Start Guide

Digital Input + Output – QEC-RXXD88H

86Duino Coding IDE 500

EtherCAT Library

(Version 1.2)

Revision

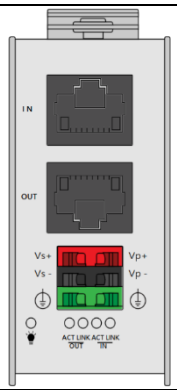
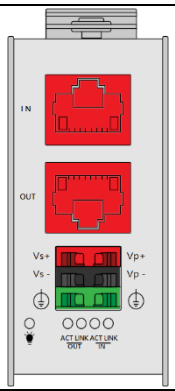
Date	Version	Description
2024/2/2	VERSION1.0	NEW RELEASE.
2024/9/16	VERSION1.1	SPLIT THE DEVELOPMENT STEPS INTO TWO DOCUMENTS.
2025/3/24	VERSION1.2	Change document's title from 'Digital Output' to 'QEC Digital Output – QEC-RXXD88H'. Change Master to MDevice, slave to SubDevice.

Preface

In this guide, we will show you how to use the EtherCAT MDevice QEC-M-01P and the Digital I/O SubDevice QEC-RXXDXX Series.

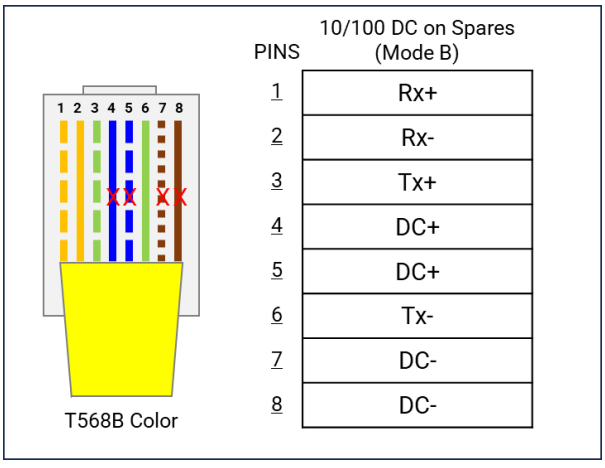
Notes QEC's PoE (Power over Ethernet)

In QEC product installations, users can easily distinguish between PoE and non-PoE: if the RJ45 house is red, it is PoE type, and if the RJ45 house is black, it is non-PoE type.

	
Non-PoE type	PoE type

PoE (Power over Ethernet) is a function that delivers power over the network. QEC can be equipped with an optional PoE function to reduce cabling. In practice, PoE is selected based on system equipment, so please pay attention to the following points while evaluating and testing:

1. The PoE function of QEC is different and incompatible with EtherCAT P, and the PoE function of QEC is based on PoE Type B, and the pin functions are as follows:



PINS	10/100 DC on Spares (Mode B)
1	Rx+
2	Rx-
3	Tx+
4	DC+
5	DC+
6	Tx-
7	DC-
8	DC-

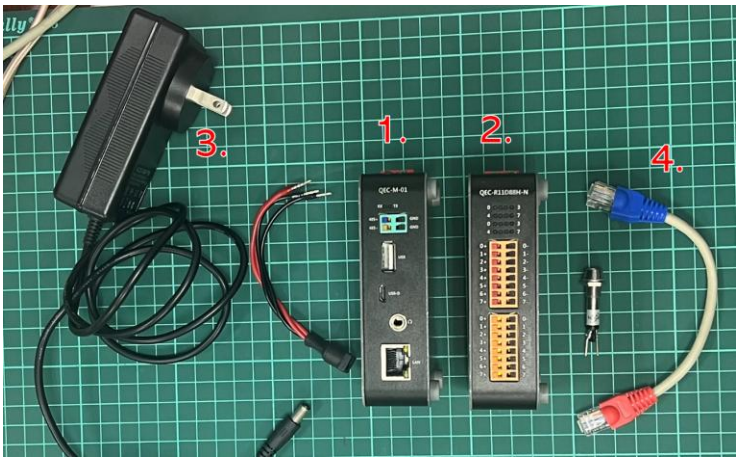
2. When connecting PoE and non-PoE devices, make sure to disconnect Ethernet cables at pins 4, 5, 7, and 8 (e.g., when a PoE-supported QEC EtherCAT MDevice connects with a third-party EtherCAT SubDevice).

