Battery Monitoring System

(Battery monitoring system for larger UPS systems)

METHOD OF STATEMENT FOR

INSTALLATION AND COMMISSIONING

Version: 1.0
Date: 30.03.2023
Document No: 30032023

Robotina d.o.o.
www.robotina.com
info@robotina.com

Table of content

1 BTMS Installation

Following steps to be done before start installation:

- Disconnect the UPS from batteries by switch off battery breaker
- Break string to small segments where total voltage doesn't reach 50 V
- Provide a place to install BTMS panel which includes below
- BM-PS in (Power supply)
- BM-GW (Gateway)
- BTMS LAN switch (Network switch)
- BM-MC (Master controller)
- BM-HMI (and communication adapter CAD-232-A2-IQ)

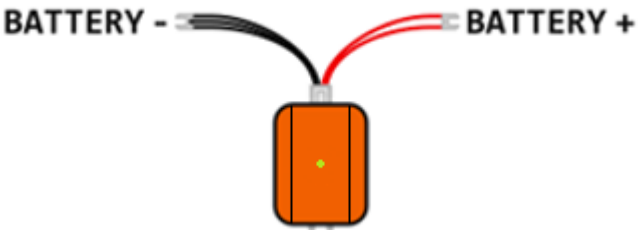
Provide space to install below component on the battery cabinet

- BM-SS (String sensor)
- BM-CS (Cell sensor)
- BM-HS (Hall sensor)

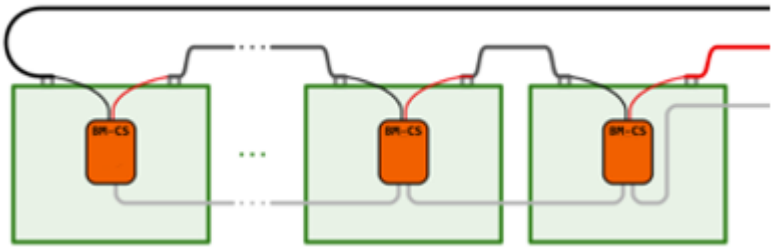
1.1 Base System

1.1.1 Install BM-CS

- Connect red / black wires to battery terminals (Use original cables as they are)



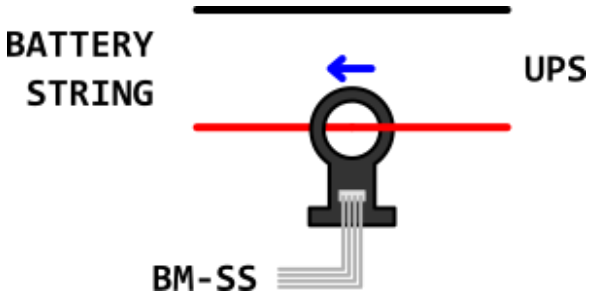
- Mount on battery with supplied 3M double sided stickers
- Plug in red / black battery cable connector in
- Connect the sensors with included white RJ9-RJ9 cables
- 1st OUT port (right) to 2nd IN port (left),
- 2nd OUT port (right) to 3rd IN port (left),



- Max 60 BM-CS in one line

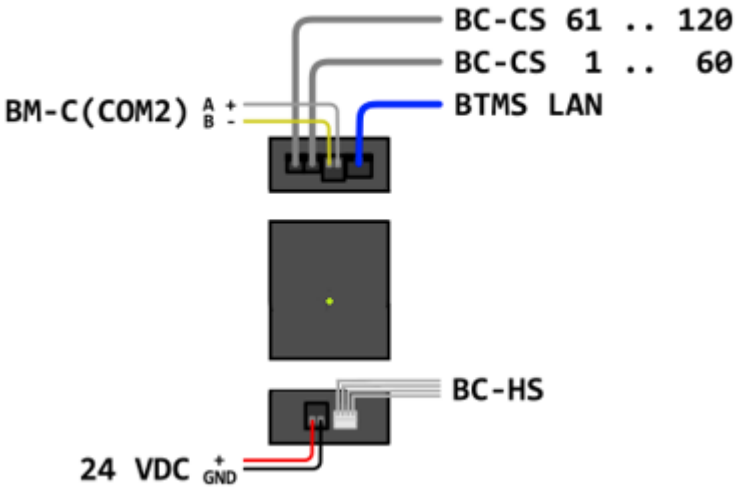
1.1.2 Install BM-HS

- Unscrew split core and put around + wire from UPS to string
- Arrow is pointing from UPS to 1st battery



1.1.3 Install BM-SS

- Mount on DIN rail near the 1st string battery
- Connect BM-HS with included 4-pin flat cable
- Connect 1st battery BM-CS with included white RJ9-RJ9 cable
- Connect 1st battery BM-CS of second line (if needed)
- Power supply (+24 Vdc) from battery monitoring panel



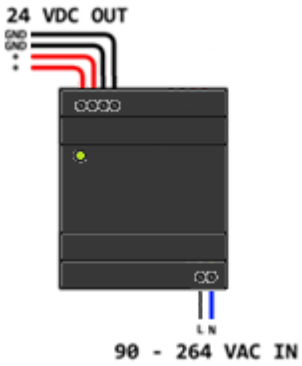
1.1.4 Install BM-GW

- Mount in distribution cabinet on DIN rail with the included bracket
- Install BTMS LAN switch
- Mount in distribution cabinet or LAN cabinet
- Plug the power supply into the appropriate socket
- Connect LAN cables to BM-GW

- Pull the LAN cables to the BM-SS but do not connect them to the LAN switch (Properly mark which cable goes to which BM-SS)

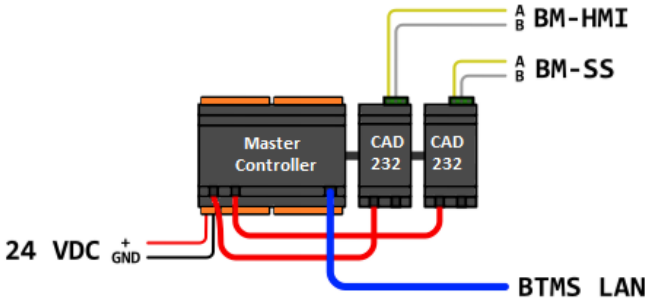
1.1.5 Install BM-PS

- Check that the BM-PS capacity (3.8 A) is sufficient for all devices powered by the PS power supply
- If the consumption exceeds the capacity of the power supply divide the consumers into groups and uses several power supplies
- Make sure that circuit breaker is switched OFF
- Mount BM-PC on DIN rail in distribution cabinet
- Connect AC L & N terminals
- Connect DC + & - terminals to
    - All BM-SS
    - BM-GW



1.1.6 Install BM-MC

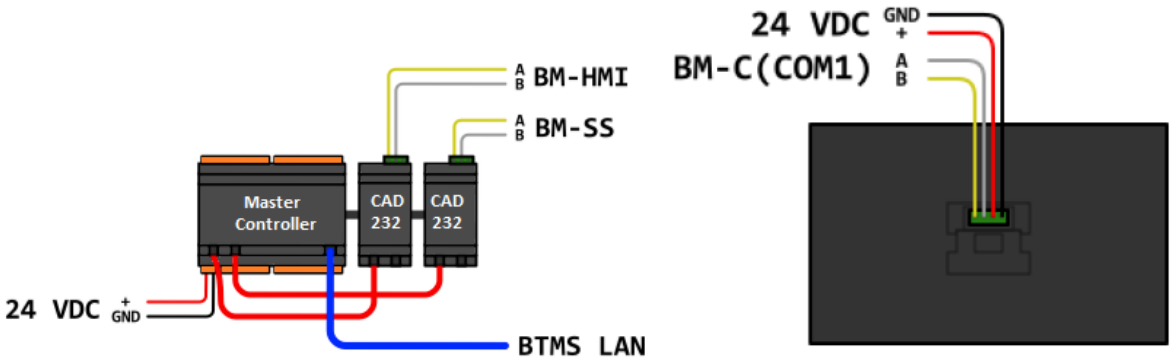
- Mount in distribution cabinet on DIN rail
- Connect DC power supply +24 V & GND terminals to + & - of power supply terminals
- Connect LAN cable to BTMS LAN switch



1.1.7 Install BM-HMI

- Mount CAD-232-A2-IQ adapter on DIN rail next to BM-MC
- Ensure that the connecting cable (short RJ9 to RJ9) to the BM-MC is correctly inserted
- Connect BM-MC COM 2 port with CAD-232-A2-IQ adapter bottom port (it doesn't matter which one)
- Connect BM-HMI A & B terminals to CAD-232-A2-IQ A & B terminals

- Connect BM-HMI +24 V & GND terminals to + & - BM-PS terminals



1.1.8 Install BM-TH

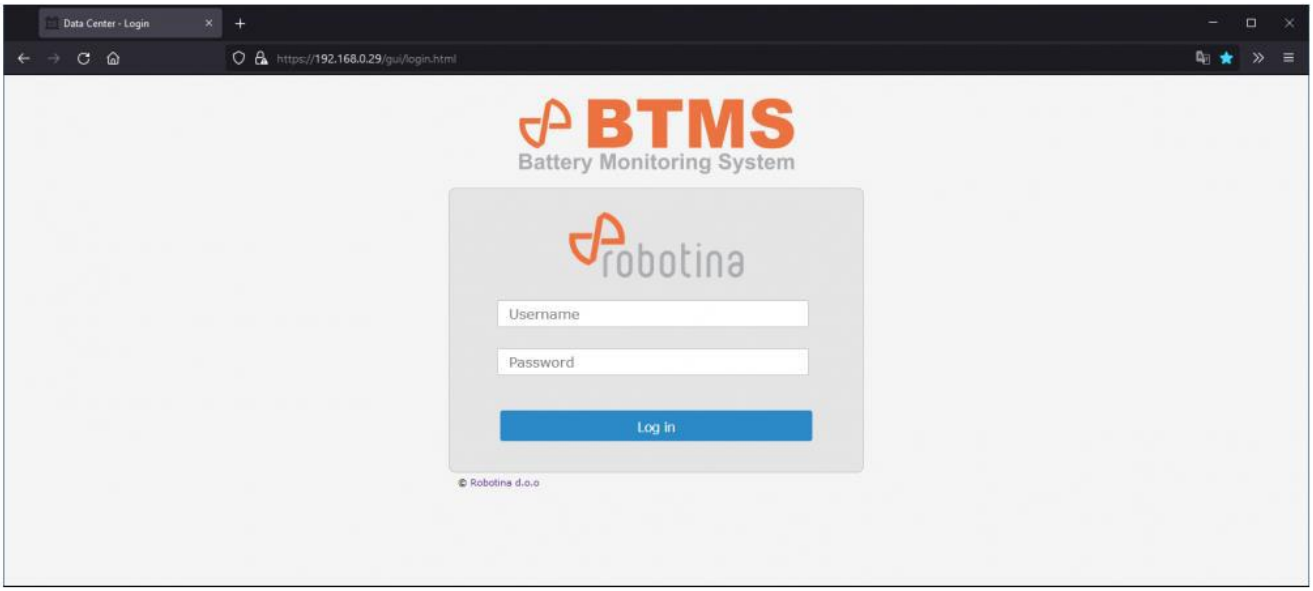
- Mount BM-TH on wall next to string
- Pull communication bus and power supply to BM-MC - do not connect to BM-TH
- Communication bus must follow rules for RS-485 wiring
    - Bus line (no branching)
    - Use twisted pair shielded cable
    - Shield connected ONLY to one end of line
    - Terminate line with 120-ohm resistor on both side
    - Max length 1200 m

1.2 Power ON

- Visually inspect wiring
- Power on BM-PS circuit breaker
- Check that all devices that are powered by the power adapter are turned on and are working stably (the LED indicators are lit continuously)

