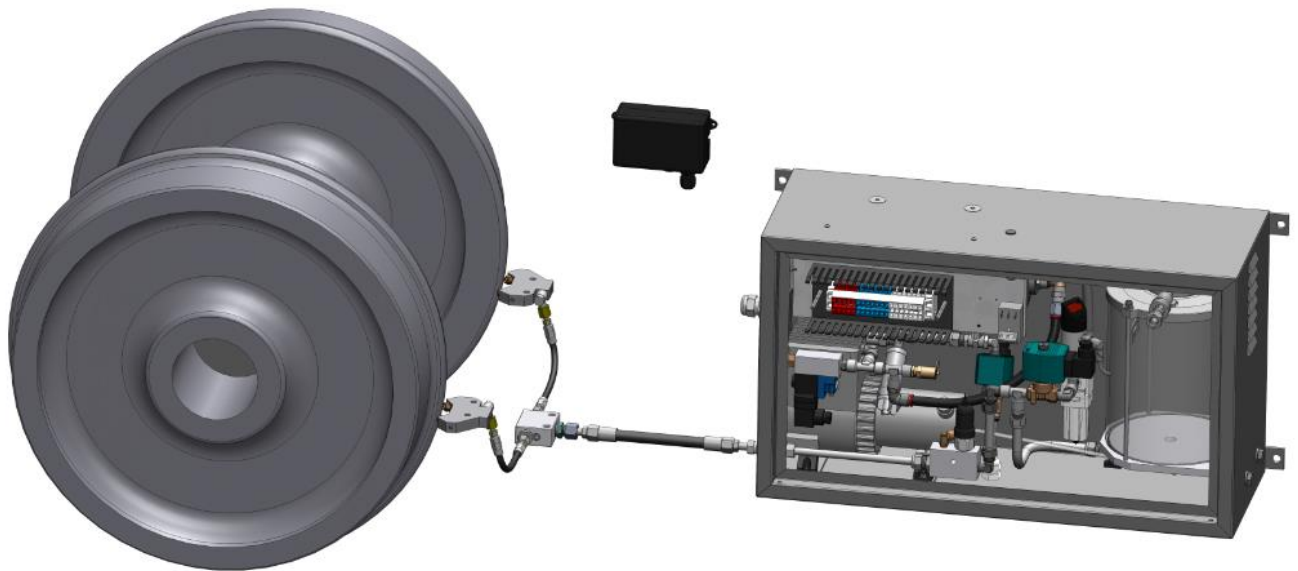


# WHEEL FLANGE LUBRICATION OK-01

Catalogue



Modification of indicated specifications and design reserved

## CONTENTS

1	PURPOSE .....	3
2	APPLICATION .....	3
3	DESCRIPTION.....	3
4	FUNCTION .....	5
4.1	The Function of the Air Compression Unit.....	5
4.1.1	Mode I – Lubrication .....	5
4.1.2	Mode II – First run (filling) of the circuit .....	6
4.1.3	Mode III – Cyclical blowing through the circuit .....	6
4.1.4	Mode IV – Service button.....	6
4.1.5	Mode V – External blowing .....	6
5	TECHNICAL PARAMETERS .....	6
6	CATALOGUE DESIGNATION.....	7
7	DIMENSIONAL DRAWING .....	7
8	HYDRAULIC AND PNEUMATIC DIAGRAMS .....	8
9	INSTALLATION AND PLACING INTO OPERATION.....	8
10	WIRING DIAGRAM, ELECTRICAL CONNECTION.....	9
11	ADJUSTMENT OF WORKING PARAMETERS.....	11
11.1	NOZZLE ADJUSTMENT .....	11
12	MAINTENANCE AND INSPECTION .....	11
12.1	FILLING LUBRICANT .....	12
13	ACCESSORIES .....	13
14	WORK SAFETY .....	13
15	STORAGE AND TRANSPORT .....	13
16	QUALITY WARRANTY .....	14
17	POSSIBLE FAULTS AND THEIR ELIMINATION .....	16

Modification of indicated specifications and design reserved

## 1 PURPOSE

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

### Wheel flange lubrication OK-01

The product is in standard execution. Individual products are identified and provided with a nameplate, bearing the code number, year of manufacture and serial number.

## 2 APPLICATION

The OK-01 wheel flange lubrication system is designed for wheel flange lubrication on the first axle in the direction of travel.