3. QEC's PoE power supply is up to 24V/3A.

1. Connection and wiring hardware

The following devices are used here:

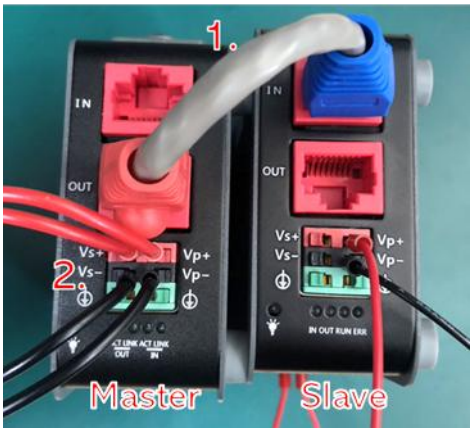
1. QEC-M-01P（EtherCAT MDevice/PoE）
2. QEC-R11D88H-N (EtherCAT SubDevice 8-ch digital input and 8-ch digital output/PoE)
3. 24V power supply & EU-type terminal cable
4. 24V LED & LAN cable



1.1 QEC-M-01P

QEC EtherCAT MDevice with PoE function.

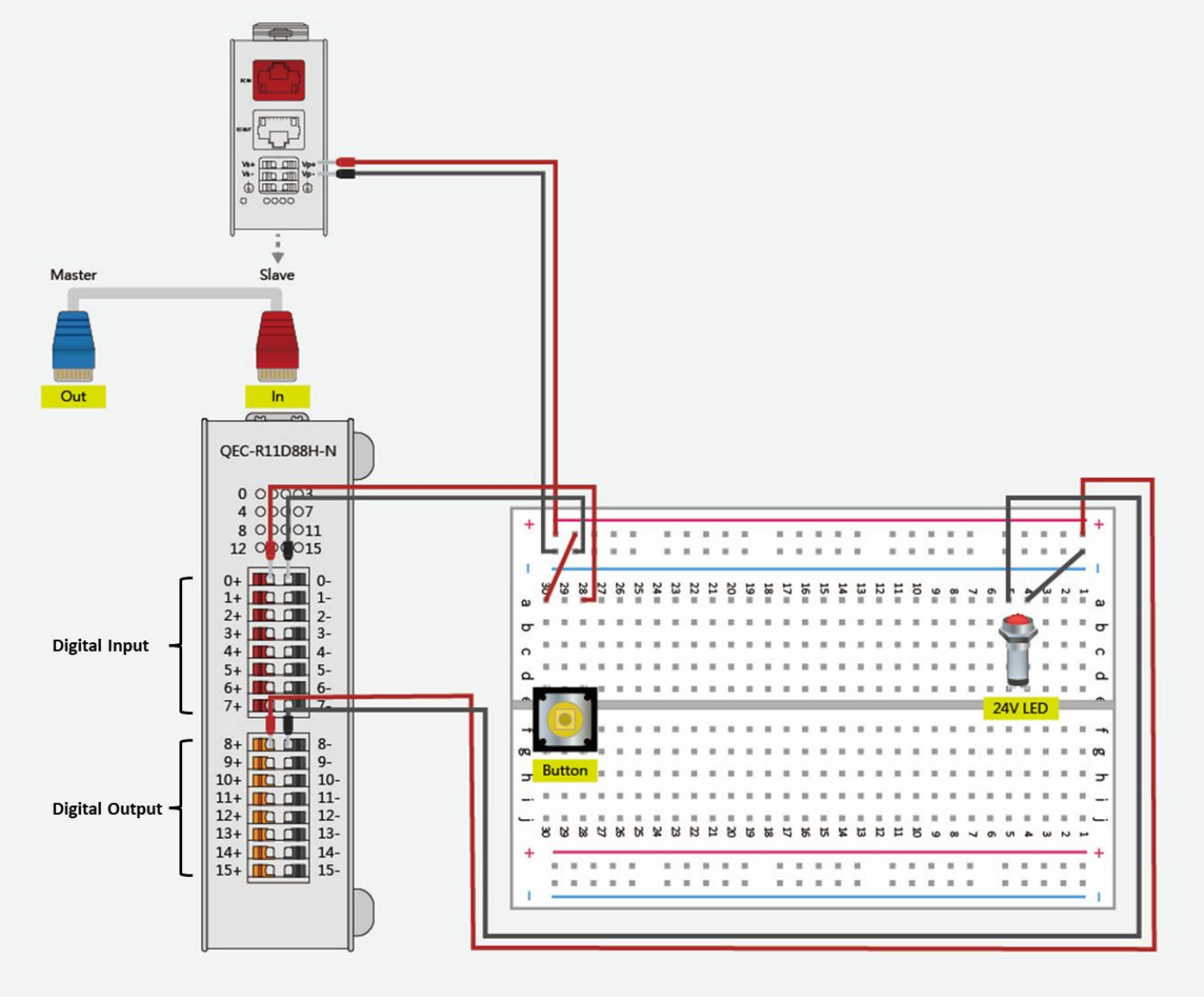
1. Using the EtherCAT Out port (top side) connected to the EtherCAT In port of QEC-R11D88H via RJ45 cable (powered by PoE).
2. Connect to Vs+/Vs- and Vp+/Vp- power supplies via EU terminals for 24V power.



