

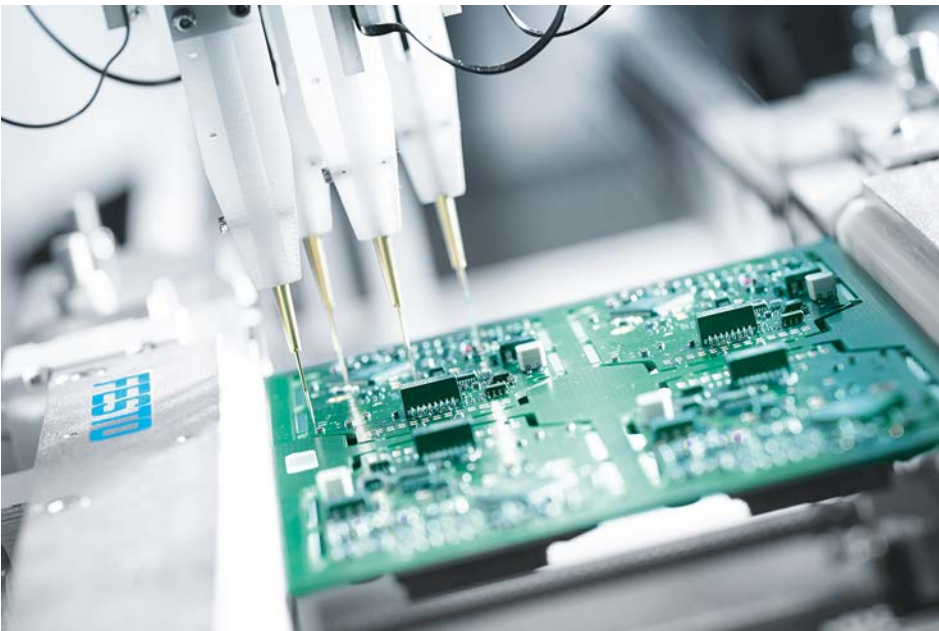
Electeo Learning System

Original Operating Instructions

FESTO

Electricity and Electronics

User Guide



Electricity and Electronics

Electeo Learning System

Original Operating Instructions

User Guide

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Document Preliminaries

About this document

The operator should be familiar with the content of this document before installing and operating the equipment.

The Safety Symbols table at the beginning of this document lists safety symbols that may be present in this document or on the equipment.

This document is freely available for download from the Festo Didactic website.

Upon request, printed copies of this document are freely available. Contact your Festo Didactic sales representative.



Important. In this document, "the equipment" and/or "the learning system" specifically refers to the Electeo learning system.

The following table lists documents important to the operation of the Electeo learning system. Beside the present user guide, the courses in the table are the main source of information. They describe procedures in which students setup, connect, and experiment with circuits on the Electeo learning boards.

Table 1: Documents important to the operation of the Electeo learning system.

Document	Part number
DC Fundamentals (workbook)	8131413 (IEC) 8131409 (ANSI)
DC Fundamentals (workbook for instructors)	8131411 (IEC) 8131407 (ANSI)
AC Fundamentals (workbook)	8131429 (IEC) 8131425 (ANSI)
AC Fundamentals (workbook for instructors)	8131427 (IEC) 8131423 (ANSI)
Magnetism and Electromagnetism (workbook)	8131421 (IEC) 8131417 (ANSI)
Magnetism and Electromagnetism (workbook for instructors)	8131419 (IEC) 8131415 (ANSI)
Diodes and Rectifiers (workbook)	8182542 (IEC) TBD (ANSI)
Diodes and Rectifiers (workbook for instructors)	8182540 (IEC) TBD (ANSI)
Capacitors, Inductors, and Impedance (workbook)	8131437 (IEC) 8131433 (ANSI)

Document	Part number
Capacitors, Inductors, and Impedance (workbook for instructors)	8131435 (IEC) 8131431 (ANSI)
BJT Fundamentals and Basic Circuits (workbook)	8196783 (IEC) TBD (ANSI)
BJT Fundamentals and Basic Circuits (workbook for instructors)	8196781 (IEC) TBD (ANSI)
Operational Amplifier Fundamentals (workbook)	8216838 (IEC) TBD (ANSI)
Operational Amplifier Fundamentals (workbook for instructors)	8243725 (IEC) TBD (ANSI)

Safety Symbols and Procedures

The following table lists the safety and common symbols that may be used in this document and on the equipment. Before performing procedures with the equipment, you should read all sections regarding safety in the User Guide accompanying the equipment. Additional safety procedures are given before any task requiring specific safety precautions.

Symbol	Description
	DANGER indicates a hazard with a high level of risk, which, if not avoided, will result in death or serious injury.
	WARNING indicates a hazard with a medium level of risk, which, if not avoided, could result in death or serious injury.
	CAUTION indicates a hazard with a low level of risk, which, if not avoided, could result in minor or moderate injury.
	NOTICE indicates a hazard with a potentially hazardous situation, which, if not avoided, may result in property damage.
	Caution, risk of danger. Consult the relevant user documentation.
	Caution, risk of electric shock.

Symbol	Description
	Caution, lifting hazard.
	Caution, hot surface.
	Caution, risk of fire.
	Caution, risk of explosion.
	Caution, belt drive entanglement hazard.
	Caution, chain drive entanglement hazard.
	Caution, gear entanglement hazard.
	Caution, hand crushing hazard.
	Static sensitive contents. Observe precautions for handling electrostatic discharge sensitive devices.
	Notice, non-ionizing radiation.
	Consult the relevant user documentation.
	Radio Equipment Directive (RED) geographical restrictions – consult the relevant user documentation.

Symbol	Description
	Direct current.
	Alternating current.
	Both direct and alternating current.
	Three-phase alternating current.
	Earth (ground) terminal.
	Protective conductor terminal.
	Frame or chassis terminal.
	Equipotentiality.
	On (supply).
	Off (supply).
	Equipment protected throughout by double insulation or reinforced insulation.
	In position of a bi-stable push control.
	Out position of a bi-stable push control.

General Requirements for Operating the Equipment

To safely operate electrical equipment in commercial or training environments, the following requirements apply:

- **Follow national regulations** that govern electrical systems and equipment in commercial or industrial facilities.
- **Ensure supervision.** A qualified supervisor (electrician or trained electrical engineer with documented training) must oversee the laboratory or classroom.
- **Perform correct setup.** Install and commission the equipment strictly according to the accompanying documentation before use.
- **Remove damaged equipment.** Immediately block off and remove damaged or defective devices, cables, leads, pneumatic tubing, or hydraulic hoses from the lab or classroom.
- **Ensure the room is equipped with all required safety devices.** Where local regulations apply, the room must include:
 - DC-sensitive residual current devices (RCDs), type B, ≤ 30 mA.
 - Overcurrent protection (circuit breakers or fuses).
 - One or more emergency-off devices to cut power either for the entire room or individual workstations.
 - Security features (e.g., lockable power-on switches or on-off valves) to prevent unauthorized activation of voltage or compressed air.

Use for Intended Purpose

The equipment may only be used:

- For its intended purpose in teaching and training applications.
- When its safety functions are in flawless condition.

The equipment components are designed with the latest technology and adhere to recognized safety standards. However, improper use can endanger the user and others, and may damage the equipment.

The Festo Didactic learning program is designed solely for training. To keep trainees safe, the training company or supervisors must ensure that all trainees use the equipment as instructed in the Festo Didactic courses and follow the safety guidelines in this document.

	 WARNING
	Risk of danger from using the equipment in a way other than prescribed by Festo Didactic! • Using the equipment in a way other than directed in the accompanying Festo Didactic courses, or using the equipment with equipment from other manufacturers, may increase the risk of injuries or property damage. • To minimize the risk of danger, always respect the specifications marked on the equipment as well as the specifications in the Festo Didactic data sheet of the equipment. • If the equipment includes a third-party component, consult the manufacturer's official documentation for that component—available from the manufacturer or online—to ensure safe use and compliance with all specifications and directives.

Guarantee and Liability

Our "general terms and conditions of sale and delivery" are always applicable. These are made available to the operating company no later than on conclusion of the sales contract. Guarantee and liability claims resulting from personal injury and/or property damage are excluded if they can be traced back to one or more of the following causes:

- Use of the equipment for anything other than its intended purpose.
- Improper commissioning and/or operation of the equipment.
- Use of the equipment with defective safety equipment, or with improperly attached or non-functional safety and protective equipment.
- Non-compliance with instructions included in the core documentation about commissioning and operation.
- Unauthorized modifications to the equipment.
- Improperly executed repairs.
- Disasters resulting from the influence of foreign bodies and acts of nature.