Advantages of wheel flange lubrication:

- Reduction of costs connected with replacement of wheels due to the wear of flanges
- Reduction of wear and deformation of rails
- Significant reduction of noise from passing vehicle, especially at railway switches and on bends
- Saving of energy by reducing friction between the flange and the rail
- Shortening of frequency and length of the vehicle's idle time due to repairs
- Reduced risk of a vehicle derailing
- Exact application of a thin film of grease, preventing the leakage from moveable components and clogging the brakes
- Economic grease consumption
- Using biodegradable grease, environmentally friendly
- Easy to apply, low demands on maintenance

## 3 DESCRIPTION

The wheel flange lubrication system is designed for lubricating wheel flanges of trams that are not equipped with pressurized air distribution. The system works on the principle of applying lubricant mixture to the contact area of tram wheel flanges with rails by means of pressure air. The mixture of lubricant and air is formed in a mixing device behind the lubrication pump and it is further lead through a divider and spray nozzles without other mechanical parts that could be source of malfunctions. The lubrication system is provided with a circuit cleaning function, if the vehicle is not operated for longer periods of time. The system is actuated either fully automatically using the bend sensor or manually by pressing a button at the driver workstation.

The OK-01 lubrication system consists of these following main parts:

1. Lubrication set – lubricator box (1)

- air compression unit (5 to 12),
- lubrication device (4,23,30 to 32)
- lubrication dosage and mixture preparation (4, 14 to 19),
- control system and controls (24 to 26)
- lubricant filling (28, 29).

Level gauges MAX. (30) and oil level meter (23) are located on the lubrication tank (32).  
Lubrication set (1) located in the vehicle, in a space under the floor, in the driver's cabin.

## 2. Wheel flange lubrication on chassis (3)

- Divider (20)
- Hose DN4 and DN8
- Nozzles (21)

## 3. Bend sensor (27)

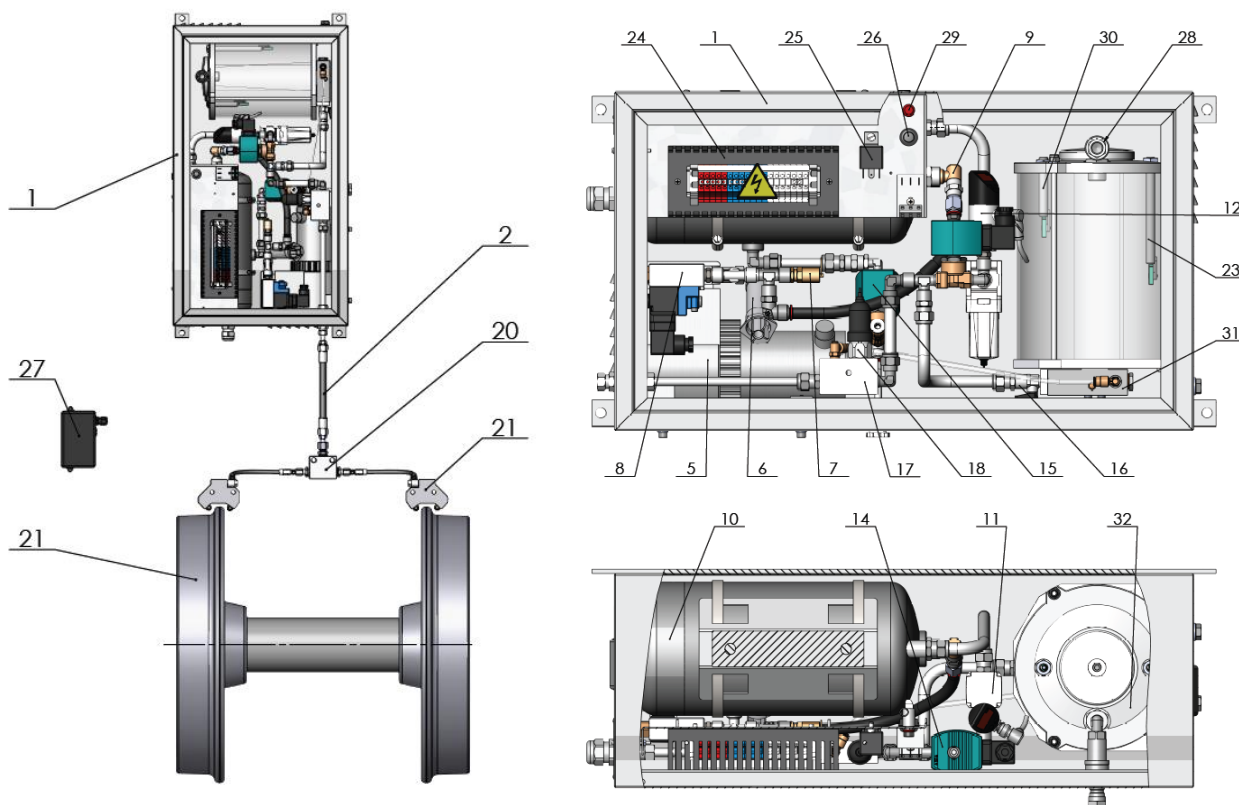


Fig. no. 1 Layout diagram OK-01

Wheel flange lubrication on chassis (3) with mixture divider (20), application nozzles (21) are located on the vehicle chassis.

