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# FLANGE LUBRICATION SYSTEM CATALOG

Friction Management Product

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## FLANGE LUBRICATION SYSTEM

The system is engineered to extend wheel life, reduce fuel consumption, and enhance driving comfort. By precisely applying the correct amount of lubricant at the optimal location and time, it ensures efficient operation and minimizes waste. This advanced technology not only lowers operational costs but also contributes to more comfortable rides. The lubrication system is activated either by processing data received from sensors—such as tilt, speed, tank level, and temperature—through its built-in algorithm, or manually via the button on the driver panel. The pneumatic air-line is opened by sending the command. In this way, the pneumatically driven pump system starts oil transfer. The oil and air mixture passes through the scaling and guiding system and the distributor system with steel pipes and into the nozzle; from here, it is sprayed into the railway wheel flange.

"EN 61373 SHOCK AND VIBRATION TEST CERTIFICATE"

"EN 50155 EMC TEST CERTIFICATE"

"DESIGNED AND MANUFACTURED UNDER IRIS (ISO 22163) MANAGEMENT  
AND WELDED ACCORDANCE WITH EN 15085"



## SCALING AND GUIDANCE SYSTEM

Upon activation of the pneumatic valve in the control system, the pressure from the regulator is directed to the scaled and guided air system. This section divides the air into two, moving towards the pneumatic-driven pump and the guidance port. The driven pump, through the dosage adjustment rod, precisely scales the desired amount of oil and directs it to the guidance port. The oil arriving at the guidance port combines with air and is directed towards the distribution system.

Parameter	Value
Lubrication Flow Range	0,02 - 0,05 cm <sup>3</sup> / Spray (Adjustable)
Oil Type	NLGI 000
Operating Air Pressure	4 - 10 bar
Operating Temperature Range	-40°C to +70°
Pump Operating Method	Pneumatic - Spring return
Ingress Protection Rating	IP 67
Compressed Air Quality	ISO 8573 / Conditioned Dry Air

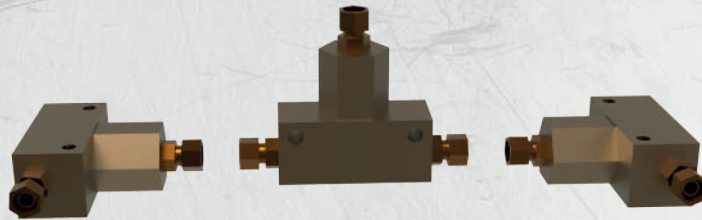


## OIL TANK

The flange lubrication system incorporates one of the crucial elements: to prevent the used oil from coming into contact with any foreign substances. The oil tank is designed and manufactured to be completely leak-proof to ensure the oil remains isolated from the external environment. Connections of accessories, such as the filling cap, filling jack, sensor linkages, observation glass, etc., are entirely isolated against external factors. The oil undergoes precise filtration during the filling process, ensuring its continuous cleanliness and preventing blockages in the system. When designing the oil tank, attention is paid to the following main points of project requirements.

- Ensure complete utilization of the oil within the tank.
- Eliminate dead zones within the tank, preventing accumulations and residues.
- Prefer materials suitable for environmental conditions, such as stainless steel, aluminum, or plastic.
- The geometric limits of the vehicle are taken into account.
- Facilitate easy and fast oil filling.

Parameter	Value
Mounting Position	Rail Vehicle Body
Mounting Method	Bolted
Material	AISI 304 / AL 5083 / Composite
Tank Volume	5 to 30 Liters
Ingress Protection Rating	IP67
Filling Port Types	Top Cover / Filling Jack
Grounding Type	Screw Grounding
Level Sensor	Optional
Level Dipstick	Optional
Level Indicator Glass	Optional



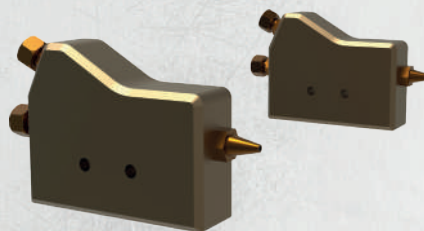
## DISTRIBUTION SYSTEM

The distribution system is used to homogeneously mix and precisely separate the oil-air mixture from the scaling and guiding system, specifically for the application to railway wheels. This system ensures a balanced application of the oil-air mixture to each wheel. The homogeneous and balanced distribution is achieved in two stages according to project requirements:

**Primary Distributor:** This is where the oil-air mixture from the scaling and guiding system is homogeneously divided into two. The separated mixture is conveyed to the nozzle or, if necessary, to the secondary mixer.

**Secondary Distributor:** When needed, the secondary mixer homogeneously separates the oil-air mixture from the primary mixer, directing it to two different nozzles on the railway wheels.