1.2 QEC-R11D88H-N

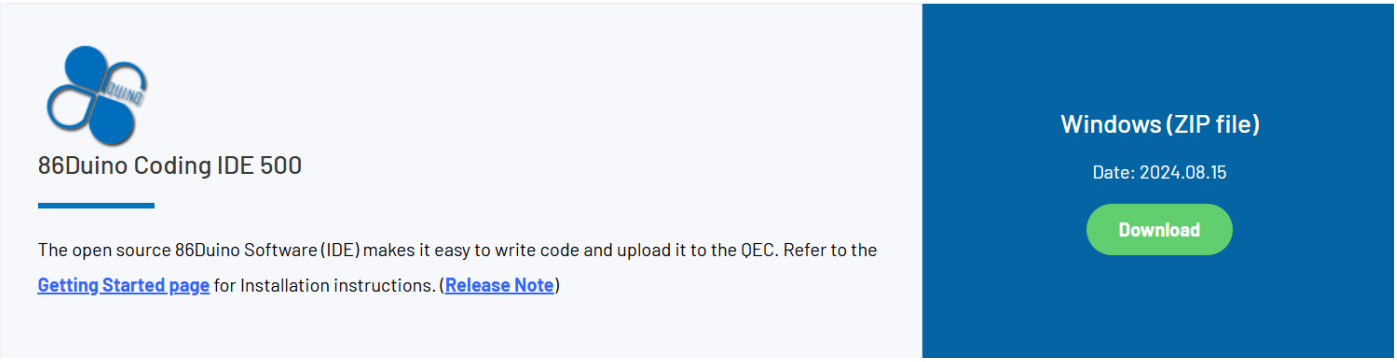
1. Connect from VP+ to Breadboard+, and connect from VP- to Breadboard-.
2. Connect from Breadboard+ to button; connect from button to DI 0+; connect from DI 0- back to Breadboard-.
3. Connect from breadboard+ to DO 0+.
4. Connect the 24V LED+ to DO 0-.
5. Connect the 24V LED- to the Breadboard-.

1.3 Wiring Diagram



2. Software/Development Environment

Download 86duino IDE from https://www.qec.tw/software/.



After downloading, please unzip the downloaded zip file, no additional software installation is required, just double-click 86duino.exe to start the IDE.

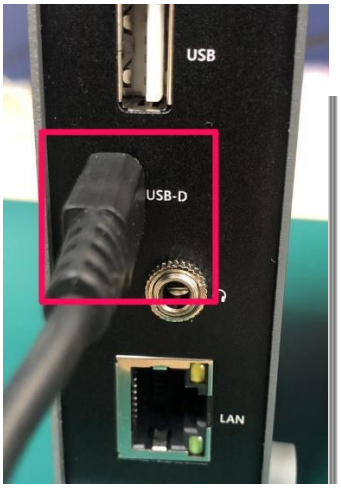
*__Note__: If Windows displays a warning, click Details once and then click the Continue Run button once.

