

Programmable electronic modules LABOTRIX ROBOKIT R1

PRODUCT PASSPORT

Kyiv

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1. General Information about the Product

- 1.1. **Product name** — Programmable electronic modules.
- 1.2. **Trademark** — Labotrix.
- 1.3. **Model** — Robokit R1; full trade designation — LABOTRIX ROBOKIT R1.
- 1.4. **Manufacturer** — Labotrix Group Limited, China.
- 1.5. **Intended use:** practical study of the basics of electronics, programming and automation of technological processes in general secondary education institutions. Using the kit, students independently assemble simple electronic circuits, write and upload training programs for them, and observe how the microcontroller board reads signals from connected modules, processes them and controls the connected elements, reproducing the logic of an automated technological process on an educational scale. The kit is intended for practical classes in the basics of electronics, programming clubs and project work of students in STEM laboratories, as well as for extracurricular technical creativity.
- 1.6. **Design features:** the basis of the kit — a programmable microcontroller board with input/output ports for connecting external electronic modules. It includes basic modules and components for assembling training circuits, as well as parts for their mechanical mounting. The connection is solderless — using a breadboard, unified connectors and jumper wires, so the assembled circuit is easy to take apart and reassemble. The board connects to a computer via a wired USB connection to upload programs. The exact list and quantity of the kit's electronic modules is given in the manufacturer's packing list.
- 1.7. **Digital learning support:** together with the product, the right of access to an online teaching support course is transferred; the course is hosted in a learning management system (LMS) and is designed for 70 academic hours of lessons. The course is compiled to match the current curricula of general secondary education institutions of Ukraine. The materials are grouped into research modules in the subjects of physics, biology, chemistry, STEM and robotics, and every topic contains a lesson plan, a list of the required equipment, an experiment scenario, a step-by-step laboratory work instruction with an explanation of the expected result, a video demonstration of working techniques, interactive exercises and tasks for independent study, suitable both for individual and for group work. All modules are compiled for this very equipment and have been tested on it, therefore the course works along the direct chain "equipment → methodology → learning outcomes". A language-model-based assistant with retrieval over the course knowledge base (Retrieval-Augmented Generation) is built into the course: for the topic of the lesson it selects appropriate tasks, sets out the sequence of conducting the study in methodological terms, examines typical student errors and gives personal advice on how to get rid of them, changes the level of difficulty to match the preparation of a particular class and helps to draw up a report on the study and to organize the conclusions. The knowledge base of the assistant is localized and aligned with the Ukrainian curriculum. The license for the course and the accompanying software is valid for 12 months from the date on which access is transferred; the content, the interface and the answers of the assistant are provided exclusively in Ukrainian.

2. Technical Specifications

- Brand — Labotrix
- Model — Robokit R1
- SKU — LTX-ROBOKIT-R1
- Product type — a set of programmable electronic modules for teaching the basics of electronics and programming
- Microcontroller — a programmable board supporting common development environments
- Input/output ports — digital and analog, for connecting the kit's external modules
- Controller power supply — autonomous from a battery or from the computer via a USB port (5 V) during programming
- Module connection method — solderless: breadboard, unified connectors, jumper wires
- Reusability of circuit assembly — unlimited, without damaging components during disassembly
- Connection to the computer — wired USB connection for uploading programs
- Programming environment — supports visual block-based programming and text-based programming
- Environmental sensors — determine temperature, air and soil humidity, air composition and ultraviolet radiation level
- Motion and spatial orientation sensors — acceleration (accelerometer), tilt angle, structural vibration, detection of obstacles and of the movement line
- Special sensors — magnetic field, structural impact or touch, open fire detection
- Wireless communication channel — the controller exchanges data with a mobile phone, tablet or computer over a short distance
- Motion drives — precision positioning servo drive (rotation angle 180°), power servo drives (rotation angle from 180°, with holding torque from 2 kg·cm), DC motors with control units (supply voltage — up to 6 V)
- Relay switching modules — turn external loads on and off by command from the program
- Visual display devices — digital and character displays, single LEDs, indicator with controllable glow color, LED matrix
- Sound signaling — buzzer
- User command input devices — buttons, potentiometer, joystick and infrared remote control
- Autonomous power supply — a battery with a charger; its capacity is sufficient for the controller with connected peripherals to operate throughout the entire lesson without recharging and without a connection to the computer
- Structural elements — parts for mechanically mounting modules into a complete device
- Material of structural elements — plastic, metal
- Packaging — individual box with the contents secured
- Ready-to-use condition — structural elements and modules are supplied assembled; before the first lesson, install the programming environment and upload the basic firmware to the board
- Care of the surfaces — wiping with a dry or slightly damp cloth is permitted

