# User Manual Joulio-Web

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# General

The User Manual at hand is meant to give an overview over the functions of Joulio-Web. This following Chapter describes the basic structure of Joulio-Web and shows the main menu points. At the end of this manual you will find a step-by-step instruction for integrating an EMU M-Bus Center and a subsequent creation of an analysis of the meters connected to the M-Bus Center.

*Please consider establishing a backup in Joulio-Web as soon as possible to minimize risk of data loss.*

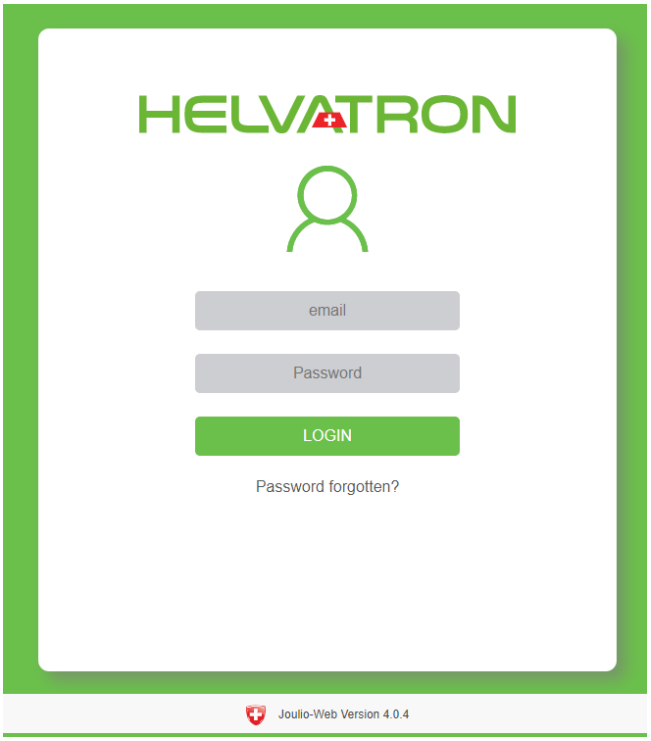
## User Interface

Joulio-Web is a so-called Web application. To use Joulio-Web you only need a web browser (Firefox >= 57, Chrome > 63, Microsoft Edge. Internet Explorer is not supported)

## Login

After the installation open the following URL in your web browser: http://[Name_or_IP-adress_of_Joulio]

Login with your e-mail and password.




## Reset Password

In case you forgot your password, you can reset your password by clicking on the “password forgotten” link.

This will generate an e-mail containing further steps to reset your password.

*Note: This Function is only available if the e-mail-Server in Joulio-Web is configured correctly.*

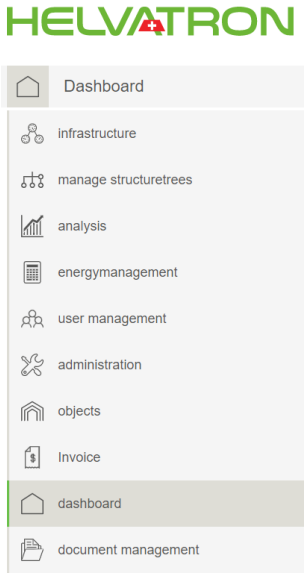
# Website Description

Joulio-Web encompasses the following user interfaces:

## Header

- Logout of Joulio-Web
- Show Notifications
- Edit Preferences
- Go to the Help page

## Menu

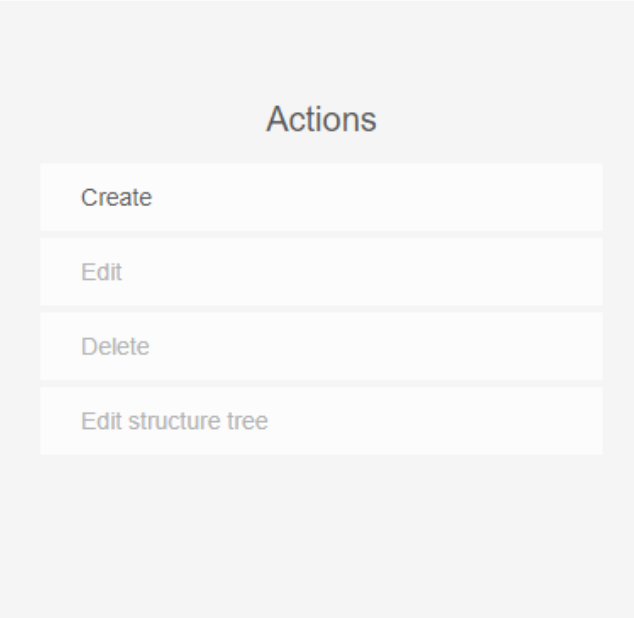



The menu shows the active menu item at the top. You can open the drop-down menu by clicking on the active item. Depending on your user authority you will see the following items:

- Infrastructure
- Manage Structuretrees
- Analysis
- Energy Management
- User Management
- Administration
- Objects
- Invoice
- Dashboard
- Document Management

## Actions menu

On many pages you can find the actions menu on the right. This menu can be minimized by clicking on the arrow on the lower screen edge. You can execute page specific actions by clicking on the appropriate actions. The available actions on each page will be explained in the individual chapters for these pages.




## Footer

The footer displays the current version number of Joulio-Web, e.g. 4.0.4.

Please submit the following information in case of a support request:

- Version number of your Joulio-Web.
- The Information in the Licence tab.

# Installation

Joulio-Web must be installed on a virtual machine. The following two chapters describe possible virtual machines. For further information, please consult the document “Installationguide_Joulio_ESXi_en”

## Installation Instruction Hyper-V

Hyper-V is the virtual machine solution from Microsoft. After you turned Hyper-V on, follow these steps to install Joulio-Web.

Download the Joulio-Web Disk-Images from the link you received to your server. Embed these Disks into your virtual machine.

Attention: The following steps must be followed while configuring the Disks:

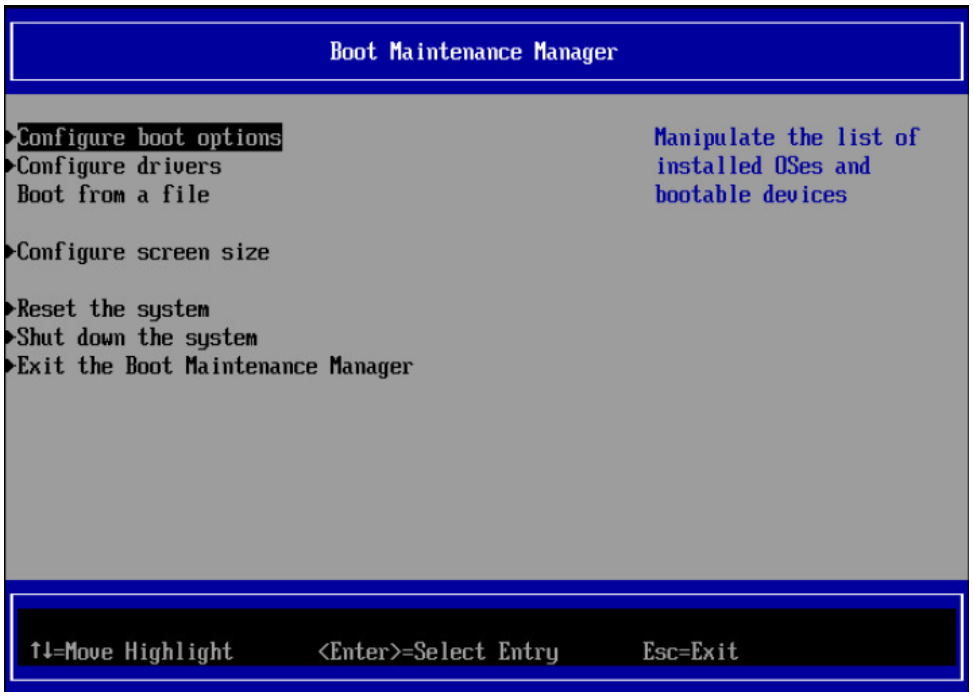
- Choose Hyper-V generation 1.
- Provide the virtual machine a minimum of 4 CPUs and 8GB of RAM.
- **IMPORTANT:** Deactivate dynamic memory allocation.
- Set a static MAC-address for the Network card.
- Boot the virtual machine via Bios.

## Installation Instruction ESXi

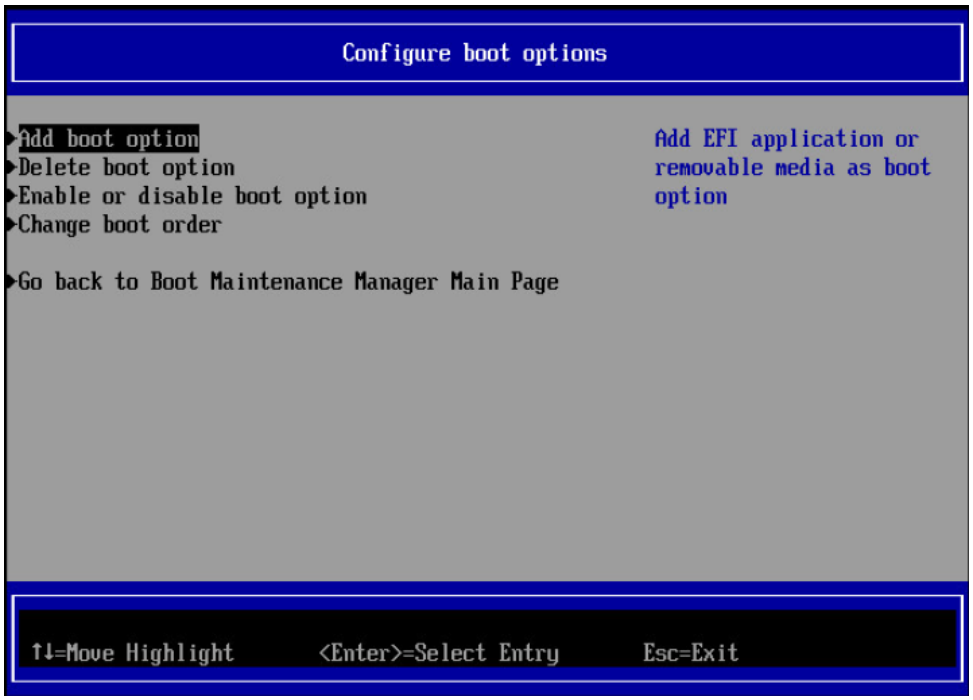
Once your virtual machine is up and running, you must configure the bootloader. Press “Del” as soon as the virtual machine starts. The display should show the following:

*Note: For easier access to the Bios change the startup timer of your virtual machine.*

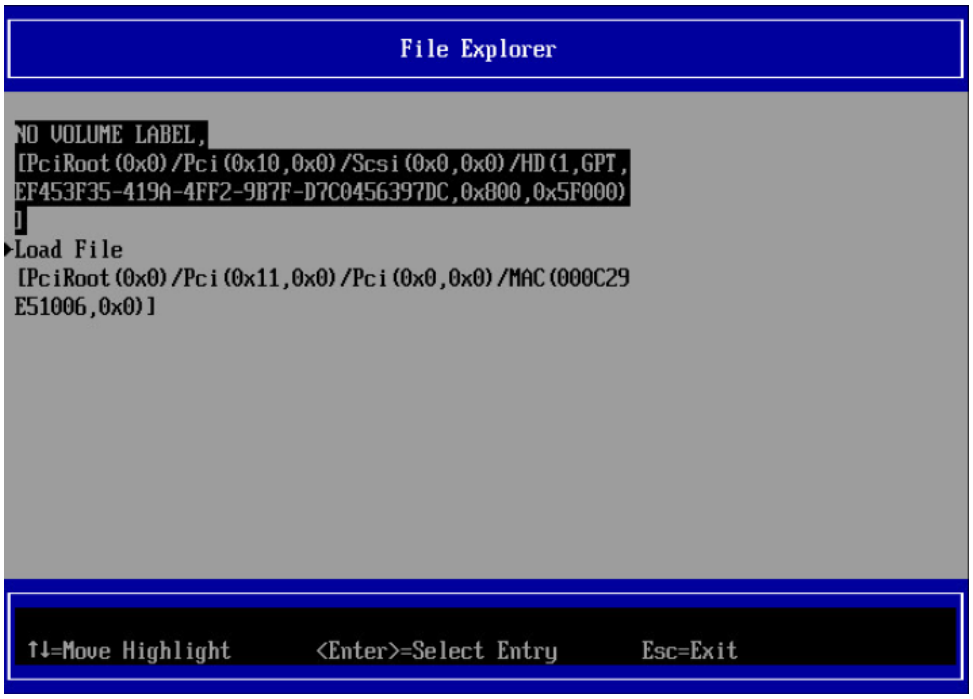
Choose the option “Boot Maintenance Manager”.



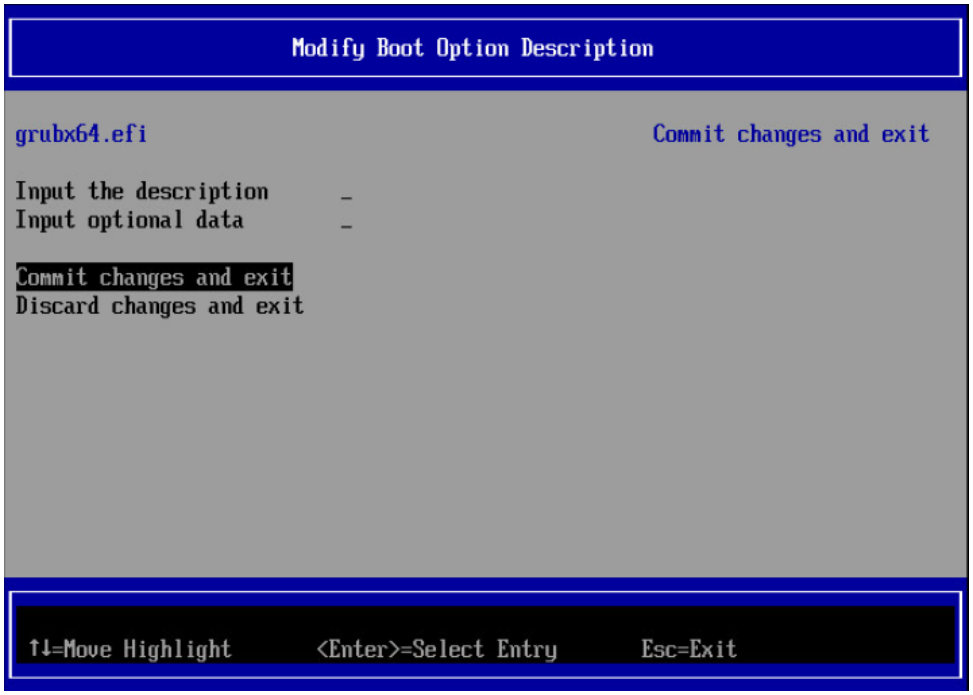

Choose the option “Configure boot options”.




Choose the option “Add boot option”.

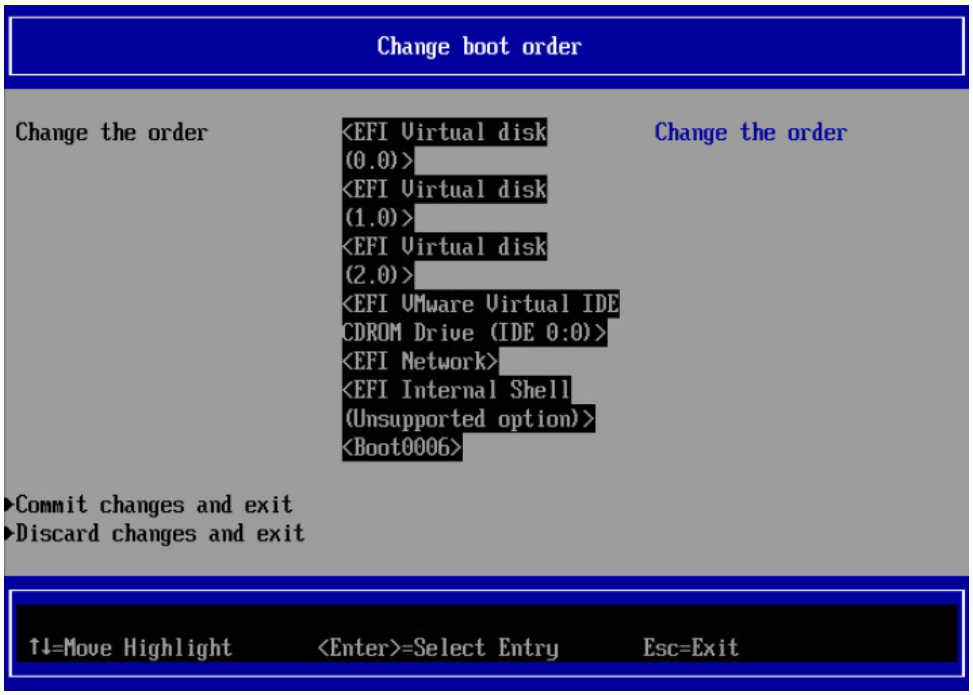



On this and the immediately following pages choose: “NO VOLUME LABEL” –> “EFI” –> “Debian” –> “grubx64.efi”



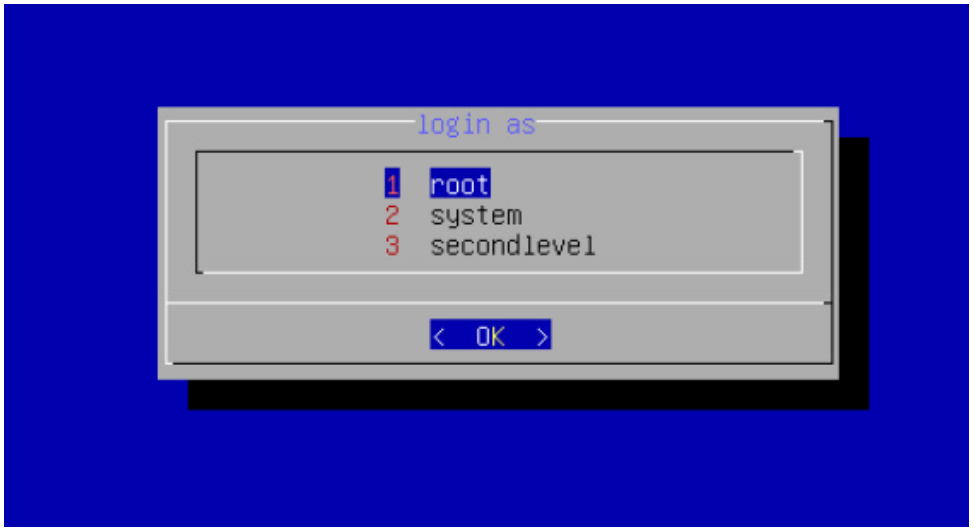

Complete this step of the configuration by choosing the “Commit changes and exit” option.

For the next step, choose “Configure boot options” again and then click on “Change boot order”.

