



Lubrication device FlexxPump4 ND

User manual

Triboserv

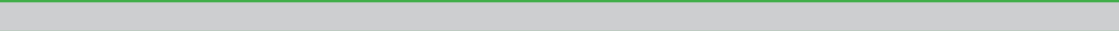


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Revision history

This manual was written in German, all other language versions are translations of this manual.

This user manual is only valid for

Product:

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1. General information about this manual

This user manual contains all necessary information to use the FlexxPump4 in the power supply version, hereinafter referred to as FP4 ND, safely and as intended. In the event that supplementary sheets are attached to these instructions, the information and data contained in the supplementary sheets are valid and replace the corresponding information in this user manual. Any contradictory information contained in this user manual thus becomes invalid. If you have any questions regarding special applications, please contact TriboServ GmbH & Co. KG.

The actual and factual operator must ensure and guarantee that these instructions, including any supplementary sheets, have been read and understood by all persons responsible for the installation, operation or maintenance of the FP4 ND. Therefore, keep these instructions in a suitable place, ideally in an easily accessible place, in the surrounding area of the FP4 ND.

Inform your colleagues who work in the local area of the machine about safety instructions so that nobody gets hurt.

This manual was written in German, all other language versions are translations of this manual.

1.1 Signal words

DANGER

This signal word points you to an immediate and threatening risk of serious injury or death.

WARNING

This signal word indicates a potentially imminent danger which can result in serious injury or even death.

CAUTION

This signal word indicates a potentially imminent danger that can result in minor to severe injuries.

NOTICE

This signal word indicates a potentially imminent danger which can result in damage to property.

INFORMATION

This signal word refers to practical application tips or particularly important information when using the FP4 ND.

The design of the signal boxes is based on ANSI Z535.

1.2 Warning symbols

The following warning symbols are used in this user manual to alert you to hazards, prohibitions and important information:

		
GENERAL WARNING SIGN	ELECTRICITY HAZARD	FLAMMABLE MATERIAL

1.3 Structure of the safety instructions

The safety instructions in this user manual are structured according to the following system:

	CAUTION
	The text explains the consequences of disregarding the reference. ☛ The text shows what to do as an instruction.

1.4 Symbols for information

The following information symbols are used in the text and instructions in this manual:

- Requests you to take action
- ➡ Shows the consequences of an action
- ① Additional information about the action

2. Safety

All persons working with the FP4 ND must follow these operating instructions, in particular the safety instructions and the rules and regulations applicable at the place of use. Generally applicable legal regulations and other rules as well as the relevant rules and regulations for accident prevention (e.g. Personal Protective Equipment (PPE)) and environmental protection must be observed.

2.1 EG/EU Directive

Within the scope of the EC/EU Directive, (re)commissioning of a machine on which the FP4 ND has been installed and/or fitted is prohibited until it has been clearly established that the machine complies with the provisions of the applicable directive.

An EC/EU declaration of conformity for the FP4 ND can be found in the appendix.

2.2 Hazards

In order to avoid danger to the user or damage to the machine on which the FP4 ND is used, the FP4 ND may only be used for its intended purpose and in a technically safe condition.

Always inform yourself about the general safety instructions before starting to work.

2.3 Staff

Only qualified staff who has read and understood this manual may work with the FP4 ND. Local and/or company regulations apply accordingly.

2.4 Reasonably predictable misuse

Any use of the FP4 ND which exceeds the maximum permissible technical data is generally considered to be improper and therefore prohibited.

2.5 Usage for the intended purpose

The following points must be observed for the intended purpose of using the FP4 ND:

- The FP4 ND is exclusively approved for industrial use.
- The FP4 ND may be used exclusively in accordance with the technical data.
- Unauthorized structural alterations to the FP4 ND are not permitted.
- Read the user manual and act accordingly.
- During operation of the FP4 ND, a visual inspection of the FP4 ND as well as of the lubrication point must be carried out regularly. Any anomalies must be eliminated immediately and the cause rectified.
- Refilling the cartridge is not permitted.
- The FP4 ND may not be opened or disassembled.
- Only lubricants approved by the manufacturer may be used.
- Relevant regulations and rules on work safety, accident prevention and environmental protection must be observed.
- Work and activities with and on the FP4 ND are only permitted with appropriate authorisation.

All other uses than the aforementioned intended usage or the disregard of one of the above points shall be deemed improper usage. In this case no liability and/or warranty is assumed.

2.6 Warranty and liability

If the following items are disregarded, all warranty and liability claims for personal injury and/or damage to property are excluded:

- Non-observance of the instructions for transport and storage;
- misuse;
- Improper or unperformed maintenance or repair work;
- Improper assembly / disassembly or improper operation;
- Operation of the FP4 ND with defective protective devices and devices;
- Operation of the FP4 ND without lubricant;

- Operation of the FP4 ND with non-approved lubricant;
- Operation of heavily contaminated FP4 ND;
- Modifications or alterations which may be carried out without the written permission of TriboServ GmbH & Co. KG have taken place;
- Opening and/or partial or complete disassembly of the FP4 ND.

2.7 General safety instructions

The following safety instructions are given for the FP4 ND:

	DANGER Damaged or incorrect electrical connections or unauthorized live components lead to serious injuries or even death. • Have all electrical connection work carried out by qualified personnel only. • Replace damaged cables or plugs immediately.
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	NOTICE Loose or overloaded screw connections can cause damage to the FP4 ND. • Mount and check all screw connections with the permissible torques specified for this purpose. Use a calibrated torque wrench.
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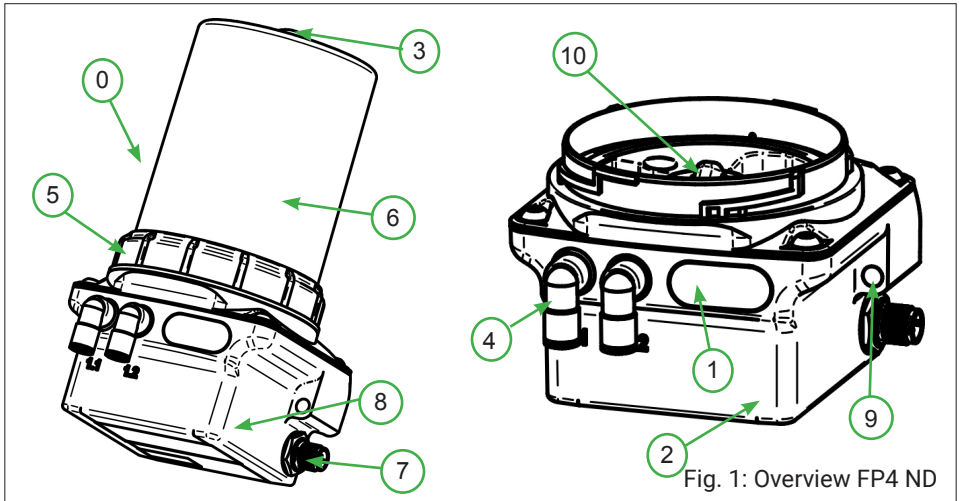
	WARNING Lubricants are flammable. • In case of fire, do not use a water jet to extinguish the fire. • In case of fire, use only suitable extinguishing agents such as powder, foam and carbon dioxide. • Observe the relevant safety instructions of the lubricant manufacturer on the safety data sheet of the lubricant used.
--	--

	CAUTION
	Lubricants can cause skin irritations. ☛ Avoid direct skin contact.

	NOTICE
	Lubricants can contaminate soil and water. ☛ Use and dispose lubricants properly.

3. Description of function

3.1 General information



Nr.	Description
0	FlexxPump4 N (FP4 ND)
1	OLED-Display
2	Action area (for actions with the activation and programming key)
3	Activation and programming key
4	Lubricant outlet, outlets (different version possible)
5	Retaining ring
6	Upper housing
7	M12x1 electrical interface
8	Nameplate with designation, CE mark and serial number
9	Through hole for assembly
10	Lubricant inlet with thread for cartridge

The FP4 ND is designed as an extremely compact double piston pump for autonomous operation with grease as the lubricant. The two pistons run force-controlled and counter-rotating. The FP4 ND is available as a version with one lubricant outlet or as a version with two lubricant outlets. The outlets are secured by an integrated non-return valve. Approx. 0.15 cm³ of lubricant is pumped during each dispensing operation; multiple dispensers can be set one after the other.

The display on the front panel displays the various operating states; further information (empty level tracking, empty cartridge, error) can be read.

The present FlexxPump4 as power supply version has an electrical interface. The supplied activation and programming key can be used to adjust the operation mode and the quantity of lubricant pumped per time in order to supply the lubrication point with the ideal quantity of lubricant.

3.2 Nameplate and designation

The nameplate of the FP4 ND is visibly attached to the side of the pump itself. There the CE mark and the serial number of the FP4 ND are visible. Refer to Fig. 1 for the location of the nameplate and serial number.

3.3 Scope of delivery

The FP4 ND is available in several different versions. They differ in the design (housing for 250 cm³ cartridge or housing for 400 cm³ cartridge), the number and type of lubricant outlets and the scope of accessories supplied.

3.4 Technical data

Housing			
Dimensions with housing for 250cm ³ cartridge	111 x 165 x 108 (B x H x T)	mm	
Dimensions with housing for 400cm ³ cartridge	111 x 200 x 108 (B x H x T)		
Weight (without cartridge)	appx. 1130	g	
Mounting options	through holes for screws M6x35 DIN 912		
Preferred mounting position	upright		
Material	Zinc die-cast / PA 6.6 GF30 / POM		
Material outlet	Nickel-plated brass		
Operating temperature	- 20 ... + 70	°C	
Lubricant and hydraulics			
Cartridge volume	250 / 400	cm ³	
Lubricant characteristics	grease until NLGI class 2		
Number of outlets	1 / 2		
Hydraulic connection	via PA-tube Ø 6mm		
Number of lubrication points per outlet	depending on the selected accessories		
Max. pressure	70	bar	
Grease delivery	per stroke 0,15	cm ³	
Electrics			
Display	OLED-Display		
Operating voltage	24 (+/- 5%)	V DC	
Protection	0,75 (slow blow)	A	
Protection class	IP 54		
Current consumption	I _{max} < 0,3 I _{quiescent} < 0,025		A

4. Transport and storage

4.1 Packaging

The FP4 ND is delivered in an outer packaging (cardboard box) and - depending on the scope of delivery with a lubricant cartridge and other accessories - in the same package. To protect them from moisture and dirt, they are also packed in PE films.

Dispose the packaging materials at the designated disposal points in compliance with the relevant national and company regulations.

After receiving the FP4 ND, check the delivery note for completeness and correctness. Any missing parts or damage must be reported immediately to the forwarding agent, the insurance company or TriboServ GmbH & Co. KG in writing.

4.2 Transport

	<table border="1"><thead><tr><th colspan="2">NOTICE</th></tr></thead><tbody><tr><td colspan="2">Hard shocks, e.g. due to falling or setting down too hard, can damage the FP4 ND.</td></tr><tr><td>•</td><td>Do not throw the FP4 ND.</td></tr><tr><td>•</td><td>When using lifting equipment, only use hoists and load handling attachments in perfect condition and with sufficient load capacity.</td></tr><tr><td>•</td><td>The permissible lifting weight of the lifting device must not be exceeded.</td></tr></tbody></table>	NOTICE		Hard shocks, e.g. due to falling or setting down too hard, can damage the FP4 ND.		•	Do not throw the FP4 ND.	•	When using lifting equipment, only use hoists and load handling attachments in perfect condition and with sufficient load capacity.	•	The permissible lifting weight of the lifting device must not be exceeded.
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•	The permissible lifting weight of the lifting device must not be exceeded.										

4.3 Storage

Store the FP4 ND in its original packaging in a vertical position in a dry, frost-free environment at an ambient temperature of – 20°C to + 40°C. The maximum storage time in unopened condition is 2 years.

The so-called „First-In-First-Out-Principle“ (FiFo) is recommended for storage logistics.

5. Mounting

5.1 Preparations

Before starting to work, inform yourself in detail about the FP4 ND using this user manual; in particular about the general safety instructions (section 2.7). Prepare the installation site carefully.



NOTE

Pressurised air can damage the seals of the FP4 ND and can transport dirt and foreign matter into the FP4 ND or the lubricant.

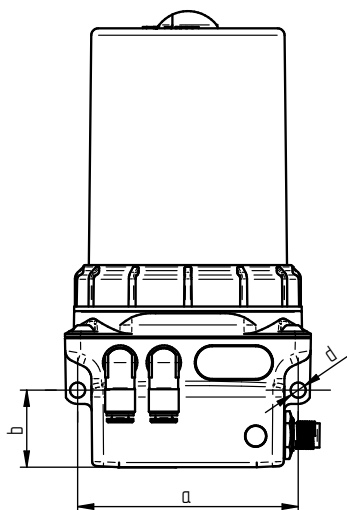
- Do not use pressurised air.
- Make sure that there is no coarse dirt in the mounting area.

5.2 Mechanical mounting

Two through holes are provided on the housing for mounting the FP4 ND at the intended mounting location.

- Fasten the FP4 ND using two DIN 912 socket head screws of size M6x35 or longer.
- Secure the screws with suitable threadlocker.

① Suitable mounting brackets and plates are also available as accessories.



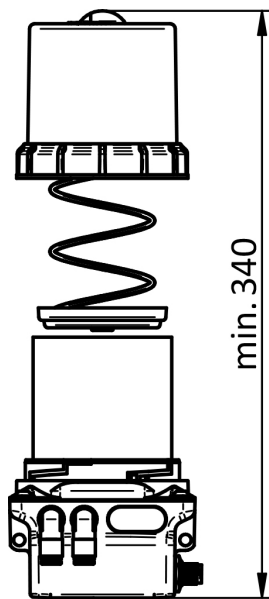
Measurements

a	96 mm
b	33,5 mm
d	6,6 mm
Prefered mounting position	upright

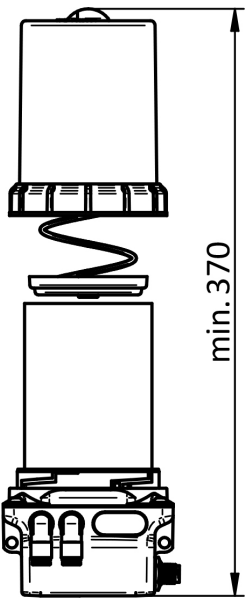
5.3 Mounting height

When selecting the mounting location, observe the minimum mounting heights required for the FP4 ND in the version with 250 cm³ cartridge volume or 400 cm³ cartridge volume for disassembly and assembly of the upper housing.

min. mounting height
version 250 cm³ [mm]



min. mounting height
version 400 cm³ [mm]



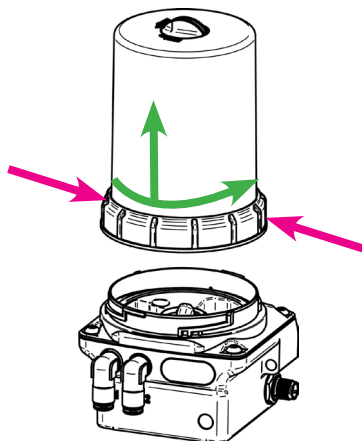
5.4 Mounting of the FP4 ND

1. Remove the housing from the power unit of the FP4 ND.

- Loosen the retaining ring from the power unit by turning it counterclockwise.
- Separate the upper housing from the FP4 ND.

① For easier loosening, grip the retaining ring on the right and left outside.

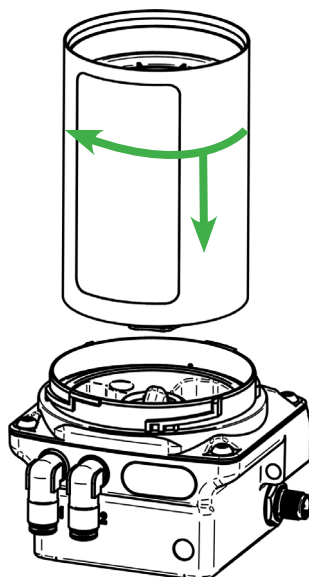
① Make sure that no dirt, water or foreign bodies enter/s the lubricant inlet.



