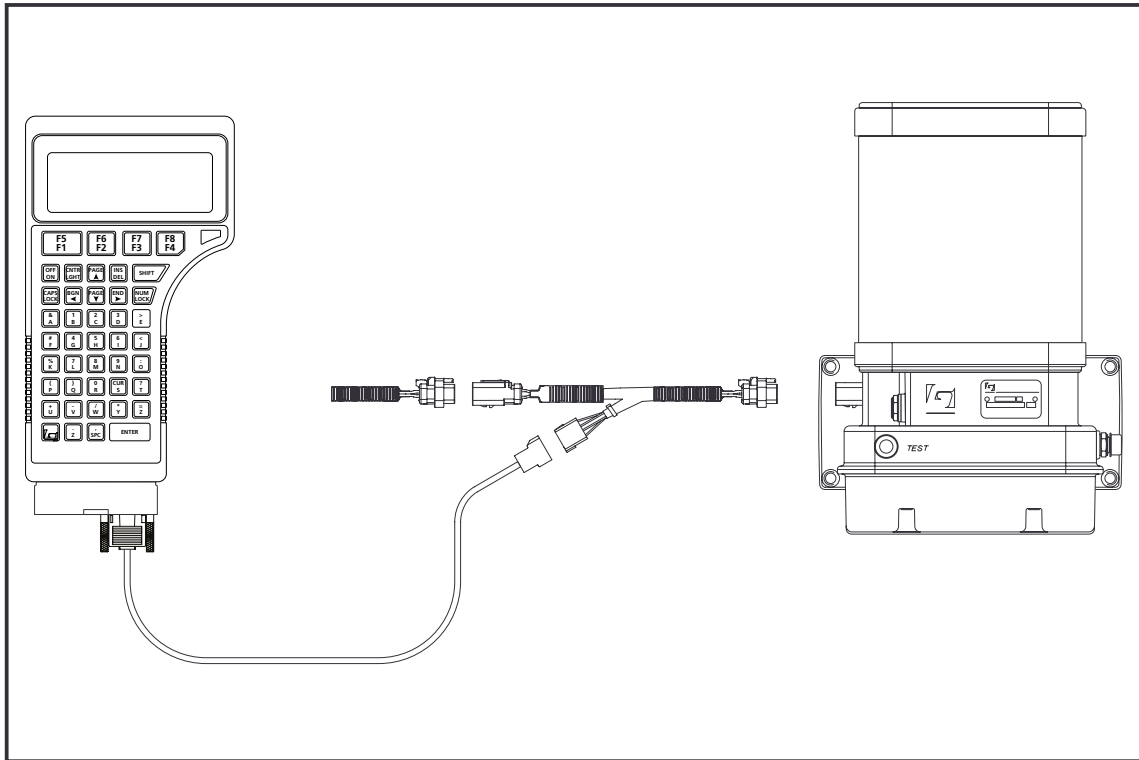


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3.3 The control unit

The control and monitoring unit initiates and controls the greasing cycles of the greasing system. All required system and program parameters (e.g. interval time, grease delivery) can be set. The control unit monitors the performance of various components of the greasing system and processes, stores and reports the malfunctions it detects.

The control unit can be programmed or read out using a UniGINA (**U**niversal **G**roeneveld **I**nstallation and **A**nalysis).



3.3.1 Behaviour during power off / on

When power to the system is switched off (power down), the software saves several variables in the control unit memory bank. These are retrieved at power on, so the software can resume operation at the point when the power was switched off. This means that when, for example, the system is switched off during a pump cycle, the remaining pump revolutions needed to finish the pump cycle are stored in the memory bank. When the system is powered again, the previously aborted pump cycle is resumed and the remaining pump revolutions finished.

3.4 The plunger pump

The electric motor drives the plunger pump through a reduction gear. The plunger pump comprises a drive shaft with excentric cam, a cylinder with piston and a non-return valve. The excentric cam moves the piston back and forth, once every revolution of the cam shaft. During the return stroke of the piston, grease is sucked from the reservoir into the cylinder (through an opening in the cylinder wall).

During the forward stroke of the piston, the grease is pressed, via the non-return valve, towards the outlet of the pump unit.

The amount of grease supplied during each stroke (revolutions of the cam shaft) depends on the (fixed) diameter of the cylinder and the stroke length of the piston.

3.5 Safety and control features

3.5.1 Maximum pressure indicator

A relief valve (fitted with an electrical contact) is installed in the grease channel between the plunger pump and the pump outlet. This relief valve leads the grease back to the reservoir if the maximum grease pressure (300 bar) is exceeded during the pump phase of a grease cycle. The grease pressure may become too high, for example, if the driver has forgotten to couple the grease line to the respective quick coupler on the dipper arm after installing the hydraulic hammer on the excavator.

The maximum admissible grease pressure can also be exceeded if the viscosity of the grease is too high (due to a low ambient temperature).

3.5.2 Minimum pressure indicator

A minimum grease pressure switch is also installed in the grease channel between the plunger pump and the pump outlet. If the minimum grease pressure (20 bar) is not reached during the pump cycle, the switch will signal this to the control unit. The control unit then processes and stores this message.

3.5.3 Minimum level switch

A minimum level switch is installed in the grease reservoir. If the grease reaches its minimum level, the switch will signal this to the control unit. The control unit will process, store and report the occurrence of that condition.

The pump will be disabled automatically when the allowed amount of grease is finished. After refilling the grease reservoir the pump will be enabled automatically.

3.5.4 Revolutions of pump drive shaft

As integrated sensor monitors the drive shaft rotations. When it does not sense a rotation every 10 seconds of a pumping phase it will abort the greasing cycle.

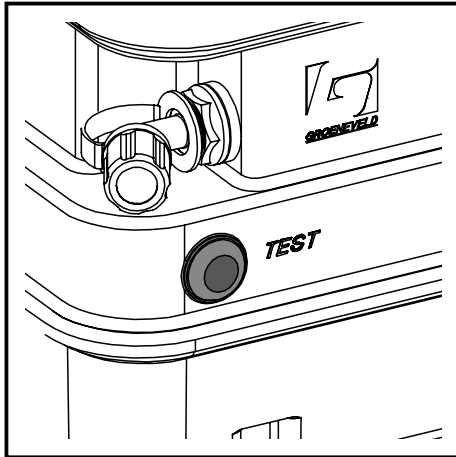
3.5.5 Defective wiring and short-circuits

Open-loads (interruptions) in the wiring sensors, the minimum level switch, the relief valve, the electric motor and any external signalling devices will be detected and processed and stored by the control unit. This is also applicable to short-circuits in the wiring.

