

Grease lubrication pump

GPA, GPA +

Design versions: Paddle, Follower, Cartridge

Original operating and assembly manual

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1. Technical data

General:

Available reservoir capacities: 2.5, 5, 8 liter (**Paddle design**) 3, 5, 8 liter (**Follower plate design**) 3 liter (**Cartridge design**)
 Dimensions Paddle design: approx. 240mm x 236mm x 223mm..(313/433)mm.....(L x W x H)
 Dimensions Follower design: approx. 220mm x 236mm x 339mm..(419/571)mm.....(L x W x H)
 Dimensions Cartridge design: approx. 226mm x 236mm x 342mm.....(L x W x H)
 Pressure connection: M12x1.5 Ø 6 mm
 Control & monitoring: **GPA**: None, needs to be added external..... **GPA+**: Integrated control unit with display and push buttons
 Filling connection: G $\frac{1}{4}$ " with a standard straight greaser (alternatives available)
 Filter mesh size: not applicable
 Level switch (monitoring): Standard on Follower plate design, Optional on Paddle and Cartridge design
 Lubricant: Grease up to NLGI-2
 Operating pressure: max. 300 bar
 Weight: Approx. 4.9 kg up to 7.2 kg for largest design (all pre-filled with 1.4 kg)
 Operating temperature: -20°C up to +70°C (standard grease)..... -40°C up to +70°C (synthetic grease)
 Sound pressure level: <70dB(A)

Pump:

Material: Hard anodized aluminum – nylon reinforced
 Number of pistons: Standard 1, optional 2 or 3 each with its own separate output (operating pump)
 Pump type: Electrical progressive piston pump with internal relieve valve
 Delivery rate (at 16 rpm): Standard piston (ø6mm) 2.0 cc/min, optional adjustable piston (ø8mm) from 2.0 up to 4cc/min
 Drive type: electric motor
 Motor power: +/-70W (nominal at 20°C)
 Motor speed: 16 rpm
 Motor voltage: 12 or 24Vdc
 Degree of protection: Reservoir IP54 / Electric compartment IP69K
 Type of electrical connection: plug/socket Tyco 776494
 Connection cable: Standard 10m (8 pin cable)

Level switch:

Switching voltage: max. 140 VAC / 200 VDC (25°C)
 Contact type: NO
 Contact function: prewarning empty signal contact
 Degree of protection: IP67
 Type of electrical connection: plug/socket Tyco 776427-1

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 **Grease lubrication pump GPA/GPA+** is subsequently called a **device**.

2. General safety instructions

Everybody who is in charge of the assembly, start-up, maintenance and operation of the device must read these instructions carefully prior to assembly and start-up of the device at the machine! Furthermore, this manual must always be available at the site of operation!

Basic instructions for setup, operation and maintenance can be found below.

2.1 Safety instructions

Observe the general safety instructions within this key chapter as well as 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.

Caution!

This heading is used if improper or general non-observance of the operating and assembly manual, instructions, specified workflow and the like might result in damage.

Notice!

This term is used to point out particular details.

Instructions and notes directly attached to the device have to be strictly observed and kept in readable condition!

2.2 Personnel qualification and training



The staff in charge of operation, maintenance, inspection and assembly have to be qualified accordingly. Competence, responsibilities and supervision of staff must be clearly defined by the operator. In case the staff does not have the necessary knowledge, it has to be instructed and trained accordingly. The operator is obliged to ensure that the staff fully understands the contents of this user information.

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



Results of **non-observance** of the **safety instructions** can be **hazards to persons**, for the environment and the device. Non-observance of the safety instructions may result in the loss of any liability claims. The non-observance could more specifically result in the following hazards (for example):

- Failure of important device functions.
- Failure of prescribed methods regarding 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 parts of the device bear risks, the customer must protect these parts against contact. This protection must not be removed.
- Any leakages of hazardous substances must be drained in a way that no risks for persons or the environment arise. Please also refer to the data or safety data sheets of the respective manufacturers.
- Observe all legal provisions.
- Hazards due to electricity are to be excluded.
- Examination of pipes and hoses regarding safe provision, use, proper assembly and function has to be carried out according to regionally applicable directives. Inspection intervals may not be exceeded.
- Defective pipes or hoses must be replaced immediately and professionally.
- Hydraulic hoses and polyamide pipes are subject to natural aging and have to be exchanged in regular intervals according to the manufacturer's specifications.
- A safety data sheet of the currently used lubricant must be provided at the device.
- Observe the universally valid 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.

Any work at the device may generally only be carried out at **complete standstill** and in **pressure less** as well as **disconnected condition**. Furthermore, appropriate **personal protective equipment** (goggles among others) is necessary. The shutdown procedure of the device as described in the manual must be strictly followed.

Secure the device against intentional or unintentional recommissioning during maintenance or repair. All safety and protection arrangements have to be put back in place again immediately after completion of the work.

Environmentally hazardous media must be disposed of professionally and according to the relevant legal provisions. **Polluted and contaminated surfaces** have to be cleaned before maintenance. Please wear protective equipment to that purpose. See the lubricant manufacturers' safety data sheets hereto, respectively the data sheets provided by the manufacturers of 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 flame and fire are strictly forbidden during 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 manufacturer feedback. **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 does not assume liability for parts that are retrofit by the operator.

2.7 Inadmissible modes of operation

Operational safety of the device is only guaranteed when it is appropriately applied as indicated in the operating and assembly manual. Never exceed or fall below the limit values, as stated in the technical data.

2.8 Electrostatic discharge



Avoid electrostatic discharge! There are electronic components integrated into the devices which might be destroyed by electrostatic discharge. Observe the safety precautions against electrostatic discharge according to DIN EN 61340-5-1/-3. Ensure that the environment (persons, workplace and packing) is well grounded when handling these devices.

2.9 General hazard warning – residual risk



All components are designed according to valid regulations for the construction of technical systems with regard to operational safety and accident prevention. Nevertheless, their use can lead to hazards for the user or third parties as well as other technical facilities. Therefore, the device may only fulfill its intended purpose in a **technically perfect and faultless condition**. This has to happen in adherence to the relevant safety regulations as well as the operating and assembly manual. **Inspect** the device and its attachment parts **regularly** and **check** them for possible **damage** or **leakages**. **Liquids** could **escape under high pressure** from pressurized components which become **leaky**.

3. Intended use

Caution!

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

Only operate the device if it is installed in/at another machine and operated together with it.

Only lubricants which comply with the machine manufacturer's specifications may be conveyed.

The device must only be used according to the technical data (see chapter 1 „Technical data“). The values may never exceed or fall below the values mentioned in the technical data. Never operate the device without lubricant.

Unauthorized modifications of the device are **not permitted**. Groeneveld-BEKA is not liable for personal injury or damage of machine resulting thereof.

The device was manufactured in compliance with Machinery Directive 2006/42/EG. The customer has to check whether further guidelines apply for the area of application and site of operation. If the device is not in conformity with these guidelines, it may not be put into operation.

The intended use also includes:

- paying attention to all chapters and notes in the operating and assembly manual.
- carrying out all maintenance work.
- **observing** all relevant instructions for **work safety** and **accident prevention** during all life cycles of the device.
- having the necessary professional training and authorization of your company to operate the device and to carry out the necessary work on the device.

Another use or a use beyond this scope 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 according to the regulations and under the following conditions:

- Assembly, connection and maintenance are only carried out by authorized and qualified staff.
- The device is only used according to the operating and assembly manual.
- Never exceed or fall below the limit values as defined in the technical data.
- Modifications and repairs at the device may only be done by Groeneveld-BEKA.

Caution!

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

Groeneveld-BEKA will generally not accept guaranty claims for any damage caused by lubricants, even though 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.) cannot be verified or reconstructed later.

5. Transport and storage

Use suitable lifting devices for transport.

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

Secure the device against toppling down 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**.

Notice!

When storing the device pay attention that the storage area is cool and dry in order to avoid corrosion of the individual parts of the device.

Observe the storability of the contained lubricant for devices which are filled with lubricant. Exchange the lubricant when it is over-stored (separation of oil and soap).

6. Assembly instructions

Check the device for possible transport damage and for completeness before the assembly. Any installed equipment for transportation safety has to be removed.



Comply with the following conditions when assembling a complete machine from this device and other components. Mind a proper and eco-friendly assembly without impairment of persons' health and safety:

Assemble the device in balance on the installation location in order to ensure safe operation. Observe the information on the fastening holes given in the dimensional drawing. The pump must be mounted on a firmly basis by the use of 2 M8 bolts (22Nm). When selecting the set-up location, please mind that the device should be protected against ambient and mechanic influences. Investigate whether existing mounting holes in the chassis of the vehicle can be used to mount the pump unit. Always follow the directions of the vehicle's manufacturer when you need to drill new holes or need welding. If a mounting plate is used, do not let it rest on the profile flange of the chassis and do not drill additional mounting holes in the flange in an effort to fix the mounting plate even more securely. Be sure not to damage anything (e.g. lines or air- tanks) that may be present behind the part in which you drill a hole. After drilling a hole, always remove the chips (with compressed air or brush) and treat the surface against corrosion. Ensure full access, e.g. for filling with lubricant and easy to inspect visually.

