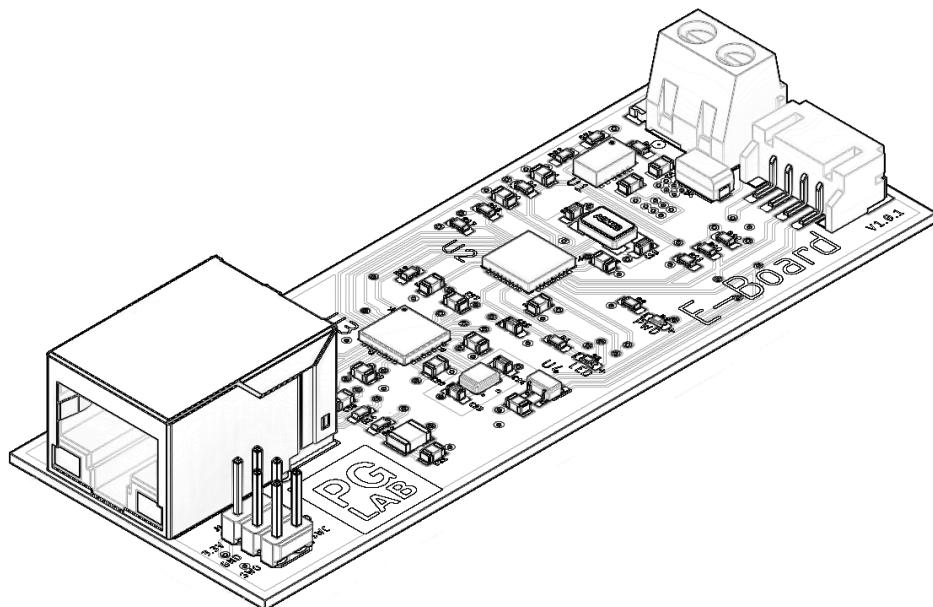




E-BOARD

V1.0



PG LAB ELECTRONICS
Chiavari, Italy © December, 2021

Description

The E-Board is a microcontroller board with I2C and LAN interfaces. It features STM32F103 microcontroller running at 72Mhz. E-Board has been designed specifically to use in home automation scenario where a LAN connection is required. E-Board uses an on board MPM3610 step down converter which is able to generate the required 3.3 volts from a range of power options. MPM3610 provides up to 1.2 Amp load current across the entire input voltage range of 4.7 to 20V. E-Board uses the Ethernet chip controller ENC28J60 to allow a wired Ethernet connection between your E-Board and your network or Internet. This is particularly useful to reduce electromagnetic noise, be faster, stable and more secure. E-Board is IEEE 802.3 compatible. E-Board uses 24AA02E48 to provide unique MAC address for the internet connection.

Reprogramming the E-Board firmware can be done via the 6 pins Serial Wire Debug (SWD) port. The SWD port can be used to interactively debug code running on E-Board.

The E-Board is intended to be mounted into a standard switchboard. E-Board can work as standalone Device or as accessory to a home automation controller.

