

Progressive lubrication pump

**GPA / GPA+ / GPO**

Versions: Paddle, follower plate, cartridge

# Original operating- and assembly manual

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**Firmware: 03.ZZ**



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## 1. Technical data

### General:

Available reservoir sizes: . . . . . 2.5, 5, 8 liter (paddle).....3, 5, 8 liter (follower plate)  
 . . . . . 3 liter (cartridge)  
 Dimensions for paddle version: . . . . .ca. 240mm x 236mm x 223mm..(313/433)mm.....(L x W x H)  
 Dimensions for follower plate version: . . .ca. 220mm x 236mm x 339mm..(419/571)mm.....(L x W x H)  
 Dimensions for cartridge version: . . . . .ca. 226mm x 236mm x 342mm.....(L x W x H)  
 Pressure connection: . . . . . M12x1.5 Ø 6 mm  
 Control & Monitoring: GPA: none, must be installed externally GPA+ / GPO: integrated control unit  
 with display and push buttons  
 Filling connection: . . . . . G $\frac{1}{4}$ " with standard lubrication zerk fitting, straight (alternatives available)  
 Filter mesh size: . . . . . n/a  
 Level switch (monitoring): standard for follower plate version, optional for paddle and cartridge version  
 Lubricant: . . . . . grease up to NLGI 2 (greases with solid contents on request)  
 . . . . . oil from 40mm<sup>2</sup>/s (cSt)  
 Operating pressure: . . . . . max. 300 bar  
 Weight: . . . . . ca. 4.9 kg to 7.2 kg for largest version (all prefilled with 1.4 kg)  
 Operating temperature: . . . . . Standard grease: -20°C up to +70°C  
 . . . . . Synthetic grease: -40°C up to +70°C  
 . . . . . Oil: -20°C up to +70°C  
 Sound pressure level: . . . . . <70dB(A)

### Pump:

Material: . . . . . aluminium, hard anodized – nylon-reinforced  
 Number of pistons: . . . . . standard 1, optional 2 or 3, each with separate output (duty pump)  
 Pump type: . . . . . electrical progressive piston pump with relief valve  
 Delivery rate (at 16 rpm): . . . . . standard piston (ø6mm) 2.0 cc/min,  
 . . . . . optional adjustable piston (ø8mm), 2.0 to 4cc/min  
 Drive type: . . . . . electric motor  
 Motor power: . . . . . +/-70W (rated value at 20°C)  
 Motor speed: . . . . . 16 rpm  
 Motor voltage: . . . . . 12 or 24 V DC  
 Degree of protection: . . . . . Reservoir IP54 / Electrical compartment IP69K  
 Connection type: . . . . . plug/socket Tyco 776494  
 Connection cable: . . . . . standard 10m (cable, 8 contacts)

### Level switch:

Switching voltage: . . . . . max. 140 V AC / 200 V DC (25°C)  
 Contact type: . . . . . NO (normally open contact)  
 Contact function: . . . . . prewarning to empty signal  
 Degree of protection: . . . . . IP67

### Proximity switch at the distributor:

Connection: . . . . . M12x1, pluggable  
 Threaded connection (at middle element) . . . . . M11x1  
 Connection type: . . . . . PNP NO contact  
 Operational voltage: . . . . . 10 - 60 V DC incl. residual ripple  
 Current-carrying capacity: . . . . . continuous: . . . . . 100 mA  
 . . . . . short-term: . . . . . 100 mA  
 Current consumption: . . . . . <15 mA  
 Ambient temperature: . . . . . -25°C to 70°C  
 Function display: . . . . . LED yellow  
 Degree of protection: . . . . . IP 67  
 Housing material: . . . . . V4A (1.4571)

**Certificates:**

..... ECE-R10, rev. 6 Automotive directive of the United Nations  
..... ISO 13766: 2006 Earth Moving Machinery standard  
..... ISO14982: 2009 Agriculture and Forestry Machinery standard  
..... EN 12895 : 2015 Industrial Truck standard  
..... EN 13309 : 2010 Construction Machinery standard  
..... EN 50498 : 2010 After Market Electronic Equipment In vehicles  
..... UL 778:2016 Certification

The **progressive lubrication pump GPA / GPA+ / GPO** is subsequently referred to as **device**.

## 2. General safety instructions

All persons entrusted with assembly, commissioning, maintenance and operation must carefully read this operating manual before assembly and commissioning of the device on the machine! Furthermore this manual must always be available at the site of operation.

The following contains basic information that must be observed for operation and maintenance.

### 2.1 Safety instructions

Observe the general safety instructions in this main chapter but also the special safety instructions in other chapters of this operating and assembly manual.



Warning of electrical voltage.



Safety instructions which might cause hazards to persons in case of non-observance are marked with the general danger symbol.



This symbol warns of hot surfaces.



Warning of suspended loads.



Warning of material damage due to electrostatic discharge! Marks potential risks which may result in material damage if not avoided.

**Attention!**

This header is used when improper or general non-observance of the operating manual, work instructions, specified workflows and the like might result in damage of the device.

**Note!**

We use this term to point out particular details.

**Strictly observe any instructions that are directly attached to the device and keep them in readable condition!**

## 2.2 Personnel qualification and training



The personnel for operation, maintenance, inspection and assembly must have the appropriate qualification for this work. The operator must clearly define competence, responsibilities and supervision of the personnel. In case the personnel does not have the necessary knowledge, they have to be trained and instructed accordingly. The operator is obliged to ensure that the personnel fully understands the contents of this user information.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

## 2.3 Hazards in case of non-observance of the safety instructions



Non-observance of the safety instructions can result in hazards to persons, the environment, and the device. Non-observance of the safety instructions may further result in the loss of any liability claims. In detail, non-observance can entail the following hazards:

- Failure of important device functions.
- Failure of prescribed methods for maintenance and repair.
- Danger to persons by electrical, mechanical and chemical effects.
- Danger to the environment by leakage of hazardous substances.

## 2.4 Obligations of the operator / user



- If movable, rotating, hot or cold machine parts bear risks, the customer must protect these parts against contact. This protection must not be removed.
- Drain any leakages of hazardous substances in a way that no risks for persons or the environment arise. Please also observe the data sheets or safety data sheets of the respective manufacturers.
- Keep to all legal provisions.
- Exclude any hazards due to electrical energy.
- The examinations of pipes and hoses for safe provision, use, proper assembly and function have to be carried out according to regionally applicable directives. Inspection intervals must not be exceeded.
- Replace defective pipes and hoses immediately and professionally.
- Hydraulic hoses and polyamide pipes are subject to a natural aging process and thus have to be exchanged in regular intervals according to the manufacturer's specifications.
- Provide a safety data sheet of the currently used lubricant at the device.
- Observe the generally applicable Ordinance on Hazardous Substances in its latest version.

## 2.5 Safety instructions for maintenance, inspection and assembly



All **maintenance, inspection** and **assembly work** may **only** be carried out **by qualified personnel** who is sufficiently informed by thorough reading of the user information.

**Generally** any **work** at the device may only be done at **complete standstill** and in **pressureless and disconnected condition**. Use appropriate **personal protective equipment** (goggles among others). The shutdown procedure of the device as described in the operating manual must be strictly followed.

Secure the device against intentional or unintentional recommissioning during maintenance and repair. Put all safety and protection arrangements back in place again immediately when the work is finished.

Dispose of environmentally hazardous media professionally and in accordance to the relevant official provisions. Clean **polluted** and **contaminated surfaces** before maintenance. Wear protective equipment to that purpose. Observe the lubricant manufacturers's data sheets and safety data sheets, respectively the data sheets provided by the manufacturers of used auxiliaries and working materials.



Check the surface temperature of the device as a possible heat transfer bears the **risk of burns**. Wear heat-resistant protective gloves!

**Open light** and **fire** are strictly forbidden during any maintenance, inspection and repair **due to fire hazard**.

## 2.6 Unauthorized modification and production of spare parts



Modification, repair and alterations of the device are only accepted after consultation with the manufacturer. Original spare parts and authorized accessories from the manufacturer contribute to safety. The use of other parts can result in the loss of any liabilities for the resulting consequences. Groeneveld-BEKA will not assume liability for parts retrofit by the operator.

## 2.7 Inadmissible modes of operation

Operational safety of the device is only guaranteed for appropriate use as stated in the operating manual. Never exceed or fall below the limit values as stated in the technical data.

## 2.8 Electrostatic discharge



Avoid electrostatic discharge! There are electrical components integrated into the devices which you can destroy by electrostatic discharge when you touch them. Observe the safety precautions against electrostatic discharge acc. to DIN EN 61340-5-1/-3. Ensure that the environment (persons, workplace and packaging) is well grounded when handling the devices.

## 2.9 General hazard warning - Residual risk



All components of the device are designed according to valid regulations for the construction of technical systems regarding operational safety and accident prevention. Independently thereof the use can lead to hazards for the user or third parties and for other technical facilities. Therefore the device may only be used for its intended purpose in **technically faultless condition** and in compliance with the relevant safety regulations and the operating manual. **Inspect** the device and its attachment parts regularly and check them for possible **damage or leakages**. **Fluids** could **escape under high pressure** from pressurized components which have become **leaky**.

### 3. Intended use

**Attention!**

The device as part of a central lubrication system serves to **convey lubricant for the lubrication** of machines as described in this operating manual. The device is approved for **industrial** and **commercial use only**.

The device may only be put into operation if it is installed in / attached to another machine and is operated together with it.

Only lubricant according to the specifications of the machine manufacturer may be conveyed.

The device may only be used as specified in the technical data (see chapter 1 „Technical data“). Never exceed or fall below these values. Never run the device without lubricant.

Unauthorized **structural modifications** of the device are **not permitted**. Groeneveld-BEKA will not assume liability for damage to persons or the machine resulting thereof.

The device has been manufactured in compliance with the Machinery Directive 2006/42/EG. The customer has to check whether further directives apply for the specific field of application and site of operation. The device may not be put into operation if it is not conform to these directives.

Use as intended also includes:

- Observance of all chapters and instructions of the operating manual.
- Carrying out all maintenance work.
- Observance of all regulations concerning work safety and accident prevention during all life cycles of the device.
- Having the necessary professional training and authorization of you company to operate the device and to carry out the necessary work.

**Another use or a use beyond this is deemed improper.**

### 4. Scope of warranty

Warranties regarding operational safety, reliability and performance will only be granted by the manufacturer if the device is used as intended and under the following conditions:

- Assembly, connection and maintenance are carried out by authorized professional staff.
- The device is used according to the specifications in the operating manual.
- The limit values as stated in the technical data must never be exceeded or fallen below.
- Modifications and repairs of the device may only be done by Groeneveld-BEKA.

**Attention!**

Guarantee and warranty for any damage at the device caused by improper lubricant (e.g. wear of pistons, piston jamming, blockades, brittled seals, etc.) will expire.

Groeneveld-BEKA will generally not assume guaranty claims for any damage caused by lubricants, although those have been laboratory tested and released by Groeneveld-BEKA, as such damage (e.g. by over-stored or incorrectly stored lubricants, batch fluctuations, etc.).

## 5. Transport and storage

Use suitable lifting devices for transport.

Do not **throw** the device or impose it to shocks.

Secure the device against falling over or slipping during transport.



Observe all valid safety and accident prevention regulations for the transport. Wear suitable **protective equipment** if necessary! Keep **adequate distance to suspended loads**. The transport help or the elevating device must have the **adequate carrying capacity**.

Store the device at a cool and dry location to avoid corrosion of individual parts of the device.

**Note!**

Mind also the storage properties of the lubricant in lubricant-filled devices. Replace the lubricant when it is overstored (separation of oil and soap).

## 6. Functional description

### 6.1 General

The Groeneveld-BEKA GP pumps belong to a modular series of progressive lubrication pumps which allows to combine one single pump concept with different reservoir types and sizes. This general manual describes and explains the operation of the system, functionality, possibilities, specifications and other technical data.

The automatic Groeneveld-BEKA GPA / GPA+ / GPO progressive lubrication system lubricates each lube point of the vehicle, the machine or the system successively, i.e. the connected lube points are supplied with lubricant one after another. By default, one pump outlet / pump element is used for that (optionally 2 or 3 also possible for higher flexibility).

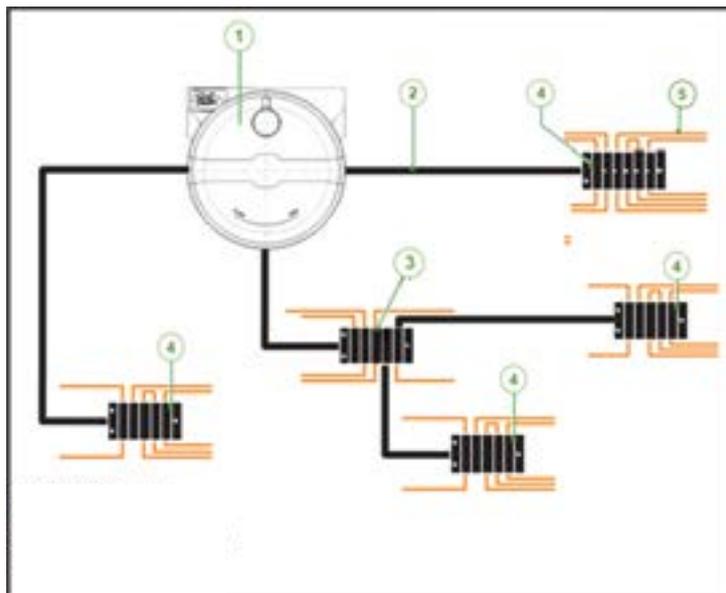
The appropriate amount of lubricant for the individual lube points is determined by the pump settings and the distributor rates. These result from the used metering element and how the elements are combined in distributor blocks (block design).

### 6.2 Components

An automatic Groeneveld-BEKA GP progressive lubrication system is made up of the following components:

1. A GPA / GPA+ / GPO pump with a lubricant reservoir of your choice as well as an integrated digital control unit with data memory for the GPA+ and a WLAN module for the GPO. This is the only difference between the pumps.
2. One or several distributor blocks (comprising several metering elements).
3. Main lines between the pump element outlets and the distributor blocks, as well as between the distributor blocks themselves.  
\*with optional 1 or 2 further pump elements / outlets.
4. Secondary lines between the distributor blocks and the individual lubrication points.

Fig.1:



- 1=Progressive lubrication pump
- 2=Primary lubricant lines
- 3=Main distributor
- 4=Secondary distributor
- 5=Secondary lubricant lines

## 7. Description of the components

The GP series from Groeneveld-BEKA has been developed with special attention to easy maintenance and the simple replacement of lifetime available components. The modular design of the GP series offers the possibility to adapt the system to the lubricant requirements and thus to easily upgrade and maintain the system.

- Exchangeable components allow easy maintenance and setting.
- Easy maintenance.
- OEM quality standards, conform with IATF and SPICE regulations.
- Suitable for greases up to NLGI 2 and oils up to 40mm<sup>2</sup>/s (cSt), including biodegradable greases and oils.

Fig.2::



The modular system of the GP series comprises three exchangeable modules, an upper one, a middle one and a lower module.

All modules offer easy maintenance, replacement and upgrade.

## 7.1 Upper module: the reservoir

Three types of reservoirs with different capacities are available for the GP series. All reservoirs are interchangeable and can be easily mounted to the middle module.

Fig.3:



Reservoir with paddle for filling with grease

Reservoir with follower plate

Cartridge reservoir

Reservoir for filling with oil

### 7.1.1 Reservoir with paddle (grease version)

A reservoir with paddle is installed as standard in the grease lubrication pump.

The rotating paddle minimizes air inclusions and grease separation in the reservoir and directs the grease to the pistons. The reservoir with paddle is available in versions with 2.5, 5 and 8 liter.

Devices with a reservoir with paddle must be mounted with the reservoir standing vertically upright.

Grease up to NLGI class 2 can be filled into devices with agitator blade containers.

### 7.1.2 Reservoir with follower plate

The reservoir with paddle can be replaced by a reservoir with follower plate if required.

The follower plate reservoir enables to use the GP series for stationary and mobile applications.

A further advantage of a reservoir with follower plate is that the lubricant in the reservoir is completely consumed and the reservoir walls stay clean. Therefore it is possible to check the level in the reservoir visually. The reservoir with follower plate is available in versions with 3.5 and 8 liter.

Devices with a reservoir with follower plate can be mounted in any desired position.

Grease up to NLGI class 2 can be filled into devices with follower piston containers.

### 7.1.3 Cartridge reservoir

The version with a cartridge reservoir is equipped with a 3-liter grease cartridge. The reservoir with paddle can be replaced by a reservoir with cartridge.

This size meets the lubrication requirements and maintenance intervals of most of the modern compact to mid-size machines.

The grease cartridge can be easily exchanged and ensures the use of the appropriate lubricant. As the grease is in a cartridge, it is that way also protected against aging and oxidation by air or water. This system is therefore perfectly suitable for the use of biodegradable greases.

As a standard, the cartridge is delivered filled with grease of NLGI class 2 but can also be filled with other greases on request.

The grease lubrication pump with cartridge reservoir can be mounted in any desired position.

### 7.1.4 Oil reservoir

The agitator blade reservoir can be replaced with an oil container if you wish to lubricate with oil.

By turning the agitator blade, the oil flow is conveyed from the container to the pump elements.

The oil reservoir is available in 5 and 8 liter versions.

Appliances with oil reservoirs must be installed with the reservoir pointing vertically upwards.

Devices with oil reservoirs can be filled with oils from 40 mm<sup>2</sup>/s (cSt).

## 7.2 Middle module (the drive unit plunger/piston pump)

The central lubrication pumps of the GP series can be delivered with two drive units for 12 V DC and 24 V DC voltage connection.

Each drive unit has max. 3 outlets. Each outlet requires an own pump element.

Fig.4:



An electric motor drives a cam shaft with eccentric. The pump element pistons are operated by the rotary movement of the eccentric.

The piston movements push the lubricant into the according main lines. Integrated non-return valves prevent reverse pumping of the lubricant with the return stroke of the pistons.

