



AUTOMATIC TRAIN PROTECTION SYSTEM (ATP) SOP-2P TYPE

- Subsystem for failsafe operation of metro trains
- Operates within LZA system (ATC)
- Automatic train speed limitation
- High reliability
- Compatible with different types of line signalling and station interlocking equipment
- Suitable for cooperation with Automatic Train Operation (ATO) System – ACBM3



General Description

The SOP-2P Automatic Train Protection subsystem is designed for failsafe operation of metro trains. Its basic task is an automatic limitation of the train speed based on traffic situation and reactions of the driver.

Automatic speed limitation is carried out based on data regarding the train positions on line, state of signals, position of points, altitude valves, permanent speed limitations at individual line sections and the state of the emergency stopping pushbuttons.



SOP-2P stationary part

Function of unmanned turn of a train is implemented in LZA system. This function makes it possible to apply turn of train set without presence of a train driver in safety way.

SOP-2P consists of the stationary and the mobile part.

Basic Technical Description

Stationary part of the SOP-2P subsystem:

- The stationary part comprises the station computer system located in the interlocking room and the transmission system formed by transmitting loops installed between rails. These circuits function as antennas transmitting data to the mobile part of the system.
- The system of station computers works according to the principle 2oo2.
- In case of a failure or a malfunctioning of one of the station computers the system guarantees that the operation of the stationary equipment is not interrupted and the failsafe traffic control continues.
- The equipment of the stationary part also tests the system failsafe operation.

Mobile part of the SOP-2P subsystem:

- Mobile part is installed on train sets and provides data reception, their evaluation and generation of signals for drive, braking set and other train equipment.
- A single train set has two sets of the equipment (for each locomotive).
- The mobile equipment can work in one of the five operation modes selected by the driver.
- The equipment complies with stipulations of the appropriate standards, valid in the Czech Republic and the EU.



Monitor systems SOP-2P



Basic Technical Parameters

Climatic resistance of the mobile part	-25 to +70 °C	
Climatic resistance of the stationary part	-5 to +35 °C	
Climatic resistance of the stationary part (in wayside environment)	-40 to +40 °C	
Climatic resistance of the stationary part (in protection cabinets)	-25 to +70 °C	
Carrier frequency	log 0 – 37,2 kHz	
	log 1 – 36,0 kHz	
Transmission speed	1200 bit/sec.	
Hamming distance	H = 4	
Check cycle	3 telegrams	
Number of transmission channels	1 (track to train)	
Safe speed limit	30 km/h	
Stationary SOP-2P	Transmitter power supply	230 V, 50 Hz
	Transmitter power input	24 W
	Dimensions of the station computer cabinet	600 × 600 × 2000 mm
	Current in the transmitting loop	80–150 mA
	Length of the transmitting loop including cable	1200 m (max. 2300 m)
	Length of telegram	47 bits
Mobile SOP-2P	Power supply (battery in the train)	24 V DC, -30 to +25 %
	Receiver power input	60 W
	Dimensions	560 × 330 × 650 mm



Mobile part of SOP-2P



Sensing units of SOP-2P mobile part