2. Mounting the lubricant cartridge

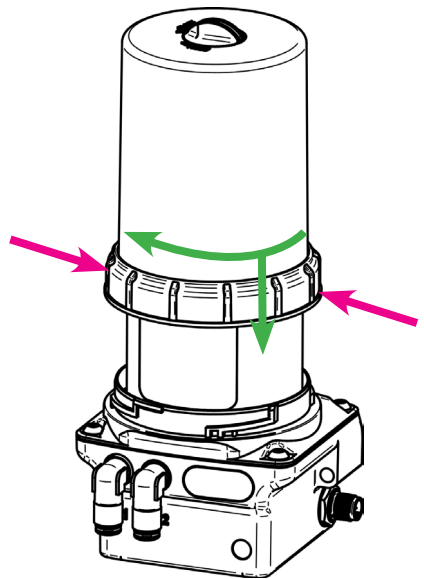
- Unscrew the lubricant cartridge cap counterclockwise and pull it off.
- Place the filled lubricant cartridge on the FP4 ND with the label facing forwards.
- Screw the lubricant cartridge clockwise onto the FP4 ND.

① The end position is reached after two full rotations when the label of the lubricant cartridge is in alignment with the front of the FP4 ND.



3. Assembling the upper housing on the power unit of the FP4 ND.

- Place the dismantled housing on the FP4 ND and press it onto the power unit.
- Fasten the housing to the power unit by turning the retaining ring clockwise.

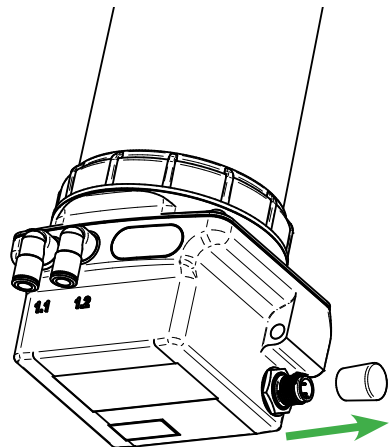


① For easier fastening, grip the retaining ring on the right and left outside.

① The retaining ring must snap into place when turning and be completely tightened.

4. Remove the protective cap on the side of the FP4 ND.

- Remove the black protective cap in the direction of the arrow from the side of the electrical M12x1 interface.

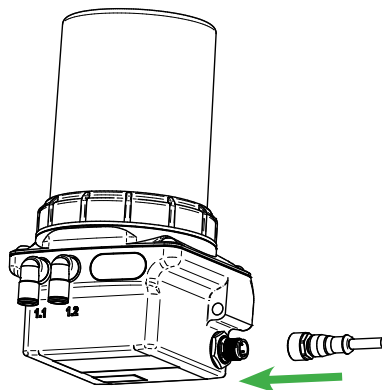


5. Connect the electrical interface

● Connect the FP4 ND to the external power supply or controller via the M12x1 interface on the side of the FP4 ND using a suitable connecting cable.

① Depending on the application, connection cables with straight or angled socket can be used.

① Please refer to chapter 7.1 or chapter 8.1 for the condition of the connection cable.



DANGER

Defective or faulty electrical connections or unauthorized live components can lead to serious injuries or even death.

- Have all electrical connection work carried out by qualified personnel only.
- Replace damaged cables or plugs immediately.
- Before carrying out any electrical installation work, observe the five safety rules of electrical engineering:
 - Unlocking
 - Secure against unintentional restarting.
 - Check that there is no voltage.
 - Ground and short-circuit.
 - Cover adjacent live parts.



DANGER

Machine elements that are not lubricated can cause failures resulting in serious injury or even death.

- Never operate the FP4 ND without the upper housing. Especially when changing the cartridge or during start-up, make sure to re-mount the upper housing after disassembly.

5.5 Start-up

Mount the FP4 ND carefully according to the steps described in chapters before. Depending on the scope of delivery, you must also carry out the following additional measures for the first-time start-up:

1. Check the assembly

Make sure that the FP4 ND is properly and completely assembled. In particular, the battery must be inserted and a lubricant cartridge must be fitted.

2. Power on

If you want to put the FP4 ND into operation, switch on the FP4 ND. Only if you switch the FP4 ND on, it delivers lubricant to the lubrication point according to the settings. The detailed description for powering on can be found in chapter 6.3.3.

3. Activate filling menu

Execute the filling menu. The detailed description of this can be found in Chap. 6.3.5. The FP4 ND thus carries out a pump cycle PZ with a total of 40 lubrication strokes C with the activation.

4. Hydraulic connection

Connect the consumer hydraulically to the FP4 ND. If you connect tubes to the FP4 ND, make sure that the tubes and connectors are installed tightly, cleanly and correctly.

① Ideally, use tubes prefilled with the appropriate lubricant!

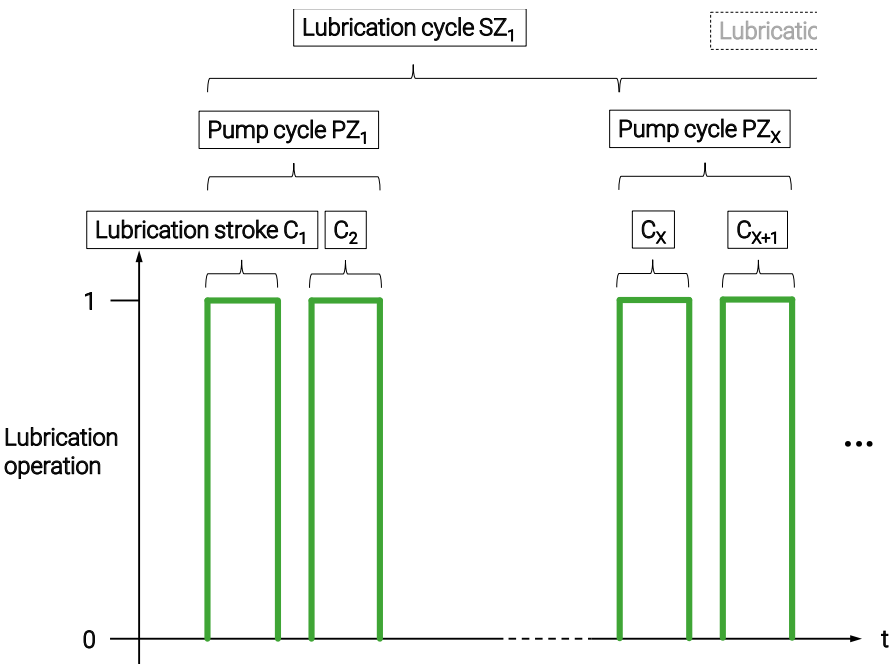
5. Check the settings on the FP4 ND

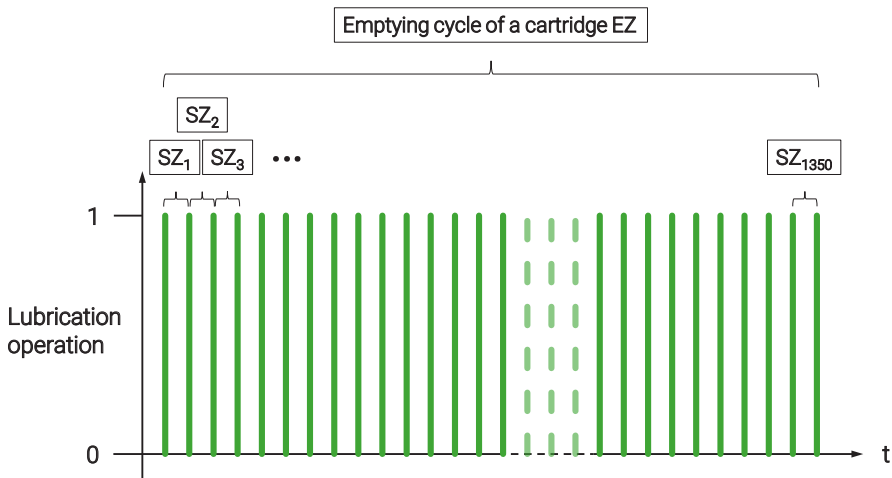
Check the factory settings of the FP4 ND with the required values for the lubrication point and adjust them if necessary. Changes to the FP4 ND must be made in the Settings menu, see Chap. 6.3.4.

6. Operation and settings

6.1 General information

The following two graphics show an overview of the most important terms necessary for programming and understanding the FP4 ND (example of a FlexxPump4 N with two outlets; the parameter C is 1):





What you should know about operating and setting the FP4 ND:

✓ The FP4 ND is suitable as a multi-point lubricator for one or two lubrication points. However, depending on the specific application, FP4 ND can also supply a limited number of lubrication points reliably and cleanly with lubricant. Accessories from the manufacturer (e. g. distributors or progressive distributors) can be connected to the FP4 ND. If necessary, changes must be made to the FP4 ND settings to ensure safe and reliable operation.

✓ The FP4 ND is a cycle controlled lubricator , which works time-based via the integrated microelectronics and is connected to a 24V DC power supply. The FP4 ND cyclically delivers a defined quantity of lubricant from the cartridge to the outlet. Three operation modes can be selected.

- ✦ The operating mode „**Setting lubrication cycle duration**“ enables the setting of the number of lubrication strokes (C) and a lubrication cycle duration (h) in hours. Lubrication cycle durations (h) between 1...240 hour(s) and lubrication strokes (C) between 1...30 can be set.
- ✦ The operating mode „**Setting emptying time**“ enables the setting of the cartridge emptying time in months. Emptying times between 1...36 month(s) and lubrication strokes (C) between 1...30 can be set. The pump calculates the lubrication cycle duration automatically.

User manual

- ☛ Alternatively, the FP4 ND can also be integrated into a control system (PLC) and commanded and controlled via this in „**pulse control mode**“, see Chap. 8.

✓ A lubrication cycle SZ thereby consists of one (1) pump cycle PZ and a pause time t_p . The pump cycle PZ can consist of a minimum of one (1) and a maximum of thirty (30) lubricating strokes C. In this case, the up to thirty (30) lubrication strokes C per outlet are performed directly one after the other. After the end of the pump cycle PZ, the FP4 ND pauses until the pause time t_p has elapsed and automatically executes the next lubrication cycle SZ after the set lubrication cycle duration t_{sz} has elapsed.

✓ The disposable interchangeable cartridge with 250 cm³ or 400 cm³ lubricant guarantees a controlled and constant quality of the lubricant and is filled without air bubble inclusions. The FP4 ND allows a high supply security of the lubrication point and prevents failures. The FP4 ND in its present version is designed exclusively for the lubricant grease.

✓ The FP4 ND cannot be used in the present version without a lubricant cartridge. Depending on the version ordered the cartridge can already be included in the scope of delivery and may already be connected and installed in the FP4 ND.

✓ If you have any questions about your application and the correct settings for FP4 ND, please contact the manufacturer.

The FP4 ND is always delivered ex works with the following settings:

Operating mode	Setting lubrication cycle duration
State	OFF (FP4 ND is switched off)

① The factory settings foresee using the FP4 ND in the operating mode „**Setting lubrication cycle duration**“. If you want to operate the FP4 ND in the operating mode „**Setting emptying time**“ or in „**Pulse control mode**“, you have to make changes in the Settings-Menu of the FP4 ND, chapter 6.3.4.

① If you have purchased a FP4 ND in the 400 cm³ version, you can use the 250 cm³ and 400 cm³ cartridge sizes. If you have purchased a FP4 ND in the 250 cm³ version, you can only use the 250 cm³ cartridge size.

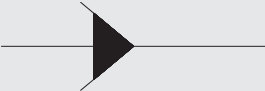
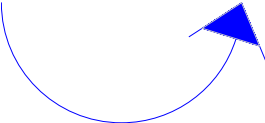
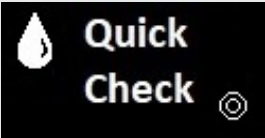
6.2 Menu and display messages

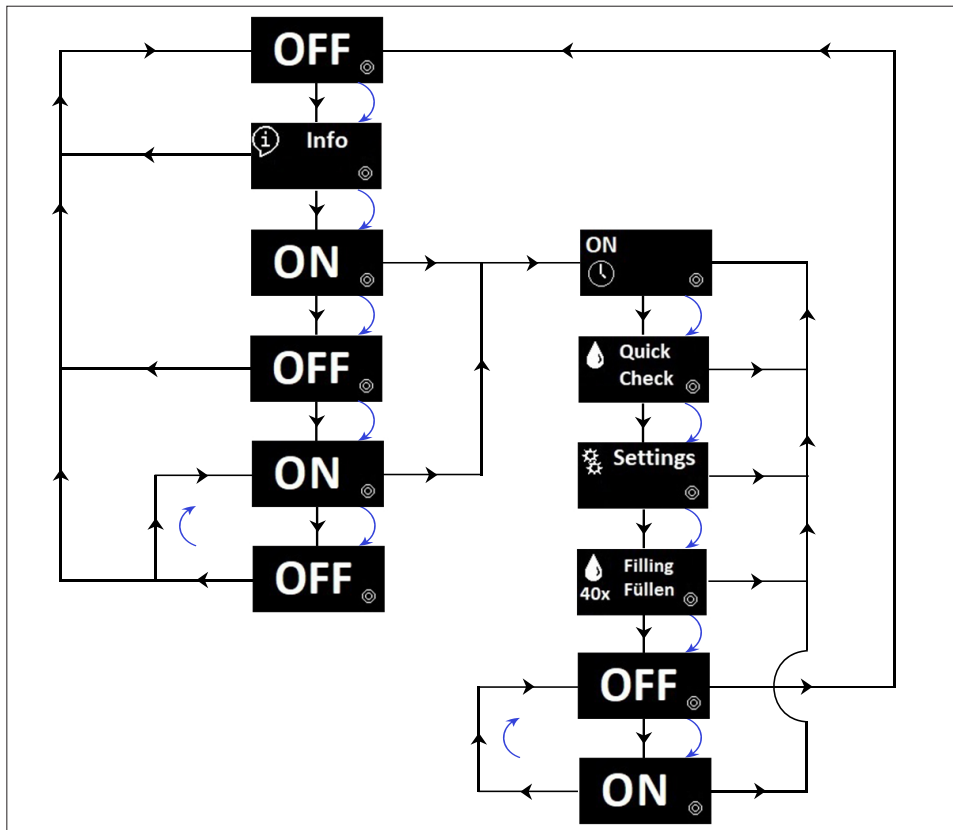
The display of the FP4 ND can be used both to read information visually and, in conjunction with the activation and programming key attached to the upper part of the FP4 ND, to change settings or trigger individual actions.

In principle, settings can be changed or actions triggered both when the FP4 ND is switched off (OFF) and when it is switched on (ON).

The individual submenus are presented, described and explained in detail in Chap. 6.3.1 to 6.3.5.

The symbolic representations used below are described as follows:

Symbol	Description	Note
	OLED display	In the OLED display, indications and information are shown visually both in operation and for programming
	Sequence arrow	The black sequence arrow indicates the unchangeable basic structure of the menu.
	Action arrow	The blue action arrow shows the sequence of touching the action area with the activation and programming key once.
	Sub-menu	In the respective submenus information can be read, dispensing processes can be initiated and settings can be changed.



The graphic above illustrates the unchangeable basic flowchart of the FP4 ND menu navigation as well as the options for branching to the Sub-menus. The illustration for the operating mode „Lubrication cycle duration“ was selected as an example.

① The FP4 ND can be switched on and off at several points in the menu navigation. For details see chapter 6.3.1.

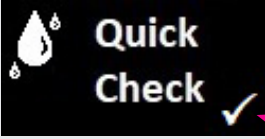
① The Info-menu can only be accessed from the OFF mode (FP4 ND is switched off). The Info-menu provides you with an informative overview of the current FP4 ND settings. For details see chapter 6.3.2.

① The Quick-Check-menu can only be accessed from the ON mode (FP4 ND is switched on). The Quick-Check-menu allows you to manually trigger a pump cycle on the FP4 ND. For details see chap. 6.3.3.

① The Settings-menu can only be accessed from the ON mode (FP4 ND is switched on). The Settings-menu allows you to make changes to the operating mode and to set the size of the cartridge used. For details, see Chapter 6.3.4. In addition, the Settings-menu allows you to make changes to the settings within the different operating modes - and thus to the dispensing behavior - of the FP4 ND. For details, see Chap. 6.3.4.1, 6.3.4.2 or 6.3.4.3.

① The Filling-menu can only be accessed from the ON mode (FP4 ND is switched on). The FP4 ND thus carries out a pump cycle PZ with a total of 40 lubrication strokes C with the activation. The detailed description of this can be found in Chap. 6.3.5.