Festo Didactic hereby excludes any and all liability for damages suffered by trainees, the training company, and/or any third parties, which occur during use of the equipment in situations which serve any purpose other than training and/or vocational education, unless such damages have been caused by Festo Didactic due to malicious intent or gross negligence.

Work and Safety Instructions

Safety responsibilities

Responsibilities are divided by role as shown in the following table.

Table 2: Responsibilities by role.

Role	Responsibilities
Operating company	● Allow only qualified personnel to work with the equipment. ● Ensure personnel are trained in safety regulations and have read the safety information in this document. ● Periodically evaluate personnel for safe working practices.
Instructor	● Supervise trainees at all times. ● Permit only harmless mistakes and prevent actions that could cause injury or damage.
Trainees	● Read the safety chapter and warnings before use. ● Follow all applicable work-safety and accident-prevention rules. ● Work only under the supervision of a qualified person.

General operational safety

	 CAUTION
	Ignoring basic operational safety rules may lead to accidents, injuries, or equipment damage. • Trainees must be supervised by an instructor at all times when working with the equipment. • Use the equipment only as instructed in Festo Didactic documentation. • Keep switches, buttons, and disconnectors unobstructed and easy to reach. • Repair or secure faulty equipment immediately. • Wear suitable personal protective equipment (PPE), such as safety glasses and safety shoes. • Avoid wearing loose clothing or accessories that could become entangled in equipment. • Secure long hair to prevent it from interfering with moving parts or obstructing vision. • Keep the work area clean, dry, and free of substances that could cause slips or interfere with equipment operation.
	 CAUTION
	Improper handling of heavy equipment may cause personal injury or equipment damage. • Use proper lifting techniques or assistance when moving heavy components marked with the lifting-hazard symbol.

Personal protective equipment (PPE)

Despite built-in safety features, residual risks remain due to misuse or faulty components. To reduce injury risk, always follow these PPE guidelines:

- Wear **safety shoes** when frequently moving equipment between storage and workstations.
- Wear **safety glasses** when working with polarized capacitors, which may explode unexpectedly.
- Wear **hearing protection** when using noisy equipment such as rotating machines.

- Wear **insulating gloves** when handling live electrical components.
- Wear **safety gloves** for mechanical handling (e.g., sharp edges, heavy parts, hot surfaces).

Equipment handling and layout

NOTICE

Cable handling

- Lay out cables without bends, pinches, or contact with hot surfaces (clearly marked if applicable).
- Always unplug by pulling the plug itself—never pull on the cable.
- Prevent continuous tension on cables to avoid damage and disconnection.

NOTICE

Ventilation and heat management

- Keep all ventilation slots unobstructed. Place equipment only on hard, flame-resistant surfaces to allow proper airflow.
- Do not install heat-generating equipment near or underneath temperature-sensitive components.

NOTICE

Workstation setup

- Check the maximum load capacity of the workstation and ensure it is not exceeded.

Electrical safety

	 WARNING
	Risk of electric shock due to dangerous voltage The equipment contains hazardous voltage that can cause death, serious injury, or major property damage if safety instructions are ignored. Protective earth (PE) • Always earth equipment fitted with a PE terminal. • Connect the PE first and disconnect it last. • Do not break or damage yellow-green PE conductors. • Equipment with high leakage current needs a separate PE lead on its extra PE terminal. Prohibited practices • Never connect power sources in series. • Never connect multiple power supplies to a single ac power wall outlet, as this can cause higher leakage currents. • Do not exceed the input voltage or current rating of any device, as this can lead to heating, shocks, and fires. Safe voltage limits • Contact with > 30 V ac rms or > 60 V dc can be fatal. • Shield power source outputs and leads from touch; use shrouded safety leads rated CAT II or higher. • Switch off all power sources and de-energize circuits before wiring changes. • Only use detachable mains supply cords, cables, and connection leads with adequate ratings. Capacitors • Large capacitors may stay charged after power-off. Wait several minutes before opening housings. Low-voltage circuits • Power low-voltage circuits only with Class II SELV or double-insulated supplies (e.g., Festo Didactic power sources).

Cyber security

Festo Didactic provides products with security functions that support the safe operation of plants, systems, machines, and networks. Protecting these assets from cyber threats, however, requires a comprehensive and regularly updated security concept. Festo's products and services form only part of such a strategy.

The customer is responsible for preventing unauthorized access to equipment and networks. Connections to company networks or the Internet should be made only when necessary and only with appropriate security measures, such as firewalls, network segmentation, defense-in-depth strategies, etc.

Without these measures, connecting products to a network can expose vulnerabilities that allow unauthorized remote access, potentially affecting the entire system. This access can be exploited for data theft, manipulation, or sabotage. Common threats include Denial-of-Service attacks, remote code execution, privilege escalation, ransomware, and other malicious activities. In industrial environments, such attacks can create unsafe conditions, endangering both people and equipment.

Customers should follow Festo's security guidelines and keep their products up to date. Festo continuously improves its products for greater security and strongly recommends installing updates promptly. Using outdated or unsupported versions increases exposure to cyber threats.

Report security issues to the Festo Product Security Incident Response Team (PSIRT) in German or English by email at psirt@festo.com or through the online form at <https://www.festo.com/psirt>.



WARNING

Unsecure operating conditions due to software tampering

- Software tampering (e.g., viruses, Trojans, malware, worms) can cause unsafe system conditions, potentially leading to serious injury or property damage.
- Keep all software up to date.
- Integrate all automation and actuator components into a comprehensive industrial security concept aligned with current technological standards.
- Ensure all installed products are included in your security concept.
- Use protective tools, such as antivirus software, to scan files on removable storage media for malware.



WARNING

Firmware Update Security

This warning applies only to products with updatable firmware. To protect the security and integrity of your system, follow these guidelines during the firmware update process:

- **Download source.** Obtain firmware updates only from the official manufacturer's website.
- **Do not tamper.** Do not modify or interfere with the firmware update process.
- **Update process.** Strictly follow the firmware update instructions provided in the user guide.

Equipment Installation and Commissioning

Environmental requirements

The equipment is designed to be installed and stored indoors and operated in the following environmental conditions:

- An altitude up to 2000 m (6560 ft).
- A temperature between 5°C and 40°C (41°F and 104°F).
- A maximum relative humidity of 80% for temperatures up to 31°C (88°F), decreasing linearly to 50% relative humidity at 40°C (104°F).
- Mains supply voltage fluctuations which do not exceed $\pm 10\%$ of the nominal voltage.
- Transient overvoltages up to the levels of overvoltage category II (1500 V for 120 V mains and 2500 V for 230 V mains).
- Temporary overvoltage occurring on the mains supply.
- A pollution degree of 2 (dry, non-conductive pollution).



The word pollution used above refers to any addition of foreign matter, solid, liquid, or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity.

Equipment handling

Before handling equipment, ensure the following:

- You know where to install or relocate the equipment.
- The path is clear—no obstacles, bumps, or slippery surfaces.
- You can safely lift and carry the equipment. Check its weight beforehand if needed.

While carrying equipment, make sure to:

- Maintain a firm grip.
- Hold the equipment close to your waist, with level shoulders. Do not extend your arms.
- Move slowly and maintain stable footing.
- Turn by moving your feet, not by twisting your back.

	 CAUTION
	Physical stress likely to occur when handling heavy equipment. • Take extra care when lifting or moving heavy equipment. • Equipment heavier than 5 kg (10 lb) is marked with a lifting hazard symbol where not otherwise obvious.

Quick start

In this section, you will set up the Base Unit and connect it to a host device, such as a computer or tablet.

1. Place the Base Unit on a table.
2. Connect the Base Unit to the power supply.



Refer to the following section for a description of each connector and button on the Base Unit.

"Electeo Base Unit (8141686 or 8208409)"

3. Press the On/Off power button to turn the Base Unit on.

Wait 2 to 3 minutes for the Base Unit to start. When the LED strip starts flashing blue, the Base Unit is ready to connect to the host device.



The Base Unit status is indicated by the LED strip color.

Refer to the following section for the meaning of each LED strip color.

"Electeo Base Unit (8141686 or 8208409) – Status LED strip color description"

4. Connect the Base Unit to the host device.

There are four ways to communicate with the Electeo Base Unit:

- USB cable (local)
- Access Point (local)
- Ethernet cable (network)
- Wi-Fi (network)

For more information, see "Setting up Base Unit communications".



