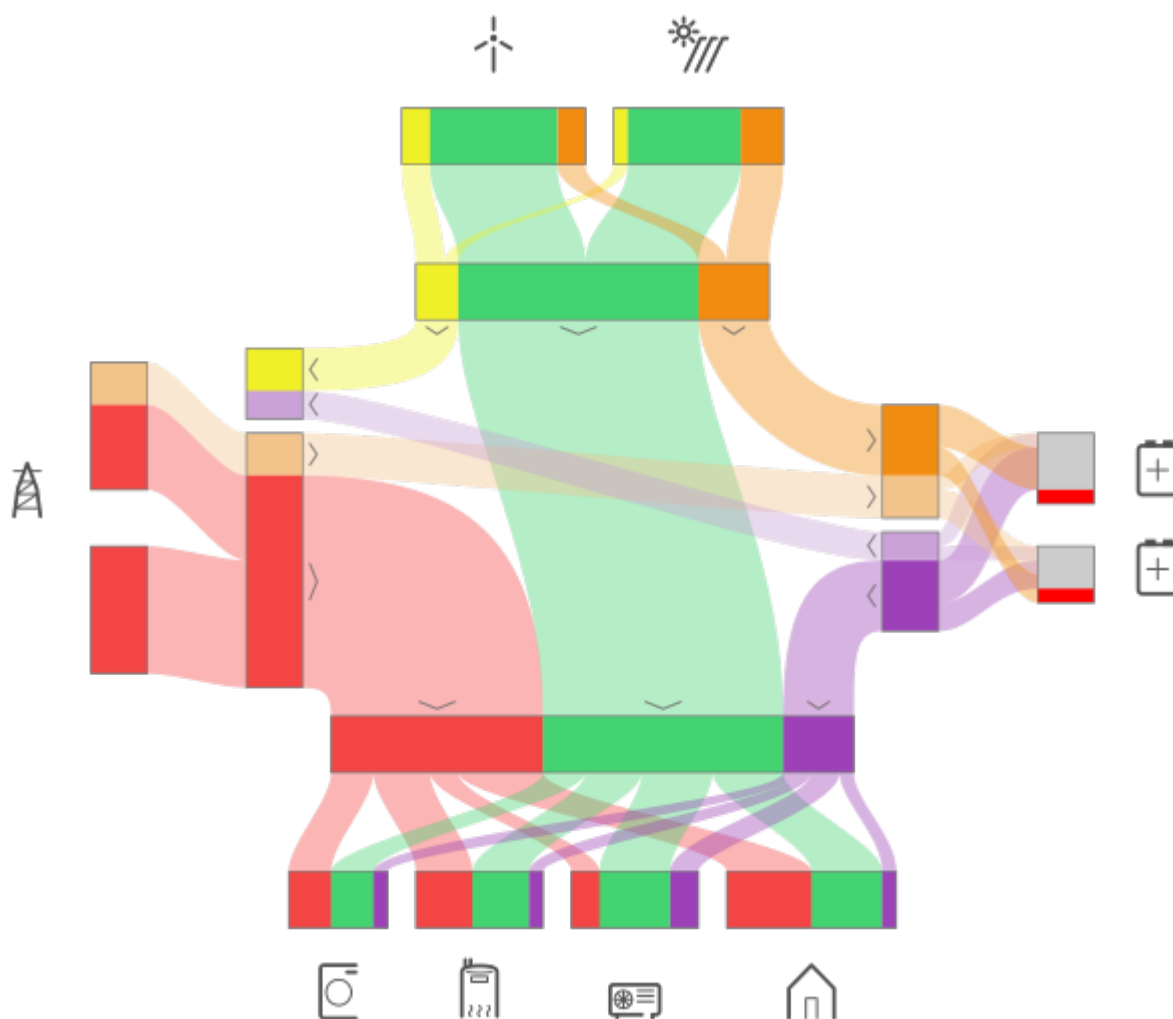


# HEMS v1.2.0 Introduction

Home Energy Management System (HEMS) is a system for:

- monitoring electricity flows at home (consumption, production, and storage),
- control of key consumers,
- optimizing consumption in terms of reducing consumption and using cheaper energy to ensure the same comfort with lower costs,
- current limiting of consumers to protect main grid fuse,
- managing charging of electric vehicles (EV fleet)



## HEMS Controller

It consists of an HEMS master controller ([MC-230](#)).

## Temperature sensor

Temperature sensor is directly wired ([Digital temperature sensor](#)) or paired ([Wireless temperature sensor](#) and [Wireless temperature and humidity sensor](#) ) to HEMS master controller [MC-230](#). Only one temperature sensor can be added.

## Power sensors

The measurement of electrical power and energy of all energy sources and main electrical consumers is provided by single-phase ([PM1-E-D](#)) and three-phase ([PM3-I-D](#) and [PM3-E-D](#)) power sensors which are connected directly to HEMS master controller [MC-230](#). It supports:

- **1 grid** power sensor
- up to **3** sensors for local power **plants** (PV, Wind, Cogeneration, Generator, etc)
- up to **2** local **storage** systems (home battery)
- up to **8** managed **consumers** (electrical heating, ev charging station, electrical water heater, washing machine, tumble dryer, ...)

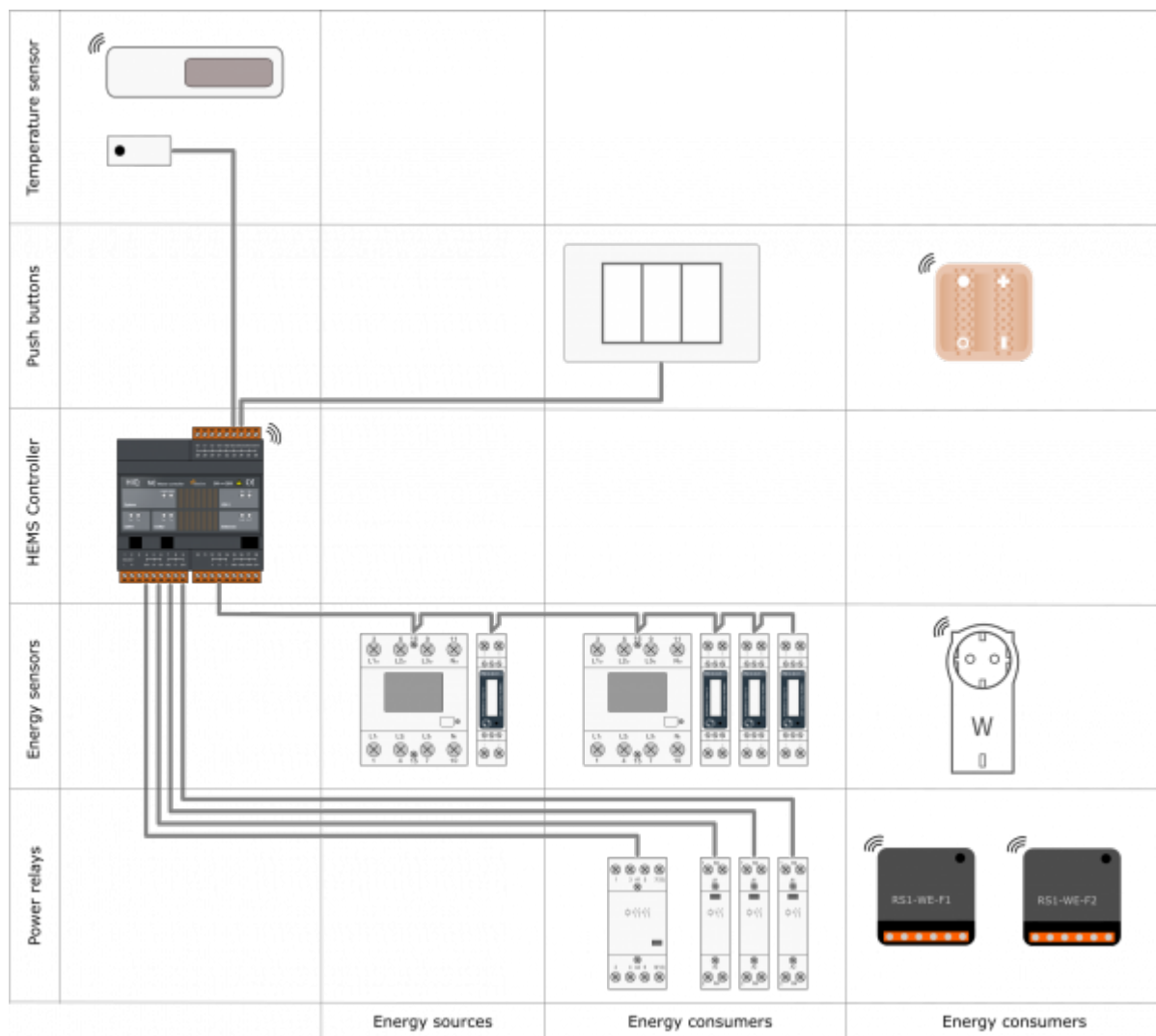
The measurement of main electrical consumers is also possible with wireless modules ([Metering smart plug](#) and [Micro smart plug](#)) which are paired to HEMS master controller [MC-230](#). It supports up to **8** managed **consumers**.

## Power relays

Are used for control of managed consumers. Power relays are toggling power supply or enabling signals for the operation of the device. They are controlled directly from HEMS master controller [MC-230](#).

## Push buttons

Are used for manual control of managed devices. Push buttons are directly wired or paired ([Soft remote](#)) to HEMS master controller [MC-230](#).



## EV chargers

Are used for charging electric vehicles. They are controlled from HEMS master controller [MC-230](#) via Modbus TCP/IP gateway.

# SAFETY INSTRUCTIONS



Use the following safety guidelines to ensure your own personal safety and to protect your equipment and working environment from potential damage.

**NOTICE:** All applicable local and national codes that regulate the installation and operation of the equipment must be strictly followed.

**NOTICE:** Installation and electrical connection of the equipment must be carried out by qualified and authorized personnel.

---

Notices which require special attention are highlighted with following symbols:

-  **WARNING** - which indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.
-  **CAUTION** - which indicates that minor to medium personal injury or property damage can result if proper precautions are not taken.

---

This product can only function correctly if it is transported, stored, set up and installed correctly, and operated and maintained as recommended according to manufacturer's instructions.



**WARNING:** Failure to comply with manufacturer's safety and installation instructions or applicable codes and standards can result in damage to equipment or serious injury to personnel.



**WARNING:** Before installing, servicing or repairing electrical equipment power source must be disconnected.

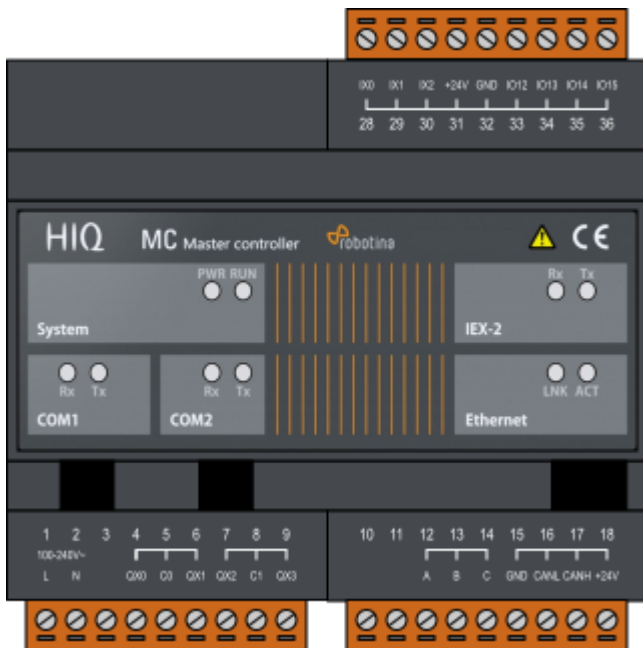


**CAUTION:** Don't try to open the device, any interference or change may impact device's properties and significantly affect safety.

- The device must be installed inside electrical enclosure where it cannot endanger people or environment.
- During operation, device must not be exposed to high temperature, high humidity, excessive dust, corrosive gases, vibration or shock.
- All connected wires must comply with manufacturer's specifications.
- For installation use only tools and equipment with non-conducting handles.
- Sufficient ventilation space has to be assured around device for proper operation.
- The manufacturer does not undertake any liability for material or personal damage resulting from use or handling which is not in accordance with the manufacturer's safety instructions.

# Master Controller

## Advanced Controller



|               |                            |   |
|---------------|----------------------------|---|
| Model number: | <b>MC-230-01</b>           | 230 VAC, 11 IO, Enocan, 2 × RS232, RS485, IEX2 terminals          |
|               | <b>MC-230-02</b>           | 230 VAC, 11 IO, 2 × RS232, RS485, IEX2 terminals                  |
|               | <b>MC-230-03</b>           | 230 VAC, 11 IO, Enocan, 2 × RS232, isolated RS485, IEX2 terminals |
|               | <b>MC-230-04</b>           | 230 VAC, 11 IO, 2 × RS232, isolated RS485, IEX2 terminals         |
| Mounting:     | DIN rail (35mm), 6M, 106mm |   |
| Dimensions:   | 106x108x58mm               |   |

## Features

- 3 digital inputs
- 4 relay outputs 8 A
- 4 universal inputs/outputs
- Ethernet, USB, IEX-2, 2×RS232, 1×RS485 (optional isolated)
- Enocan gateway (optional)
- 230 VAC power supply

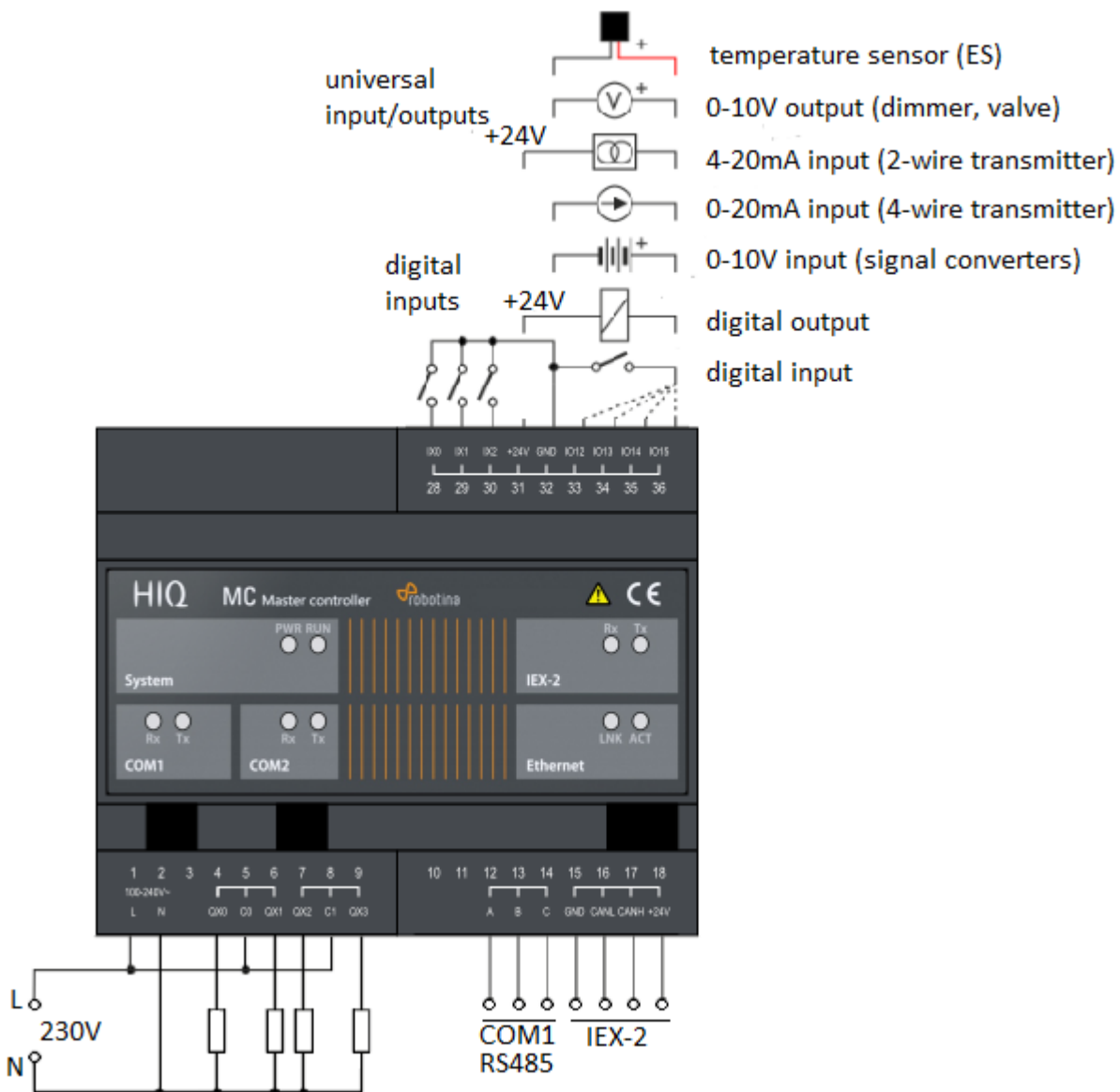
## Safety standards

EN 61010-1, EN 61010-2-201, EN 61131-2

# Technical specification

|                         |   |
|-------------------------|---|
| Relay outputs:          | 8A/250VAC resistive, 8A/30VDC resistive |
| Communication:          | Ethernet, 2x RS232, 1x RS485, IEX-2 bus |
| Nominal power rating:   | 230 VAC                                 |
| Power consumption:      | typ. 1W (no load), 10W max              |
| Power output:           | 24V 200mA (IEX-2 + terminals)           |
| Ingress protection:     | IP20                                    |
| Operating temperature:  | 0..50°C                                 |
| Storage temperature:    | -20..75°C                               |
| Relative humidity:      | 0..85% n/c                              |
| Input type(ix00..ix02): | dry contact, internal pull-up 12V 2mA   |
| Cable lenght:           | 50m                                     |
| COM1 type               | RS485 two wire                          |
| Transmit/receive        | automatic switching                     |

# Terminals



# Three phase power sensor, CT

## 3-phase power-sensor, current transformer



|   |                                     |
|---|-------------------------------------|
| Model number:                                 | <b>PM3-E-D-CT</b>                   |
| Connect to:                                   | <b>MC-230</b>                       |
|   | RS485 power sensor bus A - B        |
| Mounting:                                     | DIN rail, 1M, 18 mm                 |
| Dimensions:                                   | 65 × 72 × 94,5 mm                   |
| <b>Used for measuring power and energy of</b> |                                     |
| ✓   | single/three-phase energy sources   |
| ✓   | single/three-phase energy consumers |

## Applications

- Digital multi-function power sensor for single/three phase networks

## Features

- DIN rail mounting with 3x 50A (or 1x 50A) current transformer
- Line voltage and THD% (total harmonic distortion) of all phases
- Line Frequency
- Currents, Current demands and current THD% of all phases
- Power, maximum power demand and power factor
- Active energy imported and exported
- Reactive energy imported and exported

## General description

The unit measures and displays the characteristics of three phase four wires(3p4w) supplies, including voltage, frequency, current, power, active and reactive energy, imported or exported. Energy is measured in terms of kWh, kVArh. Maximum demand current can be measured over preset periods of up to 60minutes. In order to measure energy, the unit requires voltage and current inputs in addition to the supply required to power the product. The requisite current input(s) are obtained via current transformers (CT). This power sensor can be configured to work with a wide range of CTs with 0.33V

output, giving the unit a wide range of operation. Built-in interfaces provide pulse and RS485 Modbus RTU outputs. Configuration is password protected. This power sensor can be powered from a separate auxiliary (AC or DC) supply. Alternatively, it can be powered from the monitored supply, where appropriate.

