

# Grove Smart Plant Care Kit for Arduino





# Smart Plant Care Kit for Arduino

This kit helps build up your own plant care system. It also favors the extensibility to achieve more applications with just a few adjustments.

The kit implements two functions. One is to detect environment factors affecting plant growth such as soil moisture, illumination intensity, temperature and air humidity, all the data detected can be read on OLED display. Another one is to water plants automatically through the environment monitoring.



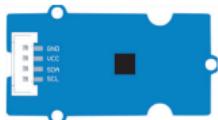
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# What's in the Kit

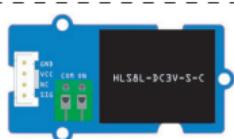
Part list	Function
Grove – Temp & Humidity Sensor	To detection the temperature & humidity
Grove - Sunlight Sensor V1.0	To detect illumination intensity
Grove - Water Flow Sensor	To detect the speed and volume of water flow
Grove - Moisture Sensor	To detect the soil moisture
Grove – Encoder	To adjust knob
Grove - OLED Display 1.12"	To display parameters
Grove - Button	To adjust parameters
Grove – Relay	To control water pump
12V DC Water Pump	To pump the water
12V Power connector	Power connector
Base Shield V2	Expansion board to connect Groves with your Arduino

## Temp & Humidity Sensor



This temperature & humidity sensor provides temperature and air humidity detection function. As temperature or air humidity exceeds the limits set, it will alarm. It has excellent reliability and stability.  
Note: this sensor will not work when temperature goes below 0 in Celsius Degree.

## Grove – Relay

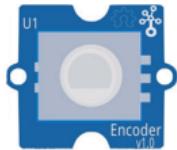


The Grove - Relay is a digital normally-open switch which used to control water pump.

## Grove - Moisture Sensor

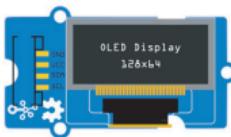


This Moisture Sensor can be used to detect moisture of soil in your plant pot. Just insert it into the soil and then read the data on OLED display. It can also detect if water volume is necessary at the moment.



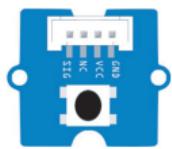
## Grove – Encoder

This module is an incremental rotary encoder. The Grove – Encoder has the standard Grove interface and can be applied to adjust knob.



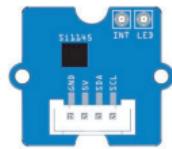
## Grove - OLED Display 1.12"

It is a 16 color grayscale, 128×64 dot matrix OLED display, with Grove compatible 4pin I2C interface. Comparing to LCD, OLED screens are more competitive, which has a number of advantages such as high brightness, self-emission, high contrast ratio, slim outline, wide view angle, wide temperature range, and low power consumption. It was used to display different parameters detected.



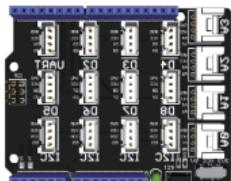
## Grove – Button

The Grove - Button is a momentary push button. It contains one independent "momentary on/off" button. "Momentary" means that the button rebounds on its own after it is released.



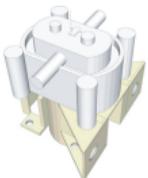
## Grove - Sunlight Sensor V1.0

Sunlight sensor is digital optical sensor (Si1145) which is sensible to visible light, infrared light and ultraviolet light. It can fetch luminance with I2C communication to visible light, infrared light and ultraviolet light. As your plant is over-illuminated detected by sunlight sensor, this system will alarm you.



## Grove - Base shield v2

As an expansion board, Base Shield V2 has many Grove connectors, making it convenient to plug more modules. It is compatible with Arduino, which equips your kit with more extensibility.



## 12V Water Pump

This is small size, light weight, high efficiency, low consumption and low noise water pump.  
It is used to pump water from the container to your plant pot.



## Grove - Water Flow Sensor

Water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. Its speed changes with different flow rate. The hall-effect sensor outputs the corresponding pulse signal. It helps you control your water flow precisely.