To communicate with the Base Unit via Ethernet cable or Wi-Fi, the device must first be on the same subnet. To configure this, click the Base Unit Settings icon (see the following figure).



Figure 1: Base Unit Settings icon.

Click the Base Unit Settings icon to open the window shown in the following figure. Configure the required network settings in the Base Unit Settings using either a USB connection or an access point (see the following figure).

Base Unit Settings

Base Unit Informations

Serial Number:	R000075
Electeo Core Version:	23.07.19.1
Constant Version:	v7_250116
FPGA Version:	26.01.15
MCU Version:	25.04.16
Update_Version	1.2.1
PCB Main/Display Versions:	v7/v5
Device Update:	Update
Admin Password:	Change Admin Password
Get Certificate:	Download certificate
OpenSource Licenses:	Show

Figure 2: Base Unit Settings.

- At this point, the Base Unit settings should be open in a browser on the host device.



If a browser certificate warning appears, proceed temporarily if your browser allows it, then install the certificate using the instructions below. If the browser does not allow access, see "Solving a certificate error."

Download the certificate from the Electeo Base Unit application by clicking "Download Certificate" in the Base Unit settings.



You can open the Base Unit settings by clicking the button in the lower-left corner of the Base Unit application's main window. The button icon shows a top view of the Base Unit.

6. Install the downloaded certificate.

The installation method depends on the platform:

- PC
- Android
- iOS

For more information, see "Certificate installation guide".

7. The Electeo Base Unit and host device are now configured and ready to use.

Installing learning boards on the Base Unit

In this section, you will set up a learning board (or two half-sized learning boards) on the Base Unit.

- 1.** Each Electeo course includes one or more learning boards. Determine whether your course requires one full-size board or two half-size boards.

Magnets and locating features on the right side of the Base Unit and the back of the learning boards align the board with the slots and lock it in place. The following animation shows how to install full-size and half-size learning boards.



Installation of learning boards on the Base Unit.

<https://lx.festo.com/media/2994b9318eb04b258d6535b9f800b885>

- 2.** Most learning boards have a status LED in the top-right corner. Once the board is correctly positioned, verify that this LED is blue, indicating that the board is powered and operational.



Refer to the following section or to the specific learning board instructions for the meaning of each LED color.

"Learning board status LED color description"

Removing a learning board from the Base Unit

In this section, you will remove a learning board from the Base Unit.

1. Ensure all connections are removed from the learning board before removing it from the Base Unit.
2. Grasp the handles on each side of the learning board and slowly pull to detach it from the magnets.

Disconnecting and shutting down the Base Unit

In this section, you will disconnect the host device from the Base Unit and shut it down safely.

NOTICE

Do not unplug the power cable to shut down the Base Unit, as this could corrupt its memory.

1. In the application, click the logout button in the bottom-right corner to properly disconnect the host device from the Base Unit.
2. Press the On/Off power button to shut down the Base Unit.
When all LEDs are off, the Base Unit is fully powered down.

Setting up Base Unit communications

Connecting and accessing the Base Unit using a USB cable

In this section, you will connect the Base Unit to the host device using a USB cable, then access it.

1. Using a USB cable, connect the Base Unit to the host device.



Refer to the following section for a description of each connector and button on the Base Unit.

"Electeo Base Unit (8141686 or 8208409)"

2. On the host device, open a browser.

3. In the browser, access the Base Unit by entering the URL that includes its serial number. For example, if the serial number is R-000000, the URL is:

https://electeoR000000.local



The serial number is printed on a label on the bottom of the Base Unit. It follows the format R-000000 and is required to access the Base Unit's functions from a host device.



Figure 3: Location of the serial number on the label.



An error page may appear when the Base Unit application is first accessed on a device. If this occurs, review the error details, then click the "Proceed anyway" button or equivalent.

If no "Proceed anyway" button is available, refer to the following section to resolve a certificate error.

Troubleshooting guide – Solving a Certificate Error



Refer to the appropriate section below for details on configuring a connection in the Base Unit settings.

- "Ethernet connection settings"
- "Wi-Fi connection settings"

Connecting and accessing the Base Unit using an Access Point

In this section, you will connect the Base Unit to the host device via an Access Point and then access it.



If your Base Unit does not include Wi-Fi (Model 8208409), you need a Wi-Fi dongle to use the Access Point connection.

1. Connect the host device to the Access Point.

From the list of Wi-Fi networks detected by your computer or tablet, connect to the network whose name includes the Base Unit serial number. For example, if the serial number is R-000000:

electeo_R000000

2. On the host device, open a browser.

3. In the browser, access the Base Unit by entering the URL that includes its serial number. For example, if the serial number is R-000000:

`https://electeoR000000.local`



An error page may appear when the Base Unit application is first accessed on a device. If this occurs, review the error details, then click the "Proceed anyway" button or equivalent.

If no "Proceed anyway" button is available, refer to the following section to resolve a certificate error.

Troubleshooting guide – Solving a Certificate Error



Refer to one of the following sections for more information on configuring a connection in the Base Unit settings.

- "Ethernet connection settings"
- "Wi-Fi connection settings"

Connecting and accessing the Base Unit using an Ethernet cable

In this section, you will connect the Base Unit to the host device with an Ethernet cable and then access it.



For the Electeo Base Unit to function correctly over Ethernet, it must be on the same subnet. Configure the Base Unit settings first via USB or Access Point.

1. Connect the Base Unit to the host device with an Ethernet cable.



Refer to the following section for a description of each connector and button on the Base Unit.

"Electeo Base Unit (8141686 or 8208409)"

2. On the host device, open a browser.
3. In the browser, access the Base Unit by entering the URL that includes its serial number. For example, if the serial number is R-000000:

`https://electeoR000000.local`



An error page may appear when the Base Unit application is first accessed on a device. If this occurs, review the error details, then click the "Proceed anyway" button or equivalent.

If no "Proceed anyway" button is available, refer to the following section to resolve a certificate error.

Troubleshooting guide – Solving a Certificate Error

Connecting and accessing the Base Unit using Wi-Fi

In this section, you will connect the Base Unit to the host device over Wi-Fi and then access it.



If your Base Unit does not include Wi-Fi (Model 8208409), you need a Wi-Fi dongle to use the Wi-Fi connection.



For the Electeo Base Unit to function correctly over Wi-Fi, it must be on the same subnet. Configure the Base Unit settings first via USB or Access Point.

1. On the host device, open a browser.
2. In the browser, access the Base Unit by entering the URL that includes its serial number. For example, if the serial number is R-000000:

`https://electeoR000000.local`



An error page may appear when the Base Unit application is first accessed on a device. If this occurs, review the error details, then click the "Proceed anyway" button or equivalent.

If no "Proceed anyway" button is available, refer to the following section to resolve a certificate error.

Troubleshooting guide – Solving a Certificate Error

Ethernet connection settings

In this section, you will configure the Ethernet connection in the Base Unit settings.

1. In the Base Unit settings, open the "Connection Settings" window.
2. In the "Connection Type" field, select "Ethernet".
3. If the Base Unit uses an automatic IP address, select "Auto" in the "IP Type" field.
If the Base Unit uses a static IP address, select "Static" in the "IP Type" field.



For a static IP address, you must fill in the "IP Address", "Subnet Mask", and "Gateway" fields.

Wi-Fi connection settings

In this section, you will configure the Wi-Fi connection in the Base Unit settings.

1. In the Base Unit settings, open the "Connection Settings" window.
2. In the "Connection Type" field, select "Wireless".
3. If the Base Unit uses an automatic IP address, select "Auto" in the "IP Type" field.
If the Base Unit uses a static IP address, select "Static" in the "IP Type" field.



For a static IP address, you must fill in the "IP Address", "Subnet Mask", and "Gateway" fields.

4. In the "SSID" and "Password" fields, enter the Wi-Fi network name and password.

Certificate installation guide

Installing a certificate on a PC

This section provides a step-by-step guide to install a certificate on a PC.

1. Open the downloaded certificate.
2. In the pop-up window, click "Open".
3. In the certificate window, click "Install Certificate".
4. Choose whether to install the certificate for the "Current User" or "Local Machine", then click "Next".
5. Select "Place all certificates in the following store", then click "Browse".
6. In the pop-up window, select "Trusted Root Certification Authorities", then click "OK".
7. Click "Next".
8. Click "Finish".
The certificate is now installed on your device.
9. Close all browsers, then reopen the Electeo Base Unit application for the certificate to take effect.

