metricí
accurate recognition

METRICI MULTICONTROLLER

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1. Introduction

Metrici MultiController is a hardware product fully developed by Metrici. The LAN device was created as a multi-function tool. This piece of hardware is designed to work indoor and outdoor, to be wall mounted or placed into a small space, to act as an input or output controller for a range of devices, to work through WiFi or Ethernet, to emulate a Wiegand Card reader and to strengthen security and access control.
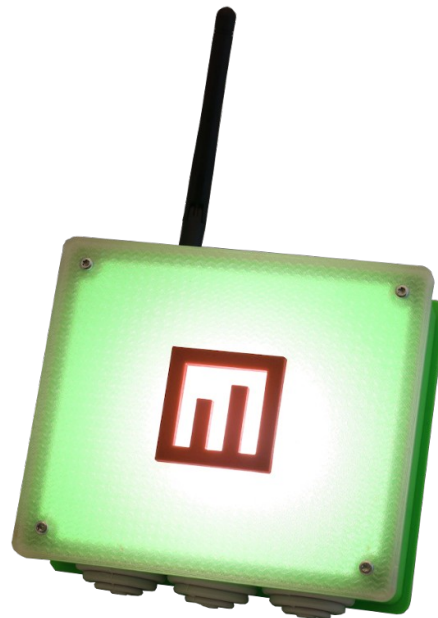
The controller has two digital inputs, two digital outputs and a 26bit Wiegand Interface. Its two inputs can can be connected to two inductive loops or sensors and send triggers to Metrici Detection Engines, while its two outputs can control up to two barriers, traffic lights or any relay actionable hardware. The novelty comes from the controller's Wiegand capabilities, making it a truly all-in-one capable hardware. It has 26bit Wiegand Interface integrated, giving the device the ability to emulate a 26bit Card Reader and send signals to a Wiegand Access Control Central.

Metrici MultiController may become a RFID reader and may include a MIFARE Classic 1k 13.56 MHz reader.

This function can be used independently to send the reading in a external database or for certain actions: open barrier, door, record an event. Also, it

can be used in combination with Metrici detection engines to cross check a license plate and doing an action only if the two parameters (license plate and card number) are both and linked in the database.

The RFID amnd Wiegand functions are independent and can work in the same time on the device. It is to remember that RFID is optional and is mounted on request.

Technical data

Description	Smart 'all in one' LAN controller
Connectivity	2 digital inputs, 2 relay driven digital outputs, 1 Wiegand 26 bits interface
Characteristics	Web interface for setup and monitoring; can send triggers to 2 Metrici engines, can open 2 barriers; can convert each license plate number into a Wiegand ID by connecting to Metrici2 database.
Networking	WiFi 802.11 b/g/n and Ethernet 10/100 Mbps
Protocols	HTTP over TCP/IP, RAW over UDP/IP and Wiegand 26 bits Optional: RFID MIFARE Classic 1k 13.56MHz
Software compatibility	Metrici2 v3.3 and higher
Power	12 - 38 V, 5W
Working temperature	-20 to +50 degrees Celsius, IP65
Dimensions	16 x 15 x 10 cm (WiFi antenna included)
Weight	0.2 Kg
Case	ABS with 2 back brackets with mounting holes and 3 rubber protected holes for cables

2. How does it work

The Metrici MultiController was built to fit multiple working scenarios.
In a first scenario, Metrici MultiController can be connected to two

inductive loops or sensors to trigger Metrici engine to make a detection when a car comes. In this scenario, it can also command up to two barriers, two traffic lights or other external hardware via its two digital outputs. It can also be connected to visual or sound alarms. In many cases, it is used to control such devices when Metrici does a recognition. For example on production line, when Metrici discovers a faulty product, MultiController will comand an alarm or will stop the production line. In some other cases, on construction sites, it triggers an alarm when people are detected in forbidden areas, for example.

When communicating with Metrici database, it will **receive command** to do an action or not for a license plate. It also can get a command to switch a traffic light when a certain license plate is detected.

In a second scenario, Metrici MultiController is used for its **Wiegand cappabilities**. When a plate number is recognized, the Metrici detection engine send a **Check Action** toward MultiController. This one will ask for a **Wiegand ID** in Metrici interface and database.

If that particular plate number has a Wiegand ID, MultiController will send it to the **Wiegand Central Station**. This one **will take the decision** to open or not the barrier or take another action.

As such can also be used as a check-in system for the employers.

In other working scenarios, it may be possible that a Wiegand reader sends an ID to Metrici, which may or may be not virtually transformed into a plate number, as one sets in the Interface.

The Wiegand ID in the Metrici Interface can also be imported as a list, copied from a central station or can be generated by Metrici and associated with a license plate.

As many companies use access control based on Wiegand, MultiController is a bonus for securing the location and a stricter regulation in and out.

One can use the same setup with the RFID reading. MultiController sends ID's to a Metrici engine, where a trigger can be set in Metrici Control Panel **Working mode and trigger in** menu settings.

3. First boot

Power the MultiController by connecting electric wires to the power strip as circled in the next image

MultiController will work and can be accessed after is connected to a local network using a Ethernet cable.

After the cable is connected, access the interface from a browser and write down the default address

ATENTION! STANDARD IP ADDRESS OF THE MULTICONTROLLER WILL ALWAYS BE

192.168.100.10.

Please keep in mind that all settings have a default value. They can be changed or left as such, but please remember to check the **Backup/Restore chapters.**

MultiController has a special firmware for Wireless and Ethernet communication and easy to use interface.

MC Interface has three sections: Dashboard, Settings si User, and a user has access to them as soon it is connected.

Dashboard: one can see the actual status of the device.

Settings is where one can change any setting.

User is where a new user is created or an old one is edited.
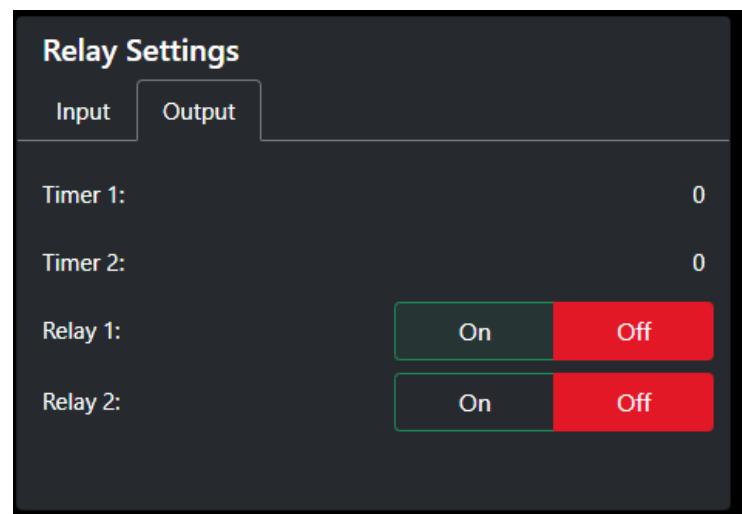
Some settings you can do:

- **change the IP Addresses and the Ports.** These are necessary to do the connection between a device that sends trigger and MultiController;

- **change relay time**. "The timer" is period of time in seconds in which the relay stays ON;

- **change the Metrici server address** which is necessary for communication between it and MultiController;

- **change Pulse Width and Inter Pulse Gap**. The default setup is 90 microseconds, but they can be unique for each Wiegand station. The values will be tuned until communication will be reached;

- **import and export configuration files**

 - **firmware update;**

- **reset** ;

4. Use/ Setting- DASHBOARD

At the IP default address - 192.168.100.10, the first window you will see is the actual size at this moment, as in the next image, with also MAC address.

Each field can have three status settings :

- you can leave it like this, and the actual value is kept;
- you can write "not set", to reset the value;
- to introduce a new value.