For visual output, information on the various states of the FP4 ND is shown on the display. The following table illustrates the indications on the display as well as the explanation of the respective output:

Display	Description	Naming
	The double circle in the lower right corner is displayed when the action area is touched with the activation and programming key (activation and programming key detected).	Activation and programming key detected by FP4 ND
	The confirmation hook in the lower right corner is displayed when an entry has been confirmed. In addition, the display flashes twice.	Acceptance of changed value
	In the ON and OFF state, the screen saver is activated after 10 seconds. ON and OFF are shown in reduced size on the display.	Screen saver

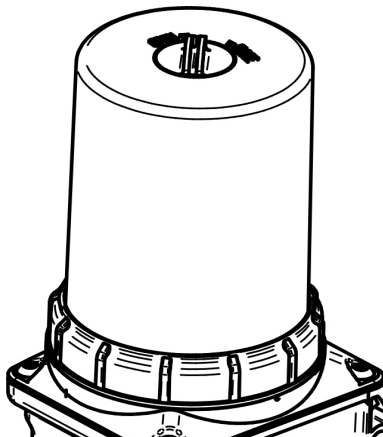
6.3 Actions with the activation and programming key

The activation and programming key attached to the upper housing of the FP4 ND allows you to perform actions and changes in the settings of the FP4 ND. This activation and programming key can be easily and permanently stored on the FP4 ND.

1. Remove the action and programming key.

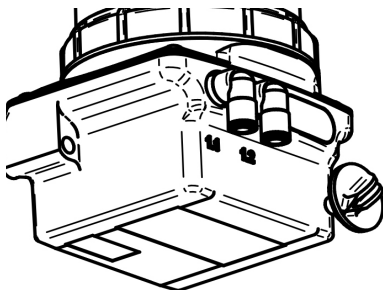
- Turn the activation and programming key to the OPEN position and remove it from the housing of the FP4 ND.

① The activation and programming key is stored in the opening on the top of the upper housing of the FP4 ND. It is also used to seal the FP4 ND.



2. Guide the activation and programming key to the action area.

- Place the activation and programming key on the action area on the front of the FP4 ND.
- ➡ As soon as the activation and programming key on the action area has been detected by the FP4 ND, the double circle in the display lights up. The menu runs in a rhythm of approx. 2 seconds.
- Remove the activation and programming key from the action area as long as the desired menu item is shown in the display.
- ➡ The double circle disappears. You have performed an operation. The display flashes twice together with the confirmation hook.



● At the end of the operation or change of settings, insert the activation and programming key again into the hole provided on the upper housing of the FP4 ND. Then turn the activation and programming key to the CLOSE position to restore the sealing effect.

① Please note, however, that in the event of faults or changes to be made, no changes or actions can be carried out on the FP4 ND without the activation and programming key. If you do **not** reattach the activation and programming key to the housing of the FP4 ND after carrying out actions on the FP4 ND, there is no separation from the environment and dirt can get into the housing. The activation and programming key must be remounted in the housing of the FP4 ND after actions have been performed.



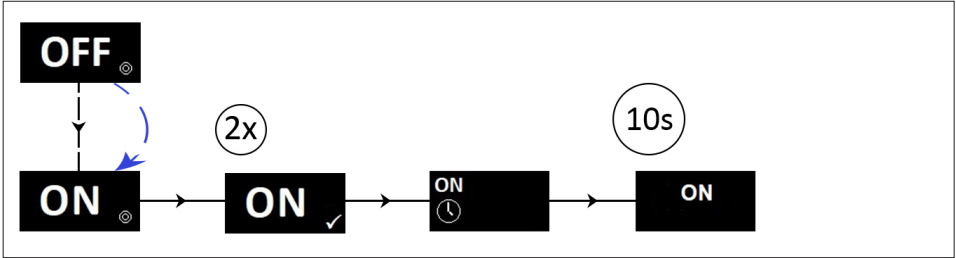
WARNING

Dirt inside the FP4 ND can lead to clogged lubricant lines, which can cause damage to machinery or equipment.

- When working on the FP4 ND, always ensure that it is clean and that the activation and programming key is mounted in the upper housing of the FP4 ND.

6.3.1 Switching FP4 ND on and off

Switch the FP4 ND on:

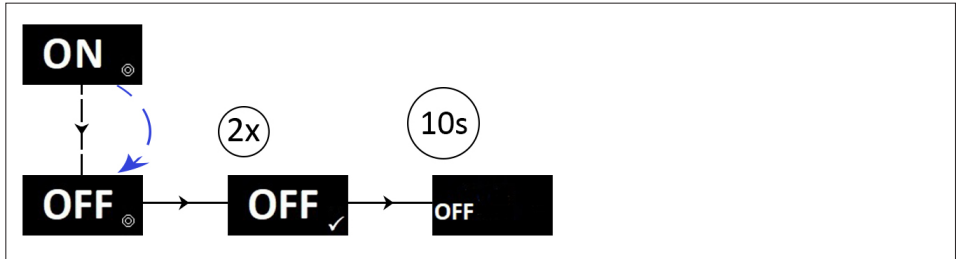


- ✓ FP4 ND is switched off (OFF).
- Hold the activation and programming key on the action area. The double circle appears in the bottom right corner. Leave the activation and programming key on the action area until **ON** appears in the display. Remove the activation and programming key from the action area as long as ON is shown in the display. The double circle disappears; the confirmation hook appears; the display and the hook flash twice for visual confirmation.
- ➡ After the self-check of the FP4 ND, ON is shown in the display. In this state, the FP4 ND has been successfully commissioned and will supply lubricant according to the set values. The FP4 ND activates a screen saver after approx. 10 seconds. The ON indicator on the display moves from left to right and from top to bottom.
- Insert the activation and programming key into the hole provided on the upper housing of the FP4 ND.

When switched on, the FP4 ND shows you the currently set operating mode. The following displays represent the individual operating modes:

Setting lubrication cycle duration	Setting emptying time	Pulse control mode

Switch the FP4 off:



✓ FP4 ND is switched on (ON).

- Hold the activation and programming key on the action area. The double circle appears in the bottom right corner. Leave the activation and programming key on the action area until **OFF** appears in the display. Remove the activation and programming key from the action area as long as ON is shown in the display. The double circle disappears; the confirmation hook appears; the display and the hook flash twice for visual confirmation.

- ➡ FP4 ND is switched off (OFF); OFF appears in the display. The FP4 ND no longer dispenses lubricant. The FP4 ND activates a screen saver after approx. 10 seconds. The OFF indicator on the display moves from left to right and from top to bottom.

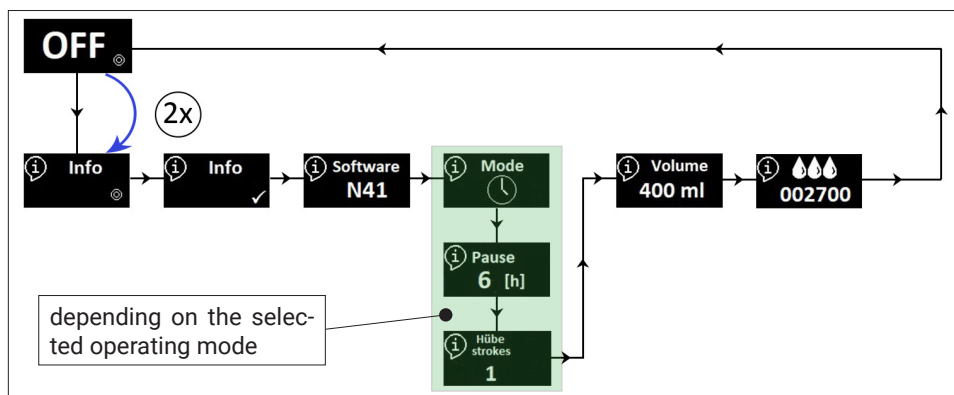
- Insert the activation and programming key into the hole provided on the upper housing of the FP4 ND.

① The FP4 ND can be switched off in any state in the manner described here.

6.3.2 Get information about the FP4 ND

The Info menu is used to inform the user about the firmware used in the FP4 ND and the settings made and currently active.

Nothing can be changed by the user in the Info menu. The values of the set parameters are displayed in an unchangeable sequence. The values displayed depend on the selected operating mode. The following shows the basic sequence for the set operating mode Setting lubrication cycle duration.



Procedure:

✓ FP4 ND is switched off (OFF).

- Remove the activation and programming key from the upper housing of the FP4 ND and place it on the action area.

- Hold the activation and programming key on the action area. The double circle appears in the bottom right corner. Leave the activation and programming key on the action surface until **Info** appears in the display. Remove the activation and programming key from the action area until Info appears in the display. The double circle disappears; the confirmation hook appears; the display and the hook flash twice for visual confirmation.

➡ FP4 ND informs you optically on the display about the set values.

- Insert the activation and programming key into the hole provided on the upper housing of the FP4 ND.

① The Info menu can only be accessed from OFF mode (FP4 ND switched off). If you have accessed the Info menu, you will automatically return to the OFF mode.

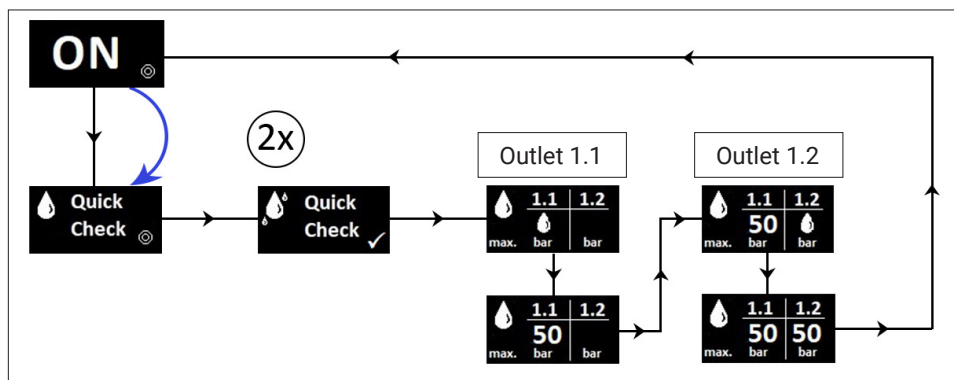
FlexxPump4 ND

Display text	Explanation
General information regardless of the selected operating mode	
 Software N41	Alphanumeric identifier of the firmware of the FP4 ND
 Mode 	Selected operating mode (factory settings see chap. 6.1)
 Volume 400 ml	Set value of the cartridge size
  002700	Number of completed lubrication strokes C
Specific displays in the operating mode Setting lubrication cycle duration	
 Mode 	Selected operating mode Setting lubrication cycle duration
 Pause 6 [h]	Set value of the variable lubrication cycle duration in hours
 Hübe strokes 1	Set value of the variable lubrication strokes C per pump cycle
Specific displays in the operating mode setting emptying time	
 Mode 	Selected operating mode Setting emptying time
 Monate months 1	set value of the variable emptying time of the cartridge in months
 Hübe strokes 1	Set value of the variable lubrication strokes C per pump cycle
Specific displays in operating mode pulse control	
 Mode 	Selected operating mode pulse control

6.3.3 Perform a Quick-Check

The Quick-Check is used to activate the FP4 ND by hand. In this way, a pump cycle PZ can be triggered directly at the FP4 ND. This function can be used, for example, to manually check the condition of the lubrication point.

After the Quick-Check has been triggered, the FP4 ND carries out a pump cycle PZ; the number of lubrication strokes carried out per outlet is exactly as set in the variable Number of lubrication strokes per lubrication cycle C in the Settings menu. During the lubrication strokes C, the counterpressure per outlet measured by the integrated microelectronics is shown in the display as an approximate value in the unit bar. After a completed lubrication stroke, the approximate maximum counterpressure reached during the lubrication stroke is shown in bar on the display per outlet.



Procedure:

✓ The FP4 ND is switched on and there is no fault or error.

- Remove the activation and programming key from the upper housing of the FP4 ND and place it on the action area.
- Hold the activation and programming key on the action area. The double circle appears in the bottom right corner. Leave the activation and programming key on the action area until **Quick-Check** appears in the display. Remove the activation and programming key from the action area until Quick-Check appears in the display. The double circle disappears.
- ➡ The confirmation hook appears; the display and the hook flash twice for visual confirmation. The FP4 ND starts the pump cycle PZ.
- Reattach the activation and programming key in the opening provided on the upper hou-

sing of the FP4 ND.

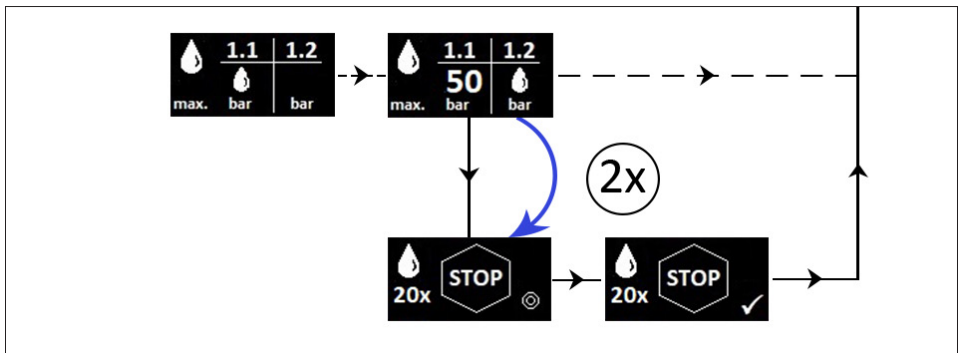
- Observe the back pressure values displayed on the display if they are of interest to you.

① During the pump cycle, the display shows the back pressure of the current lubrication stroke depending on the outlet.

- If you want to cancel the operation: Move the activation and programming key to the action area during a lubrication stroke and wait until the STOP symbol appears in the display. Remove the activation and programming key from the action surface as long as STOP is shown in the display. The double circle disappears.

- The confirmation hook appears; the display and the hook flash twice for visual confirmation.

- The FP4 ND cancels the Quick-Check. In addition, the number of complete lubrication cycles is shown in the display.



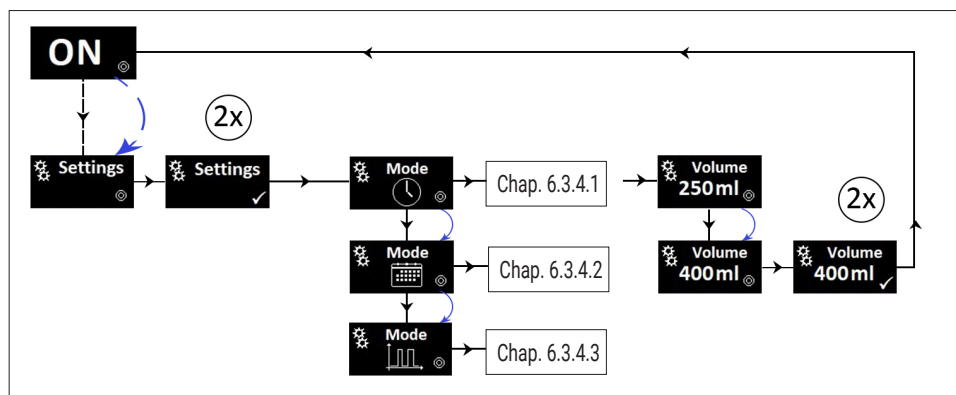
① If you use the Quick-Check in the operating mode Setting emptying time, this has a slightly shortening effect on the set emptying time.

① The Quick-Check can only be started from ON mode (FP4 ND switched on). After you have activated the Quick-Check, you will automatically return to ON mode.

① The quick check can only be started on the display in the operating modes Setting lubrication cycle duration and Setting emptying time. In the operating mode Pulse control, the quick check must be triggered by the PLC.

6.3.4 Set operating mode and cartridge size

The Settings menu allows changing general parameters of the FlexxPump setting as well as changing specific parameters of the selected operating mode. The general parameters include adjusting the operating mode and changing the cartridge size of the FP4 ND used. You can switch between the operating modes **Setting Lubrication Cycle Duration**, **Setting Emptying Time** and **Pulse Control**. This chapter explains how to select the operating mode and change the cartridge size between 250 cm³ and 400 cm³. The explanation of how to change specific parameters within the different operating modes and their explanation is given in the following chapters.



Procedure:

✓ The FP4 ND is switched on and there is no fault or error.

