# Product data sheet

## Characterstics

# SMART CONTROLS

**SC-SE-I8-AM6-TO2**

6 Digital Inputs

6 Analog Inputs

2 Transistor outputs

RS-485 communication

Built in OLED Display

micro SD card support

DS3231 RTC with battery backup

**Expansions supported**

LoRa communications
REYAX RYLR896

NB-IOT
BC95 module

Temperature
MAX31856

Analog
4-20mA / 0 - 10V

Load cell
HX-711

## Main

| | |
|---|---|
| Range of product | Smart Controls |
| Product type | Programmable Controller |
| Rated supply voltage | 24V DC |
| Discrete input number | 6 discrete input |
| Discrete output type | Relay and Transistor |
| Discrete output number | 2 Transistor outputs |
| Discrete output voltage | 24V DC for transistor output |
| Discrete output current | 0.5A with T0.0... T0.1 Transistor<br>2 A with R0....R5 |
| Communication | 1 x RS-485 |
| OLED Display protocol | I2C |

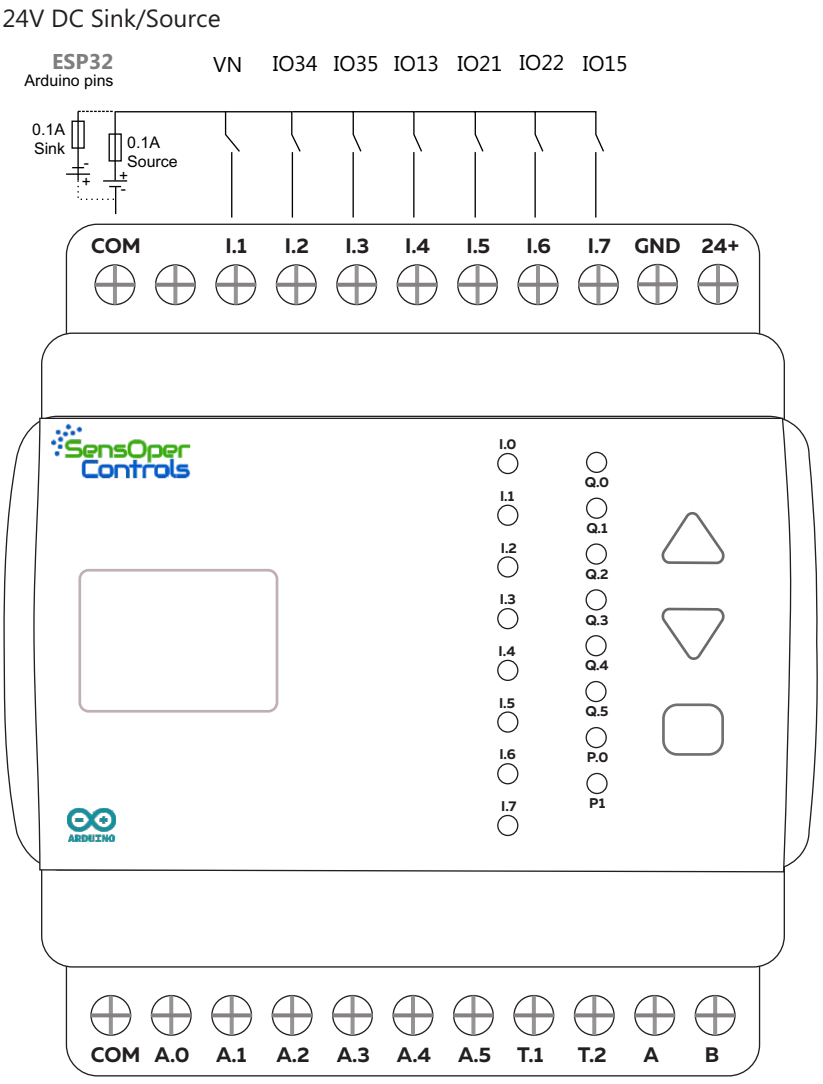
## Complementary

| | |
|---|---|
| Discrete IO number | 16 |
| Number of Expansions | ----- |
| Supply voltage limits | 20.4....28.8V |
| Inrush current | <=50A |
| Power consumption in W | 32.6.....40.4 with all outputs ON |
| Discrete logic input | Sink or source |
| Discrete input voltage | 24V |
| Discrete input voltage type | DC |
| Voltage state 1 guaranteed | >=15 V for input |
| Voltage state 0 guaranteed | <=5 V for input |
| Discrete input current | 5 mA for input |
| Input impedance | 4.7k Ohm for input |
| Memory capacity | Refer datasheet of base micro-controller |
| Battery type | ----- |
| Backup time | ----- |
| Local signalling | 1 LED green for PWR<br>8 LED green for I0.....I7<br>2 LED green for T0....T1 |
| Electrical connection | Removable screw terminal block for inputs and outputs (pitch 5.08 mm) |
| Mounting support | Top hat type TH35-15 rail conforming to IEC 60715<br>Top hat type TH35-7.5 rail conforming to IEC 60715<br>Plate or panel with fixing kit |
| Height | 90.50 mm |
| Depth | 56.60 mm |
| Width | 60.60 mm |
| Product weight | 0.43 Kg |