6. Netwok Settings

Network Settings tab lets you change the local network setting of the device. It works on WiFi or Ethernet with Static IP or DHCP.
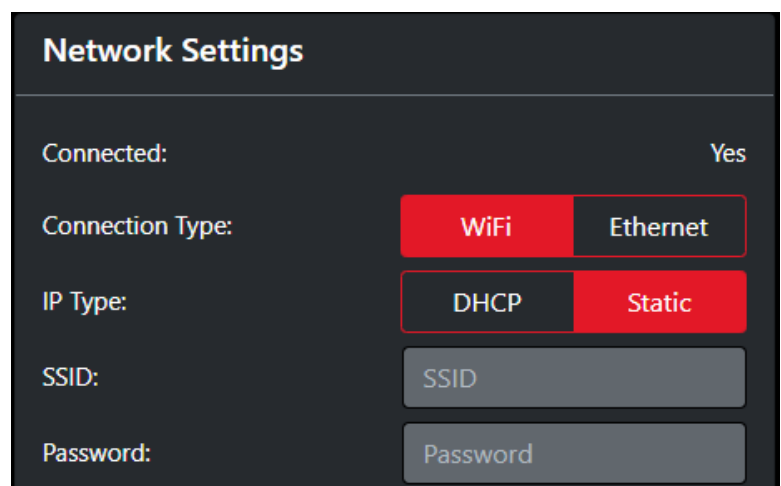
The MC comes with factory settings as **Connection Type: Ethernet** and **IP Type: Static:** this is the reason you can actually connect to it at the first boot to address 192.168.100.10, using Ethernet cable.

Connection Type

If you want the MultiController to work WiFi, **selecti WiFi** and SSID and Password will be available to fill in.

You will write the connection credentials to local WIFI network
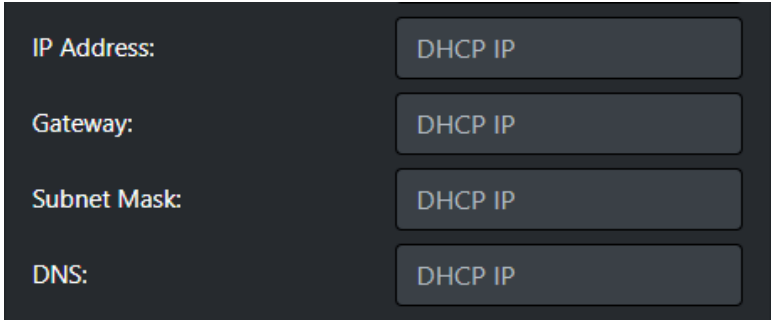
If you want the MultiController to work on **Ethernet cable**, select Ethernet, iar SSID and Password fields become inactive and will display message **Ethernet Connection** to warn that such a connection is established.
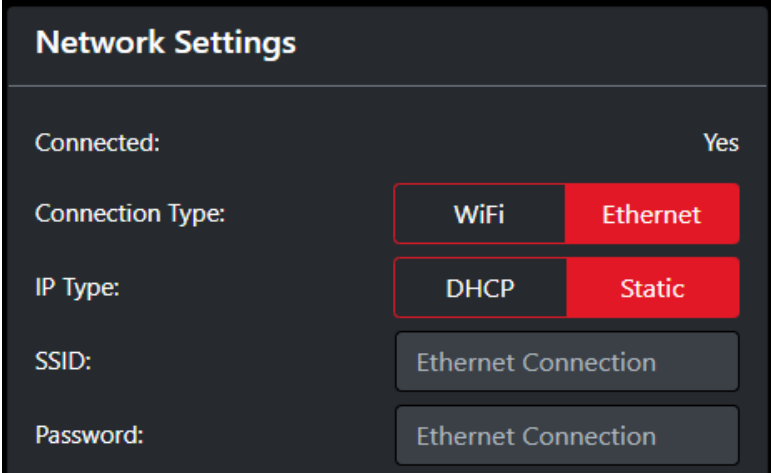When any button or setting is active, it will be displayed in red color.

IP Type

When choosing **DHCP** as **IP Type** means that MultiController will get any IP from the network router. This will also transform in inactive mode all the settings fields and the DHCP IP message will be displayed.
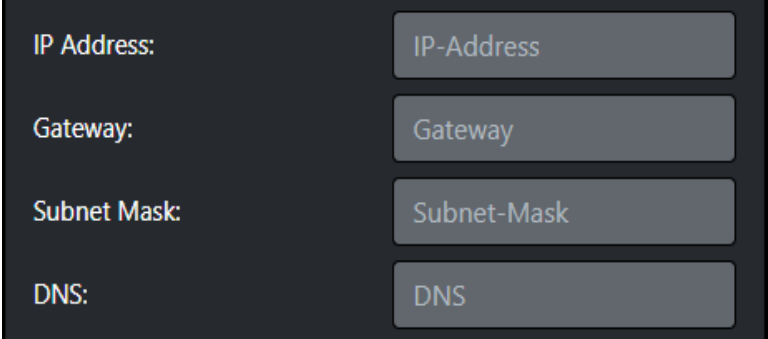
NOTE! If this working mode is chosen, more settings are to be done in your local network for the MultiController to properly work. If not, there is a big chance that every reboot will generate another IP for the MC and this one will not work as it is suppose to because the connectivity data are changed. It is possible that in the local network router to link the IP address to the MultiController's MAC address (visible on dashboard and also on a sticker on the case). So, with every restart (power or network failure) MultiController gets the same IP even if it is on DHCP mode. For all these to be properly set, one needs proper networking know-how.

IP Type: Static lets you write down an IP where you can access the MultiController. Write down IP Address, Gateway, Subnet Mask, DNS.

IP Address:	IP-Address
Gateway:	Gateway
Subnet Mask:	Subnet-Mask
DNS:	DNS

ATTENTION!

When saving the network settings, no matter which ones, the device will restart and the interface will notify that you are no longer connected to the device and you will need to connect to the new IP address (the one you chose or generated).

If the option was DHCP, you will not know the IP address to connect to the Interface. So first of all, you will need to access the local router and identify the MultiController from the list of IP addresses and then access it.

7. Settings - Relay Settings

You will find two fields in this menu: Input and Output.

7.1 Input

MultiController can send trigger for a detection to begin towards two Metrici detection engines. For example MultiController can be connected to two inductive loops or sensors and it will ask to the detection engines to recognize objects when these will be activated. For this to happen, you need to fill in the input field in MultiController with an IP Address and a Port.

Input IP Address used in MultiController is the Metrici server address which will receive trigger to begin detection.

Input Port will also be found in Metrici Control Panel n the Metrici server and will be unique for each device and each engine. The Port number will always begin from a value of 3500, the second one will have 3501 and so on.
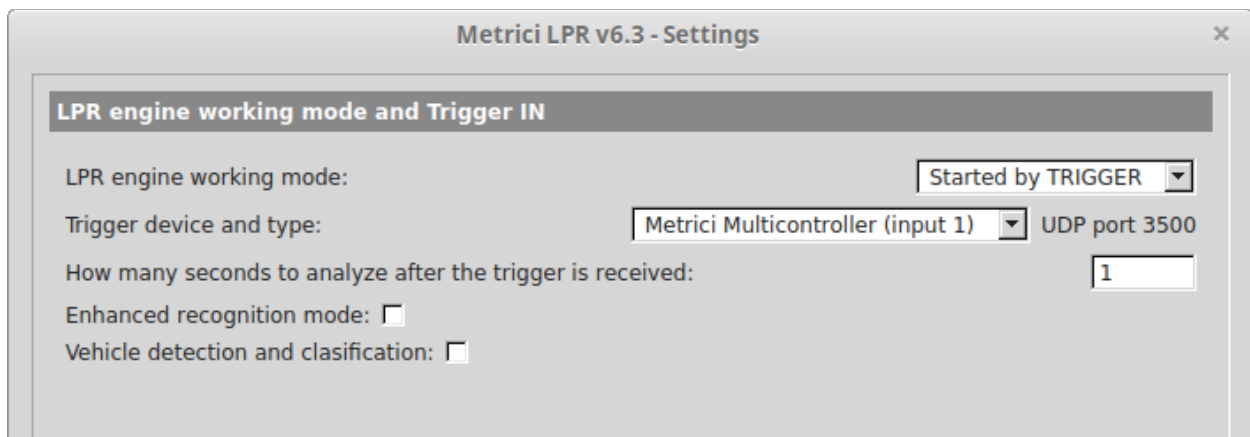
As more Metrici detection engines can be installed on the same server, MultiController can sent trigger to any of them.

First step for the trigger to work is to access the Metrici server and go to the settings of the Metrici detection engine which will get the trigger.

