

Metran-510-PKM Multifunctional Calibrator



- **Measurable and reproducible signals:**
 - **current;**
 - **voltage;**
 - **resistance;**
 - **signals from RTDs and/or thermocouples (TC)**
- **Built-in interface RS232 (option)**
- **Power supply:**
 - **4 x AA NiCd, NiMH batteries (built-in);**
 - **AC network 220 V, 50 Hz**
- **Protection rate from dust and water**
IP54

Metran-510-PKM Multifunction Portable Calibrator is designed for:

- measurement and generation of electric direct current strength, voltage, resistance;
- measurement-conversion and generation of RTD and TC signals.

Advantages:

- simultaneous operation in measurement channels and generation of electrical values (with galvanic isolation of channels);
- automatic verification mode for sensors;
- automatic generation of signals of various waveforms;
- calibration data transfer directly to PC via RS232 interface;
- software.

DESIGN AND OPERATION PRINCIPLE

Design

The main components of the calibrator are:

- Electronic module;
- Power supply unit;
- Electrical cable for the connection of pressure transmitters under test and secondary devices.

All calibrator's components are supplied in a compact, easy-to-handle carrying case.

The electronic module of the calibrator is designed as a hand-held device in a plastic housing with liquid-crystal alphanumeric display (LCD). Electrical schematic of the calibrator consists of two galvanically isolated units, one of them is designed for electrical signals measurement, and the other one for their reproduction, therefore it is possible to measure and reproduce electrical quantities simultaneously. RS232 COM port is intended for connection to a PC. The calibrator can operate both off-line (with built-in batteries), and from a power supply unit, which is also a recharger.

Programming is realized with the help of five function keys, digital keyboard is designed for data entry.

The reactive protection of calibrator's input and output guarantees Metran-510-PKM operational capability at voltage supply up to 36 V to low-resistance inputs and at electrostatic discharge.

The calibrator maintains accuracy (Table 2, 3) not only at temperature $(20 \pm 2)^\circ\text{C}$ but within the range of operating temperatures from 10 to 40°C owing to temperature compensation.

Operation Modes

Metran-510-PKM has several operation modes:

- I. Physical magnitude (PM) reproduction;
- II. PM measurement;
- III. Simultaneous reproduction and measurement of PM.

In the first operation mode, the calibrator depending on a chosen program reproduces DC, voltage and resistance signals, as well as output signals of temperature sensors (TC/RTD).

In the second mode, the calibrator measures PM described in the first mode.

In the third mode, simultaneous and independent reproduction, measurement of PM and calculation of conversion accuracy are executed.

Mode Features

For the first operation mode:

- reproduction of signals in square waveform (Fig.1), triangle (Fig.2) and other variations are possible;
- the calibrator can reproduce resistance of only the devices (bridges, logometers), where metering current via connected RTD does not exceed 2.5 mA;
- when reproducing TC signals, the automatic compensation of thermal electromotive force of cold junction is possible.

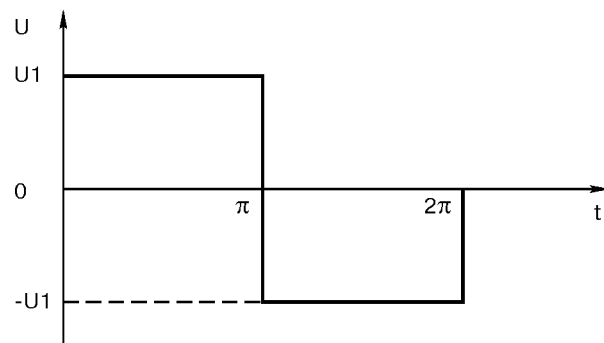


Figure 1.

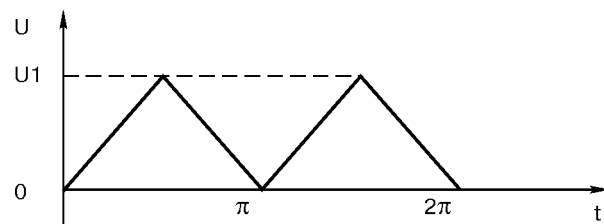


Figure 2.

For the third operation mode, the automatic verification of MTs is possible, in this case simultaneous reproduction and measurement of a signal in several points of a calibrated MT characteristic with accuracy calculation are executed. The calibrator allows verifying MTs, which have the following conversion functions: line, quadratic or root extraction (Fig.3), in this case any of the following signals is to be supplied to MT's input from the calibrator: voltage, current, resistance, sensors' signals. Voltage and current are MT output signals (Fig.3).

The calibration of MT is carried out in five points: 0, 25, 50, 75 and 100% of the range supplied to MT signal input.

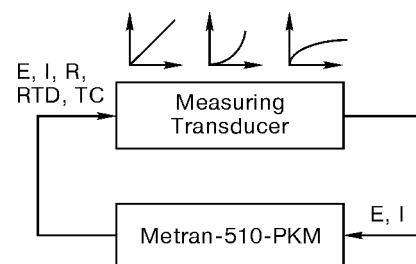


Figure 3.