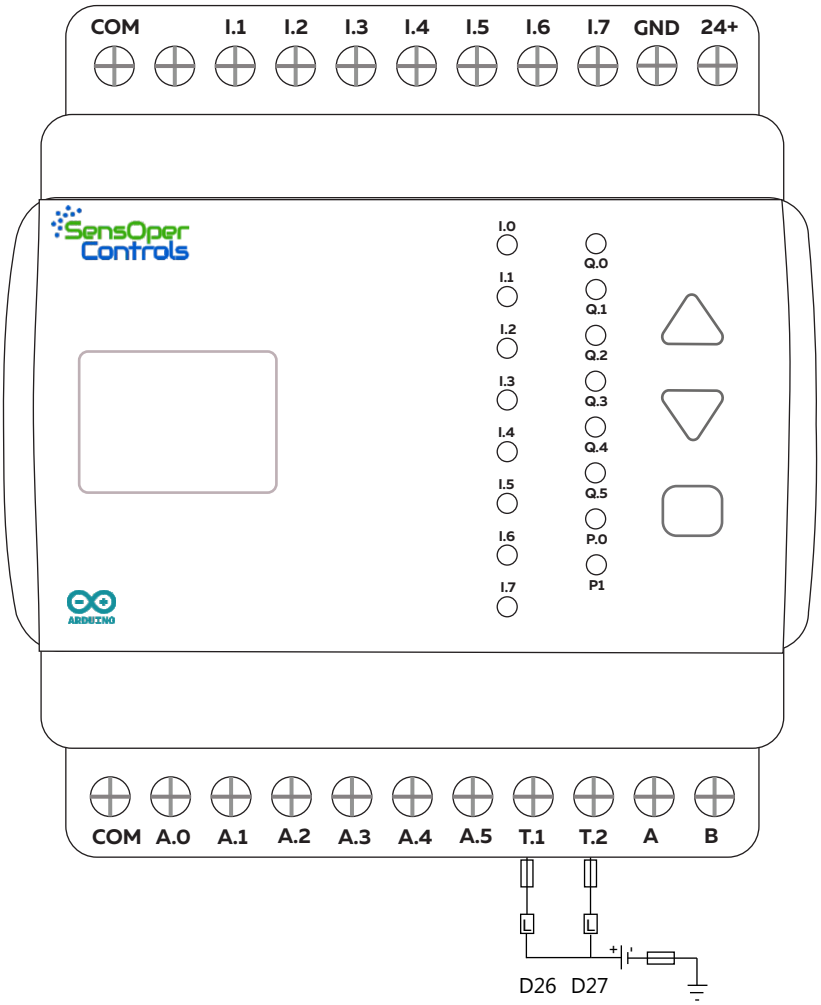
## Environment

| | |
|---|---|
| Resistance to electrostatic discharge | 4kV on contact<br>8kV on air |
| Resistance to electro magnetic fields | 10 V/m (80 MHz ..... 1GHz)<br>3 V/m (1.4 MHz ..... 2 GHz)<br>1 V/m (2 MHz ..... 3 GHz) |
| Immunity to microbreaks | 10 ms |
| Relative humidity | 10....95% without condensation in operation |
| IP degree of protection | IP20 |
| Operating altitude | 0...2000m |
| Storage altitude | 0...3000m |
| Shock resistance | 15 gn for 11 ms |