Please keep in mind that on a server one can have dozens of detection engines installed so you will need to set the ones you want.
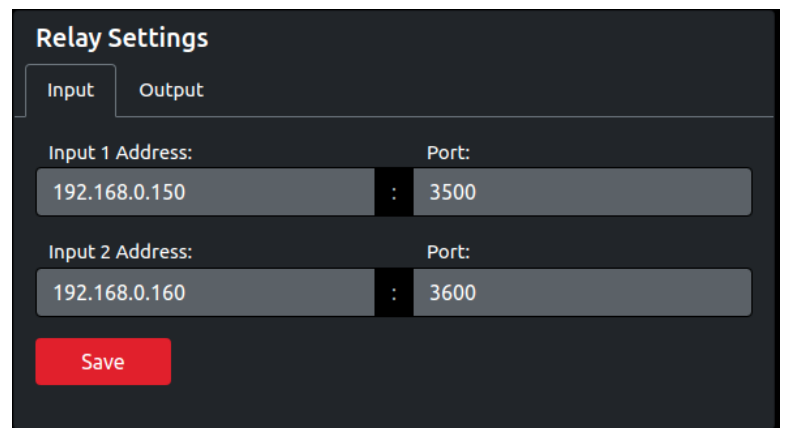
For this, go to **Metrici Control Panel** on the detection server, click on the ID of the detection engine you want and put it in **Foreground with watchdog** working mode. After start press **Edit** button. In the next window go to **Engine working mode and Trigger IN**.

You will change **engine working mode in** "**started by TRIGGER**". Then **Trigger device and type** select **Metrici Multicontroller (input 1) or Metrici Multicontroller (input 2) depending which one will give the trigger**.

Metrici will automatically generate a port, and the first one will be 3500.

These data: **IP address of the server and Port Number** will be used in MultiController settings. Then press Save
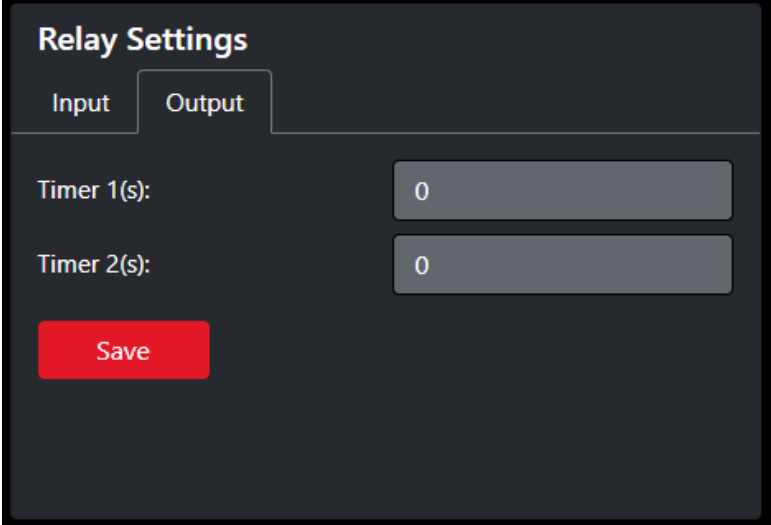
7.2 Relay Settings- Output

In **Output** Settings, you can control the controller's relays. You can connect and control any device that is capable of relay command such as, barriers, traffic light, doors, gates, alarms, lights etc.

First two fields are Timer1 and Timer2. Timer is a period of time in seconds a relay stays ON.

So up to two devices can be controlled by the MultiController.

If one wants a relay to stay ON for an unlimited period of time or until a user/operator or the Metrici engine decides to close it, this value will be set to 0. This functionality will also be used when the command to open or close the barrier will come from Metrici engines.

A 0 value will not affect the functionality, but it is recommended when both commands, open and close, will be set in the Metrici detection engines.

The buttons to manually change the relay status are to be found in **Dasboard** on **Relay Settings, Output** tab.

The relays can also be activated from Metrici engines. In the right side column you find the setting. Each link is a command for the relays.

For example http://192.168.1.150/relay1/on can be used in **Metrici Control Panel** in the settings of a detection engine to command a barrier or other device.

The IP in this example and filled in Control Panel is the **MultiController's IP Address.**

This setting is done in **Metrici Control Panel**, choose the ID of the detection engine and press **Edit.** Select **Barrier and traffic light and fill in the data for the MultiController, as in the next example .**
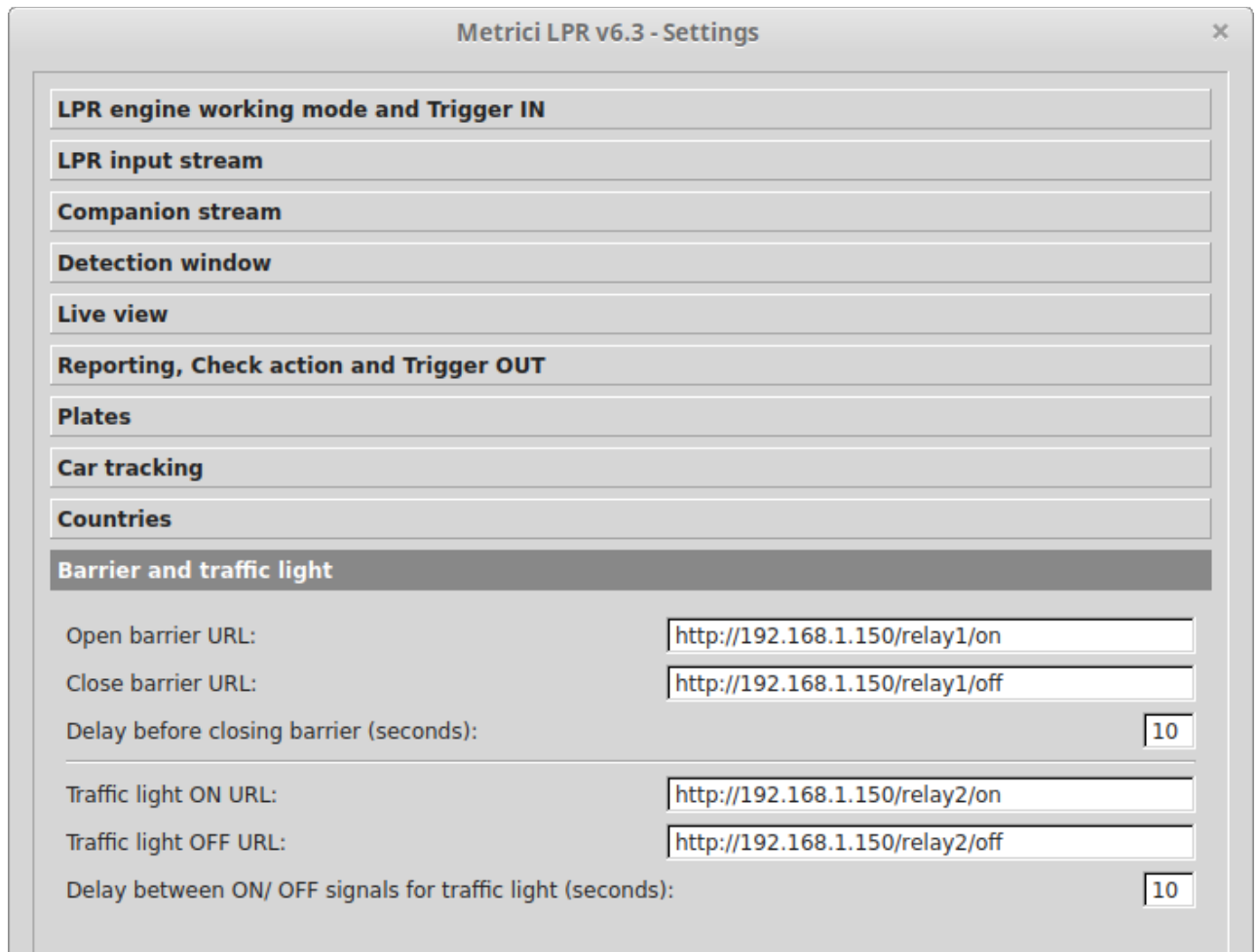
Relay 1, for example, can be used for a barrier and Relay 2 for a traffic light.

http://192.168.1.150/relay1/on to Open barrier URL
http://192.168.1.150/relay1/off to Close barrier URL

http://192.168.1.150/relay2/on to Traffic light ON URL
http://192.168.1.150/relay2/off to Traffic light OFF URL

ATTENTION! If the MultiController has a password and a user set for connection, the above addresses will be similar to:

http://username:password@192.168.1.150/relay2/on

See more at USER Chapter

If the timer in MultiController is left to 0, meaning to close the relay only on command, then you will fill in **both fields in Metrici Control Panel.**
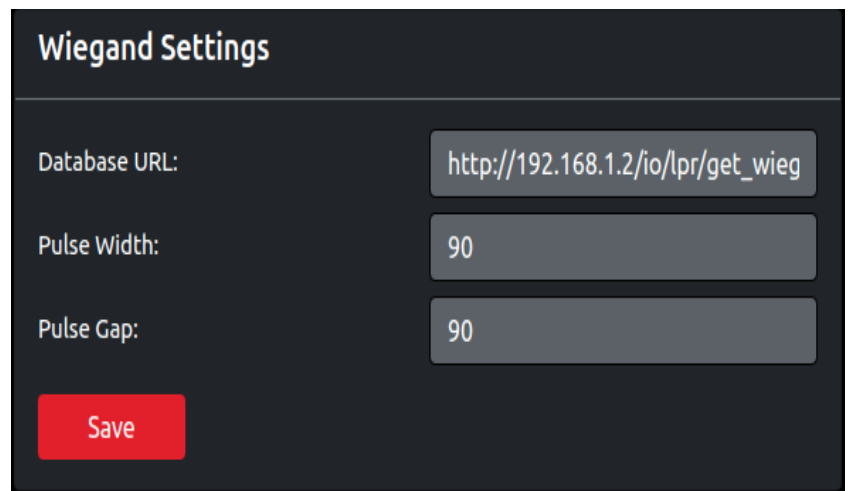
Otherwise the OFF field is not mandatory , as the MultiController will reset by itself the relay after the time you specified in its settings.

