



Limited Liability Company
"NPK MORSVYAZAVTOMATICA"



INPUT, OUTPUT, INPUT-OUTPUT, MANIPULATING AND CONTROL DEVICES

Operating Manual

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INTRODUCTION

This operating manual (hereinafter referred to as OM) is intended to familiarize service staff with the design, structure, operating principles and technical service of input, output, input-output, manipulating and control devices (hereinafter – the Product).

In addition to the instructions given in this document, the safety regulations and rules applicable in the field shall be observed.

Only those who have read and understood this document and those who have had special training shall be permitted to operate with the Product according to the applicable regulations.

Terms and abbreviations:

OM – operating manual;

PC – personal computer;

OS – operating system;

TS – technical service;

CL – check list;

LFSG – large fine-pored silica gel granular.

1 DESCRIPTION AND OPERATION OF THE PRODUCT

1.1 GENERAL DESCRIPTION

1.1.1 The Product operates as a part of PC and provides an option to control and input textual information while working with OS installed on the PC.

The Product includes keyboards, manipulators, trackballs, touchpads and computer mice.

1.1.2 A keyboard is a set of keys arranged in a particular order to input information.

1.1.3 A manipulator is a coordinate device to control the cursor and input commands.

The following types of trackballs are available for delivery:

a) a trackball – a device to position the cursor on the screen by rotating the ball embedded in the stationary casing; this allows for the cursor positioning with precision up to several pixels and does not require motion of the manipulator itself;

b) a computer mouse – a coordinate device to control the cursor and input commands. To control the cursor, move the mouse across the flat surface. To input the commands, press keys, scroll or press the mouse wheel;

c) a touchpad – a pointing coordinate input device to control the cursor and input commands. To control the cursor, move a finger on the device's surface. To input the commands, press keys.

1.2 TECHNICAL SPECIFICATIONS

1.2.1 The devices ensure the following functions:

a) the devices are ready for operation max. 1 minute after switching on.

Note – If the Product is connected via PS/2 interface time of the Product's readiness for operation depends on the OS boot-up time;

b) correct input of characters in compliance with names of keys;

c) visual indication of current register status (*Caps Lock* key), active numeric keyboard (*Num Lock* key) and scrolling (*Scroll Lock* key);

d) adjustable backlight for the devices installed on the bridge (backlight brightness is adjusted by a button).

Note – This function is available at option;

e) keystroke protection mode and lock release by means of lock button and lock status indication.

Note – This function is available at option. All controls are locked simultaneously for the Products TBK, TCK type;

f) response on the PC screen in compliance with control motion of a manipulator.

1.2.2 The devices include the following types of keyboards:

a) with an embedded trackball:

– panel mounting: TBK-1368, TBK-1378, TBK-1369, TBK-1379, TBK-2368, TBK-2378, TBK-2369, TBK-2379, TBK-1468, TBK-1478, TBK-1488;

– desktop mounting: TBK-1568, TBK-1578, TBK-1569, TBK-1579, TBK-1588;

b) with an embedded touchpad:

– panel mounting: TCK-1368, TCK-1378, TCK-1369, TCK-1379, TCK-2368, TCK-2378, TCK-2369, TCK-2379, TCK-1468, TCK-1478;

– desktop mounting: TCK-1568, TCK-1578, TCK-1569, TCK-1579;

c) w/o an embedded manipulator:

– panel mounting: K-1368, K-1378, K-1369, K-1379, K-2369, K-2379;

– desktop mounting: K-1568, K-1578, K-1569, K-1579;

– rack mounting (pull-out): K-1468, K-1478.

All keyboards have Russian-English layout. Front panel material of the keyboards is corrosion- and wear-resistant.

1.2.3 Cursor-manipulator control devices include the following autonomous manipulators:

- a) laser trackballs with a ball diameter 38 mm and 50 mm, available in plastic or metal design TBM-2368, TBM-2378, TBM-2369, TBM-2379;
- b) a mechanical trackball with a 50 mm ball TBM-23678;
- c) capacitive touchpads TCM-2369, TCM-2379;
- d) mouse M-1568;
- e) mice with embedded trackballs TBM-1468, TBM-1478.

1.2.4 In-depth technical specifications, a type of embedded manipulator, trackball diameter, size of touch manipulator's active area, quantity of keys, key service life, interface type, material of front panel are described in detail in Technical description.

