

DVEV-EP

DIGITAL COMPLEX PROTECTION FOR RAILWAY AIR-CONDITIONING SYSTEM



Application Field.

DVEV-EP digital complex protection has been specially designed for railway air-conditioning system. The carriages waiting for a long time on the railway stations are heated in wintertime and cooled in summertime. The required power is supplied by a transformer connected directly to the traction voltage (usually 25 kV / 50 Hz). The voltage ratio and the rated power of this transformer are 25 kV/1.5 kV, 0.5 – 1 MVA.

The secondary voltage is connected to a distribution cabinet, where the 1.5 kV circuit breaker, the switches for connected cables and the protection is located. One transformer supplies 3..10 connected cables. The difficulty of the protection system is that the switches are not capable to interrupt normal load current and the short-circuit current. The last section of the cable connection to the carriages is a free displaceable cable, the protection of which is extended by a special function which makes it possible to route the cable on a mostly crowded platform.

The DVEV-EP complex digital device is the protection for the transformer, for the 1.5 kV fixed cable, for the free displaceable cable and for the air-conditioner of the carriage, and at the same time it performs some automatic functions as well.

Main Features.

- Protective functions:
 - Transformer differential protection
 - Execution of external commands from transformer mechanical protection,
 - Transformer short-circuit protections on both sides of the transformer,
 - Transformer overcurrent protection as overload function,
 - Selective overcurrent protection for the cables,
 - Circuit breaker failure protection.
- Automatic functions in case of disturbances:
 - Undervoltage function (in case of low voltage or voltage loss, all consumers are disconnected from the 25 kV level to facilitate the preliminary “line check” before re-energising),
 - Automatic reclosing function after disconnection because of undervoltage,
 - In case of short circuit in this system, the disconnection is performed by the 25 kV circuit breaker, and the switch of the faulty consumer section

can disconnect the cable during the “dead time”. After disconnection the 25 kV circuit breaker performs automatic reclosing.

- Automatic functions in normal operation:
 - Blocking the disconnected cable against manual reclosing until acknowledgement
 - Switching operation and acknowledgement from local display and push-buttons
- PROTLOG powerful logic with user definable logic equations.
- Built-in software matrix to parameterise the functions of output contacts and indicating LED-s.
- Built-in self test function with dc supply check, trip/close circuit supervision and Watch Dog.
- One serial communication direction with two ports: (selectable with a parameter)
 - an isolated RS 232 connector on the front plate
 - a fibre optic connector on the rear plate.
- Two types of event recording:
 - event log for storing collected data of the last 50 protection operations
 - event sequence recorder with 1 ms resolution for 300 events.
- Optical coupled binary inputs.
- 8 output contacts with user-defined functions. Each can be NO or NC.
- 6 programmable indicating LED-s.
- Man-machine communication via external PC or built-in LCD display.,
- Battery backed-up RAM to store events and running real time clock.
- Clock synchronisation with external binary input or on serial link.

Optional Functions

- Digital fault recorder with 80 sec recording time.
- RTU card with IEC 870-5-101, 870-5-103, MODBUS protocols and complete RTU functions.
- Additional binary input and output contact cards for RTU tasks.
- Graphic LCD display (320x240 pixels) on front plate for displaying measured values and one-line scheme.

Construction

The device is mounted in two units or two racks. The upper one contains the protection functions, the LCD display and the push-buttons. The lower unit realises logic functions, receives signals via optical coupled binary inputs, and signals events with LED-s. The communication between the two units is performed through disturbance-protected ribbon cables.

The two units can be rack mounted or wall mounted.

Technical Data

- Rated secondary current,	1 A or 5 A ,
- Rated secondary line voltage, U_n	100 V , 110V or 200 V
- Rated frequency	50 Hz
- Overload capacity, in voltage circuits, continuous	$1,2 \times U_n$
- Overload capacity, in current circuits, continuous	$2 \times I_n$
1 s	$100 \times I_n$ (if $I_n=1A$), $50 \times I_n$ (if $I_n=5 A$)
- Dynamic current limit	$100 \times I_n$
- Accuracy of digital current relays ($> 50 \% I_n$)	$\pm 2 \%$
- Accuracy of digital timer	± 3 ms at 10 ms steps ± 12 ms at 1 s steps
- Reset ratio of current relays	95%
- Optical isolated inputs	220V DC
- Output relays	print relays
- Output relay contact type,	
	<i><u>programmable by matrix:</u></i>
- Output contacts ratings,	
rated switching voltage	250 V
continuous load current	8 A
switching on current	16 A
breaking current at 220 V dc,	
pure conductive circuit	0,25 A
L/R = 40 ms load	0,14 A
option: L/R = 40 ms load	4 A
- Auxiliary dc battery voltage (the same supply unit)	220 V , 110 V ,
voltage tolerance	88 to 310 V
- Permissive ambient temperature	0⁰ to 50⁰C
- Insulation test (IEC 255)	2 kV , 50 Hz ,
	5 kV , 1,2/50 μs
- Disturbance test (IEC 255)	2,5 kV , 1 MHz
- Electrostatic discharge test (ESD) (IEC 801-2)	8 kV
- Burst test (IEC 801-4)	2 kV
- Electromagnetic (radio frequency) interference test	IEC 801-3

Size (of one unit)

An ***EuroProt*** device is always rack-mounted type. One of the design form is suitable to mount directly into a ***standard 19" inch cabinet*** frame. The other designs are ***panel mounted devices*** with raised-hinged or flush mounted forms.

Outline size of a *19 inch cabinet frame mounted device* and a *panel mounted device with flush mounted form* is as follows.

Width: 483 mm, height: 132,5 mm, depth: 201 mm.

Outline size of a *panel mounted device with raised-hinged form* is as follows.

Width: 490 mm, height (with terminals): 250 mm, depth: 250 mm.

Terminal type at panel mounted design is as follows (terminal are placed only down).

No. 02 to 20 terminals, WTL6/1 Weidmüller
No. 21 to 73 terminals, WDU 2,5 Weidmüller.

Weight 8 kg.