2 BTMS commissioning

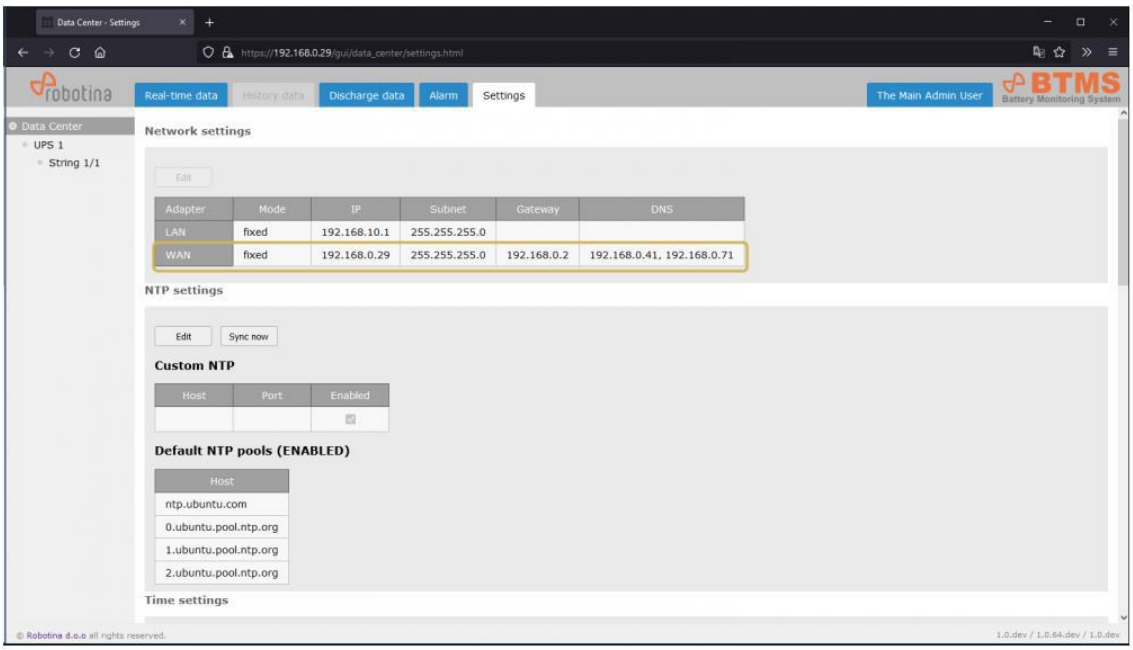
- Connect the laptop to the BTMS LAN switch
- Set the IP on the laptop to 192.168.10.20
- Open the address 192.168.10.1 in the Internet browser
- Login with default username (admin) and default password (bmgw!admin)



2.1 General settings

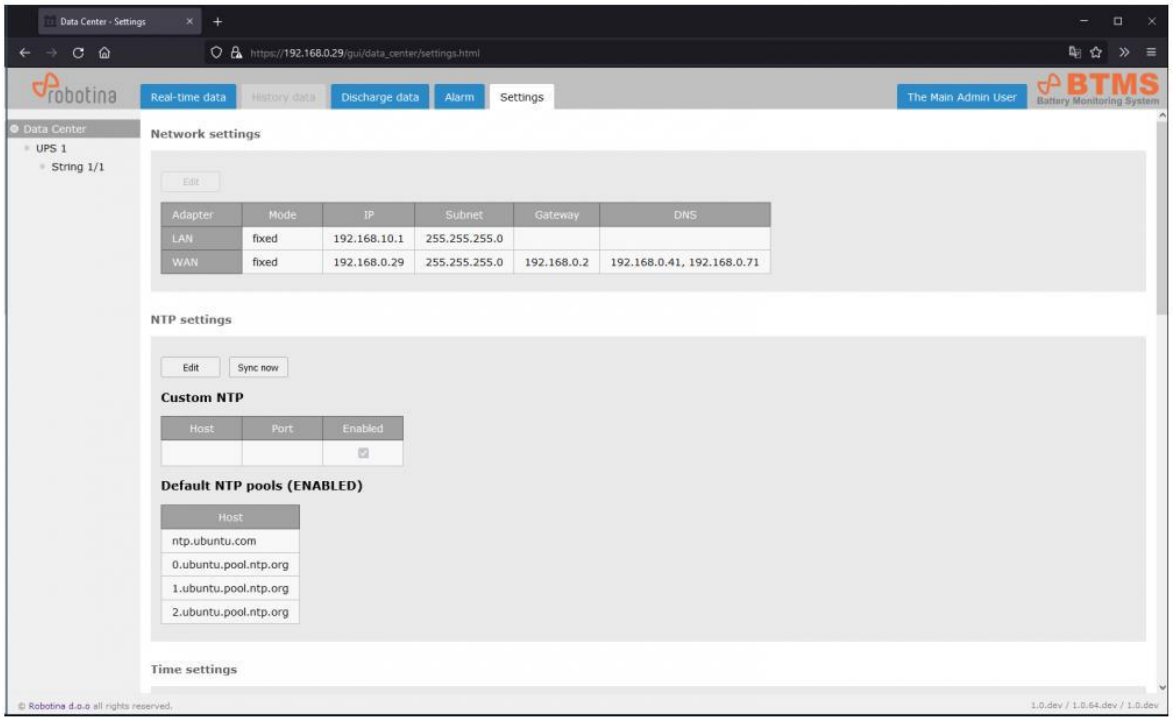
2.1.1 Network settings

- Select Settings - General tab
- Set the parameters for the WAN interface



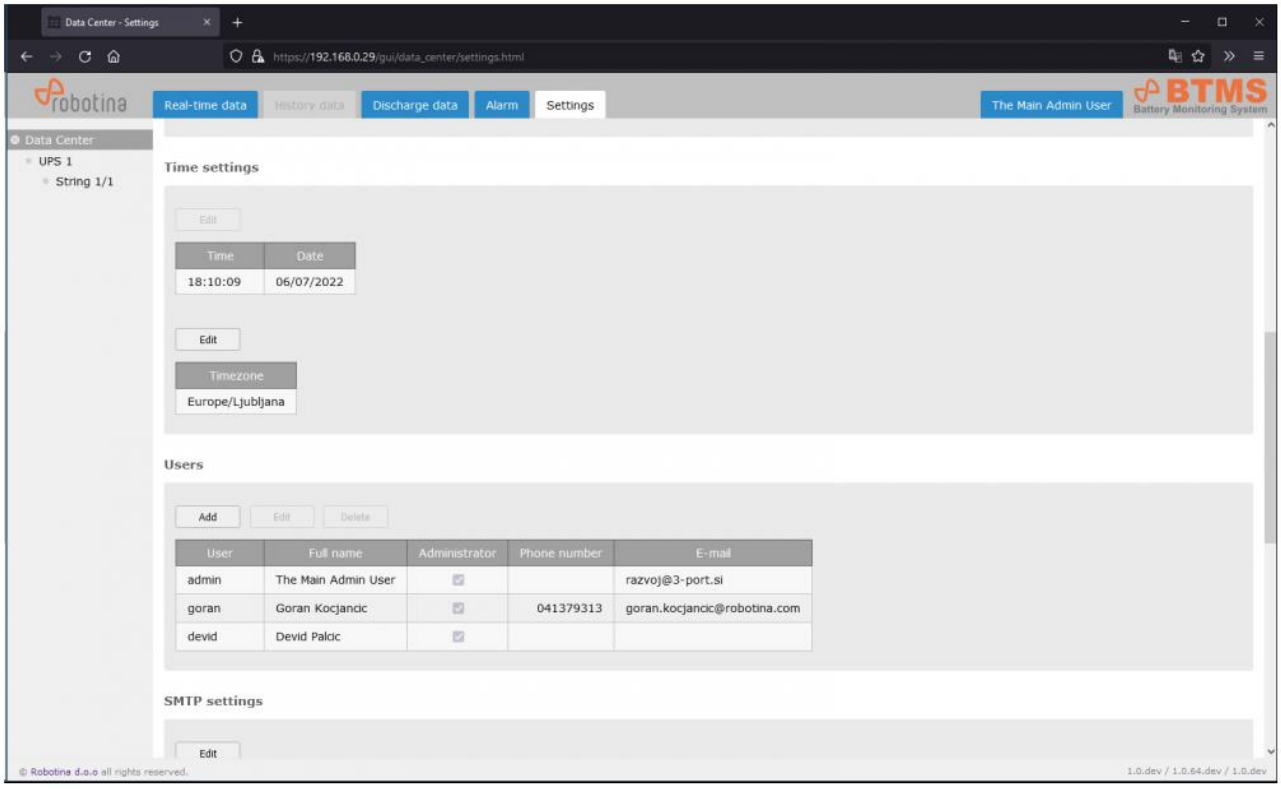
2.1.2 NTP settings

- if necessary / requested set the parameters for an additional NTP (Network Time Protocol) server



