Home » M5STACK » **M5STACK StamPLC IoT Programmable Logic Controller User Guide**

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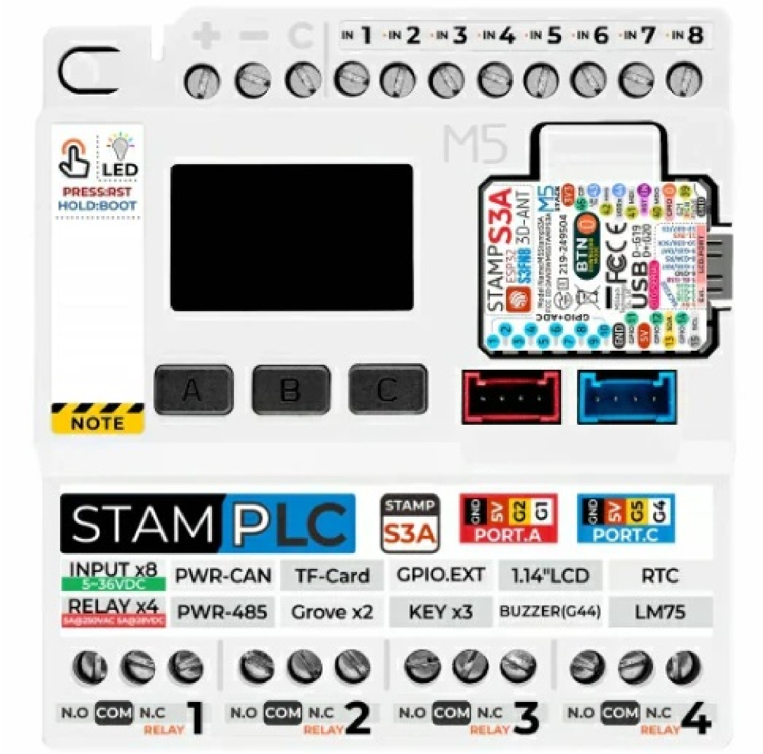
M5STACK StamPLC IoT Programmable Logic Controller



Specifications

Specification	Parameter
Control Module	StampS3A contro1 module,based on ESP32-S3FN8,includes 8MB Flash, 2.4GHz Wi-Fi,Bluetooth Low Energy (BLE)
FLASH	8MB
Digital Inputs	8 channels of opto-isolated digital inputs, input voltage range: DC 5~36V
Digital 0utputs	4-channel relay outputs
Relays	AC 5A@250V,DC 5A@28V
DC Power Supply	supports DC 6~36V@1A wide voltage supply,DC power cornnector:DC5521 female,5.5x 2.1mm(center-positive)Expansion
n Interfaces	GPIO.EXT interface,2 Grove interfaces

Communication Interfaces	Onboard PWR-CAN and PWR-485 interfaces
PWR-CAN Interface	XT30(2+2)PW-M
PWR-485 Interface	HT3.96-4P
Display	1.14-inch color display(135×240 resolution),driven by the ST7789v2 chip
Contro1 &Interaction	1 RESET/B00T button,3 user buttons, buzzer
Data Storage	Built-in Micro SD card slot
Sensors	LM75 temperature sensor,INA226 voltage/current sensor,RTC(RX8130CE)
I/0 Port Load Capacity	2×8 expansion interface:maximum 1oad capacity DC 4.76V @700mA,Grove port 1oad capacity:DC 4.81V e 700mA
Power Consumption	Standby current:(5V supp1y)DC 5V@21.60mA,(12V supply)DC 12Ve15.22mA;Operating current:(5V supply)DC 5Ve93.89mA, (12V supply)DC 12V @47.84mA
Installation Method	DIN rail mounting
Operating Temperature	-10~50°C

Product Dimensions	72.0×80.0×31.7mm
Product Weight	139.4g
Package Dimensions	102.0x 94.0 x 37mm
Gross Weight	163.7g
Manufacturer	M5Stack Technology Co., Ltd Block A10, Expo Bay South Coast, Fuhai Street, Bao'an District, Shenzhen, China
Frequency Range for CE	2.4G Wi-Fi: 2412-2472MHz/2422-2462MHz BLE: 2402-2480MHz
Maximum EIRP for CE	BLE: 6.84dBm 2.4G Wi-Fi: 17.90dBm

Product Usage Instructions

Quick Start

To get started with your Stam PLC, follow these steps:

SCAN Wi-Fi

1. Power on the Stam PLC using the provided DC power supply.
2. Press the RESET/BOOT button to start the device.
3. Access the Wi-Fi settings on your device and scan for available networks.

4. Select the appropriate Wi-Fi network and enter the password if required.
5. Once connected, you can start utilizing the wireless communication capabilities of the Stam PLC.

SCAN BLE

1. Ensure the Stam PLC is powered on and operational.
2. Activate the Bluetooth settings on your device.
3. Scan for available Bluetooth devices in the vicinity.
4. Select the Stam PLC from the list of discovered devices to establish a BLE connection.
5. You can now leverage the BLE functionality for data transfer and control.

OUTLINE

Stam PLC is an IoT programmable logic controller designed for industrial automation and remote monitoring. The product is based on the StampS3A control module, which not only delivers powerful processing capabilities but also provides efficient wireless connectivity. In terms of control, Stam PLC offers 8 opto-isolated digital inputs and 4 relay outputs (supporting both AC and DC loads), along with a GPIO.EXT port and 2 Grove interfaces, making the integration of various sensors and actuators both simple and reliable. Meanwhile, through the onboard PWR-CAN and PWR-485 interfaces, the device can be seamlessly integrated into industrial fieldbus networks, enabling remote data transmission and centralized control.