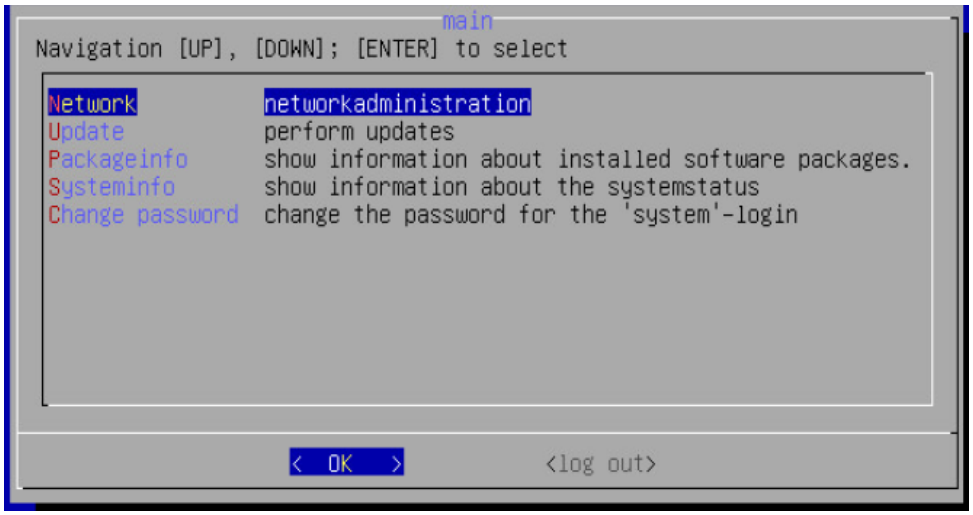



Press “Enter” and put the new boot option to the top via the “+” key. Press “Enter” again to confirm and exit via the “Commit changes and exit” option.

Leave the Boot Maintenance Manager by clicking “Exit the Boot Maintenance Manager” and choose the option “Continue”. Your System is now booting correctly.



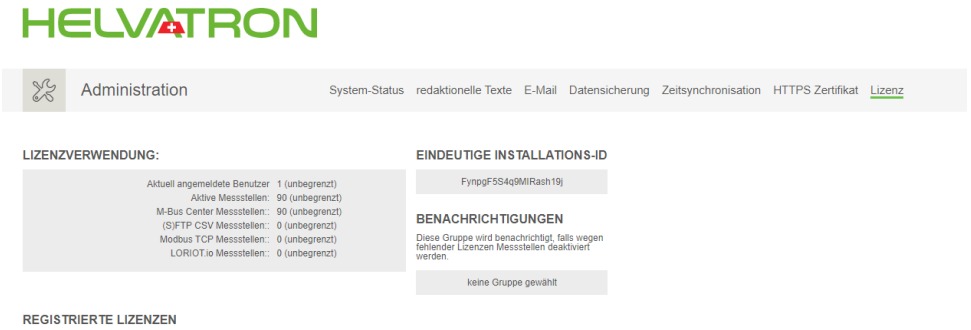

As soon as you see this window pop up, Joulio-Web is up and running. Click on “System” and enter the default password “Joulio1291”.




Choose the “Network” option to retrieve the network configuration. Select DHCP for an automatic configuration.

*Note: For a smooth operation, Joulio-Web needs a static IP-address. In case you configure the network via DHCP please ensure that the DHCP Server has a reservation for Joulio-Web.*

This menu also lets you change your password. Choose “Change Password” and enter your new password in the window that opens. Your new password needs to be at least 6 digits in length.




Your Joulio-Web is now reachable via it’s IP-address in any web browser. Choose the menu item “Administration” and the sub menu “Licence”. Copy your “UNIQUE INSTALLATION ID” string and mail it to the EMU Electronic AG. You will then receive the licence file from the EMU Electronic AG.

Once you received your licence file (.d12) upload it to Joulio-Web in the following tab: “Administration” –> “licence” –> “Upload licence”. After a short time your Joulio-Web is ready for use.

## Checklist for the installation of Joulio-Web

Please read the checklist “Installation-Checklist_Joulio_en.pdf” before you install Joulio-Web and fill in the necessary information.

This checklist acts as the basis for a correct integration of Joulio-Web into an existing infrastructure. The installation / integration of the installation-images is not described here. Go through the checklist carefully and fill in the tables with the correct information.

The following requirements must be met in order to work with Joulio-Web.

## Network

Joulio-Web needs a **static** IP-address. If a DHCP server is used, ensure that the server has a reservation for Joulio-Web.

Difference host name / service name:

The host name is the technical name of the server. The service name is the descriptive name needed for end users to access the web user interface. Host name and Service name can be the same but don't need to be. E.g. "joulio.domain.tld" for the service name and "srv02.domain.tld" for the host name. Fill in the following table with your settings.

| Item | Setting |
|---|---|
| IPv4-address | _____._____._____._____ |
| Subnetmask | _____._____._____._____ |
| Default-Gateway | _____._____._____._____ |
| Host name | |
| On the DNS | |
| Search order for domains | |
| Service name | |
| On the DNS | |

## SMTP

To catch error messages, reset passwords and set up new users, Joulio-Web needs a functioning SMTP connection. This configuration can be found under the main menu item "Administration" –> "E-Mail".

| Item | Setting |
|---|---|
| SMTP-Server | |
| Port | |
| Encryption | []Keine []SSL []TLS |
| Authentification | []Yes []No |
| User name | |
| Password | |
| Sender address | |
| Sender name | |

## NTP

If you want Joulio-Web to synchronize it's system time automatically, you need to give Joulio-Web access to a NTP-server of pool.ntp.org. Activate NTP-service under "Administration" –> "Time synchronization" directly in Joulio-Web.

## Data Backup

The system is able to create recurrent backup data locally. Please note that the storage volume can be depleted quickly depending on:

- The size of the data files
- The backup interval
- The number of backup generations

You can send the saved data via FTP / SFTP / RSync / CIFS-Share to a third party system after a successful backup.

Fill in the following table with your settings. You can find these settings under “Administration” –> “Backup”

| item | Setting |
|---|---|
| Interval | |
| Interval unit | [] Hours [] Days [] Weeks |
| Number of stored data generations | |
| Activate external backup | [] Yes [] No |
| Host | |
| Protocol | [] FTP [] SFTP [] RSync [] SMB/CIFS |
| Register | |
| User name | |
| Password | |

## Surveillance

Consider creating a user group for notification purposes. This group receives system notifications from Joulio-Web. To create such a group go to “User management” –> “User groups”

Joulio-Web will notify any users in this group if it can’t reach a meter or if the available storage space is almost depleted. Set this notification up in “Administration” –> “System Status”.

## Security

Be advised that the system is open to all connection requests to facilitate communication with all connected meters and data loggers. The responsibility for security of the server lies with the customer.

## Function Test

You can reach the service after installation via http://[ServiceNamen.Domain.tld].

Please check the following:

- Are you able to login repeatedly and are you able to create new users?
- Are you able to receive e-mails sent by Joulio-Web? To test this, you can use the “Test SMTP settings” option under “Administration” –> “e-mail” to send a test e-mail.
- Are you able to communicate with already integrated meters?

# Administration

The menu point “Administration” lets you review and adjust all settings for Joulio-Web. The sub menus are as follows.

## System-Status

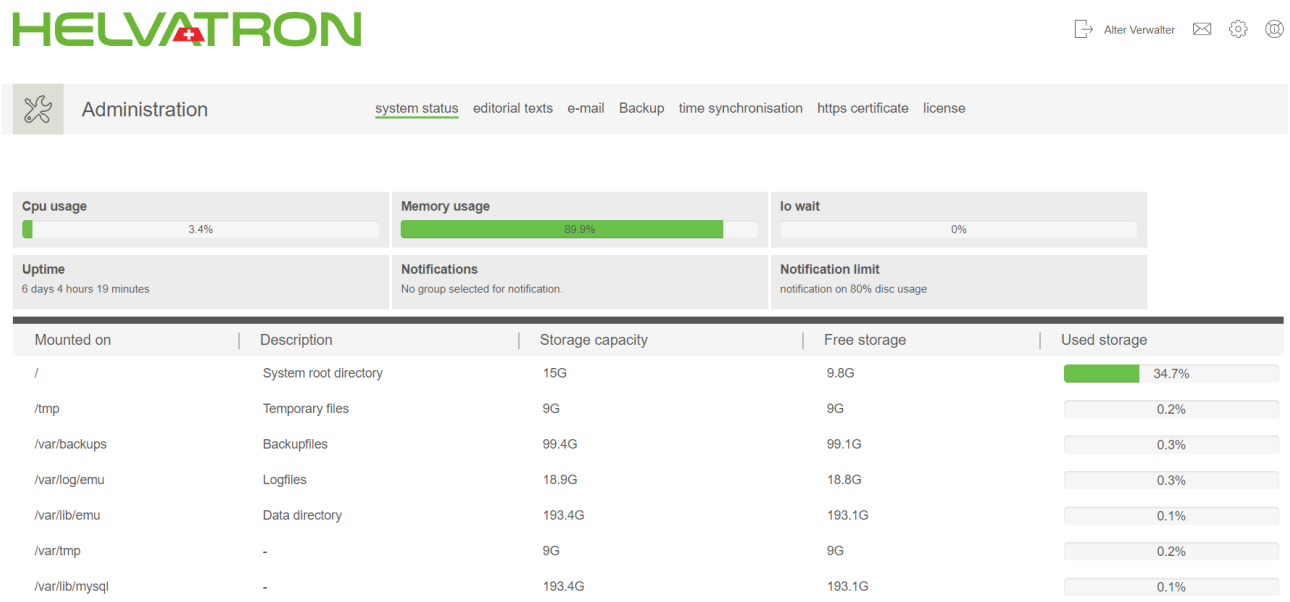
The system load can be reviewed at the top of this page. Alongside the CPU load, Joulio-Web also shows the RAM usage and the current IO-Waits. A 100% load on the RAM is not a problem.

Just below the load overview, Joulio-Web shows the available storage space and their status.

At the very bottom, Joulio-Web writes the facilitator notifications. The facilitator is the interface between Joulio-Web and all meters. If there are problems with the communication between Joulio-Web and any of its connected hardware, the facilitator shows a notification here.

### Actions Menu

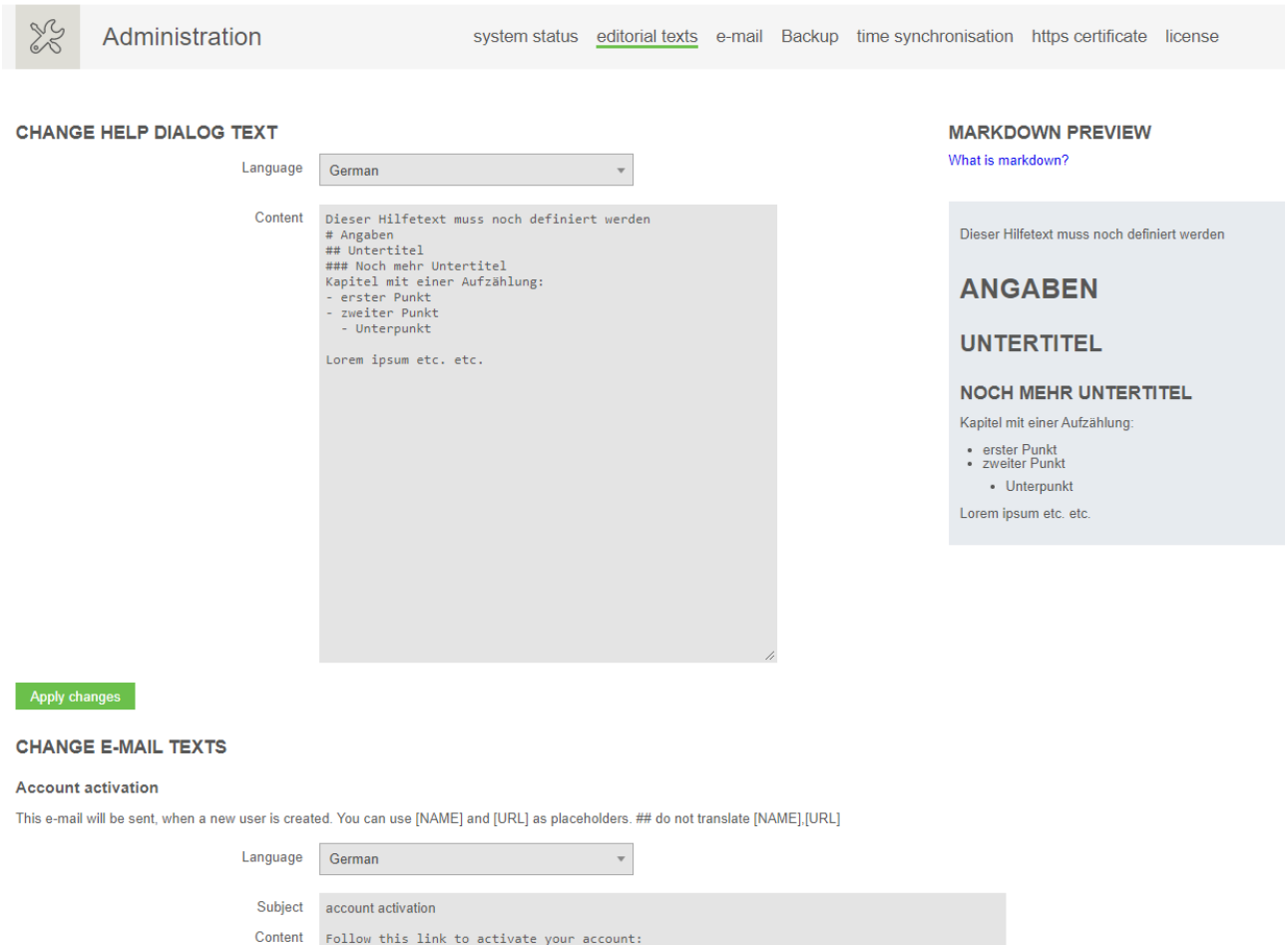
- Set notification group. This group will get an alert in the following situations:
  - Joulio-Web is in a critical system status.
  - Joulio-Web detected an error while operating. The main example is a failed communication to one or more meters.
- Set notification limit
  - Set a limit for storage use at which Joulio-Web notifies the notification group. This limit is in % of total storage capacity.




## Editorial Texts

Set up further texts. You can edit the following texts:

- The help dialogue
- The content of e-mails sent for:
  - Account activation
  - E-mail validation
  - Password reset



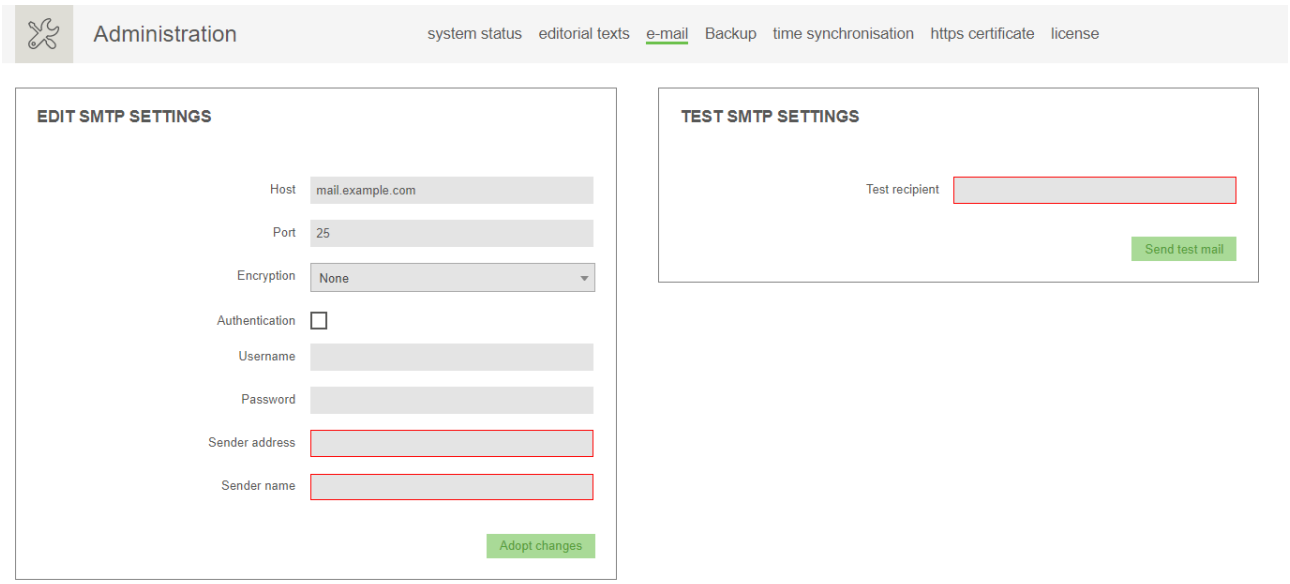

# E-mail

To function correctly, Joulio-Web needs to be able to send e-mails. E-mails will be sent in the following situations:

- When a new user is created. Activation e-mail.
- When a user requests a password reset via the “forgotten password” option.
- When Joulio-Web sends analysis portfolios.
- If any of your thresholds are crossed.
- If the facilitator receives an error on communication with data loggers.
- When the set limits of storage space is reached.

Your system administrator will give you the needed parameters to correctly set this up.

After the configuration you can test whether it works or not by sending a test-e-mail.




# Backup

Please ensure that Joulio-Web is backing up all of your data and your virtual machine frequently (based on your needs).

Joulio-Web periodically (“interval”/“interval units”) creates a backup on the internal storage. This backup contains all needed information to restore Joulio-Web.

The option “retention number” defines how many backups are kept on the internal system partition. For example: If this value is set to 2, Joulio-Web will always have the most recent backup as well as it’s predecessor.

