



**SCIENTIFIC-PRODUCTION
ENTERPRISE VIBROBIT LLC**

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EQUIPMENT 'VIBROBIT 100'

**DEVICE ADJUSTERS PN11
Operation and Maintenance Manual
VSPA.421412.174 RE**

Rostov-on-Don

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The Operations and Maintenance Manual (OMM) is designed to guide users (workmen) the purpose and operation of the instrument repairman PN11.

The user must know the rules of operation of electrical appliances, have experience with technology of radio, as well as to know the purpose and work equipment "VIBROBIT 100".

03.12.19 (Version 5)

1 Description and Operation

1.1 Designated purpose of the device adjusters PN11

The device adjusters PN11 is intended for checking the technical condition of the equipment "Vibrobit 100" during installation, adjustment, installation and maintenance.

The device is used to test and calibrate:

- sensors with transducers;
- sensors with comparators;
- control boards;

The instrument is adjusted and checked as separate units of equipment and measurement channels.

1.2 Device components

- device adjusters PN11 1 pcs;
- signal cable 1 pcs;
- power cord 1 pcs;
- rechargeable Battery Ni-MH (AA) 4 pcs

1.3 Device specifications and characteristics

The main technical features of the device of the adjuster of PN11 are specified in Table 1.

Table 1 - Main technical characteristics of the PN11 commissioner

Parameter	Norm
The output voltage of positive polarity, V	$24 \pm 0,5$
The load current is not less, A	0,15
Measuring ranges DC (from and to inclusion), mA	0 - 5 0 - 20
Measuring ranges DC voltage (from and to inclusion), V	0 - 20 0 - 40
The range of the battery voltage measurement (from and to inclusion), V	0 - 10
Measuring ranges RMS vibration (from and to inclusion), mm / sec	0 - 15 0 - 30
The maximum error of measurement, %, not more	1.5
Range of supply voltage alternating current frequency of 50 (60) Hz, V	150 - 250
Maximum power consumption, watt, not more	6,0
Overall dimensions, mm	196x100x40
Weight, kg, no more	0,3

1.3.1 The device must retain its characteristics

- at a temperature from +5 to + 50 °C;
- at a temperature of 35 °C at a relative humidity of 80 % without condensation.

1.3.2 Warm-up time (Warm) must not exceed 1 minute.

1.3.3 The insulation resistance in the circuit ~ 220 V should be less than:

- 40 megohms – in normal conditions of operation;
- 2 megohms – at a temperature plus 35 °C and the relative humidity of 80 %.

Insulation of electrical circuits with a voltage of 220 V to withstand test voltage of 0.9 kV for one minute.

1.3.4 Voltage industrial interference, μ VdB, not more:

- at frequencies from 0,15 to 0,5 MHz 80;
- at frequencies from 0,5 to 2,5 MHz 74;
- at frequencies from 2,5 to 30 MHz 60.

1.3.5 The average service life of the device - 5 years. Lifetime does not apply to batteries, for which lifetime depends on the number of cycles "charge-discharge".

1.4 Design and operation of the device

1.4.1 Structurally the device is executed in a portable version in the standard package of high impact BOS800 phenol-formaldehyde plastics production company «BOPLA» (Germany).

1.4.2 Controls and indicators are located on the top front panel in accordance with Annex A.

Appointments controls and information are listed in Table 2.

Table 2 - Controls and Information

Controls and Information	Purpose
Button «POWER ON»	switching on device.
Button «POWER OFF»	switching off device
Fuse «2,0 A»	Fuse primary circuit (VP-1-1 2A) (CAUTION! 220V);
Fork block «220 V»	Connecting the power cord; (CAUTION! 220V);
Fork block «CIRCUIT»	Connecting the power cord
Light indicator «POWER ON»	Display of the operating mode of the device
Light indicator «220 VAC ON»	Display of voltage AC 220 V
Light indicator «BATTAREY CHARGE»	Display mode battery charge
The buttons and lights select the measured parameter (MEASURING PARAMETR)	
Button «V _{DC} »	Enabling measure DC voltage
Light indicator «V _{DC} »	Displays measurement mode DC voltage
Button «I _{DC} »	Enabling DC measurement.
Light indicator «I _{DC} »	Displays measurement mode DC.
Button «RMS»	Enabling measuring vibration.
Light indicator «RMS»	Display mode measuring vibration.
Button «V _{BAT} »	Enabling measure DC voltage on batteries.
Light indicator «V _{BAT} »	Displays measurement mode DC voltage at the batteries.
The buttons and lights measuring range selection (RANGE)	
Button «1...5»	Activating the measurement:: <ul style="list-style-type: none"> • DC in the range of 0 to 5 mA, • DC voltage in the range of 0 to 20 V • RMS vibration in the range of 0 to 15 mm / sec