For human-machine interaction, the product features a 1.14-inch color display, a RESET/BOOT button, 3 user buttons, and a buzzer, which facilitate real-time parameter configuration and status monitoring, and can alert users in the event of anomalies. To withstand harsh industrial environments, Stam PLC supports a wide voltage input (DC 6–36V) and is designed for DIN rail mounting to ensure secure installation; the built-in Micro SD card slot further facilitates data storage and firmware updates.

Additionally, its environmental monitoring system integrates an LM75 temperature sensor and an INA226 voltage/current sensor for real-time feedback on device operation, while the RTC (RX8130CE) module ensures accurate time synchronization and log recording. The factory firmware automatically uploads data to M5’s EZDATA cloud platform, generating monitoring pages and offering users convenient remote cloud access and control. This product is suitable for industrial automation, remote monitoring, smart manufacturing, and other applications.

Stam PLC

Communication Capabilities

- Main Controller: ESP32-S3FN8 (StampS3A control module)
- Wireless Communication: Wi-Fi (2.4 GHz) and Bluetooth Low Energy (BLE)
- CAN Bus: Onboard PWR-CAN interface for reliable industrial data communication, RS-485:
- Onboard PWR-485 interface supporting remote control via the Modbus RTU protocol

Processor and Performance

- Processor Model: Xtensa LX7 dual-core (ESP32-S3FN8)
- Storage Capacity: 8MB Flash
- Operating Frequency: Up to 240 MHz on a dual-core 32-bit LX7 microprocessor

Display and Input

- Display: 1.14-inch color TFT display for real-time parameter monitoring
- Buttons: 1 RESET/BOOT button plus 3 user buttons for control and configuration. Buzzer:
- Built-in buzzer for audio alerts and notifications
- RGB LED: Integrated RGB LED for dynamic visual feedback

GPIO Pins and Programmable Interfaces

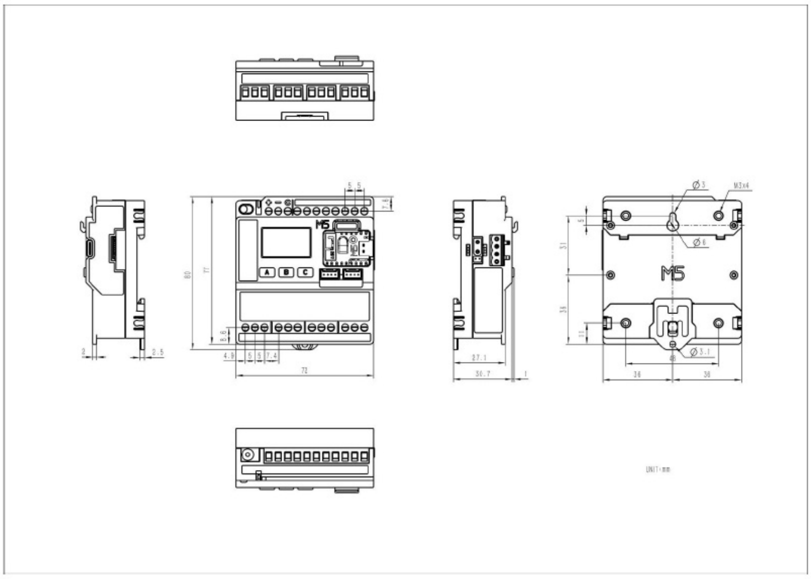
- GPIO Pins: Provides multiple configurable GPIO pins (detailed mapping available in documentation)
- Expansion Interfaces:
  - 2 Grove interfaces for easy sensor and actuator connection
  - GPIO.EXT interface for additional connectivity

  - Micro SD card slot for data storage and firmware updates

Others

- Onboard Interfaces: Type-C connector for programming, power supply, and serial communication
- Physical Dimensions: 72.0 × 80.0 × 31.7 mm with DIN rail mount design, suitable for harsh industrial environments
- Power Input: Wide voltage input ranging from DC 6–36V
- Integrated Sensors: Includes LM75 temperature sensor, INA226 voltage/current sensor, and RTC (RX8130CE) for accurate time synchronization and log recording
- Relay Outputs: 4-channel relay outputs supporting AC 5A @ 250V / DC 5A @ 28V
  Opto-Isolated Digital Inputs: 8 channels designed to support DC 5–36V inputs for safe signal acq

