General Manual

BreakAlube

Automatic greasing system

EG1604P01

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General information

Type of manual	General Manual
System	BreakAlube Automatic greasing system
Manual number	EG1604P01
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FOREWORD

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This general manual contains a description of the BreakAlube Automatic greasing system. It is intended to provide an insight as to how the system functions and what the possibilities are. In addition, this manual contains the technical data on the different parts of the BreakAlube Automatic greasing system.

The following pictograms are used in this manual to notify or warn the user:

CAUTION:

Draws the attention of the user to important supplementary information with the purpose of avoiding problems.

WARNING

Warns the user if there is a danger of bodily injury or serious damage to the equipment through incorrect actions/operation.

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1. INTRODUCTION

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1.1 Introduction

This chapter contains a brief presentation of the Groeneveld Transport Efficiency company and the products that we supply. In addition, a description of the BreakAlube Automatic greasing system is given.

1.2 *GROENEVELD* Transport Efficiency B.V.

Investing in reliability. *Groeneveld* was established in 1971 with just that in mind. In the meantime, this has resulted in an international network of companies, governed from the head office in Gorinchem, The Netherlands. *Groeneveld* strives continuously to strengthen its already predominant position, which has been obtained through a solid image and customer-oriented approach.

The people at *Groeneveld* form a team that works with great enthousiasm to please its customers. A high level of automation allows rapid reactions. The ISO 9001 standard forms the basis for the guaranteed quality of *Groeneveld's* products. Frequent contact with all business relations and an elaborate dealer network are the warranty for the good name of *Groeneveld*. We know what today's entrepreneurs need: Not an off-the-shelf product, but a customised solution for automation of the daily maintenance.

New technologies create new applications. This is why *Groeneveld* has an ample budget for research and development to create new cost-effective products. Groeneveld's Research and Development organisation co-operates closely with leading R&D organisations and manufacturers of vehicles and machines.

Apart from the BreakAlube Automatic greasing system, *Groeneveld* also supplies products such as:

- CompAlube, automatic single-line and twin-line grease lubrication systems
- Temperature recording systems
- On-board computer systems
- Speed limiters
- Automatic oil level controllers
- Reversing protection systems

Groeneveld supplies a complete range of cost-effective and comfort-enhancing products.

Figure 1.1 The head office of Groeneveld

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1.3 BreakAlube Automatic greasing system

Groeneveld's automatic grease lubrication systems takes care of the daily maintenance of almost moving parts. They reduce wear and down time to a minimum thereby lowering running costs.
Groeneveld grease lubrication systems are applied, for example, in: Manufacturing plants, machines for civil engineering, agriculture, ships, the off-shore industry and the transport industry.

The most important advantages at a glance:

- Longer maintenance intervals.
- Reduced wear, due to precise and constant lubrication.
- Lower repair and replacement costs.
- Reduced unexpected down time.

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2.

GENERAL INFORMATION

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2.1 Introduction

With a Groeneveld BreakAlube lubrication system, the hydraulic breaker 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 greased, this is possible because the hydraulic breaker is greased while it is operational. All actions are automatically performed by the system. The operator need only ensure the periodic topping up of the grease reservoir.

Groeneveld's BreakAlube 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 or vehicle. Partly through a careful choice of materials, the grease lubrication system proper is practically maintenance-free.

Caution!

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

2.2 The BreakAlube Automatic greasing system

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

A Groeneveld BreakAlube Automatic greasing system consists of the following components (see Figure 2.1):

1. An electric pump (plunger pump) with integral grease reservoir and control unit with database.
2. Secondary grease line between pump and quick coupler.
3. Quick coupler.
4. Secondary grease line between quick coupler and hydraulic breaker.
5. Electrical wiring harness.
6. Control lamp.

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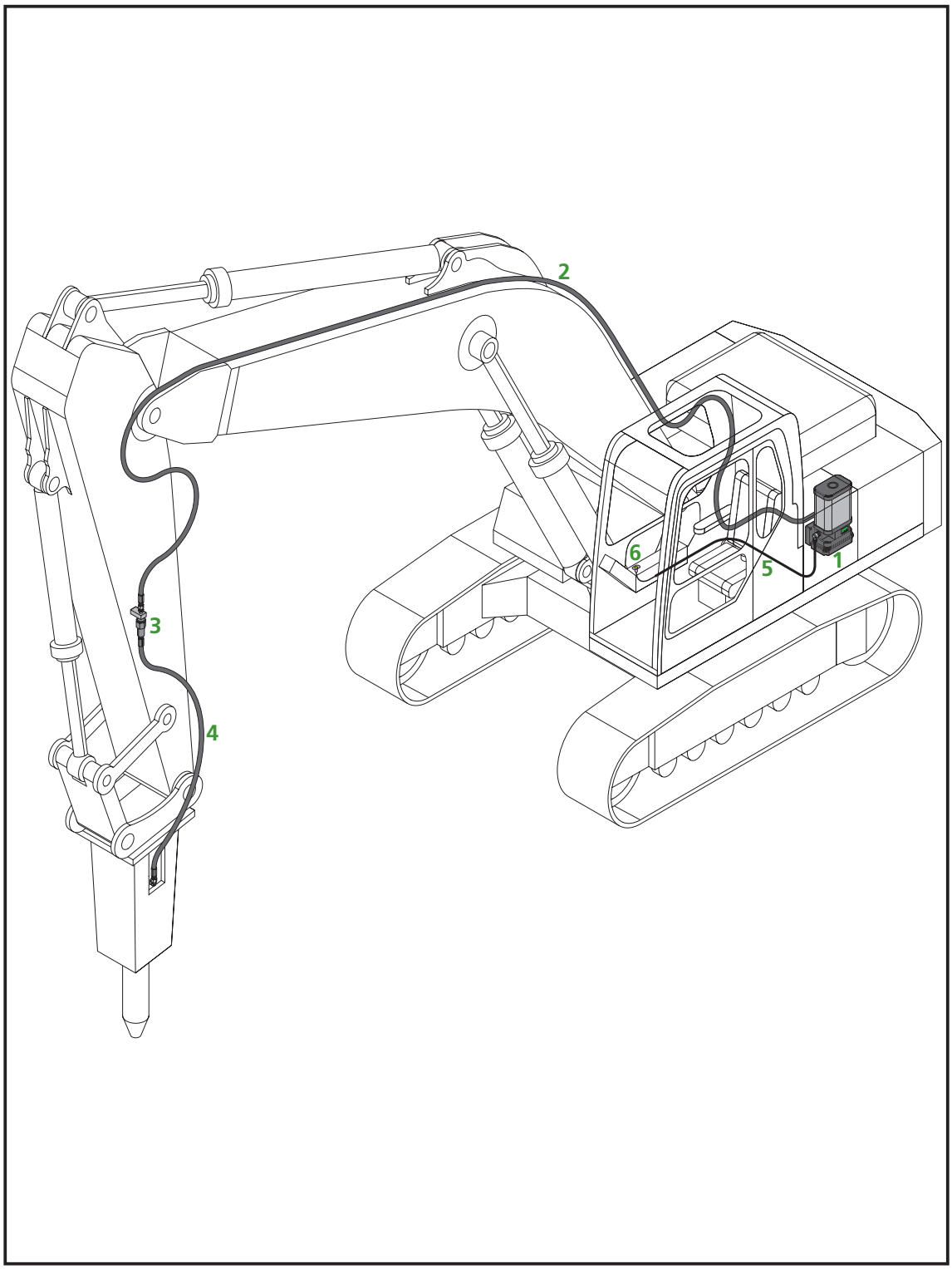

Figure 2.1 System overview

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COMPONENT DESCRIPTION

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3.1 Properties

The Groeneveld BreakAlube pump has been specially developed for use on an excavator equipped with a hydraulic breaker. The control unit is integrated into the pump unit.

The characteristic properties of the BreakAlube pump are:

- Variable grease delivery between 0.2 cc and 4 cc per minute with activated hydraulic breaker;
- Monitoring of the grease delivery by the pump;
- Monitoring of any exceeding of the maximum admissible grease pressure;
- Monitoring of the minimum grease level in the reservoir;
- Monitoring of the electrical connections and components.
- Possibility of switching off the hydraulic breaker if the lubrication system is no longer functioning, e.g. due to an empty reservoir.

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3.2 Composition of the BreakAlube pump

The BreakAlube pump consists of the following components:

1. Grease reservoir with follower piston.
2. Stirring device.
3. Plunger pump.
4. Control and monitoring unit with database.
5. Grease outlet port.
6. Pressure relief valve with return line to the grease reservoir and monitoring by the control unit.
7. Grease pressure switch for monitoring the minimum required grease pressure per lubrication cycle.
8. Signal transducer for measuring the number of revolutions of the pump drive shaft.
9. Electric motor with reducer.
10. Test button.
11. Filler coupling with filter.
12. Electrical connector.
13. Vent/grease overflow.
14. Minimum level switch.

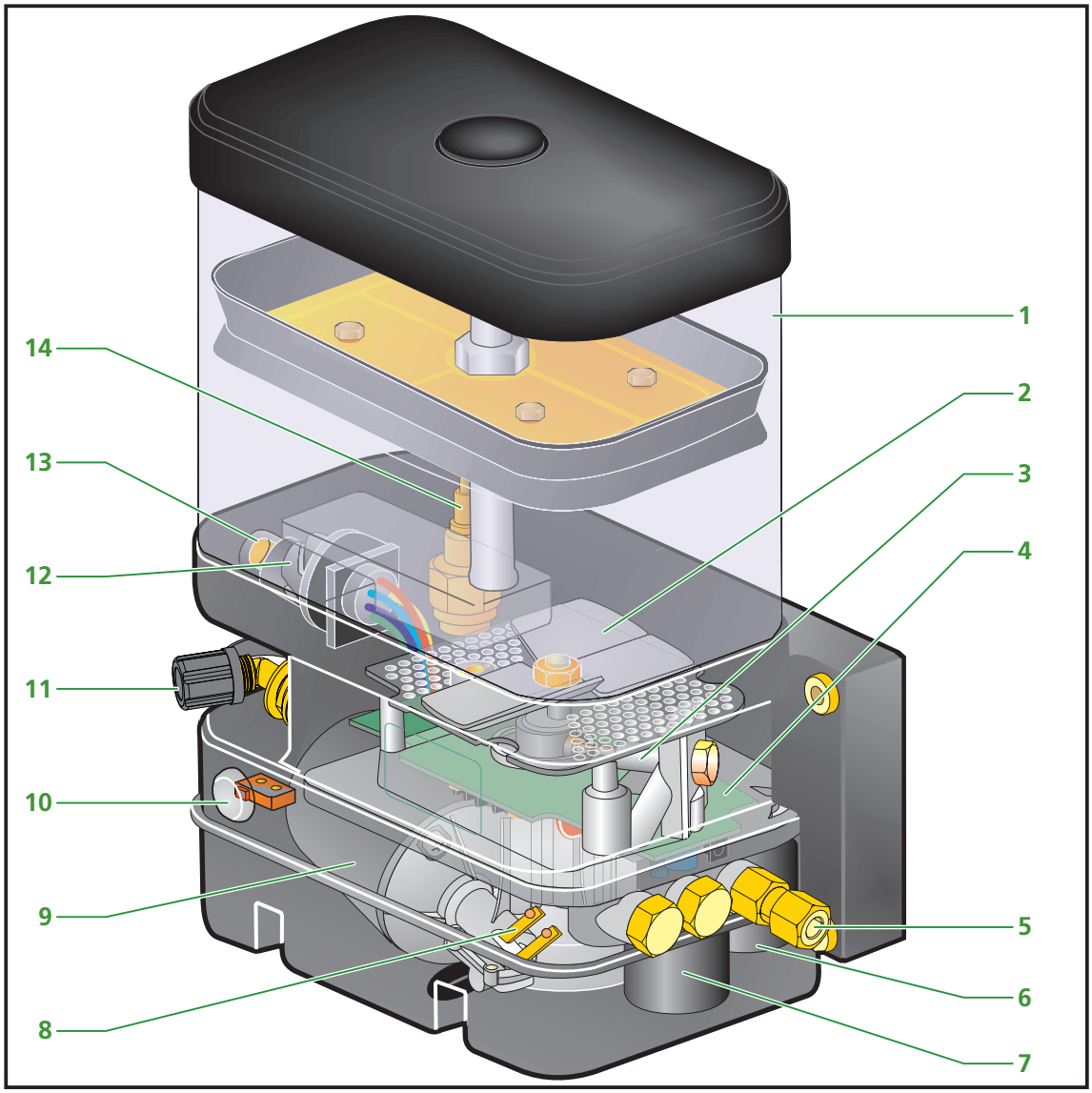

Figure 3.1 BreakAlube pump.