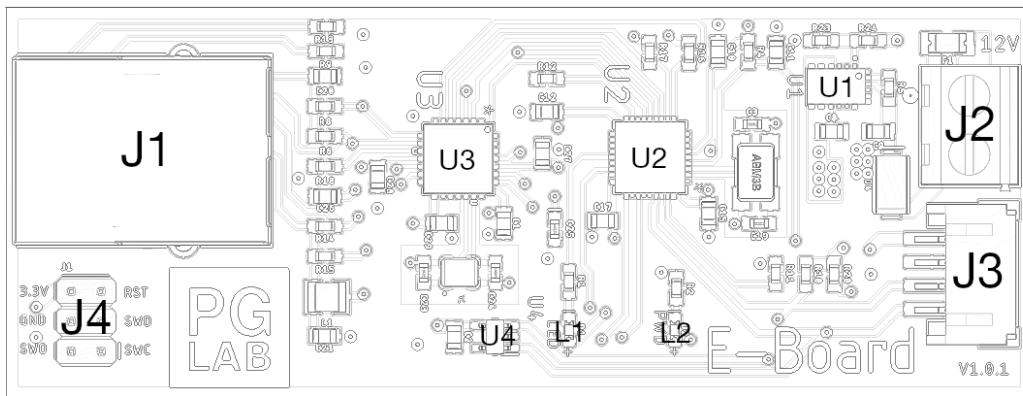
Specification

- STM32F103TBU6 running at 72Mhz, ARM Cortex M3, 32bit, 128Kb Flash, 20Kb Ram
- Supported Under STM32CubeIDE
- ENC28J60-I/ML, standard Ethernet 10 Base-TPHY
- Mac Address: 24AA02E48, Globally Unique, 48-bit mac address
- Power Supply: 4.7V-20V DC via Terminal Block Connector, input minimum 500mA
- I2C Port: for connection to any devices that support the standard i2c serial communication bus
- Flash: Firmware upgradable by a SWD 6 pins interface
- LAN connection for high security and reliability.
- PCB 1.6mm
- Operating Temperature: 0-50°C ambient
- Internal HTTP web server.
- DIN rail mountable, 2 modules footprint

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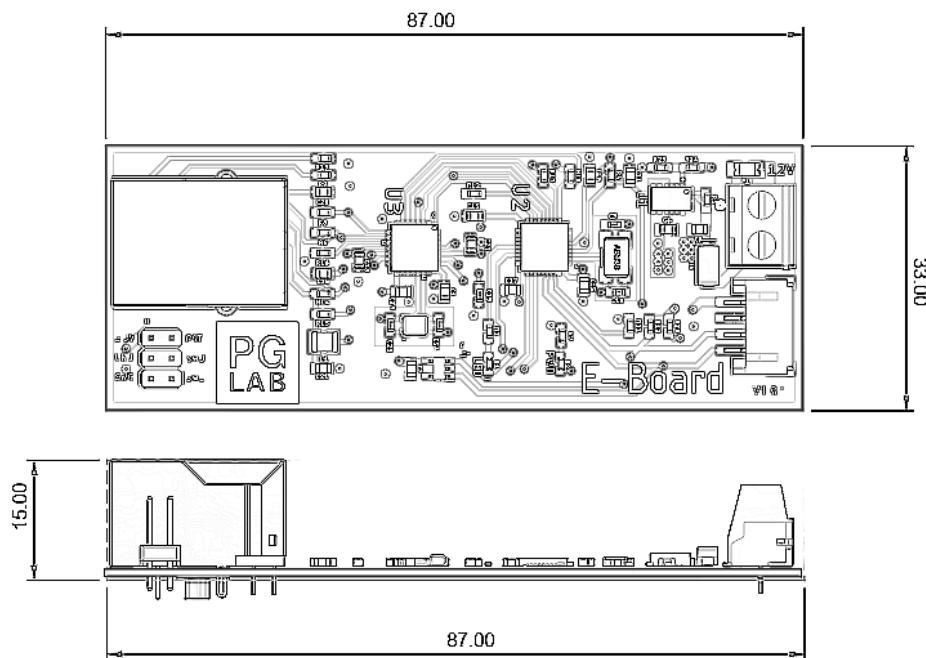
Board Topology



Board Topology Top

Ref.	Description	Ref.	Description
J1	RJ45 Connector	U1	Step Down Converter MPM3610GQV
J2	Input Voltage	U2	Microcontroller STM32F103TBU6
J3	I2C Connector	U3	Ethernet Controller ENC28J60
J4	SWD Connector	U4	EEProm, MAC address 24AA02E48T
L1	Status Green LED	L2	Power Red LED

Mechanical Information

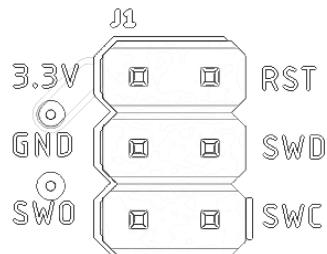


Board Outline

Operating Conditions

Description	Min	Max
Input Voltage	4.7V	20V
I2C Voltage	3.3V	3.3V
Power Consumption	140mA	50mA
Conservative thermal limits for the whole board:	-40 °C (-40°F)	85 °C (185°F)
Operating Temperature	0 °C (32°F)	50 °C (122°F)

SWD Connector



Ref.	Description
3.3V	Target Reference Voltage. It is used to check if the target has power, to create the logic-level reference for controls the output logic levels to the target
GND	Common Ground
SWO	Serial Wire Output trace port (Optional, not required for SWD communication)
RST	Target CPU reset signal
SWD	Single bi-directional data pin
SWC	Clock signal to target CPU