3.5.6 Hydraulic hammer

When the hydraulic hammer is controlled by the BreakAlube control unit (parameter setting), the control unit will disable the hydraulic hammer when an error is detected that caused to pump cycle to be unfinished.

3.6 The test push-button



The test push-button on the pump unit has 3 functions:

- Performing a test cycle.
- Resetting the signal lamp and pump after solving the error(s).
- Retrieving error codes stored in the memory bank of the control unit.

3.6.1 Performing a test cycle

A test cycle can be performed by using the test push-button, as follows:

1. The supply voltage for the pump unit must be available (ignition ON).
2. Push the test Push-button (less than one second) once to perform a test cycle. Provided that the pre-set delivery amount is more than 0 cc.
3. After two seconds the test cycle starts.

During the test cycle the signal lamp will continuously flash once followed by a pause of two seconds.

To end the test cycle immediately press the test push-button once.

Any errors that occur during the test cycle will not be indicated by the signal lamp and will not be stored in the memory bank of the control unit.



ATTENTION

When the pump unit is already performing a pump phase, a test cycle cannot be performed in this way.

3.6.2 Resetting the signal lamp and pump

Whenever the control unit has disabled the pump due error(s) (default setting: 10 errors in succession), the signal lamp will be lit continuously. The pump can be enabled using the test push-button, as follows:

1. The supply voltage for the pump unit must be available (ignition ON).
2. Push the test push-button once (one second).
3. When the signal lamp switches off, the connection between the control unit and the pump has been enabled.

ATTENTION

If this error is caused by an empty reservoir, the error can only be cancelled by refilling the reservoir.



3.6.3 Error codes

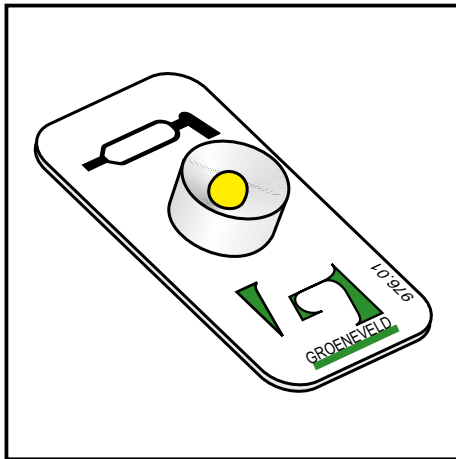
In the memory bank of the control unit information is stored about the operation of the greasing system. Two categories of error codes can be distinguished:

1. Pending errors: the number of errors stored since last successful cycle.
2. Total errors: the total numbers of errors stored since installation.

Retrieving error codes

The pending errors stored in the memory bank of the control unit can be retrieved by keeping the test push-button on the pump unit depressed for at least five seconds. Seven seconds after you released the test push-button the signal lamp will start producing the flash code(s) to indicate the pending error(s). See paragraph "Error codes by signal lamp".

3.7 Signal lamp



The signal lamp should be mounted in the field of vision of the driver and out of direct sunlight, because of the visibility of the signals.

The lamp shows the status of the greasing system and malfunctions reports by means of flashing codes. In the table below, an overview of normal signals is given. For malfunction signals refer to the paragraph "Troubleshooting".

3.7.1 The signal lamp flashing codes

Signal	Moment	Significance
Three seconds on	Five seconds after switching on power (+15)	The supply voltage for the control unit is available and the signal lamp is OK
	After activating the hammer, option (parameter setting)	Input A (- or +) is available and the control unit starts operation
Repeatedly: blink once followed by a pause of two seconds	After momentarily pressing the test push-button once	A cycle test is being performed via grease outlet 1
Continuously	When allowed quantity of grease is finished after reaching minimum level	Grease reservoir theoretical empty
	When maximum allowed number of errors in succession is exceeded	Serious system error
Continuously one second on, one second off	When a minimum grease level is detected	Provided the parameter settings have been set to act this way
Continuously half a second on, half a second off	When pump cycle is executed	Provided the parameter settings have been set to act this way

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3.7.2 Error codes by signal lamp

The pending errors stored in the memory bank of the control unit can be retrieved by using the test push-button on the pump unit.

The signal lamp displays the pending errors by flashing:

- Dozens are shown by long pulses (0.5 seconds)
- Units are shown by short pulses (.15 seconds)

Between the displaying of the error codes, a pause of two seconds is used. If, for example, the errors 13 and 22 have occurred, you will see the following flashing codes:

long, short, short, short Error code 13
Two second pause

long, long, short, short Error code 22
Two seconds pause

The following table specifies which flashing codes represent which error:

Code	Meaning
10	No currently pending errors
12	Relieve valve opened during a pump cycle in outlet 1 (pressure too high)
15	Grease reservoir empty
16	Minimum level in reservoir
21	Pump revolution time out
22	Pump open load
23	Pump over current
24	Hammer output open load
25	Hammer output short circuit
35	Pump short circuit
41	Bad wiring
42	Real time clock error
43	Real time clock battery empty
44	Parameter checksum error
45	Power relay error
61	Temperature above limit
62	Temperature below limit

4. INSTALLATION

4.1 Overview

To install the Groeneveld greasing system the following tasks must be performed:

1. Mounting the pump with integrated control unit.
2. Mounting the grease hoses and quick coupler.
3. Mounting the electrical wiring and signal lamp.
4. Testing of the system.