- User requirements — the lesson is organized by a teacher or laboratory assistant, students work under supervision
- Language of the operating documentation — Ukrainian
- Operating conditions — premises of an educational institution, air temperature from +5 to +40 °C, relative humidity from 40 to 60 % without condensate
- Digital learning support — online course in a learning management system (LMS)
- Course volume (academic hour) — 70
- Course subjects — physics, biology, chemistry, STEM, robotics
- Composition of the materials — research modules, experiment scenarios, step-by-step laboratory work instructions, video demonstrations, interactive exercises and tasks
- Compatibility of the materials with the equipment — full, along the chain "equipment → methodology → learning outcomes"
- Language-model-based assistant — built into the course, with retrieval over a localized knowledge base (Retrieval-Augmented Generation)
- Validity period of the license for the course and the software (month) — 12
- Language of the course, of the interface and of the answers of the assistant — Ukrainian
- Service life (year) — 5
- Warranty period (month) — 12

3. Package Contents

- Body structure parts for assembling a complete device: beams, frames, axles, gear wheels, panels and fastening elements — 1 set
- Breadboard — 1 pcs
- Jumper wires — 1 set
- Battery with charger and battery holder — 1 set
- USB cable for connection to a computer — 1 pcs
- Microcontroller board supporting an open programming environment — 1 pcs
- Module for wireless data exchange — connects the controller to a mobile phone, tablet or computer over a short distance — 1 pcs
- Real-time clock module — 1 pcs
- Spectral ultraviolet radiation sensor module — 1 pcs
- Combined air temperature and humidity sensor, in module design — 2 pcs
- Light sensor module — 1 pcs
- Soil moisture sensor — 1 pcs
- Air temperature measurement module — 1 pcs
- Photoresistor module — 1 pcs
- Vapor sensor module — 1 pcs
- Analog air composition sensor (gas analyzer) — 1 pcs
- Infrared motion detection modules — 2 pcs
- Vibration measurement module — 1 pcs
- Three-axis accelerometer modules for tracking spatial orientation and movement — 2 pcs
- Tilt sensor with built-in LED indicator, in module design — 2 pcs
- Ball-type tilt sensor and a module based on it — 1 pcs each

- Ultrasonic distance meter — 1 pcs
- Optical curtain module (beam interruption) — 1 pcs
- Line-following module — 1 pcs
- Obstacle avoidance module — 1 pcs
- Open fire (flame) detection module — 1 pcs
- Reed switch and Hall-effect magnetic field sensors, in module design — 1 pcs of each
- Structure impact or touch detection module — 1 pcs
- Joystick modules — 2 pcs
- Remote control (infrared) together with a receiving module — 1 pcs
- Separate pushbutton switches — 4 pcs, and pushbutton switch module — 1 pcs
- Separate infrared transmitter and receiver modules — 1 pcs of each
- Potentiometer module — 1 pcs
- DC motors with control units, supply voltage — up to 6 V — 2 pcs
- Power servo drives — rotation angle from 180°, with holding torque from 2 kg·cm — 2 pcs
- Relay modules for switching external loads — 2 pcs
- Precision positioning servo drive, rotation angle 180° — 1 pcs
- Seven-segment indicator modules with one digit and with four digits — 1 pcs of each
- Single LEDs of four colors — red, green, yellow and blue, 5 pcs of each
- Active-type buzzer — 1 pcs, passive-type buzzer — 1 pcs
- LED matrix panel 8 × 8 — 1 pcs
- LED modules of three types — white glow, controllable color, and tricolor ("traffic light"); 1 pcs of each type
- Character liquid crystal display 2 × 16 — 1 pcs
- Right of access to the online course with a language-model-based assistant (license) — 1 pcs
- Operating instructions and teaching materials in printed or electronic form — 1 set: detailed description of 30 laboratory works and 5 comprehensive research projects aligned with the current curricula
- Product Passport and Warranty Card — 1 pcs
- Individual transport packaging — 1 pcs