Module Size



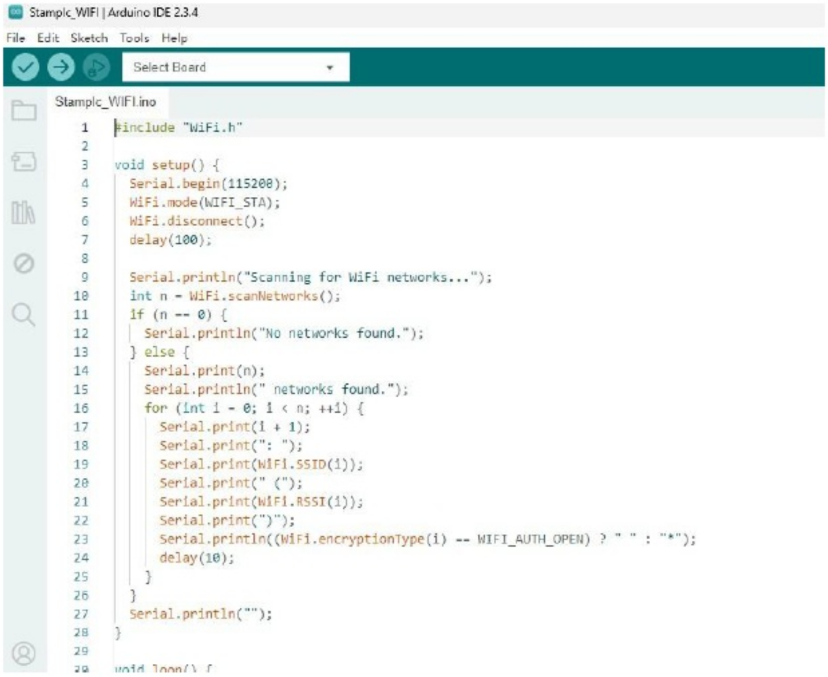
QUICK START

Before you do this step, look at the text in the final appendix: Installing Arduino.

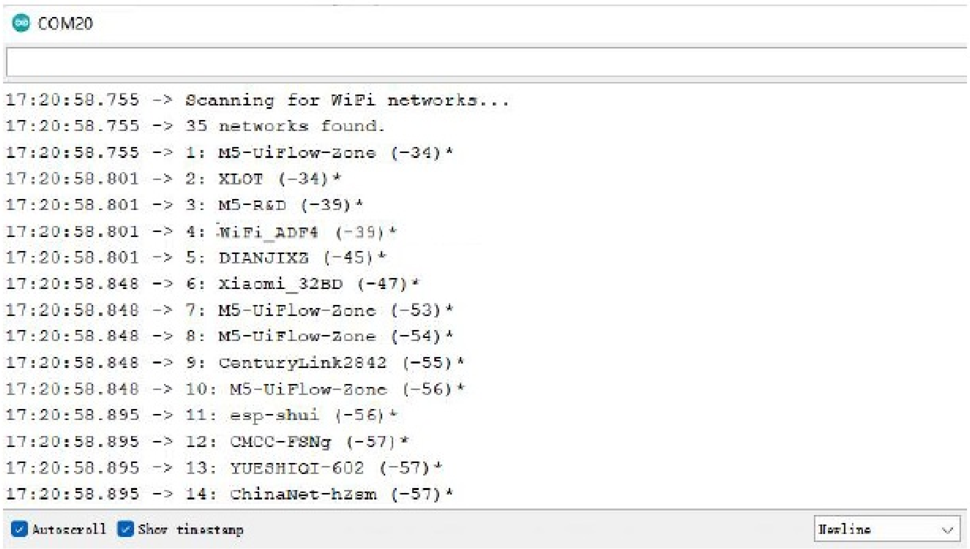
Print WiFi information

1. Open Arduino IDE (Refer to https://docs.m5stack.com/en/arduino/arduino_ide for the installation guide for the development board and software)

2. Select the ESP32S3 DEV Module board and the corresponding port, then upload the code.e
3. Open the serial monitor to display the scanned WiFi and signal strength information.



```
#include "WiFi.h"

void setup() {
  Serial.begin(115200);
  WiFi.mode(WIFI_STA);
  WiFi.disconnect();
  delay(100);

  Serial.println("Scanning for WiFi networks...");
  int n = WiFi.scanNetworks();
  if (n == 0) {
    Serial.println("No networks found.");
  } else {
    Serial.print(n);
    Serial.println(" networks found.");
    for (int i = 0; i < n; ++i) {
      Serial.print(i + 1);
      Serial.print(": ");
      Serial.print(WiFi.SSID(i));
      Serial.print(" (");
      Serial.print(WiFi.RSSI(i));
      Serial.print(")");
      Serial.println((WiFi.encryptionType(i) == WIFI_AUTH_OPEN) ? " " : "*");
      delay(10);
    }
  }
  Serial.println("");
}

void loop() {
```



```
17:20:58.755 -> Scanning for WiFi networks...
17:20:58.755 -> 35 networks found.
17:20:58.755 -> 1: M5-UiFlow-Zone (-34)*
17:20:58.801 -> 2: XLOT (-34)*
17:20:58.801 -> 3: M5-R&D (-39)*
17:20:58.801 -> 4: WiFi_ADF4 (-39)*
17:20:58.801 -> 5: DIANJIXZ (-45)*
17:20:58.848 -> 6: Xiaomi_32BD (-47)*
17:20:58.848 -> 7: M5-UiFlow-Zone (-53)*
17:20:58.848 -> 8: M5-UiFlow-Zone (-54)*
17:20:58.848 -> 9: CenturyLink2842 (-55)*
17:20:58.848 -> 10: M5-UiFlow-Zone (-56)*
17:20:58.895 -> 11: esp-shui (-56)*
17:20:58.895 -> 12: CMCC-FSNg (-57)*
17:20:58.895 -> 13: YUESHIQI-602 (-57)*
17:20:58.895 -> 14: ChinaNet-hZsm (-57)*
```

