Laboratory "Metrology. Technical measurements", aud. 101

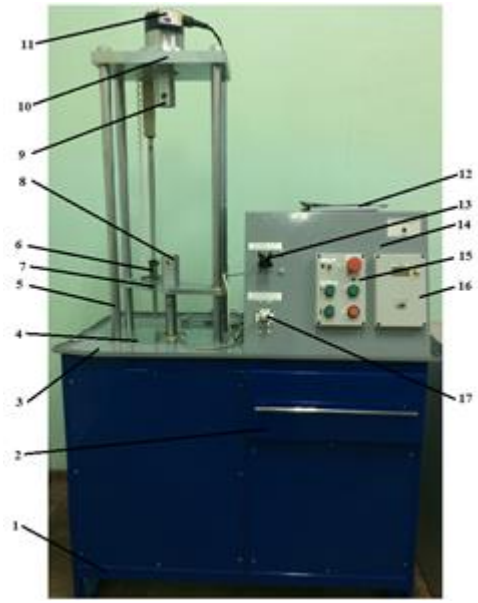
Laboratory work is carried out in the following subjects: "Testing, control and product safety", "New materials", "Qualimetry", etc.

In addition, undergraduates conduct research in the following areas: testing of metal samples and samples of building materials for tension, compression, off-center compression, torsion, bending; SI tests for objects operating under pressure; testing of gears; research of illumination of industrial premises; noise insulation and sound absorption, etc.

The laboratory has the following facilities and testing equipment:

- Training universal testing machine "Mechanical testing of materials" MIM-9LR-010;
- Standard set of training equipment "Mechanical properties of materials" MSM -09-LR, - 00.000.000 PS;
- Pressure measuring devices. A standard set of installation equipment. "Devices and means of creating and measuring pressure" PSSID-010-6LR;
- Training stand "Diagnostics of gear defects" DM-DDZP-3LR-0.14000 PS;
- Laboratory installation "Assessment of the effectiveness of lighting quality in production conditions";
- Laboratory stand "Sound insulation and sound absorption".

Training universal testing machine "Mechanical testing of materials" MIM-9LR-010



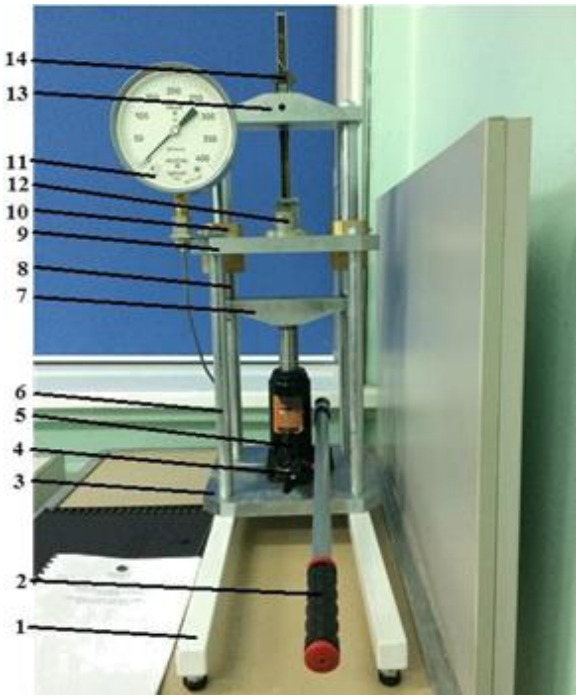
Purpose **- studying the mechanical properties of materials and construction elements.**

Technical characteristics
Power supply voltage: 220V
Current type: Single-phase
Power consumption not more than: 1.8 kW
The force developed by the machine, not less than: 50 kN
Working pressure of the liquid, not more than:7 Mpa
Traverse stroke: 500 mm
The accuracy of determining the movement of the traverse-0.01 mm, forces, not worse: 20 N
Overall dimensions, not more than 1150×640×1850 mm
Weight, not more than: 300 kg

1-frame structure; 2-drawer for storing devices, grippers and samples; 3-table top; 4-lower movable plate; 5-power columns; 6-digital motion sensor; 7-movable traverse; 8-movable support fork; 9-movable support fork; 10-upper non-moving plate;11-force meter; 12-laptop; 13-force regulator based on a safety valve; 14-control panel; 15-electric box with buttons for manual control of the machine; 16-electric box with a display indicating the forces and a connector for connecting strain gauges; 17-speed controller of the movable traverse based on the flow controller.