The teacher independently determines the exact placement of components in the packaging and their arrangement during the lesson, depending on the training diagram.

4. Safety Precautions

4.1. General requirements

- Before the first lesson, carefully read this passport and the operating instructions. Work with the kit at the educational institution is organized and supervised by the teacher.
- Work with the kit only on a clean, horizontal table free of moisture and foreign objects.
- Do not allow electronic modules to come into contact with moisture, liquids and aggressive chemical substances.
- After unpacking, inspect the board and modules for mechanical damage and damaged contacts.

4.2. Electrical safety

- The board receives power from the battery or from the computer's USB port at 5 V — both options are safe low voltage and do not pose a risk of electric injury during normal use.
- Do not insert metal objects into the connectors of the board and modules; do not touch gold-plated contacts with wet hands.
- Use only a functional USB cable; replace a damaged cable before continuing work.
- Before connecting or disconnecting modules from each other, make sure the board is disconnected from USB power.

4.3. Safety during programming and circuit assembly

- Before the first run of the program, make sure all connections are made correctly.
- Do not leave the board, connected to power, unattended.
- Assemble and disassemble the circuit only after disconnecting the USB cable from the board.

4.4. It is strictly prohibited

- Use a power source with a voltage higher than specified on the board; this will put the board out of operation.
- Disassemble the microcontroller board and electronic modules; this impairs their functionality.
- Immerse the modules in water or expose them to a strongly humid environment.
- Leave the board, connected to power, unattended by adults in the presence of children.
- Modify the board independently; repairs are performed only by an authorized service center.

5. Preparation for Use

- 5.1. Unpack the kit on a clean, dry table and check the completeness against the packing list.
- 5.2. Inspect the microcontroller board and electronic modules for mechanical damage, case cracks and damaged contacts.
- 5.3. Install on the computer the programming environment recommended in the operating instructions, and upload the basic firmware to the board according to the instructions.
- 5.4. Connect the board to the computer with a USB cable; make sure the computer has recognized the device.
- 5.5. Prepare the breadboard, jumper wires and the modules needed for the lesson — sensors, drives, indication or control devices — according to the chosen training diagram.
- 5.6. Upload the simplest test program from the training materials to the board and make sure the system is working correctly.
- 5.7. Before the first autonomous lesson, fully charge the battery with the standard charger according to the instructions in the operating manual.

- 5.8. If the lesson involves data exchange over a wireless channel, turn on the wireless connection on the mobile device or computer and perform pairing with the board in advance.

6. Operating Procedure

6.1. Circuit assembly

- Place the microcontroller board, breadboard and the required electronic modules in front of you on the table.
- Connect the modules to each other and to the board using jumper wires, following the diagram from the training materials.
- To practice skills, start with the simplest circuits and gradually move to more complex ones.

6.2. Programming

- Write the program in a block-based or text-based programming environment depending on the students' skill level.
- Follow the general logic: read the signal from the connected module → process it in the program → send a control command to the actuator module.
- Upload the finished program to the board using a USB cable.

6.3. Testing and debugging

- Run the program and observe the operation of the connected modules.
- If the circuit malfunctions, check: a) correctness of connections; b) that the board model selected in the programming environment is correct; c) program syntax; d) USB power.
- Use the port monitor of the programming environment to view the data that the board sends to the computer.