Special measures concerning noise prevention or oscillation reduction do not have to be taken.

6.1 Connection of lines

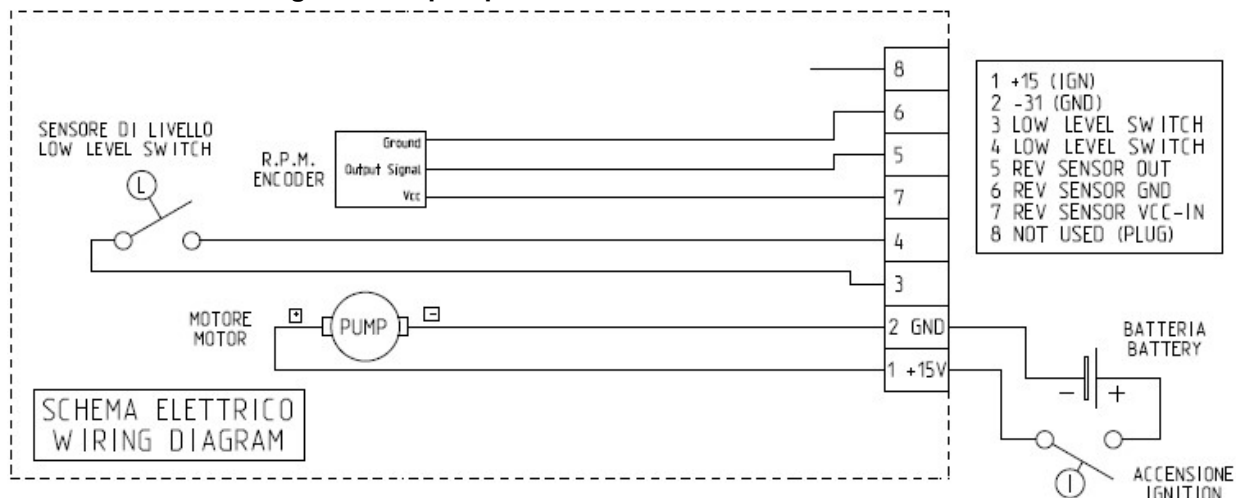
- Professional layout!
- When using pipes, observe that they are clean, seamless and of precision steel!
- Assemble the pipes professionally and free from distortion!
- Pay attention to pressure tightness of fittings!
- All components must be approved for max. operating pressure (see technical data).

6.2 Power connection



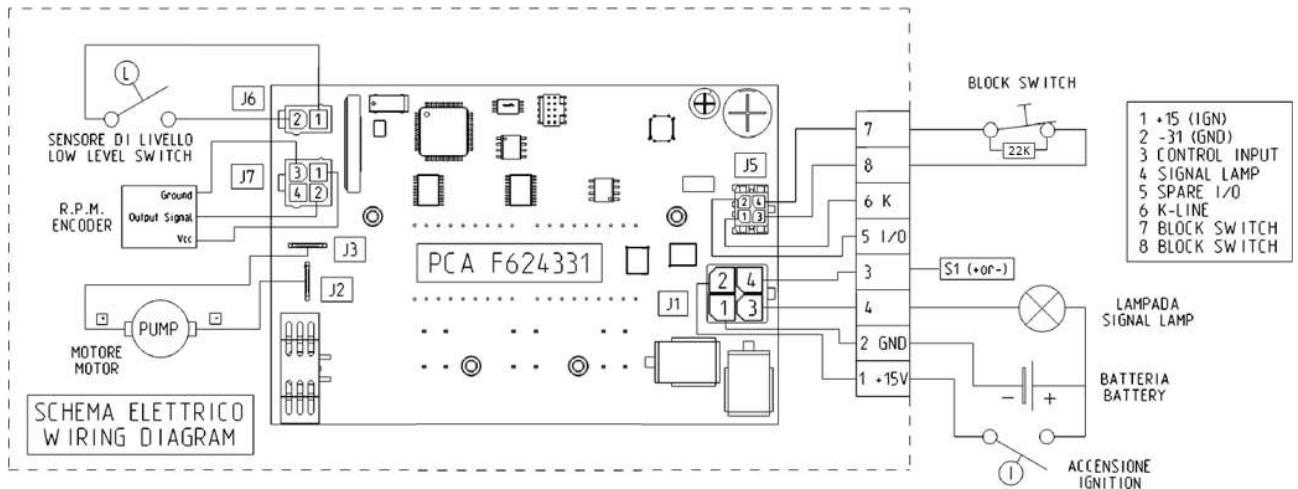
- Electrical energy supply must be done by a professional electrician!
- Electrical device components must be wired professionally!
- Compare voltage details with the existing mains voltage!
- Wire the device according to the connection diagram!

6.2.1 Connection diagram GPA pump



Pin #	GPA standard version
1	+15 (IGN)
2	-31 (GND)
3	Low level switch
4	Low level switch
5	Rev. sensor out
6	Rev. sensor GND
7	Rev. sensor VCC-IN
8	Not used

6.2.2 Connection diagram GPA+ pump



Pin #	GPA+ Truck/standard version	GPA+ Trailer version
1	+15 (IGN)	Tail Lights
2	-31 (GND)	-31 (GND)
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	Block switch contact 1# or Pressure Switch(es) contact 1#	Block switch contact 1# or Pressure Switch(es) contact 1#
8	Block switch contact 2# or Pressure Switch(es) contact 2#	Block switch contact 2# or Pressure Switch(es) contact 2#

6.2.3 Electrical wiring / fuses

To prevent damage to the electrical system of the vehicle or machine, the correct fuses must be installed in power supply circuit (+15). This does not apply to systems with a GPA+ Trailer pump, because those systems make use of the already adequately fused brake and tail light circuits of the vehicle. Consult the wiring diagrams or the tables below for the correct fuse values.

GPA+ is protected against power reverse and doesn't run in this condition.

Always verify whether the system you are installing and the methods you plan to use meet the required demands of the application related to:

- The components (e.g. pump, wiring and switches).
- The location of the components on the vehicle.
- The manner in which the greasing system is to be connected to the vehicle's electrical system.

Additionally:

Install the wiring only after the main components of the greasing system have been mounted (e.g. pump unit, signal lamp, monitoring switches on the distribution blocks).

- Try, as far as possible, to route the electrical wiring along the grease lines, and fix the wiring in place together with the grease lines.
- Connect the trailer-pump to the brake-lights supply wire and ground potential (do not exchange these connections). Make the connection in a waterproof junction box on the trailer, and ensure the cable is fed into the junction box properly (watertight). If required, mount an extra cable gland onto the junction box.

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

Cable connections Truck:

PIN	Colour	Section mm2
1	RED	2.50
2	BLACK	2.50
3	YELLOW	0.75
4	BROWN	0.75
5	GREEN	0.75
6	BLACK	0.75
7	WHITE	0.75
8	ORANGE	0.75

Cable connections Trailer:

PIN	Colour	Section mm2
1	RED	2.50
2	BLACK	2.50
3	YELLOW	2.50
4	BROWN	0.75
5	GREEN	0.75
6	BLACK	0.75
7	WHITE	0.75
8	ORANGE	0.75

*K-line interface implemented for communication with diagnostic and FCT production tools

7. Start up

7.1 Filling the reservoir of a paddle or follower plate pump with lubricant

When the reservoir reaches its minimum level, you need to fill the reservoir at the filling connection with clean lubricant without air and any kind of pollution. The connection of the pump is equipped with a standard greasing nipple on which a standard workshop grease pump can be connected. To be able to fill the reservoir using a special filling pump, a special filler coupling can be installed instead of this standard greasing nipple.

- Prevent dirt from entering the pump by first cleaning the pump and its immediate surroundings!
- Fill the reservoir up to its maximum level, as indicated on the reservoir. Never fill the reservoir any higher than the maximum level indicated to prevent any possible damage.
- Observe the machine manufacturer's lubricant details! Only use lubricants according to machine manufacturer's specifications!
- Collect leaking lubricant in a suitable reservoir and dispose it professionally!
- Observe the safety data sheet of the lubricant manufacturer!
- The lubricant viscosity changes with the operating temperature.
- Pay attention for maximum cleanness when refilling the reservoir!
- Check the level several times in equal intervals during the first hours of operation and refill lubricant if necessary.

Notice!