Completeness
- Laptop.
- A set of grips for laboratory work.
- Caliper.
- A set of samples (5 pieces of each type).
- Guidelines for use
- Guidelines for performing laboratory work.

Standard set of training equipment "Mechanical properties of materials" MSM -09-LR, - 00.000.000 PS



Purpose - for conducting laboratory work on the study of methods for determining the mechanical properties of materials.

MSM-09-6LR allows to:
- set and determine the movement of the movable traverse and the force transmitted from the traverse to the sample;
- perform compression testing of prismatic samples and tensile testing of cylindrical samples with threaded heads.

Technical characteristics:
Developed force, not less than: 30 kN
Working pressure of the liquid, not more than: 40 MPa
Force on the handle at maximum pressure, not more than: 200 N
Traverse stroke, not less than 100 mm
Accuracy of determining the traverse movement, 0.01 mm
The accuracy of the determination of the force (taking into account conversion from pressure), not worse, 300 N
Overall dimensions, not more than, 380×600/700×900 mm
Weight, not more than: 30 kg

Device
1-supports;
2-handle;
3-lower base plate;
4-valve;
5-hydraulic cylinder;
6-racks;
7-lower traverse;
8-guides;
9-upper base plate;
10-guide bushings;
11-pressure gauge;
12-adapter;
13-upper traverse;
14-displacement meter.

Completeness
The delivery package includes:
- training stand MSM-09-6LR "Mechanical properties of materials";
- operation manual MSM-09-6LR-00.000.000 RE;
- passport MSM-09-6LR-00.000.000 PS;
- description of laboratory work MSM-09-6LR-00.000.000 PP.

Pressure measuring devices. A standard set of installation equipment. "Devices and means of creating and measuring pressure" PSSID-010-6LR

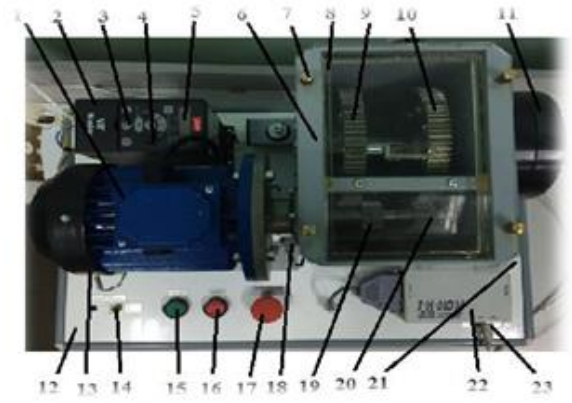
Purpose - studying of pressure measuring devices. The stand allows you to set and determine the pressure by various measurement methods. A gaseous medium is used-air.

Technical characteristics
Power supply voltage: 220
Current type: Single-phase
Power consumption, not more than: 1.8 kW
The force developed by the machine, not less than: 50 kN
Working pressure of the liquid, not more than: 7 Mpa
Traverse stroke: 500 mm
Traverse movement detection accuracy: 0.01 mm
Force detection accuracy, not worse than: 20 N

Device
1-multimeter; 2-analog output signal measurement unit, collector; 3-base;
4-pressure gauge; 5-pressure reducing valve; 6-spring pressure indicator; 7-pressure sensor; 8-sample pressure gauge; 9-pressure sensor; 10-pressure gauge; 11-panel; 12-ball valve; 13-two-phase plug; 14-two electric fuses; 15-toggle switch (to turn off the power supply of the stand); 16-toggle switch to turn off the compressor; 17-toggle switch to select the type of analog output signal of the pressure sensor (current 4-20 mA or voltage 0-1 V)

Completeness
Training stand PSSID-10-6LR "Devices and means of creating and measuring pressure".
Multimeter with a set of wires for connecting to the stand.
User manual.
Passport.
Manual for laboratory work.
Manual stopwatch.

Training stand "Diagnostics of gear defects" DM-DDZP-3LR-0.14000 PS



Purpose - studying the vibration activity of a cylindrical gearbox, depending on the presence of damage and the load on the gearbox. gearbox. The training stand "Diagnostics of gear defects" allows you to determine the vibration acceleration spectra of various points of the cylindrical gearbox housing, depending on the speed of the drive motor and the amount of transmitted torque.