8. Wiegand Settings

MultiController can emulate a Wiegand reader. To activate this functionality go to **Wiegand Settings** tab.

This capability is practically linked to Metrici Interface and means you have another method of access control and identification.

For example, any license plate can be associated with a Wiegand ID in the Metrici Interface.

8.1 Setting the Wiegand capabilities

For this working mode to be activated, you need to do some wiring. First of all you need a Wiegand station capable of 26-bit Wiegand communication. As this protocol is the most common, most of them can work with some settings done.

Secondly, you need to connect three wires from the MultiController to the Wiegand station, meaning Wiegand 0 (W0), Wiegand 1 (W1) si Ground (GND), as in the image on the upper right of the board with blue connectors:
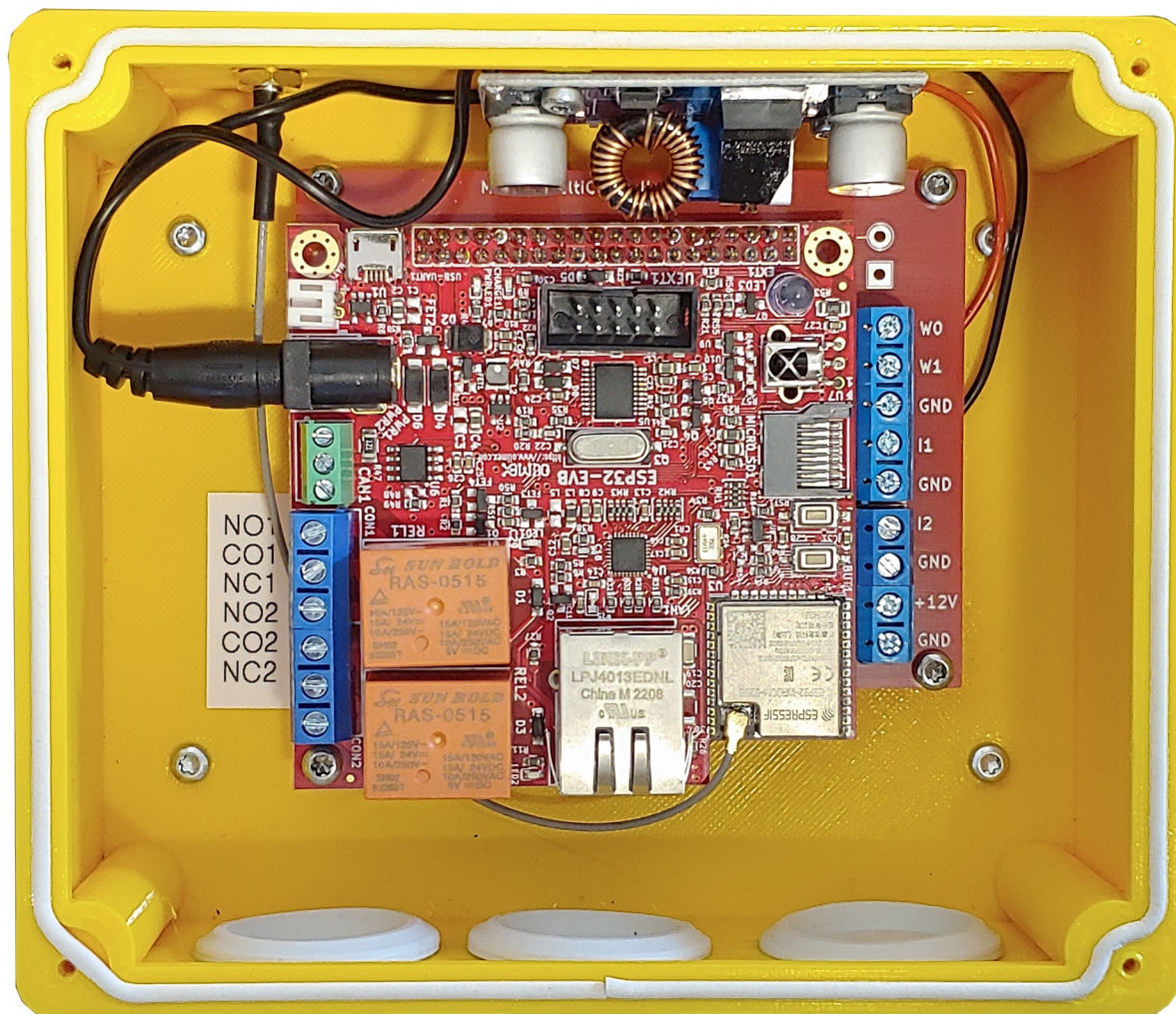
Then, Metrici server needs to be linked to the MultiController. Open **Metrici Control Panel on the Metrici server,** choose **the detection engine which will ask for** Wiegand confirmation. Set it in Foreground with watchdog working mode, press **Edit** when start**,** then select **Reporting, Check action and Trigger OUT**. **Check action URL** you will fill in the IP Address of the MultiControllerul followed by **/wiegand:**

http://192.168.1.150/wiegand
or

http://username:password@192.168.1.150/wiegand

if the MultiController has a user and a password set
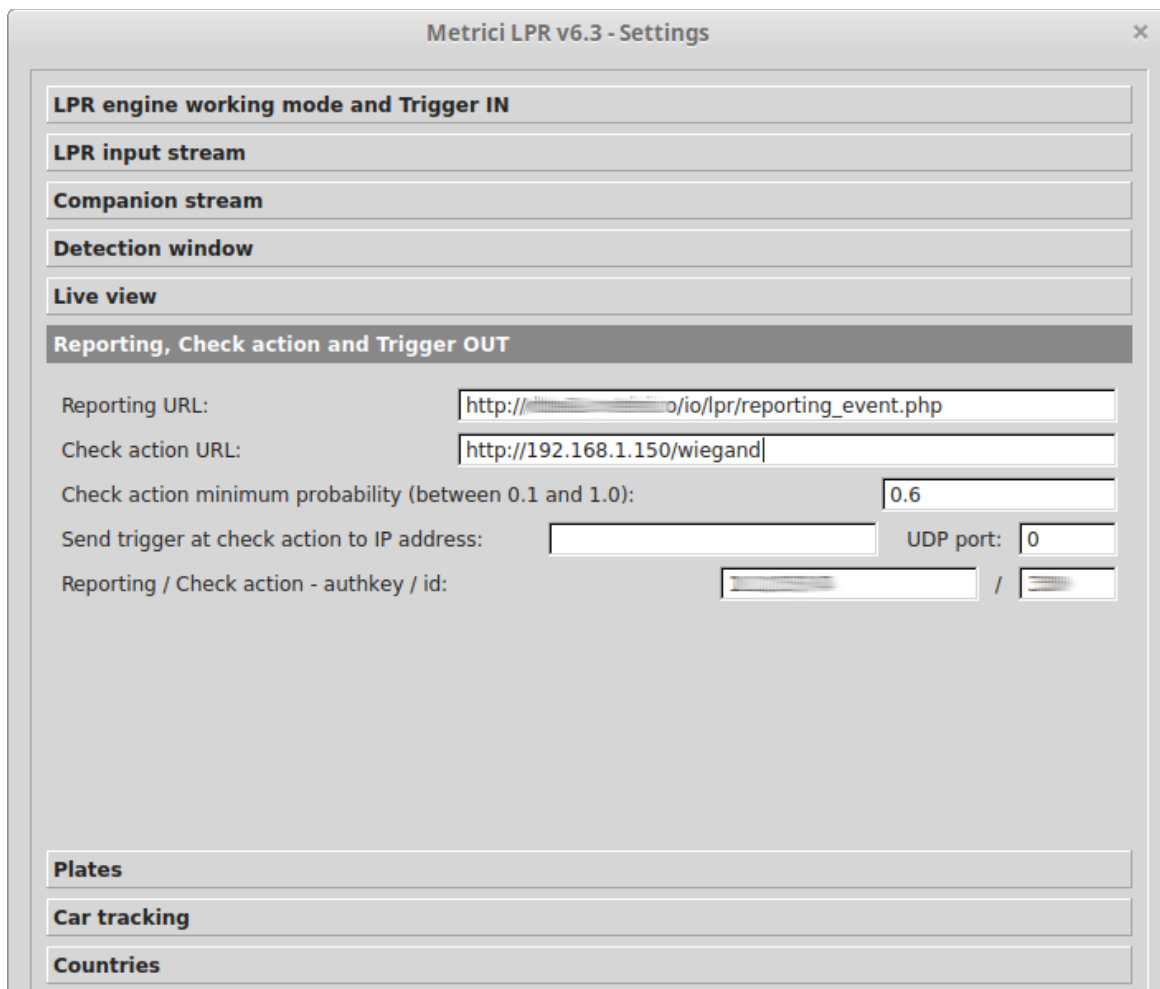
Next, go to MultiController Interface to **Wiegand Settings menu**, **Metrici Database URL and write down the Metrici server IP address followed by /io/lpr/get_wiegand_id.php, as**

