Fuse board quick start guide

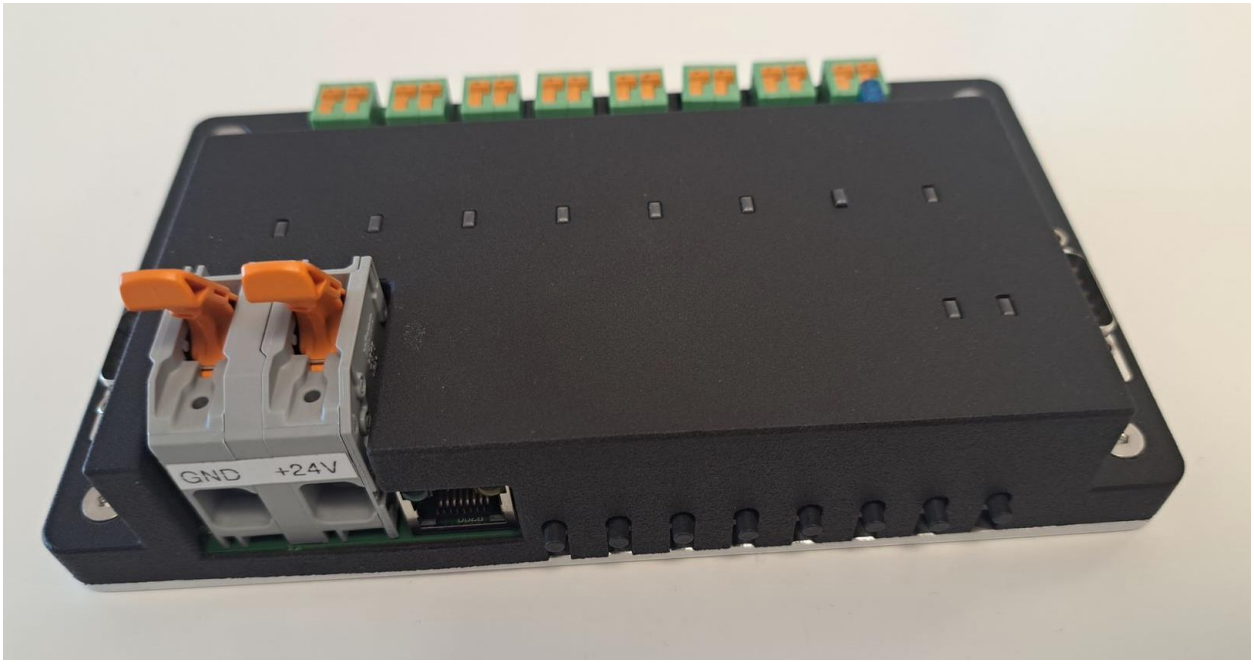
2024-11-22

1. Introduction

This document explains how to start using Fuseboard.

2. Connecting power and Ethernet cable

There are two large spring contacts for the power input connector. When looking at the back side, the left contact is negative (ground) and right contact is positive (+12V to 24V) voltage input:

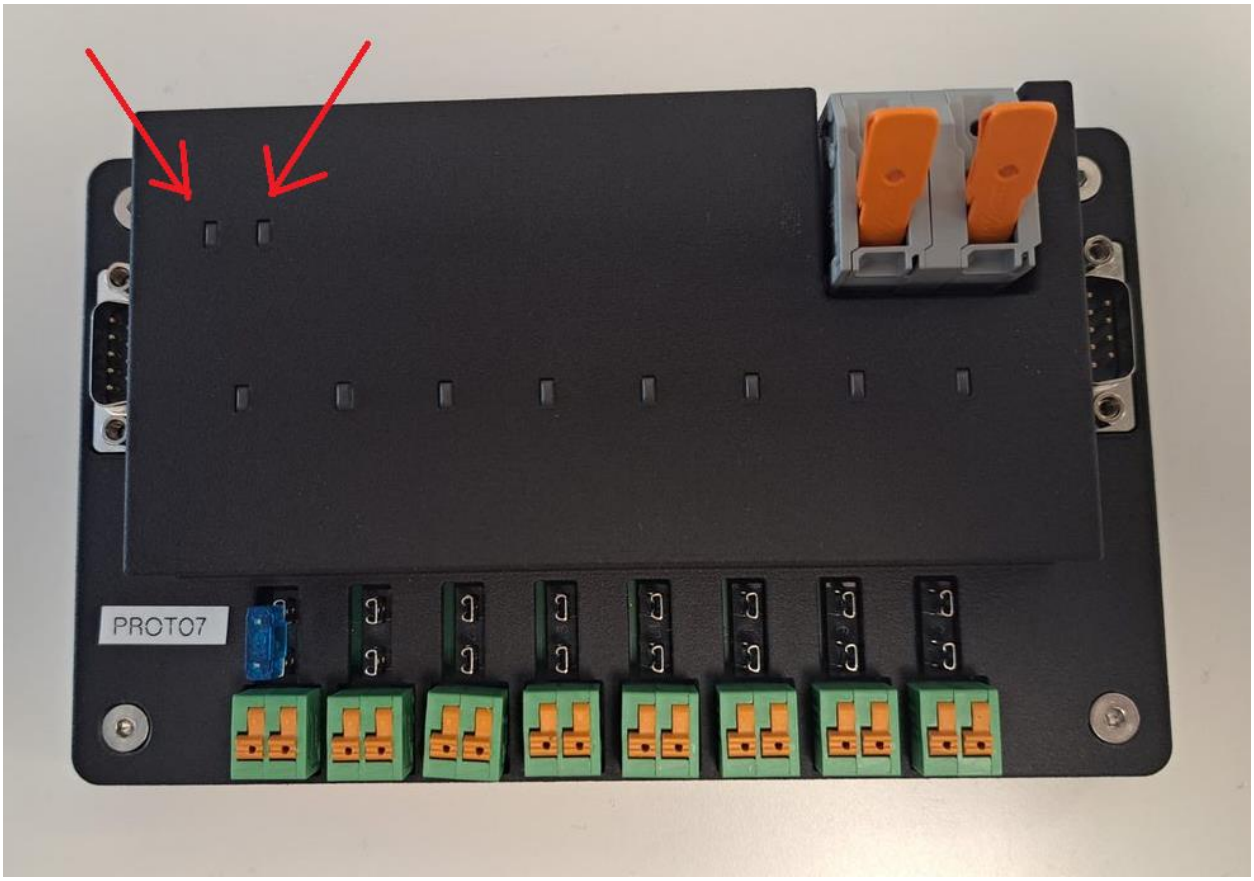


The first hardware version is not reverse-voltage tolerant and will get damaged if polarities are wrong!

Next to the power input is Ethernet RJ-45 connector. Connect it to the network.
There are also 8 buttons for manual control of 8 outputs.

3. Device status and identification

Device has two general RGB LEDs that indicate its status when device is powered up. They are highlighted with red arrows on the photo:



Left LED indicates network status, right LED indicates power status.
Power status LED blinks red when device is powered up. No other statuses in firmware currently.
Network status LED shows the following statuses:

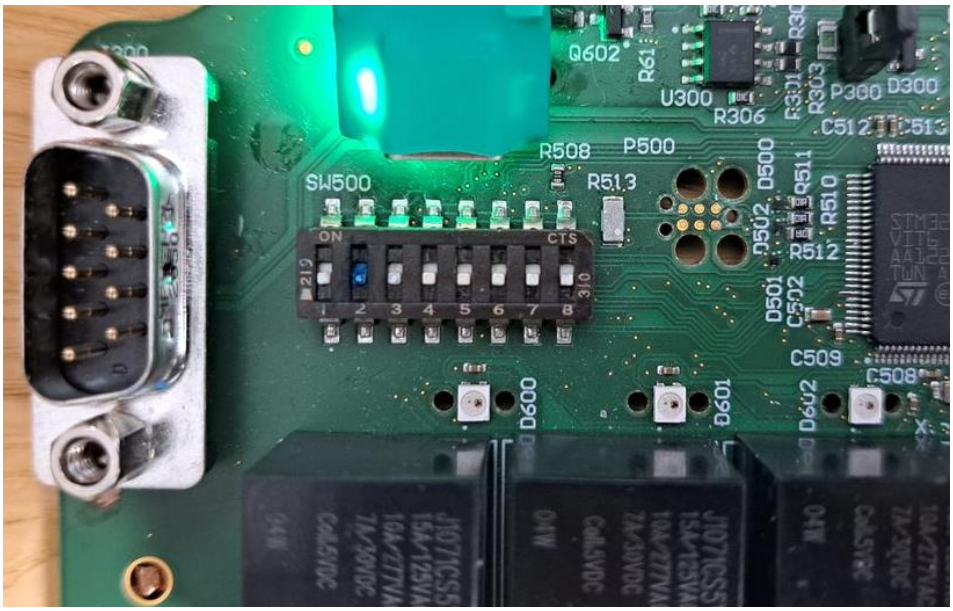
- Red - Ethernet cable disconnected
- Blinking yellow - Cable connected, acquiring IP address
- Green - Got IP address

Above each output is a fuse holder and higher up is each output status indicator LED.

On the case is a sticker marking Fuseboard serial number. The one on the photo is prototype 7 with serial number 7. There are 2^{24}-1 serial numbers available. Serial numbers start from 1.

