

LUBRICATION UNIT SAO, SAG

Instructional manual



Changes to the specified technical parameters and design are reserved

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1 PRODUCT DESIGNATION

This document serves as a guide for proper handling, storage, installation, commissioning, operation and maintenance of the product:

SAO/SAG lubrication unit

This is a standard product. Individual products are identified by a production label, which shows the code designation, year of manufacture and serial number.

2 APPLICATION

SAO lubrication units, version for lubricating oils, and SAG, version for soft greases, are used exclusively as pressure lubricant sources for single-pipe central lubrication circuits, which are equipped with single-line metering valves series SKIE, SKIB and SKIC using SRK manifolds or single-line metering valves series SMIE, SMIB mounted directly in the lubricated place.

3 DESCRIPTION

The main parts of the lubrication unit are the plastic tank and the tank lid with cover. The tank is attached to the lid with screws and sealed with a paper gasket. All components of the lubrication unit are mounted on the lid, namely the electric motor, clutch, toothed hydrogenator, suction basket, level gauge with electric indication, pressure switch, manometer, two outlets with G 1/4 BSP thread on each side and filling hole with strainer and lid. An internal electronic card is located under the cover of the tank lid, which can optionally be fitted with internal control and control automation.

4 OPERATION

After putting the lubrication unit into operation, the toothed hydro-generator, driven by an electric motor, transports the lubricant to the distributor, whose working piston is adjusted to the working position at the same time as the electric motor is started. This opens the way for the pressure lubricant to the lubrication circuit and all the included metering valves of the lubricant transported by the pressure stroke will make their stroke and deliver the lubricant to the lubricated points. When the pressure in the lubrication circuit reaches the value of the switching pressure of the built-in pressure switch, its electrical signal switches off the electric motor and the working piston of the metering valve moves to the zero position. This closes the path for the pressure lubricant to the lubrication circuit, and the pressure in the lubrication circuit drops to a pressure of 0.5 - 0.6 bar through the waste relief valve. This ensures that the pipe is filled with grease and that the circuit is not aerated. After the lubrication circuit is relieved, the pistons of the metering valves move to their initial position and the lubrication cycle can be repeated.

The pressure switch built into the unit is also used to check the pressure, and the signal is transmitted to the control timer, with which it is internally connected. The course of the lubrication cycle for the unit version with an external pressure switch, installed at the end of the lubrication circuit, is completely identical. To check the pressure with an external pressure

switch, it is necessary to connect it correctly to the control timer. The work cycles described above, one or several, take place automatically during the operating time of the lubrication unit. On the control timer, you can set the operating time or the number of external impulses and the pause time during which the lubrication unit is put out of operation

5 TECHNICAL DATE

Maximum pressure	30 bars
Working pressure	22 – 30 bars
Relief pressure	0,5 – 0,6 bar
Nominal flow rate	100 cm ³ / min – 230 V AC, 115 V AC, 50 Hz 120 cm ³ / min – 230 V AC, 115 V AC, 60 Hz 200 cm ³ / min – 24 V DC
Tank volume	2 a 3 dm ³
Number of outlets	2 outlets (left outlet – standard plugged)
Outlet thread	G 1/4 BSP
Electric motor	230 V AC, 0,78 A, 110 W, fuse 2,5A 115 V AC, 1,50 A, 110 W, fuse 2,5A 24 V DC, 3 A, 60 W, fuse 6,3 A
Working mode of electric motor	S3 20 %
Maximum operating time	Max. 4 minutes when min. 16minute pause
Level indicator (NO – normally opened)	Oil, 1,5 A - 250 V AC, 200 V DC - 50 W
Closed at sufficient oil volume (NC - normally closed)	Grease, 10 - 36 V DC, < 10 mA (24 V), < 15 mA (36 V)
Pressure switch (NO – normally closed))	22 bars < 250 V AC, 0,5A
IP protection	IP 65
Filling plug	200 µm
Working temperature	0 °C - 50°C
Storage temperature	10 °C - 40°C
Humidity	90 % max
Noise	<70 db (A)
Lubricant	Oil 20 – 1000 mm ² /s Soft grease NLGI 00, 000
Weight of empty aggregate	3,5 kg (2 dm ³) 4,3 kg (3 dm ³)

Table 1 Technical date

6 CATALOGUE DESCRIPTION

SAO – LUBRICATING OILS, supplied as standard with pressure switch and intermediate Lubrication

Description	Code	Voltage	Reservoir	Lubricant	Type
SAO 2E1	1008801	24 V DC	2 dm ³	oil	Without control timer
SAO 2E1	1008802	115 V AC			
SAO 2E1	1008803	230 V AC			
SAO 2E2	1008804	24 V DC	2 dm ³	oil	With control timer
SAO 2E2	1008805	115 V AC			
SAO 2E2	1008806	230 V AC			
SAO 3E1	1008807	24 V DC	3 dm ³	oil	Without control timer
SAO 3E1	1008808	115 V AC			
SAO 3E1	1008809	230 V AC			
SAO 3E2	1008810	24 V DC	3 dm ³	oil	With control timer
SAO 3E2	1008811	115 V AC			
SAO 3E2	1008812	230 V AC			
SAO 3E2	1008813	230 V AC			With control timer, UL/CSA certification

