

# Cable monitoring device

## Type 8531

without auxiliary power in accordance  
with VDV papers 515 4/93

8531



### Description

The cable monitoring device type 8531 is suitable for insulation monitoring of cable systems used for traction current supply of direct current railways and trolley busses with nominal voltages of up to 750 V. The cable monitoring device operates without external voltage supply.

The cable monitoring is constructed in accordance with VDV papers 515, issue 4/93, and can be connected to all cables with a concentric shield or conductor and an insulating outer sheath.

The cable monitoring device can be used for the standard insulation monitoring of the conductor-shield and shield-earth insulating distances, as well as for the additional monitoring of the shield for interruptions.

Through the use of many different terminating resistors and connecting points, it is possible to evaluate the signal of the shield interruption as an "internal fault" or "earth fault" and to take into account the increased requirements for the operating conditions, the signal flow direction of the alarm release or disconnection, and proper consideration of the voltage losses on the supply or return conductor cables, etc.

For the signals indicating operating voltage fault, a drop below the lead-shield (internal fault) and shield-earth (earth fault) insulation values, 2 potential-free changeover contacts are available in each instance. A drop below the limit values is indicated by means of light-emitting diodes. The cable monitoring device is integrated in a plastic housing, protection system IP 50.

The device is equipped with 2 test buttons for the operational function checks and 2 covered potentiometers for proper adjustment of the sensitivity (insulation limit value). The test buttons and potentiometers are accessible from the front.

The testing unit type 853299 is available for the adjustment of the limit values or for testing purposes.

### Function

Via a voltage divider or voltage regulator, the operating voltage for the cable monitoring device and the monitoring voltage for the cable shield is tapped

off by the conductor of the cable. In order to achieve the required "low ohmage" (defined measuring voltage conditions, insensitivity to charging and re-charging as well as other disturbance factors), resistors are connected parallel to the "conductor-shield" and "shield-earth" insulation distances. These resistors, however, also possess sufficient high resistance to limit the measuring current passing through the shield to less than 1 mA and the nominal shield voltage to approx. 40 V. The evaluation of the insulation states or their change is carried out according to the voltage measurement to earth principle (jumper principle). The voltage at the shield is tapped off in high-resistance state and conducted to the evaluation system.

If the shield voltage drops below the pre-set lower limit value, the "earth fault" signal will be released, the light-emitting diode will light up and the output relay will switch. If the pre-set upper limit value is exceeded, the "internal fault" signal will be released. The corresponding light-emitting diode will light up and the proper relay will switch.

The operating voltage is monitored by a relay in "quiescent current operation and indicated by a yellow light emitting diode.

In case of failure, the light-emitting diode will go out and the relay will release.

Two versions are available for monitoring the shield for interruptions. The standard method – with which a terminating resistor of 68 Kohm is fitted at the end of the cable on the cable shield. The disadvantage of this method is the direction of action. The interruption of the shield is equivalent to an "internal fault" and therefore results in cable disconnection. If the earthing reference point of this terminating resistor is located at the end of the cable outdoors at the location, the possible adjustment sensitivity for the "conductor-shield" monitoring will also be limited since the voltage drop for corresponding loading of return conductor cable must also be added to the shield voltage and the response threshold of the "internal fault" must not be below this load-dependent voltage rise since otherwise this will result in



### Technical Data

<b>Dimensions</b>	W/H/D, s. fig., 150 / 200 / 75 mm
<b>Housing</b>	IP 50
<b>Protection system</b>	Macrolon
<b>Material</b>	-20°C to +50°C
<b>Ambient temp.</b>	DC 600 V / 750 V +20% / -30%
<b>Traction voltage</b>	approx. 8 W
<b>Power consumption</b>	approx. 40 V at DC 750V (corresponds to 68 k of test resistance and 1.12 M of series resistance)
<b>Shield voltage (nominal value at 750 V)</b>	insulation limit value adjustable
<b>Switching points</b>	50 - 300 kΩ
<b>Insulation "shield-earth"</b>	350 - 1,500 kΩ
<b>Insulation "conductor-shield"</b>	
<b>Outputs</b>	1 relay for voltage fault (quiescent current operation) 1 relay, fault "shield-earth" 1 relay, fault "conductor-shield"
<b>Contacts</b>	2 changeover contacts each (potentiial-free)
<b>Voltage</b>	Current
AC 250 V	4.0 A
DC 60 V	0.5 A
<b>ON delay</b>	approx. 2.5 s
<b>Switch-in delay</b>	fault to earth: approx. 20 s internal fault: approx. 2 s
<b>Versions</b>	Without display shield interruption → 8531 00 With display shield interruption → 8531 10 (as display short "conductor-shield") With display shield interruption → 8531 20 (as display short "shield-earth")
<b>Accessoires</b>	Terminating resistor see brochure sheet type 853196; Testing unit for adjusting and testing purposes see brochure sheet type 853299

### Ordering Information

Type	Order No.
8531 00	510100
8531 10	510101
8531 20	510102

Special versions available on request.

incorrect disconnection.

These disadvantages are eliminated using the operating mode with a terminating resistance of 1.12 Mohm between the lead and shield. The major advantage is that the direction of action of the shield interruption only results in the "earth fault" signal and that load-dependent voltage fluctuations do not have any effect during the "internal fault" sensitivity adjustment.

## Note

No dangerous contact voltages are created by connecting the cable monitoring device to the shield. The contact voltages are below the voltages and times within the adjustment range demanded in accordance with VDE 0141. Independent of this fact, however, it is important to note that,

in case of a "conductor-shield" insulation defect, the power-limiting action of the cable monitoring device may be bypassed in some instances. The terminating resistors, which are included as standard equipment in the scope of supplies, also take these conditions into account. To facilitate the installation work, these terminating resistors are available in suitable housings (brochure sheet type 853196).

To protect the cable monitoring device against excessively high voltage when the cables are being checked, the use of disconnect terminals is recommended.

In case of cable disconnection by the cable monitoring device as a result of it being activated, any section testing device that may have been installed must be jumpered.