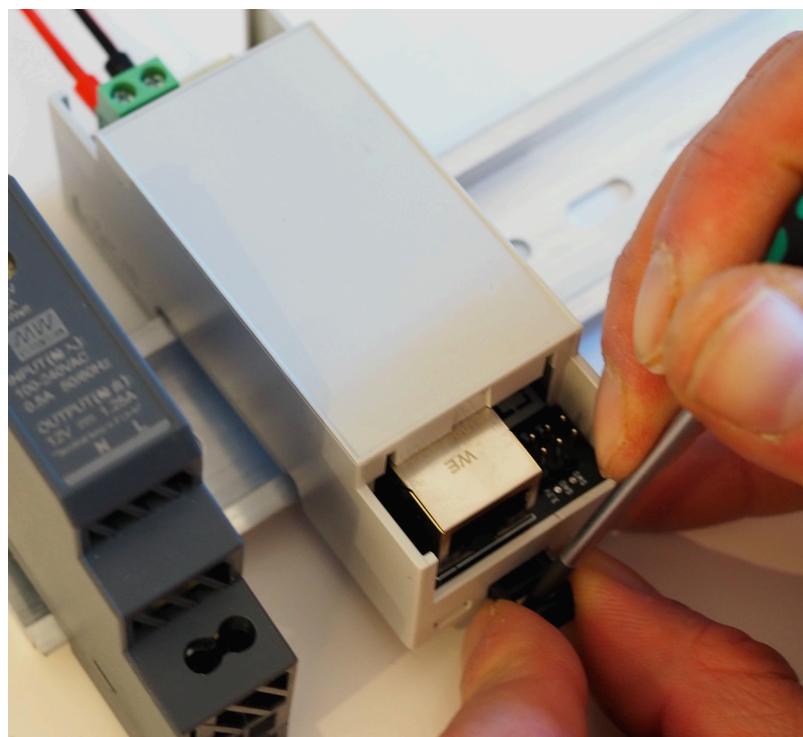
Setup And Use

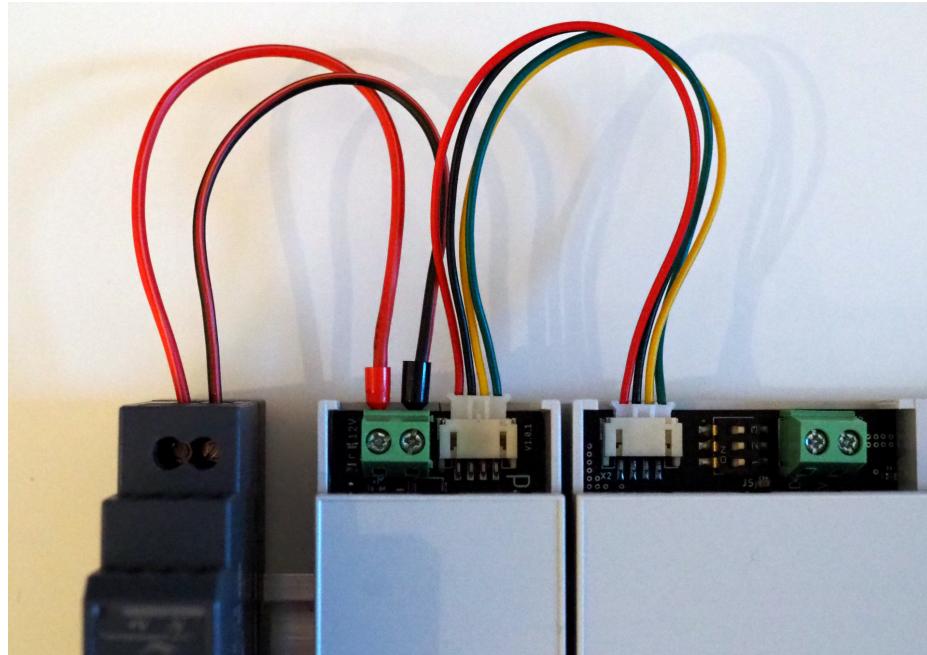
Important: Before beginning the installation, please read carefully and completely the documentation. Failure to follow recommended procedures could lead to malfunction, danger to your life or violation of the law. PG LAB Electronics is not responsible for any loss or damage in case of incorrect installation or operation of this device!