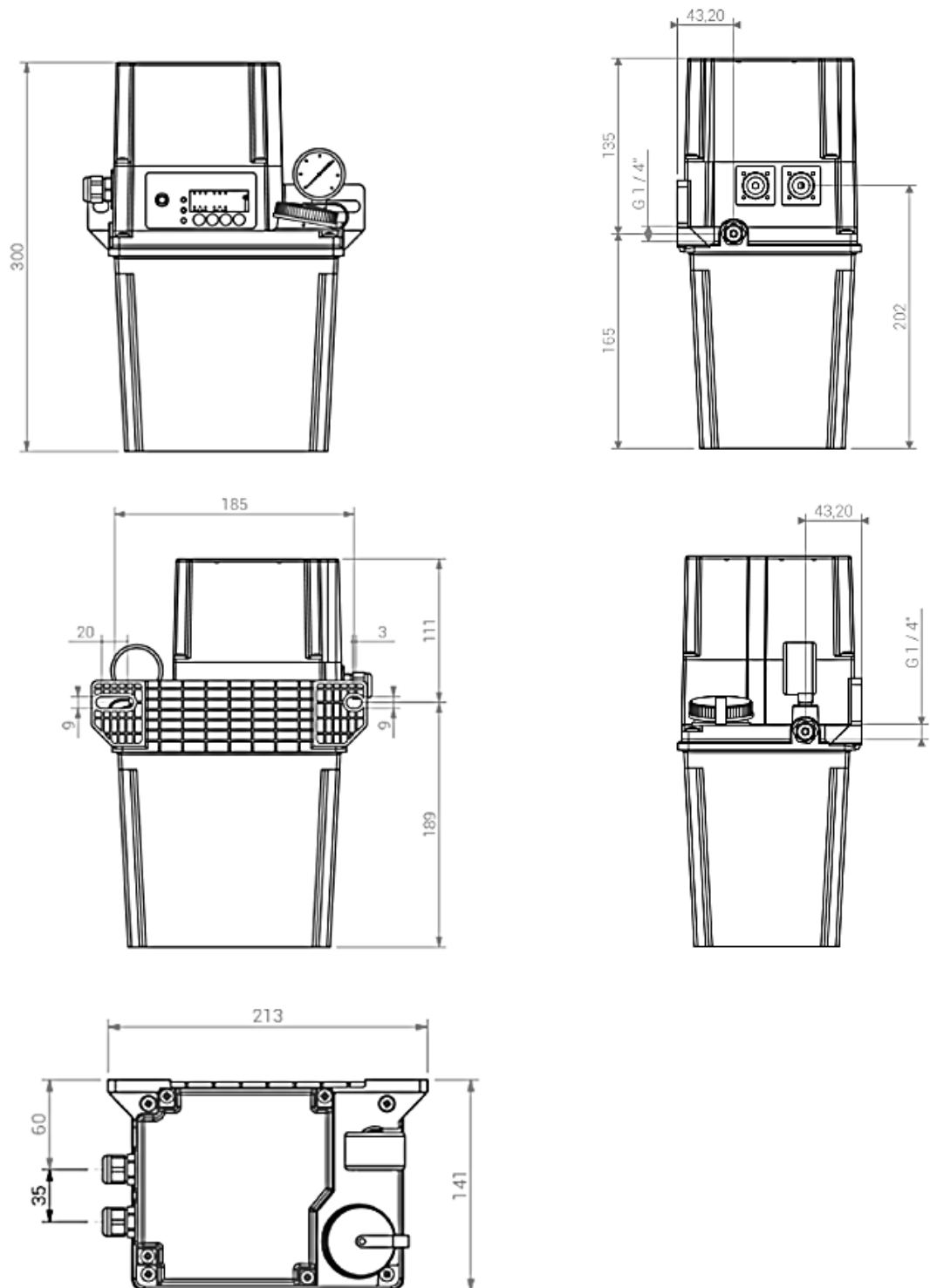
Table 2 SAO type identification

SAG – SOFT GREASES, supplied as standard with pressure switch and intermediate Lubrication

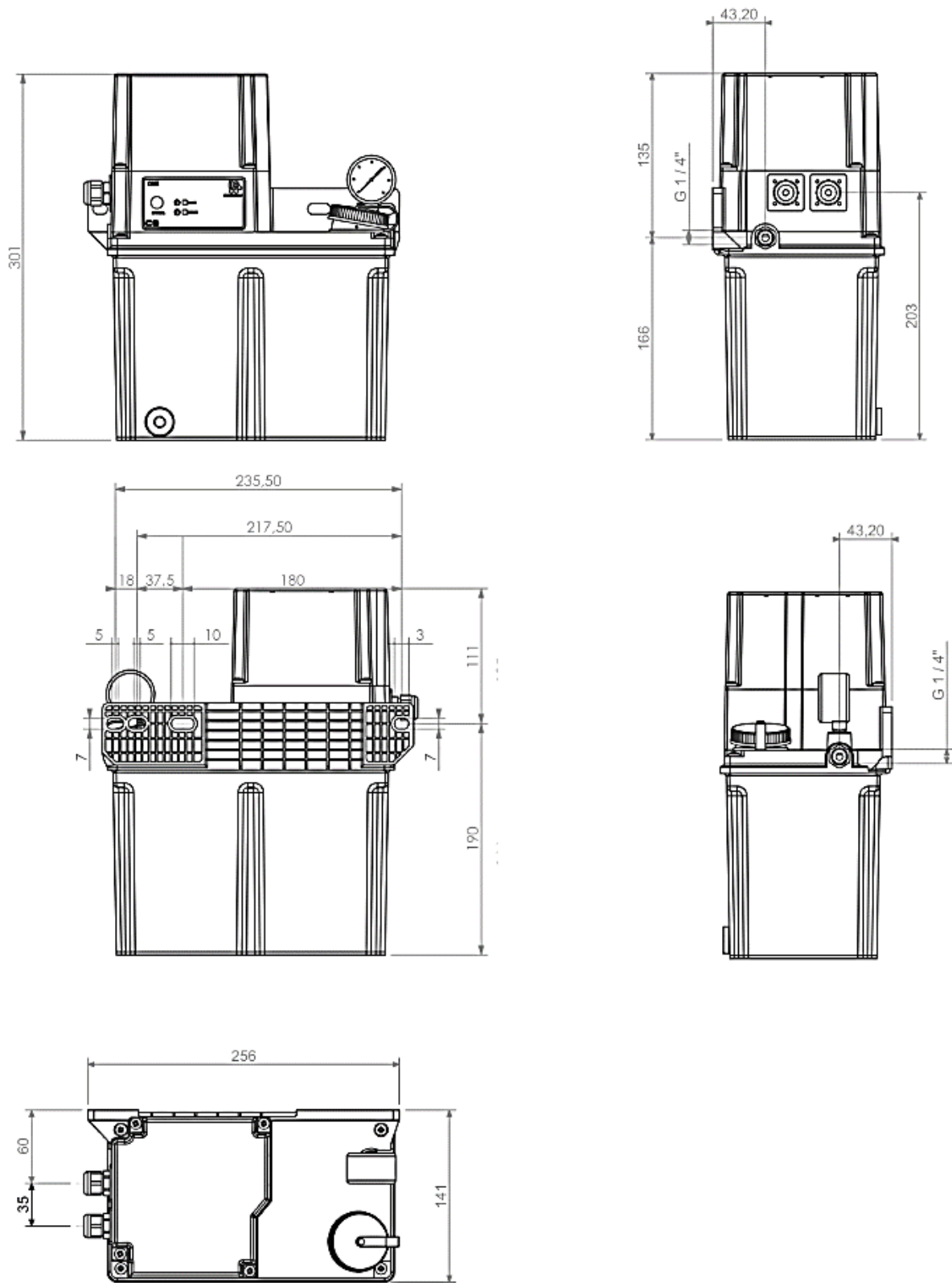
Description	Code	Voltage	Reservoir	Lubricant	Type
SAG 2E1	1008814	24 V DC	2 dm ³	grease	Without control timer
SAG 2E1	1008815	115 V AC			
SAG 2E1	1008816	230 V AC			
SAG 2E2	1008817	24 V DC	2 dm ³	grease	With control timer
SAG 2E2	1008818	115 V AC			
SAG 2E2	1008819	230 V AC			
SAG 3E1	1008820	24 V DC	3 dm ³	grease	Without control timer
SAG 3E1	1008821	115 V AC			
SAG 3E1	1008822	230 V AC			
SAG 3E2	1008823	24 V DC	3 dm ³	grease	With control timer
SAG 3E2	1008824	115 V AC			
SAG 3E2	1008825	230 V AC			