4.2 Safety precautions

1. Take the necessary precautions to prevent potentially dangerous situations from occurring during installation, checking and maintenance.
2. Always apply or use adequate safety measures to prevent bodily harm and damage before you start working.
3. Ensure that the machine is immobilised before you start work. Therefore remove the ignition key and store it in a safe place.
4. Pay special attention to blocking parts such as dipper arm. Make sure that it is safe to work under these parts and that they cannot drop down.
5. Never work underneath a machine that is raised by a jack only. Always use a trestle and check that the ground is firm and flat enough.
6. Disconnect the earth-clamp from the battery. This prevents electrical equipment being inadvertently activated.
7. Adhere to all regulations, specifications and limitations as specified by the manufacturer of the machine.
8. Use only clean tools that fit and are designed for the specific task you want to perform with them.
9. A machine may only be operated by those who are competent to do so and aware of all possible dangers. If necessary, an expert should be consulted.
10. Keep the working area clean and tidy. This enhances safety.

4.3 General installation directives

1. Check the contents of the parts kit using the parts list included in the kit.
2. Before start installing the greasing system, check whether the grease point of the hydraulic hammer is open and furnished with a sufficient amount of grease. If that is not the case, grease the grease point by hand. This prevents insufficient greasing of the grease point during the period following the first greasing cycles of the greasing system.

WARNING

No grease must be allowed to come between the bit and the actuator in the hammer case. Therefore press the bit completely up against the hammer before lubricating the hydraulic hammer. To do this, place the hydraulic hammer with the bit on the ground so that the excavator and the hammer case are resting on the bit.



3. Prevent any contamination of the system during installation. Use clean tools and clean the locations on the machine where the pump unit and other parts are to be installed.
4. During installation of grease hoses and electric wires, ensure that:
 - The hoses and wires are not fastened to or near hot parts such as exhaust, turbo or air conditioning unit.
 - The hoses and wires taut and fixed in place with small or large straps or clamps.
 - The hoses and wires are not installed alongside moving parts in such a way that they may become damaged (in time).
 - The hoses and wires have a sufficient length, particularly if they are laid to moving parts. Check this by shifting the moving parts to its extreme positions.
 - Ensure that grommets are used wherever there is a chance of a hose or wire being damaged.
5. Check whether the machine voltage corresponds to the voltage required for the pump in the kit.

4.4 Mounting the pump unit

1. Determine jointly with the client where the pump unit should be mounted, if this is not already indicated in machine-specific installation instructions. Make sure that:
 - The pump unit is easily accessible for filling its reservoir.
 - The grease level in the reservoir is easy to inspect visually.
 - The pump unit is protected against possible damage.
2. Investigate whether existing holes of the machine can be used to mount the mounting plate of the pump unit.
Always follow the directions of the machine manufacturer when you need to drill holes. Be sure not to damage anything (e.g. lines or wires) that may be present behind the part in which you drill a hole. After drilling a hole, always remove the chips (with compressed air).
3. If the mounting plate is to be welded onto the machine, the directions of the machine manufacturer should be strictly adhered to.
4. Mount the mounting plate with the pump unit onto the machine.
5. Remove the yellow/red transport plugs from the grease outlet and the de-aerating opening of the pump unit.
6. Fill the reservoir of the pump (if empty) with hammer grease prescribed by the hammer manufacturer in a NLGI-2 class.

4.5 Couplings and grease hoses

4.5.1 Installation of the couplings

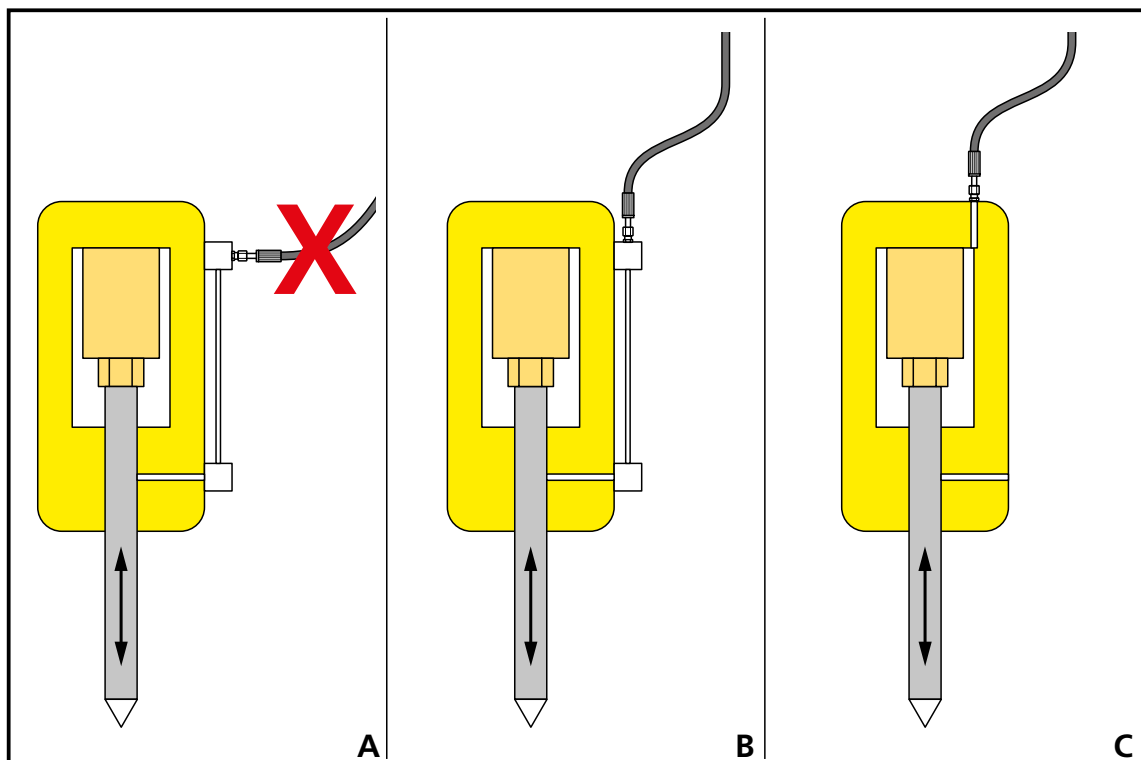
1. Determine the position for the quick coupler on the dipper arm of the machine before disconnecting the hydraulic hammer and mount or weld on a support bracket in this position.
2. Mount preferably the male part of the quick coupler rigidly on the dipper arm and mount the female part on the hose of the hydraulic hammer.
3. Do not forget to mount the dust cap and dust cover supplied so that the quick couplers can be sealed against soiling after disconnection of the hydraulic hammer.
4. Now determine the screw thread at the greasing point on the hydraulic hammer and mount the correct coupling. Pay attention also to the most favourable layout of the hose to the hammer.



