

The logo features the word "empower" in a bold, lowercase sans-serif font, with the "em" portion enclosed in a white circle. To the right of "empower" is the version number "6.3" in a smaller, regular sans-serif font. Below "empower 6.3" is the word "MANUAL" in a larger, all-caps, regular sans-serif font.

empower 6.3
MANUAL



ENERGY CONTROL - PEAK LOAD CONTROL - MONITORING

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1 Introduction

We congratulate you on your decision in favour of the **emPower** energy control and peak load management system!

With **emPower**, the energy consumption of your site is automatically controlled in such a way that short-term load peaks are reduced and the power curve becomes more even. This can significantly reduce the cost of your energy supply.

In addition, battery storage devices can also be used to reduce peak loads.

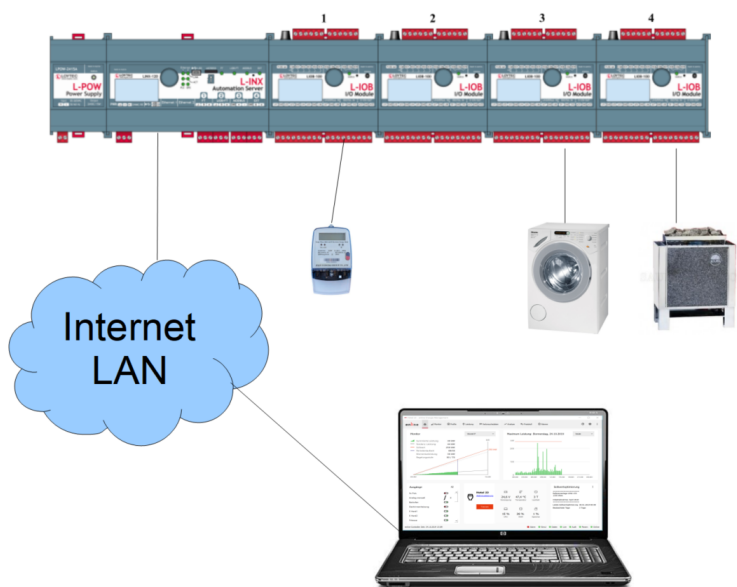
The simple integration of common charging stations for electric cars avoids problems and high costs caused by high charging currents.

If you generate energy yourself, e.g. with a PV system, **emPower** can regulate your own consumption optimally.

You can also monitor your energy requirements comprehensively and you can easily implement typical building automation control tasks.

2 System overview

The following figure shows a schematic overview of an energy control system using **emPower**:



The **emPower** controller is equipped with IO modules (4 in the figure), to whose inputs energy meters (S0 interface, Modbus, M-Bus) and sensors are connected, and to whose outputs, mostly via contactors, the energy consumers to be controlled are connected.

The **emPower** PC software runs on a normal PC connected to the **emPower** controller via LAN or Internet. The **emPower** PC software is used for parametrization and visualization, while the **emPower** regulation runs autonomously on the **<%APP>%** controller.

In systems with their own energy generation, e.g. through photovoltaic systems, **emPower** is also ideal for optimizing one's own consumption, in addition to peak load control. **emPower** can also be used for smart control of charging stations for electric cars.

Operating principle

Peak loads, which are far above average consumption, are often caused by the coincidence of many large energy consumers being switched on at the same time, although this would not be absolutely necessary. For example, heaters can often be switched off for a few minutes without any noticeable impairment. Cooling units can also be switched off, as the cold is stored for some time anyway. In the context of e-mobility, rapid charging stations can be controlled, and in the same way, many other consumers can be localized, which under certain conditions can be switched off during peak loads or which can be switched into the circuit for energy storage from PV systems

The trick is to identify these consumers and to formulate precisely the conditions under which they may or should be switched off or switched on.

With **emPower**, these conditions can then be programmed graphically so that the system can carry out disabling of outputs completely autonomously at peak loads or enabling of outputs when there is excess energy. Using the PC software, extensive evaluations of energy consumption, load distribution and costs can also be carried out later on. If irregularities occur, **emPower** automatically sends emails to one or more recipients.

System limits, EMS-153 and EMS-120

A maximum of **4 LIOB-100** (directly attached or remote via LIOB-A2 adapter at up to 50m), **16 LIOB-150** (via the LIOB-FT bus) and **4 LIOB-450** (via the LIOB-IP bus, i.e. Ethernet) can be connected to the **EMS controllers**. For details see Controller Installation ^{5.99}.

Each LIOB module has

- 4x relay output (LIOB-100: 5x)
- 4x Triac output
- 2x analog output 0-10V
- 2x digital inputs (for buttons and energy meters with S0 interface)
- 8x universal inputs (4 of which are configured by default as digital inputs for pushbuttons and energy meters with S0 interface)

This means that there is a total of

- 100x relay output
- 96x triac output
- 48x analog output 0-10V
- 48x digital input (for buttons and energy meters with S0 interface)
- 192x universal inputs (96 of which are configured by default as digital inputs for pushbuttons and energy meters with S0 interface)

In addition, a **maximum of 96 bus meters** can be connected, whereby the following limits apply to the individual buses:

- 40x Modbus
- 40x M-Bus
- 40x virtual (flexible individual configuration)

There can also be **virtual inputs and outputs**:

- 100x virtual input
- 100x virtual output

Overall, there are the following additional **system limits**, regardless of how many physical inputs and outputs are present; virtual inputs and outputs are also counted:

- 192 outputs
- 128 inputs

100 independent *tariff circuits* can be configured for recording trend (consumption) data.

Of these, 10 can be defined as *control circuits* with up to 17 *target values* each.

System limits SMART-586

A maximum of 1 **LIOB-450** can be connected to the **SMART controller** (SMART-586).

The SMART controller has

- 6x relay output
- 4x digital input (for buttons and energy meters with S0 interface)
- 6x universal inputs (4 of which are configured by default as digital inputs for pushbuttons and energy meters with S0 interface)

This means there are in total (together with one LIOB-450)

- 10x relay output
- 4x Triac output
- 2x analog output 0-10V
- 6x digital inputs (for buttons and energy meters with S0 interface)
- 14x universal inputs (8 of which are configured by default as digital inputs for pushbuttons and energy meters with S0 interface)

In addition, a **maximum of 96 bus meters** can be connected, whereby the following limits apply to the individual buses:

- 40x Modbus
- 40x M-Bus
- 40x virtual (flexible individual configuration)

There can also be **virtual inputs and outputs**:

- 100x virtual input
- 100x virtual output

100 independent *tariff circuits* can be configured for recording trend (consumption) data.

Of these, 10 can be defined as *control circuits* with up to 17 *target values* each.

3 Status bar

The status bar shows you the **emPower** controller system time in the left-hand area when connected to the **emPower** controller, and it has 5 status screens at the right edge showing the current status of alarm, online simulation, trend data, live view, authentication, parameters and connection.

If you hover the mouse pointer over an icon for a short time, a tooltip will show you its meaning.



If the *status screens* are grey, as in this screenshot ⁸, the status is unknown because there is no connection to the **emPower** controller.

- **Alarm**

A double click switches to Alarms ²⁶

- No Alarm Available for Acknowledgement.
- Alarm Available for Acknowledgement

- **Simul**
 - Normal operation, online simulation inactive.
 - Online simulation is active. A *tooltip* indicates which mode ⁵⁹⁶ of the simulation is active.
- **Data**

Double click switches to Trend Data ¹⁶

 - Trend data reflects current status, no activity
 - Trend data are being loaded
- **Live**

Double click changes the status

 - Live data from the **emPower** controller are transmitted and displayed continuously
 - Edit mode, no live data display
- **Auth**
 - Authentication successful (access to **emPower** controller enabled). The tooltip shows details about this.
 - Authentication failed (access to **emPower** controller blocked)
- **Param**

Double click switches to Parameter Manager ²⁹

 - Local site parameters match the site parameters stored on the **emPower** controller
 - Local site parameters differ from the site parameters stored on the **emPower** controller
 - Status of site parameters not yet known (during and shortly after the download or upload of site parameters)
- **Online**

Double click switches to master mode if **emPower** is currently in slave mode

 - Connection to the emPower controller exists, *Master mode*
 - Connection to the emPower controller terminated
 - Connection to the emPower controller exists, but in the *Slave mode* because another PC already has a master connection;
This means you cannot change any data on the emPower controller, but only display the data.

4 Menu bar

The start screen shows the menu bar at the top and the status bar ⁷ at the bottom. The title bar shows the currently selected site ⁸⁴.

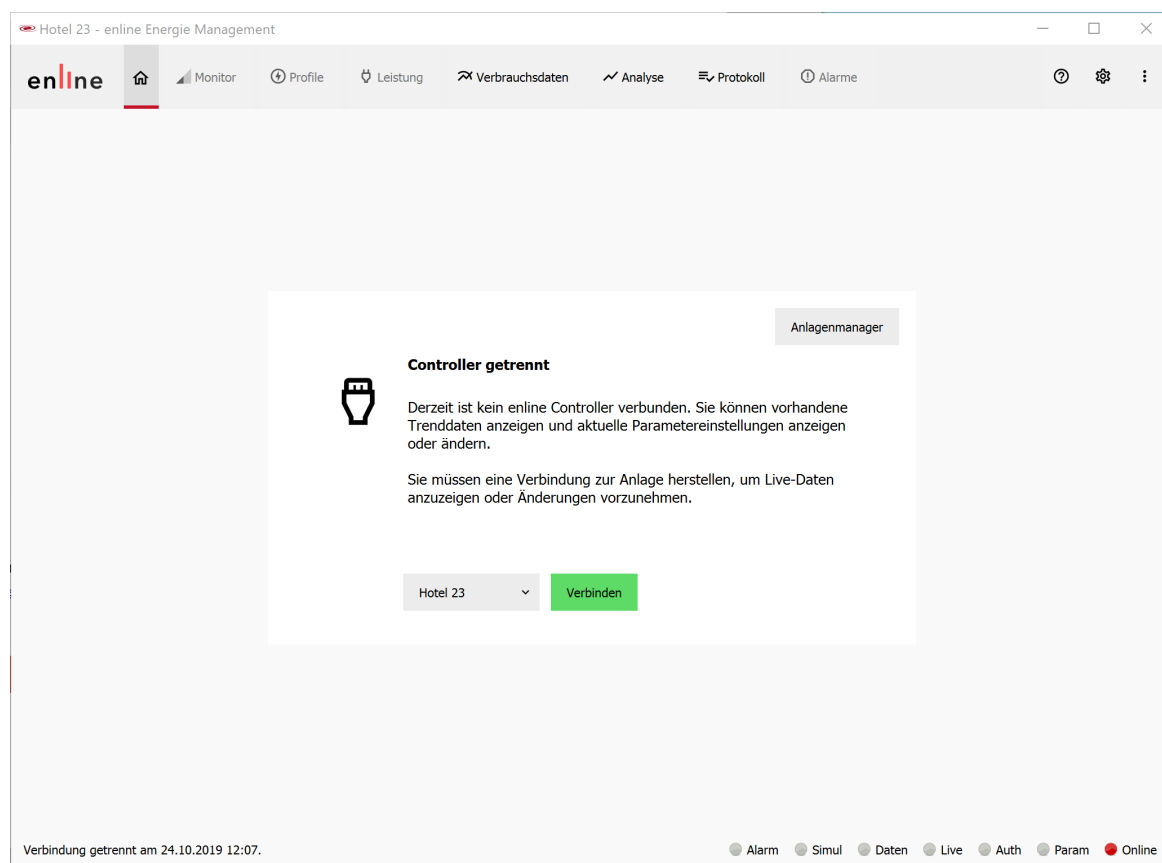
Connect

Establishes the connection to the emPower controller of the selected site.

If the connection fails, please check the access data [89](#) and IP Preferences [89](#) of the emPower controller.

Site Manager

Click on "Site Manager" to enter the Site Manager [84](#).



4.1 Status screen

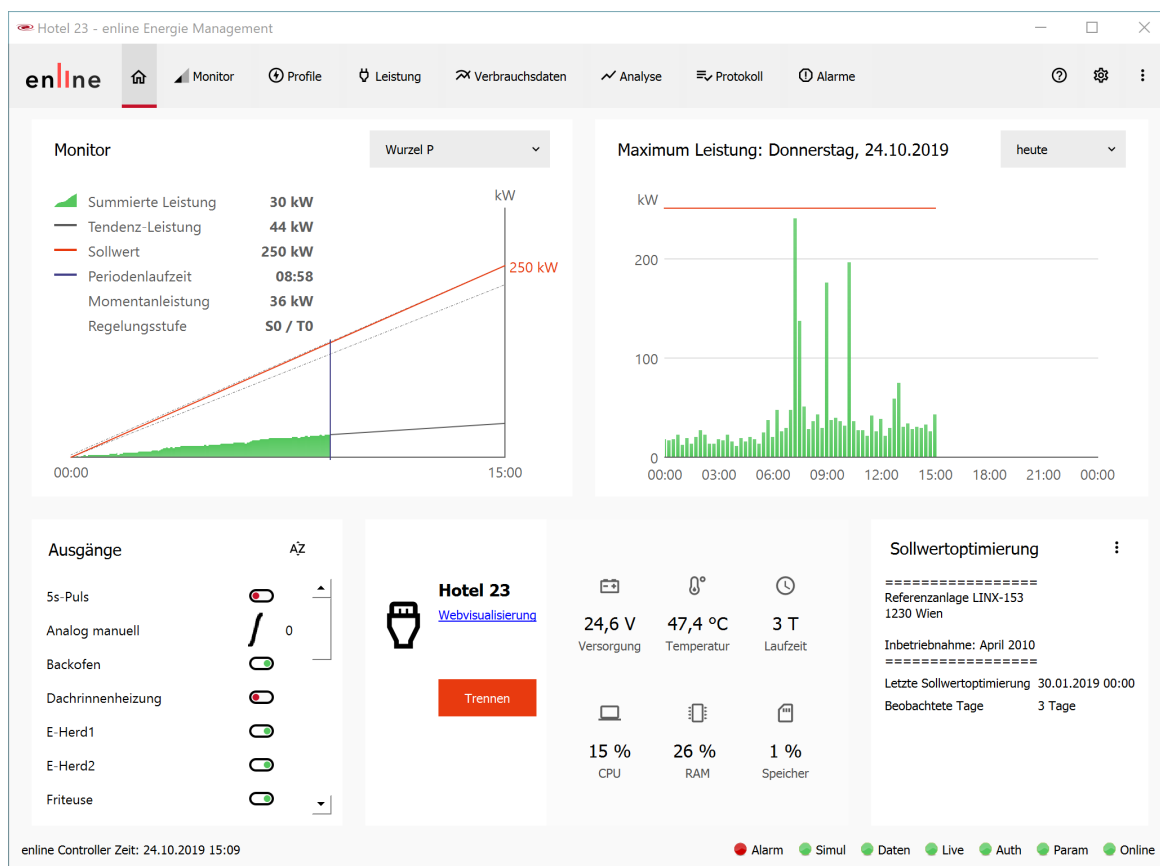
The status screen provides you with an overview of the most important data and the current status of the site.

These are displayed automatically after connecting to the emPower controller and can be accessed at any time via the house icon or the enline logo in the menu bar.

The status screen is divided into several areas:

- **Monitor:** A reduced view of the Control Monitor [11](#)
- **Trend Data:** A reduced view of the Trend Data [16](#) screen

-
- **Outputs:** Switching states or values of the outputs, as they are also displayed on the Monitor^{→11} page
 - **Controller overview:**
 - Name of the connected site
 - Link to Web Visualization^{→91}
 - Button to **disconnect** the emPower controller
 - Controller data
 - Supply voltage
 - Temperature in controller housing
 - Uptime since last restart
 - CPU utilization
 - RAM usage
 - Flash memory usage
 - **Target Value Optimization**
 - Site Data^{→32}
 - Time of the last target value optimization
 - Number of days monitored for the target value optimization^{→38}
 - **: Optimize Now:** Target value optimization is triggered immediately
 - **: Delete Optimization Data:** Existing target value optimizations are deleted immediately



4.2 Monitor

You can see the current data for the control circuits here at a glance. An alternative view is the counting circuit profile [↗ 13](#).

The red line corresponds to the *target value line*, while the dashed lines represent the *activation and deactivation points* (see Energy Control [↗ 32](#)).

Parameters

Control circuit

In the drop-down field, select the control circuit

Cumulated Power

Previous average power * period share (*period share* is calculated from *period runtime / period duration*). In the figure this would be $317/900 = 0.352$.

If the *current power* at the current *period runtime* were reduced to 0, the *cumulated*

power would remain constant until the end of the period, and it would thus correspond to the *Trended Power*.

Trended Power

Extrapolated period end value of the power with unchanged momentary current power

Setpoint

Current valid target value of the selected control circuit

Period Runtime

Uptime since the beginning of the current regulation period

Current Power

Momentary Current Power

Control Level

Currently valid priority level / currently valid trend control level

Outputs

All outputs assigned to the control circuit are listed.

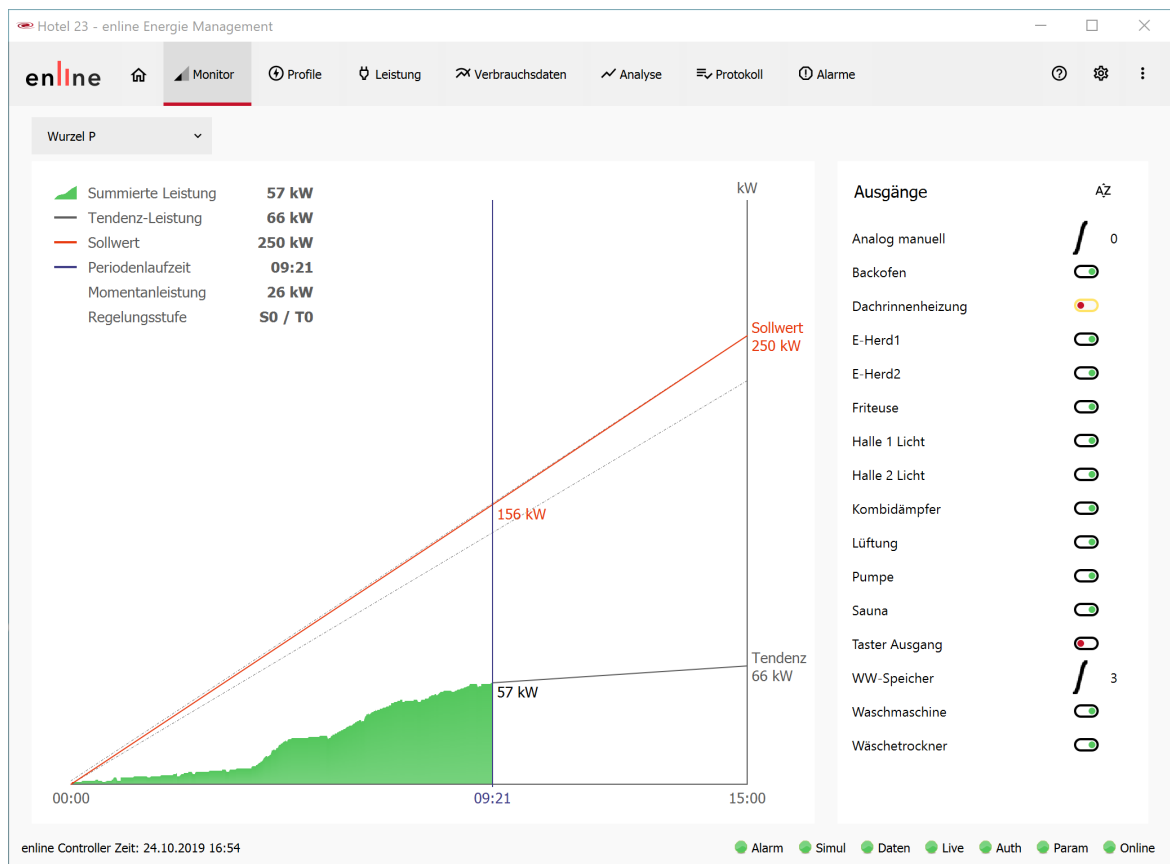
Red: switched off

Green: switched on

Yellow border: in override

/ : Value of the analog output

The column header can be used to change the alphabetic sorting or switching state.

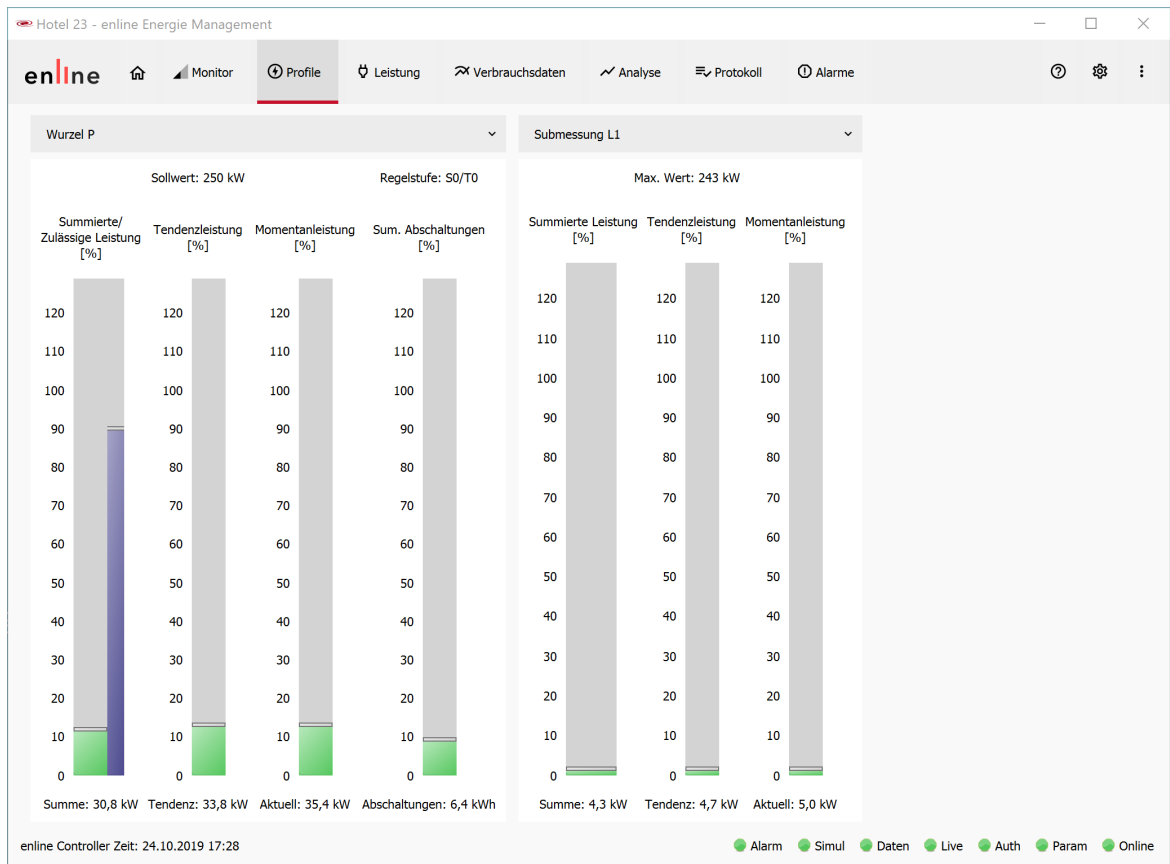


4.3 Profiles

The profiles show you the current data for the tariff circuits at a glance. The Control Monitor [↗11](#) is also available as an alternative view for control circuits.