The Electeo Base Unit and host device are now configured and ready to use.

10. Return to the Quick start section of the User Guide.

Installing a certificate on Android

This section provides a step-by-step guide to installing a certificate on an Android device.

1. Open "Settings" on the host device.



Menu names may vary depending on the Android version and device manufacturer.

2. Go to "Security and privacy" → "More security settings".
3. Select "Install from device storage", then "CA Certificate".
4. Select "Install anyway".
5. Browse to the file location and select the downloaded certificate.
The certificate is now installed on your device.
6. Close all browsers, then reopen the Electeo Base Unit application for the certificate to take effect.
The Electeo Base Unit and host device are now configured and ready to use.
7. Return to the Quick start section of the User Guide.

Installing a certificate on iOS

This section provides a step-by-step guide to installing a certificate on an iOS device.

1. When prompted to allow download of a configuration profile, tap "Allow".
2. When the message to review the profile appears, close it.
3. Open the Settings app.
4. Under the device user details, tap "Profile Downloaded".
5. On the "Install Profile" screen, tap "Install" in the top-right corner.

6. If prompted for the device passcode, enter it.
7. When the certificate warning appears, tap "Install".
8. If a second prompt appears, tap "Install" again.
9. When the "Profile Installed" screen appears, tap "Done".
10. Before the certificate can be used, it must be trusted by the device.
On the device, go to "Settings" → "General" → "About" → "Certificate Trust Settings" (at the bottom of the page).
11. Under "Enable Full Trust for Root Certificates", find the certificate you installed and tap its slider.
12. When the confirmation dialog appears, tap "Continue".
The certificate is now installed and trusted by your device.
13. Close all browsers, then reopen the Electeo Base Unit application for the certificate to take effect.
The Electeo Base Unit and host device are now configured and ready to use.
14. Return to the Quick start section of the User Guide.

Troubleshooting guide

Solving a certificate error

This section explains how to resolve a certificate error when the certificate error page for the Base Unit application does not offer a "Proceed anyway" or similar option.

1. Delete the security policies for the website `https://electeo [SERIAL_NUMBER_BASE_UNIT].local`.

On PC or Android – For Chrome

- Enter the following in the browser address bar: `chrome://net-internals/#hsts`
- In the "Delete domain security policies" field, enter the website (`https://electeo [SERIAL_NUMBER_BASE_UNIT].local`) and select "Delete".

On PC or Android – For Microsoft Edge

- Enter the following in the browser address bar: `edge://net-internals/#hsts`
- In the "Delete domain security policies" field, enter the website (`https://electeo[SERIAL_NUMBER_BASE_UNIT].local`) and select "Delete".

On PC or Android – For Firefox

- Open the application menu, select "History", and then select "Manage History".
- In the window, right-click the Base Unit website, select "Forget about this site", and confirm.

2. Restart the browser.

Soft reset procedure

This section explains how to perform a soft reset on the Base Unit. A soft reset restores connection settings, passwords, and general configurations to default without affecting software updates. It is suitable for resolving minor operational issues or preparing the unit for new settings, without reinstalling updates.

NOTICE

Proceed with caution. This reset permanently erases all data except software updates.

1. Make sure the Base Unit is powered on and ready for use, i.e., the LED strip is flashing blue or solid blue.
2. Press the Reset button using a paperclip or another small, pointed object. The LED strip flashes green for about 1 minute.
3. When the process is complete, the LED strip turns off. Then power on the Base Unit normally. Its settings are reset to default, but the software version remains unchanged.

Factory reset procedure

This section explains how to perform a factory reset on the Base Unit. A factory reset restores the device to its original factory settings, removing all user data, configurations, and updates applied since initial setup.

NOTICE

Proceed with caution, as this reset permanently erases all data.

1. Disconnect and shut down the Base Unit.
2. Press the Reset button using a paperclip or another small, pointed object.
3. While holding the Reset button, press the On/Off power button to start the Base Unit. The LED strip flashes red during the entire factory reset process (about 20 minutes).
4. When the factory reset is complete, the LED strip turns off. Then power on the Base Unit normally. All settings are reset to their original factory defaults.

Equipment Description

This unit identifies the main components (connectors, controls, displays, indicators, etc.) of the Electeo Base Unit and Learning Boards. It may also provide safety directives and operating instructions specific to certain equipment, as well as instructions for part replacement.

The following equipment is covered:

- Electeo Base Unit (8141686 or 8208409)
- Electeo Learning Board – AC/DC Fundamentals (8141693)
- Electeo Learning Board – Magnetism and Electromagnetism (8172969)
- Electeo Learning Board – Diodes and Rectifiers (8195357)
- Electeo Learning Board – Capacitors, Inductors, and Impedance (8172968)
- Electeo Learning Board – BJT Fundamentals and Basic Circuits (8217999)
- Electeo Learning Board – Operational Amplifier Fundamentals (8216836)

Electeo Base Unit (8141686 or 8208409)

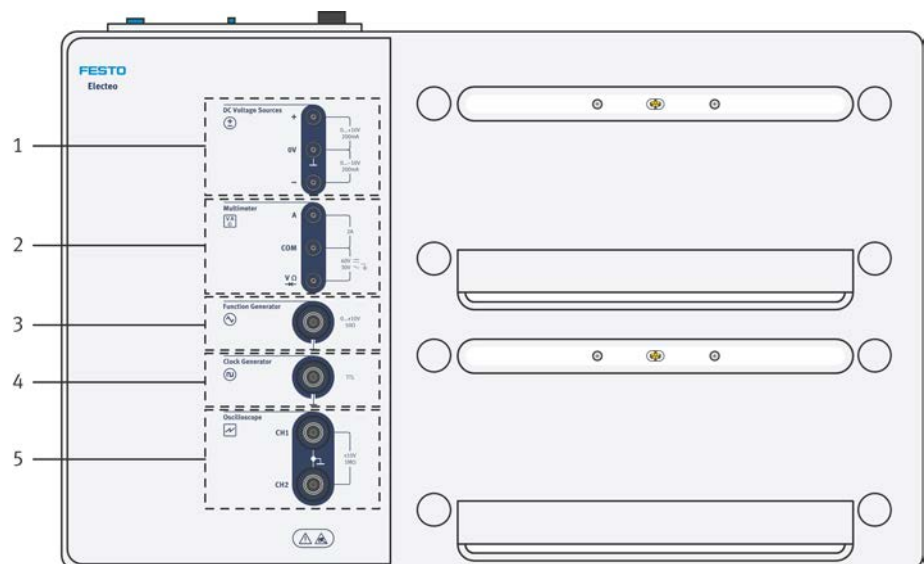


Figure 4: Electeo Base Unit (front).

- 1. DC Voltage Sources connectors.** Allow the implementation of the following dc voltage source:

- A positive 10 V dc voltage source, using the + and 0 V connectors.
- A negative 10 V dc voltage source, using the – and 0 V connectors.

Control of the DC Voltage Sources is achieved through the host device connected to the Electeo Base Unit.

- 2. Multimeter connectors.** Allow the implementation of the following multimeter functions:

- An ammeter using the A and COM connectors.
- A voltmeter using the V Ω and COM connectors.
- An ohmmeter using the V Ω and COM connectors.

Control of the Multimeter is achieved through the host device connected to the Electeo Base Unit.

- 3. Function Generator connector.** Allows access to the function currently implemented by the Function Generator.

Control of the Function Generator is achieved through the host device connected to the Electeo Base Unit.

- 4. Clock Generator connector.** Allows access to the clock function currently implemented by the Clock Generator.

Control of the Clock Generator is achieved through the host device connected to the Electeo Base Unit.

- 5. Oscilloscope connectors.** Allow access to each of the two channels of the Oscilloscope.

The Oscilloscope is controlled through the host device connected to the Electeo Base Unit.

The Oscilloscope is supplied with two probes. Four connector posts are also provided so that the probe tips and ground clips can be connected securely. Insert these connector posts into the 2 mm terminals where measurements are made, and attach the probe tips and ground clips to them.



