STEM & Robotics Produino Set

E40.1 USER MANUAL

The **STEM & Robotics Produino education set** is specially designed for Secondary school children of ages 12+ but is ideal for older students of 12-16+ and even vocational schools and hobby engineers. With innovative experimental activities it covers the core subjects of STEM and moves into advanced programming with textual coding. Besides its main controller, it embeds an additional Arduino processor that enables open DIY projects. The set comes in a convenient plastic storage tub that contains a large number of ENGINO® structural and technical parts and high-level of robotic devices such as the unique Produino controller. It has 2 DC motors, a servo motor, a touch sensor, 2 IR sensors, a color sensor, an ultrasonic sensor and a gyroscope/accelerometer sensor. Besides the programmable screen, it conveniently has a built-in large breadboard for making your own circuitry. It allows the construction of more than 30 STEM and Robotic models.

ENGINO® EDUCATION

12-16

Edition: 10/24

Engino® Robotics philosophy

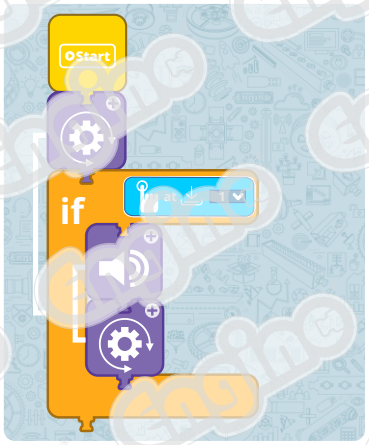
Important notice! *In this user manual you can learn about the generic interface and programming features of the Produino™ controller.* ***If you own the latest version, coded ESP32****, please refer to the* ***last page*** *about the differences in connectivity and screen buttons. The programming aspect through KEIRO™* ***is not affected****.*

The Engino® Robotics Platform Produino™ is specially designed for Secondary school students, higher education or even robotic hobbyists! It takes into account the latest technological trends and the most modern pedagogical principles of education. The set provides all the necessary parts for deploying real-life and meaningful robotics applications! The core of the set is the Produino controller, equipped with an embedded **Arduino platform**, a **breadboard** and an **LCD screen**. Powered by a **re-chargeable battery** it accommodates 7 ports in order to connect a **touch** sensor, **InfraRed** sensors, an **Ultrasonic** sensor, a **Colour** sensor, a **Compass** sensor, **DC motors** and **180° Servo** motor! The innovative Produino ERP can be connected with all sorts of devices (PCs and smart devices).

Multiple programming methods

Manual programming

The Produino™ controller allows manual program recording through the LCD screen menu. The user may transit gradually from physical manual programming to software control, by applying an innovative **reverse engineering method!** The program can be uploaded from the device to the PC/tablet in the form of pictorial flow diagram, where it can be edited and customised through the software.



Flow diagram

The "Flow Diagram" is the main programming feature of the KEIRO™ software. Here, the user can manipulate inputs and outputs to create sophisticated programs with minor effort. The platform is designed in a Scratch-like block programming language that offers a gradual transition from manual to digital programming.

Drag-and-drop programming environments have been proven to be valuable educational tools which provide an easy way to interact with the real world and develop an intuitive human-machine interface.

