



**Dear Ladies and Gentlemen,**

Are you looking for an easy-to-operate Millikan experiment for your students? Or do you want to demonstrate the measuring with simple hand movements in front of the class?

**Then explore our Millikan experiments based on the unique LEYBOLD Millikan supply unit.**

This unit is

1. a **power supply** unit,
2. a **voltage adjustment** component,
3. has a switch technology for **controlling the voltage**  
AND
4. a **switch** for **controlling** two timer outputs.

This enables you to determine the electric unit charge and verify the charge quantity by two methods: the floating method and the fall/rise method. Due to the clever design of the supply unit, the complete experiment can be performed **without the hassle of operating separate stop-clocks on top of the adjustment of voltage. Missing another hand is the past; you can easily operate it by yourself without the need of a second person.**

Also we offer you the possibility to integrate our measurement interface Sensor-CASSY 2 for recording your measurement data into your PC. This is because the LEYBOLD Millikan supply unit offers advantage number 5:

5. Connection to a **digital counter** OR a **digital measurement interface** for computer-based-measurements.

On top it is possible to combine the Millikan apparatus with a camera, so you can use a projector to show the observation for everybody.

Discover our experiment set-ups to demonstrate the famous oil-drop method with which the noble-price winner Robert A. Millikan succeeded in demonstrating the quantum nature of minute amounts of electricity in 1910.

Kind regards,  
LD DIDACTIC Team

**The basis of our Millikan experiment set-ups are the state-of-the-art Millikan apparatus and the unique Millikan supply unit.**



### Millikan apparatus

#### What you get:

- compact device
- plate capacitor under a transparent cover
- measuring microscope with angled tube 45°
- illumination system
- oil atomizer with rubber bellows
- on stand with tripod
- adjustable in height
- including plastic bottle with oil

### Millikan supply unit

#### What you get:

- Power supply unit for Millikan apparatus
- adjustment of voltage via rotary potentiometer
- digital display for voltage
- one switch for simultaneous switching on and off of the DC voltage and the electric stop-clocks
- one switch for activating both of the outputs for stop-clocks
- for measurement with one stop-clock (floating voltage method) or with two stop-clocks (rising and falling method)
- connection to digital counter and CASSY



#### P6.1.2.4

Determining the electric unit charge after Millikan and verifying the charge quantification  
 - Measuring the rising and falling speed with CASSY

[CLICK HERE FOR MORE INFORMATION](#)

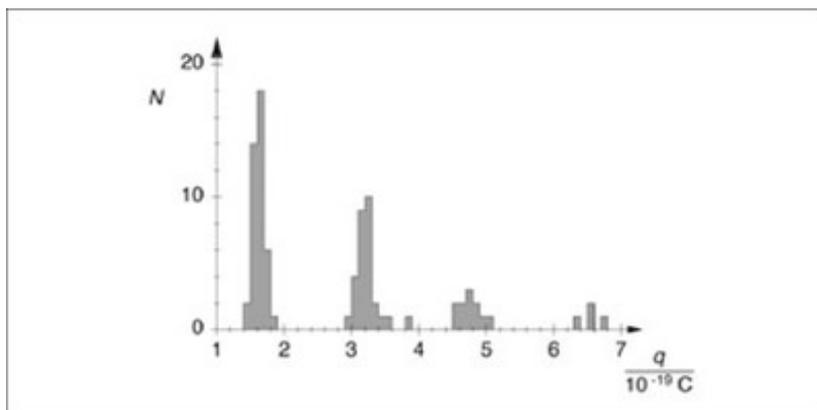
### Determining the electric unit charge after Millikan and verifying the charge quantification

In this experiment charged oil droplets are being observed in a vertical electrical field of a plate capacitor with the plate distance  $d$  and determined the charge  $q$  of a floating droplet from its radius  $r$

and the electrical field  $E=U/d$ . The oil droplets rise with a low velocity  $v_2$ . Additionally, the falling speed  $v_1$  is measured. By causing the oil droplet to rise and fall over a given distance, the total rise and fall times can be measured several times.

## USING A DIGITAL MEASUREMENT INTERFACE

Easily you can connect the Sensor-CASSY 2 with the Millikan supply unit and on the other side with a PC. This way you can record and analyse all measurement data directly with PC using our popular measurement software CASSY Lab. For the Millikan experiment there are integrated measurement settings and examples, which you can access by a click through our digital experiment library. Plus, if there is not enough time during the lesson, you can use the example measures.



Click here for your  
FREE comprehensive  
experiment instruction:  
[P6124cle.pdf](#)

IF YOU WOULD LIKE TO GET YOUR PERSONAL OFFER FOR THE MILLIKAN EXPERIMENT,  
PLEASE CLICK HERE ➔

## USING A DIGITAL COUNTER

Of course, you can also use a digital counter within the experiment. With our Counter S, which has a 5-digit LED display and 4 mm safety sockets, we arranged the experiment set-up perfectly for student experiments. Also you can use the Counter S for other experiments like time measurements in Free Fall experiments or measuring the scattering rate after the Rutherford formula.