In the Preferences [↗89](#), you can define how many tariff circuits are to be displayed simultaneously.

The blue sub-bar of the **cumulated power** corresponds to the **permissible power** and is therefore only available for control circuits.



4.4 Power

Here you can see at a glance the current energy consumption of all tariff circuits in table form, and the selected one graphically as well.

Parameters

You can influence the display using a drop-down field located above the table or the bar chart:

Energy Period

Select **day**, **week**, **month** or **year**.

Day means, for example, the last 24 hours.

⋮ **Copy**

Table is copied to the clipboard in tab-separated form so that the data can be pasted into Excel, for example.

: **Export**

Table is exported as a CSV file and can be opened, for example, with Excel

For each active tariff circuit there is a line with the following parameters for the **respective tariff circuit**:

Id

Unique number

Name

Name of the tariff circuit

P

Current Power

Pavg

Average power over the energy period (Pavg: P average)

P / Pavg

Current power relative to average power, in %.

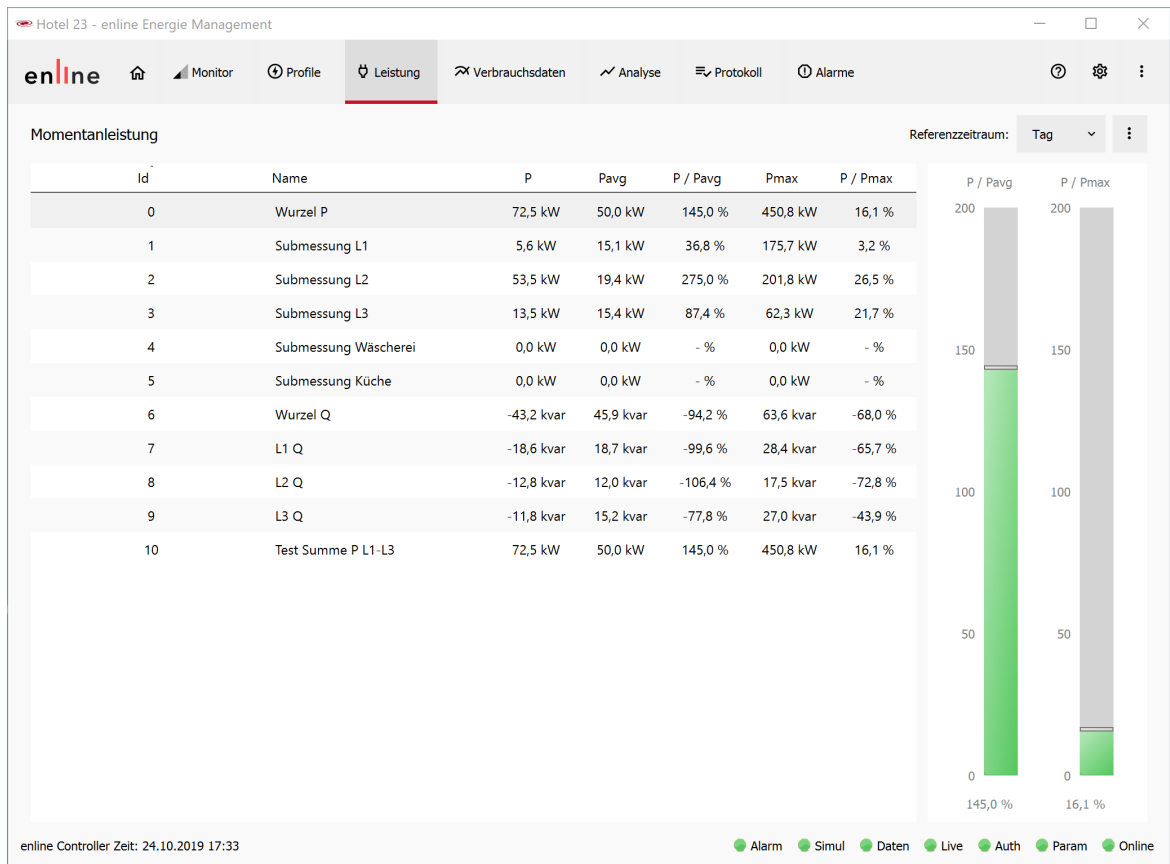
Pmax

Maximum power in the energy period

P / Pmax

Current power relative to maximum power, in %.

Since all values, except the current power, are calculated from trend data, only a "-" appears in the respective column if corresponding trend data is not available or not yet (completely) downloaded from the emPower controller.



4.5 Trend data

Here you can view the trend (consumption) and power data of your site in different time periods and at different aggregation levels.

Click on a bar to see the exact measured values above the chart. You can select the current data set not only with the mouse, but also with the arrow keys.

Parameters (dropdown fields)

Tariff circuit

Select the desired tariff circuit

Analog input

If you select a trended analog input here, the values are displayed in the chart. For example, if you select a temperature input, the temperature curve is displayed above the trend data. The scale for the analog input is displayed on the right.

Data

From **power**, **energy** and **costs**, select the variable for which you want to create a chart

Aggregation Min-Max

For *power*, you can display the **average**, **maximum**, or **minimum** of the period powers that occurred in the graphic. In the highest resolution level of "Day" there is no aggregation of data, so the setting has no effect here. To actually see the load peaks that have occurred, you should select **Maximum!**

Aggregation and Navigation

Aggregation over display period

You can aggregate the values by selecting the display period:

Day: All period values of a day are displayed in the highest resolution, that is, they are not aggregated. In the default case, these are 15min values.

Week: Period values of a week are aggregated to hourly values

Month: Period values of a month are aggregated to daily values

Year: Period values of a year are aggregated to monthly values

|< and |>

Go to the first or last existing data set

< and >

Scroll one page back or forward

Date

Jump directly to a specific date instead of using the navigation buttons

Period values or aggregation data

The following values are displayed above the chart. If a display other than "Day" is selected, the data is aggregated from the individual regulation period data; in this case "Period" is to be understood as "Aggregation period"! Depending on the *Aggregation min-max*, the **highest, averaged or lowest period value of the aggregation period** is displayed!

Start of Period

Timestamp start of period or start of aggregation period (see above)

End of period

Timestamp end of period

Period power

Power in the period. For non-aggregated data, this results from energy / period duration.

Energy

Energy consumed in this period

Target value

Target value valid for this period.

Energy costs

Energy costs (without peak costs) according to the configuration in Costs [↗40](#)

Max. power

Maximum current power that occurred

Max. trend

Maximum value of the trend energy control that occurred.

Disabled Outputs

Percentage of the regulation potential actually used: How much energy was switched off due to priority levels, in relation to the energy that could have been switched off if the highest priority level had always been in effect. Disabled outputs due to, for example, ordinary time switches are not considered. The power configured at the outputs is used to calculate the possible energy saved.

Max. disabled outputs

Number of disabled outputs per period. When aggregating several periods (all displays except "Day"), the maximum value is displayed.

If an output is continuously disabled, it is also counted, but it does not appear in the switching activities. Outputs in override mode are not counted.

: Menu

Show Switching Activities

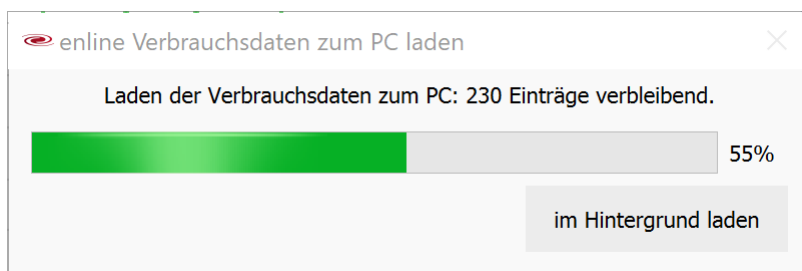
Presents the exact switching activities [↗25](#) in the selected period.

Export Image

Exports the graphic in common formats (PNG, BMP, JPEG, TIFF)

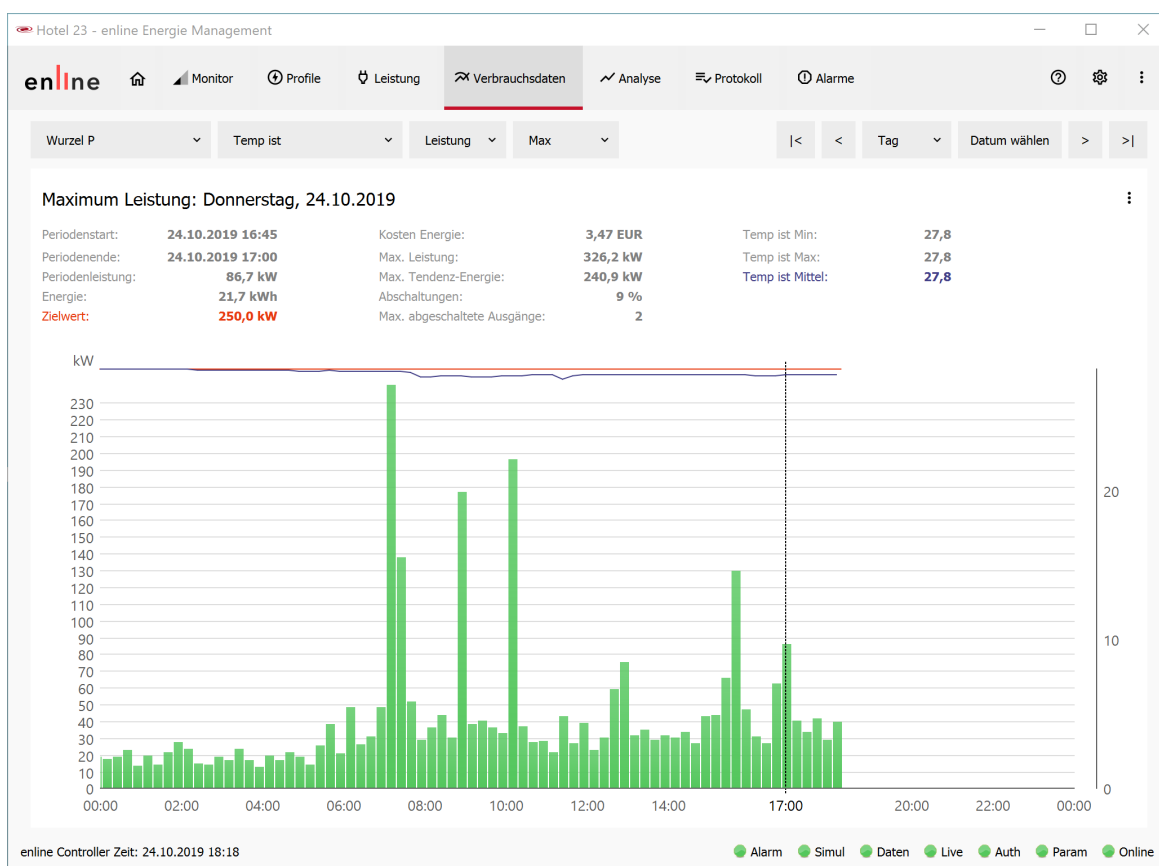
Fast Trend Loading

If you select this item while trend data are still being downloaded from the emPower controller to the PC, the following dialog box appears:




If you want the loading to go as fast as possible, please wait until the process is completed.

If you want to continue working, select the **To Background (slower)** button. In this case, loading also continues, but at a significantly reduced speed (in one test the speed was 20%, i.e. a factor of 5 slower, but this is dependent on several factors).



Power curve in the highest resolution of "Day". The history of the currently valid target value and the selected analog input are displayed. The optimized target value has been exceeded (red bar) and automatically adjusted upwards.

Switching operations

Click on the **Show Switching Activities** to display the exact switching activities  in the selected time period.

4.6 Analysis

Here you can view the energy costs of your site in different time periods and aggregation levels, each of which can be freely configured, saved and automatically exported.

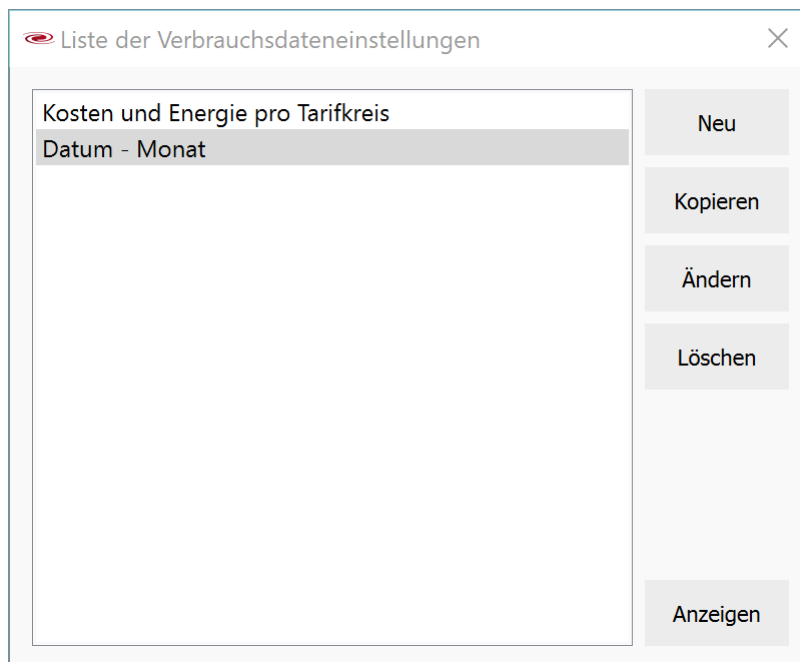
Buttons

View selection

Select one of the available views.

Edit views

Opens a selection dialog for editing  the views:



Time Filter

If activated, a time filter with the set start and end date is applied to the displayed table. The update is carried out by clicking the **Reload** button.

Reload

Starts the database query and displays the selected view with time filter. Any change to the desired time scale only becomes effective when this button is pressed.

: Copy

Copies the currently displayed table to the clipboard (column values tab-separated)

: Export

Exports the currently displayed table as a CSV file.

Edit views

If you select the **New** or **Edit** button in the "Trend Settings List", a dialog for detailed configuration of views appears.

Using **Show** for a selected view or double-clicking on a view causes it to be evaluated and displayed.

Parameters

Name

Select any name for the view

Grouping

Here you select the grouping and sorting of your data:

Group By

- **None:** All data is grouped so there is only 1 line
- **Date:** Aggregation according to the selected **time scale** in the right box (**year, month, day, hour** or **All Period Data**)
- **Tariff Circuit:** Aggregation according to tariff circuits
- **Date then Tariff Circuit:** Aggregation as for "Date", but separately for each tariff circuit
- **Tariff Circuit then Date:** Like "Date then Tariff Circuit", but sorted by tariff circuit

Data

Select which values are to be displayed. Each value corresponds to a column in the table.

With "Costs per Tariff" or "Energy per Tariff", 4 columns for each of the 4 tariffs ^{→40} are shown or hidden.

With "Date Filter Settings", an additional column with the start and end date of the date filter only appears if the date filter is actually active.

Reference

If you select a reference, an additional column called "Energy / Reference" is displayed.

- **Other Tariff Circuit:** The energy value is related to the energy value of a specific other tariff circuit
- **Previous time period:** Depending on the selected time scale, a selection of various reference values is available:

Time scale	Previous time period	Reference value
Year	Year	Previous year
Month	Year	Same month of the previous year
Month	Month	Previous month
Day	Year	Same day of the previous year
Day	Month	Same day of the previous month

Time scale	Previous time period	Reference value
Day	Day	Previous day

If “All period data” are shown in the grouping, the reference data will generally not appear, since there is probably no timestamp in the trend data that goes back exactly (to the second) one year (or one month or one day).

Filter

You can restrict the displayed data to specific tariff circuits or specific dates (years, months, or days) and hide rows with zero values.

File export

The selected view can be automatically exported daily or monthly to a CSV file.

- **daily export:** Export daily at 1:00
- **monthly export:** Export monthly on the 1st at 1:00.

The export directory is specified in the Application Settings ⁹⁰.

The resulting file name is **export_<daily|monthly>_<site name>_<view name>.csv**.

So in our example, every 1st of the month, data would be written to the file C:\Users\Martin\<%APP% \export_monthly_Hotel_23_Date_-_Month>.csv.

The *initial export* differs from the *ongoing export*. The *initial export* is executed while the export file does not yet exist.

During the *initial export*, the trend view configuration data are exported exactly as they appear in the table. In addition, only the export date is inserted as the 1st column.

In further *ongoing exports*, the time filter is activated (monthly export: previous month; daily export: previous day), and the resulting data are appended to the existing data.

Restrictions:

- If **emPower** is not running at 1:00 in the morning, the data is not exported. This causes corresponding gaps to appear in the export files.
- If the site or the trend view configuration is renamed or the export directory is changed, a new export is started.
- Only the site that is currently selected is exported
- There are trend view configurations that result in a “meaningless” export. If, for example, the grouping by years is selected in the configuration and exported monthly, annual values are exported that always consist only of the data from the previous month.

⚙️ Einstellungen zur Verbrauchsdatenansicht
✕

Name:

Gruppierung

Eingeteilt nach	Zeitraum
Keine	Jahr
Datum	Monat
Tarifkreis	Tag
Datum dann Tarifkreis	Stunde
Tarifkreis dann Datum	Alle Periodendaten

Daten

<input checked="" type="checkbox"/> Energiekosten	<input checked="" type="checkbox"/> Energie	<input checked="" type="checkbox"/> Maximale Periodenleistung	<input type="checkbox"/> Energiezähler Stand
<input type="checkbox"/> Spitzenlastkosten	<input type="checkbox"/> Energie pro Tarif	<input type="checkbox"/> Maximale Momentanleistung	<input type="checkbox"/> Energiezähler Parameter
<input type="checkbox"/> Kosten pro Tarif	<input type="checkbox"/> Sollwert		<input type="checkbox"/> Einstellungen Datumsfilter

Referenz

Keine Referenz

Anderer Tarifkreis Wurzel P v

Vorige Zeitperiode Monat v

Filter

Tarifkreis Wurzel P v

Datum <kein Filter> v Okt 2019 v

Ausblenden von Nullwerten

Dateiexport

täglicher Export monatlicher Export

OK
Abbrechen

With these settings, you get the following table, for example:

Datum	Gesamtenergie	Spitzenleistung	Energiekosten
Oktober 2019	29 581,5 kWh	461,8 kW	4 472,22 EUR
September 2019	34 605,2 kWh	391,4 kW	4 547,68 EUR
August 2019	14 744,2 kWh	338,9 kW	1 915,76 EUR
Juli 2019	14 281,3 kWh	394,3 kW	1 878,34 EUR
Juni 2019	30 825,2 kWh	594,4 kW	4 025,09 EUR
Mai 2019	37 116,7 kWh	400,8 kW	4 914,76 EUR
April 2019	30 174,3 kWh	348,4 kW	4 545,26 EUR
März 2019	36 555,0 kWh	438,0 kW	5 517,61 EUR
Februar 2019	25 850,1 kWh	480,1 kW	3 889,67 EUR
Jänner 2019	37 365,3 kWh	414,8 kW	5 634,63 EUR

4.7 Journal

Here you can query the exact switching activities of an output within a freely selectable time period.

In the **Period** area, select the start and end of the period to be viewed. Use the 3 buttons to have the start and end entered automatically.

Then select the desired output in the **Outputs** area or (with the Ctrl key held down) several outputs.

Click on the **Show Data** button to display the **switching summary** and the **switching activities** of the output or to update the data.

⋮ Menu

⋮ Copy Summary

Copies the displayed "Switching statistics" table tab-separated to the clipboard

: Export Summary

Exports the displayed "Switching statistics" table as a CSV file

: Copy Details

Copies the displayed "Switching activities" table tab-separated to the clipboard

: Export Details

Exports the displayed "Switching activities" table as a CSV file

The screenshot shows the 'enline' web interface for 'Hotel 23 - online Energie Management'. The 'Protokoll' (Log) tab is active. On the left, a sidebar lists various energy-consuming devices, with 'E-Herd1' selected. The main area displays two tables. The top table, 'Schaltstatistik', shows a summary for 'E-Herd1' with 16 switching activities and a total duration of 00:08:00. The bottom table, 'Schaltaktivitäten', provides a detailed log of each switching event, including the date, time, device name, and state (AUS or EIN).

Schaltstatistik		
Ausgang	Schaltaktivitäten	Abschaltdauer
E-Herd1	16	00:08:00

Schaltaktivitäten		
Datum	Ausgang	Zustand
25.10.2019 09:52:11	E-Herd1	AUS
25.10.2019 09:53:11	E-Herd1	EIN
25.10.2019 09:54:11	E-Herd1	AUS
25.10.2019 09:55:11	E-Herd1	EIN
25.10.2019 09:56:11	E-Herd1	AUS
25.10.2019 09:57:11	E-Herd1	EIN
25.10.2019 09:58:11	E-Herd1	AUS
25.10.2019 09:59:11	E-Herd1	EIN
25.10.2019 12:52:11	E-Herd1	AUS
25.10.2019 12:53:11	E-Herd1	EIN
25.10.2019 12:54:11	E-Herd1	AUS
25.10.2019 12:55:11	E-Herd1	EIN

4.8 Alarms

Here you can see all alarms with the triggering time, the alarm type, the status and other information.