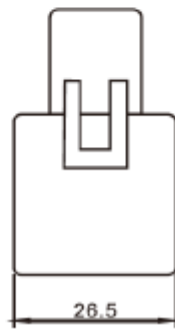
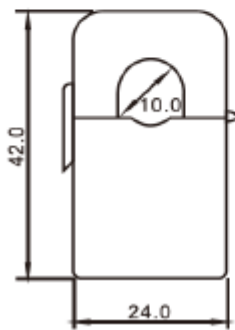
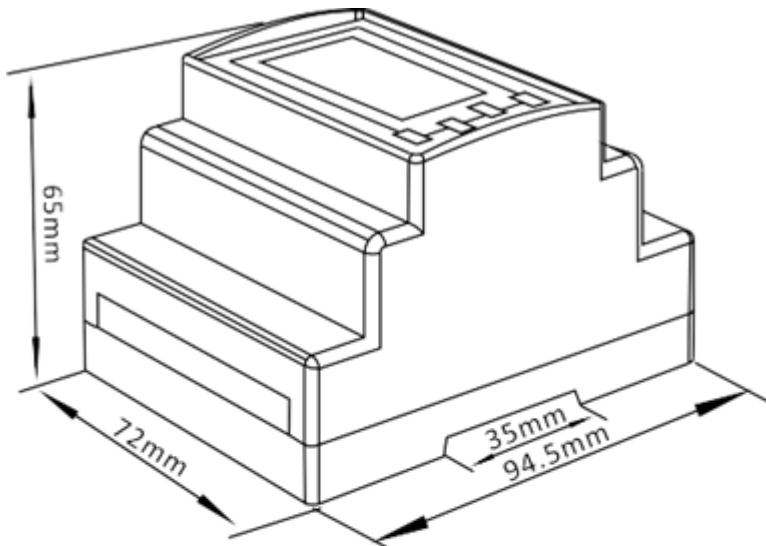
## Technical specifications

| <b>Technical Data</b>        |   |
|------------------------------|---|
| Operating Humidity           | ≤ 75%                                       |
| Storage Humidity             | ≤ 95%                                       |
| Operating Temperature        | -25°C - +50°C                               |
| Storage Temperature          | -40°C - +70°C                               |
| Mounting                     | DIN rail (DIN 43880)                        |
| Sealing                      | IP51 Indoor                                 |
| Auxiliary supply voltage     | Nominal ± 1%                                |
| Auxiliary supply frequency   | Nominal ± 1%                                |
| Frequency                    | 50Hz or 60Hz(±2%)                           |
| Power Consumption            | ≤ 10W                                       |
| <b>Accuracy</b>              |   |
| Voltage, Current             | 0.5%  |
| Frequency                    | 0.2% of Mid-Frequency                       |
| Power Factor                 | 1% of Unity (0.01)                          |
| Active Power, Apparent Power | ± 1% of Range Maximum                       |
| Reactive Power               | ± 1% of Range Maximum                       |
| Reactive Energy (Varh)       | ± 1% of Range Maximum                       |
| Active Energy (Wh)           | Class 1 IEC 62053-21                        |
| <b>Current transformer</b>   |   |
| Frequency                    | 50-60 Hz                                    |
| Rated current                | 50 A  |
| Accuracy                     | from 20% to 120% of rated current           |
| Phase angle                  | less than 2 degrees at 50% of rated current |
| Insulation voltage           | 600 VAC                                     |
| Maximum primary voltage      | 5000 VAC (insulated conductor)              |
| Dielectric strength          | 2.5 kV/1mA/1min                             |
| Operating temperature        | -15 to 60°C                                 |
| Operating humidity           | < 85 %                                      |
| Case material                | PC/UL94-V0                                  |
| Bobin                        | PBT   |
| Core                         | Permalloy                                   |
| Internal structure           | Epoxy                                       |
| Leads                        | UL 1015, Twisted pair, 22 AWG               |
| <b>Modbus</b>                |   |
| Bus Type                     | RS485 (Semi-Duplex)                         |
| Protocol                     | Modbus RTU                                  |
| Baud Rate                    | 1200/2400/4800/9600bps                      |
| Address Range                | 1-247                                       |

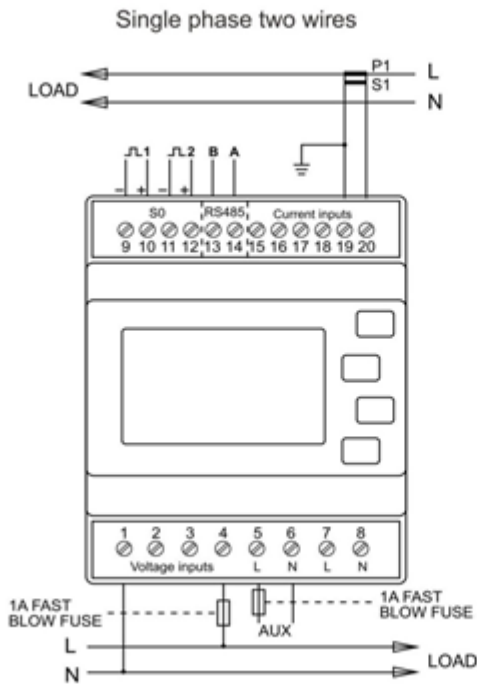
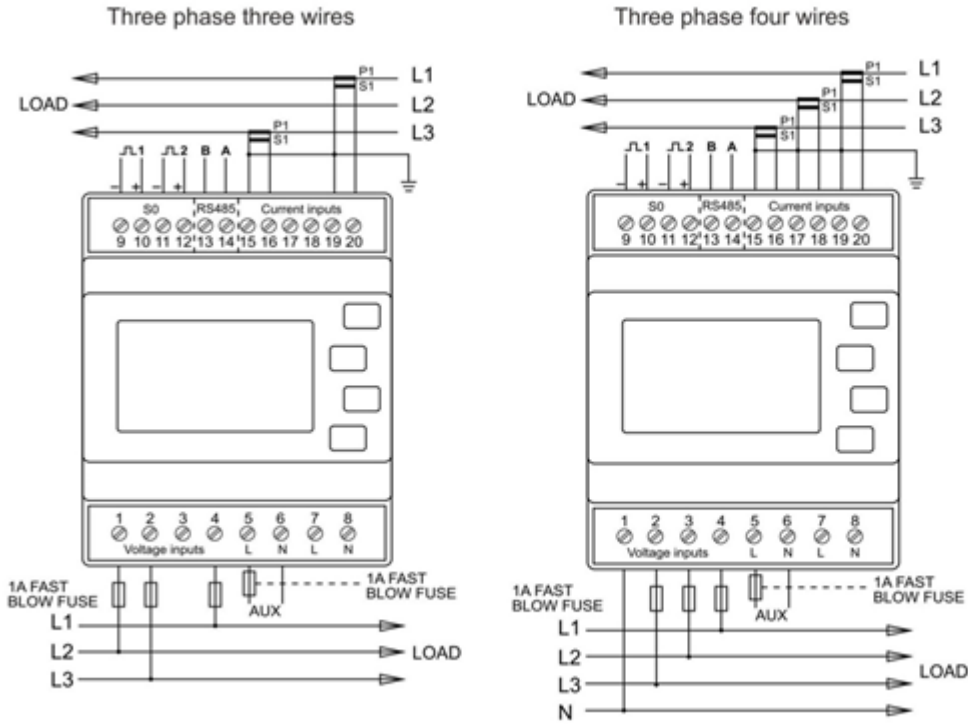


|                        |               |
|------------------------|---------------|
| Max. Bus Loading       | 64pcs         |
| Communication Distance | 1000 Meters   |
| Parity                 | EVEN/ODD/NONE |
| Data Bit               | 8             |
| Stop Bit               | 1             |

## Dimensions



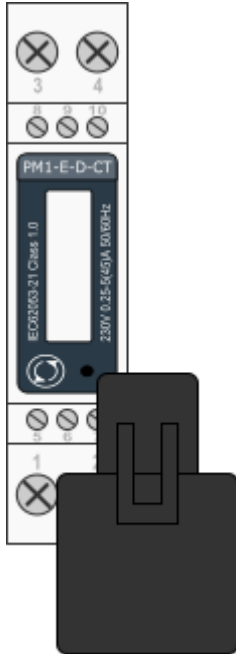
## Installation



hiq\_pm3-e-d-ct\_user\_manual\_v1.pdf  
hiq\_pm3-e-d-ct\_protocol\_v1.6.pdf

# Single phase power-sensor, CT

## 1-phase power-sensor, current transformer



|   |                               |
|---|-------------------------------|
| Model number:                                 | <b>PM1-E-D-CT</b>             |
| Connect to:                                   | <b>MC-230</b>                 |
|   | RS485 power sensor bus A - B  |
| Mounting:                                     | DIN rail, 1M, 18 mm           |
| Dimensions:                                   | 18 × 62 × 119 mm              |
| <b>Used for measuring power and energy of</b> |                               |
| ✓   | single-phase energy sources   |
| ✓   | single-phase energy consumers |

## Applications

- Digital multi-function power sensor for single phase networks

## Features

- DIN rail mounting with 50A current transformer
- Compact design in a single module 18mm wide
- Seal-able cover(phase and neutral terminals)

## General description

The PM1-E-D series is an advanced single phase energy monitoring solution with built-in configuration push button and LCD data displaying, particularly indicated for active energy and other parameters metering and for cost allocation. Housing for DIN-rail mounting, IP51 protection degree.

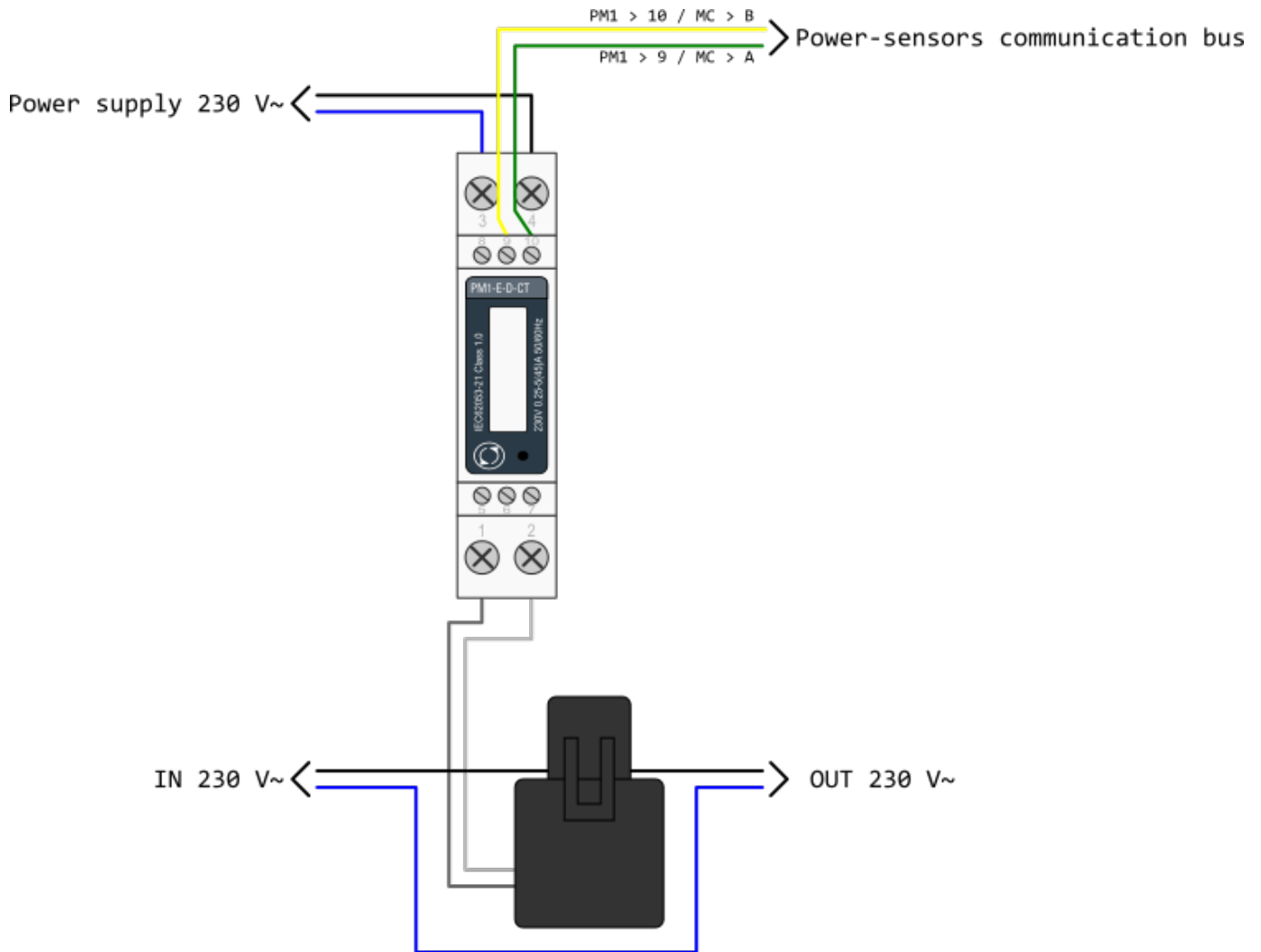
## Technical specifications

| Technical Data     |       |
|--------------------|-------|
| Operating Humidity | ≤ 75% |

|                              |   |
|------------------------------|---|
| Storage Humidity             | ≤ 95%                                       |
| Operating Temperature        | -20°C - +50°C                               |
| Storage Temperature          | -30°C - +70°C                               |
| International Standard       | IEC 62053-21                                |
| Accuracy                     | Class 1                                     |
| Mounting                     | DIN rail (DIN 43880)                        |
| Sealing                      | IP51 Indoor                                 |
| Nominal Voltage Input        | (Ph+N) 230V AC (176-276V AC)                |
| Max Continuous Voltage       | 120% of nominal                             |
| AC Voltage Withstand         | 4KV for 1 minute                            |
| Impulse Voltage Withstand    | 6KV-1.2μS                                   |
| Current Input                | 0.25-5A(6)A AC RMS                          |
| Operational Current Range    | 0.4% Ib-I <sub>max</sub>                    |
| Over current withstand       | 20I <sub>max</sub> for 0.01s                |
| Nominal Input Current Burden | 0.5VA                                       |
| Frequency                    | 50Hz(±10%)                                  |
| Power Consumption            | ≤ 2W/10VA/phase                             |
| <b>Accuracy</b>              |   |
| Voltage, Current             | 0.5%  |
| Frequency                    | 0.2% of Mid-Frequency                       |
| Power Factor                 | 1% of Unity (0.01)                          |
| Active Power, Apparent Power | ≤ 1% of Range Maximum                       |
| Reactive Power               | ≤ 1% of Range Maximum                       |
| Reactive Energy (Varh)       | Class 2                                     |
| Active Energy (Wh)           | Class 1                                     |
| <b>Current transformer</b>   |   |
| Frequency                    | 50-60 Hz                                    |
| Rated current                | 50 A  |
| Accuracy                     | from 20% to 120% of rated current           |
| Phase angle                  | less than 2 degrees at 50% of rated current |
| Insulation voltage           | 600 VAC                                     |
| Maximum primary voltage      | 5000 VAC (insulated conductor)              |
| Dielectric strength          | 2.5 kV/1mA/1min                             |
| Operating temperature        | -15 to 60°C                                 |
| Operating humidity           | < 85 %                                      |
| Case material                | PC/UL94-V0                                  |
| Bobin                        | PBT   |
| Core                         | Permalloy                                   |
| Internal structure           | Epoxy                                       |
| Leads                        | UL 1015, Twisted pair, 22 AWG               |
| <b>Modbus</b>                |   |
| Bus Type                     | RS485 (Semi-Duplex)                         |
| Protocol                     | Modbus RTU                                  |
| Baud Rate                    | 1200/2400/4800/9600bps                      |
| Address Range                | 1-247                                       |
| Max. Bus Loading             | 64pcs                                       |

|                        |               |
|------------------------|---------------|
| Communication Distance | 1000 Meters   |
| Parity                 | EVEN/ODD/NONE |
| Data Bit               | 8             |
| Stop Bit               | 1             |

## PM1-E-D-CT Terminals



hiq\_pm1-e-d-ct\_user\_manual\_2020\_v1.0.pdf  
 hiq\_pm1-e-d-ct\_protocol\_v1.2.pdf

# Smart plug

## Enocean wireless smart plug



|               |  |
|---------------|--|
| Model number: | <b>SCO-WE-F - Schuko (German)</b><br><b>SCO-WE-E - Type E (French)</b> |
| Mounting:     | In-field; power outlet   |
| Dimensions:   | 104 × 51 × 36mm  |
| Connection:   | Wireless Enocean   |
|               | <a href="#">MC-230-01</a>  |
|               | <a href="#">MC-230-03</a>  |
|               | <a href="#">MC-24-01</a>   |
|               | <a href="#">MC-24-03</a>   |
|               | <a href="#">MC-24-05</a>   |

- Smart Actuator
- High power capacity
- Ergonomy

## Technical specifications

|                         |                                       |
|-------------------------|---------------------------------------|
| Power:                  | 230V AC 50Hz (EU) / 110V AC 60Hz (US) |
| Max switching capacity: | 3.000W (Continuous)                   |
|                         | 3.680W (Temporary) on resistive load  |
| Self consumption:       | < 1W                                  |
| EEP (EnOcean Profile):  | EEP D2-01-0A                          |
| Range:                  | Up to 30m indoor                      |
| Wireless repeater:      | Yes                                   |
| Dimension:              | 104 × 51 × 36mm                       |

## Certifications and standards

### Europe

- EN61058-1 :2002+A2 :2008
- NF C 61-314 :2008+A1 :2010 (Type E)
- DIN VDE 0620 -1: 2013 (Schuko)
- DIN VDE 0620 -2-1: 2013 (Schuko)
- EN301489-1 V1.9.2
- EN301489-3 V1.6.1
- EN300220-2 V2.4.1