1.3 THE PRODUCT'S STRUCTURE AND OPERATION

1.3.1 The range of keyboards enables to organize workplaces with various functionality. The type of applied keyboard depends on its purpose, location at facilities and mounting type. The keyboards are equipped with a standard cable 1.8 m \pm 5% with a terminal device (connector) to connect to the PC.

Note – Some types of standard cables may have length 2.0 m \pm 5%.

The keys are divided into groups according to their functionality:

- a) alpha-numeric (alphabet, numbers and character keys to input letters, digits, punctuation marks, and specific characters);
- b) service: *SHIFT, CAPS LOCK, CTRL, ALT, ESC, NUM LOCK*;
- c) service keys for editing: *SPACE, BACKSPACE, DELETE, INSERT*;
- d) special (service): *ENTER, TAB*;
- e) function: *F1–F12*;
- f) navigation: *HOME, END, PAGE UP, PAGE DOWN*;
- g) numeric keyboard: *NUM LOCK*;
- h) additional: *PRINT SCREEN, CONTEXT*.

Along with the abovementioned groups the keyboard is equipped with a built-in pointing device (a cursor control device) – a trackball or touchpad.

Figure 1 and table 1 describe the keyboard layout and functions of the keys.

Note – Depending on the software, actual functions of keys may be different from the ones represented in table 1. Numbering and layout of the keys described in figure 1 and table 1 may differ depending on the type of keyboard.

Figure 1 – The Product’s layout of functional keys

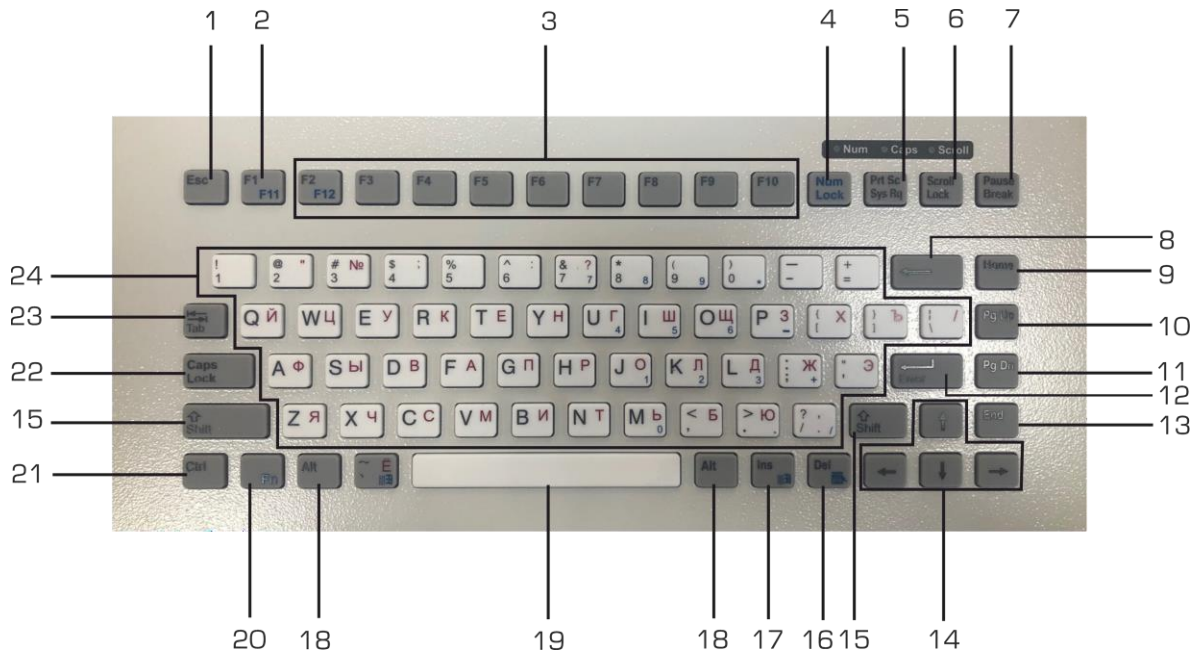




Table 1 – Description of functional elements

Name or identifier	Functionality	Numbering
Alphabet and numeric keys	Keys to input letters, digits, and punctuation marks	23–35, 41–53, 58–68, 74–83, 93
Numeric keys	Keys to input digits, and symbols of mathematical operations	37–39, 54–56, 70–72, 85–88, 100, 101
<i>SHIFT</i>	A modifier key to type uppercase letters	73, 84