Table 3 SAG type identification

7 DIMENSIONAL DRAWING



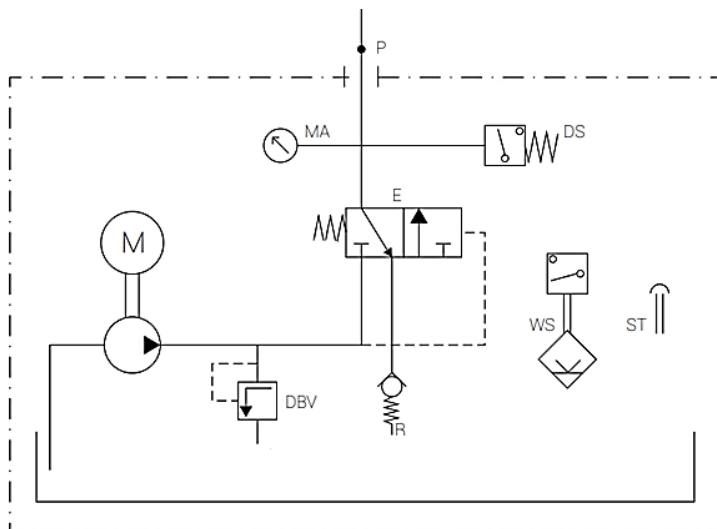
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Changes to the specified technical parameters and design are reserved

8 HYDRAULIC SCHEME

Table 4. Hydraulic scheme



Pos.	Description
M	Electric motor
DBV	Safety valve
E	Change-over valve
R	Relieve valve
DS	Pressure switch
MA	Pressure gauge
P	Outlet fitting
WS	Electric level indicator
ST	Filling cap
OV	Pressure relief valve Table 4 Hydraulic scheme

9 INSTALLING AND GETTING INTO OPERATION

Notice:

Installation and electrical connection of the unit may only be carried out by trained persons who are familiar with the regulations.

Before removing the plastic cover from the lubrication unit when adjusting the automatic control, the power supply must be disconnected.

Regularly fill the tank of the lubrication unit with only clean lubricant.

SAO, SAG lubrication units are mounted in a horizontal position and attached to the wall of the machine or device. 2 anchor holes with a diameter of 6.5 mm are prepared for fixing the aggregates. After mounting the aggregate in the selected location and connecting the outlet to the lubrication circuit pipe, the tank is filled with the prescribed lubricant. The unit is fitted with two G1/4 threaded outlets. The outlet fitting is not part of the unit and must be ordered as a separate item. The electrical connection of the unit is made according to the diagram that belongs to the given version of the lubrication unit.

The unit is equipped with control timer, it is a factory - set in Tribotec operating mode: **lubrication time: 10 seconds, pause time: 60 seconds**, with **activated level gauge and oil pressure switch**. For the operating (lubrication) time and pause time setting variants, which are determined by a time interval, the display shows the time countdown of the current process (deletion / pause) with the appropriate time unit. Lubrication can also be started manually regardless of the operating interval using the intermediate lubrication mode by pressing the **M button**.

10 OPERATING MODES

10.1 SAO, SAG – without control timer

The lubrication unit in this configuration is intended either for ON/OFF mode, lubrication without an automatic interval, or for the lubrication with external PLC control, to which the input and output signals about the operation and status of the lubrication unit are connected.

10.2 SAO, SAG – with control timer

In this configuration, the lubrication unit operates completely automatically in given intervals, which can be configured with several possible parameters:

10.2.1 Operating time and pause time in time intervals

Operating time – the pump operates/lubricates.

Pause time – the pump is stopped.

For the variant of setting the running time and the time when there are time breaks, the display shows the time countdown of the current process (lubrication / pause) with reference to the time figure. Lubrication can also be started manually, regardless of the ongoing interval, using the intermediate lubrication mode, by pressing **M** button.

10.2.2 Operating time determined by time (sec. / min. /hours), pause time determined by ON/OFF pulse signal

In the variant where the pause time is determined by a pulse signal, the set pulses are counted down. The pulse signal is formed by a mechanical switch. After reading the set signal pulses, the deletion is activated, which is set by a time interval. Wiping can also be started manually regardless of the running interval using the intermediate wiping function by pressing the **M** button.

10.2.3 Operating time determined by time (sec. / min. / hours), pause time determined by PNP pulse signal

In the variant where the pause time is determined by a pulse signal, the set pulses are counted down. The pulse signal is formed by **an external induction switch**. After reading the set signal pulses, the lubrication is activated, which is set by a time interval. Lubrication can also be started manually regardless of the running interval using the intermediate lubrication mode by pressing **M** button.

The control timer is equipped with NO/NC lubrication state output signal, thanks to which we can externally monitor the state of the lubrication unit, but also use the output signals to switch the external relay of solenoid valve, in oil-air lubrication circuits. The aggregate is equipped with a level indicator and a pressure sensor. When the minimum level is reached or the disconnection of the pressure sensor occurs, lubrication is stopped, an error message will come, and the alarm warning light will light up.

Lubrication time interval (s.)	Pause interval time interval (sec./min./hour.)	Pause – impulse (mechanical switch)	Pause – impulse (inductive switch)	System air pressure monitoring (oil + air)	Outlet signal NO / NC	Scheme Num.
X	X				X	11.2.2.
X		X			X	11.2.3.
X			X		X	11.2.4.
X	X			X	X	11.2.5.

Table 5. Determination of the wiring diagram according to the selected configuration

11. OPTIONAL MODES

11.1 Intermediate lubrication mode

This function allows you to manually start the deletion by pressing **M** button, regardless of the current cycle.

11.2 Pre - lubrication mode

This function enables the start of the set lubrication cycle every time the unit is switched on, regardless of the pause time interval, which remains saved even when the unit is switched off thanks to the automatic control. The function must be set in the configuration menu.
 Settings see chapter 13.2.4.

11.3 Pre - heating mode

This function allows the lubrication medium to be preheated by its own circulation, after each power-up of the unit in the set interval of the running time, pause time and number of cycles. **It is mainly used after longer lubrication downtimes, for example when lubricating the spindles of machine tools.** After the function is completed, the lubrication automatically switches to the standard set lubrication cycle.

Settings see chapter 13.2.3.



ATTENTION

The preheating function can be switched on by configuration only in combination with the working mode, where the run time and the pause time are defined by a time interval.