### 7.3 Lower module

The lower module is available in two main types:

- for the device GPA without integrated control unit
- for the device GPA+ / GPO with integrated control unit

Fig.5:



#### 7.3.1 Lower module without integrated control unit

The pump operation must completely be controlled by the customer.

#### 7.3.2 Lower module with integrated control unit

The module with integrated control unit is available in two versions:

- with standard connection + M12x1 plug-in connection for the proximity switch (blue connection).
- with standard connection + M12x1 plug-in connection for the proximity switch (blue connection) + M12x1 plug-in connection for the overpressure sensor (green connection).

Fig.6:



Both variants can be operated with 12 or 24 V DC, depending on the variant ordered. The voltage value cannot be adjusted by the customer.

The integrated control unit controls the operation of the central lubrication system automatically, depending on the set parameters.

## 7.4 Pump elements

There are two different pump elements available for the installation into the middle module (drive unit):

- a pump element with non-adjustable delivery rate (fig. 7)
- a pump element with adjustable delivery rate (fig. 8)

All pump elements are easily interchangeable or replaceable.

The pressure stroke (delivery stroke) of the pump element is realized by an eccentric at the cam shaft of the gear motor. The lubricant is delivered via the integrated non-return valve (2, fig. 7 or 4, fig. 8) and into the main line.

A compression spring (5, fig. 7 or 7, fig. 8) generates the return stroke of the delivery piston (7, fig. 7 or 9, fig. 8). With the return stroke is the lubricant primed back into the metering chamber (3, Abb. 7 bzw. 5, Abb. 8), through the intake openings (4, Abb. 7 bzw. 5 Abb. 8).

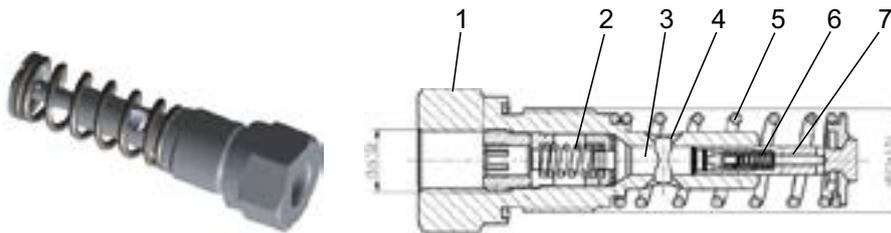
If overpressure occurs in the lubrication system, e.g. when the system blocks, the integrated pressure relief valve (6, Abb. 7 bzw. 8, Abb. 8) opens and the lubricant is returned into the reservoir.

### 7.4.1 Pump element with non-adjustable delivery rate

This pump element has a delivery rate of 2000 mm<sup>3</sup>/min at 16 rpm of the pump.

That means a delivery rate of 125 mm<sup>3</sup>/rev per piston stroke.

Fig.7:

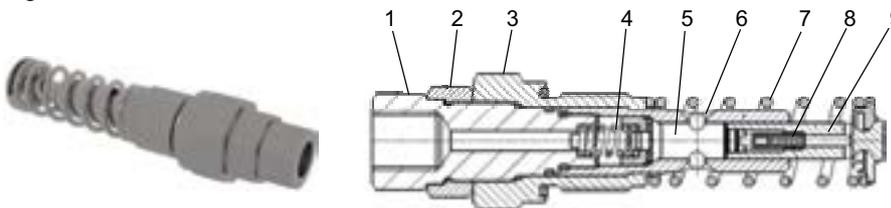


### 7.4.2 Pump element with adjustable delivery rate

For this pump element the delivery rate can be adjusted from 2000 mm<sup>3</sup>/min to 4000 mm<sup>3</sup>/min.

That means the delivery rate can be from 125 mm<sup>3</sup>/rev to 250 mm<sup>3</sup>/rev per piston stroke.

Fig.8:

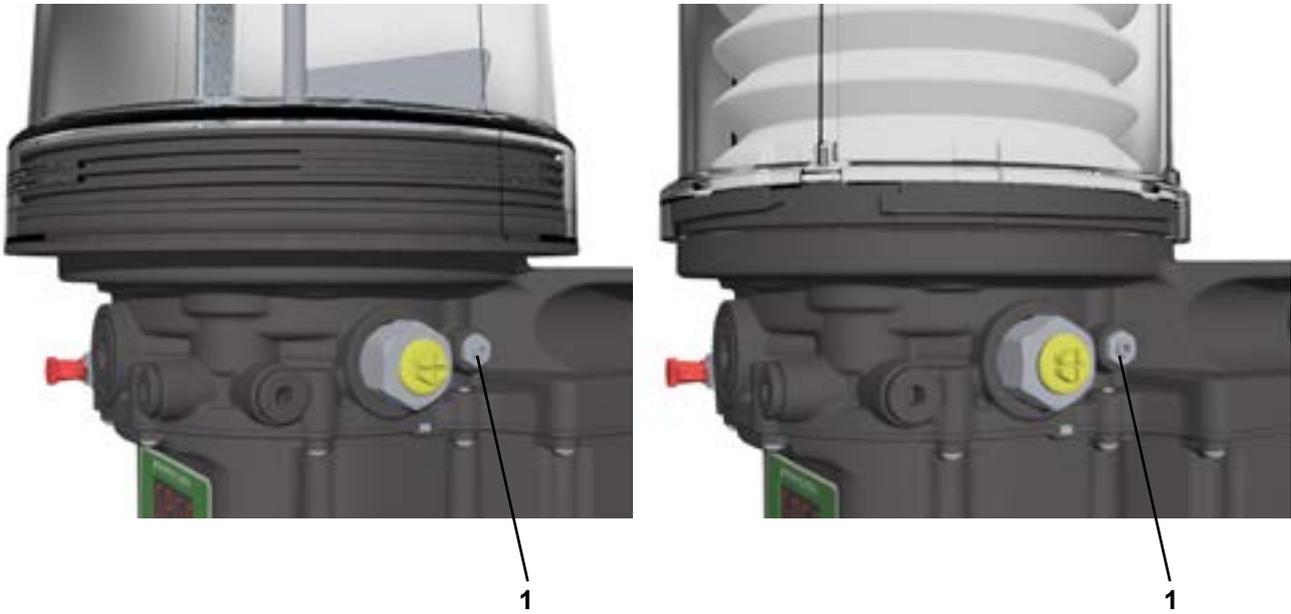


The pump element will always be delivered with the delivery rate set to maximum.

## 7.5 Overfill protection

The overfill protection (1, Fig. 8.5) is only present in the models with mixing blades and cartridge. An overfill protection valve is integrated in the pump housing to prevent the device from being overfilled. The valve opens at a pressure of 2.5 bar.

Fig. 8.5



## 7.6 Level monitoring

You can monitor the minimum level in the reservoir of the grease lubrication pump.

The middle modules is equipped with a level switch (fig. 9 or fig. 10) to that purpose.

A magnet activates the level switch. This magnet is installed in the reservoir.

Fig.9:



### 7.6.1 Level monitoring for the version with paddle reservoir (for grease and oil variants)

A magnet with a lug is mounted on the paddle (fig. 10).

A spring pushes this lug towards the reservoir wall. With the movements of the paddle, the flowing lubricant pushes this lug away from the magnet and towards the reservoir center.

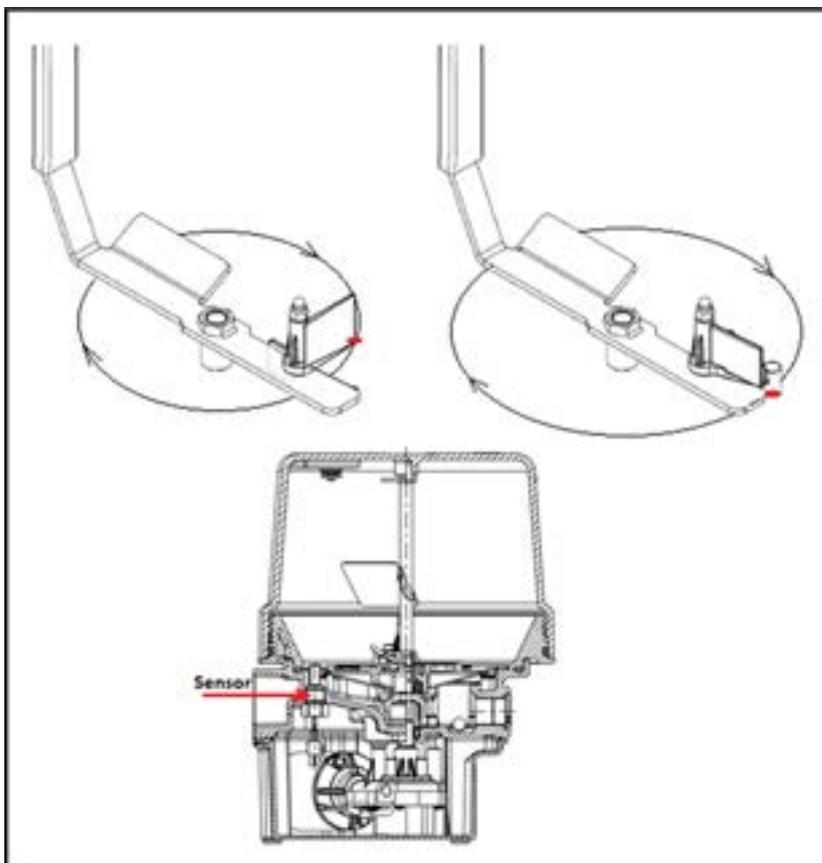
When level in the reservoir drops, the force pushing the lug inwards gets constantly lower and the magnet will approach the level switch.

With the level reaching minimum, the magnet will also reach the level switch. The switch will then emit a signal with each revolution of the device.

For the GPA (no integrated control unit), these signals need to be evaluated by the customer.

Fig.10:

Rotational travel/Magnet position      Rotational travel/Magnet position  
 with filled reservoir                      with empty reservoir



### 7.6.2 Level monitoring for the version with follower plate reservoir

A magnet is mounted on the follower plate (fig. 11).

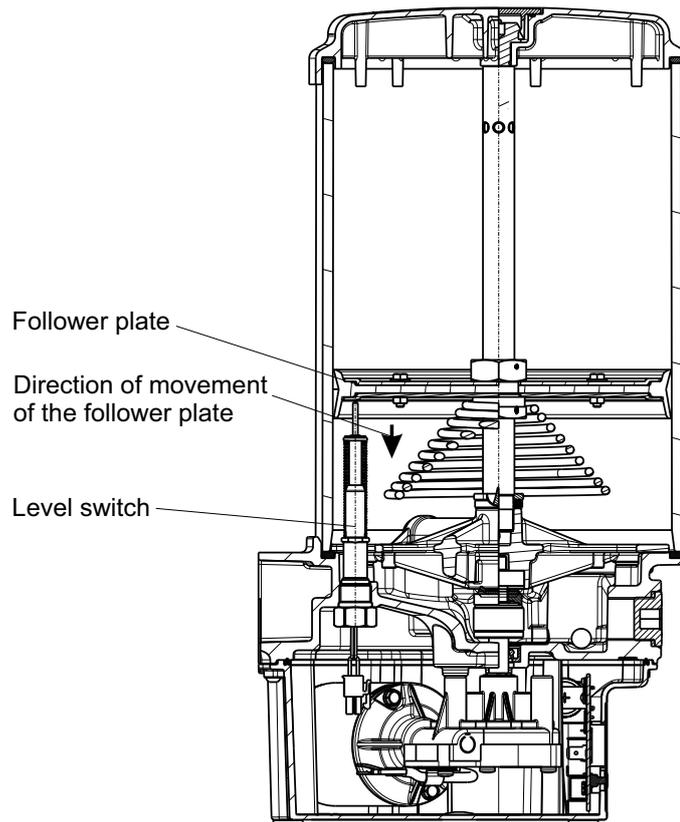
During operation, the follower plate moves constantly towards the level switch with falling level. The switch emits a signal when the minimum level is reached.

**Note!**

Vibrations caused by the machine or device to which the device is attached might effect short interruptions of the signal.

For the GPA (no integrated control unit), these signals needs to be evaluated by the customer.

Fig.11:



### 7.6.3 Level monitoring for the version with cartridge reservoir

A magnet is mounted on the cartridge (fig 12).

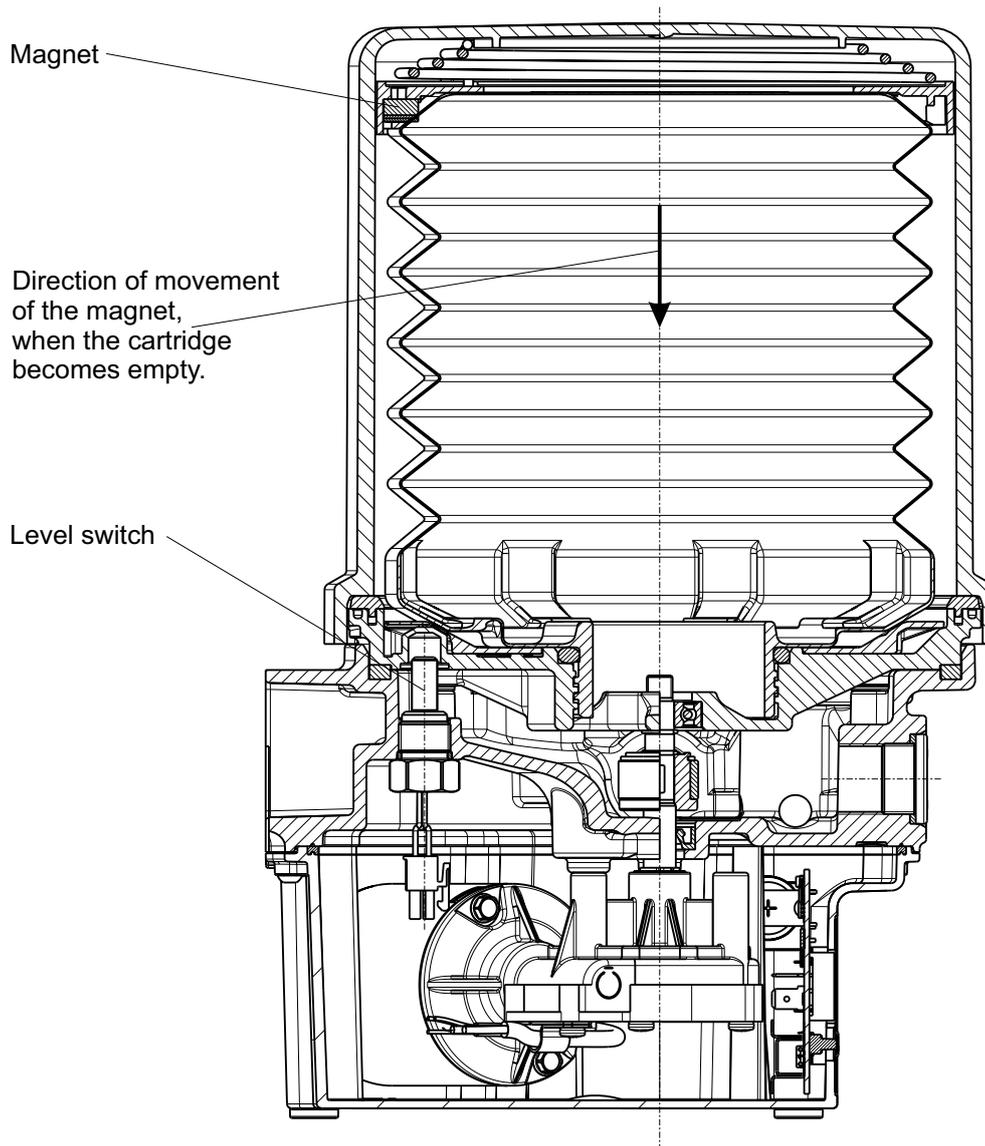
The cartridge compresses during operation and the magnet mounted on the top of the cartridge moves towards the level switch. When the minimum level is reached in the cartridge, the magnet contacts the level switch. The switch emits a signal.

**Note!**

Vibrations caused by the machine or device to which the device is attached might effect short interruptions of the signal.

For the GPA (without integrated control unit), this signal needs to be evaluated by the customer.

Fig.12:



## 8. Description and functionalities of the integrated control unit GPA+ / GPO

The integrated control unit GPA+ / GPO automatically controls and monitors the functions of the central lubrication system and the central lubrication pump.

The control unit activates a lubrication cycle at a set time interval and controls and monitors the quantity of dispensed lubricant.

### 8.1 Control of the lubrication cycle

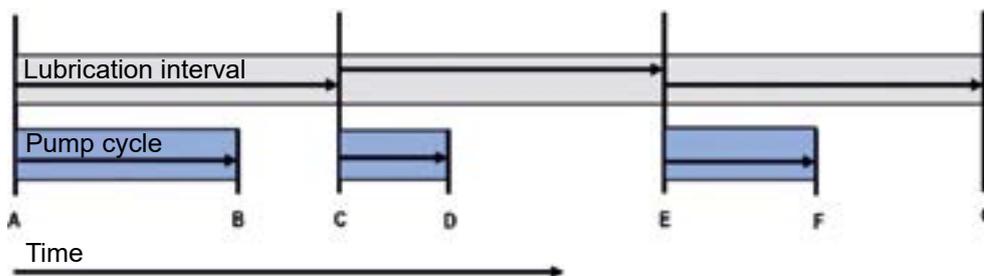
The control unit differentiates between an operation for which continuous operating voltage is available (TRK = Truck) and an operation for which operating voltage is only temporarily available (TRL = Trailer).

With the TRK operation, control of the lubrication cycle is revolution or pulse-dependent. With the TRL operation, the lubrication cycle is controlled revolution-dependent.

One lubrication cycle comprises lubrication time (pump operating time) and cycle time (lubrication interval).

Cycle time includes the lubrication time and the remaining pulse-off time.

Fig.13:



Without voltage, the parameters in operation will be stopped and saved. As soon as voltage is applied again, the functional sequence is continued where it has been stopped.

#### 8.1.1 Revolution-dependent control of the lubrication time

For the revolution-dependent control of the lubrication cycle, the cycle duration is set in minutes.

