

Automatic Train Protection System MIREL VZ1

Type **VZ1**

MIREL VZ1 automatic train protection (ATP) is a mobile component based train protection system. It is constructed for use on rail vehicles on track sections and stations with integrated ATP system components with linear transmission as well as on rails and stations without ATP. MIREL VZ1 ATP is an open system, which may be supplemented by another system for transmitting route information to the vehicle in the future.

MIREL VZ1 ATP also secures three basic functionalities: verification, information and safety interlocks. It is designed to monitor driver vigilance, transmit signals on the signal repeater as well as monitor maximum speed with respect to the maximum design speed of the rail vehicle, the defined train speed and received signals. Other functions are monitored to check for a match between the selected direction and the actually travelled direction as well as the ability to remotely control a rail vehicle.

MIREL VZ1 ATP includes a central unit, signal repeaters located in the driver's cab and horns. A serial data connection links the central unit to the signal repeaters. MIREL VZ1 ATP can be operated on in one or two driver's cabs in a single rail vehicle. It can also be configured for use on rail locomotives that allow the transmission of signals to dispatching stations and for locomotives that are not operating on coded tracks. The MIREL VZ1 ATP can be operated on rail locomotives on any track and on control wagons.

MIREL VZ1 ATP is powered from the batteries of the rail locomotive. MIREL VZ1 ATP equipment configuration is selected based on the voltage supplied by these batteries. Operation and control of the automatic train protection system is performed exclusively from the driver's cab via an installed signal repeater and other equipment including the vigilance button and other control elements installed on the driver's dash. No interference into the main machinery of the rail vehicle is necessary in order to service the MIREL VZ1 ATP.

The MIREL VZ1 ATP is a digital electrical system constructed on the basis of the most modern electronic components and is designed as fail-safe equipment. A dual processor central unit, a special set of supervisory circuits, two channel signal transmission, four channel speed measurement and measurement of distance passed all serve to ensure safe operations. The use of a component structured central unit meets the most demanding criteria for reliability and endurance.

Range of application use MIREL VZ1 ATP is as follows:

CZ	used in Czech Republic, infrastructure LS
H	used in Hungary, EVM infrastructure, speed up to 120 km/h
H160	used in Hungary, EVM infrastructure, speed up to 160 km/h
PL	used in Poland, infrastructure SHP
SK	used in Slovakia, infrastructure LS
ETCS	used in cooperation with the ETCS as the STM module

Illustrative picture



Modifications

Designation	Nominal supply voltage[VDC]	Central unit	Signal repeater	Horn	Software version	Receiving from infrastructure	Range of application
VZ1.0.204A	24	VZ1ZJ.0.204CHS	2x VZ1NO.0.2C04	2x VZ1HP.PD.201	04	yes	SK/CZ/H
VZ1.0.204AP	24	VZ1ZJ.0.204CHS	2x VZ1NO.P.2C04	2x VZ1HP.FD.201	04	yes	SK/CZ/H
VZ1.0.204B	24	VZ1ZJ.0.204CS	2x VZ1NO.0.2C04	-	04	yes	SK/CZ
VZ1.0.204E	24	VZ1ZJ.0.204CS	2x VZ1NO.0.2C04	2x VZ1HP.PD.201	04	yes	SK/CZ
VZ1.0.204F	24	VZ1ZJ.0.204CPS	2x VZ1NO.0.2C04	2x VZ1HP.PD.201	04	yes	SK/CZ/PL
VZ1.0.204G	24	VZ1ZJ.0.204CS	1x VZ1NO.0.2C04	1x VZ1HP.PD.201	04	yes	SK/CZ
VZ1.0.204H	24	VZ1ZJ.0.204CHS	2x VZ1NO.0.2C04	1x VZ1HP.PD.201	04	yes	SK/CZ/H
VZ1.0.204I	24	VZ1ZJ.0.204CH6S	2x VZ1NO.0.2C04	2x VZ1HP.PD.201	04	yes	SK/CZ/H160
VZ1.0.204J	24	VZ1ZJ.0.204CH6S	1x VZ1NO.0.2C04	1x VZ1HP.PD.201	04	yes	SK/CZ/H160
VZ1.0.204K	24	VZ1ZJ.0.204CHPS	2x VZ1NO.0.2C04	2x VZ1HP.PD.201H	04	yes	SK/CZ/H/PL
VZ1.0.204L	24	VZ1ZJ.0.204CHS	2x VZ1NO.0.2C04	2x VZ1HP.PD.201H	04	yes	SK/CZ/H
VZ1.0.204LP	24	VZ1ZJ.0.204CHS	2x VZ1NO.P.2C04	2x VZ1HP.FD.201H	04	yes	SK/CZ/H
VZ1.0.204M	24	VZ1ZJ.0.204CS	2x VZ1NO.0.2C04	2x VZ1HP.PD.201H	04	yes	SK/CZ
VZ1.0.204P	24	VZ1ZJ.0.204CES	1x VZ1NO.0.2C04	1x VZ1HP.PD.201	04	yes	SK/CZ/ETCS
VZ1.0.204Q	24	VZ1ZJ.0.204CH6S	2x VZ1NO.0.2C04	2x VZ1HP.PD.201H	04	yes	SK/CZ/H160
VZ1.0.204R	24	VZ1ZJ.0.204CEH6S	2x VZ1NO.0.2C04	2x VZ1HP.PD.201	04	yes	SK/CZ/H160/ETCS
VZ1.0.204S	24	VZ1ZJ.0.204H6	2x VZ1NO.0.2C04	2x VZ1HP.PD.201	04	yes	H160
VZ1.0.204S9	24	VZ1ZJ.0.204CHS	2x VZ1NO.0.2C04	-	04	yes	SK/CZ/H
VZ1.0.204T	24	VZ1ZJ.0.204CHS	1x VZ1NO.0.2C04	1x VZ1HP.PD.201	04	yes	SK/CZ/H
VZ1.0.204UP	24	VZ1ZJ.0.204CPS	2x VZ1NO.P.2C04	2x VZ1HP.FD.201H	04	yes	SK/CZ/PL