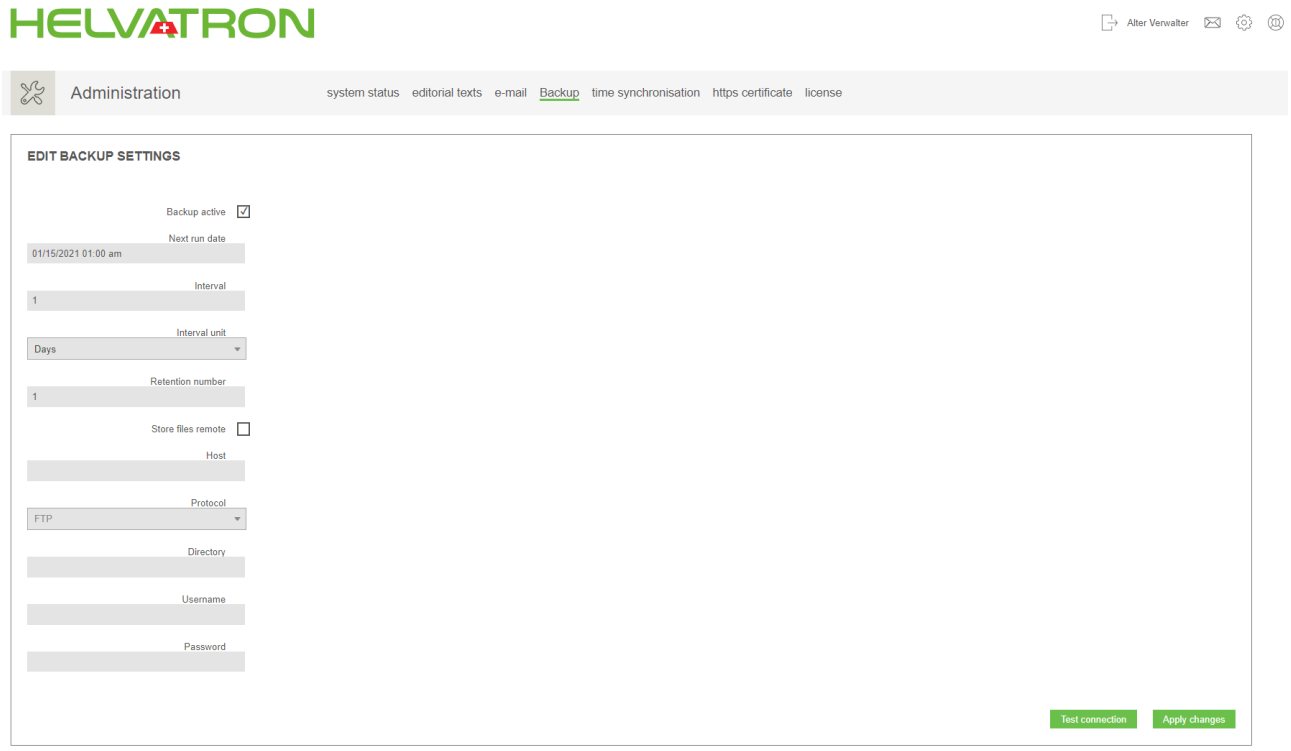
Note that the available space for backups is limited.

The option “next run date” lets you set the time of the next backup. With the options “Interval” and “Interval unit” you can automate the backup. Joulio-Web will create a backup every time the interval passes after the first “Next run date”. These options allow for a smooth integration into your organizations plans.

There are options to send your backups to third party systems. The following transport protocols are available:

- FTP
- sFTP
- rSync
- SMB/CIFS

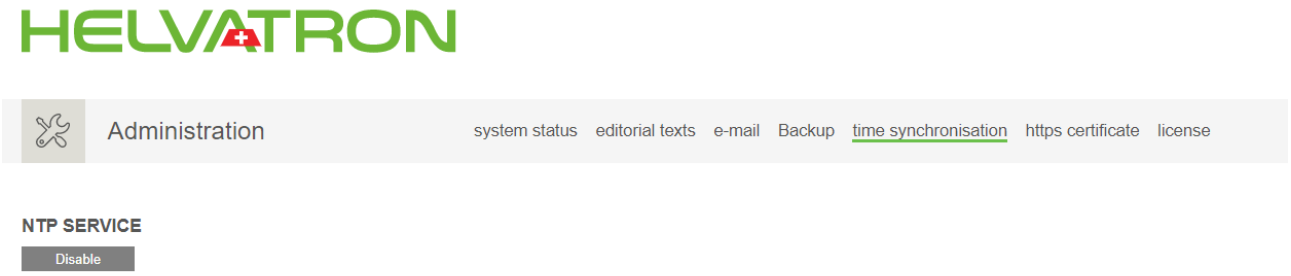
Save your settings by clicking on “Apply changes”.




## Time Synchronization

Joulio-Web automatically synchronizes the system time over an NTP-Server. Per default, Joulio-Web uses a server from the ntp.org pool.

*Note: Please ensure that if Joulio-Web runs on a virtual machine the host is synchronized on a regular basis as well.*

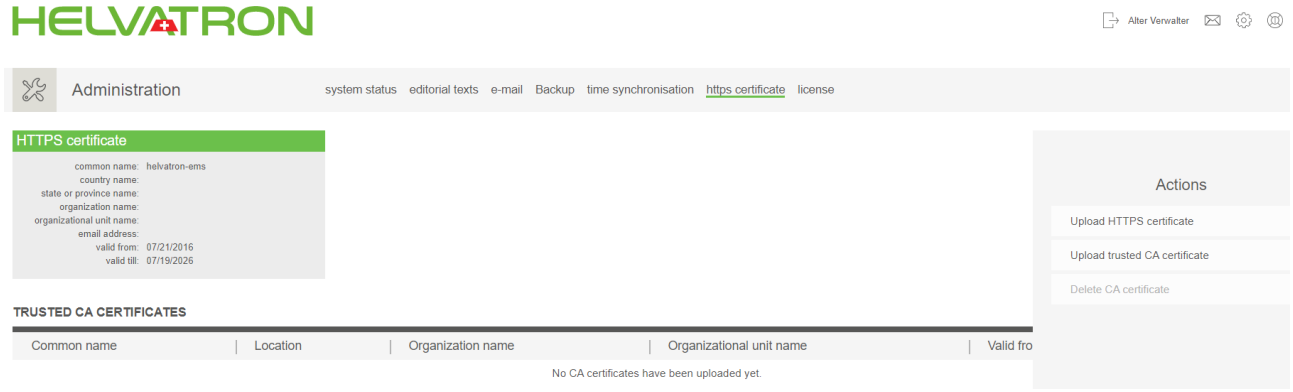



## HTTPS Certificate

A HTTPS certificate secures the web interface with SSL/TLS (https). For this, a Root CA and a Server certificate need to be uploaded.

Action menu:

- Upload HTTPS Certificate
- Upload trusted CA certificate
- Delete CA certificate

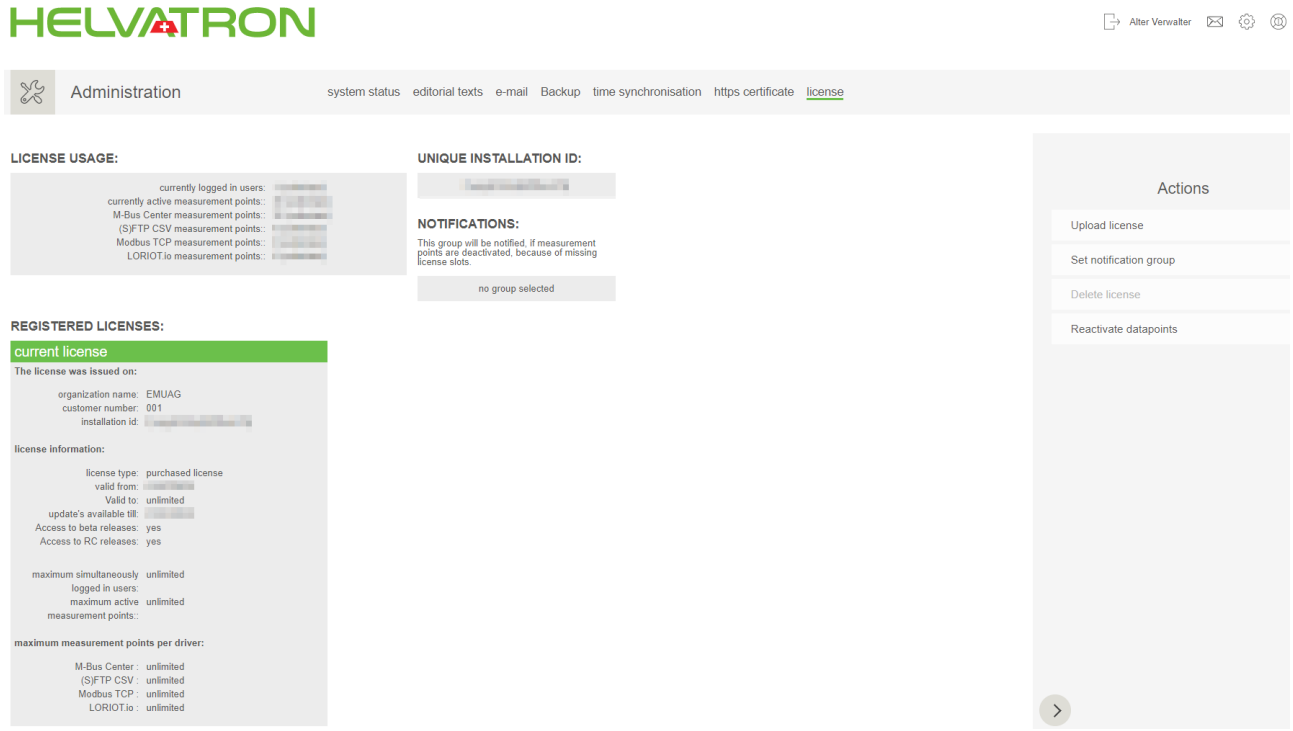



# Licence

The operation of Joulio-Web requires an active licence. The licence limits the amount of configurable meters and data loggers. For the purchase of a new licence the number of meters and data loggers, the length of the service contract and the “Unique installation ID” are required.

Action menu:

- Upload licence
  - After receiving a (new) licence you can upload it here.
- Set notification group
  - If more measurement points are connected to Joulio-Web than are licenced, a notification will be sent via e-mail to the set group.
- Delete licence
  - Removes an (old) licence from the system
- Reactivate data points
  - Any measurement points that are connected surpassing the licence limit are immediately deactivated in Joulio-Web. If more measurement points are licenced at a later date, you can reactivate any deactivated measurement points with this option.




While the update subscription is valid, you are entitled to update to the newest version of Joulio-Web.

# User Management

Upon installation a predefined set of users, groups and roles is created. The following chapter explains the options in depth.

## Users

An overview of all users of Joulio-Web.

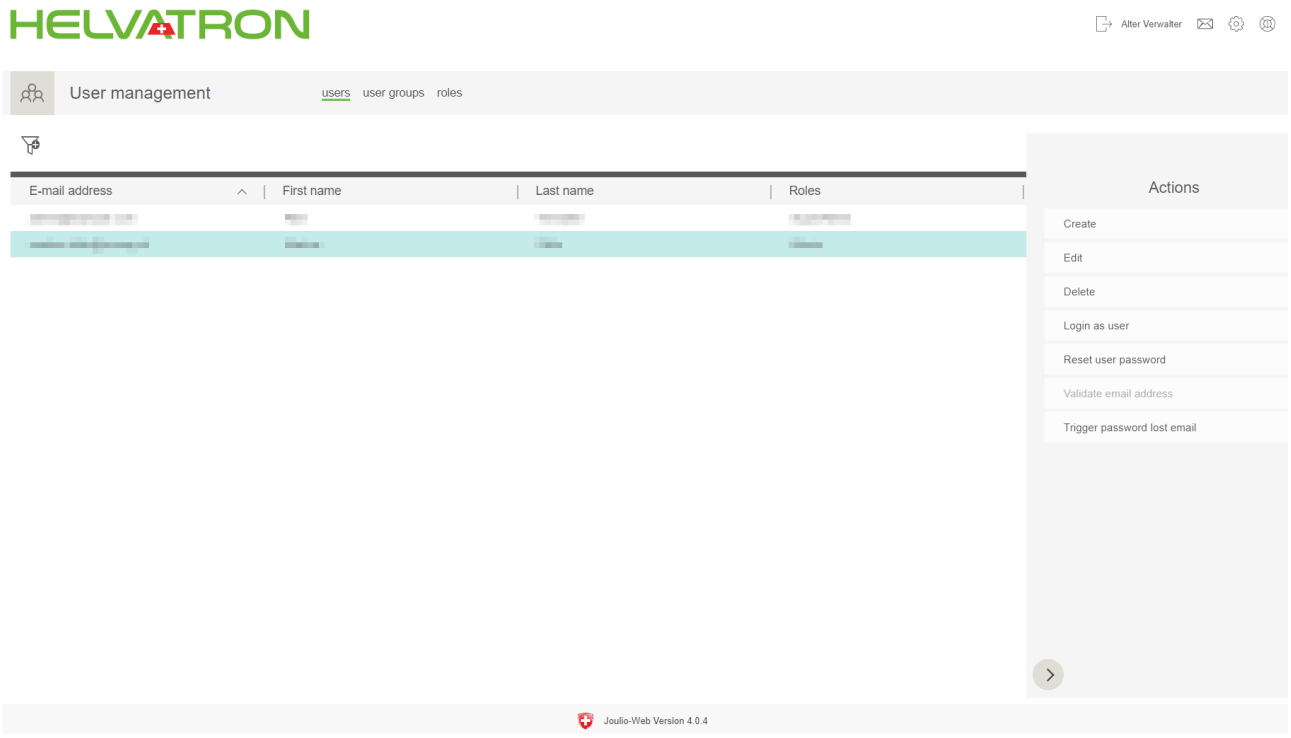
Action menu:

- Create
  - The following information are needed to create a new user:
    - E-mail address
    - Title
    - First name
    - Last name
    - Groups / roles of the user

After the successful creation of a new user, a verification e-mail will be sent with the request to confirm the e-mail address.

*Note: The new user should confirm the e-mail as soon as possible (24h).*

- Edit
  - Allows for user setting adjustment.
- Delete
  - Removes a user from Joulio-Web.
- Login as user
  - Allows to quickly login as the selected user and adjusts the rights to those of the selected user.
- Reset user password
  - Allows for a reset of the password for the selected user.
  - Joulio-Web creates a random new password for this user.
  - The next time the selected user logs in, Joulio-Web will ask for the setting of a new password.
- Validate e-mail address
  - If a newly created user did not receive the validation e-mail, this function allows for a manual validation of the e-mail address.
- Trigger “Password lost” e-mail

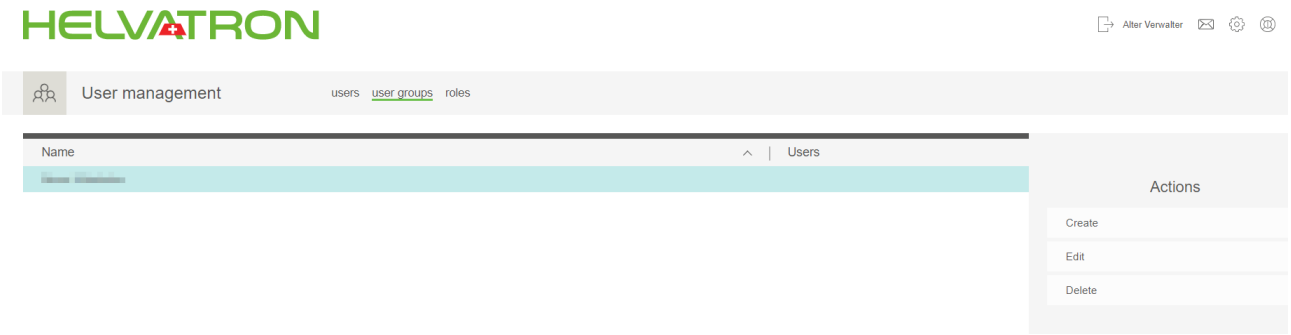



## User Groups

User groups are created to join multiple users to a logical unit e.g. “tenants”. These user groups are used to notify multiple users at once and simplify the access rights for structure trees etc.

Action menu:

- Create
  - Set the group name in various languages.
  - This allows for an automatic name change for users that use Joulio-Web in a different language.
  - The field “Users” can be clicked to add users to this group.
- Edit
- Delete



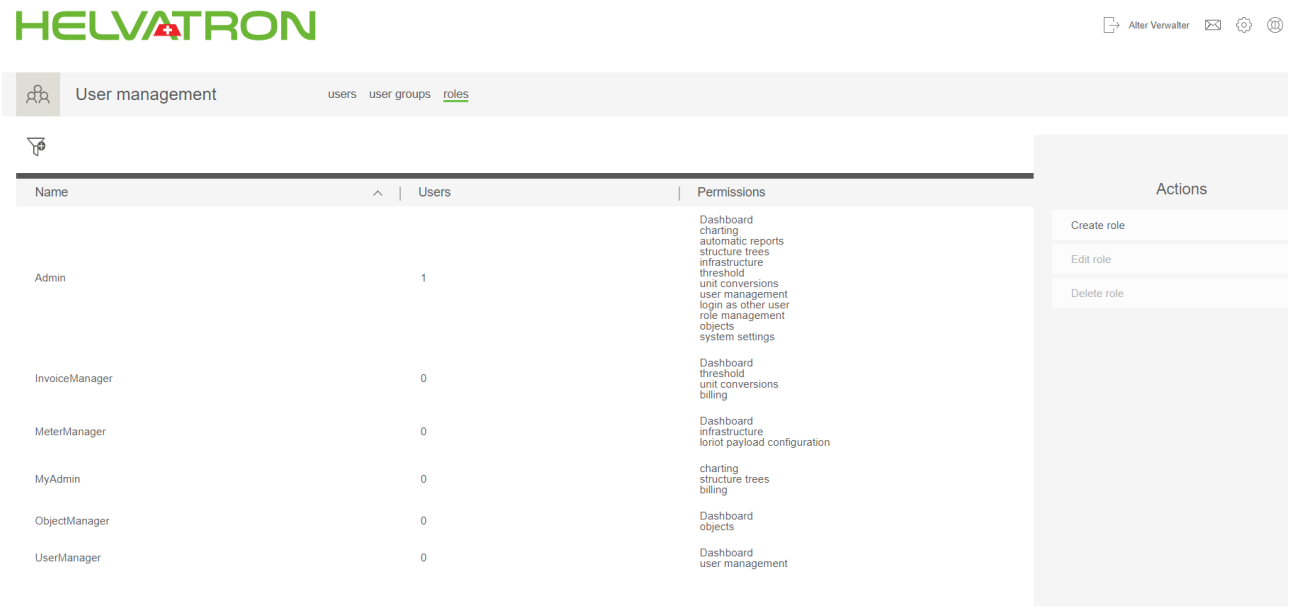
# Roles

Roles let you define which permissions a user has in Joulio-Web.

*Note: You can set the role of a user while creating them, or with the “Edit” action.*

Action menu:

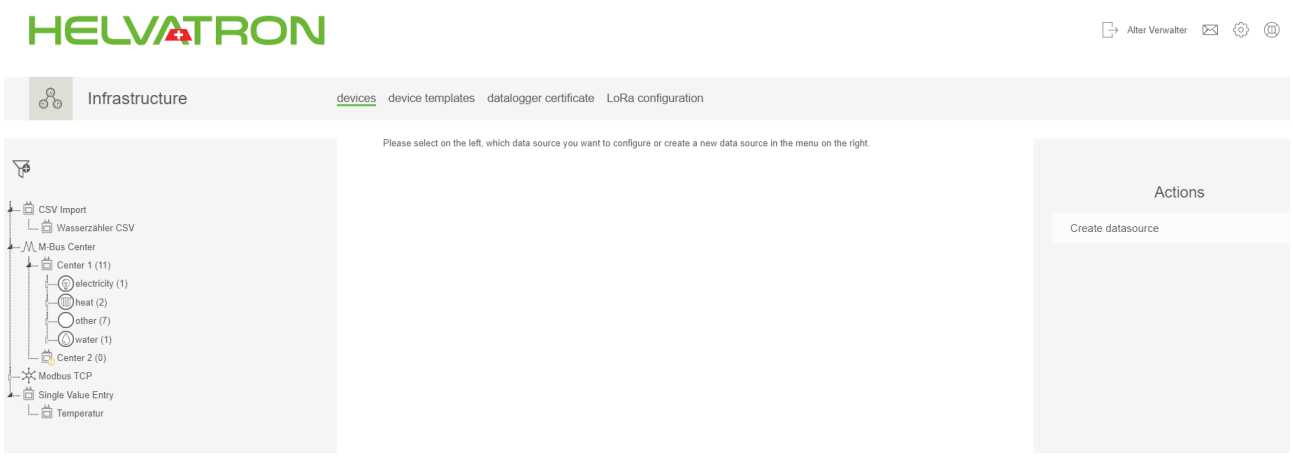
- Create role
  - Name your role and choose which permission apply.
- Edit role
- Delete role



# Infrastructure

All measurement points and data loggers are listed on this page.