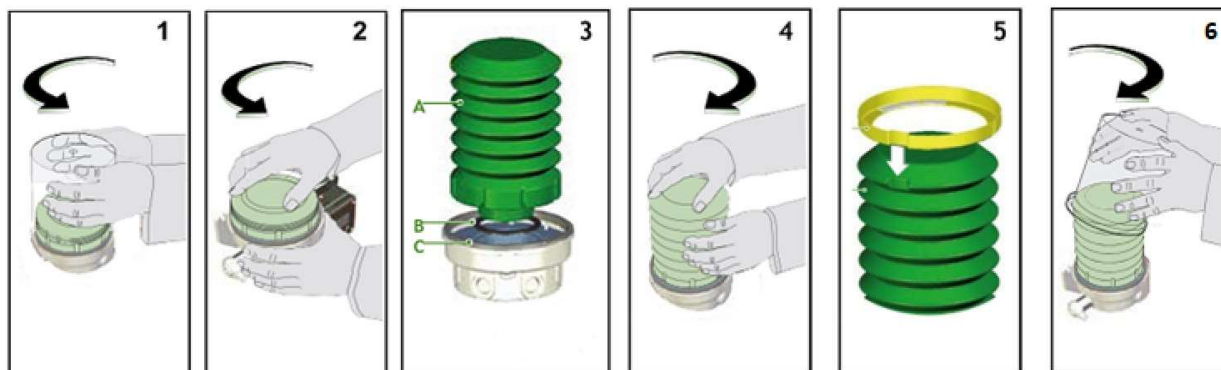
Any air that may be introduced beneath the follower plate will escape through an opening at the top of the guide rod of the follower plate. These air inclusions, together with any excess grease, will exit via the vent opening at the side on the pump unit.

The Paddle pump has a venting valve on top of the reservoir and has the same functionality.

7.2 Replacing the 3L grease cartridge on the cartridge pump

The cartridge is placed under a cover and can be easily and quickly replaced. When replacing the grease cartridge, prevent dirt from entering the pump. Before removing the cover and the cartridge, first clean the pump and its immediate surroundings. When removing a cartridge that is not completely empty be aware that grease can run out of the cartridge. Protect the environment and prevent grease spills. Empty cartridges and grease residues must be disposed of in accordance with local regulations.

- Turn the cover with bayonet catch counter-clockwise and lift it off the pump;
- Turn the empty cartridge with rubber gasket counter-clockwise and lift it straight up.
- Check to make sure the sealing ring is removed with the old cartridge.
- Remove the cap from the new cartridge.
- Put a film of grease onto the ring of the cartridge.
- Screw the cartridge clockwise onto the pump.
- Clean the cover and place it on the pump then turn it clockwise until locked.
- Reuse the magnet ring if the pump is equipped with a low level indicator, slide the magnet ring over the first ridge of the cartridge and make sure the ring is positioned correctly.
- After replacing the cartridge perform a test cycle, the system has been bled correctly when a fresh collar of grease is present at all greasing points.



7.3 Venting of the lubrication system

- Venting the whole lubrication system on first start-up and after each lubricant change!
- Venting is done by operating the system in pressure less condition and with open system outlets!
- Operate the pump until lubricant escapes from the pressure connection without air inclusions.

8. Functional description

8.1 General

The Groeneveld-BEKA GP pump is a modular progressive lubrication pump series, combining a single pump concept with different reservoir types and sizes. This general manual describes the GPA/GPA+ pump executions from this GP series and explains the system's operation, functionalities, possibilities, specifications and other related technical data.

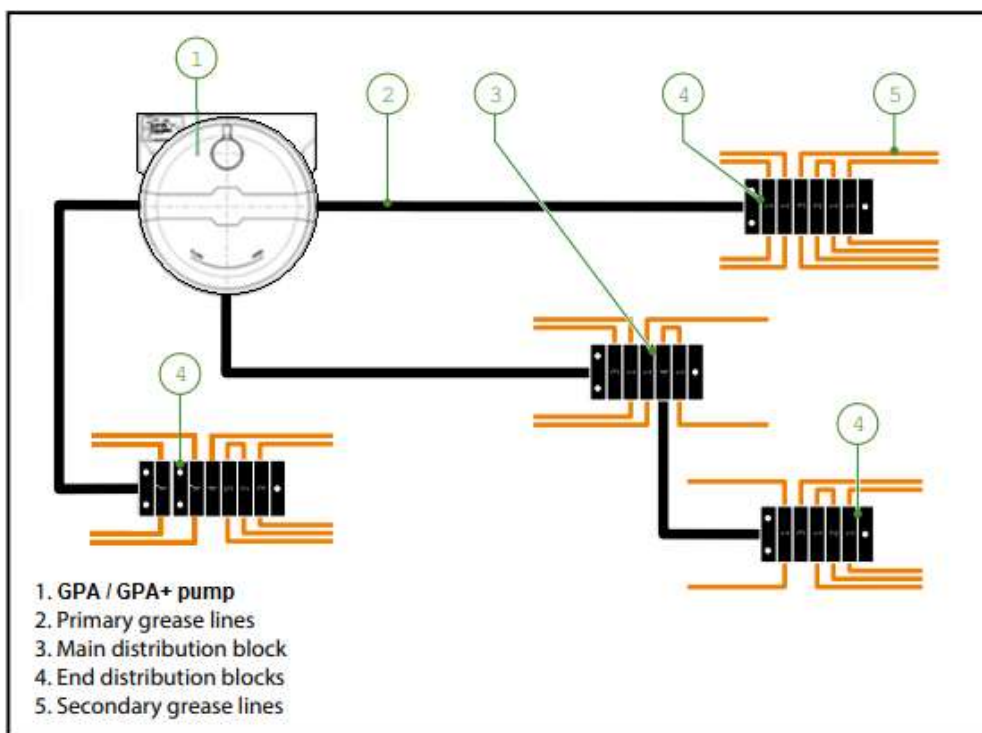
The Groeneveld-BEKA GPA/GPA+ automatic progressive greasing system serves each grease point of the vehicle, machine or installation in sequence, i.e. grease is supplied to the connected grease points one at a time and one after the other. Standard one pump output/pumping element is used (optional 2 or 3 for more flexibility).

The correct amount of grease that will be supplied to the individual grease points are defined by the pump settings in combination with the distribution ratios that results from the choice of dosing segment types and the way in which those segments are combined in distribution blocks (block design).

8.2 Components

A Groeneveld-BEKA GP automatic greasing system comprises the following parts:

- A GPA/GPA+ pump with a grease reservoir of choice and in case of a GPA+, an integrated digital control unit with data storage facility. This is the only difference between GPA and GPA+ pump.
- One or more distribution blocks (composed of multiple dosing segments).
- Primary grease lines between the pump element outlets* and the distribution blocks and interconnecting the distribution blocks themselves. *With the option of 1 or 2 additional pumping elements/outputs.
- Secondary grease lines between the distribution blocks and the individual grease points.



9. Pump modules

As a modular system the GP pump series consists of 3 interchangeable modules, a top, central and a lower module. All modules are easy to maintain, replace or upgrade.



9.1 Top module (the reservoir)

The GP series is available with 3 different kind of reservoirs and different volumes. All reservoirs are interchangeable and can easily be placed on the central module.



9.1.1 Paddle reservoir

The paddle reservoir is installed on the GP series as a standard and is equipped with a paddle blade. The rotation of the paddle blade minimizes air pockets and grease separation in the reservoir and guides the grease to the pistons. The paddle reservoir is available in 2.5, 5 and 8 liter execution.

9.1.2 Follower plate reservoir

When in need of a reservoir with a follower plate, the standard paddle blade reservoir can be replaced.

The follower plate reservoir makes it possible to use the GP series on static and rotating applications. Pump can be fitted under different angles.

The follower plate helps compress the grease as it is used to prevent air pockets forming, ageing of the grease as well as oxidation from air or water. This also makes the follower plate reservoir suitable to use with biodegradable greases.

Another advantage of the follower plate is that all the grease in the reservoir is used and the reservoir wall remains clean, allowing you to check the grease level visually. The follower plate reservoir is available in 3, 5 and 8 liter execution.

9.1.3 Cartridge reservoir

The single cartridge version reservoir is equipped with an unique 3 liter grease cartridge.

This capacity meets the lubrication needs and service interval of most modern compact to mid- size machines.

The grease cartridge makes exchanging of the grease cartridge easy and ensures that the correct grease is used. Since the grease is in a cartridge it is protected from ageing as well as oxidation from air or water, which also makes this system extremely suitable to use with biodegradable greases. The cartridge is delivered with NLGI-2 grease as a standard, but can be filled with other greases on request.

9.2 Central module (the drive unit plunger/piston pump)

The GP series comes with 2 comparable drive units, a 12V and a 24V version.

This drive unit can have up to a maximum of 3 grease outlets with each a separate piston activated by the same cam shaft with direct delivery to its own connected main line. Two outlets are plugged, so standard the central unit has one output (piston) positioned as shown below.