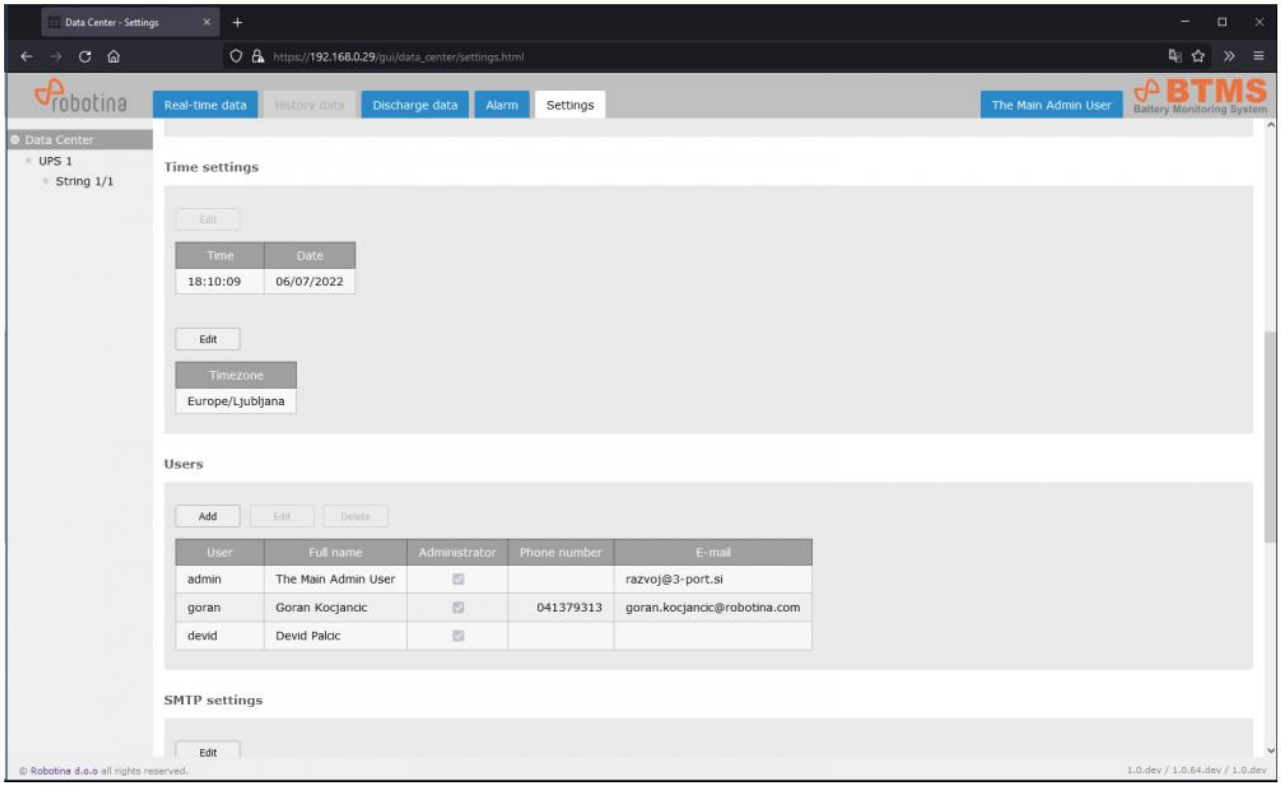
2.1.3 Time settings

- Set the desired time zone



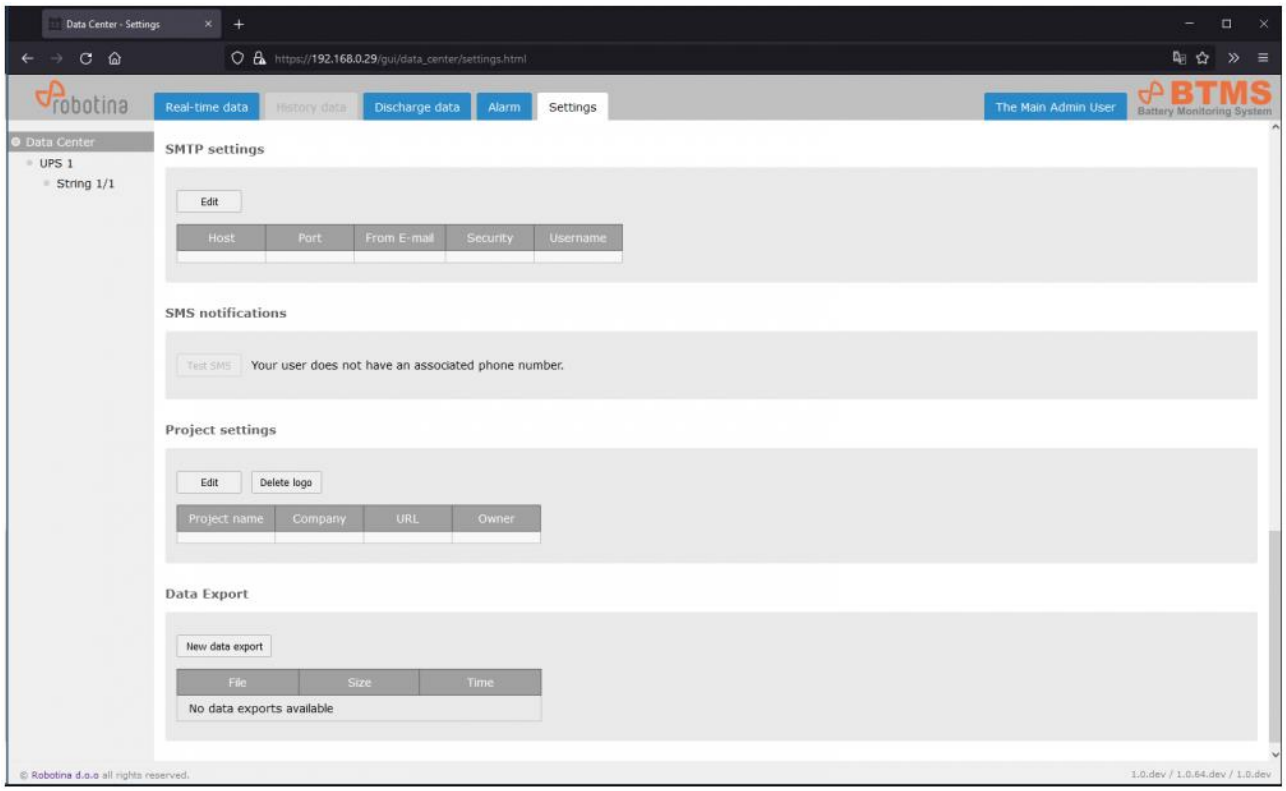
2.1.4 Users Setting

- Change (and remember!) the admin password
- Add users



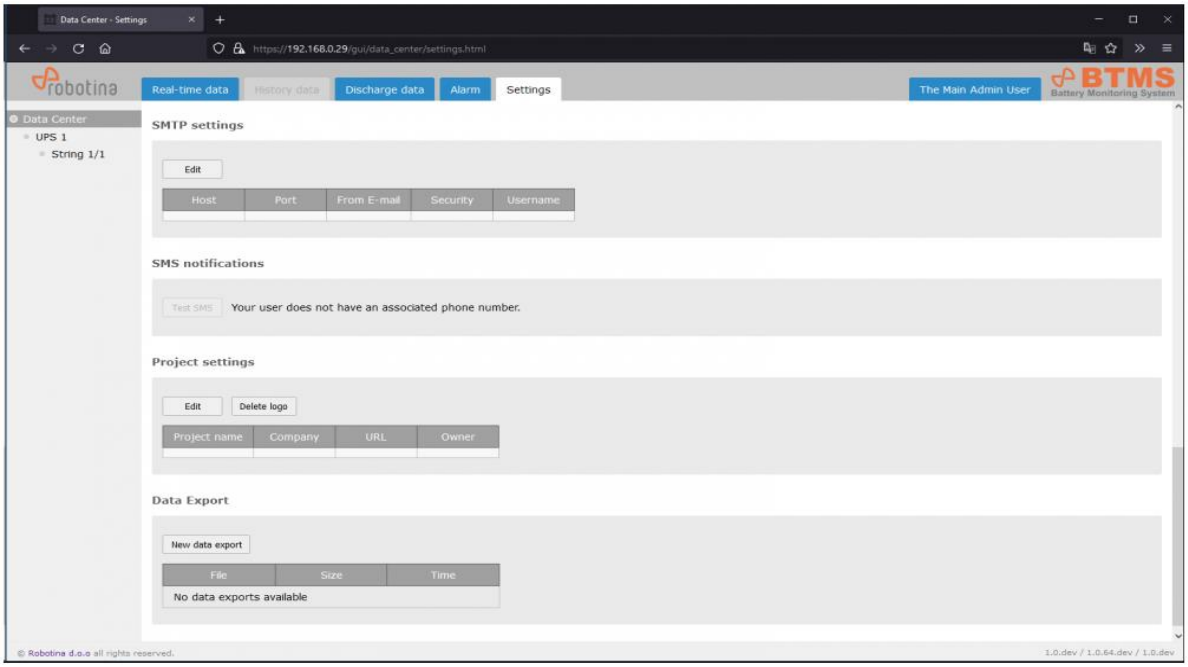
2.1.5 SMTP settings

- Set the parameters for the SMTP (e-mail) server



2.1.6 SMS notifications

- Test SMS messaging

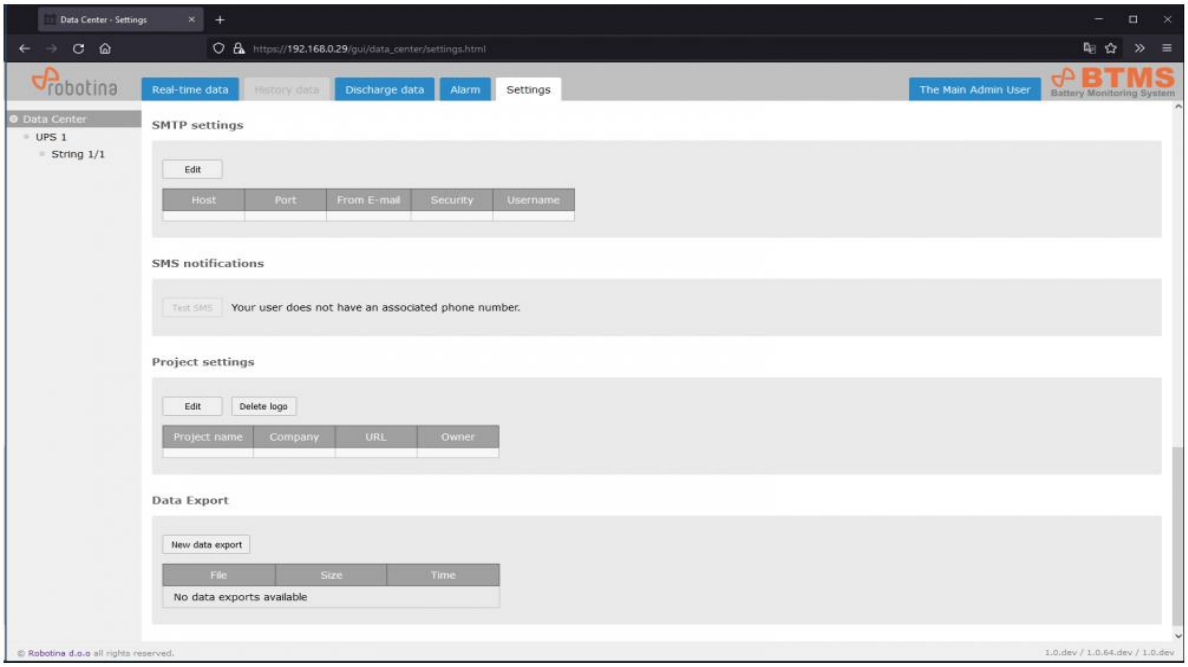


2.1.7 Modbus server

- Edit Modbus settings

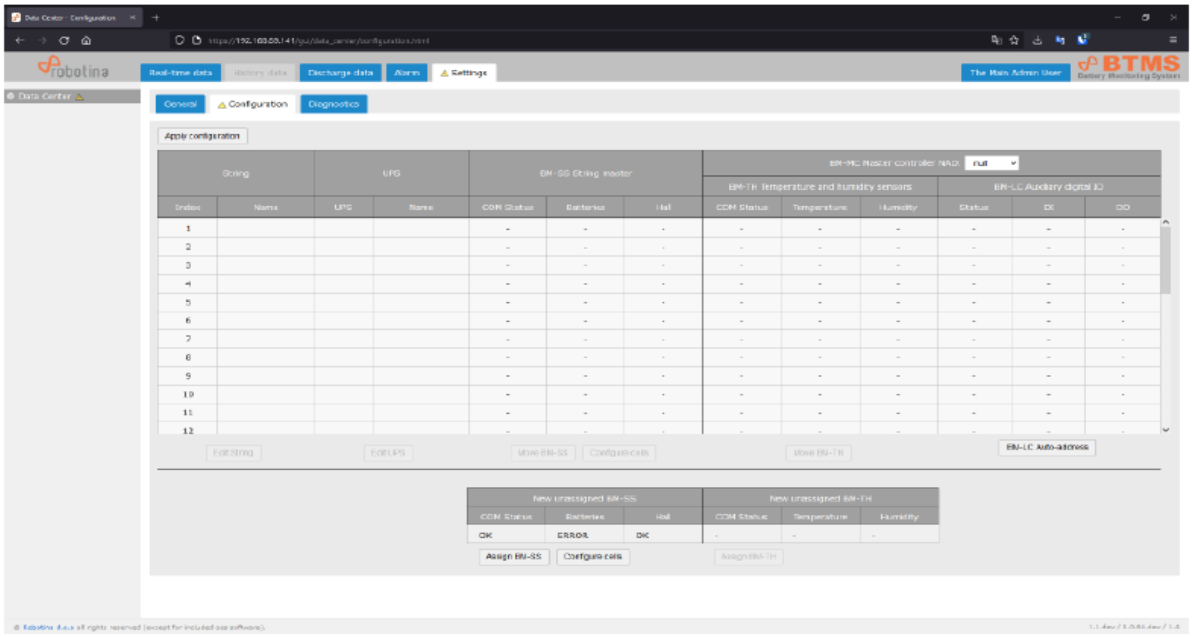
2.1.8 Project settings

- Set project information
- The project name is displayed as root in the tree menu
- You can also change the logo that appears above the tree menu

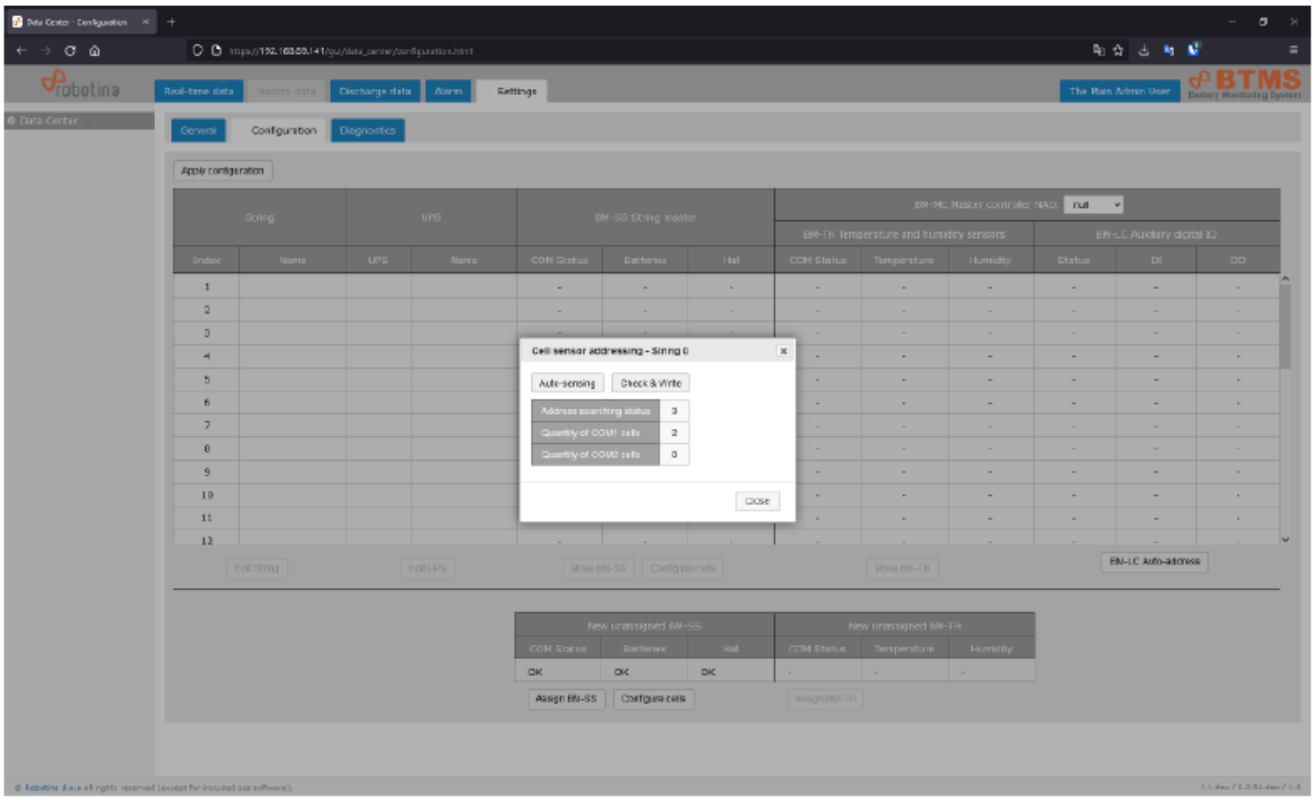


2.2 Adding string and battery sensors

- Select Settings - Configuration tab
- Connect a string sensor (always only one new-one at a time)
- In the New unassigned BM-SS table (below main table) OK should appear for COM Status and HALL