Possible alarms are:

Alarm	Explanation
Simulation Activated	The online simulation has been activated
IO module error	An IO module (bus and module number are specified), which is used according to parameters, could not be detected or has reported another error.
System Restart	The emPower controller has rebooted. This may have been triggered by a voltage interruption or a reset
Internal emPower controller error	- Undervoltage: Voltage deviation more than -10% (nominal: 24V) - Overvoltage: Voltage deviation more than +10% (nominal: 24V) - CPU load more than 80%
Target Value Exceeded	Details: Tariff circuit name, target value, overrun in %, time of overrun in % of period
Missing sync pulse	No sync pulse was received before the timeout expired
IO override active	An output was switched to override mode
Energy meter error	An energy meter has not supplied a pulse for a long time (Pulse Timeout ⁶⁸)

Buttons

Show Acknowledged Alarms

Select the checkbox to display alarms that have already been acknowledged.

Acknowledge Alarm Type

Acknowledges all alarms that have the same "Alarm" type as the currently selected alarm

: Copy

Copies the displayed table tab-delimited to the clipboard

: Export

Exports the displayed table as a CSV file

The screenshot shows the 'enline' software interface for 'Hotel 23 - enline Energie Management'. The top navigation bar includes icons for Monitor, Profile, Leistung, Verbrauchsdaten, Analyse, Protokoll, and Alarmer. The 'Alarmer' tab is active. Below the navigation bar, there is a table of alarms. The table has columns for 'Zeit', 'Alarm', 'Zustand', and 'Weitere Informationen'. A single alarm entry is visible: '25.10.2019 10:00', 'Sollwertüberschreitung', 'Bestätigung offen', and 'TK: Wurzel P, Sollwert: 250 kW, Überschreitung: 8 %, Zeit: 92 %'. At the bottom of the interface, there is a status bar with the text 'enline Controller Zeit: 25.10.2019 12:04' and a row of status indicators: Alarm (red dot), Simul (green dot), Daten (green dot), Live (green dot), Auth (green dot), Param (green dot), and Online (green dot).

Zeit	Alarm	Zustand	Weitere Informationen
25.10.2019 10:00	Sollwertüberschreitung	Bestätigung offen	TK: Wurzel P, Sollwert: 250 kW, Überschreitung: 8 %, Zeit: 92 %

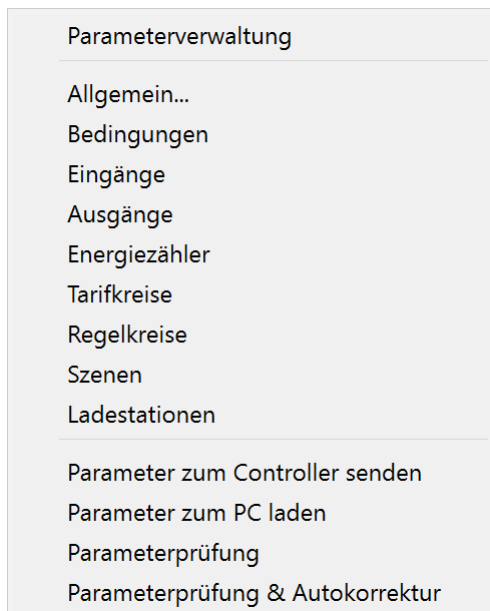
4.9 Help

The ? icon calls up the help, and always shows the start page first.

To open the context-sensitive help so that you are already at the same place where you are in **emPower**, press the **F1** key!

4.10 Preferences

The Preferences menu (gearwheel icon) is used to configure all parameters of the system, i.e. switch-off conditions, priorities, costs, energy meters, inputs, outputs, tariff circuits, etc.



4.10.1 Parameter Manager

Here you can save, load and export entire site configurations. **emPower** uses its own database to manage the parameters, and all parameters are saved automatically so that no site configuration can be accidentally lost


- after the parameter upload from the emPower controller
- before the parameter download to the emPower controller
- after the parameter import from a parameter file
- if parameters were changed when exiting emPower
- if parameters were changed when switching to another site
- if parameters were changed when switching to another parameter set
- before importing data

To display the **automatically saved parameters** in the list, please activate the corresponding **checkbox**.

The currently active parameter set is shown in **green**.

Buttons

Load Selection

Loads the parameter set marked in blue. However, this parameter set only becomes active in the controller when you select Download Parameters to online Controller  82 in the regulation.

The button is disabled when you are online. Please disconnect the connection to the emPower controller first.

Delete Selection

Removes the parameter set marked in blue from the database

Edit selection comment

Replace an automatically assigned comment with your own, more meaningful comment. This means that the parameter set in question is no longer hidden by default.

You can also change the comment directly in the table by clicking on the comment field.

Save Current Parameters

Saves the current parameters. You will rarely need this item, since **emPower** automatically saves the current parameter set for all relevant events.

Create New Parameter Set

Select this item if you want to start a completely new, empty project.

The button is disabled when Live View is enabled. Please deactivate the Live View beforehand.

Import from file

Imports a previously exported parameter set.

The button is disabled when the Live View is activated. Please deactivate the Live View beforehand.

Export Current Parameters

Exports the current parameter set to a file

enline Controller Zeit: 26.10.2019 22:01

● Alarm ● Simul ● Daten ● Live ● Auth ● Param ● Online

4.10.2 General

In this dialog box, the general site parameters can be configured on 5 tabs:

Site ³²: Details of the site

Energy Control ³²: Parametrization of the energy control algorithms

Target Value Optimization ³⁸: Parametrization of the automatic target value optimization

Costs ⁴⁰: Parameterization of the costs

Alarm ⁴⁰: Parametrization of alarms and email addresses

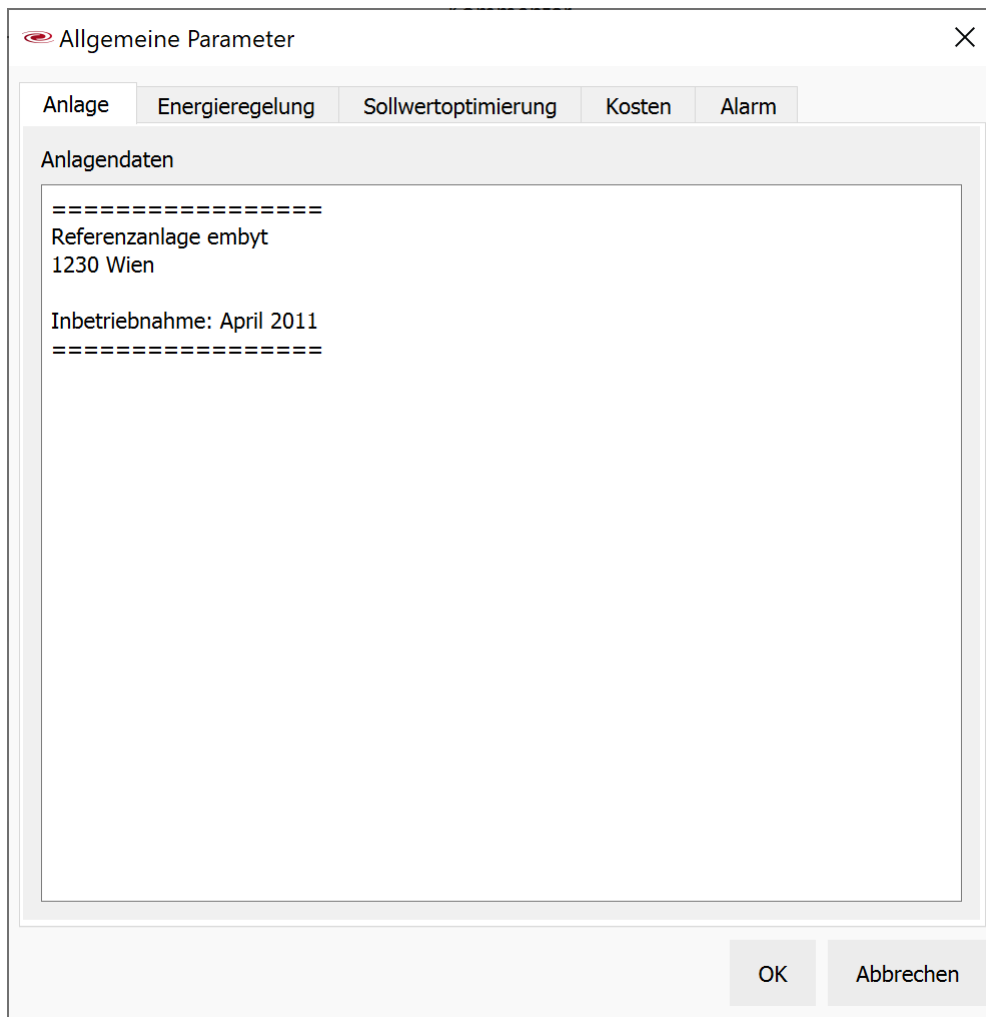
Attention: The change option is disabled (OK button missing) when Live View is enabled. Please deactivate the Live View beforehand.

4.10.2.1 Site

Site Data:

Enter any information about the site here. These data appear in the status screen and in the alarm emails.

A maximum of 128 characters can be entered.



The screenshot shows a software dialog box titled "Allgemeine Parameter" with a close button (X) in the top right corner. Below the title bar are five tabs: "Anlage", "Energieregelung", "Sollwertoptimierung", "Kosten", and "Alarm". The "Anlage" tab is selected. Inside the dialog, there is a section labeled "Anlagendaten" containing a text area with the following text: "=====
Referenzanlage embyt
1230 Wien

Inbetriebnahme: April 2011
=====". At the bottom right of the dialog are two buttons: "OK" and "Abbrechen".

4.10.2.2 Energy Control

You can parametrize the control of energy here. If in doubt, leave the values at the sensible defaults that have already been selected.

Calculation interval:

New enabling and disabling of outputs are carried out at these interval steps (in seconds).

In the further points, the exact position of the activation and deactivation points can be parametrized and further details of the energy control can be specified. The values should normally be left at the default settings.

The screenshot shows a dialog box titled 'Allgemeine Parameter' with a close button (X) in the top right corner. The 'Energieregelung' tab is selected. The parameters are as follows:

Parameter	Value
Berechnungsintervall [s]	5
Schnittpunkt Integralregelung	0,950
Zuschaltgerade (Priority 1)	0,100
Zuschaltgerade (Priority 2)	0,080
Zuschaltgerade (Priority 3)	0,070
Zuschaltgerade (Priority 4)	0,060
Zuschaltgerade (Priority 5)	0,050
Zuschaltgerade (Priority 6)	0,040
Zuschaltgerade (Priority 7)	0,030
Zuschaltgerade (Priority 8)	0,020
Zuschaltgerade (Priority 9)	0,010
Zuschaltgerade (Priority 10)	0,005
Abschaltgerade (Priority 1)	0,010
Abschaltgerade (Priority 2)	0,020
Abschaltgerade (Priority 3)	0,050
Abschaltgerade (Priority 4)	0,070
Abschaltgerade (Priority 5)	0,090
Abschaltgerade (Priority 6)	0,120
Abschaltgerade (Priority 7)	0,150
Abschaltgerade (Priority 8)	0,180
Abschaltgerade (Priority 9)	0,230
Abschaltgerade (Priority 10)	0,260
Zyklus Tendenzberechnung [s]	5
Trend Einschaltverzögerung [s]	5
Trend Stufeninkrement-Verzögerung [s]	15
Trend Stufendekrement-Verzögerung [s]	30

Buttons: OK, Abbrechen

Intersection point of integral control:

This value indicates the point of intersection of the target value line with the activation and deactivation points. By default, this is 95% of the period duration.

Activation points:

These values indicate the deviation from the permissible power at which an activation may be made. One value is available per switching priority (S1, ... S10).

Attention: The specified percentage value is referenced to the target value of the period and ends at the counterpart of the intersection point of the integral control.

Deactivation point:

These values indicate the deviation from the permissible power at which a deactivation must be made. One value is available per switching priority (S1, ... S10).

Attention: The specified percentage value is referenced to the beginning of the period (zero line) and ends at the intersection point of the integral control.

All values should be understood as percentages in decimal form.

Cycle trend calculation:

Calculation cycle of the trended power in seconds.

Trend switch-on delay:

Switch-on delay of outputs according to trend levels in seconds.

Trend level increment delay:

Delay in seconds when the trend level changes to the next higher priority (e.g. T1 to T2).

Trend level decrement delay:

Delay in seconds when the trend level changes to the next lower priority (e.g. T2 to T1).

Integral control

With integral control, the power curve since the beginning of the control period (usually 15 min periods) is added up to an energy value. At constant power P_{targ} , the power curve corresponds exactly to the target value line and the period end value corresponds to W_{targ} . The 10 priority levels are triggered by 10 deactivation points and 10 activation points, depending on the power curve. These 10 priority levels can be configured individually by means of appropriate parametrization.

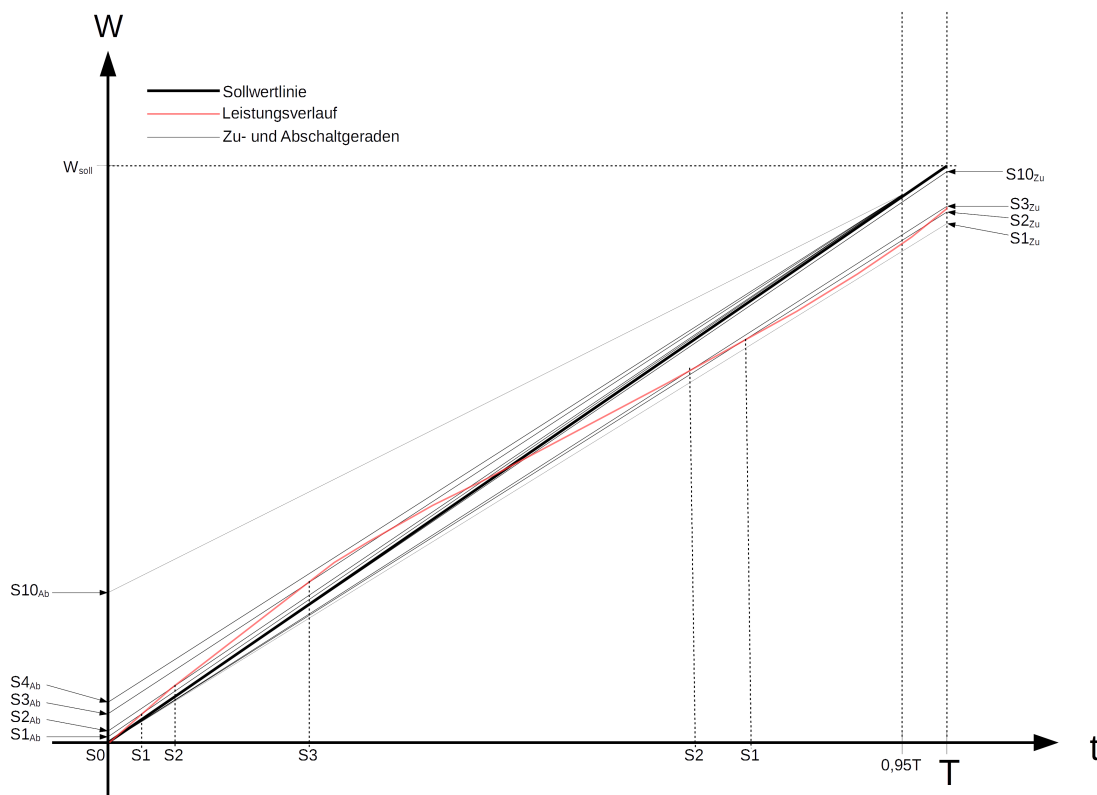
The following illustration shows **how the integral control works:**

At the beginning of the period, priority level 0 applies. Since the power curve is above the target value line and the deactivation point $S1_{\text{de}}$ is intersected, a switch to level S1 takes place. Over the further course, the deactivation points $S2_{\text{de}}$ and $S3_{\text{de}}$ are also intersected, whereby the system first switches to level S2 and then to S3. After that the power drops below the target power. If the power curve then intersects the $S3_{\text{ac}}$ activation point, the system switches back to level S2, and when $S2_{\text{ac}}$ is intersected, it then switches to S1. Since the activation point $S1_{\text{ac}}$ is no longer intersected up to the end of the period, and no deactivation point is intersected, the level S1 remains active until the end of the period.

Activation points start at the zero point and end at the intersection of the end of the period and the parametrized portion of the target value.

Deactivation points start at the intersection of the start of the period and the parametrized portion of the target value, and end at the point of the target value line at

the parametrized time (default is 95% of the period duration). Because as the time of the regulation period progresses, the distances between the deactivation points become smaller and those between the activation points larger, this results in an optimum regulation for most cases.



Example for integral control

Default values

The following values are preset for energy control:

Calculation interval: 5s

Intersection point of integral control: 0.950

Activation Point

Priority	Value
S1	0.100
S2	0.080

Priority	Value
S3	0.070
S4	0.060
S5	0.050
S6	0.040
S7	0.030
S8	0.020
S9	0.010
S10	0.005

Example

If the current permissible power is undershot by more than 0.5%, the system switches to priority level S9 if S10 was active.

If the current permissible power is undershot by more than 1%, the system switches to priority level S8 if S9 was active.

...

If the current permissible power is undershot by more than 10%, the system switches to priority level S0 if S1 was active.

Deactivation Point

Priority	Value
S1	0.010
S2	0.020
S3	0.050
S4	0.070
S5	0.090
S6	0.120
S7	0.150
S8	0.180
S9	0.230
S10	0.260

Example

If the currently permissible power is exceeded by more than 1%, the system switches to priority level S1 if S0 was active.

If the currently permissible power is exceeded by more than 2%, the system switches to priority level S2 if S1 was active.

...

If the currently permissible power is exceeded by more than 26%, the system switches to priority level S10 if S9 was active.

Trend regulation

In addition to the priority levels S1-S10, **emPower** also has 10 trend levels which are increased or decreased according to the linearly extrapolated period end value. The current power is measured at intervals of the *cycle trend calculation* (e.g. 5s) and is linearly extrapolated to a period end value.

If this value is above the target value, the trend level is increased by one if the last increase lies in the past by at least the *trend level increment delay* (e.g. 15s) (and if level 10 has not already been reached).

If this value is below the target value, the trend level is reduced by one if the last reduction lies in the past by at least the *trend stage decrement delay* (e.g. 30s) (and if stage 0 has not already been reached).

Before connecting a consumer, the power available is compared with the specified nominal power of the consumer. If the nominal power is less than the power available, the consumer is switched on. After expiry of the configurable *trend switch-on delay* time (e.g. 5s) the connection of the next consumer is checked.

Default values

The following values are preset for trend regulation:

Cycle trend calculation: 5s

Trend switch-on delay: 5s

Trend level increment delay: 15s

Trend level decrement delay: 30s

Application

The activation points are usually not changed. Since these refer to the target value, no change is usually necessary. The deactivation points of each priority level can also be changed as desired, but they must always be in ascending order. Particularly with high power requirements, it may be useful to set the deactivation points closer together, but for low power, somewhat further apart.

Example

A switch to S1 takes place when the "permissible power" is exceeded by 1% (i.e. at the respective time of the regulation period). With high power demand and a high number of pulses, this could already be done at 0.5%, but with low power demand, not until 1.5%. In addition, the intersection point of the integral control can be set to about 90% in order to force the disabling of outputs at the end of the control period.

4.10.2.3 Target Value Optimization

emPower is able to automatically optimize the target value downwards to keep the power peak even lower, if possible.

You can parametrize this optimization precisely here, or deactivate it for the entire site if you wish.

Optimization Trigger

Select any condition. If the condition changes from OFF to ON (FALSE to TRUE), i.e. with a "positive edge", target value optimization takes place at the next period change. If you select a *condition without edges* (always ON or always OFF), the *target value optimization is disabled for the entire site!*

Min Observation Period [days]

Select a value in days (0 to 30). After an optimization (positive edge of the optimization trigger), at system start and when the optimization data is reset, this value is reduced by one every day. While the time period is running, no optimization is triggered even if the edge of the optimization trigger is positive. Only after this number of days has elapsed will an optimization be triggered with the next positive edge of the optimization trigger.

Max. optimization

Specifies the lower limit of the possible optimization. If 0.66 is entered here, and the target value was set at 1000 kW, the optimized target value cannot fall below 660 kW.

Max. Power Regulation

Represents the value of the maximum power regulation that is reached: 0.80 means that 80% of the regulation potential was used in at least one period of the observation period, i.e. if the highest regulation level had been used throughout, the value would still have been 20% below the target value.

Target value optimization

Specifies the factor by which the target value should be reduced for the corresponding maximum power regulation:

If, for a maximum power regulation of 0.80, the factor for target value optimization is selected to be 0.08 (see screenshot), the target value is reduced by 8% up to a maximum power regulation of 80%.

Allgemeine Parameter ✕

Anlage Energieregulung **Sollwertoptimierung** Kosten Alarm

Auslösetrigger _Sonntag ▼

Minimale Beobachtungsdauer [Tage] ▲▼

Maximale Optimierung ▲▼

Max. Regelleistung	Sollwertoptimierung
<input type="text" value="0,80"/> ▲▼	<input type="text" value="0,08"/> ▲▼
<input type="text" value="0,85"/> ▲▼	<input type="text" value="0,07"/> ▲▼
<input type="text" value="0,90"/> ▲▼	<input type="text" value="0,06"/> ▲▼
<input type="text" value="0,95"/> ▲▼	<input type="text" value="0,02"/> ▲▼

4.10.2.4 Costs

Enter the tariffs that apply to you here along with the associated conditions. These values are used for cost calculation by **emPower**.

The screenshot shows a dialog box titled "Allgemeine Parameter" with a close button (X) in the top right corner. The dialog has five tabs: "Anlage", "Energieregelung", "Sollwertoptimierung", "Kosten", and "Alarm". The "Kosten" tab is selected. At the top, there is a field for "Spitzenlastkosten/Monat [EUR/kW]" with a value of "15,000". Below this is a table with two columns: "[EUR/kWh]" and "Bedingung".