> For more information on the experiment set-up click [HERE](#)

## THE LEYBOLD MILLIKAN EXPERIMENT SET-UPS IN AN OVERVIEW:

### P6.1.2.1

Determining the electric unit charge after Millikan and verifying the charge quantification -  
Measuring the suspension voltage and the falling speed

> [To the experiment](#)

### P6.1.2.2

Determining the electric unit charge after Millikan and verifying the charge quantification -  
Measuring the rising and falling speed

> [To the experiment](#)

### P6.1.2.3

Determining the electric unit charge after Millikan and verifying the charge quantification -  
Measuring the suspension voltage and the falling speed with CASSY

> [To the experiment](#)

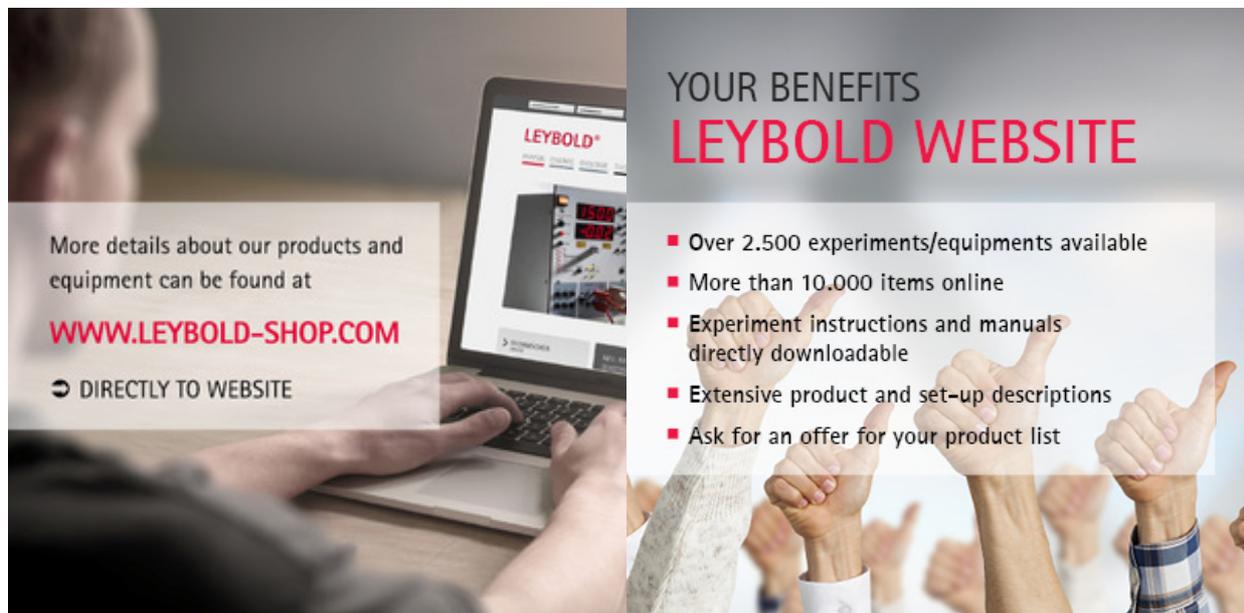
### P6.1.2.4

Determining the electric unit charge after Millikan and verifying the charge quantification -  
Measuring the rising and falling speed with CASSY

> [To the experiment](#)

#### One advice from our product specialists:

For a better demonstration of the oil droplets, you can record the image of the microscope by means of a video camera (e.g. VideoFlex from ken-a-vision). In this case, the camera can record upside down so that the visible direction of motion corresponds to the real direction of motion.



More details about our products and equipment can be found at  
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**Feedback**

**ELWE**<sup>®</sup> TECHNIK



**Dear Ladies and Gentlemen,**

Are you looking for flexible, almost limitless experimentation in electrical engineering and automotive technology? – The answer is the **STE plug-in system** from LEYBOLD.

Explore the approved experiment program for electric and electronic system. Simply choose some out of 500 components and create your individual collection or decide for one or more experiment sets for all the different fields of applied electronics. You will also get comprehensive experiments instructions with it.

Next to the big variety of individual components, we offer a diversity of topics. It starts with the fundamentals of electrical and electronic engineering and ends up in applied electrical engineering like solar and wind energy. With the STE plug-in system you furthermore can teach topics like energy storage, telecommunications, control engineering and power electronics. Also, topics within automotive technology are covered

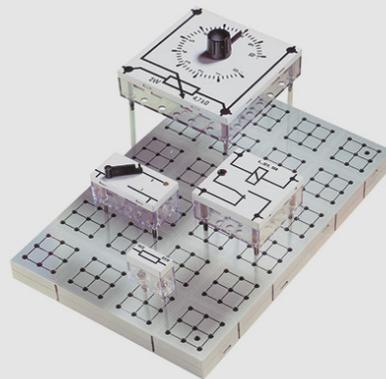
Explore the diverse possibilities of the LEYBOLD STE plug-in system.