For operating instructions about the virtual instruments of the Electeo Base Unit, refer to:



Electeo Base Unit Instruments

https://bit.ly/Electeo_Base_Unit_Instruments

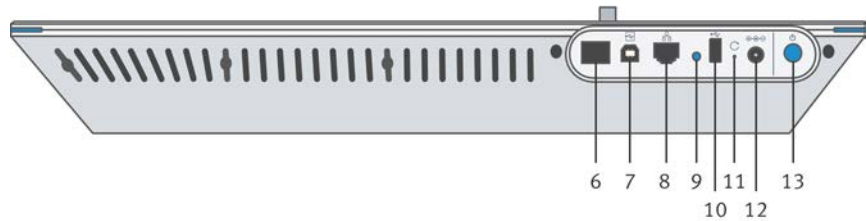


Figure 5: Electeo Base Unit (top).

6. **Optical Expansion Port.** Not used in the current version of the software but may be assigned a function in future updates.
7. **USB port – Type B.** Allows connection of the Base Unit to the host device using a USB cable.
8. **Ethernet port.** Allows connection of the Base Unit to the host device using an Ethernet cable.
9. **Reserved Button.** Not used in the current version of the software but may be assigned a function in future updates.
10. **USB port – Type A.** Allows connection of the Base Unit to the host device using a USB cable.
11. **Reset button.** Used to initiate either the soft reset or the factory reset of the Base Unit.
12. **DC power input.** Used to connect the external dc power supply that powers the Electeo Base Unit. Only use the specified Festo power adapter (correct voltage, polarity, and current rating) and ensure the unit is switched off before plugging or unplugging the connector.
13. **On/off Power button.** Used to power on or power off the Base Unit.



The serial number is printed on a label on the bottom of the Base Unit. It follows the format R-000000 and is required to access the Base Unit's functions from a host device.



Figure 6: Location of the serial number on the label.



The default password to access the Base Unit is "FestoPass123".

Status LED strip color description

The Base Unit includes an LED strip that indicates its status by color. The following table lists each possible LED strip color and its meaning.

Table 3: Status LED strip colors and meanings.

Color	Meaning	Duration
Off	The Base Unit is off.	N/A
The On/Off Power button has been pressed and the Base Unit is powering up.		
Flashing rainbow	The Base Unit is starting up as expected.	Seconds
Slow green fade-in/fade-out	The Base Unit is starting up as expected.	About 2 minutes
Flashing blue	The Base Unit is ready to be used. It is not yet connected to the host device.	N/A
Flashing red	Occurs at startup after an unsuccessful update.	N/A
The Base Unit is connected to a host device.		
Solid blue	The Base Unit is connected to a host device and functioning normally.	N/A
Fading blue	There has been no interaction with the device for 30 seconds. The light will fade until it becomes solid white, unless interaction between the host device and the Base Unit resumes.	5 minutes

Color	Meaning	Duration
Solid yellow	The Base Unit is in soft-disconnect status because the current user is inactive. Another host device can connect to the Base Unit and take control.	N/A
The On/Off Power button has been pressed and the Base Unit is powering down.		
Rapid flashing blue	The Base Unit is shutting down.	Seconds
During the soft or factory reset procedure.		
Flashing green	The Base Unit is performing a soft reset.	1 minute
Flashing red	The Base Unit is performing a factory reset.	20 minutes
Off	The reset process is complete.	N/A
During the update procedure.		
Rapid flashing yellow	The Base Unit is updating.	1 minute or more
Off	The update is complete.	N/A

Status LED ring color description

The Base Unit includes several instruments with input/output connectors on the front panel. Each connector is surrounded by an LED ring indicating the status of that instrument's input/output. The following table lists each possible LED ring color and its meaning.

Table 4: Colors of the status LED rings and corresponding meaning.

Color	Meaning
Flashing rainbow	The Base Unit is starting up.
Solid blue	The instrument input/output is active/in use.
Flashing orange	An abnormal condition is detected. A warning message appears in the application to inform the user of the issue.
Flashing red	A significant error occurs, posing a risk of equipment damage. A warning message appears in the application to inform the user of the issue and provide instructions to resolve it.

Specifications

Table 5: Main specifications of the Electeo Base Unit.

Parameter	Rating
Nominal voltage	18 V dc
Maximum current	3.9 A
Ingress protection rating	IP20
Electromagnetic compatibility	Group 1, Class A (industrial environment, EN 55011)
Dimensions (H × W × D)	70 × 475 × 300 mm (2.8 × 18.7 × 11.8")
Weight	2.25 kg (5.0 lb)
CE and UKCA markings	8141686: - Radio Equipment Directive - RoHS Directive 8208409: - EMC Directive - RoHS Directive

Electeo Learning Board – AC/DC Fundamentals (8141693)

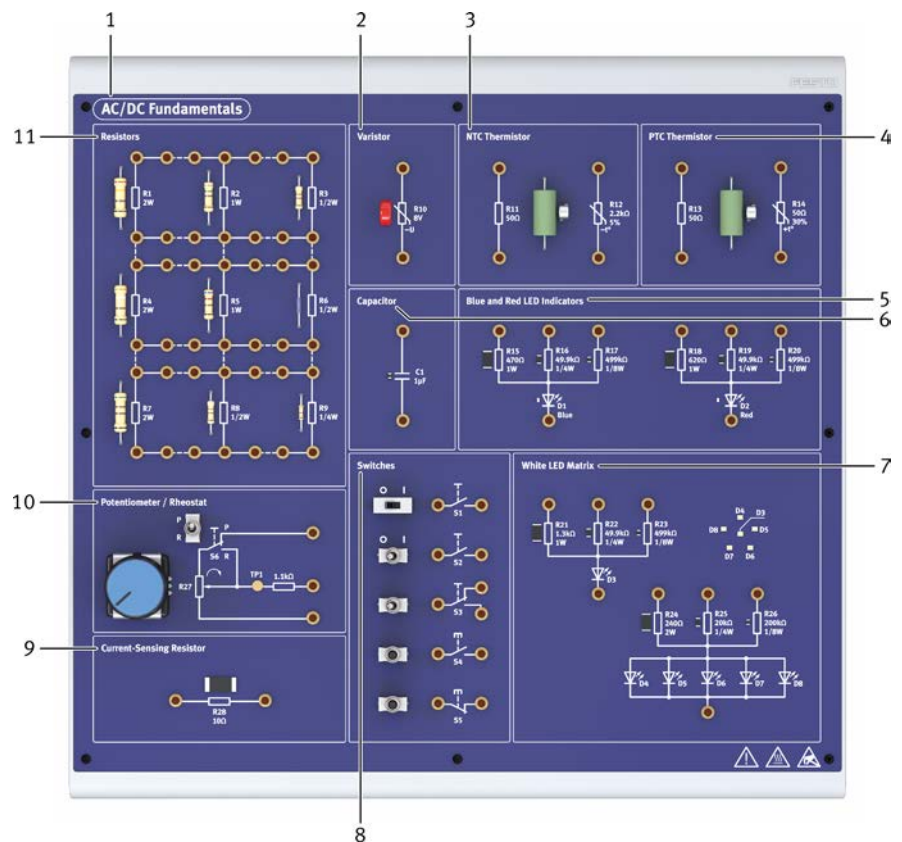


Figure 7: Electeo Learning Board – AC/DC Fundamentals.

1. AC/DC Fundamentals (AC/DC Fundamentals)
2. Varistor (Varistor)
3. NTC Thermistor (NTC Thermistor)
4. PTC Thermistor (PTC Thermistor)
5. Blue and Red LED Indicators (Blue and Red LED Indicators)
6. Capacitor (Capacitor)
7. White LED Matrix (White LED Matrix)
8. Switches (Switches)
9. Current-Sensing Resistor (Current-Sensing Resistor)
10. Potentiometer / Rheostat (Potentiometer / Rheostat)
11. Resistors (Resistors)

The various sections of the learning board are described and used in the following Electeo courses:

- DC Fundamentals
- AC Fundamentals

Specifications

Table 6: Main specifications of the Electeo Learning Board – AC/DC Fundamentals.