	[EUR/kWh]	Bedingung
Sommer Hochtarif	0,150	_Sommer HT
Sommer Niedertarif	0,130	_Sommer NT
Winter Hochtarif	0,160	_Winter HT
Winter Niedertarif	0,140	sonst

At the bottom of the dialog, there are two buttons: "OK" and "Abbrechen".

4.10.2.5 Alarm

You can parametrize the control of energy here. If in doubt, leave the values at the sensible defaults that have already been selected.

Enabled alarms:

Here you can deactivate individual alarms  26.

Email address for notifications:

Enter the email address(es) to which alarm emails should be sent. If you want to enter several addressees, separate the individual addresses with a "," (comma). If you do not wish to receive email notifications, please leave this field empty.

Trend database email address:

Enter the email address(es) to which trend data should be sent. These trend data emails are sent daily at 1:00 a.m. by the emPower controller and can then be transferred to the emPower database automatically by the emPower Trendview module. If no trend data is to be sent by email, please leave the field empty.

The screenshot shows a software dialog box titled "Allgemeine Parameter" with a close button (X) in the top right corner. The dialog has several tabs: "Anlage", "Energieregelung", "Sollwertoptimierung", "Kosten", and "Alarm". The "Alarm" tab is selected. Inside the dialog, there is a section titled "Aktivierte Alarmer" containing a list of nine items, each with a checked checkbox:

- Neustart
- Fehlender Sync-Puls
- Aktivierung der Simulation
- Sollwertüberschreitung
- Handbetrieb am LIOB aktiviert
- Modulfehler
- Keine Pulse am Energiezähler
- Über- und Unterspannung
- Interne Fehler

Below the list, there are two text input fields:

E-Mail-Adresse für Benachrichtigungen (leer zum Deaktivieren)
office@embyt.com

Trend Datenbank E-Mail-Adresse (leer zum Deaktivieren)
trends@embyt.com

At the bottom right of the dialog, there are two buttons: "OK" and "Abbrechen".

4.10.3 Conditions


This window is used to create all conditions, and the states of the conditions can be checked.

The condition can be either *binary* or *analog*: an analog condition always returns an analog numerical value, while a binary condition always returns 0 (OFF) or 1 (ON).

Condition List

In the condition list you can see the names of all the conditions and the number of outputs assigned to each (column U).

To the left of the name you can also see a symbol for *Analog* \int or *Binary* \lceil (see above).

In Live View mode , you can also see the current state of the condition (green or red).

You can also "undock" the condition list and position it freely on the screen, just like the block list.

Edit mode

If Live View  is disabled, you are in edit mode.

You can create conditions here, similar to the structure of a circuit diagram:

Parallel connection, binary: If 2 condition blocks are in parallel, this corresponds to an OR operation, since one OR the other condition block must apply (switch through) in order for the resulting condition to apply (switch through).

Parallel connection, analog: If 2 condition blocks are in parallel, this corresponds to an ADDITION of the values.

Series connection, binary: If 2 condition blocks are in series, this corresponds to an AND operation, because both the one AND the other condition block must apply (switch through) so that the resulting condition applies (switch through).


Series connection, analog: If 2 condition blocks are in series, this corresponds to a MULTIPLICATION of the values.

Creating conditions


1. Click on **New**
2. Choose a name for the new condition
3. Drag a block from the block list to the centre of drawing area
4. Double-click on the condition block to enter parameters and confirm with OK




5. Repeat steps 3 and 4 to add more condition blocks.
6. Create the connections between the blocks according to the required logic.


Creating and removing connections

- Create a connection by dragging a line from the start point to the end point with the right mouse button held down.
As an alternative, press the pencil icon  and drag the line with the *left* mouse button held down.
- Delete a connection by once again drawing a line from the start point to the end point.

Logic

Each condition is created using one or more condition blocks .

A condition can in turn be inserted as a condition block  into another condition (using a value  or comparator block ) , which allows even complex conditions to be set up very efficiently and clearly. However, a condition must not include itself (no recursion).

The starting point for the entire condition is always the start block (green arrow), and the end point is always the end block  (green arrow with vertical line).

The condition blocks are interconnected in a manner similar to a circuit diagram:

Binary logic

Each condition block corresponds to a switch that is closed (switched through) or open (disables) when the condition of the condition block is fulfilled.

Thus, condition blocks in series correspond to a logical AND operation, while condition blocks in parallel correspond to a logical OR operation.

If there is a through-connection from the start block to the end block, the entire condition is fulfilled, otherwise not.


If a condition consists only of binary condition blocks , it is a binary condition.

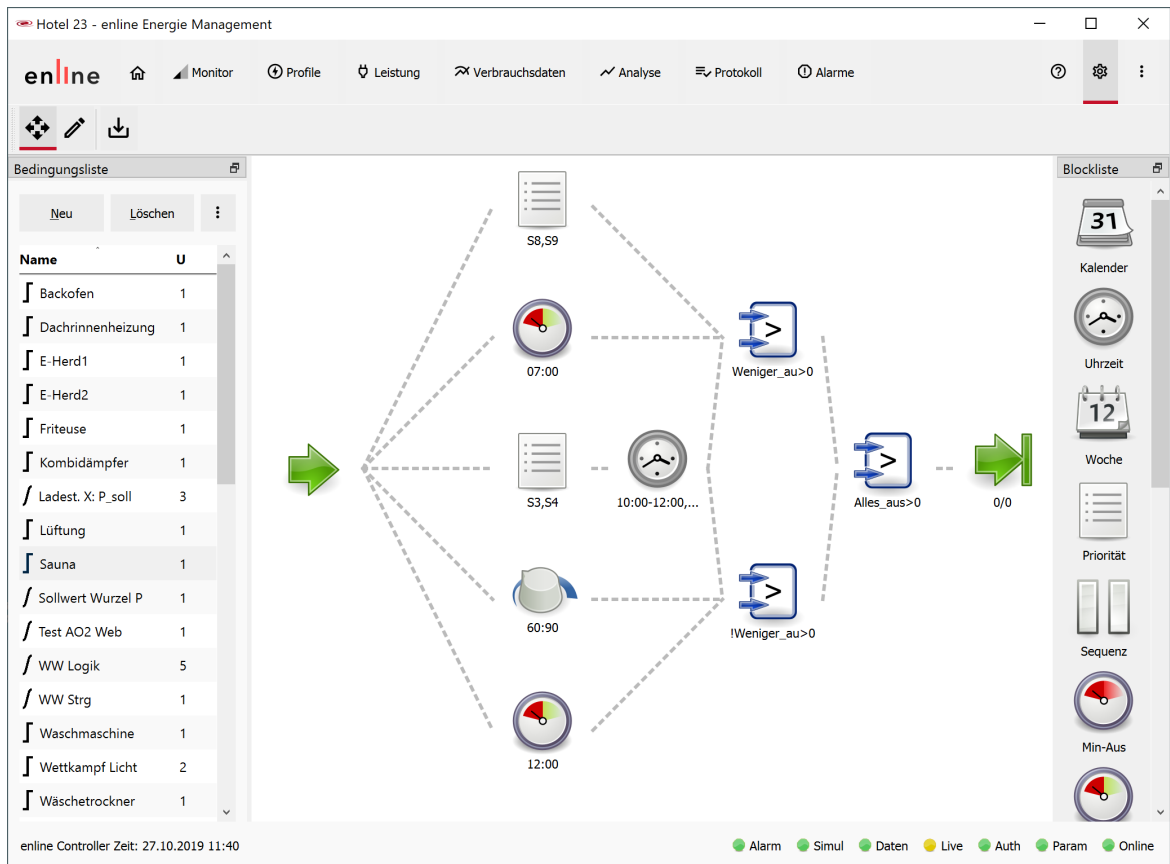
Analog logic

Each condition block corresponds to a value that can result, for example, from a current power or a target value; for binary blocks, the value equals 0 (OFF) or 1 (ON).

Condition blocks in series are multiplied by each other, while condition blocks in parallel are added.

The result of this calculation is assigned to the end block and thus to the entire condition for each cycle.

If a condition contains at least one analog condition block , it is an analog condition.



Editing mode for the binary condition "Sauna"

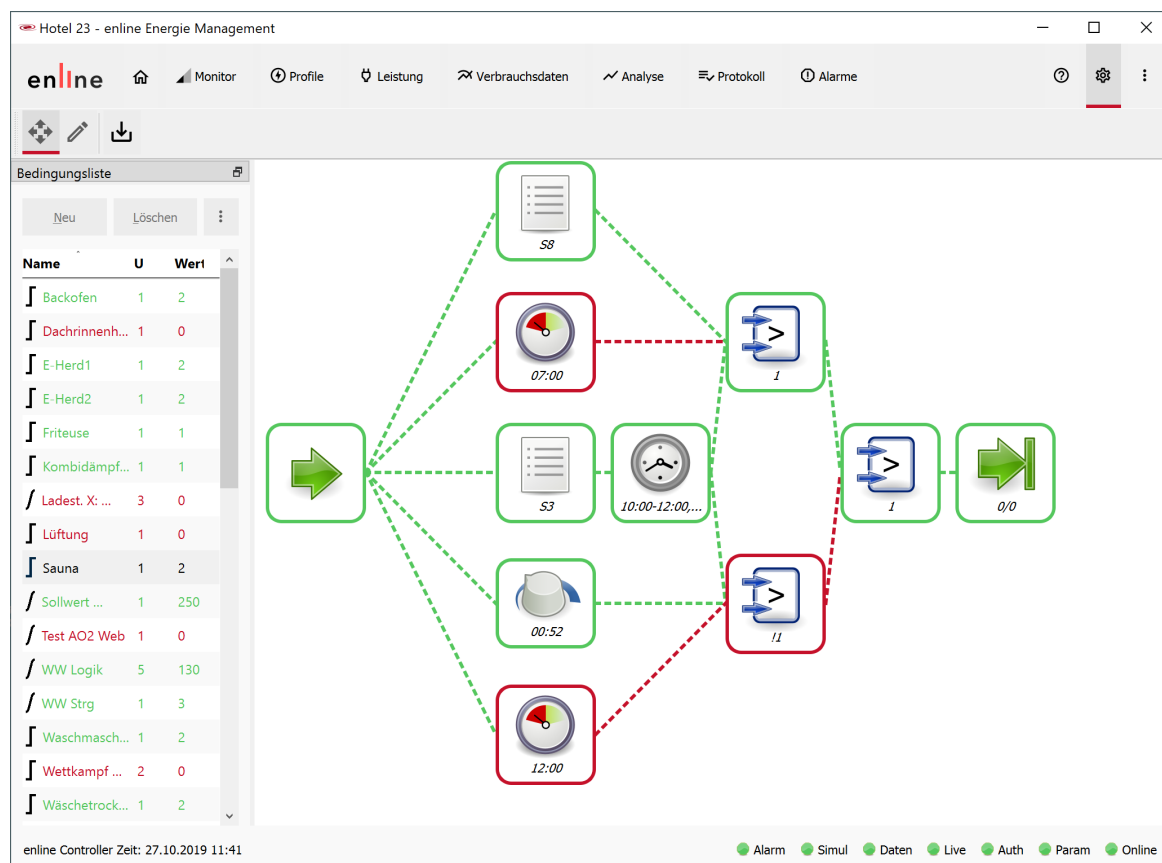
Live View mode

While the Live View is activated, you can see the current state of each condition block:

- Green border: The condition block switches through (binary) or has a value $\neq 0$ (analog)
- Red border: The condition block disables (binary) or has the value = 0
- Italic font: Currently valid parameter
- Normal font: Assigned parameters

Attention: The **current state** may depend on the **context** used, i.e. on the assigned output and its tariff circuit! Especially condition blocks in which the current time of the control period is used are always dependent on the assigned output. If column U (number of uses of the condition) contains a number >1 , the current state can be different in different contexts, but the Live View can only display one context at a time. This can result in apparent contradictions, but **emPower** actually works correctly internally depending on the context.

These **seemingly incorrect representations** can also occur with **macro blocks** (condition blocks for "Value" with selected condition). If conditions are not assigned to any output, but are only used in macro blocks, the live view of the condition in the condition list is displayed without context, for example, as if it were only assigned to one cost tariff. Priority blocks or min-max blocks are then always displayed in green (red when inverted), even if the blocks would be red in all contexts in which the macro block is used. By assigning a virtual output, however, you can specify a specific context.



Live View of the binary condition "Sauna": There is a through-connection from the start block to the end block, meaning the binary condition is therefore fulfilled.

4.10.3.1 Condition blocks, binary

The following binary condition blocks are available.

Binary blocks always have the state ON (value = 1) or OFF (value = 0), whereas analog blocks can have any analog value.

Every binary block can be logically inverted by selecting **Invert**: ON (1) becomes OFF (0)

and vice versa. In contrast, the sign of the value of analog blocks can be changed by selecting **Negate**: 1 becomes -1, -14.7 becomes 14.7, 0 remains 0.

If a block with 3 time scales is not sufficient, you can have 6 time scales for selection by inserting the same block a 2nd time and connecting them in parallel.

Calendar

31 Kalender Bedingungsblockeinstellungen

Tag Monat Jahr

von: 25 von: 31 von: 0
bis: 26 bis: 31 bis: 0

1 6 11 16 21 26 31

Invertieren OK Abbrechen

Day: Enter up to 3 daily intervals per month.

Month: Enter up to 3 monthly intervals per year.

Year: Enter up to 3 yearly intervals.

If entries are made on several tabs, they are linked by AND.

Example

You select for:

Day: 25-26 and 31-31

Month: 12-12

Year nothing

The condition is met annually from 25 to 26 and on 31 December.

Time

Zeit Bedingungsblockeinstellungen

von: 06:00 von: 12:00 von: 18:00
 bis: 08:30 bis: 13:00 bis: 19:00

00 03 06 09 12 15 18 21 24

Invertieren OK Abbrechen

Enter up to 3 time scales of one day (hh:mm).

Week

Woche Bedingungsblockeinstellungen

Wochentag Kalenderwoche

von: Samstag von: Mittwoch von: <undefiniert>
 bis: Montag bis: Mittwoch bis: <undefiniert>

Mo. Di. Mi. Do. Fr. Sa. So.

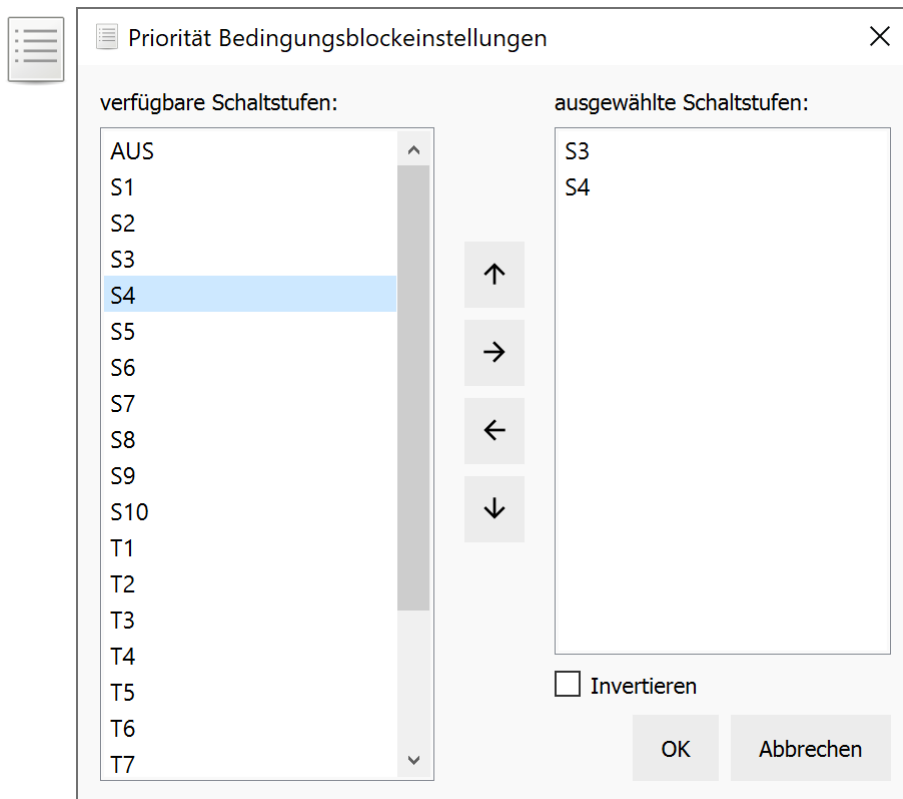
Invertieren OK Abbrechen

Weekday: Here, enter up to 3 intervals per week.

Calendar Week: Enter up to 3 intervals per year here.

If entries are made on both tabs, they are linked by AND.

Priority



Select one or more switching priority levels.

If several levels are selected, the next priority according to their order in the list becomes valid with each period change.

You can change the order with the up and down arrow buttons.

Sequence

The sequence block is always switched off or on for one control period (usually 15 min).

First select the number of periods, then one or more of the periods.

With each period change, the next period becomes valid according to its number; after the highest number it starts again with 1. If a period with a selected number is currently active, the block is switched on, otherwise it is switched off.

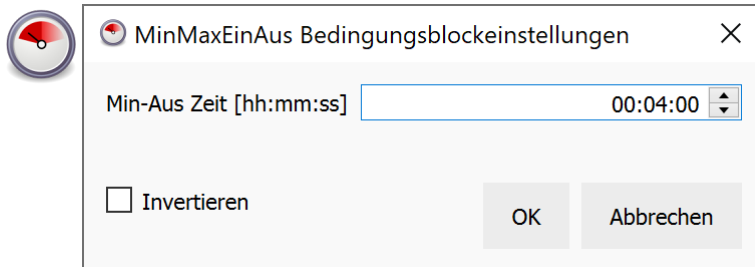
Example

In the screenshot, a quantity of 4 periods has been selected.

Of the 4 possible periods, 3 and 4 have been selected.

The condition is always alternately switched off for 2 periods and switched on for 2 periods.

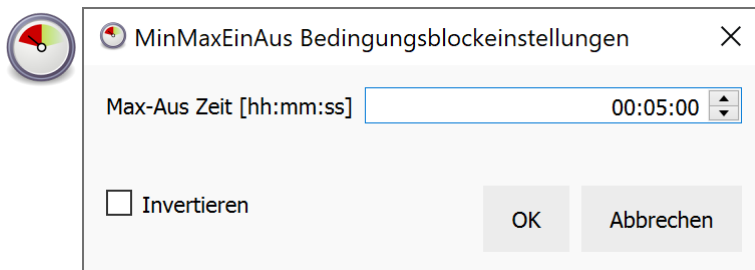
Min off



The screenshot shows a dialog box titled "MinMaxEinAus Bedingungsblockeinstellungen" with a close button (X) in the top right corner. On the left, there is a circular icon with a red and white gauge. The main content area contains a label "Min-Aus Zeit [hh:mm:ss]" followed by a text input field containing "00:04:00" and a small up/down arrow icon. Below this, there is a checkbox labeled "Invertieren" which is currently unchecked. At the bottom right, there are two buttons: "OK" and "Abbrechen".

Select the minimum period of time for which the block must remain off after the output to which the condition is assigned has been switched off (hh:mm:ss).

Max off

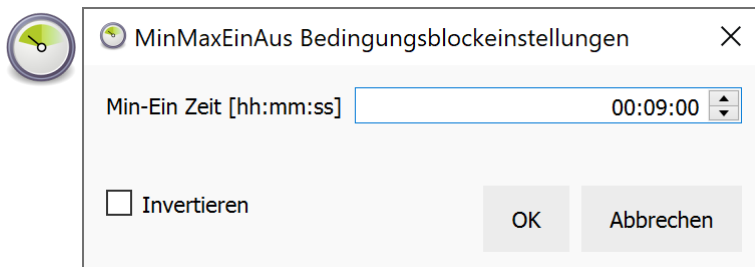


The screenshot shows a dialog box titled "MinMaxEinAus Bedingungsblockeinstellungen" with a close button (X) in the top right corner. On the left, there is a circular icon with a red, yellow, and green gauge. The main content area contains a label "Max-Aus Zeit [hh:mm:ss]" followed by a text input field containing "00:05:00" and a small up/down arrow icon. Below this, there is a checkbox labeled "Invertieren" which is currently unchecked. At the bottom right, there are two buttons: "OK" and "Abbrechen".

Select the maximum period of time for which the block may remain switched off per control period (hh:mm:ss).

Example: If the control period is 15 minutes and you select 5 minutes (00:05:00) as the max. off time, the block switches on at the start of a new control period and switches off after 10 minutes.

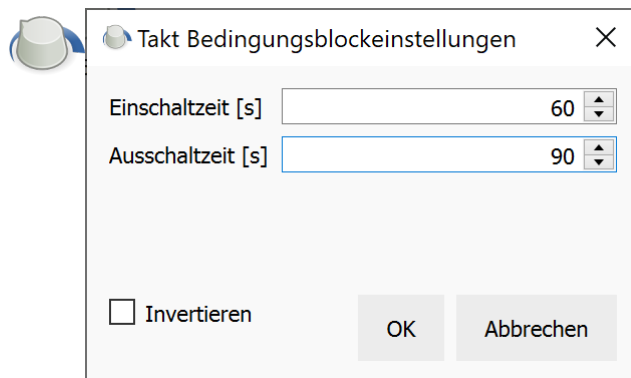
Min on



The screenshot shows a dialog box titled "MinMaxEinAus Bedingungsblockeinstellungen" with a close button (X) in the top right corner. On the left, there is a circular icon with a green and white gauge. The main content area contains a label "Min-Ein Zeit [hh:mm:ss]" followed by a text input field containing "00:09:00" and a small up/down arrow icon. Below this, there is a checkbox labeled "Invertieren" which is currently unchecked. At the bottom right, there are two buttons: "OK" and "Abbrechen".

Select the minimum period of time for which the block must remain on after the output to which the condition is assigned has been switched on (hh:mm:ss).

PWM



Select the desired clocking (PWM) of the block by setting the **switch-on time** and **switch-off time** (in seconds).

