

Operating Manual

Lubrication System LUC+400



Revision history

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01	28.11.2013	New version	All
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1 About this manual

This operating manual contains necessary information to safely operate the LUC+400 lubrication system.

If this manual is supplied with an amendment (e.g. for special applications), then the information in the amendment is valid. Contradictory specifications in this manual thereby become obsolete. The operator must ensure that this operating manual is read and fully understood by all persons assigned to install, operate, or maintain the lubrication pump.

This manual should be stored where it can be easily accessed near the lubrication pump.

Inform colleagues who work in the area around the machine about the **safety instructions** so that no one is hurt.


The original manual was created in German; all other language versions are translations of these instructions.

Be sure to read the operating manual before using the device or accessories delivered with the device. This compiled documentation contains important safety information.

1.1 Basic information

The LUC+400 is an extremely compact lubrication pump for oil and grease up to NLGI 3. The pump is designed for an external control and power supply with 24 VDC. The lubricant supply (400 cm³) is stored in a grease cartridge. The feed pressure is up to 70 bar.

Depending on the version, the LUC+400 can have up to 4 outlets, making it optimally suitable for applications with a limited number of lubrication points.

	<p style="text-align: center;">NOTICE</p> <p>The application of this pump is intended for normal industrial environments or outdoors, but not for use in or on motor vehicles, because otherwise malfunctions or failure of the pumps may occur. Use exclusively LUC+400 replacement containers and original accessories.</p>
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1.2 Scope of delivery

The standard scope of delivery of the LUC+400 includes:

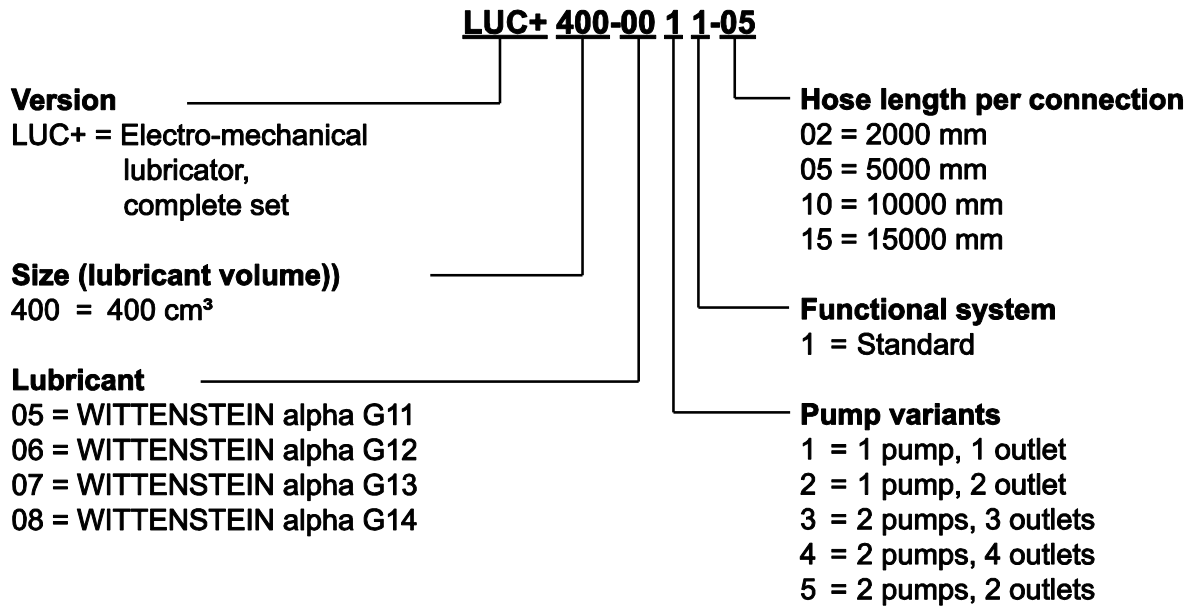
- The LUC+400 lubrication pump
- The hose fitting mounted at the outlet for a medium pressure PA hose 6 x 4 (Ø 6 mm outer diameter and Ø 4 mm inner diameter)

1.3 Identification

The lubrication pump is clearly identified by a label with the serial number attached to the housing base. The CE symbol is clearly visible on the label.