Warning: Do not allow children to play with the device. Keep the device away from children.

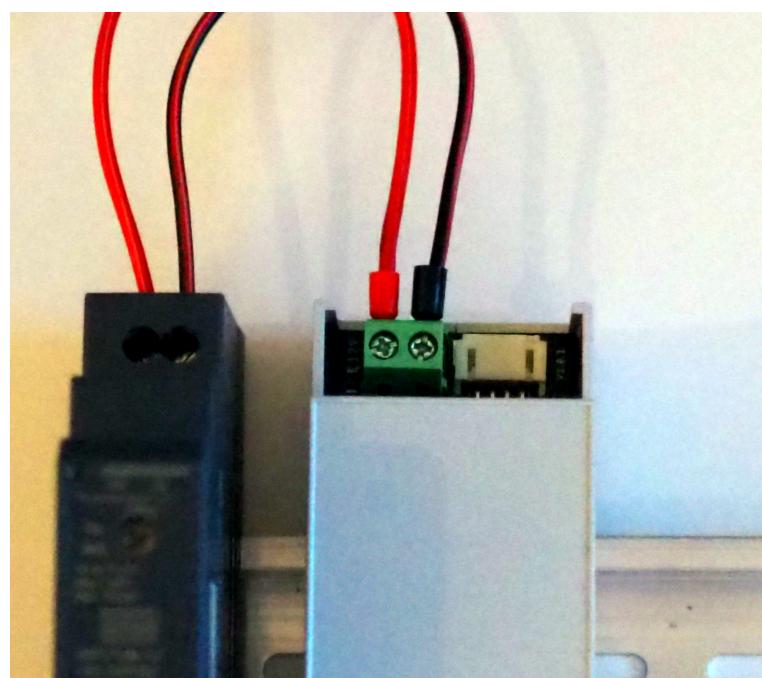
Warning: Be sure to use the right power supply and to connect the positive and the negative wires in the right order. Failure to follow the recommendation can seriously damage the E-Board device.

In your package, you will find the enclosure of E-Board electronic device as shown in the following figure. The enclosure needs to be attached to a standard DIN bar in the switchboard. Attach E-Board as shown in the figure, be sure that the ethernet port and the black hook of the body enclosure is pointing down. You can use a screw driver to better engage the hook in the DIN bar.