Lubricant is filled using a quick coupler (28) located on the lubrication tank (32) inside the lubrication set (1). A full tank (32) is signalled by a signal light (29), which is located next to the terminal board (24).

The lubrication cycle is managed using a bend sensor (27). Input and output signals (Fig. no. 4 Wiring diagram OK-01) are connected to a terminal board (24), which is located on the top half of the cabinet with the lubrication set (1).

**Input signals:**

- 0.2 – control of operating valve (pos. 15).
- I.1 – service button (pos. 28), runs a single cycle (set time) of lubrication.

**Output signals:**

- I.2 – pressure sensor (pos. 19), signalizes sufficient pressure of lubricant mixed with air.
- I.9 - signalization of MIN. lubricant level in tank (pos. 23).

## 4 FUNCTION

### 4.1 The Function of the Air Compression Unit

The function of the air compression unit is controlled by a pressure switch (12) with output signal I.5. When the air pressure in the air tank (10) decreases to 3.5 bars, the signal I.5 of the pressure switch (12) instructs the vehicle control that it should apply signal O.5 to close the release valve (8) and switch the switch relay (25) which starts the compressor (5). During compressor (5) operation, pressure in the air tank (10) grows and when pressure reaches 7 bars, signal I.5 disconnects signal O.5 and it disconnects the connection to the switch relay (25) which stops the compressor (5). At the same time, signal I.5 opens the pressure release valve (8) which connects the space between the compressor (5) and the non-return valve (9) with the surrounding atmosphere. In this way, the discharge piping is relieved which is necessary for a new start of the compressor (5).

#### Operation Modes

A time operated lubrication cycle is controlled by a signal from the bend sensor (27). Air tank filling (10) is independent from travel.

For the right functionality and use of all working options of the whole system of flange lubricating, using the modes I to V stated in this chapter.

#### 4.1.1 Mode I – Lubrication

The instruction to lubricate, using the bend sensor upon detecting a bend on the line, when signal o.2, opens the operating valve (14), which the air flows to through the control valve (15) to the piston of the air-operated lubricating machine (4) and the mixing device (17). The pneumatic pump (31) of the lubricating machine (4) pushes a dose of the lubricant into the mixing device (17) and the air flow in the mixing device (17) carries with itself the dose of the lubricant into the pipes, the divider (20) and the nozzles (21), through which the lubricant arrives to the flange. During lubricating, the pressure switch (18), via I.2 signal controls that there is sufficient pressure in the lubricant-air mixture. If signal I.2 is not active, it means there is an error in the flange lubricating system (valves, compressor, burst hose, etc.). After the time of lubricating has elapsed, signal O.2 discontinues the current supply to the operating valve (14) which then closes and interrupts the air-flow into the mixing device (17) the divider (20) and the nozzles (21).

#### 4.1.2 Mode II – First run (filling) of the circuit

Multiple (40 x) immediate repetition of the lubrication using the service button (26) with the tram standing, used for the first run of the circuit or after using mode III or V in order to fill the circuit as fast as possible with lubricant and bring the lubricant to the spray nozzles (21). If necessary, the filling mode II can be repeated.

#### 4.1.3 Mode III – Cyclical blowing through the circuit

Before putting the vehicle out of service for a long time, it is necessary to clean the lubrication circuit including the nozzles from lubricant by cyclically blowing behind the mixing device (17). Lubrication residue, mainly in the divider (20) and the nozzles (21) may accumulate, harden and cause the lubrication system to be unreliable. Before running mode III, it is necessary to close the ball valve (16) at the air input into the pneumatic lubricating device (4). This mode is performed using the service button (26) until the circuit is completely free of the lubricant.

#### 4.1.4 Mode IV – Service button

Mode IV is designed for service purposes using the service button (26), like checking the function of the lubrication circuit, adjusting spray nozzles (21) etc. After the service button has been pressed, one lubrication cycle is completed.

#### 4.1.5 Mode V – External blowing

An external source of pressurized air can be connected to the quick coupler (19) by the mixing device (17) to speed up blowing in mode III.

## 5 TECHNICAL PARAMETERS

Lubricant – type.....	grease special designed for wheel flange lubrication*
Lubricant - consistency .....	NLGI000**
Dose of lubricant .....	0.4 cm <sup>3</sup> / cycle
Lubricant tank capacity.....	5 dm <sup>3</sup>
Air tank capacity .....	5 dm <sup>3</sup>
Ambient temperature .....	- 30 to + 60 °C
Cabinet size d x w x h.....	650 x 245 x 380 mm
Air pressure:    - maximum .....	0.8 MPa
- working pressure range.....	0.35 MPa ÷ 0.7 MPa
Supply voltage.....	24 V DC + 25 % - 30 %
Max current consumption .....	10.5 A
Weight of complete wheel flange system.....	29 kg ± 5 %
Degree of protection.....	IP 65
Max noise level.....	65 dB(A) ±2 dB(A)

Modification of indicated specifications and design reserved

\* Using the biodegradable grease is possible. In case of using grease containing solid particles contact our specialist. The list of recommended greases is available on request. The manufacturer reserves the right to test any non-recommended lubricants before the delivery of goods, otherwise the producer is not responsible for the correct operation of the equipment or any damage caused by the unsuitable lubricant.