Designation	Nominal supply voltage[VDC]	Central unit	Signal repeater	Horn	Software version	Receiving from infrastructure	Range of application
VZ1.0.204V	24	VZ1ZJ.0.204CS	1x VZ1NO.0.2C04	1x VZ1HP.PD.201H	04	yes	SK/CZ
VZ1.0.204W	24	VZ1ZJ.0.204EH6	2x VZ1NO.0.2C04	2x VZ1HP.PD.201	04	yes	H160/ETCS
VZ1.0.204Y1	24	VZ1ZJ.0.204CEPS	1x VZ1NO.0.2C04	1x VZ1HP.PD.201H	04	yes	SK/CZ/PL/ETCS
VZ1.0.204Y2P	24	VZ1ZJ.0.204H6	2x VZ1NO.P.2C04	2x VZ1HP.FD.201H	04	yes	H160
VZ1.0.204Y3	24	VZ1ZJ.0.204CES	2x VZ1NO.0.2C04	2x VZ1HP.PD.201H	04	yes	SK/CZ/ETCS
VZ1.0.204Y4	24	VZ1ZJ.0.204CES	1x VZ1NO.0.2C04	1x VZ1HP.PD.201H	04	yes	SK/CZ/ETCS
VZ1.0.204Y5	24	VZ1ZJ.0.204CS	2x VZ1NO.0.2C04	2x VZ1HP.FD.201H	04	yes	SK/CZ
VZ1.0.404A	48	VZ1ZJ.0.404CHS	2x VZ1NO.0.4C04	2x VZ1HP.PD.401	04	yes	SK/CZ/H
VZ1.0.404E	48	VZ1ZJ.0.404CS	2x VZ1NO.0.4C04	2x VZ1HP.PD.401	04	yes	SK/CZ
VZ1.0.404F	48	VZ1ZJ.0.404CPS	2x VZ1NO.0.4C04	2x VZ1HP.PD.401	04	yes	SK/CZ/PL
VZ1.0.404I	48	VZ1ZJ.0.404CH6S	2x VZ1NO.0.4C04	2x VZ1HP.PD.401	04	yes	SK/CZ/H160
VZ1.0.404L	48	VZ1ZJ.0.404CHS	2x VZ1NO.0.4C04	2x VZ1HP.PD.401H	04	yes	SK/CZ/H
VZ1.0.404M	48	VZ1ZJ.0.404CS	2x VZ1NO.0.4C04	2x VZ1HP.PD.401H	04	yes	SK/CZ

Specification

Number	Version	Name
153VZ1	141119	Operating manual
154VZ1	170624	Maintenance manual and diagnostics
257VZ1	110610	Technical conditions for MIREL VZ1 automatic train protection – serial installation
738VZ1	081020	Set of functional requirements for on-board train protection systems and vigilance equipment for MAV RI working on the basis of the assessment of received 75 Hz signals
759VZ1	100622	Technical description of changes to MIREL VZ1 automatic train protection – integration of MAV RI functions

