

Electrophorus machine

LABOTRIX STATIC E1

PRODUCT PASSPORT

Kyiv

2026

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1. General Information about the Product

- 1.1. **Product name** — Electrophorus machine.
- 1.2. **Trademark** — Labotrix.
- 1.3. **Model** — Static E1; full trade designation — LABOTRIX STATIC E1.
- 1.4. **Manufacturer** — Labotrix Group Limited, China.
- 1.5. **Intended use:** the Static E1 electrophorus machine is primarily intended for demonstration experiments in the field of electrostatics. The product allows a significant electric charge to be accumulated and high-voltage power to be obtained for observing the phenomena of charge distribution on conductors, electric field lines, electricity leakage from sharp points, and arc discharges. It is used in science classrooms during physics lessons.
- 1.6. **Design features:** every unit of the machine is mounted on reliable posts made of electrically insulating material; these posts are joined to the Leyden jars on a single massive base, also made of insulating material. The machine is equipped with disks 235 mm in diameter with a conductive coating, ensuring reliable operation in conditions of increased humidity. Conductive sectors are arranged on the disks, which interact with the neutralizer brushes. The design provides for the use of Leyden jars to accumulate charge and discharge electrodes with insulating handles for safe operation with high voltage.

2. Technical Specifications

- Brand — Labotrix
- Model — Static E1
- SKU — LTX-STATIC-E1
- Product type — electrophorus machine for demonstration experiments
- Disk diameter (millimeter) — 235
- Maximum voltage (volt) — over 10000
- Discharge distance at 65 % humidity (millimeter) — 55
- Discharge distance at humidity above 80 % (millimeter) — 30
- Operating temperature range (degree Celsius) — from –10 to +40
- Disk material — conductive composite with enhanced adhesion
- Built-in capacitors — Leyden jars, their capacitance can be adjusted
- Power source — manual drive with belt transmission
- 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 the inventory number
- Packaging — individual box of corrugated cardboard with the contents secured
- Documentation supplied — product passport with warranty card and operating manual
- Installation method — on the instructor's demonstration table
- Care of surfaces — the disks and housing can be wiped with a dry or slightly damp cloth
- Service life (year) — 5

- Warranty period (month) — 12

3. Package Contents

- Housing with disks and shafts — 1 pcs
- Discharge electrodes with insulating handles — 2 pcs
- Conductors (charge collectors) — 2 pcs
- Leyden jars — 2 pcs
- Connecting bars for capacitance adjustment — 2 pcs
- Neutralizer brushes — 4 pcs
- Product Passport and Warranty Card — 1 pcs
- Individual transport packaging — 1 pcs

The machine does not require assembly before use. Repair and replacement of worn parts is carried out by a specialized service center.

4. Safety Precautions

4.1. General requirements

- Before first use, read this passport carefully and afterward keep it together with the product and the proof of purchase.
- The device is used by a teacher or another adult who has completed occupational safety training. Students are allowed to work only under the constant supervision of an adult.
- Before use, make sure all elements are intact: disks, brushes, discharge electrodes, wires, and connections.
- The cleanliness and dryness of the machine's working surface must be maintained at all times, since moisture always worsens the device's electrification.

4.2. Electrical safety

- The machine generates a voltage of over 10000 volts. Although the current is small and does not pose a fatal danger, the discharge is accompanied by a painful reaction of the body.
- Hold the discharge electrodes only by their insulating handles. Do not touch metal elements that are energized.
- Change the position of the discharge balls slowly, moving them apart step by step.
- Do not bring your head, face, or exposed parts of the body close to the discharge electrodes during the experiment.

4.3. Mechanical safety

- While turning the starting handle, keep long hair, clothing, and small objects at a safe distance from the moving disks.
- Do not attempt to insert objects between the disks or into the machine's slots during operation.
- When stopping the machine, first reduce the rotation speed, then release the handle — do not stop the mechanism with your hand.

4.4. It is strictly prohibited

- Touching or leaning on parts of the machine that are at electric potential, even with the other hand.

- Rotating the machine too fast — this disrupts brush contact and may damage the disks and mechanism.
- Disassembling, reconfiguring, or modifying the machine's design on your own.
- Leaving the machine energized without an adult present.
- Using the machine in explosive environments or near flammable materials.