Yours truly

The LD DIDACTIC Team

## PLUG-IN SYSTEM

Foundation for electric and electronic circuits for student, practical and demonstration experiments

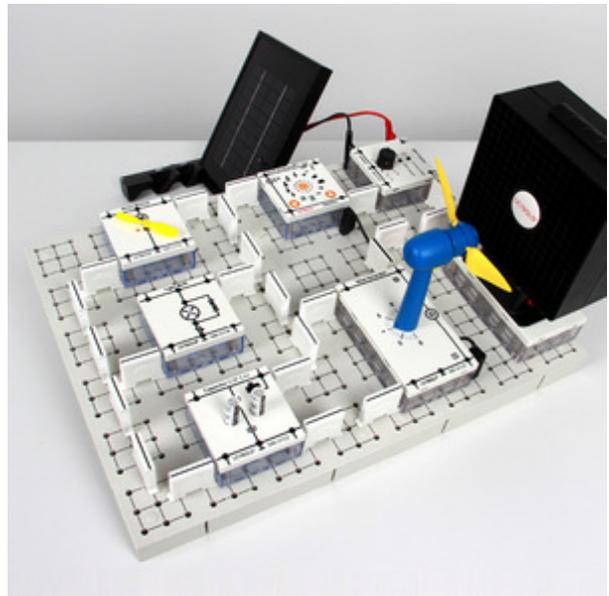


Instruction sheets for students and accompanying teacher information are available for conducting the experiments. The printed symbols on the plug-in housing elements, connectors and training panels provide a circuit-like appearance of the experiment set-ups. This facilitates the knowledge transfer between the circuit diagrams in the text books and the created circuits. Therefore the documentation of experiment set-ups becomes way easier and ultimately promotes circuit-based thinking, learning and experimenting.

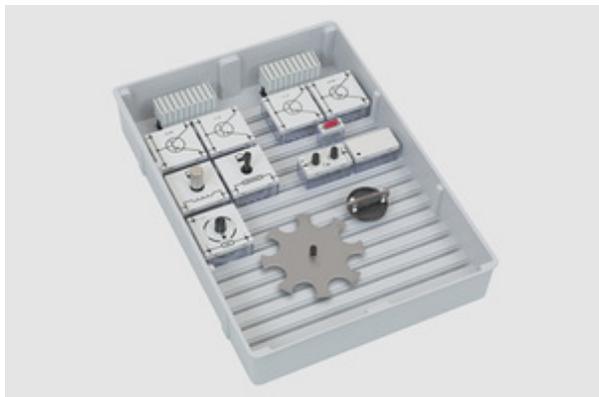
The STE elements come ready-for-use and are protected against external mechanical damage due to their electrical and electronic components encased in transparent housings. Thanks to the transparent bottom part the original component is visible.

## ADVANTAGES

- Modular system
- Also available as demo system
- Five different, flexible to combine housing sizes
- Comfortable storage solutions for rapid assembly and disassembly
- Easy to expand panels in different sizes for desktop and vertical arrangement
- Clearly printed circuit symbols and designations
- Right power supply



The STE case is the storage solution which also serves as a student workstation. The cover can be used to accommodate various **STE equipment sets** and also assist in performing experiments in the classroom. The clearly configured storage design permits quick setup and a quick start to experimenting.



**Stackable plastic trays** offer alternatively a space saving and clear storage configuration of STE-elements, components and accessories in cabinets or drawers.

For more information and a product overview please select one of the following topics:

## ELECTRICAL ENGINEERING:



**Click here and choose between stand-alone products out of overview tables:**

different plug-in boards, switches, lamp holders, linear or variable or non-linear resistors, capacitors, coils, iron and transformer cores, electromagnetic components and devices, electromotors and generators, opto receivers, diodes, Zener diodes, bridging rectifiers, transistors, operational amplifiers, communications technology, component holders, equipment trays, empty housings, supports, bridging plugs, plug-in symbols, electrical safety

**Simply add them to the Product List and get your personal offer.**

- Choose between two **storage solutions**:
  - **Storage tray STE**  
Storage tray, S33, STE or [click here](#)  
Storage tray, S24, STE [click here](#)
  - **STE universal case** [click here](#)

**AUTOMOTIVE TECHNOLOGY:**

- To the overview of all **Experiment set-ups** [click here](#)
- Request your offer of the **compact set**:

Request your personal offer today for the:  
Compact set "Basics of automotive electrical engineering" in the STE suitcase.

Simply fill out the "Send-me-an-offer"-form. Quick and easy.

[Click here](#) ➔

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