http://IP_ADRESS/io/lpr/get_wiegand_id.php

For example: http://192.168.1.2/io/lpr/get_wiegand_id.php

It is mandatory to have a Wiegand ID or import a list of ID's associated with license plate numbers. In Metrici Interface **go to Plates Information**:
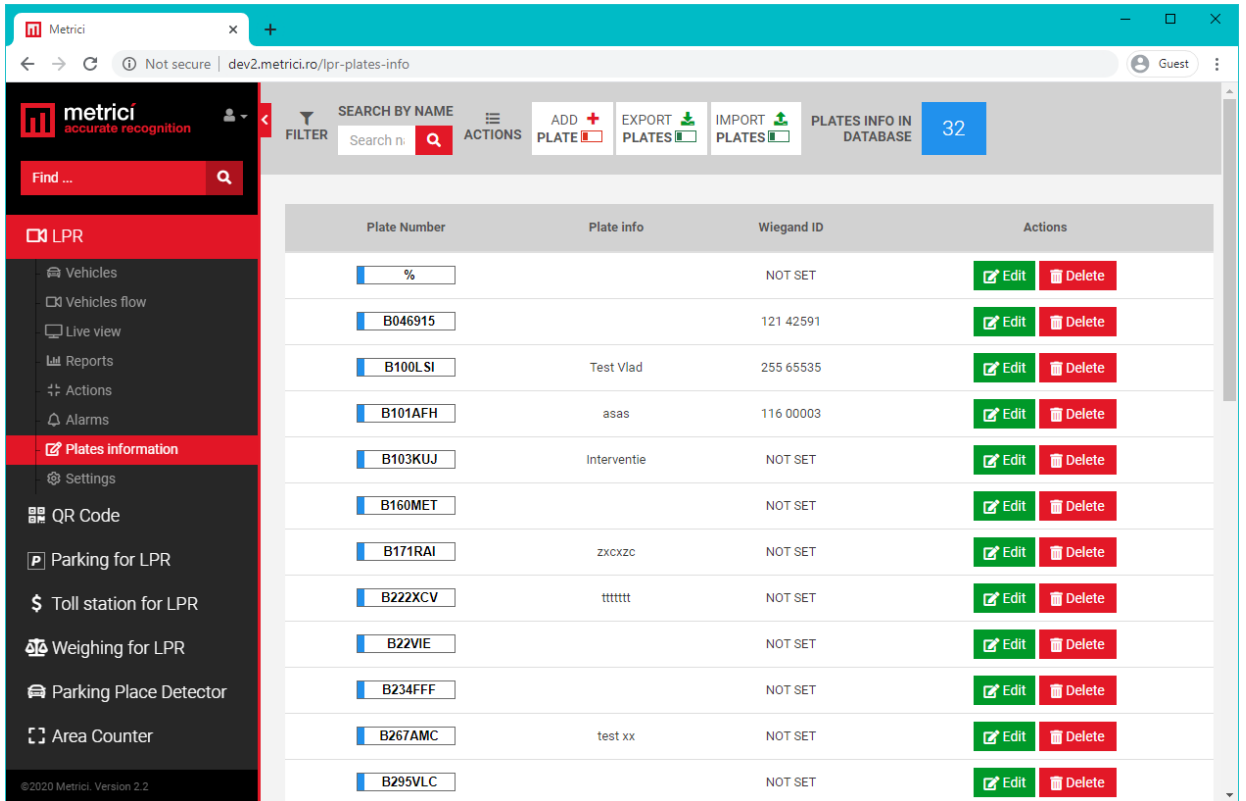
Write a license plate or edit an old one
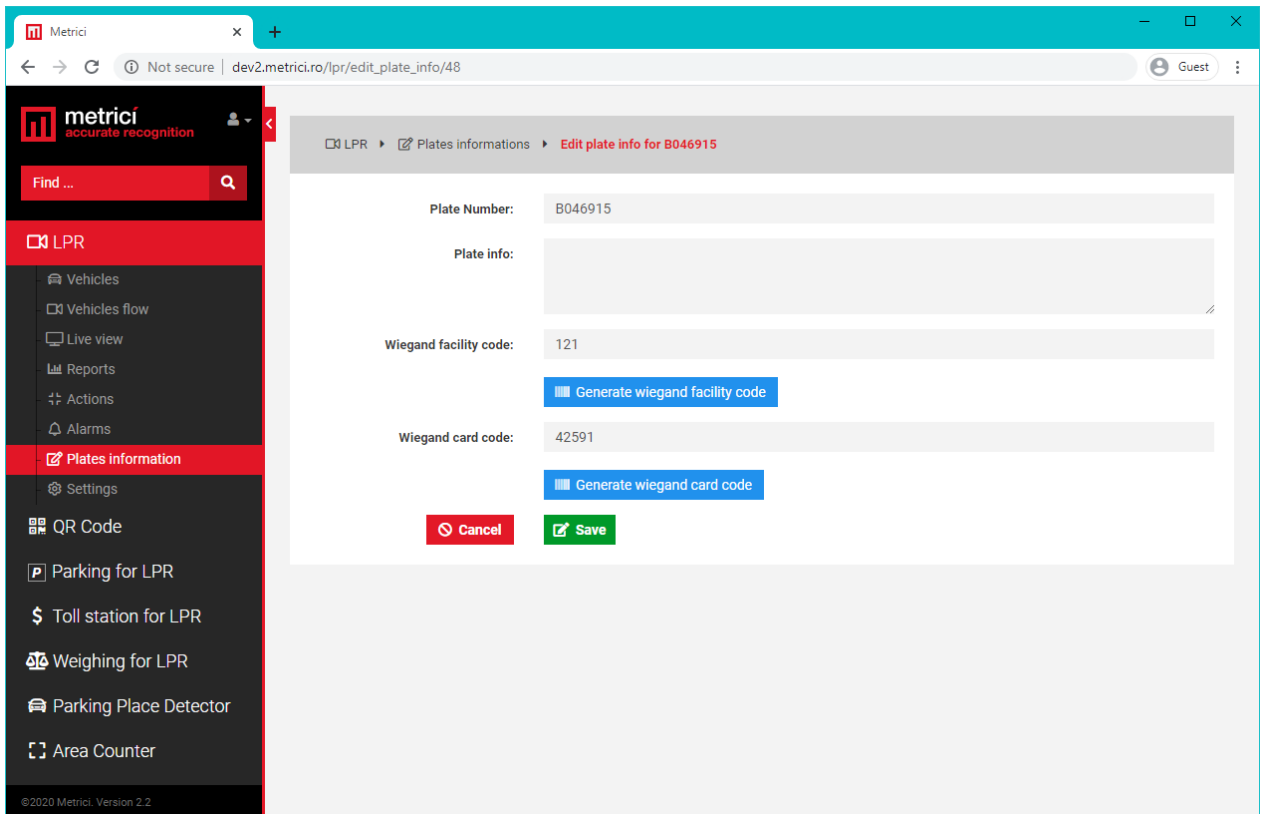
Select **Generate Wiegand facility code** and **Generate wiegand card code**, then **Save**.