## Extra Tools

Arduino UNO Board



DC Power Supply (12V)

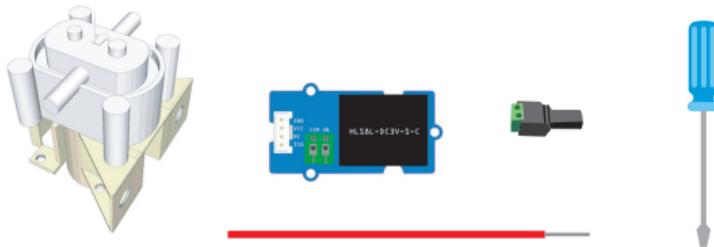


Other accessories: screwdriver, glue gun, scissors, vinyl tubing, water container, etc.

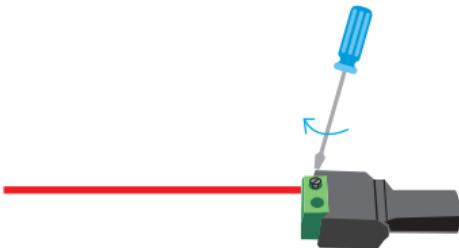
# Build A Simple Plant-care System

## Assemble water pump circuit

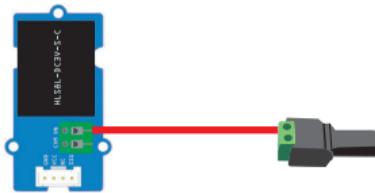
1. Select all parts required to build water pump circuit from this kit: 2V Water Pump, Grove-Relay, 12V Power Connector, Power Cables.



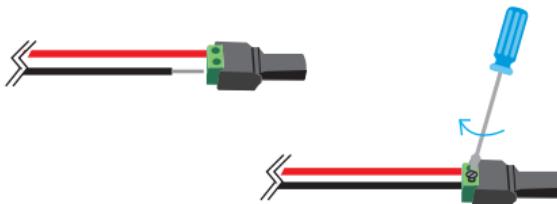
2. Plug one red wire of water pump into positive terminal of power connector and fix it with screw.



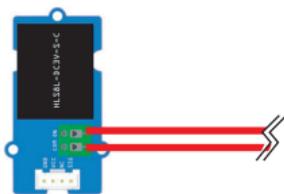
3. Plug cable to relay's either J1 port and fix it.



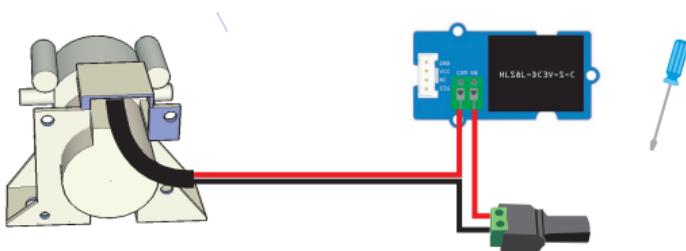
4. Plug black wire of water pump into negative terminal of power connector and fix them.



5. Plug red wire of water pump into relay's another port of J1 connector.

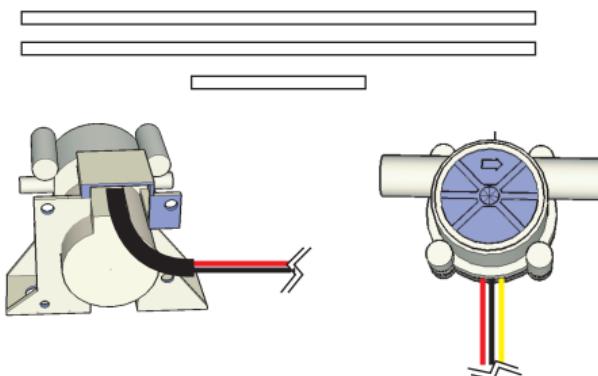


6. Have a look at the completed connection.

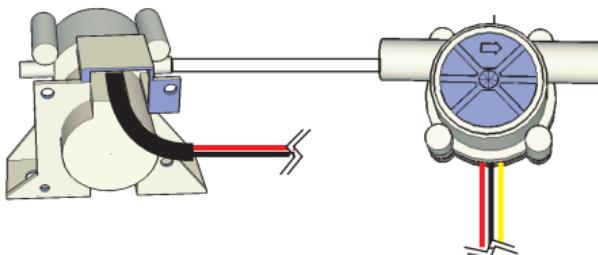


## 2. Vinyl tubing connection

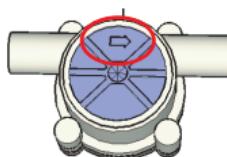
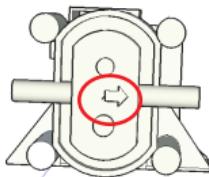
1. Note: The vinyl tubing (70 cm) is not included in this kit.