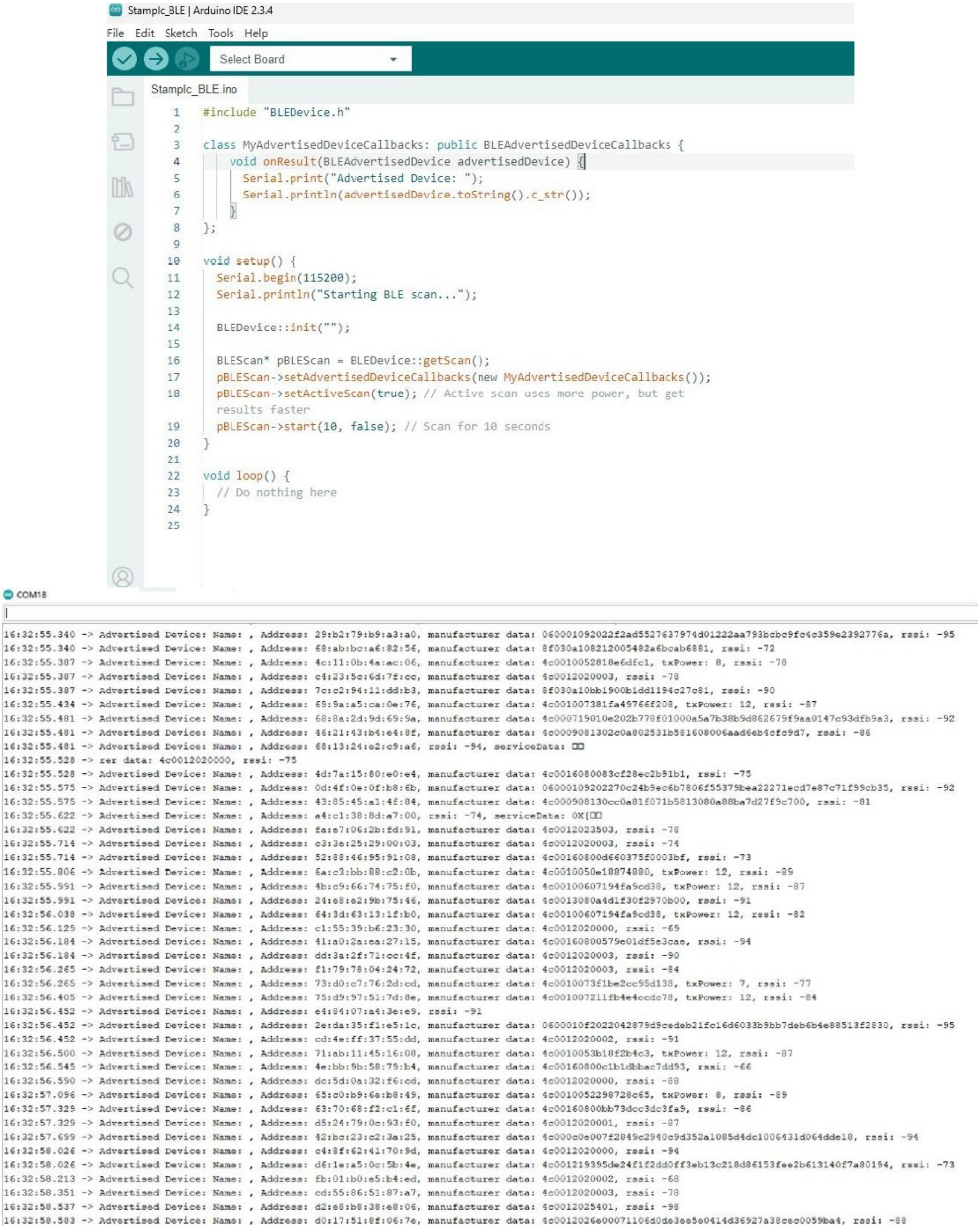
QUICK START

Before you do this step, look at the text in the final appendix: Installing Arduin.

Print BLE information

1. Open Arduino IDE (Refer to https://docs.m5stack.com/en/arduino/arduino_ide for the installation guide for the development board and software)
2. Select the ESP32S3 DEV Module board and the corresponding port, then upload the code.

3. Open the serial monitor to display the scanned BLE and signal strength information.



```
#include "BLEDevice.h"

class MyAdvertisedDeviceCallbacks: public BLEAdvertisedDeviceCallbacks {
    void onResult(BLEAdvertisedDevice advertisedDevice) {
      Serial.print("Advertised Device: ");
      Serial.println(advertisedDevice.toString().c_str());
    }
};

void setup() {
  Serial.begin(115200);
  Serial.println("Starting BLE scan...");

  BLEDevice::init("");

  BLEScan* pBLEScan = BLEDevice::getScan();
  pBLEScan->setAdvertisedDeviceCallbacks(new MyAdvertisedDeviceCallbacks());
  pBLEScan->setActiveScan(true); // Active scan uses more power, but get results faster
  pBLEScan->start(10, false); // Scan for 10 seconds
}

void loop() {
  // Do nothing here
}

