

# Automatic Train Protection System MIREL VZ1

## Type **VZ1**

Illustrative picture

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.

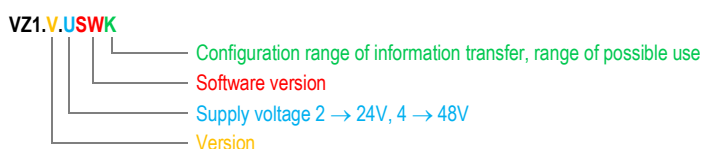
MIREL VZ1 ATP includes a central unit, signal repeaters located in the driver's cab and horns. A serial data connection links the central unit to the signal repeaters. MIREL VZ1 ATP can be operated on in one or two driver's cabs in a single rail vehicle. It can also be configured for use on rail locomotives 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.



### Nomenclature



### Modifications

| Designation | Central unit    | Signal repeater | Horn             | End-Of-Life replacement |
|-------------|-----------------|-----------------|------------------|-------------------------|
| VZ1.0.204A  | VZ1ZJ.0.204CHS  | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201  | -                       |
| VZ1.0.204B  | VZ1ZJ.0.204CS   | 2x VZ1NO.0.2C04 | -                | -                       |
| VZ1.0.204E  | VZ1ZJ.0.204CS   | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201  | -                       |
| VZ1.0.204F  | VZ1ZJ.0.204CPS  | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201  | -                       |
| VZ1.0.204G  | VZ1ZJ.0.204CS   | 1x VZ1NO.0.2C04 | 1x VZ1HP.PD.201  | -                       |
| VZ1.0.204I  | VZ1ZJ.0.204CH6S | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201  | -                       |
| VZ1.0.204J  | VZ1ZJ.0.204CH6S | 1x VZ1NO.0.2C04 | 1x VZ1HP.PD.201  | -                       |
| VZ1.0.204K  | VZ1ZJ.0.204CHPS | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201H | -                       |
| VZ1.0.204L  | VZ1ZJ.0.204CHS  | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201H | -                       |
| VZ1.0.204LP | VZ1ZJ.0.204CHS  | 2x VZ1NO.P.2C04 | 2x VZ1HP.FD.201H | -                       |
| VZ1.0.204M  | VZ1ZJ.0.204CS   | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201H | -                       |

| Designation  | Central unit      | Signal repeater | Horn             | End-Of-Life replacement |
|--------------|-------------------|-----------------|------------------|-------------------------|
| VZ1.0.204MP  | VZ1ZJ.0.204CS     | 2x VZ1NO.P.2C04 | 2x VZ1HP.FD.201H | -                       |
| VZ1.0.204P   | VZ1ZJ.0.204CES    | 1x VZ1NO.0.2C04 | 1x VZ1HP.PD.201  | -                       |
| VZ1.0.204PP  | VZ1ZJ.0.204CES    | 1x VZ1NO.P.2C04 | 1x VZ1HP.FD.201H | -                       |
| VZ1.0.204Q   | VZ1ZJ.0.204CH6S   | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201H | -                       |
| VZ1.0.204R   | VZ1ZJ.0.204CEH6S  | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201  | VZ1.1.204A              |
| VZ1.0.204S9  | VZ1ZJ.0.204CHS    | 2x VZ1NO.0.2C04 | -                | -                       |
| VZ1.0.204T   | VZ1ZJ.0.204CHS    | 1x VZ1NO.0.2C04 | 1x VZ1HP.PD.201  | -                       |
| VZ1.0.204UP  | VZ1ZJ.0.204CPS    | 2x VZ1NO.P.2C04 | 2x VZ1HP.FD.201H | -                       |
| VZ1.0.204V   | VZ1ZJ.0.204CS     | 1x VZ1NO.0.2C04 | 1x VZ1HP.PD.201H | -                       |
| VZ1.0.204VM  | VZ1ZJ.0.204CS     | 1x VZ1NO.M.2C04 | 1x VZ1HP.MD.201H | -                       |
| VZ1.0.204W   | VZ1ZJ.0.204EH6    | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201  | -                       |
| VZ1.0.204Y2P | VZ1ZJ.0.204H6     | 2x VZ1NO.P.2C04 | 2x VZ1HP.FD.201H | -                       |
| VZ1.0.204Y3  | VZ1ZJ.0.204CES    | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201H | -                       |
| VZ1.0.204Y4  | VZ1ZJ.0.204CES    | 1x VZ1NO.0.2C04 | 1x VZ1HP.PD.201H | -                       |
| VZ1.0.204Y4M | VZ1ZJ.0.204CES    | 1x VZ1NO.M.2C04 | 1x VZ1HP.MD.201H | -                       |
| VZ1.0.204Y5  | VZ1ZJ.0.204CS     | 2x VZ1NO.0.2C04 | 2x VZ1HP.FD.201H | -                       |
| VZ1.0.204Y8  | VZ1ZJ.0.204CEHS   | 2x VZ1NO.0.2C04 | 2x VZ1HP.PD.201H | -                       |
| VZ1.0.204Y9  | VZ1ZJ.0.204CEH6PS | 2x VZ1NO.0.2C04 | -                | -                       |
| VZ1.0.204Y10 | VZ1ZJ.0.204CHS    | 2x VZ1NO.0.2C04 | 2x VZ1HP.FD.201  | -                       |
| VZ1.0.204Y11 | VZ1ZJ.0.204CEHS   | 2x VZ1NO.0.2C04 | 2x VZ1HP.FD.201  | -                       |
| VZ1.0.404A   | VZ1ZJ.0.404CHS    | 2x VZ1NO.0.4C04 | 2x VZ1HP.PD.401  | VZ1.1.404E              |
| VZ1.0.404E   | VZ1ZJ.0.404CS     | 2x VZ1NO.0.4C04 | 2x VZ1HP.PD.401  | VZ1.1.404D              |
| VZ1.0.404F   | VZ1ZJ.0.404CPS    | 2x VZ1NO.0.4C04 | 2x VZ1HP.PD.401  | -                       |
| VZ1.0.404L   | VZ1ZJ.0.404CHS    | 2x VZ1NO.0.4C04 | 2x VZ1HP.PD.401H | -                       |
| VZ1.0.404M   | VZ1ZJ.0.404CS     | 2x VZ1NO.0.4C04 | 2x VZ1HP.PD.401H | -                       |
| VZ1.0.404Y6  | VZ1ZJ.0.404CES    | 2x VZ1NO.0.4C04 | 2x VZ1HP.PD.401  | VZ1.1.404F              |