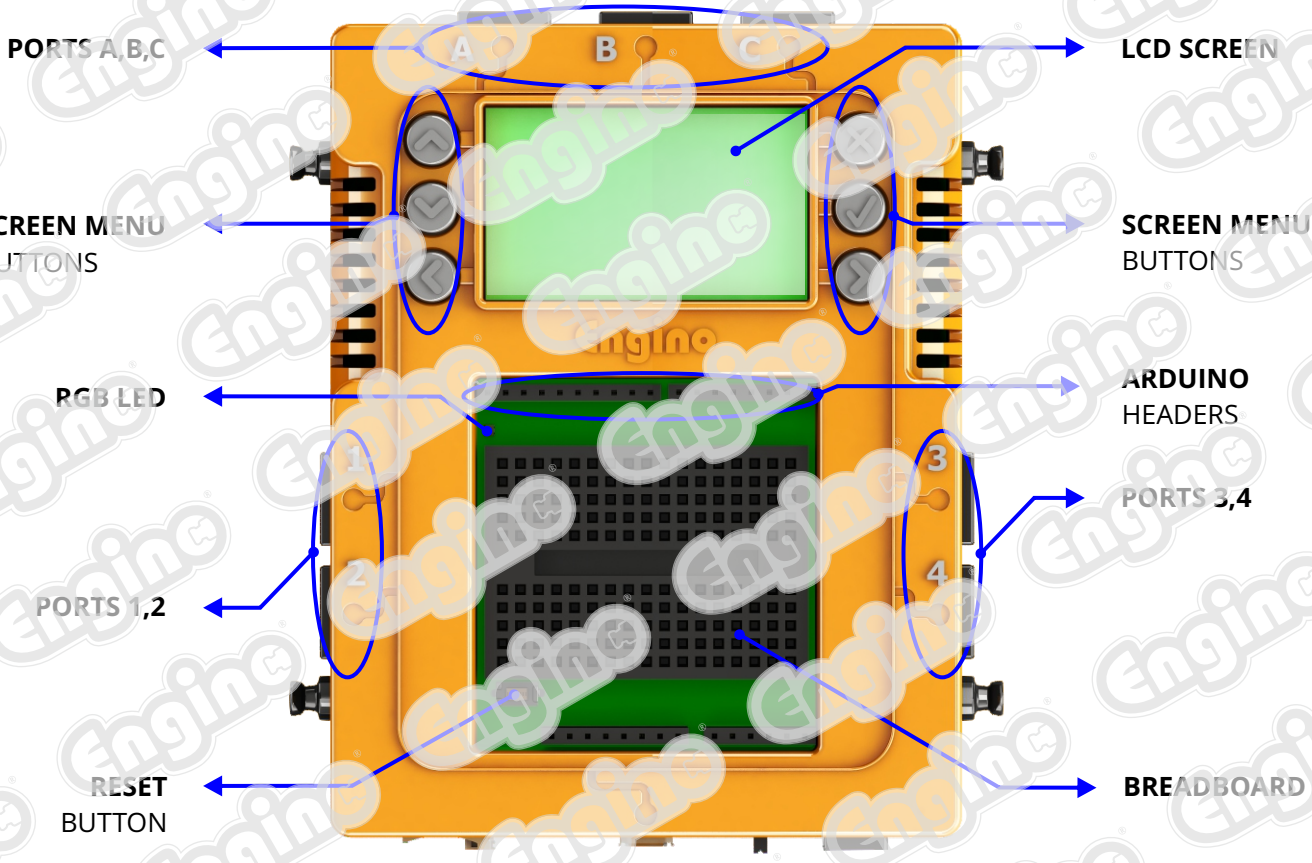
Arduino mode

When a program is created on the flow diagram, at the same time a textual code is generated in the form of a pseudo-language. This code can be viewed in the KEIRO code panel. The software offers the feature to switch into **Arduino mode**, where programming methodology is similar to Arduino. In addition, the generated code is in the form of a true C and C++ programming language which can be opened and modified directly through an Arduino IDE editor. Read more about on page 31.