ATTENTION

Experience has shown that the vibrations of the hydraulic hammer, a coupler can quickly come loose or even break off completely. We therefore recommend that only steel couplings are used, preferably with R1/4" screw thread and that these are mounted with Loctite rather than Teflon tape.

It is also important that the hose in the opposite direction is laid away from the bit of the hammer. This ensures the least chance of vibration damage to the hose and coupling (see illustration below).



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5. If the greasing point is in a unprotected position low down on the side of the hydraulic hammer, it should be moved to a higher and more protected position on the hammer using a thick-walled tube and/or welding block so that a safe transition can be made to a hose to the dipper arm of the machine.
6. Before modification, always check first whether the hydraulic hammer manufacturer has not already provided an extra greasing channel on the top of the hammer for connection of a greasing system.

4.5.2 Installation of the grease hoses

1. The installation kit includes two 1/4" i/d high pressure hoses with steel reinforcement that normally have sufficient length for installation on an excavator with a standard boom and dipper arm.

NOTE

If the excavator is equipped with a boom extension or multi-section boom, it is possible that the hose length supplied as standard is not sufficient.

2. A standard length of 20 meters is supplied for installation between the pump unit and the quick coupler with a hose end fitting (ø6mm diameter) already installed on one end for mounting to the pump unit outlet.
3. A standard length of 3 meters is supplied for installation between the quick coupler and the greasing point on the hydraulic hammer, here again, a hose end fitting (R1/4") is already installed on one end for mounting to the quick coupler.
4. Determine the length of the two hoses required, following as far as possible the passages of the installed hydraulic hoses and/or tubes. Then cut both hoses to the required length.
5. Now mount the re-usable hose end fittings (ø8mm diameter) supplied to the other end of the two hoses following the procedure below:
 - Grip the hose in a vice.
 - Screw the sleeve of the re-usable hose end fitting up to the end of the hose (anticlockwise).
 - Turn the sleeve back by 1/4 or 1/2 turn (clockwise).
 - Grip the sleeve in the vice.
 - Lubricate the hose end fitting and the inside of the sleeve with a little bit of oil or grease.
 - Screw the hose end fitting into the sleeve using a wrench until it is tight but without strain (clockwise).
6. Remove any burrs and sawing residues and blow out the hose to clean the inside. Check whether the hose is open and free from any inner damage behind the hose end fittings (upsetting of inside material).
7. Fill the hose with grease with a grease gun. Use the grease prescribed by the hydraulic hammer manufacturer for this.

4.6 Electrical wiring

Detailed wiring diagrams are available as aids to install the electrical wiring. Where possible, pre-assembled wiring harnesses are delivered.



ATTENTION

In order to avoid damage to the electrical signal of the machine, the supply line such as the +15 (red wire, pin 1) and the hydraulic hammer control signal line (green wire, pin 3) must be protected with the correct fuses. Consult the table below or the wiring diagrams for the correct fuse ratings.

- Connect the wires only when the main components (pump unit, signal lamp and optional hammer shut-down valve or relay) have been installed.
- Lay the wiring as far as possible along the passage of the existing electrical wiring and fasten them with small or large straps.
- Always make wire connections in the cabin or in a watertight terminal box.

4.6.1 Fuse ratings

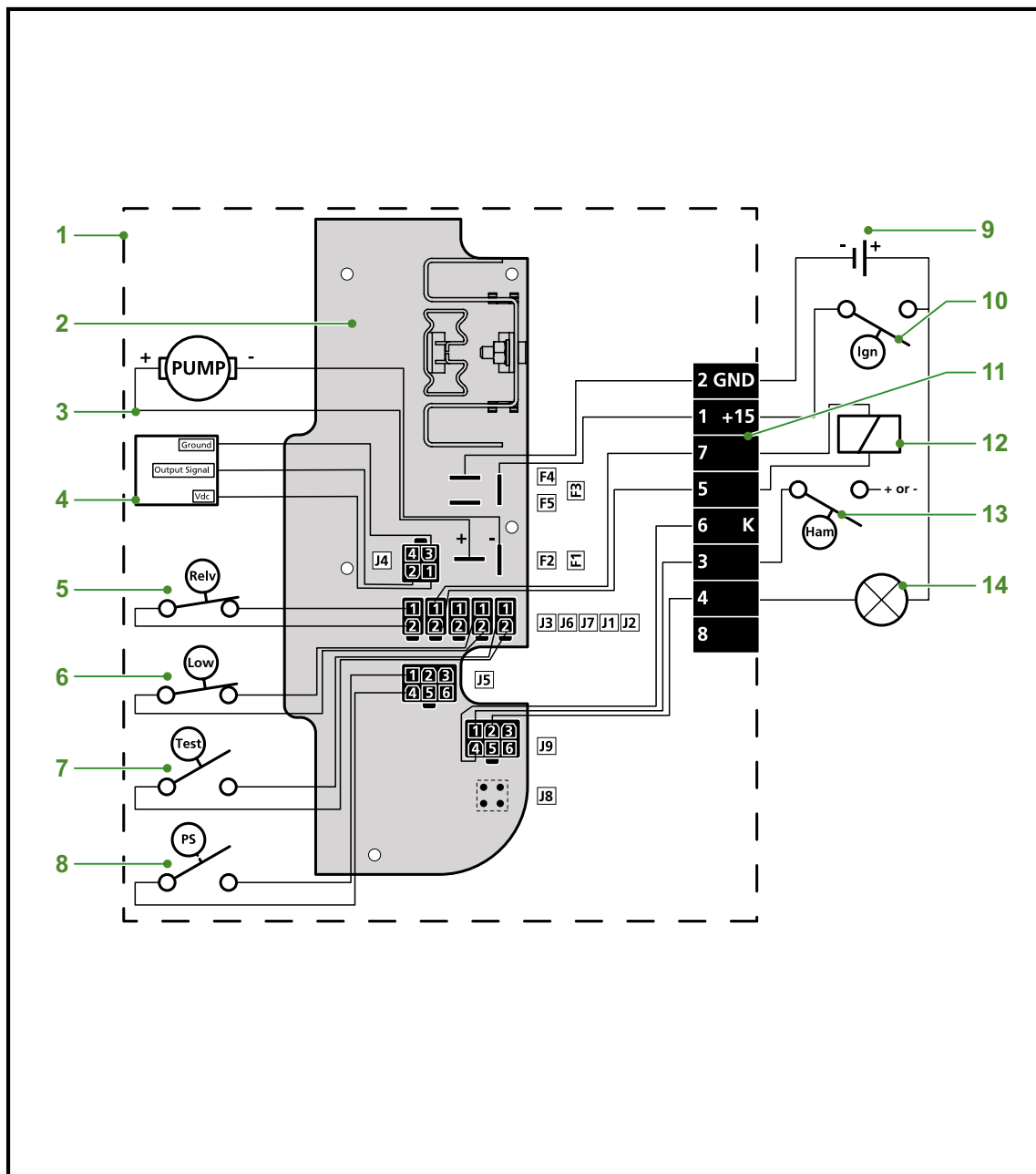
<i>Voltage</i>	<i>Supply voltage fuse (pin 1)</i>	<i>Control voltage fuse (pin 3)</i>
12 Vdc	15 A	3 A
24 Vdc	10 A	3 A