Parameter	Rating
Ingress protection rating	IP20
Dimensions (H × W × D)	43 × 282 × 271 mm (1.7 × 11.1 × 10.7")
Weight	0.65 kg (1.4 lb)
CE and UKCA markings	• RoHS Directive

Electeo Learning Board – Magnetism and Electromagnetism (8172969)

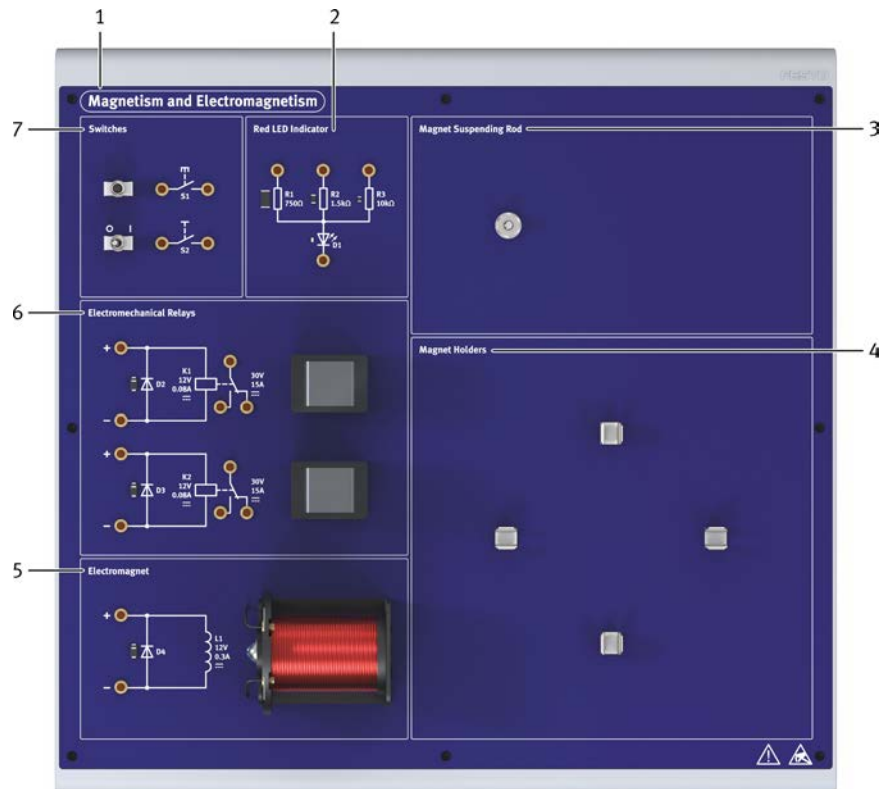


Figure 8: Electeo Learning Board – Magnetism and Electromagnetism.

1. Magnetism and Electromagnetism (Magnetism and Electromagnetism)
2. Red LED Indicator (Red LED Indicator)
3. Magnet Suspending Rod (Magnet Suspending Rod)
4. Magnet Holders (Magnet Holders)
5. Electromagnet (Electromagnet)
6. Electromechanical Relays (Electromechanical Relays)
7. Switches (Switches)

The various sections of the learning board are described and used in the following Electeo course:

- Magnetism and Electromagnetism

Specifications

Table 7: Main specifications of the Electeo Learning Board – Magnetism and Electromagnetism.

Parameter	Rating
Ingress protection rating	IP20
Dimensions (H × W × D)	67 × 282 × 271 mm (2.6 × 11.1 × 10.7")
Weight	0.82 kg (1.8 lb)
CE and UKCA markings	RoHS Directive

Electeo Learning Board – Diodes and Rectifiers (8195357)

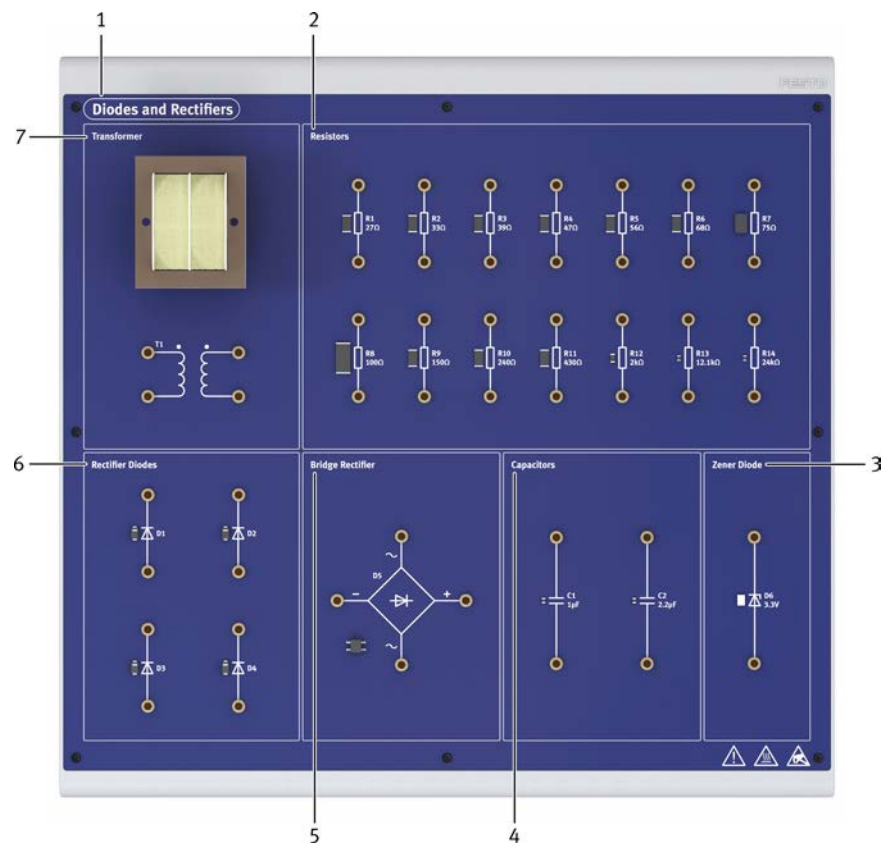


Figure 9: Electeo Learning Board – Diodes and Rectifiers.

1. Diodes and Rectifiers (Diodes and Rectifiers)
2. Resistors (Resistors)
3. Zener Diode (Zener Diode)
4. Capacitors (Capacitors)
5. Bridge Rectifier (Bridge Rectifier)
6. Rectifier Diodes (Rectifier Diodes)
7. Transformer (Transformer)

The various sections of the learning board are described and used in the following Electeo course:

- Diodes and Rectifier Circuits

Specifications

Table 8: Main specifications of the Electeo Learning Board – Diodes and Rectifiers.

Parameter	Rating
Ingress protection rating	IP20
Dimensions (H × W × D)	50 × 282 × 271 mm (1.96 × 11.1 × 10.7")
Weight	0.88 kg (1.94 lb)
CE and UKCA markings	• RoHS Directive

Electeo Learning Board – Capacitors, Inductors, and Impedance (8172968)

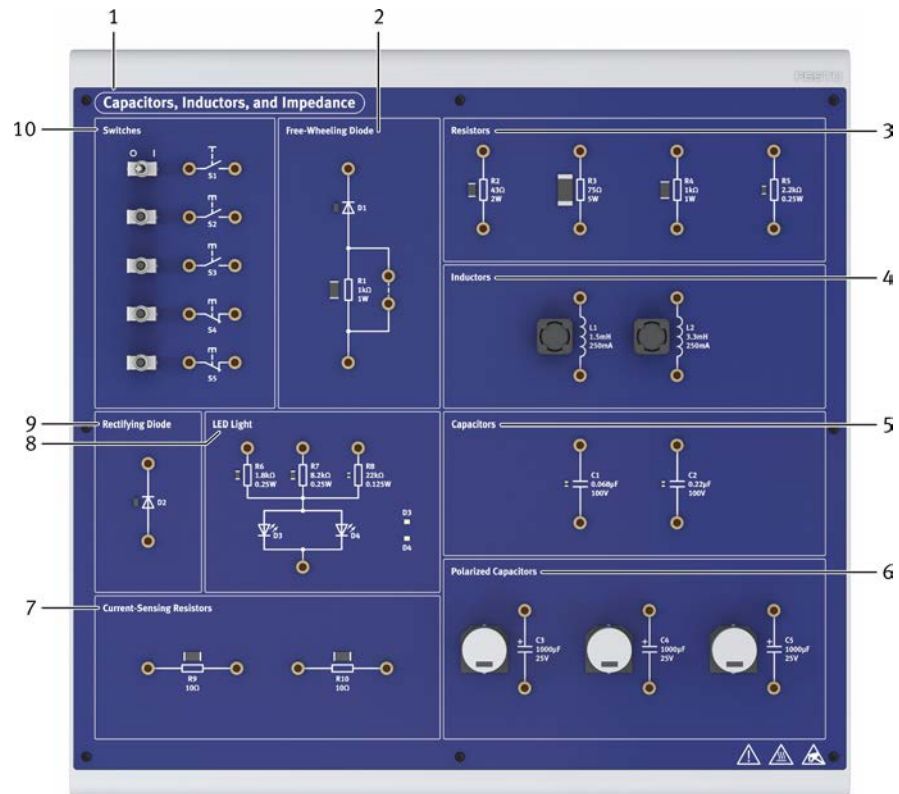


Figure 10: Electeo Learning Board – Capacitors, Inductors, and Impedance.