## Devices




The structure tree on the left lists all active measurement points. These points are listed by their type of data source.

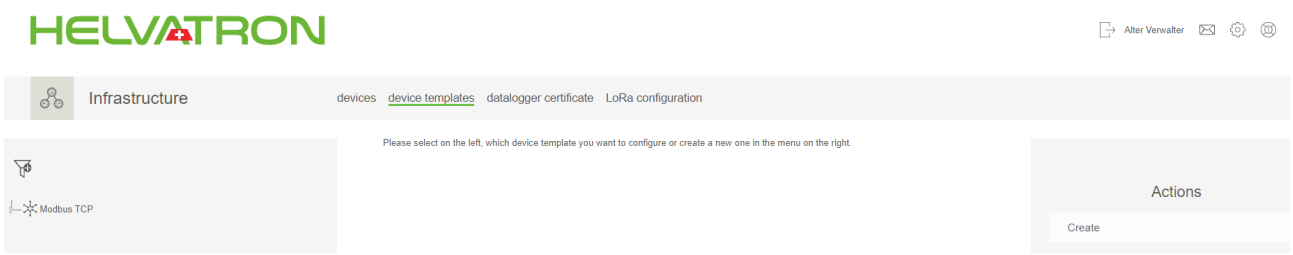
Find measurement points faster with the help of the filter tool.

Action menu:

- Create data source:
  - Datalogger: Allows for the integration of an M-Bus Center.
    - Caption: Set the name for the M-Bus Center in the Infrastructure.
    - Command interval: the interval in which the M-Bus Center exchanges data with Joulio-Web.
    - Error message count: Specifies after how many errors an alarm is triggered. This parameter can be adjusted via the action menu after the creation of the data logger.
    - Synchronize configuration: requests an up to date list of all meters from the M-Bus Center. This refresh of data points may take up to 15 minutes.
    - *Note:*
      - Only measurement points that are configured in Joulio-Web are processed.
      - If a measurement point was already configured on the M-Bus Center it will automatically be configured in Joulio-Web as well.
      - We recommend configuring your meters on the M-Bus Center before integrating them into Joulio-Web.
  - Create (S)FTP-Source
    - Allows the import of measurement values from an (S)FTP-Server.
    - A (S)FTP server is the basic necessity for the configuration of further measurement points.
    - *Note: Creating a measurement point through (S)FTP is only successful if Joulio-Web can establish a connection to the server.*
    - Base path: The resulting path is a combination of the base path and the file mask of the csv-meter.
    - *Note: the csv-files are not deleted after successful processing.*
  - Modbus device
    - Set the name and host for the Modbus device.
    - Register template: the automatic configuration of a Modbus device can be done via a matching template.

        - Joulio-Web has configured templates for UMD measurement devices and EMU Professional meters.
        - If no register template is chosen, the registers need to be configured manually. After a Modbus device is created it can be edited in the action menu.
        - While configuring a register you can test your input with the “test” button.
        - *Note: Depending on the manufacturer, the address of the Modbus register may need to be adjusted with [registeraddress -1]*
    - Modbus device (csv configuration)
        - Allows for automatic addition of a batch of Modbus devices.
        - The configuration is done through an uploaded csv-file. A template for such a file can be downloaded by clicking on “Download csv template”
        - Set the correct delimiter.
    - Loriot application
    - Connect to a Loriot server to read-out LoraWan-meters.
    - Single value entry
        - With this option you can manually add measurement data. After the measurement point is created you can edit it via the action menu.
    - CSV import data source
        - Allows for manual import of meter readings or consumption values through uploading a csv-file.
        - Import measurement values afterwards
            - Historic measurement values of present measurement points can be imported as a csv-file with the “import csv” action menu item of a CSV import
            - Ensure that all timestamps are UTC on import.
            - The readout interval needs to be uniform for every import.
            - The readout interval can be selected between 1, 5, 15 Minutes or 1 hour.
            - On import you must select whether the imported values are meter readings or consumption values.

## Device Templates



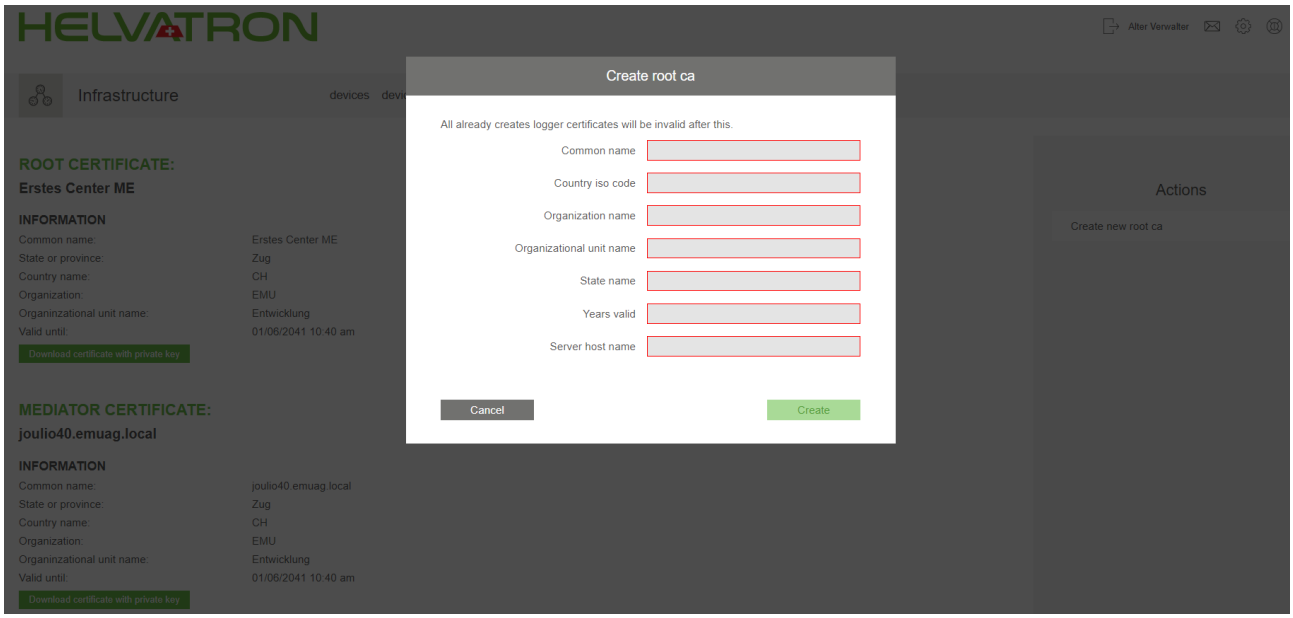

Device templates are used to automatically configure the registers of new Modbus devices.

Action menu:

- Create
    - Set the name for your new template.
- Edit device template
    - Change the name of your template.
- Add register template
    - The required information for the register configuration can be found in your Modbus meter’s documentation.
- Delete device template
    - Deletes the template

*Note: A device template can also be created from an existing definition of a Modbus device.*

# Datalogger Certificate



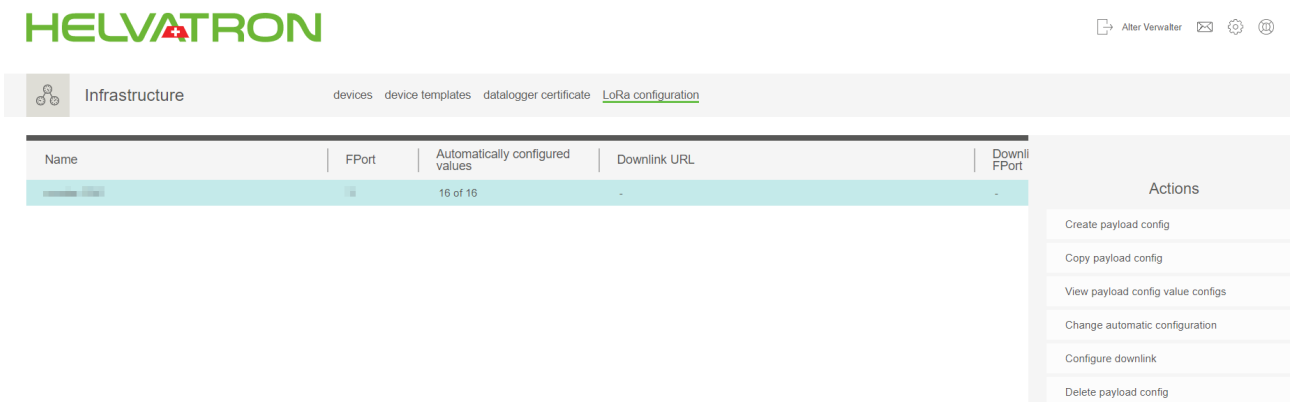

- To add an M-Bus Center to Joulio-Web a system certificate needs to be created.
- The system certificate is the basis for the PKI-infrastructure to ensure the integrity and authenticity of the communication between the M-Bus Center and Joulio-Web.

Action menu:

- Create new root ca
    - Entries correspond to the fields of a X.509 certification.
    - The maximal string length must not exceed 32 digits.
    - The server host name field should contain the system name that is used by all M-Bus Centers to connect to Joulio-Web.
    - If no system name is defined in the domain name system the IP-address of Joulio (**not the M-Bus Center**) can be used as well.

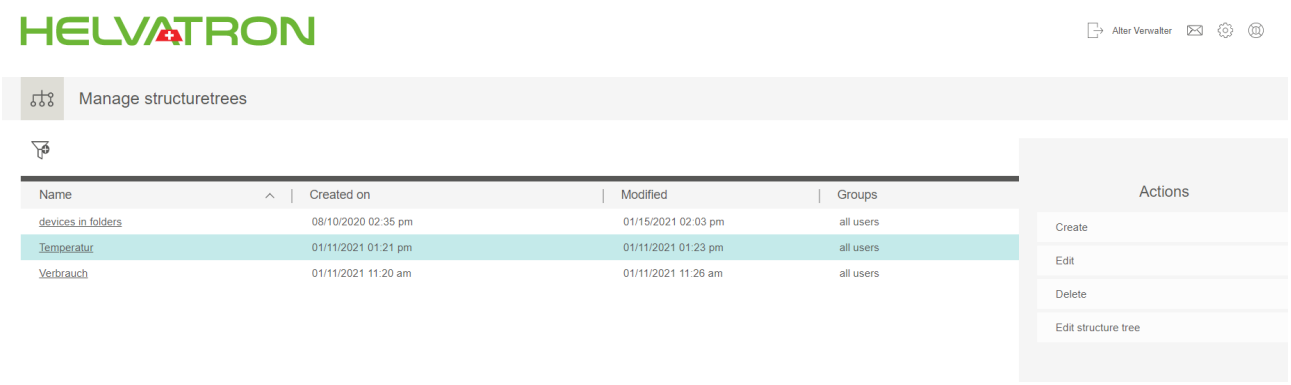
*Note: Should it be necessary to change the system certificate, all connected M-Bus Centers need to be updated with a new certificate.*

# LoRa Configuration




- Allows for configuration of new LoraWAN devices for monitoring over a Loriot gateway.

# Manage Structure trees




A structure tree can contain, as an example, a set of all electric meters of one location grouped in individual sections. Furthermore it is possible to add formulas and sum nodes to the structure.

Structure trees are needed to create analyses.

Action menu:

- Create
  - Set a name and a description
  - Set users and groups that are allowed to use this structure tree
- Edit
  - Edit the parameters you set while creating this structure tree.
- Delete
- Edit structure tree
  - Create element
    - A directory allows to group measurement points.
    - A sum node is an automatically generated formula which adds up all underlying elements.
    - A formula is a mathematical term with variables. These variables can be connected to a measurement point. The result is available as an element in the structure tree.
      - Example: $sqrta^2 + b^2$
      - Take the square root of the value of a squared added to b squared.
      - Once the formula is created you can assign a measurement point to each variable. Do this by clicking on the variable in the structure tree and then on “Edit” in the action menu. Chose a measurement point. If you choose Active Power for a and Reactive Power for b, the formula will calculate the apparent power.
      - The result of the operation above is now available.
    - Measurement points are always related to:
      - Measurement points of the infrastructure.
      - Virtual measurement points of the infrastructure. If a measurement point is declared as meter reading, two measurement points are generated. One contains the actual meter reading and the second one calculates the consumption per defined interval.
      - Results from sum nodes or formulas
  - Edit
    - Change the settings done while creating this element.
  - Delete
    - Delete this element.
  - Undo
    - Undo your last action.
  - Redo
    - Undo your last “Undo”-action.

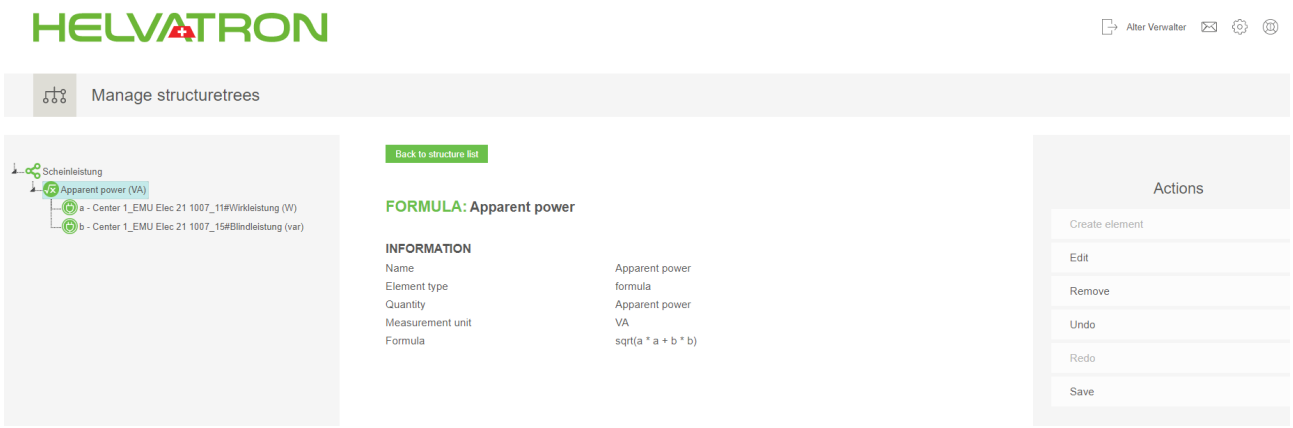
- Save

Example: You want to add two electrical meters.

- Create a sum node in the structure tree:
  - Quantity: electrical work
  - Measurement unit: Wh
- Two measurement points are added under the sum node.
- Select the filter and search for:
  - name -> consumption
  - quantity -> electrical work
- select the desired measurement points.
  - Name the element as you wish, this name will be displayed in the legend of the analysis. It will also be displayed as column title in a CSV-Export.
  - The system will automatically generate a name if no name is defined.

*Note: After a mutation on a structure tree you need to save to keep the changes.*

*Note: Elements inside a structure tree can be organized via drag&drop.*




## Overview of usable Formula

The following Formulas are used to calculate metrics and other values for use in structure trees.

A formula consists of one or more instructions. A simple instruction is “3 + 4”. Besides the arithmetic instructions ”+, -, *, / and % (modulo)”you can use the following functions in Joulio-Web:

- acos(x), Calculate the inverse cosine function of the value in brackets (measurement point). Inverse cosine is defined as follows: x=cos(acos(x)).
- acosh(x), Calculate the inverse hyperbolic cosine. Inverse hyperbolic cosine is defined as follows: x=acosh(cosh(x)).
- asin(x), Calculate the inverse sine function of the value in brackets (measurement point). Inverse sine is defined as follows: x=sin(asin(x)).
- asinh(x), Calculate the inverse hyperbolic sine. Inverse hyperbolic sine is defined as follows: x=asinh(sinh(x)).
- atan(x), Calculate the inverse tangent function of the value in brackets (measurement point). Inverse tangent is defined as follows: x=tan(atan(x)).
- atan2(y, x), Calculate the inverse tangent function of $\frac{y}{x}$. This function differs from atan(x) as atan2(x) is able to calculate the quadrant of the result.
- atanh(x), Calculate the inverse hyperbolic tangent. Inverse hyperbolic tangent is defined as follows: x=atanh(tanh(x)).

- avg(x, y, …), Calculate the average of a series of numbers.
- ceil(x), Calculate the next Integer which is greater than or equal to x.
- cos(x), Calculate the cosine of the value x.
- cosh(x), Calculate the hyperbolic cosine of the value x. cosh(x) is defined as follows: $\frac{\exp(x)+\exp(x)}{2}$.
- exp(x), Calculate e to the power of x.
- floor(x), Calculates the next Integer which is less than or equal to x.
- hypot(x, y), Calculate the length of the hypotenuse of a rectangular triangle from the lengths of both it's cathetuses. This function is defined as follows: $\sqrt{x^2+y^2}$.
- max(x, y, …), Calculates the maximum of the given values.
- min(x, y, …), Calculates the minimum of the given values.
- pi(), This function provides an approximation of $\pi$. The number of significant decimal places is defined by the php.ini-directive precision. 14 digits is the default setting.
- pow(x, y), Calculates x to the power of y. $x^y$.
- sum(x, y, …), Calculates the sum of all given values.
- rad2deg(x), Convert an angle x from radian to degree.
- rand(min, max), Calculates a pseudo random number between "min" and "max" (inclusive) or between 0 and getrandmax() if no values are given. E.g. if you need a random value between 5 and 15, use rand(5, 15).
- srand(), Set the starting value for the random generator or set it to a random value if you do not give a value.
- sin(x), Calculate the sine of the value x.
- sinh(x), Calculate the hyperbolic sine of the value x. sinh(x) is defined as follows: $\frac{\exp(x)-\exp(x)}{2}$.
- sqrt(x), Calculate the square root of the value x.
- tan(x), Calculate the tangent of the value x.
- tanh(x), Calculate the hyperbolic tangent of the value x. tanh(x) is defined as follows: $\frac{sinh(x)}{cosh(x)}$.
- log(y), Calculate the natural logarithm of y.
- round(x, y), Rounds the value x to y positions after the decimal point. y can be 0 (default) or negative. A y of -1 rounds x to the next tenner.

Any other string is seen as a variable. You can later assign a measurement point to these variables. This measurement point is set for all variables of the same name inside a structure.