The dispensed lubricant quantity depends on the pump element installed and the settings of the adjustable pump element.

It is determined by the number of revolutions of the pump shaft.

A sensor installed in the reservoir sends a signal with each revolution.

##### Determination of the number of pump revolutions:

The number of revolutions normally is 16 rpm.

As the delivered lubricant quantity depends on the pump element installed, the required number of pump revolutions results from the delivery rate of the pump element

e.g. for a pump element with non-adjustable delivery rate:

Delivery rate per piston stroke = 125 mm<sup>3</sup>/rev

Required quantity: 1250 mm<sup>3</sup>

Calculation: 1250 mm<sup>3</sup> / 125 mm<sup>3</sup>/rev = 10 rev

## 8.1.2 Pulse-dependent control of the lubrication time

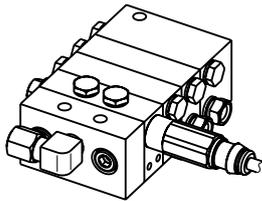
For the pulse-dependent control of the lubrication cycle, the cycle duration is set in minutes.

The dispensed lubricant quantity depends on the pump element installed and the settings of the adjustable pump element.

It is controlled and monitored by the signals of a proximity switch attached to the main distributor (fig. 14).

It emits a signal with each piston movement of the distributor. These signals are counted and the lubricant quantity is determined accordingly.

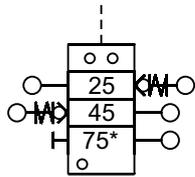
Fig.14:



The number of piston strokes results from the lubricant quantity which the progressive distributor supplies with each cycle.

That means that the distributor from fig. 15 distributes  $25 \text{ mm}^3 + 45 \text{ mm}^3 + 75 \text{ mm}^3 = 145 \text{ mm}^3 \times 2 = 290 \text{ mm}^3$  per distributor cycle, i.e. per pulse signal of the proximity switch.

Fig.15:



The necessary lubricant quantity needed to supply all lube points once is e.g.  $1550 \text{ mm}^3$ .

Therefore  $1550 \text{ mm}^3 : 290 \text{ mm}^3/\text{pulse} = 5,35$  pulses are necessary to once lubricate all lube points of the circuit.

Set 5 pulses and equal the number after the decimal point with the cycle time (shorter cycle time = more lubricant, longer cycle time = less lubricant).

## 8.2 Appearance and functions of the display of the integrated control unit GPA+ / GPO

The GPA+ / GPO control unit is integrated into the lower module of the device (fig. 16).

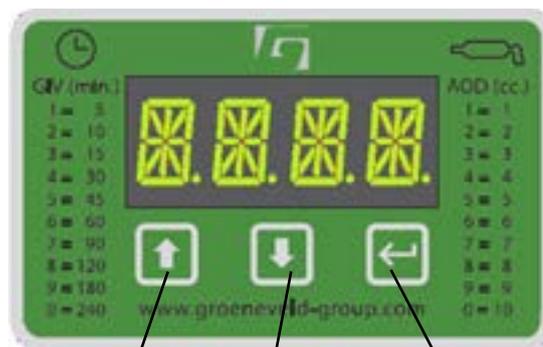
The display shows the settings and the current status of the control unit. With the three function keys, you can set the control unit and query functions and errors (fig. 17).

Fig.16:



Fig.17:

Display with four digits



Function keys:

UP

DOWN

ENTER

With the UP or DOWN key you can browse through the menu.

With ENTER you can confirm your selection or switch the menu level.

By holding the function keys pressed or pressing several function keys at the same time you can query further information or you get into the setting mode of the control unit.

In the following the functions will be described in detail.

Fig.18:

Side view



Plug connection M12x1  
for connecting the  
overpressure sensor

Plug connection M12x1  
for connecting the  
proximity switch

## 8.3 Basic functions

The control unit GPA+ / GPO differentiates between two modes:

The **Truck mode** (TRK) (standard) requires **continuous operating voltage**. If the device is mounted at a system **without continuous operating voltage** like e.g. a truck trailer, the control unit must be operated in the **Trailer mode** (TRL).

You will find a more detailed description of functioning and setting of both modes in chapter 8.12 Description and Setting of the TRK mode (truck) or in chapter 8.16 Description and Setting of the TRL mode (trailer).

### Attention!

The following functions are applicable for both modes!  
The following setting need to be done for both modes!

### 8.3.1 Switch-on behavior of the control unit

In the truck mode, the display will be always on as soon as there is voltage at the device (e.g. ignition is switched on). The firmware of the control unit will appear for 10 sec and then the control unit switches into the operating mode.

In the trailer mode, the display is off. Pressing a key will activate it. The firmware will also appear for 10 sec and then the control unit switches into the operating mode.

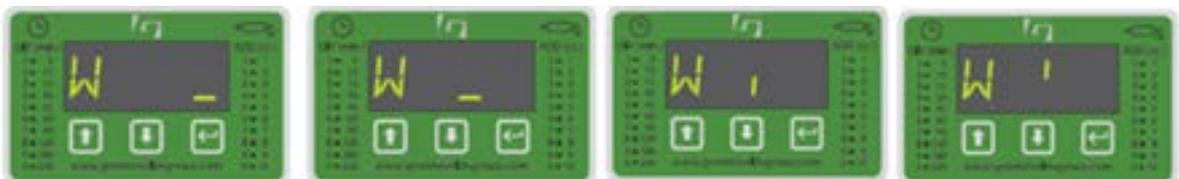
### 8.3.2 Operating mode of the control unit

In the operating mode, the first digit of the display will show a W- (Work).

The operating mode differentiates between a running lubrication process and the pulse-off time.

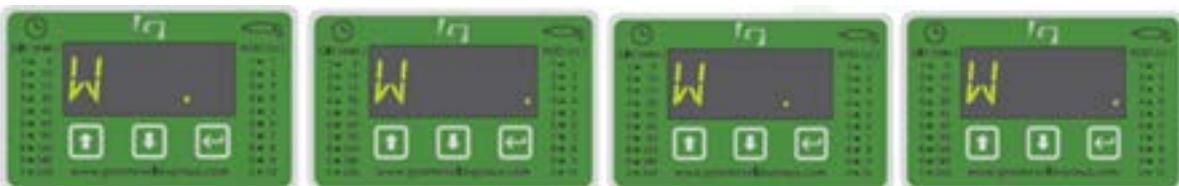
During a **running lubrication process**, the display shows a dash (-) running through different digit position.

Fig.19:



During the **pulse-off time** the display will show a dot (.) alternately appearing on the two right digits.

Fig.20:



### 8.3.3 Start intermediate lubrication or reset cycle

Keep the UP key and the ENTER key pressed at the same time and for longer (>10 sec).

The cycle will be reset and the control unit will immediately start a lubrication.

You can also use this function to put changed setting immediately into operation.

### 8.3.4 Access the Info menu

Keep the DOWN key pressed for longer (>10 sec).

The control unit will switch to the Info menu.

In this menu you can retrieve data on the control unit and its operation. See below table.

Fig.21:

Info menu		
Message	Meaning	Available Values
THRS	Total working <b>HouRS</b> , counter for the total operating time	□NNN // NNN□ (up to 999.999)
TCY	Total <b>CYcles</b> , counter for the total number of cycles	□NNN // NNN□ (up to 999.999)
PCA	<b>PCA</b> parameter set	794602□
FW	<b>FW</b> release / version	XX.ZZ (XX major version, ZZ minor version)
SN	PCA serial number	YYWW./NNNN (YY balance year, WW balance week, NNNN ascending number from 0001 to 9999, is reset every change of YYWW)
IP *	<b>IP</b> Adress	C0A8//E801 (standard IP) is displayed in hexadecimal on two screen pages decimal = 192,168,232.1
PWD *	WLAN <b>PassWorD</b>	XXXX//XXXX (individual pump password) * is displayed on two screens
EXIT	Exit menu (Jumps back to work mode.)	

□ = space character

// = display on split screens (change with UP and DOWN key)

\* = only for GPO

### 8.3.5 Set and use the test function

With the test function you can override the timer for the cycle duration and switch the device on and off as necessary.

**Note!**

The current timer status will be stopped and recorded in the memory.

This function helps you to carry out diagnostics, to vent the device and as a test function for system repairs.

**Note!**

With the TRL mode (Trailer) you have to ensure that the device is supplied with voltage, e.g. the trailer brake lights glow.

**Procedure:**

- Press ENTER (fig. 17) for longer (>10 sec). The system changes to the test mode. The letter T (test) will appear on the display. The device starts to convey lubricant.
- Briefly press the ENTER key to interrupt lubricant delivery.
- To start the delivery again, briefly press the ENTER key again.
- Press the ENTER key for longer (>10 sec.) to leave the function. The control unit will leave the function and resume the functional sequence at the point where you have stopped it before. The letter W (Work) will appear on the display.

**Note!**

If no button is pressed for more than 10 minutes, the test mode is exited and the device returns to work mode.

### 8.3.6 Creating a WiFi password (GPO)

The WLAN connection is protected by an individual password.

The individual preset password is the last 8 digits of the serial number of the central lubrication pump (see chapter 8.3.4 Function SN)

Setting/changing the password:

The password can be changed using the app (see chapter 8.4).

## 8.4 Communication via app (GPO)

An GPOApp for Android devices or iOS devices can be downloaded to make communication with the device easier.

You can find the GPOApp for Android devices in the Google Playstore and the GPOApp for iOS devices in the APP Store.

The connection between the GPOApp and the device is via the WIFI module. To do this, WIFI must be activated (see Chapter 8.11).

Some pump parameters can be set in the app and the error history can be read out.

## 8.5 Basic settings of the control unit to configurate the device

You will need to do some basic settings to ensure a faultless functional sequence.

### 8.5.1 Set the reservoir type

By default, you will receive the device with a paddle reservoir. If you have a retrofit device with another reservoir type, you have to set this in the menu of the control unit (see also chapter 7.1 Upper module: the reservoir).

#### Procedure:

#### Note!

Please also see the table fig. 25.

- Press and hold the UP and DOWN keys (fig. 17) together for a longer time (>10 sec). The text PUMT will appear on the display.
- Briefly press ENTER to access the settings menu. Select the new reservoir type with the UP and DOWN keys (please see also the table fig. 25).
  - **PADD (PADDeI)** for paddle reservoir (grease and oil)
  - **FOLL (FOLLow)** for follower plate reservoir
  - **CARR (CARRidge)** for cartridge reservoir
- Confirm your choice by briefly pressing ENTER.
- To apply the settings for the functional sequence, scroll with the UP and the DOWN key to EXIT. Confirm by briefly pressing ENTER.

#### Note!

You have to confirm changed setting with the EXIT function as otherwise your settings will be lost with the next restart of the device (switching the voltage off and on).

#### Attention!

Your new setting will only become active with the next restart of the device. Switch the voltage off and then on again or reset the cycle (see chapter 8.3.3 Start intermediate lubrication or reset cycle).

### 8.5.2 Set the control mode TRK or TRL

By default, you will receive the control unit set to TRK mode.

Use the TRK mode when continuous voltage is available. If not, please use the TRL mode (see also chapter 8.3 Basic functions).

If you want to change or check this, please proceed as follows:

**Procedure:**

**Note!** Please see also the table fig. 25.

- Press and hold the UP And DOWN key (fig. 17) together for a longer time (>10 sec). The text PUMT will appear on the display.
- Scroll with the UP and the DOWN key until the text **APTY** (APplication TYpe) appears on the display.

**Note!** You will not get this value displayed when you have already chosen PULS under MODE.

- Briefly press ENTER to switch into the settings menu. TRK (TRuck) will appear on the display.
- You can change the settings with the UP or DOWN key (see also table fig. 25).
  - **TRK** (TRuck)
  - **TRL** (TRaiLer)
- Confirm your setting by briefly pressing ENTER. The text APTY will appear on the display.
- Scroll with the UP and the DOWN key until the text EXIT appears on the display. Confirm by briefly pressing ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!** You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!** Your new setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

### 8.5.3 Set the number of lubrication circuits

**Note!** Please also refer to the table fig. 25.

You can connect up to three independent lubrication circuits to the device (see also chapter 7.2 Middle module - Drive unit Plunger / Piston pump or 7.4 Pump elements).

You have to set the actual number of used outlets at the control unit.

**Procedure:**

- Press and hold the UP and the DOWN key (fig. 17) together for a longer time (>10 sec.). The text PUMT will appear on the display.
- Scroll with the UP and the DOWN key until the text **OUT** appears on the display.
- Briefly press ENTER to access the settings menu. The text OUT1 (standard) or your current setting will appear on the display.
- Select the number of connected lubrication circuits with the UP or the DOWN key (please also refer to the table fig. 25).
  - **OUT1** for 1 lubrication circuit
  - **OUT2** for 2 lubrication circuits
  - **OUT 3** for 3 lubrication circuits
- Confirm you setting by briefly pressing ENTER. The text OUT will appear on the display again.

- Scroll with the UP and the DOWN key until the text EXIT appears on the display.
- Confirm by briefly pressing ENTER. The control unit will switch into the work mode again. The letter W (Work) will appear on the display.

### Note!

**You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage on and off again).**

### Attention!

Your new setting will become active with the next restart of the device. Switch the voltage on and off again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.5.4 Set the pump element type

You have to set the number of adjustable pump outlets, i.e. the pump outlets into which a pump element with adjustable delivery rate is installed at the control unit to be able to e.g. figure up the number of remaining pump revolutions (please see also chapter 7.4.2 Pump element with adjustable delivery rate).

### Procedure:

### Note!

Please also refer to the table fig. 25.

- Press the UP and the DOWN key (fig. 17) together for a longer time (>10 sec). The text PUMT will appear on the display.
- Scroll with the UP and the DOWN key until the text **CUS** appears on the display.
- Briefly press ENTER to access the settings mode. The text CUS0 or the currently set value will appear on the display.
- You can change the value by scrolling with the UP or the DOWN key (please refer also to the table fig. 25).
  - **CUS0** = no adjustable output
  - **CUS1** = 1 adjustable output
  - **CUS2** = 2 adjustable outputs
  - **CUS3** = 3 adjustable outputs
- Confirm your choice by briefly pressing ENTER. The text CUS will appear on the display again.
- Scroll with the UP and the DOWN key until the text EXIT appears on the display.
- Confirm with ENTER. The control unit will switch into the work mode and the letter W (Work) will appear on the display.

### Note!

**You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).**

### Attention!

Your new setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.6 Control unit settings for the use of the level monitoring

The level in the lubricant reservoir can be monitored electronically (please refer also to chapter 7.5 level monitoring).

If the lubricant falls to min. level, the control unit will display a warning (see chapter 8.17 Errors and warnings). Refill the lubricant as soon as possible .

If this warning is active, the device continues to operate for a certain time until the lubricant is completely consumed (see table fig. 22).

Fig.22:

	1 pump element	2 pump elements	3 pump elements
<b>Reservoir with paddle</b>	1740 revolutions	870 revolutions	580 revolutions
<b>Reservoir with follower plate</b>	3030 revolutions	1515 revolutions	1010 revolutions
<b>Reservoir with cartridge</b>	2610 revolutions	1305 revolutions	870 revolutions

After this pump revolutions have been processed, the control unit will switch off the device to avoid that air is pumped into the system. The control unit displays error 8 (see chapter 8.14. Errors and warnings).

The error will clear automatically when you refill the lubricant (see chapter 10.1 Fill the device).

### 8.6.1 Activate or deactivate the level monitoring

The level monitoring is optional. It can be retrofitted.

When the level monitoring should be used, this function must be activated in the control unit.

#### Attention!

If level monitoring is activated but no level monitoring is connected, an error message is displayed (see chapter 8.17 Errors and warnings).

#### Procedure:

#### Note!

Please also refer to the table fig. 25.

- Press the UP and the DOWN key (fig. 17) together for a longer time (>10 sec). The text PUMT will appear on the display.
- Scroll with the UP and the DOWN key until the text **LLS** appears on the display.
- Briefly press ENTER to access the settings menu. The text LLSD or the value which you have set will appear on the display.
- Select a value with the UP or the DOWN key (please refer also to the table fig. 25).
  - **LLSD**, if the level monitoring should not be active
  - **LLSE**, if the level monitoring should be active
- Confirm your setting by briefly pressing ENTER. The text LLS will appear on the display again.
- Scroll with the UP and the DOWN key until the text EXIT appears on the display.
- Confirm by briefly pressing ENTER. The control unit will return into the work mode. The letter W (Work) will appear on the display.

#### Note!

**You have to confirm the changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).**

#### Attention!

Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.6.2 Set the function of the level monitoring

The level monitoring can operate as NO contact or NC contact.

By default, the function is a NO contact.

If the level monitoring is operated as a NO contact, you will receive a signal when the level falls to minimum. As soon as the control unit receives a signal, it will display error (see chapter 8.14 Errors and warnings).

If the level monitoring is operated as NC contact, you will receive a signal as long as there is sufficient lubricant in the reservoir. When the level falls to minimum, the level switch will stop the signal. As soon as this signal is missing, the control unit will display error (see chapter 8.14 Errors and warnings). This also serves for wire break monitoring.

### Procedure:

#### Note!

Please also refer to the table fig. 25.

- Press the UP and the DOWN key (fig. 17) together for a longer time to access the settings menu. The text PUMT will appear on the display.
- Scroll with the UP or the DOWN key until the text **LLC** appears on the display.
- Briefly press ENTER to get one level down in the menu. The text LLCO or your set value will appear on the display.
- Set your desired function by briefly pressing the UP or the DOWN key (please also refer to the table fig. 25).
  - **LLCO** for the **NO contact** function (standard)
  - **LLCC** for the **NC contact** function
- Confirm your setting by briefly pressing ENTER. The text LLC will appear on the display again.
- Scroll with the UP or the DOWN key until the text EXIT appears.
- Confirm you settings with ENTER.

#### Note!

**You have to confirm your setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).**

#### Attention!

Your selected setting will become active with the next restart of the device. Switch the voltage off an on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.7 Control unit settings for monitoring the system pressure

With the GPA+ / GPO you can also monitor the pressure in the lubrication system. To do so, a pressure switch can be installed in each lubrication circuit.