Technical characteristics
Power supply voltage: 220V
Power consumption (without PC), no more than: 900 W
Overall dimensions (without PC), no more than: 600× 400× 400 mm.
Weight, not more than: 30 kg

1 - electric motor; 2-frequency converter; 3-control panel; 4 - handle of the potentiometer for setting the frequency of the supply current of the electric motor; 5-screen for displaying the current parameters of the frequency converter; 6 - cylindrical gearbox housing mounted on vibration-insulating supports; 7-screws for fixing the transparent cover of the gearbox; 8-transparent cover of the gearbox; 9-gear wheel with a defect, the number of teeth Zk=72; 10-gear wheel without defects, the number of teeth Zk =72 ; 11-powder brake; 12-stand base with adjustable supports; 13 - motor speed sensor; 14-toggle switch for switching on the power supply of the control system; 15 - "START" button for starting the rotation of the electric motor; 16 - "STOP" button for stopping the rotation of the electric motor; 17 - "Emergency stop" button for emergency disconnection of the power supply of the stand; 18, 21-accelerometers installed on the bearing housings of the drive shaft of the gearbox; 19-gear without defects, number of teeth ш w =15; 20 - gear with defects, number of teeth Z w = 15 ; 22 - ADC-DAC board for controlling the stand with a PC; 23-USB connector 23 for connecting the stand to a PC.	**Completeness** **- training stand "DDZP"; - PC (laptop); - program for working with the stand; - operating manual DM-DDZP-3LR-014.000 RE; - manual for performing laboratory work DM-DDZP3LR-014.000 PZ; - passport DM-DDZP-3LR-014.000 PS. - operating instructions for the frequency converter "Danfoss"; - oil canister TAD-17 1 l; - hex key 4 mm; - gloves lagex non-styrene 5 pairs**

Laboratory of Materials Science and Technology of Structural Materials, auditorium 102

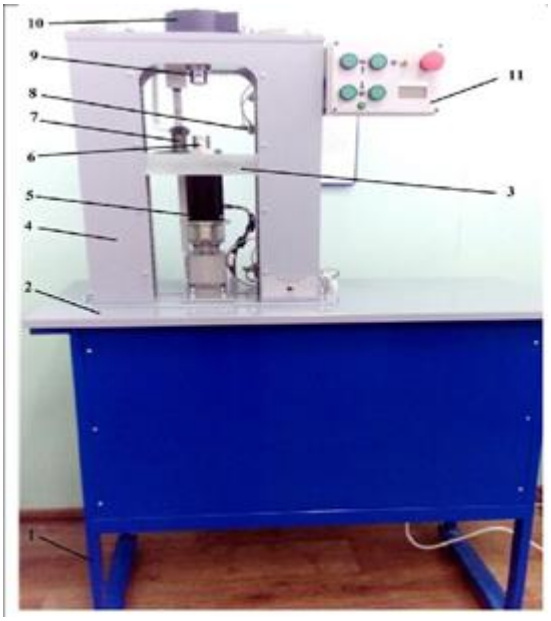
Laboratory work is carried out in the following subjects: "Materials Science and new materials", "Fundamentals of interchangeability", "SI of electrical quantities", "Metrology", etc.

In addition, undergraduates conduct research in the following areas: composite materials and vibration dampers, anticorrosive coatings of metals and alloys, preparation of metal samples of micro-grinds, testing of building materials, research of the microstructure of metals, etc.

The laboratory has the following facilities and testing equipment:

- Educational electromechanical testing machine UEIM-20-300;
- Universal laboratory installation " Study of metal corrosion by the method of polarization resistance";
- Standard set of training equipment "Electrical measurements and fundamentals of metrology" Desktop version, manual version of EIOM-HP
- Training and laboratory complex "Industrial sensors of mechanical quantities";
- Training universal testing machine "Testing of composite materials" IKM-010-4LR;
- Stationary HARDNESS tester HBRV-187.5 D;
- Device for checking products for runout in the centers of the model PB-250M, PB-500M, PB-1600M;
- Profilometer model 130.

