

# MULTI-FUNCTIONAL HIGH-PRECISION MODULE

## MFHPM-1

Multi-Functional High-Precision Module (MFHPM-1 UYAISH.468161.001) is designed to produce 24-bit digital signals from three measurement channels that can be used for voltage, current, impedance values, and bridge measurement circuits. It also provides parameter outputs via a digital interface RS 485 and control signals by two universal static discrete outputs.



### SCOPE OF APPLICATION:

MFHPM-1 is used when working with sensors having an output proportional to the measured values: differential and unipolar voltage up to  $\pm 30$  V, including microstrain sources (thermocouples), current signal 0..2000 Ohm (resistance temperature detectors) including bridge conversion diagrams (strain sensors) with a speed up to 500 samples per second. It generates discrete threshold signals of the measured value for automatic process control (e.g., P, PI, PID).

#### Main technical characteristics

Number of measurement channels	3
Number of digits per measuring channel	24
Number of discrete outputs	2
Application programming interface	RS 485
Supply voltage	24 V
Power consumption	1 Watt
Galvanic isolation	input circuits, RS 485 interface, discrete outputs, 24 V power supply

#### Configuration of current values measurement

Current measurement range	0..20 mA
Absolute measurement error in the range of $\pm 10$ V at the conversion frequency , 16,7	$\pm 4$ nA
33,3	$\pm 6$ nA
62,5	$\pm 10$ nA
125	$\pm 16$ nA
250	$\pm 36$ nA
500	$\pm 36$ nA
Input impedance	49,9 Ohm
The full-scale current is limited by the power dispersion	0,25 watt

### Main measurement characteristics

A number of sampling frequencies (current or voltage) by one channel	4,17; 8,33; 16,7; 33,3; 62,5; 125; Hz
Disturbance suppress 50 Hz	Yes
Synchronization of measurements in a group transformation	Yes

### Configuration of the voltage meter

Voltage measurement range (configurable during manufacturing)	$\pm 10$ , $\pm 15$ , $\pm 30$ V
Input impedance	>200 kOhm
Input capacitance	No more than 1000 Pf
Voltage limit for any configuration	200 V
Absolute measurement error in the range of $\pm 10$ V at the conversion frequency Hz, 16,7 33,3 62,5 125 250 500	$\pm 2$ mkV $\pm 3$ mkV $\pm 5$ mkV $\pm 8$ mkV $\pm 18$ mkV $\pm 18$ mkV
Absolute measurement error in the range of $\pm 150$ V at the conversion frequency Hz, 16,7 33,3 62,5 125 250 500	$\pm 3$ mkV $\pm 5$ mkV $\pm 8$ mkV $\pm 12$ mkV $\pm 27$ mkV $\pm 27$ mkV

### Configuration of microstrain

Supported types of thermocouples	TKhK, TKh, PP-1, NS, PR-30/6, TMK
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### Configuration of strain-gauge measurement

Number of processed strain sensors	3
Power supply voltage of strain sensors	5 V
Input impedance of a measuring circuit	> 1 mOhm
Resolution of measurement at 4.17 Hz conversion	$\pm 1$ mkV
Types of used strain sensors	563YH, 563YSGS etc.

### Configuration of impedance measurement

Number of processed channels	3
Range of measured impedance	0...2000 Ohm
Absolute error of measurement at sampling frequency 4,17 Hz	$\pm 0,001$ Ohm
Supply current of measured impedance	1,5 mA
Type of used temperature sensors	TSM, TSP, TKh, TKhK and others
Supported calibration of temperature transducers (TSM, TSP)	TSN50H, TSN100H, TSN50M, TSN100M, TSP50П, TSP100П, TSP500П, TSP1000П, 21GR, 22GR, 23GR.

### Parameters of discrete outputs

Output type	2 outputs of electronic static relay
Maximum value of switched voltage current	1 A alternating, 2 A direct 60 V
Type of switched voltage	alternating, direct

## Design Solutions of Physical Process Analysis Design Bureau

Physical Process Analysis Design Bureau of RPC Radiy is set up for development of seismic protection systems, calibration equipment and qualification of product data at NPP. The bureau designs and implements the Seismic Sensor that is the source of seismic data for the seismic protection equipment. Other successfully designed and implemented product is the vibration measuring system for periodic calibration of seismic sensors in semi-automatic mode. Besides nuclear products the design bureau has developed the Information Acquisition and Display Unit that is the basic item in any monitoring system design including the Automatic System for Early Diagnostics of Emergencies. Additionally, the design bureau develops the angel precision gages for the wide scope of measurement.