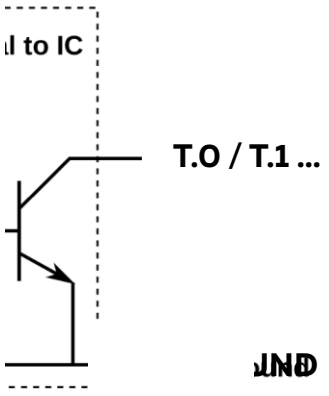
## Digital inputs wiring diagram



## Relay and Transistor outputs wiring diagram

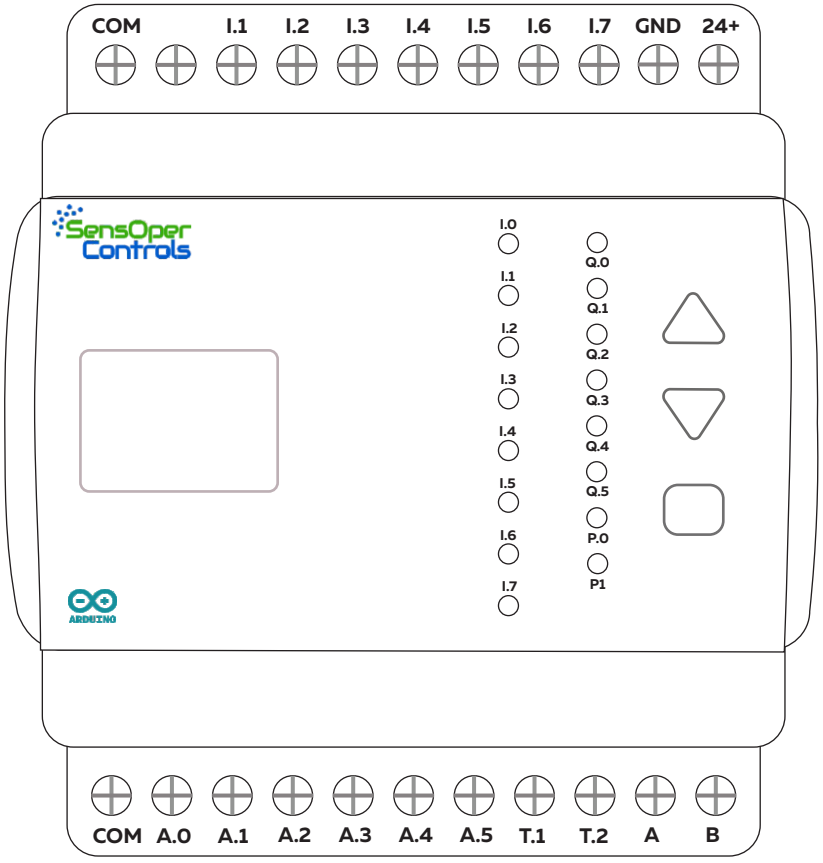



Transistor output



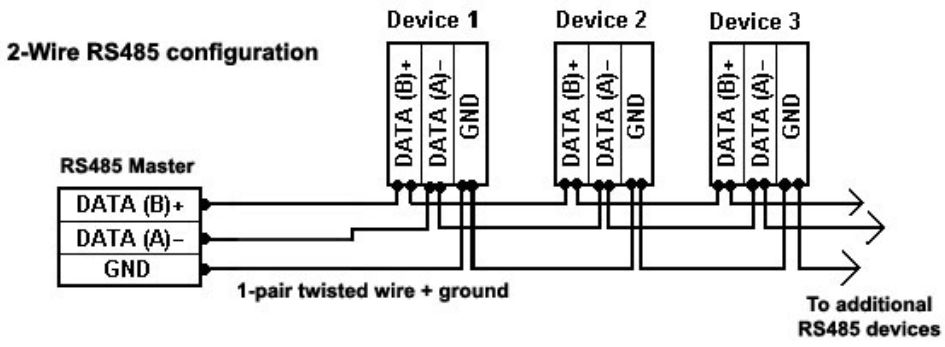
## RS-485 communication wiring diagram

| | |
|---|---|
| Driver | MAX485 |
| UART Connection | IO3 - RXD IO1 - TXD |
| Flow Control | IO4 |