Compare



Vergleich Bedingungsblockeinstellungen

Leistung	>	Zahlenwert	+	3,0
Wurzel P		Null		
Hysterese		1,0		
Einschaltverzögerung				00:00:30
Ausschaltverzögerung				00:00:10

Invertieren

OK Abbrechen

Vergleich Bedingungsblockeinstellungen

Eingang	≥	Zahlenwert	-	00:05:00
Sport Zeit Ein		Aktuelle Zeit [s]		<input checked="" type="checkbox"/> Negativ
Hysterese		00:00:00		
Einschaltverzögerung				00:00:00
Ausschaltverzögerung				00:00:00

Invertieren

OK Abbrechen

This block has binary behaviour and is either ON (if the comparison is true) or OFF (if the comparison is false). It is used to compare analog and digital variables, e.g. temperatures and power values or to check whether inputs or outputs are switched on or off. Time values can also be compared; the fields then change to corresponding time input fields.

You can choose from the following value sources (both left and right of the comparison):

- **Numeric Value:** is only available on the right-hand side. The following values can be set:
 - Zero: corresponds to the value 0 or OFF in the case of a binary comparison
 - Current date [d]: unit 1 day; the numerical value results from the form YYYYMMDD, 11/27/2020 therefore corresponds to the numerical value 201127
 - Current time [s]: unit 1 second; the numerical value corresponds to the

seconds since midnight

- *Current time stamp [min]: unit 1 minute; the numerical value corresponds to the minutes since 2015.*

These values correspond to the possible units of the virtual inputs⁵⁸ and are mostly only useful for corresponding comparisons.

- **Input:** current value of the selected input
- **Output:** current value of the selected output
- **Condition:** current value of the selected condition
- **Power:** current power of the selected tariff circuit
- **Target Value:** currently valid target value of the selected control circuit

If the left value is greater (or smaller, equal etc., depending on the selected comparison operator) than the right value plus the possible **offset** value (can also be negative), the block is ON, otherwise it is OFF.

Switching from ON to OFF can optionally be done with **hysteresis**: In this case, when the block switches from OFF to ON (in case of $>$ and \geq), or from ON to OFF (in case of $<$ and \leq), the **hysteresis value** is subtracted from the **offset value**. After switching to OFF (or ON), the set **offset value** is taken once again. The switching thresholds are therefore the same for all 4 greater-less comparison operators.

The **comparison operator '&'** causes a logical bit-by-bit AND operation: If the result is 0, the block is OFF, otherwise ON. The value of the block corresponds to the bit-wise AND operation (the offset is taken into account). This function can be used, for example, to evaluate the flags of the charging stations. Example: When comparing 9 (binary 1001) and 8 (binary 1000), the result is 8 and the status is ON.

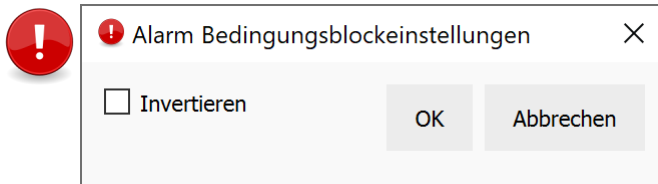
In addition, switching on can be delayed by the **switch-on delay**, and switching off by the **switch-off delay**.

Using **Invert** causes a logical inversion: ON (1) becomes OFF (0) and vice versa. The inversion is done as the last operation, which means the **switch-on delay** actually becomes the **switch-off delay** and vice versa. Two identically configured blocks within a condition, of which one is inverted, therefore always behave exactly complementarily! This can be used to create branches in which exactly one of the two branches is always run through.

The Live View⁴⁴ displays the current *value of the block*: For example, if the power "root P" in the above block is 1 kW, then the value of the block is "-2" and the block is OFF, because the power is 2 kW below the comparison value. If the power then rises to 5 kW, the block switches ON and the value of the block is "3", because after switching to ON the comparison value was reduced by 1 due to the hysteresis, and the power is therefore 3 kW above the comparison value.

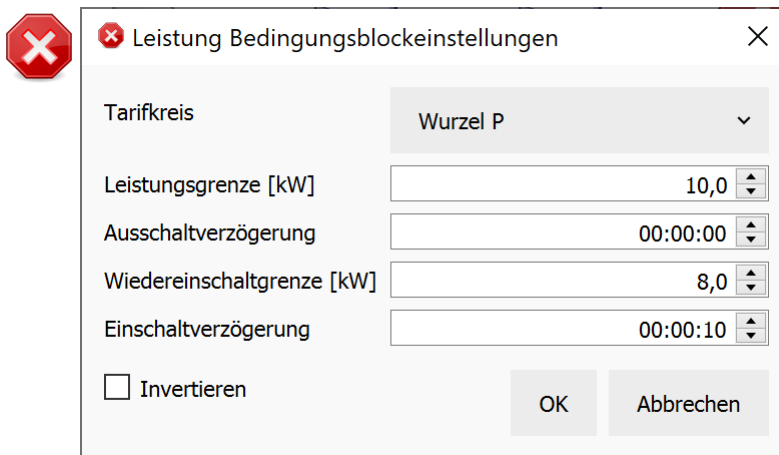
The value is also calculated in the same way for the smaller comparison operators, so that here the block is switched ON for negative values, but switched OFF for positive values.

Alarm



The block is ON when an active, unacknowledged alarm is present.

Max Power

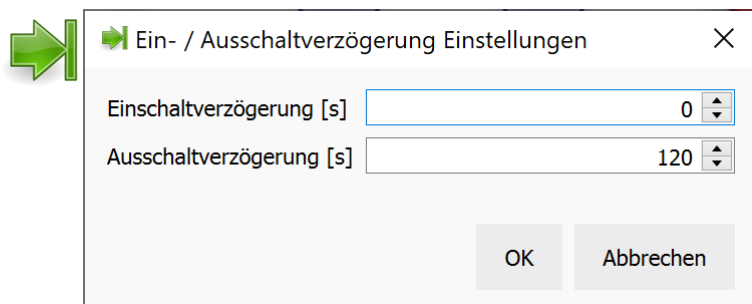


Depending on the current power at the moment of a selected **Tariff Circuit**, the block is ON or OFF.

If the current power rises above the **power limit**, the block switches OFF after the **switch-off delay** has elapsed. If the current power once again drops below the **restart limit**, the block switches ON again after the **switch-on delay** has expired.

Using **Invert** causes a logical inversion: ON (1) becomes OFF (0) and vice versa. The inversion is done as the last operation, which means the **switch-on delay** actually becomes the **switch-off delay** and vice versa. Two identically configured blocks within a condition, of which one is inverted, therefore always behave exactly complementarily!

Switch-on and switch-off delay



The switch-on and switch-off delay are configured directly in the end block.

If you select values >0 s for the switch-on delay or the switch-off delay, the entire condition is switched on or off with a delay.

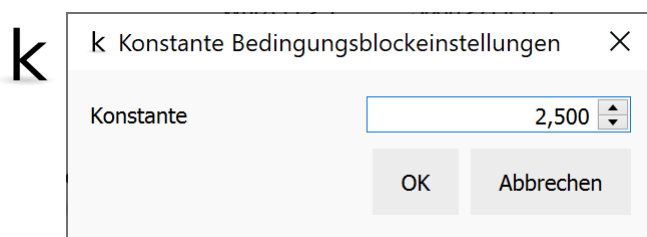
4.10.3.2 Condition blocks, analog

The following analog condition blocks are available.

Analog blocks can have any analog value (positive and negative), while binary blocks always have the state ON (value = 1) or OFF (value = 0).

With an analog block, the sign of the value can be changed by selecting **Negate**: 1 becomes -1, -14.7 becomes 14.7, 0 remains 0. In contrast, binary blocks can be logically inverted by selecting **Invert**: ON (1) becomes OFF (0) and vice versa.

Constant



The block always has the selected constant analog value.

Value



Wert Bedingungsblockeinstellungen ✕

Ausgang ▼ Sauna ▼

Typ Binär

Wert entspricht Eingangswert: 1 (EIN) oder 0 (AUS)

Negieren OK Abbrechen

Wert Bedingungsblockeinstellungen ✕

Sollwert ▼ Wurzel P ▼

Typ Analog

Offset ▲▼

Kehrwert (1/x)

Negieren OK Abbrechen

The dialog box is titled 'Wert Bedingungsblockeinstellungen' and has a close button (X) in the top right corner. It features two dropdown menus at the top: 'Eingang' and 'Sport Zeit Aus'. Below these is a section titled 'Typ Zeit' containing a label 'Zeit addieren:' followed by a numeric input field with a spinner, currently showing '00:00:05'. A checkbox labeled 'Negativ: Zeit subtrahieren' is checked. At the bottom left is an unchecked checkbox 'Negieren', and at the bottom right are 'OK' and 'Abbrechen' buttons.

The dialog box is titled 'Wert Bedingungsblockeinstellungen' and has a close button (X) in the top right corner. It features two dropdown menus at the top: 'Eingang' and 'Sport Datum Start'. Below these is a section titled 'Typ Datum' containing a label 'Tage addieren:' followed by a numeric input field with a spinner, currently showing '0'. At the bottom left is an unchecked checkbox 'Negieren', and at the bottom right are 'OK' and 'Abbrechen' buttons.

The block always supplies an analog value.

You can choose from the following value sources (the possible types are shown in parentheses):

- **Input** (analog, binary, time): current value
- **Output** (analog, binary): current value
- **Condition** (analog): current value
- **Power** (analog): current power of the selected tariff circuit
- **Target value** (analog): currently valid target value of the selected control circuit

There are 3 types, which are automatically active depending on the selected source:

Type Analog: A positive or negative **offset** can be selected, which is always added to the value. Using **Negate** changes the sign of the resulting value. Using **Reciprocal (1/x)** forms the reciprocal of the resulting value.

Type Binary: If the state of the selected input or output is ON, the value = 1, if it is OFF, the value = 0. Using **Negate** changes the sign of the resulting value: *With OFF there is no change (-0 = +0), with ON the value changes from 1 to -1!* This means the value is *not logically inverted* as is the case with binary condition blocks! For binary value sources it is usually better to choose the comparison block ⁵²!

Type Time: For *virtual* inputs of the **type Analog (time, date, timestamp)**, the block provides the following values:

Time: Number of seconds since 00:00. For the time 1 o'clock (01:00) the value is therefore 3600.

Date: Number of days since about 1900. By summation (parallel connection) of a value date block 15.1.2018 and a negated value date block 12.1.2018 the value 3 would result.

Timestamp: Number of seconds since about 1900. By summation (parallel connection) of a value timestamp block 2018-01-15T14:00:00 and a negated value timestamp block 2018-01-15T13:59:30, the value 30 would result.

A **delay time** (hh:mm:ss or dd for date) adds the corresponding number of seconds or days. Using **Negate** changes the sign of the resulting value (1 becomes -1, meaning there is *no logical inversion*).

4.10.4 Inputs

All inputs are created and parametrized here.

Buttons

New input

Creates a new input

Duplicate

Duplicates the selected input

Delete

Deletes the selected input

: Copy

Copies the displayed table tab-delimited to the clipboard

: Export

Exports the displayed table as a CSV file

Parameters

Name

Select any name for your input

Bus

Connect: LIOB module is connected to the LIOB Connect Bus.

FT: LIOB module is connected to the LIOB FT bus

IP: LIOB module is connected to the LIOB IP bus

Local: Local input of the LIOB emPower controller

Virtual: Virtual input without physical bus

Module and channel

Choose the respective module and channel number for your input. The channel numbers UI 1 to UI 4 as well as DI 1 and DI 2 are configured as pulse inputs (S0) and can therefore only be used for S0 pushbuttons or S0 switches (or energy meters). The channels UI 5 to UI 8 can be used as analog inputs or for switches.

Web

Ticking the checkbox activates the display of the input in the Web Visualization 

Type

Pushbutton switch: only switching edges from ON to OFF (!) lead to a change of state of the input.

Pushbutton pulse: the switching edge from ON to OFF (!) switches the input ON for the duration of a task cycle, then off again. With the emPower controller, this is a pulse of 1s.


Switch: Standard operating mode: Closed = ON, Open = OFF


Analog: Analog input for things like temperature values; the measured value is the resistance in ohms. For virtual inputs, date, time or timestamp (date+time) is also possible.


A symbol in front of the type designation also indicates whether the operating mode is binary or analog.

Unit

Only available for *virtual inputs of the type Analog*:

Date: Date (dd.mm.yyyy) can be entered in the web visualization .

Time: Time (hh:mm:ss) can be entered in the Web Visualization .

Timestamp: Date and time (dd.mm.yyyy hh:mm) can be entered in the Web Visualization .

Other: For any numerical values, e.g. temperature values

Invert

Input is inverted (not available for analog inputs)

Offset and factor

Available for physical analog inputs: **Output variable = (measured value * factor) + offset**

Example: If a PT1000 temperature measuring resistor is connected to the input, and the

output variable is to be the temperature value in °C, the *factor* 0.260 and the *offset* -260 would have to be selected, as the resistance value is 1000 ohms at 0°C and 1385 ohms at 100°C. Thus a function $f(R)=T$ is formed, in which the resistance value is plotted on the x-axis and the temperature on the y-axis. In our example, 0 ohms would mean -260°C (offset), and each additional ohm would represent a temperature increase of 0.26°C (factor).

Since the function $R(T)$ is non-linear for a measuring resistor, one should consider in which measuring range one wants to achieve the highest accuracy when choosing the factor and offset. If, for example, the highest accuracy is to be achieved with values between 200°C and 300°C, the *factor* would have to be set to 0.276 and the *offset* to -286.

Trend Int. and Trend Hyst.

Available for all analog inputs: **Trend Interval** and **Trend Hysteresis**

These values can be used to configure the recording (trending) of analog inputs (the recording of digital inputs always takes place anyway and can be called up in the switching activities).

The **Trend Interval** indicates the maximum time interval (in seconds) between two recorded values.

The **Trend Hysteresis** indicates the minimum amount of change relative to the last recorded value before a new value is recorded.

If *both values are selected to be 0*, no recording takes place.

Example: If 600s is selected as *Trend Int.* and 0.5 as *Trend Hyst.* for a temperature input, when the temperature changes by 0.5°C, the new measured value is recorded at least every 10 minutes even if the temperature changed by less than 0.5°C during this period.

Hotel 23 - online Energie Management

enline Monitor Profile Leistung Verbrauchsdaten Analyse Protokoll Alarme

Eingänge Neuer Eingang Duplizieren Löschen

Name	Bus	Modul	Kanal	Web	Typ	Einheit	Inve	Offs	Fakto	Trend Int.	Trend
Temp außen	LC	1	UI 8	<input type="checkbox"/>	Analog	-	-	-260	0,26	0 s	0
Taster RF	LC	1	DI 1	<input checked="" type="checkbox"/>	Tast-Puls	-	<input type="checkbox"/>	-	-	-	-
Sollwert Wurzel P manuell	Virtual	1	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0
Sport Zeit Aus	Virtual	2	-	<input checked="" type="checkbox"/>	Analog	Zeit	-	-	-	0 s	0
Temp soll	Virtual	3	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0
Test Analogausgang	Virtual	4	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0
Schalter virtuell	Virtual	5	-	<input checked="" type="checkbox"/>	Schalter	-	<input type="checkbox"/>	-	-	-	-
Zeitstempel Stop	Virtual	6	-	<input checked="" type="checkbox"/>	Analog	Zeitstempel	-	-	-	0 s	0
Sport Datum Start	Virtual	7	-	<input checked="" type="checkbox"/>	Analog	Datum	-	-	-	0 s	0
Zeitstempel Start	Virtual	8	-	<input checked="" type="checkbox"/>	Analog	Zeitstempel	-	-	-	0 s	0
Sport Datum Stop	Virtual	9	-	<input checked="" type="checkbox"/>	Analog	Datum	-	-	-	0 s	0
Weniger_aus	Virtual	10	-	<input checked="" type="checkbox"/>	Schalter	-	<input checked="" type="checkbox"/>	-	-	-	-
Sport Zeit Ein	Virtual	11	-	<input checked="" type="checkbox"/>	Analog	Zeit	-	-	-	0 s	0
Alles_aus	Virtual	13	-	<input type="checkbox"/>	Schalter	-	<input checked="" type="checkbox"/>	-	-	-	-
Lichtschalter Saal 1	Virtual	18	-	<input checked="" type="checkbox"/>	Schalter	-	<input type="checkbox"/>	-	-	-	-
Ladest. X: P_soll	Virtual	20	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0
Ladest. W1: P_max	Virtual	21	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0
Ladest. W1: P_now	Virtual	22	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0
Ladest. W1: Schalter	Virtual	23	-	<input checked="" type="checkbox"/>	Schalter	-	<input type="checkbox"/>	-	-	-	-

enline Controller Zeit: 27.10.2019 12:33

Alarm
 Simul
 Daten
 Live
 Auth
 Param
 Online

Live View

If the **Live View** is activated, **switched-on** inputs are shown **green**, and **switched-off** inputs are shown **red**.

In addition, the current value or state of the input is displayed in the new column called **Value**.

Hotel 23 - online Energie Management

enline Monitor Profile Leistung Verbrauchsdaten Analyse Protokoll Alarme

Eingänge Neuer Eingang Duplizieren Löschen

Name	Bus	Modul	Kanal	Web	Typ	Einheit	Inve	Offs	Fakto	Trend Int.	Trend	Wert
Temp ist	LC	1	UI 7	<input checked="" type="checkbox"/>	Analog	-	-	-260	0,26	600 s	0,5	26,8702
Temp außen	LC	1	UI 8	<input type="checkbox"/>	Analog	-	-	-260	0,26	0 s	0	19,856
Taster RF	LC	1	DI 1	<input checked="" type="checkbox"/>	Tast-Puls	-	<input type="checkbox"/>	-	-	-	-	aus
Sollwert Wurzel P...	Virtual	1	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0	250
Sport Zeit Aus	Virtual	2	-	<input checked="" type="checkbox"/>	Analog	Zeit	-	-	-	0 s	0	23:00:00
Temp soll	Virtual	3	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0	25
Test Analogausgang	Virtual	4	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0	0
Schalter virtuell	Virtual	5	-	<input checked="" type="checkbox"/>	Schalter	-	<input type="checkbox"/>	-	-	-	-	aus
Zeitstempel Stop	Virtual	6	-	<input checked="" type="checkbox"/>	Analog	Zeitstempel	-	-	-	0 s	0	28.10.2019 22:00
Sport Datum Start	Virtual	7	-	<input checked="" type="checkbox"/>	Analog	Datum	-	-	-	0 s	0	26.10.2019
Zeitstempel Start	Virtual	8	-	<input checked="" type="checkbox"/>	Analog	Zeitstempel	-	-	-	0 s	0	28.10.2019 08:00
Sport Datum Stop	Virtual	9	-	<input checked="" type="checkbox"/>	Analog	Datum	-	-	-	0 s	0	28.10.2019
Weniger_aus	Virtual	10	-	<input checked="" type="checkbox"/>	Schalter	-	<input checked="" type="checkbox"/>	-	-	-	-	ein
Sport Zeit Ein	Virtual	11	-	<input checked="" type="checkbox"/>	Analog	Zeit	-	-	-	0 s	0	15:00:00
Alles_aus	Virtual	13	-	<input type="checkbox"/>	Schalter	-	<input checked="" type="checkbox"/>	-	-	-	-	ein
Lichtschalter Saal 1	Virtual	18	-	<input checked="" type="checkbox"/>	Schalter	-	<input type="checkbox"/>	-	-	-	-	aus
Ladest. X: P_soll	Virtual	20	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0	0
Ladest. W1: P_max	Virtual	21	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0	0
Ladest. W1: P_soll	Virtual	22	-	<input checked="" type="checkbox"/>	Analog	sonstige	-	-	-	0 s	0	0

enline Controller Zeit: 27.10.2019 12:34

Alarm Simul Daten Live Auth Param Online

Virtual inputs

If an input is configured on the bus as *Virtual*, it is a virtual input.

Such inputs can either be set via the Web Visualization (to do so, the checkbox under *Web* must be activated), or the input can be set directly via a special configuration of the emPower controller, e.g. using Modbus devices; please contact your emPower system partner for this.

4.10.5 Outputs

All outputs are created and parametrized here.

To sort the list, click on the column header by which you want to sort.

Buttons

New output

Creates a new output

Duplicate

Duplicates the selected output

Delete

Deletes the selected output

: Copy

Copies the displayed table tab-delimited to the clipboard

: Export

Exports the displayed table as a CSV file

Parameters

Name

Select any name for your output

Bus

Connect: LIOB module is connected to the LIOB Connect Bus.

FT: LIOB module is connected to the LIOB FT bus

IP: LIOB module is connected to the LIOB IP bus

Local: Local output of the LIOB emPower controller

Virtual: Virtual output without physical bus ("flag"). Also see the explanations [→ 66](#) below.

Module and channel

Choose the respective module and channel number for your output. Not available for virtual outputs.

Web

Ticking the checkbox activates the *display* of the output in the Web Visualization [→ 91](#)

Ctrl

Ticking the checkbox enables the *control* of the output in the Web Visualization [→ 91](#)
However, it is not possible to set analog outputs in this way.

Power

Enter the approximate power of the connected consumer here. This information is included in the regulation.

Mode

N/O contact: Condition ON = Closed, condition OFF = Open (default). The consumer is therefore switched on by closing the output.

N/C contact: Condition ON = Open, condition OFF = Closed. The consumer is therefore switched on by opening the output.

Pulse on pos. edge: If the condition changes from OFF to ON, the output closes for the time entered under *Pulse Time* and then opens again.

Pulse on neg. edge If the condition changes from ON to OFF, the output closes for the time entered under *Pulse Time* and then opens again.

Pulse on both edges: If the condition changes from OFF to ON or from ON to OFF, the output closes for the time entered under *Pulse Time* and then opens again.

Analog: The value of an analog condition is provided at the output. Also see the explanations [→ 66](#) below.

Control circuit

Select the control circuit to which this output is assigned, or leave the value as <undefined>

Condition

Here, select the condition according to whose state (binary) or value (analog) the output of **emPower** is to be controlled. The physical output value results from the *operating mode*.

Fallback state

If there is a communication failure between the LIOB module and the emPower controller, e.g. due to a cable break, the outputs switch to the state defined here after 60s. Select "Last Value" if you want the output to maintain the state it was switched to by the emPower controller before the communication failure.

Pulse Time

Here you define for how long the output is to close if "Pulse on ..." has been selected under *Operating Mode*.

Cycle time

This indicates the cycle (in s) in which the output is reset. Default 0 (=minimum cycle time=1s). For some regulation circuits, the condition assigned to the output must first "settle in" so that cycle times of e.g. 5s should be selected here. Or the output should simply not change so often.