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3.3 The integrated control and monitoring unit

The control and monitoring unit regulates the whole process of the lubrication cycles. The lubrication intervals and the quantity of grease for lubrication are set in this unit. In addition, the control unit monitors various components of the lubrication system for their proper function, and records and signals any faults.

The control unit can be programmed or read out using a GINA (**G**roeneveld tester for **IN**stallation and **A**nalysis) (see Figure 3.2)

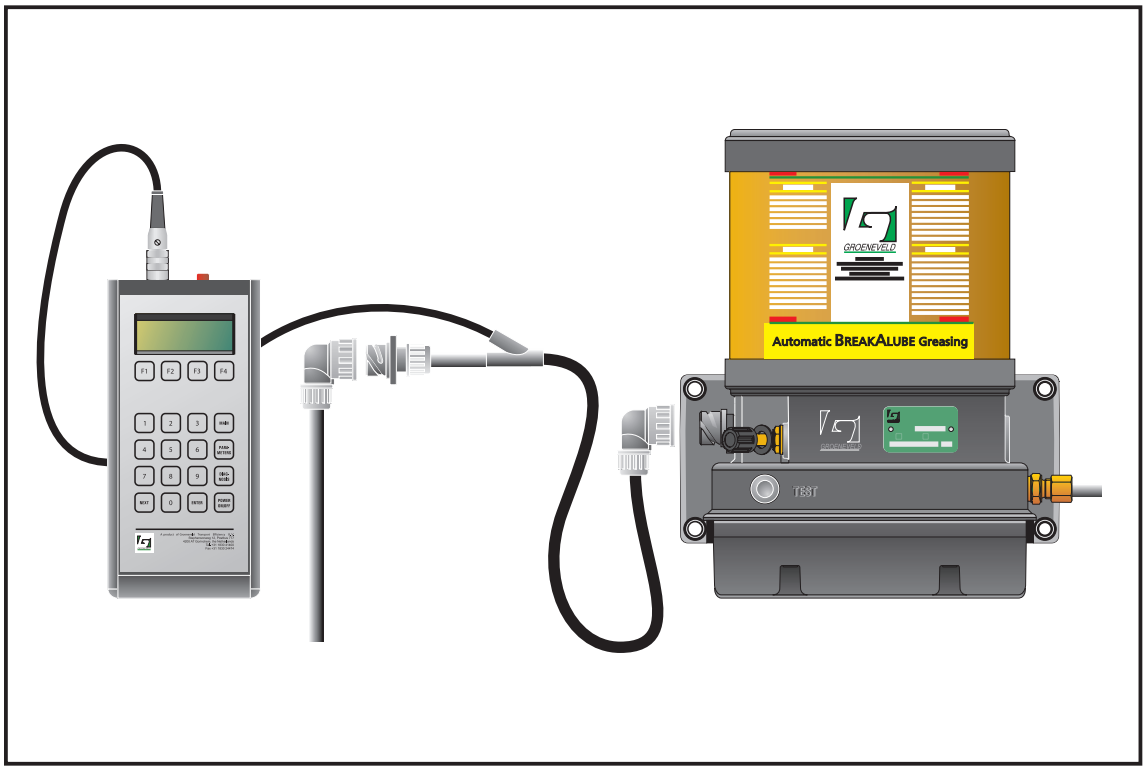

Figure 3.2 Connection of the GINA to the BreakAlube pump.

3.4 The plunger pump

The electric motor drives the plunger pump via a reduction gear unit. The plunger pump comprises a drive shaft with eccentric, a cylinder with piston and a non-return valve. The piston is moved back and forth in the cylinder once by the eccentric at each revolution of the drive shaft. During the extension stroke, the grease is drawn from the grease reservoir into the cylinder via an opening in the cylinder wall. During the retraction stroke, the grease is pressed to the grease outlet port of the pump unit via a non-return valve. The quantity of grease pumped at each stroke of the piston (per revolution of the drive shaft) is determined by the (invariable) diameter and stroke length of the piston.

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3.5 Protection and signalling devices

3.5.1 Maximum grease pressure

A pressure relief valve (with an electric contact) is installed in the grease line between the plunger pump and the grease outlet port. If the grease pressure becomes too high during the pump phase, the pressure relief valve will return the grease to the reservoir. This can occur, 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 breaker 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 grease pressure

A minimum grease pressure switch is also installed in the grease line between the plunger pump and the grease outlet port. If the minimum grease pressure 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 grease level in the reservoir

A level switch is installed in the grease reservoir. When the minimum grease level in the reservoir is reached, the switch will signal this to the control unit. The control unit then processes and stores this message.

3.5.4 Faulty wiring and short circuit

Open circuits (broken wires) to sensors, minimum level switch, pressure-relief valve, electric motor and any external signalling devices installed are signalled to the control unit which then processes and stores this message. Short circuits in the electric wiring or in the components are also signalled, processed and stored.

3.6 The test button

The test button on the pump unit has 3 functions:
- Resetting of the pump after a fault.
- Performing a test cycle.
- Checking the cause of the fault as stored in the control unit; this is signalled by a flashing code via the control lamp in the cabin.

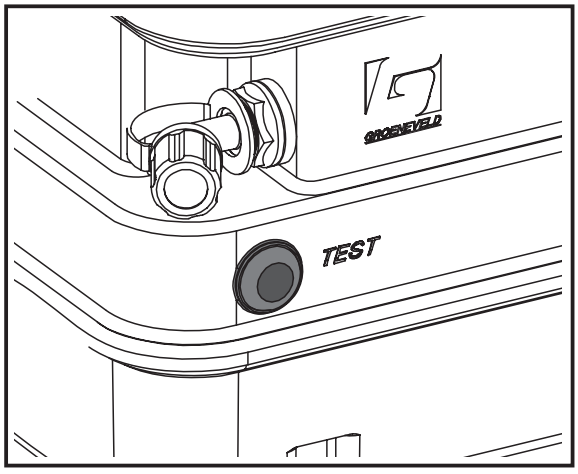

Figure 3.3 The test button

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3.6.1 Resetting the pump after a fault

Whenever the control unit has disconnected the pump due to a fault, the control lamp will be lit continuously. The pump can be reconnected using the test button as follows:

1. The power supply to the pump unit must be present (contact ON).
2. Press the test button briefly once (between 0.2 and 2 seconds).
3. When the control lamp goes out, the connection between the control unit and the pump has been re-established.

Caution!

If this fault is caused by an empty grease reservoir, the fault can only be cancelled by first filling the grease reservoir and then resetting the pump.

3.6.2 Performing a test cycle

A test cycle can be performed with the test button as follows:

1. The power supply to the pump unit must be present (contact ON).
2. Press the test button once (between 2 and 5 seconds).
3. The test cycle starts as soon as the test button is released.

During the test cycle, the control lamp will flash with a given frequency (0.3 seconds ON - 2 seconds OFF).
Any faults that may occur during a test cycle are not signalled by the signal lamp or stored in the memory of the control unit.

Caution!

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

3.6.3 Checking error messages

Information on the functioning of the system is stored in the memory of the control unit. There are two groups of error messages:

1. ***Pending errors:*** Errors that have occurred during the last pump phase performed.
2. ***Stored errors:*** All errors that have occurred in the past.

A new fault is stored as both a pending error and a stored error. If this fault does not occur again in a subsequent pump phase, the pending error will be deleted.

Checking error messages:

The current error messages (pending errors) can be checked by holding the test button depressed for at least 5 seconds. Ten seconds after releasing the button, the error messages will be indicated by the signal lamp with flashing codes. The pending errors and stored errors can also be checked using a GINA.

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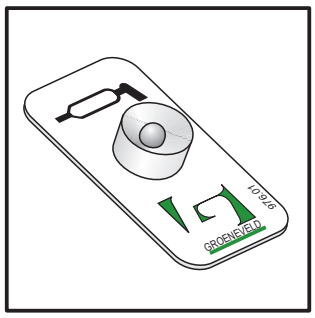
3.7 The control lamp



The driver or machine operator is informed about the functioning of the lubrication system by means of a control lamp installed in a clearly visible position on the dashboard in the cabin. The physical form of the control lamp can vary.

Figure 3.4 The control lamp

3.7.1 Control lamp signals

The control lamp can display the following signals:

Signal	*Moment*	*Meaning*
ON for 3 seconds	1 second after activation of the ignition.	The supply voltage for the control unit is available and the signal lamp is OK.
Flashing continuously (0.5 s. ON / 0.5 s. OUT)	When ignition is activated.	Low grease level in the grease reservoir.
Repeatedly 0.3 s. ON, followed by 2 s. pause.	After pressing the test-button.	A test cycle is being performed by the pump unit.
Continuously ON.	When ignition is activated.	Serious error detected, pump is shut-OFF.

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3.7.2 Error codes

The error codes can be output via the control lamp using the test button on the pump. The control lamp indicates the error codes by flashing:

The tens of the error code : long pulses (0.5 seconds)
The ones of the error code : short pulses (0.15 seconds)

There is a 2 second pause between the flashing codes of successive error messages. 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 second pause

A two-digit error code is assigned to every type of error:

Error code	***Meaning***
10	No fault at the present time.
11	The minimum required grease pressure was not reached during the last pump phase performed (mps fault).
12	The maximum admissible grease pressure was exceeded during the last pump phase performed (rdgr fault).
15	Grease reservoir is empty (empt fault).
21	The pump drive shaft has stopped or is rotating too slowly (rto fault).
22	Power circuit of the pump motor interrupted (pol fault).
23	Pump motor switched off during pump phase, caused by an excessively high power consumption (poc fault).
24	The power circuit linked to the "Hammer OFF" output is interrupted, broken wire or possibly not connected (hvol fault).
25	The power circuit linked to the "Hammer OFF" output is switched off in combination with an excessively high power consumption (hvoc fault).
35	Short circuit in the power circuit of the pump motor or the "Hammer OFF" option (sc fault).
41	Bad wiring or connector, causing a power-DIP each time the pump wants to start a greasing cycle (badw fault).

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4.

THE GINA

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4.1 Introduction

The GINA (**G**roeneveld tester for **In**stallation and **A**nalysis) is a device with which the electronic control unit of the BreakAlube Automatic greasing system can be read out and set.

Figure 4.1 The GINA.

In the following description, all the screen masks are shown in turn and an explanation is given of each screen. In order to familiarise yourself quickly with the function of GINA, it is advisable that the first time you go through all these screens with the GINA according to the description. Later in practice, however, this sequence of screens does not have to be observed.