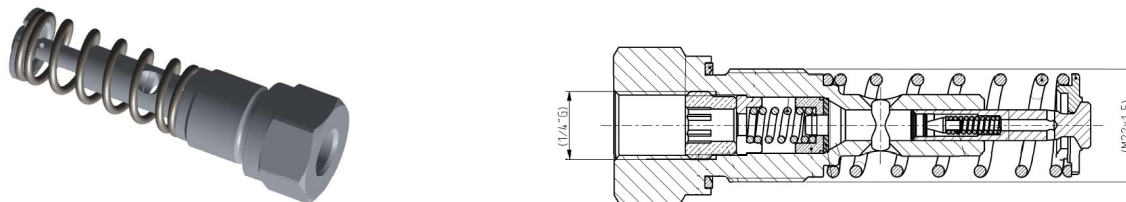


The electric motor drives the plunger/piston pump through a reduction gear. The plunger/piston pump comprises a drive shaft with an eccentric cam, one or more cylinders with a piston designed with a non-return valve on its output. The eccentric cam moves the piston(s) once every revolution of the cam shaft. During the forward stroke of the piston by the cam shaft, the grease is pressed towards the outlet of the pump element. The amount of grease supplied during each stroke depends on the (fixed) diameter of the cylinder and the stroke length of the piston. During the return stroke by the spring of the piston, grease is sucked from the reservoir into the cylinder (through an opening in the cylinder wall).

The option for 3 different outlets makes it easier to lubricate different greasing points on complex machinery.

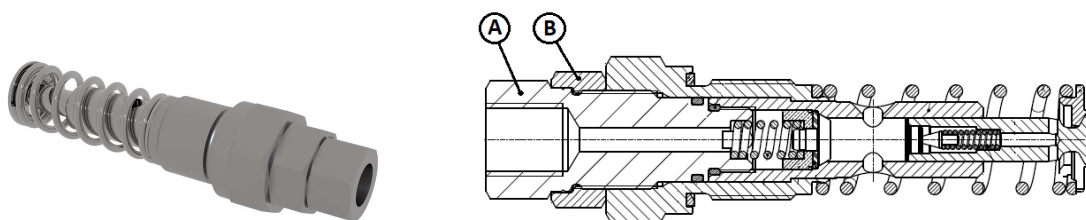
9.2.1 The standard ø6 piston/pumping element

This pumping element (F622552) has a non-adjustable output of 2 cc/min at 16 rpm. (=0.125 cc/rev)
 The pumping elements are easily exchangeable.



9.2.2 The adjustable ø8 piston/pumping element

Optionally a larger piston/pumping element (F791192) can be installed with an adjustable output from 2 up to 4 cc/min. (from 0.125 cc/rev up to 0.250 cc/rev).



Standard this adjustable pumping element is installed with the maximum output setting of 4cc/min. (0,250 cc/rev)

Adjusting procedure:

- Unscrew nut (A) to reduce delivery output.
- By unscrewing every ¼ turn (90° rotation) of nut A the output will decrease with 0.2cc/min (0.0125 cc/rev)
- When the adjustment is fixed, tightened the nut (A) with nut (B).

9.3 Lower module

The lower module has a co-moulded gasket and is available in 4 options, the GPA with 12V and 24V motor and the GPA+ with a 12V or 24V motor.

The only difference between a GPA and GPA+ pump:

- The GPA lower unit is delivered without an integrated control unit. Complete pump operation/functionality needs to be handled external by the application it is fitted on.
- The GPA+ lower unit is delivered with one same and single integrated control unit that will operate on a 12V and 24V power supply by its own. A Backup battery on the print provides a lifetime power supply when key is switched off in order to retain RTC data for diagnoses.



GPA lower module



GPA+ lower module

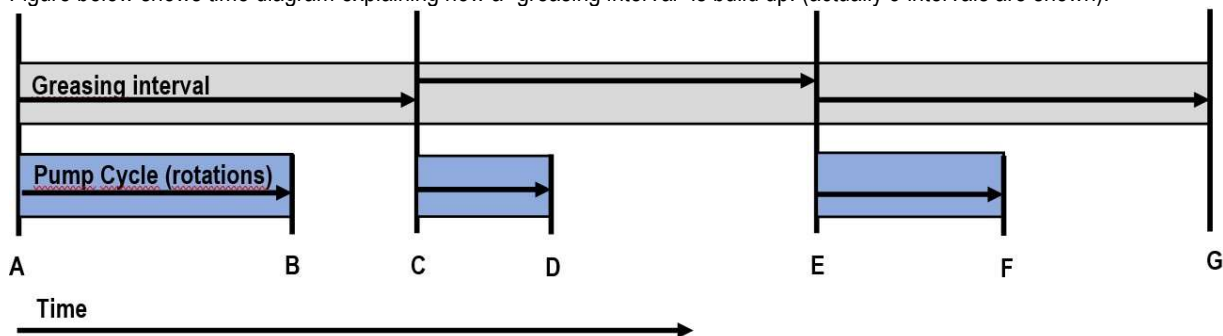
The internal control unit is connected to a 4 digit display and 3 touchpads on the outside which makes it easy to program and adjust the greasing interval, grease output and check the system status. Alarms and warning messages are also showed on the display.

10. GPA+ common description and functionality of the integrated control unit

The GPA+ internal timer controls the delivery of a known amount of grease within a known amount of time (called “greasing interval”, GIV) to its outlets. A distribution block is used to distribute related grease among all the grease points.

The pump will deliver a specific amount of grease to the connected grease line(s) each time it makes a revolution. By counting the number of revolution the pump makes, the timer can calculate/define the total amount of grease-output on the outlet during each greasing interval.

Figure below shows time diagram explaining how a “greasing interval” is build up. (actually 3 intervals are shown):



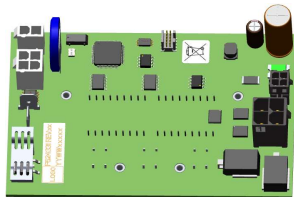
Two times are shown in the figure GREASING INTERVAL and PUMP CYCLE. The GREASING INTERVAL (GIV) is fixed, controlled and measured in minutes by the control unit and set by the user by means of the display interface. The PUMP CYCLE (time) however, is not fixed and is directly related to the rotation speed of the pump motor that depends and is influenced by the system pressure, type of grease, amount of pumping elements and the ambient temperature. When the system pressure is high, or the ambient temperature is low, the pump will rotate slower, thus consume more time to deliver the same amount of grease (hence the difference between points A-B and C-D). The interval between two pump cycles (e.g. B-C, D-E and so on) are defined as “pause” or “dwell time”.

To make sure that the same quantity of grease is supplied within a fixed amount of time, the GREASING INTERVAL is immediately restarted after the previous one has ended. At the same moment the pump is activated (= Pump Cycle) and will stop only after the pre-set number of rotations are made. The number of rotations for each GREASING INTERVAL is set by the user by means of the display interface.

This number of rotation (controlled by the internal encoder) and the diameter of the piston inside the pumping element define the predetermined amount of grease provided during each greasing cycle to the connected greasing line(s).

10.1 The control unit in the GPA+

The integrated control unit in the GPA+ pump initiates and controls the greasing cycles of the greasing system. All required system and program parameters (e.g. interval type, grease delivery) can be set. The control unit has extensive diagnostic features and monitors the performance of various components of the greasing system and processes, stores and reports the malfunctions it detects. Malfunctions are shown on the pump display.



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

10.2 GPA+ Truck and Trailer settings

- GPA+ TRK (truck version):

This is the standard version for the use on vehicles and machines where a permanent power supply (+12V or +24V) is available from vehicle battery after ignition (+15). The type of "grease interval" can be set in the 2 different ways in the programming menu:

-Control input disabled (CTRD)

Interval in time: the grease interval (GIV) is directly activated by applying only power to the +15 input (default).

-Control input enabled (CTRE)

Interval in time, controlled by an additional external signal on pin3.

With a power to the +15 input the grease interval (GIV) will be actually activated by an additional "Control input" pin 3.

The interval timer is enabled (GIV timer running) while the CTRL input is ACTIVE and it is disabled (GIV timer paused) while the CTRL input is deactivated. GIV timer resumes from the point where GIV was paused once CTRL is active again.

CTRL input can be Disable (CTRD), Active Low (CTRD → CI_L) or Active High (CTRD → CI_H).

The exact grease delivery is measured and controlled by counting the number of cam shaft revolutions during each grease interval and can be set / adjusted through the appropriate parameters.

- GPA+ TRL (trailer version):

Additional setting that has basically the same functions but is specifically set for the use on vehicles and machines without its own power supply (e.g. trailers).

It is primarily powered by the brake lights feed (through the brake power input, and thus, will only be active during braking) and by the tail lights feed, if available.