\*\* The grease must meet the given consistency class and must be functional in the whole range of required environmental temperature.

## 6 CATALOGUE DESIGNATION

Wheel flange lubrication OK-01

## 7 DIMENSIONAL DRAWING

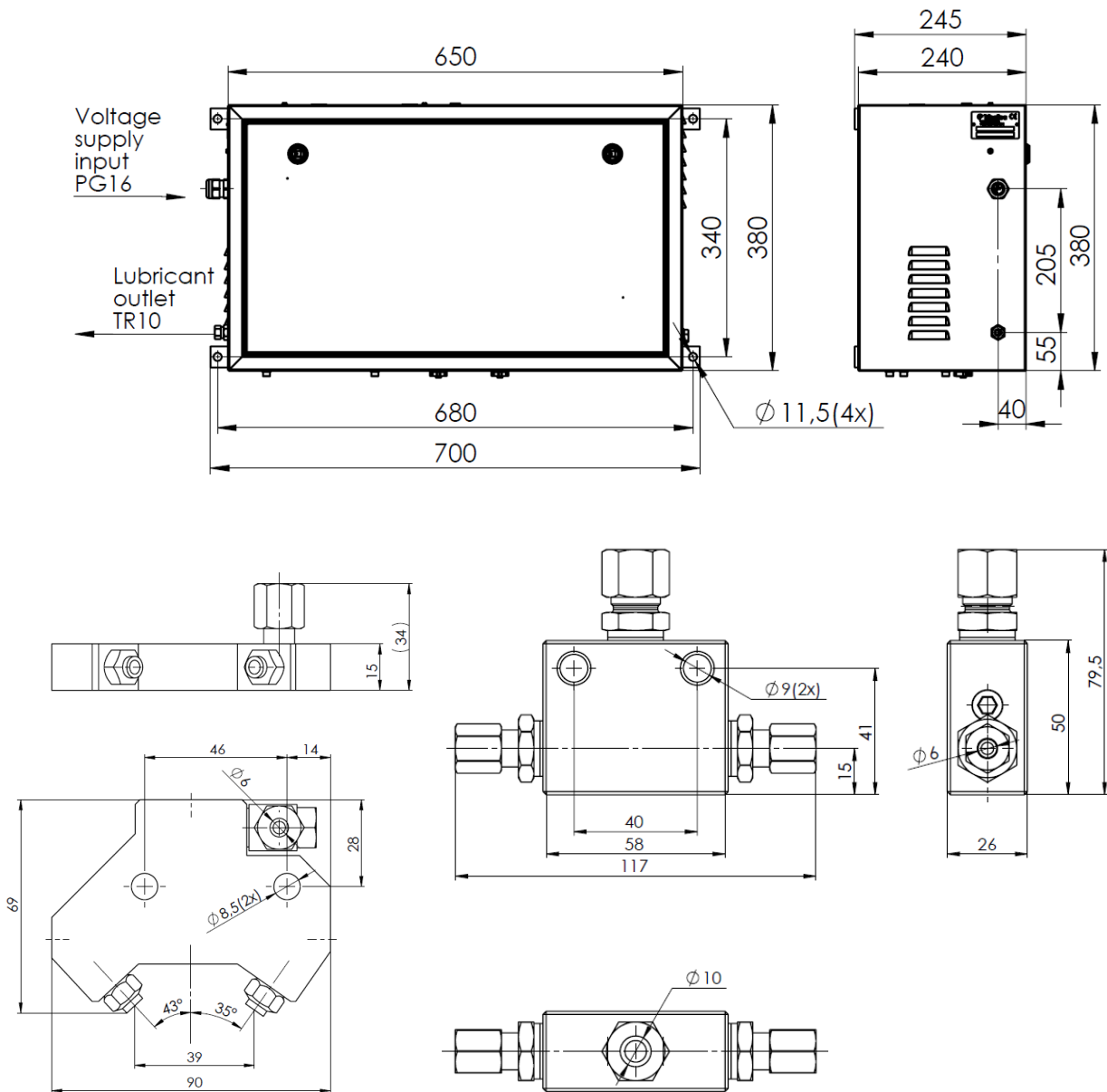


Fig. no. 2 Dimensions drawing of individual lubrication nodes: lubricator box, nozzle, divider

## 8 HYDRAULIC AND PNEUMATIC DIAGRAMS

Hydraulic and pneumatic diagrams visible in Fig. no. 3 Hydraulic-pneumatic diagram OK-01.