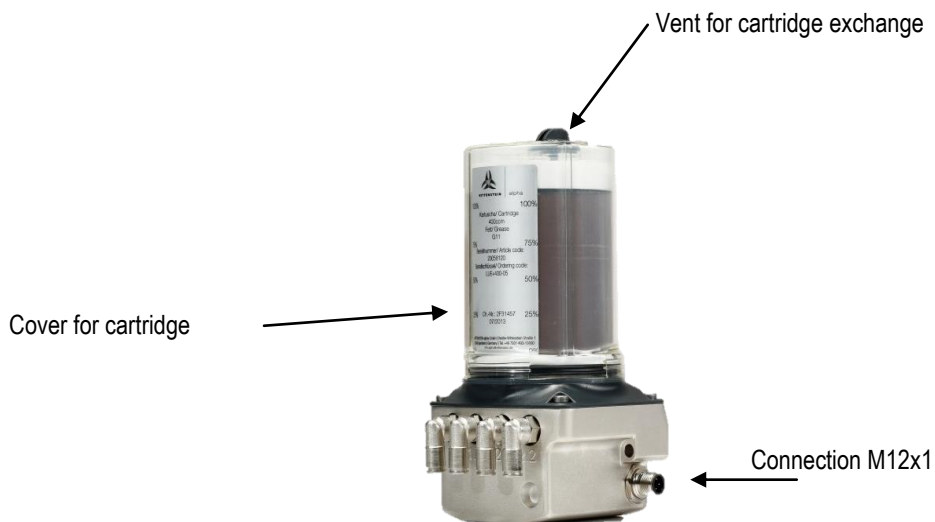
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1.3.1 Ordering code



1.4 Overview/Details

Setting up your LUC+400 is easy. These instructions should help you install your devices quickly and easily and to learn the basics quickly.



NOTICE
<p>Outlets that are not used must not be closed! Manipulation of an independent machine. Malfunction and uncontrolled leaks.</p>

2 Safety

Before assembly and starting up the LUC+400 at the machine, this operating manual must be read carefully by all persons that are authorized to assemble, maintain, and operate the plant.

2.1 Intended use

<p>The LUC+400 is approved only for industrial applications. LUC+400s may be put into operation only according to the technical specifications (see Chapter "Technical specifications"). Unauthorized modifications to the LUC+400 are not permitted. We do not accept any liability for resulting damages to machine or injuries to persons.</p>
--

Intended use also includes:

- That you adhere to all of the instructions in the operating manual.
- That you carry out all maintenance tasks.
- That you observe the pertinent work safety and accident prevention regulations during the entire service life of the LUC+400.
- That you have the required technical training and the authorization of your company to carry out the required work on the LUC+400.

<p>Any other or further use is considered improper use.</p>
--

2.2 Scope of warranty

A warranty is provided by the manufacturer in regard to operational safety, reliability, and output only under the following conditions:

- Assembly, connection, maintenance, and repairs are performed by authorized technicians.
- If hot or cold machine components become hazardous, then these parts need to be secured on site against contact.
- LUC+400s are used according to the instructions of the specification sheets.
- The limit values specified in the technical specifications may not be exceeded in any case.
- Retrofitting and repair work on the LUC+400 may be carried out only by the manufacturer.

2.3 Safety instructions

In the following, fundamental information is listed that must be observed during assembly, operation, and maintenance. This operating manual must definitely be read by the fitters and the responsible technicians/operators before assembly and startup. In addition, it must always be available at the operating site.

2.3.1 Important notifications

Not only should the safety instructions introduced in this main section be observed, but all the other special safety instructions inserted in other places.



This symbol is a warning of voltage.



Safety instructions that can endanger persons if disregarded are identified with the general danger symbol.

NOTICE
This signal word indicates a potential hazard that could lead to property damage.

A note without a signal word indicates application hints or especially important information for handling the LUC+400.

Notes attached directly to the machine must definitely be observed and be kept in a completely legible condition.

2.3.2 Personnel qualification and personnel training



The personnel for operation, maintenance, inspection, and assembly must have the appropriate qualification for this work. Authorities, responsibilities, and monitoring of the personnel must be regulated precisely by the operator. If the personnel does not have the necessary skills, then they have to be instructed and trained. The operator must ensure that the content of the user information is completely understood by the personnel.

2.3.3 Dangers resulting from disregarding the safety instructions



Consequences of **disregarding** the **safety instructions** can be **danger to persons**, the environment, and machines. Disregarding the safety instructions can lead to the loss of all claims for damages. In particular, disregard can lead, for example, to the following dangers:

- Failure of important functions of the plant.
- Failure of prescribed methods for maintenance and servicing.
- Danger to persons due to electrical, mechanical, and chemical influences.
- Danger to the environment due to leaks of hazardous substances.