You can use conditions in your formula. These are defined as follows: (Condition) {Instruction 1} {Instruction 2}. If (Condition) is met Joulio-Web follows {Instruction 1}, otherwise it follows {Instruction 2}.

The (Condition) can be the following operations: "==" (equal to), "<" (less than), "<=" (less than or equal), ">" (greater than), ">="(greater than or equal) and "!=" (not equal). Furthermore, you can use the boolean expressions & (logical and) as well as | (logical or) to concatenate multiple (Condition).

Example: Choose "Formula" and enter "Current * Voltage" to calculate the power. "Current" and "Voltage" will be recognized as variables to which you can connect measurement points by clicking them and use the action menu item "Edit".

*Note: Variables are unique and can only be used once inside Joulio-Web. Joulio-Web will set every occurrence of the variable "Voltage" to the same measurement point.*

# Analysis

Analyses are based on a structure tree. Beside the definition of individual structures there is always the default structure which contains all measurement points.

After the selection of the desired structure tree you can select which measurement points should be used in this analysis.

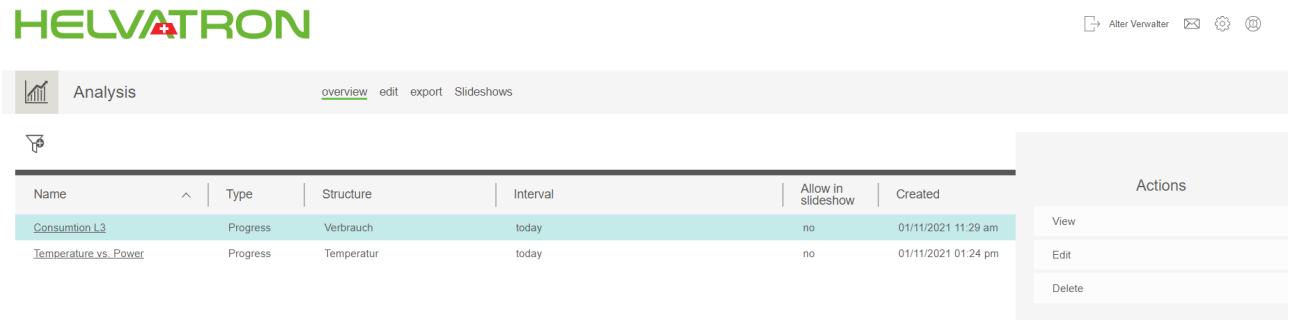
An analysis lets you plot the data and export it as a plotted graph (.png) or as a csv-file.

## Overview

Shows an overview of previously saved Analyses.

Action menu:

- View: The selected analysis is displayed and can be edited.
- Edit: Edit the name of this analysis. You can also select the box “Allow as slide” to allow this analysis on the dashboard or in slideshows.
- Delete: Delete the selected analysis.




## Edit

An analysis is based on a structure tree. On the left side you can select your structure tree. Once selected, all measurement points of that structure tree are shown below. Select the measurement points you want visualized.

On default settings the past five days are visualized.

The following diagram types are available [1]:

- Progress plot
  - plots the measurement over time (Power W).
- Consumption plot
  - plots the consumption in Wh.
  - is used to display meter readings.
  - is used to export meter readings as CSV
- Sankey
  - Shows the energy flow.
- Load curve analysis

Action menu:

- Select periods [2]:
  - Select the time period for the chart, it can either be a relative or a fixed period.
  - Relative periods are used to display data from the viewpoint of the current date. E.g. yesterday, last week, last month.

- Fixed periods are static and can be compared to other fixed time periods

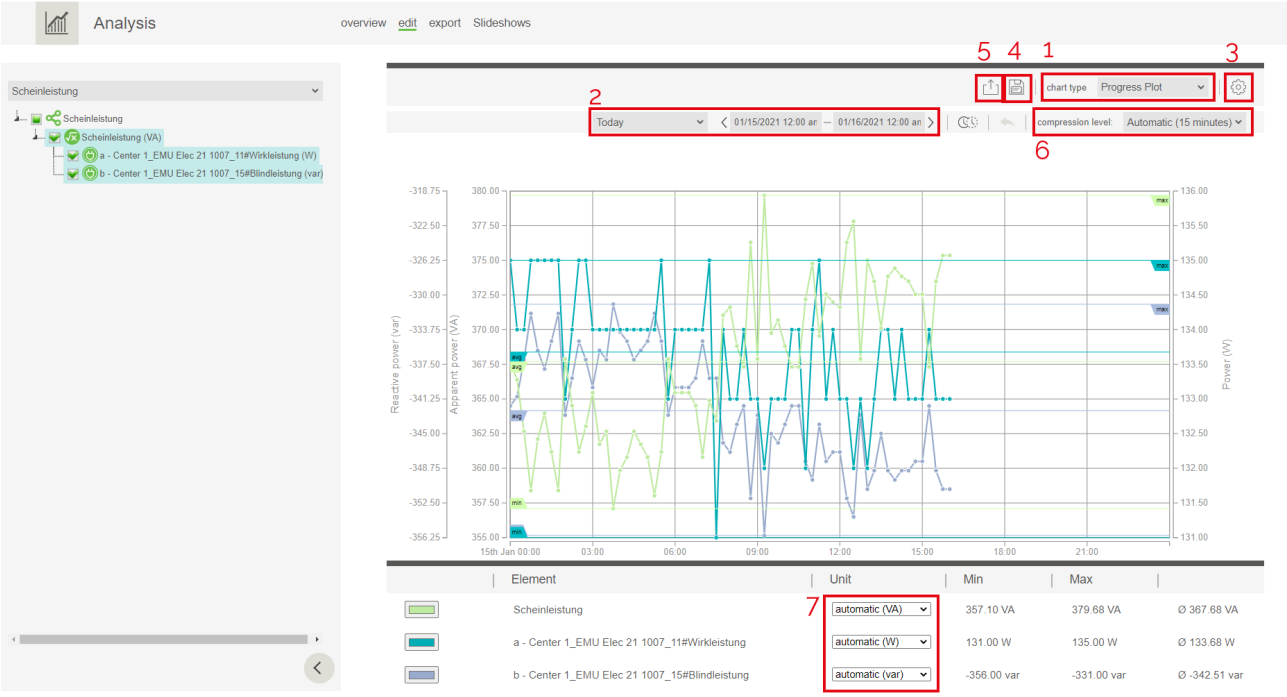
- Change options [3]:
  - Option to dis-/enable minimum, maximum and average lines in your diagram.
  - Change the compression level, the automatic selection chooses the optimal compression level depending on the selected time period.

- Save [4]:
  - Saves the selection in the structure tree, the time period and the settings.
  - A saved analysis can be viewed in the overview.
  - If you save your analysis you can give it a name and choose whether it can be used in slideshows.

- Export [5]:
  - As csv:
    - Exports the selected data.
    - Selection of the desired data interval, the field separator and decimal marker.
    - For the export of meter readings the consumption diagram must be selected.
  - As image:
    - Download the diagram as a pdf/png file.
    - Export of a diagram supports up to 30 meter readings.

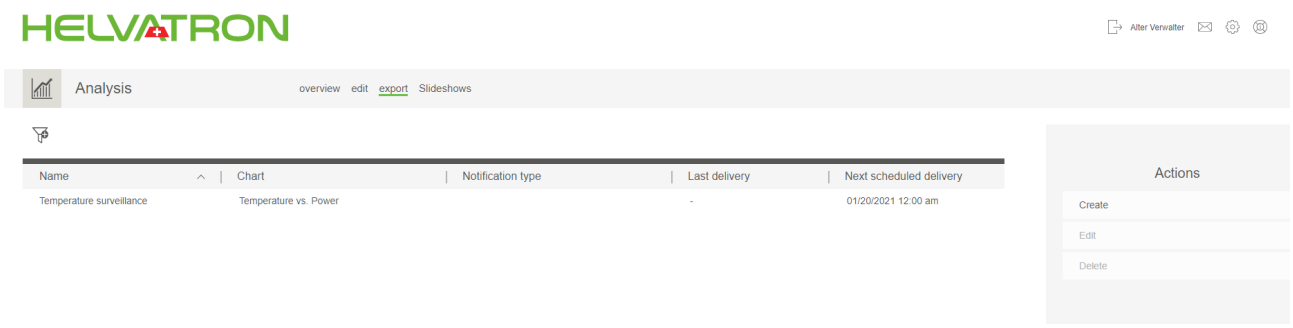
- Edit compression [6]:
  - Use this option to edit the number of shown data points per time interval.

- Unit [7]:
  - Change the shown unit of the selected measurement.
    - E.g. You can choose to display the consumed energy in Wh or kWh.



# Export

The export is used to automatically send analyses in a defined interval.




Action menu:

- Create
  - Creates a new export entry. The process is described in the next chapter.
- Edit
  - Edit the settings on a created analysis.
- Delete
  - Delete a created analysis.

## Export of analyses

To generate a recurring export of an analysis, click on “Create” or “Edit” for already created analyses.

- General information:
  - Set the name for this analysis.
- report settings
  - Chart: Choose your analysis.
  - Include chart: Option to include a chart with a defined resolution (1024x768 up to 1920x1080.) in the export.
  - Include CSV: Option to include data as a CSV file
    - Data interval: Compression level of the exported data.
    - Field separator: Choose a field separator.
    - Decimal marker: Depending on the local settings of the recipient you can choose between comma or point.
- Delivery frequency:
  - Next transmission time: If the next transmission time is set in the past the portfolio will be processed immediately.
  - Frequency: The following frequencies are selectable
    - 15min, 30min, 1h, 6h, 24h (daily), weekly, monthly, yearly.
  - Enabled: Make sure to check this box if you want Joulio-Web to create your portfolio.
- Notification settings
  - The portfolio can be sent to:
    - An e-mail address. Select the “E-mail” box and fill in the necessary information.
    - To user groups of Joulio-Web. Select the box “Message”. If the chosen user has activated external e-mails, this message will be sent as an e-mail as well.
    - An external FTP server. Select the “FTP” box. Transmits the report to the configured FTP-Server. One click on the test button allows you to check if a connection to the FTP-Server can be established.

# Slideshows

You can create slideshows out of your various analyses. Once created, Joulio-Web will automatically generate a link which can be opened on modern web browsers. This option is tailored to users who want to show their production or consumption in public places.

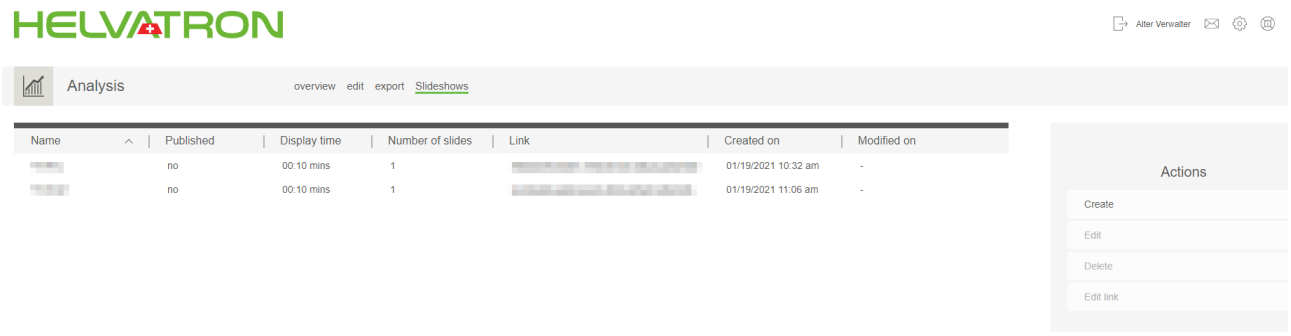
*Note: Make sure that the desired analyses have the “Allow as slide” option activated.*

- Create:
  - Name: Choose a Name for your slideshow.
  - Language: Choose the language of your slideshow. All axis descriptions etc. are translated automatically into the chosen language.
  - Published: Select this option if you want this slideshow to be accessible without the need to login.
  - Standard display time (s): Set a default display time for all your slides in this slideshow. You can later change the display time of individual slides.
  - Slides: Select all desired analyses or dashboards.
    - Use the “B” button to edit individual display time.
    - Use the “X” button to delete this slide from the slideshow.

Once created, your slideshow will be shown in the overview. The link will send you to a web based presentation of your slideshow.

*Note:*

- *You can choose to make your own link. This can only be done while creating the slideshow.*
- *To overwrite the language setting of a slideshow add the following string at the end of the link: “?lang=[Language code”, e.g. “?lang=de_CH” for a presentation in German.*



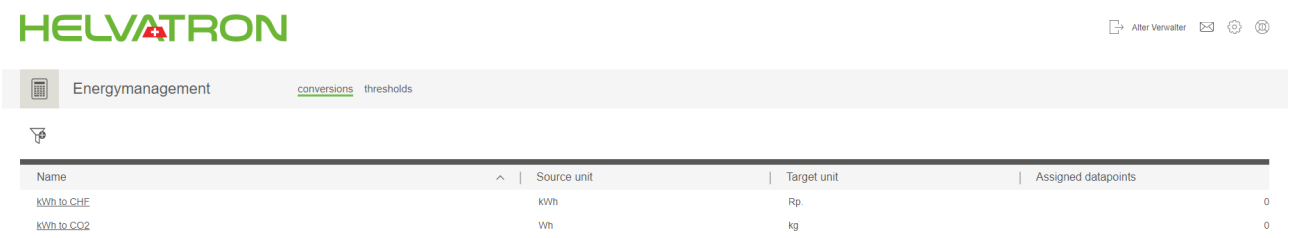
# Energy Management

The menu “Energy Management” lets you define conversions for use in structure trees as well as thresholds.

## Conversions

The “conversions” tab allows for creation of new structure tree elements.

- Create: Create a new Conversion
  - Name: Set a name for your conversion.
  - Source quantity / unit: Choose the measurement and the unit of the source you want to converse. The source is the data point which you will choose later.
  - Target quantity / unit: Choose the measurement and the unit of the target element you want to use in your structure trees.
  - Datapoints: Choose the source data point. You can use the filter function to narrow down your search.
- Edit: Edit the parameters you set while creating the conversion.
- View conversion factor values: Set a conversion factor for your conversion.
  - Use the button “Add value” to set a value and a date and time from which on this new conversion factor applies.
  - You can set multiple conversion factors. The start date of the new factor will automatically become the end date of any previously set factors if the new factor applies for a later time and date.
- Delete: Delete a conversion




The converted measurement points can now be accessed in the structure tree.

An example:

You want to know how much CO2 you produce with your energy needs. You know your electricity mix is 50/50 hydro-power and coal-power. One kWh electrical energy produced in a coal power plant results in ca. 0.38 Kg of CO2. For your conversion you now choose electrical work in kWh for your source and mass in kg for your target. The conversion value is 0.19 as only 50% of your consumed electrical power is coal-generated (Hydro-power CO2 emissions are negligible). Save and go to “Structure tree”. You can now use the measurement point with the unit “mass”. You can use this measurement the same way as all the other measurements.

# Thresholds

With the configuration of threshold levels, data points from the infrastructure and the structure tree can be monitored. You can set the check interval, the minimum and maximum values. A threshold violation on a monitored measurement point or structure tree triggers a notification to the set user group.

Click the action menu item “Create” to choose between a single data point or a structure tree to monitor.

- On a structure tree you can choose the desired item (e.g. a sum node).
- A singular measurement point can be chosen via the filter feature.

Check the “Enable” box if you want this threshold monitored. The “Check interval” defines the time period that is used for the calculation of a threshold violation. The delay depends on the selected check interval:

| check interval | delay |
|---|---|
| 1 min | 1 min |
| 15 min | 15 min |
| > 15 min | 1 h |

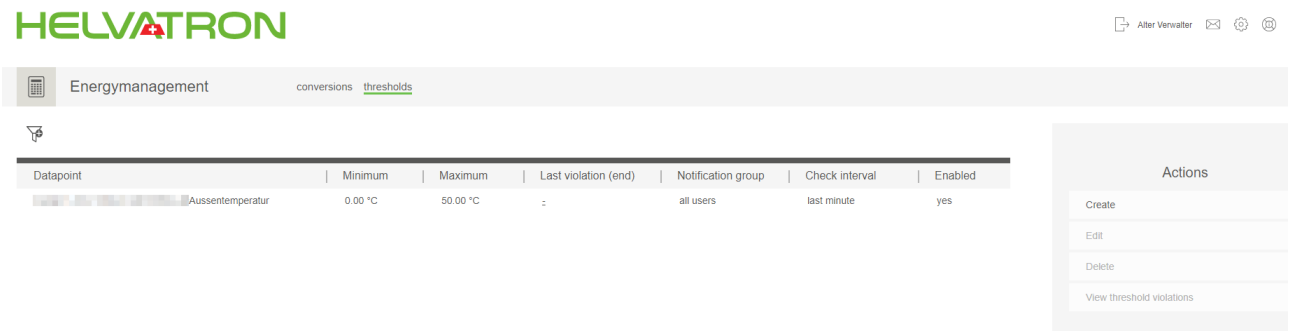
The delay for the interval “last two hours” is one hour.

- The following intervals are monitored
  - 09:00 - 11:00
  - 10:00 - 12:00

During an interval the system checks if the average values are violated.

Example: A household sets itself the 2000-Watt goal:

- Choose a sum node for your threshold monitoring which adds all power of this household.
- Check “Enable”
- Set the check interval to “current day”
- Set the minimum to 0 Watt and the maximum to 48kWh (24h * 2000 Watt per person)
- Set the owner of the household under “Notification group”. The owner now receives a notification each time the household uses more than 48kWh in a day.



# Dashboard

The dashboard is displayed after a successful login to Joulio-Web. It can be used to get a quick overview over everything important and is fully customizable.

## Show Dashboard

This tab shows the default dashboard. “Show dashboard” is the first page of Joulio-Web that is shown after logging in.

To the top right of the dashboard is its name. By clicking on the name you can choose between all your created dashboards. In the same menu you can edit and refresh the current dashboard.