The read-outs and settings can be sub-divided into three main groups: Main menu, parameters timer and diagnosis menu. These groups can be called up with the buttons <MAIN>, <PARAMETERS> and <DIAGNOSIS>.
One of these three groups can be called up at practically any time, irrespective of which screen is currently displayed.

There are screens that only display information. Nothing can be changed or set in these screens. Screens in which changes can be made are recognisable by the flashing cursor (except the screens for the system configuration and for the resetting of error messages).
A number of screens display the current time in the top right-hand corner. In the illustration of these screens in this manual, the time is indicated in each case with **hh:mm:ss**.
The other values indicated in the screens are displayed in each case with **x** characters, with one **x** standing for each digit of the value.

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4.2 Connection

The control unit that is to be read out and/or set must be connected electrically to the power circuit of the machine (switch the contact of the machine on or possibly to an external power supply).
Connect the GINA between the existing wiring harness and the connector on the pump unit using the connecting lead.

4.3 The Keyboard

Key	*Function*
<POWER ON/OFF>	Switching the GIN on and off
<F1> .. <F4>	('soft keys') for making certain selections on the screen menu
<0> .. <9>	Input of numeric data (numbers)
<MAIN>	Start the main menu for the checking of various data
<PARAMETERS>	Start the parameter timer for the checking and input of various values (parameters)
<DIAGNOSIS>	Start the diagnosis menu for the checking of various system data
<NEXT>	Call up the next screen
<ENTER>	Confirm a value set in the screen

4.4 Switching on the GINA

The GINA can be switched on when:

- The GINA is connected to the control unit, and
- the control unit has been connected to a supply voltage for at least 8 seconds.

Press <POWER ON/OFF>.

Pressing one of the keys <MAIN>, <PARAMETERS> or <DIAGNOSIS> calls ps the respective menus, main menu, parameters timer or diagnosis menu.

In the event of a fault in the communication between the GINA and the control unit, the following message appears on the screen:

This fault can be caused i.a. by:
- Poor cable connection (broken wire, connector).
- Switching on the GINA too quickly.

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In the event of a communication fault, always try to remedy the fault by switching the GINA off and on again, or by pressing one of the function keys (<F1>, <F2>, <F3> or <F4>).

If the control unit is not supported by the GINA, the following text is displayed:

DEVICE NOT SUPPORTED

A different GINA is then required for access to this control unit.

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4.5 The Main Menu

Press <**main**>

```
MAIN MENU


info    time    contr
```

The main menu displays various data on the GINA and the control unit and allows certain of these to be changed.

info Information on the GINA, which was connected to the BreakAlube pump before and information on the access-level and text version of the currently used GINA.

time Information on date & time in the currently used GINA, with the possibility to update the minute and hour setting.

contr Menu for improving the visibility (contrast) of the screen.

Press <F1> (**info**).

```
INFO
User ID
last access: xxxxxx
u-ac    d-ac    u-ch   d-ch
```

The screen shows the identification number of the last person to connect a GINA to this control unit.

Caution: When you switch off the GINA, this identification number is overwritten with your own identification number.

Press <F2> (**d-ac**).

```
INFO
Time&date , last access
xx-xx-xx      xx:xx
u-ac    d-ac    u-ch   d-ch
```

The screen shows the date and time when a GINA was last connected to this control unit.

Caution: When you switch off the GINA, this time and date and overwritten by the current time and date.

Press <F3> (**u-ch**).

```
INFO
User ID
last change: xxxxxx
u-ac    d-ac    u-ch   d-ch
```

The screen shows the identification number of the last person to make changes to the settings of the respective control unit.

Caution: If you change settings and then switch off the GINA, this identification number will be overwritten by your own.

Press <F4> (**d-ch**).

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```
INFO
Time&date , last change
xx-xx-xx      xx:xx
u-ac   d-ac    u-ch   d-ch
```

The screen shows the date and time when the last changes were made to the settings of this control unit.

Caution: If you change settings and then switch off the GINA, the date and time will be overwritten by the current date and time.

Press <NEXT>.

```
INFO
Software-version
Prog unit:    xxxx
p-s     p-ui     acces
```

The screen displays the version number of the software in this GINA.

Press <F2> (**p-ui**).

```
INFO
User ID
Prog unit:    xxxx
p-s     p-ui     acces
```

The screen displays the identification number of the registered user of this GINA.

Press <F3> (**acces**).

```
INFO
Authorisation level
xxx [Device 10]
ald10  ald11
```

The screen displays the access level of the control unit (GINA) in the "proto" BreakAlube program (device 10). This setting cannot be changed.

Press <F2> (**al10**).

```
INFO
Authorisation level
xxx [Device 11]
ald10  ald11
```

The screen displays the access level of the control unit (GINA) in the "final" BreakAlube program (device 11). This setting cannot be changed.

Press <NEXT>.

```
INFO
Software-version
Prog unit:    xxxx
p-s     p-ui     acces
```

The screen displays the version number of the software in this GINA again.

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Press <NEXT>.

text vers. xx101101
April 2007

The screen displays the version number of the screen texts in the software of this GINA.

Press <MAIN>.

MAIN MENU

info time contr

The screen displays the main menu again.

Press <F2> (**time**).

TIME
Enter hours
xx
hrs min

The screen displays the current time (only the hours). Change this setting, if necessary, with the numeric keys and confirm with <ENTER>.

Press <F2> (**min**).

TIME
Enter minutes
xx
hrs min

The screen displays the current time (only the minutes). Change this setting, if necessary, with the numeric keys and confirm with <ENTER>. As soon as <ENTER> is pressed, the seconds are set to 0 and the clock starts to run.

Press <NEXT>.

DATE
Enter day
xx
day mnth year

The screen displays the current date (only the day of the month). This setting cannot be changed.

Press <F2> (**mnth**).

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```
DATE
Enter month
 xx
day    mnth   year
```

The screen displays the current date (only the month of the year). This setting cannot be changed.

Press <F3> (**year**).

```
DATE
Enter year
 xx
day    mnth   year
```

The screen displays the current date (only the year). This setting cannot be changed.

Press <MAIN>.

```
MAIN MENU


info   time   contr
```

The screen displays the main menu again.

Press <F3> (**contr**).

```
MAIN MENU
Adjust contrast

 -                    +
```

In this screen you can adjust the display contrast to your personal wishes. Press <F1> (-) for a lower contrast and <F4> (+) for a higher contrast.

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4.6 Parameters Timer

The parameters timer menu allows the settings of the various parameters of the lubrication cycle to be called up and the parameter values to be changed.

Press <**parameters**>

PARAMETERS TIMER
Delivery
x.x [cc]
del cp rvwp

The screen displays the set quantity of grease (in cc) that the pump is to deliver during each pump phase.

Setting range: 0,2 ... 4.0 cc.
Set the interval with the numeric keys <0> to <9>.

Note:
The pump has a delivery of 0.2 cc per revolution of the pump shaft (piston stroke) and cannot produce an uneven delivery. Uneven deliveries are therefore automatically rounded up (for example, 1.3 cc = 7 revolutions of 0.2 cc = 1.4 cc).

The position of the cursor (the flashing block) indicates which digit can be changed; after each change, the cursor moves one position further. If the displayed value is OK, press <ENTER> to confirm. The cursor then disappears from the display.

Press <F2> (**cp**).

PARAMETERS TIMER
Cycle period
x.xx [cc/r]
del cp rvwp

The screen displays the duration of the lubrication cycle (in minutes).

This is set to 1 minute is order to achieve a practically continuous small grease delivery to the hydraulic breaker and therefore must **NOT** be changed.

Press <F3> (**rvwp**).

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PARAMETERS TIMER
Relieve valve watch period
xxxxx
del cp rvwp

The screen displays a period of the pump phase during which an exceeding of the maximum grease pressure is to be identified as a fault (rdg error).
This period is expressed as a percentage (%) of the pump phase duration that is dependent on the set volume of grease per cycle.

Setting range: 10 ... 100% (standard is 75%).

With the standard setting, exceeding of the max. grease pressure should only result in the identification of a fault during the first part (3/4) of the pump phase. If this only occurs during the last part (1/4) of the phase, this is not identified as a fault.
Under cold ambient conditions it is possible, for example, that the grease delivered by the pump cannot be transported through the system quickly enough so that at the end of the lubrication phase the max. pressure may be briefly exceeded. This does not have to be stored as a fault.

Change the value, if necessary, and confirm with <ENTER>.

Press <NEXT>.

PARAMETERS TIMER
Number of attempts
xxx [x]
noa rdlv

The screen displays the number of consecutive faults necessary for the pump to be switched off.
At the same moment, the control lamp should be switched on continuously to inform the machine operator.

Setting range: 1 ... 20x (standard is 10).

Change the value, if necessary, and confirm with <ENTER>.

As an option, a relay or hydraulic valve can be connected to the pump that also switches off the hydraulic breaker circuit at the same moment.
This prevents the machine operator from continuing to break without lubrication.
For this, the corresponding output has to be activated in the last parameter screen.

Press <F2> (**rdlv**).

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PARAMETERS TIMER
Rotation delivery
x.xx [cc/r]
noa rdlv

The screen displays the delivery (in cc) per revolution of the pump drive shaft. The delivery is determined by the diameter and the stroke of the plunger. On the basis of this value and the total volume of grease to be delivered, the program calculates the necessary number of shaft revolutions per pump phase.

This value is set to 0.2 cc and calculated for the delivery per stroke of the piston installed in the pump.
This value **CANNOT** be changed with a GINA.

Press <NEXT>.

The following three screens are only available with a GINA with an authorisation level between 0 and 50. These screens are not available with a level of 100.

PARAMETERS TIMER
Pump oc time
xxx [msec]
poct hoct loct

The screen displays the time (in milliseconds) for which the control unit permits a short circuit in the pump motor before it switches off the motor.

The standard value is 50 milliseconds. This value must **NOT** be changed.

Press <F2> (**hoct**).

PARAMETERS TIMER
Hammer oc time
xxx [msec]
poct hoct loct

The screen displays the time (in milliseconds) for which the control unit permits a short circuit in the hydraulic breaker shutdown circuit before it switches off this circuit.

The standard value is 10 milliseconds. This value must **NOT** be changed.

Press <F3> (**loct**).

PARAMETERS TIMER
Lamp oc time
xxx [msec]
poct hoct loct

The screen displays the time (in milliseconds) for which the control unit permits a short circuit in the control lamp before it switches off the lamp.

The standard value is 10 milliseconds. This value must **NOT** be changed.

Press <NEXT>.

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PARAMETERS TIMER			
Activate bits			
0	0	0	0
hvlv	csi	spr	spr

The screen displays a number of switches for activation of extra system options:

hvlv for activation of the hydraulic breaker shutdown circuit.
After turning on this switch, a relay (NO contact) or hydraulic valve (NC position) can be connected to the pump unit for switching off the hydraulic breaker at the moment a problem occurs with the lubrication system. In addition to the pump motor circuit, the hydraulic breaker circuit is then also switched off.
Press <F1> to change the value from 0 to 1. This option is now selected.
Pressing <F1> a second time deselects this option again.

csi for inversion of the signal so that the interval clock in the pump controller is activated.
The interval clock must be started at the same time as the hydraulic breaker. For this, a connection has to be made between the breaker activation command of the machine and the pump unit (pin 3). As standard, the interval clock starts as soon as voltage is supplied to this connection and stops as soon as the voltage is switched off again.
After activation of this csi switch, however, the function is the exact reverse. When voltage is supplied, the interval clock stops and starts again when the voltage is disconnected.
For this, however, the ignition has to be activated via pin 1.
Press <F2> to change the value from 0 to 1. This option is now selected.
Pressing <F2> a second time deselects this option again.

spr reserve.