Name or identifier	Functionality	Numbering
<i>ESC</i>	A key to cancel the previous action	1
<i>CAPS LOCK</i>	A key to type all letters as capital	57
<i>CTRL</i>	A modifier key (system key)	90, 99
<i>ALT</i>	A modifier key (system key) is used to expand event lists in case of combination with other keys	96
<i>NUM LOCK</i>	A key to type digits with an LED. When it is enabled, a user can input digits; when it is disabled the keyboard controls the cursor (alternates keys' function)	36
<i>SPACE</i>	A key to move the cursor one space forward	95
<i>BACKSPACE</i>	A key to delete a character before the current cursor's position	35
<i>DELETE</i>	A key to delete a character ahead of the cursor's current position	20
<i>INSERT</i>	A key to turn on Insert mode	14
<i>ENTER</i>	A key to confirm a command, any action or move the cursor to the beginning of the next line	69, 89
<i>TAB</i>	A key to switch among tasks or move the cursor several spaces forward in some editor programs	40
<i>F1</i>	A key to get system information	2
<i>F2–F12</i>	Programmable keys (each key is programmed to perform a particular function)	3–13
<i>HOME</i>	A key to return the cursor to the beginning of the line	15
<i>END</i>	A key to return the cursor to the end of the line	21
<i>PAGE UP</i>	A key to scroll the cursor one page up	16
<i>PAGE DOWN</i>	A key to scroll the cursor one page down	22
<i>PRINT SCREEN</i>	A key to copy the screen picture to the clipboard	–
<i>Windows</i>	A key to control OS	91, 97
<i>CONTEXT</i>	A key to call the context menu	98
Manipulator	A pointing device to control the cursor (touchpad or trackball)	–
	Keys emulating left and right buttons of the manipulator	–
	An indicator to display that <i>CAPS LOCK</i> is enabled	–
Num	Alternates a mode of keys 0–9 on 10-number keyboard to functions <i>HOME</i> , <i>END</i> , <i>PG UP</i> and <i>PG DOWN</i>	–
Rollen	An indicator to display scrolling lock	–
Caps	Indicators to display that corresponding functions are enabled	–
Scroll		–
Num		–
Note – see the numbering in figure 1.		

1.3.2 A trackball is a computer mouse turned upside down. A ball is located at the top or at the side; a user may roll it by palm or fingers; the casing remains in the same position. When in motion the ball moves a pair of rollers (a mechanical trackball), or optic and laser sensors scan ball motion. As a user does not move the casing while operating the device, it allows for saving space on the working table. A user may place the trackball at any position according to their comfort and needs.

The trackball includes the following controls: two (sometimes three) buttons emulating left and right buttons of a computer mouse, and a ball emulating a scroll wheel for manual page scrolling on the screen, see figure 2.



Figure 2 – The layout of trackball’s controls

Table 2 – The trackball’s controls

Pos.	Name
1	Buttons emulating left and right buttons and scroll wheel of a computer mouse
2	A ball to control the cursor

1.3.3 A touchpad is a rectangular touch panel on which a user may move or drag their finger, tap or double tap. Finger motion moves the pointer (the cursor) on the screen; tap or double tap emulate keystrokes of a computer mouse. Operation principle is based on the electric capacity measurement between a finger and panel’s sensor. The sensors located along the vertical and horizontal axes of the panel enable to define the position of the finger with high precision.

The touchpad includes two buttons emulating left and right buttons of a computer mouse, and the active touch area that performs the cursor control and scrolling function.

1.3.4 Move the mouse along the horizontal surface to control the cursor. The keys and scroll wheel enable to select and activate an object, call the context menu, and scroll electronic documents vertically.

A laser mouse is equipped with three buttons, two of which perform standard functions of any computer mouse, and the third button controls scrolling, see figure 3.

