

Digital laboratory for the physics classroom

LABOTRIX SENSE PHY L2

PRODUCT PASSPORT

Kyiv

2026

1. Basic product information

- 1.1. Product name — Digital laboratory for the physics classroom.
- 1.2. Trademark — Labotrix.
- 1.3. Model — SENSE PHY L2; full trade name — LABOTRIX SENSE PHY L2.
- 1.4. Manufacturer — Labotrix Group Limited, China.
- 1.5. Intended use: A comprehensive digital laboratory designed for conducting experimental work and demonstrations in physics in secondary schools and higher education institutions. The system allows teachers and students to perform more than 11 experimental tasks and demonstrations in such branches of physics as mechanics, thermodynamics, electricity and acoustics. The kit includes computer software and a set of wireless sensors for measuring physical quantities. The laboratory combines hardware, multimedia content and elements of generative artificial intelligence, which makes classes inclusive and exciting for students of different levels of training: working with the platform develops attention, logical and imaginative thinking, creativity and cooperation skills, and students perform tasks individually or in groups, developing educational independence and interaction.
- 1.6. Design features: The system works in conjunction with an educational institution's computer compatible with common operating systems and with a set of wireless sensors that exchange data with it via a radio frequency connection. The system includes sensors for measuring force, current, voltage, gas pressure and sound, as well as a photo shutter, accelerometer/altimeter, microcurrent, charge, magnetic field, lighting and thermocouple (the latter also measures temperature). The software allows you to record, analyze and visualize experimental data in real time. Each sensor is equipped with a 1.8-inch color LCD screen that immediately shows the measurement result, and works completely autonomously - without a data logger or other additional analog-to-digital converter for transferring data to a computer or tablet.
- 1.7. Digital learning support: The product includes access to an online teaching support course hosted in a learning management system (LMS) and designed for 70 academic hours of classes. The course is designed to meet the current curricula of secondary education institutions in Ukraine. The materials are grouped into research modules in the disciplines of physics, biology, chemistry, STEM, and each topic contains a lesson plan, a list of necessary supplies, an experiment scenario, step-by-step instructions for laboratory work with an explanation of the expected result, a video demonstration of work methods, interactive exercises and tasks for independent study and for project activities, suitable for both individual and group work. All modules are designed for this equipment and tested on it, so the course works in a direct chain of "equipment → methodology → learning results." The course has a built-in assistant based on a language model with a search through

the course knowledge base (Retrieval-Augmented Generation): based on the topic of the lesson, it selects relevant experiments, methodically describes the sequence of conducting the research, analyzes typical student errors and gives personal advice on how to get rid of them, changes the level of complexity to prepare for a specific class, and helps to write a research report and organize the conclusions. The assistant's knowledge base is localized and aligned with the Ukrainian curriculum. The license for the course and accompanying software is valid for 12 months from the date of access transfer. The course content and assistant answers are provided in Ukrainian, and the learning platform interface is multilingual: Ukrainian localization is enabled by default, the English interface is available as an option.

- 1.8. Processing of the measured data on the platform: The sensors of the kit transmit the measurement results to the electronic platform automatically - the student does not copy the display from the screen or enter numbers by hand. The built-in artificial intelligence agent already works with this array: it builds graphs and tables from it, processes the results obtained, shows the patterns that appeared during the experiment, compares the measured with the reference values for this work and leads the student to independently formulate a hypothesis, conclusion and interpretation, keeping him within the given "corridor of knowledge" - it does not prompt a ready-made answer, but narrows the search to the right direction. Work with the platform is built in such a way that it is suitable for both individual performance and group work.