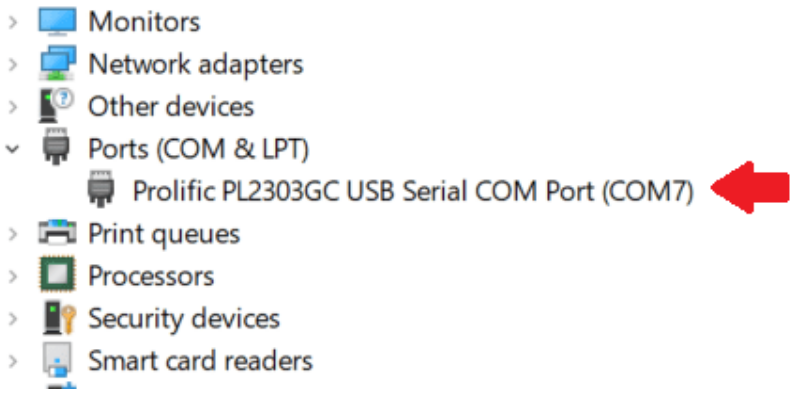
86Duino Coding IDE 500+ looks like below.

3. Connect to PC and set up the environment

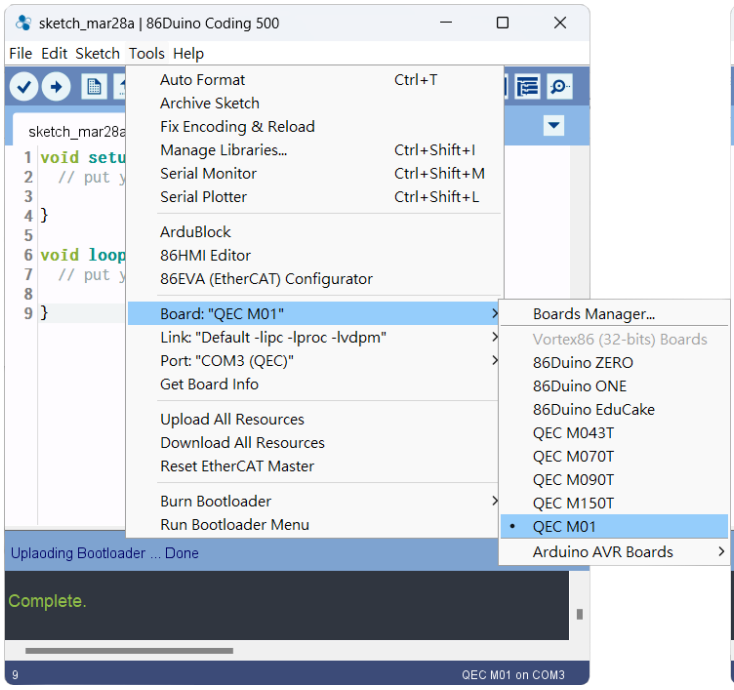
Follow the steps below to set up the environment:

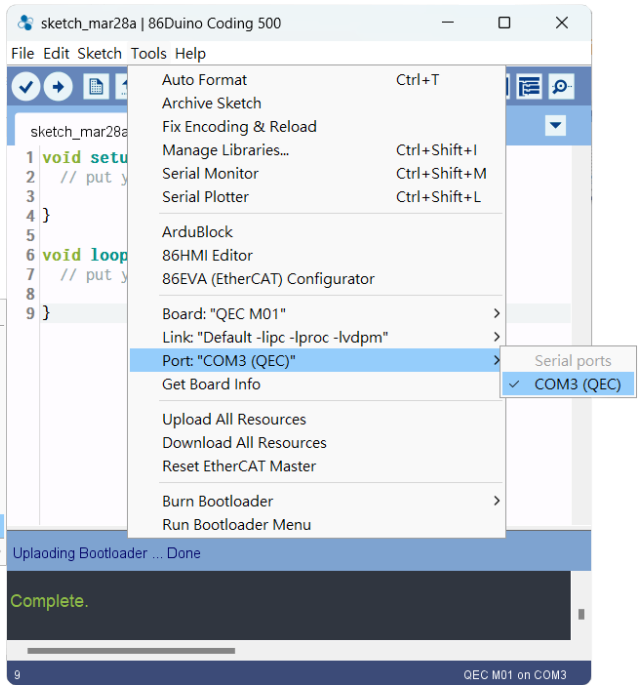
1. Connect the QEC-M-01P to your PC via a Micro USB to USB cable (86Duino IDE installed).
2. Turn on the QEC power.
3. Open “Device Manager” (select in the menu after pressing Win+X) ->” Ports (COM & LPT)” in your PC and expand the ports; you should see that the “Prolific PL2303GC USB Serial COM Port (COMx)” is detected; if not, you will need to install the required drivers.
   (For Windows PL2303 driver, you can download here)