For TRL version, the type of "grease interval" can be set in the following ways:

-Interval in brake pulses (only brake input connected):

The system will measure the number of times that the brake is applied and defines the start and end of each individual grease interval. Every new interval is started with a new pump cycle.

Interval in brake pulses and time (brake input and tail lights input are both connected):

-The system will count down in number of brake pulses as well as in elapsed time. As soon as one of the intervals has passed, a new pump cycle is started. The counters for both the interval in number of brake pulses as well as for the interval in time are restarted.

The exact grease delivery is measured by the control unit by counting the number of cam shaft revolutions and can be set through the appropriate parameter.

-When interval set in brake pulses and elapsed time (pulse + min), the timer starts running simultaneously with the counter the moment the tail lights are switched ON. The first one that finishes the interval period starts the pump cycle. Both the counter and timer will be reset for a fresh interval countdown start.

When the interval is set by brake pulses only and a pump cycle has started it can only run the moment the brake lights are activated. In the meantime the drivers braking behaviour can already trigger the start of a new interval cycle, while the previous pump cycle was still running and can't be completed. (many short braking actions causing many short pulses)

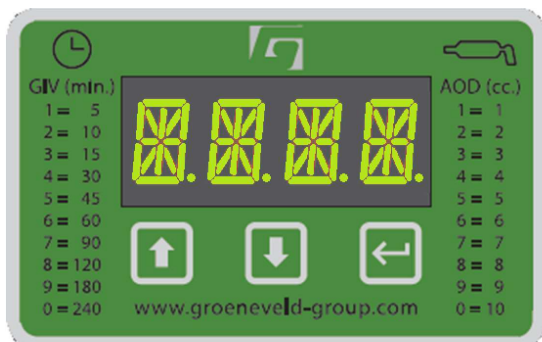
In this case, there is less grease delivered in one grease cycle interval than intended by the parameter settings. Therefore the system as trailer timer can be connected also to a secondary power supply through the +15 power input on the pump. (main power supply input in "truck" mode).

When the grease interval has passed before the pump cycle is finished, the ongoing pump cycle is interrupted and the remaining amount of grease to be delivered is added to a special counter in the system memory of the control unit. As soon as the system measures that it's powered through the secondary power input (tail lights can go ON and OFF), the system will start once an additional pump cycle to deliver the skipped amount of grease. To prevent 'over greasing' this additional pump cycle is limited to deliver a maximum of twice the amount of grease during a normal pump cycle time. If the additional cycle is interrupted by a normal cycle again, the remaining amount will not further increase the counter, that will remain unchanged. When the power is re-applied to the secondary power input and there is still some 'skipped amount of grease' left, another additional pump cycle will be started. To summarize, while system is powered from +15 power supply input, in total only a single additional cycle can be performed during a power cycle.

11. Safety and control features

11.1 GPA+ pump display

GPA+ has a display with an user interface on the pump unit, this removes the need for expensive diagnostic tools to change parameters and read out information and fault codes. (See chapter 13 for "Display Menu and functions")



11.2 Errors and warning codes

Alarms and warnings are showed on the display.

Below a visual example for a fault-code E8 "undervoltage"



In case of more alarms or warnings in same moment, only the alarm or warning with higher priority is shown on display. (E1=higher priority; E17=lower priority). The behavior of the ECU depends on the severity of the alarm or warning.

Acknowledge of alarm is possible pushing the ENTER key

A fault-code will be automatically deleted when the cause has been fixed or circumstance are back to normal. In case the pump-motor is disabled by a severe fault-code and the problem is solved, it will be necessary to turn the ignition off and on to enable the pump again and to restart the normal greasing interval cycles. Fault-code will be then automatically deleted during normal operation.

Priority	Error code	Alarm	Description	Show error on display	Shutoff motor	Remarks / action
1	E1	Pump Short Circuit	When motor is detected as to be in short circuit	Yes	Yes	1) Max 5 attempts showing error message 2) After this: stop attempts and show error message continuously 3) Attempts can be restarted only after power off / power on
2	E2	Pump Open Load	When motor lass=0A (open load)	Yes	Yes	Same as E1
3	E3	Pump Overcurrent	When motor is in overcurrent error	Yes	Yes	Same as E1

4	E4	Pump / motor stuck	No gearmotor revolution detected or gearmotor too slow (below 1,5RPM)	Yes	Yes	Same as E1
5	E5	Empty Reservoir	Empty Reservoir	Yes	Yes	1) Stop immediately showing error message 2) Once reservoir is refilled the pump does not start running by itself. There are 2 options to re-activate the pump again: -Initiate a manual test to let the LLS move in the "not empty reservoir" position (and reset the error, for the paddle version) and purge the system (if necessary) -If the empty message E5 is displayed on the control unit, the pump will make 5 revolutions after each power cut (e.g. ignition off and on again) to check whether the container has been filled.
6	E6	Low Level Sensor reached	Low level reached	Yes	No	Executes and counts the predefined # of revolutions until Empty Reservoir
7	E7	Overvoltage	Alarm if: > 18V for 12V vers. >32V for 24V vers	Yes	No	Shut down when Vin >35V
8	E8	Undervoltage	Alarm if: 10V for 12V vers. <20V for 24V vers.	Yes	No	Shut down when Vin <9,0V
9	E9	Lamp Open Load	Lamp open load failure	Yes	No	None
10	E10	Lamp Overcurrent	Lamp overcurrent failure	Yes	No	None
11	E11	Block Switch failure	Connected but not detected as expected: nr of changing states is lower than the expected value	Yes	No	Alarm resets on the following cycle only when BS changes state
		Pressure switch(es) error	Overpressure on one or more PRSW (one or more contact closed)	Yes	No	None
12	E12	Block Switch open load	Block switch enabled but not connected or broken	Yes	No	None
		One or more pressure switch(es) not connected	One or more pressure switch(es) enabled but one or more of them not connected or broken	Yes	No	None
13	E13	Temperature above Limit	Ambient temperature above the upper limit	Yes	No	None
14	E14	Temperature below Limit	Ambient temperature below the lower limit	Yes	No	None
15	E15	RTC Battery Low	RTC (Real Time Clock) Battery low error	Yes	No	None
16	E16	Real Time Clock Error	RTC error	Yes	No	None
17	E17	Checksum Error	EEPROM Checksum error	Yes	No	None

11.3 Signal lamp operation (optional)

The optional lamp can be placed in the cabin for showing pump status and fault(s) status in case of troubles. It has to be mounted in the field of vision of the driver and out of direct sunlight, because of the visibility of the signals.



If external lamp is connected, the related function must be enabled via Setup menu:

→ LMP → LMPE

Note:

- if lamp is enabled but not correctly connected, broken or somehow disconnected in a later stage, E9 error will appear on the display
- if lamp is enabled but short-circuited or in overload, E10 will appear on the screen

Alarms and warnings info on lamp

If alarms and / or errors are detected, the lamp stays always ON (except for the low level warning, see below). Error code is shown on display.

Pump cycle info on lamp

To enable the pump cycle info on the lamp: Setup menu → PCL → PCLE

Behaviour is:

- Pump cycle (motor running): Lamp is 1"ON / 1"OFF (alternatively)
- Dwell time (pause): Lamp is always OFF

Low level warning info on lamp

To enable the low level info on the lamp:

Setup menu → LLW → LLWE

When low level is reached there is a fast blinking of the lamp: 0.5"ON / 0.5"OFF (low level option must be installed and enabled)

When Lamp output disabled (default): always OFF. Associated alarms are not shown on the lamp.

11.4 Maximum grease pressure

In case a distribution block or a grease line to the grease points is blocked or when the viscosity of the grease becomes too high (at low temperature) the grease pressure could exceed its maximum allowed value.

To prevent an excessive pressure the greasing pistons have an internal relief valve that leads the grease back into the reservoir if the maximum grease pressure exceeds 300 bar during the pump phase of a greasing cycle.

11.5 Low grease level (optional)

A low level switch can be installed in the pump and can be enabled or disabled by the display. If the grease reaches its minimum level, sensor will be activated and the control unit will process, store and report the occurrence of that condition.



The basic low level sensor F624777 is always the same, but the required magnetic activator is different from design and working principle for the Paddle pump (standard equipped with sensor) compared to the Follower and Cartridge pump (sensor optional).

11.5.1 Continuous activation: FOLLOWER pump version

In follower pump version an additional attachment with a magnet is added and mounted (M8) on top of the low level sensor. This magnet is not close to the sensor in vertical direction when the reservoir is full. Because the grease level in the pump reservoir drops during operation, the magnet moves down by the follower-plate or cartridge top towards the sensor along the sensor axes. At a certain level it activates the sensor with possible bounces caused by vibrations and grease reflow into the reservoir. After some time, the grease level will be so low that the magnet will activate permanently the sensor except for short bounces caused by system vibrations. When refilling the follower reservoir it will behave in the opposite way.