2. Technical specifications

- Brand — Labotrix
- Model — SENSE PHY L2
- The article number is LTX-SENSE-PHY-L2
- Product type — digital laboratory for physical research
- Specific purpose - educational experiments in mechanics, thermodynamics, electricity and acoustics
- Number of sensor types in the basic set — 12 (13 devices in total; only the photo shutter sensor is doubled — 2 pcs., the remaining types — 1 pc.)
- Sensor display — color LCD, diagonal 1.8 inches, the readings are displayed on the screen immediately in real time
- Autonomy of the sensors — measurement and data transmission without a datalogger or any other additional analog-to-digital converter
- Photo shutter sensor (photo gate) — 2 pcs., range 0–10 s, resolution 0.1 ms
- Force sensor - resolution 0.01 N in the range from –50 N to +50 N
- Voltage sensor — resolution 0.01 V, nominal accuracy ± 0.1 V in the range from –25 V to +25 V
- Current sensor — 0.01 A resolution (measures DC and AC current) in the range from –3 A to +3 A

- Gas pressure sensor - resolution 0.1 kPa (relative pressure measurement) within the range of 0–700 kPa
- Triaxial accelerometer/altimeter - 0.01 g resolution from -5 g to +5 g (XYZ axes)
- Microcurrent (galvanometric) sensor — resolution 0.01 μA in the range from -30 μA to +30 μA
- Charge sensor - 0.1 nC resolution from -50 nC to +50 nC
- Magnetic field sensor - 0.01 mT resolution in the range of -84 mT to +84 mT
- Light sensor - 1 lux resolution within 0-8000 lux
- Thermocouple sensor - ± 0.5 °C resolution from -200 °C to +1200 °C
- Sound sensor — resolution 0.1 dB within 20 Hz–20 000 Hz and 20 dB–120 dB
- Wireless technology — radio frequency (Bluetooth) data transfer between sensors and a computer, as well as wired connection (including USB) and/or transfer to a mobile device or cloud service, with support for simultaneous reading of data from multiple sensors
- Wireless connection range — at least 10 meters in open space
- Sensors are powered by built-in batteries; charged using the included charger, which allows you to charge four sensors simultaneously
- Data analysis software - display of measured data in the form of tables and graphs with export to spreadsheet editors and other programs
- Software compatibility — Windows and macOS platforms, interface in Ukrainian (English — as an option)
- Data sampling rate (hertz) — from 1 to 1000 depending on the sensor and measurement mode
- Number of experiments (pieces) — minimum 11
- Sensor materials - impact-resistant plastic and metal
- Digital learning support — online course in a learning management system (LMS)
- Course volume (academic hour) — 70
- Course subjects — physics, biology, chemistry, STEM
- 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 and of the answers of the assistant — Ukrainian; interface of the platform — multilingual, the Ukrainian localization by default, an English-language interface available as an option
- Transfer of the results to the platform — automatic, without manual entry of numbers

- Processing of the measured data by the artificial intelligence agent — plotting of graphs and tables, analysis of the results, identification of the patterns of the experiment
- Comparison with reference values — provided for every laboratory work of the course
- Support in formulating the conclusions — within the defined "knowledge corridor", without a ready answer
- Operating conditions — premises of an educational institution, air temperature from +5 to +40 °C, relative humidity from 40 to 60 % without condensate
- Language of marking and operating documentation — Ukrainian
- Product marking — trademark, model and a space for applying the inventory number
- Packaging - individual corrugated cardboard box, each sensor is fixed in a separate cell of the housing
- Completeness of documentation - passport with warranty card, operating instructions and methodological manual for the teacher and student with a catalog of experiments and project work
- Ready to use - comes assembled; just charge the sensor batteries before first use
- Care of the sensor surfaces — wiping with a dry or slightly damp cloth is permitted
- Organization of work - suitable for frontal demonstration in front of the class, as well as for individual and group work of students
- Service life (year) — 5
- Warranty period (month) — 12