- Remove the activation and programming key from the upper housing of the FP4 ND and place it on the action area.
- Hold the activation and programming key on the action area. The double circle appears in the bottom right corner. Leave the activation and programming key on the action area until **Settings** appears in the display. Remove the activation and programming key from the action area until **Settings** appears in the display. The double circle disappears.
- ⌚ The confirmation hook appears; the display and the hook flash twice for visual confirmation.

Changing the operating mode:

As soon as the Mode display appears, the active operating mode is displayed. The following operating modes are available for the FP4 ND:

Display	Operating mode	Explanation
	Setting Lubrication cycle duration (Dial symbol)	In the operating mode „Setting lubrication cycle duration“ you can set the lubrication cycle duration in hours between two lubrication cycles and additionally the number of lubrication strokes per pump cycle.
	Setting Emptying time (Calendar icon)	In the operating mode „Setting emptying time“ you can set the emptying time in months (=running time) and additionally the number of lubrication strokes per pump cycle for a complete cartridge.
	Pulse control mode (Control pulse symbol)	In the operating mode „Pulse control“ you can trigger lubrication strokes on the FP4 ND with the help of an external control or PLC and certain signals.

- If you want to change the operating mode, move the activation and programming key back to the action area as soon as the **Settings** display appears in conjunction with one of the symbols.

- The double circle appears and the next operating mode is shown in the display. The double circle lights up for as long as the activation and programming key is on the action surface; the adjustable operating modes run through alternately.

- When the desired operating mode is shown in the display, remove the activation and programming key from the action area.

- The double circle disappears and the confirmation hook appears; for visual confirmation, the display and the hook flash twice. The selected operating mode has now been accepted and is active. If necessary, adjust the settings within the operating mode, see Chap. 6.3.4.1, Chap. 6.3.4.2 and Chap. 6.3.4.3.

No changing of the operating mode:

- If you do not want to change the operating mode, the activation and programming key must remain removed from the action area.

- The confirmation hook appears; for visual confirmation, the display and the hook flash twice. The submenu now automatically takes you to the specific parameters within the operating mode. The explanation of the parameters and the setting options can be found in the following chapters.

If the specific parameters of the operating modes have been run through without any changes, the cartridge volume appears as the last setting option with the display keyword Volume. You now have the option of changing the value of the cartridge size.

Change the value of the cartridge size:

- If you want to change the cartridge size, move the activation and programming key back to the action area.

- The double circle appears and the next cartridge size is shown in the display. The double circle lights up as long as the activation and programming key is on the action surface; the adjustable cartridge sizes run through alternately one after the other.

- When the desired cartridge size is shown in the display, remove the activation and programming key from the action area.

- The double circle disappears and the confirmation hook appears; for visual confirmation, the display and the hook flash twice. The selected cartridge size has now been accepted.

No changing the value of the cartridge size:

- If you do not want to change the cartridge size, the activation and programming key must remain removed from the action area.

- The confirmation hook appears; the display and the hook flash twice for visual confirmation.

① The Settings menu can only be accessed from ON mode (FP4 ND switched on). Once you have entered the Settings menu, you will automatically return to the ON mode.

① Before commissioning, check if the correct cartridge size is set in the FP4 ND software. The cartridge size used and the cartridge size set in the software must be identical!

6.3.4.1 Operating mode Setting Lubrication cycle duration

General information:

Term/Parameter	Shortcut	Value
Number of lubrication strokes per pump cycle and outlet	C	adjustable, 1 ... 30
Lubrication stroke time	t_c	predefined, 7s ... 17s
Relaxation time	t_E	predefined, 2s
Pause time	t_p	calculable
Pump cycle	PZ	–
Pump cycle duration	t_{pZ}	calculable
Lubrication cycle	SZ	–
Lubrication cycle duration	t_{sZ}	adjustable, 1h ... 240h
Emptying time	EZ	–
Emptying time of a cartridge	t_{EZ}	calculable

The different parameters can be calculated as follows:

$$t_{pZ} = C * t_c + (C - 1) * t_E$$

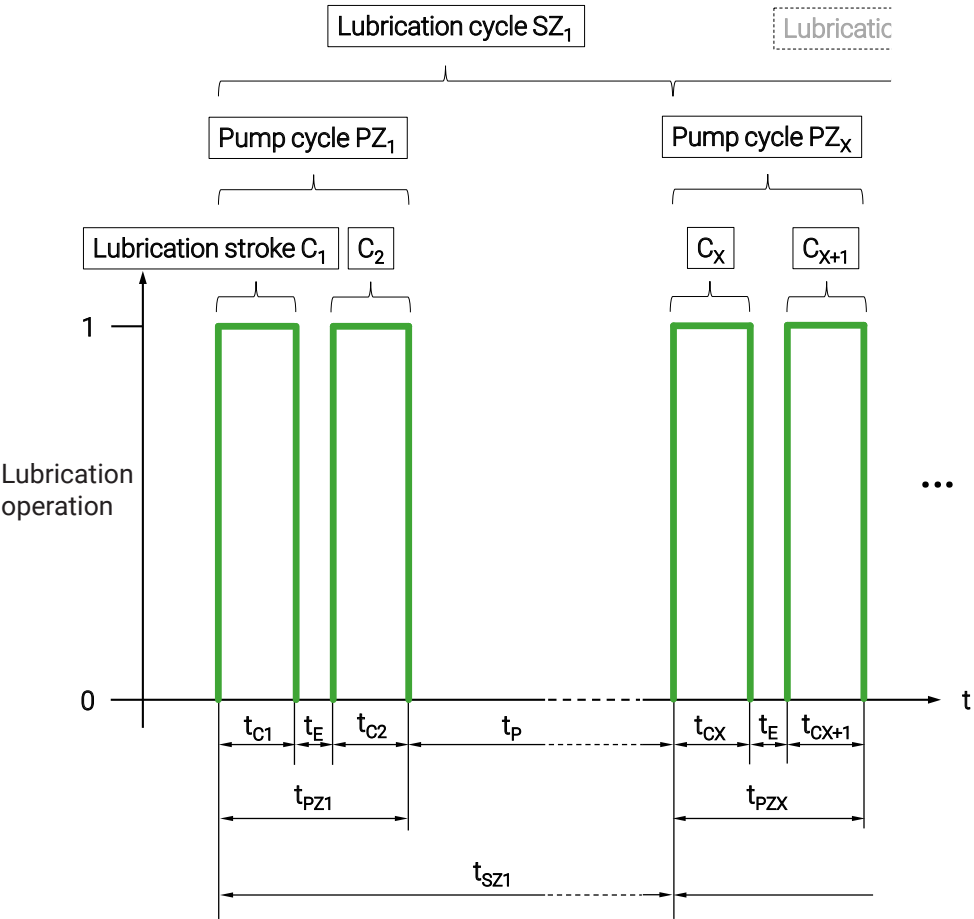
$$t_p = t_{sZ} - t_{pZ}$$

Simplified calculation of the **emptying time** t_{EZ} [h] depending on the selected cartridge and FlexxPump type:

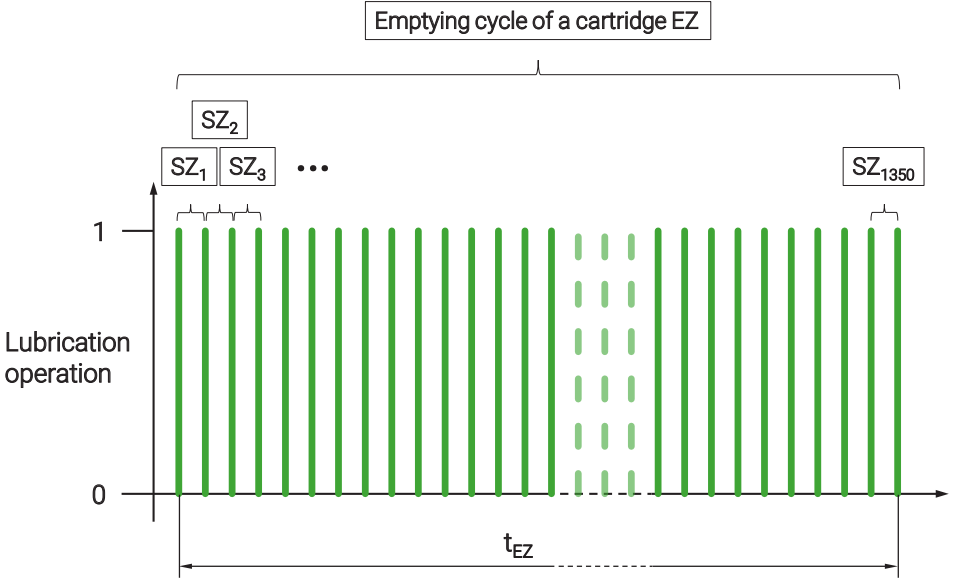
	250 cm ³ cartridge	400 cm ³ cartridge
FP4 ND with 1 outlet	$= t_{sZ} * \frac{1687}{C}$	$= t_{sZ} * \frac{2700}{C}$
FP4 ND with 2 outlets	$= t_{sZ} * \frac{1687}{2 * C}$	$= t_{sZ} * \frac{2700}{2 * C}$

User manual

The following graphic explains the parameters and terms. The graphic shows the example of a FlexxPump4 N with two outlets. The parameter C is 1.



The following graphic explains the parameters and terms. The graphic shows the example of a FlexxPump4 N with two outlets. The parameter C is 1.



Default settings Operating mode Setting Lubrication cycle duration:

Lubrication cycle duration	$t_{sz} = 3\text{h}$	The lubrication cycle duration is 3 hours.
Number of lubrication strokes	$C = 1$	The number of lubrication strokes is one (1) per outlet and per pump cycle.

① The default settings result in an emptying time (service life) for a full lubricant cartridge with a content of 400 cm³ of approx. 337.5 days (= approx. 11 months) when using an FP4 ND with one (1) outlet, provided that the FP4 ND is permanently switched on and no extraordinary lubrication strokes have been carried out, e.g. by the filling or Quick-Check menu. In this case, a pump cycle is triggered by the FP4 ND at the beginning of the set lubrication cycle duration of 3 hours. The emptying time depends on the number of outlets of the present FP4 ND and the selected cartridge size.

① If you use the FP4 ND with one (1) lubricant outlet, a pump cycle of one lubrication stroke from the one outlet is performed at the beginning of the lubrication cycle duration. If you use the FP4 ND with two (2) lubricant outlets, a pump cycle of one lubrication stroke per outlet is performed at the beginning of the lubrication cycle duration. The emptying time (service life) of the cartridge is halved.

● Determine whether the default settings apply to your application and whether the lubrication point is supplied with the correct amount of lubricant per time unit.

If this is the case, you can operate the FP4 ND in the operating mode Setting lubrication cycle duration with the basic settings.

If this is **not** the case, change the values for the lubrication cycle duration t_{sz} and/or the number of lubrication strokes C accordingly. This chapter explains how to make these changes.

① To use the FP4 ND, it must first be properly mounted and installed and then switched on. Mounting is very simple and described in detail in Chap. 5; switching on is described in Chap. 6.3.1.

Definitions of the adjustable parameters for the lubrication cycle duration t_{sz} and the number of lubrication strokes C per pump cycle PZ and their respective permissible values:

$t_{sz} :=$ **lubrication cycle duration** in hours (h).

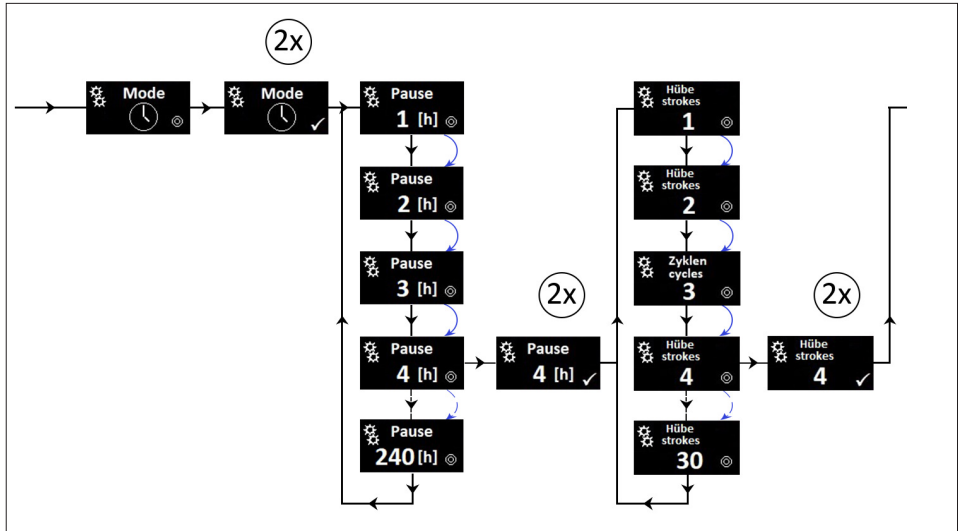
The lubrication cycle duration can be set between 1 | 2 | 3 | ... | 240 hours.

$C :=$ **number of lubrication strokes** during a pump cycle PZ.

The number of cycles c can be set between 1 | 2 | 3 | ... | 30 strokes.

Performing changes:

The Settings menu allows changing specific parameters of the selected operating mode. This chapter explains the parameters essential for the operating mode Setting lubrication cycle duration and how you can change the specific parameters Lubrication cycle duration t_{sz} in hours and the number of lubrication strokes C per pump cycle PZ when the operating mode Setting lubrication cycle duration is selected.



Procedure:

✓ The FP4 ND is switched on and there is no fault or error.

- Remove the activation and programming key from the upper housing of the FP4 ND and place it on the action area.
- Hold the activation and programming key on the action area. The double circle appears in the bottom right corner. Leave the activation and programming key on the action area until **Settings** appears in the display. Remove the activation and programming key from the action area until Settings appears in the display. The double circle disappears.
- ⌚ The confirmation hook appears; the display and the hook flash twice for visual confirmation.

Changing the lubrication cycle duration t_{SZ} :

As soon as the Settings menu has been selected, the active operating mode is displayed. To be able to set the lubrication cycle duration t_{SZ} , the operating mode Lubrication cycle duration setting must be selected with the symbol of the dial. If this is not the case, change the operating mode accordingly. An explanation of how to change the operating mode can be found in Chap. 6.3.4.

After the operating mode Setting lubrication cycle duration is displayed, the lubrication cycle duration t_{SZ} and then the number of lubrication strokes C can be set; direct access to the number of lubrication strokes C is not possible.

- In addition to the display of the active operating mode, the confirmation hook appears; the display and the hook flash twice for visual confirmation.
- In the next step, the currently set value of the lubrication cycle duration ($t_{SZ \text{ actual}}$) is shown in the display. You now have the option of changing the value.

Changing a value of the lubrication cycle duration t_{SZ} :

- If you want to change the value of the lubrication cycle duration t_{SZ} , move the activation and programming key back to the action surface.
- The double circle appears and the next higher ($t_{SZ \text{ actual} + 1}$) adjustable value of the lubrication cycle duration is shown in the display. The double circle lights up for as long as the activation and programming key is on the action surface; the other values of the lubrication cycle duration run through one after the other (the display accelerates). However, you can also remove the activation and programming key from the action surface and place it on the action surface again shortly afterwards in order to reach each value individually one after the other. If the final value of the lubrication cycle duration of $t_{SZ} = 240$ is reached and no value was selected, the menu jumps back to $t_{SZ} = 01$ and the run can be started again.
- When the new value you desire for the lubrication cycle duration ($t_{SZ \text{ new}}$) is shown in the display, remove the activation and programming key from the action surface.
- The confirmation hook appears; for visual confirmation, the display and the hook flash twice. The selected new value ($t_{SZ \text{ new}} \Rightarrow t_{SZ \text{ actual}}$) of the lubrication cycle duration has now been accepted. The submenu now automatically continues to the values of the number of lubrication strokes.

No changing a value of the lubrication cycle duration t_{SZ} :

- If you do not want to change the value of the lubrication cycle duration t_{SZ} , the activation and programming key must remain away from the action area.
- The confirmation hook appears; for visual confirmation, the display and the hook flash twice, while the display shows the lubrication cycle duration t_{SZ} . The submenu now automatically continues to the value of the number of lubrication strokes C.

The display first shows the currently set value for the number of lubrication strokes per pump cycle (C_{actual}). You now have the option of changing the values.