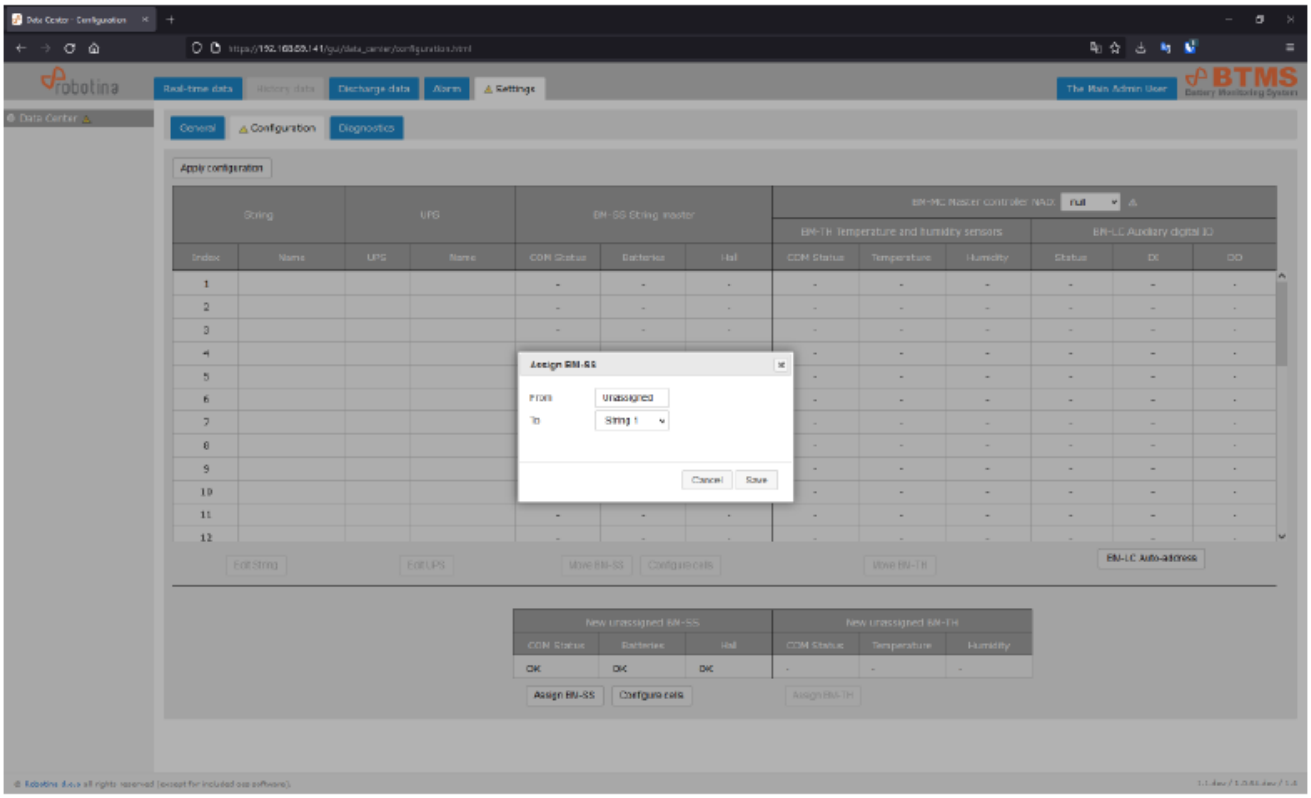


- To set the battery sensors press the Configure cells button
- In Cell sensor addressing dialog box
- Press Auto-sensing
- Wait that Address searching status change to 3
- Check whether all battery sensors have been found
- If all sensors found then confirm with the Check & Write button
- If the number of sensors found does not match the expected check sensor
- Cabling and repeat Auto-sensing



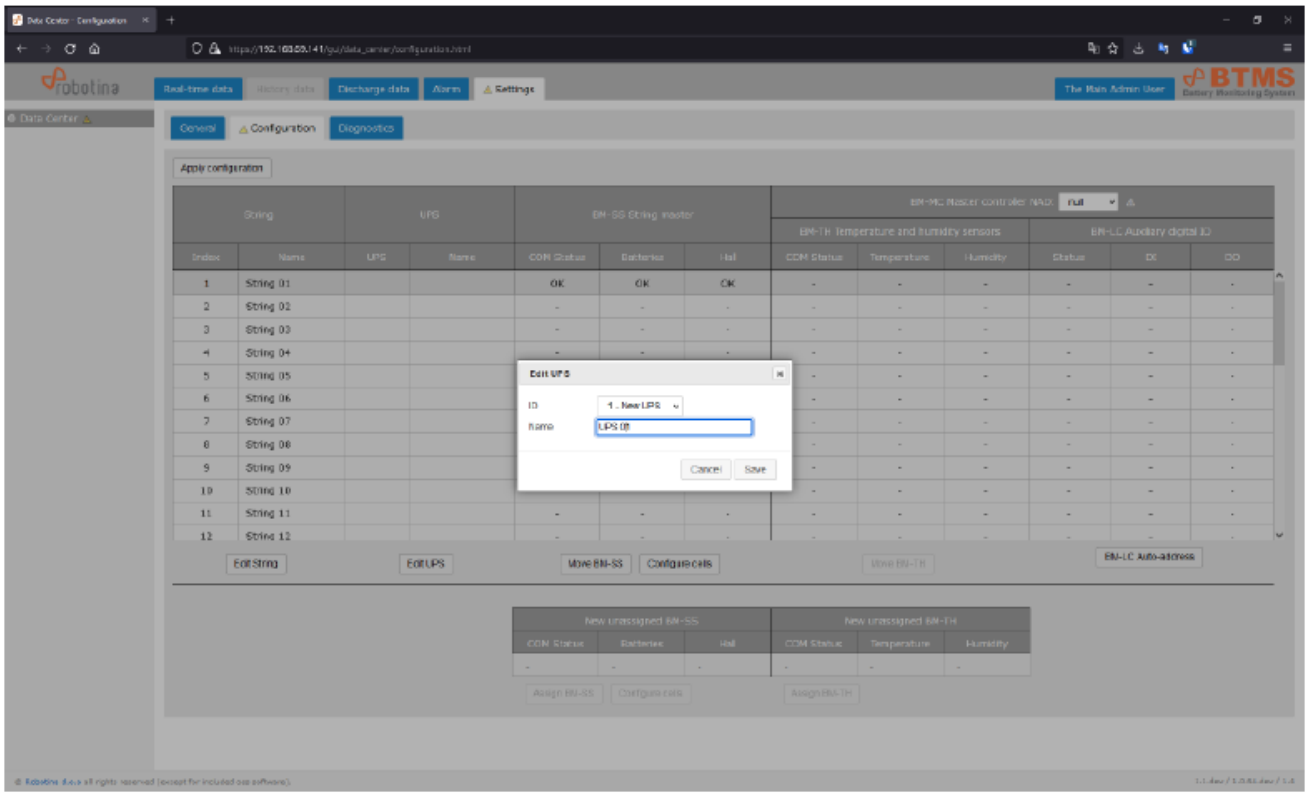
2.2.1 Assign string sensor to string

- Press Assign BM-SS
- In Assign BM-SS dialog box select to which string BM-SS should be assigned



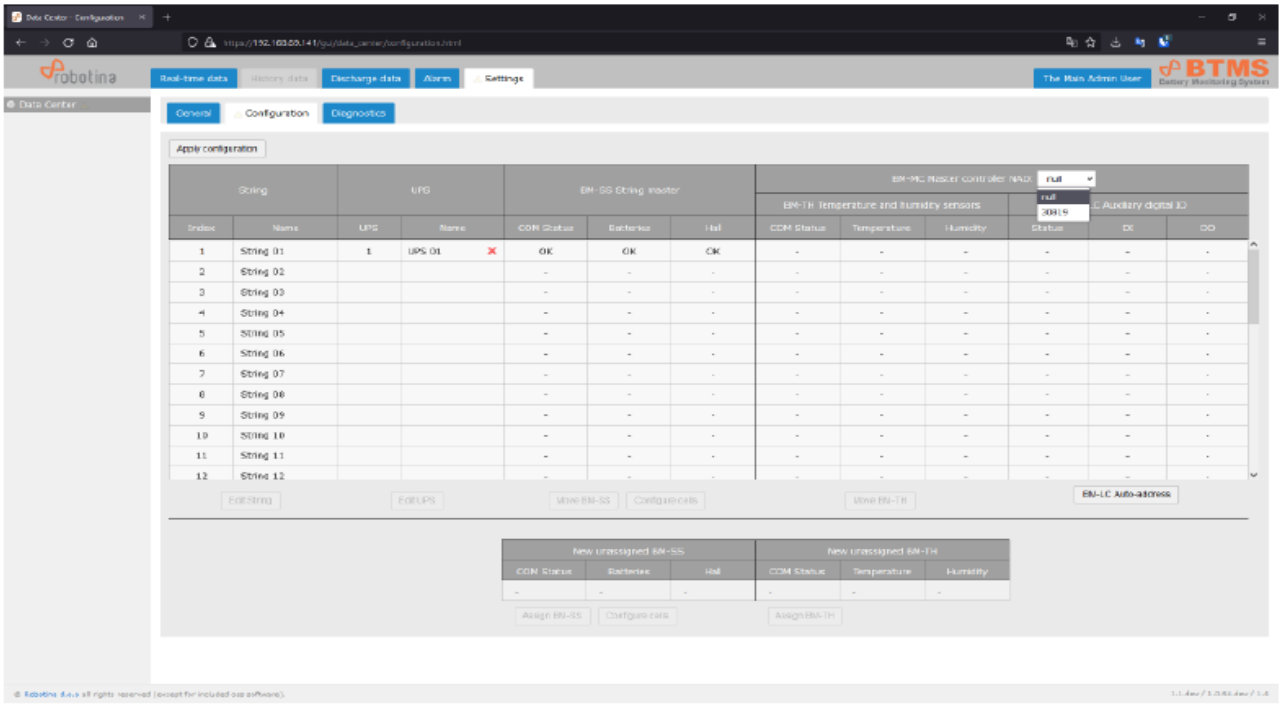
2.2.2 Assign string to UPS

- In main table select row
- Press Edit UPS
- In Edit UPS dialog
    - Select UPS ID
    - Set name for UPS
- Subsequent movement or reassignment of BM-SS sensors to another string and automatic reconfiguration of battery sensors is also possible
- Repeat the process for all string sensors