# Micro smart plug

## Enocean wireless micro smart plug with metering



|               |  |
|---------------|--|
| Model number: | <b>SMM-WE-F - Schuko (German)</b><br><b>SMM-WE-E - Type E (French)</b>   |
| Mounting:     | In-field; power outlet   |
| Dimensions:   | 41 × 73 mm   |
| Connection:   | Wireless EnOcean<br><a href="#">MC-230-01</a><br><a href="#">MC-230-03</a><br><a href="#">MC-24-01</a><br><a href="#">MC-24-03</a><br><a href="#">MC-24-05</a> |

- Smart Actuator
- Metering
- High power capacity
- Ergonomic



## Technical specifications

|                         |                           |
|-------------------------|---------------------------|
| Power:                  | 230V AC 50Hz (EU)         |
| Max switching capacity: | 1.840 W on resistive load |
| Metering                | power [W] and energy [Wh] |
| Self consumption:       | < 1W                      |
| EEP (EnOcean Profile):  | EEP D2-01-0E              |
| Range:                  | Up to 30m indoor          |
| Wireless repeater:      | Yes                       |
| Dimension:              | 41 × 73 mm                |

## Certifications and standards

### Europe

- EN61058-1 :2002+A2 :2008
- NF C 61-314 :2008+A1 :2010 (Type E)
- DIN VDE 0620 -1: 2013 (Schuko)
- DIN VDE 0620 -2-1: 2013 (Schuko)
- EN301489-1 V1.9.2
- EN301489-3 V1.6.1
- EN300220-2 V2.4.1

# Temperature and humidity sensor

## Enocean wireless temperature and humidity sensor



|               |  |
|---------------|--|
| Model number: | <b>TSH-WE-W1</b>                                 |
| Mounting:     | In-field; on wall                                |
| Dimensions:   | 80 × 26 × 18 mm                                  |
| Connection:   | Wireless Enocean<br>to <a href="#">MC-230-01</a> |

- No battery
- Wireless
- Easy to mount
- Discreet
- Optional battery

## Technical specifications

|                        |                             |
|------------------------|-----------------------------|
| Power:                 | Solar panel                 |
| - optional:            | battery CR1216, 3 years     |
| Metering               | 0 to 40°C (0.16°resolution) |
|                        | 0 to 100% RH - Indoor use   |
| Self consumption:      | < 1W                        |
| EEP (EnOcean Profile): | EEP - A5-04-01              |
| Range:                 | Up to 30m indoor            |
| Dimension:             | 80 × 26 × 18 mm             |

## Certifications and standards

### Europe

- EN 60950-1: 2006+A11:2009
- +A1:2010+A12:2011+A2:2013
- EN301489-3 V1.6.1
- EN 61000-3-2:2013,
- EN 61000-3-3:2013
- EN 300220-2 V3.1.1
- EN 62479:2010

### USA

- FCC & IC Rules

# Relay Switch

## Wireless relay switch, 1 channel



|               |                           |
|---------------|---------------------------|
| Model number: | <b>RS1-WE-F1</b>          |
| Mounting:     | In-field; flush box       |
| Dimensions:   | 40 x 44 x 16.9 mm         |
| Connection:   | Wireless Enocean          |
|               | <a href="#">MC-230-01</a> |
|               | <a href="#">MC-230-03</a> |
|               | <a href="#">MC-24-01</a>  |
|               | <a href="#">MC-24-03</a>  |
|               | <a href="#">MC-24-06</a>  |

- High switching capacity
- Ultra low profile
- Potential-free input
- Remote commissioning

## Technical specifications

|                          |                                 |
|--------------------------|---------------------------------|
| Power supply:            | 230 V AC ~ 50 Hz                |
| Switching capabilities:  | 230 V AC - 10A / 30 V DC - 10 A |
| Consumption:             | <1W                             |
| Maximum output power:    | 2,3 kW (resistive load)         |
| Radio frequency range:   | 868,0 to 868,6 MHz              |
| RF power max:            | +3dBm                           |
| Range:                   | Up to 30m indoor                |
| Wireless repeater:       | Yes                             |
| Operational temperature: | 0°C to 40°                      |
| Protection rating:       | IP 2X                           |
| Pairing:                 | up to 22 controllers            |
| EEP (EnOcean Profile):   | D2-01-0F                        |
| Dimensions :             | 40 x 44 x 16.9 mm               |

## Certifications and standards





### Europe

- EN60669-1:1999+A1:02+A2:08
- EN60669-2-1:2004+A1:09+A12:10
- EN300220-2 V3.1.1
- EN301489-01 V2.1.1
- EN301489-03 V2.1.1
- EN62479:2010

rs1-we-f1\_user\_manual.pdf

# Temperature sensor

## Digital temperature sensor

| Technical specifications    |   |
|-----------------------------|---|
| Operating temperature range | -55°C to +100°C (0°C to +50°C for -W)   |
| Measuring error             | max. ±2°C (-55°C to +100°C)   |
|                             | max. ±0.5°C (-10°C to +85°C)  |
|                             | typ. ±0.2°C (-10°C to +85°C)  |
| Connect to                  | <a href="#">MC-230</a>  |
|                             | terminals GND - IO12  |
|                             | for ES-B connect red and black to GND and yellow to IO12                            |
| Order code                  |   |
| <b>ES</b>                   | heat-shrink tubing, 2m wire   |
|                             |    |
| <b>ES-A</b>                 | aluminum housing IP 67, 5m wire   |
|                             |   |
| <b>ES-W-OW-WHITE</b>        | white plastic housing, terminals  |
| <b>ES-W-OW-IVORY</b>        | ivory plastic housing, terminals  |
|                             |  |
| <b>ES-B</b>                 | steel tube housing IP 67, 2m wire   |
|                             |  |

# Commissioning

## Mounting

Mount the main controller MC-230, PM1-E-D, PM3-E-D and PM3-I-D electricity sensors, fuses, power relays, and push-buttons to a suitable location.

## Wiring

Wire all elements **except** communication with **PM1-E-D** and **PM3-E-D** sensors.

Connect the MC-230 to the home LAN.

## Configuration

Install and run [HEMS Configurator](#) on your PC.

Go to the “**settings**” page.

With the “**autodetect**” button, the application will locate the controller in the local network.

Enter **names**, select **icons** for all sources and consumers.

### Power-sensor adding

#### One-phase sensor PM1-E-D

- **Connect** communication bus (to only one power-sensor)
- In HEMS Configurator counter should appear as “new device”
- Press and hold the push-button on the power-sensor until it appears **-SEt-** on display
- In HEMS Configurator click on the “ **add**” button next to the source or consumer that the sensor is measuring

#### Three-phase sensor PM3-E-D

- **Connect** communication bus (to only one power-sensor)
- In HEMS Configurator counter should appear as “new device”
- Click on the “ **add**” button next to the source or consumer that the sensor is measuring

#### Three-phase sensor PM3-I-D

- Communication bus with the power-sensor should already be connected
- Press and hold the push-button on the sensor until it appears **“CONf Add”** on display
- In HEMS Configurator counter should appear as “new device”
- Click on the **“add”** button next to the device that the sensor is measuring

### Without grid power meter

- **Virtual grid PM** is an option if no grid meter is used. Power, current and energy will be calculated from other power meters.

### Power-sensor removing

#### One-phase sensors PM1-E-D

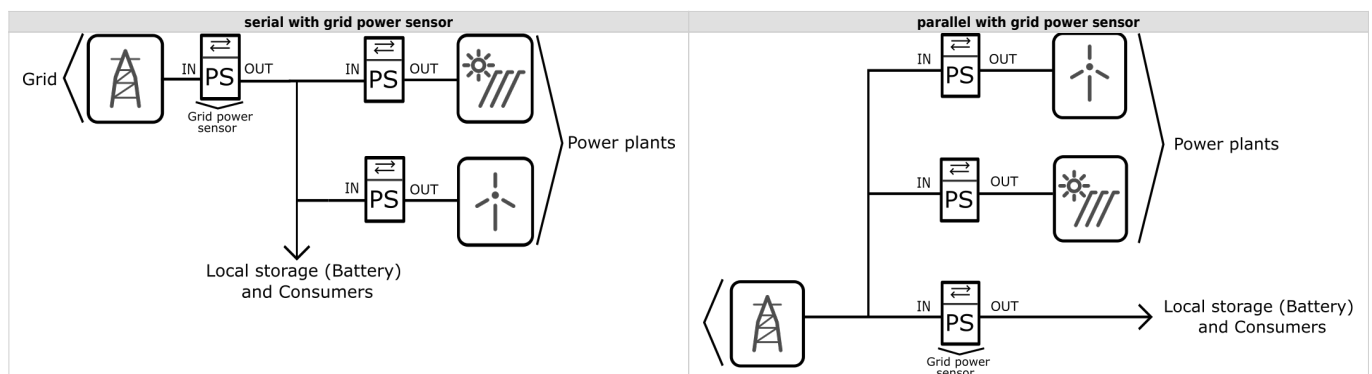
- Make sure the “new device” is empty
- Press the button on power-sensor until **-Set-** appears on the display
- In HEMS Configurator press **“del”** button next to the sensor
- After a few seconds, the sensor should appear as the “new device”
- If desired, the sensor can be removed or it can be assigned to another device

#### Three-phase power-sensor

- Make sure the “new device” is empty
- In HEMS Configurator press **“del”** button next to the sensor
- After a few seconds, the sensor should appear as the “new device”
- If desired, the sensor can be removed or it can be assigned to another device

### Power plant connection<sup>1</sup>

The power plant can be connected to the grid in two ways:



When configuring the power plant, select

- **in:** serial with grid power sensor
- **ex:** parallel with grid power sensor



In HEMS Configurator by default, the power plant is connected in series.

## Wireless setting

Enable the wireless setting to add, delete, or set repeater level wireless modules.

### Wireless module adding

#### Temperature and humidity sensor

- Launch the pairing by the press on the learning button on the back of the device.
- The wireless sensor is added in the HEMS Configurator.

#### Micro smart plug and Smart plug

- Launch the pairing by the press on the button for 2 seconds until the LED becomes red. Release the button, the LED will then glow in red
- To confirm that the pairing is OK, the LED will blink in green
- In the HEMS Configurator module should appear as “new device”
- Click on the “ **add**” button next to the consumer that is connected to the module

#### Relay switch-1 channel

- Launch the pairing by doing 3 consecutive presses on the relay switch button. The LED blinks red
- To confirm that the pairing is OK, the LED will blink green twice
- The HEMS Configurator module should appear as a “new device”
- Click on the “ **add**” button next to the consumer that is connected to the module

#### Relay switch-2 channel

- Launch the pairing by doing 3 consecutive presses on the relay switch button. The LED blinks red
- To confirm that the pairing is OK, the LED will blink green twice
- In the HEMS Configurator the module first channel should appear as a “new device”
- Click on the “ **add**” button next to the consumer that is connected to the modules first channel
- In the HEMS Configurator the module second channel should appear as a “new device”
- Click on the “ **add**” button next to the consumer that is connected to the modules second channel
- Before you pair a new device both channels must be added to the consumers

### Wireless module removing

### Micro smart plug, smart plug and relay switch-1 channel

- In the HEMS Configurator press “**del**” button next to the consumer connected to the module you want to remove
- After a few seconds the module is removed

### Relay switch-2 channel

- In the HEMS Configurator press “**del**” button next to the consumer connected to the channel module you want to remove
- After a few seconds, deleted channel of a module should appear as a “new device”
- We can remove the module by deleting the second channel or the deleted channel can be assigned to another consumer

### Setting repeater level

When enabling repeater mode, the wireless module can repeat a message not addressed to him, and increase range by creating network grid between all wireless devices.

The repeater can be configured to level 0 (off), level 1 (one hop), or level 2 (two hops):

- **Level 0:** gateway — module.
- **Level 1:** gateway — repeater — module.
- **Level 2:** gateway — repeater — repeater — module<sup>2</sup>.

By default, the repeater mode is disabled (level 0). If you want to change the repeater mode press icon «» in the **output** in **Consumers settings table**.

### Setting device management features

For each managed consumer we can set:

- **sub:** mark device as submeter if device is not part of internal network. Energy division for this device will be ignored.
- **man. time:** the time is in minutes for the manual override. It serves to ensure that the user can ensure a minimum validity of the manual switchover.
- **out mode:** it can be normal (the output is turned on means the device is working) or inverted (the device is working when the output is off).
- **timetable checkbox:** allows to enable or disable the timetable for each device.

### Enable power-sensor from compatible systems

HEMS will automatically detect compatible

- battery systems **eStore** and
- home automation systems **HIQ Home**

which are in the same local network.

Only the first system is detected, if there is more than one it is necessary to enter the serial number of the desired system manually.

if **eStore** is **enabled**, HEMS will read:

- **grid** power-sensor
- power-sensor for the **first PV Plant** and
- power-sensor of the **first storage** system

From the **enabled HIQ Home** system, HEMS will automatically read the **grid** power-sensor.

## Internet access

If enabled, the system will automatically establish access to the HIQ Universe web service. Communication with the server is automatically established so that the controller sends the push message to the server, and the server can then access the controller on the given path. The UDP type of internet packets on the output port 8442 is used. If communication is not established automatically, check the access from the local network to the Internet and the router settings.

## Permanent memory

Saving parameters to the permanent memory, after changing the settings, is necessary since at startup HEMS always reads parameters from the permanent memory.

## Backup / restore to PC

HEMS Configurator allows you to backup and restores all parameters to PC.

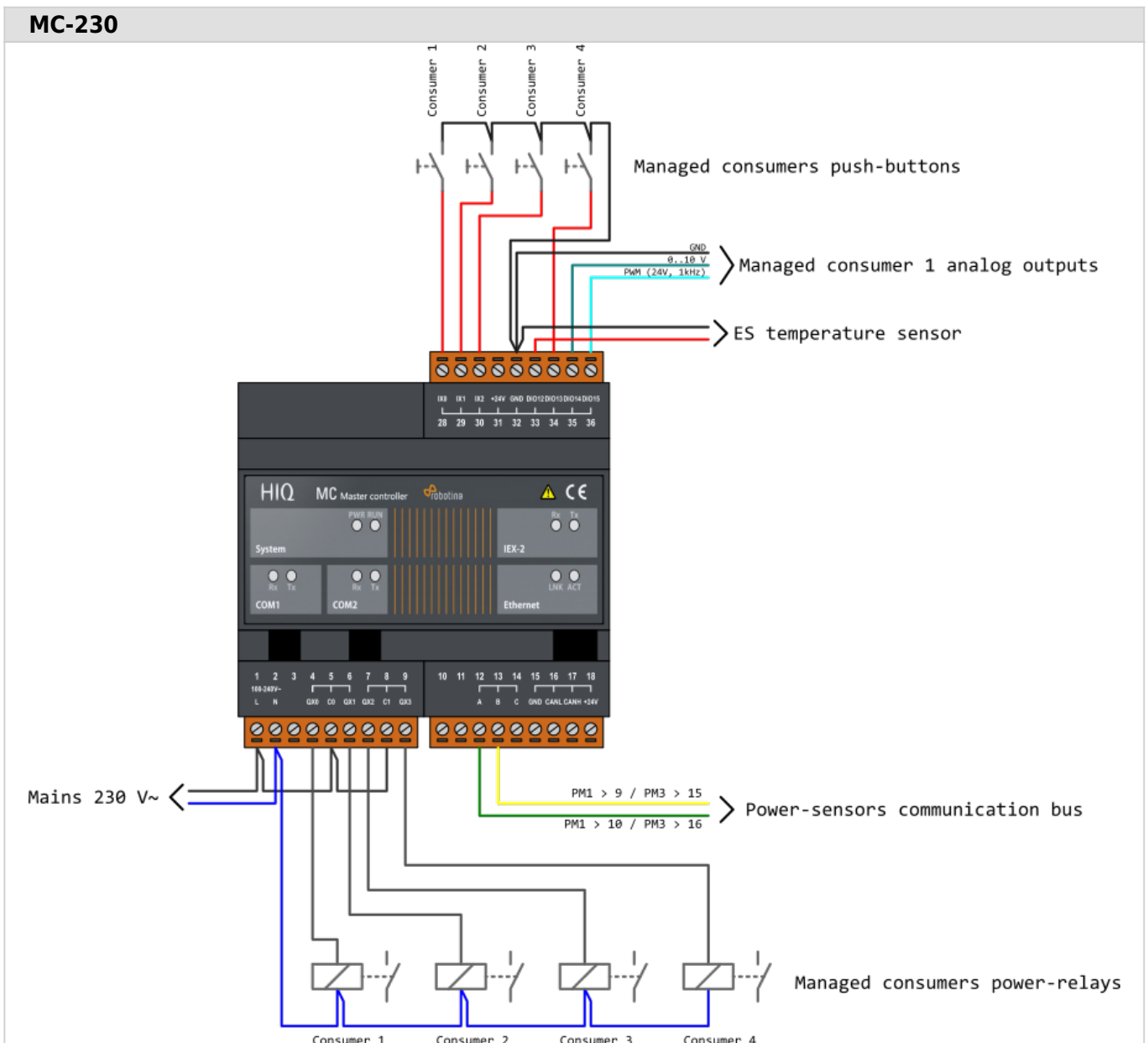
<sup>1</sup> Only for the first power plant