Changing a value of the number of lubrication strokes C per pump cycle PZ:

- If you want to change the value of the number of lubrication strokes C, move the activation and programming key back to the action surface.
- ➡ The double circle appears and the next higher ($C_{\text{actual} + 1}$) adjustable value of the number of lubrication strokes is shown in the display. The double circle lights up for as long as the activation and programming key is on the action surface; the other values of the number of lubrication strokes run through one after the other. However, you can also remove the activation and programming key from the action surface and shortly afterwards return it to the action surface in order to reach each value individually one after the other. If the final value of the number of lubrication strokes of $C = 30$ is reached and no value was selected, the menu jumps back to $C = 01$ and the run can be started again.
- When the new value you desire for the number of lubrication strokes (C_{new}) is shown in the display, remove the activation and programming key from the action surface.
- ➡ The confirmation hook appears; for visual confirmation, the display and the hook flash twice. The selected new value ($C_{\text{new}} \Rightarrow C_{\text{actual}}$) of the number of lubrication strokes C per pump cycle has now been accepted.

No changing of the value of the number of lubrication strokes C per pumping cycle PZ:

- If you do not want to change the value of the number of lubrication strokes C, the activation and programming key must remain away from the action surface.
- ➡ The confirmation hook appears; for visual confirmation, the display and the hook flash twice, while the display shows the set number of cycles.
- Reattach the activation and programming key in the opening provided on the upper housing of the FP4 ND.

① The Settings menu can only be accessed from ON mode (FP4 ND switched on). Once you have entered the Settings menu, you will automatically return to the ON mode.

① If you have made changes to the value of the lubrication cycle duration t_{SZ} or the value of the number of lubrication strokes C per pump cycle PZ in the Settings menu and the FP4 ND is otherwise ready for operation (operating voltage applied and a cartridge fitted), the FP4 ND will then immediately start with the newly set lubrication cycle SZ. The integrated time counter of the FP4 ND starts counting the new lubrication cycle duration t_{SZ} that has just been set.

- Observe the back pressure values shown in the display if they are of interest to you.

① During the pumping cycle, the display shows the back pressure for each lubrication stroke.



WARNING

Incorrect settings can cause damage to machinery or equipment.

- ☛ Carefully determine the required lubricant quantity before selecting the settings.
- ☛ Set the correct lubricant delivery quantity on the FP4 ND.
- ☛ Check the lubrication point regularly to see whether the settings made result in overlubrication or insufficient lubrication.

6.3.4.2 Operating mode Setting Emptying time

General information:

Term/Parameter	Shortcut	Value
Number of lubrication strokes per pump cycle and outlet	C	adjustable, 1 ... 30
Lubrication stroke time	t_c	predefined, 7s ... 17s
Relaxation time	t_E	predefined, 2s
Pause time	t_p	calculable
Pump cycle	PZ	–
Pump cycle duration	t_{PZ}	calculable
Lubrication cycle	SZ	–
Lubrication cycle duration	t_{SZ}	calculable
Emptying time	EZ	–
Emptying time of a cartridge	t_{EZ}	adjustable, 1 ... 36

The different parameters can be calculated as follows:

$$t_{PZ} = C * t_c + (C - 1) * t_E$$

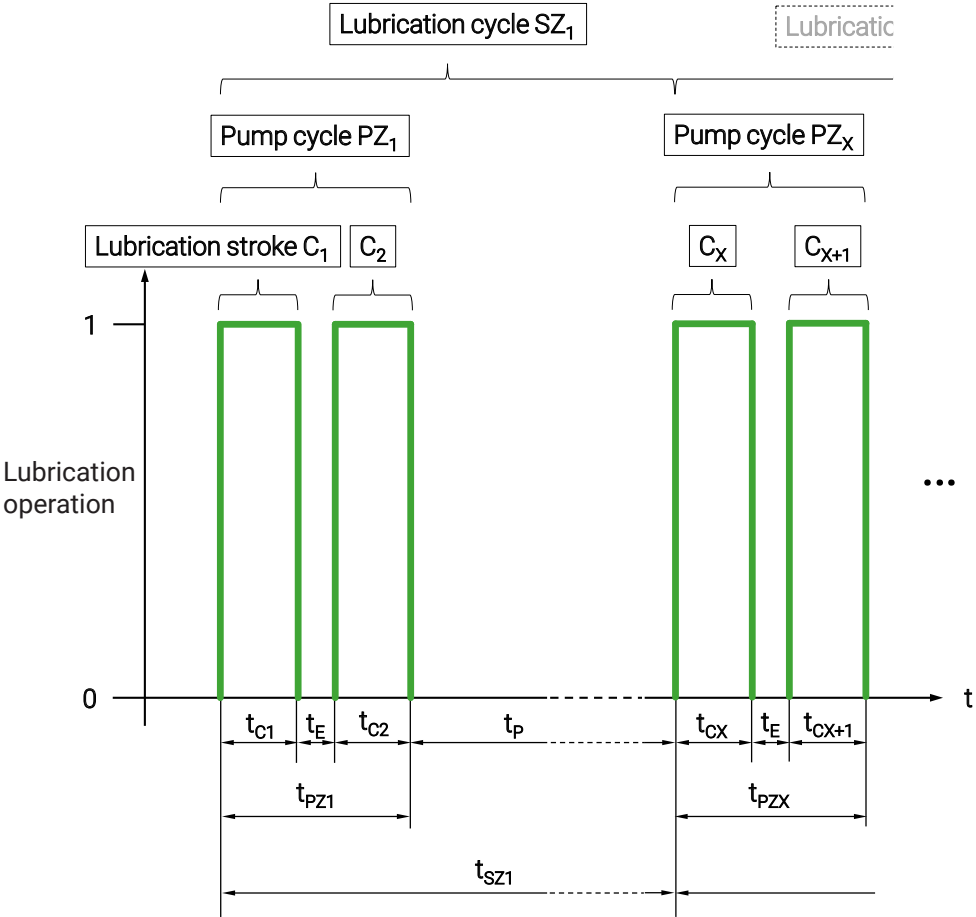
$$t_p = t_{SZ} - t_{PZ}$$

Simplified calculation of the **lubrication cycle duration t_{SZ} [h]** depending on the selected cartridge and FlexxPump type:

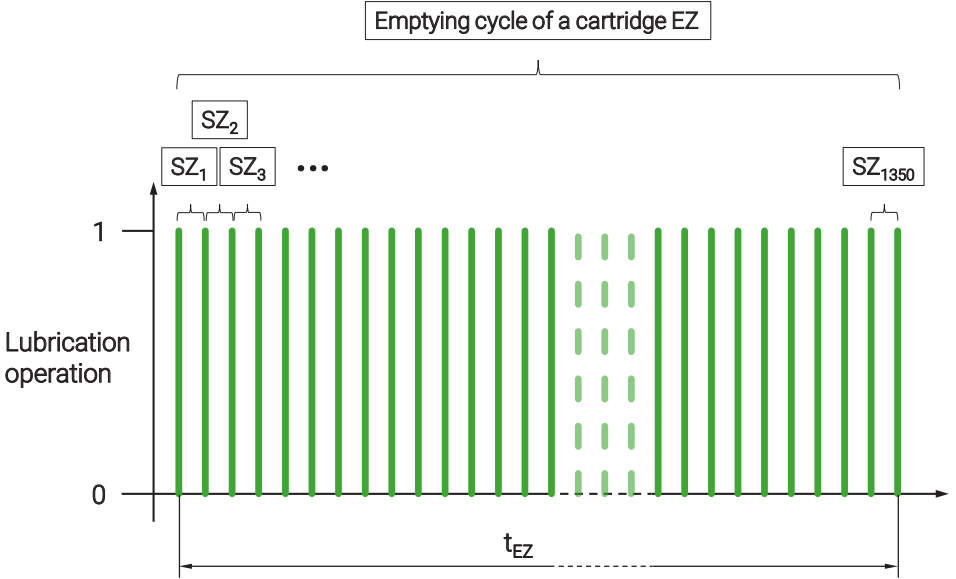
	250 cm ³ cartridge	400 cm ³ cartridge
FP4 ND with 1 outlet	$= t_{EZ} * 30,5d * 24h * \frac{C}{1687}$	$= t_{EZ} * 30,5d * 24h * \frac{C}{2700}$
FP4 ND with 2 outlets	$= t_{EZ} * 30,5d * 24h * \frac{2 * C}{1687}$	$= t_{EZ} * 30,5d * 24h * \frac{2 * C}{2700}$

User manual

The following graphic explains the parameters and terms. The graphic shows the example of a FlexxPump4 N with two outlets. The parameter C is 1.



The following graphic explains the parameters and terms. The graphic shows the example of a FlexxPump4 N with two outlets. The parameter C is 1.



Default settings Operating mode Setting Emptying time:

Emptying time	$t_{EZ} = 12$	The emptying time t_{EZ} of the cartridge is 12 months.
Number of lubrication strokes	$C = 1$	The number of lubrication strokes is one (1) per outlet and per pump cycle.

① The default settings result in an emptying time t_{EZ} (service life) for a full lubricant cartridge with 250 cm³ or 400 cm³ content of 12 months when using an FP4 ND with one (1) outlet in the operating mode setting emptying time, provided that the FP4 ND is permanently switched on and no special lubrication strokes were carried out, e.g. by the filling or quick check menu. The FP4 ND calculates a lubrication cycle time of approx. 5.2 hours when using a cartridge with 250 cm³ content and a lubrication cycle time of approx. 3.3 hours when using a cartridge with 400 cm³ content. The lubrication cycle duration depends on the number of outlets of the present FP4 ND and the selected cartridge size.

① If you use the FP4 ND with one (1) lubricant outlet, a pump cycle of one lubrication stroke from the one outlet is performed at the beginning of the lubrication cycle duration t_{SZ} . If you use the FP4 ND with two (2) lubricant outlets, a pump cycle of one stroke per outlet is performed at the beginning of the lubrication cycle duration. The lubrication cycle duration is doubled.

● Determine whether the default settings are applicable to your application and whether the lubrication point is supplied with the correct amount of lubricant per time unit. If this is the case, you can operate the FP4 ND in the operating mode Setting emptying time with the default settings.

If this is **not** the case, change the value for the emptying time t_{EZ} and/or the number of lubrication strokes C per pump cycle PZ accordingly: This chapter explains how to make these changes.

① To use the FP4 ND, it must first be properly mounted and installed and then switched on. Mounting is very simple and described in detail in Chap. 5; switching on is described in Chap. 6.3.1.

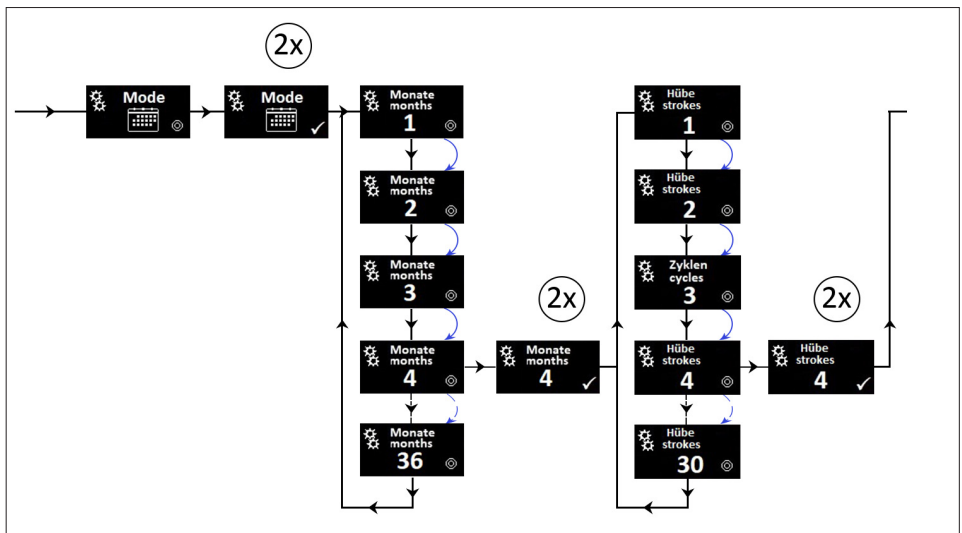
Definitions of the adjustable parameters for the emptying time t_{EZ} and the number of lubrication strokes C per pump cycle PZ and their respective permissible values:

$t_{EZ} :=$ **emptying time** in months (m).
The emptying time can be set between 1 | 2 | 3 | ... | 36 months.

C := number of lubrication strokes during a pump cycle PZ.
The number of cycles c can be set between 1 | 2 | 3 | ... | 30 strokes.

Performing changes:

The Settings menu allows changing specific parameters of the selected operating mode. This chapter explains how to change the specific parameters of the emptying time t_{EZ} in months and the number of lubrication strokes C per pump cycle PZ when the operating mode Setting emptying time is selected.



Procedure:

✓ The FP4 ND is switched on and there is no fault or error.

- Remove the activation and programming key from the upper housing of the FP4 ND and place it on the action area.
- Hold the activation and programming key on the action area. The double circle appears in the bottom right corner. Leave the activation and programming key on the action area until **Settings** appears in the display. Remove the activation and programming key from the action area until Settings appears in the display. The double circle disappears.
- The confirmation hook appears; the display and the hook flash twice for visual confirmation.

Changing the emptying time t_{EZ} :

As soon as the Settings menu has been selected, the active operating mode is displayed. To be able to set the emptying time t_{EZ} , the operating mode Setting emptying time with the calendar symbol must be selected. If this is not the case, change the operating mode accordingly. An explanation of how to change the operating mode can be found in Chap. 6.3.4.

After the display of the operating mode Setting emptying time, the emptying time t_{EZ} in months and the number of lubrication strokes C per pumping cycle PZ can be set; a direct entry to the number of lubrication strokes C is not possible.

- In addition to the display of the active operating mode, the confirmation hook appears; the display and the hook flash twice for visual confirmation.
- In the next step, the currently set value of the emptying time ($t_{EZ \text{ actual}}$) is shown in the display. You now have the option of changing the value.

Changing a value of the emptying time t_{EZ} :

- If you want to change the value of the emptying time t_{EZ} , move the activation and programming key to the action area again.
- The double circle appears and the next higher ($t_{EZ \text{ actual} + 1}$) adjustable value of the emptying time is shown in the display. The double circle lights up as long as the activation and programming key is on the action surface; the other values of the emptying time run through one after the other. However, you can also remove the activation and programming key from the action surface and shortly afterwards return it to the action surface in order to reach each value individually one after the other. If the final value of the emptying time of $t_{EZ} = 36$ is reached and no value was selected, the menu jumps back to $t_{EZ} = 01$ and the run can be started again.
- When the new value you desire for the emptying time ($t_{EZ \text{ new}}$) is shown in the display, remove the activation and programming key from the action surface.
- The confirmation hook appears; for visual confirmation, the display and the hook flash twice. The selected new value ($t_{EZ \text{ new}} \Rightarrow t_{EZ \text{ actual}}$) of the emptying time has now been accepted. The submenu now automatically takes you to the values for the number of lubrication strokes C.

No changing a value of the emptying time t_{EZ} :

- If you do not want to change the value of the emptying time t_{EZ} , the activation and programming key must remain away from the action area.
- The confirmation hook appears; for visual confirmation, the display and the hook flash twice, while the display shows the emptying time t_{EZ} . The submenu now automatically continues to the values of the number of lubrication strokes C.

The display first shows the currently set value for the number of lubrication strokes per pump cycle (C_{actual}). You now have the option of changing the values.

Changing a value of the number of lubrication strokes C per pump cycle PZ:

- If you want to change the value of the number of lubrication strokes C, move the activation and programming key back to the action surface.

- ➞ The double circle appears and the next higher ($C_{\text{actual} + 1}$) adjustable value of the number of lubrication strokes is shown in the display. The double circle lights up for as long as the activation and programming key is on the action surface; the other values of the number of lubrication strokes run through one after the other. However, you can also remove the activation and programming key from the action surface and shortly afterwards return it to the action surface in order to reach each value individually one after the other. If the final value of the number of lubrication strokes of $C = 30$ is reached and no value was selected, the menu jumps back to $C = 01$ and the run can be started again.

- When the new value you desire for the number of lubrication strokes (C_{new}) is shown in the display, remove the activation and programming key from the action surface.

- ➞ The confirmation hook appears; for visual confirmation, the display and the hook flash twice. The selected new value ($C_{\text{new}} \Rightarrow C_{\text{actual}}$) of the number of lubrication strokes C per pump cycle has now been accepted.

No changing of the value of the number of lubrication strokes C per pumping cycle PZ:

- If you do not want to change the value of the number of lubrication strokes C, the activation and programming key must remain away from the action surface.