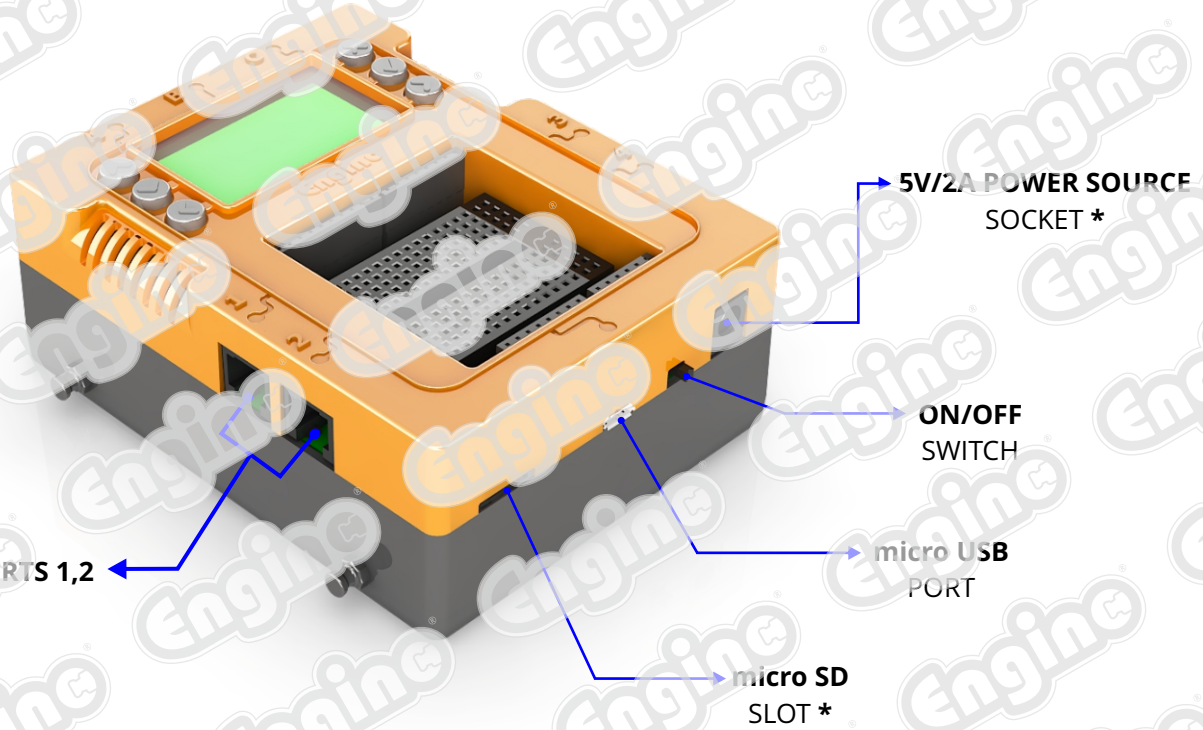
KEIRO code viewer

Arduino IDE editor

The PRODUINO controller



The PRODUINO controller
Top view



The PRODUINO controller
Side view

* *Applicable to specific hardware versions*

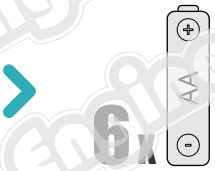
Power supply

Re-chargeable battery: To power on the Produino controller you need to install the Engino re-chargeable battery on the back of the device. You will need a cross-head screw driver to remove the battery cap. The battery can be charged through the micro USB cable while having the device switched on. Alternatively, you may use a power source (not included) of 5V/2A and 5.5x2.1 mm jack through the proper port.

3.7V 2000mAh Li-ion re-chargeable battery

Back side of Produino™ Controller

Batteries: In addition, the device can accommodate six AA batteries on its back side. It also works with 3 batteries, placed continuously up or down. Place the batteries with correct polarity, the + and - signs as indicated in each battery position. After placing the batteries, screw the cap back in position.



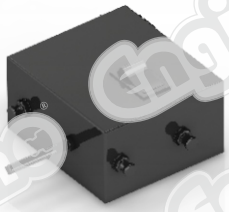
Safety guidelines: Do not overcharge the battery. Do not mix alkaline, standard or rechargeable batteries. Non-rechargeable batteries are not to be re-charged. Do not mix old with new batteries. Remove dead or old batteries from the device if they will not be used for a long time. Never dispose off batteries in fire. Supply terminals are not to be short circuited.

Peripherals and Ports

Peripherals and ports: Peripheral are the hardware devices that can be connected to the controller through its ports. These can either be input devices (sensors) which gather information, or output devices (actuators) that execute commands. Different types of peripherals work only in specific ports of the controller, indicated in Table 1.

Servo motor with RJ connector

An **180°** servo motor that enables **rotation** with high precision and accuracy.



DC motor

A **high torque** DC motor with adjustable speed which can spin **wheels** or cause **motion** to your model.

Compass/Magnetometer

This 3-axis sensor can measure magnetic fields, serving as a **compass** and map **navigation.**

Note: in some Produino versions, the colour and infrared sensors are replaced with a Dual sensor, with the same functionality.

Colour sensor

A multi **photodiode** sensor that detects the **colour** signal of an object in RGB format.

Infrared sensor

The infrared sensor can be used either for object **detection** or for **line following**!

Ultrasonic sensor

A sensor that uses high-frequency waves, ideal for measuring the **distance** to an object.

Touch sensor

This **switch** button can cause **action** and trigger motion once pressed.

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