#### Modifications prepared for new applications

| Designation   | Central unit        | Signal repeater  | Horn             | Notes  |
|---------------|---------------------|------------------|------------------|--------|
| VZ1.0.204Y7   | VZ1ZJ.0.204CEPS     | 2x VZ1NO.0.2C04  | 2x VZ1HP.PD.201H | WF943  |
| VZ1.0.204Y12  | VZ1ZJ.0.204CEH6S    | 1x VZ1NO.P.2C04  | 1x VZ1HP.MD.201H | WF1012 |
| VZ1.0.204Y13M | VZ1ZJ.0.204CEH6S    | 2x VZ1NO.M.2C04  | 2x VZ1HP.MD.201H | WF1041 |
| VZ1.0.204Y14P | VZ1ZJ.0.204H        | 2x VZ1NO.P.2C04  | 2x VZ1HP.FD.201H | WF1033 |
| VZ1.0.204Y15  | VZ1ZJ.0.204CEHPS    | 2x VZ1NO.0.2C04  | 2x VZ1HP.PD.201H | WF1065 |
| VZ1.1.204A    | VZ1ZJ.1U.2R04CEH6S  | 2x VZ1NO.0.2C04  | 2x VZ1HP.PD.201  | WF892  |
| VZ1.1.204B    | VZ1ZJ.1U.2R04CEH6S  | 1x VZ1NO.0.2C04  | -                | WF892  |
| VZ1.1.204C    | VZ1ZJ.1U.2R04CEH6PS | 2x VZ1NO.0.2C04  | 2x VZ1HP.PD.201  | WF892  |
| VZ1.1.204D    | VZ1ZJ.1U.2R04CS     | 2x VZ1NO.0.2C04  | 2x VZ1HP.PD.201  | WF1066 |
| VZ1.1.204E    | VZ1ZJ.1U.2R04CHS    | 2x VZ1NO.0.2C04  | 2x VZ1HP.PD.201  | WF1066 |
| VZ1.1.204G    | VZ1ZJ.1U.2R04EP1    | 1x VZ1NO.S.204   | 1x VZ1HP.PD.201H | WF1083 |
| VZ1.1.204H    | VZ1ZJ.1U.2R04CEH6S  | 1x VZ1NO.0.2C04  | 1x VZ1HP.PD.201  | WF1057 |
| VZ1.1.404D    | VZ1ZJ.1U.4R04CS     | 2 x VZ1NO.0.4C04 | 2 x VZ1HP.PD.401 | WF1000 |
| VZ1.1.404E    | VZ1ZJ.1U.4R04CHS    | 2 x VZ1NO.0.4C04 | 2 x VZ1HP.PD.401 | WF1001 |
| VZ1.1.404F    | VZ1ZJ.1U.4R04CES    | 2x VZ1NO.0.4C04  | 2x VZ1HP.PD.401  | WF959  |