Publication date: March 2007

4.7 Diagnosis Menu

Press <**diagnosis**>

```
DIAGNOSIS MENU

err   I/O   var   tinfo
```

The screen displays the diagnosis menu.
Choose the wanted sub-menu.

- **err** Information on stored errors.
- **I/O** Information on the status of the in- and out-puts of the pump controller.
- **var** Information on the remaining interval period (until the next greasing cycle) and other variable system counters.
- **Tinfo** Information on the pump controller execution and the system history since installation (total counters).

Press <F1> (**err**).

```
DIAGNOSIS
Total errors
 xxxxx
terr
```

The screen displays the total number of faults occurring until a pump motor is switched off.
When the pump motor has been disconnected from the timer switch, the lubrication cycles are no longer performed, but are written to the counters provided for this (see the “skpce” and “skpcf” counters in Diagnosis> Tinfo>History).

Press <NEXT>.

```
DIAGNOSIS
Pending errors (1)
  0     0     0     0
mps   rdgr  lwl   spr
```

The screen displays four "pending errors" (= last errors that have occurred).
(0 = not occurred / 1 = occurred):

- **mps** The minimum grease pressure was not reached during the last pump phase performed.
- **rdgr** The maximum grease pressure was exceeded during the lat pump phase performed.
- **lwl** The minimum level switch in the grease reservoir is activated.
- **spr** Spare.

All "pending errors" are automatically reset if the respective error no longer occurs during the next pump phase.

Press <NEXT>.

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```
DIAGNOSIS
Pending errors (2)
  0     0     0     0
empt   rto   pol   poc
```

The screen displays four "pending errors" (0 = not occurred / 1 = occurred):

empt The grease reservoir is empty and hence the pump motor is switched off and the control lamp is switched on continuousy (if +15 is present).

rto The drive shaft is rotating too slowly or not at all, pump phase terminated.

pol Pump motor power circuit interrupted.

poc Excessively high power consumption of the pump motor, pump phase terminated.

Press <NEXT>.

```
DIAGNOSIS
Pending errors (3)
  0     0     0     0
hvol  hvoc  lol   loc
```

The screen displays four "pending errors" (0 = not occurred / 1 = occurred):

hvol Interrupted power circuit of the hydraulic breaker shutdown circuit.

hvoc Excessively high power consumption in the power circuit of the hydraulic breaker shutdown circuit.

lol Interrupted power circuit of the control lamp.

loc Excessively high power consumption in the power circuit of the control lamp.

Press <NEXT>.

```
DIAGNOSIS
Pending errors (4)
  0     0     0     0
 spr   spr    sc   badw
```

The screen displays four "pending errors" (0 = not occurred / 1 = occurred):

spr Spare.

spr Spare.

sc Short circuit in the power circuit of the pump motor, pump phase terminated.

badw Bad wiring or connector, causing a power-DIP each time the pump wants to start a greasing cycle.

Press <NEXT>.

```
DIAGNOSIS
Stored errors (1)
  0     0     0     0
mps   rdgr  lwl   spr
```

The screen displays four "stored errors" (= errors in the memory), (0 = not occurred / 1 = occurred). For an explanation of the errors, see "pending errors".

Press <NEXT>.

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```
DIAGNOSIS
Stored errors (2)
  0     0     0     0
empt   rto   pol   poc
```

The screen displays four "stored errors" (= errors in the memory), (0 = not occurred / 1 = occurred). For an explanation of the errors, see "pending errors".

Press <NEXT>.

```
DIAGNOSIS
Stored errors (3)
  0     0     0     0
hvol  hvoc  lol   loc
```

The screen displays four "stored errors" (= errors in the memory), (0 = not occurred / 1 = occurred). For an explanation of the errors, see "pending errors".

Press <NEXT>.

```
DIAGNOSIS
Stored errors (4)
  0     0     0     0
spr   spr   sc    badw
```

The screen displays four "stored errors" (= errors in the memory), (0 = not occurred / 1 = occurred). For an explanation of the errors, see "pending errors".

Press <NEXT>.

```
DIAGNOSIS MENU


err   I/O   var   tinfo
```

The screen displays the diagnosis main menu again.

Press <F2> (**I/O**).

```
INP/OUTP
Mode:   0=auto  1=man
 X              2=test
Mode
```

The screen displays the operating status of the lubrication system:

0 auto The lubrication system is functioning automatically according to the program in the control unit.

1 man The functions of the lubrication system are being controlled by hand (via GINA), completely separately from the program in the control unit.

2 test The lubrication system performs one test cycle. Graese volume depends on the parameter setting.

Change the operating status, if necessary, with the keys <0>, <1> and <2>, and confirm with <ENTER>.

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Press <NEXT>.

INP/OUTP			hh:mm:ss
I/O (1)			
0	0	0	0
hamm	spr	lamp	pump

This is the first I/O screen. The status of the various outputs signals is displayed:

hamm Power circuit of the hydraulic breaker is switched ON.
When this option is not activated in parameters or when the BreakAlube pump is shutdown due to an error, this option remains switched-OFF (0). In all other cases this option will be activated (1) together with the "hammer start signal" and open the "hammer shutdown valve" for making it possible to operate the hammer (hydraulic braker).

spr Spare.

lamp Control lamp driven.

pump Electric motor of the pump driven.

For test purposes, the control lamp and pump can be driven by pressing <F1>, <F3> and <F4> or the breaker shutdown circuit. A precondition for this, however, is that the timer mode has been set to **1 (manual**) in the previous screen.

Press <NEXT>.

INP/OUTP			hh:mm:ss
I/O (2)			
0	0	0	0
lwl	test	rvlv	revol

This is the second I/O screen. The status of various input signals is displayed:

lwl Minimum level in the reservoir reached.

test Contacts of the test button closed.

rvlv Pressure relief valve opened due to exceeding of the maximum grease pressure.

revol Sensor pulse at each revolution of the pump drive shaft.

Press <NEXT>.

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INP/OUTP			hh:mm:ss
I/O (3)			
0	0	0	0
mps	cs	Trun	spr

This is the third I/O screen. The status of various input signals is displayed:

mps Minimum required grease pressure (line resistance) in the system present.

cs Hydraulic breaker is switched on, the time control signal is present.

Trun The timer in the timer switch is running.
Note: If this timer is stopped while the control signal (cs) is present or vice versa, it is possible that the timer function is inverted (see also explanation of the csi parameter).

spr Spare.

Press <NEXT>.

INP/OUTP			hh:mm:ss
I/O (4)			
0	0	0	0
hvol	lol	pol	spr

This is the fourth I/O screen. The status of various input signals is displayed:

lol Interrupted power circuit of the breaker shutdown option.

lol Interrupted power circuit of the control lamp.

pol Interrupted power circuit of the pump electric motor.

spr Spare.

Press <DIAGNOSIS>.

DIAGNOSIS MENU			
err	I/O	var	tinfo

The screen displays the diagnosis main menu again.

Press <F3> (**var**).

VARIABLES (1)			hh:mm:ss
Remaining cycle time			
xxxxx [s]			
rct	rrev	rcem	-

The screen displays the remaining time until the start of the following pump phase (in seconds).

Press <F2> (**rrev**).

VARIABLES (1)			hh:mm:ss
Remaining revolutions			
xxxxx			
rct	rrev	rcem	-

The screen displays the remaining number of revolutions of the drive shaft until the pump phase is completed.

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Press <F3> (**rcem**).

```
VARIABLES (1)    hh:mm:ss
Remaining cycles empty
xxxxx
rct    rrev    rcem    -
```

The screen displays the remaining number of lubrication cycles that can still be performed after reaching the low level. When this low level is reached, this counter must be decreased by 1 at each following lubrication cycle. At 0 the pump motor is switched off and the control lamp is lit continuously.

Press <NEXT>.

```
VARIABLES (2)    hh:mm:ss
Revolution time out
xxx
rto    mps    rdgr    -
```

The screen displays the number of successive lubrication cycles with the drive shaft rotating too slowly (if a drive shaft rotation takes longer than 10 seconds, the pump phase will be terminated).
When the maximum value entered under parameter <NOA> is reached, the pump motor is switched off and the control lamp is lit continuously.

Press <F2> (**mps**).

```
VARIABLES (2)    hh:mm:ss
Min. pressure switch
xxx
rto    mps    rdgr    -
```

The screen displays the number of successive lubrication cycles when the required minimum grease pressure has **NOT** been reached (the pump is equipped as standard with an integral 20 bar grease pressure switch).
When the maximum value entered under parameter <NOA> is reached, the pump motor is switched off and the control lamp is lit continuously.

Press <F3> (**rdgr**).

```
VARIABLES (2)    hh:mm:ss
Relieve during grease
xxx
rto    mps    rdgr    -
```

The screen displays the number of successive lubrication cycles when the maximum admissible grease pressure (275 bar) has been exceeded.
When the maximum value entered under parameter <NOA> is reached, the pump motor is switched off and the control lamp is lit continuously.

Press <NEXT>.

```
VARIABLES (3)    hh:mm:ss
Pump over current
xxx
poc    pol    badw    -
```

The screen displays the number of successive lubrication cycles when an excessive current consumption of the pump motor circuit has been detected.
When the maximum value entered under parameter <NOA> is reached, the pump motor is switched off and the control lamp is lit continuously.

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Note:

If an excessive current consumption is detected or even a short circuit, the timer switch (after allowing for a cooling-down period) will make two further attempts to switch on the part in question. An error should only be recorded when these two attempts have also failed.

Press <F2> (**pol**).

VARIABLES (3) hh:mm:ss **Pump open load** **xxx** **poc pol badw -**

The screen displays the number of successive lubrication cycles when an interrupted pump motor power circuit has been detected.
When the maximum value entered under parameter <NOA> is reached, the pump motor is switched off and the control lamp is lit continuously.

Press <F3> (**badw**).

VARIABLES (3) hh:mm:ss **Bad wiring** **xxx** **poc pol badw -**

The screen displays the number of successive lubrication cycles caused by a power-DIP each time the pump wants to start a greasing cycle.
When the maximum value entered under parameter <NOA> is reached, the pump motor is switched off and the control lamp is lit continuously.

Press <NEXT>.

DIAGNOSIS MENU **err I/O var tinfo**

The screen displays the diagnosis main menu again.

Press <F4> (**tinfo**).

TIMER INFO MENU **pdif hist**

The screen displays the Timer Info main menu. Choose the wanted sub-menu.

pdif Information on execution of pump controller.

hist Information on system totals, like the total number of successful executed greasing cycles since installation.

Press <F1> (**pdif**).

PRODUCTION INFO **Part number** **xxxxx** **prno srno tive**

The screen displays the part number of the timer pcb.

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Press <F2> (**srno**).

```
PRODUCTION INFO
Serial number
 xxxxxxxxxx
prno   srno    tive
```

The screen displays the serial number of the timer pcb.

Press <F3> (**tive**).

```
PRODUCTION INFO
Timer version
 xxx
prno   srno    tive
```

The screen displays a version number showing both the software version and the hardware type.

Press <NEXT>.

```
TIMER INFO MENU


pdif   hist
```

The screen displays the Timer Info main menu again.

Press <F2> (**hist**).

```
HISTORY (1)
Total pumping cycles
 xxxxxxxx
tcy     skpe   skpf
```

The screen displays the number of lubrication cycles that have been performed without an error.