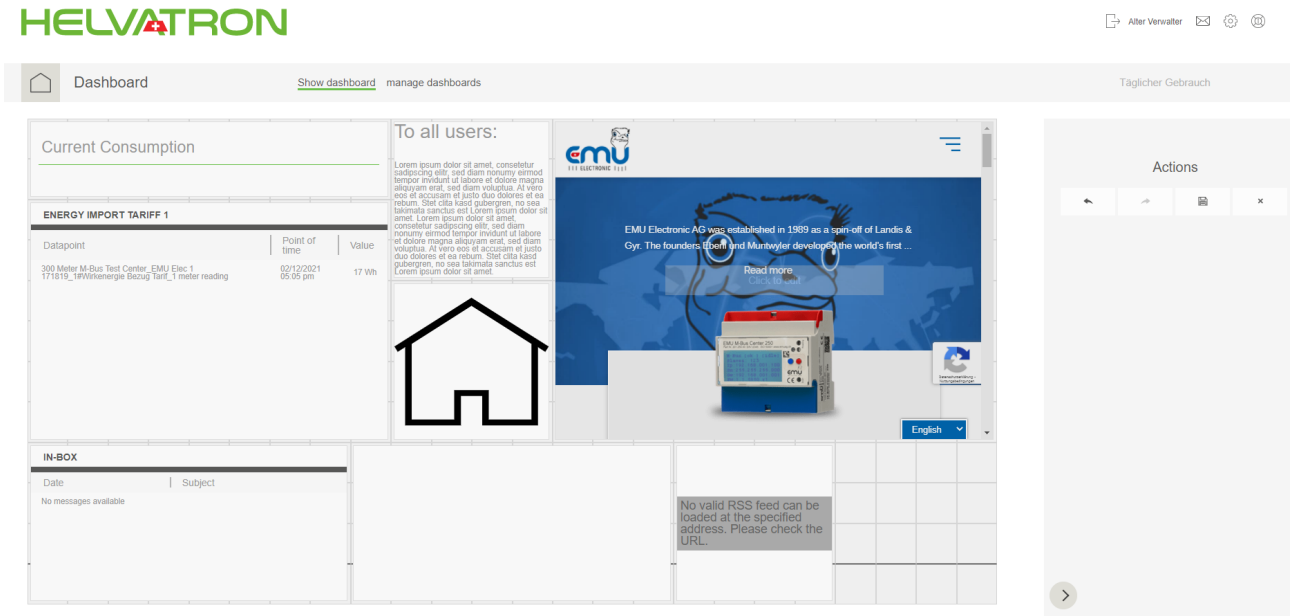
### Edit Dashboard

To place an element on your dashboard, click on any of the free grid space. A circular menu will pop up with the following items (clockwise):

- Value Display: Display a specific measurement point of a meter.
- Data point state table: Display multiple measurement points in a single table.
- Headline: Structure your dashboard with headlines.
- Text block: Insert a text.
- Image: Insert a figure from your uploaded files.
- Website: Link a website to your dashboard.
- RSS Feed: Link a RSS Feed to your dashboard.
- Inbox: Get instant access to your Joulio-Web inbox.
- Chart: Display an analysis on your dashboard.

Once you placed the empty element you can situate it per drag&drop anywhere on your dashboard. Click the element a second time to edit it. The edit mode lets you change the size of the element, set the needed links or choose the desired measurement points. The actions menu lets you undo and redo your last changes.

Make sure to save your dashboard via the save symbol in the actions menu. Leave the edit mode by clicking on the “x” in the actions menu.



## Manage Dashboards

This tab displays all created dashboards. The actions menu gives you access to the following functions:

- Create dashboards: Create a new dashboard.
  - Information: Set the name of your new dashboard and give it a short description.
  - Permissions: Set the users or user groups which have access to the dashboard and may edit it.
  - Settings: Choose a background image for your dashboard and format it as you wish. If you want to use this dashboard in a slideshow, make sure to check the “Allow as slide” box.
- Edit settings: Edit the settings you made while creating the dashboard.
- Use as default dashboard: Click this option for the dashboard you want displayed after your login. A checkmark next to the dashboard lets you see which one is set as default.
- Delete dashboard: Delete the selected dashboard.

# Objects

This menu allows you to organize your project in form of a tree structure.

## Object Types

Joulio-Web ships with 4 premade object types. The complex, the house, the story and the flat.

Object types represent a specific unit of a project (and can be created and grouped individually). A complex consists of a certain amount of houses, which in turn consist of multiple stories. Every story has multiple flats. A large scale project can be broken down into smaller pieces.

Action menu:

- Create: Create a new object type for your project. *Note: We recommend starting with the smallest possible object in your project. This will save you time in the long run.*
    - Name: Set a name for your new object type (in all languages if needed).
    - Icon: Choose an icon for your object type from your repository.
    - Can have devices: If you want to assign meters and measurement points to this object, make sure to check this box.
    - Allowed children: Choose from the list of object types and select which children are permitted for your new object. *Note: You can add more children later, but once you saved an object type the chosen children cannot be removed.*
    - Create: Save your newly created object type.
- Edit: Edit your object type.
- Delete: Delete an object type permanently.

Example:

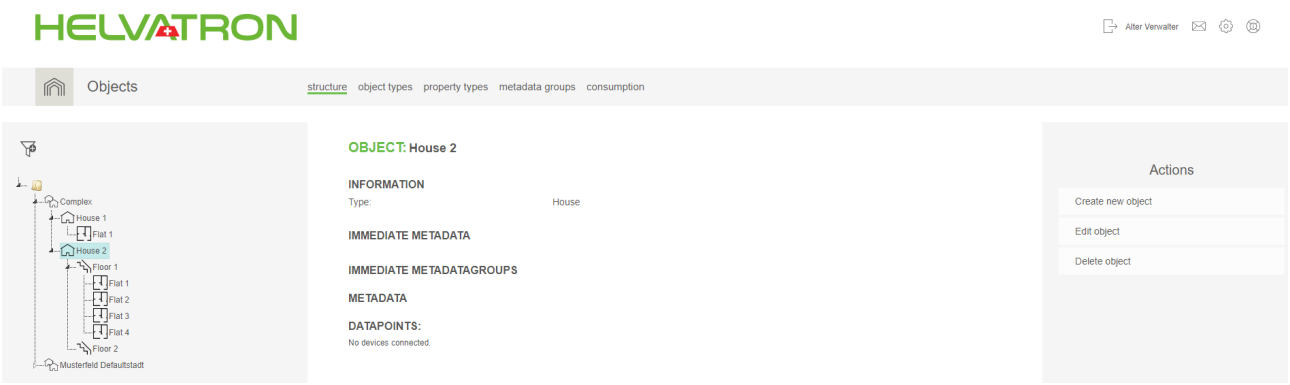
We create the object type “Flat” as the smallest object of our project. The next bigger object would be a story. We assign the flat as a child to the story because a story can have multiple flats. We repeat this process with “House” and “Complex”. Our complex consist of multistory houses, as well as single flat houses, therefore we assign both “Flat” and “Story” as children for our house.

## Structure

This tab lets you organize your project. Click on the folder symbol in the left screen area and choose “create new object”. *Note: Differing from creating object types, you may want to start building the hierarchy of your project from top to bottom (Complex in the default case).*

- Display name: Set a specific name for your object (e.g. the physical address).
- Template: Choose which object type your new object is.
- Metadata: Shows the properties of the chosen object type.
- Metadata groups: Choose a metadata group for this object.

Save your object by clicking on “Submit and close”. If you want to create further objects on this layer choose “Submit and continue” instead. To create subordinated elements for the newly created object, choose the object and click on “create new object” in the actions menu.




## Property Types

This tab lists all properties of your objects. Per default, Joulio-Web is delivered with property types for meters and measurement points. To establish your own property types, choose the “Create” function of the action menu.

- Create: Create a new Property type
  - Name and Symbol: Choose a name for your property (in all languages if needed). You can also add a symbol for your property (in all languages if needed).
  - Identifier: Set an unique identifier for your property type e.g. device.location.
  - Inheritable: If you check this box, objects with this property will inherit it to all their sub-elements (children).
  - Can be assigned to: Choose which devices this property type can be assigned to.
  - Assign property to the..: Choose which object types this property can be assigned to.
  - Save your new property type by clicking on the “Create” button.
- Edit: Edit the parameters mentioned under “Create” of a property type.
- Delete: Delete a property type.
- Sort: Sort your property types via drag&drop or by clicking on the arrows on the right of the properties.

## Metadata Groups

Create metadata groups which can be selected easily in the structure tree.

*Note: Metadata groups can be edited but not deleted.*

To create a metadata group use the “Create” function of the Action menu and subsequently choose a name and property for this group. Save your group by clicking on “Create”.

## Consumption

Every measurement point that has an assigned Obis code and is linked to an object can be displayed here. This display needs a prior consultation with EMU Electronic AG and is much like the overview in Analysis. Each object with linked meters automatically displays the basic data from those meters here.

The structure tree on the left lets you navigate your project and the corresponding energy use easily.

*Note: This functionality only works if all meter registers are correctly configured with Obis codes!*

# Invoice

Get an overview over created invoice runs and your saved tariffs.

*Note: This functionality is only available if the correct Obis codes have been set on all meter registers!*

## Invoice Runs

This tab displays all invoice runs created by Joulio-Web.

- Invoice run configuration:
  - Automatic generation on/off: Activate the automatic creation of this invoice run by Joulio-Web.
  - Delay in days: Set the delay time after which Joulio-Web creates the invoice automatically.
  - Message group: Set a group which gets informed once new invoices have been created.
- Create invoices immediately: Create outstanding invoices immediately.
- Download invoices: Click on an invoice to download it. You are able to download multiple invoices by clicking the boxes to the left of them.

## Tariffs

This tab allows you to create your own tariffs.

- Create:
  - Name: Set a name for your tariff
  - Currency: Choose a currency for this tariff
  - Rounding rule: Set the rounding rule. 0.01 rounds to the next cent, 0.05 rounds to the next 5 cents (Rappen), 0.001 rounds to 0.1 cents.
  - Billing interval: Choose at what interval Joulio-Web creates the invoice.
  - Taxes: The basic value-added tax (VAT) for Switzerland can be selected.
  - Tariff items: Choose between the tariff items “Meter reading” and “Peak load”. You can add multiple meter readings and peak loads per tariff.
    - Meter reading: Choose a name for this position and the corresponding Obis codes as well as the price per unit.
    - Peak load: Choose a name for this position and the corresponding Obis codes as well as the price per period.

## Tariff Lists

Create lists from saved tariffs. The actions menu lets you:

- Create: Create a new tariff list. Set a name and choose which tariffs you want in this list.
- Edit tariff list: Edit the settings of created tariff lists.

# Document Management

This menu lets you upload new documents, files and images to Joulio-Web and download previously uploaded documents etc.

These files can be linked to specific functions in Joulio-Web:

- While creating new objects you can choose a file for the object's icon.
- Choose an image for your dashboards from this repository.

Choose:

- Upload document: Upload a file to Joulio-Web. For this you must choose a file to upload and give it a name.
    - If you do not set a name, Joulio-Web keeps the name and file extension of the uploaded file.
    - *Note: If the name is already in use, Joulio-Web overwrites the currently uploaded file without asking!*
- Download document: Click on the name of the files you want to download or choose multiple files by clicking on the box to the left of the files.

# Step by Step Integration of a M-Bus Center and Creation of an Analysis

The following instructions are a step-by-step guide through the integration of a M-Bus Center in Joulio-Web. At the end it is explained how you can create your first analysis .

## Preamble

This example explains how you integrate a M-Bus Center into Joulio-Web. Furthermore the example provides a walkthrough for creating a monthly analysis of meter readings and sending them via e-mail.

## Assumptions

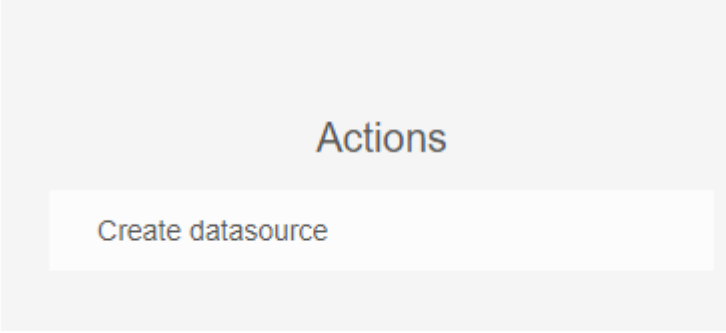
- M-Bus-Center
  - All meters are connected correctly.
  - All meters can be read-out over M-Bus.
  - All meters are added to the M-Bus Center.
  - Name, location, etc. are already configured on each meter.
  - Measurement points which should be analyzed are configured on the meter (correct unit, divisor, etc.).

*Note: For an even easier integration use the M-Bus Center templates.*

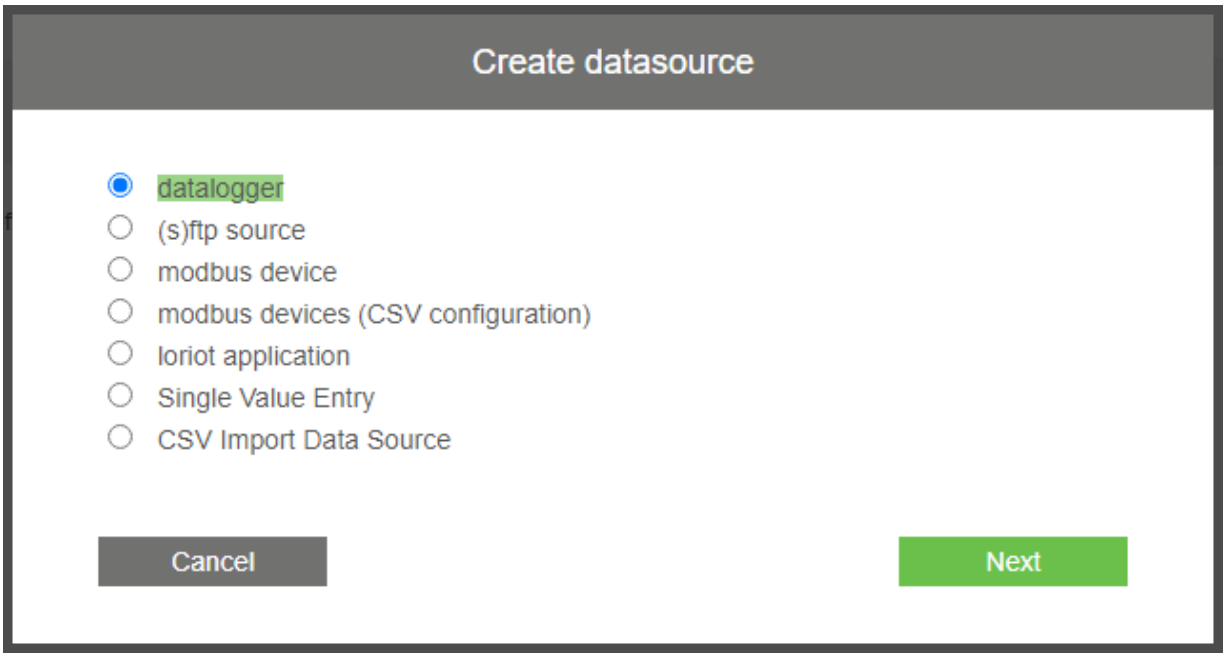
- Joulio-Web
  - The system certificate has been requested and installed.
  - The communication between Joulio-Web and the M-Bus Center over the network is possible.

## Integrate an M-Bus Center into Joulio-Web

- Create a new data logger in the infrastructure.
  - Action menu “Create datasource”

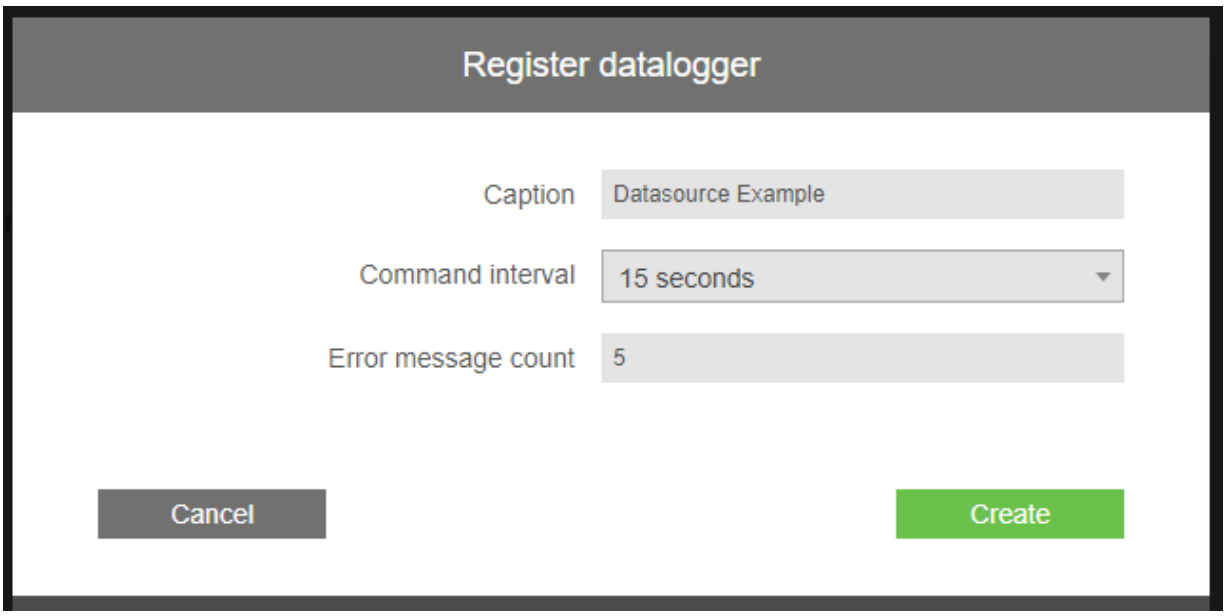



- Select “datalogger” and press “Next”.



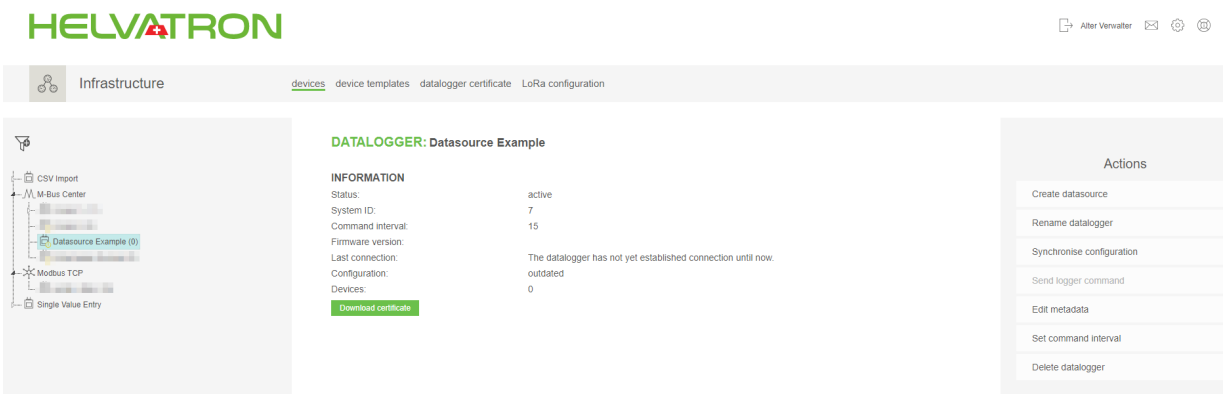

- “Register Datalogger”: Give your logger a new caption (max. 30 digits) and set a command interval. The interval should be less than or equal to the smallest read-out interval of the M-Bus Center. Click on “Create” to finish this step.

  *Note: To begin with, we recommend you set the connection interval to 15 seconds. After the first successful data transfer, you may edit the interval to fit your needs.*




- In the next step, download the certificate for the M-Bus Center from Joulio-Web. You find the button “Download certificate” in the middle of your screen once you select your newly created data logger. The certificate is a .pem file.