12 WIRING DIAGRAM, CONNECTION TO ELECTRICAL NETWORK

12.1 SAO, SAG – without automatic control

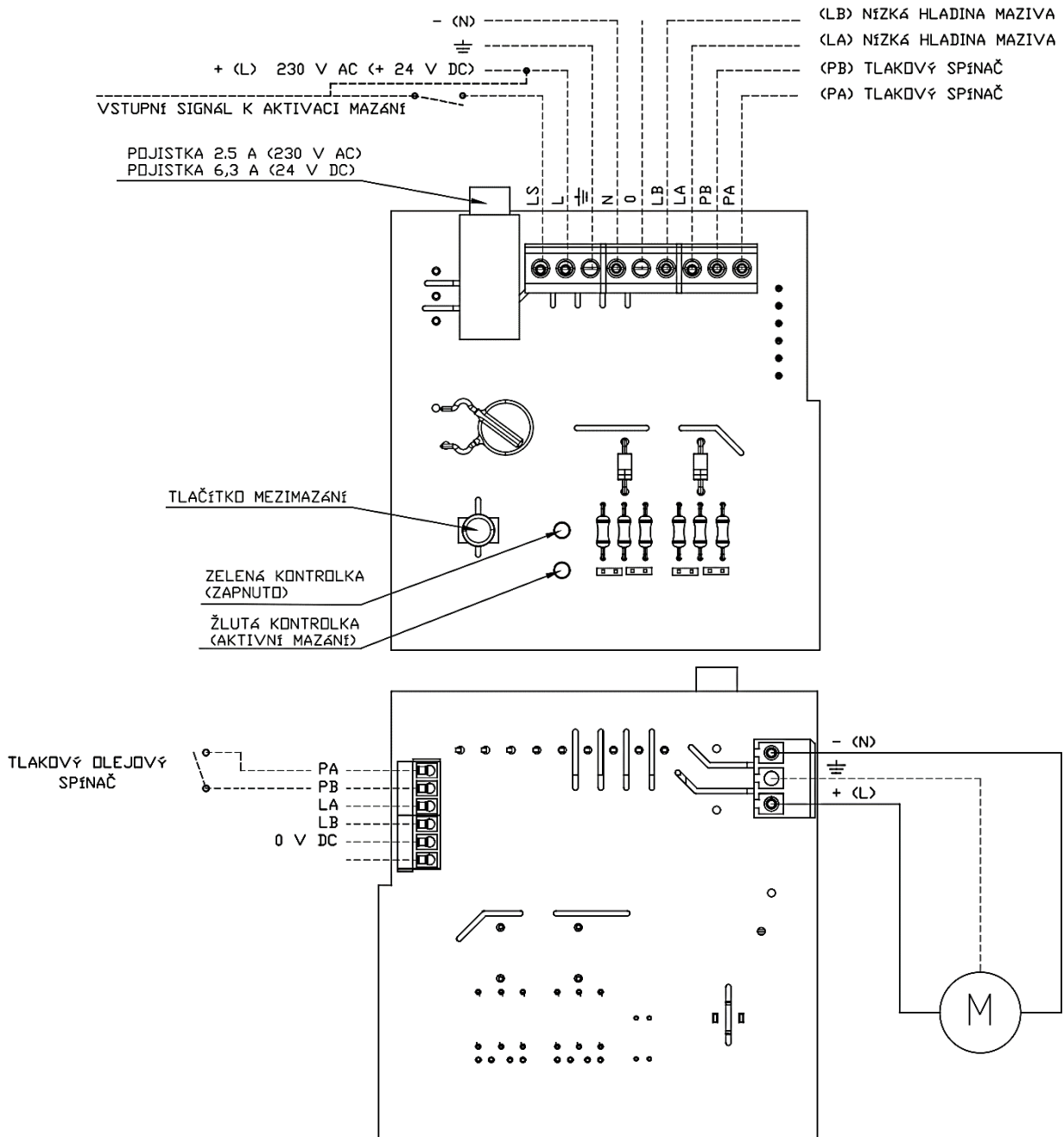


Fig. 4 Connection diagram without control automation

12.2 SAO, SAG – with control timer

12.2.1 Standard electric wiring set in Tribotec factory

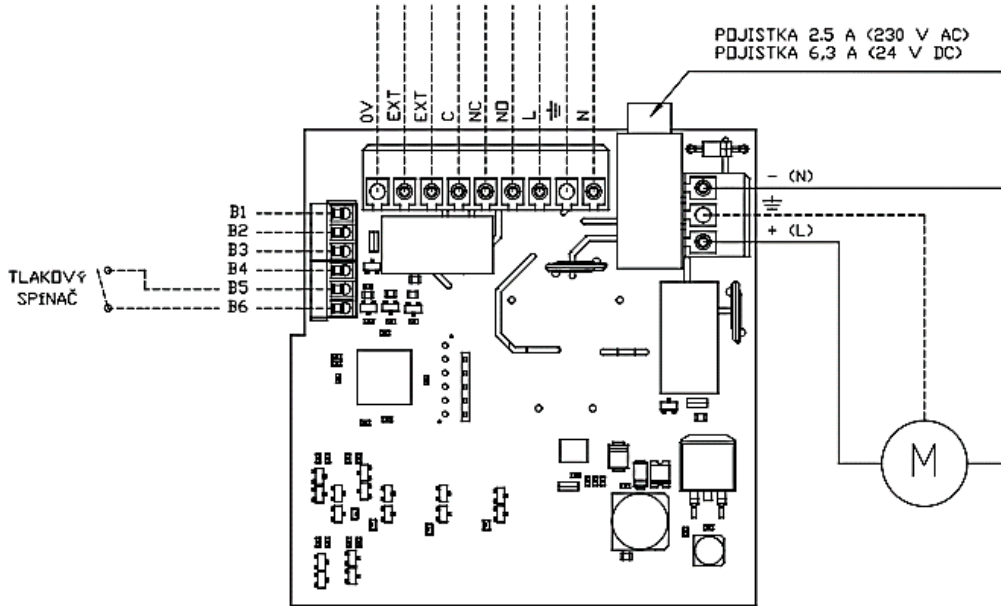


Figure 5 Wiring diagram with control automation 12.2.1

12.2.2 Connection for a volumetric lubrication or oil + air lubrication with control of the operating and pause time in hours, minutes or seconds.