Press <F2> (**skpe**).

```
HISTORY (1)
Skipped cycles empty
 xxxxx
tcy     skpe   skpf
```

The screen displays the total number of skipped lubrication cycles after the pump motor was switched off due to an empty grease reservoir.

Press <F3> (**skpf**).

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HISTORY (1)
Skipped cycles faults
xxxxx
tcy skpe skpf

The screen displays the total number of skipped lubrication cycles after the pump motor was switched off due to a number of consecutive errors

Press <NEXT>.

HISTORY (2)
Pending p_off period
xxxxxx [minutes]
poff toff loff teewr

If an error that is still present has caused a stoppage of the pump motor, it is possible to read out here how long that machine had breaked without lubrication (i.e. from the stoppage until the read-out, in minutes). If this error no longer occurs in the next automatic cycle, this counter will be reset to 0.

Press <F2> (**toff**).

HISTORY (2)
Total p_off period
xxxxxx [hours]
poff toff loff teewr

The screen displays the total breaking period without lubrication (since installation) while the pump was switched off due to an error (in hours).

Press <F3> (**loff**).

HISTORY (2)
Longest p_off period
xxxxxx [hours]
poff toff loff teewr

The screen displays the longest continuous breaking period without lubrication (since installation) while the pump was switched off due to an error (in hours). If a longer continuous period occurs, this value will be overwritten.

Press <F4> (**teewr**).

HISTORY (2)
Total EEPROM writes
xxxxx
poff toff loff teewr

The screen displays the total number of times the EEPROM has been overwritten.

All the screens have now been explained. When the read-out and setting has been completed, the GINA can be switched off.

Press <POWER ON/OFF> and remove the connecting lead between control unit and GINA.

Publication date: March 2007

4.8 Breakdown of the screens

4.8.1 Abbreviations used

Abbreviation	*Meaning*
-	min (low contrast)
+	plus (high contrast)
access	User level
al6	Access level for control unit (6) (Twin version)
al10	Access level for control unit (10) (BreakAlube version)
auto	Automatic
badw	Bad wiring or connector, causing a power-DIP each time the pump wants to start a greasing cycle.
contr	Screen contrast
cp	Cycle duration
cs	Control signal for the timer
csi	Inverted timer effect on the control signal
d-ac	Time and date of last use
d-ch	Time and date of last change
day	Day
del	Set pump delivery per lubrication cycle
empt	Reservoir empty
err	Errors
hamm	Hydraulic breaker ON/OFF switching option
hoct	Time for which the timer switch permits an excessive current for the hydraulic breaker ON/OFF switching circuit
hist	Historical data
hrs	Hours
hvlv	Hydraulic breaker OFF switching option
hvoc	Excessive current consumption in the power circuit of the hydraulic breaker ON/OFF switching option
hvol	Interrupted power circuit of the hydraulic breaker shutdown circuit
I/O	Input/output signals
info	General GINA information

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Abbreviation	*Meaning*
lamp	Control lamp
loc	Power circuit overload control lamp
loct	Maximum overload/short circuit time, control lamp
loff	Longest period with a pump motor switched off
lol	Control lamp power circuit interrupted
lwl	Minimum level switch
man	Manual operation
min	Minutes
mps	Minimum grease pressure switch
mode	Operating status
mnth	Month
noa	Number of admissible consecutive errors
p-s	GINA software version
p-ui	Identification No. of registered user of respective GINA
pdif	Production information
poc	Pump power circuit overload
poct	Maximum overload/short circuit time, pump
poff	Breaker starting time from the pump motor shutdown until now in conjunction with an error
pol	Pump power circuit interrupted
prno	Control unit code
pump	Pump
rcem	Remaining number of lubrication cycles until the reservoir is completely empty
rct	Remaining period until the start of the following lubrication cycle
rdgr	Pressure relief valve open during the pump phase
rdlv	Grease delivery of pump element per revolution of the drive shaft
revol	Revolution detection sensor
rrev	Remaining number of drive shaft revolutions per pump phase
rto	Drive shaft has exceeded the admissible time 'per revolution' so that the control unit terminates the pump phase
rvlv	Pressure relief valve
rvwp	Period in % of the pump phase within which the exceeding of the max. admissible grease pressure is also stored as an error

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Abbreviation	*Meaning*
sc	Short circuit in the power circuit of the pump motor or hydraulic breaker OFF switching option
skpe	Number of cycles with pump motor switched off due to an empty grease reservoir
skpf	Number of cycles with pump motor switched off due to a number of consecutive errors
spr	Spare
srno	Serial number
tcy	Total number of cycles
teewr	Total number of time that the EEPROM has been overwritten
terr	Total number of errors
test	Test switch
text vers.	Text version in the GINA software
time	Current time
tinfo	Timer information
tive	Configuration of the BreakAlube timer with respect to software, hardware and component composition
toff	Longest period with a pump motor switched off
trun	Timer running indicator
u-ac	Identification No. of last GINA user
u-ch	Identification No. of last person to make changes
var	Variables
year	Year

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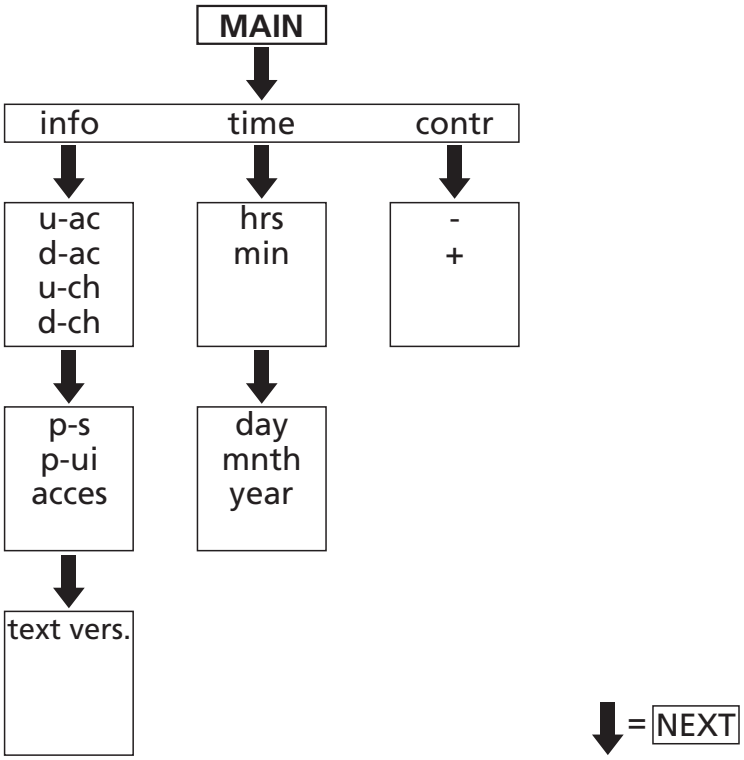
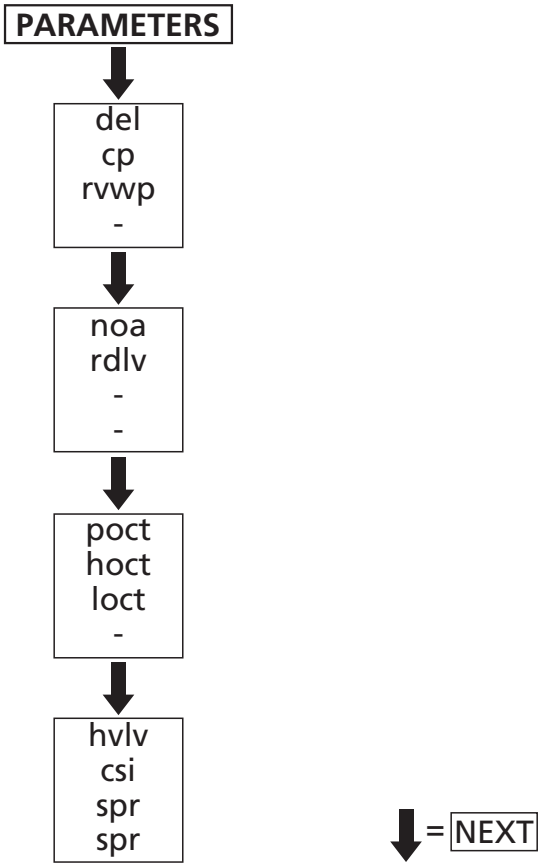
4.8.2 Main menu



4.8.3 Parameters menu



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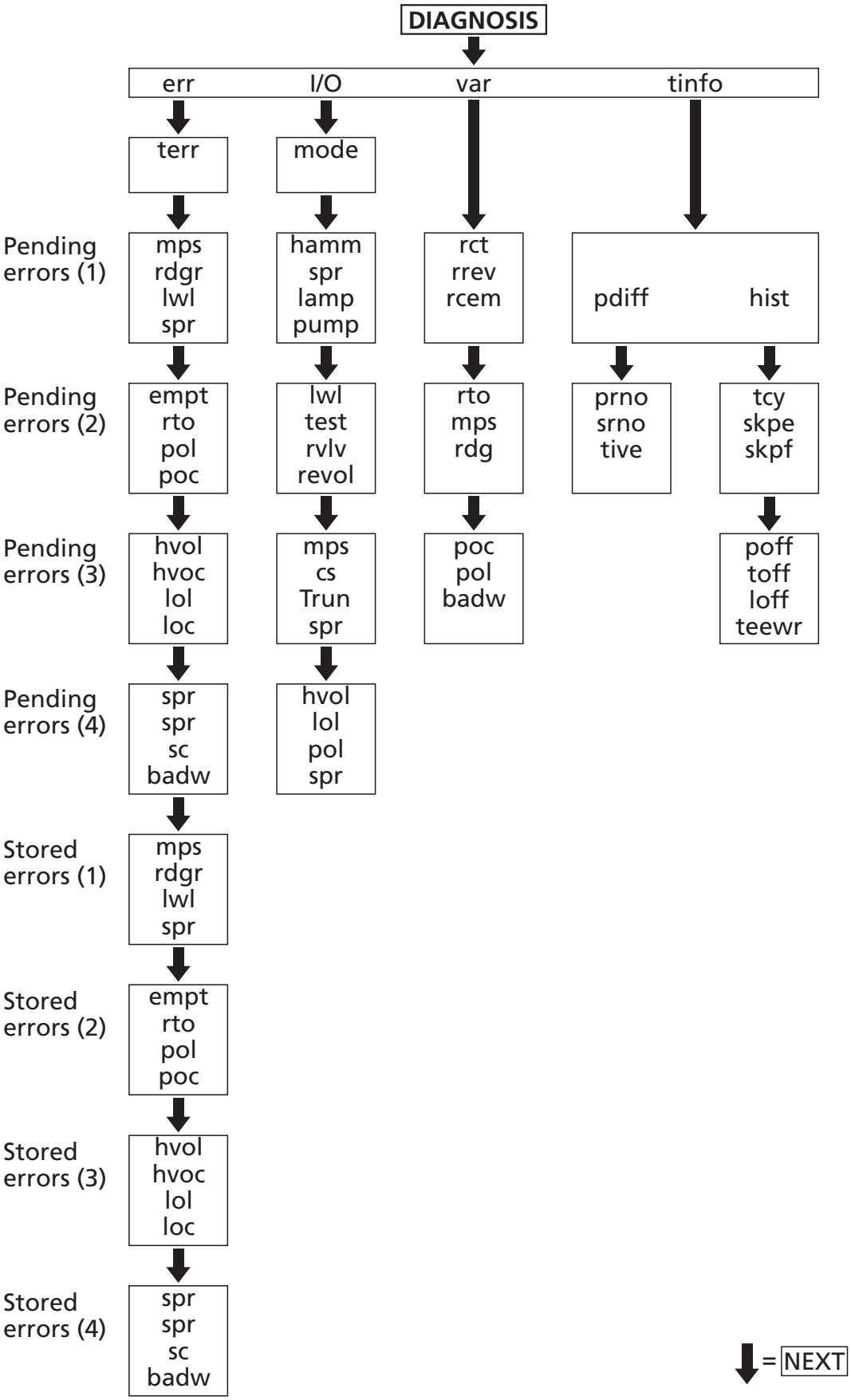
4.8.4 Diagnosis menu



Publication date: March 2007

5.