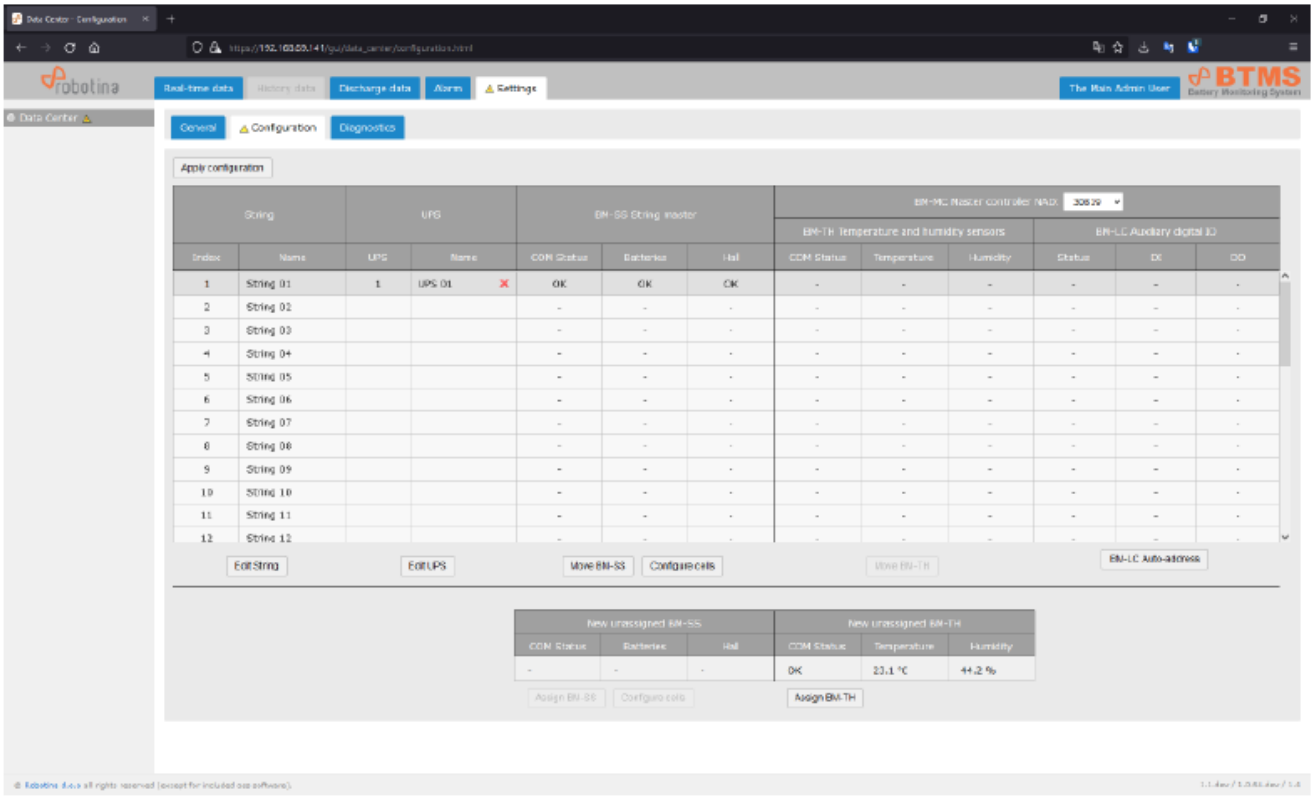


2.2.3 Adding BM-MC, BM-LC and BM-TH

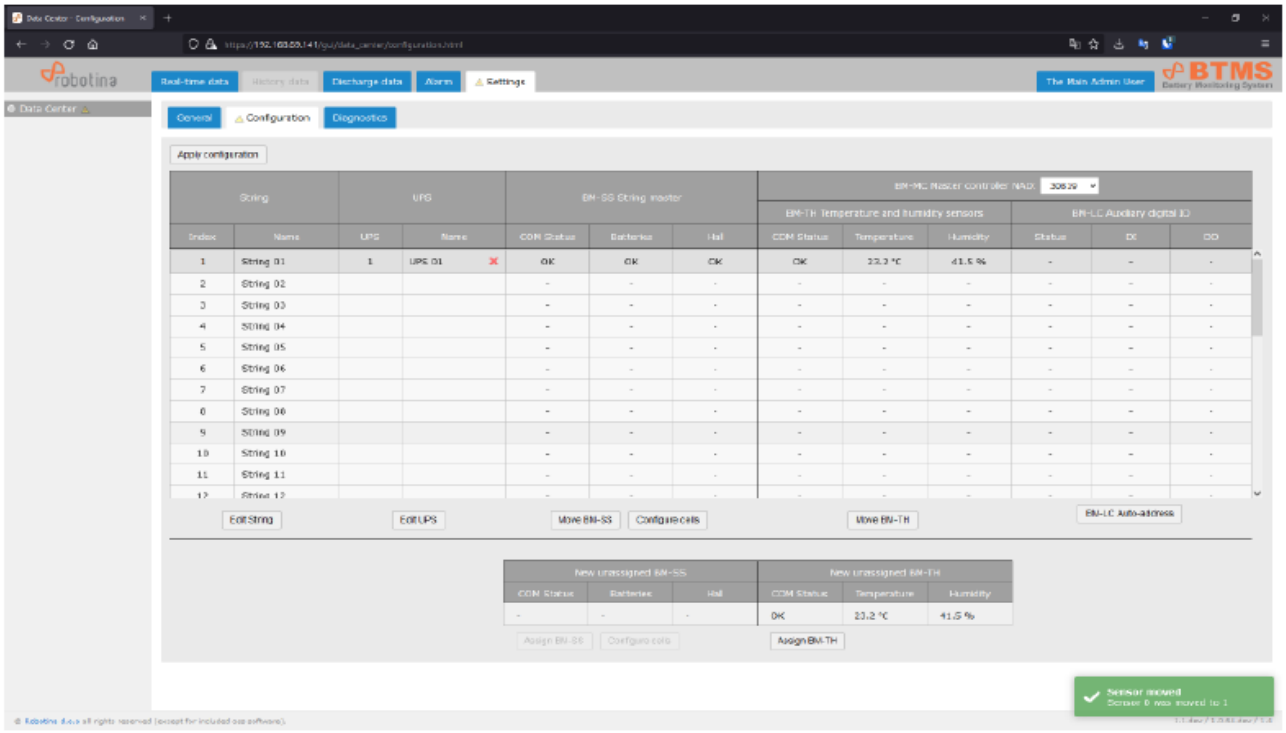
- Select Settings - Configuration tab
- Select BM-MC controller in main table 1st row right side
- Press BM-LC Auto-address to discover connected BM-LC IO modules
- If the modules are connected correctly, the statuses in the right 3 columns should change



- Connect BM-TH temperature and humidity sensor (only one new sensor at a time)
- The data of the connected sensor should appear in the New unassigned BM-TH table below the main table

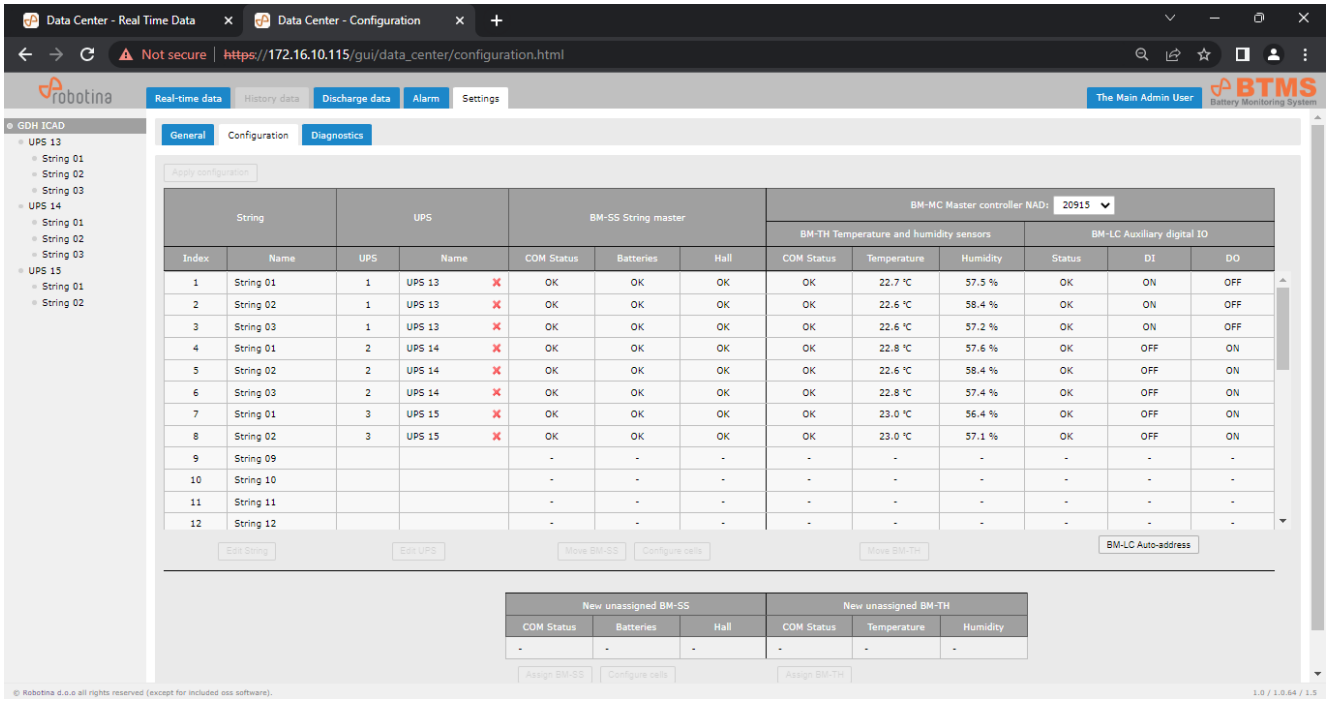


- Use the Assign BM-TH button to determine which string the sensor belongs to
- Repeat for all BM-TH sensors

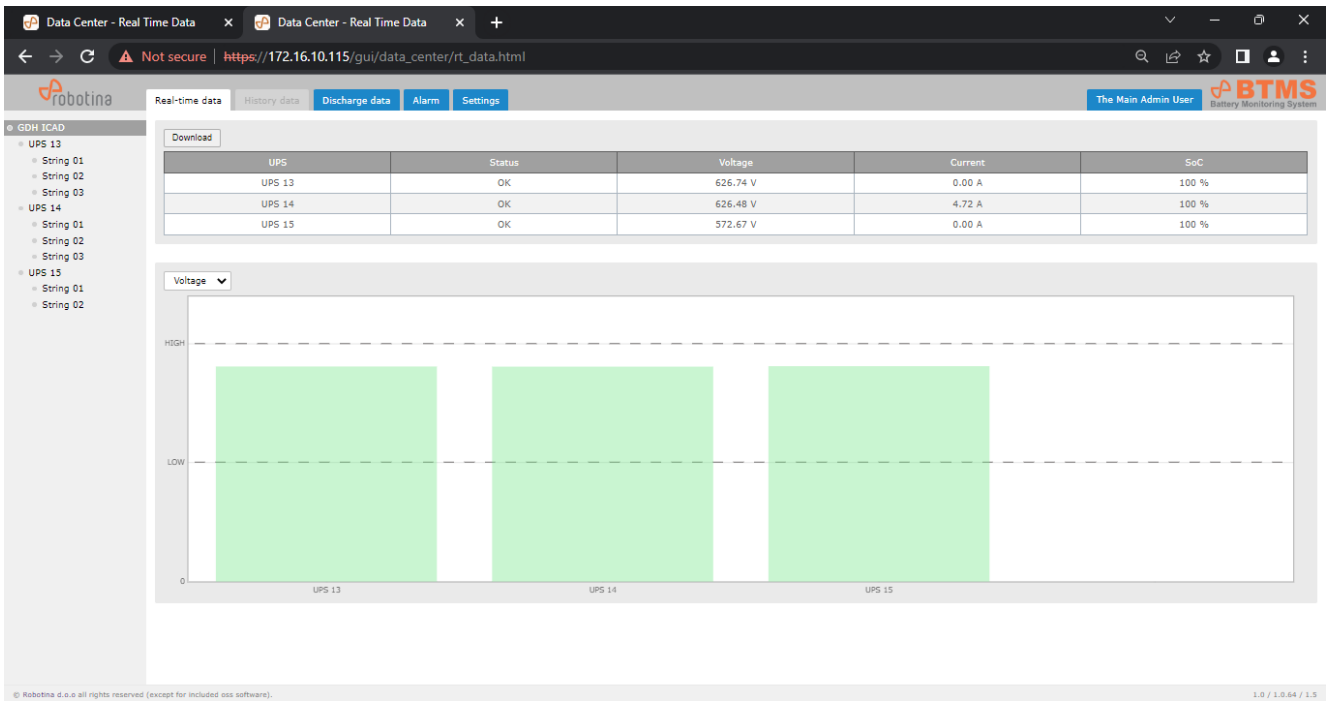


2.2.4 Validate Configuration

- Check whether the data in the main table reflect the actual desired state
- Confirm the configuration with the Apply configuration button above the table



- The tree menu on the left side should refresh and reflect the actual status of the UPS and strings connected to the BM-GW