```

```
16:32:55.340 -> Advertised Device: Name: , Address: 29:b2:79:b9:a3:a0, manufacturer data: 060001092022f2ad5527637974d01222aa793bcbc9fc4c359e2392776a, rssi: -95
16:32:55.340 -> Advertised Device: Name: , Address: 68:ab:bc:a6:82:56, manufacturer data: 8f030a108212005482a6bcab6881, rssi: -72
16:32:55.387 -> Advertised Device: Name: , Address: 4c:11:0b:4a:ac:06, manufacturer data: 4c0010052818e6dfc1, txPower: 8, rssi: -78
16:32:55.387 -> Advertised Device: Name: , Address: c4:23:5c:6d:7f:cc, manufacturer data: 4c0012020003, rssi: -78
16:32:55.387 -> Advertised Device: Name: , Address: 7c:c2:94:11:dd:b3, manufacturer data: 8f030a10bb1900b1dd1194c27c81, rssi: -90
16:32:55.434 -> Advertised Device: Name: , Address: 69:9a:a5:ca:0e:76, manufacturer data: 4c001007381fa49766f208, txPower: 12, rssi: -87
16:32:55.481 -> Advertised Device: Name: , Address: 68:8a:2d:9d:69:9a, manufacturer data: 4c000719010e202b778f01000a5a7b38b9d862679f9aa0147c93dfb9a3, rssi: -92
16:32:55.481 -> Advertised Device: Name: , Address: 46:21:43:b4:e4:8f, manufacturer data: 4c0009081302c0a802531b581608006aad6eb4cfc9d7, rssi: -86
16:32:55.481 -> Advertised Device: Name: , Address: 68:13:24:e2:c9:a6, rssi: -94, serviceData: □□
16:32:55.528 -> rer data: 4c0012020000, rssi: -75
16:32:55.528 -> Advertised Device: Name: , Address: 4d:7a:15:80:e0:e4, manufacturer data: 4c0016080083cf28ec2b91b1, rssi: -75
16:32:55.575 -> Advertised Device: Name: , Address: 0d:4f:0e:0f:b8:6b, manufacturer data: 06000109202270c24b9ec6b7806f55379bea22271ecd7e87c71f99cb35, rssi: -92
16:32:55.575 -> Advertised Device: Name: , Address: 43:85:45:a1:4f:84, manufacturer data: 4c000908130cc0a81f071b5813080a88ba7d27f9c700, rssi: -81
16:32:55.622 -> Advertised Device: Name: , Address: a4:c1:38:8d:a7:00, rssi: -74, serviceData: 0X[□□
16:32:55.622 -> Advertised Device: Name: , Address: fa:e7:06:2b:fd:91, manufacturer data: 4c0012023503, rssi: -78
16:32:55.714 -> Advertised Device: Name: , Address: c3:3e:25:29:00:03, manufacturer data: 4c0012020003, rssi: -74
16:32:55.714 -> Advertised Device: Name: , Address: 52:88:46:95:91:08, manufacturer data: 4c00160800d660375f0003bf, rssi: -73
16:32:55.806 -> Advertised Device: Name: , Address: 6a:c3:bb:88:c2:0b, manufacturer data: 4c0010050e18874880, txPower: 12, rssi: -89
16:32:55.991 -> Advertised Device: Name: , Address: 4b:c9:66:74:75:f0, manufacturer data: 4c00100607194fa9cd38, txPower: 12, rssi: -87
16:32:55.991 -> Advertised Device: Name: , Address: 24:e8:e2:9b:75:46, manufacturer data: 4c0013080a4d1f30f2970b00, rssi: -91
16:32:56.038 -> Advertised Device: Name: , Address: 64:3d:63:13:1f:b0, manufacturer data: 4c00100607194fa9cd38, txPower: 12, rssi: -82
16:32:56.129 -> Advertised Device: Name: , Address: c1:55:39:b6:23:30, manufacturer data: 4c0012020000, rssi: -69
16:32:56.184 -> Advertised Device: Name: , Address: 41:a0:2a:ea:27:15, manufacturer data: 4c00160800579e01df5e3cae, rssi: -94
16:32:56.184 -> Advertised Device: Name: , Address: dd:3a:2f:71:cc:4f, manufacturer data: 4c0012020003, rssi: -90
16:32:56.265 -> Advertised Device: Name: , Address: f1:79:78:04:24:72, manufacturer data: 4c0012020003, rssi: -84
16:32:56.265 -> Advertised Device: Name: , Address: 73:d0:c7:76:2d:cd, manufacturer data: 4c0010073f1be2cc95d138, txPower: 7, rssi: -77
16:32:56.405 -> Advertised Device: Name: , Address: 75:d9:97:51:7d:8e, manufacturer data: 4c001007211fb4e4ccdc78, txPower: 12, rssi: -84
16:32:56.452 -> Advertised Device: Name: , Address: e4:84:07:a4:3e:e9, rssi: -91
16:32:56.452 -> Advertised Device: Name: , Address: 2e:da:35:f1:e5:1c, manufacturer data: 0600010f2022042879d9cedeb21fc16d6033b9bb7deb6b4e88513f2830, rssi: -95
16:32:56.452 -> Advertised Device: Name: , Address: cd:4e:ff:37:55:dd, manufacturer data: 4c0012020002, rssi: -91
16:32:56.500 -> Advertised Device: Name: , Address: 71:ab:11:45:16:08, manufacturer data: 4c0010053b18f2b4c3, txPower: 12, rssi: -87
16:32:56.545 -> Advertised Device: Name: , Address: 4e:bb:9b:58:79:b4, manufacturer data: 4c00160800c1b1dbbac7dd93, rssi: -66
16:32:56.590 -> Advertised Device: Name: , Address: dc:5d:0a:32:f6:cd, manufacturer data: 4c0012020000, rssi: -88
16:32:57.096 -> Advertised Device: Name: , Address: 65:c0:b9:6e:b8:49, manufacturer data: 4c001005229872 8c65, txPower: 8, rssi: -89
16:32:57.329 -> Advertised Device: Name: , Address: 63:70:68:f2:c1:6f, manufacturer data: 4c00160800bb73dcc3dc3fa9, rssi: -86
16:32:57.329 -> Advertised Device: Name: , Address: d5:24:79:0c:93:f0, manufacturer data: 4c0012020001, rssi: -87
16:32:57.699 -> Advertised Device: Name: , Address: 42:bc:23:c2:3a:25, manufacturer data: 4c000c0e007f2849c2940c9d352a1085d4dc1006431d064dde18, rssi: -94
16:32:58.026 -> Advertised Device: Name: , Address: c4:8f:62:41:70:9d, manufacturer data: 4c0012020000, rssi: -94
16:32:58.026 -> Advertised Device: Name: , Address: d6:1e:a5:0c:5b:4e, manufacturer data: 4c001219395de24f1f2dd0ff3eb13c218d86153fee2b613140f7a80194, rssi: -73
16:32:58.213 -> Advertised Device: Name: , Address: fb:01:b0:e5:b4:ed, manufacturer data: 4c0012020002, rssi: -68
16:32:58.351 -> Advertised Device: Name: , Address: cd:55:86:51:87:a7, manufacturer data: 4c0012020003, rssi: -78
16:32:58.537 -> Advertised Device: Name: , Address: d2:e8:b8:38:e8:06, manufacturer data: 4c0012025401, rssi: -98
16:32:58.583 -> Advertised Device: Name: , Address: d0:17:51:8f:06:7e, manufacturer data: 4c0012026e00071106d0de3ee5e0414d36927a38cec0059ba4, rssi: -88
```