4.6.2 Pin assignment of the connector on the pump unit

<i>Connector pin number</i>	<i>Description of connection</i>	<i>Wire colour in wiring harness</i>
1	Supply voltage (+15)	red
2	Ground (-31)	black
3	Hammer control input	green
4	Signal lamp output (-)	orange
5	Hammer shut-down output (+)	pink
6	K-line (communication with UniGINA)	purple
7	Hammer shut-down output (-)	light blue
8	n.a.	grey

4.6.3 Wiring diagram

1. Pump unit.
2. Control unit.
3. Pump motor.
4. Revolution sensor.
5. Relief valve switch (NC).
6. Minimum level switch (NC).
7. Test switch (NO).
8. Minimum pressure switch (NO).
9. Battery of the machine.
10. Ignition switch.
11. Connector 8-pole.
12. Hammer disable relay (option) (NC).
13. Timer control switch (input A), positive (+) or negative (-), NC or NO (parameter settings).
14. Signal lamp.



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4.7 Bleeding the system

Because each hydraulic hammer supplier prescribes his own specific grease, we have decided to supply the pump with an empty grease reservoir (also pumps pre-filled with HammerLube grease NLGI 1.5 are available). For bleeding and testing the pump during production, however, the pump with an empty grease reservoir has been filled with a minimum amount of HammerLube grease NLGI 1.5. During the subsequent transport it is possible that the grease has come away from the pump element and been replaced by air. We therefore recommend that the pump is allowed to run briefly after installation of the system and filling the grease reservoir in order to allow the air around this pump element to escape.

Proceed as follows:

- Disconnect the grease hose from the pump.
- In order to avoid soiling of the workplace, place a beaker or plastic bug under the grease outlet port of the pump.
- Connect the UniGINA to the pump.
- Switch on the power of the machine.
- Switch on the UniGINA and turn it to the manual mode by means of the Diagnosis Input/Output menu or push the test push-button on the pump (less then one second) once.
- Now switch on the pump motor and allow it to run until a continuous stream of grease emerges from the pump outlet port.
- When air bubbles no longer appears, the pump motor can be switched off with the UniGINA or push the test push-button on the pump once.
- The grease hose already filled with grease can be connected to the pump again.

NOTE

If the client so wishes, the grease filling used during production can also be removed in this way. Then allow the pump to run until the proper grease just starts to come out of the pump grease outlet.

- Now disconnect the grease hose form the greasing point on the hydraulic hammer.
- Place a beaker or plastic bag under the end of the grease hose.
- Then switch on the pump motor again.
- Check whether grease comes of the end of the grease hose. This can take a short time because a certain pressure first has to be built up before the grease at the end of the grease hose starts to move.
- When the grease starts to come out of the grease hose, the pump motor can be switched off.
- The grease hose can now be connected to the greasing point on the hydraulic hammer again.
- The BreakAlube system is now completely free from air.

4.8 Putting the system into operation

Before putting the system into operation, ensure that the quick coupler in the grease hose to the hydraulic hammer is connected and that the UniGINA is connected to the pump.

The switch on the ignition (+15) and check that the signal lamp comes on in between five seconds. In doing this you ensure that the voltage and ground connections are correctly connected, the fuse has not blown and the signal lamp is OK.

Now switch on the UniGINA and set or check the desired system parameters (see also the BreakAlube UniGINA user manual).

Then check using the UniGINA:

- The status of the hydraulic hammer command signal ("timer input state") in the third Input/Output screen of the Diagnosis menu. This command signal should change from "Off" to "On" when the hydraulic hammer is switched on (use the machine hammer switch for this). It is possible to have a positive (+) or a negative (-) input signal (check the "timer input source setting in the parameter menu, select "power" if the signal is positive (+) and when negative (-) select "ground"). It is also possible that the voltage switches off when the hydraulic hammer is switched on (the parameter setting "timer start/stop" should be on "stop", see the parameter menu).
- The status of the remaining cycle time ("rem. cycle time") in the Variables screen of the Diagnosis menu is counting down at the same time as the hydraulic hammer is been switched on.
- Whether the pump motor is really started when the remaining cycle time is counted down to "0", see if the remaining revolutions ("rem. revolutions") are counting down, same Variables screen. Listen also closely to check whether a greasing cycle is really started.
- Whether the status of the test switch ("test switch state") changes from "off" to "on" in the third Input/Output screen of the Diagnosis menu. A test cycle can be started directly in this way.

ATTENTION

If the pump is already running a grease cycle, the pump should not react to the test push-button.



- Whether errors are stored in the error menu. It is possible, however, that a minimum level in the grease reservoir ("low level") of an interrupted lamp circuit ("OL lamp circuit") error is stored due to the fact the voltage to the pump was switched on at a time when, for example, the grease reservoir had not yet been filled or that the signal lamp was not yet connected. Always check whether such errors in the error counts or indication counts groups disappear after a correctly performed cycle.