Connection is made to PIN 7 and PIN 8.

The pressure switch sends a signal to the control unit when it detects overpressure in the system. The lubricant is returned into the reservoir by a pressure limiting valve which is integrated into the pump element (see chapter 7.4 Pump elements).

The control unit will display error and switch off the pump (see chapter 8.17 Errors and warnings).

**Procedure:**
**Note!**

Please also refer to the table fig. 25.

- Press the UP and the DOWN key (fig. 17) together for a longer time (>10 sec) to access the settings menu. The text PUMT will appear on the display.
- Scroll with the UP or the DOWN key until the text **PRSW** appears.
- Briefly press ENTER to get one level up in the menu.
- Select the desired value by briefly pressing UP or down.
  - **PR00** = if **no pressure switch** is connected.
  - **PR01** = if **1 pressure switch** is connected.
  - **PR02** = if **2 pressure switches** are connected.
  - **PR03** = if **3 pressure switches** are connected.
- Confirm your setting by briefly pressing ENTER. The text PRSW will appear on the display again.
- Scroll with the UP or the DOWN key until the text EXIT appears on the display.
- Confirm with ENTER. The control unit will switch into the work mode again. The letter W (Work) will appear on the display.

**Note!**

**You have to confirm your setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).**

**Attention!**

Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.8 Control unit settings for the use of the external signal lamp

You can connect an external signal lamp to the control unit with which the control unit functions or errors can also be signalled more remotely, like e.g. the driver's cabin of a truck.

Fig.23:



The lamp has to be mounted in the field of vision of the driver and, for better visibility of the signals, out of direct sunlight.

The signal lamp can indicate some functions and a possibly occurring malfunction with flashing signals.

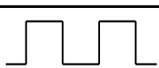
## 8.8.1 Flashing signals of the external signal lamp

The signal lamp is off during the pulse-off time (period between the lubrication cycles). As soon as the control unit starts a lubrication cycle (pump operates), the external signal lamp starts flashing (1 second on - 1 second off) (see table below).

If the control unit detects an error in the system, the external signal lamp lights up constantly (see table below). You can see the error code on the control unit display (please also refer to 8.17 Errors and warnings).

If the level in the reservoir falls down to min. (with integrated and active level monitoring), the external signal lamp starts flashing quickly (0.5 seconds on - 0.5 seconds off) (see table below).

Fig.24:

Signal indicators	Function
ON OFF _____	Pause time is counted
ON  OFF _____	Lubrication in progress
ON _____ OFF _____	An error has occurred in the system
ON  OFF _____	The reservoir level is at the minimum

## 8.8.2 Activate and deactivate the lamp output

The external signal lamp is optional can be retrofitted. The signal lamp must be activated in the control unit if it is intended to be used.

### Procedure:

#### Note!

Please also refer to the table fig. 25.

- Press the UP and the DOWN key (fig. 17) together for a longer time (>10 sec) to access the settings menu. The text PUMT will appear on the display.
- Scroll with the UP or the DOWN key until the text **LMP** appears on the display.
- Briefly press ENTER to get one level down in the menu. The text LMPD or the your selected value will appear on the display.
- Select your desired value by briefly pressing UP or DOWN (please also refer to the table fig. 25).
  - **LMPD**, if the external **lamp is NOT to be used**.
  - **LMPE**, if the external **lamp is to be used**.
- Confirm your setting by briefly pressing ENTER. The text LMP will appear on the display again.
- Scroll with the UP or the DOWN key until the text EXIT appears on the display.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) appears on the display.

#### Note!

**You have to confirm your setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).**

#### Attention!

Your selected setting will become active with the next restart of the device. Switch the voltage off an on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate cycle or Reset cycle).

### 8.8.3 Set the displayed signals of the external signal lamp

In the following you will see some options which functions and errors the external signal lamp should indicate.

You can only see these parameters with the external signal lamp activated (LMPE).

#### 8.8.3.1. Set the pump cycle information

You can set when the signal lamp should flash during an operating lubrication.

##### Procedure:

**Note!** Please also refer to the table fig. 25.

- Press the UP and the DOWN key (fig. 17) together for a longer time (>10 sec) to access the settings menu. The text PUMT will appear on the display.
- Scroll with the UP or the DOWN key until the text **PCL** appears on the display.
- Briefly press ENTER to get one level up in the menu. The text PCLD or your currently set value will appear on the display.
- Select your desired setting by briefly pressing UP or DOWN (please also refer to the table fig. 25).
  - **PCLD**, if **signal display** should be **deactivated**
  - **PLCE**, if **signal display** should be **activated**
- Confirm your setting by briefly pressing ENTER. The text PCL will appear on the display again.
- Scroll with the UP or the DOWN key until the text EXIT appears.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!** You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!** Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

#### 8.8.3.2. Set the minimum level warning

You can set whether you want to have min. level in the reservoir signalled (please also refer to chapter 8.5 Control settings for the use of the level monitoring).

##### Procedure:

**Note!** Please also refer to the table fig. 25.

- Press the UP and the DOWN key (fig. 17) together for a longer time (>10 sec) to access the settings menu. The text PUMT will appear on the display.
- Scroll with the UP or the DOWN key until the text **LLW** appears on the display.
- Briefly press ENTER to get one level up in the menu. The text LLWD your your currently set value will appear on the display.
- Select your desired setting by briefly pressing UP or DOWN.
  - **LLWD** = **Min. level warning** by external signal lamp **deactivated**
  - **LLWE** = **Min. level warning** by external signal lamp **activated**
- Confirm your setting by briefly pressing ENTER. The text LLW will appear on the display again.
- Scroll with the UP or the DOWN key until the text EXIT appears.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!**

You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!**

Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.9 Set the overcurrent at the pump motor

You can set how high the current (at the pump motor) may go before the control unit indicates a malfunction (please also refer to chapter 8.17 Errors and warnings).

**Procedure:****Note!**

Please also refer to the table fig. 25.

- Press the UP and the DOWN key (fig. 17) together for a longer time (>10 sec) to access the settings menu. The text PUMT will appear on the display.
- Scroll with the UP or the DOWN key until the text **OC** appears on the display.
- Briefly press ENTER to get one level up in the menu. The text OC\_A or your currently set value will appear on the display.
- Select your desired value by briefly pressing UP or DOWN.
  - **OC\_A = 7A** at VCC = 12 V, 5A bei VCC=24 V (**default setting**)
  - **OC\_1 = 1 A**
  - **OC\_2 = 2 A**
  - ...
  - **OC\_5= 5 A**
- Confirm you setting by briefly pressing ENTER. The text OC will appear on the display again.
- Scroll with the UP or the DOWN key until the text EXIT appears.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!**

You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!**

Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.10 Setting the CAN communication (GPO)

You can activate or deactivate CAN communication by selecting the CAN speed.

**Note!** Please also note the table Fig. 25.

- Press the UP and the DOWN key (fig. 17) together for a longer time (>10 sec) to access the settings menu. The text PUMT will appear on the display.
- Scroll by with the UP or DOWN key until the text **CAN** appears in the display.
- Briefly press the ENTER button to move up one level in the menu. The text OFF\_ or the value you set appears on the display.
- Select the value you want by briefly pressing the UP or DOWN button.
  - OFF = deactivates CAN communication
  - 250K = CAN speed is 250K
  - 500K = CAN speed = 500k
- Confirm the setting by briefly pressing ENTER. The text CAN appears on the display again.
- Scroll with the UP or DOWN key until the text EXIT appears.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!** You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!** Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.11 Setting the WIFI communication (GPO)

You can enable or disable WIFI communication.

### Procedure:

**Note!** Please also refer to the table fig. 25.

- Press the UP and the DOWN key (fig. 17) together for a longer time (>10 sec) to access the settings menu. The text PUMT will appear on the display.
- Scroll with the UP or the DOWN key until the text **WIFI** appears on the display.
- Briefly press ENTER to get one level up in the menu. The text WION or your currently set value will appear on the display.
- Select your desired value by briefly pressing UP or DOWN.
  - **WION** = WIFI communication is activated (default)
  - **WOFF** = WIFI communication is deactivated
- Confirm you setting by briefly pressing ENTER. The text WIFI will appear on the display again.
- Scroll with the UP or the DOWN key until the text EXIT appears.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!** You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!** Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

Fig.25:

Table for system set-up:

Message	Meaning	Available values	Default
PUMT	PUMp Type of reservoir	PADD (PADDle)	PADD
		FOLL (FOLLer)	
		CARR (CARtRidge)	
MODE	Control MODE	STD Control of the lubrication duration dependent on revolutions (STandarD)	STD
		PULS Control of the lubrication duration PULS-dependent	
APTY	APplication TYpe	TRK (TRuck) with permanent power supply	TRK
		TRL (TRaiLer) without permanent power supply	
OUT	OUT Total number of installed and active OUTlets („standard“ + „customizable“)	OUT1	OUT1
		OUT2	
		OUT3	
CUS	CUS Number of installed and active „CUStomizable“ outlets	CUS0	CUS0
		CUS1	
		CUS2	
		CUS3	
LLS	Low Level Sensor enable /disable	LLCD (disable)	LLCD
		LLCE (enable)	
LLC	Type of Low Level Contact	LLCO (LLC normally Open)	LLCO
		LLCC (LLC normally Closed)	
LMP	LaMP output enable / disable	LMPD LaMP output Disable	LMPD
		LMPE LaMP output Enable	
PCL	Pump CycLe info reproduced on lamp (only @ LMPE) Enable/Disable	PCLD Pump CycLe reproduced Disable	PCLD
		PCLE Pump CycLe reproduced Enable	
LLW	Low Level Warning info reproduced at lamp (only @ LMPE) enable / disable	LLWD Low Level Warning info Disable	LLWE
		LLWE Low Level Warning info Enable	
PRSW	Number of PResure SWitches connected	PR00	PR00
		PR01	
		PR02	
		PR03	
OC	OverCurrent max level (A) (note: OC_A: automatically set: to 7A (@VCC = 12 V) to 5 A (@VCC = 24 V)	OC_A = (see meaning)	OC_A
		OC_1 = 1 A	
		OC_2 = 2 A	
		OC_3 = 3 A	
		OC_4 = 4 A	
		OC_5 = 5 A	

Message	Meaning	Available values	Default
CAN	CAN communication (GPO) (Setting the CAN speed)	OFF_ = CAN disabled	OFF_
		250k = CAN speed is 250k	
		500k = CAN speed is 500k	
WIFI	WIFI communication (GPO) (Activate/deactivate WIFI communication)	WION = WIFI enabled	WOFF
		WOFF = WIFI disabled	
EXIT	Confirms the settings made		

## 8.12 Description and setting of the TRK mode (Truck)

The TRK mode is the standard application at machines and vehicles with permanently available power supply.

This mode is set via APTY in the menu (please also refer to chapter 8.5.2 Set the control mode TRK or TRL).

In TRK mode you can choose from two different control versions.

With the **revolution-dependent control of the lubrication time**, a sensor counts the revolutions of the drive shaft of the device (see chapter 8.1.1 Revolution-dependent control of the lubrication time). This function can also be monitored.

The **revolution-dependent control is monitored** via the number of revolutions per minute. If the number of revolutions per minute falls below 5, the control unit reports a malfunction. The device is switched off (please also refer to chapter 8.17 Errors and warnings).

With the **pulse-dependent control** of the lubrication time, the distributor pulses are counted (see chapter 8.1.2 Pulse-dependent control of the lubrication time). This function can also be monitored (see chapter 8.14 Set monitoring for the pulse-dependent control of the lubrication time).

The **pulse-dependent control is monitored** by counting of the signals of the proximity switch. If the set number of pulses is not reached during an adjustable monitoring time (default 12 min), the control unit reports a malfunction. The device is switched off (see also chapter 8.17 Errors and warnings).

The cycle time is independent of the mode. You have to set it in both of the available modes.

The cycle time is set in minutes (please also refer to chapter 8.1 Control of the lubrication cycle).

Fig.26:

GIV-no.	Cycle time (min)
1	5
2	10
3	15
4	30
5	45
6	60
7	90
8	120
9	180
0	240

**Procedure:**

**Note!** Please also refer to the table fig. 28.

- Press the UP key (fig. 17) for a longer time (>10 sec) to access the User setup mode. The text **GIV** will appear on the display.
- Briefly press ENTER to get one level up in the menu. The text GIV4 or your currently selected value will appear on the display.
- Select your desired value by briefly pressing UP or DOWN (please also refer to the table fig. 26).
  - **GIV1** = 5 min cycle time
  - **GIV2** = 10 min cycle time
  - **GIV3** = 15 min cycle time
  - ....
  - **GIV0** = 240 min cycle time
- Confirm your setting by briefly pressing ENTER. The text GIV will appear on the display again.
- Scroll with the UP or the DOWN key until the text EXIT appears.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!** You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!** Your selected setting will become active with the next restart of the device. Switch the voltage off an on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.12.1 Set the control type

You can set whether the control unit should work revolution or pulse dependent and how many distributors should be monitored.

**Procedure:**

**Note!** Please also refer to the table fig. 25.

- Press the UP and the DOWN key (fig. 17) together for a longer time (>10 sec) to access the settings menu. The text PUMT will appear on the display.
- Scroll with the UP or the DOWN key until the text **MODE** appears on the display.

**Note!** You are only able to see the following setting mode if you have selected the **TRK mode**.

- Briefly press ENTER to get one level up in the menu. The text STD or your currently selected value will appear on the display.
- Select your desired value by briefly pressing UP or DOWN (please also refer to the table fig. 23).
  - **STD** = (standard) revolution-dependent control of the lubrication time
  - **PULS** = pulse-dependent control of the lubrication time
- Confirm your setting by briefly pressing ENTER. The text MODE will appear on the display again.
- Scroll with UP or DOWN until the text EXIT appears.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!**

You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!**

Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

### 8.13 Set the parameters for the TRK mode with revolution-dependent control of the lubrication cycle

For the revolution-dependent control of the lubrication cycle you have to set the number of revolutions of the pump shaft and hence the delivered lubricant volume (please also refer to chapter 8.1.1 Revolution-dependent control of the lubrication time)

#### 8.13.1 Set the device revolutions

The delivery rate depends on the used pump element (see chapter 7.4 Pump elements).

The number of revolutions is determined by the required lubricant quantity and the delivery rate of the pump element installed.

This means that the the device needs at an ambient temperature of  $> -10^{\circ}\text{C}$  ca. 8 revolutions to supply  $1000\text{ mm}^3$  of lubricant if a non-adjustable pump element is installed.

The lubricant flow properties vary with the ambient temperature. The lower the ambient temperature is, the more increases the lubricant stiffness and thus the backpressure.

The control unit will therefore automatically increase the set number of revolutions by ca. 20% from an ambient temperature of  $< -10^{\circ}\text{C}$  on (see table fig. 27).

Fig.27:

AOD no.	Lubricant quantity ( $\text{mm}^3$ )*	Set number of revolutions at temperatures $> -10^{\circ}\text{C}$	Number of revolutions at temperatures $< -10^{\circ}\text{C}$
1	1000	8	10
2	2000	16	20
3	3000	24	30
4	4000	32	40
5	5000	40	50
6	6000	48	60
7	7000	56	70
8	8000	64	80
9	9000	72	90
0	10000	<b>80</b>	100

\* (Delivery rates calculated for the use of a non-adjustable pump element with a delivery rate of  $125\text{ mm}^3/\text{stroke}$ ).

**Procedure:**

**Note!** Please also refer to the table fig. 28.

- Press the UP key (fig. 17) for longer (>10 sec) to access the settings menu. The text GIV will appear on the display.
- Scroll with the UP or the DOWN key until the text **AOD** appears on the display.
- Briefly press ENTER to get one level up in the menu. The text AOD6 or your currently set value will appear on the display.
- Select your desired value by briefly pressing UP or DOWN (please also refer to the table fig. 27).
  - **AOD1** = output quantity **1000 mm<sup>3</sup>**
  - **AOD2** = output quantity **2000 mm<sup>3</sup>**
  - **AOD3** = output quantity **3000 mm<sup>3</sup>**
  - ... (see table fig. 25)
  - **AOD0** = output quantity **10000 mm<sup>3</sup>**
- Confirm your setting by briefly pressing ENTER. The text AOD will appear on the display again.
- Scroll with UP or DOWN until the text EXIT appears.
- Confirm with ENTER. The control unit will switch in the work mode. The letter W (Work) will appear on the display.

**Note!** You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!** Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle)

## 8.14 Set the parameters for the TRK mode with pulse-dependent control of the lubrication cycle

For the pulse-dependent control of the lubrication time you have to set the number of the distributor piston movements, the monitoring time and the cycle time (please also refer to the chapter 8.1.2 Pulse-dependent control of the lubrication time).

The proximity switch is connected at the plug-type connection on M12x1 on the side of the lower module (fig. 6).

You can monitor the functional sequence of the lubrication. If the number of distributor pulses is not reached within an adjustable monitoring time, the control unit reports a malfunction.

### 8.14.1 Set the number of distributor pulses

**Note!** You will only see the following setting mode if you have previously selected the **TRK mode** and **PULS mode**.

Pulse-dependent control means the lubrication time is determined by the signals of the proximity switch mounted at the distributor (see chapter 8.1.2 Pulse-dependent control of the lubrication time).

**Procedure:**

**Note!** Please also refer to the table fig. 28.

- Press the UP key (fig. 17) for longer (>10 sec) to access the User setup mode. The text GIV will appear on the display.
- Scroll with the UP or the DOWN key until the text **PLS** appears on the display.
- Briefly press ENTER to get one level up in the menu. The text PL01 or your currently set value will appear on the display.

- Select your desired value by briefly pressing UP or DOWN (please also refer to the tabel fig. 29)
  - **PL01 = 1 pulse**
  - **PL02 = 2 pulses**
  - **PL03 = 3 pulses**
  - ....
  - **PL99 = 99 pulses**
- Confirm your setting by briefly pressing ENTER. The text PLS will appear on the display again.
- Scroll with UP or DOWN until the text EXIT appears.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!**

You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!**

Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

#### 8.14.2 Set the monitoring time

**Note!**

You will only see the following setting mode if you have previously selected the **TRK mode** and **PULSE mode**.