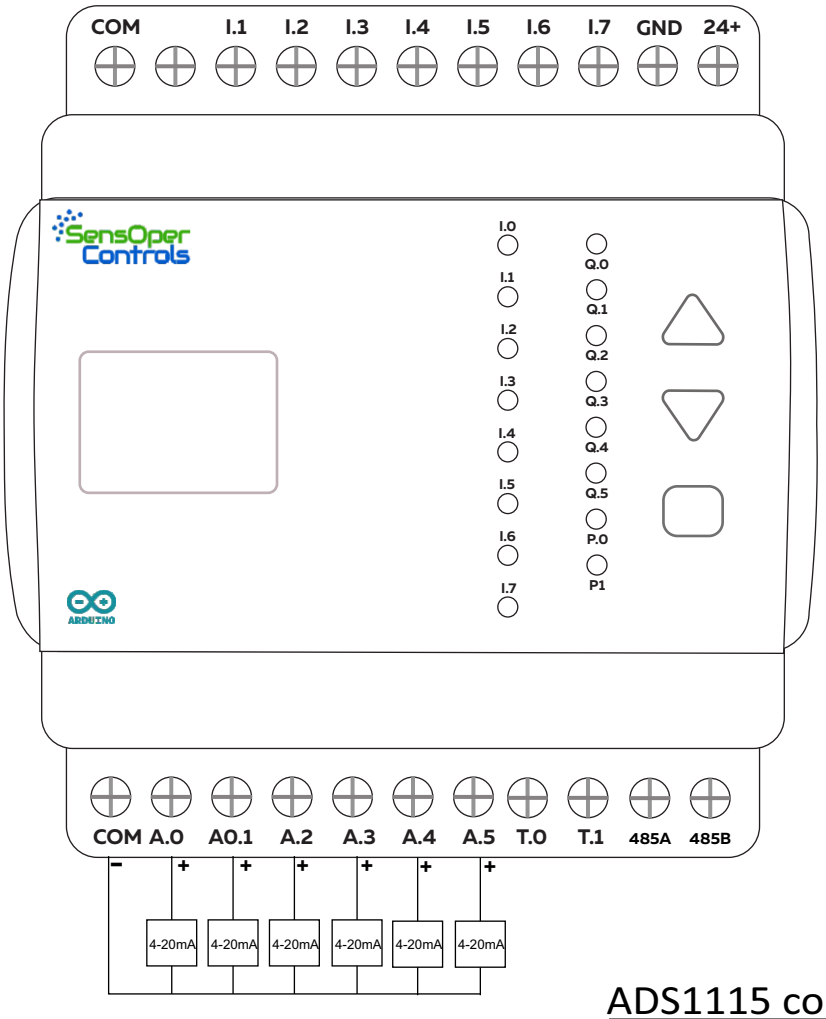



HALF-DUPLEX

Flow control
Arduino pin D26

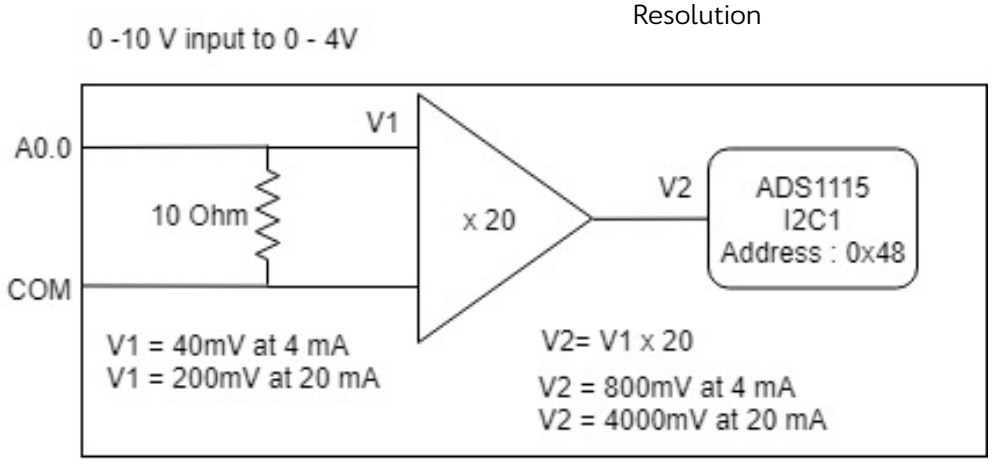


## Analog input wiring diagram (4-20mA)




## ADS1115 connections

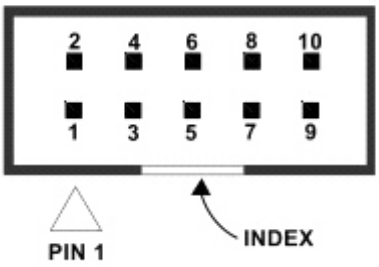
| | |
|---|---|
| IC Type | ADS 1115 |
| Communication | I2C IO16 - IO17 |
| Module Address | 0x48 / 0x49 |
| Resolution | 16 bit |