- ➞ The confirmation hook appears; for visual confirmation, the display and the hook flash twice, while the display shows the set number of cycles.

- Reattach the activation and programming key in the opening provided on the upper housing of the FP4 ND.

① The Settings menu can only be accessed from ON mode (FP4 ND switched on). Once you have entered the Settings menu, you will automatically return to the ON mode.

① If you have made changes to the value of the emptying time t_{EZ} or the value of the number of lubrication strokes C per pump cycle PZ in the Settings menu and the FP4 ND is otherwise ready for operation (operating voltage applied and a cartridge fitted), the FP4 ND will then immediately start with the newly set lubrication cycle SZ. The integrated time counter of the FP4 ND starts counting the new emptying time t_{EZ} that has just been set.

- Observe the back pressure values shown in the display if they are of interest to you.

① During the pumping cycle, the display shows the back pressure for each lubrication stroke.



WARNING

Incorrect settings can cause damage to machinery or equipment.

- ☛ Carefully determine the required lubricant quantity before selecting the settings.
- ☛ Set the correct lubricant delivery quantity on the FP4 ND.
- ☛ Check the lubrication point regularly to see whether the settings made result in overlubrication or insufficient lubrication.

6.3.4.3 Operating mode pulse control

No specific settings can be changed in the Settings menu within the operating mode Pulse control, since the FP4 ND is integrated into a control system (PLC) and is commanded and controlled via the PLC, see Chap. 8. Only the operating mode and the cartridge size can be set here, see Chap. 6.3.4.

Any other control signals can only be sent by the PLC.

Default settings Pulse control mode:

In the pulse control operating mode, the FP4 ND must be integrated into a control system (PLC) and commanded and controlled via this. In this case, a lubrication stroke/several lubrication strokes (one stroke = 0.15 cm³) is/are triggered at the FP4 ND depending on signals from the external control (PLC).

- Make sure that your PLC program is applicable to your application and that the lubrication point is supplied with the correct amount of lubricant per time unit. If this is the case, you can operate the FP4 ND in pulse control mode. If this is **not** the case, modify your PLC program accordingly.

① To use the FP4 ND, it must first be properly mounted and installed and then switched on. Mounting is very simple and described in detail in Chap. 5; switching on is described in Chap. 6.3.1.



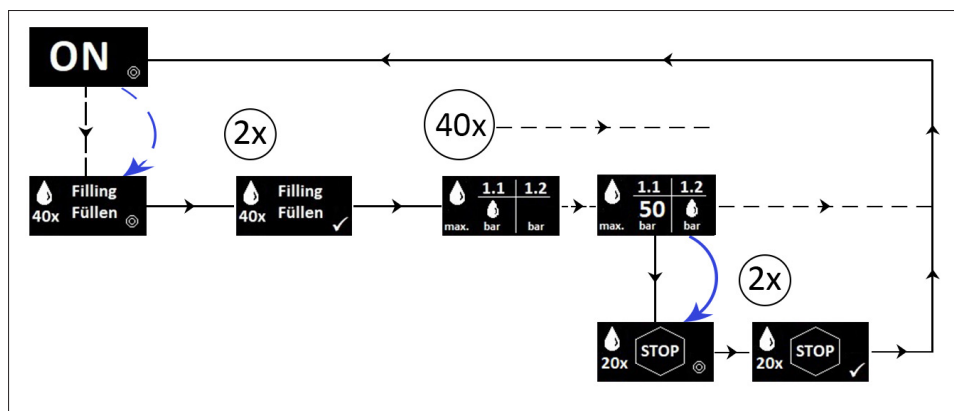
DANGER

Machine elements that are not lubricated can cause failures resulting in serious injury or death.

- After sending a control signal, the response signal of the FP4 ND must be waited for, evaluated and interpreted in order to prevent an uncontrolled failure of the FP4 ND.

6.3.5 Activate the Filling-menu

The filling command enables you to trigger a defined multiple dispensing at the FP4 ND. A pump cycle PZ with a total of 40 lubrication strokes C is initiated with the activation. This function enables you to pre-fill connected accessories (tubes, distributors, etc.) with the lubricant contained in the lubricant cartridge, especially during the initial commissioning of the FP4 ND. The process can be interrupted manually at any time.



✓ The FP4 ND is switched on and there is no fault or error.

- Remove the activation and programming key from the upper housing of the FP4 ND and place it on the action area.
- Hold the activation and programming key on the action area. The double circle appears in the bottom right corner. Leave the activation and programming key on the action area until **Filling** appears in the display. Remove the activation and programming key from the action area until Filling appears in the display. The double circle disappears.
- ➔ The confirmation hook appears; the display and the hook flash twice for visual confirmation.
- If you do not want to cancel the process: Reattach the activation and programming key in the opening provided for this purpose on the upper housing of the FP4 ND.
- ➔ The FP4 ND delivers 40 strokes of lubricant.
- If you want to cancel the operation: Move the activation and programming key to the ac-

tion area during the pump cycle PZ and wait until the STOP symbol appears in the display. Remove the activation and programming key from the action surface as long as STOP is shown in the display. The double circle disappears.

➡ The confirmation hook appears; the display and the hook flash twice for visual confirmation.

➡ The FP4 ND cancels the filling function. In addition, the number of complete lubrication strokes is shown in the display.

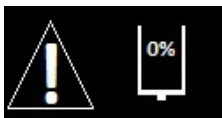
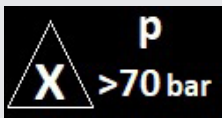
- Observe the back pressure values shown in the display if they are of interest to you.

① If you use the Filling menu in the operating mode Setting emptying time, this will have a shortening effect on the set emptying time.

① The Filling menu can only be reached from the ON mode (FP4 ND switched on). If you have activated the Fill command, you will automatically return to ON mode.

6.4 Error and information messages on the display

The integrated microelectronic in the FP4 ND permanently monitors the status. In case of abnormalities, an addressed message is issued and shown on the display. If the FP4 ND has detected an error and issues an error message for better identification of the error, no more lubricant is pumped. In addition, the screen saver changes and gives an indication of the type of error by displaying the error number. The errors must be eliminated after they occur. If you operate the FP4 ND in the operating modes Setting lubrication cycle duration or Setting emptying time, errors must be acknowledged on the display. If the FP4 ND is operated in pulse control mode, the errors can only be acknowledged by the PLC by sending a specific signal, see Chap. 8.2.

Symbol	Name	Explanation	Remedy
	Note E1	Cartridge empty	● Place a new cartridge on the FP4 ND (see chapter 9.2) ① No need to acknowledge the note; it is automatically cleared after the shutdown action.
	Error E2	Overpressure; the counter-pressure at the lubrication point is too high	● Check the lubrication point and eliminate the cause. ● Then trigger a Quick-Check for self-testing of the FP4 ND or disconnect the power supply.
	Error E3	Under- or overvoltage	● Switch off the FP4 ND (OFF). ● Check the power supply of the FP4 ND. ● Switch on FP4 ND (ON).
	Error E4	Device error	● Disassemble the FP4 ND and return it to the manufacturer together with the lubricant cartridge and a description of the fault. ① A serious fault is usually in the electronics of the FP4 ND and cannot be repaired by you on site.

If the cause of an error message on the FP4 ND has been searched for, found and eliminated and the error has been acknowledged on site or by the PLC, the FP4 ND automatically returns to automatic mode. If the error message persists despite the elimination of the cause, or if it occurs repeatedly, the FP4 ND must be sent to the manufacturer. To do this, disassemble the FP4 ND and return it to the manufacturer together with the lubricant cartridge and a description of the error.

6.5 Empty level warning

The microelectronic integrated in the FP4 ND permanently monitors the status. The FP4 ND warns you on the display that the cartridge will soon be empty if it falls below approx. 18% residual filling quantity. In addition, the FP4 ND shows the remaining filling quantity in % on the display after the empty level warning has been activated. In this way, you can follow the progress of the filling level and reorder a new cartridge in good time before the complete empty level is reached.

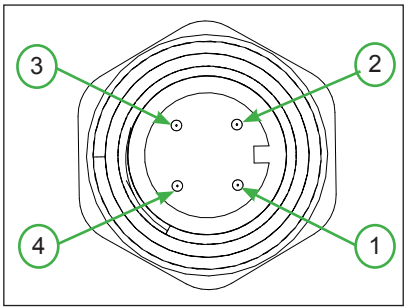
① If you use a cartridge with a capacity of 250 cm³, the message empty level warning is displayed at 28% remaining capacity. However, the remaining number of lubrication strokes is identical.

Symbol	Name	Explanation
	Empty level warning	Residual amount inside the cartridge approx. 18% (28%).

7. Output signals – Time control

The FP4 ND operates in the time control mode (Operating modes setting lubrication cycle duration or emptying time) as a time-based and cycle-controlled lubrication system according to the values set in the Settings menu.

7.1 Pin assignment – Time control



Pin assignment – Time control

PIN	Assignment	Colour
1	+24 V DC	brown
2	unallocated	white
3	Ground	blue
4	Output signal	black

Type: M12x1 female connector; 4-pin, A-coded

The FP4 ND can be switched off completely in the time control mode by switching off the supply voltage. The settings made are not lost in the process. The time elapsed until the next scheduled lubrication cycle is automatically stored by the FP4 ND in the integrated microelectronics; after the supply voltage is reconnected, the FP4 ND checks itself automatically and constantly processes the remaining pause time according to the set values.

① After a longer standstill of the FP4 ND, the manual execution of the „Quick-Check“ is recommended (chap. 6.3.3).

① The output signal at PIN 4 can be tapped for further processing (e.g. indicator light or external control). The maximum permissible output current must not exceed $I_{\max} < 20\text{mA}$. No inductive load (e.g. relay) may be connected!

7.2 Output signals – Time control

The present FP4 ND provides three output signals in the time control via the electrical interface. Basically, the output signals can only be sampled and must not be subjected to inductive load or low ohmic load. This enables – in addition to the optical indication via the display on the FP4 ND – also the status control from a distance.

Output signal (PIN 4)	Meaning	Description
0,5 Hz-Square wave signal, permanent	Note E1 Empty cartridge	The integrated microelectronic of the FP4 ND is equipped with an automatic counter which counts the number of lubrication strokes. If this signal is present, the FP4 ND will not deliver any lubricant! Remedial measures can be found in Chap. 9.2.
low, permanent	FP4 ND is switched off Error E2 Error E3 Error E4	A permanent low level (0V) at PIN 4 means that the FP4 ND is either switched off or – if it is switched on – there is an error. The error must be read on the display of the FP4 ND (chap. 6.4). The FP4 ND does not deliver lubricant!
high, permanent	FP4 ND is operation correctly	A permanent high level (+24 V DC) at PIN 4 means that the FP4 ND is working correctly and that there is no error. The FP4 ND operates according to the settings made and delivers lubricant from the cartridge to the outlet accordingly.

8. Input and output signals – External control (PLC)

To command the FP4 ND via an external control (PLC), it is necessary to switch the FP4 ND to pulse control mode in the Settings menu (chap. 6.3.4).

The FP4 ND operates in pulse control mode as a pulse-controlled lubrication system only if unalterable control signals of defined length are transmitted from the PLC to the FP4 ND via PIN 2. The FP4 ND signals the respective condition to the PLC via high/low levels, which must be tapped at PIN 4, and thus enables comprehensive control of the various conditions. For the integration of the FP4 ND into an external control system, one input and one output each must be provided on the control side.

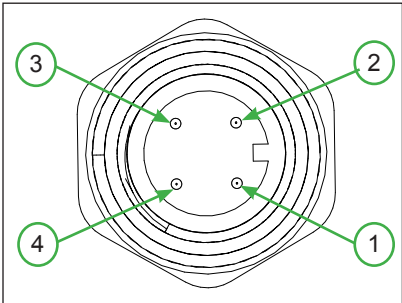


DANGER

Machine elements that are not lubricated can cause failures resulting in serious injury or death.

- To operate the FP4 ND via an external controller (PLC) in pulse control mode, a program corresponding to the communication protocol must be created in the PLC.
- After sending a control signal, the response signal of the FP4 ND must be waited for, evaluated and interpreted in order to prevent an uncontrolled failure of the FP4 ND.

8.1 Pin assignment – External control (PLC)



PIN-Assignment-external control (PLC):

PIN	Assignment	Colour
1	+24 V DC	brown
2	Input Signal PLC → FP4 ND	white
3	Ground	blue
4	Output Signal FP4 ND → PLC	black

Type: M12x1 female connector; 4-pin, A-coded

For the electrical connection to the external control system (PLC) of a machine, the FP4 ND has a 4-pin interface, which is designed as a plug-in connection with the industry-standard M12x1 connection.

① The FP4 ND can be switched off completely in pulse control mode by switching off the supply voltage. The settings made are not lost in the process. After the supply voltage is reconnected, the FP4 ND checks itself automatically and does not operate until it receives a control signal from the PLC.

① The output signal at PIN 4 must be tapped at an external control for further processing. The maximum permissible output current must not exceed $I_{\max} < 20\text{mA}$. No inductive load (e.g. relay) may be connected!

① After a longer standstill of the FP4 ND, it is recommended to trigger the control signal „1 lubrication stroke“ twice manually (100 ms) (chap. 8.2.1).

8.2 Input signals – External control (PLC)

The FP4 ND provides the following invariably defined control signals (input signals), which must be transmitted from the PLC to the FP4 ND via PIN 2 of the electrical M12x1 interface as high level (+24 V DC).

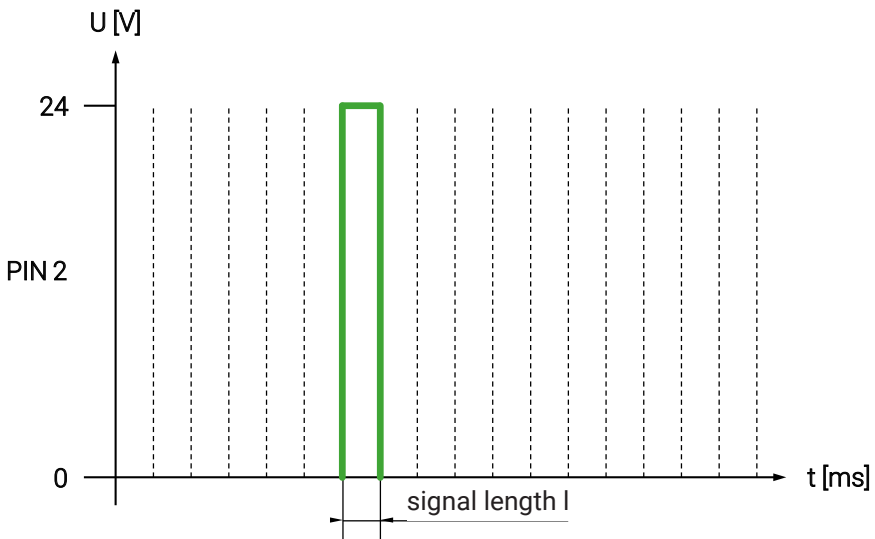
The control signals must be generated as high level (+24 V DC) by the external control (PLC) over specific times, each with a tolerance of ± 25 milliseconds.