You can monitor the process of a lubrication electronically (see chapter 8.9 Description and setting of the TRK mode (Truck)).

**Procedure:**
**Note!**

Please also refer to the table fig. 28.

- Press the UP key (fig. 17) for longer (>10 sec) to access the User setup mode. The text GIV will appear on the display.
- Scroll with the UP or the DOWN key until the text **TOUT** appears on the display
- Briefly press ENTER to get one level up in the menu. The text TI12 or your currently selected value will appear on the display.
- Select your desired value by briefly pressing UP or DOWN.
  - **TI01 = 1 min** monitoring time
  - **TI02 = 2 min** monitoring time
  - **TI03 = 3 min** monitoring time
  - ...
  - **TI12 = 12 min** monitoring time (standard)
  - ...
  - **TI59 = 59 min** monitoring time
- Confirm your setting by briefly pressing ENTER. The text TOUT will appear on the display again.
- Scroll with UP or DOWN until the text EXIT appears.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!**

You have to confirm your changed setting with the **EXIT** function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!**

Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.15 Activate or Deactivate a release or blocking signal

**Note!**

You will only see the following setting mode if you have previously selected the **TRK mode** and **PULSE mode**.

You can set with this code whether the device should be controlled via an external input (control input). If this type of control is active, the device only operates when the release signal is provided or the blocking signal is cancelled.

**Procedure:**

**Note!**

Please also refer to the table fig. 29.

- Press the UP key for longer (>10 sec) to access the User setup mode. The text GIV will appear on the display.
- Scroll with the UP or the DOWN key until the text **CTR** appears on the display.
- Briefly press ENTER to get one level up in the menu. The text CTRD or your currently set value will appear on the display.
- Select your desired value by briefly pressing UP or DOWN.
  - **CTRD** = Control input **deactivated** (standard)
  - **CTRE** = Control input **activated**
- Confirm your setting by briefly pressing ENTER. The text CTR will appear on the display again.
- Scroll with UP or DOWN until the text EXIT appears.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!**

You have to confirm your changed setting with the **EXIT** function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Note!**

Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

### 8.15.1 Set the signal type for the release or blocking function

**Note!**

You will only see the following setting mode if you have previously selected the **TRK mode** and **PULSE mode**.

You can set with this code whether the control signal should be evaluated as a release or a blocking signal.

**Procedure:**

**Note!**

Please also refer to the table fig. 29.

- Press the UP key for longer (>10 sec) to access the User setup mode. The text GIV will appear on the display.
- Scroll with the UP or the DOWN key until the text **CI** appears on the display.
- Briefly press ENTER to get one level up in the menu. The text CI\_H or your currently set value will appear on the display.
- Select your desired value by briefly pressing UP or DOWN.

- **CI\_L = (release signal)** The device operates as soon as **GND** at the control input **falls**
  - **CI\_H = (release signal)** The device only operates as long as **voltage is applied** at the control input.
- Confirm your setting by briefly pressing ENTER. The text CI will appear on the display again.
  - Scroll with UP or DOWN until the text EXIT appears on the display.
  - Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!**

**You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).**

**Attention!**

Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.16 Description and setting of the TRL mode (Trailer)

The TRL mode is applied for vehicles without a permanent voltage supply, like e.g. trailers or semi-trailers.

**Setting this mode is done under the menu item APTY (see chapter 8.5.2 Set the control mode TRK or TRL).**

The device is mainly supplied with voltage by the brake lights (and thus only during brake application) and if available, by the taillights.

There are **two control variants** for the cycle time available in the TRL mode.

The cycle time can be controlled by the **number of braking impulses**. After the set number of braking impulses, the control unit will start a lubrication process.

**Additionally**, it is also possible to control the cycle time by a **time interval**. Depending on which interval is completed first, the lubrication process is started. Both intervals are reset and start anew.

The lubrication time is defined by the number of revolutions of the pump shaft.

**Setting is done as described under chapter 8.13.1 Set the device revolutions.**

As the lubrication time (pump operates) can only be processed when voltage is applied to the device, it is possible that a new lubrication cycle would already have to start while the current lubrication time has not yet been processed completely. The remaining number of revolutions is stored by a special timer. If this occurs several time, the number of revolutions is added up in the timer but only up to twice of the set number of revolutions in order to prevent overlubrication.

The device will take every opportunity to continue the lubrication process, i.e. lubrication starts as soon as voltage is available.

During the period within which the added revolutions from the timer are processed, possibly completed lubrication intervals (braking intervals or time intervals) might be ignored. When all revolutions are processed, the cycle will start anew.

## 8.16.1 Set the number of braking impulses

### Note!

You will only see the following setting mode if you have previously selected the **TRL mode**.

### Procedure:

- Press the UP key (fig. 17) for longer (>10 sec) to access the User setup menu. The text GIV will appear on the display.
- Scroll with the UP or the DOWN key until the text **NBRK** appears on the display.
- Briefly press ENTER to get one level up in the menu. The text B050 (default) or your currently set value will appear on the display.
- Select your desired value by briefly pressing UP or DOWN.
  - **B001 = 1 braking impulse**
  - **B002 = 2 braking impulses**
  - ...
  - **B050 = 50 braking impulses**
  - ...
  - **B999 = 999 braking impulses**
- Confirm your setting by briefly pressing ENTER. The text Text NBRK will appear on the display again.
- Scroll with UP or DOWN until the text EXIT appears on the display.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

### Note!

**You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).**

### Attention!

Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

## 8.16.2 Set the timer for the cycle time

### Note!

You will only see the following setting mode if you have previously selected the **TRL mode**.

### Procedure:

- Press the UP key (fig. 17) for longer (<10 sec) to access the User setup mode. The text GIV will appear on the display.
- Scroll with the UP or the DOWN key until the text **TGIV** appears on the display..
- Briefly press ENTER to get one level up in the menu. The text TD\_D (default) or your currently set value will appear on the display.
- Select your desired value by briefly pressing UP or DOWN. .
  - **TG\_D = time interval deactivated**
  - **TG\_E = time interval activated**
- Confirm your setting by briefly pressing ENTER. The text TGIV will appear on the display again
- Scroll with UP or DOWN until the text EXIT appears on the display.
- Confirm with ENTER. The control unit will switch into the work mode. The letter W (Work) will appear on the display.

**Note!**

You have to confirm your changed setting with the EXIT function as otherwise it will get lost with restart of the device (switching the voltage off and on again).

**Attention!**

Your selected setting will become active with the next restart of the device. Switch the voltage off and on again or reset the cycle to that purpose (see chapter 8.3.3 Start intermediate lubrication or Reset cycle).

Setting of the time is done as described in chapter 8.16.1 Set the cycle time.

Fig.28:

Table for the User setup mode:

Message	Meaning	Available values	Default
GIV	Setting Greasing InterVal (min)	GIV1 = 5 min	GIV4
		GIV2 = 10 min	
		GIV3 = 15 min	
		... (see table fig. 26)	
		GIV0 = 240 min	
CTR	ConTRol input enable / disable (@ APTY = TRK)	CTRD ConTRol input Disable	CTRD
		CTRE ConTRol input Enable	
CI	Control Input low / high (@ APTY = TRK)	CI_L = Low	CI_H
		CI_H = High	
PLS	Number of PuLSes (only @ MODE = PULS)	PL01 = 1 Cycle	PL01
		PL02 = 2 Takte / Cycles	
		PL03 = 3 Takte / Cycles	
		...	
		PL99 = 99 Takte / Cycles	
TOUT	Time OUT (only @ MODE = PULS)	TI01 = 1 min	TI12
		TI02 = 2 min	
		TI03 = 3 min	
		...	
		TI59 = 59 min	
NBRK	Number of braking impulses (@ APTY = TRL)	B001 = 1 brake impulse	B050
		B002 = 2 brake impulses	
		...	
		B050 = 50 brake impulses	
		B999 = 999 brake impulses	
TGIV	Time interval enable / disable (@ APTY = TRL)	TG_E = Enable	TG_D
		TG_D = Disable	
AOD	Amount Of Delivery (@ APTY = TRK and APTY = TRL (@ TGIV = enalbe))	AOD1 = 1000 mm <sup>3</sup>	AOD6
		AOD2 = 2000 mm <sup>3</sup>	
		AOD3 = 3000 mm <sup>3</sup>	
		... (see table fig. 27)	
		AOD0 = 10000 mm <sup>3</sup>	
EXIT	Confirms the settings made		

## 8.17 Errors and warnings

Errors and warnings are displayed with a code (see table fig. 30).

Fig.29:



The control unit differentiates between error and warning.

The device is switched off in case of an error in order to prevent major damage.

The device will continue to operate in case of a warning in order to ensure lubrication, however only until a situation occurs that triggers the error signal.

The errors and warnings have different priorities.

The higher the code is, the lower is the priority.

E1 = highest priority

E17 = lowest priority

If several errors and warnings occur at the same time, the display will show the error or warning with the highest priority. With the UP or the DOWN key (fig. 17) you can scroll through the list of active errors and warnings.

You can reset errors and warnings by briefly pressing ENTER (fig. 17). However, if the cause of the error or warning is not remedied, the error or warning will occur again with the next lubrication cycle.

After remedy of the error cause, the error code is reset automatically. Certain errors, with which the motor of the device is blocked, require that the voltage is switched off and on again to release the device motor.

The control unit will immediately start with a new lubrication cycle then.

Fig.30:

Priority	Code	Alarm	Description	Motor shutdown	Remarks / Reactions
1	E1	Pump Short Circuit	When motor is detected as to be in short circuit	Yes	<ul style="list-style-type: none"> <li>The control unit makes a max. of 5 attempts to start the device.</li> <li>After this, the control unit stops the motor and shows the error continuously.</li> <li>Further attempts to start the motor can only be started after switching the voltage off and on.</li> </ul>
2	E2	Pump open load	When motor last = 0 A (open load)	Yes	Same as E1
3	E3	Pump overcurrent	When motor last is over current (see setting code OC)	Yes	Same as E1
4	E4	Revolution error	The pump shaft revolutions are too low	Yes	Same as E1

Priority	Code	Alarm	Beschreibung Description	Motor shutdown	Remarks / Reactions
4	E4_P	Distributor pulse error	The pulses of the distributor were not reached within the monitoring time	Yes	Same as E1
5	E5	Reservoir is empty	The reservoir is empty, the remaining revolutions are processed.	Yes	Fix the error immediately. Start an additional lubrication cycle to return the magnet in the tank back to the „tank full“ position and reset the error message (for paddle reservoir) Vent the lubrication system (if necessary)
6	E6	Min. level is reached	The reservoir is almost empty.	No	A certain number of revolutions will be processed (see fig. 21).
7	E7	Overvoltage	If >18 V for 12 V operating voltage If >32 V for 24 V operating voltage	No	Shutdown when >35 V
8	E8	Under-voltage	If <10 V for 12 V operating voltage If <20 V for 24 V operating voltage	No	Shut down when $V_{in} < 9,0$ V
9	E9	Lamp open load	If the load at the connection of the external signal lamp is 0 V (lamp not connected or line to lamp defective)	No	Check and replace the lamp, install a lamp if necessary, or disable the output in the controller.
10	E10	Lamp overcurrent	Lamp overcurrent failure	No	None
11	E11	Pressure switch(es) error	Overpressure on one or more PRSW (one or more contact closed)	No	None
12	E12	Pressure switch open load	At least 1 pressure switch is not connected or defective	No	None
13	E13	Temperature limit exceeded	The ambient temperature is above the max. limit	No	None
14	E14	Temperature below limit	The ambient temperature is below the minimum limit	No	None
15	E15	RTC battery low	Warning RTC (Real-Time-Clock) battery is low	No	None
16	E16	RTC-error	RTC error	No	None
17	E17	Checksum Error	EEPROM Checksum error	No	None

## 8.17.1 Error history

The errors that have occurred are saved for life in the error history. Deleting/resetting the error memory is only possible by the manufacturer.

**Note!** The error history is read out using the app.

**The error memory is displayed with the following information:**

- Type of error
- Start of error
- End of the error (for temporary errors or after the cause has been eliminated)

**The following errors appear in the error history:**

- Over/under voltage
- Pump short circuit / pump overcurrent
- Lamp open load / pump overcurrent
- Reservoir empty
- Low level error
- Overpressure error
- Overtemperature / undertemperature

## 9. Assembly instructions

### 9.1 Assembly of the device

Check the device for possible transport damage and for completeness before assembly.

Remove the transportation protection.



The following conditions must be met for assembly of the device, so that it can be assembled properly and in an environmentally friendly manner into a complete machine, without compromising the safety and health of persons and other parts.

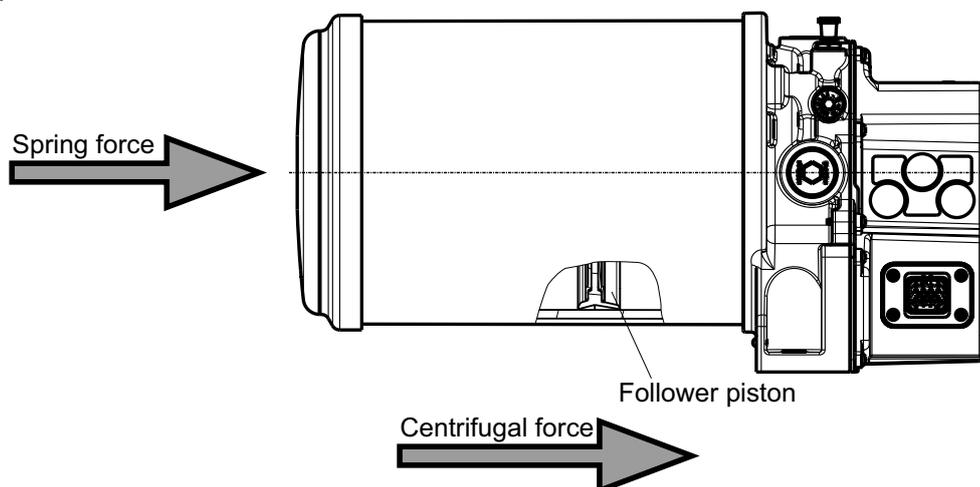
#### 9.1.1 Device with paddle reservoir for grease and oil

Mount the device at the site of installation in balance on both sides, with the reservoir standing vertically upright in order to ensure safe operation. The device may not be exposed to centrifugal forces.

#### 9.1.2 Device with follower plate reservoir

The device can be mounted in any optional position at the site of installation. However, for a rotating installation, mount the follower piston in direction of the centrifugal forces so that the follower piston movement is promoted by the force from the rotation.

Fig.31:



### 9.1.3 Device with grease cartridge reservoir

The device can be mounted in any optional position at the site of installation. The device may not be exposed to centrifugal forces.

### 9.1.4 General installation instructions

Please select your setup location for the device so that it is protected against environmental and mechanical impacts.

Check whether you can use possibly already existing installation holes in the vehicle chassis for assembly of the device. Please also refer to the information on the fastening bores given on the dimension diagrams (16. dimensional drawing).

Keep to the specifications of the machine manufacturer if you need to drill new holes or if welding is required.

Please mind not to damage parts which could be behind the part you want to drill holes in, such as e.g. lines or air reservoirs.

Remove any chips after drilling a hole (with compressed air or brush) and treat the surface against corrosion.

If it is required to use a mounting plate, ensure that it does not rest on the vehicle's profile flange and do not drill any additional fastening holes into the flange.

Mount the pump **2 screws M8** (tightening torque **22 Nm**).

Ensure free access to the device, e.g. for refilling lubricant and to enable an easy visual check. Especially for devices with integrated control unit, the display must be visible and accessible.

## 9.2 Line assembly

- Pay attention to a professional layout of the lines.
- Only use cleaned and seamless precision steel pipes for the pipe lines.
- Mount the pipe lines professionally and strain-free.
- Observe the requirements of the fittings for pressure tightness.
- All components must be approved for the max. operating pressure (see technical data).

## 9.3 Electrical connection



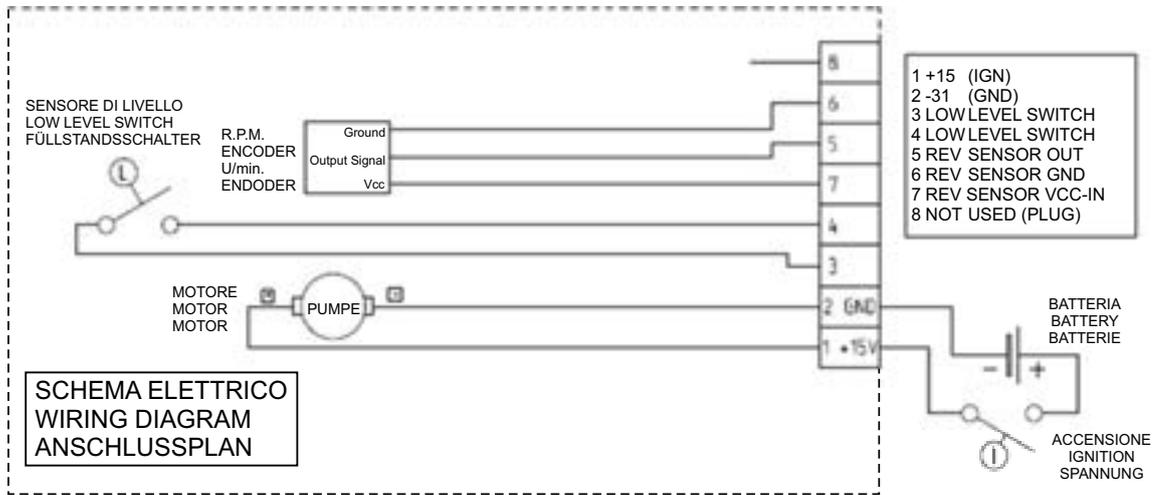
- Have the electrical supply only connected by a qualified electrician.
- Make sure that all electrical components of the device are wired professionally.
- Please check the available mains voltage against the voltage data on the device (see technical data).
- Ensure professional equipotential bonding via an according ground connection.