3. Equipment

- Data analysis software - 1 license
- Wireless force sensor — 1 pcs
- Wireless current sensor — 1 pcs
- Wireless voltage sensor — 1 pcs
- Wireless gas pressure sensor — 1 pcs
- Wireless sound sensor — 1 pcs
- Wireless photo gates (photo shutter sensor) — 1 set (2 pcs.)
- Wireless three-axis accelerometer/altimeter — 1 pc.
- Wireless microcurrent (galvanometric) sensor — 1 pc.
- Wireless charge sensor — 1 pc.
- Wireless magnetic field sensor — 1 pc.
- Wireless illumination sensor — 1 pcs
- Wireless thermocouple sensor — 1 pc.
- Box (case) with foam insert liners for the sensors — 1 pcs
- Right of access to the online course with a language-model-based assistant (license) — 1 pcs
- Set of auxiliary equipment (tripods, wires, feet, clamps) — 1 set

- Charger for the sensors (simultaneous charging of 4 sensors) — 1 pcs
- USB cable for connection to a computer — 1 pcs
- Operating instructions and a methodological guide for the teacher and the student with a catalog of experiments and project work - 1 set.
- Product Passport and Warranty Card — 1 pcs
- Individual transport packaging — 1 pcs

A computer is not included in the kit - the system is used with an educational institution computer that meets the software requirements. Before first use, it is enough to fully charge the sensors with the charger included in the kit.

4. Safety measures

4.1. General requirements

- Before first use, read this passport and keep it together with the product.
- The system should only be used for its intended purpose under the supervision of a qualified teacher or instructor.
- Inspect the unpacked kit for mechanical damage; damaged sensors must not be used.
- Make sure the computer you are using meets the operating system requirements of the software.

4.2. Electrical safety

- The sensors operate at low voltage, however, follow basic electrical safety rules when working with AC circuits.
- Do not touch the terminals of components with bare hands when the power is on.
- When working with a voltage sensor, follow safety rules and do not use it to measure mains voltage (over 50 volts).
- Do not short-circuit the sensor terminals together.

4.3. Safety when working with sensors

- Do not heat the sensors or expose them to fire: the plastic parts may melt.
- Do not disassemble the sensors; this may damage them and void the warranty.
- Charge the sensors only with the standard charger included in the kit.

4.4. It is strictly forbidden

- Do not immerse the sensors and computer in water or other liquids without special protection.
- Use sensors in conditions for which they are not intended (explosive, radioactive or chemically aggressive environments).
- Do not allow moisture to enter the USB port and cables.
- Place the sensors in a strong magnetic field, which may affect their readings.
- Leave sensors unattended in places accessible to small children.

5. Preparation for work

- 5.1. Unpack the kit and check the completeness according to section 3 of this passport. We recommend that you keep the original packaging for further transportation and storage.
- 5.2. Inspect each sensor for visible damage, cracks in the housing, or missing components. Damaged sensors should not be used.
- 5.3. Connect the sensors to the charger included in the kit (at least four at a time) and fully charge them before first use.
- 5.4. Connect the computer to a power source and install the software by following the instructions that came with it.
- 5.5. Check the wireless connection: turn on the sensors and run the program; it should automatically detect available sensors within range.
- 5.6. Read the software operating instructions and view the catalog of available experiments.

6. Procedure

6.1. Sensor installation and initialization

Turn on each sensor you are going to use in the experiment. Make sure the indicator lights on the sensors are lit, indicating that they are ready. Run the program and check if the sensors are detected in the devices menu.

6.2. Preparation of the experimental setup

Assemble the experimental setup as described in the experiment catalog. Attach the sensors to the experimental setup using additional equipment (tripods, clamps, feet).

6.3. Setting measurement parameters

In the software, select the necessary sensors, set the sampling rate, measurement limits, and other parameters required for a specific experiment.

6.4. Data recording and analysis

Click the "Start" button to begin recording data. The program will receive and store sensor readings in real time. When the experiment is finished, click the "Stop" button and save the results to a file.

6.5. Completion of work

Turn off all sensors when finished. Save the experimental data and close the program. Disassemble the experimental setup and return the equipment to its place.

6.6. Working with an 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 experiments, 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.
- Start recording the sensor readings: the data arrive at the platform automatically, there is no need to copy them out manually.
- Open the graph or the table of the measured values and ask the agent to process the result: it will show the patterns, compare the data with the reference values of the work and lead the student to formulating a hypothesis and a conclusion.