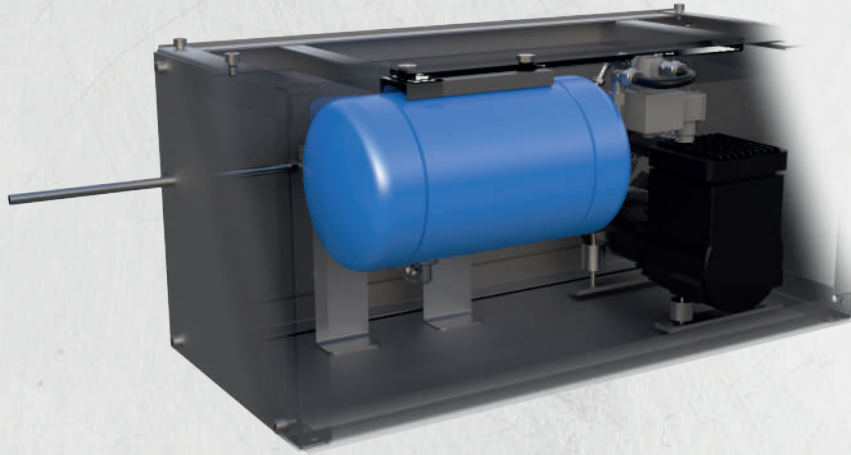
Parameter	Values
Material	AISI 304 / CuSn10 / CuZnAl
Mounting Position	Rail Vehicle Body
Mounting Method	Bolted
Ingress Protection Rating	IP 67
Connection Pipes	Steel Pipe / EN 10305-4



## NOZZLE

A nozzle is utilized to apply the oil-air mixture from the distributors to the railway wheel flange at a specific angle and quantity. Specially designed brackets provide both positional stability and easy maintenance. The nozzle outlet is positioned relative to the wheel center axis: 30° for bottom applications, 45° for top applications, and 45° relative to the wheel side surface. A precision-machined nozzle tip is used to lubricate only the designated effective friction area of the wheel flange. Adding a heating system to the nozzle ensures uninterrupted service in all climate and environmental conditions. The heating system maintains every nozzle point at the desired temperature by emitting heat along the entire length of the heating spray opening. After lubrication, an air-cleaning operation removes residual oil from the nozzle.

Parameter	Value
Material	AISI 304 / CuSn10 / CuZnAl
Mounting Position	Rail Vehicle Body
Mounting Method	Bolted
Ingress Protection Rating	IP 67
Oil Outlet Diameter	2 mm
Connection Pipes	Steel Pipe / EN 10305-4
Heating Type	Cartridge Heater
Heating Power	30 ... 100 Watt
Heating Operating Voltage	12 / 24 / 48 / 72 / 80 / 110 V DC



## PNEUMATIC SYSTEM

The lubrication system obtains the required compressed air for its operation either from the vehicle's central compressor or from a specially designed pneumatic supply unit for the lubrication system. Compressed air quality is vital for the maintenance and lifespan of sub-systems. Therefore, maintaining air quality at specified levels is crucial. The compressed air from the compressor is adjusted to suitable operating values, and the desired air quality is guaranteed using equipment such as a conditioner, filter, regulator, etc.

In our developed pneumatic system, we utilize proven equipment from reputable manufacturers in the industry (such as Parker, Bosch, CKD, Festo, SMC, etc.). This ensures:

- Low maintenance frequency and cost,
- Long operational life,
- Low energy consumption,
- Efficient system operation with reduced noise pollution.

Parameter	Value
Mounting Position	Rail Vehicle Body
Mounting Method	Bolted
Ingress Protection Rating	IP 54
Supply Pressure	10 bar
Noise Level	70 dB
Output Pressure	6 bar
Operating Voltage	12/24/48/72/80/110 V DC
Operating Temperature	-40 to +70 °C
Air Tank	10 liters
Filter Precision	1 to 5 µm
Conditioner Ratio	1:9



## CONTROL SYSTEM

The fundamental factors in lubrication systems determine lubrication's time, location, and quantity. Our developed control system consists of a tilt sensor, tank level sensor, temperature sensor, speed sensor, circuit board, and a touchscreen display. The control system processes the data received from sensors through algorithms, ensuring that lubrication is performed at the correct position, time, and quantity. The tilt sensor identifies curved areas, the speed sensor provides speed and distance information, the temperature sensor measures air temperature and humidity, and the GPS determines the location for the most effective lubrication.

Several algorithms are created based on project and user requirements. These algorithms are selected via the touchscreen display to determine lubrication parameters. Below are a few example parameters:

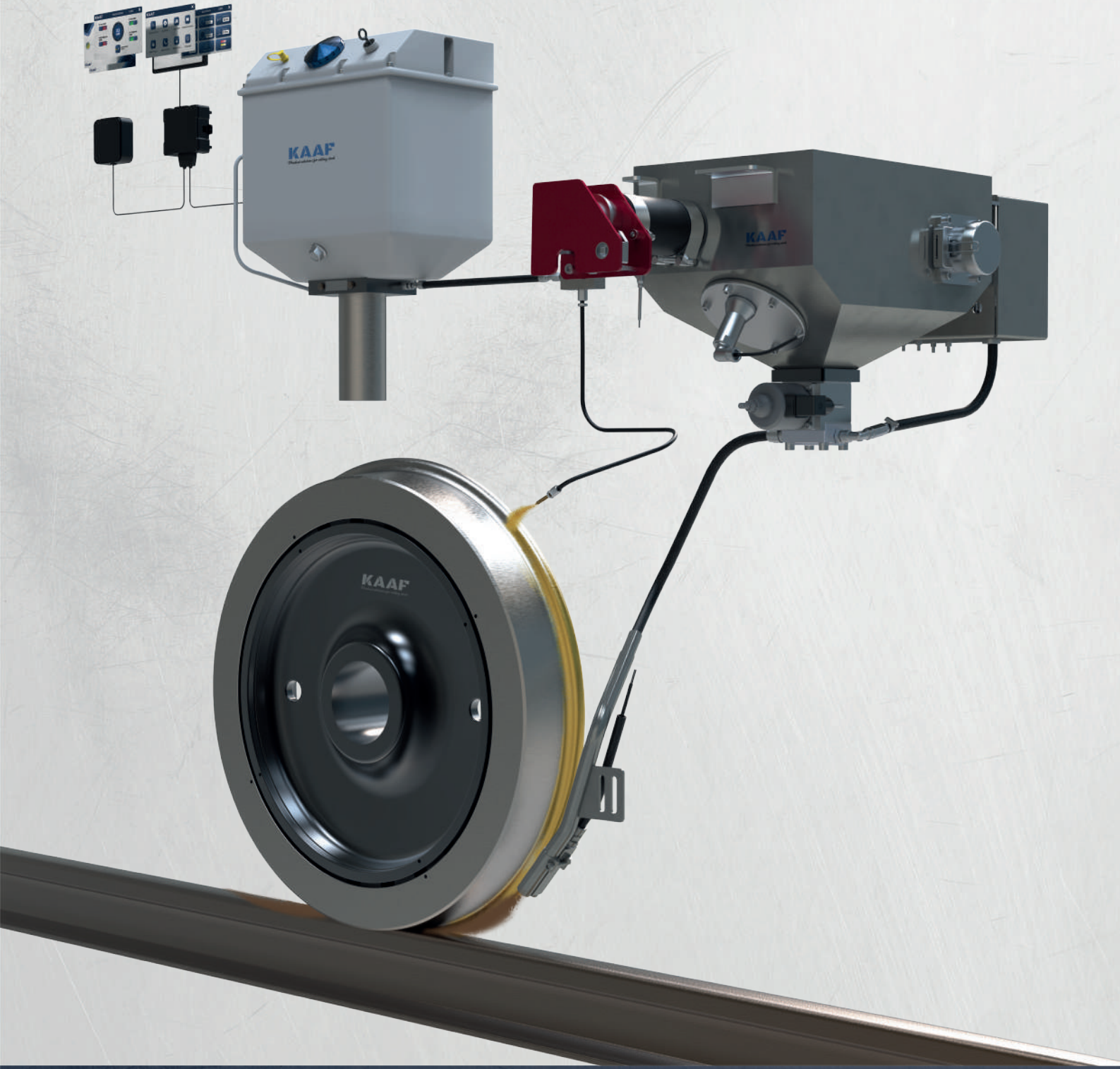
Nu	Lubrication Algorithm Names	Inputs
S1	Based on Tilt and Speed	Tilt Sensor / Speed Sensor
S2	Based on Tilt and Distance	Tilt Sensor / Speed Sensor
S3	Based on Distance and Time	Speed Sensor
S4	Based on Tilt, Speed, and Distance	Tilt Sensor / Speed Sensor
S5	Based on Tilt, Distance, and Location	Tilt Sensor / Speed Sensor / GPS
S6	Based on Tilt, Time, Speed, and Location	Tilt Sensor / Speed Sensor / GPS
S7	...	...

The system is equipped with software controls to prevent its operation contrary to occupational health and safety, reduce energy consumption, and prevent unnecessary oil consumption. The software manages some situations where lubrication should not be performed to achieve these goals.



- If the railway vehicle is traveling at speeds below 10 km/h (speed value is adjustable), the lubrication system will not operate.
- If the oil in the tank is depleted, the lubrication system will not operate.
- If the air pressure is below 6 bar, the lubrication system will not operate.
- If manual operation is active, the lubrication system will not operate.
- If the railway vehicle is stationary, the pneumatic system and nozzle heater will not operate.

Parameters	Values
Operating Voltage	12 / 24 / 48 / 72 / 80 / 110 V DC
Operating Temperature Range	-40°C to +70 °C
Touchscreen	4.3" / IP 67
Sensor - Control Unit Enclosure	Aluminum Casting / IP 67
Programming	PLC / Electronic card
Oil Level Sensor	Optional
Speed Sensor	Speed values are obtained from the vehicle. Additionally, it is offered as an option.
Tilt Sensor	Optional
Gyroscope	Optional
Vibration Sensor	Optional
Temperature Sensor	Temperature values are obtained from the vehicle. Additionally, it is offered as an option.
Standard	EN 50155



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