Educational electromechanical testing machine UEIM-20-300



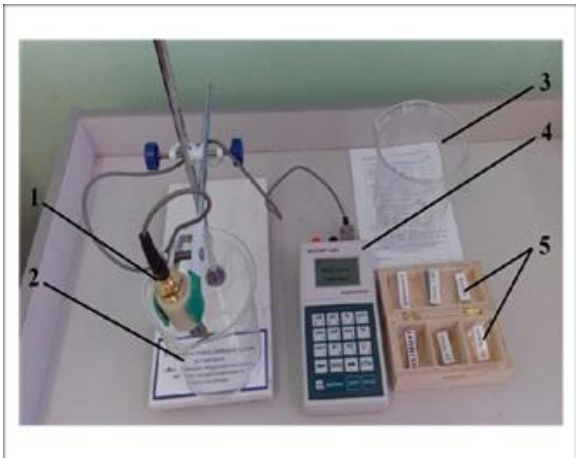
Purpose-study of mechanical properties of materials and structural elements in the discipline "Testing, control and product safety".

Technical characteristics
Supply voltage: 220V
Current type: AC single-phase 50 Hz
Power consumption, not more than, kW: 0.8
The force developed by the machine, not less than, kN: 20
Traverse stroke, mm: 300
Discreteness of determining the traverse movement, mm: 0.01
The accuracy of determining the force, not worse, N: 20
Overall dimensions:
width-1000 mm
depth-500 mm
height-1650 mm
Weight: 120 kg

Device
1-frame structure; 2-table top; 3-movable traverse; 4 – ball-screw gears located in the housing; 5-drive gearbox with stepper servo motor; 6-lower adapter for installing supports and grippers; 7-digital displacement sensor; 8 - sensors of the final position of the movable traverse; 9-upper adapter for installing supports and grippers; 10-force meter; 11-electric unit with buttons for manual control of the machine and a display indicating the force.

Completeness
Educational electromechanical testing machine UEIM-20-300.
A laptop.
A set of grips for laboratory work.
A set of samples (5 pieces of each type).

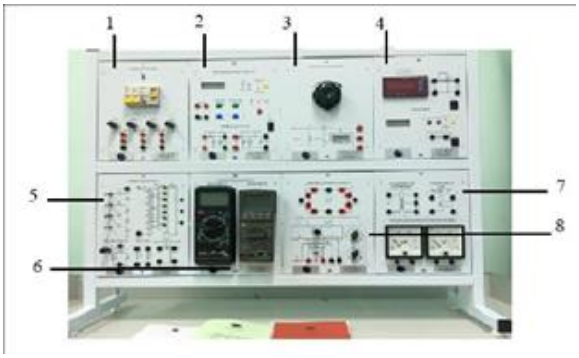
Universal laboratory installation " Study of metal corrosion by the method of polarization resistance



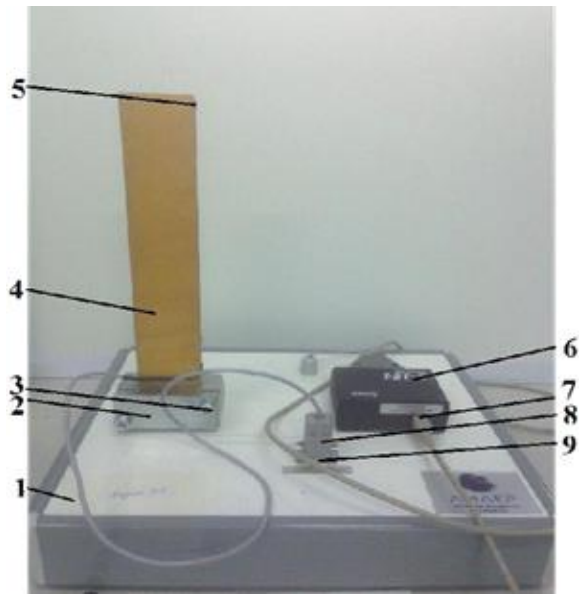
Purpose-to determine the indicators of uniform, pitting corrosion, as well as the corrosion potential of metals, alloys and coatings in liquid conductive media, the parameters of metal etching processes, the protective properties of anode, chromate and other conversion coatings, and the implementation of a number of other corrosion-electrochemical methods.