<sup>2</sup> Both repeaters must be set to level 2

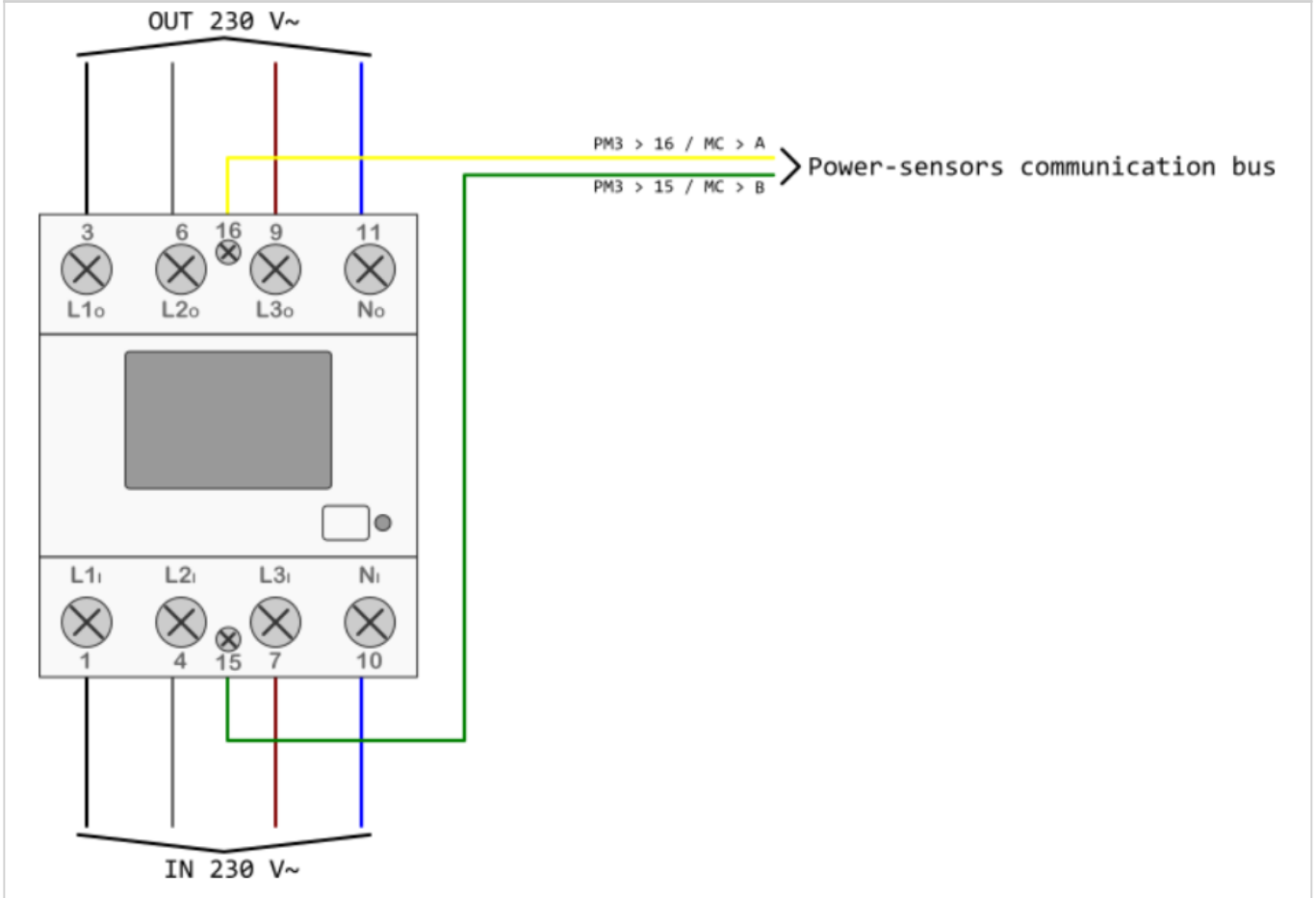
## Phase alignment and limiter settings

Under limiter page set correct phase order to align phases on each device. Set correct main fuse limit [A] to protect the main grid fuse from over current. Check devices that can be managed by limiter and set correct limiter priority. Choose from no limiter, limit last, limit second, limit first. Max expected device current consumption is dynamically calculated and does not need to be set. In case device is a EV charging station, manually set max current for this device.

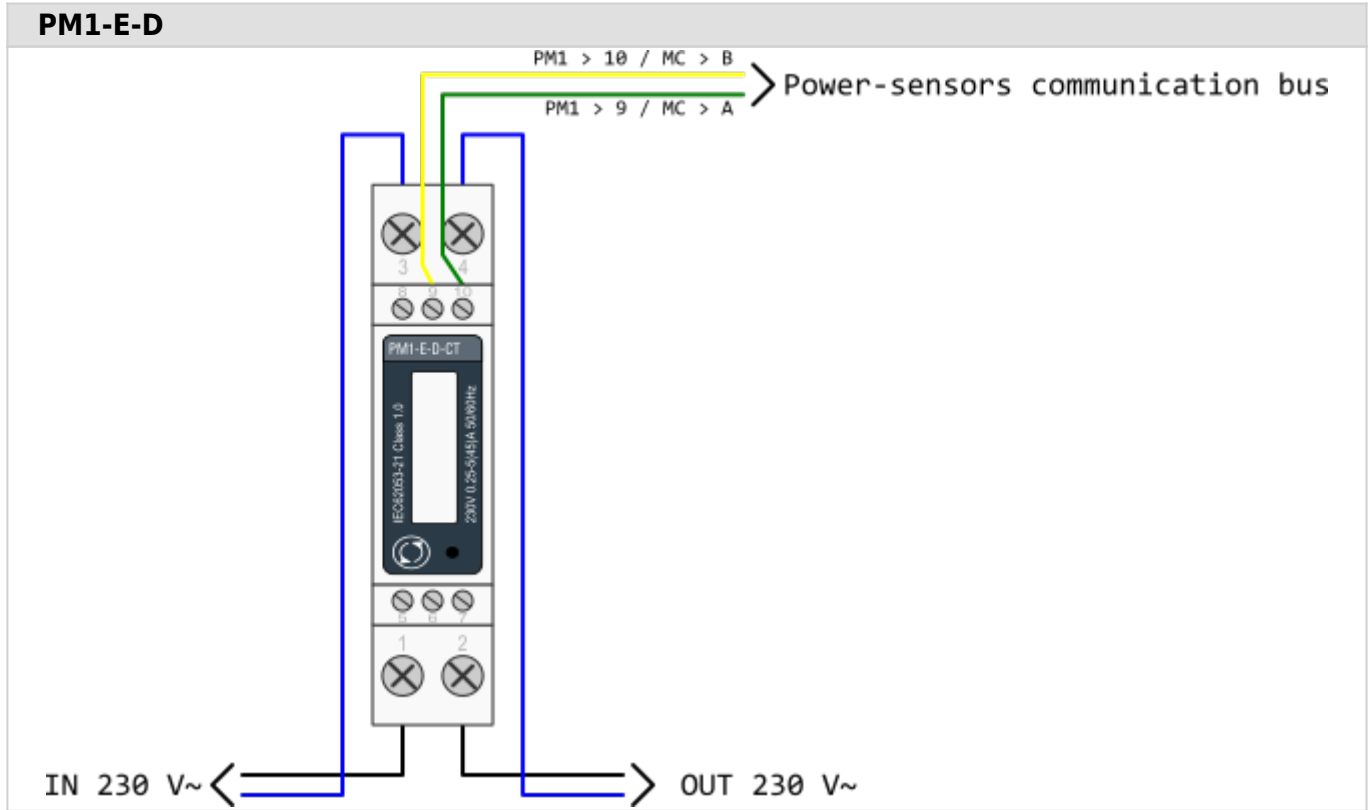
# HEMS v1.2.0 wiring



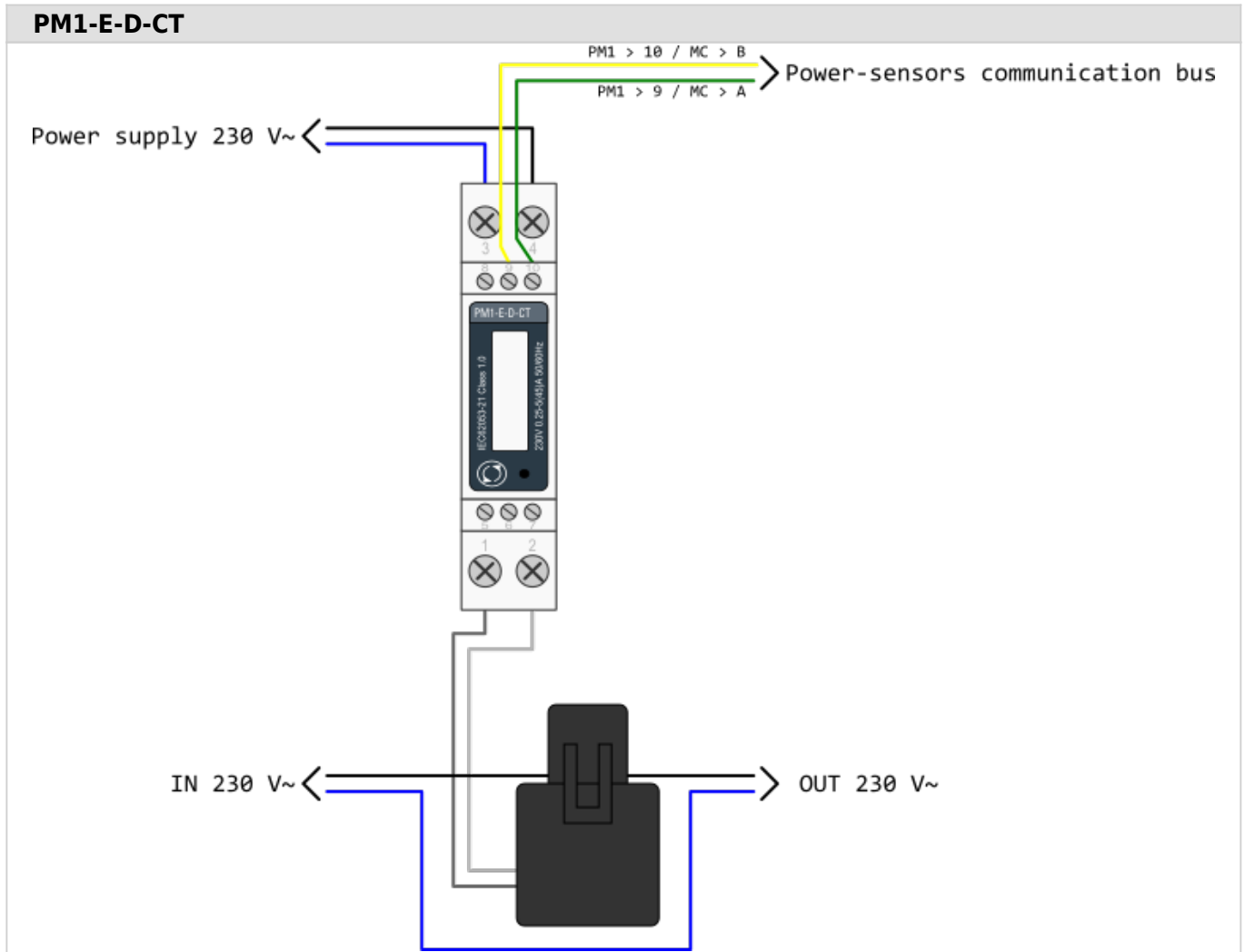
**PM3-I-D**



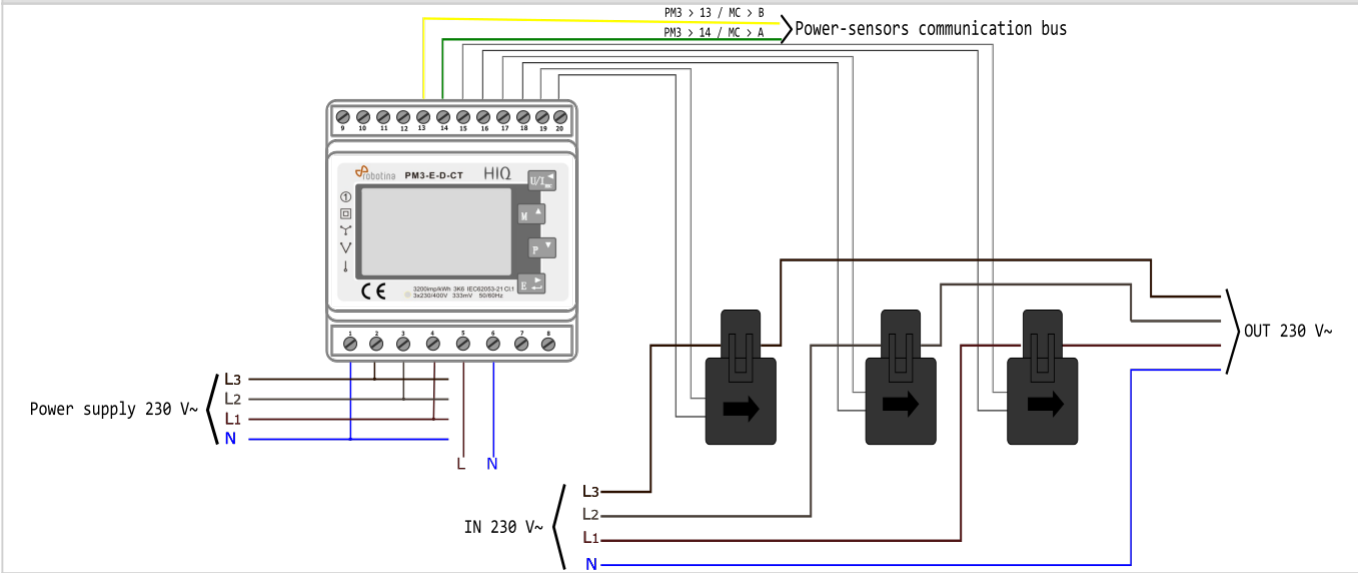
### PM1-E-D



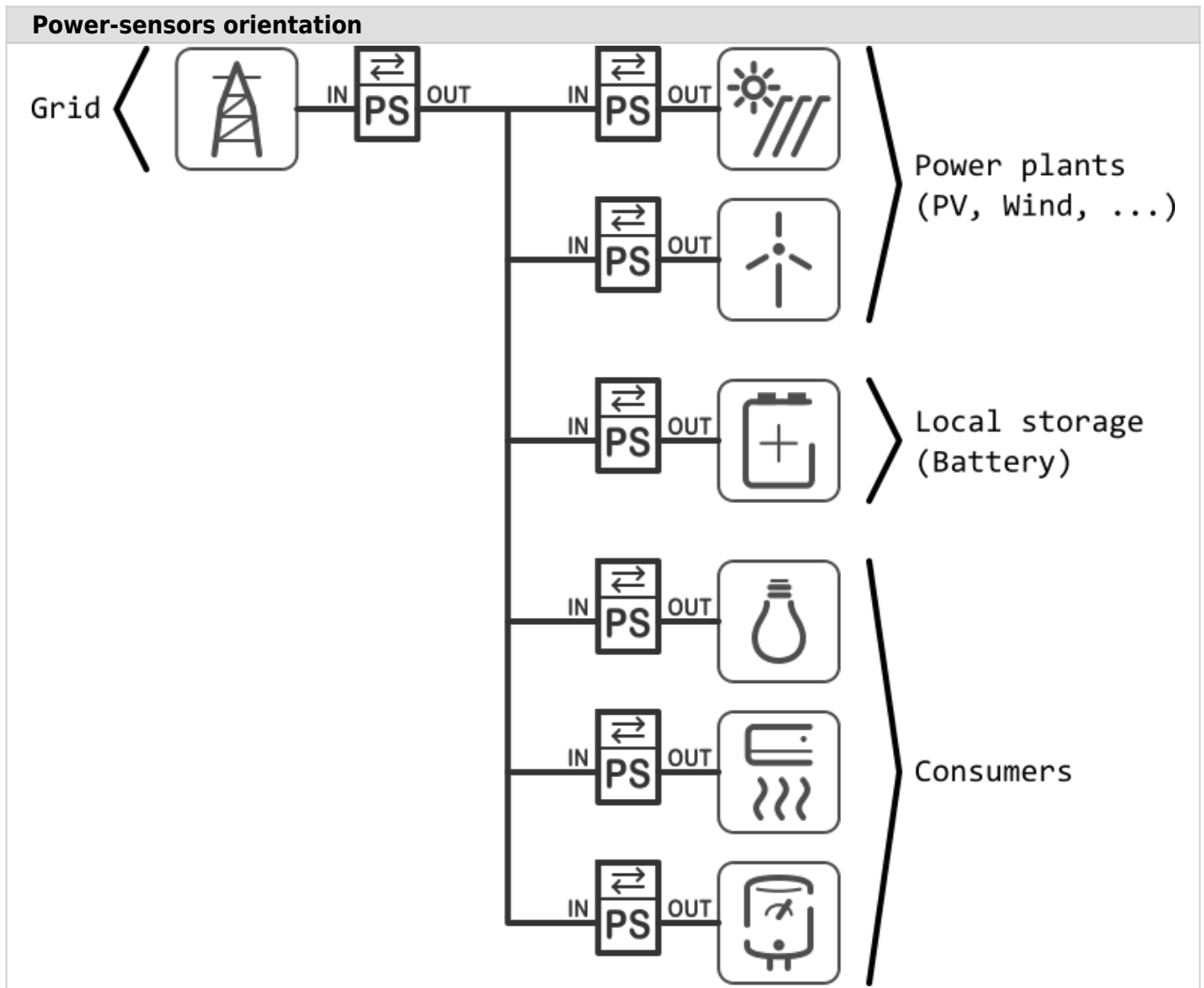
### PM1-E-D-CT



**PM3-E-D-CT**





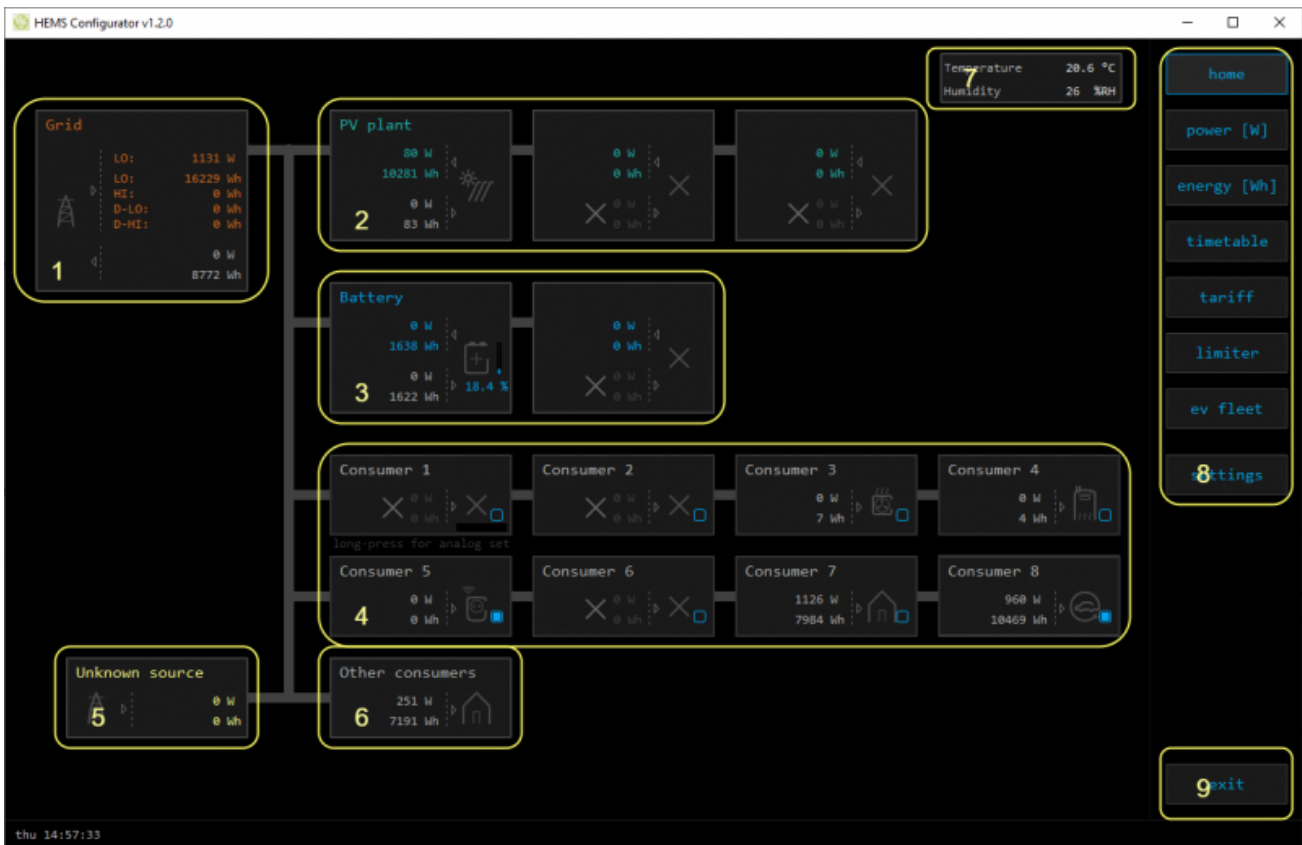


# HEMS v1.2.0 Configurator

## HEMS Configurator

### home

Basic system overview.