2.3.4 Safety instructions for the owner /operator



If moving, rotating, hot, or cold machine components become hazardous, then these parts need to be secured on site against contact. The protection against contact must not be removed from moving or rotating parts.

- Collect leaked liquids of hazardous transported material so that there is no danger for persons and the environment.
- Legal regulations must be observed.
- Dangers caused by electric power must be ruled out.

2.3.5 Safety instructions for maintenance, inspection, and assembly work



All **maintenance, inspection, and assembly work** may only be carried out by trained technicians who have sufficiently informed themselves by thoroughly studying the user information.

Basically, work on the plant should be carried out only **when it is at standstill** and while wearing suitable **personal safety equipment**. Be sure to observe the procedure for shutting down the system described in the operating manual.

All safety and protection facilities need to be reinstalled after completing the work.

Environmentally hazardous media needs to be disposed of according to the pertinent legal regulations.

Secure the plant during maintenance and repair against intentional as well as accidental restarts. Process materials need to be disposed of according to the corresponding safety specification sheets of the lubricant manufacturer.

2.3.6 Unauthorized retrofitting and spare part manufacture



Retrofitting and modification of the plant is permitted only upon consultation with the manufacturer. The **Original spare parts** and accessories authorized by the manufacturer serve **safety** purposes. Usage of other parts can invalidate the liability for resulting consequences. WITTENSTEIN alpha GmbH grants no warranty and assumes no liability for any components retrofitted by the operator.

2.3.7 Impermissible operating modes

The operational safety of the plant is ensured only when it is **used as intended** as specified in the operating manual. The limit values specified in the technical specifications may not be exceeded in any case.

2.3.8 General hazard notice



All components of the LUC+400 have been designed according to the valid regulations concerning the construction of technical systems in regard to operational safety and accident prevention. Independent of that, their use can lead to danger to the user or third parties or other technical facilities. LUC+400s may therefore fulfill their purpose only when in **technically fault-free condition**. This may be done only if the corresponding safety regulations are complied with and the operating manual is observed. **Observe** the LUC+400 and its added components therefore **regularly** and check them for possible **damage and leaks**.

2.4 Transport and storage

Use suitable hoists for transport. The LUC+400 must not be thrown or subjected to hard impacts. When storing the LUC+400, it is important to keep the storage site cool and dry so that corrosion cannot form on individual parts of the system.



During transport, observe the valid safety and accident prevention regulations. Wear suitable safety equipment if necessary!

2.5 Assembly instructions



The following conditions need to be fulfilled during the assembly of the LUC+400 so that it can be assembled properly with other parts to form a complete machine and without risking the safety and the health of persons:

To avoid the buildup of condensation, the housing of the LUC+400 may not be subjected to direct sunlight and/or radiant heat.

2.5.1 Electrical connection



- Power connection may be established only by a trained electrician.
- The electrical components of the system have to be wired properly.
- Compare the voltage specifications to the available mains voltage.

2.6 Startup

Notes:

- The LUC+400 is delivered with an inserted grease cartridge in vented condition as a ready-to-install component. Yellow hose fittings have been inserted in the outlets.
- The hose lines have already been prefilled with the respective grease.

The startup of the LUC+400 is carried out step by step and in stages, from the LUC+400 onward to the lubrication point.

- Assembly of the LUC+400 onto a structure (see Chap. 7)
- Establish electrical connection via M12x1 interface (see Chap. 3)
- Removal of the yellow protective sleeves from the outlets of the LUC+400
- Are distributors installed?
 - o Yes:
 - Connection of hose lines to distributor(s); observe hydraulic circuit diagram (depending on plant and application).
 - Vent the distributor (e.g. by using the filling function of LUC+400; see Chap. 3.3); if necessary, visual inspection of liquid output
 - Connect hose lines leading out of the distributor to the lubrication points (e.g. by using the filling function of LUC+400; see Chap. 3.3); if necessary, visual inspection of liquid output; observe hydraulic circuit diagram (depending on plant and application).
 - Vent the lubrication points if necessary (e.g. by using the filling function of LUC+400; see Chap. 3.3); if necessary, visual inspection of liquid output
 - o No (direct hydraulic connection of the lubrication point):
 - Connection of hose lines to lubrication point(s); observe hydraulic circuit diagram (depending on plant and application).
 - Vent the lubrication point if necessary (e.g. by using the filling function of LUC+400; see Chap. 3.3); if necessary, visual inspection of liquid output

Note: The liquid output occurs delayed after the pump function of the LUC+400 and depends on the actual hose line lengths, grease used, any distributors, as well as ambient conditions, and can take several minutes.