Technical characteristics
Measurement ranges: total (Cp) and pitting corrosion (P) 0.001-75000 microns / year*; electrode potentials (Ecor) +/ - 2000 mV (0.001 mV) 10000 μA постоянного DC (I).
Continuous operation duration: 8 h
Operating mode setting time, up to 5 min.

	Operating temperatures: IP, 0-500C; **sensors,-50 - +1000C.** **Operating mode: two-three-electrode** **Overall dimensions of the IP, mm, not more than: 200x100x60**
Device **1 - measuring sensor in a teflon housing;** **2,3-laboratory beaker;** **4-universal corrosion meter (MC) "Expert-004»;** **5-samples of steel grades 20, 45, U10.**	**Completeness** **Universal corrosion meter "Expert-004".** **Measuring two-electrode sensor in a teflon housing DTF-2.** **Measuring three-electrode sensor in a teflon housing DTF-3.** **Power supply unit.** **The cable of the output channel of information exchange.**

Standard set of training equipment "Electrical measurements and fundamentals of metrology" Desktop version, manual version of EIOM-HP	
	**Purpose-for use in the study of the disciplines "Metrology", "Standardization and certification", "Electrical measurements".** **Technical characteristics** **AC power supply voltage: 220 V.** **Supply voltage frequency: 50 Hz Power consumption, no more: 100 W** **Overall dimensions, mm:862×680×260** **Weight, not more than: 30 kg** **Operating temperature range:+10…+35°C** **Relative humidity, up to: 80%** **Protection class against electric shock: 1**
Device **1 – Power supply module.** **2-Function generator.** **3-Autotransformer.** **4-Wattmeter. Stopwatch.** **5 – DAC and ADC elements.** **6-Measuring unit.** **7-Diagram of the measuring bridge.** **8-Voltage and current transformers.**	**Completeness** **Frame (2x4).** **Set of modules:"Autotransformer"; " Wattmeter. Stopwatch"; "Power module"; "Dial field"; " DAC and ADC elements»;** **"Function generator. Peak detectors"; " Current and voltage transformer. Magnetoelectric system devices"; " Measuring unit»** **A set of minimodules: a set of minimodules "Resistor (the nominal values of the resistors' resistances are indicated on the upper covers of the minimodules); "Capacitor" (the nominal values of the capacitances of the capacitors are indicated on the upper covers of the minimodules); "Choke" (the nominal values of the inductances of the chokes are indicated on the upper covers of the minimodules); "RC – link (the nominal values of the parameters R and C are indicated on the upper covers of the minimodules); universal minimodule (user elements).** **Resistance store P33;** **A set of connecting conductors.**

Training and laboratory complex "Industrial sensors of mechanical quantities”	
	Purpose-for training in specialties that study disciplines related to automation of various industries. **Technical characteristics** **Power supply voltage: 220 V.** **Supply voltage frequency: 50 Hz Power consumption, not more than: 200 VA** **Stand dimensions, no more than: 500×400×350 mm** **Stand weight, not more than: 15 kg**
Device **1. Block of digital indicators.** **2.Food.** **3. Tachogenerator.** **4. The unit for the study of speed sensors.** **5. Drive motor.** **6. Encoder.** **7. Unit for the study of speed sensors.**	**Completeness** **A set of contactless limit switches.** **A set of targets.** **A set of cables and connecting wires.** **Technical description of the stand.** **Guidelines for conducting laboratory work.** **Passport.**

Training universal testing machine "Testing of composite materials" IKM-010-4LR	
	**Purpose - to conduct laboratory work on the courses "Mechanics of composite materials".** **The stand allows for the experimental determination of the first the natural frequency and the decrement of free vibrations of a cantilever beam made of a composite material plate.** **Technical characteristics:** **Length of the free part of the sample under study: 260 mm.** **Maximum recorded acceleration: 180 m / s2** **Overall dimensions (without PC), mm** **Width: 350** **Depth: 300** **Height: 400** **Weight (without PC), 10 kg** **Device** **1-Massive base.** **2 - a sample attachment device that includes a pressure plate.** **3-screws.** **4 – the plate under study.** **5-accelerometer.** **6-payment.** **7-USB connector.**

8-fork part.
9-socket part.
10-case.
11-sample.
12-samples with cutting angles.
13-6 mm hex key.
14-elastic gasket.