Modifications not recommended for new applications

Designation	Nominal supply voltage [VDC]	Central unit	Signal repeater	Horn	Software version	Receiving from infrastructure	Range of application
VZ1.0.203A	24	VZ1ZJ.0.203CHS	2x VZ1NO.0.2C03	2x VZ1HP.PD.201	03	yes	SK/CZ/H
VZ1.0.203B	24	VZ1ZJ.0.203CS	2x VZ1NO.0.2C03	-	03	yes	SK/CZ
VZ1.0.203C	24	VZ1ZJ.0.203H	2x VZ1NO.0.203	-	03	yes	H
VZ1.0.203D	24	VZ1ZJ.0.203CS	2x VZ1NO.0.2C03	2x VZ1HP.P.2	03	yes	SK/CZ
VZ1.0.203E	24	VZ1ZJ.0.203CS	2x VZ1NO.0.2C03	2x VZ1HP.PD.201	03	yes	SK/CZ
VZ1.0.203F	24	VZ1ZJ.0.203CPS	2x VZ1NO.0.2C03	2x VZ1HP.PD.201	03	yes	SK/CZ/PL
VZ1.0.203G	24	VZ1ZJ.0.203CS	1x VZ1NO.0.2C03	1x VZ1HP.PD.201	03	yes	SK/CZ
VZ1.0.203H	24	VZ1ZJ.0.203CHS	2x VZ1NO.0.2C03	1x VZ1HP.PD.201	03	yes	SK/CZ/H
VZ1.0.203I	24	VZ1ZJ.0.203CH6S	2x VZ1NO.0.2C03	2x VZ1HP.PD.201	03	yes	SK/CZ/H160
VZ1.0.203J	24	VZ1ZJ.0.203CH6S	1x VZ1NO.0.2C03	1x VZ1HP.PD.201	03	yes	SK/CZ/H160
VZ1.0.203K	24	VZ1ZJ.0.203CHPS	2x VZ1NO.0.2C03	2x VZ1HP.PD.201H	03	yes	SK/CZ/H/PL
VZ1.0.203L	24	VZ1ZJ.0.203CHS	2x VZ1NO.0.2C03	2x VZ1HP.PD.201H	03	yes	SK/CZ/H
VZ1.0.203M	24	VZ1ZJ.0.203CS	2x VZ1NO.0.2C03	2x VZ1HP.PD.201H	03	yes	SK/CZ
VZ1.0.203N	24	VZ1ZJ.0.2S03CS	2x VZ1NO.S.203	2x VZ1HP.PD.201H	03	no	SK/CZ
VZ1.0.203Q	24	VZ1ZJ.0.203CH6S	2x VZ1NO.0.2C03	2x VZ1HP.PD.201H	03	yes	SK/CZ/H160
VZ1.0.204C	24	VZ1ZJ.0.204H	2x VZ1NO.0.204	-	04	yes	H
VZ1.0.204N	24	VZ1ZJ.0.2S04CS	2x VZ1NO.S.204	2x VZ1HP.PD.201H	04	no	SK/CZ
VZ1.0.403A	48	VZ1ZJ.0.403CHS	2x VZ1NO.0.4C03	2x VZ1HP.PD.401	03	yes	SK/CZ/H
VZ1.0.403D	48	VZ1ZJ.0.403CS	2x VZ1NO.0.4C03	2x VZ1HP.P.4	03	yes	SK/CZ
VZ1.0.403E	48	VZ1ZJ.0.403CS	2x VZ1NO.0.4C03	2x VZ1HP.PD.401	03	yes	SK/CZ
VZ1.0.403F	48	VZ1ZJ.0.403CPS	2x VZ1NO.0.4C03	2x VZ1HP.PD.401	03	yes	SK/CZ/PL
VZ1.0.403I	48	VZ1ZJ.0.403CH6S	2x VZ1NO.0.4C03	2x VZ1HP.PD.401	03	yes	SK/CZ/H160
VZ1.0.403M	48	VZ1ZJ.0.403CS	2x VZ1NO.0.4C03	2x VZ1HP.PD.401H	03	yes	SK/CZ
VZ1.0.203S1	24	VZ1ZJ.0.2S03CS	2x VZ1NO.S.203	2x VZ1HP.0.2P	03	no	SK/CZ