2.6.1 Maintenance



The voltage in the plant needs to be switched off before you carry out maintenance and repair tasks. All maintenance and repair tasks should be carried out only when the plant is at a complete standstill. The surface temperature of the LUC+400 needs to be checked, because there is a risk of burns due to heat transfer. Wear heat-resistant safety gloves! Secure the plant during maintenance and repair against restarts.

3 Function/Principle

Once the power supply has been applied, the LUC+400 pumps the lubricant to the outlets. The external control, e.g. PLC, controls and monitors the set amount of lubricant as well as the intervals between lubrications.

As a connection to the controller of your plant, e.g. PLC, every LUC+400 features a 4-pin built-in plug for connecting a M12x1 socket. The communication with the controller as well as the voltage supply flows through this connection. The voltage to operate and switch the LUC+400 on and off is +20...+30 VDC (PIN 1). Once voltage is applied, the lubrication pump is in operation. If there is no malfunction (device OK), the power supply is applied to the output (PIN 4). Low signal means there is a fault. If the voltage is switched off, the device stops. When switched back on (restarting), the saved status is continued. The operational status is output via PIN 4.

3.1 Communication interface and connection to LUC+400



Connection assignment plug M 12 x 1

- PIN 1: Input voltage + 20...30 VDC, color: brown
- PIN 2: Control of the individual pump outlets, color: white
- PIN 3: Output/Ground (GND), color: blue
- PIN 4: Output signal, color: black

Details

Peak current I_{max} (during pumping), approx. 350 mA, typically < 200 mA

quiescent current (standby) < 20 mA

Output signal PIN 4: High (+ 20...30 VDC) = OK, Low (0 V) = fault

Max. output current (at PIN 4) 300mA

Attention: Observe the polarity, do not short circuit!

Surge-proof fuses 1A are recommended.

Exception: Output signal in empty state: Alternating signal (square wave pulse), the output voltage at PIN 4 alternates with a frequency of 0.5 Hz between high (+ 20...30 VDC) and low (0 V).

Motor running control: After signaling the outputs, the output signal at PIN 4 is switched from high (+ 20...30 VDC) to low (0 V) for the duration of the actual motor run (about 7 seconds per output). The number of the confirmed motor runs can be used to estimate the volume emptied (1 motor run = 1 pump stroke = 0.15 cm³).

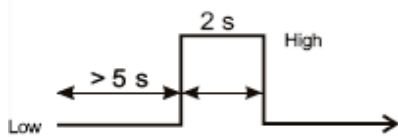
3.2 Designation of the pump outlets / Details on the control

Pulse signals for controlling the outlets (output in seconds, precision $\pm 0.2s$ or $\pm 10\%$)
 Important: Interval between two pulses $> 15s$

Designation of the pump outlets:

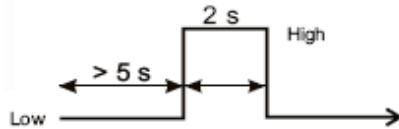


Control LUC+400-0_11: Outlet 1.1



Amount of lubricant per pulse 0.15 cm^3

Control LUC+400-0_21: Outlet 1.1 or outlet 1.2



Amount of lubricant per pulse: 0.15 cm^3 (per outlet). Beginning of the dispensing = outlet 1.1 or 1.2, outlets are signaled alternately.

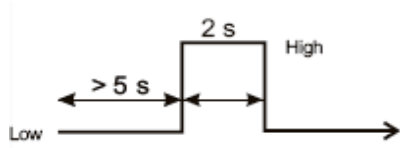
Outlet 1.1 and outlet 1.2



Amount of lubricant per pulse: 0.15 cm^3 (per outlet). Beginning of the dispensing = outlet 1.1 or 1.2, outlets are signaled after each other.