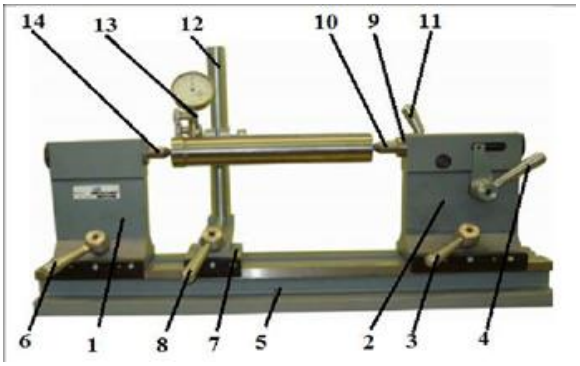
Completeness
Training stand "Testing of composite materials" IKM-010-4LR.
Case with samples, hex key and elastic gasket.
A laptop.
Operation manual IKM-010-4LR. 000 RE.
Passport IKM-010-4LR. 000PS.
Description of the software ICM-010-4LR. 001 PZ.
Guidelines for performing laboratory work IKM-010-4LR. 001 PZ.

Stationary HARDNESS tester HBRV-187.5 D

Purpose - measurement of hardness on the Brinell, Rockwell and Vickers scales with the possibility of using 7 load stages.

Technical characteristics
Preload: 98.07 N (10kg);
Tolerance: 1.0%. Total
load tolerance: 2.0%. Brinell
scale load: 30 kg (294.2 N), 100 kg (980.7 N).
Load on the Rockwell scale: 60 kg (588.4 N), 100 kg (980.7 N), 150 (1471 H).
Load on the Vickers scale: 30 kg (294.2 N), 100 kg (980.7 N).
Indentors: Rockwell and Vickers diamond pyramids.
Power supply and voltage: 220V, 50-60Hz5%,
Load application time: 2-60 sec
Distance from the indenter to the base: 160 mm
Maximum sample height:
for Rockwell scale-175mm
for Vickers scale-145 mm
Eyepiece magnification: 15x
Magnifying the lens: 2.5 x; 5x
Overall dimensions: 730×525×240
Total weight of the device: about 70 kg

Device **1-control panel;** **2-dial;** **3-indenter mounting screw;** **4-indenter;** **5-object table;** **6-way screw;** **7-flywheel for moving the lead screw;** **8-horizontal adjustment screw;** **9 – power cable and fuse;** **10-load change handle;** **11-switch;** **12-back cover;** **13-holder;** **14-connector**	**Completeness** **Rockwell diamond indenter.** **Ball indenter - 1.5875 mm.** **The table is large, flat, small, and V - shaped.** **Standard Rockwell hardness measurement unit.** **HRC(High); HRC(Lower); HRB.** **Cargo 0, 1, 2, 3, 4.** **Power cord.** **The fuse is 2A.** **Level.** **Horizontal adjustment screw.** **Screwdriver, wrench.** **The case.** **Operating instructions.** **Tables for Vickers, Brinell.**

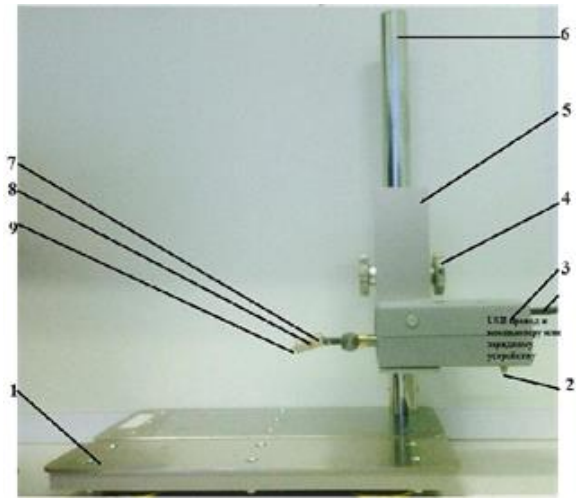
Device for checking products for runout in the centers of the model PB-250M, PB-500M, PB-1600M	
	**Purpose - controling the value of the radial and end runout of the bodies of rotation installed in the centers.**
Device **1-left headstock** **2-right headstock** **3; 6; 8-manual clamp** **4-handle with lever** **5-base** **7-carriage** **9-movable pinole** **10; 14-center** **11-locking device** **12-carriage stand** **13-indicator holder**	**Completeness** **Device for checking products for runout in the centers of PB-250M. 00. 000.** **Device for checking products for runout in the centers of PB-500M. 00. 000.** **Device for checking products for runout in the centers of PB-1600M. 00. 000.** **Accessories** **The indicator of the clock type ICH10KL.1 GOST 577-68.**