Continuation of Table 2

Controls and Information	Purpose
Light indicator «1...5»	Displays measurement mode: <ul style="list-style-type: none"> • DC in the range of 0 to 5 mA, • DC voltage in the range of 0 to 20 V • RMS vibration in the range of 0 to 15 mm / sec
Button «4...20»	Activating the measurement: <ul style="list-style-type: none"> • DC in the range of 0 to 20 mA, • DC voltage in the range of 0 to 40 V • RMS vibration in the range of 0 to 30 mm / sec
Light indicator «4...20»	Displays measurement mode: <ul style="list-style-type: none"> • DC in the range of 0 to 20 mA, • DC voltage in the range of 0 to 40 V • RMS vibration in the range of 0 to 30 mm / sec
The buttons and lights measuring channel selection (CHANNEL)	
Button «CH1»	Enabling DC measurement values and vibration velocity in the channel 1.
Light indicator «CH1»	Display mode DC measurement values and vibration velocity in the channel 1.
Button «CH2»	Enabling DC measurement values and vibration velocity in the channel 2.
Light indicator «CH2»	Display mode DC measurement values and vibration velocity in the channel 2.

2 Intended use

2.1 Safeguard

- When working on the device voltage circuit elements are life-threatening. It is strictly forbidden to break the sealing device and make measurements of the electrical parameters within the device.
- Disconnect the power cord from the unit carried out only after disconnecting the power cord from the mains.
- Check and replace the fuse only after disconnect the device from the network.
- To prevent the exploitation of persons having a third and higher group on electrical safety.

2.2 Operational procedure

Connect the cable signal to block the fork «CURCUIT».

Attention! It is strictly prohibited to short-circuit connector "+ 24 V» on the plug «CH1» and «CH2». This can lead to overload and failure of the current sensor.

Connect the unit under test, observing the name chains (shown on cable plug). When running on the network to connect the power cord to the device itself shnur- to AC power. This indicator light "220 VAC ON», LED «POWER ON», the decimal point in the third discharge, the indicator and the indicator light «BATTAREY CHARGE», if the battery level is below normal. Intermittent flashing indicator light «BATTAREY CHARGE» indicates the absence of batteries in the battery compartment or poor contact with the slip slats.

When running on batteries the device is activated by pressing and holding the button «POWER ON» before the decimal point in the third discharge indicator. If the battery discharges below normal on the display appears: "-.-" after which the device automatically turns off.

Select with the keys select the measurement range and the desired channel number Mode. When the output value of the measured value of range, the indicator displays the message: "--.--". After measurement switch the appliance off by pressing and holding until the display message «OFF» button «POWER OFF". After that, when running on batteries the device will turn off, while running on AC power unit switches to low power consumption and will continue to charge the battery to the level of the nominal charge, after which the charge will stop, the indicator light «BATTAREY CHARGE» goes off. After the charge disconnect the power cord from the AC.

3 Maintenance of the device

3.1 Permanent repair

- Repairs carried out to the extent failure device
- By reducing the time of continuous operation from a fully charged battery up to 10-15 minutes to be replaced. Never use batteries of a different type than the specified in item 1.2. This can lead to overload and failure of the device.
- All repairs to the unit to produce at the disconnected network cord and the battery removed from the battery compartment. **Attention! When using the device in standalone mode and in operation by AC on some elements of the system are high-amplitude pulses up to 600 V, a life-threatening.**

3.2 Calibration of the device

This section establishes the methodology for initial and periodic calibration device.

Periodic checking of the operation of the device is made in the current period or the controlled equipment preventive maintenance, once a year.

Applied Instrument primary sensors and transducers checked separately by the procedures specified in the operational documents.

Allowed verification equipment as a part of the channel measurement parameters directly on the monitored equipment.

During verification should be performed surgery and apply means of verification indicated in Table 3.

Table 3 – Operation and means of calibration

The name of the operation	Item number calibration	Means of calibration	Obligation operation for calibration	
			Initial	Periodic
Exterior check	3.2.3		Yes	Yes
Try-out	3.2.4	Milliammeter M2020	Yes	Yes
The termination of the main measurement error	3.2.5	Voltammeter B7-40, B7-43, M2044 Resistance box P4831 Power supply MP24	Yes	Yes

Note - It is permissible to replace the instruments and equipment with the similar ones regarding their metrological characteristics.