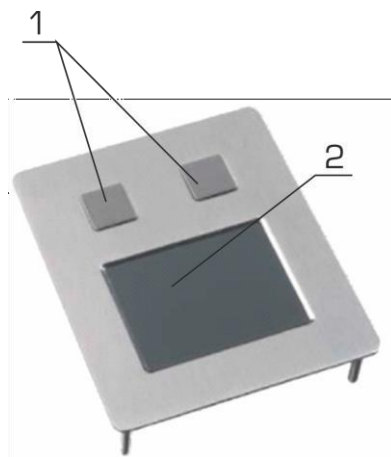


Figure 3 – The layout of touchpad controls

Table 3 – The touchpad controls

Pos.	Name
1	The buttons emulating left and right buttons and a scroll wheel of a computer mouse
2	The touch panel to control the cursor

1.4 MEASUREMENT INSTRUMENTS, TOOLS AND APPLIANCES

Table 4 describes consumables required to perform the TS.

1.5 MARKING AND SEALING

The Product has a nameplate indicating serial number, date of manufacturing, weight, protection degree, input voltage and power consumption.

The sealing of the Product is not provided.

1.6 PACKAGING

At the time of delivery the Product is packed in a corrugated board box and inner packaging (air bubble polyethylene film) ensuring its transportation and storage at the warehouse.

Transport packaging is also used as a returnable packaging for transportation of the Product to the repair location and back.

The sealing of transport packaging is not provided.

Table 4 – Consumables required to perform the TS

Name and identifier of consumables	Amount of consumables	Note
Cleaning cloth	0.10 kg	1 To wipe down the surfaces of the equipment – by clean cloth. 2 To remove severe contamination – by cloth soaked in alcohol
Rectified hydrolytic technical ethyl alcohol	0.05 l	To soak cloth to remove contamination from the screen
Varnish	0.05 kg	To cover surfaces of the Product in case of paint coating damage
Abrasive cloth	0.06 x 0.06 m	To polish surfaces of the Product in case of paint coating damage

2 INTENDED USE OF THE PRODUCT

2.1 OPERATIONAL LIMITATIONS

Select a place to install the Product in compliance with the operational limitations (operating temperature and protection degree – IP).

Caution! Distance between the installation site and magnetic compass shall not be less than 1 m!

2.2 USAGE PREPARATIONS

2.2.1 Safety features

While preparing the Product for operation, check it visually after unpacking and make sure that mechanical damage is absent.

While using the Product the staff shall follow “The technical rules for operation of electric installation” and “Safety rules for operation of electric installation” while testing electrical circuits and insulation resistance.

2.2.2 Visual check procedure

Before switching the Product on:

- a) observe visually integrity and initial position of the controls;
- b) check the absence of dust and dirt on the Product casing; clean with a soft cloth if necessary, see table 4;
- c) make sure that cable connectors are securely connected to the Product and check proper grounding of the Product.

2.2.3 Switching on instructions

To connect the Product, use its standard cables; the types of connectors are described in Technical description.

Before switching the Product on, a user shall connect the protection grounding terminal.

Follow the steps below to connect the Product and put it into operation:

- a) make sure that PC is switched off if the equipment has PS/2 interface. If the equipment has USB interface the PC can remain running;
- b) connect the Product’s cable to the PC connector.

To turn off the Product, disconnect the cable from the PC connector.

2.3 INTENDED USE

The Product is delivered from the Manufacturing plant in ready to use condition after connection according to 2.2.

Once the Product is connected to the PC a user should make sure that graphic data is displayed on the screen correctly and with proper quality. Keyboards' operation should ensure correct input of characters, manipulators should ensure correction motion of the cursor – it should not move beyond the PC display.

3 TECHNICAL SERVICE OF THE PRODUCT

3.1 GENERAL INSTRUCTIONS

The Product's TS shall be provided by the staff acquainted with its composition, structure and operation features.

In order to provide safe and reliable operation of the Product, the staff shall maintain all types of TS:

- technical service № 1 (hereinafter – TS-1) – semi-annual TS;
- technical service № 2 (hereinafter – TS -2) – annual TS.

TS-1 and TS-2 shall be provided by the staff on the running Product.

3.2 SAFETY FEATURES

While maintaining the TS, observe the instructions in 4.2.

3.3 MAINTENANCE ROUTINE

Table 5 describes the list of works to be performed during types of TS. Maintenance routine procedure is given in CLs represented in tables 6, 7.

Table 4 describes the list of consumables required to perform TS.

Table 5 – The works to be performed during types of TS

CL No.	Work	TS Type	
		TS-1	TS-2
1	Visual check of the Product	+	+
2	Operation test of the Product	–	+
Notes + implies that the work is obligatory; – implies that the work is not obligatory.			