The entire verification cycle is executed under calibrator control, and after its completion the table or verification report is executed. Obtained results can be entered into the archive, which allows storing data of 196 verified MTs.

SPECIFICATIONS

‰ Ranges and accuracy of measurement and reproduction of voltage, current and resistance signals are provided in Table 1.

Table 1

Function	Operating Range	Low-Order Digit Value	Accuracy, ±
Reproduction of DC strength	0-5 mA 5-20 mA	0.0001 mA	0.015%Rdg. + 0.005%URL
Reproduction of DC voltage	0-100 mV	10 microV	0.015%Rdg. + 0.01%URL
	0,1-1 V 1-5.5 V	0.01 mV 0.1 mV	0.015%Rdg. + 0.005%URL
Reproduction of DC resistance	0-400 Ohm 400-2000 Ohm	0.001 Ohm 0.01 Ohm	0.015%Rdg. + 0.005%URL
Measurement of DC strength	0-5 mA 5-22 mA	0.0001mA	0.015%Rdg. + 0.005%URL
Measurement of DC voltage	0-100 mV	1 microV	0.015%Rdg. + 0.01%URL
	0,1-1 V 1-11 V	0.01 mV 0.1 mV	0.015%Rdg. + 0.005%URL
Measurement of DC resistance	0-400 Ohm 400-2000 Ohm	0.001 Ohm 0.01 Ohm	0.015%Rdg. + 0.005%URL

Of reading means the value of a current measured/reproduced quantity;
URL is the upper range limit of a measured/reproduced quantity.

● Ranges and accuracy of measurement and reproduction of TC output signals are provided in Table 2.

Table 2

TC	Range of Outputs Measurement and Reproduction, °C	Accuracy, ±°C	Low-Order Digit Value, °C
Type R	-49...1767	1.20±1 digit	0.01
Type S	-49...1767	1.25±1 digit	
Type B	250...1820	1.60±1 digit	
Type N	-200...1300	0.55±1 digit	
Type K	-200...1370	0.50±1 digit	
Type T	-200...400	0.35±1 digit	
Type J	-200...1200	0.38±1 digit	
Type E	-200...1000	0.33±1 digit	
Type L	-180...790	0.50±1 digit	
A-1, A-2, A-3 (BP)	10...2500 (1800)	1.10±1 digit	

Notes:

1. Accuracy of inputs with cold junction compensated is ±0.5°C.
2. TC is a thermocouple.

- Ranges and accuracy of measurement and reproduction of RTD output signals are provided in Table 3.

Table 3

RTD	W100	Range of Outputs Measurement and Reproduction, °C	Accuracy, ±°C	Low-Order Digit Value, °C
50P	1.3910	-200...1100	$(0.14+2.4 \cdot 10^{-4} \cdot t) \pm 1$ digit	0.01
100P			$(0.09+2.1 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=-200...870°C $(0.20+4.0 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=870...1100°C	
200P			$(0.06+1.7 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=-200...260°C $(0.15+2.7 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=260...1100°C	
500P		-200...850	$(0.05+1.7 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=-200...-50°C $(0.09+2.1 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=-50...850°C	
1000P		-200...250	$(0.04+1.6 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=-200...-150°C $(0.06+1.7 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=-150...250°C	
Pt50	1.3850	-200...850	$(0.14+2.4 \cdot 10^{-4} \cdot t) \pm 1$ digit	
Pt100			$(0.09+2.1 \cdot 10^{-4} \cdot t) \pm 1$ digit	
Pt200			$(0.06+1.8 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=-200...265°C $(0.15+2.6 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=265...850°C	
Pt500		$(0.05+1.7 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=-200...-50°C $(0.09+2.1 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=-50...850°C		
Pt1000		-200...250	$(0.04+1.6 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=-200...-150°C $(0.06+1.7 \cdot 10^{-4} \cdot t) \pm 1$ digit for t=-150...250°C	
50M	1.4280	-184...200	$(0.13+1.5 \cdot 10^{-4} \cdot t) \pm 1$ digit	
53M				
100M			$(0.08+1.5 \cdot 10^{-4} \cdot t) \pm 1$ digit	
Cu50	1.4260	-50...200	$(0.13+1.5 \cdot 10^{-4} \cdot t) \pm 1$ digit	
Cu100			$(0.08+1.5 \cdot 10^{-4} \cdot t) \pm 1$ digit	
100H	1.6170	-60...180	0.07 ± 1 digit	
Ni100				

DELIVERY SET

- Electronic Module 1 unit
- Power Supply 1 unit
- Battery (NiCd, NiMH: dimension-type AA) 4 units
- Hot Probe for TC cold junction compensation 1 unit
- Thermostatic Switch for TC connection 1 unit
- Electrical Cable for connection of device under test 1 unit
- Electrical cable for resistance reproduction and measurement 1 unit

Options:

Hardware-software interface of PC "Sensor Calibration":

- RS232 interface for connection to PC 1 unit;
- Software (CD) 1 unit.

OPERATION CONDITIONS

- Ambient temperature is 0...50°C.
- Relative humidity is up to 80% at 25°C without moisture condensation.
- Atmospheric pressure is from 84 to 106.7 kPa (630 to 800 mm of mercury.).