4. Open the 86Duino IDE.
5. Select the correct board: In the IDE's menu, select Tools> Board > QEC-M-01 (or the QEC-M MDevice model you use).
6. Select Port: In the IDE's menu, select Tools > Port and select the USB port to connect to the QEC-M MDevice (in this case, COM3 (QEC)).





4. Write code

The EtherCAT MDevice (QEC-M-01P) and the Digital IO SubDevice (QEC-R11D88H-N) can be configured and programmed via the EtherCAT library in the 86Duino IDE.
The Arduino development environment has two main parts: setup() and loop(), which correspond to initialization and main programs. Before operating the EtherCAT network, you must configure it once. The process should be from Pre-OP to OP mode in EtherCAT devices.

The following example is reading the pin 0 of Digital Input and judging its status. If it's HIGH, then set the pin0 of Digital Output to HIGH; if it's LOW, then set the pin0 of Digital Output to LOW. We connect an external button to DI pin0 and an external 24V LED to DO pin0.

When using QEC SubDevice, you can use the dedicated QEC Ethercat SubDevice Library. For example, QEC-R11D88H can be used EthercatDevice_DmpDIQ_Generic Class.
The example code is as follows:

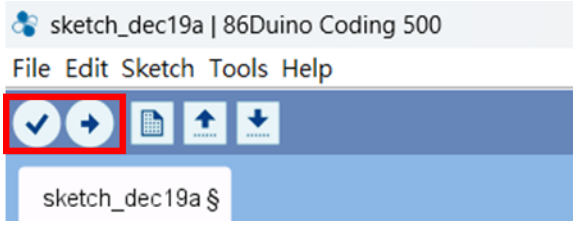
```
#include "Ethercat.h"

EthercatMaster master;
EthercatDevice_QECR11D88H slave;

void setup() {
  master.begin();
  slave.attach(0, master);
  master.start(1000000, ECAT_SYNC);
}

void loop() {
  if (slave.digitalRead(0) == HIGH) {
    slave.digitalWrite(0, HIGH);
  } else if (slave.digitalRead(0) == LOW) {
    slave.digitalWrite(0, LOW);
  }
}
```

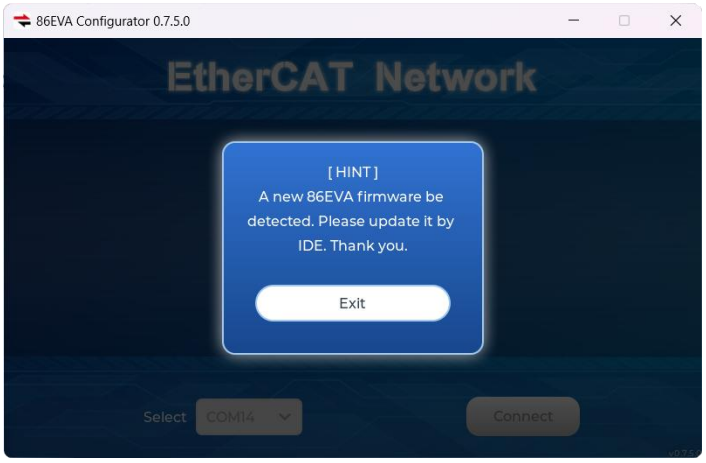
***Note:** Once the code is written, click on the toolbar to compile, and to confirm that the compilation is complete and error-free, you can click to upload.