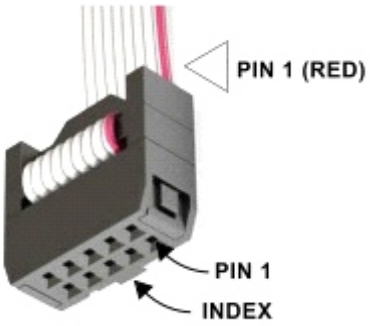


# Product data sheet
## Expansion

# SMART CONTROLS
**SC-SE-I8-AM6-TO2**

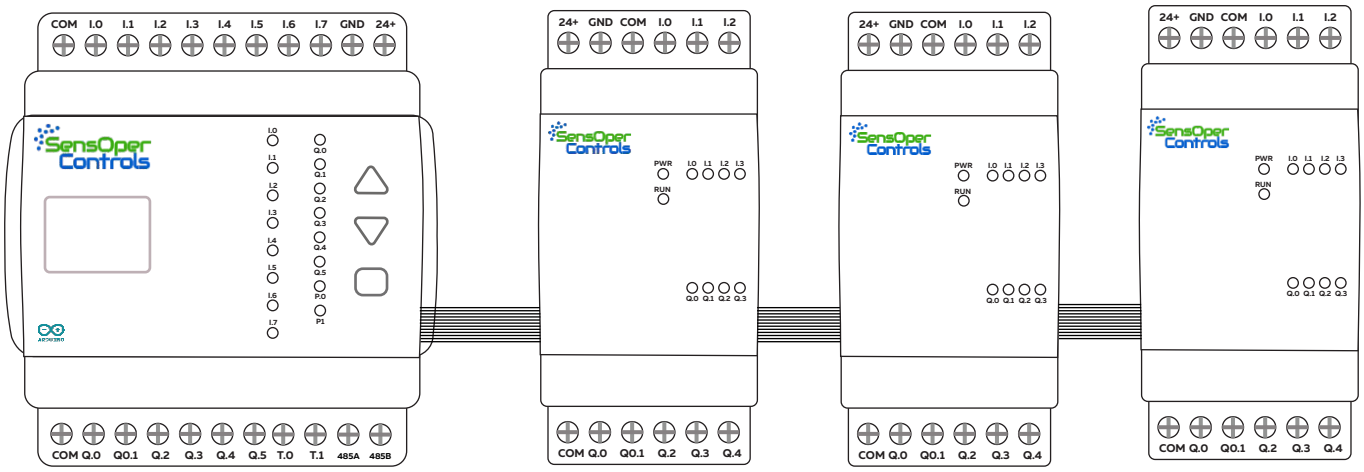
## Expansion port




| PIN | ESP32 Connection |
|---|---|
| 1 | IO25 |
| 2 | TXD0 |
| 3 | Not Connected |
| 4 | RXD0 |
| 5 | BOOT IO0 |
| 6 | IO32 |
| 7 | Not Connected |
| 8 | SCL IO17 |
| 9 | Ground |
| 10 | SDA IO16 |

## Expansion modules




**Main Controller** | **Expansion Module** | **Expansion Module** | **Expansion Module**

Expansion modules connects to the right side of the controller

Upto 6 expansion modules can be connected on one controller

Expansion modules use I2C, UART and GPIO on the expansion port

Depending on the model, some expansion modules require external power

