De-icing system PROFIL 1500V
System description and features

System description

The de-icing system PROFIL 1500V was developed for the treatment of overhead contact wires against ice formation and consists of three modules. The system can be installed in various vehicles (e.g. a maintenance vehicle, a freight wagon, a container on a railway wagon, etc.) with a pantograph that holds the insulated spray module.
The compact "pump and control unit" is installed directly in the vehicle. The device is connected via the supply line to the "spray module" mounted on the pantograph. The "spray module" consists of a spray bar with 7 nozzles and a position sensor which detects the exact position of the contact wire. The exact position is transmitted to the controller which, depending on it, activates the spray nozzle with the shortest distance to the contact wire. The spraying agent is thus uniformly and economically on the contact wire. The system covers a spray area of up to +/- 40 cm from the middle of the track.
The device can be easily operated from the driver's cockpit via the "safety radio remote control".
Kummler+Matter provides the customer with expert support during the installation of the system.

The three modules of the system

Module	Name	Function
1	**Pump and control unit**	Dimensions (LxDxH): 750mm x 600mm x 1000mm Tank volume of approx. 135 liters System pressure of up to 10 bar by a diaphragm pump Continuous pressure control by sensor technology Adjustable spray pressure for output regulation Filtering of the liquid through a stainless steel filter Continuous tank level control by sensor technology Possibility to suck from an external container PLC switching and control unit for operation and settings Operation with mains voltage and/or battery Flushing the system with water Cleaning of the nozzles by blowing out with compressed air
2	**Radio Remote Control**	Safety radio remote control Average range up to 100 m Battery life up to 10 hours Sealing according to IP65 Start/stop of the spray function Checking the system pressure Possibility to adjust the pump pressure Tank level control
3	**Spray Unit**	Installation on new or existing pantograph Catenary wire detection by sensor technology Contactless impregnating of the overhead contact wire Spraying the liquid with full cone nozzles Individual nozzle control

The various modules with their respective components are listed below:

1 Pump and Control Unit

1	Diaphragm pump with pressure control 96 W / 24 V DC
1	Tank with a volume of approx. 135 liters for de-icing fluid
1	Connection for suction from an external tank
1	Pressure relief valve (10 bar)
1	Pressure sensor 24 V DC
1	Ultrasonic sensor for level detection 24 V DC
3	Solenoid valves 24 V DC
1	Washable filter (mesh 50)
var.	Hose lines and fittings
1	Connection piece for compressed air for blowing out
1	Mains plug 230 V / 50 Hz or 120 V / 60 Hz
1	optional: Battery 24 V / 50 Ah (or 24 V / 100 Ah)
1	optional: Remote maintenance module
1	PLC switching and control unit 230 V AC / 24 V DC
1	Earthing connection

2 Radio Remote Control

1	Safety radio remote control
1	Charging station for radio remote control

3 Spray Unit

1	Spray bar
1	Bracket for the spray bar
7	Full cone nozzles
7	Solenoid valves 24 V DC
1	Control voltage distributor
var.	Hose lines and fittings
1	Ultrasonic sensor for overhead contact wire detection
1	Holder for sensor for overhead contact wire detection
1	Spiral hose
1	Cable and connections for spraying unit

Principle diagram of the de-icing system PROFIL 1500V

The functional principle of the de-icing system PROFIL 1500V is shown schematically in the following figure. In standard operation, the pump sucks the de-icing fluid from the integrated tank. The valve control also makes it possible to suck in liquid from an external tank, e.g. for spraying, flushing or for refilling the tank via pump. The de-icing fluid then flows through the filter unit into the pump. From the pump, the de-icing fluid is conveyed to the spray bar at the set pressure (max. 10 bar). Meanwhile, the wire position sensor continuously determines the position of the contact wire. On the basis of this information, the valves of the nozzles are controlled in such a way that only the nozzle closest to the contact wire (in borderline cases also two nozzles) sprays liquid. Thus, the contact wire is economically de-iced or impregnated with de-icing fluid.

At an overpressure (> 10 bar) in the system, the overpressure valve opens and transports the liquid directly back into the tank. Likewise, when the shut-off valve is open, the medium is conveyed directly into the tank.

For the power supply the device is equipped with a 230 V or 120 V mains connection. In addition, it is possible to operate the device autonomously via a 24 V Li-Ion battery.

The device can be operated and calibrated via the integrated operating display. All functions are available to the user on that display. Furthermore, the device contains an additional radio remote control, which serves the driver to control the device from the driving cab. The radio remote control only provides the driver with for him important functions, such as starting and stopping the device, EMERGENCY STOP, setting whether more or less pressure (= spread rate) is required, as well as a display with operating values and fault messages.