Avoid electrostatic discharge! There are components integrated into the devices which you can destroy by electrostatic discharge when you touch them. Mind the safety precautions against electrostatic discharge acc. to DIN EN 61340-5-1/-3. Ensure that the environment (persons, workplace and packaging) is well grounded when handling the devices.

### 9.3.1 Connection diagram GPA pump

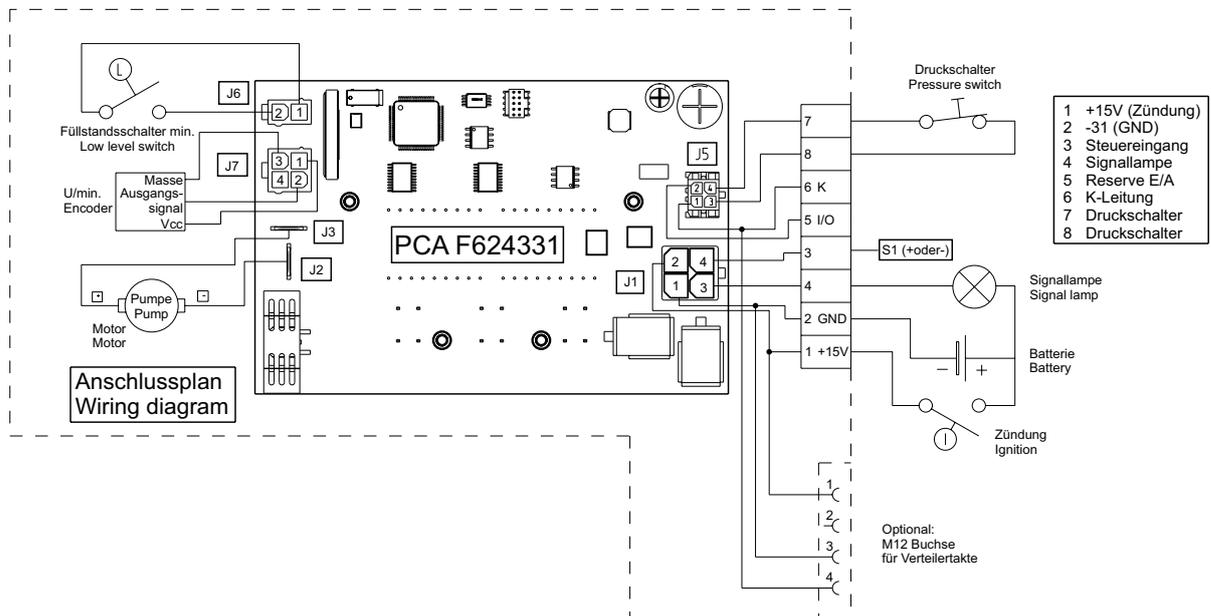
Fig.32:



PIN	GPA (standard version)
1	+15 (ignition)
2	-31 (ground)
3	level switch min
4	level switch min.
5	
6	
7	
8	Not assigned (plug)

### 9.3.2 Connection diagram GPA+ pump

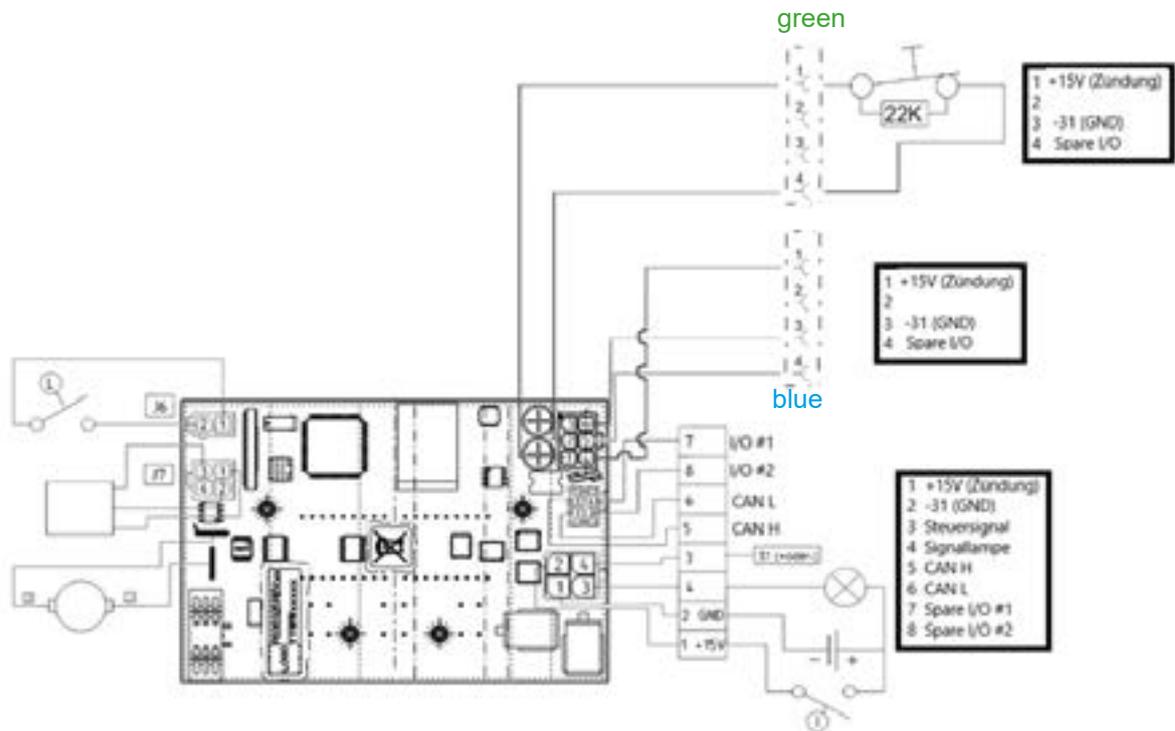
Fig.33:



PIN	Truck version	Trailer version
1	+ 15 (ignition)	Tail Lights
2	- 31 (ground)	- 31 (mass)
3	Control input	Brake lights
4	Lamp signal output	Lamp signal output
5	Spare I/O	Spare I/O
6	K-Line	K-Line
7	Pressure switch contact 1#	Pressure switch contact 1#
8	Pressure switch contact 2#	Pressure switch contact 2#

### 9.3.3 Connection diagram GPO pump

Fig.34:



#### PIN assignment

#### Connection plug

PIN	Version for trucks (TRK)	Version for trailers and semi-trailers (TRL)
1	Ignition, clamp 15	Taillight
2	Ground, clamp 31	Ground, clamp 31
3	Control signal	brake light
4	Signal lamp	Signal lamp
5	CAN H	CAN H
6	CAN L	CAN L
7	Spare I/O #1	Spare I/O #1
8	Spare I/O #2	Spare I/O #2

Connector M12x1 (pulse sensor)  
(blue identification nut)

PIN	GPO (Standard version)
1	+ 15 V (ignition)
2	
3	-31 (ground)
4	Spare I/O

Connector M12x1 (overpressure sensor)  
(green identification nut)

PIN	GPO (Standard version)
1	+ 15 V (ignition)
2	
3	-31 (ground)
4	Spare I/O

### 9.3.4 Electrical lines and fuses

In order to avoid damage of the electrical system of the vehicle or the machine, you have to install the proper fuses in the circuit (+ terminal 15).

**Note!**

This goes not for systems with a GPA+ / GPO pump at trailers as these systems will use the already sufficiently fused brake and tail light circuits of the vehicle.

The GPA+ / GPO pump is secured against return current and will not operate in this condition.

Fig.35:

Operating voltage	Fuse	Fuse type
12 V	15 A	Slow acting automotive fuse
24 V	10 A	Slow acting automotive fuse

Check whether the system which you wish to install and the planned methods meet the requirements of the intended application:

- the components (e.g. the pump, wiring and switches).
- position of the components at the vehicle.
- how the lubrication system should be connected to the electrical system of the vehicle.

**Further:**

- Only do the wiring after the main components of the lubrication system have been mounted (e.g. the pump, the signal lamp, the monitoring switches at the distributor blocks).
- Where possible, try to run the electrical wiring along the lubrication lines and fix the wiring together with the lubrication lines.
- Connect the „trailer pump“ with the supply lines and the potential connection.

**Attention!**

Do not interchange these connections.

- Establish the connection in a waterproof terminal box at the trailer.
- Make sure that the connection cables are properly led into the terminal box (waterproof).

Fig.36:

PIN	Color	Cable Ø (mm <sup>2</sup> )
1	red	2,50
2	black	2,50
3	green	0,75
4	orange	0,75
5	pink	0,75
6	purple	0,75
7	light blue	0,75
8	grey	0,75

## 10. Start-up

Before start-up, some points must be observed, otherwise the proper functioning of the system cannot be guaranteed.

### 10.1 Fill the device

Fill the device reservoir with lubricant before initial start-up.

#### 10.1.1 General

- Clean the device, especially the zerk fitting for filling and its immediate surroundings to avoid the ingress of dirt.
- Fill the reservoir up to max. level as indicated on the reservoir.

**Attention!**

Never fill the device above max. level to prevent possible damage.

- Please observe the the specifications of the machine manufacturer when you select the lubricant!

**Note!**

Only use lubricants acc. to the specifications of the machine manufacturer!

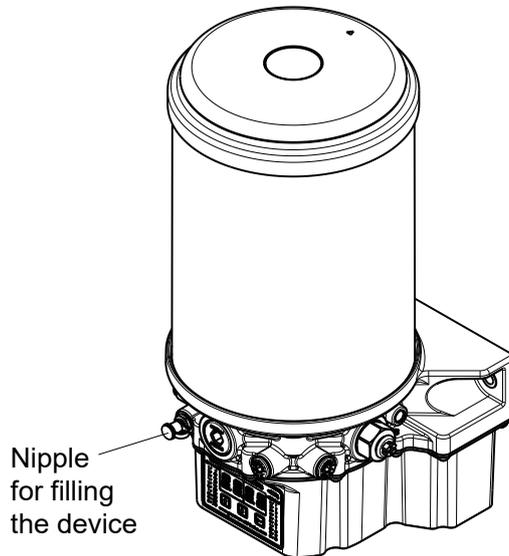
- Collect possibly leaking lubricant in a suitable receptacle and dispose of it properly!
- Please observe the safety data sheet of the manufacturer.
- The flow properties of the lubricant vary with the operating temperature!
- Please ensure utmost cleanliness during refilling!
- Check the level several times and at equal intervals during the first hours of operation. Refill clean lubricant when necessary.

### 10.1.2 Standard filling of the reservoir with paddle or follower plate

Fill the device as a standard via the filling zerk fitting at the device.

- Please observe the instructions under 10.1.1 General.
- Fill the device using a standard hand-lever grease gun.

Fig.37:



#### Note!

Air which possibly has been entrapped during filling, can escape from the follower plate reservoir through an opening at the top of the plate. These air inclusions will come out at the vent bore on the side of the device, together with excess lubricant. The paddle reservoir has a vent valve on top with the same function.

### 10.1.3 Filling the oil reservoir

- Follow the instructions in chapter 10.1.1 General information.
- The oil reservoir should be filled via the socket on the reservoir cover.
- Remove the red cover cap.
- Place the socket of the filling pump on the filter edge.
- Fill the pump to the specified maximum fill level.

The oil flows through a filter sieve into the reservoir.

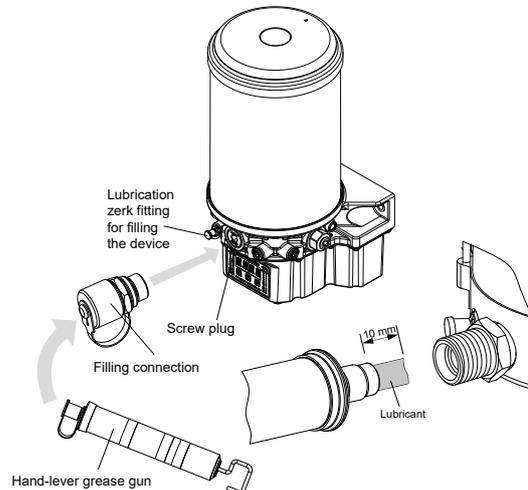
- After filling, clean any leaked oil from the filling connection and screw the red cover cap back on.

#### 10.1.4 Fill the paddle reservoir via a filling connection

You can also fill the device with a standard grease gun (article no. 10125287).

To that purpose, install a filling connection (article no. 10104309) into one of the pump outlets (fig. 38).

Fig.38:



- Please observe the instructions under 10.1.1 General.
- Remove the screw plug (fig. 38).
- Screw the filling connection in instead.
- Unscrew the protective cap of the filling connection.
- Press the grease gun until the lubricant visibly escapes at the outlet (ca. 10 mm, see fig. 38).
- Fill the reservoir up to the indicated max. level.
- Clean the filling connection from possibly leaked lubricant.
- Screw the protective cap on the filling connection again.

#### 10.1.5 Fill the follower plate reservoir via a filling connection

You can also fill the device with a standard grease gun (article no. 10125287).

To that purpose, install a filling connection with non-return valve (article no. 10142494) into one of the pump outlets (fig. 38).

- Please observe the instructions under 10.1.1 General.
- Remove the screw plug (fig. 38).
- Screw the filling connection in instead.
- Unscrew the protective cap of the filling connection.
- Press the grease gun until the lubricant visibly escapes at the outlet (ca. 10 mm, see fig. 38).
- Fill the reservoir up to the indicated max. level.
- Clean the filling connection from possibly leaked lubricant.
- Screw the protective cap on the filling connection again.

### 10.1.6 Replace the 3L lubricant cartridge

The cartridge is placed under a cover and can be easily replaced.

**Attention!** Avoid that dirt gets into the device during cartridge replacement.

- Clean the device and its immediate surroundings first, before you remove the cartridge cover.
- If you have to remove a cartridge which is not drained completely, it might happen that lubricant comes out.

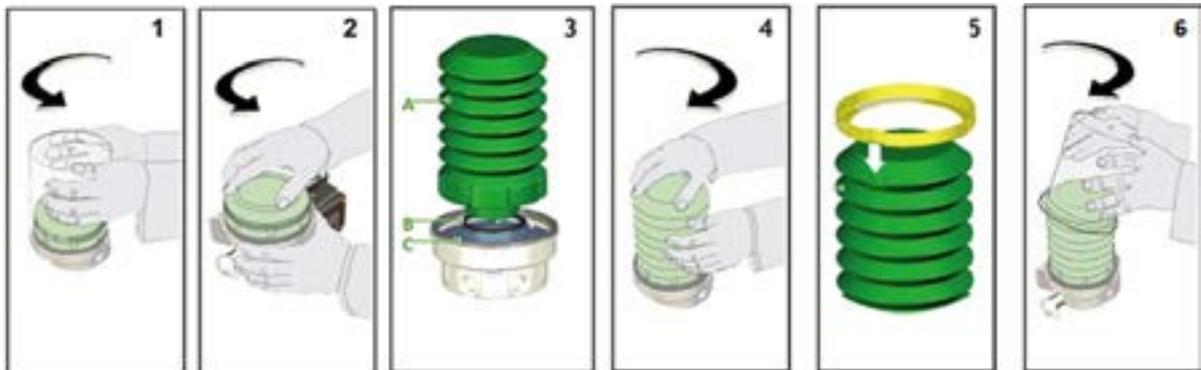
**Attention!** Protect the environment and avoid lubricant leakage. Dispose of empty cartridges and lubricant residues properly and in accordance with local regulations.

- Turn the cover counterclockwise and remove it (1, fig. 39).
- Turn the empty cartridge counterclockwise and lift it straight upwards (2, fig. 39).

**Attention!** Make sure that you remove the rubber sealing ring together with the old cartridge (3, fig. 39, B).

- Remove the cover of the new cartridge.
- Apply a lubricant film on the cartridge ring.
- Screw the cartridge clockwise on the device (4, fig. 39).
- If there is a level monitoring installed into the device, reuse the magnet ring. Push the ring over the first edge of the cartridge. Make sure that you place the ring in the correct position (5 fig. 39).
- Clean the cover and put the device on again. Screw clockwise until it clicks into. (6, fig. 39).

Fig.39:



### 10.1.7 Vent the lubrication system

Vent the complete system with commissioning and after each lubricant change!

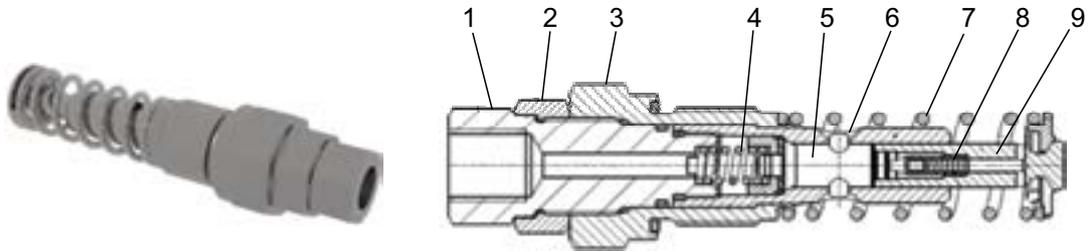
Venting is done by pressureless operation with the system outlets open!

Operate the device until lubricant comes out at the pressure connection free of air bubbles.

### 10.1.8 Set the delivery rate of adjustable pump elements

- Loosen the nut (2, fig. 40) with an open-end wrench AF 22.
- Unscrewing the nut (1, fig. 40) reduces the delivery rate by 200 mm<sup>3</sup>/min (12,5 mm<sup>3</sup>/rev) with each 1/4 turn (90° turn). Use an open-end wrench AF19.
- After completion of the setting, tighten the nut (2, fig. 40) with a drawing torque of 15Nm. Use an open-end wrench AF22.

Fig.40:



## 11. Maintenance



**Disconnect** the device **from voltage** before any maintenance or repair.

Only carry out any **maintenance or repair** at **complete standstill** and under **pressureless condition**. Check the surface temperature of the device, as there is the **risk of burns** due to heat transfer. Wear heat-resistant gloves and safety goggles!