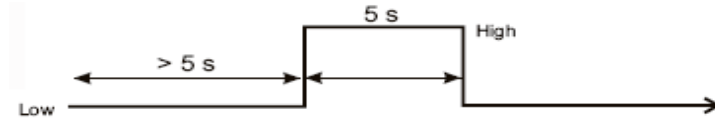
Control LUC+400-0_31:

Outlet 1.1



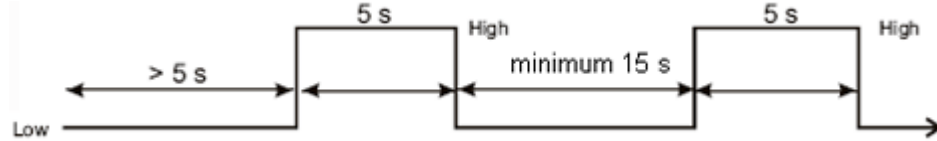
Amount of lubricant per pulse 0.15 cm³

Outlet 2.1 or outlet 2.2



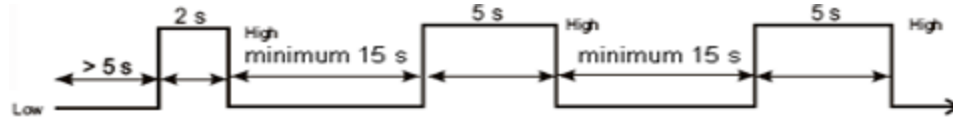
Amount of lubricant per pulse: 0.15 cm³ (per outlet). Beginning of the dispensing = outlet 2.1 or 2.2, outlets are signaled alternately.

Outlet 2.1 and outlet 2.2



Amount of lubricant per pulse: 0.15 cm³ (per outlet). Beginning of the dispensing = outlet 2.1 or outlet 2.2, outlets are signaled after each other.

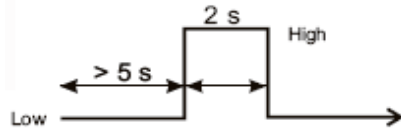
Outlet 1.1 and outlet 2.1 and outlet 2.2



Amount of lubricant per pulse: 0.15 cm³ (per outlet). Outlets are signaled after each other.

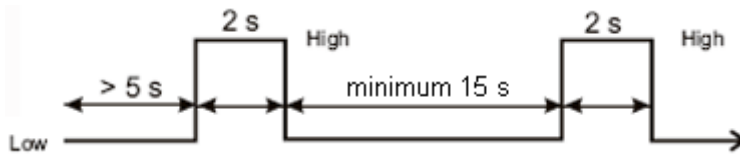
Control LUC+400-0_41:

Outlet 1.1 or outlet 1.2



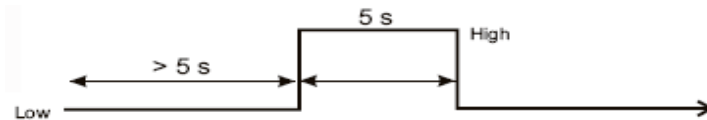
Amount of lubricant per pulse: 0.15 cm³ (per outlet). Beginning of the dispensing = outlet 1.1 or outlet 1.2, outlets are signaled alternately.

Outlet 1.1 and outlet 1.2



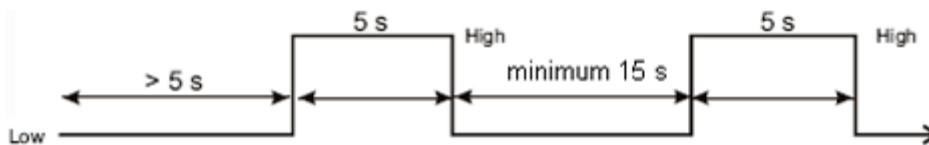
Amount of lubricant per pulse: 0.15 cm³ (per outlet). Beginning of the dispensing = outlet 1.1 or outlet 1.2, outlets are signaled after each other.

Outlet 2.1 or outlet 2.2



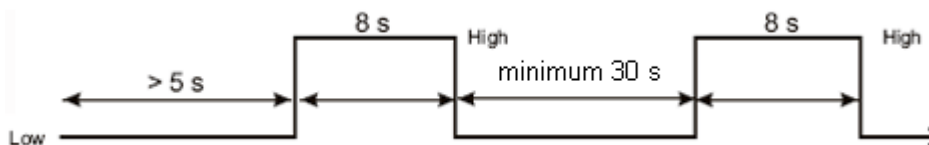
Amount of lubricant per pulse: 0.15 cm³ (per outlet). Beginning of the dispensing = outlet 2.1 or 2.2, outlets are signaled alternately.