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- Also check the grease pressure of the system. For this, a pressure gauge must be connected to the pump as a standard, The pressure in the system must remain above the minimum set grease pressure of 20 bar and below the maximum grease pressure of 275/300 bar during every cycle to avoid an error being stored.
The counter-pressure of the connected grease hose is normally far higher than 20 bar , but it is possible that with a small quantity of grease per cycle, this pressure is not yet reached during the first few cycles after installation.
If the grease pressure rises to above 275/300 bar, an integrated safety valve should open and relieve the excessive pressure to the grease reservoir. If the grease hose is clogged or the quick coupler to the hydraulic hammer is not or not correctly connected, this pressure should increase at each cycle until this maximum pressure is reached.
- Check the system one last time for leaks. If leaks are found, remedy these and thoroughly clean the area of the leakage so that the client does not later get the impression that the system is still leaking.
- Explain and demonstrate the function of the system to the client or machine dealer, if present.
- Disconnect the UniGINA from the pump and connect the pump wiring harness directly to the pump again.
- The system is now ready for operation.

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5. MAINTENANCE

5.1 General

The maintenance of the Groeneveld BreakAlube system can be combined with the normal maintenance of the machine.

WARNING

If a high-pressure steam/water jet is used to clean the machine, the pump unit should not be directly exposed to the jet. This to prevent water from entering the pump unit through its de-aerating opening. During normal operation, however, water will never be able to enter the pump unit.



ATTENTION

The automatic greasing system reduces the time and effort spent on manual greasing significantly. However, do not forget that there may be greasing points that are not served by the greasing system and must still be greased by hand.



5.2 Regularly checks of the greasing system

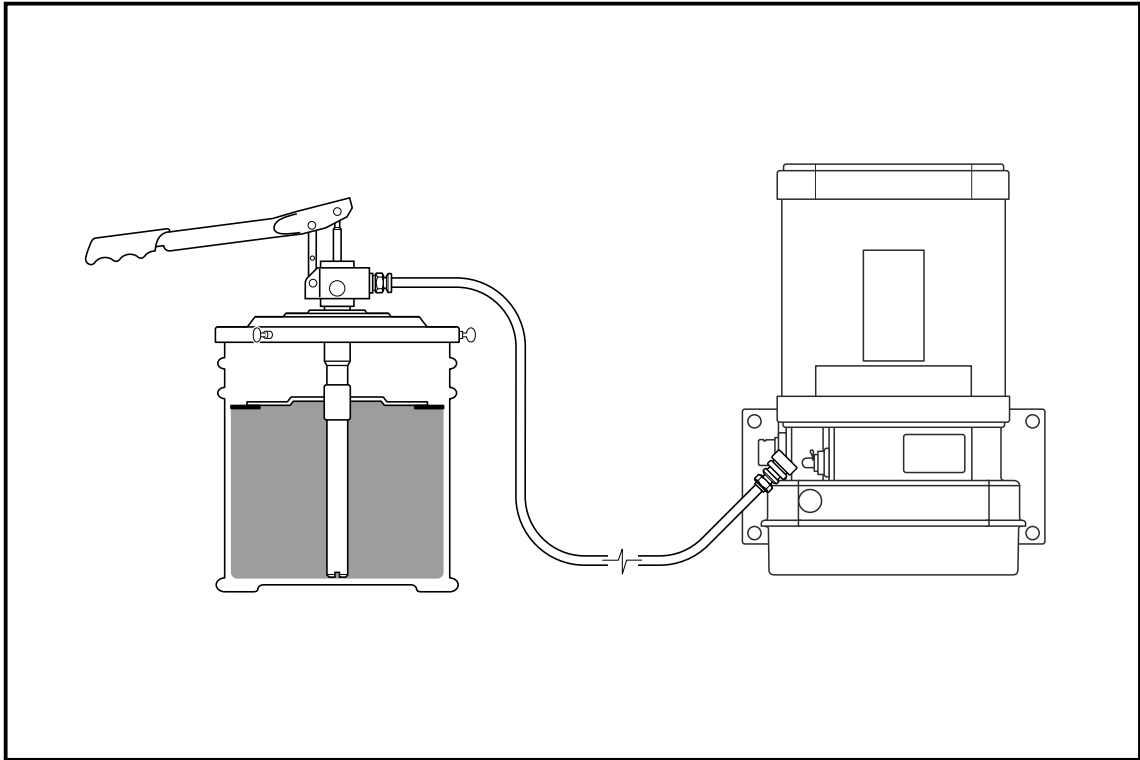
Check the following points of the BreakAlube greasing system:

1. The grease level in the reservoir of the pump unit (refill on time).
2. The pump unit for damage and leakage.
3. The operation of the whole greasing system. Perform a test cycle.
4. Retrieve the error codes stored in the memory bank of the control unit, either by using the test push-button on the pump unit or by connecting a UniGINA to the pump unit.
5. The grease hoses for damage and leaking.
6. A collar of fresh grease should be present alongside the hammer bit to the outside.

5.3 Filling the grease reservoir

When the grease in the reservoir reaches its minimum level, it needs to be refilled. To facilitate this, the pump unit is fitted with a grease nipple onto which a workshop grease gun can be connected.

To be able to fill the reservoir using a special filling pump, a special filler coupling can be installed. Groeneveld can supply you with both mobile or stationary filling pumps (hand- or air-operated).



5.3.1 Filling procedure

The grease filling pump must be suitable for NLGI-2 grease.

First fill the filling hose with grease (if the filling pump or grease barrel is new). This prevents air being pumped into the grease reservoir.

1. Remove the dust cap of the filler coupling.
2. Clean the filler coupling and the coupling on the hose thoroughly.
3. Lock the hose onto the filler coupling or position the grease gun onto the filler coupling.
4. Fill the reservoir up to its maximum level, as indicated on the reservoir. Never fill the reservoir any higher than the maximum level indicated, otherwise the grease may flow out of the de-aerating opening at the side of the pump unit.
5. Remove the filling hose.
6. Clean the dust cap and filling coupling with a clean rag. Place the dust cap back onto the filler coupling.