This will create a unique number associated to that license plate. For each detection, MultiController will ask the Metrici Interface if there is a Wiegand ID for that license plate, and will send it further to the Wiegand station.

This station will decide what to do: take an action or not.

NOTE: Metrici MultiController can communicate with any Wiegand station, if proper settings are done. But not all the stations read and interpret the signals the same way.

For this to be fixed, go to Wiegand Settings, to Pulse Width and Inter Pulse Gap.
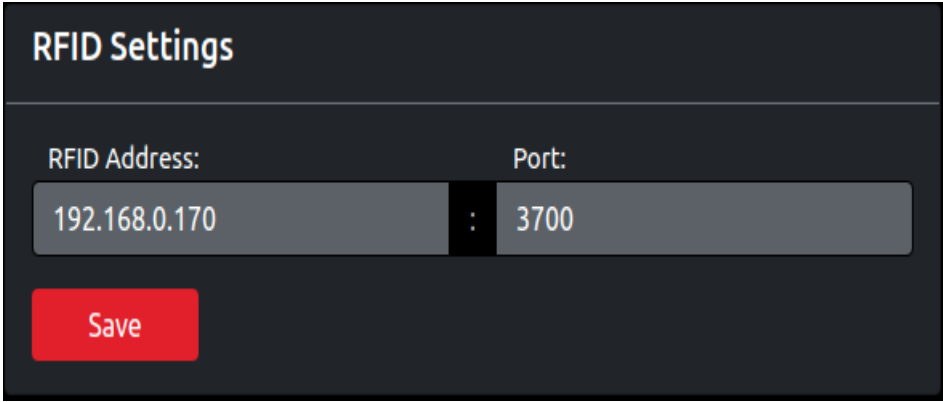
The standard value is 90 microseconds, but could be different for other stations. You will need to change the values and test it as you go. The default value works with most of them. For special project or situations this settings was introduced in the Interface, but one will need advanced knowledge of how the Wiegand station works.

9. RFID Settings

Metrici MultiController has the ability to become a RFID reader. This capability can be used independently to send the reading to an external database/device or for certain actions: open barrier/gate/ record event. Or also, in combination with Metrici detection engines to cross check a license plate with a RFID code to take actions only the two are linked in database.

RFID and Wiegand settings are independent one to the other and can work simultaneously on the same device.

MultiController can read RFID cards Mifare Classic 1K 13.56 MHz.

MultiController can send the ID to the Metrici engine, where you can personalize a trigger in Metrici Control Panel/ Working mode and trigger in settings for each detection engine that needs to get the info from MC.
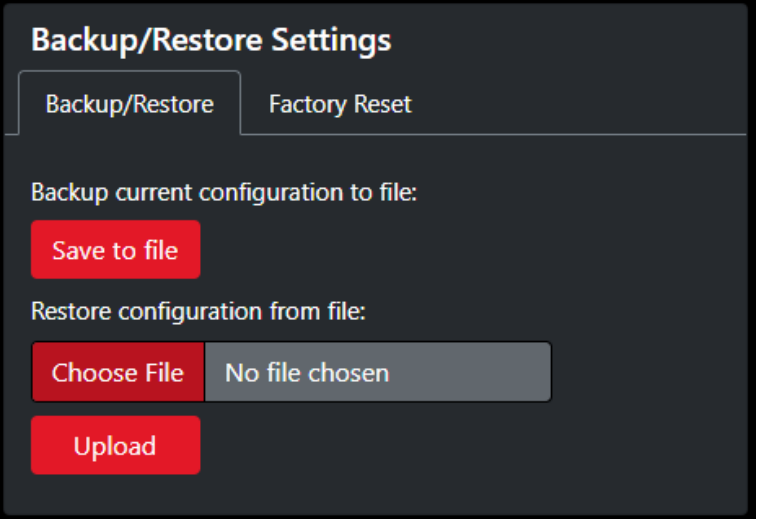
RFID Address is the IP Address of the Metrici server which will get the ID's. **The Port** will be found in Metrici Control Panel and will be unique for each device, as explained also in the last chapter regarding Wiegand settings.

10. Backup/Restore/Reset Settings

Backup current configuration

will download a file with all the current settings of the MultiController. Just press Save to file.

File format is JSON. More info you fill find in **Restore Settings Chapter**

Restore configuration
will import a configuration file. **Importing one means that all current settings will be replaced. The file to be imported can be a backup one or one created by the user.**

Once the file is uploaded, by pressing Choose file, then Upload, the device will restart and a page like next one will open.

Congratulation !
config.json has been uploaded.
Please wait 10 seconds before navigating to 192.168.100.10

Backup/Restore Settings

Backup/Restore | Factory Reset

Factory Reset
Has two buttons **Soft Reset** and
Factory Reset.

Soft Reset keeps the network
settings, but not the others. After
press you will be notified that the
reset was successful and the device
will restart.

Reset settings but keep Network Configuration:

Soft Reset

Reset all settings:

Factory Reset

So Soft Reset **keeps only the network setting** (SSID, Password, IP,
Gateway, Subnet, DNS), all the other (Input, Output, RFID, Wiegand) will be
reset. .

Factory Reset will reset all the settings to the default ones. After restart,
you will access the device to the standard IP Address for the Multicontroller :
192.168.100.10.

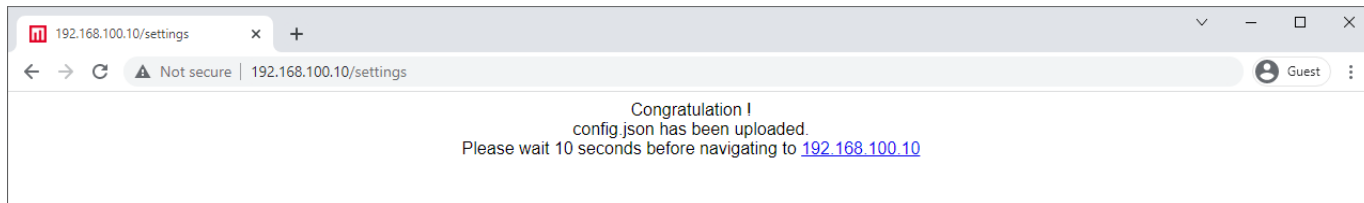Any of the buttons press will demand a confirmation of the reset.
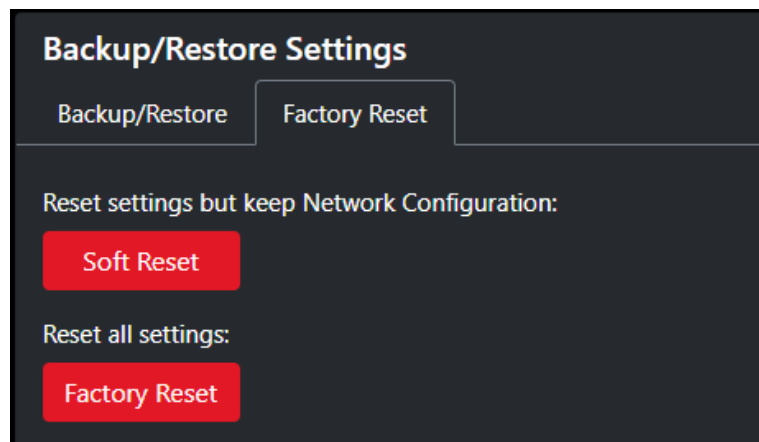
11. Update firmware

You can upgrade the firmware for the
MultiController. **firmware.bin** and
spiffs.bin files will be developed by
Metrici and are to be found on
support.metrici.ro.

Update Firmware

Please upload the provided firmware.bin file and/or spiffs.bin
file one at a time.

Notes:
(1): After the update has ended you will be redirected to
another page.
(2): Don't worry about your settings. The current configuration
will be kept after the update.
(3): The device will restart after each file upload.