6.4. Working with the wireless interface and autonomous power supply

- To exchange data with a mobile device or computer over a wireless channel, turn on the wireless connection on that device and perform pairing with the board according to the instructions of the programming environment.
- For autonomous operation without a connection to the computer, first upload the required program to the board via USB, then connect a charged battery to the board.
- Monitor the operation of the modules during autonomous power supply: at signs of discharge (unstable or weakened operation), disconnect the circuit and put the battery on charge with the standard charger.
- Before disconnecting or rearranging modules, turn off the power from the battery.

6.5. Changing and reassembling the circuit

- Before changing the circuit, disconnect the board from USB power.
- Disconnect the wires, rearrange or replace the modules, and assemble a new circuit according to the required operating logic.
- Reconnect the board to the computer and upload the appropriate program.

6.6. Finishing the work

- Disconnect the USB cable from the board and the computer.
- Disassemble the circuit and return the modules and wires to their designated storage places.
- Check the completeness against the packing list before placing it in the box.

6.7. Work with the online course

- Obtain an account at the educational institution and activate the right of access to the course; the validity period of the license is counted from the date on which access is transferred.
- Select the topic of the lesson in the course list: every topic is accompanied by a plan, a list of equipment, an experiment scenario, a step-by-step instruction, a video demonstration and interactive tasks.
- Formulate a query to the assistant on the topic of the lesson — it will suggest appropriate tasks, set out the sequence of actions, examine typical errors and advise how to correct them.
- Set the level of difficulty of the tasks to match the preparation of the class; on the basis of the results of the work the assistant will help to draw up the report and to organize the conclusions.

7. Care, Maintenance and Troubleshooting

7.1. Cleaning

- Wipe the module casings with a dry, soft cloth.
- Gently clean gold-plated contacts with a contact-cleaning eraser if they have oxidized.
- Do not wash the modules with water and do not immerse them in liquid.
- An empty breadboard can be carefully wiped with a dry cloth; do not touch the internal holes.

7.2. Periodic inspection

- Check the integrity of the jumper wires and connectors, especially after intensive use.
- Check the board and modules for case cracks and contact oxidation.
- If an unusual smell appears from the board or modules, stop working, disconnect the USB cable and let the device cool down.
- Complex faults (board damage, module malfunction) are resolved through an authorized service center.

7.3. Possible malfunctions and methods of their elimination

Symptom	Possible cause	User actions
The board is not recognized by the computer	USB cable is damaged; incorrect connection	Replace the cable; connect to another USB port on the computer
The program does not upload to the board	Incorrect USB driver; incorrect board model selected in the programming environment	Reinstall the driver; select the correct board model in the settings

Symptom	Possible cause	User actions
The connected module does not respond	Incorrect wire connection; error in the program	Check the connections; check the code and re-upload the program to the board
The circuit operates unstably	Weak contact in the breadboard connectors; damaged jumper wire	Check and tighten the connections; replace the damaged wire
The board unexpectedly stops working	The computer went into sleep mode; the USB port turned off	Wake up the computer; disconnect and reconnect the USB cable
The programming environment does not see the board	The board is not selected in the settings; the driver is not installed	Select the required port and board model in the environment settings; install the driver

8. Storage and Transportation Conditions

- Store the kit in a dry, cool place at a temperature of not less than +5 °C and not more than +40 °C and relative humidity up to 80% without condensation.
- Protect the board and modules from dust, moisture and contact with aggressive substances; do not leave them at the edge of a table or in direct sunlight.
- Before long-term storage, distribute the small modules and wires into the packaging compartments provided for them.
- Transport the kit in its original packaging or in a rigid case, avoiding impacts and shaking.
- Do not place heavy objects on the packaging with the set.
- The storage period before commissioning is unlimited provided that the stated requirements are observed.