| 1. Grid                           |           |   |
|-----------------------------------|-----------|---|
| >                                 | From grid | Tariff (LO, HI, D-LO, D-HI) and power from grid in W<br>Imported energy by tariff in Wh |
| <                                 | To grid   | Power exported to grid in W<br>Exported energy in Wh                                    |
| 2. Plants                         |           |   |
| <                                 | Produced  | Produced power in W and energy in Wh  |
| >                                 | Consumed  | Consumed power in W and energy in Wh  |
| 3. Storage systems                |           |   |
| <                                 | Sourced   | Power in W and energy in Wh sourced from storage (battery)                              |
| >                                 | Stored    | Power in W and energy in Wh stored (to battery)   |
| <b>bargraph and %<sup>1</sup></b> | SOC       | Battery State Of Charge   |
| 4. Consumers                      |           |   |
| >                                 | Consumed  | Consumed power in W and energy in Wh  |

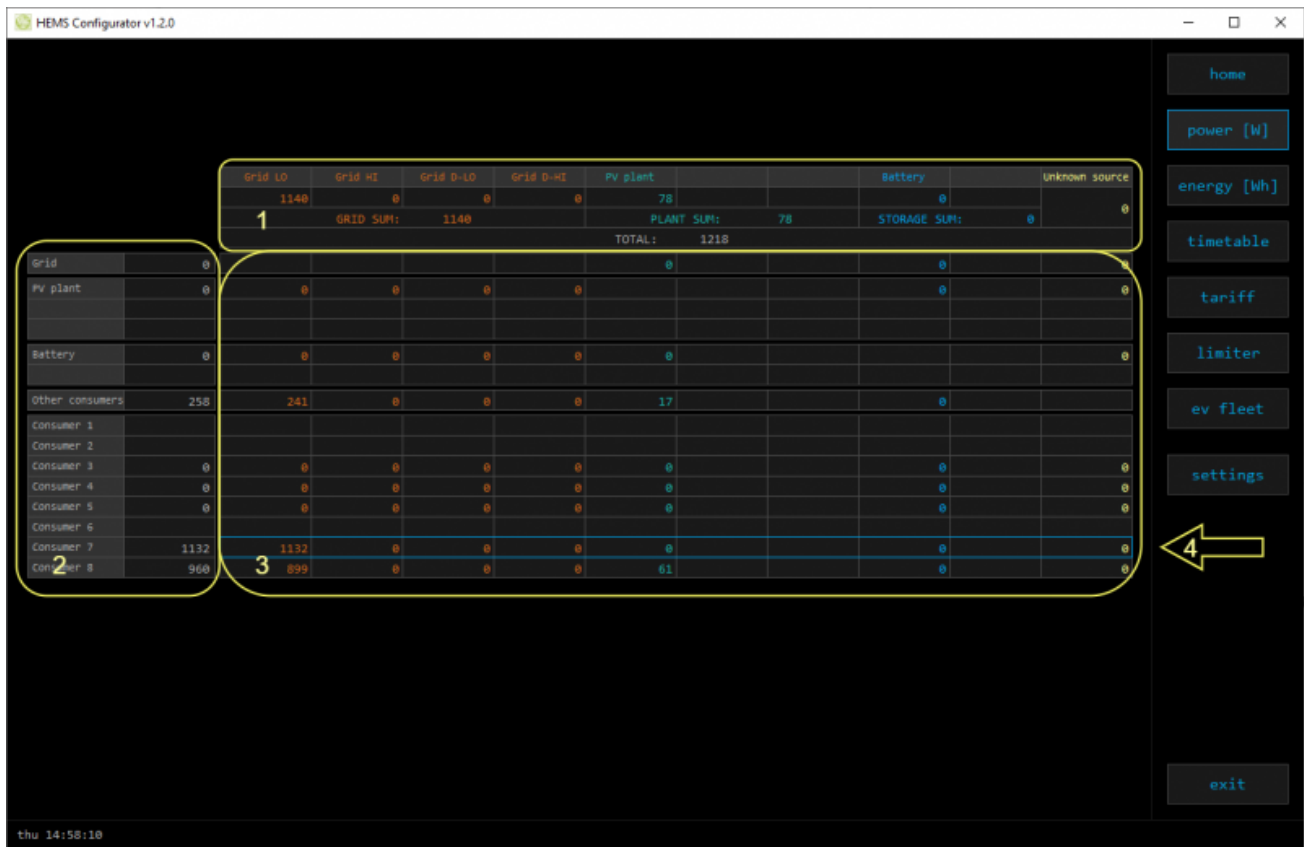
|   |             |  |
|---|-------------|--|
| <b>[ ]</b>  | Status      | Output status for managed consumers                                    |
| <b>bargraph</b> <sup>2</sup>  | Analog out  | Analog output value  |
| <b>click</b>  | Toggle      | Click in frame toggles managed consumers output                        |
| <b>long-press</b> <sup>2</sup>                                      | Set analog  | Long press on first consumer pops-up dialog for analog value set       |
| <b>5. Unknown source</b>  |             |  |
| >   | Sourced     | Power in W and energy in Wh from unknown source                        |
| ! Accumulate also all differences caused by power-sensor inaccuracy |             |  |
| <b>6. Other consumers</b>   |             |  |
| >   | Consumed    | Consumed power in W and energy in Wh by other (not measured) consumers |
| <b>7. Temperature and humidity</b>                                  |             |  |
|   | Temperature | Temperature in °C  |
|   | Humidity    | Humidity in % RH   |
| <b>8. Page navigation</b>   |             |  |
|   | Home        | Home screen  |
|   | Power [W]   | Power screen   |
|   | Energy [Wh] | Energy screen  |
|   | Timetable   | Timetable screen   |
|   | Tariff      | Tariff screen  |
|   | Limiter     | Limiterscreen  |
|   | EV fleet    | EV fleet screen  |
|   | Settings    | Settings screen  |
| <b>9. Exit</b>  |             |  |
|   | Exit        | Close application  |

<sup>1</sup> only for eStore

<sup>2</sup> only for first managed consumer

# power

Overview of current power distribution by source / consumer.



|   |
|---|
| <b>1. Sourced power</b>                     |
| Sourced power for each source               |
| Sums per source type                        |
| Total of all sourced power                  |
| <b>2. Consumed power</b>                    |
| Power for each consumer                     |
| <b>3. Power distribution</b>                |
| Partial distributed power                   |
| <b>4. Submeter (Blue outline)</b>           |
| Power meter is not part of internal circuit |

HEMS Configurator v1.2.0

|                 | Grid LO        | Grid HI | Grid D-LO | Grid D-HI | PV plant      | Battery        | Unknown source |
|-----------------|----------------|---------|-----------|-----------|---------------|----------------|----------------|
|                 | 1140           | 0       | 0         | 0         | 78            | 0              | 0              |
|                 | GRID SUP: 1140 |         |           |           | PLANT SUP: 78 | STORAGE SUP: 0 | 0              |
|                 |                |         |           |           | TOTAL: 1318   |                |                |
| 2               | 0              |         |           |           | 0             | 0              | 0              |
| PV plant        | 0              | 0       | 0         | 0         | 0             | 0              | 0              |
| Battery         | 0              | 0       | 0         | 0         | 0             | 0              | 0              |
| Other consumers | 258            | 241     | 0         | 0         | 17            | 0              | 0              |
| Consumer 1      |                |         |           |           |               |                |                |
| Consumer 2      |                |         |           |           |               |                |                |
| Consumer 3      | 0              | 0       | 0         | 0         | 0             | 0              | 0              |
| Consumer 4      | 0              | 0       | 0         | 0         | 0             | 0              | 0              |
| Consumer 5      | 0              | 0       | 0         | 0         | 0             | 0              | 0              |
| Consumer 6      |                |         |           |           |               |                |                |
| Consumer 7      | 1132           | 1132    | 0         | 0         | 0             | 0              | 0              |
| Consumer 8      | 960            | 899     | 0         | 0         | 61            | 0              | 0              |

Navigation buttons: home, power [W], energy [MWh], timetable, tariff, limiter, ev fleet, settings, exit

thu 14:58:10

**1. Sourced power distribution**

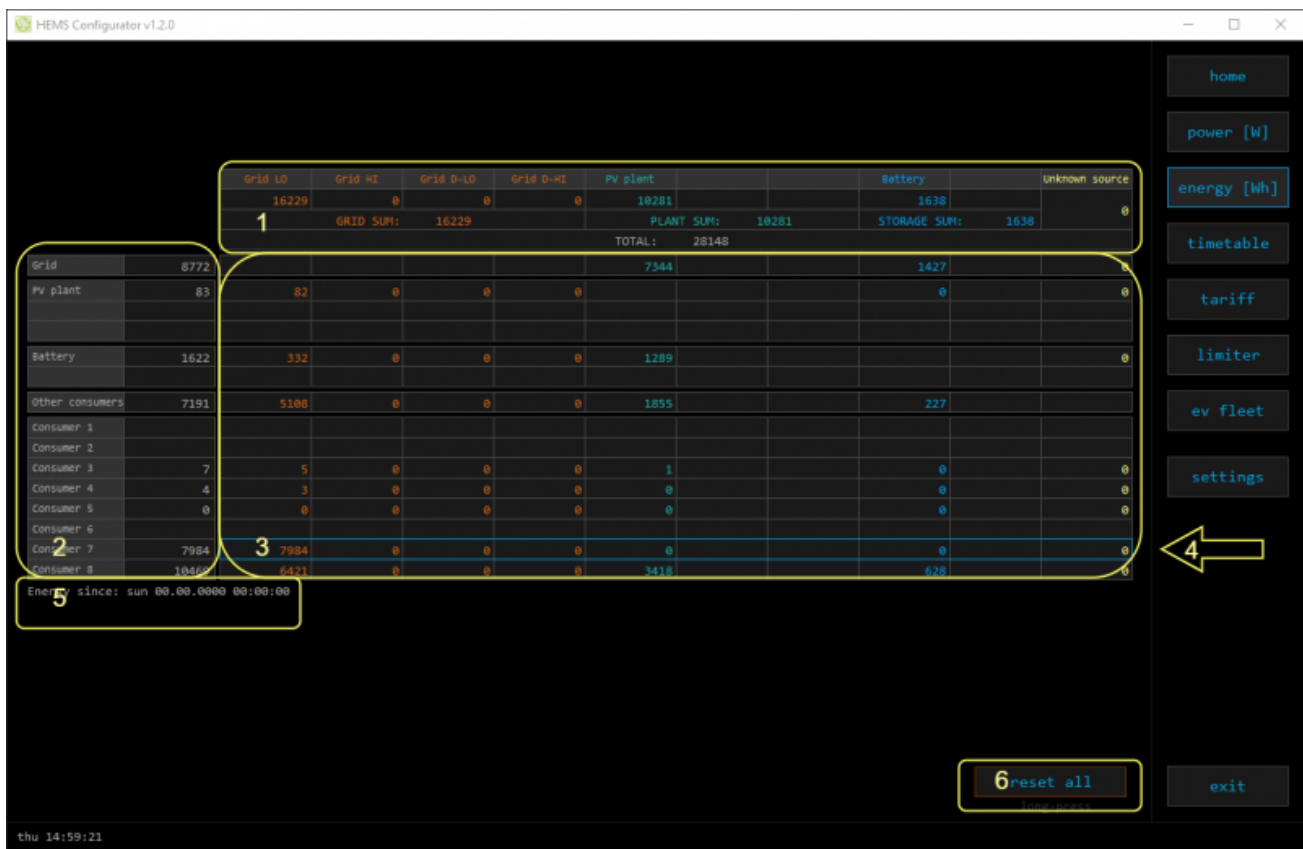
How sourced power is consumed by each consumer

**2. Consumed power distribution**

Who sources consumed power

# energy

Energy overview of a given time distributed by sources / consumers.



## 1. Sourced energy

Sourced energy for each source

Sums per source type

Total of all sourced energy

## 2. Consumed energy

Energy for each consumer

## 3. Energy distribution

Partial distributed energy

## 4. Submeter (Blue outline)

Power meter is not part of internal circuit

## 5. Energy since

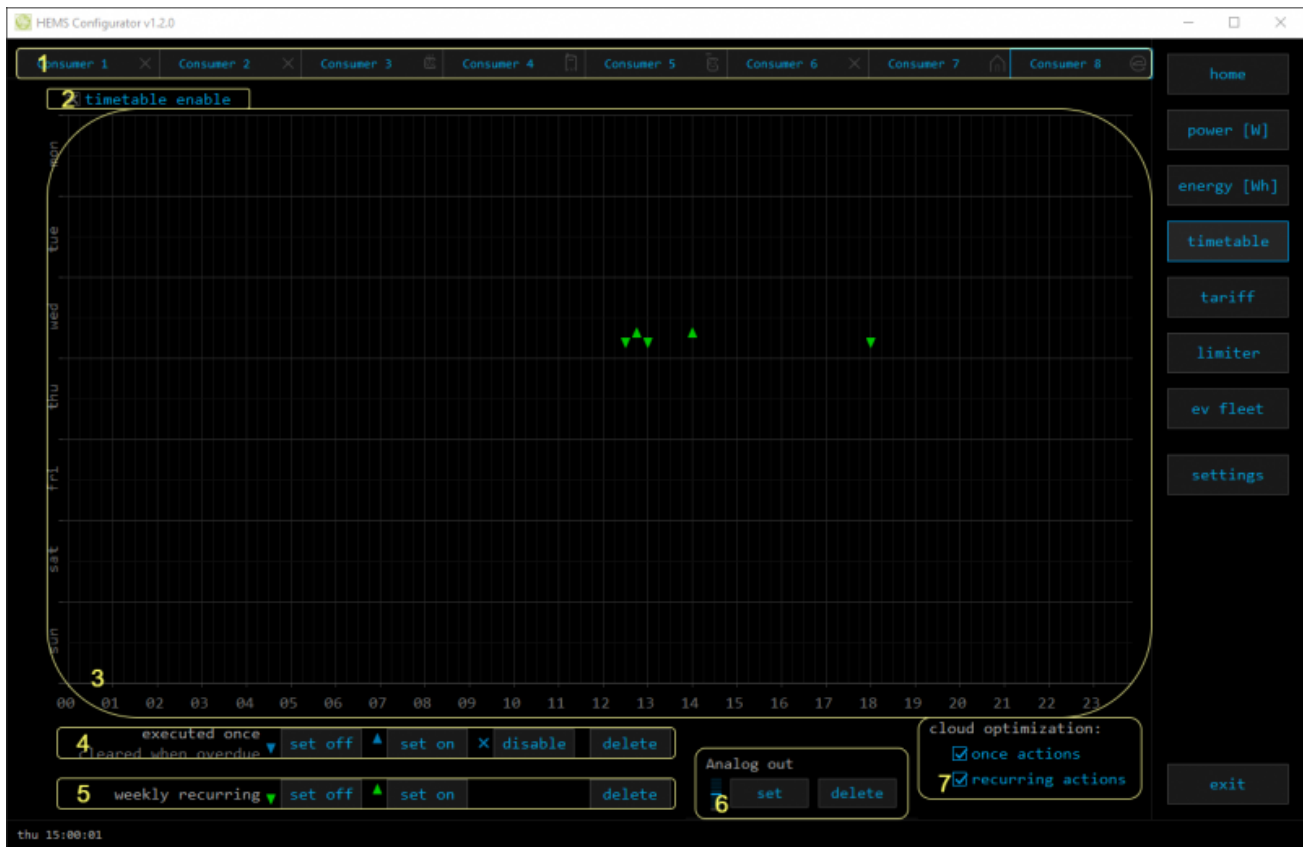
Date and time since energy is recorded

## 6. Reset all

Long-press to reset all energy counters

# timetable

Weekly timetable for managed consumers.



## 1. Managed load menu

Switch between managed loads

## 2. Enable checkbox

When un-checked timetable is not executed

## 3. Events grid

Events displayed in weekly grid (15 min resolution)

Click to select time and set event by clicking buttons below

## 4. Once actions (top priority timetable actions)

Actions are executed and then automatically cleared.

“Disable” action will just disable recurring action.

## 5. Recurring actions (low priority actions)

Actions are executed each week.

## 6. Analog out <sup>1</sup>

Action to set analog output. Analog actions are recurring.