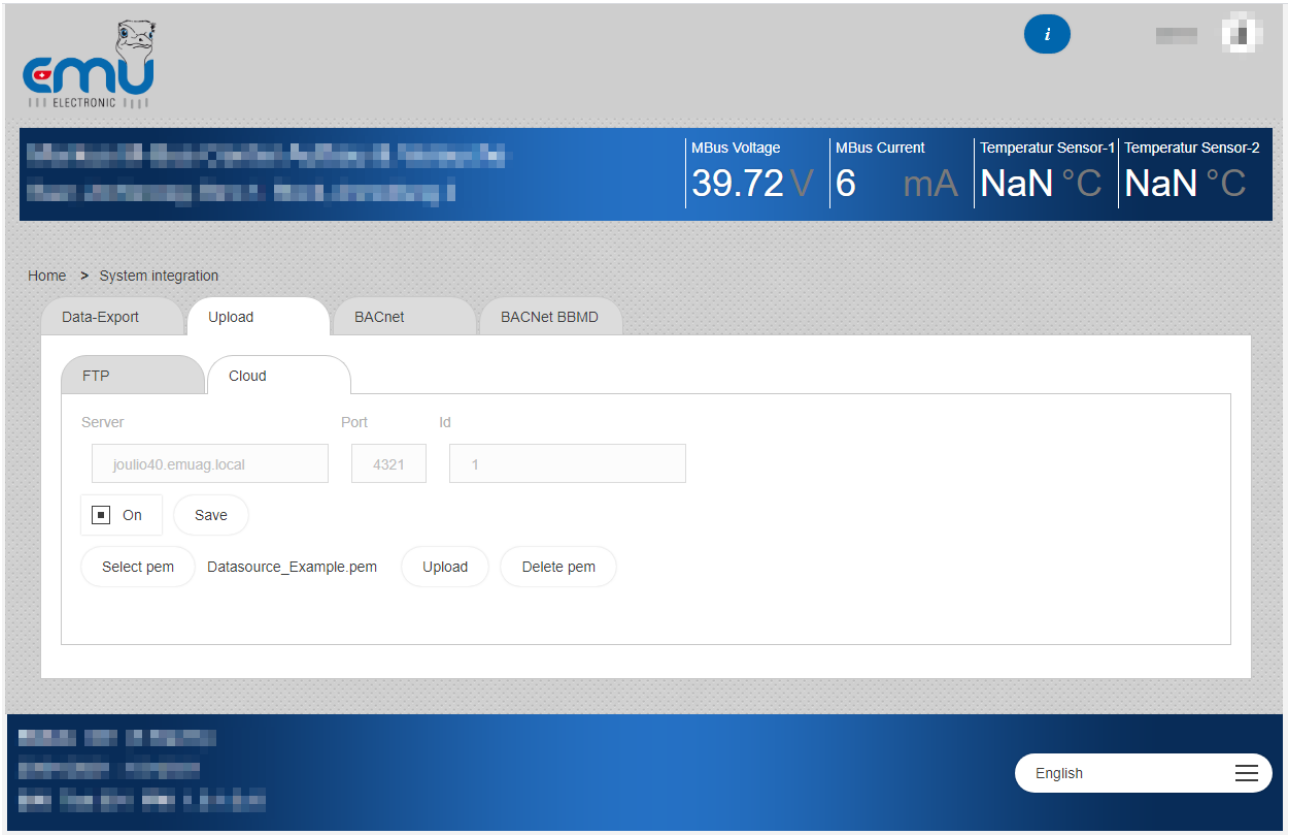
  *Note: This certificate is only valid for this specific M-Bus Center. Repeat all above steps if you want to integrate more than one M-Bus Center.*




Once all of the above steps are complete, open your M-Bus Center via the web based user interface (Enter the IP of the M-Bus Center into the search bar). Log into the web user interface.

## M-Bus Center

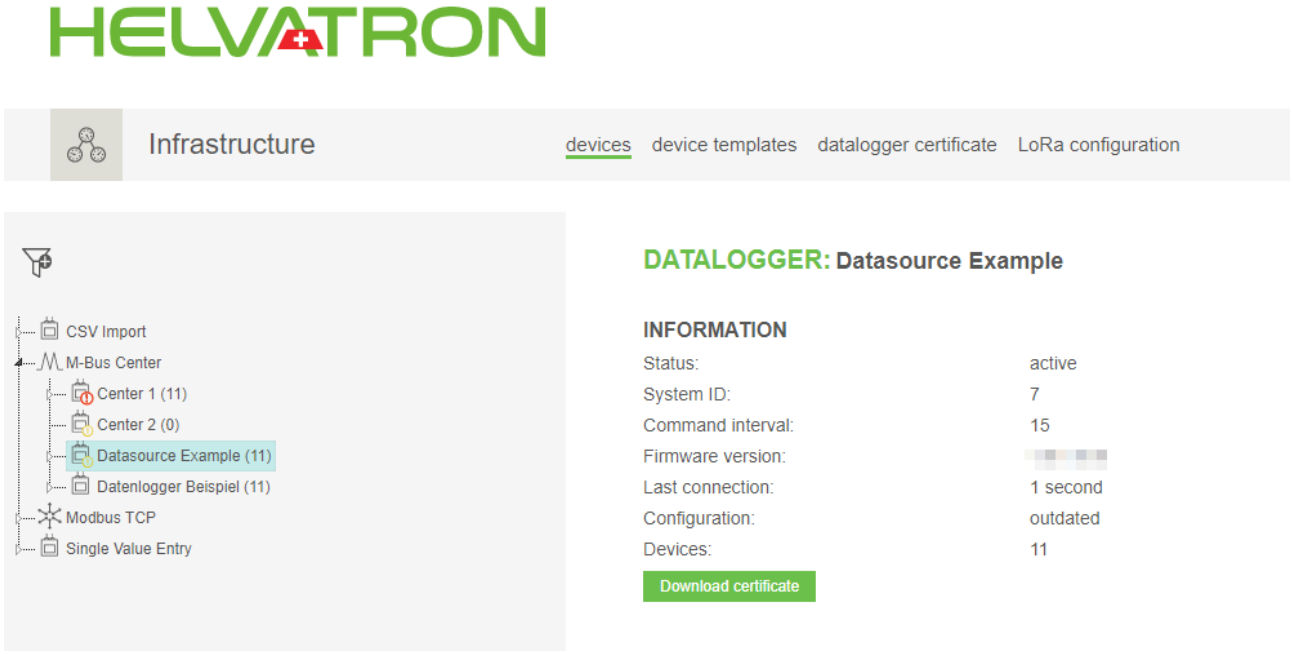
- Now you upload the certificate you just downloaded from Joulio-Web to the M-Bus Center. For this you need to go to “System integration –> Upload –> Cloud” on your M-Bus Center web interface and click on the option “select pem”. Once you see the name of the .pem file next to “Upload” click on “Upload”.




- *Note:*
  - *The check box “On” needs to be activated.*
  - *The field “Server” shows to which host name / IP-address the M-Bus Center connects.*
  - *Clicking on the “Upload” button gives no indication for a successful upload.*
  - *To force the first-time communication between the M-Bus Center and Joulio-Web you may want to restart the M-Bus Center (Logger configuration –> General –> Reboot).*

## Function Test

After a short while the M-Bus Center will communicate with Joulio-Web. The field “last connection” shows the last successful connection between the two.



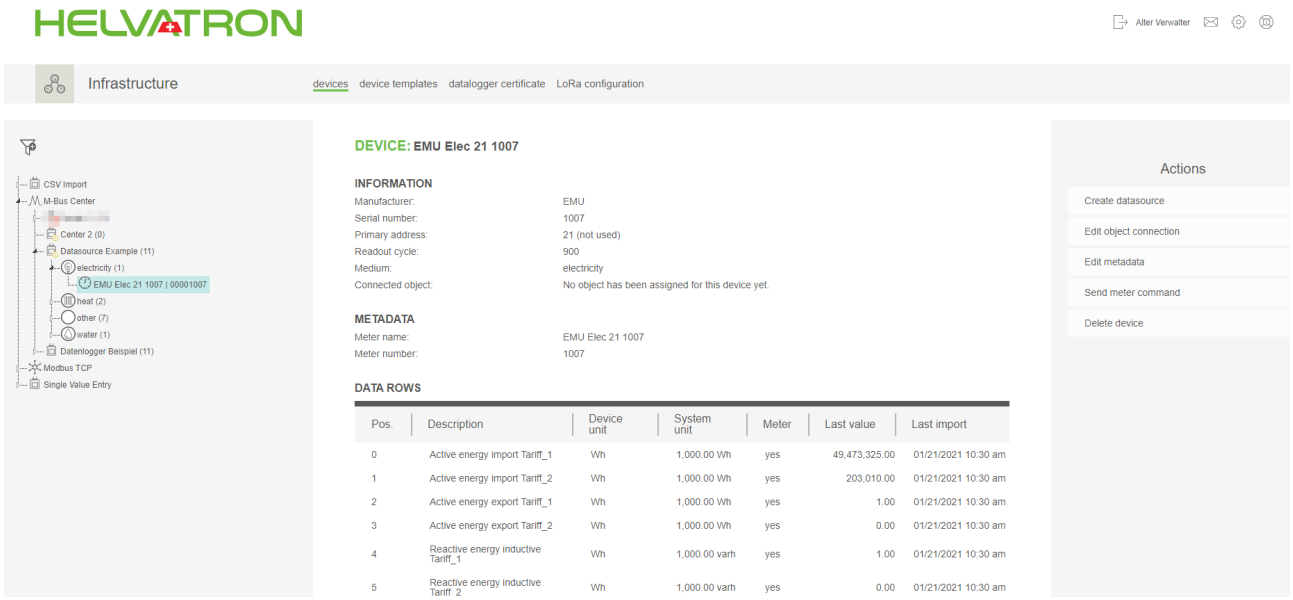

Following this first communication, you can send the M-Bus Center the order to synchronize the configuration with Joulio-Web. Click on “Synchronize configuration” in the action menu on the right.

The configuration of the M-Bus Center entails all connected meters, the corresponding measurement points and their configuration.

*Note: The upload of this configuration may take up to 15 minutes.*

As soon as the configuration between the M-Bus Center and Joulio-Web is synchronized, Joulio-Web will display all connected meters on the left. The upload of historical data starts at the same time. You can click on any meter and see when its historical data was last imported (“Last import”). If any data point displays the message “the datarow is not yet configured”, the register isn’t configured on the M-Bus Center.

In case the M-Bus Center has collected meter data over a long period of time before integration into Joulio-Web, the upload of these historical data may take a while.



*Note: If the configuration of the measurement points on the M-Bus Center did not happen yet or was not saved, Joulio-Web will not activate this data point and will not import data from this data point!*

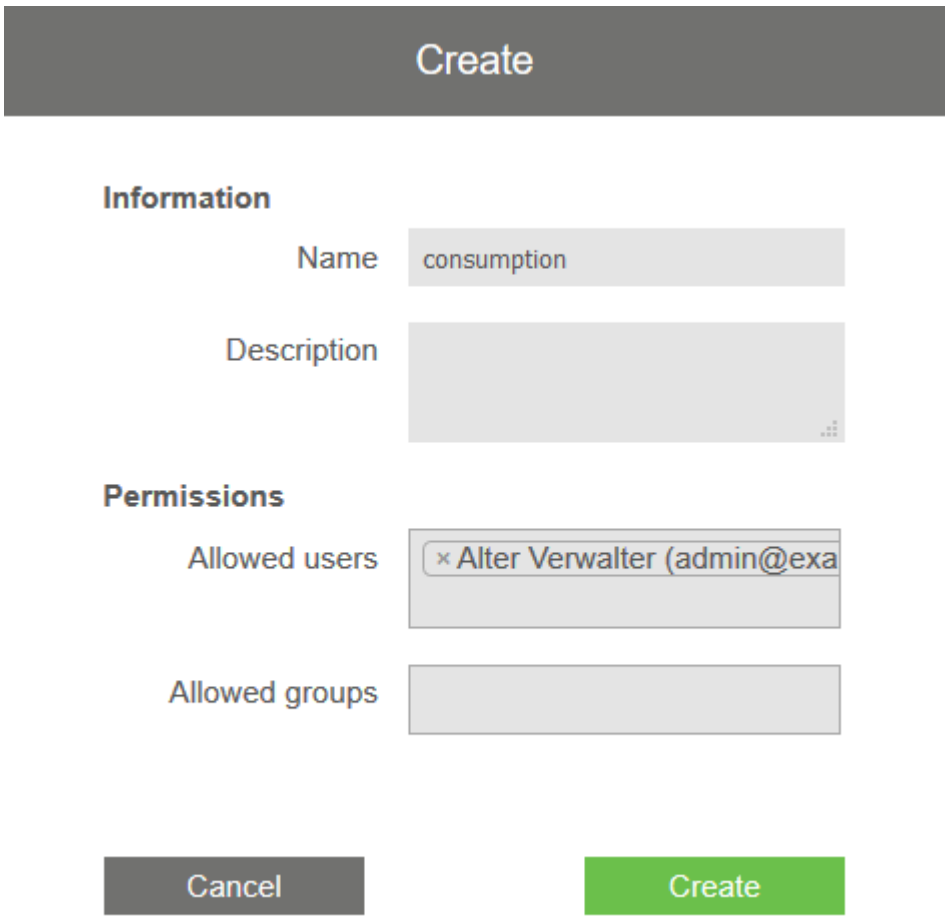
Once you finished all of the above steps, your M-Bus Center is integrated correctly into Joulio-Web. You are now able to review all meters and registers which are connected to the M-Bus Center. The next step describes how you can display this data in more presentable ways.

## Create a Structure Tree

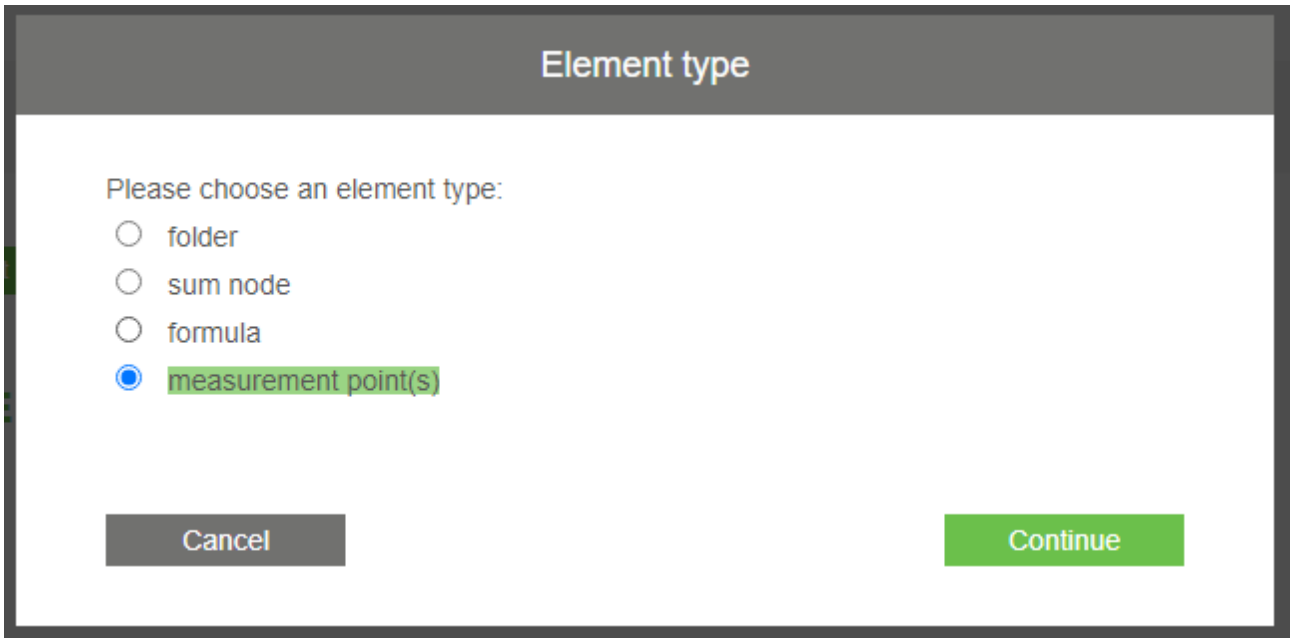
Firstly you need to create a structure tree. Click on “Create” in the action menu.

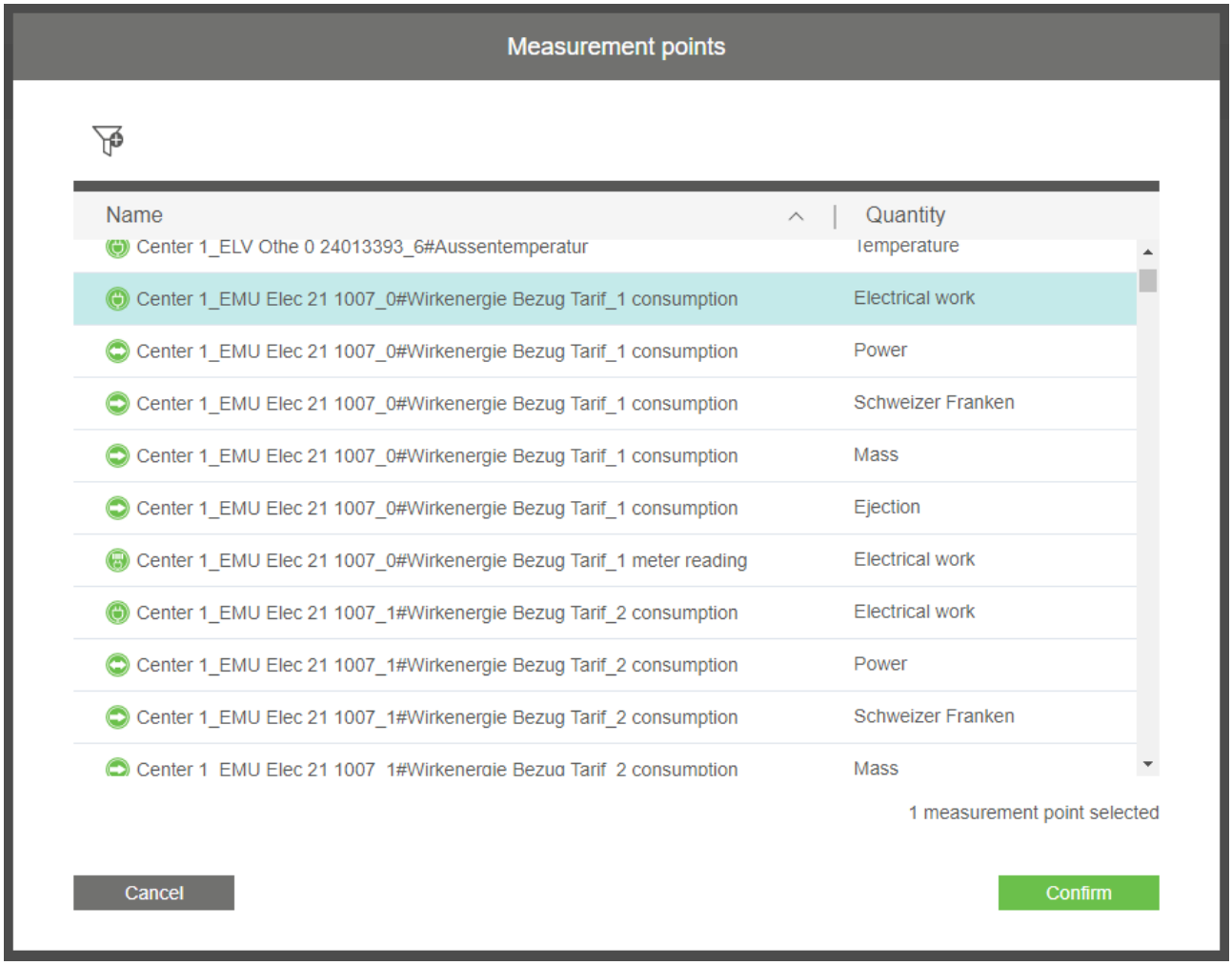
- Choose an appropriate name for your analysis (e.g. Consumption). Make sure that you select all users and user groups that are allowed to edit this structure tree.