The FP4 ND processes the following control/input signals:

Signal length l [ms]	Function	Detail
100	1 lubrication stroke	Chap. 8.2.1
900	Filling	Chap. 8.2.2
1000	Cancel filling	Chap. 8.2.3
1600	Status request (sign of presence)	Chap. 8.2.4
1700	Acknowledge error	Chap. 8.2.5

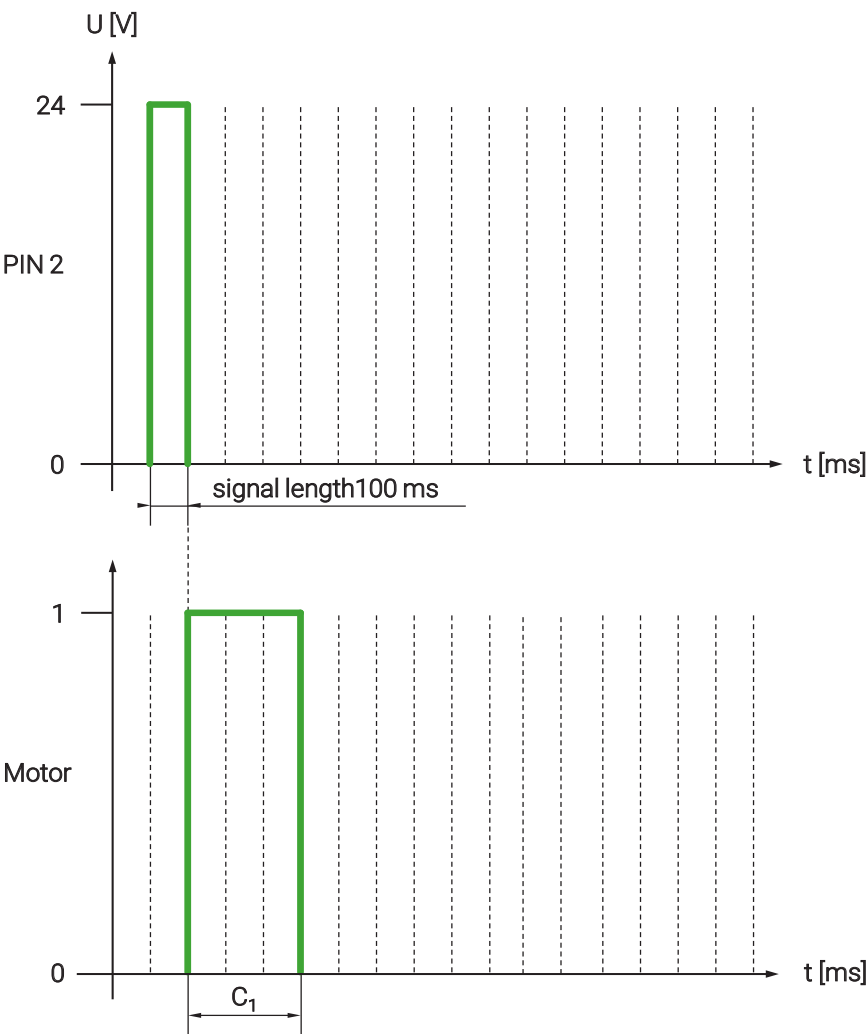
① The FP4 ND in pulse mode only processes the control signals listed in the table up to a maximum length of 1700 ± 25 milliseconds. If a high level (+24 V DC) is present outside the tolerances, the FP4 ND returns a message for an impermissible control signal as a response, see Chap. 8.3. If a high level (+24 V DC) is present at PIN 2 of the electrical interface for longer than 1725 milliseconds, the FP4 ND also returns a message for an impermissible control signal as a response, see Chap. 8.3.

① The following diagram shows the general characteristics of a control signal that must be generated by the PLC or external controller and sent to the FP4 ND controller via PIN 2.



8.2.1 Control/input signal „1 lubrication stroke“

The control signal „1 lubrication stroke“ triggers a single lubrication stroke.



Description:

- ✓ The FP4 ND is properly connected to an external controller via the electrical interface and connected to the power supply.
- ✓ Pulse control mode is activated on the FP4 ND.
- ✓ There are no errors on the FP4 ND; the FP4 ND is ready for operation.

- The FP4 ND sends a permanent output signal (high level) to PIN 4, which indicates readiness for operation to the external controller (PLC). This output signal must be present permanently and uninterruptedly for >500 milliseconds. Only if this prerequisite is fulfilled, an activation by the external control is possible at all.

- The control signal „1 lubrication stroke“ with signal length of 100 (75 ... 125) milliseconds high level can be sent from the external control (PLC) to the FP4 ND.

- While a high level is present at PIN 2 of the FP4 ND as an input signal from the external controller (PLC), the symbol indicating the pulse control operating mode flashes in the display for the length of the signal.

- Immediately after the control signal drops, the lubrication stroke C of the FP4 ND starts and 0.15 cm³ of lubricant is delivered to the outlet. The FP4 ND monitors this lubrication stroke for the entire duration.

- The lubrication stroke time depends on various conditions, including the counterpressure present or built up in the hydraulic system and the temperature. For the FP4 ND, the lubrication stroke duration is 7...17 seconds ($t_c = 7...17$ seconds).

- During the lubrication stroke C, a numerical value 1...70 is shown in the display, which indicates the approximate back pressure in bar. The back pressure is displayed in relation to the outlet.

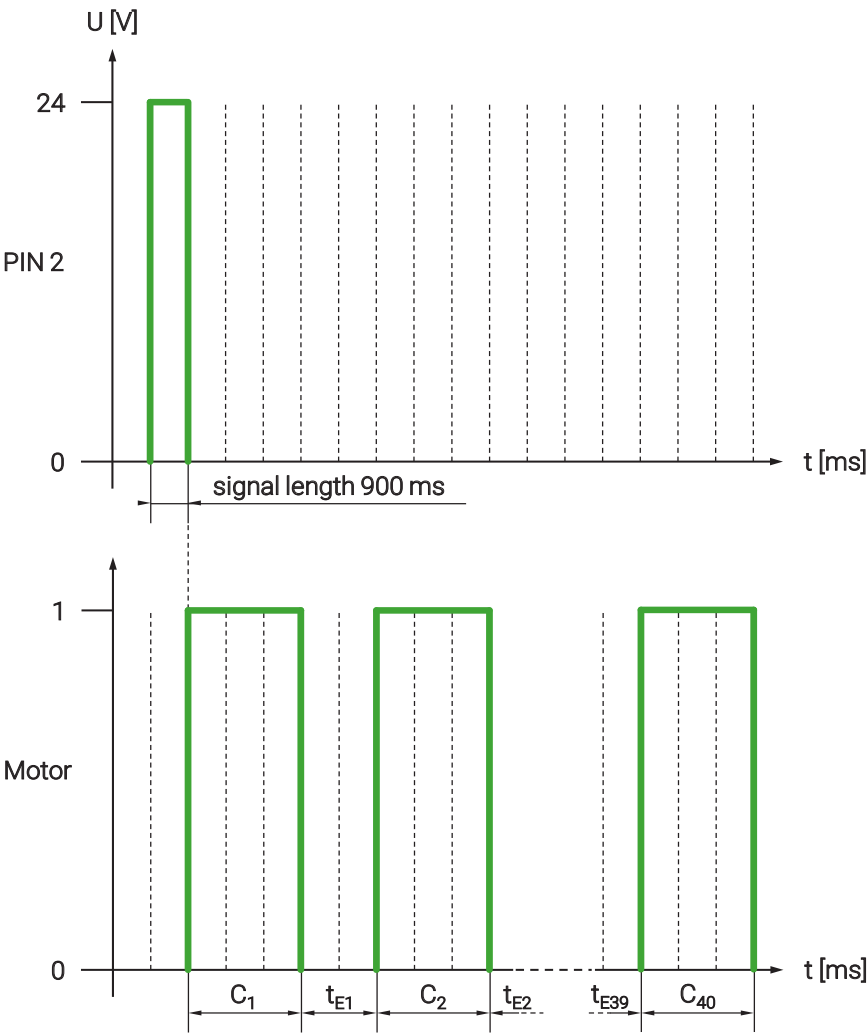
- At the end of a lubrication stroke C, the FP4 ND sends an output signal to PIN 4, which provides information about the past lubrication stroke as well as other states of the FP4 ND for evaluation at a PLC or other external controller (see chapter 8.3).

① At the earliest >500 milliseconds after the end of the response signal, a possible next control signal can be sent from the external control (PLC). For the characteristics and interpretation of the output signal, refer to Chap. 8.3. In the meantime, the FP4 ND does not process any control signals.

① If the integrated microelectronic of the FP4 ND has detected an error during or immediately after the end of the lubrication stroke, it will be transmitted to the external control (PLC) by the corresponding output signal (chap. 8.3).

8.2.2 Control/input signal „Filling“

The „Filling“ control signal triggers the filling function by the external control. A total of 40 lubrication strokes are performed automatically one after the other.



Description:

- ✓ The FP4 ND is properly connected to an external controller via the electrical interface and connected to the power supply.
- ✓ Pulse control mode is activated on the FP4 ND.
- ✓ There are no errors on the FP4 ND; the FP4 ND is ready for operation.

- The FP4 ND sends a permanent output signal (high level) to PIN 4, which indicates readiness for operation to the external controller (PLC). This output signal must be present permanently and uninterruptedly for >500 milliseconds. Only if this prerequisite is fulfilled, an activation by the external control is possible at all.

- The control signal „Filling“ with signal length of 900 (875 ... 925) milliseconds high level can be sent to the FP4 ND from the external control (PLC).

- While a high level is present at PIN 2 of the FP4 ND as an input signal from the external controller (PLC), the symbol indicating the pulse control operating mode flashes in the display for the length of the signal.

- Immediately after the control signal drops, the lubrication stroke C of the FP4 ND starts and 0.15 cm³ of lubricant is delivered to the outlet. The FP4 ND monitors this lubrication stroke for the entire duration.

- The lubrication stroke time depends on various conditions, including the counterpressure present or built up in the hydraulic system and the temperature. For the FP4 ND, the lubrication stroke duration is 7...17 seconds ($t_c = 7...17$ seconds).

- During the lubrication stroke C, a numerical value 1...70 is shown in the display, which indicates the approximate back pressure in bar. The back pressure is displayed in relation to the outlet.

- At the end of a lubrication stroke C, the FP4 ND sends an output signal to PIN 4, which provides information about the past lubrication stroke as well as other states of the FP4 ND for evaluation at a PLC or other external controller (see chapter 8.3).

- A total of 40 lubrication strokes C and 39 relaxation phases t_e of two seconds length take place in immediate succession between the lubrication strokes. In the process, 40×0.15 cm³ = 6.0 cm³ of lubricant are delivered from the cartridge to the outlet.

① At the earliest >500 milliseconds after the end of the last output signal, a possible next control signal can be sent from the external control (PLC). During the filling function, the control signal „Cancel filling“ (chap. 8.2.3) is the only control signal that the FP4 ND can process.

① If the integrated microelectronic of the FP4 ND has detected an error during or immediately after the end of the lubrication stroke, it will be transmitted to the external control (PLC) by the corresponding output signal (chap. 8.3).

① The filling function can be stopped with the „Cancel filling“ control signal, see section 8.2.3.

8.2.3 Control/input signal „Cancel filling“

The „Cancel filling“ control signal can be used to stop the filling function activated by the „Filling“ control signal. During the filling function, the „Cancel filling“ control signal is the only control signal that the FP4 ND can process.

Description:

- ✓ The FP4 ND is properly connected to an external controller via the electrical interface and connected to the power supply.
- ✓ Pulse control mode is activated on the FP4 ND.
- ✓ The filling function has been activated by the „Filling“ control signal.
- The FP4 ND carries out the filling function.
- The control signal „Cancel filling“ with a signal length of 1000 (975 ... 1025) milliseconds high level can be sent from the external control (PLC) to the FP4 ND during the relaxation time t_E between two lubrication strokes C.
- At the end of the transmission of the „Cancel filling“ control signal, the FP4 ND stops the filling function directly. If the „Cancel filling“ control signal is sent during a lubrication stroke, the current lubrication stroke is completed and then the filling function is canceled.

① At the earliest >500 milliseconds after the end of the response signal, a possible next control signal can be sent from the external control (PLC). For the characteristics and interpretation of the output signal, refer to Chap. 8.3. In the meantime, the FP4 ND does not process any control signals.

8.2.4 Control/input signal „Status request“

The „Status request (sign of presence)“ control signal can be used to check the last status of the FP4 ND and the last lubrication stroke. In addition, the „Status request (sign of presence)“ control signal can be used to cyclically check whether the FP4 ND can be reached.

Description:

- ✓ The FP4 ND is properly connected to an external controller via the electrical interface and connected to the power supply.
- ✓ Pulse control mode is activated on the FP4 ND.

- A high level is applied to PIN 4 of FP4 ND for >500 milliseconds.
- The control signal „Status request (sign of presence)“ with signal length of 1600 (1575 ... 1625) milliseconds high level can be sent from the external control (PLC) to the FP4 ND.
- After the end of the transmission of the control signal „Status request (sign of presence)“, the FP4 ND repeats the output signal of the past lubrication stroke on PIN 4.

① At the earliest >500 milliseconds after the end of the response signal, a possible next control signal can be sent from the external control (PLC). For the characteristics and interpretation of the output signal, refer to Chap. 8.3. In the meantime, the FP4 ND does not process any control signals.

8.2.5 Control/input signal „Acknowledge error“

The „Acknowledge error“ control signal is used to acknowledge the E2 overpressure or E3 over/undervoltage errors after they have occurred previously and have been communicated by the FP4 ND to the PLC. It is the only control signal that the FP4 ND can process if an error message was sent in response to the previous motor run. Regardless of the principle possibility of remote acknowledgement of an error, it is essential to identify and eliminate the cause when an error message is present.

Description:

- ✓ The FP4 ND is properly connected to an external controller via the electrical interface and connected to the power supply.
- ✓ Pulse control mode is activated on the FP4 ND.
- ✓ There is an E2 or E3 error at FP4 ND.

- The output signal sent from the FP4 ND to PIN 4 to the external controller reports an error message E2 or E3 back.
- An identification of the cause of the error message has taken place on the FP4 ND and it has been eliminated.
- The control signal „Acknowledge error“ with signal length of 1700 (1675 ... 1725) milliseconds high level can be sent from the external control (PLC) to the FP4 ND.
- After the end of the control signal, the integrated microelectronic checks the FP4 ND independently:
 - ☛ If this internal check is **successful**, the error E2 or E3 is thus acknowledged and the FP4 ND is ready for operation again.
 - ☛ If this internal check is **not successful**, the FP4 ND continues to send an output signal that defines an error. The error is still present. In this case, check the lubrication point and the FP4 ND again and then send the „Acknowledge error“ control signal again. If the second check is again unsuccessful, disassemble the FP4 ND with the lubricant cartridge screwed on and return the complete lubrication system to the manufacturer with a detailed description of the error.

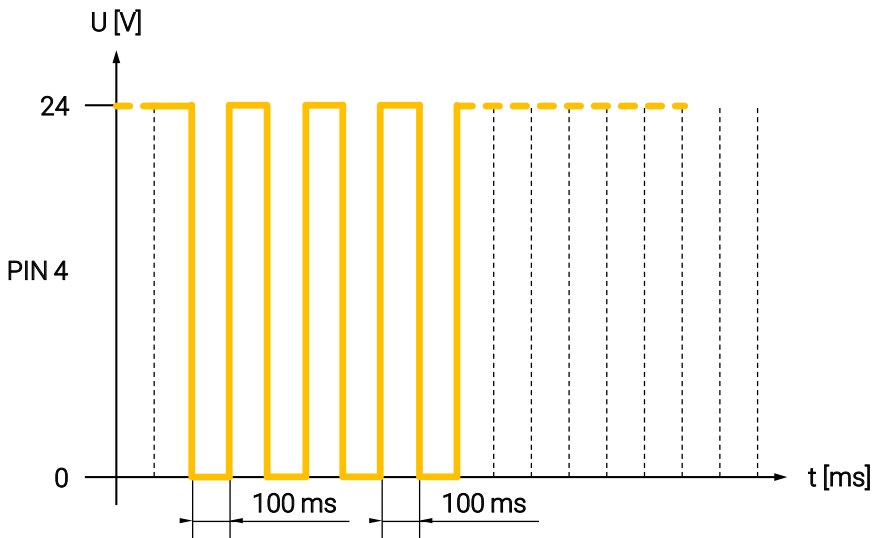
① At the earliest >500 milliseconds after the end of the response signal, a possible next control signal can be sent from the external control (PLC). For the characteristics and interpretation of the output signal, refer to Chap. 8.3. In the meantime, the FP4 ND does not process any control signals.

8.3 Output signals – External control (PLC)

The FP4 ND has invariably defined output signals that are transmitted to the PLC via PIN 4 of the M12x1 electrical interface depending on the condition of the FP4 ND. Each time a control signal is sent from the PLC to the FP4 ND, the FP4 ND sends an output signal after the action caused by the control signal has been executed, which must be waited for, evaluated and interpreted by a suitable PLC program.

A high level (+ 24 V DC) is permanently present at PIN 4. During the transmission of the output signal, the signaling for information transmission changes several times from a high level to a low level and back again. After sending an output signal, a high level is permanently present at PIN 4.

The following graphic shows an example of an output signal.



Information about the status of the FP4 ND and about the past motor run must be evaluated via an evaluation of the number of edge changes of the output signal. For the evaluation of the edge changes, the rising edge (change of the output voltage at PIN 4 of the FP4 ND from a low level (0 V) to a high level (+24 V DC)) must always be counted. The counted

number of edge changes corresponds to a one-to-one state of the FP4 ND.