Outlet 2.1 and outlet 2.2



Amount of lubricant per pulse: 0.15 cm³ (per outlet). Beginning of the dispensing = outlet 2.1 or outlet 2.2, outlets are signaled after each other.

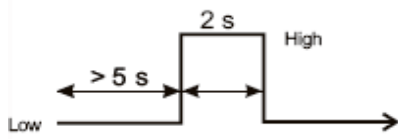
Outlet 1.1 and outlet 1.2 and outlet 2.1 and outlet 2.2



Amount of lubricant per pulse: 0.15 cm³ (per outlet). Beginning of the dispensing = outlet 1.1 or outlet 1.2, then outlet 2.1 or outlet 2.2, outlets are signaled after each other. Interval between two pulses > 30s.

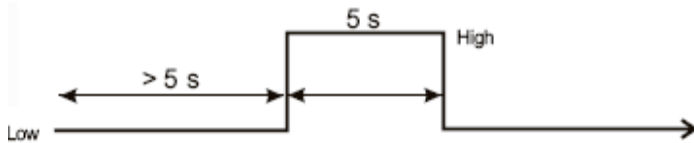
Control LUC+400-0_51:

Outlet 1.1



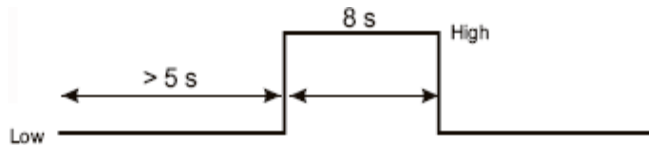
Amount of lubricant per pulse 0.15 cm³

Outlet 2.1



Amount of lubricant per pulse 0.15 cm³

Outlet 1.1 and outlet 2.1



Amount of lubricant per pulse: 0.15 cm³ (per outlet). Beginning of the dispensing = outlet 1.1 then outlet 2.1. Interval between 2 pulses > 30s.

3.3 Filling function

Venting the pump (in delivery status, the pump is already vented):
When sending a high signal 12 seconds long to PIN 2 every pump element is actuated and special dispensing occurs at each outlet. Pump bodies are vented.

LUC+400-0_11	Outlet 1.1: 20 x 0.15cm ³ =3.0cm ³	
LUC+400-0_21	Outlet 1.1: 10 x 0.15cm ³ =1.5cm ³	Outlet 1.2: 10 x 0.15cm ³ =1.5cm ³
LUC+400-0_31	Outlet 1.1: 20 x 0.15cm ³ =3.0cm ³ Outlet 2.1: 10 x 0.15cm ³ =1.5cm ³	Outlet 1.2: closed Outlet 2.2: 10 x 0.15cm ³ =1.5cm ³
LUC+400-0_41	Outlet 1.1: 10 x 0.15cm ³ =1.5cm ³ Outlet 2.1: 10 x 0.15cm ³ =1.5cm ³	Outlet 1.2: 10 x 0.15cm ³ =1.5cm ³ Outlet 2.2: 10 x 0.15cm ³ =1.5cm ³
LUC+400-0_51	Outlet 1.1: 20 x 0.15 cm ³ =3.0 cm ³ Outlet 2.1: 20 x 0.15 cm ³ =3.0 cm ³	Outlet 1.2: closed Outlet 2.2: closed

Table 1: Venting of the pump

Note: This filling function can be used for filling/venting hose lines and/or distributors. Intervals between the pulses 12 s. Running time for LUC+400 with outlet 1.1 and 1.2: 240 s. For other variants 500 s.

4 Messages, Malfunctions

4.1 Fault messages / Malfunctions

E1: Empty indicator	Alternating signal (square wave pulse), the output voltage at PIN 4 alternates with a frequency of 0.5 Hz between high (+ 20...30 VDC) and low (0 V).
Cause:	Cartridge empty or missing. The pumping function is stopped.
Solution:	Insert new cartridge. Afterwards, the pump continues running as before.
E2: Overcurrent: Output signal PIN 4:= Low (0 V)	
Cause:	The counter-pressure was too high three times in a row. The lubrication point may be blocked or the hose length is too long and/or the grease is too firm/hard. The pumping function is stopped.
Solution:	Remove the cause of the high counter-pressure (>70 bar), switch device off (disconnected from 24V DC for about 2 seconds)

Table 2: Error messages

System malfunctions	
Solution:	Switch device off and back on (disconnected from 24V DC for about 2 seconds)

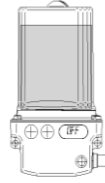
Table 3: System malfunctions

5 Maintenance

5.1 Maintenance: LUC+400 - cartridge exchange (fault message, empty state E1)

Maintenance of the device is not necessary until the cartridge has been exchanged.