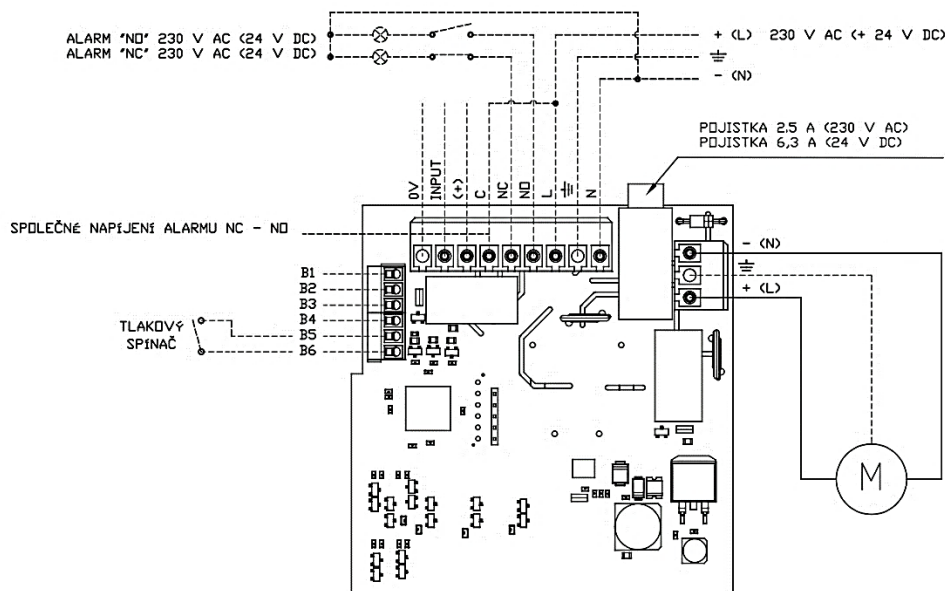


Fig. 6 Wiring diagram with control timer 12.2.2

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12.2.3 Connection for a volumetric lubrication or oil + air lubrication with an interval control of operating time in seconds, while the pause time is determined by the number of pulses from the external switch.

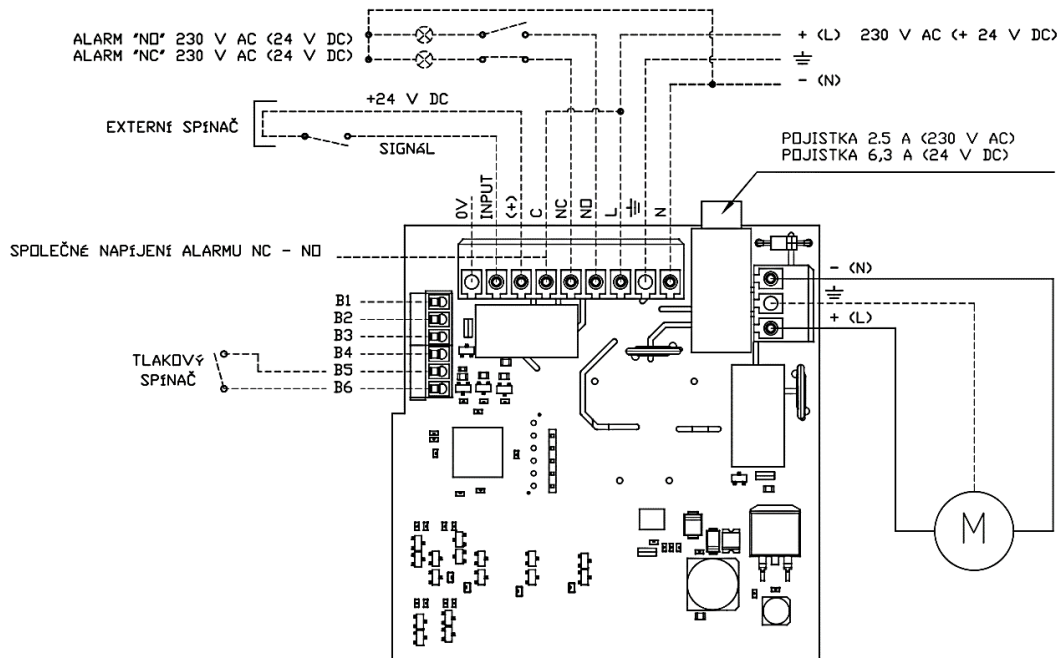


Fig. 7 Wiring diagram with control timer 12.2.3

12.2.4 Connection for the volumetric lubrication or oil + air lubrication with control of operating time in seconds, while the pause time is determined by the number of pulses from the external inductive sensor.

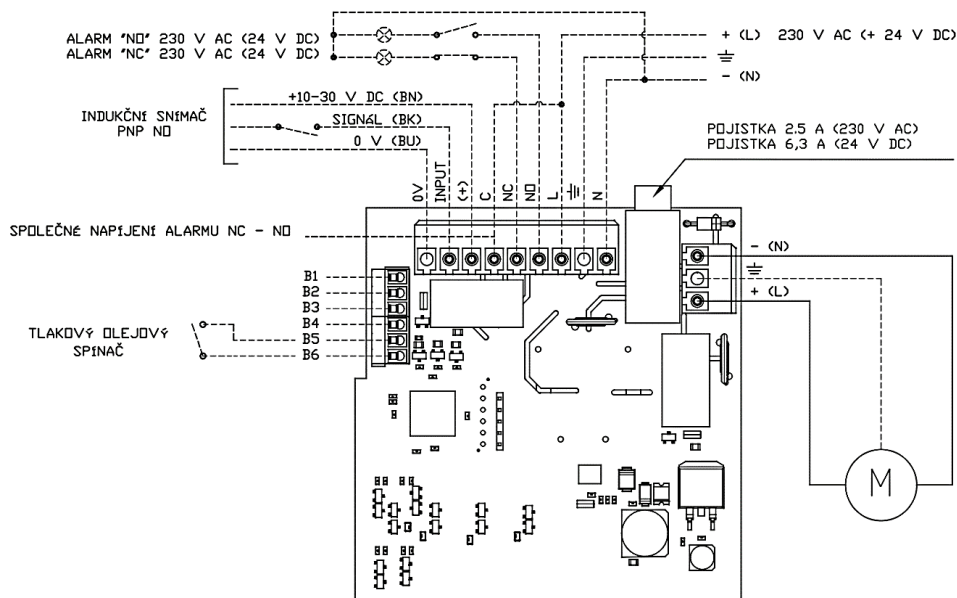


Fig. 8 Wiring diagram with control timer 12.2.4

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12.2.5 C0“must for obil + air obil switch systém air presuje control.

For this type of connection, the pause time is specified in hours, minutes or seconds.