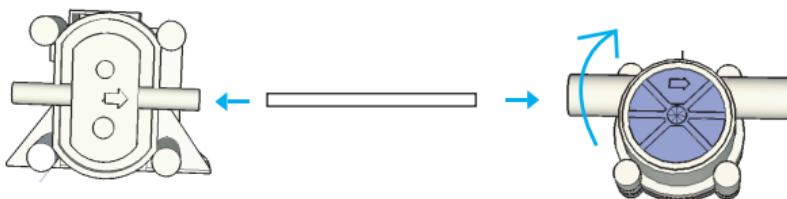
2. Slice vinyl tubing into three parts: two long ones and one short. Each of the two long ones should be about triple times of the short one in length. The long ones are used to inlet tube and irrigate tube. The short one will be used to connect the water pump and the water flow sensor.



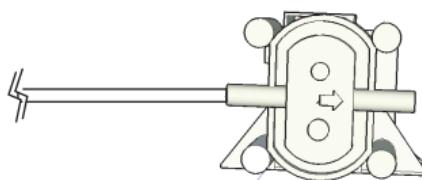
3. Thumb of rules: you can connect tubes according to arrow symbols on water pump and water flow sensor.



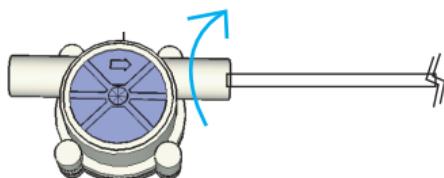
4. Connect both end of short tube to outlet of water pump and inlet of water flow sensor. Note: fix inlet of water flow sensor with nut and make sure tube connected with water pump is tightened.



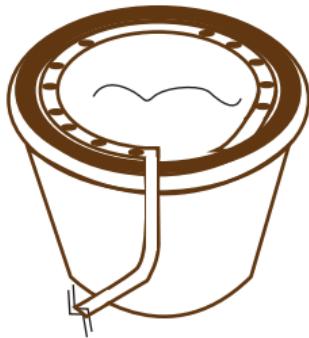
5. Connect one end of either long tube to inlet of water pump and place the other end into water container.



6. Connect the other long tube to outlet of water flow sensor and fix them with knob.

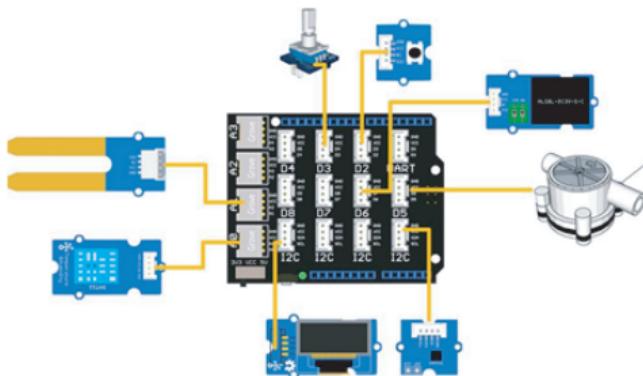


7. To ensure a good irrigation effect, you can make a few holes on the tube and place it around the plant. Remember to clog the tube output.