1. Capacitors, Inductors, and Impedance (Capacitors, Inductors, and Impedance)
2. Free-Wheeling Diode (Free-Wheeling Diode)
3. Resistors (Resistors)
4. Inductors (Inductors)
5. Capacitors (Capacitors)
6. Polarized Capacitors (Polarized Capacitors)
7. Current-Sensing Resistors (Current-Sensing Resistors)
8. LED Light (LED Light)
9. Rectifying Diode (Rectifying Diode)
10. Switches (Switches)

The various sections of the learning board are described and used in the following Electeo course:

- Capacitors, Inductors, and Impedance
- Resonant Circuits and Passive Filters

Specifications

Table 9: Main specifications of the Electeo Learning Board – Capacitors, Inductors, and Impedance.

Parameter	Rating
Ingress protection rating	IP20
Dimensions (H × W × D)	31 × 282 × 271 mm (1.2 × 11.1 × 10.7")
Weight	0.62 kg (1.37 lb)
CE and UKCA markings	• RoHS Directive

Electeo Learning Board – BJT Fundamentals and Basic Circuits (8217999)

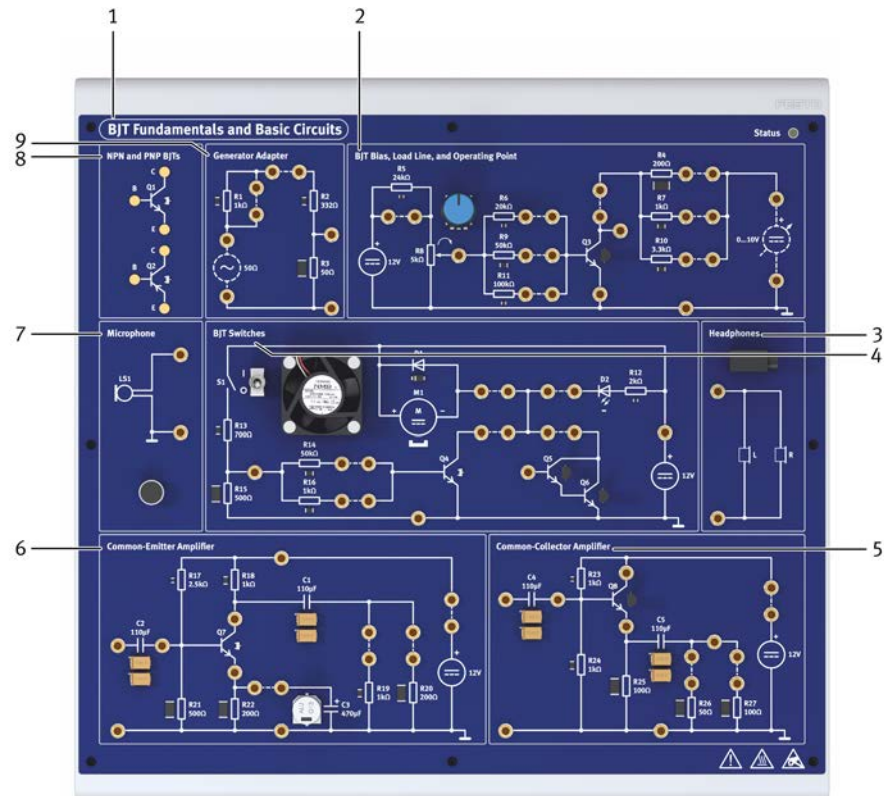


Figure 11: Electeo Learning Board – BJT Fundamentals and Basic Circuits.

1. BJT Fundamentals and Basic Circuits (BJT Fundamentals and Basic Circuits)
2. BJT Bias, Load Line, and Operating Point (BJT Bias, Load Line, and Operating Point)
3. Headphones (Headphones)
4. BJT Switches (BJT Switches)
5. Common-Collector Amplifier (Common-Collector Amplifier)
6. Common-Emitter Amplifier (Common-Emitter Amplifier)
7. Microphone (Microphone)
8. NPN and PNP BJTs (NPN and PNP BJTs)
9. Generator Adapter (Generator Adapter)

The various sections of the learning board are described and used in the following Electeo course:

- BJT Fundamentals and Basic Circuits

Learning board status LED color description

Most learning boards feature a status LED in the top right corner. The following table lists each possible color of the status LED and their corresponding meanings.

Table 10: Colors of the learning board status LED and corresponding meaning.

Color	Meaning
Solid blue	The learning board is powered and operational.
Solid orange	To be determined
Solid red	To be determined

Specifications

Table 11: Main specifications of the Electeo Learning Board – BJT Fundamentals and Basic Circuits.

Parameter	Rating
Ingress protection rating	IP20
Dimensions (H × W × D)	41 × 282 × 271 mm (1.6 × 11.1 × 10.7")
Weight	0.65 kg (1.43 lb)
CE and UKCA markings	• RoHS Directive

Electeo Learning Board – Operational Amplifier Fundamentals (8216836)

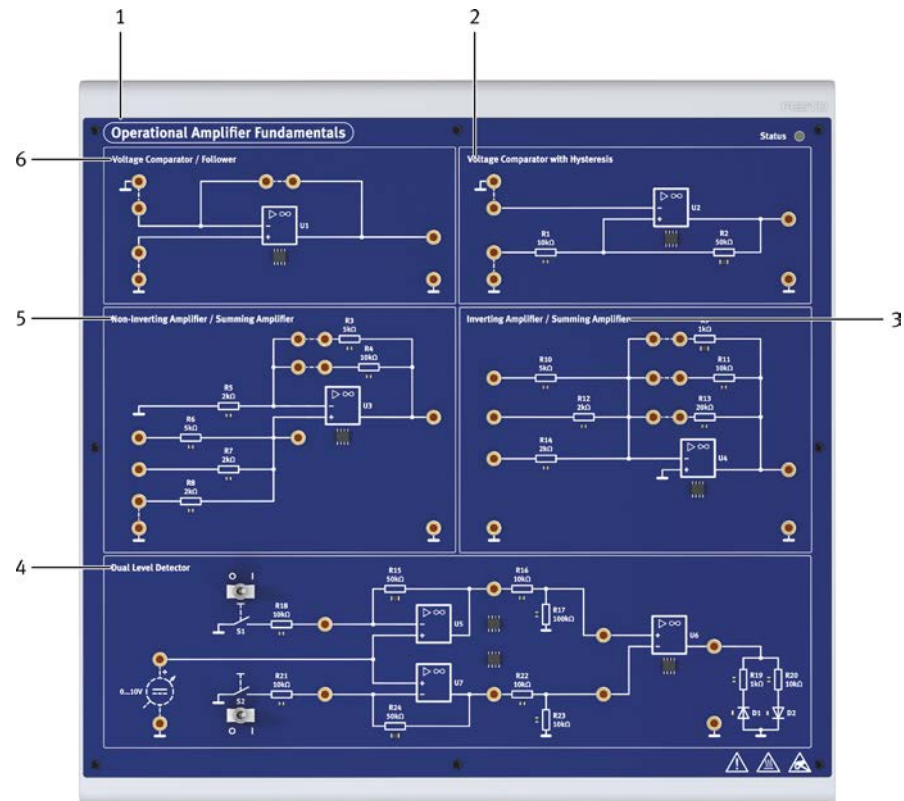


Figure 12: Operational Amplifier Fundamentals learning board.

1. Operational Amplifier Fundamentals (Operational Amplifier Fundamentals)
2. Voltage Comparator with Hysteresis (Voltage Comparator with Hysteresis)
3. Inverting Amplifier / Summing Amplifier (Inverting Amplifier / Summing Amplifier)
4. Dual-Level Detector (Dual-Level Detector)
5. Non-Inverting Amplifier / Summing Amplifier (Non-Inverting Amplifier / Summing Amplifier)
6. Voltage Comparator / Follower (Voltage Comparator / Follower)

The various sections of the learning board are described and used in the following Electeo course:

- Operational Amplifier Fundamentals

Learning board status LED color description

Most learning boards feature a status LED in the top right corner. The following table lists each possible color of the status LED and their corresponding meanings.

Table 12: Colors of the learning board status LED and corresponding meaning.