Table 6 – CL № 1. Visual check of the Product

To be done	Routine	Man-hours per 1 Product
Examine the Product visually	1 check completeness and appearance of the Product; mechanical damage, paint defects must be absent; marking plates shall be present; legends are to be read easily; 2 clean up the Product surfaces with clean cloth; 3 remove severe contamination, parts of corrosion, oil spots from the metal surfaces – using ethyl alcohol, avoiding its penetration inside the Product; all surfaces clean dry by clean cloth and dry up; 4 if varnish paint coating is damaged, polish it with sand paper, then clean with alcohol-soaked cloth, cover with varnish and dry up	1 person 5 minutes
Check that cable and bus are connected to the Product reliably	1 check that connectors and attaching screws are fastened tight; provide further fastening if needed; 2 check the cable integrity (mechanical damage shall be absent) within visibility	1 person 5 minutes

Table 7 – CL №2. Operation test of the Product

To be done	Routine	Man-hours per 1 Product
Check the Product's operation	1 connect the product to the PC; 2 turn on the PC and wait for OS to boot; 3 wait for the Product's response (response time depends on boot-up time of OS); 4 act in accordance with cl. 2.3	1 person 15 minutes

3.4 PRESERVATION

The Product and set of operational documents are stored in preserved condition in Manufacturer's packaging boxes.

The time of representation – 2 years from the Manufacturer's commissioning.

The preservation is done in full terms, for 2 years, applying protection and packaging.

The representation is done in heated rooms in the same order as the preservation.

The represented Product and documents are placed in package.

4 CURRENT REPAIR OF THE PRODUCT

4.1 GENERAL INSTRUCTIONS

To diagnose the malfunctions, see table 8.

If you cannot diagnose the problem, contact the Manufacturer's service centre.

4.2 SAFETY FEATURES

Any repair works must be provided by personnel examined and received proper qualifications in the area of the occupational safety.

Check grounding of the Product before providing any repair works.

It is PROHIBITED to put a poster "DO NOT switch on! Under Operation!", when power supply switch is in OFF position.

Replacing damaged parts, boards, modules is PROHIBITED if power supply of the repaired unit is on

Installation, aligning and repair works are PROHIBITED in the room, where less than 2 people are present

4.3 CURRENT REPAIR

The list of malfunctions that can be eliminated by own employees is represented in table 8.

Table 8 – The list of potential malfunctions and troubleshooting

Malfunction	Potential reasons	To be done
The Product does not respond to user commands	The Product's cable is not connected to PC	Connect the cable. Reboot the PC (if the connector is PS/2)
	The Product's connection cable is faulty	Contact the Manufacturer's service centre
	The Product is faulty	Contact the Manufacturer's service centre

5 STORAGE

The Product must be stored in packaging inside areas complying with the required storage conditions (+ 5 to + 40 °C) with the concentration of dust, oil, moisture and aggressive impurities in the air within the required limits for the working areas of production facilities.

After storage or transportation of the device below + 10 °C, it must be unpacked only in heated premises and left in normal climate conditions for 12 hours beforehand.

6 TRANSPORTATION

The Product must be transported in the Manufacturer's transportation package in closed means of transport.

Types of shipment:

- motor vehicle and railroad transportation in closed means of transport (covered cars, multipurpose containers)
- air transportation (in sealed and heated compartments);
- sea transportation (in dry service premises).

The Product must be transported in compliance with transportation rules applicable for each means of transport.

During loading/unloading operations and transportation, the requirements indicated on warning labels on the boxes/packaging must be observed, and no impacts are permitted since they can affect the safety and performance of the Product.

Inside the means of transport, the packed device must be firmly secured/fastened.

7 DISPOSAL

New equipment, the parts of the Product damaged during operation, and any overage equipment must not be disposed as standard household wastes, since they contain the materials suitable for re-use.

Decommissioned and non-used components of the Product must be delivered to a special waste disposal center licensed by local authorities. You can also send an over-age equipment/unit to the manufacturer for its further disposal.

Proper disposal of Product components allows avoiding possible negative environmental and health impacts, and it also allows for proper restoration of components with substantial energy and resources saving.

During operation and upon completion of its service life, the equipment is not hazardous for health and environment

This unit must be disposed according to the rules applied to electronic devices



Any products marked with a crossed trash bin must be disposed separately from standard house-hold wastes