NOTE

If the pumping action seems to go heavy, check the filter behind the filling coupling on the pump unit. Clean the filter and filler coupling. Also check the filling hose for obstructions and clean it. Any air that may be entered beneath the follower plate will escape through an opening at the top of the guide rod of the follower plate. These air inclusions, together with any excess grease, will exit via the de-aerating opening at the side on the pump unit.

5.4 Trouble shooting

The greasing system is equipped with an electronic control unit with a memory bank. All relevant data concerning the functioning of the greasing system are stored in that memory bank. This data can be read out with the use of a UniGINA.

5.4.1 Recognizing malfunctions

Malfunctioning are recognizable or discovered as follows:

- The signal lamp no longer lights up when the ignition is switched on.
- The signal lamp shows a malfunction.
- Retrieving an error code on the signal lamp.
- Reading the malfunction reports saved in the memory bank of the control unit.
- The grease level in the pump no longer decreases.
- When visually checking the grease point, it appears that no fresh grease collar is present.

NOTE

When lamp is lit due to an error, first reset the lamp with a short push on the test push-button before holding it for minimal five seconds to retrieve the error code.

5.4.2 General malfunction reports

Problem	Cause	Solution
Signal lamp does not light-up after ignition was switched on.	No supply voltage (+15) on pin no.1 or at signal lamp.	Check the fuse and, if required, replace the fuse.
	No ground (-31) potential on pin no.2.	Check the ground connection and if required repair it.
	Signal lamp defective.	Replace the bulb.
	Wiring to the pump unit or to the signal lamp defective.	Check the wiring and, if required, repair it.
Signal lamp ON continuously.	Empty grease reservoir.	Fill the reservoir.
	Persistent system error.	Retrieve fault code with the test push-button or the UniGINA and repair the system.
The greasing point of the hydraulic hammer is too dry, but no malfunction is indicated.	The grease output (cc) and/or the interval time is not set correctly for the current application.	Increase the grease output and/or set a shorter interval time.
The greasing point of the hydraulic hammer becomes too much grease.	The grease output (cc) and/or the interval time is not set correctly for the current application.	Decrease the grease output and/or set a longer interval time.

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Problem	Cause	Solution
The greasing point of the hydraulic hammer is too dry and a malfunction is indicated.	Defective pump unit or blockage in the system.	<p>Retrieve the error code.</p> <p>If the outlet blocked (relief valve opened during a pump phase):</p> <p>1. System contains grease that is not suitable for the current operating conditions. Solution: Replace the grease in the pump and flush the system.</p> <p>2. Grease hose or greasing point blocked. Solution: Check if the quick coupler is connected and fastened. Check if the greasing point of the hydraulic hammer is open by means of a grease gun. Check if the grease hoses are damaged and/or blocked.</p> <p>Other error codes: Remedy the indicated malfunction.</p>

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5.4.3 Error codes by signal lamp

Error code / failure	Cause	Solution
10 : Currently no pending errors	-	-
12: Outlet 1 blocked	<p>Maximum pressure exceeded during a pump cycle (relief valve opened), possible caused by:</p> <ol style="list-style-type: none"> 1. Blocked grease hose. 2. Blocked greasing point. 	<ol style="list-style-type: none"> 1. Check the grease hose and quick coupler. 2. Ask the customer to fix the greasing point blockage.
15: Empty reservoir	Pump disabled and theoretically declared empty because the maximum allowed grease quantity with an active minimum level switch was finished.	Refill the grease reservoir. Lamp will be reset automatically when filling the grease reservoir.
16: Minimum level	Grease in the reservoir reached the minimum level where it activates the minimum level switch.	Refill the grease reservoir. Lamp will be reset automatically when filling the grease reservoir.
21: Revolution error	<p>Control unit detected a not or too slow rotating pump drive shaft and aborted the attempted cycle (max. allowed revolution time exceeded), possibly caused by:</p> <ol style="list-style-type: none"> 1. Pump drive shaft blocked or rotating heavily. 2. Defective revolution sensor. 	<p>Start a test cycle and check whether pump is running and keeps running longer than ten seconds. When:</p> <ol style="list-style-type: none"> 1a. Not running: Check pump cam shaft or piston on blockages and solve. 1b. Running heavily for ten seconds: Check pump cam shaft and piston on damage and repair or renew pump section. 2. Running smooth for ten seconds: Check revolution sensor and magnet in the motor reduction gear and repair or renew pump section.

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Error code / failure	Cause	Solution
22: Open Load pump motor	<p>Control unit detected an interrupted power circuit to the pump motor and aborted the attempted pump cycle, possibly caused by:</p> <ol style="list-style-type: none"> 1. Interrupted wiring. 2. Defective motor. 3. Corroded contacts. 4. Defective control unit. 	<ol style="list-style-type: none"> 1. Check wiring harness between motor and circuit board and restore when necessary. 2. Check the resistance of the motor. Replace when necessary. 3. Check wiring harness contacts on corrosion. Replace when necessary. 4. Replace control unit when error persists.
23: Over Current pump motor	<p>Control unit detected a too high current draw to pump motor and aborted the attempted cycle, caused by:</p> <ol style="list-style-type: none"> 1. Drive shaft blocked. 2. Extreme low working temperatures in combination with a grease not suitable for these conditions. 3. The "pump motor current limit" setting not suitable for the extreme low working temperatures. 	<ol style="list-style-type: none"> 1. Check pump cam shaft or piston on damage or blockage and repair or renew pump section. 2. Replace the grease in the reservoir and bleed the system with a suitable grease for the obtained working conditions. 3. Increase the "pump motor current limit" parameter setting but only after checking whether the machine wiring and fuse can handle a higher setting.