Color	Meaning
Solid blue	The learning board is powered and operational.
Solid orange	To be determined
Solid red	To be determined

Specifications

Table 13: Main specifications of the Electeo Learning Board – Operational Amplifier Fundamentals.

Parameter	Rating
Ingress protection rating	IP20
Dimensions (H × W × D)	43 × 282 × 271 mm (1.7 × 11.1 × 10.7")
Weight	0.65 kg (1.43 lb)
CE and UKCA markings	RoHS Directive

Equipment Maintenance

The equipment is designed for user safety, reliability, and effective learning. To maintain safety and performance, it must be kept in good condition.

The learning system requires regular maintenance. Students perform some tasks as part of their training, while qualified personnel handle periodic maintenance.

Because trainees may not yet detect issues, a technician or instructor should inspect the system before and after each use.

Replace defective or missing components immediately. Contact our service department for replacement parts and instructions.

	 CAUTION
	• Instructors and laboratory personnel must communicate these directions and guidelines to students, as they are essential for maintaining equipment safety and functionality. • Do not operate the equipment with missing or damaged parts.

General maintenance

The equipment does not require any particular maintenance. However, it is very important to perform a visual inspection of the equipment before each laboratory exercise. If a piece of equipment appears damaged or shows wear, it must be replaced to ensure user safety and prevent further damage to the equipment.

There are no user serviceable parts inside the equipment. Opening or removing the equipment housing to replace parts could have undesired consequences on product integrity and safety. Do not try to open the equipment housing to replace parts. If any problem persists, consult a Festo Didactic representative.

Consumables and replacement parts

Certain consumable or damaged equipment can be replaced. Use only Festo Didactic parts and accessories to ensure compatibility and sustainability. Available replacement parts and accessories are listed below.

Table 14: Electeo Learning System and accessories.

Part	Order no.
Electeo Base Unit (8141686 or 8208409)	
Cable, BNC to double 2 mm	769318
Cable, USB A to USB B	782988
Cable, 2 mm, black	768379
Cable, 2 mm, blue	768378
Cable, 2 mm, red	768380
Cable, 2 mm, white	768376
Contact pin, 2 mm	788314
Jumper, 2 mm	764988
Oscilloscope probe	773479
Power supply, 18 V dc, 70 W	8197015
Systainer, mini	8201751
Systainer, mini (complete with all cable accessories)	8205338
Electeo Learning Board – Magnetism and Electromagnetism (8172969)	
Cable, nylon	769927
Clip	789928
Compass	769081
Elastic	773718
Iron filings in casing	764641
Magnetic rod	770633

Part	Order no.
Nail	773716
Spacer, brass	770109
Support rod	773717
Rod	773544

Updating the Base Unit

This section provides detailed instructions for updating the Base Unit software.

1. On the host device, download or obtain a ".sig" update package from the Festo Didactic download website.



Festo Didactic download website

https://bit.ly/Electeo_Base_Unit

2. Ensure the host device is connected to the Base Unit.
3. On the host device, open a browser and access the Base Unit by entering the URL that includes its serial number. For example, if the serial number is R-000000:
<https://electeoR000000.local>

4. Open the Base Unit settings.



A password may be required. The default password is "FestoPass123".

5. Press the blue "Update" button.
6. Select the downloaded ".sig" file.
7. Press "OK" to start the update. A pop-up confirms that the transfer has started.



A normal update takes about 1 minute. If it includes critical operating system components, it may take significantly longer.

When the transfer is complete, a pop-up indicates that the Base Unit is updating. The status LED strip then flashes rapidly in yellow until the update is complete.

When the update is complete, the Base Unit shuts down.

8. Close all browsers. The Base Unit is now up to date and ready to be restarted.

Equipment modification

Do not modify the equipment without prior written permission from Festo Didactic. The equipment is designed to meet safety, electromagnetic compatibility, and other regulations; modifications can compromise product integrity and safety.

Use or installation of spare parts by unqualified persons, and any repairs or modifications that do not comply with the product's original specifications and manufacturing methods, can cause material damage, serious injury, or death, and may void any warranty or product approval.

Equipment disposal

Do not discard the equipment with normal waste: it contains electrical and electronic components. A specialist must dismantle the product. Each component must be recycled or disposed of according to your local legislation.

It is the owner's responsibility to make provisions for the equipment recycling and safe disposal.

Waste from Electrical and Electronic Equipment (WEEE) directive:

- In accordance with European regulations, used electrical and electronics devices cannot be disposed of in unsorted municipal waste. The symbol of the waste bin on wheels indicates the necessity for separate collection. For environmental protection, make sure the equipment is disposed of in the waste sorting processes designed for this purpose. DIRECTIVE 2012/19/EU of the EUROPEAN PARLIAMENT AND OF the COUNCIL of 4 July 2012 on waste electrical and electronic equipment (WEEE).



The presence of this symbol on the equipment indicates the necessity of separate collection.

Cleaning

To clean the equipment front panel(s) and housing(s), use a soft cloth with a mild detergent-and-water solution. Do not apply the solution directly to the equipment; apply it to the cloth.

NOTICE

Unless specifically stated otherwise, do not use abrasive cleaners or solvents on any part of the equipment.

Indications of conformity

Directives and declarations of conformity

The directives applicable to each piece of equipment in the learning system are specified in the corresponding Equipment Description section.

You can download declarations of conformity for all available equipment using the following link:

1. Enter your equipment name in the search field.
2. Click the "Didactic Products" tab.
3. Select your equipment from the search results.
4. Open the "Downloads" tab.
5. Go to the "Certificates" section.
6. Download the required documents.



Festo website.

<https://www.festo.com>

Electromagnetic compatibility (EMC)

The following table outlines international electromagnetic compatibility (EMC) compliance requirements, specifying applicable standards, equipment classifications, and usage limitations.

Table 15: Electromagnetic compatibility (EMC) compliance.

Europe	EN IEC 61326-1: Basic Electromagnetic Environment CISPR 11: Group 1 or 2 (see the Equipment Description section for precision on each piece of equipment), Class A - Group 1: Equipment covered by this standard that is not classified as Group 2. Group 2: Industrial, scientific, and medical radio-frequency (ISM RF) equipment that intentionally generates or uses radio-frequency energy (9 kHz to 400 GHz), locally applied via electromagnetic radiation, inductive or capacitive coupling, for purposes such as material treatment, inspection, analysis, or energy transfer. - Class A: Equipment is suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted and radiated disturbances. - Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.
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Regulatory information

Federal communication commission interference statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult your Festo dealer or an experienced radio/ TV technician for help.

 CAUTION

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Important notice

FCC radiation exposure statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment has been SARevaluated for use in hand. SAR measurements are based on a 5mm spacing from the body and that compliance is achieved at that distance.

CE mark warning

This is a class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Operating frequency (maximum transmitted power)

2400 MHz-2483.5MHz: 20dBm
5150 MHz-5250MHz: 23dBm
5250 MHz -5350 MHz: 20dBm
5470 MHz -5725 MHz: 27dBm

EU declaration of conformity

Festo Didactic hereby declares that the device is in compliance with the essential requirements and other relevant provisions of directives 2014/53/EU and 2011/65/EU.

RF exposure information

This device meets the EU requirements (2014/53/EU Article 3.1a) on the limitation of exposure of the public to electromagnetic fields by way of health protection. This device has been tested and meets the ICNIRP exposure guidelines and the European Standard EN 62209-2. SAR is measured with this device at a separation of 0.5 cm to the body, while transmitting at the highest certified output power level in all frequency bands of this device. Carry this device at least 0.5 cm away from your body to ensure exposure levels remain at or below the as-tested levels.

National restrictions

This device may only be used indoors in all EU member states and EFTA countries.

AT	BE	BG	CH	CY	CZ	DE	DK
EE	EL	ES	FI	FR	HR	HU	IE
IS	IT	LI	LT	LU	LV	MT	NL
NO	PL	PT	RO	SE	SI	SK	UK

Canadian compliance statement

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

CAUTION

1. The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
2. For devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;
3. For devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate.

In addition, The high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

DFS (Dynamic Frequency Selection) products that operate in the bands 5250-5350 MHz, 5470-5600MHz, and 5650-5725MHz.

Radiation exposure statement

This EUT is compliant with SAR for general population/uncontrolled exposure limits in RSS-102 and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528 and IEC 62209. This equipment should be installed and operated with minimum distance 1.0 cm between the radiator and your body. This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

Industry Canada Statement

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