VZ1.0.203S2	24	VZ1ZJ.0.2S03CS	2x VZ1NO.S.203	2x VZ1HP.D.2P01	03	no	SK/CZ
VZ1.0.203S3	24	VZ1ZJ.0.203CS	2x VZ1NO.0.2C03	2x VZ1HP.0.2P	03	yes	SK/CZ
VZ1.0.203S4	24	VZ1ZJ.0.203CS	2x VZ1NO.0.2C03	2x VZ1HP.D.2P01	03	yes	SK/CZ
VZ1.0.203S9	24	VZ1ZJ.0.203CHS	2x VZ1NO.0.2C03	-	03	yes	SK/CZ/H
VZ1.0.203S13	24	VZ1ZJ.0.203CS	1x VZ1NO.0.2C03	1x VZ1HP.P.2	03	yes	SK/CZ
VZ1.0.203S14	24	VZ1ZJ.0.2S03CS	2x VZ1NO.S.203	2x VZ1HP.P.2	03	no	SK/CZ
VZ1.0.203S15	24	VZ1ZJ.0.2S03CS	2x VZ1NO.0.2C03	2x VZ1HP.P.2	03	no	SK/CZ
VZ1.0.203S16	24	VZ1ZJ.0.2S03CS	2x VZ1NO.0.2C03	2x VZ1HP.PD.201	03	no	SK/CZ
VZ1.0.204S3	24	VZ1ZJ.0.204CS	2x VZ1NO.0.2C04	2x VZ1HP.0.2P	04	yes	SK/CZ
VZ1.0.204S4	24	VZ1ZJ.0.204CS	2x VZ1NO.0.2C04	2x VZ1HP.D.2P01	04	yes	SK/CZ
VZ1.0.204S10	24	VZ1ZJ.0.204CES	2x VZ1NO.0.2C04	-	04	yes	SK/CZ/ETCS
VZ1.0.204S11	24	VZ1ZJ.0.204CEHS	2x VZ1NO.0.2C04	-	04	yes	SK/CZ/H/ETCS
VZ1.0.204S12	24	VZ1ZJ.0.204CEH6S	2x VZ1NO.0.2C04	-	04	yes	SK/CZ/H160/ETCS
VZ1.0.403S3	48	VZ1ZJ.0.403CS	2x VZ1NO.0.4C03	2x VZ1HP.0.4P	03	yes	SK/CZ
VZ1.0.403S4	48	VZ1ZJ.0.403CS	2x VZ1NO.0.4C03	2x VZ1HP.D.4P01	03	yes	SK/CZ
VZ1.0.403S5	48	VZ1ZJ.0.403CS	2x VZ1NO.0.4C03	2x VZ1HP.0.4L	03	yes	SK/CZ
VZ1.0.403S6	48	VZ1ZJ.0.403CS	2x VZ1NO.0.4C03	2x VZ1HP.D.4L01	03	yes	SK/CZ
VZ1.0.403S7	48	VZ1ZJ.0.403CHS	2x VZ1NO.0.4C03	2x VZ1HP.D.4L01	03	yes	SK/CZ/H
VZ1.0.403S14	48	VZ1ZJ.0.4S03CS	2x VZ1NO.S.403	2x VZ1HP.P.4	03	no	SK/CZ
VZ1.0.404S3	48	VZ1ZJ.0.404CS	2x VZ1NO.0.4C04	2x VZ1HP.0.4P	04	yes	SK/CZ
VZ1.0.404S4	48	VZ1ZJ.0.404CS	2x VZ1NO.0.4C04	2x VZ1HP.D.4P01	04	yes	SK/CZ

Designation	Nominal supply voltage [VDC]	Central unit	Signal repeater	Horn	Software version	Receiving from infrastructure	Range of application
VZ1.0.404S5	48	VZ1ZJ.0.404CS	2x VZ1NO.0.4C04	2x VZ1HP.0.4L	04	yes	SK/CZ
VZ1.0.404S6	48	VZ1ZJ.0.404CS	2x VZ1NO.0.4C04	2x VZ1HP.D.4L01	04	yes	SK/CZ
VZ1.0.404S7	48	VZ1ZJ.0.404CHS	2x VZ1NO.0.4C04	2x VZ1HP.D.4L01	04	yes	SK/CZ/H
VZ1.0.404S8	48	VZ1ZJ.0.404CEHS	2x VZ1NO.0.4C04	2x VZ1HP.D.4L01	04	yes	SK/CZ/H/ETCS