Troubleshooting

QEC-M-01 cannot successfully upload code

When you are unable to successfully upload code, please open 86EVA to check if your QEC EtherCAT MDevice's environment is abnormal. As shown in the figure below, please try updating your QEC EtherCAT MDevice's environment, which will include the following three items: Bootloader, EtherCAT firmware, and EtherCAT tool.



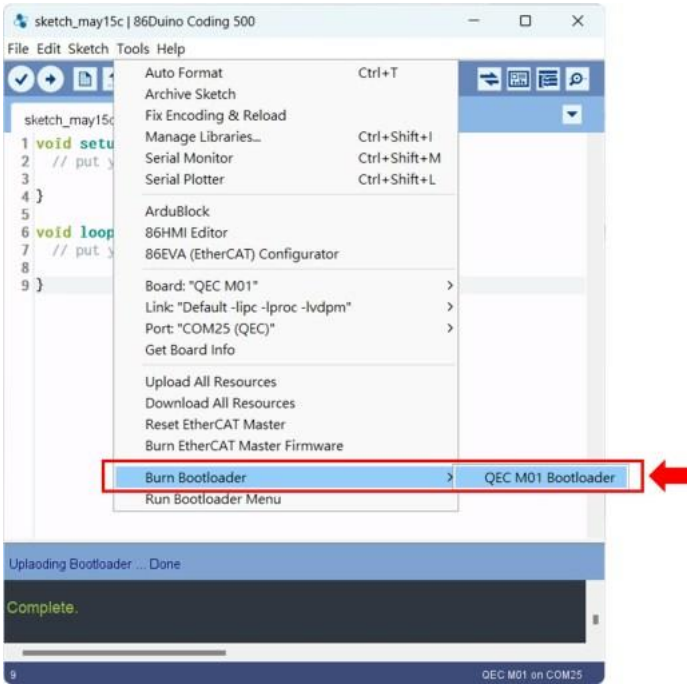
Now, we will further explain how to proceed with the update:

Step 1: Setting up QEC-M

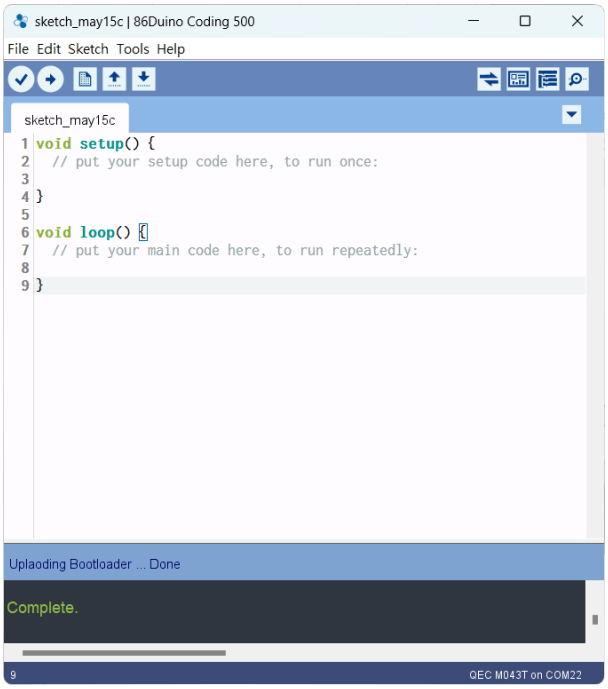
1. Download and install 86Duino IDE 500 (or a newer version): You can download it from Software.
2. Connect the QEC-M: Use a USB cable to connect the QEC-M to your computer.
3. Open 86Duino IDE: After the installation is complete, open the 86Duino IDE software.
4. Select Board: From the IDE menu, choose "Tools" > "Board" > "QEC-M-01" (or the specific model of QEC-M you are using).
5. Select Port: From the IDE menu, choose "Tools" > "Port" and select the USB port to which the QEC-M is connected.

Step 2: Click “Burn Bootloader” button

After connecting to your QEC-M product, go to “Tools”> “Burn Bootloader”. The currently selected QEC-M name will appear. Clicking on it will start the update process, which will take approximately 5-20 minutes.
QEC-M-01:



Step 3: Complete the Update



After completing the above steps, your QEC-M has been successfully updated to the latest version of the development environment.

Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster. Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, originality to use this product. Vendor will not be liable for any claim made by any other related party. Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.