LoRa communications
REYAX RYLR896

NB-IOT
BC95 module

Temperature
MAX31856

Analog
4-20mA / 0 - 10V

Load cell
HX-711

## 0.96 OLED Display parameters

| | |
|---|---|
| Display driver | SSD1306 |
| Communication | I2C IO16(SDA) - IO17(SCL) |
| Module Address | 0x3C |
| Resolution | 128 x 64 |

## RTC parameters

| | |
|---|---|
| Display driver | DS3231 |
| Communication | I2C IO16(SDA) - IO17(SCL) |
| Module Address | 0x68 |
| Battery Backup | YES |

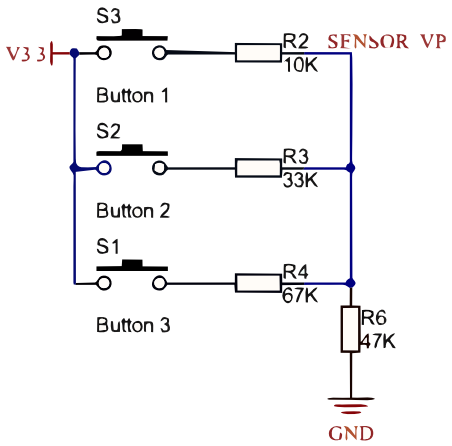
## microSD card access

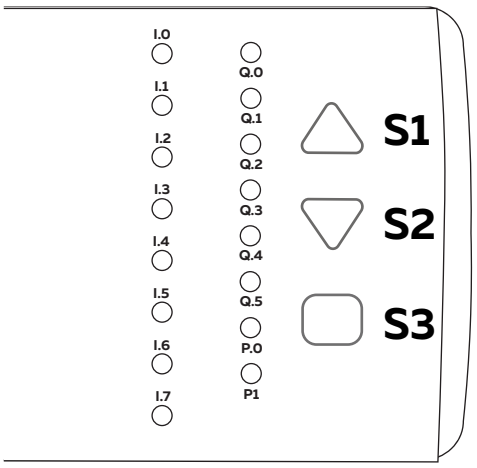
| | | | | |
|---|---|---|---|---|
| Connection | SCK | IO18 | CS | IO5 |
| | MISO | IO19 | SD Detect | IO14 |
| | MOSI | IO23 | | |