Clean soiled or contaminated surfaces before maintenance, wear protective equipment if necessary. Protect the device against recommissioning during maintenance/repairs!

### 11.1 General maintenance

- Retighten all fittings 6 weeks after start-up!
- Check all components for leakages and damage at least every 4 weeks!
- Check the complete pump for operating and functional reliability. Carry out one cycle and check whether the device conveys lubricant.
- When you use a high-pressure cleaner or steam cleaner to clean the vehicle or the machine, do not expose the pump unit directly to the jet. This is to avoid that water enters the pump unit, e.g. via the vent bore. However, during normal operation, no water can get into the pump unit.



Leaks that have not been removed may cause **lubricant** to **escape** under **high pressure**. If puddles of lubricant have formed due to leakage, remove them immediately.

### 11.2 Lubricant change

**Attention!**

Ensure utmost **cleanliness** when **refilling** the **lubricant**!

- Check the filling level regularly and refilly clean lubricant if necessary. Proceed as described in the chapter Start-up!
- Carry out the lubricant change according to the specifications of the lubricant manufacturer. Environmental influences like increased temperature or pollution can shorten the intervals!
- Please mind to only use lubricants which are suitable for the device as well as the machine to be lubricated and which meet the requirements of the respective operating conditions!
- When the used lubricants are from **different suppliers**, make sure that the lubricant quality corresponds to the **quality** of the previously filled lubricant! As a precaution, the lubricant reservoir should be drained and cleaned properly!

## 12. Repair

### 12.1 Repair of the central lubrication system

Blocking of the central lubrication system might have several reasons:

- a crushed or clogged line
- a bearing overfilled or clogged with lubricant
- a blocked pump element
- an unsuitable lubricant for the central lubrication system

#### Find the blocked point:

Detach line by line from the respective pump element and actuate an additional lubrication cycle.

The pump element at which the device operates again, is the reason for the blockage.

Please check now, whether the corresponding hose line is passable.

Connect the line to the pump element again to that purpose and detach the end at the lube point.

Actuate an additional lubrication cycle.

If the device blocks, the line is defective. Replace the line.

If the device does not block, the lube point is defective. Repair the lube point.

#### Find the defective pump element:

If your search for the defective line / lube point is not successful, unscrew each pump element individually from the housing.

The pump element at which the device operates again is the defective pump element. Replace the pump element.

#### To be sure you should also check the lubricant.

If you should detect, that improper lubricant has been filled, exchange it. Proceed as described under 11.2 (Lubricant change).

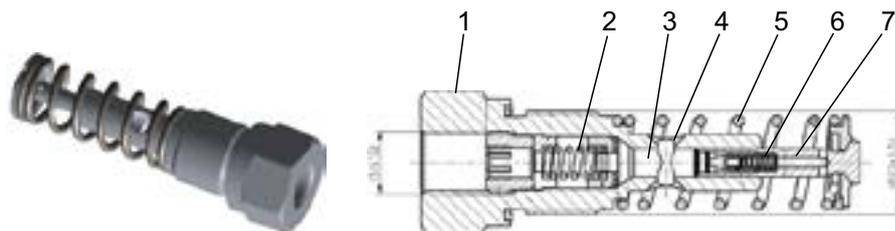
#### 12.1.1 Installation and removal of a pump element

If you have found that one of the pump elements is defective, replace it immediately.

##### Proceed as follows:

- Remove the pump element by detaching the nut (3, fig. 41 or 1, fig. 41) from the housing bore. Use an open-end wrench AF27.
- Replace the pump element by a new one and tighten it with the open-end wrench and a torque of 15 Nm.

Fig.41:



### 13. Shutdown

- Relieve the device from pressure!
- Switch off the electrical power supply!
- Have electrical components disconnected from the electrical power supply by a qualified electrician!
- Remove any pipes and hose lines for disassembly and detach the fastenings!

### 14. Disposal

**Observe the disposal instructions of the lubricant manufacturer when lubricant is changed!**

**Note!**

**Collect lubricants or cloths contaminated with lubricant or similar in specially marked receptacles and dispose of properly.**

**Dispose of the device professionally and properly and in accordance with the national and international laws and regulations.**



**Moreover, Groeneveld-BEKA devices could contain batteries. Professionally and properly disposed of batteries will be recycled. They contain important raw materials.**

## 15. Troubleshooting

### 15.1 General troubleshooting

Fig.42:

Error	Possible cause	Possible troubleshooting
Device does not operate	Fuse defective	Replace fuse
	Electrical line defective or incorrectly connected	Check electrical connection and renew it if necessary
	Device defective	Repair or replace the device
	A lube point is not supplied, the system blocks	See instructions under 12.1 Repair of the central lubrication system
Device operates, but does not convey lubricant	Air cushion in reservoir	Vent the device
	Reservoir empty	Refill reservoir and vent device
	Poor or wrong lubricant	Change lubricant
The device operates, but conveys less lubricant	Device turns slower	See error „Device operates with reduced revolutions“
	Poor or wrong lubricant	Change lubricant
	The respective pump element is worn	Replace pump element
Device operates with reduced revolutions	Low ambient temperature	No damage Actuate one or two additional lubrication operations
	High backpressure	Check the central lubrication system If no damage is detected, actuate one or two additional lubrication operations
	Incorrect power supply	Compare the available voltage with the voltage specifications on the device
The conveyed lubricant contains air bubbles	Air got in during refilling	Vent the device
	Device reservoir has been drained completely	Refill reservoir and vent device
	The respective pump element is worn	Replace pump element
	Poor or wrong lubricant	Change lubricant
No or little lubricant at all lube points	Device does not operate	See error „Device does not operate“
	Reservoir empty	Refill reservoir and vent device
	Device operates but conveys less lubricant	See error „Device operates but conveys less lubricant“
	Device operates with reduced revolutions	See error „Device operates with reduced revolutions“

<b>Error</b>	<b>Possible cause</b>	<b>Possible troubleshooting</b>
No or little lubricant at some lube points	Corresponding distributor (main or secondary distributor) blocks	Search the error as described under 12.1 Repair of the central lubrication system
	Corresponding line is burst, squashed or leaky	Replace the line
	Corresponding fitting is leaky	Retighten fitting or replace it
	The outlet at the main distributor that feeds the respective secondary distributor is calculated incorrectly	Exchange the main distributor after recalculation
	Corresponding pump element is worn	Replace pump element
No or only little lubricant at one lube point	Corresponding lubricant line is burst, squashed or leaky	Replace lubricant line
	Corresponding fittings are leaky	Retighten fittings or replace them
	Lube point connected to wrong distributor outlet	Compare central lubrication system with the corresponding lubrication scheme
	Secondary distributor has been calculated incorrectly	Exchange the secondary distributor after recalculation
Too much lubricant at some lube points	The outlet at the main distributor that feeds the respective secondary distributor is calculated incorrectly	Exchange the main distributor after recalculation

## 15.2 Troubleshooting for the GPA+ / GPO device in TRK mode

**Note!**

Please also refer to chapter 15.1 General troubleshooting

Fig.43:

Error	Possible cause	Possible troubleshooting
Device does not operate	Error in the system	Please see device display. Find an explanation of the error codes under 8.14 Errors and warnings
No or little lubricant at all lube points	Too long lubrication interval GIV-	Shorten interval GIV, see chapter 8.9 Description and setting of the TRK mode (Truck)
	Set lubricant quantity AOD is too little	Increase setting value, see chapter 8.10.1 Set the revolutions of the device
	Set cycle pulses too low	Increase cycle pulses, see chapter 8.11.1 Set the number of distributor pulses
Too much lubricant at all lube points	Too short lubrication interval GIV	Extend lubrication interval GIV, see chapter 8.9 Description and setting of the TRK mode (Truck)
	Set lubricant quantity AOD too high	Reduce setting value, see 8.10.1 Set the revolutions of the device
	Set cycle pulses too high	Reduce cycle pulses, see chapter 8.11.1 Set the number of distributor pulses

### 15.3 Troubleshooting for the GPA+ / GPO device in TRL mode

**Note!**

Please also refer to chapter 15.1 General troubleshooting

Fig.44:

Error	Possible cause	Possible troubleshooting
Display is off	No error Display is on standby	Press one of the function keys to activate display
Device does not operate	Error in the system	Please see device display. Find an explanation of the error codes under 8.14 Errors and warnings
No or little lubricant at all lube points	Set number of braking intervals NBRK is too high	Reduce the number of braking intervals NBRK, see chapter 8.13.1 Set the number of brake intervals
	Too long lubrication interval TGIV.	Reduce lubrication interval TGIV, see chapter 18.13.2 Set timer for the cycle time
	The set lubricant quantity AOD could not be reached several time, see chapter 8.13 Description and setting of the TRL mode (Trailer).	Actuate one or two additional lubrication operations, see chapter 8.3.3 Actuate intermediate lubrication or reset cycle.  Make sure that voltage supply is to the device is secured during this time
Too much lubricant at all lube points	Set number of braking intervals NBRK too low.	Increase the number of braking intervals NBRK, see chapter 8.13.1 Set the number of brake intervals
	Too short lubrication interval TGIV	Extend lubrication interval TGIV, see chapter 18.13.2 Set timer for the cycle time

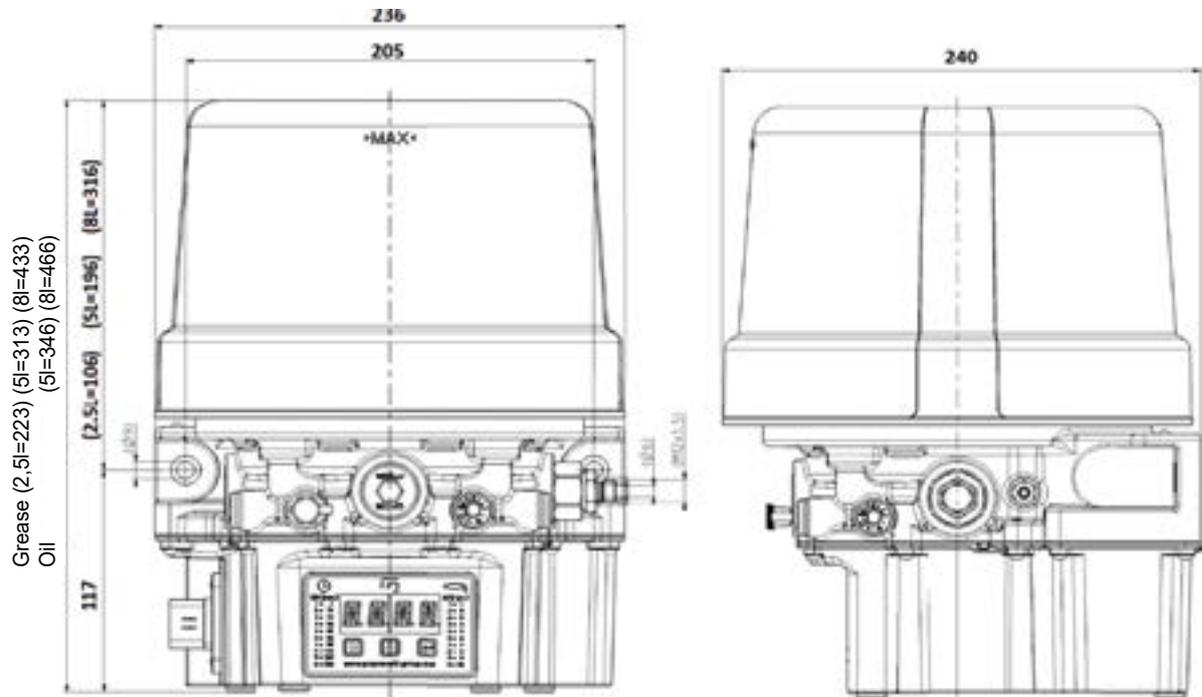
In case of an error which is not described in here, please read out the error memory.

If it is still not possible to fix the problem, please contact our Groeneveld-BEKA customer service.

16. Dimensional drawing

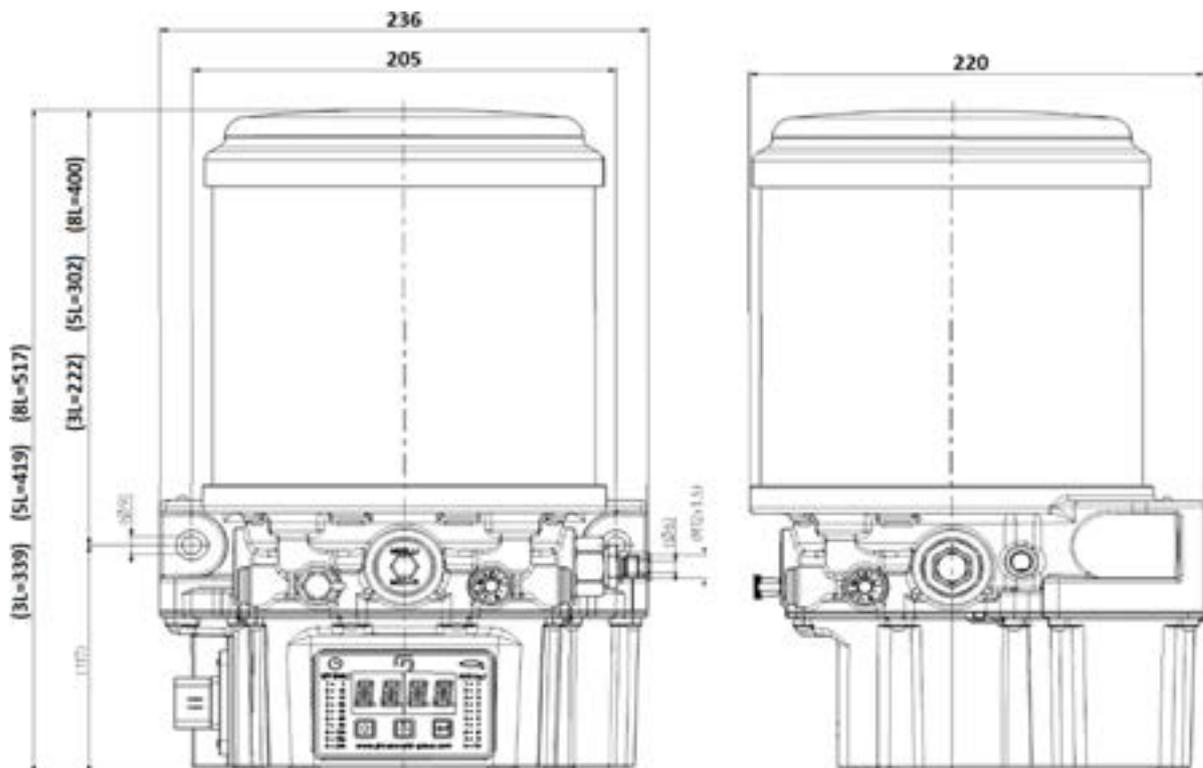
16.1 Dimensional drawing of the device with paddle reservoir

Fig.45:



16.2 Dimensional drawing of the device with follower plate reservoir

Fig.46:



17. User manual Lube Connect

## GPO MOBILE APP - USER GUIDE



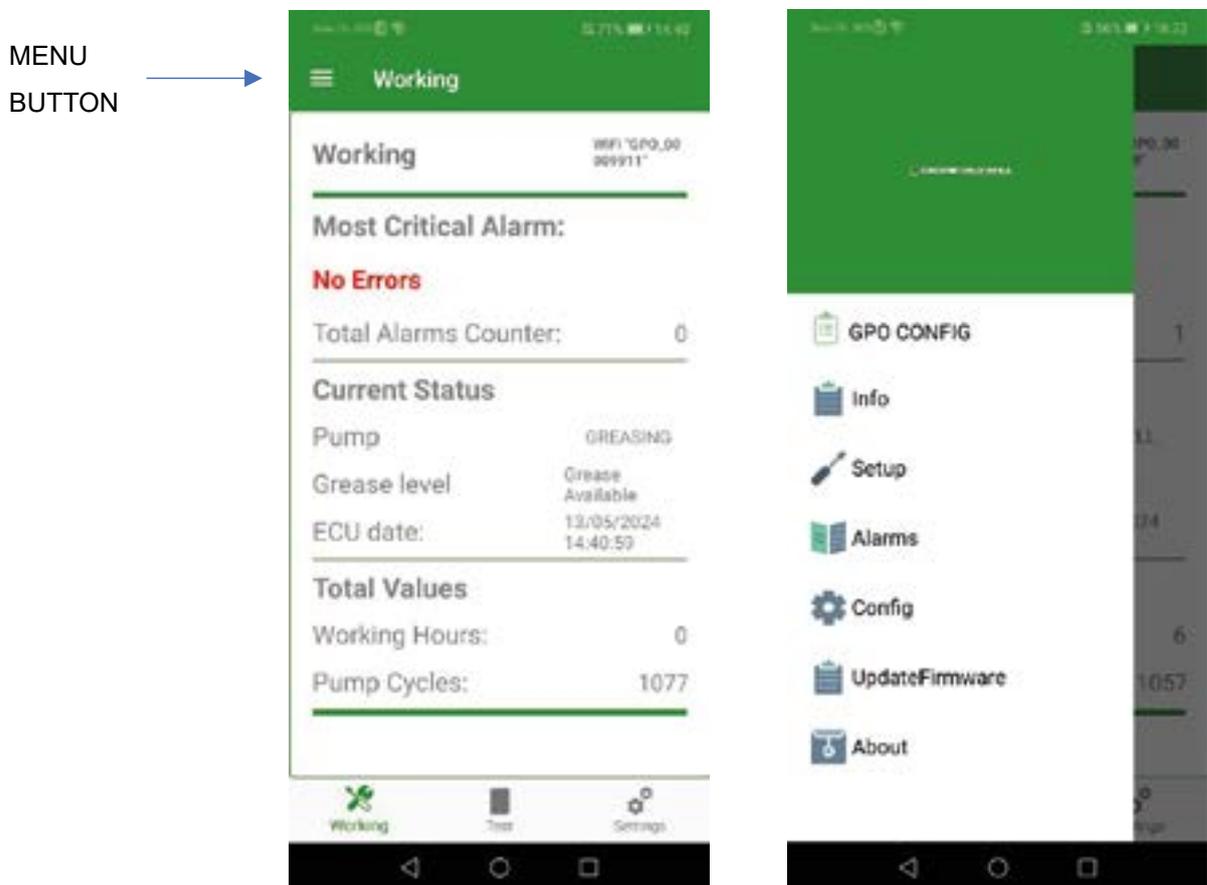
## Introduction

This guide is aimed at demonstrating the general use of the app.  
The application purpose is to act as an interface between the user and the GPO board.