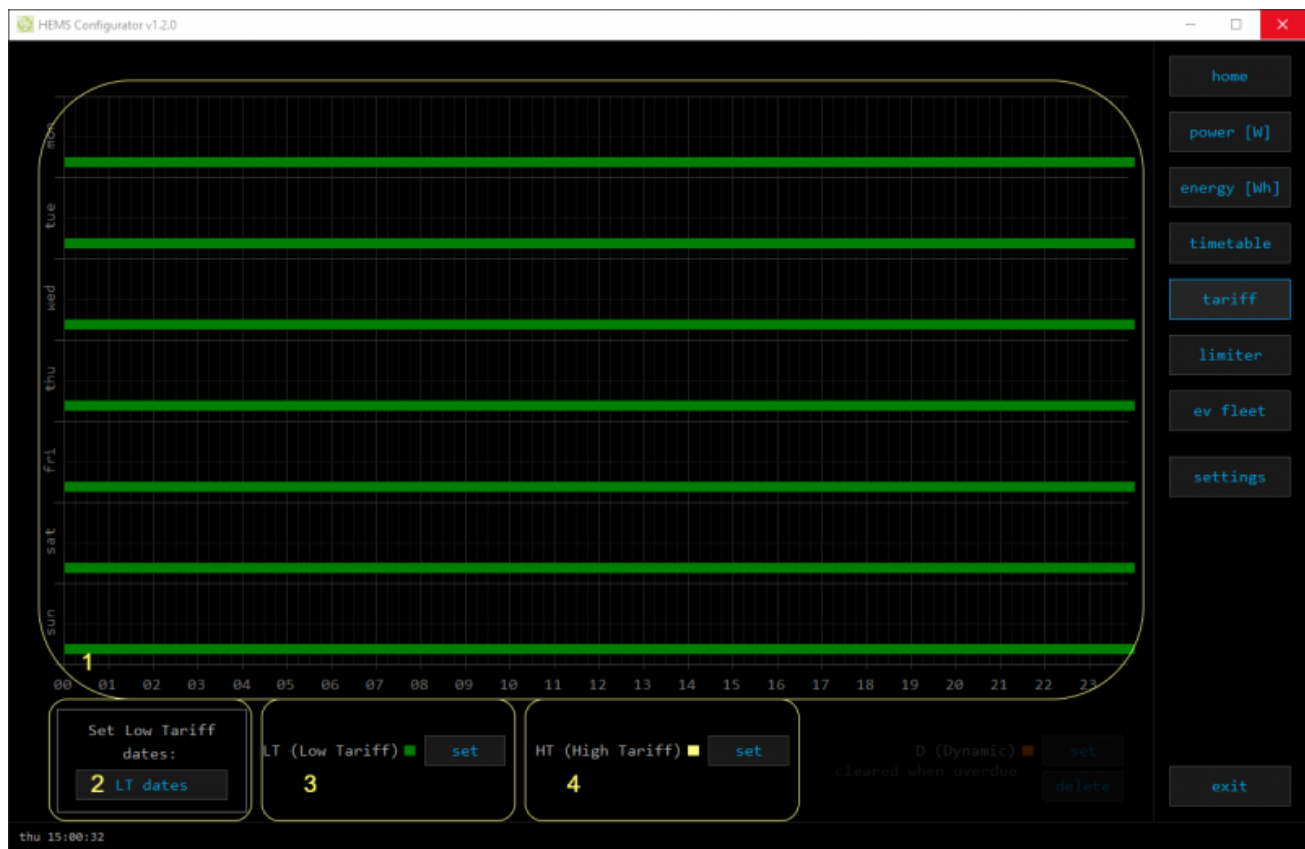
## 7. Cloud optimization

When enabled (checked) cloud optimization is enabled.

<sup>1</sup> only for Consumer 1

# tariff

Weekly tariff timetable for grid energy per tariff distribution.



## 1. Tariff grid

Graphical weekly timetable with tariffs.

Click to select term, click-and-drag to select multiple terms.

## 2. Low tariff dates

Set low tariff dates for holidays.

## 3. Low tariff

Set low tariff for selected terms.

## 4. High tariff

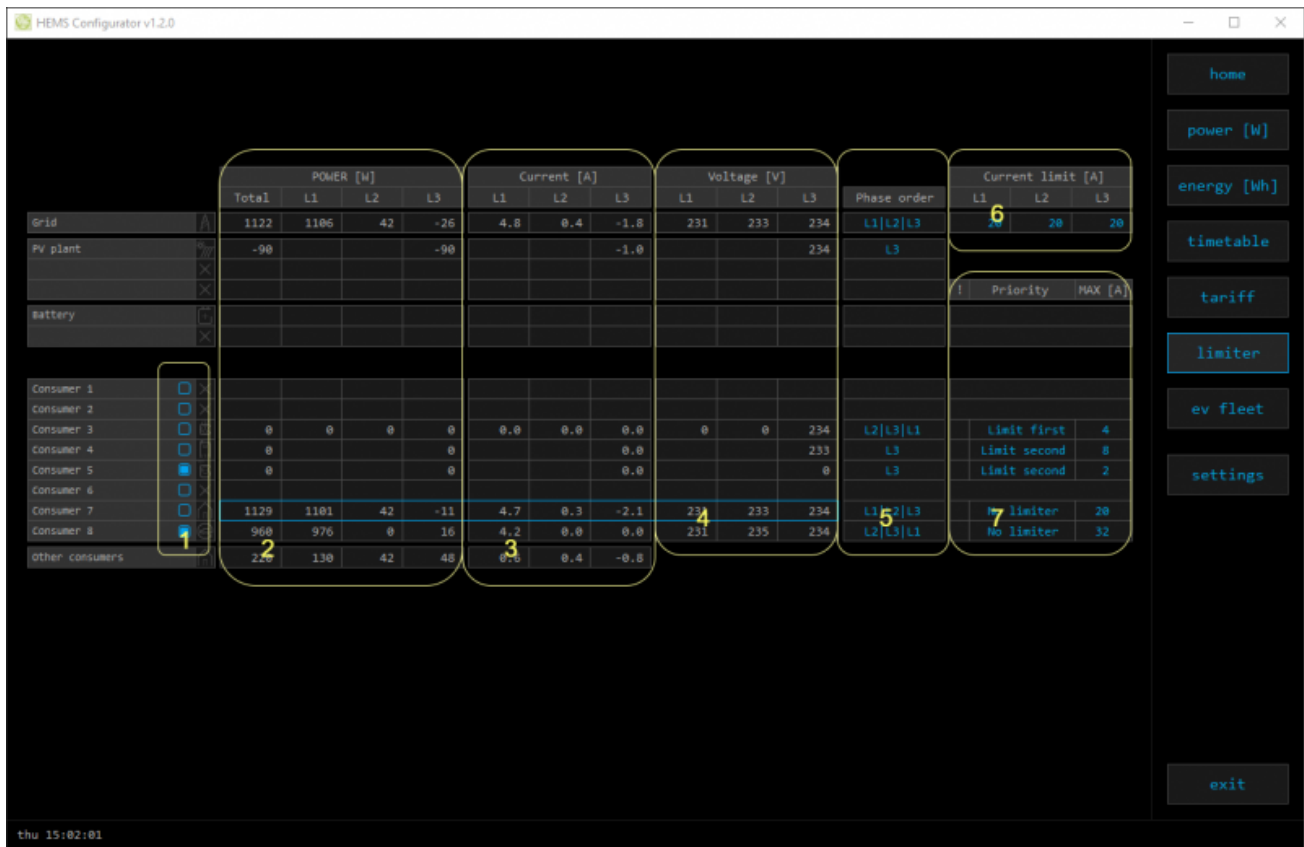
Set high tariff for selected terms.





# limiter

Overview and configuration of limiter

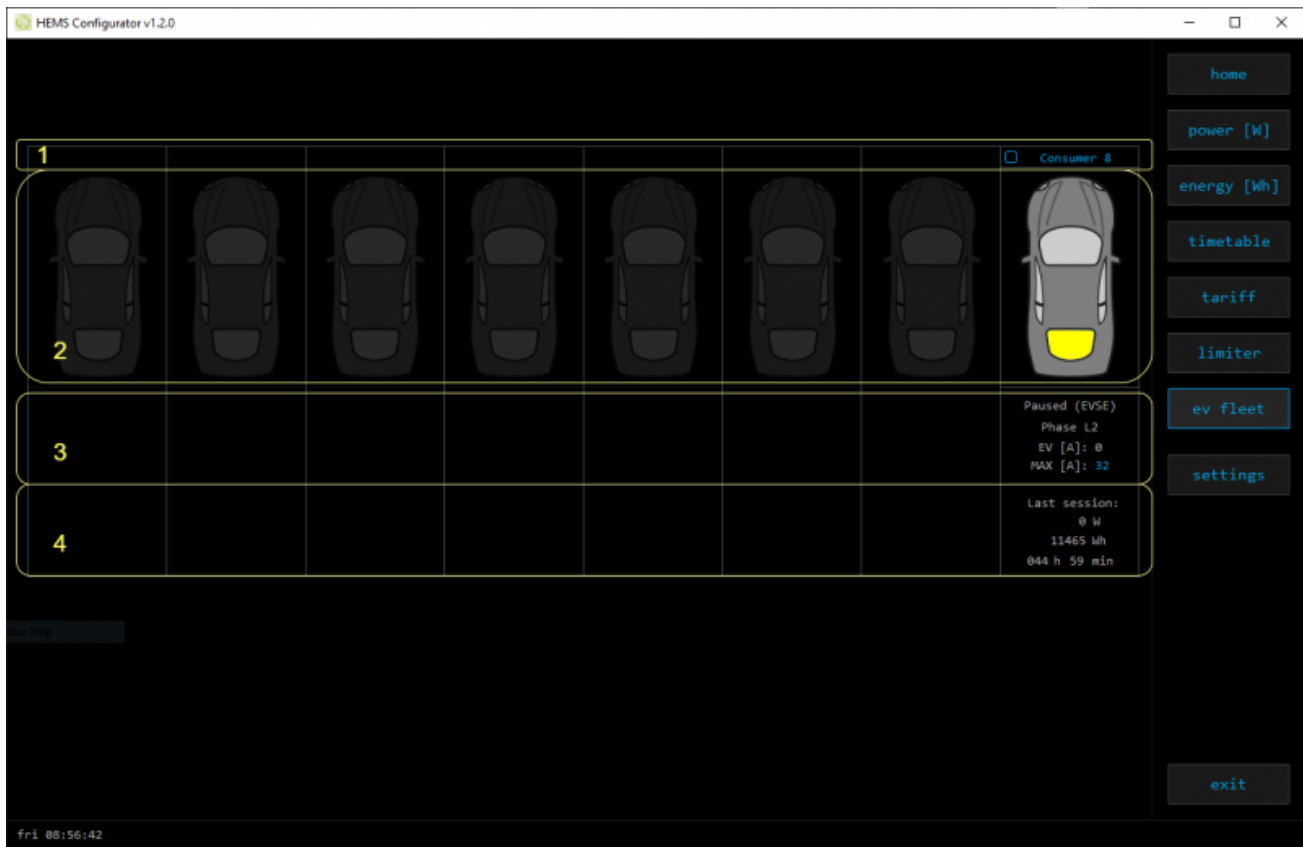


|   |   |
|---|---|
| <b>1. Consumer management</b>   |   |
| Turn consumers on or off  |   |
| <b>2. Power</b>   |   |
| Total power and power for each phase  |   |
| <b>3. Current</b>   |   |
| Current for each phase  |   |
| <b>4. Voltage</b>   |   |
| Voltage for each phase  |   |
| <b>5. Phase order</b>   |   |
| Setting correct phase order after power meters were installed (commissioning) |   |
| <b>6. Current limit</b>   |   |
| Current limit threshold for main grid fuse                                    |   |
| <b>7. Status, priority and current setpoint</b>                               |   |
| ! ⚠️  | Status when limiter is active   |
| Priority  | Device priority group (no limiter, limit last, limit second, limit first) |
| Max [A] <sup>1</sup>  | Device expected current draw  |

<sup>1</sup> parameter is dynamically set for all devices, except for the EV charging stations

# ev fleet

Overview and configuration of EV charging stations



## 1. EV charging station management

Turn EV station on or off

## 2. EV vehicle status

|        |                 |
|--------|-----------------|
| GREY   | Stand by        |
| RED    | Error           |
| YELLOW | Charging paused |
| BLUE   | Charging        |
| GREEN  | Charging done   |

## 3. EV charging station status

|                 |                                |
|-----------------|--------------------------------|
| Status          | Status of EV charging station  |
| Phase detection | Detection of utilized phases   |
| EV [A]          | EV charger max allowed current |
| MAX [A]         | User set MAX charging current  |

## 3. EV charging session

|          |                           |
|----------|---------------------------|
| Power    | Actual power draw         |
| Energy   | Energy delivered to EV    |
| Duration | Session charging duration |

# settings

Easy and intuitive system setup.



## 1. System settings

|                 |            |   |
|-----------------|------------|---|
| [ autodetect ]  |            | Click to find HEMS in local network   |
| eStore          | c.....     | eStore serial number (automatically detected or can be entered manually).   |
|                 | [ ] enable | When checked HEMS will read Grid, first plant and first Storage directly from eStore (so there is no need to duplicate power-sensor). |
|                 | [detect]   | eStore address is cleared and new eStore can be detected.   |
| HIQ Home        | c.....     | HIQ Home serial number (automatically detected or can be entered manually).   |
|                 | [ ] enable | When checked HEMS will read Grid power and energy from HIQ Home (so there is no need to duplicate power-sensor).                      |
|                 | [detect]   | HIQ Home address is cleared so new can be detected.   |
| Virtual grid PM | [ ] enable | Check if system is without main grid power meter. Energy, power and currents are calculated from other power meters.                  |

## 2. Internet access and modbus

|  |   |  |
|--|---|--|
| [ ] enable                                     | When checked HEMS is automatically connected to HIQ Universe cloud service. The connection is initialized by the HEMS system and uses UDP packets on port 8442. |  |
| [test]   | New "push" message is sent to server and roundtrip time is rechecked.   |  |
| [reset]  | Clear messages counts and roundtrip time  |  |
| push timer                                     | Timer in s for send "push" message to server  |  |
| messages                                       | Sent "push" messages / responses counters   |  |
| roundtrip                                      | Time in ms between sent push message and response.  |  |
| Modbus cycle time                              | Time in ms for modbus communication to complete reading of all connected devices.   |  |
| <b>3. Sources and Consumers settings table</b> |   |  |
| SOURCES  | Source name   |  |
| icon   | Source icon   |  |
| <b>4. Device status</b>                        |   |  |
| Status   | Status OK, Warning, Error, Detected   |  |
| <b>5. Device message</b>                       |   |  |
| source and consumer management                 | Source or consumer power-sensor management  |  |
|  | message   | Messages regarding source or consumer power-sensor                                   |
| <b>6. Device configuration</b>                 |   |  |
| Configuration                                  | add   | Associate new power-sensor to source or consumer                                     |
|  | del   | Disassociate power-sensor from source or consumer & configure it as new power-sensor |
| <b>7. Device type</b>                          |   |  |
| meter  | Source or consumer power-sensor type  |  |
| configuration                                  | in/ex   | Power plant connection <sup>1</sup>  |
| <b>8. Submeter option</b>                      |   |  |
| sub  | Check if this power meter or device is not part of internal circuit. Energy division for this device is ignored and outlined in blue border.                    |  |
| <b>9. Wireless settigs</b>                     |   |  |
| new device                                     | Power-sensor configured as new one detected or wireless module configuration <sup>2</sup>   |  |
| Wireless setting                               | Setting up wireless modules: pairing, adding and delete the wireless modules and setting repeater level   |  |
| <b>10. Device output</b>                       |   |  |
| output   | Consumer output type  |  |
|  | <<>>  | Set repeater level <sup>3</sup>  |
| man. time                                      | Manged consumer manual override timer   |  |
| out mode                                       | Manged consumer output mode (normal or inverted)  |  |
| timetable                                      | Manged consumer timetable execution enabled   |  |
| <b>11. Permanent memory parameters</b>         |   |  |
| [init parameters]                              | Init all parameters to default values   |  |
| [save parameters]                              | Save all parameters to permanent memory   |  |
| [read parameters]                              | Read all parameters from permanent memory   |  |

|                                   |  |
|-----------------------------------|--|
| [ ] autosave parameters           | Parameters will be automatically saved to permanent memory in 15 minutes after last parameter change |
| <b>12. Backup / Restore to PC</b> |  |
| [backup]                          | Backup all parameters to PC  |
| [restore]                         | Restore all parameters from PC backup  |

<sup>1</sup> only for the first power plant

<sup>2</sup> wireless setting must be enabled

<sup>3</sup> only for wireless modules and wireless setting must be enabled

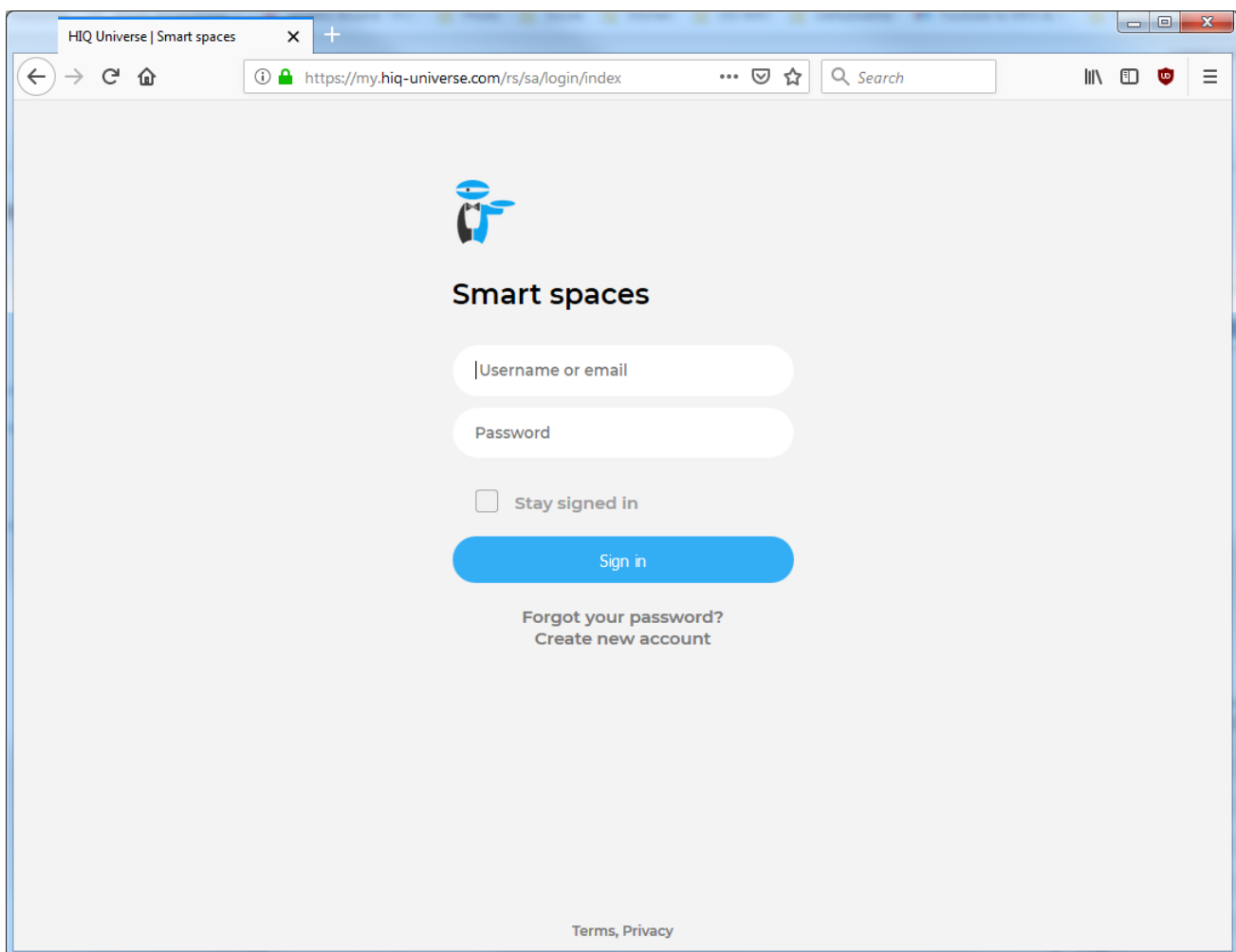
# HIQ UNIVERSE

HIQ Universe is a cloud service that enables:

- An overview of current power consumption and
- An overview of the history of electrical power and energy consumption and production.