INSTALLATION

Publication date: March 2007

GROENEVELD

your efficiency is our challenge

5.1 Overview

The installation of a Groeneveld BreakAlube lubrication system involves - in brief - the following operations:

1. Installation of the pump (including control unit)
2. Installation of the grease line.
3. Installation of the electric wiring.
4. Testing of the system.

5.2 Safety precautions

1. Ensure that dangerous situations are avoided when carrying out work (installation or repair).
2. Always apply or use adequate safety precautions to prevent bodily harm and damage before you start working.
3. Ensure that a machine cannot be started or set in motion while you are working. Remove the ignition key and store it in a safe place. Block parts that may move of their own accord. Engage the parking brake.
4. Pay special attention to blocking parts such as loading flaps. 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 jack stands and ensure in advance that the ground is firm and flat enough.
6. If necessary, disconnect the ground cable from the battery to prevent inadvertent switching on of electrical equipment.
7. Avoid working on the cooling system without allowing it to cool down first. The system is pressurised and the toxic coolant can easily spray outwards and cause burns.
8. Adhere to all regulations, specifications and limitations specified by the manufacturer of the machine.
9. Use only clean tools that are suitable for the task you want to perform with them.
10. A machine may only be operated when its operation is fully understood. Obtain advice from a qualified person, if necessary.
11. Keep the working area clean and tidy; this promotes safety.

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5.3 General installation instructions

1. Check the contents of the parts kit against the enclosed packing list (kit list).
2. Before you start installing the grease lubrication system, check whether all lubrication points are open and properly greased. If not, grease the lubrication points to prevent damage occurring due to a lack of grease during the initial operation.

CAUTION

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

3. Prevent any contamination entering the system during installation. Use clean tools and clean the location on the machine where the pump unit is to be installed.
   Flush the line through if it is not possible to prevent dirt or moisture entering the line during installation or repair work. Follow the same procedure as for the bleeding of the lubrication system.
4. During installation of grease lines and electric leads, ensure that:
   - The lines are not fastened to or near hot parts such as exhaust, turbo or air conditioning unit.
   - The lines are fitted taut and fixed in place with large or small straps or clamps.
   - The lines are not installed alongside moving parts in such a way that they may become damaged (in time).
   - The lines have a sufficient length, particularly if they are laid to moving parts. Check this by shifting the moving part to its extreme positions.
   - Ensure that grommets are used wherever there is a chance of a line being damaged.
5. Check whether the machine voltage corresponds to the voltage required for the pump in the kit.

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5.4 BreakAlube pump unit

5.4.1 Installing the pump

1. Determine jointly with the client where the pump unit is to be installed, if this is not already indicated in machine-specific installation instructions. Make sure that:
   - The pump unit is easily accessible for filling the grease reservoir.
   - The level in the reservoir can be read off.
   - The pump is protected against damage.
2. Check before determining the installation location whether use can be made of existing holes in the chassis. If this is not the case, holes have to be drilled. Always follow the machine manufacturer's instructions. Do not allow the mounting plate to rest on the chassis profile flange and do not drill holes in the flange for extra fastening of the mounting plate. Pay particular attention that there are no lines, cables, air tanks, etc. behind the point where the holes are to be drilled. After drilling, clear the area of chips using compressed air or a brush.
3. If the mounting plate is to be welded to the machine, the instructions of the machine manufacturer must again be followed.
4. Fit the mounting plate (with the pump) on the chassis.
5. Remove the yellow/red transport plugs from the grease outlet port(s) and the vent outlet of the pump.
6. Screw the connection onto the grease outlet port of the pump. The grease line to the hydraulic breaker is connected to this connection later.
7. Fill the reservoir of the pump with the breaker grease prescribed by the breaker manufacturer in an NLGI-2 class.

5.5 Couplings and grease lines

5.5.1 Installation of the couplings

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

CAUTION

Experience has shown that the vibrations of the hydraulic breaker, a coupler can quickly come loose of even break off completely. We therefore recommend that only steel couplers are used, preferably with a 1/4"G screw thread and that these are installed with Loctite rather than Teflon tape.
It is also important that the line in the opposite direction is laid away from the bit. This ensures the least chance of vibration damage to the line and coupler (see Figure 5.1).

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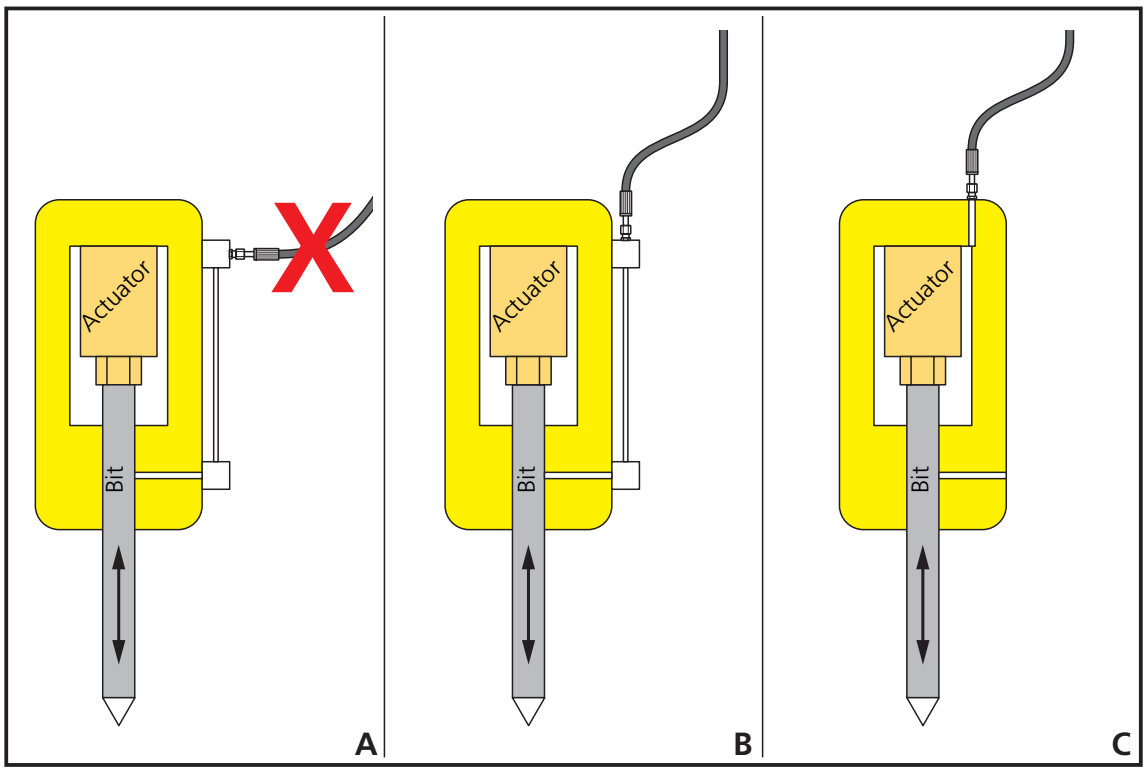

Figure 5.1 Connection of the hydraulic breaker

5. If the lubrication point is in an unprotected position low down on the side of the hydraulic breaker, it should be moved to a higher and more protected position on the breaker using a thick-walled hose and/or a welding block so that a safe transition can be made to a hose to the dipper arm of the machine (see Figure 5.1a and Figure 5.1b).
6. Before modification, always check first whether the breaker manufacturer has not already provided an extra lubrication channel on the top of the breaker for connection of a lubrication system (see Figure 5.1c).

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5.5.2 Installation of the grease line

1. The installation kit includes two 1/4" ID hoses with steel wire reinforcement that normally have sufficient length for installation on a machine with a standard boom and arm.

NOTE

If the machine is equipped with an 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 metres is supplied for installation between the pump and the quick coupler with a hose coupler (6 mm diameter) already installed on one end for connection to the pump outlet port.
3. A standard length of 3 metres is supplied for installation between the quick coupler and the lubrication point on the hydraulic breaker; here again, a hose coupler (1/4"G) is already installed on one end for connection to the quick coupler.
4. Determine the length of the two hoses required, following as far as possible the passage of the installed hydraulic lines. Then cut both hoses to the required length.
5. Now install the removable hose couplers (8 mm diameter) supplied to the other end of the two hoses following the procedure below.
   a. Grip the sleeve in a vice.
   b. Screw the hose into the sleeve up to the end (in anticlockwise direction!).
   c. Turn the hose back by 1/4 to 1/2 turn (in clockwise direction!).
   d. Lubricate the hose fitting and the inside of the sleeve with oil or grease.
   e. Screw the hose fitting (in clockwise direction) into the sleeve using a wrench until it is tight but without strain.
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 couplers (upsetting of inside material).
7. Fill the line with grease. Use the grease prescribed by the hydraulic breaker manufacturer for this.

Publication date: March 2007

5.6 Electric leads

5.6.1 General

In order to make the installation of the necessary electric wiring quick and easy, detailed wiring diagrams are available and - where possible - use is made of pre-assembled wiring harnesses.

CAUTION

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

- Connect the wiring only when the main components (pump, signal lamp, an optional breaker shutdown valve or relay) have been installed.
- Lay the wiring as far as possible along the passage of the existing electric wiring and fasten the wiring to these cables.
- Always make cable connections in the cabin or in a watertight terminal box.