The internal evaluation of the conditions is not influenced by the cycle time.

Hotel 23 - online Energie Management

enline Monitor Profile Leistung Verbrauchsdaten Analyse Protokoll Alarmer

Ausgänge Neuer Ausgang Duplizieren Löschen ⋮

Name	Bus	Moc	Kanal	Wet	Strg	Leistung	Betriebsart	Regelkreis	Bedingung	Fallbac	Pulsdaue	Zyklus
5s-Puls	LC	1	DO 1	<input type="checkbox"/>	<input type="checkbox"/>	0 kW	↗ Puls bei pos. ...	<undefiniert>	↘ _Puls	aus	5000 ms	min
Analog manuell	LC	1	AO 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0 kW	↗ analog	Wurzel P	↘ Test AO2 Web	letzter...	-	min
Backofen	LC	1	DO 7	<input type="checkbox"/>	<input type="checkbox"/>	11 kW	↘ Schließer	Wurzel P	↘ Backofen	aus	-	min
Dachrinnenheizung	LC	1	DO 6	<input type="checkbox"/>	<input type="checkbox"/>	7 kW	↘ Schließer	Wurzel P	↘ Dachrinnenheizung	letzter...	-	min
E-Herd1	LC	1	DO 4	<input type="checkbox"/>	<input type="checkbox"/>	12 kW	↘ Schließer	Wurzel P	↘ E-Herd1	aus	-	min
E-Herd2	LC	1	DO 5	<input type="checkbox"/>	<input type="checkbox"/>	14 kW	↘ Schließer	Wurzel P	↘ E-Herd2	aus	-	min
Friteuse	Virtual	13	-	<input type="checkbox"/>	<input type="checkbox"/>	16 kW	↘ Schließer	Wurzel P	↘ Friteuse	aus	-	min
Halle 1 Licht	Virtual	14	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1 kW	↘ Schließer	Wurzel P	<undefiniert>	ein	-	min
Halle 2 Licht	Virtual	15	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1 kW	↘ Schließer	Wurzel P	<undefiniert>	ein	-	min
Kombidämpfer	IP	1	DO 2	<input type="checkbox"/>	<input type="checkbox"/>	17 kW	↘ Schließer	Wurzel P	↘ Kombidämpfer	aus	-	min
Lüftung	Virtual	1	-	<input type="checkbox"/>	<input type="checkbox"/>	5 kW	↘ Schließer	Wurzel P	↘ Lüftung	aus	-	min
Merker	Virtual	5	-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0 kW	↗ analog	<undefiniert>	↘ _zMerker	ein	-	min
Pumpe	Virtual	2	-	<input type="checkbox"/>	<input type="checkbox"/>	9 kW	↘ Schließer	Wurzel P	↘ _00_Immer	aus	-	min
Sauna	LC	1	DO 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	25 kW	↘ Schließer	Wurzel P	↘ Sauna	ein	-	min
Taster Ausgang	LC	1	DO 3	<input type="checkbox"/>	<input type="checkbox"/>	10 kW	↗ Puls bei pos. ...	Wurzel P	<undefiniert>	ein	100 ms	min
WW-Speicher	LC	1	AO 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	6 kW	↗ analog	Wurzel P	↘ WW Strg	aus	-	5 s
Waschmaschine	LC	1	DO 8	<input type="checkbox"/>	<input type="checkbox"/>	17 kW	↘ Schließer	Wurzel P	↘ Waschmaschine	aus	-	min
Wäschetrockner	LC	1	DO 9	<input type="checkbox"/>	<input type="checkbox"/>	25 kW	↘ Schließer	Wurzel P	↘ Wäschetrockner	aus	-	min
Zeitwert	Virtual	6	-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0 kW	↗ analog	<undefiniert>	↘ Zeitwert	letzter...	-	min

enline Controller Zeit: 27.10.2019 12:40

● Alarm ● Simul ● Daten ● Live ● Auth ● Param ● Online

Live View

If **Live View** is activated, **switched on** outputs are shown **green**, **switched off** outputs are shown **red**. Analog outputs remain in a normal font.

Control State

Indicates the (logical) state of the output according to the emPower controller, independent of a possibly activated override or power scaling ⁶⁶.

Physical state

Always shows the current switching state of the output relay or triac. With a normally open contact (N/O) the value corresponds to the logical switching state (green = on, red = off), but with a normally closed contact (N/C) it would be the other way round.

For physical analog outputs, the percentage is displayed here, where 0% corresponds to the output value 0V and 100% to the output value 10V.

Override

Tick the checkbox to control the output manually and no longer by means of the emPower controller.

Manually operated (overridden) outputs are highlighted in yellow, and an alarm is generated when switching to override.

If the override is activated directly at the LIOB, the output is highlighted in red. In this case the output can be switched back to automatic mode directly at the LIOB or optionally from the emPower.

Req Value

Only available for override operation of the output. Tick the checkbox to turn the output ON, or clear the checkbox to turn the output OFF. For a normally closed contact, the switching state displayed here is the reverse of the physical switching state.

Name	Bus	Moc	Kanal	Wet	Strg	Leistung	Betriebsart	Regelkreis	Bedingung	Fallbac	Pulsdaue	Zyklus	Steuer	Physisc	Handb	Abfr. V
5s-Puls	LC	1	DO 1	<input type="checkbox"/>	<input type="checkbox"/>	0 kW	Schließer	Wurzel P	Test AO...	letzter...	-	min	0	0 %	<input type="checkbox"/>	
Analog ...	LC	1	AO 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0 kW	analog	Wurzel P	Test AO...	letzter...	-	min	0	0 %	<input type="checkbox"/>	
Backofen	LC	1	DO 7	<input type="checkbox"/>	<input type="checkbox"/>	11 kW	Schließer	Wurzel P	Backofen	aus	-	min	Ein	Ein	<input type="checkbox"/>	
Dachrinne...	LC	1	DO 6	<input type="checkbox"/>	<input type="checkbox"/>	7 kW	Schließer	Wurzel P	Dachrin...	letzter...	-	min	Aus	Aus	<input checked="" type="checkbox"/>	<input type="checkbox"/> Aus
E-Herd1	LC	1	DO 4	<input type="checkbox"/>	<input type="checkbox"/>	12 kW	Schließer	Wurzel P	E-Herd1	aus	-	min	Ein	Ein	<input type="checkbox"/>	
E-Herd2	LC	1	DO 5	<input type="checkbox"/>	<input type="checkbox"/>	14 kW	Schließer	Wurzel P	E-Herd2	aus	-	min	Ein	Ein	<input type="checkbox"/>	
Friteuse	Virtual	13	-	<input type="checkbox"/>	<input type="checkbox"/>	16 kW	Schließer	Wurzel P	Friteuse	aus	-	min	Ein	Ein	<input type="checkbox"/>	
Halle 1 Licht	Virtual	14	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1 kW	Schließer	Wurzel P	<undefini...	ein	-	min	Ein	Ein	<input type="checkbox"/>	
Halle 2 Licht	Virtual	15	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1 kW	Schließer	Wurzel P	<undefini...	ein	-	min	Ein	Ein	<input type="checkbox"/>	
Kombidä...	IP	1	DO 2	<input type="checkbox"/>	<input type="checkbox"/>	17 kW	Schließer	Wurzel P	Kombid...	aus	-	min	Ein	Ein	<input type="checkbox"/>	
Lüftung	Virtual	1	-	<input type="checkbox"/>	<input type="checkbox"/>	5 kW	Schließer	Wurzel P	Lüftung	aus	-	min	Aus	Aus	<input type="checkbox"/>	
Merker	Virtual	5	-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0 kW	analog	<undefini...	zMerker	ein	-	min	1	1	<input type="checkbox"/>	
Pumpe	Virtual	2	-	<input type="checkbox"/>	<input type="checkbox"/>	9 kW	Schließer	Wurzel P	_00_lm...	aus	-	min	Ein	Ein	<input type="checkbox"/>	
Sauna	LC	1	DO 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	25 kW	Schließer	Wurzel P	Sauna	ein	-	min	Ein	Ein	<input type="checkbox"/>	
Taster ...	LC	1	DO 3	<input type="checkbox"/>	<input type="checkbox"/>	10 kW	Schließer	Wurzel P	<undefini...	ein	100 ms	min	Ein	Aus	<input type="checkbox"/>	
WW-...	LC	1	AO 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	6 kW	analog	Wurzel P	WW Strg	aus	-	5 s	3	50 %	<input type="checkbox"/>	
Waschmas...	LC	1	DO 8	<input type="checkbox"/>	<input type="checkbox"/>	17 kW	Schließer	Wurzel P	Wasch...	aus	-	min	Ein	Ein	<input type="checkbox"/>	
Wäschetro...	LC	1	DO 9	<input type="checkbox"/>	<input type="checkbox"/>	25 kW	Schließer	Wurzel P	Wäsche...	aus	-	min	Ein	Ein	<input type="checkbox"/>	
Zeitwert	Virtual	6	-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0 kW	analog	<undefini...	zZeitw...	letzter...	min	54000	54000	<input type="checkbox"/>		

Virtual and analog outputs

If an output is configured on the bus as *Virtual*, it is a virtual output.

Such outputs can be set either via a condition or via the Web Visualization (both checkboxes must be activated for this). By means of virtual outputs, values can also be

transmitted to external devices via a special configuration of the emPower controller, e.g. via Modbus; please contact your emPower system partner for more on this.

For **physical analog outputs**, **AO1** and **AO2** can be used as 0-10V outputs.

If the **power** of the output is set to **0 or 1**, the output voltage increases linearly from **0V** at an output value of **0** to **10V** at an output value of **1**.

If the **power** of the output is set to **greater than 0**, the output value is *normalized to this power*. If the assigned condition returns, for example, the value 5, and the output power is set to 20 kW, then the output is set to $5/20 = 25\%$ and the output voltage would therefore be 2.5V and the connected consumer would require 5kW of power (with linear control). This means that power values can be used directly for calculations in conditions.

Analog outputs (whether physical or virtual) cannot be set directly via the Web Visualization. However, a virtual analog input can easily be set via the web interface, which controls the analog output via a condition.

4.10.6 Energy meters

All physically existing energy meters are created and parametrized here.

Buttons

New energy meter

Creates a new energy meter

Duplicate

Duplicates the selected energy meter

Delete

Deletes the selected energy meter

: Copy

Copies the displayed table tab-delimited to the clipboard

: Export

Exports the displayed table as a CSV file

: Reset Counter

Temporarily sets the current meter reading value displayed in the Counter Value column to 0 so that it is easier to observe the incrementing of high meter values. After disconnecting and reconnecting to the emPower controller, the actual meter reading is again displayed.

Parameters

Name

Select any name for your energy meter

Number

Select any number for your energy meter

Bus

Connect: Meter is connected to the LIOB module at the LIOB Connect Bus

FT: Meter is connected to LIOB module on LIOB FT bus

Modbus: Meter is connected to Modbus

M-Bus: Meter is connected to M-Bus

IP: Meter is connected to the LIOB module at the LIOB IP bus

Local: Meter is connected to the local input of the LIOB emPower controller

Virtual: Counter is integrated in the LINX configuration via special data points and maths objects

Module and channel

Select the respective module and channel number for your energy meter. The standard configuration makes channels UI1 to UI4, DI1 and DI2 available as channel numbers. For bus meters, the primary address of the meter is to be entered under *Module*, and under *Channel* you can choose between active or reactive energy for some meters.

Web

Ticking the checkbox activates the display of the meter in the Web Visualization ⁹¹

Unit

Select the unit for this meter: kWh, m³, l, kg, kvarh or no unit. Default is kWh

Factor I

Select the conversion factor for the current

Factor U

Select the conversion factor for the voltage

Impulse Const.

Select the energy value of a pulse as it is noted on the meter

Correction

Select a correction factor

Pulse Timeout

Select the time period in which a pulse must come; otherwise a zero power alarm ("No Pulse on Energy Meter") is triggered. Enter 0 to deactivate the function.

After the selected time period, the current power of the pulse counter is also set to 0, regardless of whether the "No Pulse on Energy Meter" alarm is activated or not.

Comment

Select any comment for your energy meter

Counter value

This value is only available in the **Live View** and shows the current meter reading (for bus meters) or the number of pulses accumulated at the counter input so far (pulse counter), converted into an energy value.

The screenshot shows the 'enline' software interface for 'Hotel 23 - online Energie Management'. The main content is a table titled 'Energiezähler' (Energy Meters). The table has columns for Name, Nummer, Bus, Modul, Kanal, Wel, Einh, Wandlerfaktor I, War, Impulskor, Korrekturfaktor, Puls Timeout, Kor, and Zählwert. The 'Zählwert' column shows values like 27 980,7 kWh for 'Wurzel P' and 0 kWh for 'Submessung P Küche'. The interface also includes a navigation bar at the top with icons for Monitor, Profile, Leistung, Verbrauchsdaten, Analyse, Protokoll, and Alarme. At the bottom, there is a status bar with 'enline Controller Zeit: 27.10.2019 13:06' and several status indicators (Alarm, Simul, Daten, Live, Auth, Param, Online).

Name	Nummer	Bus	Modul	Kanal	Wel	Einh	Wandlerfaktor I	War	Impulskor	Korrekturfaktor	Puls Timeout	Kor	Zählwert
Wurzel P	1a_W_P	Virtual	1	Wirkenergie	<input checked="" type="checkbox"/>	kWh	100	1	-	100 %	deaktiviert		27 980,7 kWh
Wurzel Q	1b_W_Q	Virtual	1	Blindenergie kap.	<input checked="" type="checkbox"/>	kvarh	100	1	-	100 %	deaktiviert		25 699,4 kvarh
Submessung P L1	2a_S_P_L1	Virtual	2	Wirkenergie	<input checked="" type="checkbox"/>	kWh	100	1	-	100 %	deaktiviert		2 634,44 kWh
Submessung Q L1	2b_S_Q_L1	Virtual	2	Blindenergie kap.	<input checked="" type="checkbox"/>	kvarh	100	1	-	100 %	deaktiviert		4 175,46 kvarh
Submessung P L2	3a_S_P_L2	Virtual	3	Wirkenergie	<input checked="" type="checkbox"/>	kWh	100	1	-	100 %	deaktiviert		14 656,6 kWh
Submessung Q L2	3b_S_Q_L2	Virtual	3	Blindenergie kap.	<input checked="" type="checkbox"/>	kvarh	100	1	-	100 %	deaktiviert		9 473,45 kvarh
Submessung P L3	4a_S_P_L3	Virtual	4	Wirkenergie	<input checked="" type="checkbox"/>	kWh	100	1	-	100 %	deaktiviert		10 689,7 kWh
Submessung Q L3	4b_S_Q_L3	Virtual	4	Blindenergie kap.	<input checked="" type="checkbox"/>	kvarh	100	1	-	100 %	deaktiviert		12 050,5 kvarh
Submessung P ...	5_S_P_Wä	LC	1	UI 1	<input checked="" type="checkbox"/>	kWh	100	1	1000 /kWh	100 %	86400 s		0,006 kWh
Submessung P Küche	6_S_P_Kü	M-Bus	7	Wirkenergie	<input type="checkbox"/>	kWh	100	1	-	100 %	deaktiviert		0 kWh

4.10.7 Tariff circuits

Here you may parametrize up to **100 tariff circuits**.

You can **delete** a tariff circuit by deactivating the "Active" checkbox.

Attention: Only the **period duration, power, energy and costs** of the **tariff circuits** are recorded, while **all trend data** of the **control circuits**^{→72} (see trend data view^{→16}) are stored in the database.

Buttons

New Tariff Circuit

A new line is inserted to enter a new tariff circuit

Duplicate

The selected tariff circuit is duplicated.

: Copy

Copies the displayed table tab-delimited to the clipboard

: Export

Exports the displayed table as a CSV file

Parameters

Name

Choose any name for your tariff circuit

Active

Ticking the checkbox activates the tariff circuit

Web

Ticking the checkbox activates the display of the tariff circuit in the Web Visualization^{→91}

Reg. Period

Measuring interval specified by the network operator (in seconds). Usually 15 minutes (900 seconds) are used.

Sync Source

Select an input to which the sync pulse from the network operator is applied, or select <internal> if the regulation is to run without external synchronization.

Sync Timeout

Time (in seconds), after which a new regulation period is started anyway if the sync pulse fails.

Sync Susp.

Time (in seconds), within which further sync pulses are ignored after the sync pulse has occurred

Extrapolate

Tick the checkbox to enable energy extrapolation. This means that the energy and power values are updated even without new meter readings, whereby the update is based on the last read power values.

Bus meter: For Modbus and M-Bus meters with continuously readable power but low energy value resolution (e.g. 10Wh for meters from Saia-Burgess), the current energy value can be extrapolated from the current power value with much higher accuracy.

Pulse counter: If pulse counters are used, this option cannot be activated – in this case an error message appears during the parameter download!

The reason for this is that for the "current" power value, the power resulting from the time interval of the last two pulses would be taken. This would not result in a higher accuracy than if extrapolation was not activated. The advantage would be rather cosmetic, because with energy extrapolation activated in the visualizations (control monitor, counting circuit profile, current power) there would be continuous "current" values, and the display would not always remain the same until the next counting pulse. However, the disadvantages of potentially inaccurate extrapolation outweigh this.

Attention: As a result of extrapolation, it will generally be the case that the stored energy period values will not exactly match those currently displayed by the energy meter. This can result in slight deviations in the billing data, for example, because the utility company uses the current meter readings and not extrapolated interim readings. However, the deviation is always within the meter value resolution (e.g. 10Wh for bus meters from Saia-Burgess), so it should be negligible.

Energy meters

In the pop-up dialog box, select all energy meters that should contribute to the energy measurement of the tariff circuit. If "1" is selected as the value, the contribution is evaluated positively, if "-1" is selected, the contribution is deducted. A maximum of 16 energy meters can be selected.

Tariff, or -1

If you wish, please indicate a specific tariff for this tariff circuit in EUR/unit. In this case, the peak costs are calculated as 0.

If -1 is entered, "Global tariff in use" appears in the Value column, and the rates entered under Costs ⁴⁰ are used.

Load behaviour

Using the load behaviour allows the current power to be displayed more precisely for pulse meters if no new pulses are received for a relatively long time.

Example: A meter with 500 pulses/kWh is assigned to the tariff circuit. A 2 kW boiler is connected as a consumer, which is either on or off. If the boiler is on, a pulse is therefore received every 3.6s.

With *normal* load behaviour, the power is set to 0 at a pulse interval corresponding to 50% of this power, i.e. if no new pulse is received for 7.2s.

With *static* load behaviour, this would already be the case at 90% of this power, i.e. after 4s.

With *dynamic* load behaviour, this would only be the case at 10% of this power, i.e. after 36s.

Boilers that only switch on or off are static consumers, so in this case the load behaviour should be set to *static*.

Id	Name	Akti	Web	Reg. Periode	Sync Quelle	Sync Timeo	Sync Sperre	Extrapolieren	Energiezähler	Tarif, oder -1	Lastverhalt
0	Wurzel P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	900 s	Sync Puls extern	10 s	30 s	<input checked="" type="checkbox"/>	1 Zähler	globaler Tarif	normal
1	Submessung L1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	900 s	Sync Puls extern	10 s	30 s	<input checked="" type="checkbox"/>	1 Zähler	globaler Tarif	statisch
2	Submessung L2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	900 s	Sync Puls extern	10 s	30 s	<input checked="" type="checkbox"/>	1 Zähler	globaler Tarif	normal
3	Submessung L3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	900 s	Sync Puls extern	10 s	30 s	<input checked="" type="checkbox"/>	1 Zähler	globaler Tarif	normal
4	Submessung Wäscherei	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	900 s	<intern>	-	30 s	<input type="checkbox"/>	1 Zähler	globaler Tarif	normal
5	Submessung Küche	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	900 s	<intern>	-	30 s	<input type="checkbox"/>	1 Zähler	globaler Tarif	normal
6	Wurzel Q	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	900 s	Sync Puls extern	10 s	30 s	<input checked="" type="checkbox"/>	1 Zähler	globaler Tarif	normal
7	L1 Q	<input checked="" type="checkbox"/>	<input type="checkbox"/>	900 s	Sync Puls extern	10 s	30 s	<input checked="" type="checkbox"/>	1 Zähler	globaler Tarif	normal
8	L2 Q	<input checked="" type="checkbox"/>	<input type="checkbox"/>	900 s	Sync Puls extern	10 s	30 s	<input checked="" type="checkbox"/>	1 Zähler	globaler Tarif	normal
9	L3 Q	<input checked="" type="checkbox"/>	<input type="checkbox"/>	900 s	Sync Puls extern	10 s	30 s	<input checked="" type="checkbox"/>	1 Zähler	globaler Tarif	normal
10	Test Summe P L1-L3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	900 s	Sync Puls extern	10 s	60 s	<input checked="" type="checkbox"/>	3 Zähler	globaler Tarif	normal

4.10.8 Control circuits

Here you can parametrize up to **10 control circuits**.

Based on the control circuits, **all trend data** is stored in the database (see trend data view ¹⁶), whereas from the **tariff circuits** ⁶⁹, only the **period duration, energy and costs** are recorded.

Buttons

New

Creates a new control circuit

Delete

Deletes the currently selected control circuit

: Copy

Copies the displayed table tab-delimited to the clipboard

: Export

Exports the displayed table as a CSV file

Parameters

Tariff circuit

Select a tariff circuit for the regulation control loop

Target Value Optimization

Automatic target value optimization is only performed for this control circuit if the checkbox is ticked.

Default

If **no** condition is selected, this value counts as the current target value.

Condition

Select an analog condition that defines the currently valid target value. The condition could, for example, specify a different target value depending on the month. If target value optimization is activated, the optimization is reset as soon as the target value changes.

Hotel 23 - enline Energie Management

enline Monitor Profile Leistung Verbrauchsdaten Analyse Protokoll Alarme

Regelkreise [Neu] [Löschen] [⋮]

Tarifkreis	Sollwertoptir	Standard	Bedingung
Wurzel P	<input checked="" type="checkbox"/>	500 kW	Sollwert Wurzel P
Test Summe P L1-L3	<input type="checkbox"/>	500 kW	<undefiniert>
Submessung Wäscherei	<input checked="" type="checkbox"/>	300 kW	<undefiniert>


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Alarm Simul Daten Live Auth Param Online

Live View

If the **Live View** is activated, you will also see the target value optimization information of each target value for each tariff circuit, but you cannot make any changes. The currently valid target value of the selected tariff circuit is displayed in **green**:

Optimized

Displays the target value optimized by target value optimization  for each target value of the tariff circuit.

