

RETURN CABLES CONTINUITY TEST APPARATUS

type TCK-2

Application. The return cables continuity test apparatus TCK-2 was designed and made to meet PKP needs. The device checks whether the resistance between minus bus-bar and earth does not exceed the set value. In the case of too high values the signalling can be switched on or even the switching off the substation (sectioning cabin) can follow.

Together with short-circuiting and earth fault protection thyristor device of type TUZZ or EZZ the return cables continuity test apparatus creates complete earth fault protection system in substations or sectioning cabins. It can be used in other systems requiring the resistance level monitoring i.e. in the tram or underground traction.



Application principle. Two outer tester terminals should be connected with: first GND – earthing system, second MIN - bus-bar of the railway substation. In that circuit the (previously charged) capacitor is pulse discharged. The circuit resistance is calculated on a base of analyzing the current and voltage graphs. The analysis eliminates influences (existing in the measuring circuit) of induction, DC and 50 Hz AC (and its harmonics). The measured resistance includes the resultant value of serially connected resistances of: earth electrode, return cables and passage rails-earth.

The microprocessor is used to control the measurement process, computations, switching interlocking relays K1 and K2 and user interface.

Because of the fact that the minus bus-bar voltage can be severely disrupted, at least three following measurement, indicating exceeding of the set resistance value, result in the K1 or K2 relay switching. After crossing the first resistance R1, threshold the K1 relay is switched on, after the second – R2 – the K2 relay is switched on. Each relay is interlocked in that position and its switching required staff intervention. Threshold levels R1 and R2 can be set by the program.

Normally the successive measurements are performed at regular – several or dozen minute intervals. When the result exceeds the threshold level the series of quickened measurements (every 30 sec) follow. After the third consecutive measurement indicating higher value than threshold level the right relay is switched on. If the resistance incidentally exceeds the threshold level the tester returns to the fixed measurement cycle.



Operation. Using buttons and displayed information the device parameters can be set and resistance values, the present minus bus-bar voltage, previous measurement results can be shown. Signaling lamps indicates the interlocking relays state.

The consecutive measurement results are stored in the tester memory (up to 1000 measurements – including power supply switching on). To facilitate reading and saving of measurement results the TCK-2 tester can be connected with a computer via RS-232.

Basic technical parameters.

- Supply voltage 220V 50Hz.
- Power max 50W.
- Measured resistance range 0 ÷ 20Ω.
- Accuracy of measured resistance 5% or 0,1Ω (lack of interferences).
- Max voltage of measurement impulse 100V.
- Interlocking output relays RM94p with two change-over contacts current capacity 6A/380V or 0,4A/250VDC
- Protection level IP65.
- Overall dimensions 520 * 270 * 140.
- Weight 3 kG.

Operation features. The control – in the longer time period – of changes in the resistance measured by the TCK-2 tester allows to notice abnormal situations (though the resistance could be in acceptable levels). Reasons for that could be for example: earthing of running rails (decrease of resistance) or gaps in the return circuit (increase of resistance).

Because of the earth fault protection system it is important to keep up the return cables continuity and low value earth electrode resistance of the substation. The protection against stray currents requires increase of the track insulation from earth. When the TCK-2 tester shows very small resistance, it can indicate the occurrence of short-circuits between return circuits and substation earthing system.

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