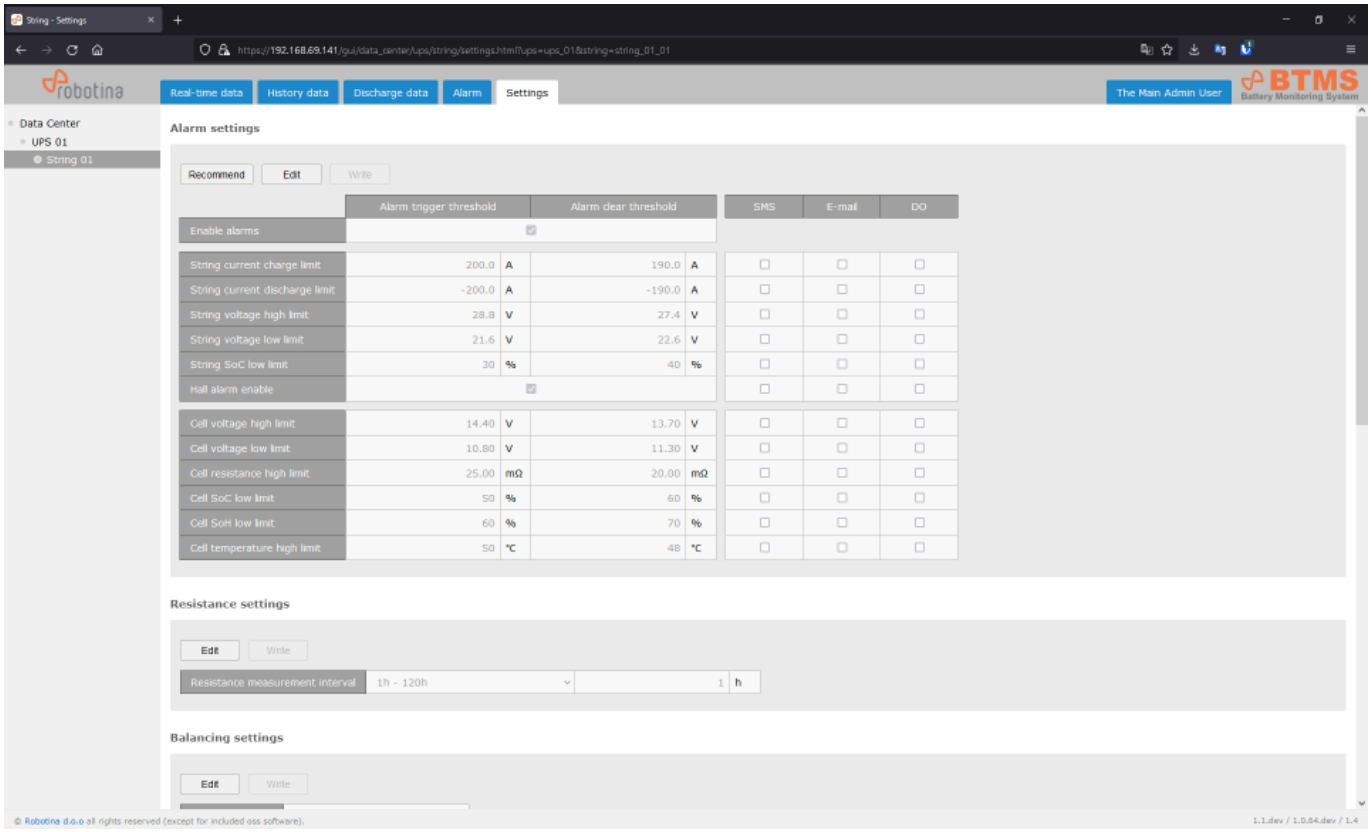


2.2.5 Check Settings

- Switch the laptop to the facility network
- Set the IP on the laptop according to the requirements for the facility LAN
- Use the Internet browser to go to the address you set for the WAN connection

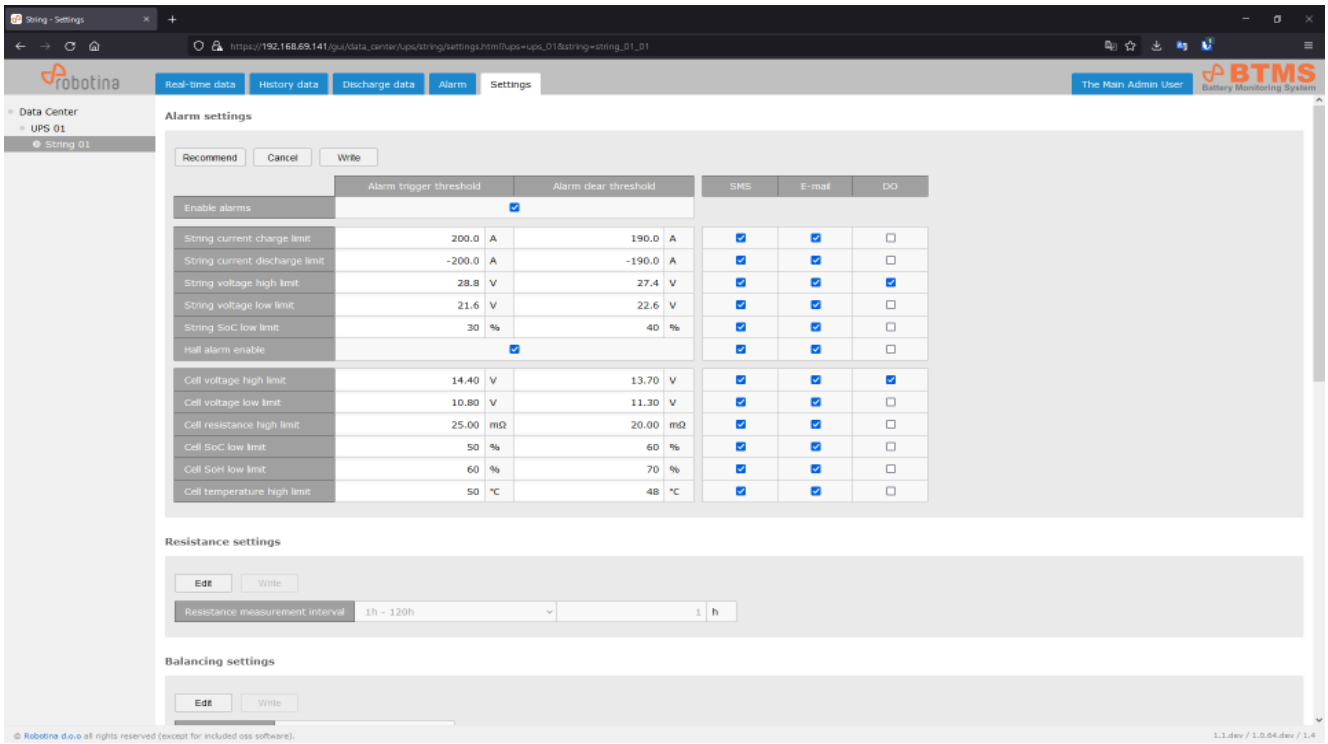
2.3 String and Battery sensors settings

- To set up an individual BTMS string sensor, just select it in the tree structure on the left and select the Settings view.

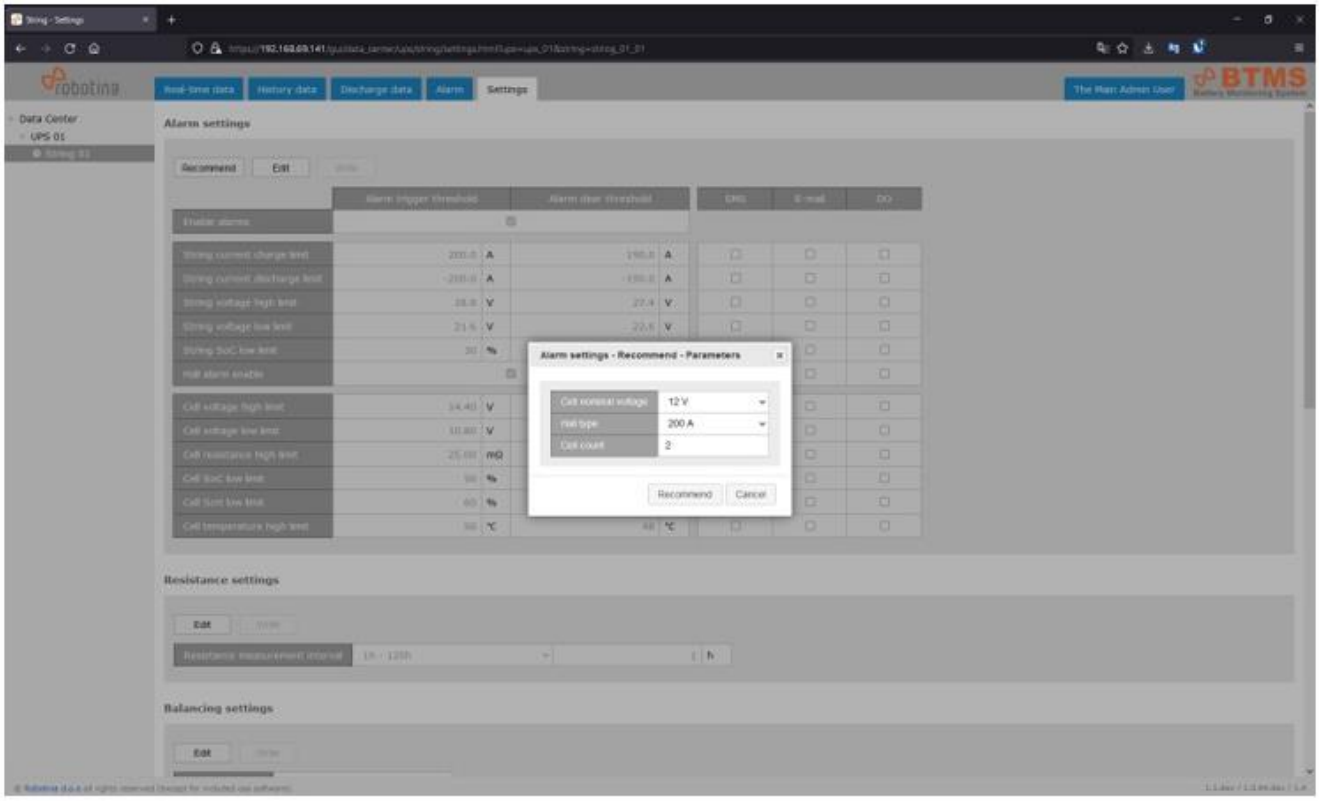


2.3.1 Alarm settings

- The conditions for triggering and automatic alarm reset are set for the string and for all batterieswithin the string.
- Editing of the settings is enabled with the Edit button above the table.



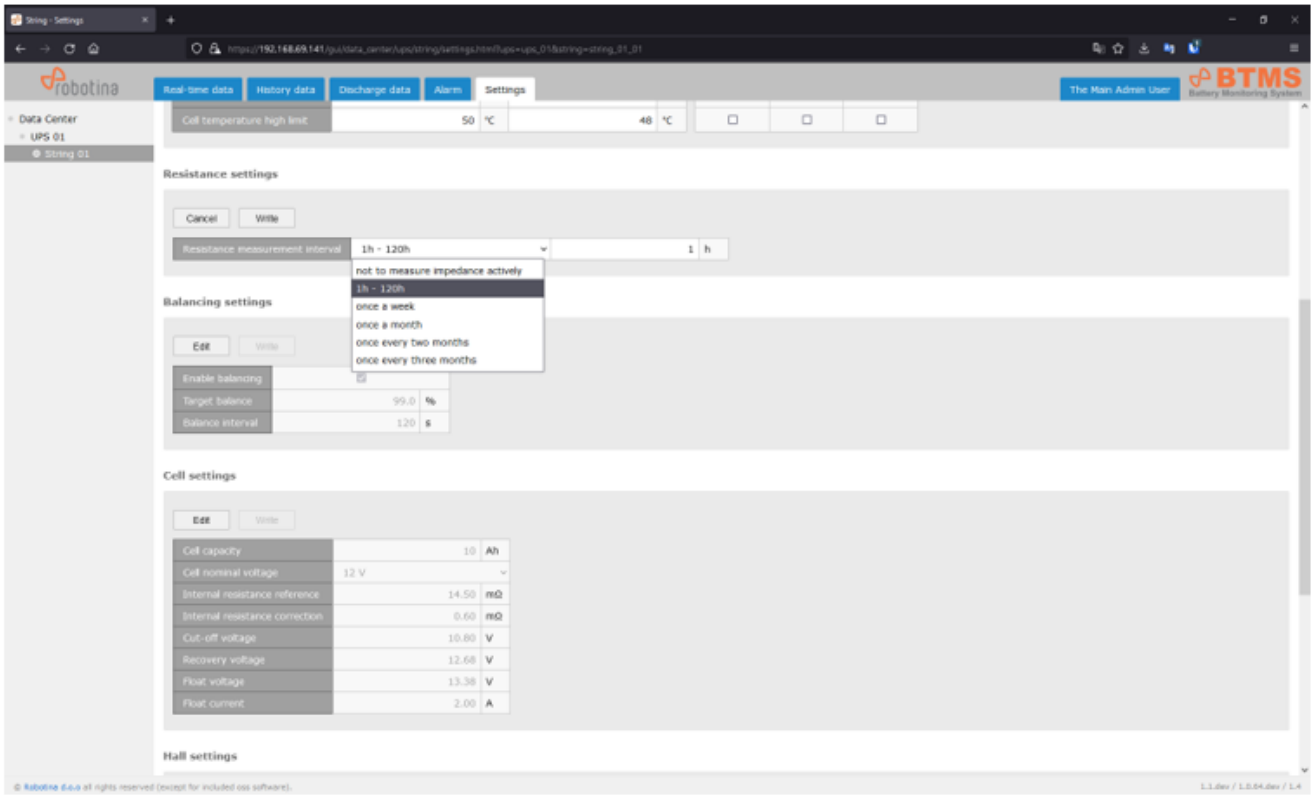
- Limit values are set in the left part of the table, and the action that the alarm triggers is set in the right part. The action can be sending an SMS or/and e-mail message or/and triggering a digital output.
- Use the Write button to use the entered changes. The “Cancel” button cancels all changes.
- The Recommend button presets some alarm parameters depending on the connected batteries and the used Hall sensor.