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## Specifications

Catalogue sheet was prepared based on the following specifications:

| Number  | Version | Name   |
|---------|---------|--|
| 257VZ1  | 230721  | Technical conditions   |
| 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  | 190313  | Technical description of changes to MIREL VZ1 automatic train protection – integration of MAV RI functions   |
| 1122VZ1 | 230926  | Installation manual  |
| 153VZ1  | 230726  | Operating manual   |
| 154VZ1  | 230726  | Maintenance manual, diagnostics  |

## Modifications not recommended for new applications

| Designation | Central unit    | Signal repeater | Hom              | Substitute |
|-------------|-----------------|-----------------|------------------|------------|
| VZ1.0.203A  | VZ1ZJ.0.203CHS  | 2x VZ1NO.0.2C03 | 2x VZ1HP.PD.201  | VZ1.0.204A |
| VZ1.0.203B  | VZ1ZJ.0.203CS   | 2x VZ1NO.0.2C03 | -                | VZ1.0.204B |
| VZ1.0.203C  | VZ1ZJ.0.203H    | 2x VZ1NO.0.2C03 | -                | -          |
| VZ1.0.203D  | VZ1ZJ.0.203CS   | 2x VZ1NO.0.2C03 | 2x VZ1HP.P.2     | -          |
| VZ1.0.203E  | VZ1ZJ.0.203CS   | 2x VZ1NO.0.2C03 | 2x VZ1HP.PD.201  | VZ1.0.204E |
| VZ1.0.203F  | VZ1ZJ.0.203CPS  | 2x VZ1NO.0.2C03 | 2x VZ1HP.PD.201  | VZ1.0.204F |
| VZ1.0.203G  | VZ1ZJ.0.203CS   | 1x VZ1NO.0.2C03 | 1x VZ1HP.PD.201  | VZ1.0.204G |
| VZ1.0.203I  | VZ1ZJ.0.203CH6S | 2x VZ1NO.0.2C03 | 2x VZ1HP.PD.201  | VZ1.0.204I |
| VZ1.0.203J  | VZ1ZJ.0.203CH6S | 1x VZ1NO.0.2C03 | 1x VZ1HP.PD.201  | VZ1.0.204J |
| VZ1.0.203K  | VZ1ZJ.0.203CHPS | 2x VZ1NO.0.2C03 | 2x VZ1HP.PD.201H | VZ1.0.204K |
| VZ1.0.203L  | VZ1ZJ.0.203CHS  | 2x VZ1NO.0.2C03 | 2x VZ1HP.PD.201H | VZ1.0.204L |
| VZ1.0.203M  | VZ1ZJ.0.203CS   | 2x VZ1NO.0.2C03 | 2x VZ1HP.PD.201H | VZ1.0.204M |
| VZ1.0.203N  | VZ1ZJ.0.2S03CS  | 2x VZ1NO.S.203  | 2x VZ1HP.PD.201H | -          |
| VZ1.0.203Q  | VZ1ZJ.0.203CH6S | 2x VZ1NO.0.2C03 | 2x VZ1HP.PD.201H | VZ1.0.204Q |
| VZ1.0.204C  | VZ1ZJ.0.204H    | 2x VZ1NO.0.2C04 | -                | -          |
| VZ1.0.204N  | VZ1ZJ.0.2S04CS  | 2x VZ1NO.S.204  | 2x VZ1HP.PD.201H | -          |
| VZ1.0.403A  | VZ1ZJ.0.403CHS  | 2x VZ1NO.0.4C03 | 2x VZ1HP.PD.401  | VZ1.0.404A |
| VZ1.0.403D  | VZ1ZJ.0.403CS   | 2x VZ1NO.0.4C03 | 2x VZ1HP.P.4     | -          |
| VZ1.0.403E  | VZ1ZJ.0.403CS   | 2x VZ1NO.0.4C03 | 2x VZ1HP.PD.401  | VZ1.0.404E |
| VZ1.0.403F  | VZ1ZJ.0.403CPS  | 2x VZ1NO.0.4C03 | 2x VZ1HP.PD.401  | VZ1.0.404F |
| VZ1.0.403M  | VZ1ZJ.0.403CS   | 2x VZ1NO.0.4C03 | 2x VZ1HP.PD.401H | VZ1.0.404M |
| VZ1.0.404S6 | VZ1ZJ.0.404CS   | 2x VZ1NO.0.4C04 | 2x VZ1HP.D.4L01  | -          |
| VZ1.0.404S7 | VZ1ZJ.0.404CHS  | 2x VZ1NO.0.4C04 | 2x VZ1HP.D.4L01  | -          |