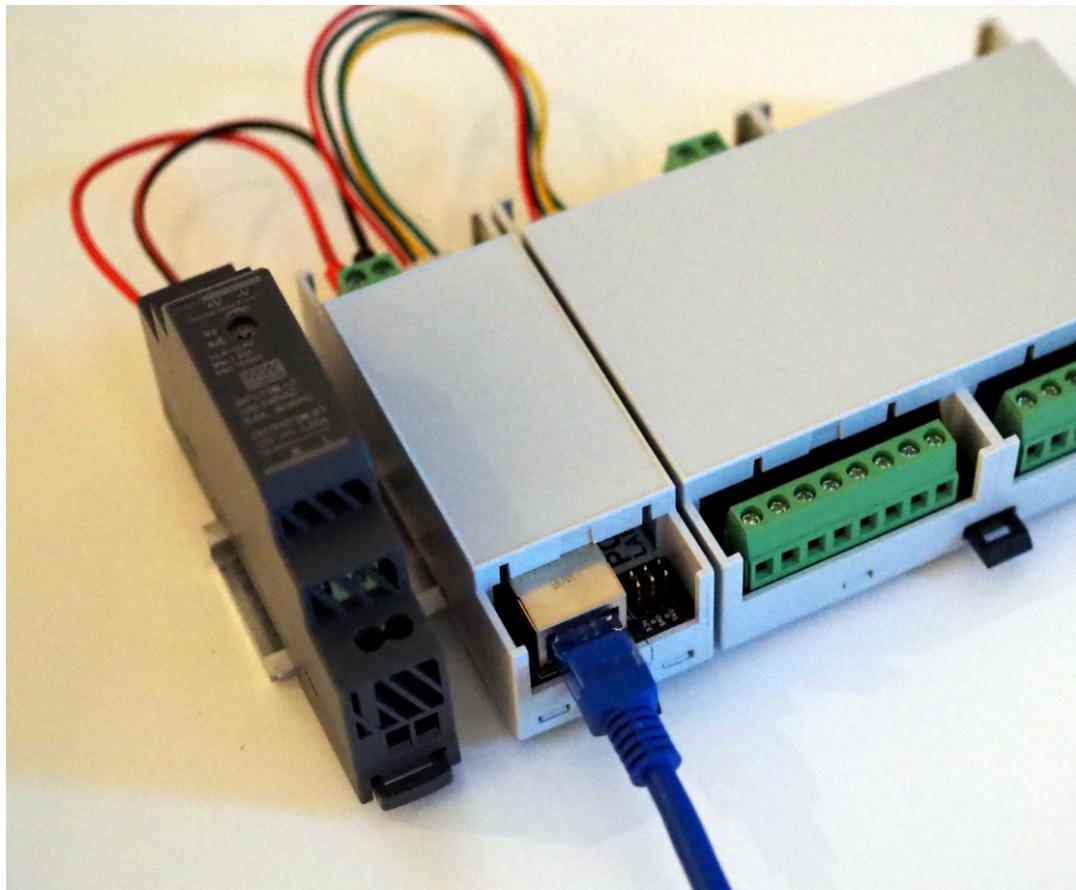




Connect the input voltage respecting the E-Board power supply specification. Be sure to connect the power lines respecting the polarity as show in the following figure.



Connect the I2C port to the E-Relay I2C port using the 4 pin cable.



Connect E-Board to your local network with a Cat5E cable to your router or switcher.

Embedded Web Server

If every thing is connected properly you should see the power red led (L2) turn on and the status green led (L1) blinking. At this point E-Board negotiate an IP address using DHCP with your router. You are ready now to do the software setup.

E-Board come preload with a firmware to be able to control E-Relay devices and be easily integrated with your home automation controller.

The preload firmware allows E-Board to be controlled by an internal web server or by a connection with an MQTT server. No applications is needed in order to operate with E-Board.

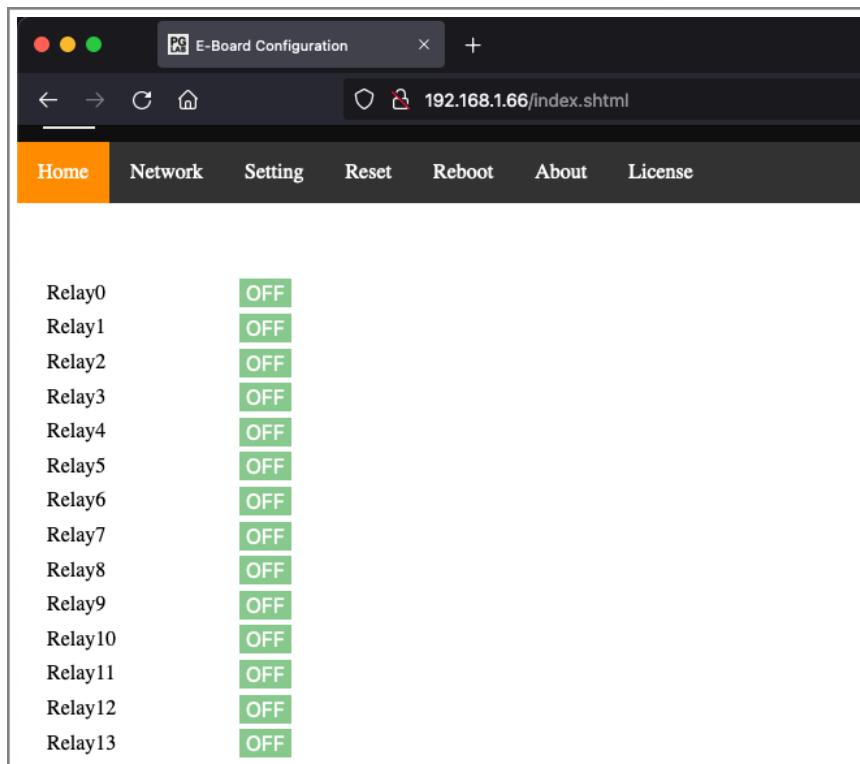
Home Page

Find the IP address that it's been associated with the E-Board. Please refer to your router manual instruction. The IP address should be something like: **192.168.1.66**

Open the following address with your favourite web browser: <http://192.168.1.66>

Note: E-Board doesn't support **https**. In your web browser be sure to type the address starting as **http://...**

You should see the E-Board home page for configuration as show in the following figure.