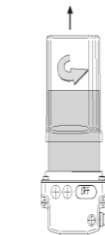
- Switch off device:



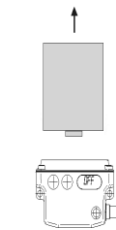
- Remove venting lock
(turning movement CLOSE --> OPEN)



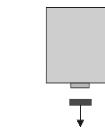
- Remove cover by turning to the left



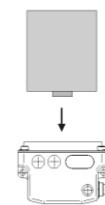
- Pull off the empty cartridge



- Remove safety cover from the new cartridge
- Grease the O-ring of the cartridge lightly

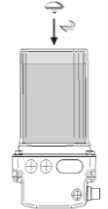
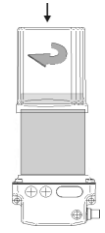


- Insert new cartridge with a turn

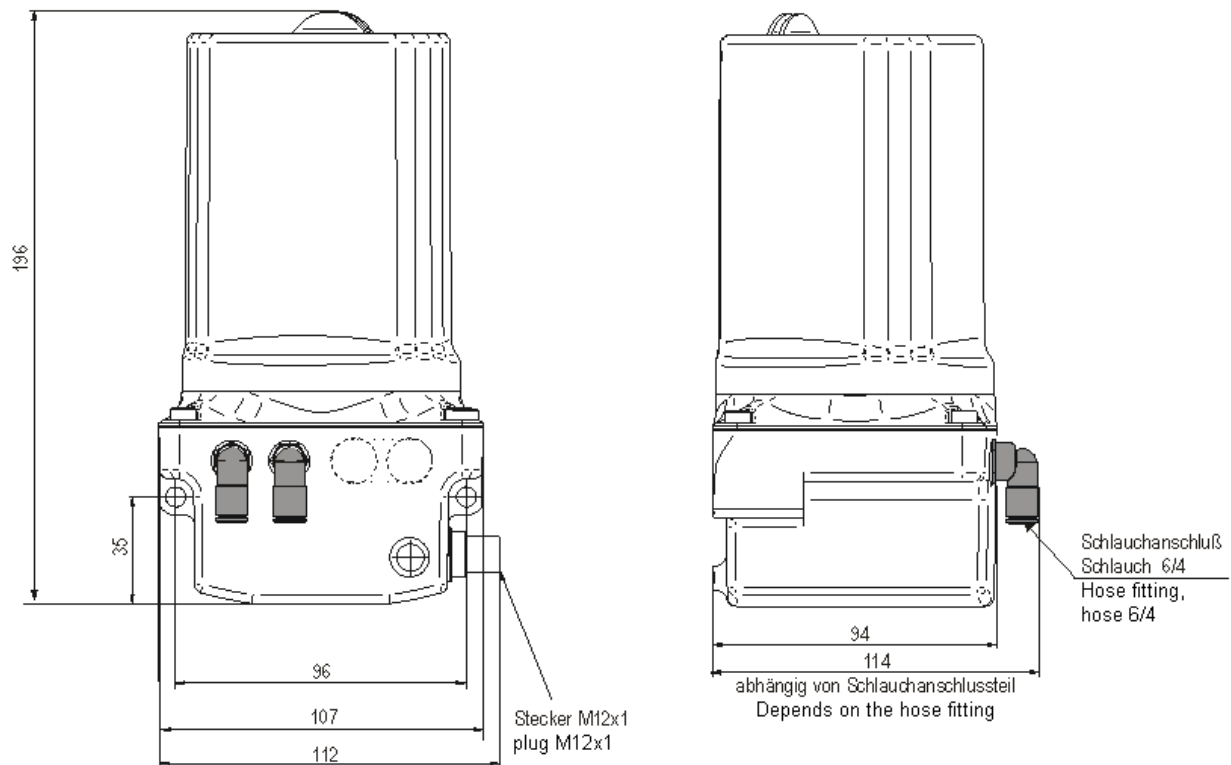


- Put the cover on with light pressure, secure hand-tight by turning to the right