11.5.2 Continuous activation: CARTRIDGE pump version

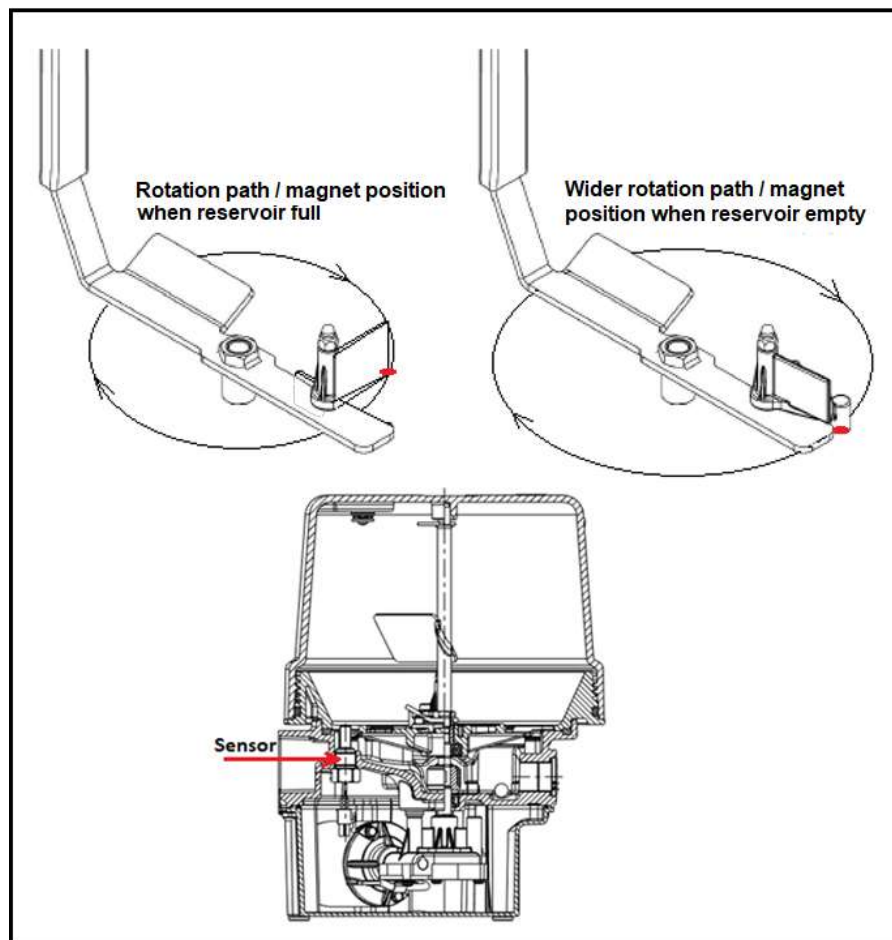
The principle is the same as for the follower version only instead of the additional attachment on the level sensor the cartridge is equipped with a reusable magnet ring that needs to be placed over the first ridge on the top of the cartridge.

11.5.3 Single pulse activation: PADDLE

In the PADDLE version an additional Flag with magnet is required and added. The Flag that is mounted on the paddle has a magnet that remains always at the same horizontal height from the sensor both with reservoir full and reservoir empty, but it can move on a horizontal plane (turning position). The paddle rotates by the motor and mixes and spread the grease inside the reservoir to obtain an uniform (flat) grease level. The magnet moves by the "flag" that is attached to the paddle in a circular orbit across a rotation center. When the reservoir is empty or the grease is below the minimum level, the flag with magnet is forced by a mechanical constrain to the EMPTY position, so at every engine revolution it activates the low level sensor with a single pulse.

If the grease is above the minimum level, the grease creates a momentum that overcome the mechanical constrain and moves the flag so that the magnet rotates along the FULL orbit path. The "FULL" orbit path is closer to the center so the magnet cannot activate the sensor.

The duration of the sensor pulse is proportional to the rotation speed. The grease level only indicates if the physical grease amount in the reservoir is above or below the minimum. Default value sensor is NO (normally open).



11.5.4 Reservoir empty

After the low level became active, the pump can/will finish a maximum allowed additional quantity of grease before it finally will be disabled and reservoir empty alarm is set.

The amount of the revolutions to be made before the pump stops completely are calculated considering the amount of grease left in the body of the pump once low level is detected for any type of reservoir and the amount of pistons (standard ø6 pumping elements) mounted:

	1 pumping element	2 pumping elements	3 pumping elements
Paddle	1.740	870	580
Follower	3.030	1.515	1.010
Cartridge	2.610	1.305	870

The number of pistons must be configurable (OUTN) and the number of big outlet must be configurable (CUST) from 0 up to the number of pistons set by the associated parameter (OUTN) to set correctly the alarm. Maximum amount of revolutions will be adjusted accordingly.

11.6 GPA+ block switch (BLSW) and pressure switch (PRSW) options

11.6.1 Block switch (BLSW)

The GPA+ automatic greasing system can be equipped with one optional block switch for monitoring a distribution block. When this switch is used and set, but not activated (does not change state) during a number of successive greasing cycles, it will warn the operator by a message on the display and when available the signal lamp is switched on.

Block switch signal input is available via the main external connector (pin 7 and 8) on the pump.

Block switch setup menu:

- Enable/disable the Block Switch by parameter (BLSW) via Setup menu (→ OPT → BLSW)
- Select # of cycles max before alarm (BLSW parameter): 1, 2, 3, 4, 5, 10, 15, 20, ... 95 (single step from 1 to 5, above 5 performs 5 steps at the time)
- Initial default value: 3

Notice!

Inputs are two-wires, with a N.C. (normally closed) switch. Status can be read as follow:

- 22K detected: block switch connected and open, OK
- 0R detected: block switch closed, OK
- Open load: block switch enabled and NOT connected. NOK (FC is set, see 12.2)

11.6.2 Pressure switch (PRSW)

Instead of a BLSW the GPA+ automatic greasing system can also be equipped on the same input (pin 7 and 8) with 1, 2 or 3 pressure switches in parallel for monitoring the system pressure. In case of an overpressure it can warn the operator by a message on the display and when available the signal lamp is switched on. Pressure switch signal input is available via the same main external connector pin 7 and 8 on the pump.

Pressure switch setup menu:

- Enable/disable the Pressure Switch by parameter (PRSW) via Setup menu → OPT → PRSW

Notice!

Each pressure switch has a NO (normally open) contact with a R=22KΩ in parallel to the contact itself in order to check the correct connection to the main connector.

11.7 Defective wiring and short-circuits

- Open-loads in the wiring, the electric motor, block switch, pressure switch and signal lamp will be detected, processed, shown on the display and stored by the control unit. This is also applicable to short-circuits in the wiring. (FC is set, see 12.2).

11.8 Revolutions of pump drive shaft

An integrated sensor monitors the drive shaft rotations. When rotations speed drops below 5rpm during a pumping phase it will abort the greasing cycle and will set a fault code. (12.2).

11.9 PCA info

PCA part number, serial number, software version and other relevant info are stored in the control unit.

12. Display Menu and functions

The GPA+ system is equipped with a 4-digit display with a keyboard equipped with three function keys (UP, DOWN, ENTER) which makes it possible to program and check the system status (operation and active alarms and warnings).

- Key "1": UP / page up / increase value
- Key "2": DOWN / page down / decrease value
- Key "3": ENTER / Manual override

It is possible to read and modify parameters in both "Programming menu" and "Setup menu", while info shown in "Info menu" can be only read. The menus can be shown on the display by pressing certain keys or combination of keys for certain amount of time (see tables below for details).

Once activated:

- Pages of the menu can be browsed via UP and DOWN keys
- By pressing ENTER key it is possible to enter in a specific parameter
- Value of parameters can be changed via UP and DOWN keys and confirmed by pressing ENTER key within 10 seconds (otherwise modifications are discarded and not stored)

All the modifications on the setup are stored immediately in the memory of the PCA when "EXIT" message is reached on the menu and confirmed by pressing the ENTER key but are applied only:

- From the beginning of the following cycle.
- After a power off / power on of the system.
- By activating "Manual reset and immediate restart of GIV" function (see related section)

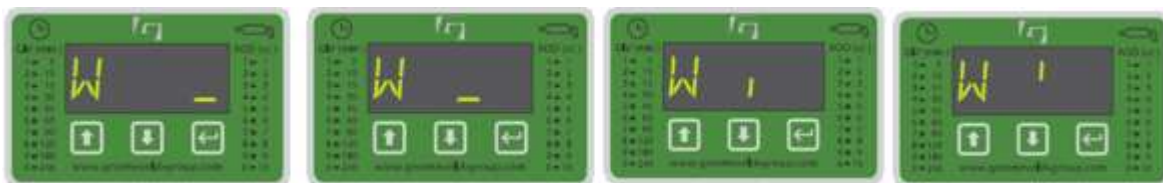
12.1 Display behaviour at power on

At power on, the system starts in the default "Working Mode" (can be either in pause or greasing phase).