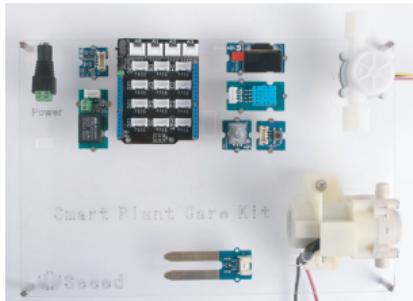
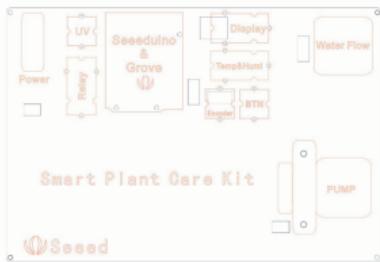


### 3. Grove module connections manner

Modules	Port
Grove - OLED Display 1.12"	I2C
Grove – Sunlight Sensor V1.0	I2C
Grove–Button	D2
Grove - Encoder	D3
Grove - Water Flow Sensor	D5
Grove - Relay	D6
Grove – Temp & Humidity Sensor	A0
Grove - Moisture Sensor	A1



The following figures show layout of all modules and a demo for it.



#### 4. Additional notes

- The project built with this kit should be placed in the environment where dry and no rain reached, to avoid short circuit.
- Please insert moisture sensor into the center part of flowerpot, and keep it near to the plant and away from the landing point of water.

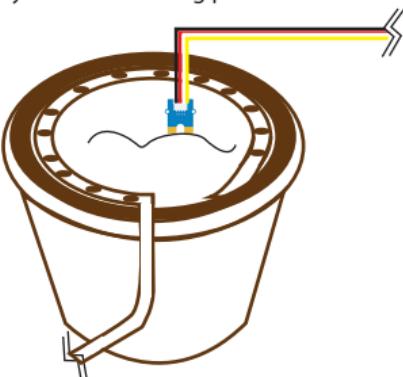


Figure: Moisture sensor should be placed like this.

# Software operations

## 1. Install the Aduino Development Environment

Get a Arduino UNO board and USB cable (Type A to type C ).



### Download the Arduino IDE

Get the latest version from the Arduino UNO integrated development environment (IDE). When downloading work finishes, install it on your PC.

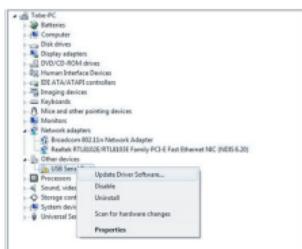
### Connect the board

The Arduino board automatically draw power from the USB connection to the computer or an external power supply. Connect A plug to your PC and C plug to Arduino UNO board.

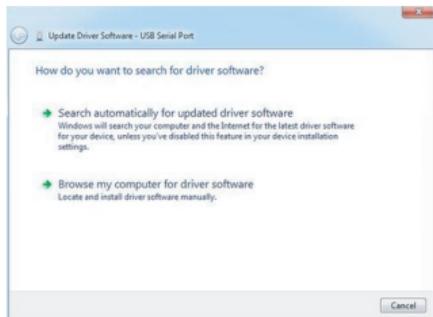
The green power LED (labelled PWR) should go on.

### Install the drivers

- Click on the Start Menu, and open up the Control Panel.
- While in the Control Panel, navigate to System and Security. Next, click on System. Once the System window is up, open the Device Manager.
- Look under Ports (COM & LPT). You should see a port named "Arduino (COMx)". If there is no COM & LPT section, look under "Other Devices" for "Unknown Device".



- Right click on the "Arduino (COMxx)" port and choose the "Update Driver Software" option.
- Next, choose the "Browse my computer for Driver software" option.



- Finally, navigate to and select the driver file named "FTDI USB Drivers", located in the "Drivers" folder in Arduino installation directories. And follow general windows driver install wizard to complete installation.



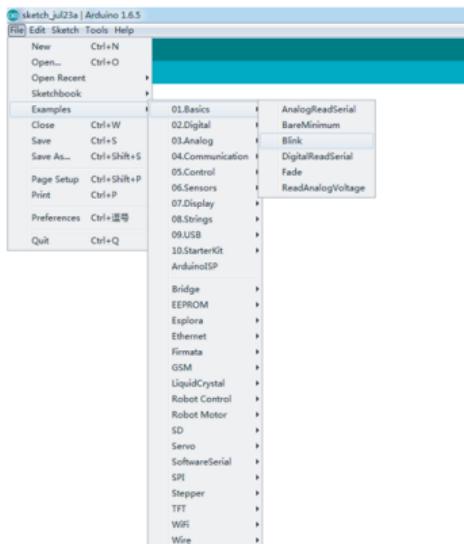
## ***Launch the Arduino IDE***

Double-click the Arduino application.