4. Acquiring IP address

Under the case, on top-left of the PCB are 8 DIP switches. The second switch from left (blue on the photo) is controlling IP mode:



When 2nd DIP switch is up, device assigns itself a static IP, which is 192.168.1.100 in current (2024 November) firmware. When DIP switch is down, it seeks for IP from DHCP server. Default DIP state is down. DIP switch state can be set when the device is powered down and during operation.

Fuseboards MAC addresses are made of serial numbers. 24-bit serial number is represented in big-endian byte order in the lower 3 bytes of MAC address. Upper 3 bytes of MAC are fixed.
MAC address format: 60 : 4B : AA : SN_{MSB} : SN_{Mid} : SN_{LSB}

Fuseboards report their hostname with multicast DNS (mDNS) service. This is a network protocol that works without DNS server. Fuseboard hostname is made of “fuseboard“ dash and serial number in decimal format.

The device on the picture has MAC 60:4B:AA:00:00:07 and hostname “fuseboard-7”.

To figure out what IP fuseboard got from DHCP server it is possible to ping fuseboard by the hostname and get the IP from reply. An example:

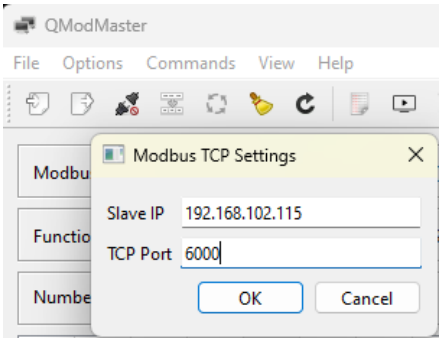
```
ping fuseboard-7

Pinging fuseboard-7.local [192.168.102.115] with 32 bytes of data:
Reply from 192.168.102.115: bytes=32 time=1ms TTL=128
```

5. Controlling with Modbus master

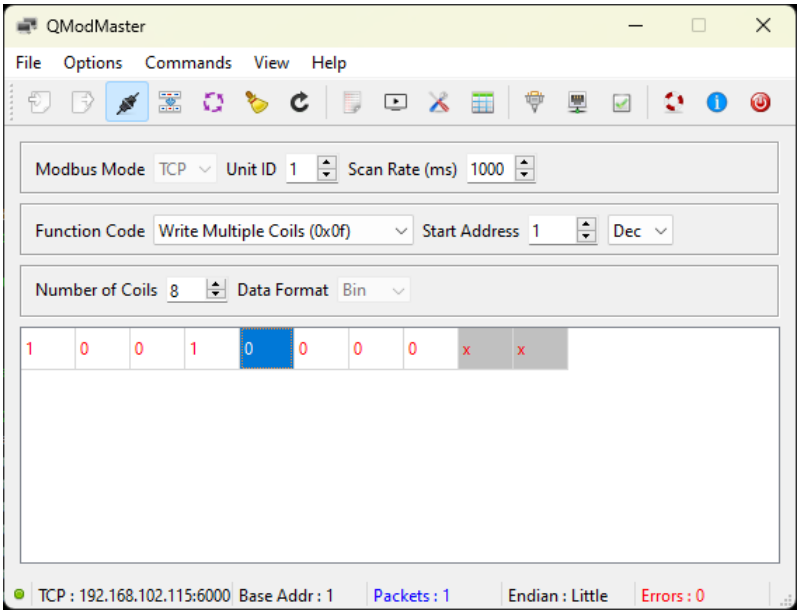
Fuseboard implements Modbus TCP protocol at port 6000. Current firmware (2024 November) supports only multiple coils write function to address 1.

To test Modbus, it is possible to use open-source tool called QModMaster:
https://sourceforge.net/projects/qmodmaster

First the fuseboard IP address and port must be configured from Option -> Modbus TCP.
A dialog like this shows up:



Then Modbus mode “TCP” shall be chosen and Connect button (3rd on the toolbar) shall be pressed. Function code shall be set to “Write Multiple Coils” and number of coils to 8. Now it is possible to set each of the 8 relay statuses. 0 is off, 1 is on. Read/Write button (4th on the toolbar) shall be pressed to send the command to fuseboard.



6. Output statuses

Fuseboard has 8 outputs, 8 output LEDs (on top) and 8 manual control buttons (on the back side). Outputs can be controlled over Modbus and they can be toggled by pressing respective output buttons for half a second.

When the output is off, LED is off. When the output is on, LED is green. When output has a fault and it has been turned off by firmware automatically, then LED is red. To recover from fault mode, output shall be turned off and then on again (via Modbus or button).

Output statuses cannot be read through Modbus is current (2024 November) firmware.