FCC Warning

FCC Caution:

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

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.

IMPORTANT NOTE:

Note: 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 or more 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 the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator& your body.

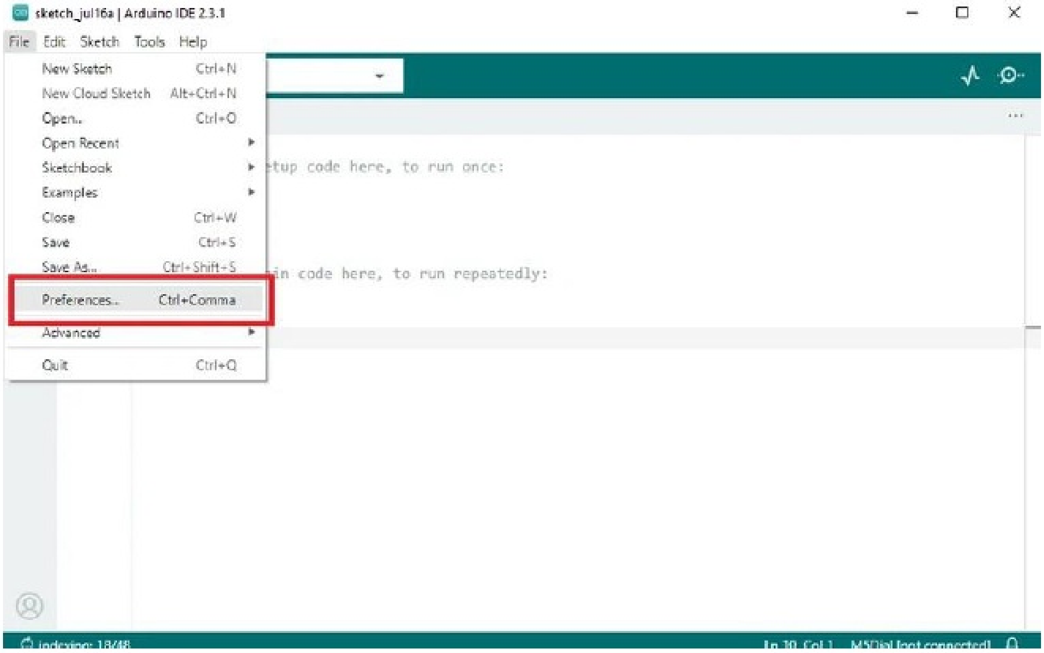
Arduino Install

Installing Arduino IDE(https://www.arduino.cc/en/Main/Software)

Click to visit the Arduino official website, and select the installation package for your operating system to download.

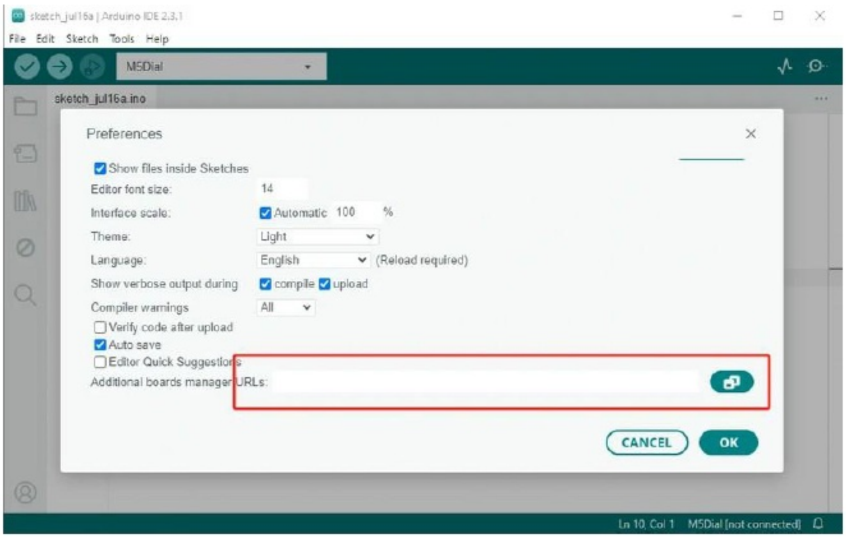
Installing Arduino Board Management

1. The Board Manager URL is used to index the development board information for a specific platform. In the Arduino IDE menu, select File -> Preferences