Note: you can change it in the preferences dialog (Click File>Preference) to choose your personal language.

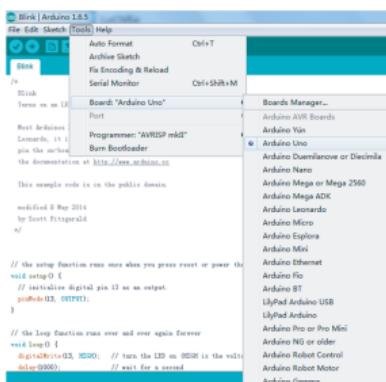
## ***Add a sample source code***

Check that your IDE is well built. Open the LED blink example sketch: File > Examples > 1. Basics > Blink.



## Select your board

You'll need to select the entry in the Tools > Board menu that corresponds to your Arduino board. We choose Aduino UNO herein.



## **Select your serial port**

Please choose corresponding COM port for your Arduino board, it can be found in Device manager in the windows Control Panel.

Note: You should choose right one appropriately to your Arduino board.

## **Flash the program**

Now, simply click the "Upload" button in the environment. Wait a few seconds - you should

See a prompt like following figure shows:

Done uploading.

A few seconds after the upload finishes and we assume you use sample Blink, you should see the pin 13 (L) LED on the board start to blink (in orange). If it does, congratulations! You've got Arduino up-and-running.

## **2. Download demo code**

We assume you have connected your Arduino board and computer well with USB (type A to type C)

[Download demo code at https://github.com/Seeed-Studio/Gardening\\_demo\\_Arduino](https://github.com/Seeed-Studio/Gardening_demo_Arduino)  
Click "Download zip" button on right side of webpage to download all codes.

Decompress the downloaded zip files to C:\Users\Administrator\Documents\Arduino\ and remove "-master" in decompressed file name.

Note you may need to create a new file called Arduino if it does not exist.

Launch Arduino IDE.

Click Sketch>Add file to add Gardening.ino file from C:\Users\Administrator\Documents\Arduino\Gardening\_demo\_Arduino\Gardening\_demo\_Arduino\Gardening

Note: add library. Copy file library under directory C:\Users\Administrator\Documents\Arduino\Gardening\_demo\_Arduino\Gardening\_demo\_Arduino\ to C:\Users\Administrator\Documents\Arduino\Gardening\_demo\_Arduino\Gardening\_demo\_Arduino\Gardening

Press CTRL +U to upload codes to your board. Wait a while, there will be prompt like following figure:

## Done uploading.

FAQs:

Q: How should I do if the IDE prompted as "cannot find xxx.h file"?

A: That shows some header files cannot be found by IDE itself. Click Sketch>Include Library>Add .zip library to add corresponding header file. For example, you should add C:\Users\Administrator\Documents\Arduino\Gardening\_demo\_Arduino-master\libraries\OLED\_Display\_128X64 into library if IDE have prompted "cannot find OLED.h file".

Get community help at <http://support.seeedstudio.com/>

## Demo Operation Instruction

### Input interface definition

- Knob, adjust different parameters' value and switch parameter-setting page.
- Button, control different action to particular event. To be specific, switch temperature upper and low limits, start or cancel an action and so on.

Attention: Interval of environment factor detection can be configured.

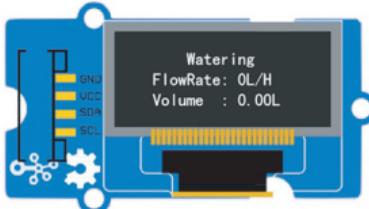
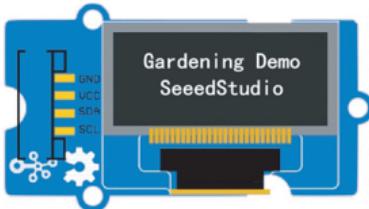
### Menu function

Choose a sensor parameter, press and hold button, then rotate knob to adjust the values of corresponding parameters.

Attention: For air temperature setting page, there are two parameter which are high limens and low limens. Once you have pressed button, it will switch parameter to another. E.g. you are setting high limen and you have pressed down button and then adjusting knob to change high limen. After stop holding button, press down button again and rotate knob, you are changing low limen now.