5.6.2 Fuse ratings

Voltage	*Supply voltage fuse (pin 1)*	*Control voltage fuse (pin 3)*
12 V DC	15 A	3 A
24 V DC	7.5 A	3 A

5.6.3 Pin assignment of the connector on the pump unit

Connector pin number	***Description of connection***	***Wire colour in wiring harness***
1	Supply voltage 1 (+15)	red
2	Ground (-31)	brown
3	Breaker control voltage (+)	red/yellow
4	Control lamp (-)	green
5	Breaker shutdown option (+15)	blue
6	K line (communication with GINA)	grey
7	Breaker shutdown option (-)	white
8	n.a.	black

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5.6.4 Wiring diagram

1. Pump housing
2. Revolution detection sensor
3. Pressure relief valve
4. Test switch
5. Minimum level switch
6. Minimum grease pressure switch
7. Control unit
8. Pump motor
9. 8-pin connector
10. Hydraulic breaker starter switch
11. Lamp
12. Battery
13. Fuse
14. Contact switch
15. Breaker shutdown valve or relay (option)

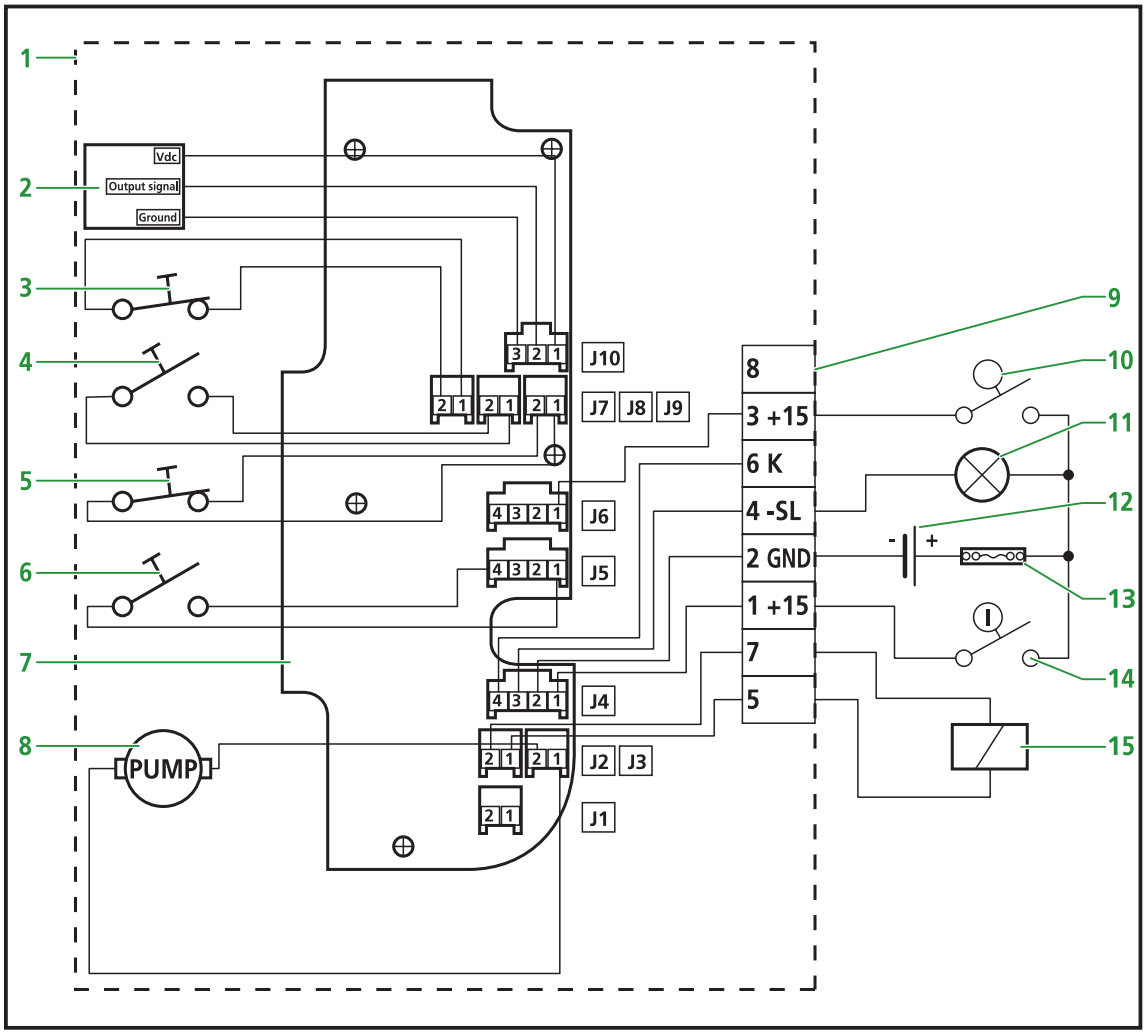

Figure 5.2 Wiring diagram

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5.7 Bleeding the system

Because each breaker supplier prescribes his own specific grease, we have decided to supply the pump with an empty grease reservoir. For bleeding and testing the pump during production, however, the pump has been filled with a minimum amount of GreenLube EP-2 grease. 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 line from the pump.
- In order to avoid soiling of the workplace, place a beaker or plastic bag under the grease outlet port of the pump.
- Connect the GINA to the pump.
- Switch on the machine starter.
- Switch on the GINA and turn it to manual mode by means of the diagnosis I/O menu.
- Now switch on the pump and allow it to run until a continuous stream of grease emerges from the pump outlet port.
- When air bubbles no longer appear, the pump can be switched off with the GINA and the line 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.

- Now disconnect the grease line from the lubrication point on the hydraulic breaker.
- Place a beaker or plastic bag under the end of the grease hose.
- Then switch on the pump again by hand.
- Check whether grease comes of the end of the grease line. 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. The quick coupler also has to be filled and this also takes some time.
- When the grease starts to come out of the grease line, the pump can be switched off.
- The grease line can now be connected to the lubrication point on the hydraulic breaker again.
- The system is now completely free from air.

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5.8 Putting the system into operation

Before putting the system into operation, ensure that the quick coupler in the grease hose to the hydraulic breaker is connected and that a GINA is connected to the pump.
Then switch on the contact (+15) and check that the signal lamp comes on at the same moment. In doing this you ensure that the voltage and ground are correctly connected, the fuse has not blown and the signal lamp is OK.
Now switch on the GINA and set or check the desired system parameters (see also chapter GINA).

Then check using the GINA:

- The status of the hydraulic breaker command signal (cs) in the third I/O screen of the diagnosis menu. This command signal should change from "0" to "1" when the hydraulic breaker is switched on (have the machine operator switch on the hydraulic breaker for this). It is also possible that the voltage switches off when the hydraulic breaker is switched on (meaning above "cs" from "1" to "0"), and the CSI parameter must be activated at the same time.
- The status of the time (Trun) in the same I/O screen that must be switched on at the same time as the hydraulic breaker (meaning above "Trun" from "0" to "1"). In the first VAR screen of the diagnosis menu it is possible to check with a remaining cycle time (rct) whether the remaining cycle time is really counted down with the hydraulic breaker switched on.
- Whether the pump is really started when the remaining cycle time has been reset to "0". Listen closely to check whether a lubrication cycle is really started.
- Whether the status of the test switch changes (from "0" to "1") in the second I/O screen at the moment the test button is pressed. A test cycle can be started directly in this way.

CAUTION

If a manual mode is set with the GINA, the pump should not react to the test button. First set the pump to automatic mode or switch the GINA off.

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

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Also check the grease pressure in the grease line to the pump. For this, a pressure gauge must be connected to the pump as standard. The pressure in the system must remain above the minimum set grease pressure of 20 bar and below the maximum grease pressure of 250/275 bar during every cycle to avoid an error being stored. The counter-pressure of the connected grease line is normally far higher than 20 bar, but it is possible that with a set 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 250/275 bar, an integrated safety valve should open and relieve the excessive pressure to the grease reservoir. If the grease line is clogged or the quick coupler to the hydraulic breaker 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 GINA 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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6.

MAINTENANCE

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6.1 General

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

WARNING:

If a high-pressure (steam) spray is used to clean the machine, the pump must be disconnected from the lubrication system to prevent a possible entry of water via the vent openings. Under normal operating conditions, however, the entry of moisture is not possible.

WARNING:

The automatic grease lubrication system significantly reduces the time and effort spent on manual greasing. Do not forget, however, that there may still be lubrication points that do have to be greased by hand.

6.2 Regular Inspection of the BreakAlube Lubrication System

Check the BreakAlube lubrication system for the following points:

1. The grease level in the reservoir of the pump unit (top up in good time).
2. The pump unit for damage or leaks.
3. The grease line for damage or leaks.
4. The quick coupler in the grease line to the hydraulic breaker.
5. Whether fresh grease still emerges alongside the breaker bit to the outside.
6. The function of the whole lubrication system. Carry out a test cycle. Check, if possible, using the test button or GINA the error codes of any possible (pending) errors.

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6.3 Filling the grease reservoir

When the grease in the reservoir has reached the minimum level, it must be topped up. For this the pump is equipped with a filler port to which a special filling pump can be connected.
A grease nipple can be fitted for filling the reservoir with a garage lubrication pump. Groeneveld has mobile and stationary filling pumps in both manual and pneumatic versions.

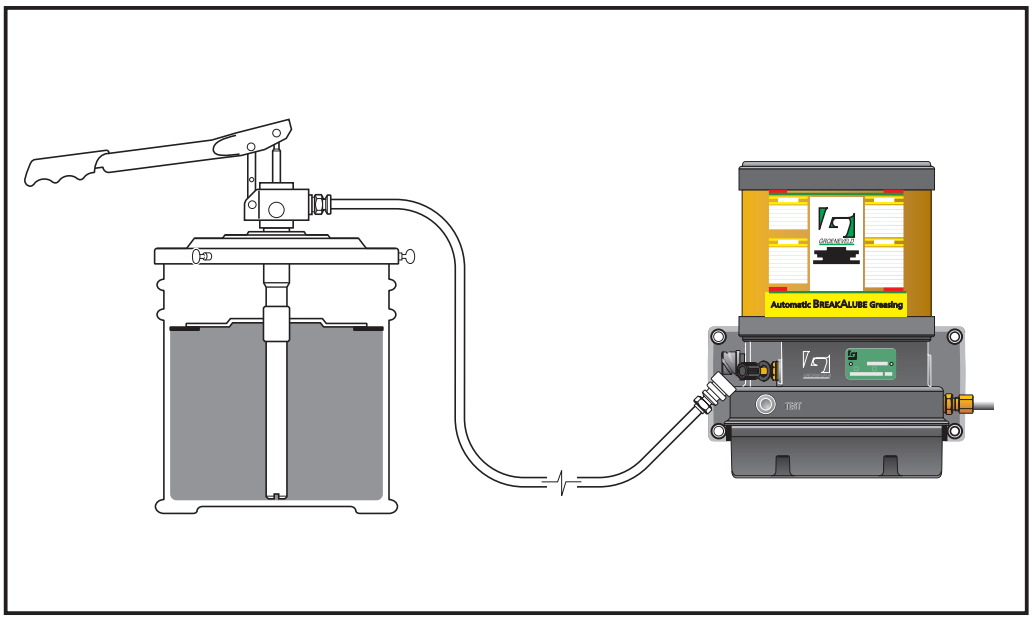

Figure 6.1 Filling the grease reservoir with a special filling pump.

Filling procedure

The filling pump must be suitable for the grease used.
Before using a filling pump, a filling hose or a new drum of grease, first fill the filling hose with grease. This prevents are being pumped into the grease reservoir.

1. Remove the dust cap on the grease nipple or filling port.
2. Clean the connector on the grease gun or filling pump with a clean cloth.
3. Push the grease gun onto the grease nipple or connect to the filling port.
4. Fill the reservoir to the maximum level as indicated on the reservoir. Never fill the reservoir high as this may lead to damage to the plunger.
5. Remove the grease gun from the grease nipple or from the filling port.
6. Clean the dust cap and grease nipple or filling port with a clean cloth and replace the cap.

Remarks:

If filling the reservoir is difficult or slow, it is possible that the filter behind the grease nipple or filling port is clogged. The grease nipple or the filling port on the pump or filling hose may also be clogged. In this case remove and clean the soiled parts.
Air possibly trapped under the plunger can escape via an opening at the top of the plunger rod if the grease reservoir is filled to slightly above the max. level. Via this opening, the air and any excess grease will be discharged to the vent opening on the side of the pump.