RPmax

Parameter R_{Pmax} (= "Ratio of highest power regulation") is a measure of how much range there still is for target value optimization. The higher the value, the less range there is for a reduction. 94% means that the (optimized) target value could still be reduced by a maximum of 6% of the (non-optimized) target value.

Optimization Flags

The values "Target value exceeded", "Optimized value exceeded" or "Optimization at maximum" can occur here. If target value optimization is running normally, no entry is made here.

Tarifkreis	Sollwertoptir	Standard	Bedingung	Nicht optir	Optimiert	R_Pmax	Optimierungszustand
Wurzel P	<input checked="" type="checkbox"/>	500 kW	Sollwert Wurzel P	250 kW	250 kW	0 %	
Test Summe P L1-L3	<input type="checkbox"/>	500 kW	<undefiniert>	500 kW	500 kW	0 %	
Submessung Wäscherei	<input checked="" type="checkbox"/>	300 kW	<undefiniert>	300 kW	198 kW	0 %	

enline Controller Zeit: 27.10.2019 13:41

Alarm Simul Daten Live Auth Param Online

4.10.9 Scenes

With scenes you can switch any outputs one after the other, with or without delays in between, without having to formulate a corresponding condition for each output.

Attention: As a result, the state of an output might no longer be synchronous with the state of an assigned condition, since the output can be controlled by the assigned condition as well as by a scene. The output would only become synchronous with its assigned condition again once the condition changes, i.e. once an "edge" occurs. In other words, as of emPower 4.0, the control of the outputs is **edge triggered** and no longer solely status-controlled.

Buttons

New sequence

Creates a new sequence. You then enter the parameters directly in the table.

Duplicate

Duplicates the selected sequence

Delete

Deletes the selected sequence

New entry

Creates a new action for the sequence selected on the left. You then enter the parameters directly in the table above.

Duplicate

Duplicates the selected action

Delete

Deletes the selected action

Arrow up and Arrow down

Moves the selected action up or down. Since the actions are processed sequentially from top to bottom, the position within the list is relevant for the time of execution.

Parameters

Name

Select any name for the sequence

Mode

Pulse on pos. edge: If the condition changes from OFF to ON, the sequence is started

Pulse on neg. edge: If the condition changes from ON to OFF, the sequence is started

Pulse on both edges: If the condition changes from OFF to ON or from ON to OFF, the sequence is started

Condition

Select the condition by which the sequence is to be started (according to the selected operating mode)

Output

Select an output for this action

State

Choose whether the selected output should switch **off**, switch **on** or **toggle**

Delay

The actions are always processed from top to bottom. If you enter a delay of > 0s, the execution of the corresponding action will be delayed by this set time. The actions entered afterwards are then also processed later accordingly.

Live View

If the **Live View** is activated, the progress of scenes can be observed.

First select the desired sequence (in the example below "Lights 1+2 on").

The next action to be performed is then displayed to the right on a **green** background.

Changes are not possible in the Live View.

The **Logical State** column displays the current state of the condition.

Hotel 23 - enline Energie Management

enline Monitor Profile Leistung Verbrauchsdaten Analyse Protokoll Alarme

Neue Sequenz Duplizieren Löschen Neuer Eintrag Duplizieren Löschen ↑ ↓

Name	Betriebsart	Bedingung	Logischer Zustand	Ausgang	Zustand	Verzöger
Lichter 1+2 aus	Puls bei neg. Flanke	Wettkampf Licht	Ein	Halle 1 Licht	ein	0 s
Lichter 1+2 ein	Puls bei pos. Flanke	Wettkampf Licht	Ein	Halle 2 Licht	ein	3 s

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● Alarm ● Simul ● Daten ● Live ● Auth ● Param ● Online

4.10.10 Charging stations

All charging stations or charging controllers are created and parameterized here
To sort the list, click on the column header you want to sort by.

Buttons

New charging station

Creates a new charging station

Duplicate

Duplicates the selected charging station

Delete

Deletes the selected charging station

: Copy

Copies the displayed table tab-delimited to the clipboard

: Export

Exports the displayed table as a CSV file

Parameters

Name

Choose a name for your charging station

Type

Bender CC612: Charging station with Bender CC612 charging controller

Circontrol

Etrell Inch

KEBA / Eaton: KEBA P30, Eaton xChargeIn S-series/M-series

OCPP: Charging stations according OCPP 1.6 JSON

PCE Wallbox

go-eCharger Home+

other: Charging station with another charging controller

IP address

Enter the IP address of the charging station here

If chosen OCPP as Type, please enter the OCPP chargepoint identity string instead.

Password

Enter the password of the charging station. When the input field is active, it appears in plaintext.

Connection

Configure here the phase to which phase 1 of the charging station is connected. This enables online to make the correct assignment to the building installation based on the feedback from the charging station on which phase and how much current is flowing.

If, for example, L3 of the building installation is connected to connection L1 of the charging station, then L1 should be connected to L2 and L2 to L3 of the charging station. So choose **L3-L1-L2** from the drop-down menu.

Since many cars can only charge 1-phase, a rotation of the phase connections is advisable when there are several charging stations in order to avoid impermissible phase unbalance and phase overload.

If the charging station is only connected in one phase, e.g. via L3 of the building installation, **L3-L1-L2** must be selected in the dropdown.

Limit P [cond]

Select an analog condition here, the value of which is specified as the target charging power. If the resulting charging current is higher than defined by **Limit I**, the lower value is selected.

Limit I [cond]

Select an analog condition here, the value of which is specified as the target charging current. If the charging current is higher than defined by **Limit P**, the lower value is selected.

Current Power [in]

Select an analog virtual input here to which the momentary current power is transferred, e.g. via an energy meter.

If no input is assigned, the value is still displayed in the live view.

User [in]

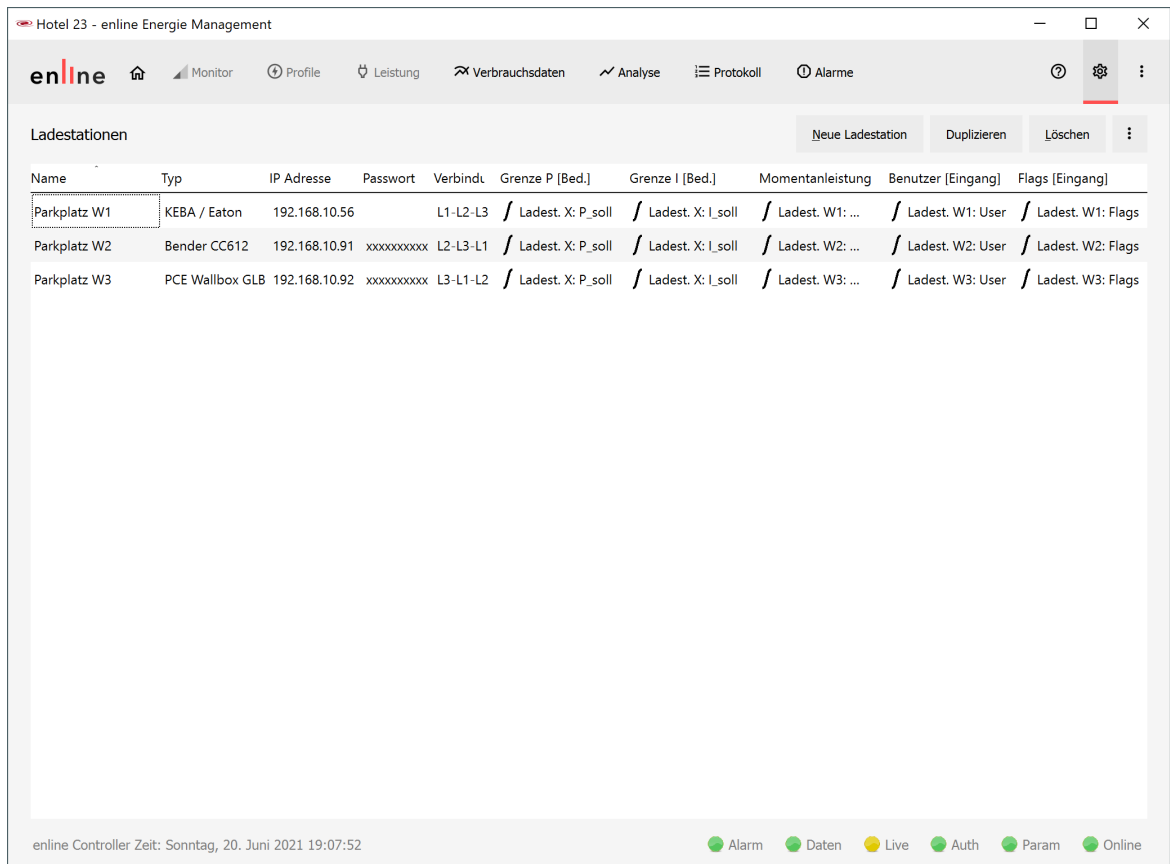
Select an analog virtual input here, via which the charging station transmits the RFID of the authenticated user.

If no input is assigned, the value is still displayed in the live view.

Flags [in]

Select an analog virtual input here, via which the charging station signals various flags (see flags ⁸⁰).

If no input is assigned, the value is still displayed in the live view.



Name	Type	IP Adresse	Passwort	Verbind.	Grenze P [Bed.]	Grenze I [Bed.]	Momentanleistung	Benutzer [Eingang]	Flags [Eingang]
Parkplatz W1	KEBA / Eaton	192.168.10.56		L1-L2-L3	/ Ladest. X: P_soll	/ Ladest. X: I_soll	/ Ladest. W1: ...	/ Ladest. W1: User	/ Ladest. W1: Flags
Parkplatz W2	Bender CC612	192.168.10.91	xxxxxxxxxx	L2-L3-L1	/ Ladest. X: P_soll	/ Ladest. X: I_soll	/ Ladest. W2: ...	/ Ladest. W2: User	/ Ladest. W2: Flags
Parkplatz W3	PCE Wallbox GLB	192.168.10.92	xxxxxxxxxx	L3-L1-L2	/ Ladest. X: P_soll	/ Ladest. X: I_soll	/ Ladest. W3: ...	/ Ladest. W3: User	/ Ladest. W3: Flags

enline Controller Zeit: Sonntag, 20. Juni 2021 19:07:52

Alarm Daten Live Auth Param Online

Live View

If the **Live View** is activated, 2 additional columns appear:

Plug

Shows plug state

Status

Shows charging state

Flags

The states of the charger are signaled via the Flags parameter. Using bit masks and the compare block [52](#) with the relational operator '&', various actions can be controlled using conditions.

The following information is available in the 4 bytes (32 bits) of the flags (the LSB is in position 0, the MSB in position 31):

Bit Position	Meaning
0-7 (Byte 1)	plugState: 0: no cable 1: cable in charger 2: cable in charger and car
8-15 (Byte 2)	plugIsLocked: 0: plug is not locked 1: plug is locked
16-23 (Byte 3)	chargerState: 0: not ready 1: ready, not charging 2: charging 3: paused 4: error
24	isConnected: Charger is connected to network and can be reached by the controller
25	chargerWritePending
26	errorChargerRead
27	errorChargerWrite
28	errorControllerRead
29	priorityCharger: User was authorized via RFID, and this ID is one of the priority IDs

OCPP

Chargers can log into the **emPower** controller as a backend via OCPP 1.6 JSON. To do this, OCPP must be selected as the type of charging station.

At the charging station itself, the **emPower** controller must be configured as a backend. The following settings are typically required for this:

- *Chargepoint Identity*: Select any value, e.g. **Charger1**. You then have to enter this value under *IP address* in **emPower**.
- *OCPP Communication Type*: **OCPP 1.6 JSON**
- *OCPP Backend Hostname*: enter here the IP address of the **emPower** controller, e.g. **192.168.1.33** or **controller.fritz.box**
- *OCPP Port*: **1780**
- *OCPP System Path*: **ocpp**
- *Secure OCPP Connection*: **OFF**
- *OCPP Authentication Method*: **None**

-
- *Reconnect Interval: 300s*
 - *WebSocket Ping Interval: 600s*
 - *Predefined Token: any value, e.g. 734043911*
 - *Meter values during charging session: 30s*
 - *Meter values reference to clock: 900s*

4.10.11 Download Parameters to online Controller

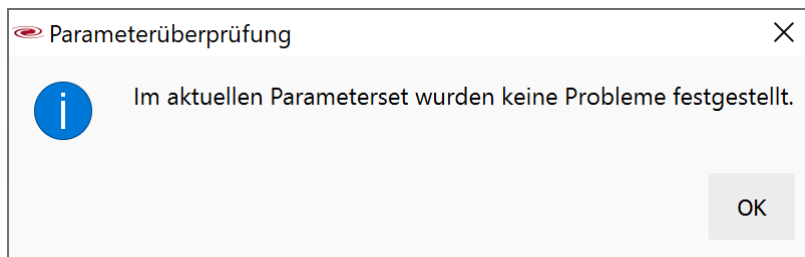
Select this option to load the current site parameters to the emPower controller. The progress bar indicates when the download is complete. Download is only possible if the locally set site parameters differ from the site parameters on the emPower controller.

4.10.12 Upload Parameters to PC

Select this option to upload all site parameters currently configured on the emPower controller to the PC. An upload is only possible if the locally set site parameters differ from the site parameters on the emPower controller.

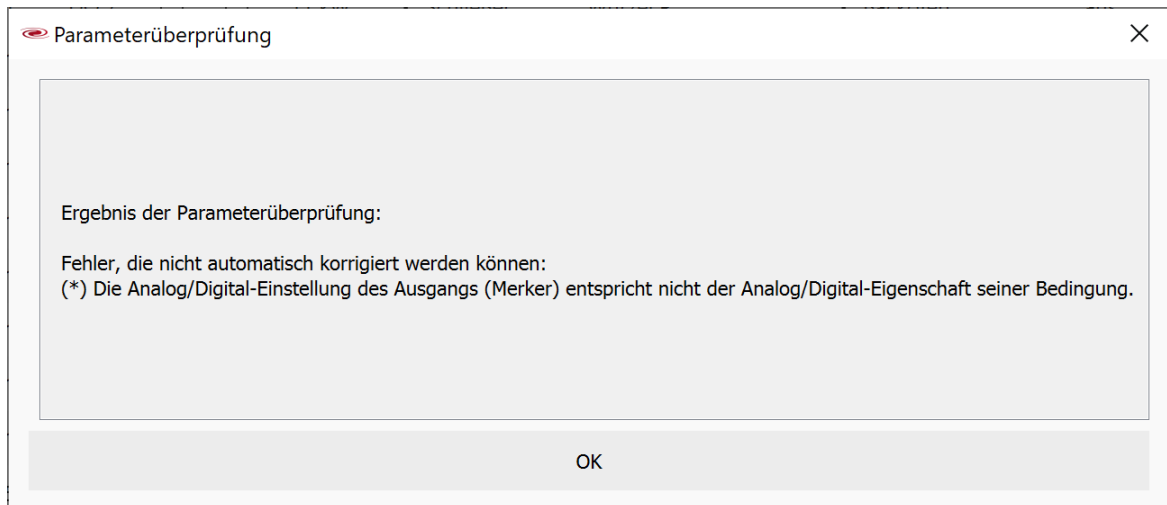
4.10.13 Parameter Check

Call this function to check for errors after changing the parameters, for example the conditions. This check is done automatically before downloading to the emPower controller.



4.10.14 Parameter check & autocorrection

Call this function to check for errors after changing the parameters, for example the conditions. If possible, detected errors are automatically corrected.



4.11 : Menu

The : Menu:



Site Manager

Site Manager


Print...

A screenshot of the current display can be printed directly to a printer using the default Windows print dialog.

Export to PDF...

A screenshot of the current display can be directly exported and saved as a PDF.

Preferences

Only available when no connection to a **emPower** controller is established.
Opens the Preferences .

About...

Displays information about the version of **emPower** in use.

4.11.1 Site Manager

Here you can switch between different sites. Please disconnect the connection to the emPower controller by clicking Disconnect  before switching over.

The *title bar* of the **emPower** window displays the *name* of the current site.

Buttons

Select

The selected site becomes the current site. Alternatively, you can also select the site *by double-clicking* on it.

Attention: Only available if there is no connection to a site! If this is the case, you must first terminate the connection.

Create New

Enter the name (e.g. Hotel Müller) and the IP address (e.g. emPower.mueller.at or 84.56.172.5) of the site in the dialog box. The local IP address of the emPower controller can be read on the display.

Edit

Edit the site settings here:

Name: Choose any name

Device type: Select either "EMS-120", "EMS-153" or "SMART-586" from the dropdown list, depending on the **emPower** controller used.

IP Address: Enter the IP address of the **emPower** controller. If the **<%APP>%** controller is accessible via a port enable (open port) and the port is not the default port 80, you can enter the corresponding port number behind it, separated by a colon, e.g.: emPower.hotel-mueller.com:36123

Serial Number: Displays the serial number of the **emPower** controller, if available. The button can be used to copy it to the clipboard.

Secure Connection (https): Tick the checkbox to establish an encrypted connection to the **emPower** controller.

Ignore SSL Certificate Errors: If no valid certificate for the domain in use is installed on the **emPower** controller, you must tick this checkbox.

Username: this entry cannot be changed because the **emPower** controller user must be "admin"

Password: Enter the password of the **emPower** controller user "admin" here

Automatic Download: Select whether and when the trend data from the **emPower** controller should be loaded into the PC database:

Disabled: neither the trend data nor DB status are loaded

Read status only: Trend data are not loaded, but the Site Manager shows from when the last trend data in the PC database originate

With active connection: Trend data are loaded as soon as a connection to the **emPower** controller has been established

permanent download: Trend data are always loaded when the **emPower** PC software is running

Only Live View: No changes can be made to the configuration of the site. To cancel the change block (uncheck the checkbox), you must enter the controller password.

Delete

The selected installation is deleted. **Attention:** All database entries for the site are also deleted, but the data in the **emPower** controller are retained.

Add License

In order to connect to the **< %APP% >** controller, you need the access code (authentication data) you received when you purchased the system.

Enter this code in the following window (it's best to use copy and paste):

After pressing OK you can connect to the **emPower** controller.

The codes are stored in the database. The correct code is automatically transmitted when connecting to the emPower controller.

Database Export

All data of the selected site are exported (does not have to be the active site). You will be asked for the desired file name and storage location.

Database Import

Previously exported emPower database data will be imported into the selected site. You will be warned if the data to be imported come from another site.

Delete Database

Here, the trend data can be deleted both in the internal database of the emPower controller as well as in the local PC database. To delete the data in the emPower controller, there must already be a connection to the emPower controller.

Trend Data: All data of all tariff circuits that you can display under Trend Data ^{→16} or Costs ^{→20}. Under "Data Set", you can select the tariff circuit from which you want to delete the data, or whether you want to delete the trend data of all tariff circuits.

Alarm data: All alarm entries that you can display under Alarms ^{→26}

Switching data: All switching data that you can display under Switching Data ^{→20}

Parameters: All parameter sets that you can display under Parameter Manager ^{→29}. Since only the current parameter set is stored in the emPower controller, these data can only be deleted on the PC.

Authentication Data: All authentication data (access codes) that you have previously entered under Enter Code ^{→86}.

🔍 Datenbank Löschung
✕

	online Controller	Daten am PC	Datensatz
Verbrauchsdaten	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Wurzel P ▼
Alarmdaten	<input type="checkbox"/>	<input type="checkbox"/>	
Schaltdaten	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Parameter		<input type="checkbox"/>	
Zugriffscodes		<input type="checkbox"/>	

Löschung durchführen
Abbrechen

Parameters

Name

The name you freely assign

Database Status

Date of the last entry in the database

Status

Shows whether the site is online or offline. If the site is offline, no connection can be established

Monitor PC

Shows whether the monitor PC of the site is online or offline

Device

Shows the controller device type.

Version

Displays the software version of the emPower controller in the form *firmware version / emPower software version (build date)*

Alarms

Shows the number of unacknowledged alarms of this site

Web visualization

Shows the link to the Web Visualization [91](#) of the emPower controller, if it is installed

Attention: If the option *Use Site Manager Offline Only* is activated in the Preferences [89](#), only the two columns *Name* and *Database Status* are displayed!

The screenshot shows the 'enline' software interface for 'Hotel 23 - enline Energie Management'. The main window displays a table of sites under the heading 'Anlagenliste'. The table has columns for Name, Datenbankstatus, Status, Steuer-PC, Gerät, Version, Alarmer, and Webvisualisierung. The 'Supermarkt' site is highlighted with a blue cursor bar. To the right of the table is a vertical menu with buttons: Auswählen, Neu erstellen, Ändern, Löschen, Lizenz eingeben, Datenbank Export, Datenbank Import, and Datenbank Löschen. At the bottom of the window, there is a status bar with the text 'enline Controller Zeit: 25.10.2019 16:42' and a row of status indicators: Alarm, Simul, Daten, Live, Auth, Param, and Online.

Name	Datenbankstatus	Status	Steuer-PC	Gerät	Version	Alarmer	Webvisualisierung
Hotel 23	25.10.2019 16:30	Online	Online	LINX-153	7.0.4 / 6.1.0 (Build 21.10.2019)	0	https://192.168.10.36/...
Power Manager	25.10.2019 16:38	Online	Offline	LIOB-586	7.0.4 / 6.1.0 (Build 21.10.2019)	8	http://192.168.10.43/...
Hotel 02	25.10.2019 16:30	Online	Offline	LIOB-586	7.0.4 / 6.0.0 (Build 05.10.2019)	8	https://...
L 63	25.10.2019 16:39	Online	Offline	LIOB-586	7.0.4 / 6.0.0 (Build 02.10.2019)	6	https://...
Demo-Koffer		deaktiviert					
Supermarkt	25.10.2019 16:24	Online	Offline	LINX-120	7.0.4 / 6.1.0 (Build 21.10.2019)	6	https://192.168.10.23/...

Site Manager.

The currently active site appears in green letters and in the title bar of the window. The actions of the buttons refer to the site selected by the blue cursor bar.