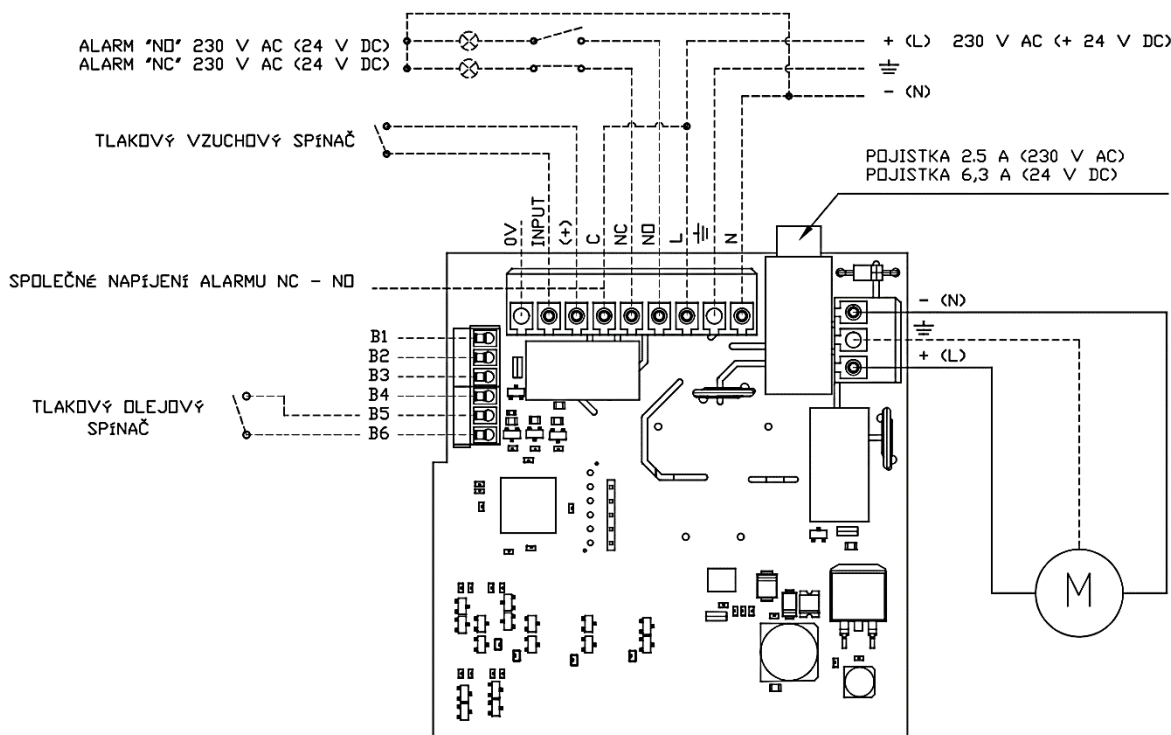


Fig. 9 Wiring diagram with control automation 12.2.5

12.2.6 Connection of level indicator according to the chosen variant

12.2.6.1 SAO, SAG with control timer

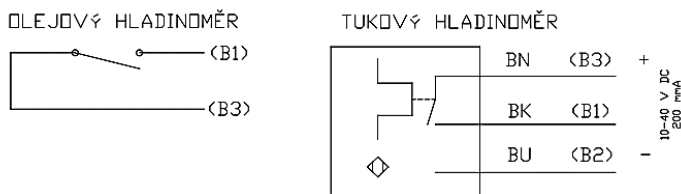


Fig. 10 Connection diagram of the SAO, SAG level gauge with control timer 12.2.6

12.2.6.2 SAO, SAG without control timer

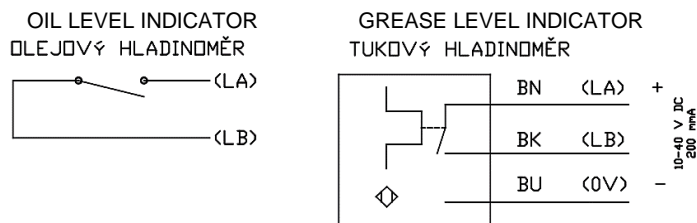


Fig. 10 Connection diagram of the SAO, SAG level gauge with control timer 12.2.7

Changes to the specified technical parameters and design are reserved

13 CONTROL AND ADJUSTMENT OF CONTROL TIMER

13.1 OPERATING MODE

In this mode, the pump works completely automatically in pre-set intervals of running time and pause time. The control panel is equipped with three LEDs, a four-digit display and four touch buttons, which are used to set the lubrication system and related diagnostics. A green light indicates a pause between lubrication cycles, an orange light indicates active lubrication, and a red light indicates a malfunction.



- ↑ Menu selection / value change
- ↓ Menu selection / value change
- ↵ Programming input
- M Start deletion / reset of error message



After starting the lubrication (supplying voltage to the lubrication unit), the lubrication is automatically started in pre-set parameters.

Manual deletion starts regardless of the time interval or the signal interval can be achieved by pressing the **M button**. This step will start the deletion from the beginning of the set interval.

If the control system detects a problem with one of the three input parameters, an error message appears on the display together with a red light and the deletion is interrupted. You can use the arrows to display an error message in the menu, which specifies the fault in more detail. To restart, remove the fault and press the **M button** to start the cycle.

13.2 PROGRAMMABLE MODE

To enter programming mode, press and hold the Enter ↵ key until all LEDs flash.



ATTENTION

To save changes in programming mode, press and hold the Enter ↵ key for at least 5 seconds.

If this procedure is not followed, all changes will be lost.



13.2.1 PROGRAMMING MENU SELECTION



After entering the programming menu, select via using the arrows ↑↓ item **E-CM**.
 Press **M** button to enter.



Use to select a specific menu ↑↓.
 Confirm your selection with the button **M**.



***CM-b** – basic menu („b“ = basic“)
CM-F – full menu („F“ = Full“)

Confirm the selection by button **M**.



E-CM is now set, using the arrows ↑↓ you can continue to set other parameters in the menu you selected.

*In **CM-b** basic menu, **only operation and pause time intervals can be set**. Parameter pause times differ in this menu, depending on the selected operating mode **E-FU** in **Full** menu **CM-F**.

13.2.2 OPERATING MODE SELECTION

Using arrows ↑↓ select item **E-FU**.
 Press button **M** to enter.



13.2.2.1 PROGRAMMABLE MODE WITH A TIME INTERVAL OF PAUSE



Using arrows $\uparrow \downarrow$ choose item **FU-PL**.
 Confirm the selection by pressing the button **M**.



Via arrow \uparrow in the programming menu, select item **E-LS** to set the lubrication time in seconds.
 "LS" = "Lubricating Seconds"



Confirm the selection by button **M**.



Using arrows $\uparrow \downarrow$ set requested lubrication time in the range 1– 60 seconds.

The last letter on the display represents the set time unit (**S - seconds**). We save the set interval by pressing the button **M**.



In the case of choosing a pause in seconds only, choose a selection **E-PS**



Using arrow \uparrow select the item **E-PS** in the programming menu for setting pause interval in seconds.
 "PS" = "Pausing Seconds"



Confirm the selection by button **M**.



Using arrows $\uparrow \downarrow$ set requested pause interval in the range 60 - 999 seconds. The last letter on the display represents the set time figure (**S - seconds**). We save the set interval by pressing the button **M**.

Changes to the specified technical parameters and design are reserved

In the case of choosing a **pause in minutes only**, select the **E-PM** option.

Using arrow **↑** in the programming menu select item **E-PM** to set the pause interval in seconds.
“PM” = “Pausing Minutes”



Confirm the selection by button **M**.