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6.4 Troubleshooting

Error	*Cause*	*Solution*
No lamp signal (3 s) when contact (+15) is switched on.	1. No power supply to the pump. 2. Faulty lamp. 3. Loose or damaged wiring. 4. Other cause.	- Check the fuse and replace, if necessary. - Replace the lamp. - Check the wiring and replace, if necessary. - Contact the dealer.
Lamp flashes continuously (0.5 s on / 0.5 s off) when a contact is switched on.	1. Minimum level in the grease reservoir reached.	- Fill the grease reservoir. Note: The error is automatically cancelled during filling.
Lamp flashes continuously (0.3 s on / 2 s off) when a contact is switched on.	1. Test cycle being performed.	- A test cycle takes max. 1 minute and is terminated automatically, but can also be terminated by switching off the contact.
Lamp is on continuously when a contact is switched on. Pump motor is disconnected from the timer and the hydraulic breaker shutdown option is also activated. From this moment on, the lubrication cycles are no longer performed. Any skipped lubrication cycles are counter in the history counter provided.	1. Empty grease reservoir.	- Fill the grease reservoir. Note: The error is automatically cancelled during filling.
	2. Errors have been detected during a series of consecutive lubrication cycles so that the pump motor has been switched off. In order to avoid damage to the hydraulic breaker, this can also be switched off (option) so that breaking without lubrication is no longer possible.	- Check with a GINA the error stored during the last cycle performed (pending errors) or call up the string code using the test button (check against the error code list). - For reactions to these error codes, see further below in this table. - This error can be reset by pressing the test button. If the error has not been remedied, however, the pump will go into the same error state again after a number of cycles.

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Error	*Cause*	*Solution*
Code 11 (MPS error) Minimum grease pressure (20 bar) was not reached during the last lubrication cycle performed.	1. Grease leakage in the grease line just behind or close to the pump.	- Inspect the grease line and repair, if necessary. - Reset the error by pressing the test button. - Carry out a test cycle to check the repair and that the error has indeed been remedied.
	2. Air trapped around the pump piston in the grease reservoir so that grease is no longer drawn in.	- Disconnect the grease line from the pump. - Fill the grease reservoir up to the maximum. - Reset the error by pressing the test button. - Start the pump via the GINA or with the test button. - If grease does still not come out of the pump outlet port after a few minutes, press ± 100 cc of oil into the pump via the grease connector and allow the pump to continue to run until grease flows out of the pump outlet port. - Connect the grease line to the pump again and carry out one or more test cycles as a check (the grease pressure must ultimately rise to above 20 bar during these cycles). - Contact your dealer is all these measures do not resolve the problem.
Code 12 (rdgr error) The max. admissible grease pressure was exceeded during the last lubrication cycle performed.	1. The quick coupler in the grease line to the hydraulic breaker is not or not correctly connected.	- Check whether the quick coupler in the grease line to the hydraulic breaker and tighten it securely.
	2. The grease line is pinched or clogged somewhere between the pump and the hydraulic breaker.	- Inspect this grease line for pinching or clogging.
	3. The lubrication point is clogged.	- Inspect the lubrication point and ensure an open channel, if necesary.
	4. Other cause.	- Contact your dealer.

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Error	*Cause*	*Solution*
Code 15 (empt error)	1. Grease reservoir is empty.	- Fill the grease reservoir. Note: The error is automatically cancelled during filling.
Code 21 (rto error) A drive shaft revolution takes longer than 10 s, so that the pump phase is automatically terminated.	1. Drive shaft is binding or blocked.	- Inspect the whoel drive line for blockage and/or damage. In the event of damage, replace the pump.
	2. The HAL sensor on the reduction gear unit is defective.	- Inspect the HAL sensor for proper function and if defective, contact your dealer.
	3. Other cause.	- Contact your dealer.
Code 22 (pol error) Interrupted power circuit of the pump motor.	1. Wiring between motor and timer pcb is loose or defective.	- Inspect this connection and repair, if necessary.
	2. Pump motor is defective.	- Inspect the motor and replace, if necessary.
	3. Timer pcb is defective.	- Inspect the pcb and replace, if necessary.
Code 23 (poc error) Pump motor has an excessive current consumption so that the pump phase is directly terminated for a short cooling-down pause. If the current consumption is still too high after 2 repeat attempts, this pump phase should be terminated.	1. Pump drive is binding.	- Check whether the drive line is running against an obstacle (e.g. the stiiring device against a loose part in the reservoir) and try to remedy the problem. - In the event of damage to the drive line, replace the pump.
	2. Pump motor defective.	- Inspect the pump motor and replace the whole pump, if defective.
	3. Leakage current in the pump motor power circuit.	- Inspect the housing for the presence of moisture. If the pump motor and/or timer pcb are affected by moisture, the whole pump has to be replaced. - Inspect the wiring for possible damage to the insulation and repair or replace, as necessary.
	4. Timer pcb defective.	- Inspect the timer pcb and replace, if necessary.

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Error	*Cause*	*Solution*
Code 24 (hol error) Interrupted power circuit of the breaker shutdown option.	1. This option is not in use and this option has been incorrectly activated in the parameter menu (hvlv).	- Deactivate this option (0) using a GINA.
	2. Wiring between pump and the breaker shutdown valve or relay is loose or defective.	- Inspect this connection and repair, if necessary.
	3. Spool of the breaker shutdown valve or relay is defective.	- Inspect the spool and replace, if necessary.
	4. No or poor connection in the pump connector.	- Inspect the contacts in the pump connector for moisture and/or corrosion and replace the whole connector, if necessary. - Inspect the contacts in the pump connector for good connection and replace the contact or repair the connection as necessary.
	5. Wiring between the pump connector and timer pcb is loose or defective.	- Inspect this connection and repair, if necessary.
Code 25 (hoc error) Power circuit of the breaker shutdown option has an excessive current consumption.	1. Leakage current in the power circuit of this option.	- Inspect the connectors in this power circuit for moisture and corrosion and replace, if necessary.
	2. Defective valve or relay spool.	- Inspect the spool and replace, if necessary.
	3. Timer pcb defective.	- Inspect the pcb and replace, if necessary.

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Error	*Cause*	*Solution*
Code 35 (sc error) Short circuit in the power circuit of the pump motor or hydraulic breaker shutdown option.	1. Short circuit in the power circuit of the pump motor or hydraulic breaker shutdown option.	- Disconnect one of the two from the pcb to determine which power circuit is responsible for this error.
	2. Short circuit in the power circuit of the pump motor.	- Inspect the pump motor and replace, if necessary. - Inspect the wiring of this power circuit for damage and repair, if necessary.
	3. Short circuit in the power circuit of the hydraulic breaker shutdown option.	- Inspect the spool of this option and replace, if necessary. - Inspect the wiring of this power circuit for damage and repair, if necessary.

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Error	*Cause*	*Solution*
Code 41 (badw-fault) Each time the pump is started, the voltage drops below minimum, causing a power-down.	1. Weak battery.	- Start the engine to see whether the voltage level increases. - Check whether the problem is caused by a weak battery or a charging problem (dynamo). - Charge or renew the battery, if necessary.
	2. Corroded or loose wiring contacts.	- Check the power contacts (terminals 1+2) of the greasing system and fasten them properly, if necessary. - Check the power wires on correct dimension (2,5mm²) and or damage. Replace them, if necessary.
	3. Corroded connector terminals.	- Check all the connector terminals on loose wires and or corrosion. Repair or replace, if necessary.
	4. Faulty pump controller.	- Check the pump controller, behind the bottom cover, on damage or corrosion. Repair or replace, if necessary.
Hydraulic breaker is excessively lubricated.	1. The hydraulic breaker has been excessively lubricated before installation or during servicing that consequently runs down the bit during breaking.	- Observe this for a few days; the quantity of grease should gradually decrease.
	2. Excessive quantity of grease set per lubrication cycle.	- Reduce the grease delivery per lubrication cycle using a GINA.
Hydraulic breaker is not supplied with sufficient grease.	1. Insufficient quantity of grease set per lubrication cycle.	- Increase the grease delivery per lubrication cycle using a GINA.

Note:

The GINA is used to set various system parameters in the control unit. The GINA can also be used for troubleshooting. The control unit stores the different types of error that have occurred in its memory. This memory can be read out using the GINA. These errors can also be polled using the test button on the pump unit and displayed by means of flashing codes via the signal lamp.

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7.

TECHNICAL DATA

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7.1 BreakAlube pump

Maximum operating pressure	: 250 bar
Temperature range	: -20 ... +85° C
Power supply voltage	: 12 or 24 V DC (one or other)
Power consumption of the pump motor (nominal at 20° C)	: 36 W
Closed-circuit current	: 10 mA
Grease reservoir capacity (standard)	: 3 litres*
Minimum level switch	: standard
Pump material	: hard anodised aluminium and reinforced nylon
Delivery per pump element	: 0.2 cc per revolution
Protection class	: IP67 (for the lower part of the housing)
CE-marking	: this BreakAlube pump complies to the requirements of the EMC directive ISO 13766, for earth moving machinery.
Lubricants	: consult the manufacturer of the hydraulic breaker for the right type of grease. The BreakAlube pump is suitable for pumping grease in the NLGI 2** thickness class.

* Other grease reservoirs are available on request.

** When the hydraulic breaker is used in a cold environment, it is important to check the pumpability of the advised lubricant at these low temperatures. Some lubricants simply congeal below -10°C and can hardly be pumped anymore.

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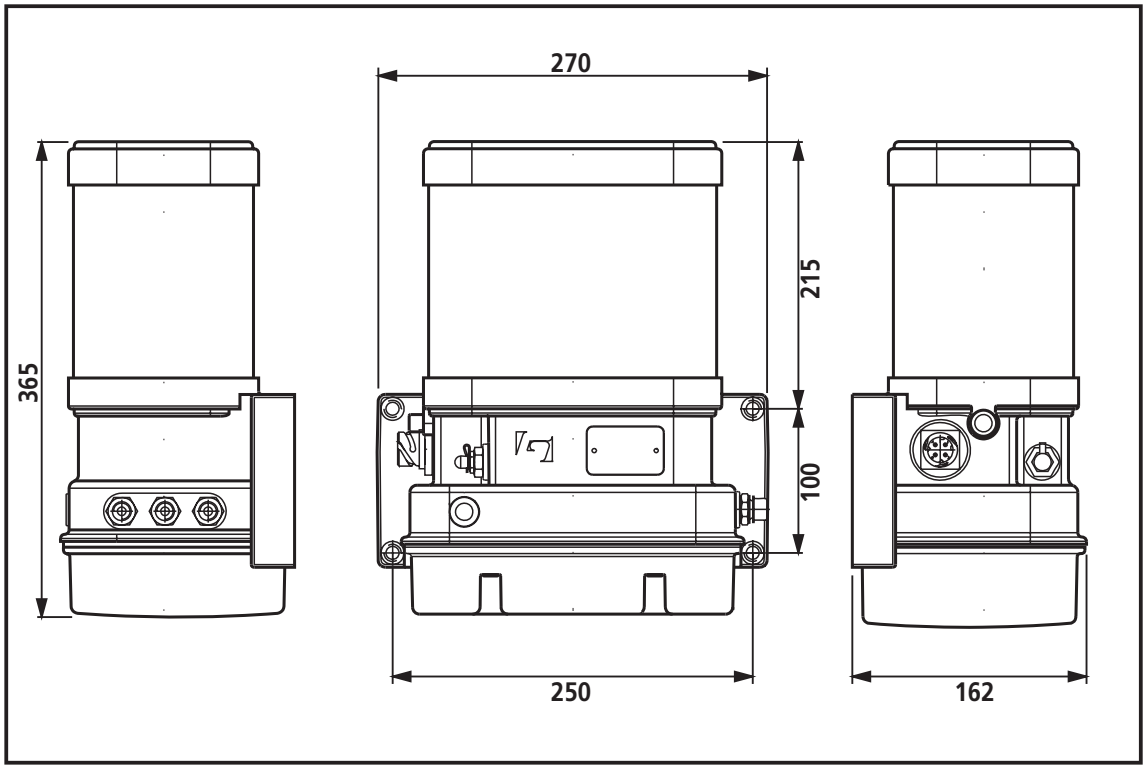

Figure 7.1 Dimensions of the BreakAlube pump with a 3 litre reservoir

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