sketch_jul16a | Arduino IDE 2.3.1
File Edit Sketch Tools Help
New Sketch Ctrl+N
New Cloud Sketch Alt+Ctrl+N
Open.. Ctrl+O
Open Recent
Sketchbook
Examples
Close Ctrl+W
Save Ctrl+S
Save As... Ctrl+Shift+S
Preferences.. Ctrl+Comma
Advanced
Quit Ctrl+Q
etup code here, to run once:
in code here, to run repeatedly:
indexing: 18/48
Ln 10, Col 1 M5Dial [not connected]

2. Copy the ESP board management URL below into the Additional Board Manager URLs field, and save. https://espressif.github.io/arduino-esp32/package_esp32_dev_index.json



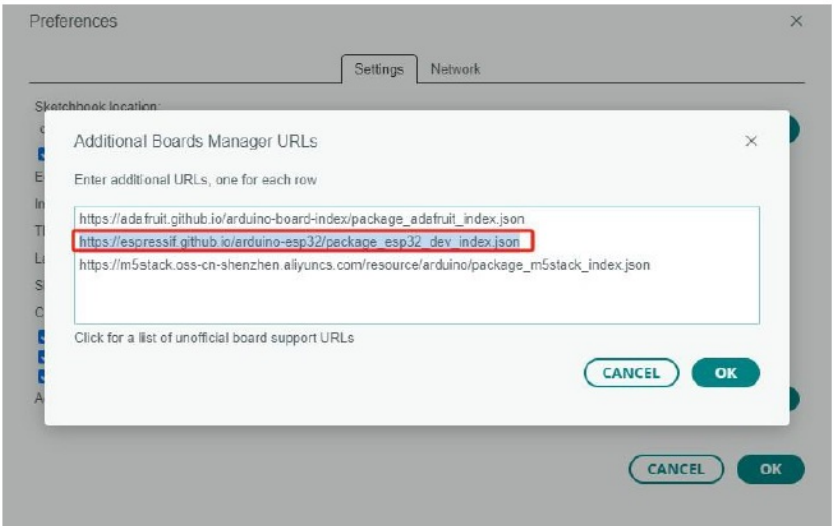
sketch_jul16a | Arduino IDE 2.3.1

File Edit Sketch Tools Help
M5Dial
sketch_jul16a.ino

Preferences

☑ Show files inside Sketches
Editor font size: 14
Interface scale: ☑ Automatic 100 %
Theme: Light
Language: English (Reload required)
Show verbose output during ☑ compile ☑ upload
Compiler warnings All
☐ Verify code after upload
☑ Auto save
☐ Editor Quick Suggestions
Additional boards manager URLs:

CANCEL
OK
Ln 10, Col 1 M5Dial [not connected]



Preferences

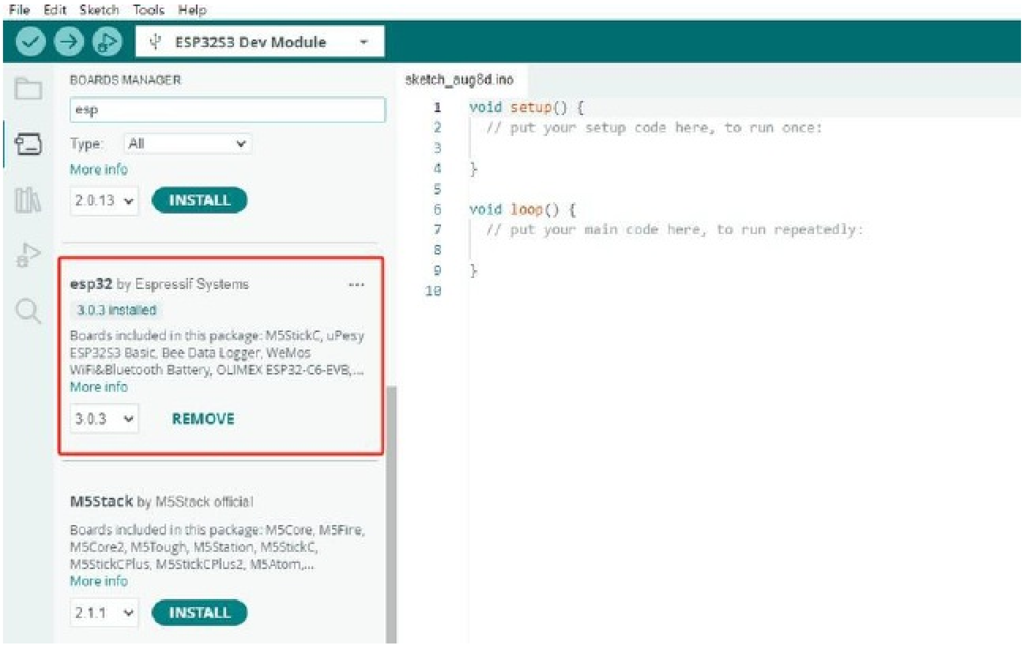
Additional Boards Manager URLs

Enter additional URLs, one for each row

```
https://adafruit.github.io/arduino-board-index/package_adafruit_index.json
https://espressif.github.io/arduino-esp32/package_esp32_dev_index.json
https://m5stack.oss-cn-shenzhen.aliyuncs.com/resource/arduino/package_m5stack_index.json
```