4.11.2 Preferences

You can only open the Preferences dialog if there is no connection to a site.

Communication Settings

You can normally leave the values at the default values.

Connect at Startup

Tick this checkbox to have **<%APP>%** automatically connect to the emPower controller immediately after the program is started

Reconnect on Connection Loss

If the connection is lost at some point, or if the connection setup fails at startup, **emPower** will try to establish the connection again every 10 minutes

Query Interval

Query interval for the display of live data in [s]. The value should not be set lower than 1s.

Application settings

Database

If "Default" is selected, "online" is chosen as database. Otherwise, you can enter a different DB name. You can specify a separate database for each location of an online installation.

Under Windows, the name specified here refers to the "Name" or "Data Source" field in the ODBC data source administrator, not the actual database name. This is entered in the ODBC configuration.

From online 6.0 on, the ODBC driver "PostgreSQL Unicode(x64)" must be selected.

For older online versions, you still have to choose the corresponding 32-bit driver.

Whether the PostgreSQL database used is a 32-bit (x86) or 64-bit (x64) version is irrelevant for the choice of ODBC driver.

Export path

Select a directory in which the automatically exported consumption analyses are to be stored.

Simulation mode

If you select "With physical output switching", the outputs of connected LIOBs are actually switched during the online simulation ⁶⁹.

If you want the LIOB outputs to all remain at their fallback value during the online simulation without switching further, select "Without physical output switching".

View Settings

Currency unit

Select the desired currency here.

Max. tariff lines in the counting circuit profile

Number of tariff circuits displayed simultaneously in the counting circuit profile ⁶⁹

Display in W instead of kW

Select this checkbox if all values in emPower should be displayed in W instead of kW

Lokale Einstellungen

Kommunikationseinstellungen

Verbinden bei Programmstart

Verbinden nach Verbindungsunterbrechung

Abfrageintervall [s] 1,0

Applikationseinstellungen

Datenbank Standard enline6

Exportverzeichnis C:\Users\embytt\enline Auswählen

Simulationsmodus mit Schaltvorgängen der Ausgänge

Darstellung

Währungseinheit EUR

Max. Tarifkreise im Zählkreisprofil 2

Anzeige in W anstatt kW

OK Abbrechen

5 Web visualization

If you have the appropriate authorization and the Web Visualization is not already up to date, you can install the Web Visualization after connecting to the **emPower** controller.


You can access the **<%APP>%** Web Visualization via the link in the status screen⁹, or directly at the IP address of your emPower controller, e.g.

<http://192.168.1.25/user/>

As the username, you can use "admin", "operator" or "guest", and as the password the respective password.

In the **emPower** Web Visualization, you are shown an overview of the site data, the tariff circuits and energy meters, as well as of the inputs and outputs.

Depending on the configuration of the inputs and outputs, they are displayed here and can be controlled and parametrized.

The values can be entered here in particular for virtual inputs  [62](#) of the analog type, see screenshot.

enline webVIS

ANLAGENDATEN
TARIFKREISE UND ENERGIEZÄHLER
EIN- UND AUSGÄNGE

AUSGÄNGE

		Sauna	aus	Handbetrieb: ein
		Halle 1 Licht		Umschalten
		Halle 2 Licht		Umschalten
		Merker		Umschalten
		WW-Speicher	0	

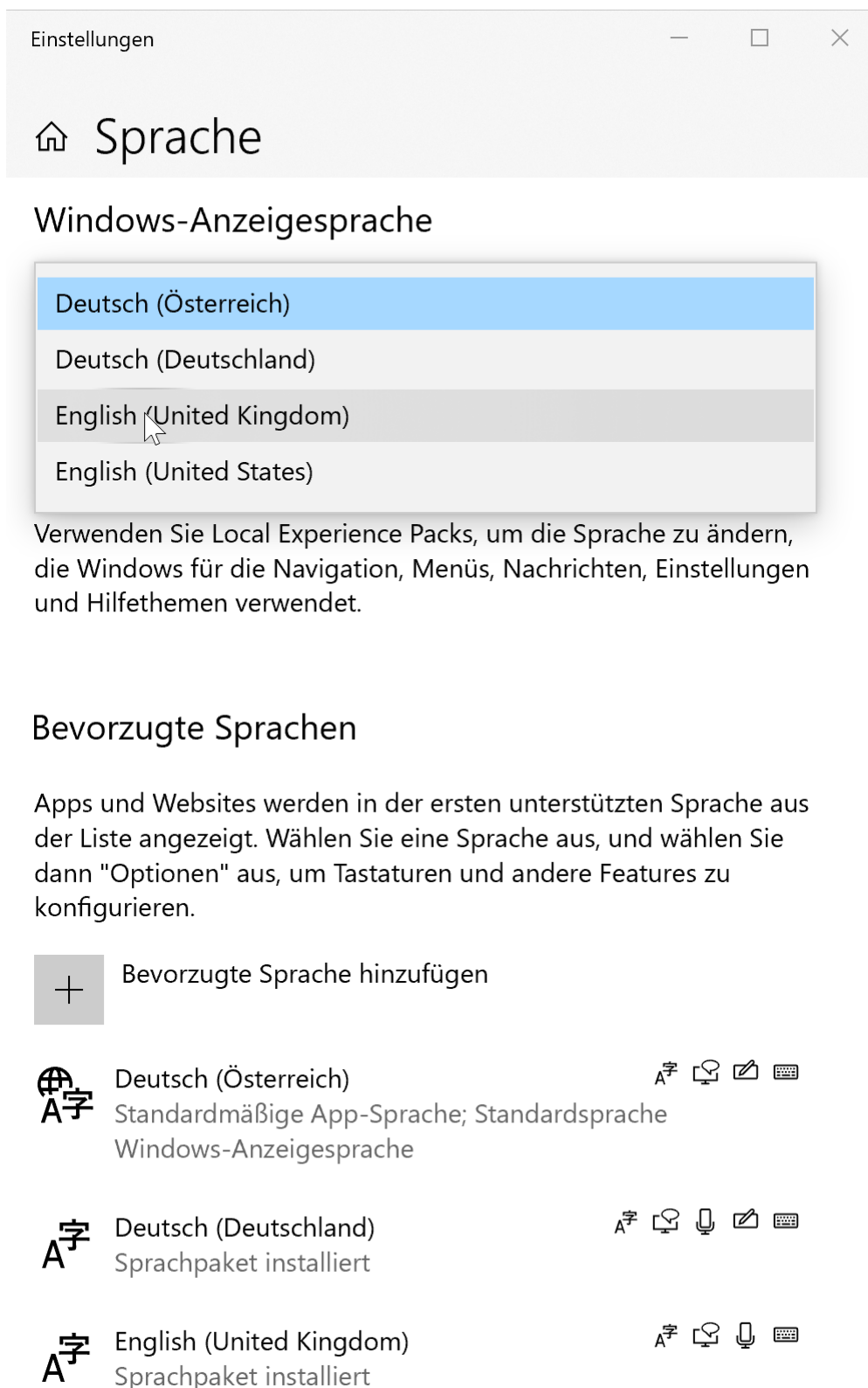
EINGÄNGE

		Lichtschalter Saal 1	aus	
		Temp ist	28.2	
		Schalter virtuell	aus	v
		Sport Zeit Aus	20 : 01	x
		Sport Zeit Ein	15 : 00	x
		Taster RF	aus	
		Temp soll	22	↕
		Temp außen	6.8	
		Zeitstempel Stop	2018-01-13T23:00	

enline Zeit: 15:24:13

6 Language

emPower is equipped with both German and English user interfaces. The language is automatically selected according to the system settings. If a language other than "German (...)" is selected, the English user interface is displayed. To do so, go to the Windows "Language Settings" and change the Windows display language.



Windows 10 dialog box for setting the language

7 Further notes

Here you will find additional information about **emPower**.

Live View

When the live view is activated, the corresponding status screen⁷ is green. Double-clicking on the status screen deactivates the live view; the status screen is then yellow.

In the live view, the current trend data and the evaluation of the conditions are continuously transferred from the emPower controller to the PC and displayed there. Many parameter changes are locked in this mode; to make changes, you must first deactivate the live view.

Online simulation

You can activate the online simulation by double-clicking **Simul** on the status screen⁷ (red if online simulation is activated, otherwise green).

Activating the online simulation allows you to simulate your site without actually having to connect energy meters or devices. The current power is generated internally according to the configured power of the consumers as if all consumers were switched on, and each tariff circuit is allocated to the 1st energy meter.

The simulated trend data are also recorded, so that the trend data of a real site would be falsified!

Sync pulses are not influenced by this: if the tariff circuit is set to "external synchronization", the internal sync pulse is generated only after the configured timeout, otherwise it is generated internally immediately after the configured period duration has expired, as in normal operation.

In the Preferences⁹⁰ you can choose from two simulation modes:

Without physical output switching

Outputs are not actually switched, but are only displayed in **emPower** as if they had been switched. The simulated current power decreases with a switched off output by the power assigned to the output. If LIOBs are connected, the outputs are maintained constant in their fallback state⁶².

With physical output switching

Outputs are actually switched as shown in **emPower**; if loads are configured on non-existent outputs, these are assumed to be OFF.

Attention: If devices are already connected here, it would probably be better to select the mode "Without physical output switching"!

When online simulation is activated, a *tooltip* in the *Simul* status display shows in which mode the simulation is running.

8 System requirements

emPower uses a platform-independent development concept and can therefore be used on numerous systems.

The development as well as the complete test scope are covered for Microsoft Windows platforms. **emPower** can be used on the following 64-bit Windows operating systems:

- Windows 7
- Windows 8.1
- Windows 10

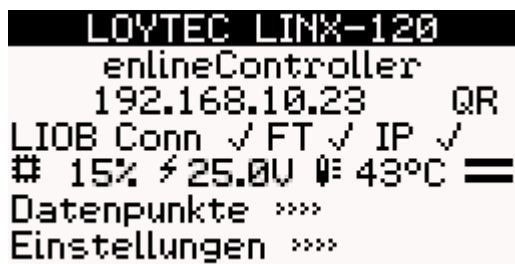
emPower also operates under

- Linux
- Mac OS X

9 Controller Operation

You can also call up data on the running operation directly on the **emPower** controller via the display.

In the basic state you will see the following display:



```
LOYTEC LINX-120
enlineController
192.168.10.23   QR
LIOB Conn ✓ FT ✓ IP ✓
# 15% / 25.0V @ 43°C =
Datenpunkte >>>
Einstellungen >>>
```

1st line: Device type

2nd line: Device name (freely selectable)

3rd line: IP address of the **emPower** controller / QR command to show the IP address as QR code on the display

4th line: Status of the buses LIOB Connect, LIOB FT and LIOB IP (OK if checked, error if

exclamation mark in a triangle).

5th line: Processor load; operating voltage; system temperature

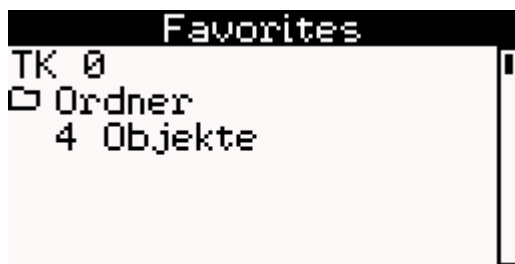
6th line: Data Points menu

7th line: Preferences menu

Use the push/turn button to navigate to the Data Points menu by turning it and press the button:



Now select the 1st menu item "Favorites":



You can now select one of the tariff circuits 0 to 9 on which you would like more detailed information:



- P_current: Current Power
- P_sum: total power
- t_per: current period runtime
- P_perEnd: Power of the previous period

10 Controller Installation

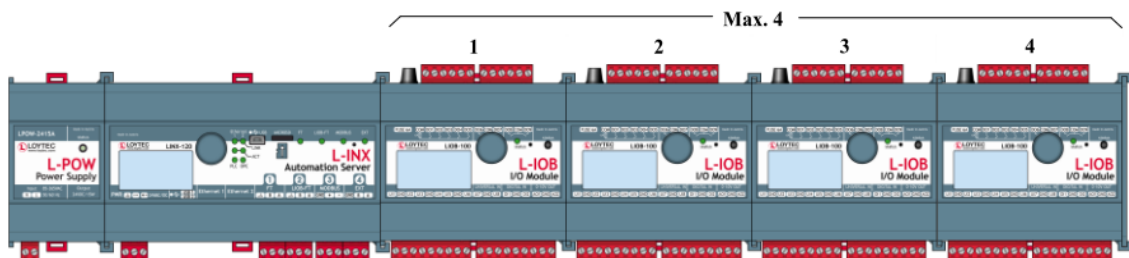
The following information is not intended to be complete installation instructions, but is to be understood only as supplementary information for the electrically skilled person who must competently carry out the installation.

The respective switching capacity and the maximum power of directly switched consumers is indicated for the **outputs**. A coupling relay or contactor must be used to switch higher loads. The output on the device used for this purpose must be protected by a quenching circuit (varistor, RC element, etc.).

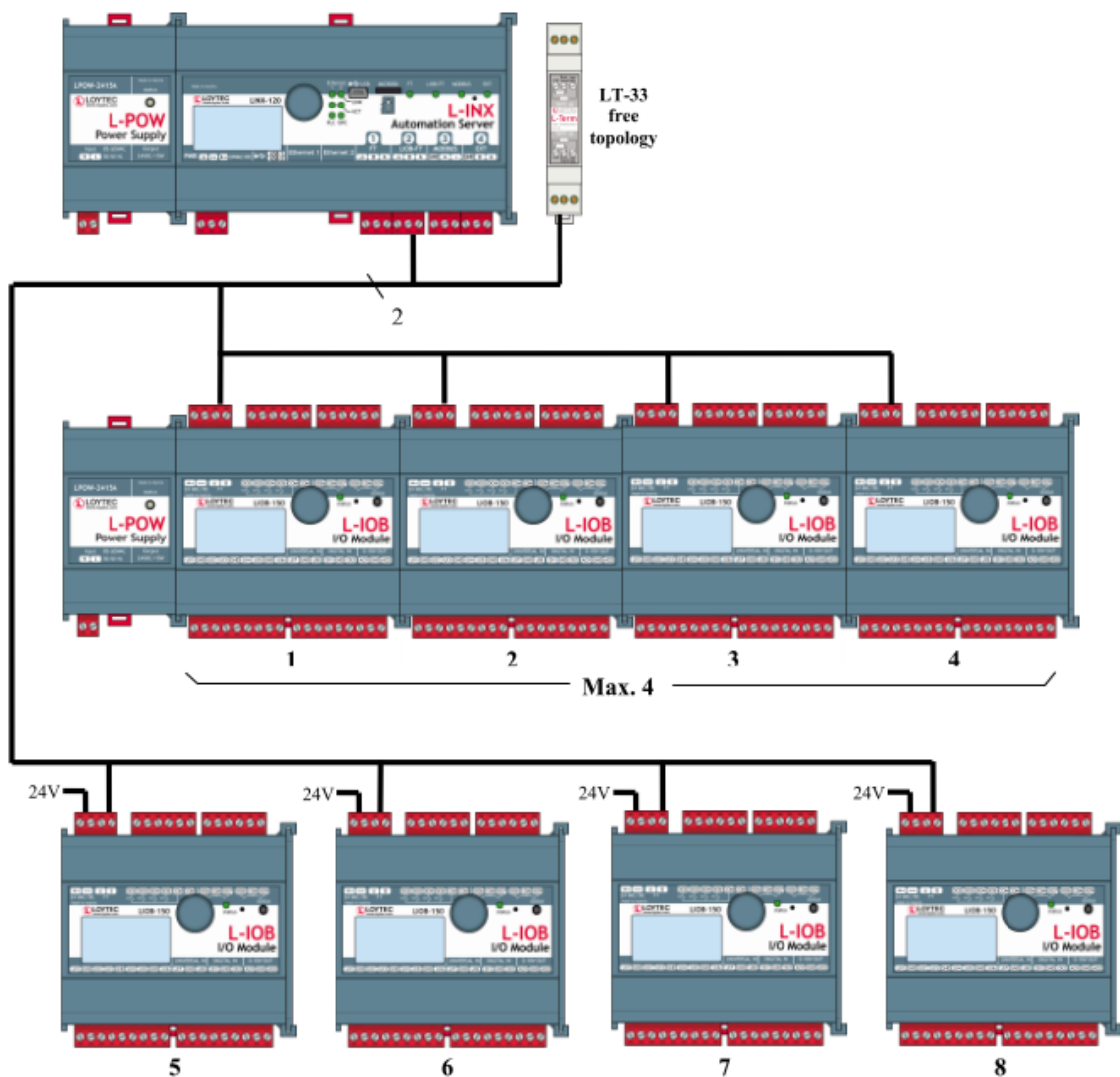
Devices

The following devices are available:

- **LINX emPower Controller:** This device, also known as a *LINX Automation Server*, forms the heart of the system. It is parametrized via the PC software **emPower** and then controls the entire site completely independently of the PC.
- **LPOW-2415A:** 24 V power supply which is connected on the left side of the **emPower** controller or of LIOBs for power supply
- **LIOB-100:** I/O module with LIOB Connect Bus connection, 6 inputs for pulse counters (UI1 to UI4, DI1 and DI2), 4 universal inputs (UI5 to UI8), 5 relay outputs (DO1 to DO5, each max. 6 A, 600 W ohmic at 250 VAC) and 4 triac outputs (DO6 to DO9, each max. 0.5 A, no coupling relays).
Up to 4 of these modules can be connected on the right side of the **emPower** controller and thus be supplied with power from the LPOW.

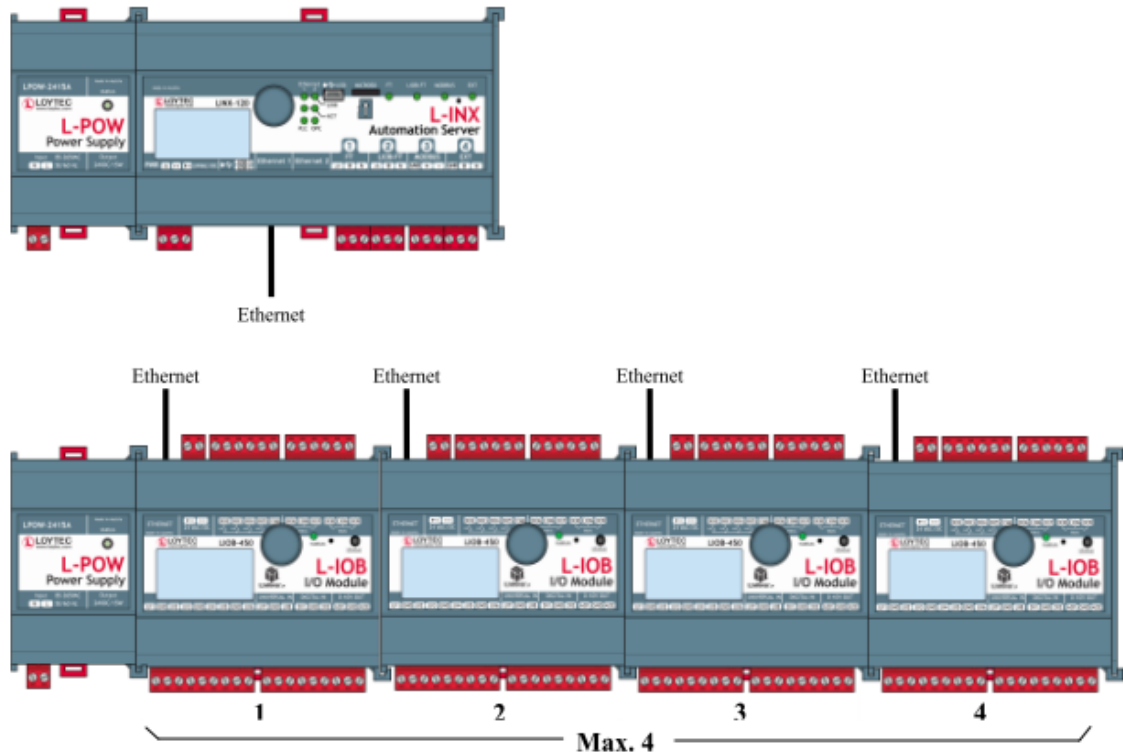


- **LIOB-150:** I/O module with FT bus connection, 6 inputs for pulse counters (UI1 to UI4, DI1 and DI2), 4 universal inputs (UI5 to UI8), 4 relay outputs (DO2 to DO5, each max. 6 A, 600 W ohmic at 250 VAC) and 4 triac outputs (DO6 to DO9, each max. 0.5 A, no coupling relays).

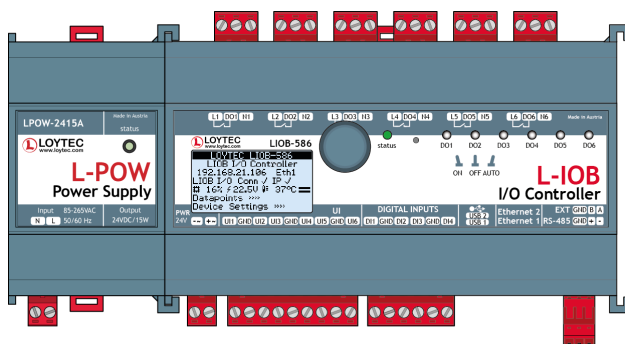


- LIOB-450:** I/O module with IP bus connection, 6 inputs for pulse counters (UI1 to UI4, DI1 and DI2), 4 universal inputs (UI5 to UI8), 4 relay outputs (DO2 to DO5, each max. 6 A, 600 W ohmic at 250 VAC) and 4 triac outputs (DO6 to DO9, each max. 0.5 A, no coupling relays)

Up to 4 of these modules can be powered by one LPOW and up to 4 modules can be connected to the emPower controller via Ethernet.



- LIOB-586 emPower Controller:** This device, also known as an *LIOB Controller*, is the heart of a small system that can be expanded at most by one LIOB-450. It is parametrized via the PC software **emPower** and then controls the entire site completely independently of the PC. The controller has 8 inputs for pulse counters (UI1 to UI4, DI1 to DI4), 2 universal inputs (UI5 and UI6) and 6 relay outputs (DO1 to DO6, each max. 16 A (inrush current up to 80 A), 2000 W ohmic at 250 VAC).



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Printed: December 2021 in Wien

Publisher

embyt GmbH

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