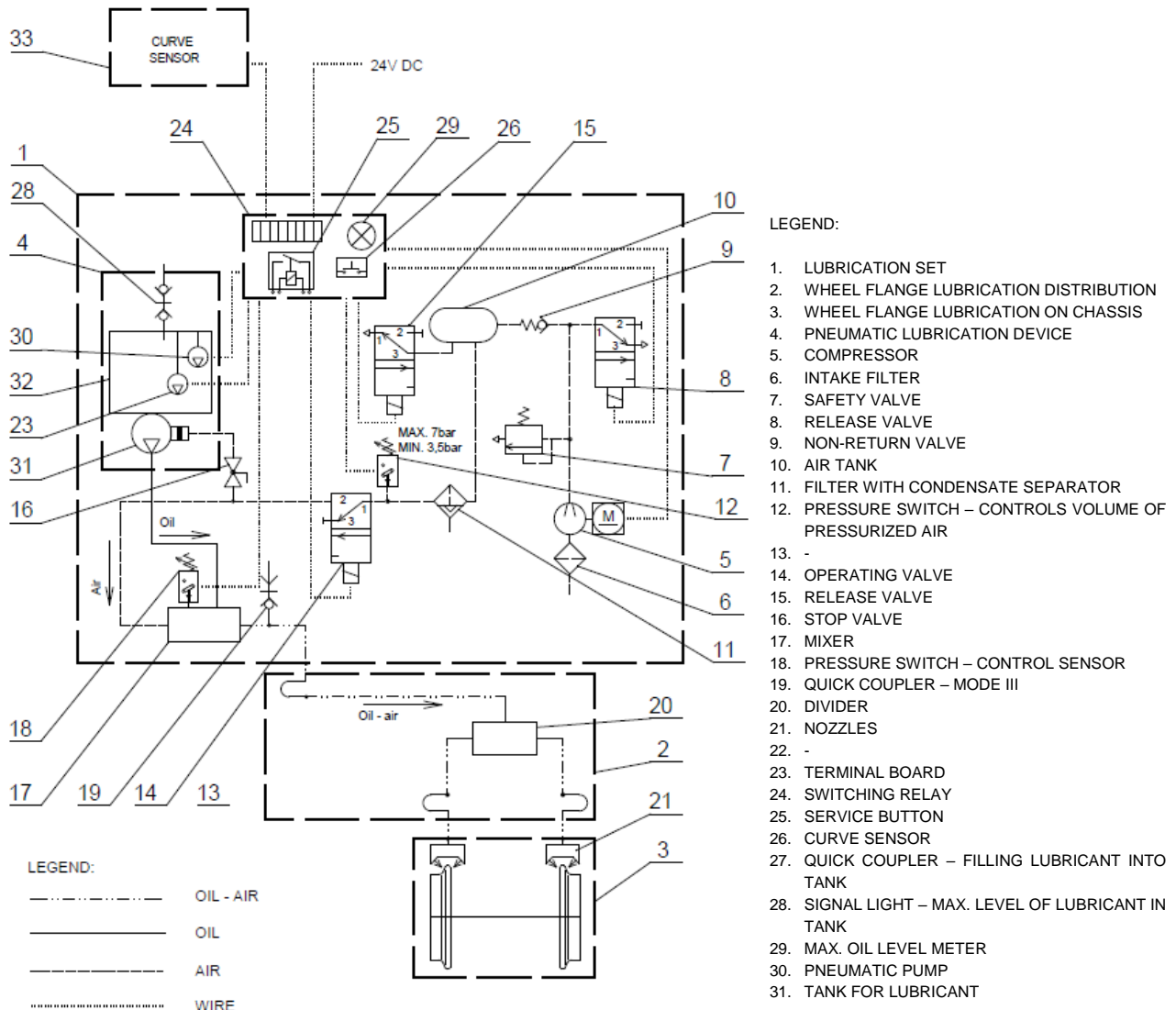


Fig. no. 3 Hydraulic-pneumatic diagram OK-01

## 9 INSTALLATION AND PLACING INTO OPERATION

The installation of the wheel flange lubrication system in the vehicle must be carried out professionally with adherence to safety rules. The Client is liable for proper installation of the wheel flange lubrication system in the rail vehicle.

The lubrication set (1) for wheel flange lubrication is located on the tram chassis. It is installed in a vertical position using four M10 screws. The lubricant mixture output from the lubrication set with the divider (20) is connected using DN8 hose, which is part of the lubrication on the chassis (3).

Modification of indicated specifications and design reserved



The divider (20) installation is done by attaching two M6 screws to a console on the chassis.

Nozzles (21), which are part of the wheel flange lubrication system on the chassis (3), are attached to a holder located in front of the wheel in the direction of travel, so that the lubricant mixture only drops onto the sides of the flanges. It is not allowed for the mixture to drop into the travel line of the wheel. Nozzle adjustment (21) is done according to drawing Fig. no. 5 Adjustment of nozzles on chassis.