3.2.1 Safety requirements

Calibration instruments, as well as ancillary equipment must be reliably grounded.

3.2.2 Calibration conditions

In conducting calibration, the following conditions shall be observed:

- ambient air temperature range (+20±5) °C;
- relative air humidity from 30 to 80%;
- atmospheric pressure 650-800 mmHg. ((86-106,7) kPa);
- supply voltage (+24±0,5) V;
- input voltage of the adjuster PN11 (~220±4) V, 50Hz
- load resistance of the output unified signal:
 - (1-5) mA (2±0,005) kOhm;
 - (4-20) mA (500±10) Ohm;
- absence of vibration, external magnetic fields.

3.2.3 External examination

In conducting external examination the following shall be checked:

- cleanness of the device, the state front panel indicators, controls;;
- absence of damage.

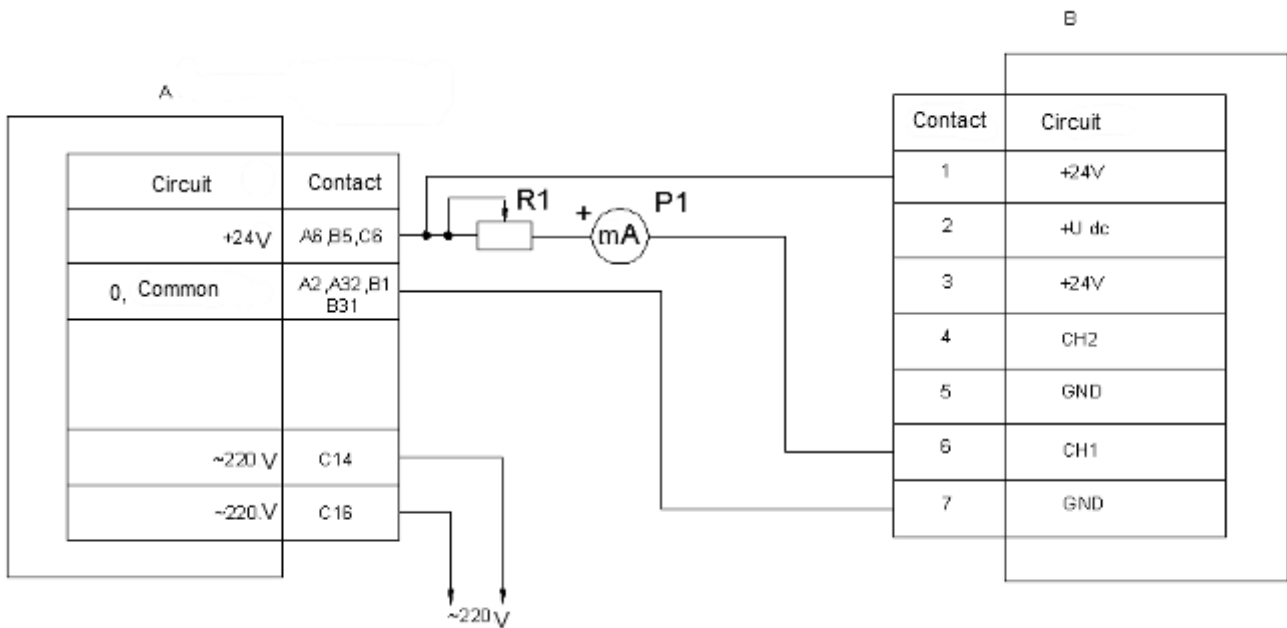
3.2.4 Try-out

For the purpose of trying out, the following shall be performed:

- Rig up the electrical circuit for the tryout;
- fed to the input of the device several values of the electrical signal, make sure it is measured and displayed on the display, the presence of the output unified signal.

3.2.5 The termination of the main measurement error

Calibration PN11 made by circuitry Figure 1.



A – MP24

B – PN11

R1 – resistance box, 100kOhm

P1 – DC milliamperemeter, 0-20 mA, Class 0.2

Figure 1 - Wiring diagram for checking PN11

Resistor R1, P1 on the device to establish a number of values of direct current (DC), and the digital display device read (write) the value and unified signal.