9. Warranty Obligations

- 9.1. The warranty period of operation of the product is 12 months from the date of sale specified in the warranty card.
- 9.2. The manufacturer guarantees that the product conforms to the declared technical specifications provided that the transportation, storage and operating rules set out in this passport are observed.
- 9.3. During the warranty period, defects of the product that have arisen through the fault of the manufacturer are remedied free of charge. The method of remedy (repair, replacement of a component or replacement of the product) is determined by the service center.
- 9.4. Warranty service is provided on presentation of a correctly and completely filled-in warranty card and of a document confirming the fact and the date of purchase.
- 9.5. The warranty does not cover cases where the malfunction is caused by:

- mechanical damage, in particular cracks, chips and deformation of the housing and of the components of the product;
- violation of the operating, storage or transportation rules set out in this passport;
- ingress of liquid or foreign objects into the product, and also the action of insects and animals;
- independent disassembly, repair or modification of the product, in particular repair at unauthorized workshops;
- use of the product other than for its intended purpose;
- force majeure circumstances (fire, flood, earthquake, etc.).

9.6. The warranty does not cover the natural wear of the coating and of the appearance of the product, nor consumables.

10. Product Disposal

- The product must not be disposed of together with unsorted municipal waste. This is indicated by the marking in the form of a crossed-out container on the product or its packaging.
- After the end of the service life, hand the product over to a collection point for the corresponding waste or to an organization holding the appropriate permit.
- Hand over the packaging elements (cardboard, polymer materials) to the corresponding streams of recyclable materials.

Contacts

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Conditions of use and storage of the product

The product is intended for educational work in general secondary education institutions and is used only under the control and supervision of a teaching staff member; the recommended age of students — from 10 years, that is, students of grade 5 and of higher grades. Keep the product in a dry, clean and ventilated room at a temperature from +5 to +40 °C and relative air humidity up to 80 % without condensation, separately from heat sources and out of direct sunlight, moisture and dust. Use the product exclusively for its intended purpose and do not allow drops, impacts or other mechanical damage. If you notice damage, a crack or any malfunction, stop working with the product immediately and inform the teacher or the responsible person of the educational institution; repairing the product on your own is prohibited.

WARRANTY CARD

Name:	Programmable electronic modules
Product model:	LABOTRIX ROBOKIT R1
Serial number:	
Date of sale:	
Warranty period:	12 months from the date of sale
Trading organization:	
Signature of the seller:	

The goods have been received in working order, without visible damage, complete, and have been checked in my presence. I have no claims regarding the quality of the goods; I have read and agree to the operating and warranty service conditions.

Full name of the buyer _____

Telephone of the buyer _____ Signature of the buyer _____

Dear Customer!

Thank you for choosing Labotrix products. After-sales service of this product is provided in accordance with the regulations of the company and the legislation of the country of sale. So that we can serve you quickly and without unnecessary formalities, check that this warranty card is filled in correctly at the moment of purchase and keep it together with the payment document throughout the entire warranty period. When applying for repair, hand the product over to the seller or to the service center together with the filled-in card.

Procedure for applying

1. The right to free warranty service of the product is valid for 12 months from the date of sale specified in the warranty card. Within this period, components that have failed because of a manufacturing defect are repaired or replaced at no cost to the buyer.
2. Before applying, make sure that the malfunction is not caused by the reasons listed in section 9 of this passport and, if possible, use the table of possible malfunctions in subsection 7.3.
3. After the end of the 12-month warranty period, repairs are performed on a paid basis; the cost of the work and of the spare parts is determined depending on the nature of the malfunction.

Grounds for refusal of warranty service

The company reserves the right to refuse free service or to perform the work on a paid basis if at least one of the following circumstances is established:

- absence of the warranty card, its incomplete or corrected completion, and also the absence of a document confirming the purchase;
- non-conformity of the serial number of the product with the number specified in the card, or damage to the factory marking;
- traces of independent disassembly, repair or modification of the product;
- damage caused by violation of the operating rules, connection to an unsuitable power source or external mechanical impact;
- damage as a result of force majeure circumstances.

Service Records

Date of entry	Description of the malfunction	Work performed	Position, signature, full name of the responsible person