For an update, donload the files, press
Choose file, then **Update**. It will save
the actual configuration, the device will
restart and a new browser page will
confirm the update

Choose File | No file chosen
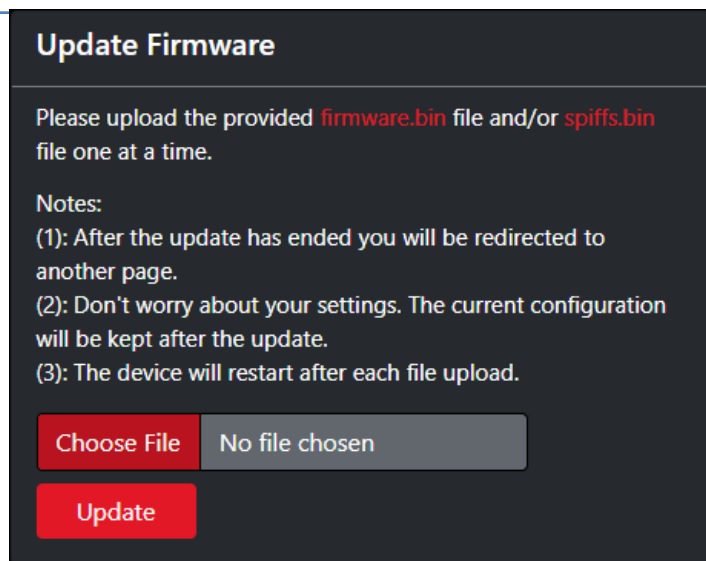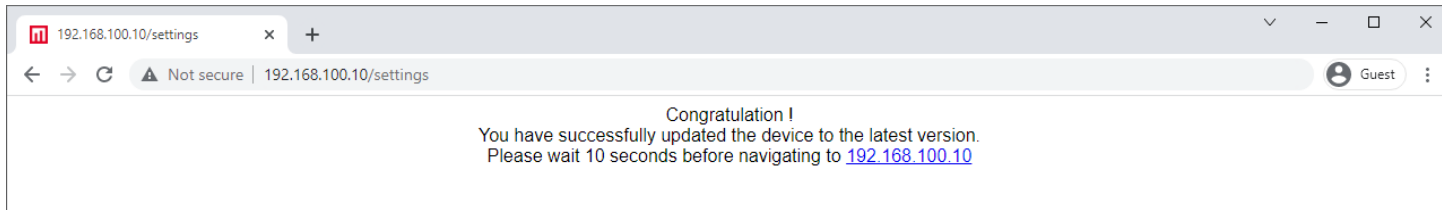
Update

For an update, follow next steps:

1. Download the files from support.metrici.ro
2. Click "Choose File". Load as first file "firmware.bin"
3. Select the "firmware.bin" file you downloaded.
4. Press the "Update" button.
5. After the firmware update is completed, repeat the process for the optional "spiffs.bin" file. During the update process, a blue "Updating..." message will appear at the bottom right corner of the page. Please be patient as the update may take a couple of minutes to complete. Please note that while the update is in progress, you will remain on the Settings page, but the controller will not be responsive. It's important to wait to be redirected to the confirmation page after the update. Do not attempt to interact with the controller until the update is fully completed.

12. User

You can set here only one user and a password that can access the MultiController Interface. If you want to change it, just write another Username and password and press **Save. The old data will be overwritten.**
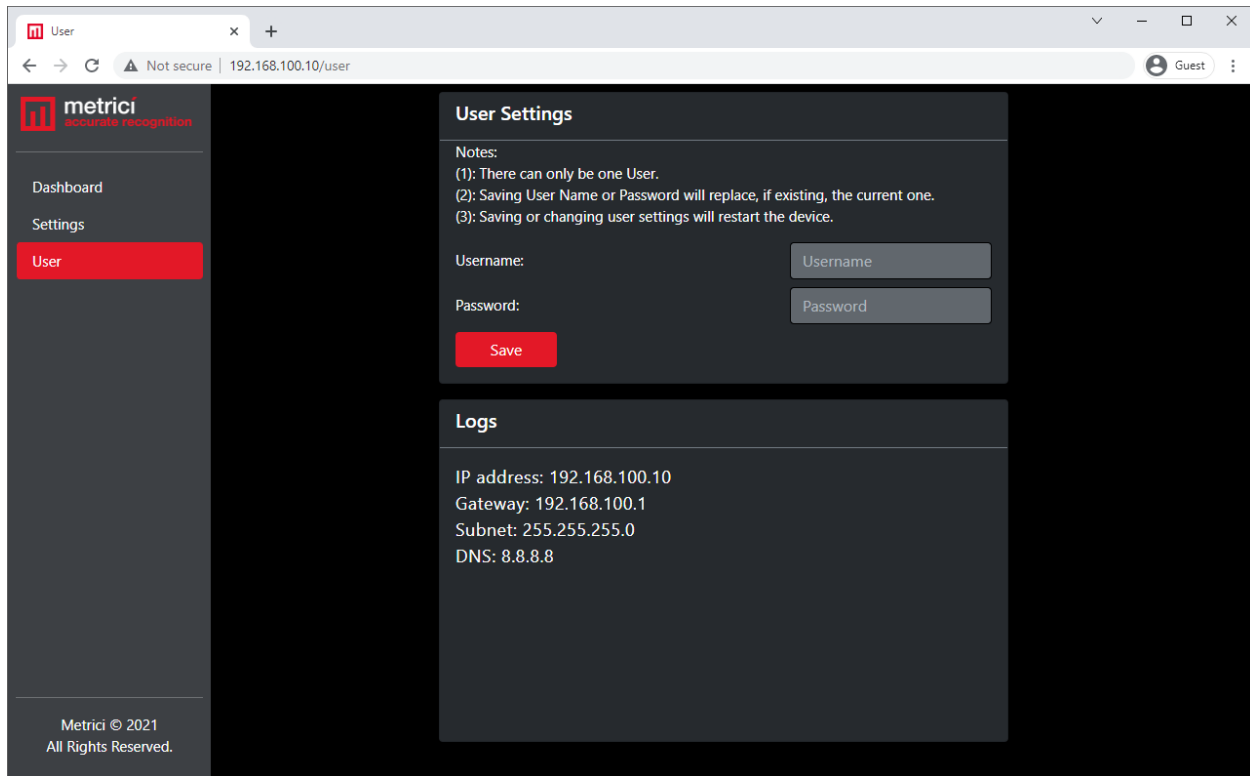
A user is not mandatory for the MultiController to work, it is just a security feature that will not allow anyone to access its interface who uses the local network.

User and password are HTTP Authentication. In this situation, some commands will get a new form, as explained in the previous chapters. For example, to open a relay

from

http://192.168.100.10/relay1/on

we go to

http://username:password@192.168.100.10/relay1/on .

As well as Wiegand ones.

13. Hard factory reset

MultiController has a physical button for **Reset inside the case**. Pressing this one will delet all the settings and will send the MultiController to the

default settings. Practically it does the same as the Factory Reset from the Interface.