Access point: <https://my.hiq-universe.com>

## HIQ Universe Log-in



The screenshot shows a web browser window with the URL <https://my.hiq-universe.com/rs/sa/login/index>. The page features a blue robot-like logo at the top center, followed by the heading "Smart spaces". Below the heading are two input fields: "Username or email" and "Password". There is a checkbox labeled "Stay signed in" and a prominent blue "Sign in" button. At the bottom of the form area, there are two links: "Forgot your password?" and "Create new account". At the very bottom of the page, there are links for "Terms, Privacy".

Log in with your username or email and password to see your [HIQ Universe subscription dashboard](#).

To reset forgotten password click on "[Forgot your password?](#)"


To create new account click on "[Create new account](#)".

## Create HIQ Universe account

HIQ Universe | Create new account X +

https://my.hiq-universe.com/rs/sa/register/index

Search



### Create new account

Choose your username


Your first name and last name

Email address

UTC+1:00 Africa/Algiers

••••••

Confirm your password

Nisem robot. 

Accept Terms and Conditions

Create account

In the appropriate fields, enter:

- Username
- First and Last name
- E-mail address
- Timezone
- Password

Click on "I'm not a robot"

Accept Terms and Conditions.

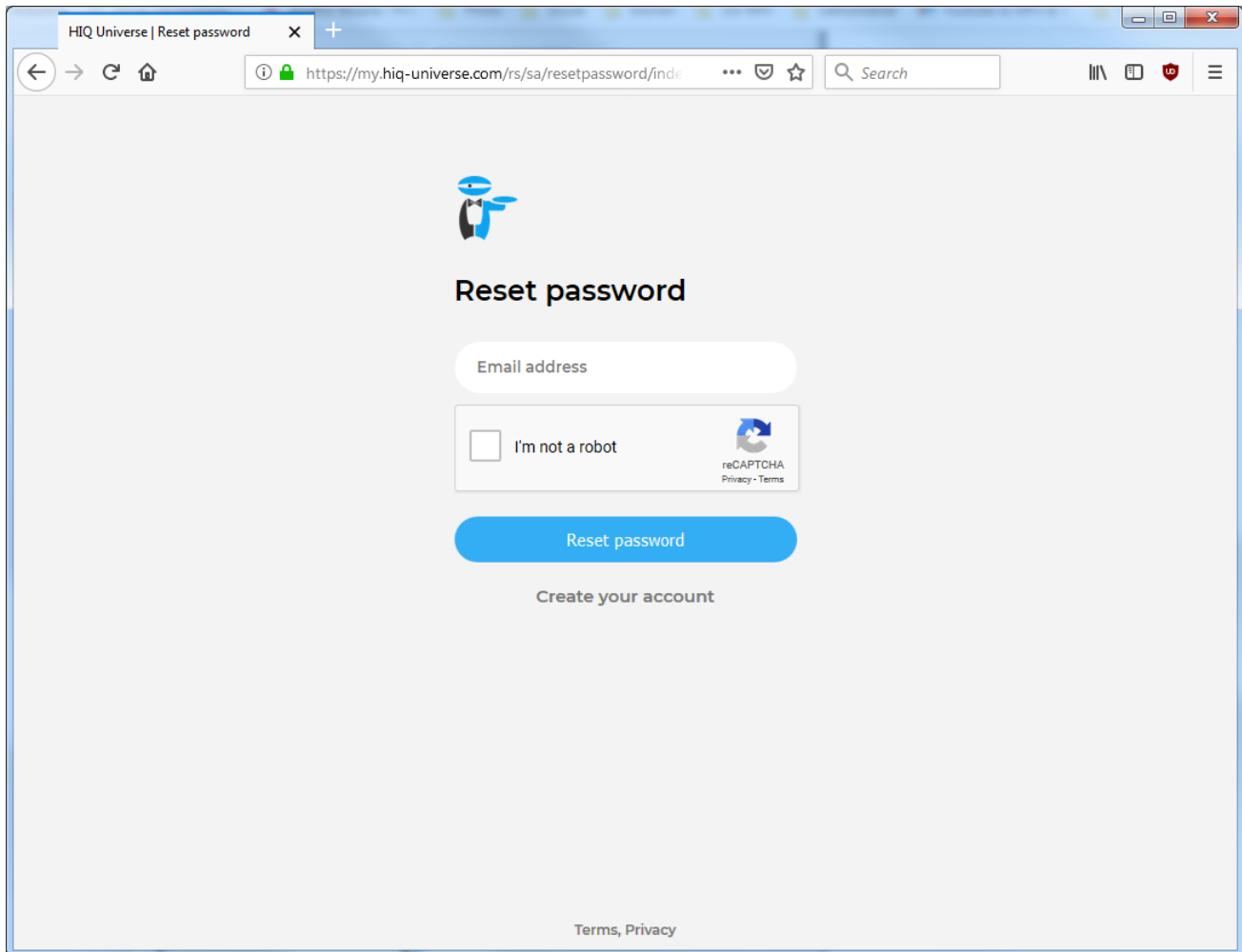
Click on Create account.

A confirmation link will be sent to your email address.

Proceed to ["HIQ Universe Log-in"](#) screen.

## Reset forgotten password





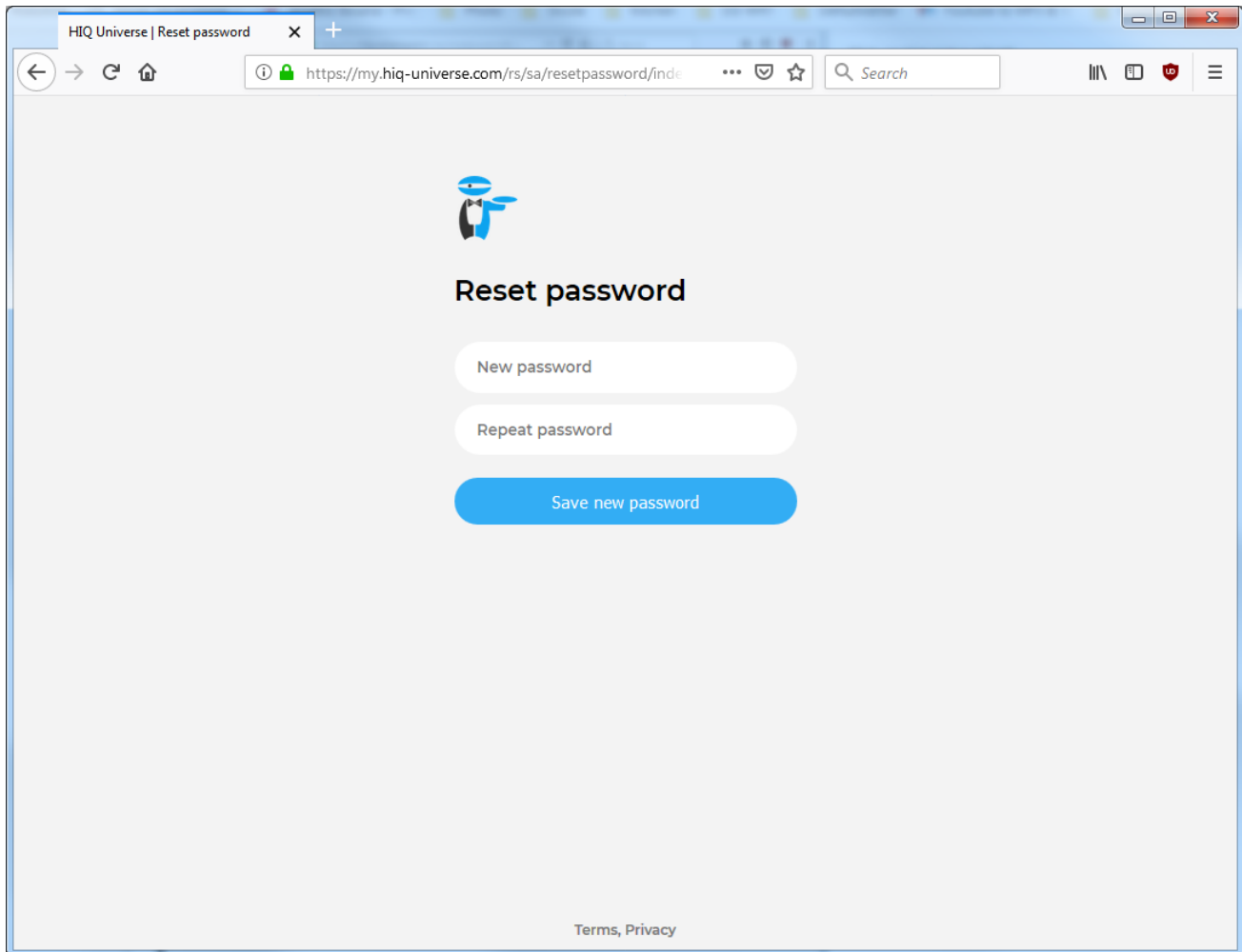
The screenshot shows a web browser window with the title "HIQ Universe | Reset password". The address bar displays the URL "https://my.hiq-universe.com/rs/sa/resetpassword/index". The page content includes a blue robot icon, the heading "Reset password", an "Email address" input field, a checkbox labeled "I'm not a robot" next to a reCAPTCHA widget, a blue "Reset password" button, and a "Create your account" link. At the bottom, there are links for "Terms, Privacy".

In the appropriate field, enter email address.

Click on "I'm not a robot"

Click on "Reset password".

You will receive email with password reset link.

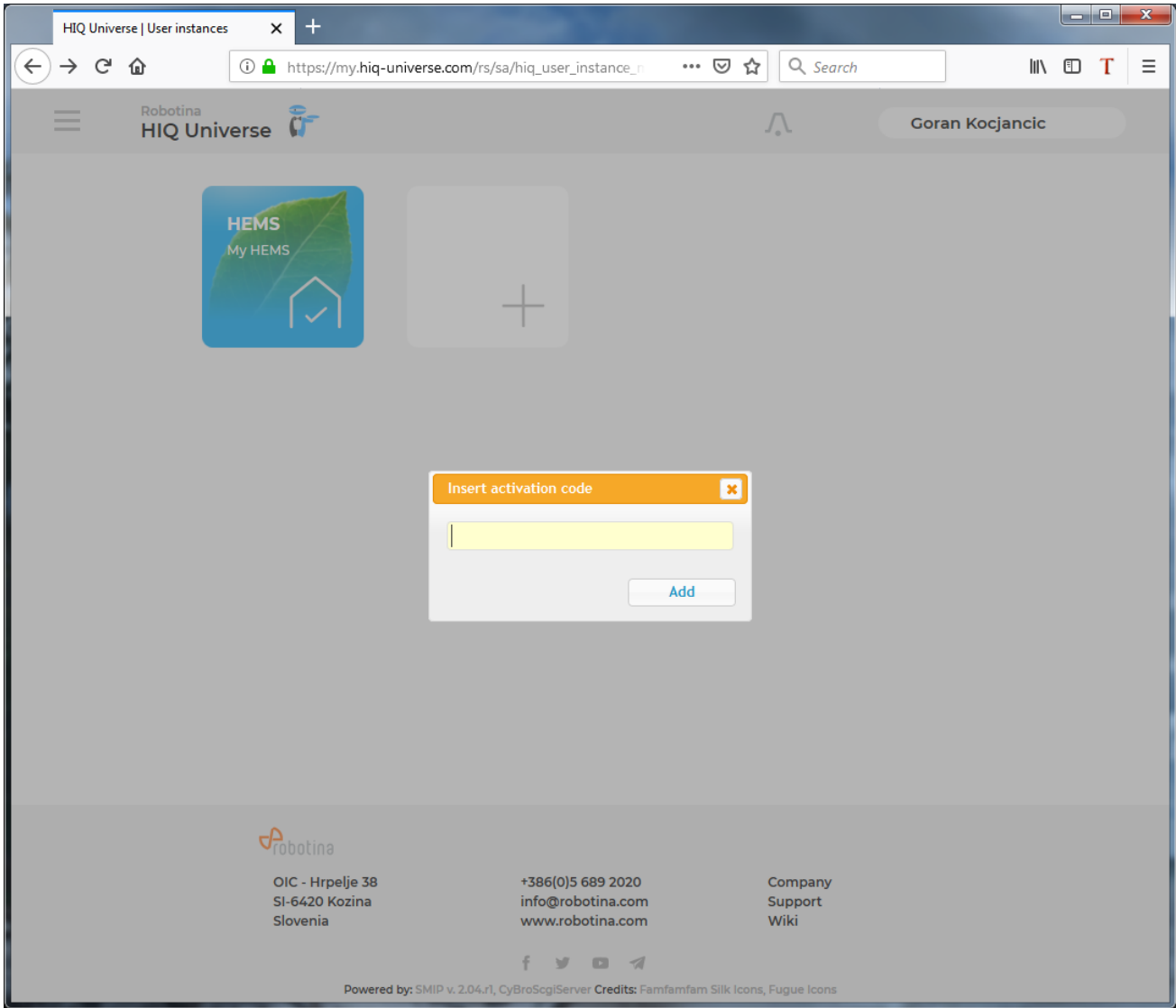


The screenshot shows a web browser window with the title "HIQ Universe | Reset password". The address bar displays "https://my.hiq-universe.com/rs/sa/resetpassword/index". The page content includes a blue robot-like logo at the top center, followed by the heading "Reset password". Below the heading are three input fields: "New password", "Repeat password", and a blue "Save new password" button. At the bottom center of the page, there are links for "Terms, Privacy".

Enter new password and click on "Save new password".

Proceed to "[HIQ Universe Log-in](#)" screen.

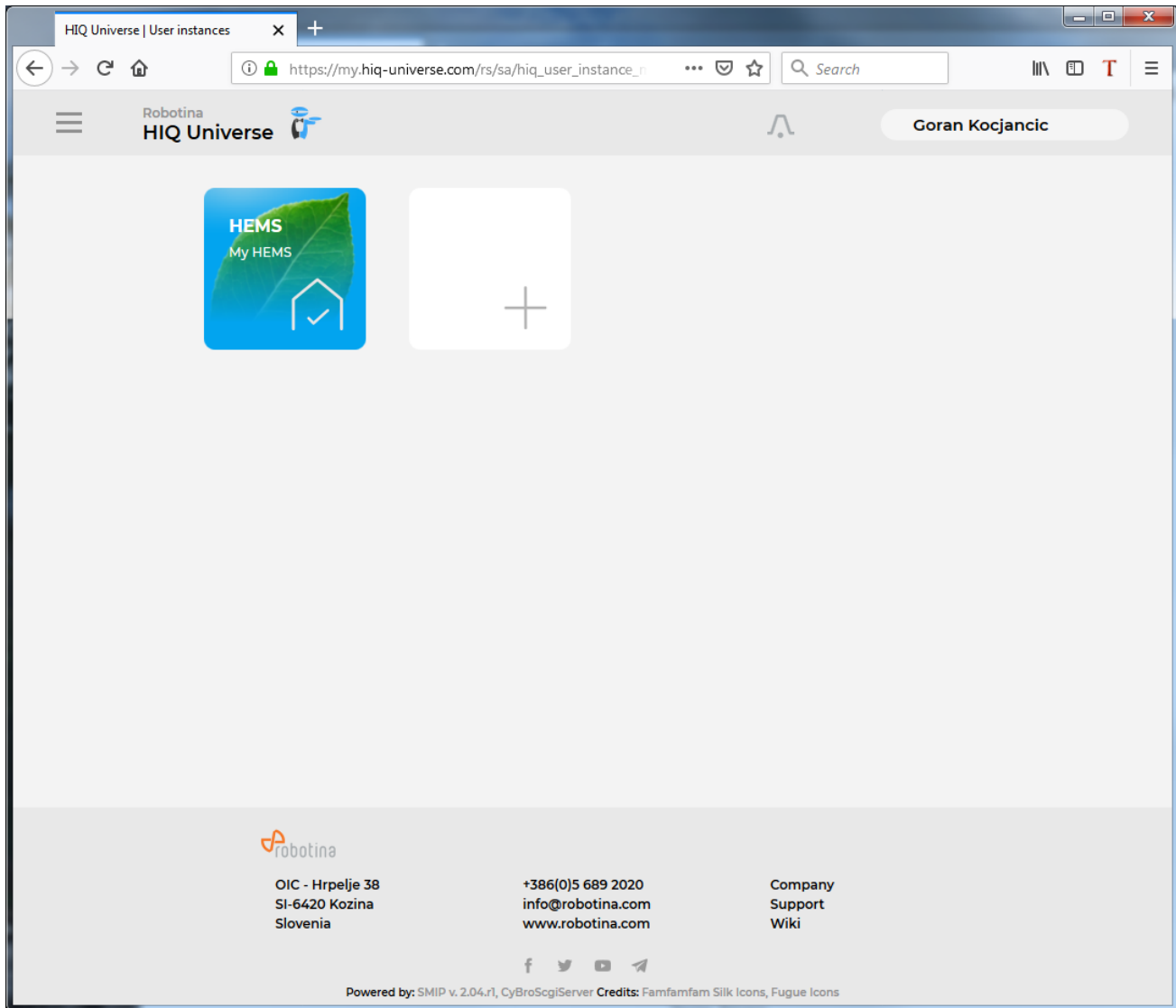
## **Add HEMS controller**



Enter HEMS activation code from “HEMS Quick Set-Up Guide” found in HEMS box.

A screenshot of the HIQ Universe registration form. The form has a blue header with 'HIQ UNIVERSE' and the URL 'https://my.hiq-universe.com'. Below the header are three input fields labeled 'user name', 'email', and 'password'. At the bottom of the form, there is a box containing the activation code: 'ACTIVATION CODE SN-0012345A-85212FC25-685D-BEBE'.