The output signal is sent with a frequency of $f = 5 \text{ Hz}$. The low level is a voltage of + 0 to 5 V DC, the high level is a voltage between + 17 and + 27 V DC.

The following table shows all the output signals that are sent from the FP4 ND to the external controller depending on its status.

Number of edge changes	Information	Remedy
1	Filling function canceled	none necessary, purely informative
2	Past lubrication stroke OK	none necessary, purely informative
3	Past lubrication stroke OK, cartridge soon empty	Buy a new cartridge in time.
4	Past lubrication stroke Overpressure (E2) at outlet 1	● Check the lubrication point and eliminate the cause ● Acknowledge error (Chap. 8.2.5)
5	Past lubrication stroke Overpressure (E2) at outlet 2 (if present)	● Check the lubrication point and eliminate the cause ● Acknowledge error (Chap. 8.2.5)
12	Cartridge empty	● Change the cartridge (see chap. 9.2) ① No need to acknowledge the error; it is automatically cleared after the shut-down action.
14	Over-/undervoltage (E3)	● Check the power supply of the FP4 ND. ● Acknowledge error (Chap. 8.2.5)
15	Internal device error (E4)	Disassemble the FP4 ND and return it to the manufacturer together with the lubricant cartridge and a description of the fault.
16	Inadmissible, undefined control signal received	Check the PLC program for operating the FP4 ND for correctness.



DANGER

Machine elements that are not lubricated can cause failures resulting in serious injury or death.

- After sending a control signal, the response signal of the FP4 ND must be waited for, evaluated and interpreted in order to prevent an uncontrolled failure of the FP4 ND.

① If there is a low level at PIN 4 in pulse mode, but the operating voltage is connected, check the connection cable from external control to PIN 4 of the FP4 ND. If you cannot detect a problem during the check, a serious device error has occurred that cannot be remedied by you on site. In this case, disassemble the FP4 ND with the lubricant cartridge screwed on and return the complete lubrication system to the manufacturer with a detailed description of the fault.

① The FP4 ND always sends a specific output signal within 30 sec. after sending an arbitrary control signal. If this is not the case and the FP4 ND no longer responds to any control signal, a time-out has been detected. To check the communication readiness of the FP4 ND in this case, send the control signal „Status request (sign of presence)“. If again >30 sec. pass without a response signal from the FP4 ND, disconnect the supply voltage from the FP4 ND for at least 10 sec. and send the control signal „Status request (sign of presence)“ again after reconnecting the supply voltage. If communication with the FP4 ND is still not possible, disassemble the FP4 ND with the lubricant cartridge screwed on and return the complete lubrication system to the manufacturer with a detailed description of the error.

9. Maintenance and disposal

- Before starting any (maintenance) work, inform yourself about the general safety instructions (see chapter 2.7) and observe the relevant local and company safety regulations.
- Do not disable any protective device without authorization!

9.1 Maintenance schedule

Maintenance	Commissioning	Yearly	If necessary
Cleaning	x	x	x*
Visual check	x	x	x*
Cartridge change	x**	x***	x*

* Depending on operating conditions and lubricant consumption.

** Dependent on delivery condition (ordered version)

*** Recommendation after 2 years at the latest

9.1.1 Visual inspection

- Check the entire lubrication system (FP4 ND as well as possibly connected accessories including lines and distributors) by means of a thorough and conscientious visual inspection for external damage (e.g. loose or loosened lines).
- Check the condition of the lubrication point for correct supply of lubricant.
- Replace damaged or defective parts immediately to ensure permanent and continuous lubrication.
- Check the filling level of the cartridge on the FP4 ND.
- Check possible error messages on the FP4 ND and eliminate the causes accordingly.

9.1.2 Cleaning

- Clean the FP4 ND with suitable means (e.g. absorbent wipes, towels) to remove dirt.

	NOTE
	Pressurised air can damage the seals of the FP4 ND and can transport dirt and foreign matter into the FP4 ND or the lubricant. ☛ Do not use pressurised air. ☛ Make sure that there is no coarse dirt in the mounting area.

9.1.3 Recommissioning after maintenance

- Reassemble all safety devices and make sure that no tool remains in the danger zone.
- Check that the FP4 ND is switched on.
- Perform a „Quick-Check“ (test run).

9.2 Cartridge change



NOTE

Only use original lubricant cartridges with lubricant approved by the manufacturer.

- ☛ Observe the maximum storage life of lubricant filled in cartridges.



NOTE

Make sure that you use the same lubricant in the new cartridge which is already in use. Make sure that you only use cartridges with the same filling quantity.

- ☛ Compare the information on the new lubricant cartridge with the information on the old lubricant cartridge.

The cartridge only needs to be changed when it is empty or the service life of the lubricant has been exceeded. A cartridge can be changed during normal operation of the FP4 ND. No further measures are necessary apart from changing the cartridge!

① Observe the signaling of the empty cartridge by the FP4 ND described in chap. 6.4, chap. 7.2 or chap. 8.3 when using the FP4 ND in pulse control mode.



DANGER

Machine elements that are not lubricated can cause failures resulting in serious injury or even death.

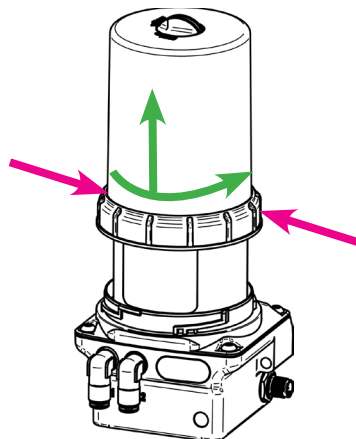
- ☛ Never operate the FP4 ND without the upper housing. Especially when changing the cartridge or during start-up, make sure to re-mount the upper housing after disassembly.

1. Remove the upper housing from the drive unit of the FP4 ND.

- Loosen the retaining ring from the drive unit by turning it counterclockwise.
- Disconnect the upper housing from the FP4 ND.

① Grip the retaining ring on the outside right and left for easier loosening, as shown with the pink arrows.

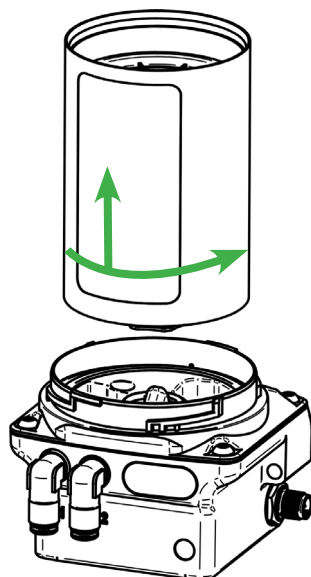
① Make sure that no dirt, water or foreign bodies get into the lubricant inlet.



2. Remove the empty cartridge.

- Turn the lubricant cartridge counterclockwise from the FP4 ND and dispose of it.

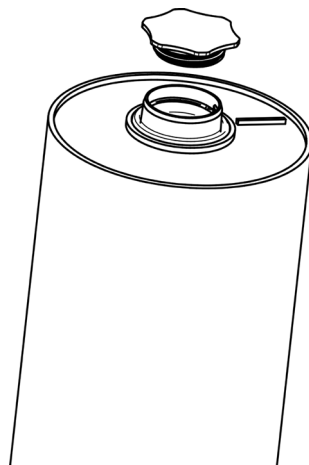
① Pay attention to cleanliness when performing the work. Be sure to prevent dirt, liquids and foreign bodies from entering the lubricant inlet.



3. Unscrewing the cartridge cap.

- Turn the cap of the new lubricant cartridge counterclockwise and pull it off.

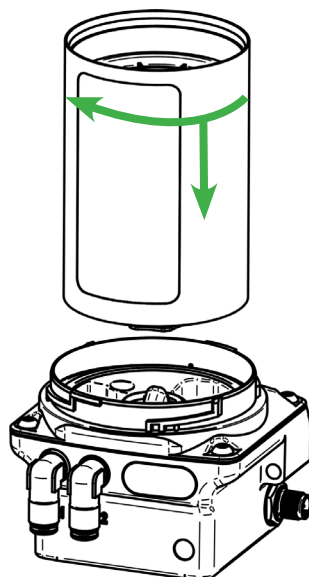
① Pay attention to cleanliness when carrying out the work. Avoid at all costs the penetration of dirt, liquids and foreign bodies into the cartridge.



4. Fitting the new lubricant cartridge.

- Place the full lubricant cartridge on the FP4 ND with the label facing forwards.
- Turn the lubricant cartridge clockwise onto the FP4 ND.

① The end position is reached after two full rotations when the label of the lubricant cartridge is in alignment with the front of the FP4 ND.

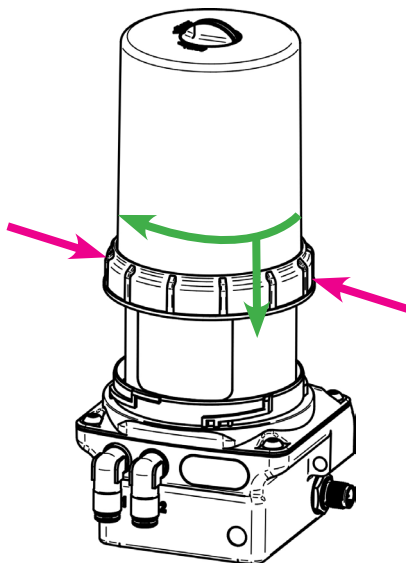


5. Mounting the upper housing of the drive unit of the FP4 ND.

- Place the disassembled upper housing on the FP4 ND and press it onto the drive unit.
- Fasten the upper housing to the drive unit by turning the retaining ring clockwise.

① Grip the retaining ring on the outside right and left for easier loosening, as shown with the pink arrows.

① The retaining ring must engage noticeably when turned and be completely tightened.



- Carry out the work according to the above description.
- ➡ If a message was shown in the display before the cartridge was changed, the message now disappears. A separate acknowledgement is not required.
- ➡ After completion of this work, the FP4 ND automatically returns to the last active mode (ON or OFF) before the work.
- ① If the empty cartridge level (note E1) has been reached during a pumping cycle, the cycle will be automatically interrupted and automatically continued after completion of the work.

9.1 Disposal

- Observe the relevant national valid regulations for the disposal of the FP4 ND and empty or opened cartridges.
- For disposal, observe the respective safety data sheets and disposal instructions for the individual components.

① It is not possible to refill empty lubricant cartridges.

10. Further notes

10.1 Lubricants

Only use lubricants approved by the manufacturer TriboServ GmbH & Co. KG in the original cartridges developed and manufactured exclusively for the FP4 ND.

Further information on the lubricants, documentation and safety data sheets can be obtained directly from the manufacturer TriboServ GmbH & Co. KG.

10.2 Pipe lengths

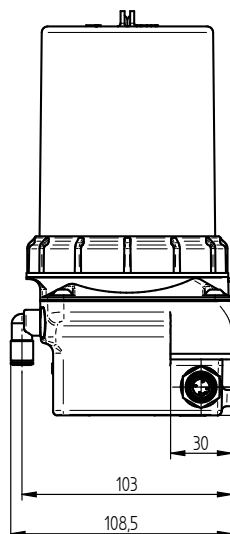
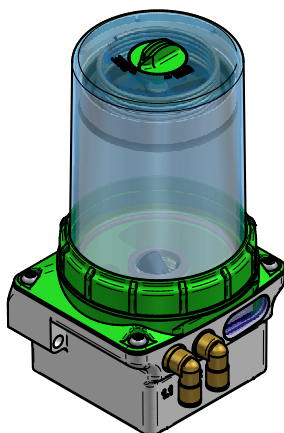
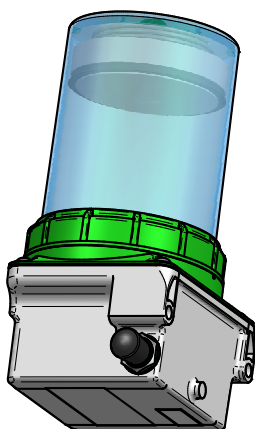
In principle, it is recommended to mount the FP4 ND as close as possible to the consumer (lubrication point). Ideally, this should be done directly at or on the lubrication point. In cases where this is not possible due to the installation space or for reasons of accessibility, pipes can also be used between the FP4 ND and the lubrication point (or distributors).

If it is not possible to install the FP4 ND directly at the lubrication point, please contact the manufacturer to verify your application.

The influence of temperature, the grease used, the hoses used and the accessories used does not allow any general statement on the possible hose length on the FP4 ND.

11. Appendix

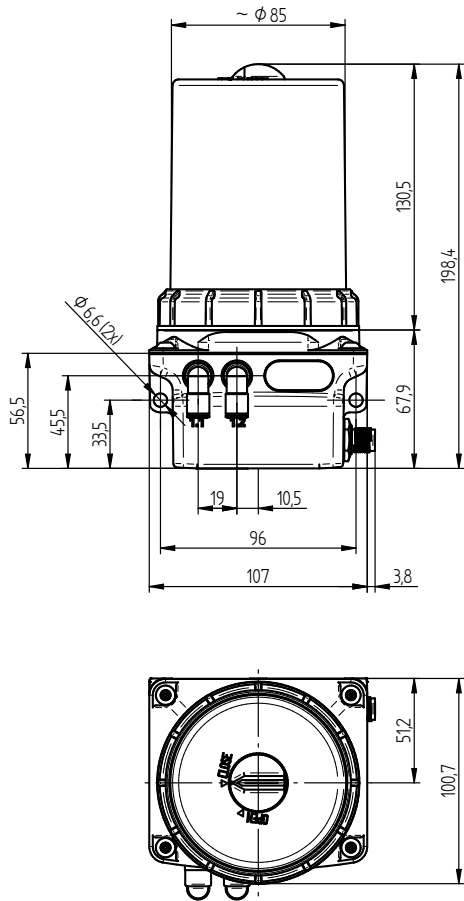
11.1 Dimension sheet and installation dimension



Alle Schlauchanschluss
für Schlauch A- $\phi 6$ m

[illegible]

FlexxPump4 ND



teile
ml

VK-Artikel-Nr.		Maßstab/Scale	Warengruppe	Material	Maße in mm	Gewicht/Weight	Revisionsnr.	Rev.
12		DIN A3					04.12.2019	J. Niederg.
Dieses Dokument ist Eigentum von:		This document is ownership of:		Benennung / Title		Zeichnungsnr. / Drawing no.		
						FlexxPump4 N412		
Toleranzen / Tolerances ISO 2768-1 m K						And./Index Blatt/Sheet		
Datum		Name/Gepr.		Schaumstoffteile nach DIN 775 Teil 5 Klasse P2		a 1/1		

11.2 EC/EU Declaration of conformity

Declaration of EG conformity



According to the Machinery Directive 2006/42/EG of 2006, May 17th

Herewith the manufacturer
TriboServ GmbH & Co. KG, Gelthari-Ring 3, D-97505 Geldersheim,
declares that the following lubricating systems

FlexxPump4 – ND 411, ND 412

as well as the FlexxPump4 – ND 411, ND 412 with the suffix OIL

delivered by us, concerning design and construction as well as the model put into circulation,
comply with the EG directives 2006/42/EG.

In particular, the following harmonized standard was applied:

EN 12100:2011-03 Safety of machinery

According the EG directive on Electromagnetic Compatibility 2014/30/EU

The manufacturer herewith declares that the following lubricating systems

FlexxPump4 – ND 411, ND 412

as well as the FlexxPump4 – ND 411, ND 412 with the suffix OIL

delivered by us, concerning design and construction as well as the model put into circulation,
comply with the above mentioned EU directive.

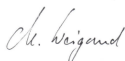
In particular, the following harmonized standards were applied:

EN 61000-6-2, EN 61000-6-4 Electromagnetic Compatibility (EMC)

Authorized representative for the compilation of technical documentation:

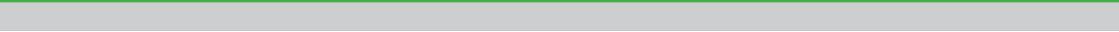
Dr.-Ing. Michael Weigand
General Manager
TriboServ GmbH & Co. KG
Gelthari-Ring 3
D-97505 Geldersheim

Geldersheim, 31.03.2022



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Commercial register of Schweinfurt

Local Court

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Dr.-Ing. Michael Weigand

Managing director:

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