- The proposed values can then be further adapted to the requirements and entered.

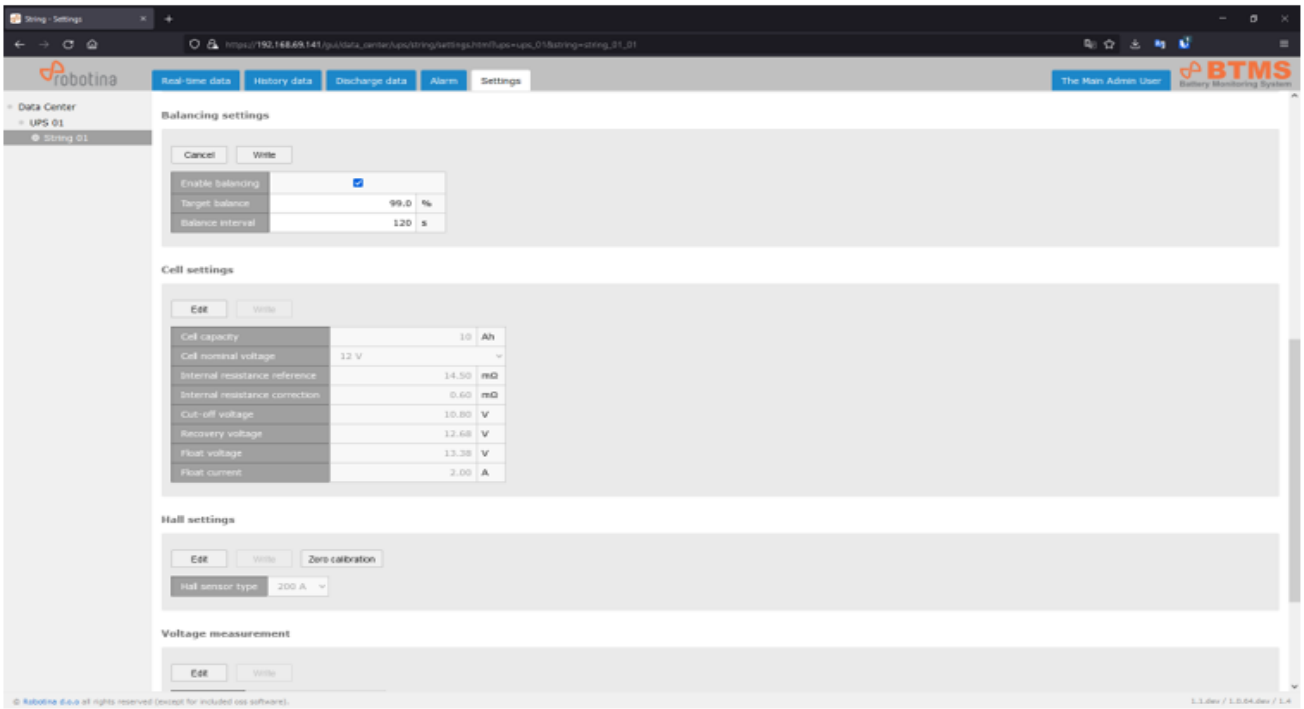
2.3.2 Resistance settings

- Here we set the battery resistance measurement frequency.



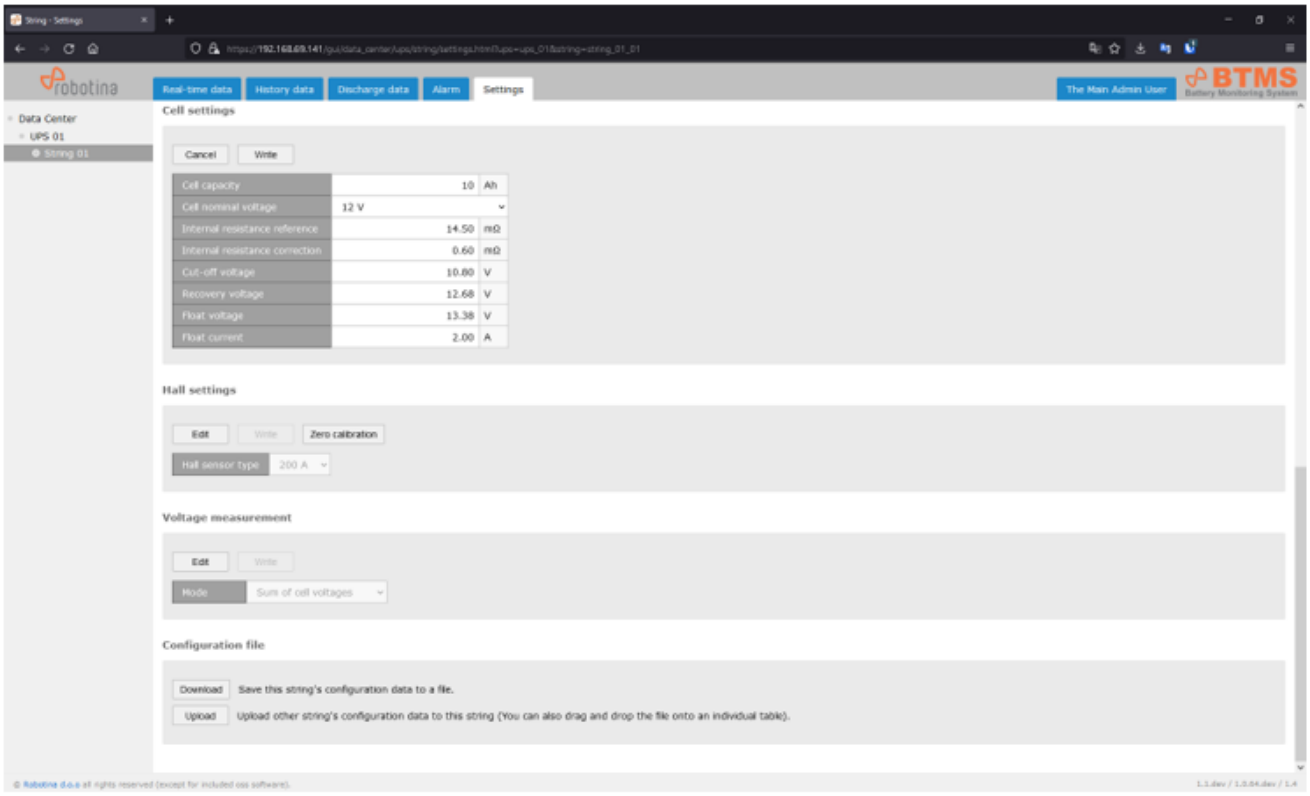
2.3.3 Balancing settings

- Battery balancing can be enabled or disabled. If balancing is enabled, set the threshold value at whichbalancing is triggered and the balancing execution interval.



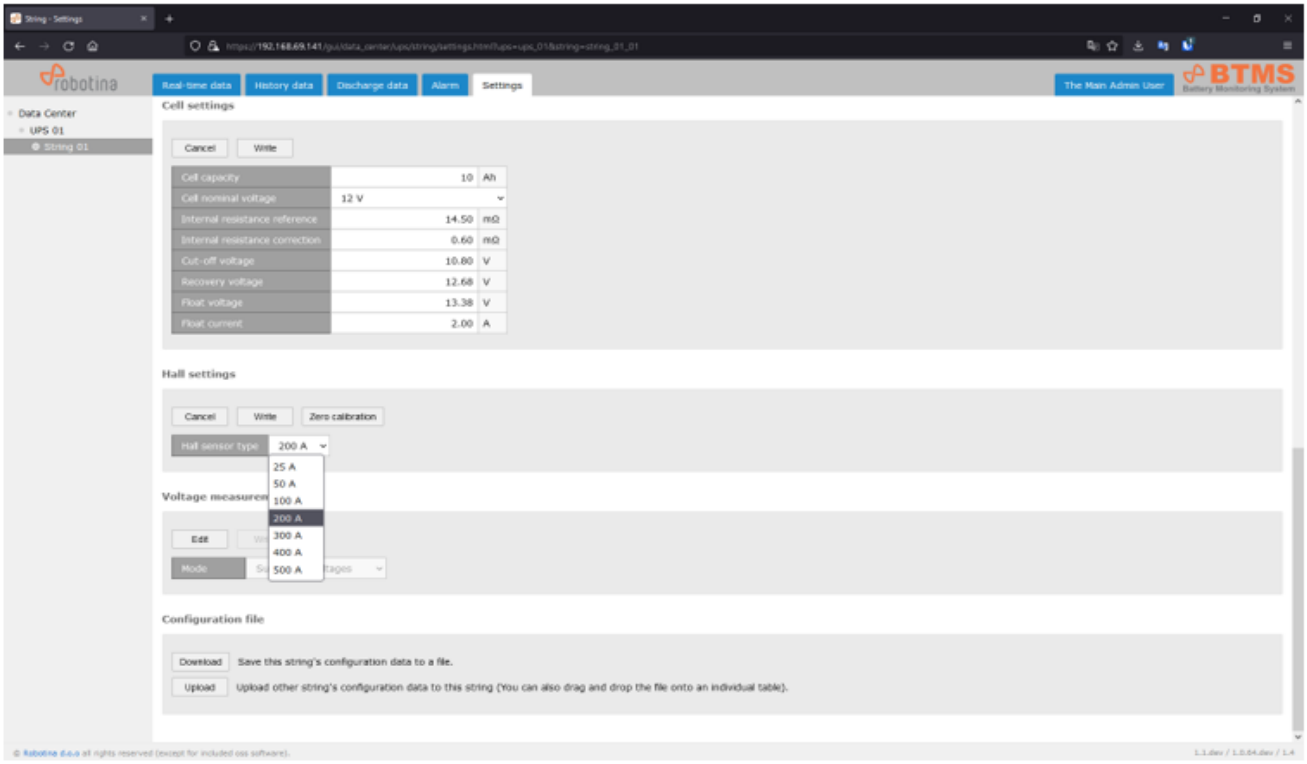
2.3.4 Cell settings

- For the proper functioning of battery status monitoring, it is necessary to specify what batteries areused in the string.



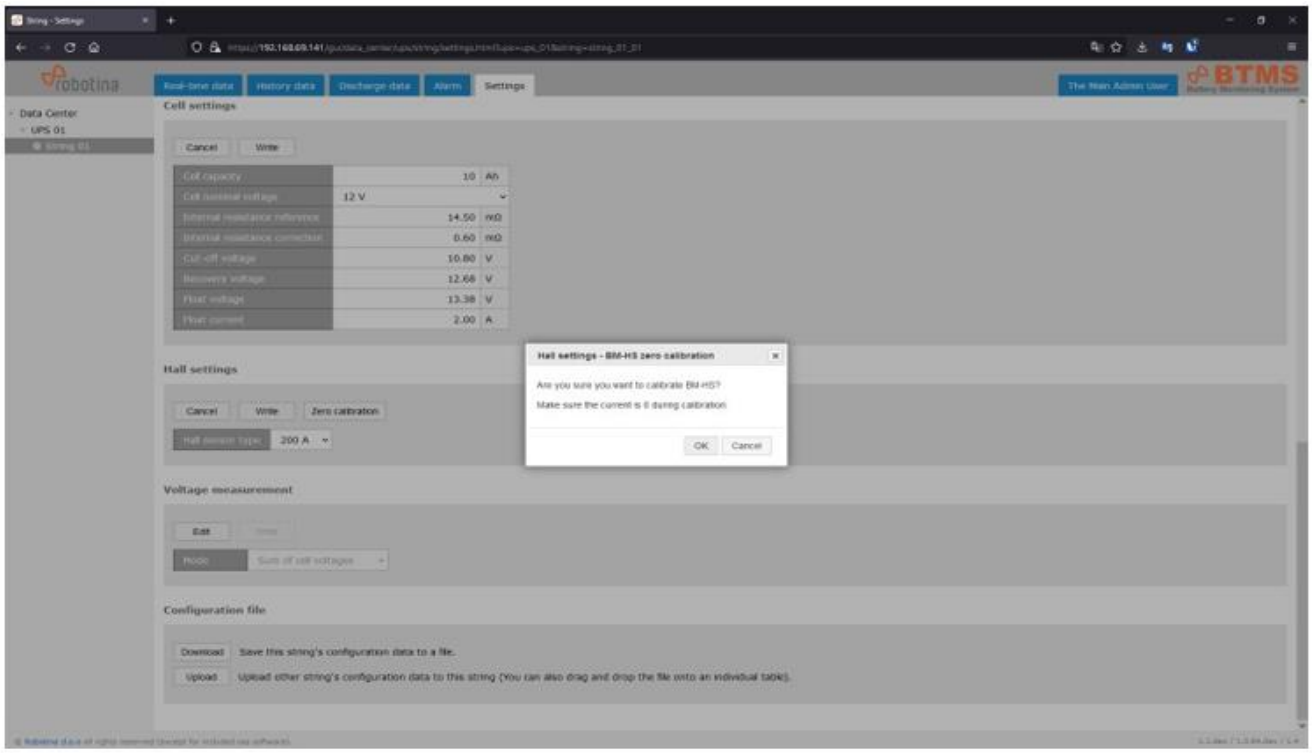
2.3.5 Hall Setting

- Select the sensor used from the values offered.