Title	**PB-250M**	**PB-500M**	**PB-1600**
1 Characteristics of the controlled parts::			
1.1 Measured parameters	**Radial and end runout**		

1.2 Diameters of the controlled parts, mm, not more than: **- shafts;** **- disks, gears, etc.**	**140** **300**	**140** **300**	**260** **340**
Weight of the controlled parts, not more than, kg	**13,5**	**50,0**	**95,0**
Height of the centers, mm, no more	**160**	**160**	**250**
Distance between centers, mm, not less	**250**	**500**	**1600**
Operating principle	**Mechanic**		
Measuring method	**Direct evaluation method**		
The price of the division of the scale of the indicator of the hourly type ICH 10 cl. 1, mm	**0,01**	**0,01**	**0,01**
The range of readings of the scale of the indicator of the hour type ICH 10 cl. 1, mm	**0-10**	**0-10**	**0-10**
The maximum permissible error of the device with the indicator IC10 cl. 1, mm	**±0,020**	**±0,032**	**±0,036**
Overall dimensions (length x width x height), mm, no more	**650x320x380**	**900x320x380**	**30x545x825**

Weight of the device, kg, no more	**50**	**60**	**450**

Profilometer model 130



Device
1-plate.
2-leg.
3-drive.
4-flywheel.
5-carriage.
6-column.
7-sensor housing.
8-locking screw.
9-diamond needle.

Purpose-for measurement under the following external conditions:
- ambient temperature from +100C to 350C
- relative humidity from 45% to 85%
- temperature change in 1 hour-no more than 20C
- the external vibration should not exceed the values at which the instability of the parameter Z (microns) of the operating window of the control program at its values near zero exceeds 1% of the upper limit of the measurement sub-range.

Technical characteristics
Set of sensor trace speeds: 0.25; 0.5; 1.0; 2.0 mm/s.
Maximum rating length: 40 mm.
The radius of curvature of the needle tip: 10±2.5 microns.
Filter type: C – PC.
The operating temperature range is 10±35 0C.
Overall dimensions, not more than:
drive: 150×80×75;
sensor: 70×10×10;
rack: 420×200×300:
Weight (with stand and computer), kg, not more than: 18
Additional technical specifications
Radius of curvature of the working part of the sensor support in the measurement plane: 125 mm.
The impact force of the sensor support on the measured surface, not more than: 0.5 N.
The force of the needle on the measured surface: 0.004 N.
The smallest diameter of the hole in which the measurement is possible:
at a depth of up to: 17 mm
at a depth of up to: 60 mm

Completeness

The sensor.
Drive.
A control computer with a monitor, keyboard, and mouse.
A rack with a prism for basing cylindrical parts.
Measure of mood (calibration).
The program for the control computer on the DVD.
Passport.

Computer class, room 140A

The computer class is equipped with 13 computers of the latest generation. Issuing and receiving tasks to students, monitoring the process of their implementation is carried out from the main computer. All computers are located in a single local network, connected to high-speed Internet.

For students, computers have been introduced:

1. Database of national (ST RK) and interstate (GOST) standards of RSE on PCV "KazStandart" KTRM (GOSSTANDART) MIIR RK:

- National and interstate standards (GOST, GOST ISO, GOST IEC, GOST ISO / IEC, ST RK ISO / IEC, ST RK ISO, ST RK IEC, etc.);
- National classifiers (NC RK);
- Monthly information indexes (IUS);
- Annual indexes: Index of normative documents on standardization of the Republic of Kazakhstan, Index of interstate normative documents on standardization, List of canceled and replaced interstate normative documents on standardization.

2. Collection of tasks on the discipline "Database and expert evaluation".

3. Tasks on the assembly and calculation of electrical circuits, calibration of SI in the disciplines "Methods and means of measuring electrical quantities", "Fundamentals of Electrical Engineering".

4. Virtual laboratory work "Impact tests".

5. Licensed programs.