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# Modbus Scanner

The purpose of the system is to read all available addresses of the Charge-Controller and send the related content to an MQTT Broker. From that MQTT Broker, data will be retrieved and stored in a database.

The system is composed of two different subjects:

* Scanner
* Server

# Scanner

The scanner is composed of an ESP32 with an Ethernet cable for Modbus communication over RS485 protocol. The ESP32 microcontroller is already connected to a JSY-MK-194G power meter for AC voltage and current measurements.

The device has Wi-Fi connectivity in order to both connect to an existing network and to manage local client through local Access Point to configure the device itself.

Immagine che contiene elettronica, cavo, Impianto elettrico, Ingegneria elettronica

Descrizione generata automaticamente

## Ports

The device has four different input/output ports labelled as follows:

1. CHARGE-CONTR:

Is the communication channel between the ESP32 microcontroller and the charge-controller using Modbus protocol over RS-485

1. USB:

Is the USB connector of the ESP32 microcontroller that can be used for communication or power supply by using an USB-micro connector. To supply the device a 5V-1A DC power source will be fine.

1. CURRENT CT1 – CT2:

Those are the ports for the current clamps. It is possible to measure two different channels separately by connecting the clamps on two different loads.

1. N L:

Those are the connections of the power meter to the AC supply as specified in its technical documentation.

UL -> Live wire

UN -> Neutral wire

## Configuration web-page

The configuration web-page is accessible both by connecting to the device Access Point either by being connect to the same local Wi-Fi network.

The resource is accessible at *esp32.local* or by searching the local IP address of the device.

The configuration web-page is divided into 3 sections as follows:

*Immagine che contiene testo, schermata, Carattere, numero

Descrizione generata automaticamente*

1. System Info

Brief overview of the device status:

* 1. Current time of the system
  2. Last address read from the charge controller
  3. Wi-Fi network status to access to internet connectivity

1. Configure Wi-Fi credentials

SSID and password of the Wi-Fi network to which the device will be connected

1. Update firmware

Select a file in *.bin* format in order to update the device with a new executable firmware

# Server

The server is an application running on a computer currently based in Italy.

The application has been deployed by using Node-RED.

The application is in charge of sending periodically the current timestamp in order to update the system timestamp of the scanner.

In addition, by subscribing to a dedicated topic, the data sent by the scanner are received and then stored in a local database.

The transmission of the data is relying on MQTT by using a private broker hosted on Hive-MQ online services.

# Setup

1. Connect the Ethernet cable to the Charge-Controller (port *CHARGE-CONTR.*)
   1. Check on the Charge-Controller configuration panel on the display ([datasheet](https://drive.google.com/file/d/1pTPZ9wZ2vCXpGwVN3OHbS6OMTgzr4It5/view?usp=drive_link)) if the baud-rate (speed) of communication is set to 115200 bps. Otherwise the firmware needs to be updated with the Charge-Controller baud-rate.
2. Connect the current clamp and the power supply of the JSY-MK-194G power meter. The connection should follow the scheme on the [technical documentation](https://www.jsypowermeter.com/uploads/JSY-MK-194G-User-Manual2.pdf) (port *CURRENT CT1 – CT2* and *N L*)

Immagine che contiene testo, diagramma, Piano, schermata

Descrizione generata automaticamente

1. Supply the ESP32 microcontroller with 5V DC power source
2. Connect to the Access Point of the device:

SSID: *ESP32\_modbus\_scanner*

PSW: A1234567

1. Open the browser and search for *esp32.local.*

It will show-up the configuration page

1. Insert the local Wi-Fi credentials and press *Change* button
2. Once the system it is connected with internet capabilities, it will receive an updated datetime and the scanner will start to read Modbus addresses and send data