Click for a list of unofficial board support URLs

3. In the sidebar, select Board Manager, search for ESP, and click Install.



esp

Type: All

More info

2.0.13 INSTALL

esp32 by Espressif Systems

3.0.3 installed

Boards included in this package: M5StickC, uPesy ESP32S3 Basic, Bee Data Logger, WeMos WiFi&Bluetooth Battery, OLIMEX ESP32-C6-EVB,...
More info

3.0.3 REMOVE

M5Stack by M5Stack official

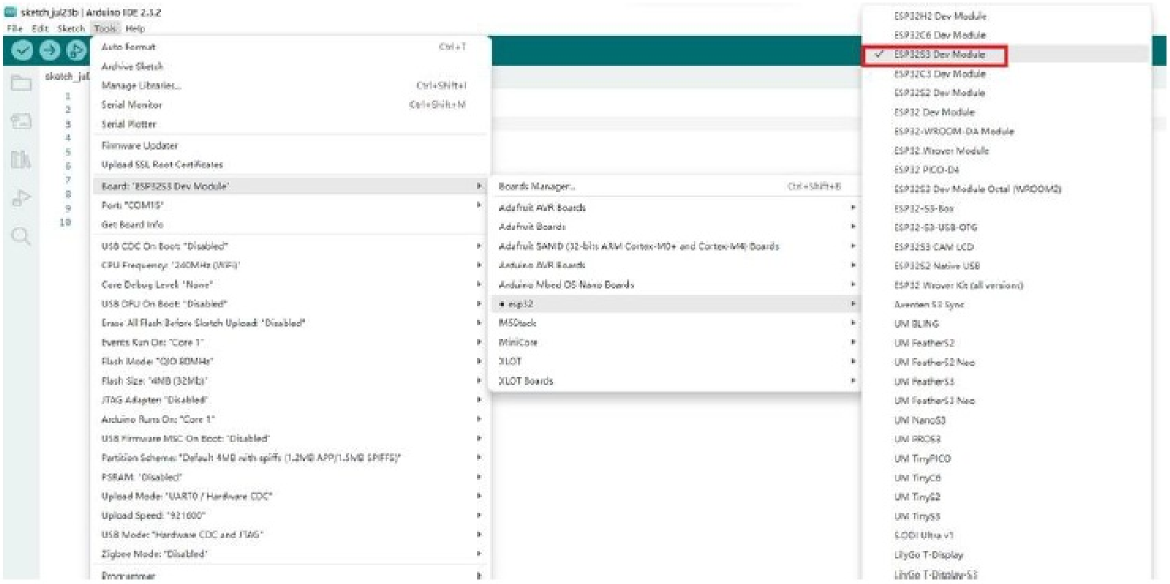
Boards included in this package: M5Core, M5Fire, M5Core2, M5Tough, M5Station, M5StickC, M5StickCPlus, M5StickCPlus2, M5Atom,...
More info

2.1.1 INSTALL

sketch_aug8d.ino

```
void setup() {
  // put your setup code here, to run once:

}

void loop() {
  // put your main code here, to run repeatedly:

}

```

4. In the sidebar, select Board Manager, search for M5Stack, and click Install. Depending on the product used, select the corresponding development board under Tools -> Board -> M5Stack -> {ESP32S3 DEV Module board}.



sketch_jul23b | Arduino IDE 2.3.2

Board: "ESP32S3 Dev Module"
Port: "COM15"
USB CDC On Boot: "Disabled"
CPU Frequency: "240MHz (WiFi)"
Core Debug Level: "None"
USB DFU On Boot: "Disabled"
Erase All Flash Before Sketch Upload: "Disabled"
Events Run On: "Core 1"
Flash Mode: "QIO 80MHz"
Flash Size: "4MB (32Mb)"
JTAG Adapter: "Disabled"
Arduino Runs On: "Core 1"
USB Firmware MSC On Boot: "Disabled"
Partition Scheme: "Default 4MB with spiffs (1.2MB APP/1.5MB SPIFFS)"
PSRAM: "Disabled"
Upload Mode: "UART0 / Hardware CDC"
Upload Speed: "921600"
USB Mode: "Hardware CDC and JTAG"
Zigbee Mode: "Disabled"

5. Connect the device to your computer with a data cable to upload the program.

Frequently Asked Questions

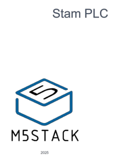
What is the recommended operating voltage for the Stam PLC?

The recommended operating voltage is between DC 6V to 36V with a current supply of 1A. Ensure to use a compatible DC power supply for optimal performance.

How can I expand the functionality of the Stam PLC?

You can expand the functionality by utilizing the GPIO pins and additional interfaces provided. Connect sensors and actuators to the Grove interfaces for enhanced capabilities.

Documents / Resources

	M5STACK StamPLC IoT Programmable Logic Controller [pdf] User Guide StamPLC IoT Programmable Logic Controller, IoT Programmable Logic Controller, Programmable Logic Controller, Logic Controller

References

- User Manual

M5STACK

IoT Programmable Logic Controller, Logic Controller, M5STACK, Programmable Logic Controller, StamPLC IoT Programmable Logic Controller

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