*Note: Per default, only the creator can edit a structure tree.*



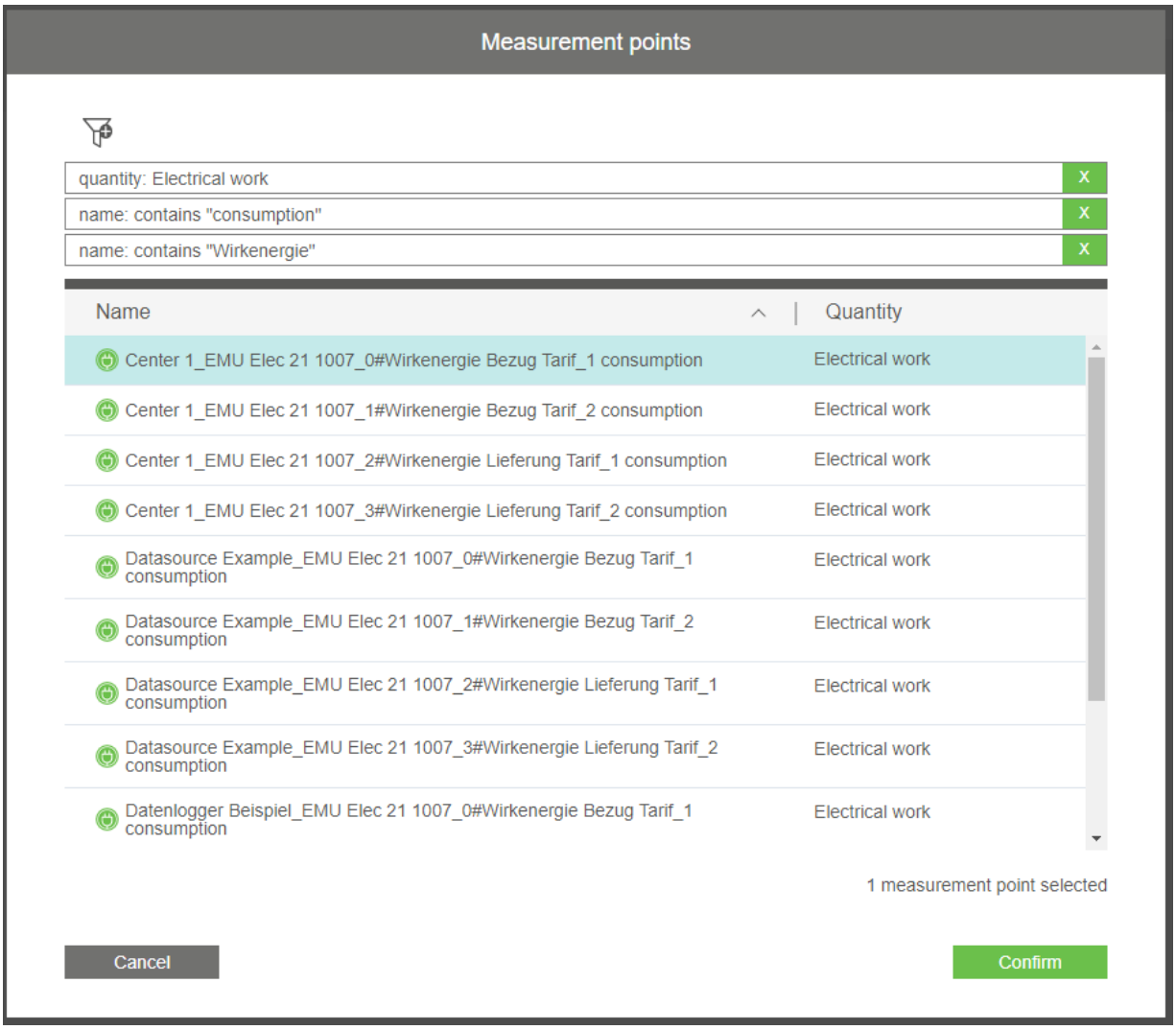

The next step is to select the newly created structure tree and clicking on “Edit structure tree”. Select the item on the left and click on “Create element”. Choose what kind of element you want to add to this structure. To get a meter reading for your analysis choose “measurement point(s)”.



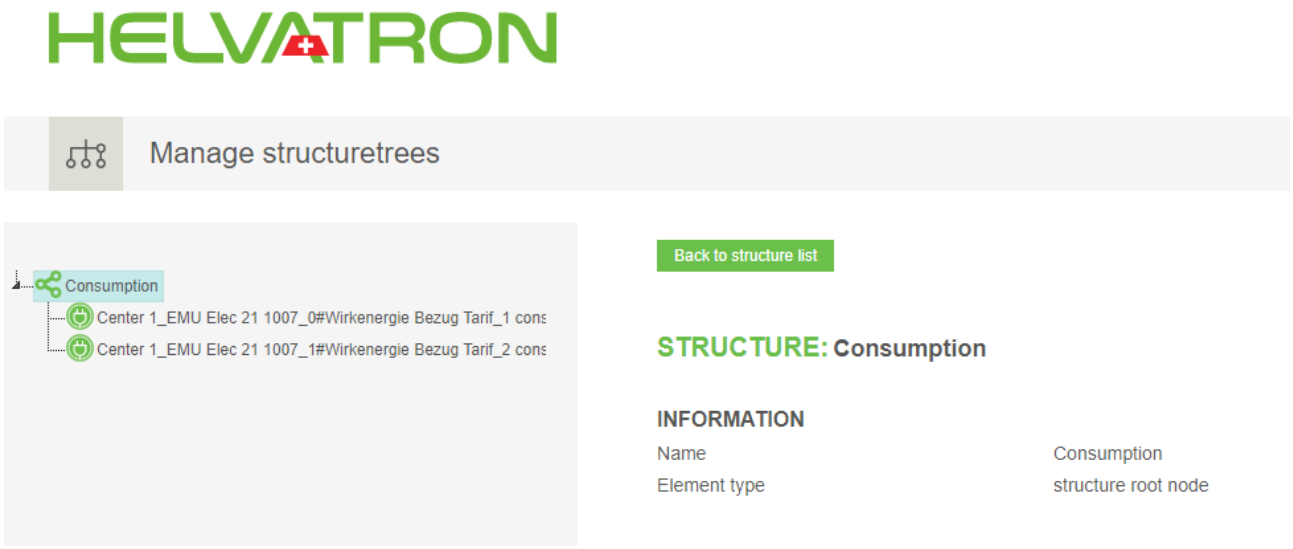




Click on continue and select the desired measurement point(s). To facilitate easier navigation you can use the filter option to search for specific words or units. The filters used in the picture are the following:

- Quantity: electrical work
- Name: Active energy
- Name: Import

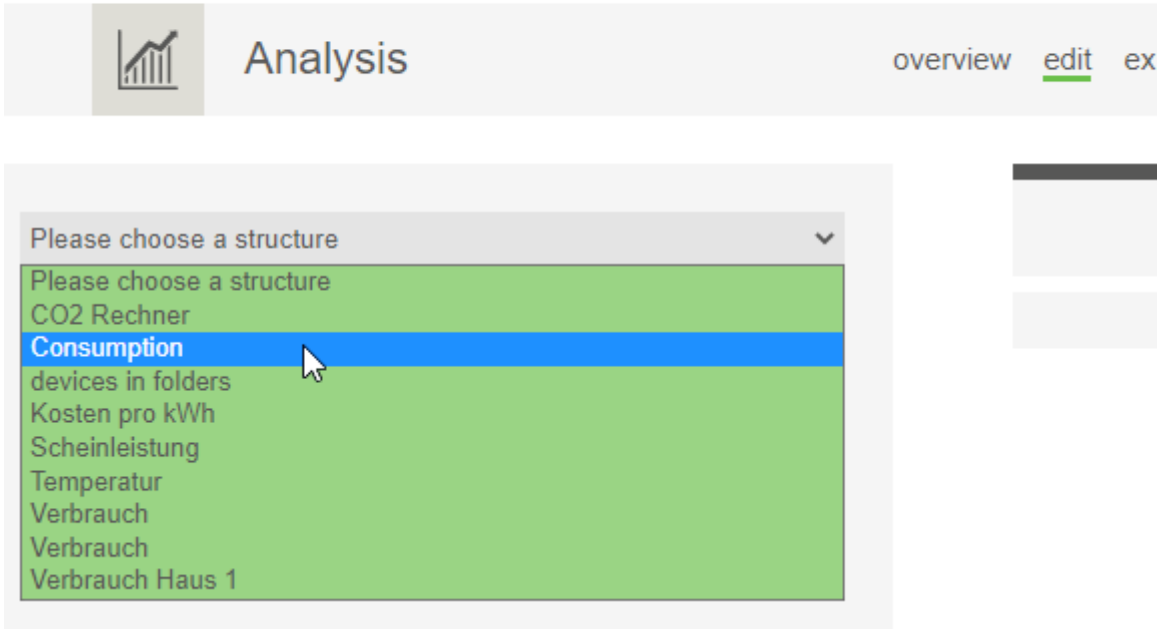



After you click “Confirm” the chosen measurement point(s) are added to the structure tree. Save these changes to your structure tree by clicking on the “Save” button in the action menu.

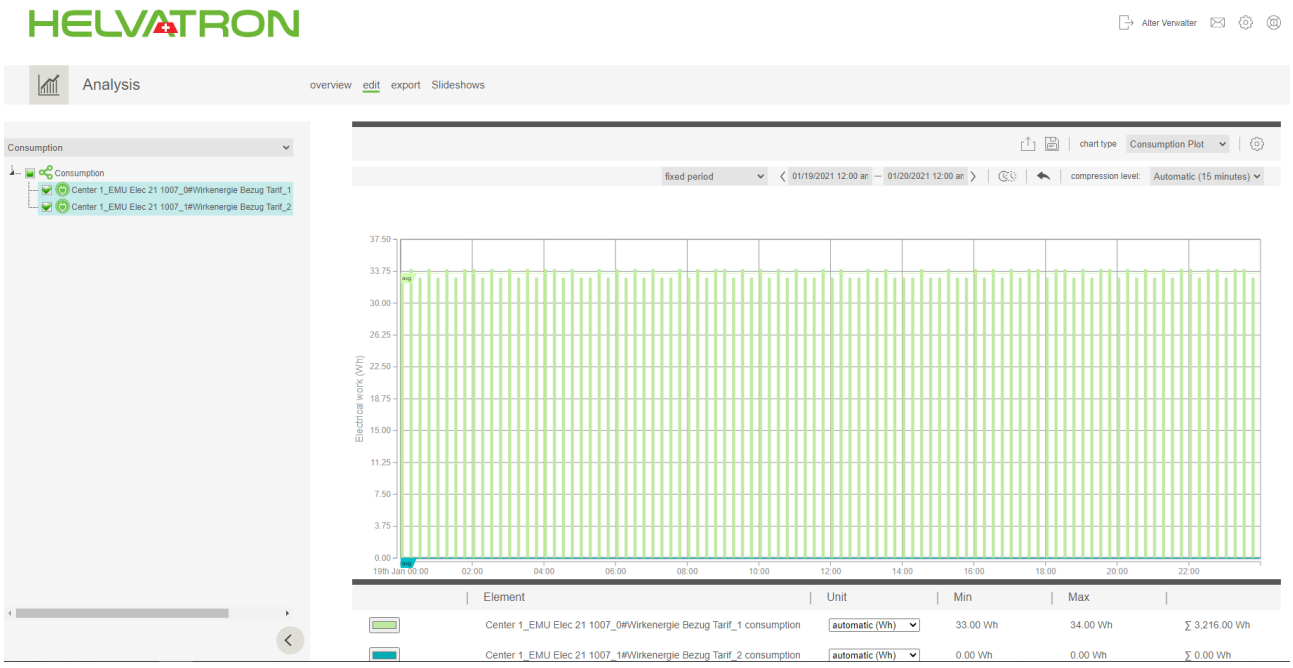


# Create Analysis

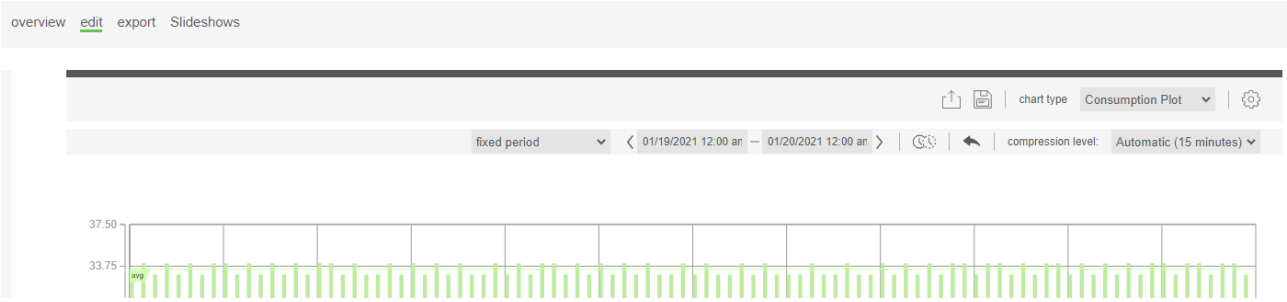
After you created the structure tree, you can use it in an analysis. For this, select the menu “Analysis” and select the tab “Edit”. Use the drop-down menu to find your newly created structure.




On the left hand side you are now able to see all measurement points in the structure. Choose which of those should be displayed in the analysis. As soon as you select a measurement point, Joulio-Web will create a default graphic for the selected values. Once you select further measurement points Joulio-Web will overlay them into the graphic as well. Should it be necessary, Joulio-Web will create multiple axis descriptions to correctly display all measurements.




Once the graphics are calculated and displayed, you are able to edit them. Use the options above the graphics.

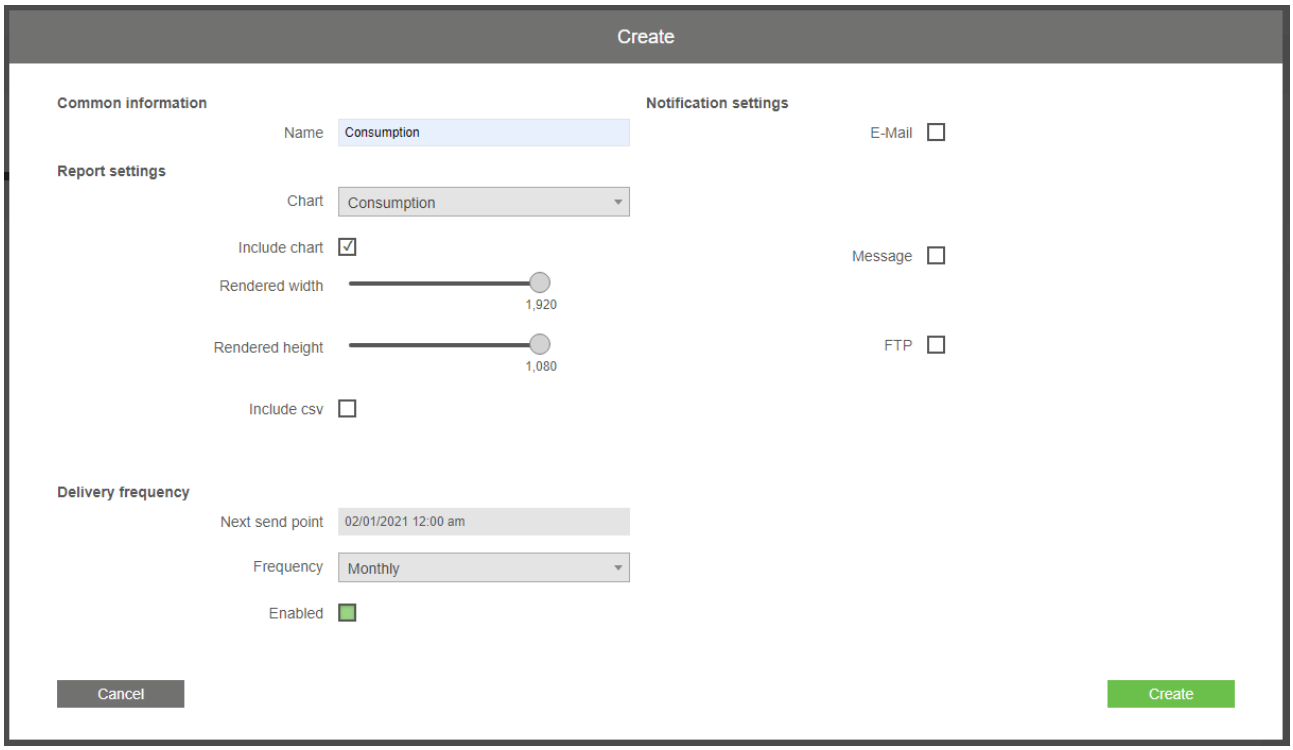



Choose between multiple compression levels, the desired time period and the type of diagram you want. Change the legend and reference lines in the options on the top right. You are also able to export these graphics as .csv or .pdf file.

Don't forget to save your analysis once you are happy with it. When you save, Joulio-Web will ask you to give your analysis a name and to set whether you want to allow this graphic to be displayed in slideshows.

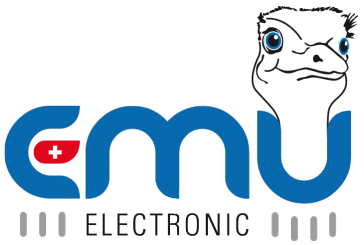
## Mail the Analysis

Click the tab "Export" to create analyses in recurring intervals. The action menu lets you create an export.




We want the monthly meter readings to be sent, so we choose the "next sent point" as the first day of the next month. We also choose the interval "Monthly" and click on the check box "Enabled". Now we decide how we want to send this analysis to third parties. It is possible to send it via e-mail, via the internal messaging system to user groups in Joulio-Web or we can upload the analysis to an external FTP server. Once everything is set click on "Create". Your monthly analysis will now be sent to the chosen users each month.

The calculation of the analysis always happens at the time the analysis is created.

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