The bend radius of the DN4 hose may not be smaller than 60 mm.

The bend radius of the DN8 hose may not be smaller than 120 mm.

Bend sensor (27) must be attached in a horizontal position using two M4 screws at the front of the vehicle.

The client must connect the lubrication system to a power supply according to the drawing, see Fig. no. 4 Wiring diagram OK-01 using a conductor with a minimum diameter of 1 mm – compliant to standard ČSN EN 50343 Art. 4.5.

## 10 WIRING DIAGRAM, ELECTRICAL CONNECTION

Electrical connections can only be done by a qualified person. Electrical installations and cables must be compliant to applicable regulations and standards. The client must connect the lubrication system to a power supply in compliance with Fig. no. 4 Wiring diagram OK-01 using a conductor with a minimum diameter of 1 mm<sup>2</sup> – compliant to standard ČSN EN 50343 Art. 4.5.

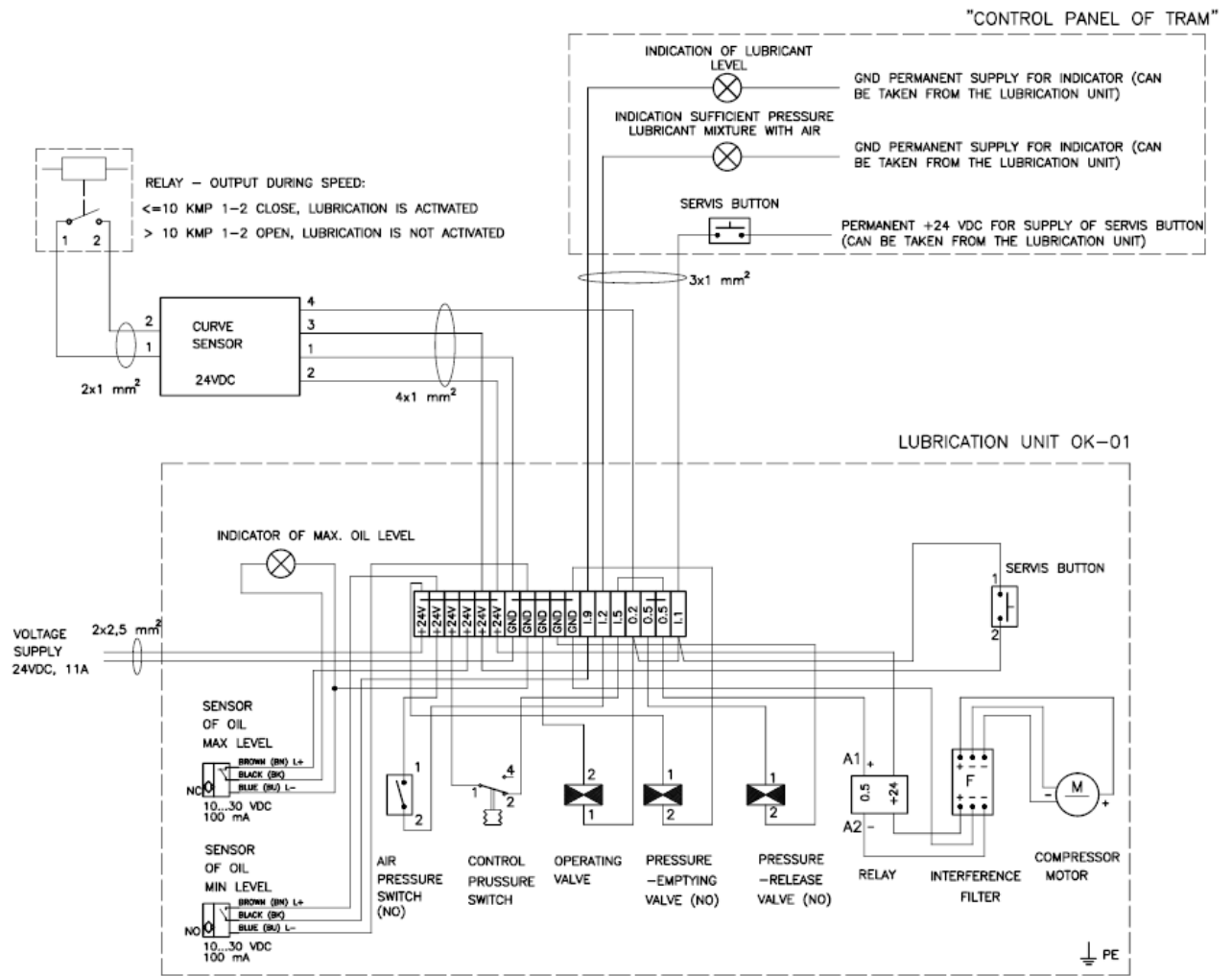


Fig. no. 4 Wiring diagram OK-01

Modification of indicated specifications and design reserved

## 11 ADJUSTMENT OF WORKING PARAMETERS

### 11.1 NOZZLE ADJUSTMENT

Nozzles must be adjusted compliant to Fig. no. 5 Adjustment of nozzles on chassis.