## Built in buttons

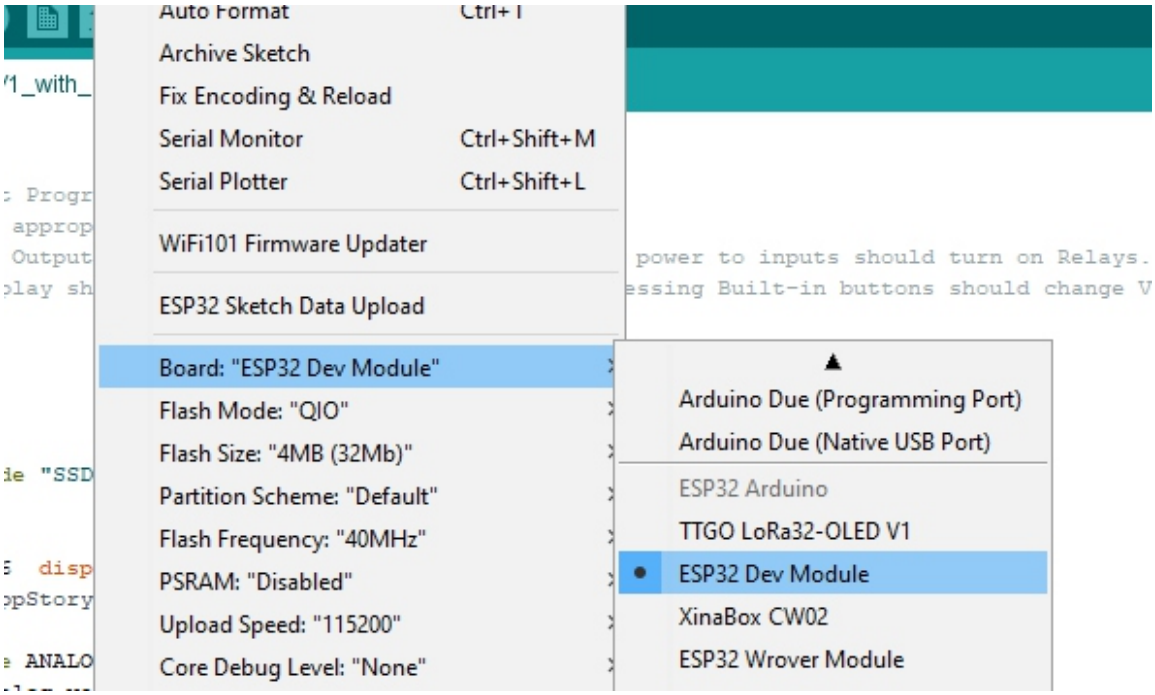
| | |
|---|---|
| Read mode | ADC (Analog to Digital Conversion) |
| Analog IO | GPIO 32 |

Voltage levels 3



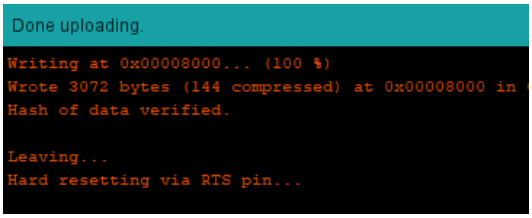



## Programming procedure




| | |
|---|---|
| Board | ESP32 Dev Module |
| Flash Mode | QIO |
| Flash Size | 4MB |
| Flash Frequency | 10MHz |
| PSRAM | Disabled |
| Upload Speed | 115200 |

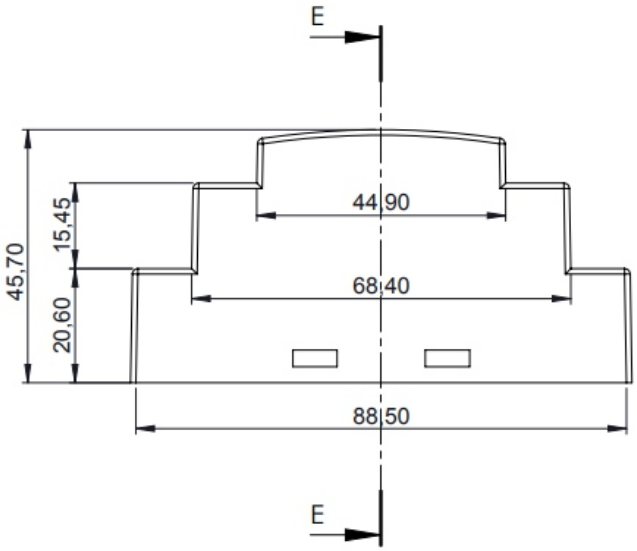
After successful uploading of program following message appears.