Using arrows **↑↓** set requested lubrication time in the range of 0 – 999 minutes. The last letter on the display represents the set time unit (**M - minutes**). We save the set interval by pressing the button **M**.



In the case of choosing a **pause in hours only**, select the **E-PH**

Using arrow **↑** in programming menu select item **E-PH** to set the pause interval in hours.
“PH” = “Pausing Hours”



Confirm the selection by button **M**.



Using arrows **↑↓** set the requested pause interval in the range 0 – 999 hours. The last letter on the display represents the set time figure (**H - hours**). We save the set interval by pressing **M** button.



The pause time can also be set in a common combination of hours / minutes / seconds. If a pause is selected in only one of the three-time figures, the figure “0” must be set for the other two figures.

Changes to the specified technical parameters and design are reserved

13.2.2. PROGRAMMABLE MODE WITH IMPULSIVE INTERVAL OF PAUSE



Using arrows **↑↓** in menu **FU** select item **FU-IL**.

Confirm the selection by button **M**.
"IL" = "Impulsive Lubrication"



Using arrow **↑** in programming menu, select item **E-LS** to set lubrication time in seconds.

"LS" = "Lubricating Seconds"



Confirm the selection by button **M**.



Using arrows **↑↓**, set the requested lubrication time in the range 1–60 seconds. The last letter on the display represents the set time figure. (**S – seconds**). We save the set interval by pressing **M** button.



Using arrow **↑** in programming menu, select item **E-IP** to set the pause interval determined by the number of impulses

"IP" = "Impulsive Pause"

Confirm the selection by button **M**.



Using arrows **↑↓**, set the requested number of impulses determines the pause interval. We save the set interval by pressing button **M**.



When exiting the menu, press **Enter ↵** for 5 seconds to save the set parameters.

13.2.3 PREE - HEATING OPERATION



Using arrows $\uparrow\downarrow$ in programming menu, select item **E-ML**, to set pre-heating time interval. média. We save the set interval by pressing button **M**.



Using arrows $\uparrow\downarrow$, set the requested pause interval in the range 1 – 60 seconds. The last letter on the display represents the set time figure (**S - seconds**). Save the set interval by pressing button **M**.



Using arrows \uparrow in programming menu, select item **E-MS** to set pre-heating pause interval. Confirm the selection by pressing button **M**.



Using arrows $\uparrow\downarrow$, set the requested pause interval in the range 1 – 60 seconds. The last letter on the display represents the set time figure (**S - seconds**). Save the set interval by pressing button **M**.



Using arrow \uparrow in programming menu, select item **E-MC**, to set the number of cycles of pre-heating.



Using arrows $\uparrow\downarrow$, set the requested number of cycles of pre-heating we set the required number of preheating cycles, which will take place already in the set time parameters **E-ML**, **E-MS**. Save the set interval by pressing button **M**.



Changes to the specified technical parameters and design are reserved



Using arrow **↑** in programming menu, select item **E-MP** for activation and deactivation of pre-heating operation. Confirm the selection by pressing button **M**.



Using arrows **↑↓**, set figure 0 or 1.
ACTIVE operation **NP-1**
NONE-ACTIVE operation **NP-0**
Confirm the selection by pressing button **M**.



When exiting the menu, press **Enter** **↵** for 5 seconds to save the set parameters.

13.2.4 PRE-LUBRICATION OPERATION



Using arrows **↑↓** in programming menu, select item **E-PL**, pre-lubrication operation. Confirm the selection by pressing button **M**.
“PL” = “Pre - Lubrication”



Using arrows **↑↓**, select figure 0 or 1
ACTIVE operation **NP-1**
NONE-ACTIVE operation **NP-0**
Confirm the selection by pressing button **M**.



When exiting the menu, press **Enter** **↵** for 5 seconds to save the set parameters.

Changes to the specified technical parameters and design are reserved

13.2.5 ACTIVATION OF LEVEL SENSOR

Using arrows \uparrow \downarrow in programming menu select item **E-AL**, minimum level lubricant sensor status.

“AL” = “Activated Level”

Confirm the selection by pressing button **M**.



Using arrows \uparrow \downarrow , set figure 0 or 1

ACTIVE operation **AL-1**

NONE-ACTIVE operation **AL-0**

Confirm the selection by pressing button **M**.



When exiting the menu, press **Enter** \leftarrow for 5 seconds to save the set parameters.



13.2.6 ACTIVATION OF PRESSURE OIL INDICATOR

Using arrows \uparrow \downarrow in programming menu select item **E-AO**, pressure oil indicator statuses.

“AO” = “Activated Oil”

Using arrows \uparrow \downarrow , set figure 0 or 1

ACTIVE operation **AO-1**

NONE-ACTIVE operation **AO-0**

Confirm the selection by pressing button **M**.



When exiting the menu, press **Enter** \leftarrow for 5 seconds to save the set parameters.

Confirm the selection by pressing button **M**.



13.2.7 ACTIVATION OF PRESSURE AIR INDICATOR

Using arrows **↑↓** in programming menu select item **E-AA**, pressure air indicator status.

“AA” = “Activated Air”

Confirm the selection by pressing button **M**.



Using arrows **↑↓** set figure 0 or 1

ACTIVE operation **AA-1**

NONE-ACTIVE operation **AA-0**

Confirm the selection by pressing button **M**.



When exiting the menu, press **Enter** **↵** for **5** seconds to save the set parameters.

Confirm the selection by pressing button **M**.



13.2.9 FAILURE OCCURRING AND ERROR CODE READING

If there is a fault or non-compliance with an external parameter, the display will show "block" with the simultaneous signalling of the red "alarm" light. The lubrication cycle is interrupted. By selecting with the arrows $\uparrow\downarrow$, the error code can be displayed, thanks to which the fault that has occurred can be accurately diagnosed. To restart the removal, it is necessary to remove and get into operation manually by pressing button **M**.

If there is a fault or non-compliance with an external parameter, the display will show "block" with the simultaneous signalling of the red "alarm" light.



The lubrication cycle is interrupted. By selecting with $\uparrow\downarrow$ arrows, the error code can be displayed, thanks to which the fault that has occurred can be accurately diagnosed. To restart the removal, it is necessary to remove and run manually run M fault.



If an error occurs during erasing when the display is inactive, the cycle will be interrupted and the red LED will light up.