Almost every setting and parameter present and used by the firmware can be read and set by the application. A few advanced features are available (e.g. the update of the firmware over Wi-Fi).

## App Navigation

To navigate the app, the main way is by the use of the menu button on the left.



From the starting page, you can navigate either through the three tabs (shown at the bottom, Working, Test and Settings), or select a page from the menu

## List of available settings/parameters per page

In the following table every present parameter is reported and linked to the page it can be found in.

SETTING/PARAMETER	PAGE	DESCRIPTION
Most critical alarm (DTC)	Working Page	e.g. E2 Pump Open Load
Total alarms counter	Working Page	Number of active alarms
Pump current status	Working Page	Greasing/Idle
Grease Level	Working Page	Low Level status
ECU date	Working Page	
Total working hours	Working Page	
Total pump cycles	Working Page	
Motor status	Test Page	
Motor ON/OFF	Test Page	Current status of the pump
Motor DTC	Test Page	Motor error DTC (if present)
Motor voltage	Test Page	Analogic voltage read from the motor
Motor current	Test Page	Analogic current read from the motor
Lamp status	Test Page	
Lamp mode	Test Page	Mode (Auto, on, off)
Lamp DTC	Test Page	Lamp error DTC (if present)
Power supply voltage (PWS)	Test Page	Voltage supplied to the pump
Pressure switch	Test Page	Pressure switch read value
Low level sensor	Test Page	Enabled/Disabled
Control input	Test Page	Set/Not set
Revolution sensor	Test Page	Set/Not set
Display mode	Test Page	Mode (Auto, on, off)
Spare I/O 1 Mode	Test Page	Input/Output
Spare I/O 1	Test Page	Analogic read
Spare I/O 2 Mode	Test Page	Input/Output
Temperature	Test Page	
Greasing interval time	Settings Page	Duration of the interval (GIV)
Amount of delivery	Settings Page	(AOD)
Time GIV enable	Settings Page	Enabling of time GIV (used for TRL)
Brakes number	Settings Page	



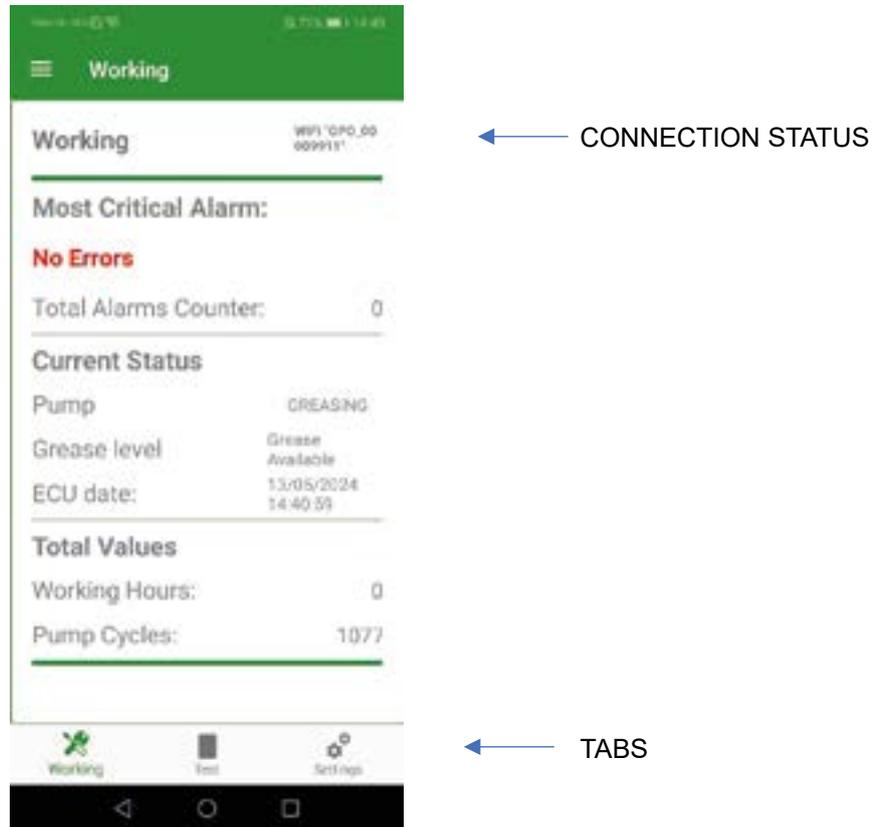
Control input enable	Settings Page	
Control input level	Settings Page	High or low
PCA Model	Info Page	(data read from the board)
PCA Serial Number	Info Page	(data read from the board)
Production date	Info Page	(data read from the board)
System part number	Info Page	(data read from the board)
Firmware version	Info Page	(data read from the board)
Application type	Setup Page	TRL or TRK
Pump type	Setup Page	Follower, cartridge or paddle
Outlet number	Setup Page	
Piston number	Setup Page	
Low level enable	Setup Page	
Low level config	Setup Page	Close or open
Lamp enable	Setup Page	
Pump cycle info on lamp	Setup Page	Lamp will blink during pump cycle
Low level warning on lamp	Setup Page	Lamp will be on if low level is detected
Pressure switch	Setup Page	Pressure switch number selection
Working mode	Setup Page	STD or PULSE
Pulse count	Setup Page	
Pulse timeout	Setup Page	
Overcurrent	Setup Page	Overcurrent selection
Motor version	Setup Page	12V or 24V
CAN ON/OFF	Configuration Page	
CAN speed	Configuration Page	250k or 500k
CAN mode	Configuration Page	Fixed CAN address or detected
CAN address	Configuration Page	
Network (management)	Configuration Page	(fixed)
Wi-Fi ON/OFF	Configuration Page	
Wi-Fi SSID	Configuration Page	
Password	Configuration Page	
Set date	Configuration Page	Update of date time of the board
Version	About Page	Version of the mobile app
Date	About Page	Date of mobile app development

## 17.1 Starting page

Upon opening the app, the splash screen will be visible for a few seconds.



The starting page will be the “Working” page.



In the top right corner, the connection status is shown.

A popup will show up if the connection is not available.

The page will take a couple of seconds to load all values, if connected to the ECU.

It is recommended to give a few seconds for every value to load in the page.

In the “App Connectivity” section of this guide, you will be able to find more useful information about what concerns the connection between the app and the ECU.

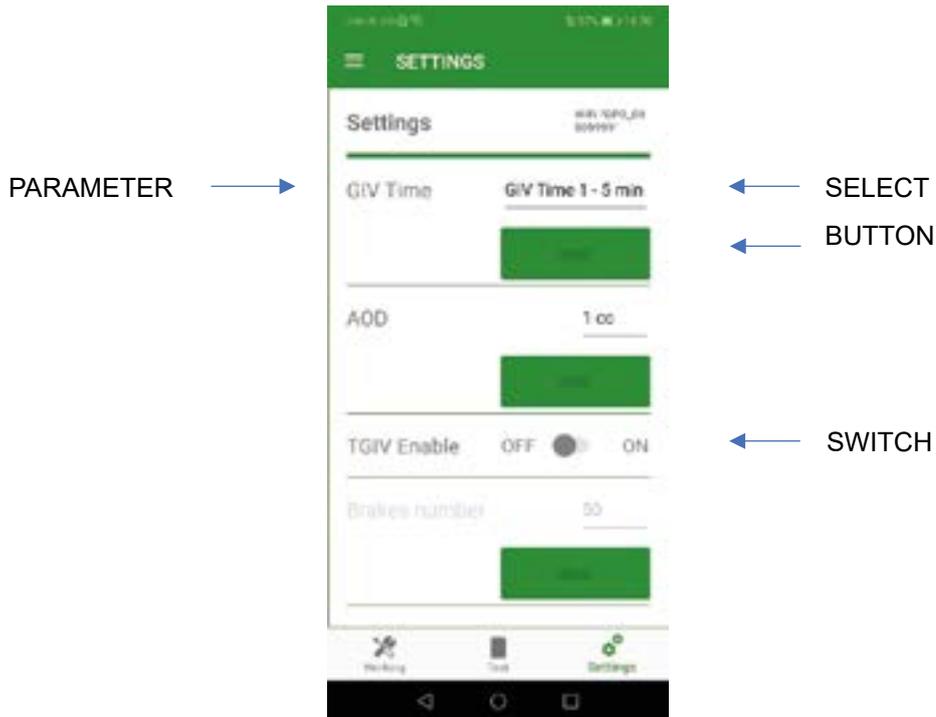
In the working page the following information are displayed:

- Most critical current alarm, active on the ECU
- The number of currently active alarms on the ECU
- Current status of the pump
- ECU date
- Number of hours the ECU worked, and total number of pump cycles

## 17.2 General behavior of a page

Every page requires a few seconds to fetch all the data from the ECU. It is recommended to wait that all values are loaded. If after a few seconds the values are still not appearing in the page, it is most likely there has been a connection issue. Follow the instructions you find in the “App Connectivity” section of this guide.

You might also notice one or two values not being loaded in the page while others have. It is possible some values are lost in the communication. After waiting a couple more seconds, the value will be loaded in and you can start operating.



Through a page it is possible to interact with the ECU actively, using the switches and buttons. For almost every parameter, there is a button/switch you can use to set your desired value on the ECU.

Pages you can navigate to by using the menu, will not display the three tabs at the bottom. Moreover, you can leave those pages only by tapping the back button on your mobile phone.

### 17.3 Select, button and switch behavior

Select:

Through the select dropdown, it is possible to choose among the possible values to be set to ECU for a specific parameter.



Switch:

Enabling or disabling a switch, sends a message to the ECU instantaneously. There are no wait times.

The message can be either received correctly by the ECU or not. In the latter case, the switch will be reset by the app itself, as the value fetched from the ECU will not be consistent with the switch.

You will see the switch resetting to the previous state.

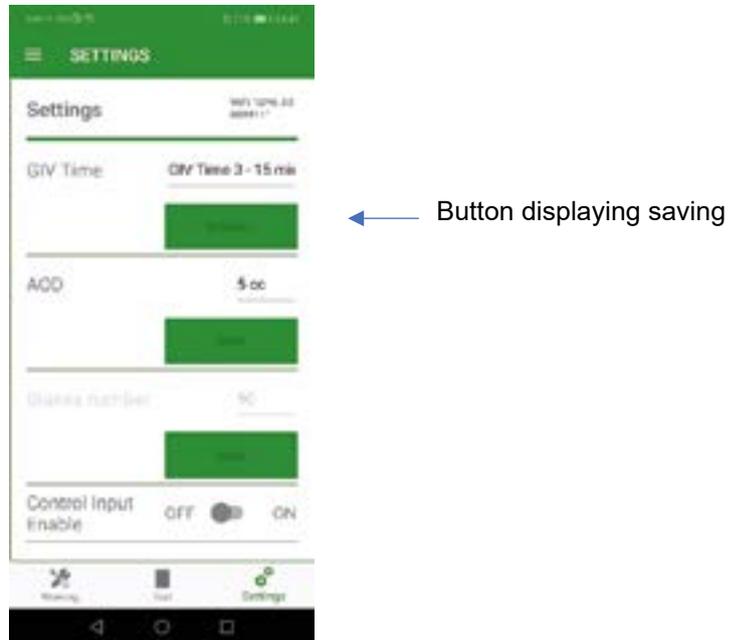
Save button:

Upon selecting a value different from the one currently set on the ECU, the button shall become enabled and have its text colored in white.



Button is enabled and has its text colored in white

Save buttons do not send messages to the ECU as soon as they are pushed. Upon clicking the button, if the action is correctly recognized by the app, the button shall become unavailable and change its text to “Saving”, colored in black. This means the app is starting the desired action. In a few seconds, the value currently selected above the button, will be sent to the ECU.



Upon receiving the updated value from the ECU, matching the one sent through the button, the button will once again change its text back to “Save”, meaning the operation has concluded successfully.

## 17.4 Alarm page

This page differs a bit from the others. It is not possible to set anything from here to ECU, it is only possible to fetch the error history from ECU.

The page will show seven lines, one for every group of error records, named with the title of the group.



Tapping once on a group name, will fetch and display all the records for that group.



The screenshot shows a mobile application interface with a green header bar. The main content area is titled 'Alarm' and contains a list of records under the 'MOTOR' group. The records are displayed in a table-like format with columns for motor ID, date, and time.

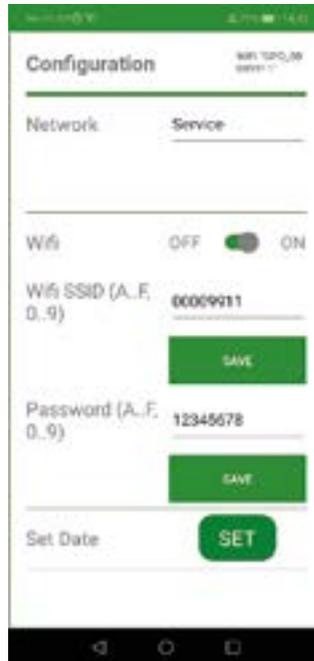
MOTOR	Date	Time
MOTOR 1	03/01/2024	10:24
MOTOR 2	13/05/2024	14:37
MOTOR 3	13/05/2024	14:58
MOTOR 4	13/05/2024	14:53
MOTOR 5	13/05/2024	14:53
MOTOR 6	13/05/2024	14:56
MOTOR 7	13/05/2024	14:56
MOTOR 8	13/05/2024	14:56
MOTOR 9	13/05/2024	14:56
MOTOR 10	13/05/2024	14:56

Tapping again on the same group name, will hide the group, leaving once again the name only. It is possible to open more than one group at a time.

At the end of the page you can find the "Download alarms log file button". Through this button, it is possible to download a log file of every alarm currently stored in NVM. If the connection is available, the file will be stored in the "Download" folder of the phone.

## 17.5 Config page

Configuration page differs from the others for a few fields.



The network field cannot be modified and hence will only be displayed the currently set value.

Wi-Fi SSID and Password entry texts:

These fields are entry texts which will have the save button always available.

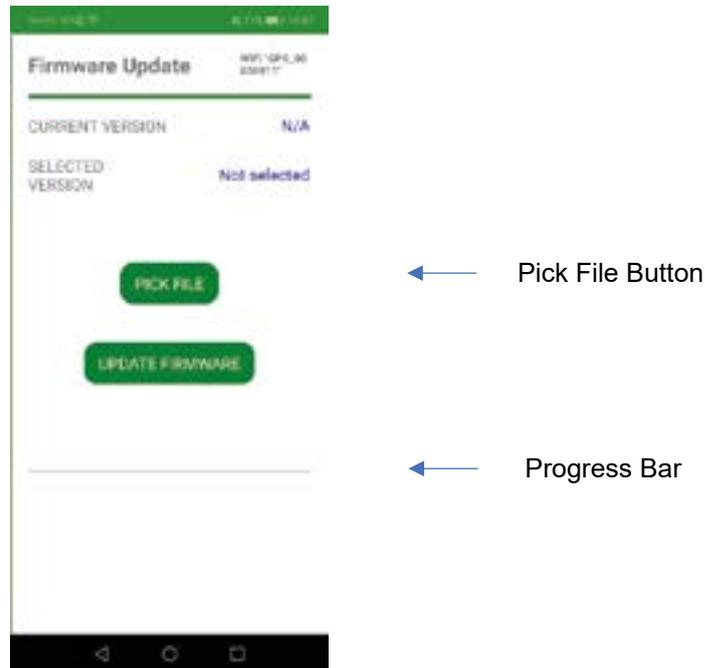
To set one of these parameters, it is only necessary to modify the text and press the save button. After a few seconds, the same parameter will be fetched from ECU and displayed. If your desired value was not correctly set, you will notice the text setting back to the previous value.

Set Date and Reset alarms buttons:

These buttons will send a message each to the ECU, requesting to perform the corresponding action. Upon pushing the set date button, if the action has been correctly done by the ECU, a feedback line will be displayed below the same button.

## 17.6 Firmware update page

Through this page, it is possible to update the firmware of the ECU, by sending a new firmware to the ECU, which will take care of the update procedure.



Using the file picker, you can load a new file to be sent to the ECU.

Upon tapping the pick file button, a file explorer will open, letting you select the file from the memory of the mobile phone.

After selecting the file, the field “Selected version” will hold the name of the selected file, making it clear which file was loaded.

To start the update procedure, just tap once on the Update Firmware button.

The progress bar below above-mentioned button, will show the progress of the update.

Even if you notice the progress bar setting back a few times, the update will continue normally.

Upon completion of the progress bar, a feedback text will be displayed below the bar itself.

If the procedure was completed successfully, you may notice the ECU restarting, loading the new firmware, even if the feedback text does not tell the same.

If the display of the ECU still shows ‘BOOT’, it means the procedure did not complete successfully. This may be due to the connection between the ECU and the phone. It is recommended to shut down the app and restart the procedure completely.

## 17.7 App Connectivity

In order to correctly connect to the ECU, enable both Wi-Fi and GPS position. Make sure the Wi-Fi is enabled on the ECU and you are correctly connected to the Wi-Fi of the ECU.

In the top right corner of the app, it is shown the current connection status.

If needed, tap on the text, a popup will appear, giving useful tips in order to make sure you are correctly connected to the ECU.



Upon losing connection to the ECU, a popup will be displayed, containing the instructions to reconnect to the ECU.



In the case of connection lost, it is recommended to shut down the app, turn off the Wi-Fi of the mobile phone, turn it on again and only after noticing the Wi-Fi being connected to the ECU again, open the app.



## 18. Details of the manufacturer

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