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Error code / failure	Cause	Solution
24: Open Load hammer output	<p>Control unit detected an interrupted power circuit of the hammer output option, caused by:</p> <ol style="list-style-type: none"> 1. This option is not in use and this option has been incorrectly activated in the parameter menu. 2. Wiring between pump and the hammer shut-down valve or relay is loose or defective. 3. Spool of the hammer shut-down valve or relay is defective. 4. No or poor connection in the pump connector. 5. Wiring between the pump connector and circuit board is loose or defective. 	<ol style="list-style-type: none"> 1. Deactivate this option using a UniGINA. 2. Check the wiring harness between the pump and hammer shut-down valve or relay and restore when necessary. 3. Check the spool or relay and replace when necessary. 4. Check wiring harness contacts on corrosion. Replace when necessary. 5. Check wiring harness between pump connector and circuit board and restore when necessary.
25: Over Current hammer output	<p>Control unit detected a too high current draw to hammer shut-down valve or relay, caused by:</p> <ol style="list-style-type: none"> 1. Short circuit in wiring hammer shut-down valve or relay. 2. Short circuit in hammer shut-down valve or relay. 3. Short circuit in control unit. 	<ol style="list-style-type: none"> 1. Check wiring harness between pump and valve or relay. 2. Check the resistance of the valve or relay. Replace when necessary. 3. Replace control unit.
35: Short Circuit pump motor	<p>Control unit detected a short circuit to the pump motor, caused by:</p> <ol style="list-style-type: none"> 1. Short circuit in wiring pump motor. 2. Short circuit in motor. 3. Short circuit in control unit. 	<ol style="list-style-type: none"> 1. Check wiring harness and restore when necessary. 2. Check the resistance of the motor. Replace when necessary. 3. Replace control unit.

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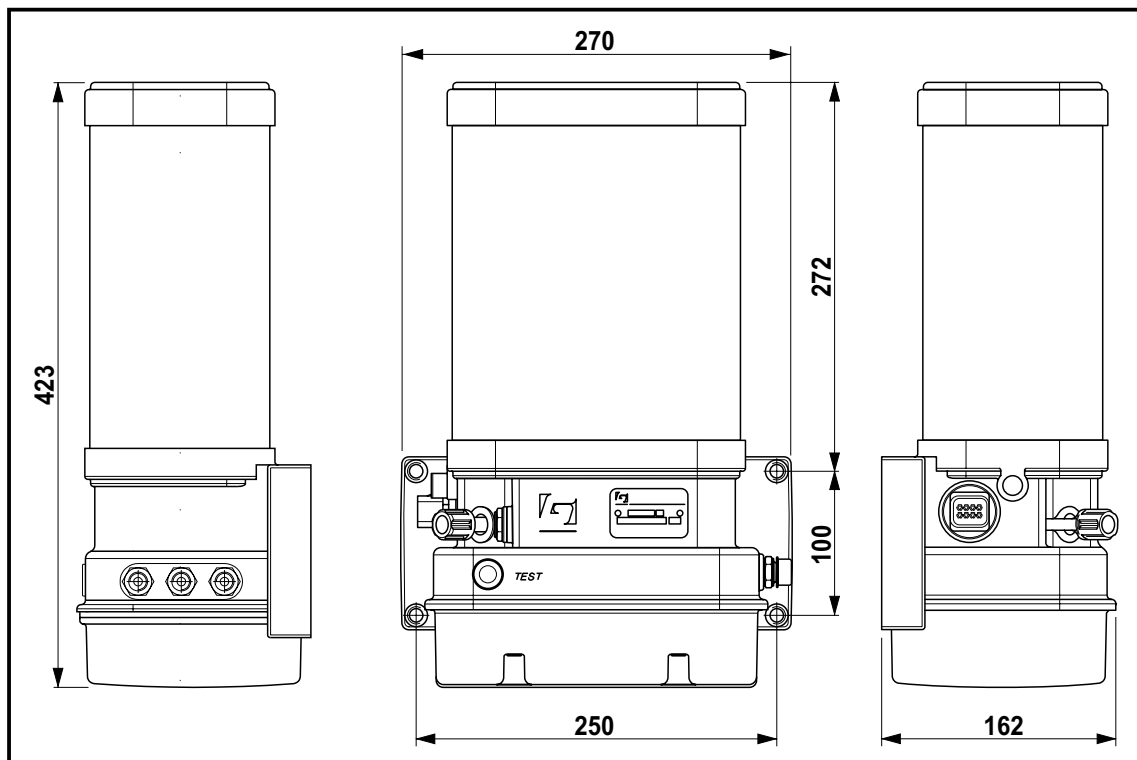
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Error code / failure	Cause	Solution
41: Voltage drop	Control unit encountered a successive power dip during pump start and aborted the attempted cycle, caused by: 1. Faulty battery (machine). 2. Faulty wiring (ground). 3. Corroded pin-contacts in pump connector and/or cabin.	1. Charge or replace battery. 2. Check wiring. Replace or repair when necessary. 3. Check connections and replace or repair when necessary.
42: Clock error	Control unit encountered a corrupted real time clock, causing the events and errors to be stored with inaccurate time & date, possibly caused by: 1. Empty clock battery. 2. Faulty clock.	1. Replace the control unit. 2. Replace the control unit.
43: Clock battery low	Control unit detected a low real time clock battery on its circuit board.	Replace the control unit.
44: Parameter error	Control unit encountered corrupted parameters during power up and restored the default production settings which can be totally unsuitable for this application.	Replace the control unit.
45: Power relay error	Control unit encountered a power relay that does not want to switch over and aborted the attempted pump cycle.	Replace the control unit.
61: Temperature high exceeded	The control unit temperature exceeded the set high temperature. This period will be stored in the memory bank to be able to declare possible damage or malfunction.	Mount the pump unit on another position on the machine where it is cooler, when necessary.
62: Temperature low exceeded	The control unit temperature exceeded the set low temperature. This period will be stored in the memory bank to be able to declare possible damage or malfunction.	No action.

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5.5 Technical data pump unit

Maximum operating pressure:	300 bar
Operating temperature:	-20 ... +85 °C
Power supply voltage:	12 or 24 Vdc
Rating pump motor (nominal at 20°C):	36 W
Rest current:	10 mA
Advised fusing:	15A (12 Vdc) / 10A (24Vdc)
Capacity grease reservoir:	4 litres
Minimum level switch:	standard
Pump material:	hard anodised aluminium - nylon reinforced
Delivery:	0.2 per revolution
Protection class:	IP67 (for lower part of pump unit)
Regulations / EMC:	ISO7637-1, ISO7637-2 and ISO13766
Grease types:	up to NLGI-2 class (consult hammer manufacture)



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