The main page show the status of all 64 relays. From the main page you can turn ON or OFF any specific relays. If the status button is light green, it means that the specific relay is not connected to E-Board.

Network

The network TAB allows you to setup the IP connection, you can use DHCP or set a static IP connection, the following table show the available fields:

Ref.	Description
DHCP Client	When Enable, E-Board use the dynamic IP generated by the DHCP server.
IP Address	Enter the static IP.
Network Mask	Assign the E-Board static network mask.
Gateway	Set the E-Board static gateway.
DNS	Set the E-Board static DNS.

In the network TAB you can set the SNTP server for synchronise the internal time with an external server. Every hours, E-Board synchronises the system time with the server. The following table show the available fields:

Ref.	Description
SNTP	Enter the server name used to synchronise the system time.

For the connection with an MQTT server are available the following fields:

Ref.	Description
Server	Enter the MQTT server address.
Port	Enter the MQTT server communication port.
Username	If needed enter the username for connection with the MQTT server.
Password	If needed enter the password for connection with the MQTT server.
MQTT ID	Enter the MQTT ID to the E-Board. It's mandatory that ID is unique, no other open connection with the MQTT server must have the same ID.

Note: After setting are done, please save parameters and reboot the device to make it effective.

Setting

In this tab you can set the E-Board time zone and the daylight saving time. The following table show the available fields:

Ref.	Description
Timezone	Set your time zone respect UTC (Coordinated Universal Time).
DST/STD Week	Set the week numbers of the month to start daylight saving time (DST) and to return the standard time (STD). Set the field to NEVER to don't use this feature.
DST/STD Day	Set the day of the week to start DST and return to STD.
DST/STD Month	Set the month of the year to start DST and return to STD.
DST/STD Hours	Set the hour of the day to start DST and return to STD.

The following fields are used to give a safe mechanism in the way E-Board control the connected E-Relay devices.

Ref.	Description
Auto OFF	It's a timeout in seconds. E-Board automatically turn OFF relays that are been on for more than this time. It can be useful in irrigation system to prevent an electro-valve to stay open for too much time. This for example is the user forget to turn OFF a relay or if the connection with MQTT server is lost. When zero this feature is disable.
Max ON	This is the maximum number of relays that can be ON at the same time. This feature can be useful to carefully select the power supply max wattage.
MQTT lost	When selected, and the MQTT connection is lost, all connected relays are turned OFF.

E-Board has also an auto reboot functionality. It's recommended to use this functionality to increase the stability of E-Board over time. The available fields are:

Ref.	Description
Auto REBOOT	It's a timeout in seconds. E-Board automatically turn OFF relays that are been on for more than this time. It can be useful in irrigation system to prevent an electro-valve to stay open for too much time. This for example is the user forget to turn OFF a relay or if the connection with MQTT server is lost. When zero this feature is disable.

Ref.	Description
REBOOT hours	This is the maximum number of relays that can be ON at the same time. This feature can be useful to carefully select the power supply max wattage.

Reset

In this tab you have the possibility to restore the factory setting of the E-Board. Click the Apply button to erase the current setting and restore the default one.

Reboot

Clicking on the Apply button of this tap will force E-Board to restart. E-Board needs to be restarted every time a Network or a Setting fields is changed to make it affective.

About

In this Tab you can see device informations as current firmware version, the status of MQTT connection, the Local Time and the E-Board MAC address.

MQTT Support

E-Board device include a support with MQTT (Message Queue Telemetry Transport). MQTT is an ISO standard (ISO/IEC PRF 20922) publish-subscribe based “light weight” messaging protocol for use on top of the TCP/IP protocol. It is designed for connections with remote locations where a “small code footprint” is required or the network bandwidth is limited.

E-Board support a set of MQTT commands published on "**pglab/<MQTT id>/**" to address an individual device. **<MQTT Id>** is the field of the E-Board configuration present in Network Configuration Tab of the internal web server.

The E-Board reports data on:

- **pglab/<MQTT id>/relay/<i>/status** report status **on, off**

The E-Board accept command on :

- **pglab/<MQTT id>/relay/<i>/set** accept **on, off**