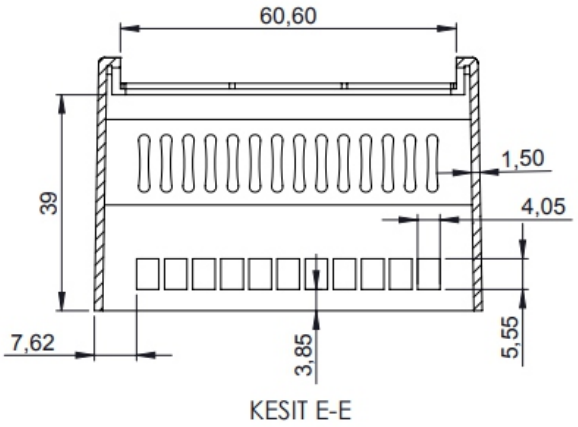



esp32 Boards must be installed under board manager, it is recommended to use the latest version of esp32 board driver for Arduino.

Due to installation of different drivers and older versions of libraries, Arduino fails to upload the program to the controller. In most cases it is due to failure to enter boot mode of the device.
The device can be forced to boot mode by connecting the BOOT IO0 of the expansion port to the GND pin with a jumper wire. Arduino is able to upload the program to controller while the controller is in boot mode.
After uploading the program , the connection between the BOOT IO0 and GND must be removed to run the uploaded program.

## Dimensions


E
45,70
15,45
20,60
44,90
68,40
88,50
E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39
1,50
4,05
7,62
3,85
5,55
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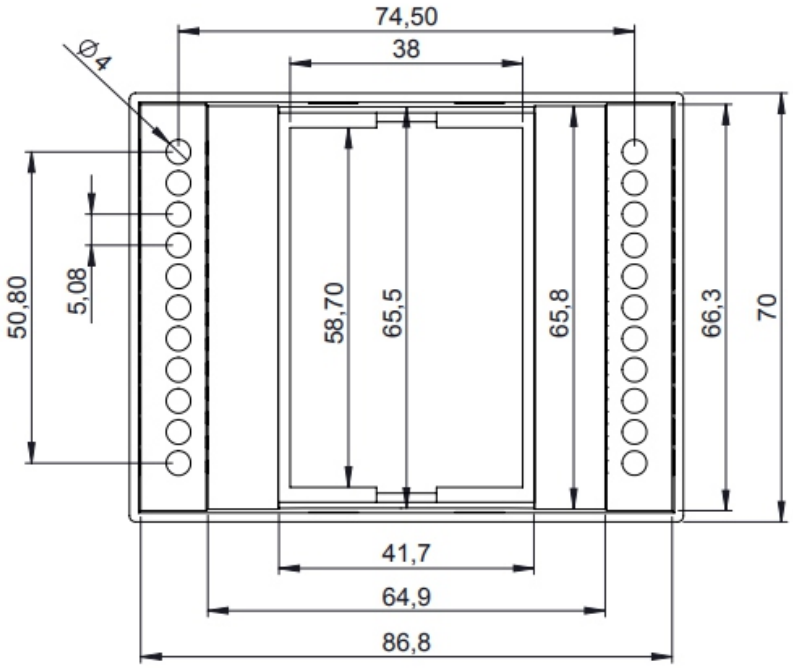
74,50
38
Ø4
50,80
5,08
58,70
65,5
65,8
66,3
70
41,7
64,9
86,8

# Reach-Us

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