- Insert and secure vent lock



6 Technical specifications LUC+400

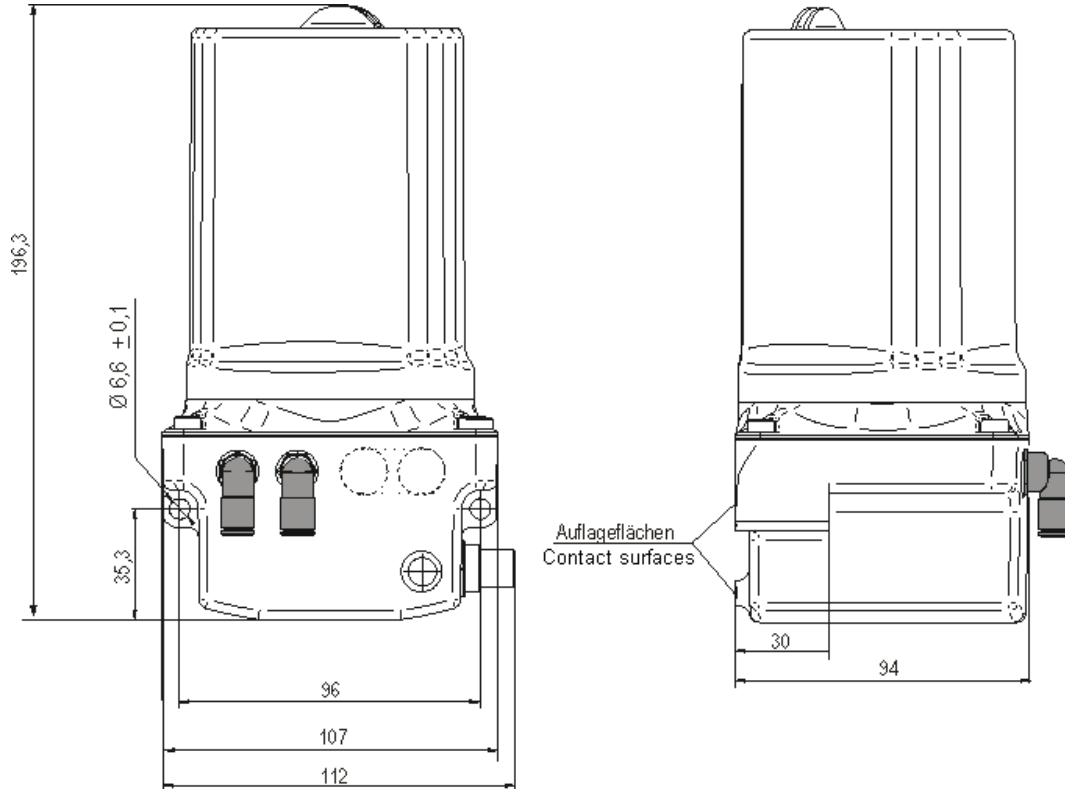


Lubricant volume	400cm ³ in cartridge
Lubrication medium	Oil or grease up to NLGI, class 3
Functional principle	Piston pump
Dispensing volume per stroke	0.15 cm ³ (per signaled outlet and pulse)
Number of outlets	max. 4
Connection	Hose with outer diameter 6 mm, maximum pressure up to 150 bar
Operating pressure	max. 70 bar
Operating voltage	24 VDC
Application temperature range	-20°C to +70°C
Dimensions, max., WxHxD	112 x 196 x 94 mm (without hose fitting)
Weight, without lubricant	approx. 1120g
Control system	integrated, microprocessor
Pressure monitoring	integrated, electronic (measurement of counter-pressure)
Fill level monitoring	integrated, reed contact
Connection plug	M12x1, 4-pin for connection to the plant's controller
Protection class	IP 65
Progressive distributor control	suitable

Table 4: Technical specifications

7 Assembly LUC+400

Fastening is done with 2 screws, e.g. M6x40 (or longer), inner hexagon screws, which are not included in the scope of delivery. The tightening torque is 5 Nm. A secure contact is ensured by 3 points on the back side.



8 Disposal

NOTICE	
	<p>If there is a lubricant exchange, the disposal guidelines of the lubricant manufacturer must be observed. When disposing of the LUC+400, be sure to observe the pertinent regional provisions.</p> <p>The emptied cartridges contain lubricant residues!</p> <ul style="list-style-type: none"> • Please dispose of together with waste material containing oil.



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