The values of the input signals of the device, which is determined by measurement error:

1,0;	2,0;	3,0;	4,0;	5,0	mA
4,0;	8,0;	12,0;	16,0;	20,0	mA

The measurement error is calculated by formula:

- for the digital indicator:

Setting the device corresponds to the measurement of the current input signal

$$\delta = \frac{I_y - I_i}{I_i} \cdot 100\% \quad (1)$$

Setting the device corresponds to the measurement parameter input current

$$\delta = \frac{K_1 \left(1 + \frac{4([S_M] + S_i)}{S_{PR}} \right) - I_i}{I_i} \cdot 100\% \quad (2)$$

$$S_{PR} = [S_M] + [S_P] \quad (3)$$

where: I_i – input current measured by the milliamperemeter P1, mA;

I_y – Current indications for the digital display, mA;

K_1, K_2 – scaling coefficients:

input signal	K_1	K_2
current 1 – 5 mA	1.0	0.25
current 4 – 20mA	4.0	1

S_i – reading digital display, mm / s;

S_M, S_P – the range of change (with a minus sign, plus) mm / s;

S_{PR} – range parameter measurement, mm / s;

The maximum measurement error shall conform to Table 1

- Define measurement error across all channels of the device.
- The maximum measurement error across all channels shall conform to Table 1.

4 Transportation and Storage

The PN11 adjuster's device in the package withstands transportation to any distance by road and rail (in closed vehicles), water (in the holds of ships), and air transport (in sealed compartments).

Transportation conditions - J according to GOST 25804.4-83.

The device in the package can withstand the following transport factors:

- temperatures from minus 50 ° C to plus 50 ° C;
- relative humidity 95% at 35 ° C;
- vibration (acting along three mutually perpendicular axes of the container) during transportation by rail, by road and by plane in the frequency range (10 - 55) Hz with an amplitude of vibration displacement of 0.35 mm and vibration acceleration of 5g;
- strokes with a peak shock acceleration value of 10g, shock pulse duration of 10 ms, the number of strokes (1000 ± 10) in the direction indicated on the container.

Storage of the device regarding the impact of climatic environmental factors must comply with conditions 3 (J3) according to GOST 15150-69. Shelf life no more than 24 months from the date of manufacture.

Long-term storage of the device is carried out in packaging, in heated rooms with conditions 1 (L) according to GOST 15150-69.

Annex A
(informative)

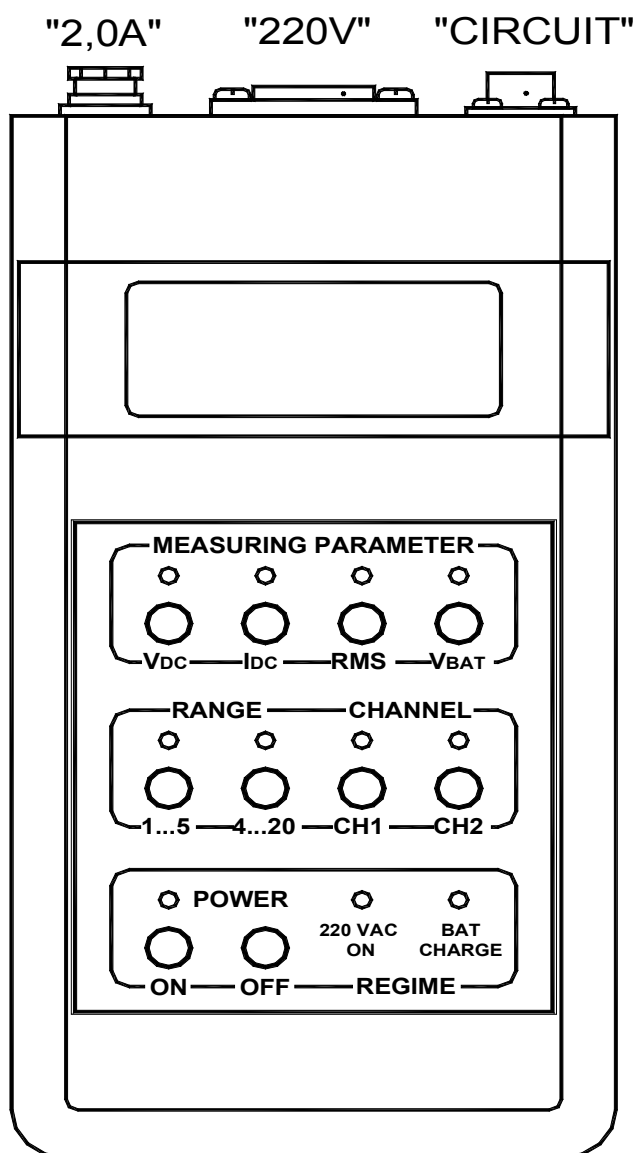


Figure A.1 - Appearance of the device adjusters PN11