- Start watering immediately.

Switch current page to boot-up which shows as above figure by knob. Press button once to start water your plants and flowing figure will be displayed which show how much water have complemented and max limit of water complemented. as water completed reach the limit, this system will stop watering.



It also will alarm if no water available in water container and alarming information will be displayed.



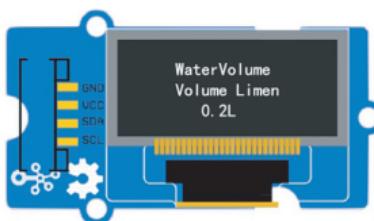
Note: you can always press button to cancel alarming in alarming status.

Note: you can press button to stop watering in watering status.

Note: interval of watering is 5 minutes which means even watering action's demand is satisfied, it still needs 5 minutes since last watering.

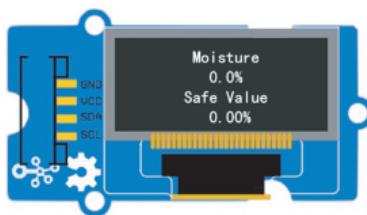
- Set water volume

You can set water volume complemented for your plant. Switch page to "water volume" page. Press and hold button, adjust knob to change values. As water completed reach the limit, this system will stop watering. Default water volume is 0.2L.



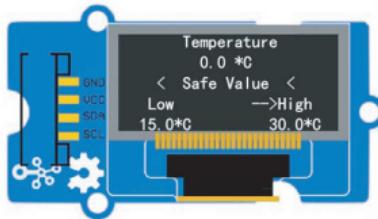
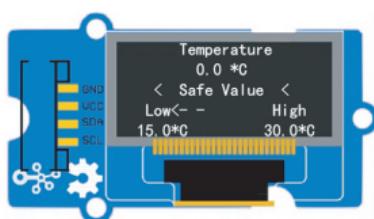
- Set soil moisture limit.

At moisture setting page, you can set moisture safe value for your plant and check current moisture magnitude. This system water your plants as moisture magnitude reach limit. Press and hold button, adjust knob to change values, real moisture value on upper part, setting value on bottom part of display.

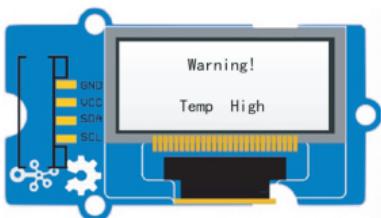
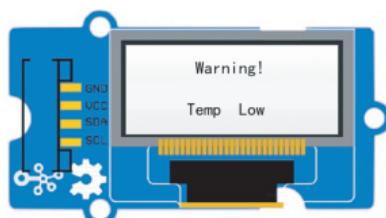


- Set temperature limits.

At temperature setting page, you can set temperature limits for your plant and check current temperature. Press button to switch between low limit setting and high limit setting. Press and hold button, adjust knob to change values, real temperatures index on upper part, setting value on bottom part of display.

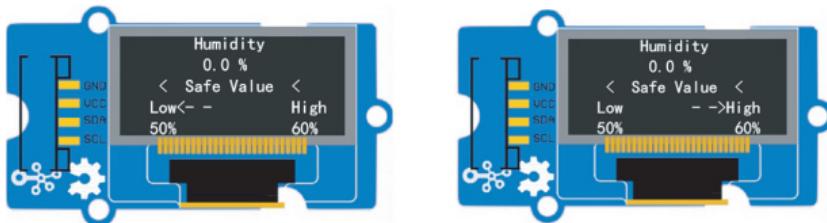


This system alarms as temperature reaches limit. Default temperature range is 15°C~30°C.

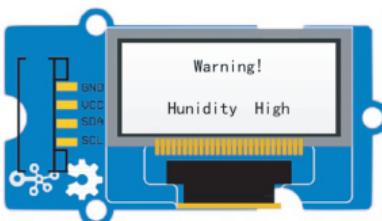


- Set air humidity limit.

At humidity setting page, you can set humidity limits for your plant and check current air humidity. Press button to switch between low limit setting and high limit setting. Press and hold button, adjust knob to change values, real humidity value on upper part, setting value on bottom part of display.