## HIQ Universe subscription dashboard



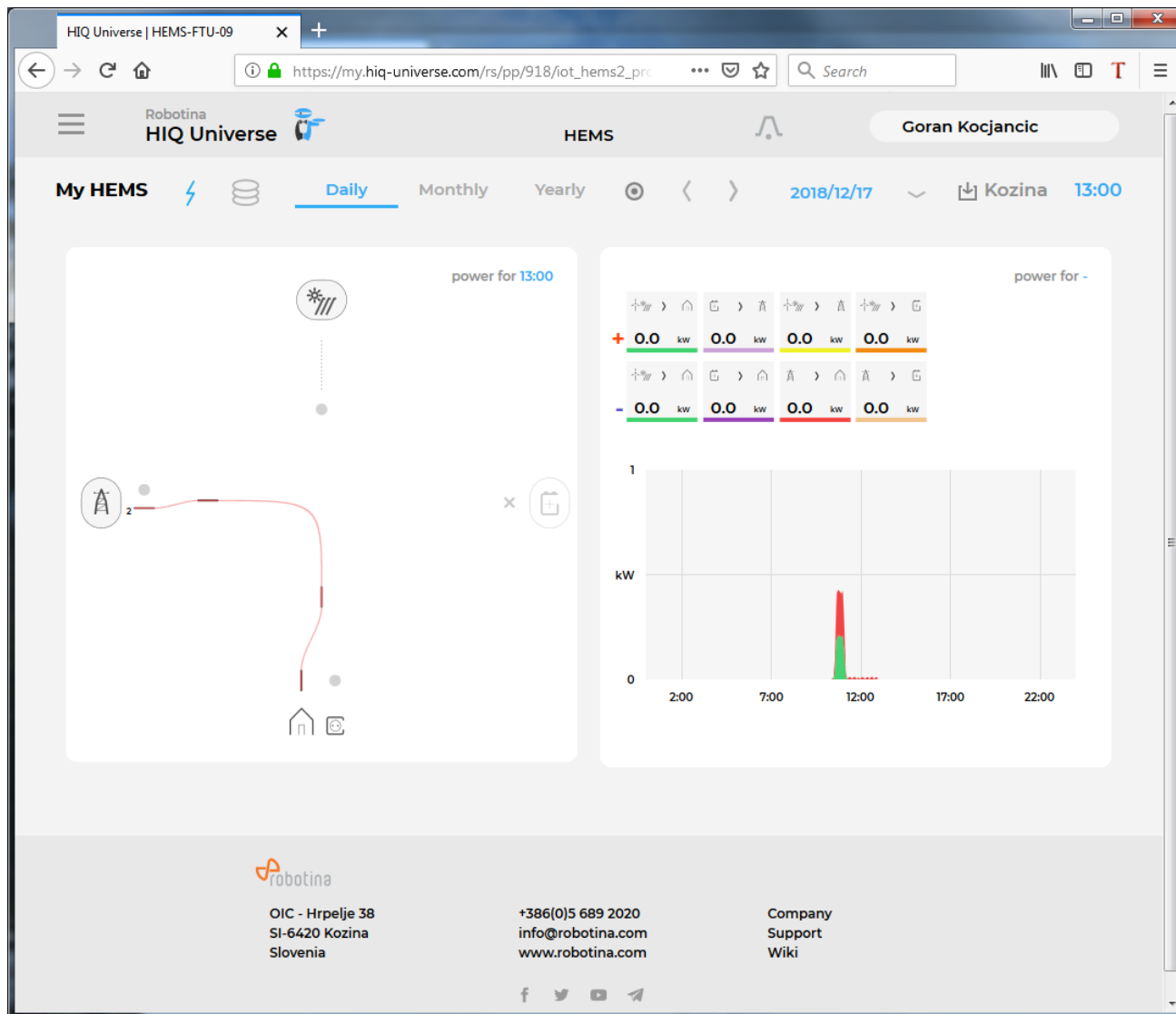
You will see tiles for all your subscribed HIQ Universe devices and services.

Go to [Main HEMS view](#) by clicking on HEMS tile or

add [new HEMS device](#) by clicking on blank tile with + sign.

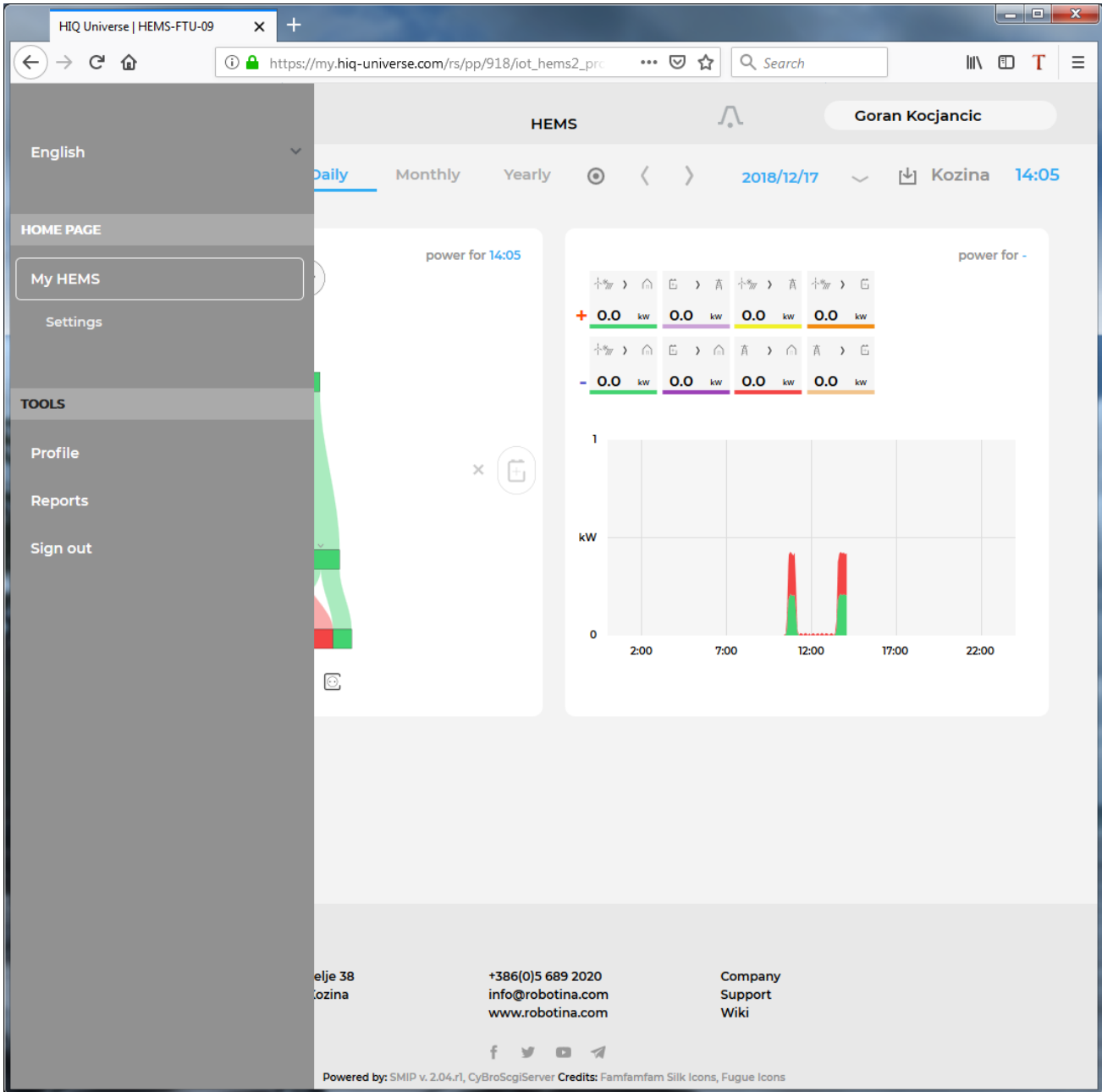
["User profile set-up"](#) is invoked by clicking on user name on top right.

## Main HEMS view



Main HEMS page consists of 3 sections:

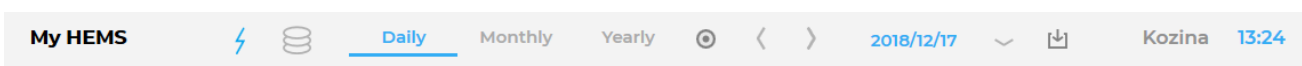
- "Title and view selection row" at the top
- "Power flow chart" on left side
- "Power and energy time-plot" on right



Side menu is activated by clicking menu icon (tree vertical lines at top-left). Menu items are dynamic created so can be different for each user. Typical menu items from top:

- Language selection
- Home page → section with all your subscribed HIQ Universe devices and services
  - MyHems → "Main HEMS view"
    - Settings → "HEMS settings"
- TOOLS → section with general site tools
  - Profile → "User profile set-up"
  - Sign out → Log off from HIQ Universe

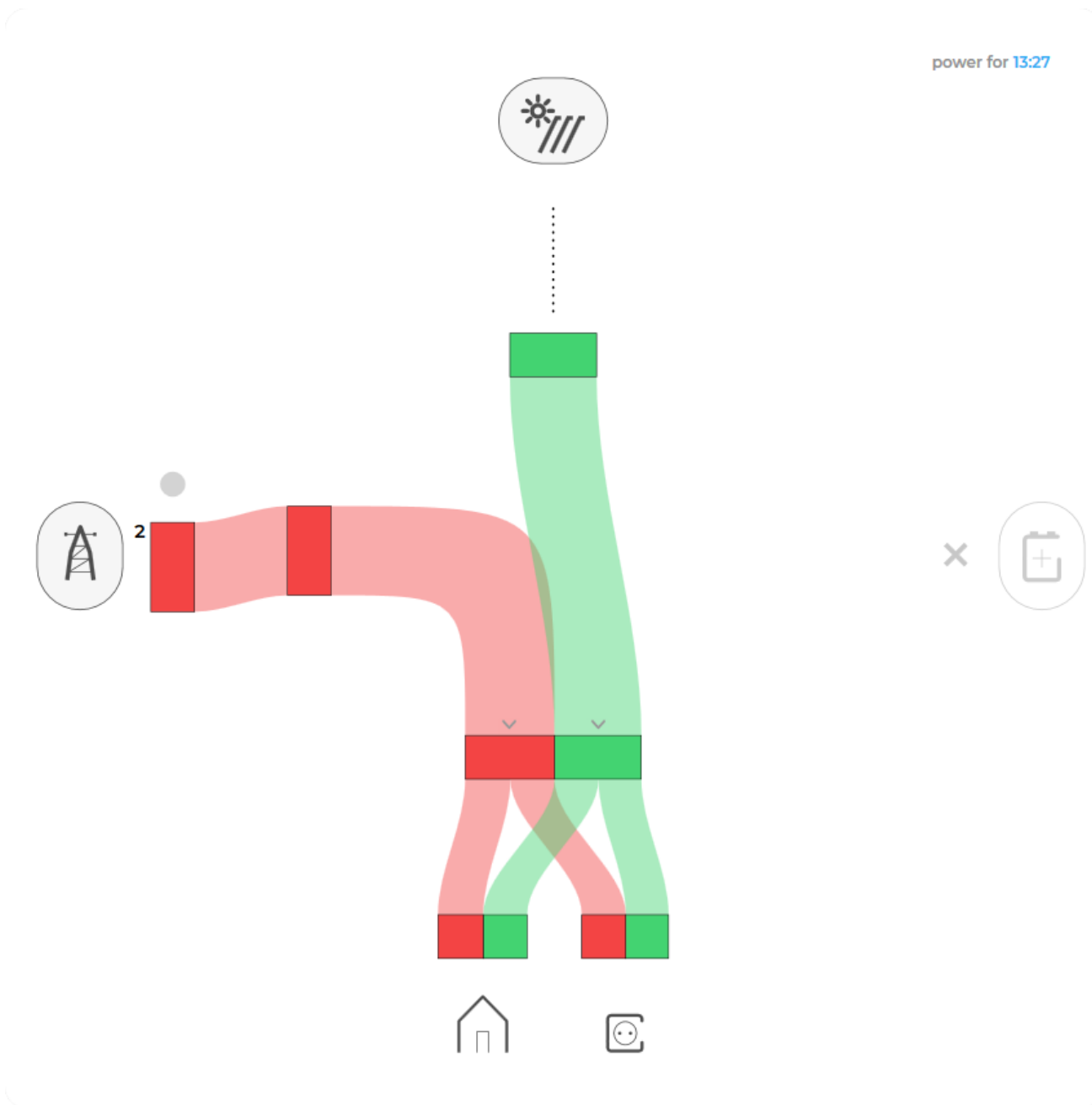
**Title and view selection row**



From the left:

- HEMS name
- Lighting icon → time-plot displays energy or power
- Money icon → time-plot displays currency
- Daily → time-plot displays power
- Monthly → time-plot displays energy per day
- Yearly → time-plot displays energy par month
- Target icon → time-plot go to now
- < → time-plot goes to previous term
- > → time-plot goes to next term
- Date → Select term for time-plot
- Download icon → Download “csv” data for displayed time-plot period
- Location of HEMS installation
- Time at HEMS installation site.

### **Power flow chart**



Displays actual power flow with:

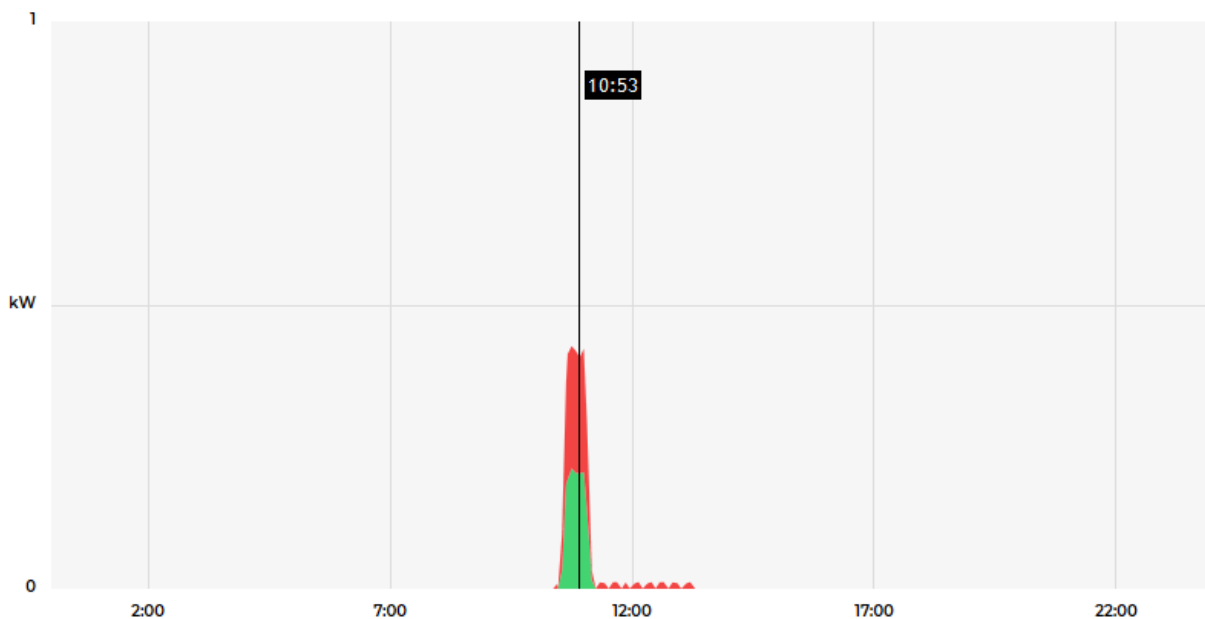
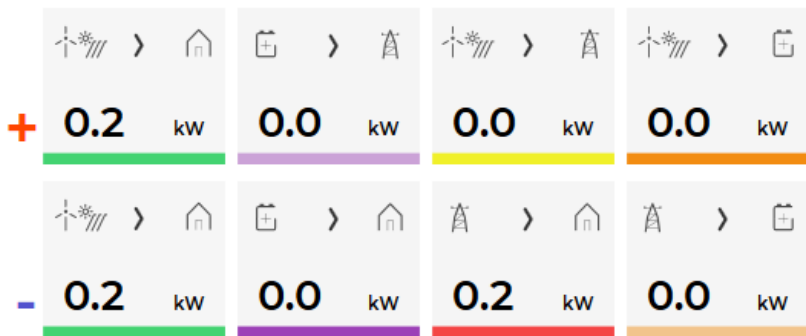
- Power sources (Local PV, wind, co-generation plants) at top
- Grid (divided by tariffs) on left side
- Storage (battery) systems on right side and
- Consumers on bottom.

Unused items are soft greyed out with X. Items without actual power are displayed as dots.

### Power and energy time-plot



power for 10:55



On bottom is time-plot for selected time period (in title row). By clicking on time plot a term for legend display is selected. Above there is power/energy legend.

### User profile set-up

The screenshot shows a web browser window with the URL [https://my.hiq-universe.com/rs/sa/user\\_profile/](https://my.hiq-universe.com/rs/sa/user_profile/). The page header includes the HIQ Universe logo and the user's name, Goran Kocjancic. The main content is divided into four sections:

- Basic information:** A table listing user details:
 

|                      |  |
|----------------------|--|
| Username             | username   |
| Created              | 11/05/2018 01:34:41 PM CET from IP 89.212.246.66 |
| Previous login       | 12/17/2018 12:31:16 PM CET from IP 89.212.246.66 |
| Last login           | 12/17/2018 12:48:57 PM CET from IP 89.212.246.66 |
| Last password change | 12/17/2018 12:45:50 PM CET from IP 89.212.246.66 |
- Profile:** A form with fields for:
  - Main realm: HEMS (dropdown)
  - Full name: Goran Kocjancic
  - Email address: goran.kocjancic@gmail.com
  - Timezone: UTC+1:00 Europe/Amsterdam (dropdown)
 A blue "Save changes" button is located below the form.
- Foreign realms:** A section with a horizontal line, currently empty.
- Password:** A form with three input fields:
  - Old password
  - New password
  - Repeat password
 A blue "Change password" button is located below the form.

Basic information section:

- Username
- Created date and IP
- Previous and last login date and IP
- Last password change date and IP

Profile section:

- Main realm display
- Full name, email address and timezone edit fields

Foreign realms - devices and services where you have access to but you are not owner.

Password: fields for password changing.

## HEMS settings

HIQ Universe | Settings

Robotina  
HIQ Universe

Goran Kocjancic

### Settings

Device name: My HEMS

Location: Kozina

Location name: Kozina

Location latitude:

Location longitude:

### Energy price

Low tariff price (€/kWh): 0.100

High tariff price (€/kWh): 0.200

Feed-in tariff price (€/kWh): 0.100

### Timeplots range

Electricity

Max daily power (kW): 1

Max daily energy (kWh): 1

Max monthly energy (kWh): 20

Cost

Max daily value (€): 10

Max monthly value (€): 100

Save settings

### Share your device

Owner: goran.kocjancic@gmail.com

Guest account

Guest email address Remove quest

### Sections:

- Settings:
  - Device name
  - Location name and coordinates
- Energy price: per tariff energy price
- Timeplots range: ranges for various timeplots
- Share your device: manage device sharing guest accounts