The bend detection sensitivity of the bend sensor (27) is pre-set from the factory. If the pre-set mode does not comply with the nature of the line, it is possible to change the sensitivity of the sensor according to Annexe No. 1: Instruction manual for bend sensor SO-01.

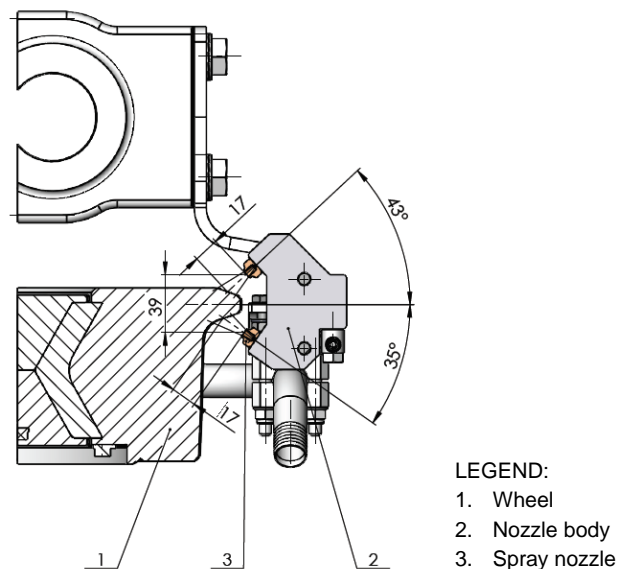


Fig. no. 5 Adjustment of nozzles on chassis

## 12 MAINTENANCE AND INSPECTION

Control and maintenance of the wheel flange lubrication system in regular operation is necessary for faultless and reliable operation on vehicle. All connections of the pressure air distribution system and the nozzle adjustment are checked in a fourth month period.

Maintenance frequency of wheel flange lubrication system complies with vehicle maintenance frequencies:

- DO - daily care - every day before leaving for operation, max. 400 km
- KP - inspection check ..... 10 000 km / 30 days
- SO - medium repair..... 140 000 km / 1 year
- VO - large repair ..... 600 000 km / 5 years
- GO - general repair ..... 2 100 000 km  $\pm$  20 % or 30 years of operation / 16 years

During individual maintenance intervals, the following tasks are performed:

DO:

- visual inspection of mechanical damage to nozzles and air hoses,

Modification of indicated specifications and design reserved

- inspection of lubricant levels and its filling, if necessary

**KP :**

- check the nozzle position adjustment (21) by lubricating by mean of the IV mode - service button (25)
- nozzle adjustment check.
- cleaning the nozzles (21) from lubricant and dust

**SO :**

- visual inspection of electric cables,
- visual inspection of key components (lubrication devices, compressor, air tank, mixer (17), hoses on the chassis (2), divider (20), nozzles (21)
- replacement of compressor filter,
- replacement of filter with drain filter (11),
- function check.

**VO :**

- replacement of the hoses on the chassis (2)\*,
- function check.

**GO :**

- removal of wheel flange lubrication system from the vehicle and subsequent handover to the manufacturer to:
  - o general assessment of operation condition of the wheel flange lubrication system
  - o replacement of the key components \* (nozzles (21), hoses (2), pneumatic pump (30), compressor (5), electromagnetic valves (8, 14, 15), non-return valve (9).
  - o performance of manufacturing item test by manufacturer before reverse installation onto vehicle

\* not mandatory if functional state

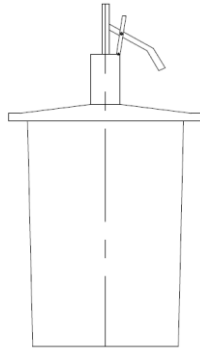
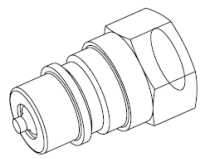
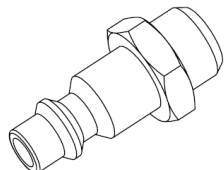
## 12.1 FILLING LUBRICANT

Lubricant is filled into the tank (32) of the lubrication device (4) is done using a quick coupler (28), which is located on the lid of the lubricant tank (32) of the lubrication device (4). A full tank (32) is signalled by a signal light (29), which is located next to the terminal board (24).

The counterpart of the quick coupler is known as: "Quick coupler, plug, ID: 425820041401". Connection dimension, internal G1/4.