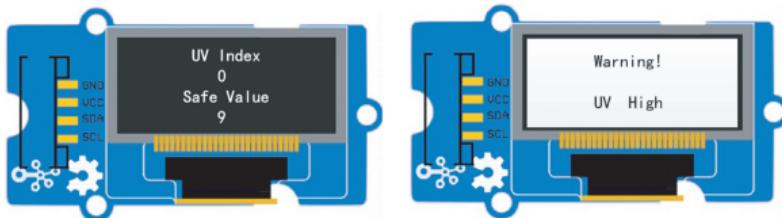


This system alarm as temperature reach limit. Default humidity range is 40%~60%.



- Set ultraviolet(UV) index limit

At UV index setting page, you can set UV index limits for your plant and check current UV index, real UV index on upper part, setting value on bottom part of display. Press and hold button, adjust knob to change values. This system alarm as UV index reach limit. Default UV index is 9.



## More application expansion

This kit features high extensibility on which you can add more modules to make your project more intelligent. For example:

- Add a buzzer to alarm yourself;
- Add Bluetooth module to control it more convenient.

## Related topics

Smart Plant Care Kit is a smart and inexpensive kit which could help you develop a plant-caring system quickly. Few and easy modifications are needed if you want to add more features since it is expanded well. Easy-built plant-caring-system will make your plants well-attended as you get no time for them.

### About Grove

Grove is a modular, ready-to-use tool set that takes a building block approach to assembling electronics. The Grove system consists of a base shield and a large selection of modules that feature standardized connectors. The base shield allows for easy connection of any microcontroller to interface with the various Grove modules. Each Grove module addresses a unique function & the overall collection of modules expand a wide range of functionality-from a simple push-button to a complex heart rate sensor. Each one comes with clear documentation and demo code to help you get started quickly.

### About Seeed Studio

Seeed is a hardware innovation platform for makers to grow inspirations into differentiating products. Seeed provides accessible technologies with quality, speed and supply chain knowledge. Seeed helps productize 1 to 1,000 pcs using in-house engineering, supply chain management and agile manufacture forces. Seeed also teams up with incubators, China tech ecosystem, investors and distribution channels to get Maker startups beyond. <http://www.seeedstudio.com/depot/>

### Have Questions?

If you encounter any problem, please refer to the following websites for resources & help.

For the details of Grove system and Seeed products.

[http://www.seeedstudio.com/wiki/Main\\_Page](http://www.seeedstudio.com/wiki/Main_Page)

## ***Disclaimer***

For physical injuries and possessions loss caused by those reasons which are not related to product quality, such as operating without following manual guide, natural disasters or force majeure, we take no responsibility for that.

Under the supervision of Seeed Technology Inc., this manual has been compiled and published which covered the latest product description and specification. The content of this manual is subject to change without notice.

## **Appendix**

### ***Web links to all the modules:***

- Temp & Humidity Sensor: <http://www.seeedstudio.com/depot/Grove-Temperature-Humidity-Sensor-HighAccuracy-Mini-p-1921.html>
- Water Flow Sensor: <http://www.seeedstudio.com/depot/G14-Water-Flow-Sensor-p-1345.html>
- Grove – Moisture Sensor: <http://www.seeedstudio.com/depot/Grove-Moisture-Sensor-p-955.html>
- Grove-Encoder: <http://www.seeedstudio.com/depot/Grove-Encoder-p-1352.html>
- Grove - OLED Display 1.12": <http://www.seeedstudio.com/depot/Grove-OLED-Display-112-p-781.html>
- Grove – Button: <http://www.seeedstudio.com/depot/Grove-Button-p-766.html>
- Grove – Relay: <http://www.seeedstudio.com/depot/Grove-Relay-p-769.html>
- 12V DC Water Pump: <http://www.seeedstudio.com/depot/12V-DC-Water-Pump-p-1946.html>
- Base Shield V2: <http://www.seeedstudio.com/depot/Base-Shield-V2-p-1378.html>



## ATTENTION

Best to keep away  
from fire.

Innovate with China



For more information, please visit  
[seeed.cc/grove](http://seeed.cc/grove)