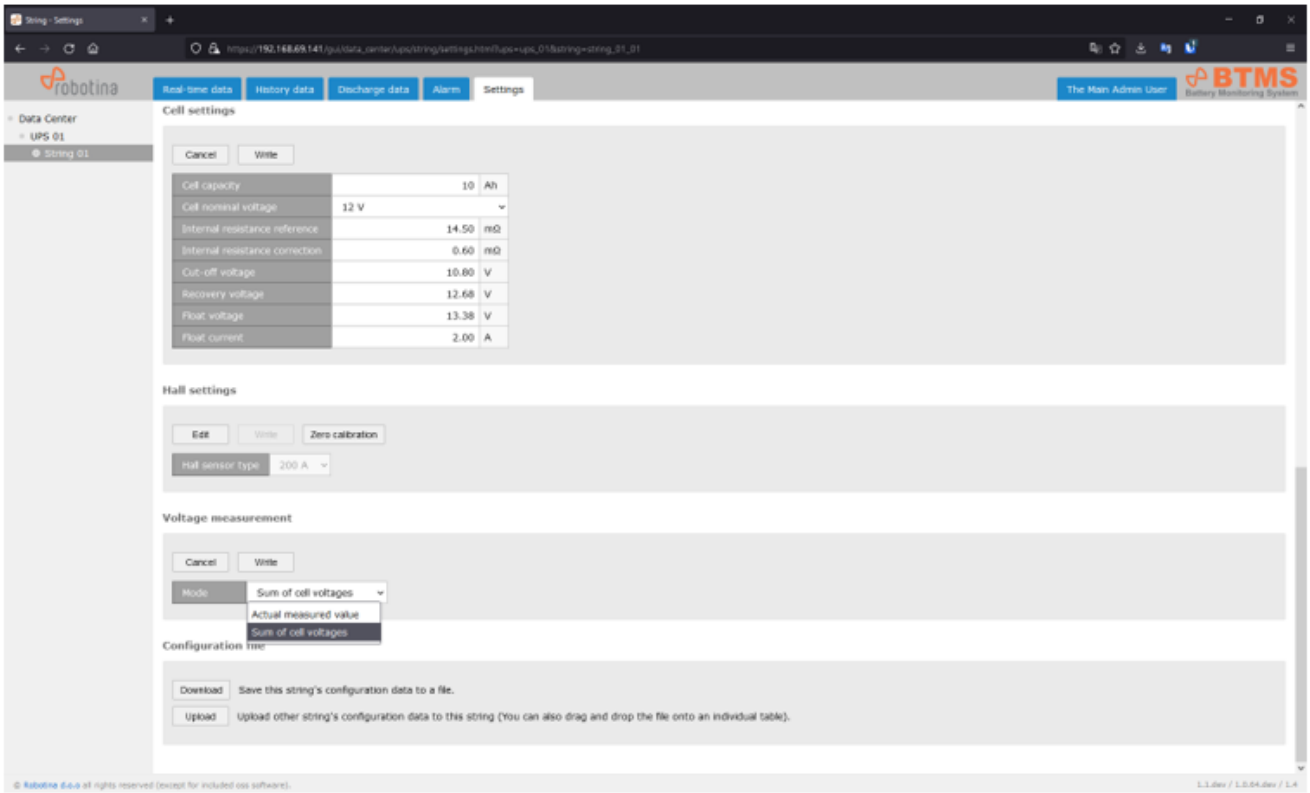
The Zero calibration button is used to calibrate the Hall sensors.

It is important to ensure that during calibration the string current is 0 A



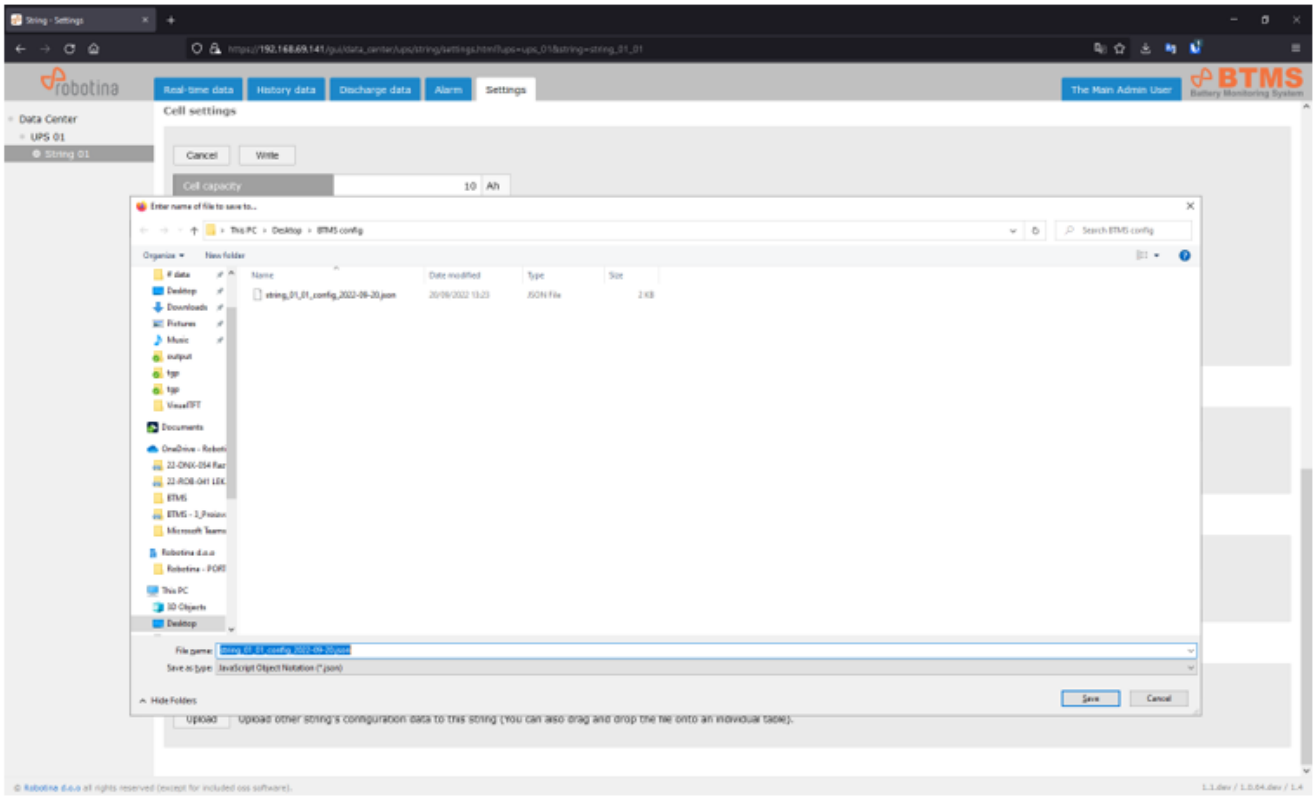
2.3.6 Voltage Measurement

- The string sensor allows 2 ways of measuring the string voltage: as the sum of the voltage of the batteries in the string or directly. Since we have to work with dangerously high voltage when measuring the voltage directly, it is recommended to use the summation of the voltage of individualbatteries where possible.

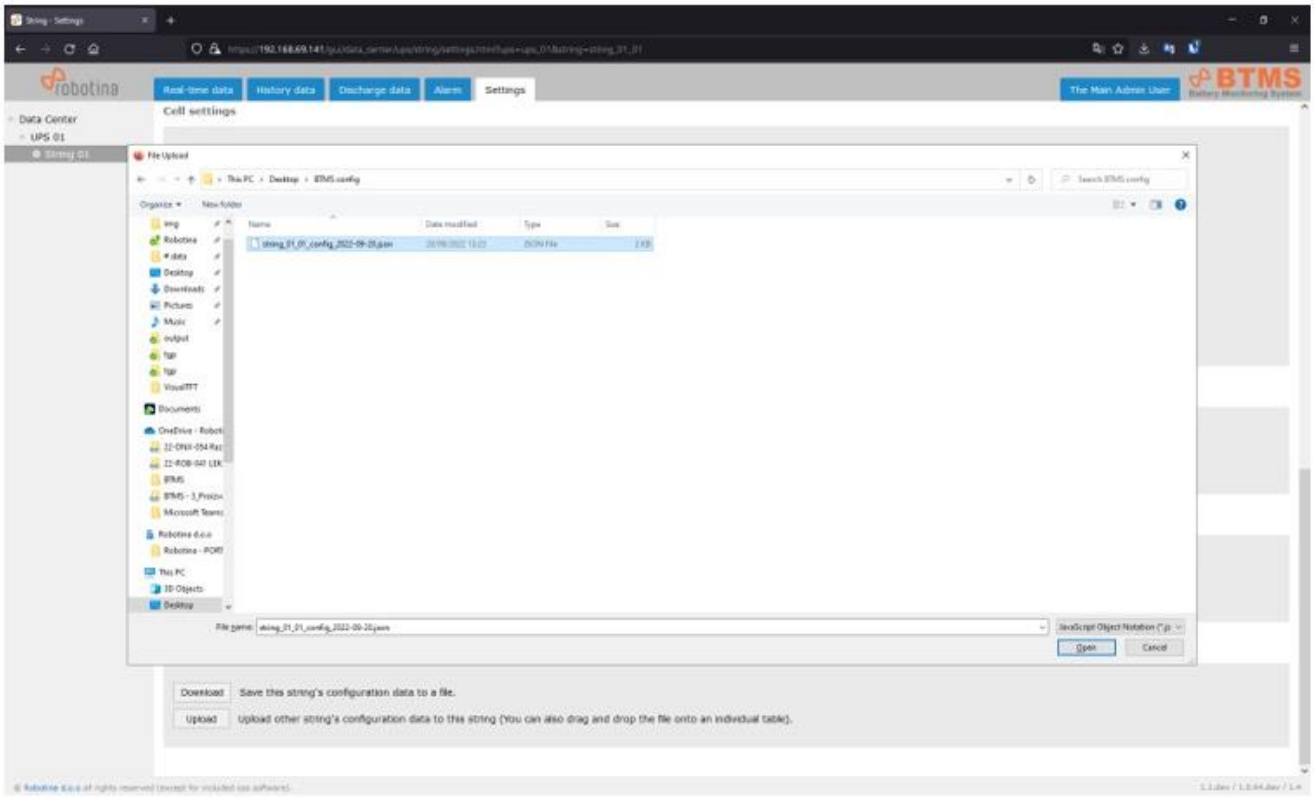


2.3.7 Configuration file

- It is possible to easily save the string sensor settings to a file.



- And reading all the instructions from this one.



- If we drag and drop the saved file onto the settings table, only the parameters that are in the table will be entered from the file.

3 Troubleshooting

If you are having problems with the system, try the appropriate solutions below. This may fix a system error that is the result of one of the most common system failures or installation mistakes. In any case, our technical support will be able to help you, it is at in http://support.robotina.com.

By trying the solutions listed below, our technical support will also be more effective in identifying errors and will help you more effectively.

The power supply and the power supply of all components are connected correctly

Communication cables are properly connected (it is best to check each one step by step)

Check that the hall sensor is facing correctly (there is an arrow on it showing the direction of the electric current)

Check LED on Cell sensor and String master (is green breathing mode or constant red)

One of the possible causes of malfunction may also be incorrect initial system configuration.

The initial configuration of the system can only be done by an authorized person! Contact an authorized person for any problems.

Robotina Help Desk in http://support.robotina.com