To access the button, open the case's lid, and inside you will see a button marked BUT1 (green square in the image).
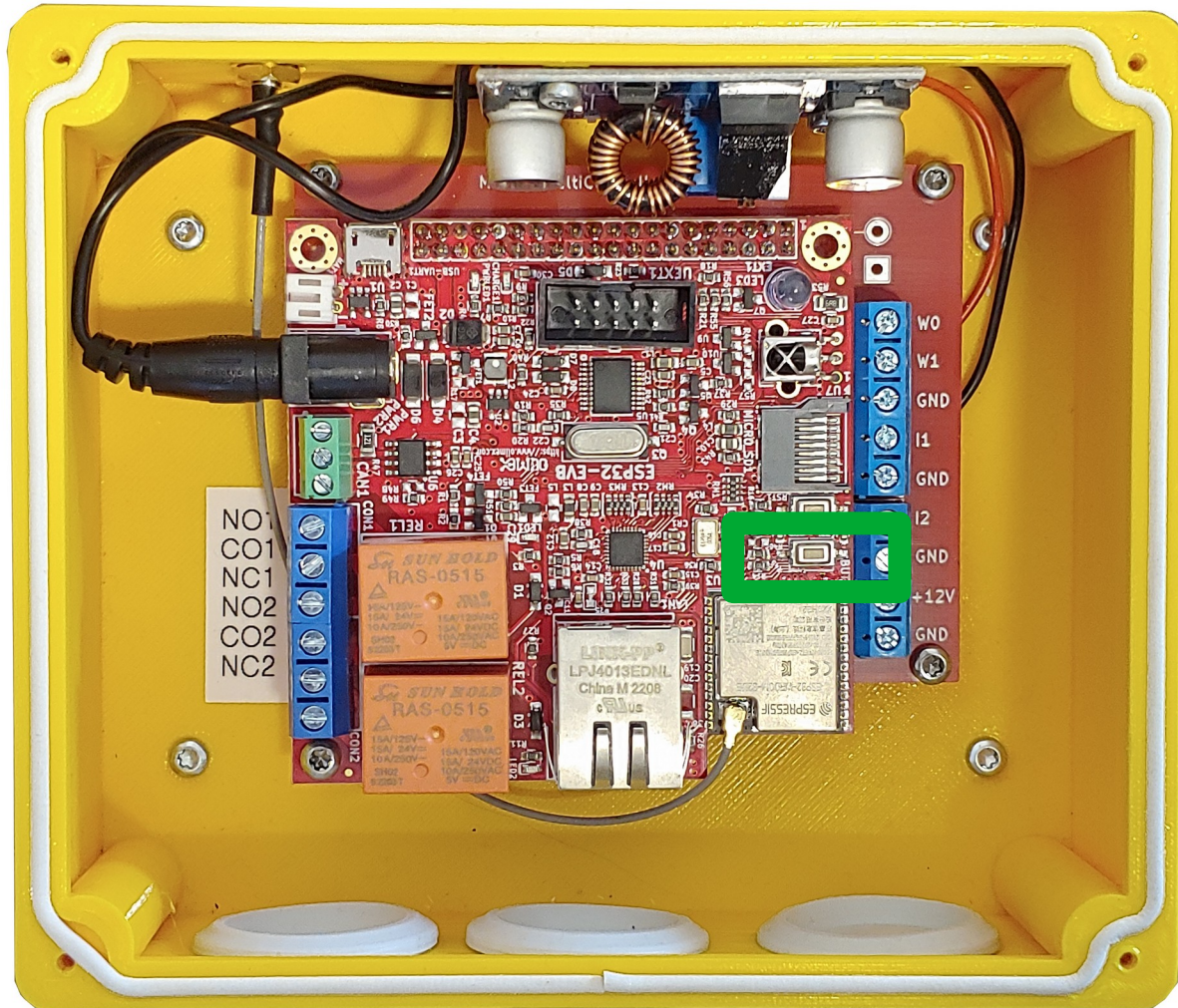
For the reset procedure to begin, stop the power, press the button and reconnect the power while pressing for 5-10 seconds,

To check the success of the operation, connect an Ethernet cable and try to access it at the 192.168.100.10 address.

14. Advanced Backup/Restore Settings – config file format

You have the chance to save and upload configuration files in the MultiController Interface.

This will use only one configuration file named config.json, in JSON format.

This is the ONLY name it can have. Any other name will be ignored.

An example of configuration file can be seen below.

Please keep in mind that this configuration is for advanced users. If the file is written and not the backup one, the JSON format is not respected, or the values are not well written, MultiController will not properly work.

The settings are divided in 8 categories, corresponding to the tabs in the interface.

network_settings

connection: values can be Ethernet or WiFi

ip_type: Static or DHCP

ssid: an alphanumeric line

password: an alphanumeric line of minimum 8 characters

ip_address: an IP line

gateway: an IP line

subnet: an IP line

dns: an IP line

mac_address_wifi

mac_address_eth

MAC values can not be modified. These are the MAC for WiFi and Ethernet connection for MultiController. Any value written here will be ignored and overwritten with the correct ones hard-coded. The MAC addresses are to be found on a sticker on the MultiController shipping box.

If the device is WiFi connected, the ETH interface will not get a MAC Address and will get the value 00:00:00:00:00:00 .

input

ip_1: an IP file or not set

port_1: number 1 to 65536 or not set

ip_2: an IP file or not set

port_2: number 1 to 65536 or not set

output

timer1: number 0 to 99999 or not set

timer2: number 0 to 99999 or not set

relay1

state1: values Off or On

relay2

state2: values Off or On

wiegand

database_url: an alphanumeric URL line or not set

pulse_width: number 1 to 99999

pulse_gap: number 1 to 99999

rfid

ip_rfid: an IP line format or not set
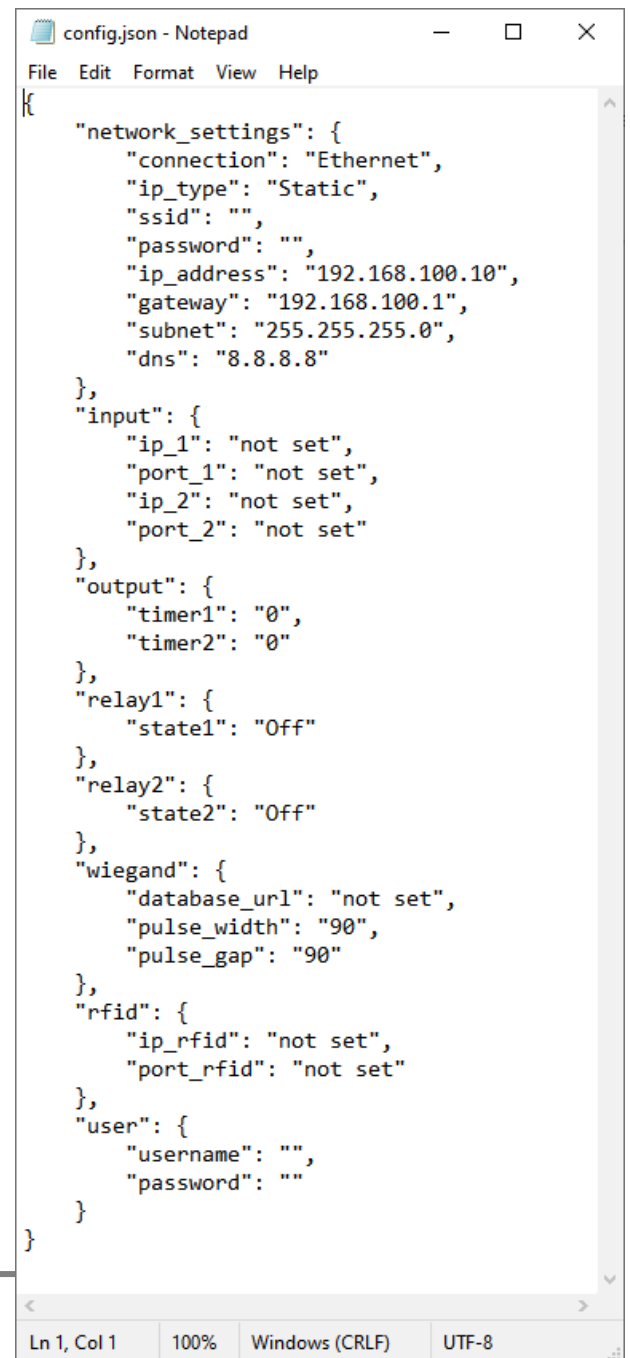
port_rfid: number 1 to 65536 or not set

user

username: alphanumeric line

password: alphanumeric line minimum 8 characters

For example:

```
{
   "network_settings": {
      "connection": "Ethernet",
      "ip_type": "Static",
      "ssid": "",
      "password": "",
      "mac_address_wifi": "",
      "mac_address_eth": "",
```

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```json
{
    "network_settings": {
        "connection": "Ethernet",
        "ip_type": "Static",
        "ssid": "",
        "password": "",
        "ip_address": "192.168.100.10",
        "gateway": "192.168.100.1",
        "subnet": "255.255.255.0",
        "dns": "8.8.8.8"
    },
    "input": {
        "ip_1": "not set",
        "port_1": "not set",
        "ip_2": "not set",
        "port_2": "not set"
    },
    "output": {
        "timer1": "0",
        "timer2": "0"
    },
    "relay1": {
        "state1": "Off"
    },
    "relay2": {
        "state2": "Off"
    },
    "wiegand": {
        "database_url": "not set",
        "pulse_width": "90",
        "pulse_gap": "90"
    },
    "rfid": {
        "ip_rfid": "not set",
        "port_rfid": "not set"
    },
    "user": {
        "username": "",
        "password": ""
    }
}
```

```
        "ip_address": "192.168.100.10",
        "gateway": "192.168.100.1",
        "subnet": "255.255.255.0",
        "dns": "8.8.8.8"
    },
    "input": {
        "ip_1": "not set",
        "port_1": "not set",
        "ip_2": "not set",
        "port_2": "not set"
    },
    "output": {
        "timer1": "0",
        "timer2": "0"
    },
    "relay1": {
        "state1": "Off"
    },
    "relay2": {
        "state2": "Off"
    },
    "wiegand": {
        "database_url": "not set",
        "pulse_width": "90",
        "pulse_gap": "90"
    },
    "rfid": {
        "ip_rfid": "not set",
        "port_rfid": "not set"
    },
    "user": {
        "username": "",
        "password": ""
    }
}
```