5. Preparation for Use

- 5.1. Remove the machine from the packaging and place it on a horizontal, stable surface protected from wind and moisture.
- 5.2. Check the completeness of the set: the presence of both disks, brushes, discharge electrodes, Leyden jars, and the drive handle.
- 5.3. Remove dust and assembly residue with a soft, dry cloth. Contamination on the disks or brushes reduces electrification efficiency.
- 5.4. Make sure both discharge electrodes are installed in the rearranged positions: the front and rear brushes must intersect at a right angle, and the brushes are tilted at an angle of 45° .
- 5.5. If the machine has previously been in a damp environment or has frozen, dry it in the sun or wipe it with a dry cloth, then let it stand at room temperature for at least 1 hour before use.
- 5.6. Spread the discharge balls to an initial distance of 10–15 mm; the main voltage will be applied to them during operation.

6. Operating Procedure

6.1. Starting the machine

- Slowly and evenly turn the drive handle. During rotation, the brushes contact the conductive sectors of the disks, which causes charge to accumulate on the conductors.
- If the machine is charging correctly, sparks will begin to appear between the discharge balls.
- Due to disrupted brush contact, the machine may not charge. In this case, check the position of the brushes and make sure the conductive sectors of the disks are clean.

6.2. Observing discharges

- Slowly spread the discharge balls apart to observe the increase in spark length. The maximum discharge distance depends on the voltage and the humidity of the air.
- For better observation of the phenomena, turn off the overhead lighting and let the disks rotate in a dark room.
- Near one ball, bright sparks are visible (positive charge), near the other — a violet glow (negative charge).

6.3. Adjusting the capacitance of the Leyden jars

- If the outer conductive coatings of the Leyden jars are connected using the bars, the total capacitance increases and the spark becomes brighter and longer.

- If the bars are moved outward, the capacitance decreases and the spark becomes smaller.

6.4. Stopping the machine

- Before stopping, spread the discharge balls to the maximum distance.
- Reduce the rotation speed of the handle, then release it and let the disks stop by themselves.

6.5. Finishing the work

- After finishing the experiment, bring the two discharge balls together until they touch, to neutralize residual charges and make the machine safe.
- Remove the covers and protective elements; store the machine in its original position.

7. Care, Maintenance and Troubleshooting

7.1. Cleaning

- Wipe the housing, disks, and sectors with a dry, soft cloth once a month or after every observation of contamination.
- Remove dust from the brushes with a soft brush or air; dried dust reduces contact quality.
- To remove stubborn dirt, use a cloth dampened with distilled water, then wipe dry.
- Never use abrasive powders, solvents, alcohol, or chlorine-containing agents.

7.2. Periodic inspection

- Every month, check the reliability of the brush and conductor mounts; they must make firm contact with the conductive sectors.
- Check the condition of the shafts and screws; loose connections reduce operating efficiency.
- If the machine does not charge even with correct operation, contact an authorized service center — repairs and part replacement are performed only by a specialist.

7.3. Possible malfunctions and methods of their elimination

Symptom	Possible cause	User actions
The machine does not charge, there are no sparks	The surface of the disks or brushes is contaminated with moisture; the brushes are worn; poor contact	Wipe the disks and brushes with a dry cloth; check the position of the brushes at a 45° angle; replace the brushes
Sparks are weak, short	Low rotation speed; brushes insufficiently pressed	Turn the handle faster; check the pressure of the brushes on the disks
The discharge on one side is stronger	The brushes are installed asymmetrically; contact quality varies	Rearrange the brushes so that the front and rear ones intersect at a right angle

Symptom	Possible cause	User actions
Metal parts emit a hissing sound	Excess points on conductive elements after assembly	Locate the points in a darkened room by the thin discharges and singe or grind them down
The discharge electrode does not produce sparks	The discharge electrode is shorted by clumps of dust; the Leyden jar is discharged	Wipe the surfaces of the discharge electrode; make sure the machine is charging

8. Storage and Transportation Conditions

- Store the machine in a dry, enclosed room at a temperature from +5 °C to +40 °C and relative humidity not exceeding 80 % without condensation.
- Protect the product from dust, direct sunlight, impacts, vibration, and the effects of aggressive substances.
- Do not leave the machine on damp surfaces or near sources of moisture; during storage, cover it with a protective film or material.
- Transport the machine in its original or similar rigid packaging, protected from moisture and mechanical damage.
- In case of prolonged storage (more than 3 months), regularly check the condition of the machine and remove any condensation.
- 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 is not electrical or electronic equipment, therefore the marking in the form of a crossed-out container does not apply to it.
- After the end of the service life, the product is disposed of according to the rules established at the institution that operated it, with prior separation by materials.
- Hand over the packaging elements (cardboard, polymer materials) to the corresponding streams of recyclable materials.

Contacts

LABOTRIX GROUP LIMITED

Room 910, Isteeasia 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

Name:	Electrophorus machine
Product model:	LABOTRIX STATIC E1
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