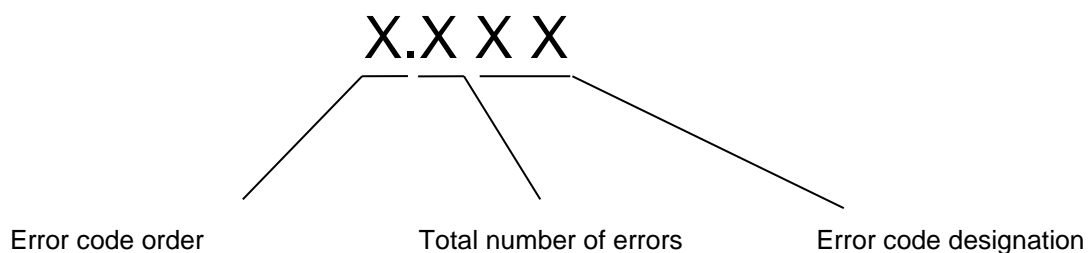
If the error occurs during erasing when the display is active, the cycle will be interrupted, the display will show "block" at the same time as the red LED lights up.



Use the arrows to select the error code. We can erase the error code by pressing the M button. At the same time, the defect must be removed.

If multiple error codes are displayed, the first letter determines the order of the error messages, the second letter the total number and the last two letters determine the type of error code, see chapter 18



Error code track


X.X AL	Error code related to the low level of lubricant in the tank
X.X AO	Error code related to integrated oil pressure switch
X.X AA	Error code related to external pressure air switch

Tab. 6 Error codes

11 MAINTENANCE AND INSPECTION

With the exception of timely replenishment of lubricant and cleaning of the suction basket approximately twice a year, the lubrication unit does not require additional maintenance or service.

12 ACCESSORIES

SAO, SAG lubrication units do not require any special accessories for installation, operation or maintenance.

13 WORK SAFETY

The electrical connection must be carried out professionally in compliance with the relevant safety regulations. The customer is responsible for professionally performed and correct installation.

14 STORAGE AND TRANSPORT

When storing customers, observe the product conditions according to the set of IE11 class combinations according to ČSN EN 60721-3-1 (temperature range +5°C to +40°C, relative humidity range 5 to 85%) and the transport conditions of the IE21 class combination according to ČSN EN 60721-3-2 (temperature range -25°C to 60°C, relative humidity 75%). The customer is responsible for storing the product after delivery.

Products must be repaired in protective packaging. For lubricating SAO, SAG, you can use an aggregate normally packaged in cardboard boxes filled with crushed polystyrene or similar protection against mechanical damage. In the means of transport, the products must be stored in such a way that the possibility of mechanical loading by stacking, damage due to shocks and weather effects during transport is excluded. Loading and unloading must be done carefully to prevent the mechanical shipment from falling.

15 QUALITY AND GURANTEEE

TRIBOTEC warrants that all products manufactured by TRIBOTEC will be of simple material and workmanship on the date of sale by TRIBOTEC to the original purchaser of these products.

With the offer of a special, extended or safety warranty, published by TRIBOTEC, TRIBOTEC will repair or replace for a period of six (6) months from the date of sale any product that TRIBOTEC confirms is defective.

This warranty applies only if the products are installed, operated and maintained in accordance with the written instructions and requirements contained herein.

This warranty does not cover, and TRIBOTEC will not be responsible for, normal wear and tear of the product. In addition, a defect in the product, its damage or damage caused by the following will not be detected:

1. faulty installation (if delivery is not directly from TRIBOTEC),

2. improper use, e.g., use and operation under other than specified operating conditions,
3. use for other than recommended purposes,
4. abrasion,
5. pollutants or debris,
6. corrosion caused by installation in a different than recommended working environment,
7. inadequate or inappropriate maintenance,
8. damage due to negligence, accident or intentional damage,
9. using spare parts not supplied by TRIBOTEC,
10. additional installation of parts and components not supplied or not approved by TRIBOTEC,
11. incompatibility of the TRIBOTEC product with equipment, accessories or materials not supplied by TRIBOTEC, or their incorrect design, production, installation or maintenance,
12. inadmissible liquids:

-	Liquid	Hazards
1.	Lubricants with abrasive additives	Wear of internal pump components
2.	Lubricants with silicone additives	Pump seizing
3.	Corrosive products	Pump corrosion – injury to persons
4.	Petrol-solvents-inflammable liquids	Fire-explosion-damaged gaskets
5.	Water	Pump oxidation
6.	Food contamination	Contamination of said products

For items that TRIBOTEC sold, either as part of the product or separately, but did not manufacture (such as electric motors, switches, relays, pressure gauges, etc.), TRIBOTEC accepts a warranty for the duration of the warranty of the complete product to its full extent, except for cases in which explicitly warned the customer in this document or in the purchase contract. In these cases, TRIBOTEC will provide the buyer with reasonable cooperation in submitting complaints to the manufacturer of the component or part in question.

THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ANY OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

TRIBOTEC shall in no way be liable for indirect, incidental, force majeure or consequential damages and losses resulting from TRIBOTEC supplying the products.

Changes to the specified technical parameters and design are reserved

19 POSSIBLE FAILURES AND THEIR REMOVING

Table 7 Possible malfunctions and their elimination

FAULT	PROBABLE CAUSE	TROUBLESHOOTING
Red LED warning light is blinking error code AL	Lack of lubricant in the tank	Fill the tank
Red LED warning light lights up, the display shows "alarm", error code AO	Lubrication unit doesn't dispense the lubricant under a requested pressure	Fill the tank up
	Faulty pressure switch	Replace a faulty switch
	Dirty suction filter	Remove and clean the filter
	Inner fittings are loosened	Tight all inner fittings
	Worn out the gear pump	Replace the gear pump
	Dirty valves	Remove and clean valves
	Operating cuff is damaged	Replace the operating cuff
Red LED warning light lights up, the display shows "alarm", error code AA	Insufficient pressure of external pressure air switch	Check an air circuit of system up in the oil – air application
	Air pressure external switch is faulty	Replace the air pressure switch
	Wrong settings of the control timer	Check and, if necessary, readjust wrong settings of the air pressure switch, see 13.2.7 chapter
Pressure relief valve doesn't open itself at the end of time lubrication.	Dirty relief valve	Remove and clean up.

Changes to the specified technical parameters and design are reserved

20 ANNEXES

20.1 Spare part catalogue with Identification Numbers



A **Motor cover**
ID 791170093732

B **Motor**

24 V DC	ID 1950311
115 V AC	ID 1950303
230 V AC	ID 1950304

C **Control timer**

Without control timer (24 V DC)	ID 791191111500
Without control timer (115/230 V AC)	ID 791191111501
With control timer (24 V DC)	ID 791191111502
With control timer (115V AC)	ID 791191111503
With control timer (230V AC)	ID 791191111504

D **Filling cup**
ID 791170093731

E **Filling filter**
ID 791193086045

F **Pressure gauge**
ID 1463000

G **Pressure switch 22 bar, NO**
ID 1490627

H **Minimum level indicator**

Oil	ID 791170094170
Grease	ID 791170094171

I **Adjustable by-pass valve 5/50 bar**
ID 79116875043

J **Valve unit**
ID 791168075041

L **Gear pump**
ID 79100000540

M **Reservoir**

2 litres	ID 791170093741
3 litres	ID 791170093742