7. Care, maintenance and possible malfunctions

7.1. Cleaning

- Wipe the sensors with a soft, dry cloth to remove dust.
- If necessary, carefully clean the sensor outputs with a soft brush.
- Do not wash the sensors under running water; this may damage the electronics.
- For stubborn dirt, use a cloth dampened with distilled water and wipe dry.

7.2. Periodic control

- Check the battery level at least once a month and charge the sensors in a timely manner.
- Check the tightness of the sensor ports and cable connections.
- Repair and replacement of damaged sensors are performed only by an authorized service center.

7.3. Possible malfunctions and ways to eliminate them

Symptom	Possible cause	User actions
The sensor is not detected by the program	The battery is low, the sensor is not turned on, or the wireless connection is damaged.	Charge the sensor battery, turn on the sensor, restart the program, check the range

Symptom	Possible cause	User actions
Sensor readings are unstable or jumpy	Weak wireless signal, electromagnetic interference nearby	Move the sensor closer to the computer, remove sources of interference (microwave ovens, mobile phones)
The program often freezes or freezes	Not enough memory in the computer, outdated device drivers	Close unnecessary programs, update sensor drivers, restart your computer
The quality of data and graphs is poor.	Sampling frequency set too low, graph axes configured incorrectly	Increase the sampling rate in the settings, rescale the axes
Batteries drain quickly	Sensors remain on unnecessarily; battery is worn out	Turn off the sensors after the experiment is over; if the capacity has dropped noticeably, contact a service center to replace the battery.

8. Storage and transportation conditions

- Store the system in a dry, indoor location at a temperature not lower than +5 °C and not higher than +40 °C and a relative humidity of up to 80% without condensation.
- Protect the computer and sensors from direct sunlight, heat sources, and wind.
- Store the kit in its original packaging or a special case to prevent mechanical damage.
- During long-term storage (more than 3 months), check and, if necessary, recharge the sensor batteries.
- Transport the system in a rigid packaging or a special shockproof case. Protect from strong shocks and vibrations.
- Do not place heavy objects on top of the system packaging.
- The storage period before commissioning is unlimited provided that the stated requirements are observed and the integrity of the packaging is monitored.

9. Warranty obligations

- 9.1. The warranty period of the product is 12 months from the date of sale specified in the warranty card.

- 9.2. The manufacturer guarantees that the product complies with the declared technical characteristics, provided that the rules for transportation, storage and operation set out in this passport are followed.
- 9.3. During the warranty period, product defects that have arisen due to the manufacturer's fault will be eliminated free of charge. The method of elimination (repair, component replacement or product replacement) is determined by the service center.
- 9.4. Warranty service is provided upon receipt of a correctly and completely filled out warranty card and a document confirming the fact and date of purchase.
- 9.5. The warranty does not apply to 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 apply to natural wear and tear of the coating and appearance of the product, as well as to 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

LABOTRIX GROUP LIMITED

Room 910, Isteelesia 1 No. 18 Fu'an Blvd, Pinghu Subdistrict,
Longgang District, Shenzhen City,
Guangdong Province, China 518111
Phone: +86 13925261264
E-mail: salesmanager@labotrix.com
Website: <https://labotrix.com/>

Address in Ukrainian:

LABOTRIX GROUP LIMITED

Room 910, Istilazia 1, Fuan Boulevard No. 18,
Pinghu Subdistrict, Longgang District,
Shenzhen, Guangdong Province, China 518111
Telephone: +86 13925261264
E-mail: salesmanager@labotrix.com
Website: <https://labotrix.com/>

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

Product name:	Digital laboratory for the physics classroom
Product model:	LABOTRIX SENSE PHY L2
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

Buyer's phone number Buyer's signature

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 for the product is valid for 12 months from the date of sale specified in the warranty card. Within this period, components that have failed due to a manufacturing defect are repaired or replaced without payment from the buyer.
2. Before contacting, 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 section 7.3.
3. After the 12-month warranty period, repairs are carried out for a fee; the cost of work and 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