## 13 ACCESSORIES

Table No. 1 Accessories

Designation	Preview	Order code
Hand lubricating pump PRP-16-OK		9 45 1005
Quick coupler – plug for filling lubricant (internal G1/4 thread)		425 820 041 401
Quick coupler – plug for blowing circuit (outer G1/4 thread)		425 000 221 014

## 14 WORK SAFETY

Electrical connection of the lubrication pump must be executed professionally and applicable safety precautions must be adhered to. The customer is liable for correct and professional installation.

## 15 STORAGE AND TRANSPORT

When this product is stored, the customer must comply with the ambient conditions corresponding to the set of combinations of classes IE11 according to ČSN EN 60721-3-1 and in case of transportation, the ambient conditions corresponding to the set of combinations of classes IE21 according to ČSN EN 60721-3-2. The customer is responsible for storage of the product after delivery.

The products must be transported in protective containers. The products must be placed on a vehicle so that mechanical loading by stacking, damaging by shocks and weather effects during transportation can be avoided. Loading and unloading must be carried out carefully, avoiding fall and mechanical damage of the shipment.

Modification of indicated specifications and design reserved

## 16 QUALITY WARRANTY

TRIBOTEC guarantees that all products manufactured by TRIBOTEC will be free of material and workmanship defects on the date of sale from TRIBOTEC to the original buyer of these products.

With the exception of any special, extended or limited warranty published by TRIBOTEC, any product confirmed by TRIBOTEC as defective will be repaired or replaced by TRIBOTEC for a period of six (6) months from the date of sale.

This warranty is only valid in the event that the products are installed, operated and maintained in compliance with the written instructions and requirements contained in this document.

This warranty does not cover and TRIBOTEC will not be liable for product's normal wear and tear. The company will not be liable for defects on the product, its damage or wear and tear caused by the following:

1. faulty installation (unless realized directly by TRIBOTEC)
2. misapplication, i.e. use and operation under non-specified operating conditions
3. usage for other than recommended purpose
4. use of an unsuitable lubricant, use of a contaminated or a degraded lubricant
5. abrasion
6. pollutants or fragments
7. corrosion due to installation in a non-recommended work environment
8. Inadequate or improper maintenance
9. damage due to negligence, accident or intentional damage
10. using spare parts not supplied by TRIBOTEC
11. additional installation of parts and components not supplied or not approved by the TRIBOTEC
12. incompatibility of the TRIBOTEC products with the equipment, accessories or materials that TRIBOTEC has not supplied, or improper design, manufacture, installation or maintenance
13. unsuitable storage of the product before its installation and commissioning or storage in a contradiction with specified storage regulations.

TRIBOTEC covers the items sold by TRIBOTEC, whether as part of the product or separately, but not manufactured by TRIBOTEC (such as electric motor, switches, relays, pressure gauges, etc.) with the guarantee period covering the complete product at its expense in full, except the cases TRIBOTEC advised the customer of in this document or in the purchase contract. In such cases, TRIBOTEC will provide the buyer with reasonable co-operation in submitting complaints regarding the components or parts in question to the manufacturer.

THIS WARRANTY IS THE EXCLUSIVE WARRANTY AND REPLACES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

TRIBOTEC will not be responsible for indirect, incidental damages and losses or consequential damages and losses caused by Force Majeure, resulting from the fact that TRIBOTEC has supplied the products.

Modification of indicated specifications and design reserved

## 17 POSSIBLE FAULTS AND THEIR ELIMINATION

The table below indicates possible failures, their causes and method of remedy.

Table No. 2 Possible faults and their elimination

FAULT	LIKELY CAUSE	REPAIR POSSIBILITIES
<b>The device is connected to the electrical system of the tram, but does not respond</b>	Circuit-breaker triggered	Switch on circuit-breaker
<b>Lubricant is not supplied under wheel</b>	Not enough lubricant in tank caused by insufficient DT.	Fill lubricant into the tank.
	A different lubricant than prescribed has been used (an incompatible lubricant with the prescribed one, lubricant not suitable for lubricating wheel flanges).	Remove lubrication cabinet from the vehicle, completely clean tank from lubricant, fill tank with prescribed lubricant. Start and run mode III until the lubrication system, mixing device, divider, nozzles and distribution pipelines are free from the incompatible lubricant.
<b>Lubricant is not released under wheel after extended down-time of the vehicle.</b>	Mode III tasks were not undertaken before vehicle down-time. Lubricant solidified in distribution system during down-time of the vehicle.	Remove divider and nozzles from vehicle, completely clean. Check condition of lubricant in tank and replace if needed. Install back into vehicle and start and run mode II for the necessary time, until functionality is restored.
<b>Mechanical damage to nozzles and nozzle holders</b>	Physical obstacle on railway track.	Replace damaged nozzles and nozzle holders.
<b>Damage to conductors or connectors</b>	Mechanical damage.	Repair and test power supply.
<b>Pressure air supply distribution broken.</b>	Mechanical damage.	Repair and test the pressure air distribution.

Modification of indicated specifications and design reserved