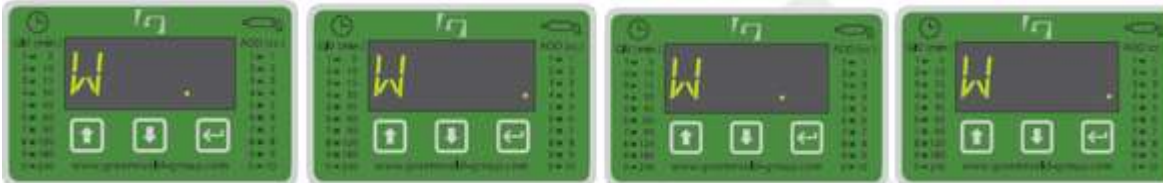
This differs in Truck (TRK) or Trailer (TRL) mode.

Power on in TRK mode:

- Display is always ON
- At power on, major FW (firmware) version is showed on display (PA.XX) for 10 seconds.
(For FW updating the unit must be opened so the dedicated connector can be reached)
- Pumping phase: display shows letter W in green on first digit and the outside segments of the last 2 digits are displayed one after another (clockwise)



-Pause phase: display shows letter W and last two dots blink alternatively



Power on in TRL mode

- Same as TRK mode, but display is always OFF unless a key is pressed once.

12.2 Using the function key's

Particular combinations of key pressed simultaneously and/or pressed for a certain amount of time can be used for additional functions e.g. activation of a secondary menu, shortcut to selected functions, activate a test cycle, force greasing cycle, restore factory defaults and so on.

-Long pressure (>10s) of Up key + Enter key simultaneously:

Manual reset and immediate restart of GIV

This feature allows the user, in every moment, to (re)start manually the running GIV and/or apply immediately the modifications on the setup, if needed. Letter R is shown on the display for 0.5" and a new GIV is started.

-Long pressure (>10s) of Down key:

System info (enter Info menu. See 13.2.1)

-Long pressure (>10s) of Up key + Down key simultaneously:

System setup (enter Setup menu. See 13.2.2)

-Long pressure (>10s) of Up key:

User mode setup (enter Programming-menu. See 13.2.3)

-Long pressure (10s) of Enter key:

Manual test mode (enter Test menu. See 13.2.4)

12.2.1 Info menu

Menu INFO → press DOWN key and keep hold >10 seconds		
<i>Read data</i>		
Message	Meaning	Available values
THRS	Total working HouRS counter	□NNN. // NNN□ (up to 999.999)
TCY	Total CY cles counter	□NNN. // NNN□ (up to 999.999)
PCA	PCA model / code	F624//331□
FW	FW release / version	XX.ZZ (XX major release, ZZ minor release)
SN	PCA Serial Number	YYWW.//NNNN (YY fiscal year, WW fiscal week, NNNN increasing number from 0000 to 9999, resets at each change of YYWW)
EXIT		

□ = empty character on display

// = visualization split in two screens (UP or DOWN key to change screen)

If a key is not pushed within 10 seconds the menu is left and display shows Working mode again.

12.2.2 System setup (Setup menu)

Menu SYSTEM SETUP → press UP and DOWN keys and keep hold >10 seconds Read/write setup			
Message	Meaning	Available values	Default
PUMT	PUM p Type of reservoir	PADD (PADDle) FOLL (FOLLow) CARR (CARRidge)	PADD
APTY	AP plication TY pe	TRK (TRuCK) TRL (TRaiLer)	TRK
OUT	Total quantity of installed and active OUT lets ("standard" + "customizable")	OUT1 OUT2 OUT3	OUT1
CUS	Quantity of installed and active "CUS tomizable" outlets	CUS0 CUS1 CUS2 CUS3	CUS0
LLS	Low Level Sensor enable/disable	LLSD (disable) LLSE (enable)	LLSD
LLC	Low Level Contact	LLCO (LLC normally Open) LLCC (LLC normally Close)	LLCO
LMP	LaMP output enable/disable	LMPD (disable) LMPE (enable)	LMPD
PCL	Pump CycLe info reproduced on lamp (only @ LMPE)	PCLD (disable) PCLE (enable)	PCLD
LLW	Low Level Warning reproduced on lamp (only @ LMPE)	LLWD (disable) LLWE (enable)	LLWE
OPT	Selectable OPT ion functionality for pin7 and pin8	NONE PRSW (PReSSure SWitch(es)) BLSW (BLoCk SWitch)	NONE
BLSW (@ OPT=BLSW)	- Available only if BLoCk SWitch selected in OPT - GCn: block switch # max of attempts (Greasing Cycles) before fail (when BS = BS_E) (note: the "n" includes the cycle that is running when set)	GCn (n=00...95)	GC05
PRSW (@ OPT=PRSW)	- Available only if PReSSure SWitch selected in OPT - PRn: quantity of pressure switch(es) connected	PRn (n=01...03)	PR01
OC	OverCurrent max level (A) (note: OC_A: automatically set to 7A (@VCC=12V), to 5A (@VCC=24V))	OC_A; OC_1...OC15	OC_A
EXIT			

12.2.3 User mode setup (Programming menu)

Menu USER MODE SETUP (Programming) → press UP key and keep hold >10 seconds			
Read/write setup			
Message	Meaning	Available values	Default
GIV	Greasing InterVal (minutes)	GIVn (n=1, 2, 3...0)	GIV4
CTR (@ APTY=TRK)	- Available only if TRK selected on APTY - ConTRol input enable/disable	CTRD (disable) CTRE (enable)	CTRD
CI (@ APTY=TRK)	- Available only if TRK selected on APTY - Control Input active level (@ CTRE)	CI_L (low) CI_H (high)	CI_H
NBRK (@ APTY=TRL)	- Available only if TRL selected on APTY - Activates the cycle after defined # of brakes applications (<i>only brakes app. count</i>)	B000...B999	B050
TGIV (@ APTY=TRL)	- Available only if TRL selected on APTY - Activates the cycle after defined # of brakes applications (NBRK) OR at defined GIV (what comes first)	TG_D (disable) TG_E (enable)	TG_D
AOD	Amount Of Delivery	AODn (n=1, 2, 3...0)	AOD6
EXIT			

12.2.3.1 Greasing interval (GIV) for a Truck

Greasing InterVal (GIV) table for a Truck (TRK / Standard) pump.

-In Time (GIVt), to be adjustable between 5 and 240 minutes.

This is the total time of the single cycle (pump cycle + pause time):

GIV # selected	Cycle time [minutes]
1	5
2	10
3	15
4	30
5	45
6	60
7	90
8	120
9	180
0	240

12.2.3.2 Greasing interval (GIV) for a Trailer

Greasing InterVal for a Trailer (TRL) pump.

-In Brake Pulses (NBRK) only. TGIV = TG_D (time disabled, GIVn not active) Brakes count to start a greasing cycle.

Single unit step from 1 to 10 (1, 2, 3, ...8, 9, 10), than 10 steps at time (10, 20, 30, ... 80, 90, 100), than 100 of steps at the time 100, 200, 300, ..., 800, 900

-In Brake Pulses (NBRK) and in Time (GIVt), TGIV = TG_E (time enabled, GIVn also active)

Greasing cycle is started after defined # of brakes or at defined GIVn. What comes first will trigger the greasing cycle.

12.2.3.3 Amount Of Delivery (AOD)

AOD is directly proportional to the number of revolutions of the motor (each revolution will deliver a well-defined amount of grease), based on the following information:

For every single revolution of the motor, @ 20°C, an amount of 0.125cc of grease is released.

Examples:

AOD #1 = 1cc, 8 revolutions ($8 \times 0.125 = 1.0\text{cc}$), AOD #7 = 7cc, 56 revolutions ($56 \times 0.125 = 7.0\text{cc}$)

NOTE:

• The measured average amount of grease released each revolution can be considered stable 0.125cc/rev in the range -10°C to +70°. However it changes into 0.100cc/rev in the range -20°C to -10°C. Via the SW this issue is compensated by monitoring the temperature via the sensors placed on the PCA.

In the range -20°C to -10°C the example above become:

- AOD #1 = 1cc, 10 revolutions ($10 \times 0.100 = 1.0\text{cc}$)

- AOD #7 = 7cc, 70 revolutions ($70 \times 0.100 = 7.0\text{cc}$)

AOD # selected	Amount of delivery [cc]	Number of revolutions @ temp > -10°C	Number of revolutions @ temp ≤ -10°C
1	1	8	10
2	2	16	20
3	3	24	30
4	4	32	40
5	5	40	50
6	6	48	60
7	7	56	70
8	8	64	80
9	9	72	90
0	10	80	100

- It is possible to mount as an option, one or more adjustable pumping element(s), that can be manually set for an adjustable amount between 0.125 and 0.250cc/rev.
- This value can't be controlled by the AOD and is only a mechanical adjustment of the pumping element itself.
- Due to particular setup and circumstances (e.g. GIV @ minimum, AOD @ maximum and temperature very low) there could be, in theory, a situation in which the pump cycle time results to be higher than the greasing interval, due e.g. to the reduction of the revolution speed of the gearmotor. The consequence should be a continuous pumping of grease without pause (dwell time).

12.2.4 Manual function / TEST mode

This feature allows the user to override the automatic operation of the timer, starting or stopping manually the pump motor. When this function is active, the timer is put on hold.

This option is not only useful for diagnostics but can also be used to de-aerate the pump.

If a GPA+ Trailer pump unit is used, it will be required that the brake lights of the vehicle are lit during the test mode, otherwise the pump unit would be without a power supply.

How to proceed:

- press ENTER key and keep hold >10 seconds: system enters in TEST mode, letter T will substitute W on display, segment running means that motor is enabled (pumping mode started)
- press ENTER key again to switch from pumping into pause mode
- By pressing ENTER key, the system enters alternatively in pumping mode (greasing) or in pause mode
- By pressing ENTER key and keeping it hold >10 seconds the system exits from TEST mode and continues in Working mode (timer resumes automatic cycle)

Notice!

TEST mode switches automatically from greasing to pause after 10 minutes.

13. Maintenance



Disconnect the device from electrical energy supply before **maintenance or repairs**.

Only carry out **maintenance and repair** in **complete device standstill** and **pressureless condition**.

Check the surface temperature of the device to avoid the **risk of burns** by radiant heat. Wear heat-resistant gloves and safety goggles! Clean soiled or contaminated surfaces before maintenance, wearing protective equipment if necessary! Secure the device against recommissioning during maintenance and repair work!



13.1 General maintenance

- Retighten all fittings 6 weeks after start up!
- Check all components for leakages and damage at least every four weeks!
- The operation / functionality of the complete pump. Perform a cycle and check all used grease outlets of the pump unit.
- If a high-pressure steam/water jet is used to clean the vehicle or machine, the pump unit of the greasing system should not be directly exposed to the jet. This to prevent water from entering the pump unit, for example through its de-aerating opening. During normal operation, however, water will never be able to enter the pump unit.



If leakages are not repaired, lubricant **might escape under high pressure**. Remove possible puddles of lubricant immediately.

13.2 Lubricant change

Caution!

Pay attention to utmost **cleanness** when refilling lubricant!

- Check the level regularly and refill clean lubricant as necessary, see chapter start up.
- Change the lubricant according to the specifications of the lubricant manufacturer. Environmental influences like increased temperature or pollution may shorten these intervals!
- Please make sure to only use lubricants that are suitable for the device as well as the lubricated machine and that comply with the requirements of the particular operating conditions.
- In case of **different lubricant manufacturers**, ensure that the lubricant **quality** corresponds to the quality of the previously used one! As precautionary measure, drain the lubricant reservoir properly and clean it!

13.3 Assembly and disassembly



Caution!

Assembly and disassembly **only in depressurized state!**

14. Shutdown

- Relieve the device from pressure!
- Turn off electrical energy supply!
- A qualified electrician has to disconnect electrical components from the electrical energy supply!
- Remove all pipes and hoses from the device and loosen all fastenings for disassembly!

15. Disposal

Notice!

Observe the disposal instructions of the lubricant manufacturer when lubricant is changed! Lubricants or cloths contaminated with lubricant, etc. must be collected in specially marked reservoirs and disposed of accordingly.

Disposal of the device must be done properly and professionally and according to the national and international laws and regulations.



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

16. Troubleshooting

Malfunction	Possible cause	Possible remedy
Pump and display does not work	Wrong or bad electrical connection	Check wiring (connections), fuses and power supply
Pump does not work	Active fault-code	Check fault-code for necessary action/repair
	Internal contamination	Clean
	Empty reservoir	Refill reservoir
	Wrong or bad electrical connection	Check connections
Pump supplies without or with low pressure	Damaged pumping element	Replace pumping element
	Heavy pump wear / internal leakage	Renew pump
	Internal contamination	Clean and renew
Pump supplies air in grease	Wrong filling procedure	Vent pump and refill if necessary
	Leakage	Repair pump
	Grease separation	Renew grease in reservoir
Low grease output	Wrong power-supply	Adjust/repair
	Wrong pump setting	Adjust parameter-setting
	Wrong pumping element	Exchange
	Bad working conditions, wrong grease	Use appropriate grease
	Internal contamination	Clean / replace

17. Dimensional drawing

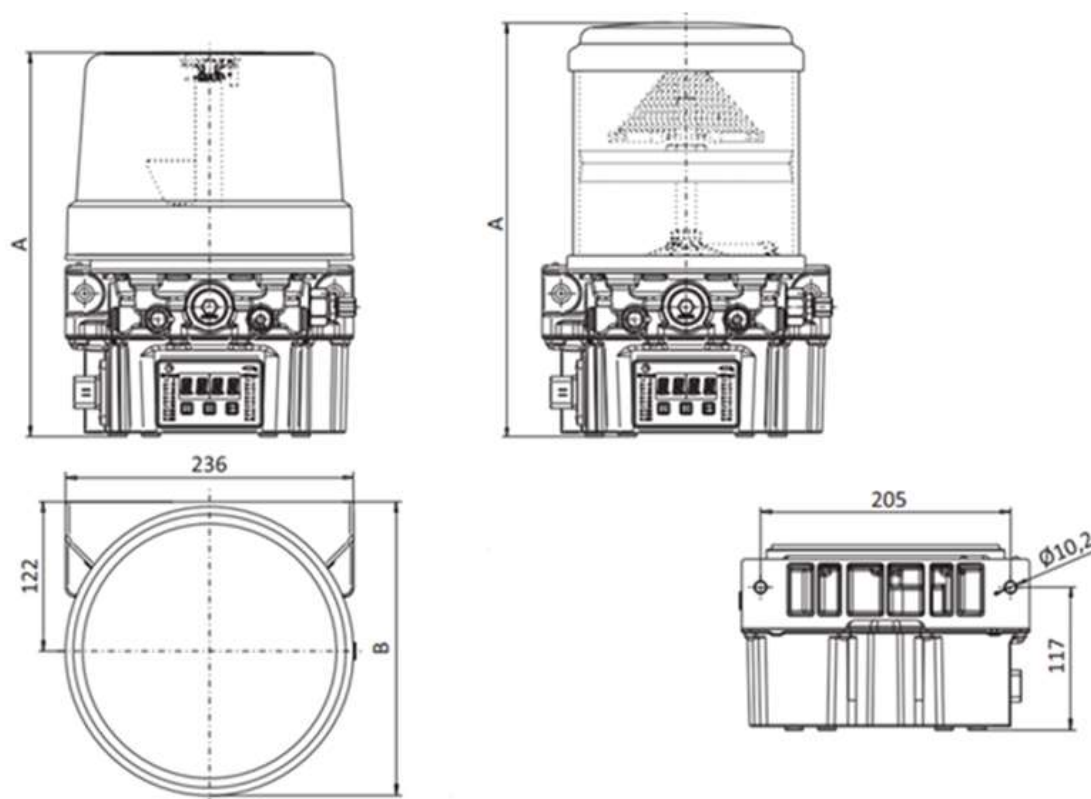


Table for dimensions

Version of reservoir	Paddle			Follower plate			Cartridge
	2,5 l	5 l	8 l	3 l	5 l	8 l	
Dimension A in mm	223	313	433	339	419	517	342
Dimension B in mm	240			220			226

18. Details of the manufacturer

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Our range of supply:

Gear pumps
Multi-line oil pumps
Multi-line grease pumps
Single-line central lubrication systems
Dual line central lubrication systems
Oil circulation central lubrication systems
Oil-air and spray lubrication
Wheel flange central lubrication systems
Rolling mill central lubrication systems
Commercial vehicle lubrication
Progressive distributors
Control and monitoring units

This document is provided solely to give you analysis tools and data to assist your use of our product. Product performance is affected by many factors beyond the control of Groeneveld-BEKA.

Groeneveld-BEKA products are sold subject to Groeneveld-BEKA terms and conditions of sale, which include our limited warranty and remedy. You can find these at <https://www.groeneveld-beka.com/en/>

Technical data is subject to changes without prior notification.

Please consult with your Groeneveld-BEKA engineer for more information and assistance.

Every reasonable effort has been made to ensure the accuracy of the information in this writing, but no liability is accepted for errors, omissions or for any other reason.